

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**February 24-25, 2016**

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Agenda Item

Razorback Sucker Research Update

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Action Requested

Information item only; we will answer questions but no action is requested.

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Presenter

Mark McKinstry, Ph.D., Biological Scientist, Bureau of Reclamation, Upper Colorado Region

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Previous Action Taken

This project is a requirement of the 2007 (USFWS 2007, Appendix A, p. 74) Coordinated Reservoir Operations Biological Opinion.

U.S. Fish and Wildlife Service. 2007. Final biological opinion for the proposed adoption of Colorado River interim guidelines for lower basin shortages and coordinated operations for Lake Powell and Lake Mead. USFWS, Phoenix, Arizona. December 12, 2007. Available at: <http://www.usbr.gov/lc/region/programs/strategies/documents.html#bo>.

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Relevant Science

The following describes the relevant research or monitoring on this subject:

Kegerries, R., B. Albrecht, R. Rogers, E. Gilbert, W. H. Brandenburg, A. L. Barkalow, S. P. Platania, M. McKinstry, B. Healy, J. Stolberg, Emily Omana Smith, Clay Nelson, and H. Mohn. 2015b. Razorback Sucker *Xyrauchen texanus* research and monitoring in the Colorado River inflow area of Lake Mead and the lower Grand Canyon, Arizona and Nevada. Final report prepared by BIO-WEST, Inc., for the U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, Utah.

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Summary of Presentation and Background Information

Since the mid 1990s, Razorback Suckers, *Xyrauchen texanus*, were considered extirpated from Grand Canyon. In 2010, the U.S. Bureau of Reclamation, Upper Colorado Region (Reclamation), and the Lower Colorado River Multi-Species Conservation Program initiated a joint project to evaluate Razorback Sucker use of the Colorado River Inflow Area of Lake Mead (CRI). That project was based on a Biological Opinion from the U.S. Fish and Wildlife Service (USFWS) that recommended Reclamation begin a project to "...examine the potential habitat in the lower Grand Canyon for the species, and institute an augmentation program in collaboration with USFWS, if appropriate" (USFWS 2007, Appendix A, p. 74). The "the lower Grand Canyon" was subsequently defined as Grand Canyon from Lava Falls rapid downstream to include the inflow portion in Lake Mead as well as several miles of Lake habitat (USFWS decision in 2008).

Initial surveys at the CRI showed that Razorback Sucker were using the area, including the lower few miles of river; and were spawning, with recently recruited fish identified. In 2014, Reclamation, in cooperation with National Park Service (NPS) and the contractors BioWest and American Southwest Ichthyological Researchers, began a project to further document Razorback Sucker use of Lower Grand Canyon. Nine sonic-tagged adult Razorbacks were released at Lava Falls with the goal that they would lead to concentrations (e.g., spawning areas) of other fish. A project was also begun to randomly sample for small fish and larvae. These techniques have worked in other areas of the Basin to identify spawning and habitat use by this fish species.

More than 40 sites were identified through random sampling for larval and small-fish surveys. Subsequent sampling during seven sampling trips in 2014 and 2015 each documented spawning by Razorback Suckers at all of the sample sites, indicating documentation that Razorback Suckers were using the area and were spawning from late February until June.

Lake Mead and the CRI are the only locations in the entire Colorado River Basin where Razorback Suckers are naturally spawning, recruiting, and maintaining a natural population without stocking.

The sampling has also identified extensive spawning by Humpback Chub, *Gila cypha*, and other native suckers including Flannelmouth, *Catostomus latipinnis*, and Bluehead, *C. discobolus*, suckers. In fact, the fish community in lower Grand Canyon is dominated by native fish, which comprise over 90% of the catch in larval and small-bodied samples. The composition of native fish in Grand Canyon is much higher than any other major river in the Colorado River Basin, suggesting that Grand Canyon serves as a native-fish stronghold. Some biologists have suggested that the proportion of native fish in Grand Canyon has shifted in the last few years, possibly as a result of warming water or other conditions that give them an advantage over nonnative species.

This work is planned to continue in 2016, with all work funded directly from Reclamation to NPS and contractors. At the conclusion of the 2016 field season, after the results are reported, Reclamation plans to convene another group of experts in Razorback Sucker ecology to identify what steps, both research and management, should be taken to benefit this species in the future.

# RAZORBACK SUCKER IN LOWER GRAND CANYON AND THE LAKE MEAD INFLOW

*Mark McKinstry, Brandon Albrecht, Ron Kegerries, Ron Rogers, Eliza Gilbert, W. Howard Brandenburg, Adam L. Barkalow, Steven P. Platania, Brian Healy, James Stolberg, Emily Omana Smith, Clay Nelson, and Harrison Mohn*

RECLAMATION

# Outline

- 1) Background on razorback sucker
- 2) Overview of work in Lake Mead – Bio-West, MSCP
- 3) Initial findings in Lower Grand Canyon



RECLAMATION

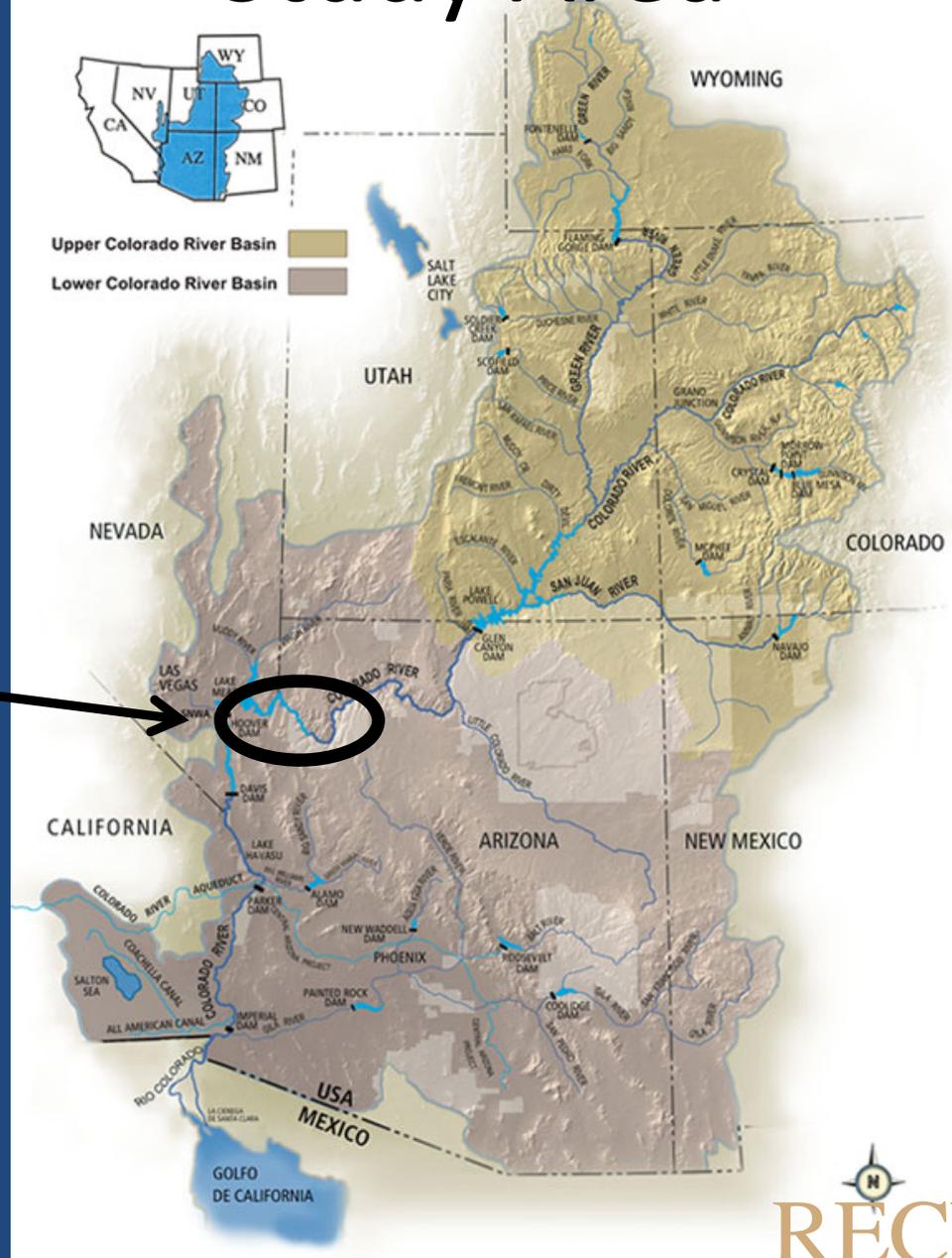
# Overview Razorback Sucker

- Listed ESA 1991
- Critical Habitat designated 1994
- Recovery plan 1998
- Recovery goals 2002
- Recovery Goals require two populations in upper Basin (Green River and Upper Colorado River OR San Juan River), and two populations in the lower Basin (not specified where)



RECLAMATION

# Study Area



Lower Grand Canyon  
and Lake Mead Inflow

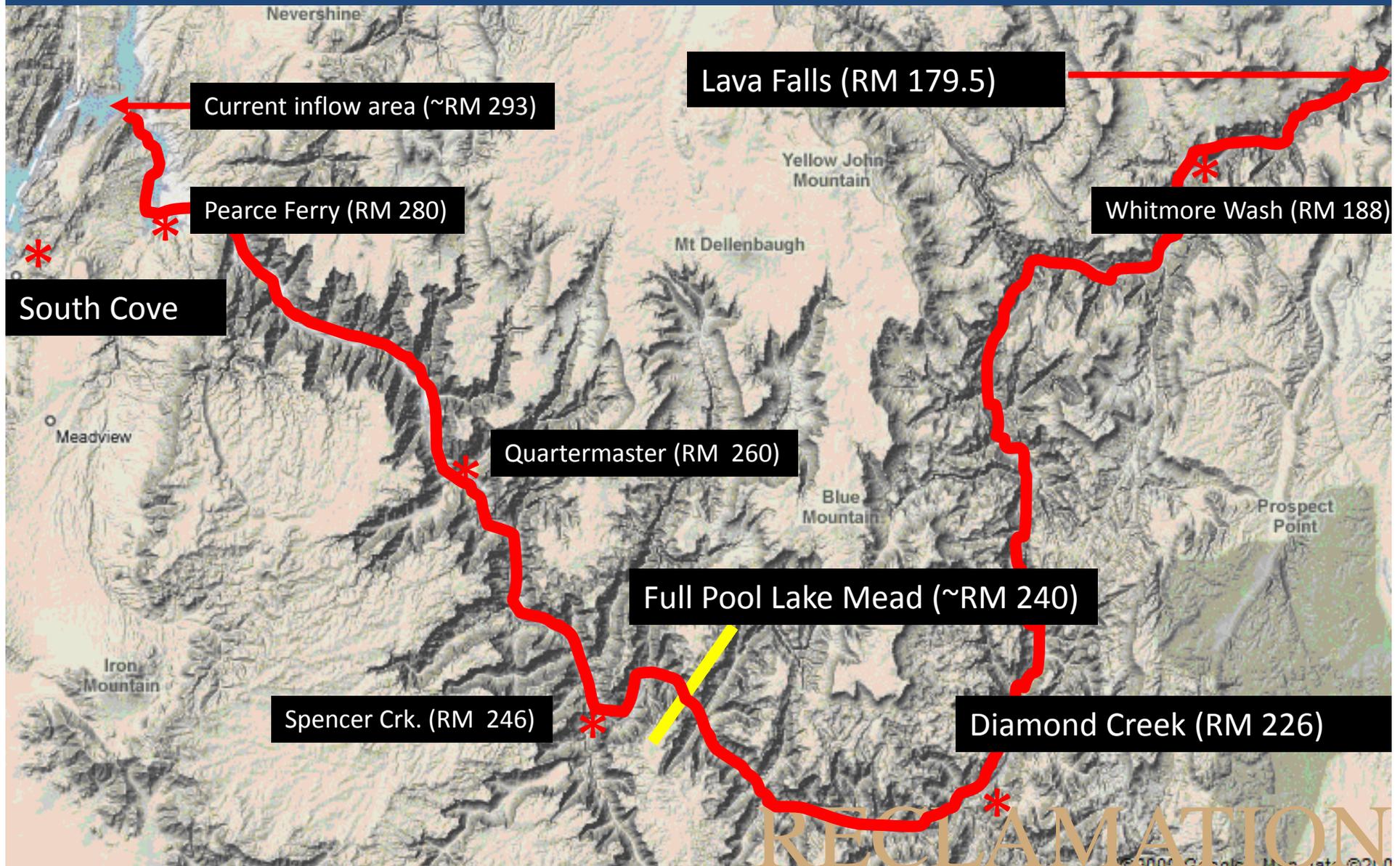


# Review of Biological Opinions for RBS in Grand Canyon

- **1995 BiOp (Reclamation, Operation of Glen Canyon Dam)**— “sponsor a workshop, develop a management plan for RBS in Grand Canyon.”
- **2006 BiOp (NPS-Colorado River Management Plan)**— “...conduct surveys in the Lower Gorge-Lake Mead interface for spawning razorback suckers...”
- **2008 BiOp (Reclamation, Shortages and Coordinated Reservoir Operations)**— “...examine the potential habitat in the **lower Grand Canyon** for RBS and institute an augmentation program in collaboration with FWS, if appropriate.”

RECLAMATION

# What is Lower Grand Canyon?



# Historic RBS Records From Grand Canyon

- 10 records for RBS in Grand Canyon
- 1944, 1963, 1978, 1984, 1989, 1990 (1-F, 2-M)
- All adults
- Potential larvae at LCR and Havasu Creek??
- All found above RM 108
- Most captures near mouths of tributaries—Paria River, LCR, Bright Angel Creek, Havasu
- Larvae captured at Inflow Area to Lake Mead
- Was considered extirpated
- Critical habitat is Grand Canyon and Lake Mead

RECLAMATION

# Overview of RBS in Lake Mead

- 20<sup>th</sup> year of study (1996-2016)
- 119<sup>rk4</sup> sonic-tagged individuals released in Lake Mead
- 1,198 total captures
- Nearly 700 unique individuals—all wild fish
- 4 areas of known, established reproduction in Lake Mead (Las Vegas Bay, Echo Bay, Overton Arm, Colorado River Inflow)
- Over 500 individuals aged, 2-36 years old
- 2014<sup>rk1</sup><sup>rk2</sup> lake-wide population estimate 590 (CI 423-873)<sup>rk3</sup>
- Only documented population of recruiting fish in Colorado River Basin

## Slide 8

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- rk1** We didn't have a 2015 estimate because recapture rate was too low.  
rkegerries, 2/24/2016
- rk2** Consider replacing it with survival rate of approximately 80%  
rkegerries, 2/24/2016
- rk3** If you wanted to add the numbers of juvenile fish captured.....nearly 100 wild juveniles (<450 mm) captured  
rkegerries, 2/24/2016
- rk4** Not all of these are currently active and do not include the 29 fish released in the LGC from 2013-2016.  
rkegerries, 2/24/2016

# Science Panel (2010)

- Chuck McAda
- Gordon Mueller
- Dale Ryden
- Melissa Trammel
- Rich Valdez



# Recommendations For the Future (Science Panel Review of RBS in Lower Grand Canyon)

- Continue work on RBS at CRI and Lake Mead
- Do not force augmentation for political reasons
- Use translocated wild fish (wild larvae from lake pop'n) if augmentation is done
- Integrate all information on fish and foodbase in LGC and CRI
- Expand fish surveys in LGC, esp. for RBS
  - Larval fish study
- Potentially sonic-tag large adult RBS and release in Lower Grand Canyon
  - Look at habitat use, movements, other fish

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# RBS Records From Colorado River Inflow Area of Lake Mead 2000-2012

- 2000 and 2001—larvae found
- 2008—adult in Gregg Basin (near CRI)
- 2010—3 untagged (wild) adults captured, 7 larvae
- 2011—7 untagged (wild) adults, 8 recaps, 65 larvae
- 2012—13 untagged (wild) adults, 13 recaps, 12 Larvae, 2 fish moved upstream to Quartermaster or beyond, 3 fish moved up past Pearce Ferry, 1 wild fish (male, ripe) captured at Spencer Creek

Data courtesy Brandon Albrecht and Ron Kegerries, Bio-West

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# Colorado River inflow (CRI)

2012 spawning areas

Devils Cove

Sunfish Cove

Crappie Cove

2011 spawning area

2010 spawning area

"Lunch Cove"

North Bay

2015 spawning areas

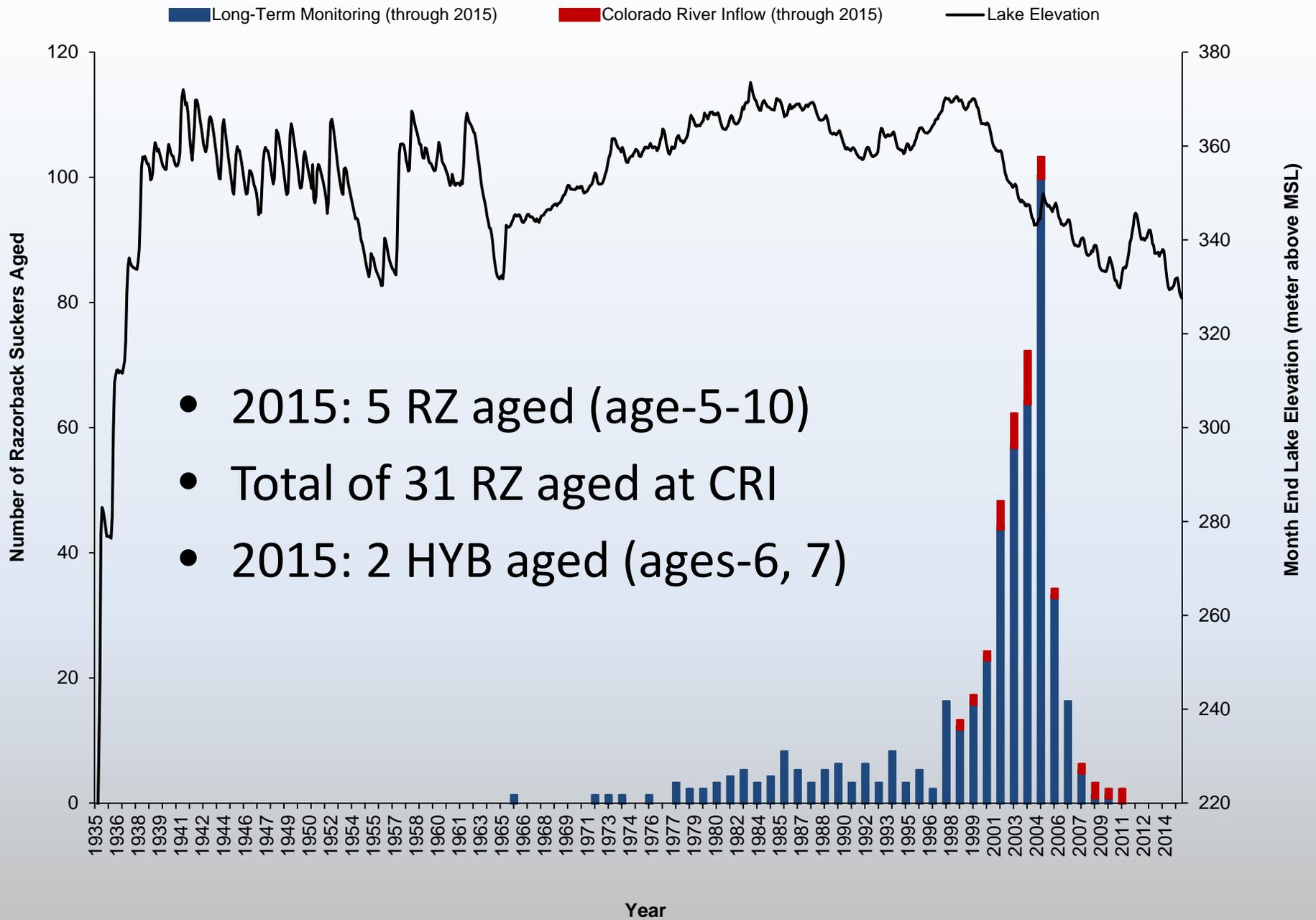
© 2014 Google

Google

1994

Imagery Date: 4/7/2014 lat 36.131849° lon -114.099804° elev 1126 ft eye alt



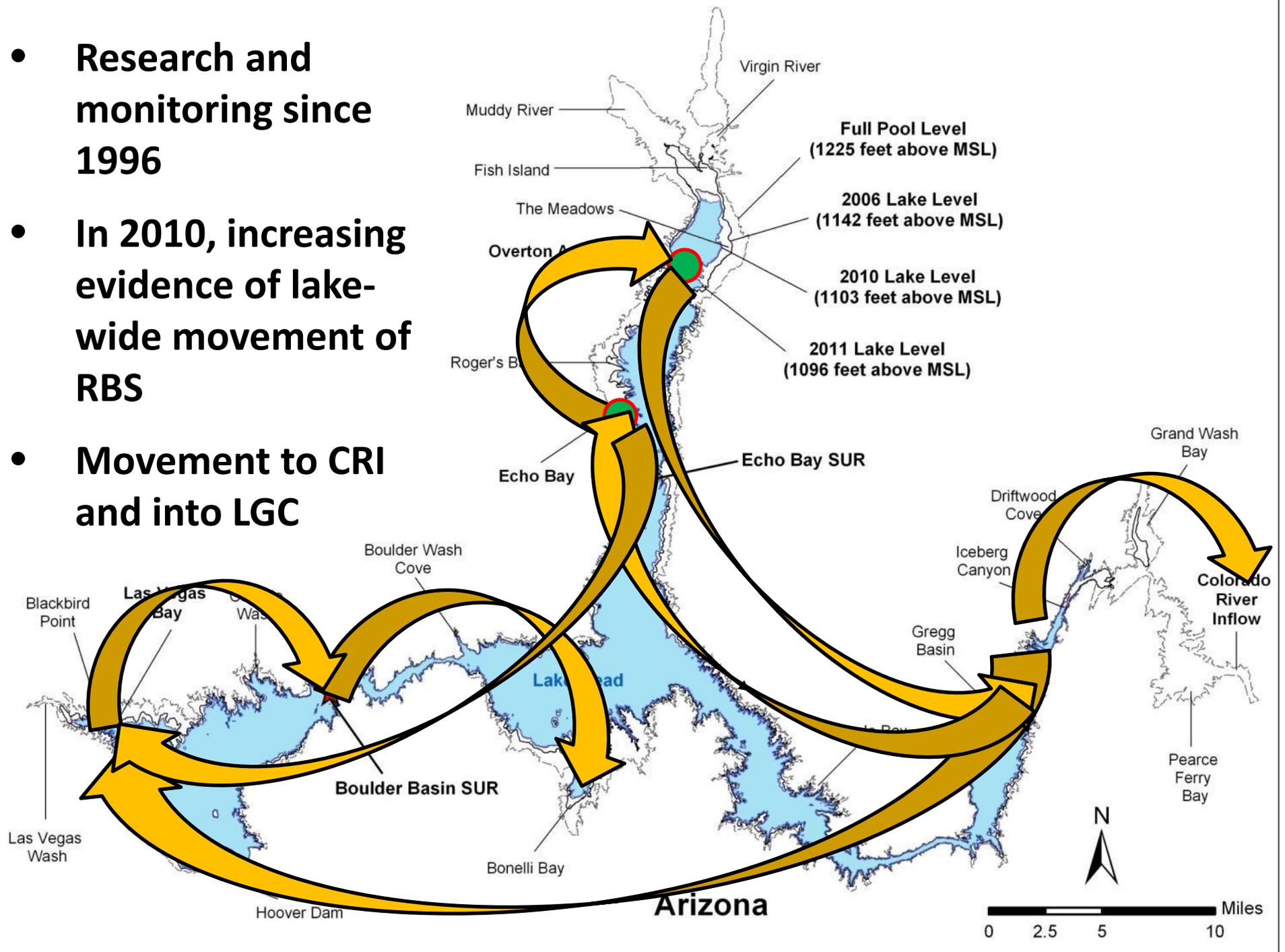


# Objectives 2014-2015

- Continue monitoring the CRI
  - Same methods since 2010
- Determine RBS presence and habitat use in LGC
  - Larval and small-bodied fish community sampling within the LGC
    - Assess reproduction, spawning, and distribution
  - LGC sonic telemetry
- Explore linkages between Lake Mead and LGC



- Research and monitoring since 1996
- In 2010, increasing evidence of lake-wide movement of RBS
- Movement to CRI and into LGC



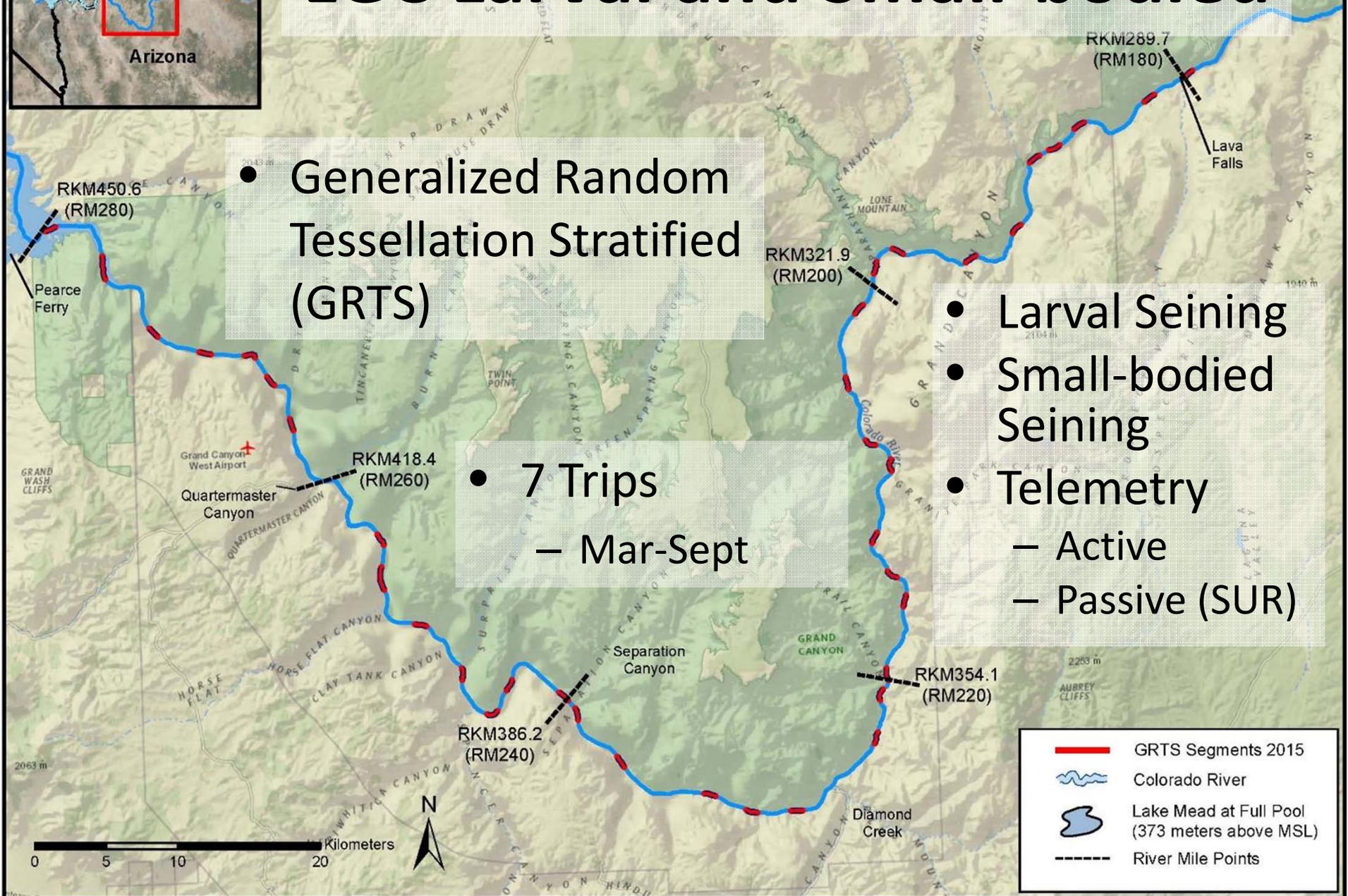
# LGC Larval and Small-bodied



- Generalized Random Tessellation Stratified (GRTS)

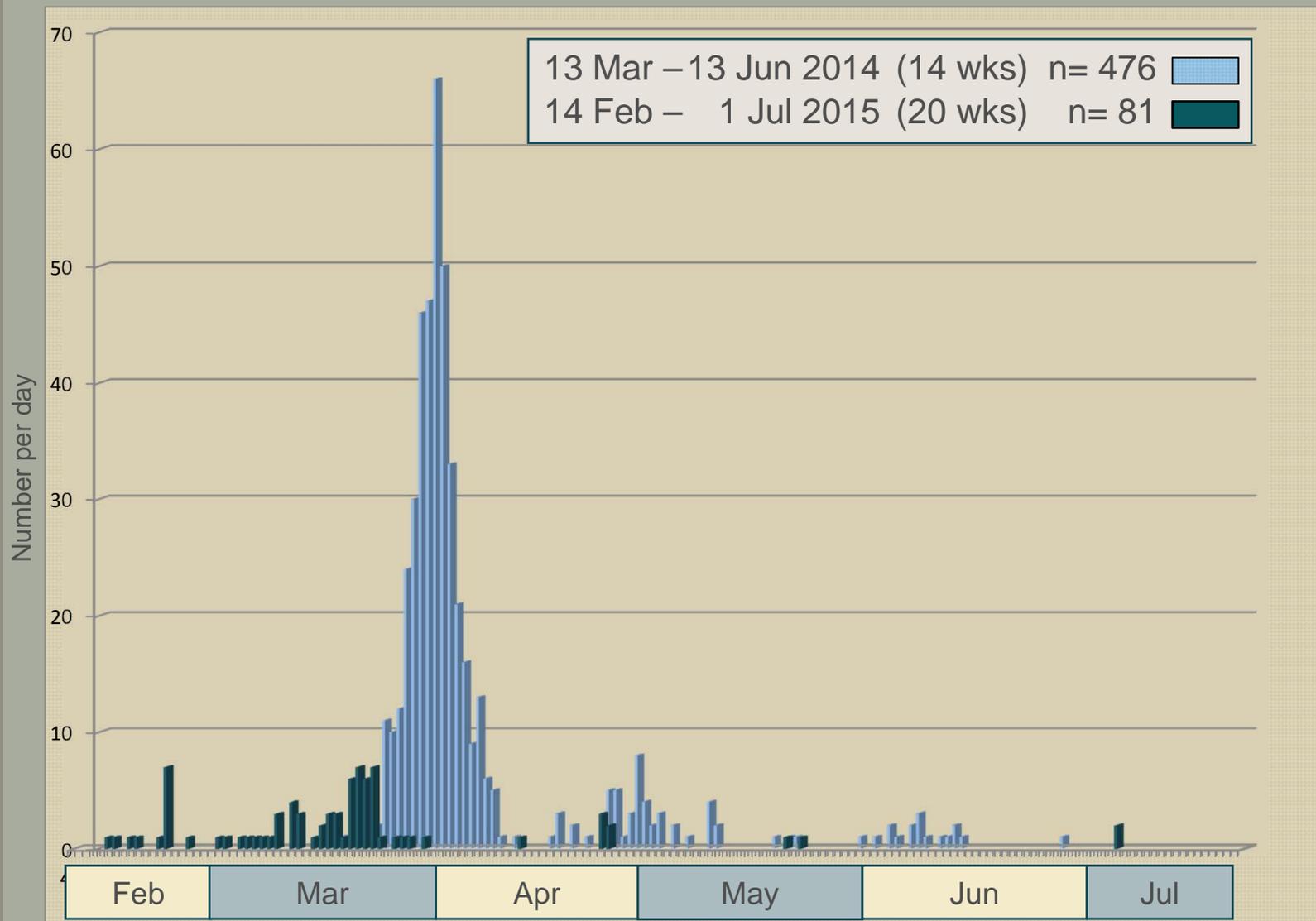
- 7 Trips  
– Mar-Sept

- Larval Seining
- Small-bodied Seining
- Telemetry
  - Active
  - Passive (SUR)





# Razorback Sucker Back-calculated Spawning

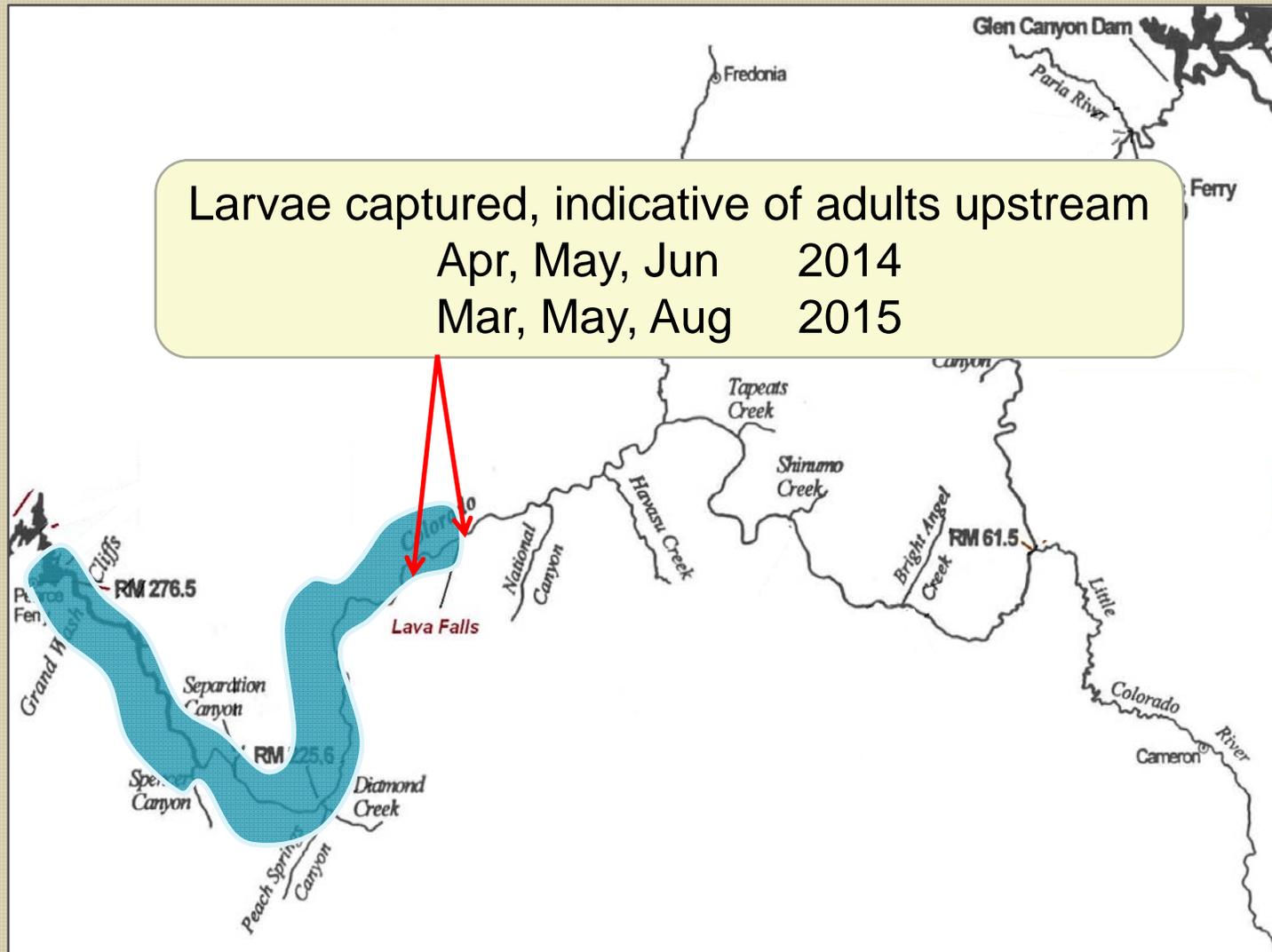


Formula: Bestgen 2002, 2011 (Green River)

Temperature Dependent

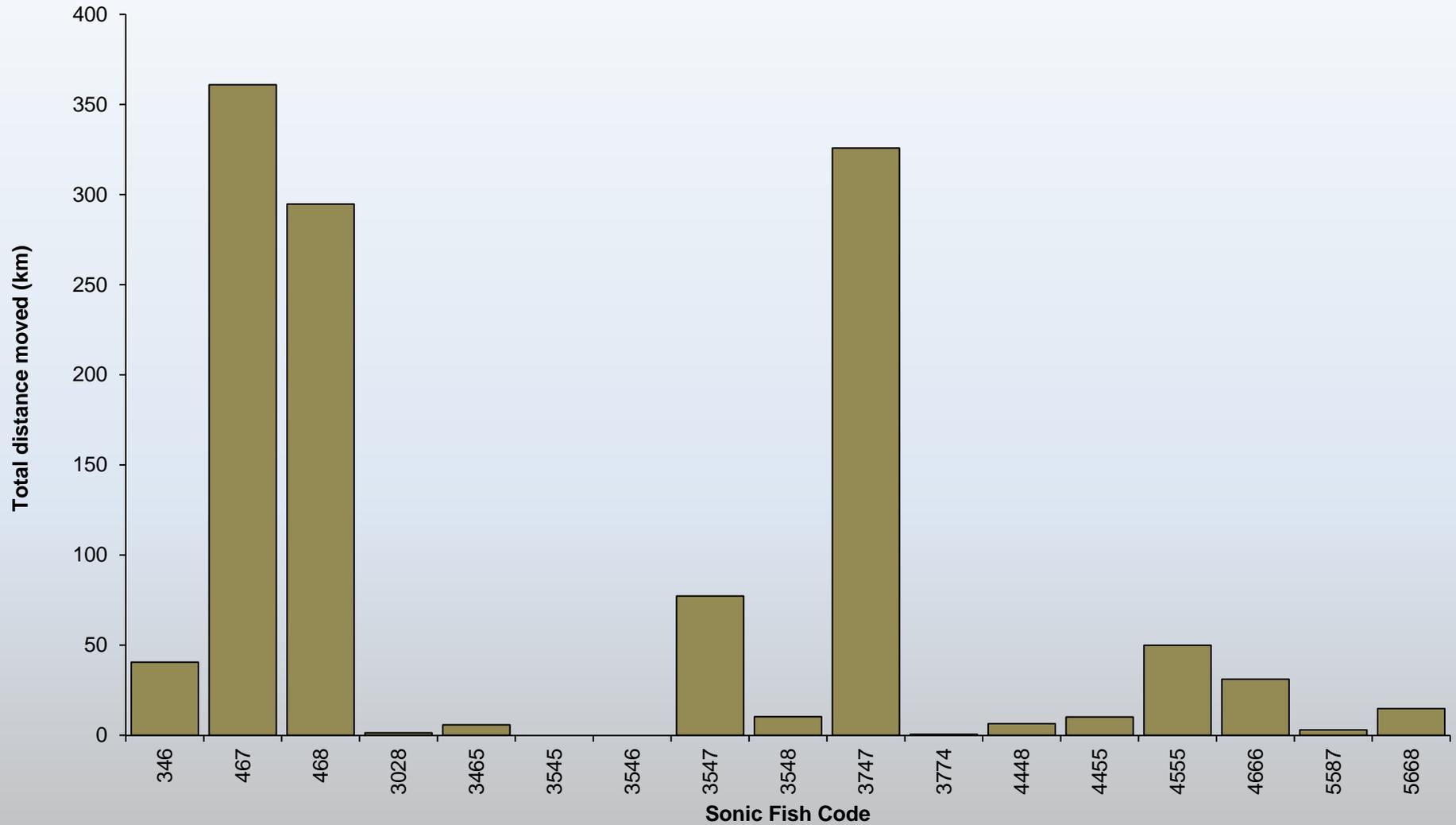
# Upstream Spawning

Larvae captured, indicative of adults upstream  
Apr, May, Jun 2014  
Mar, May, Aug 2015

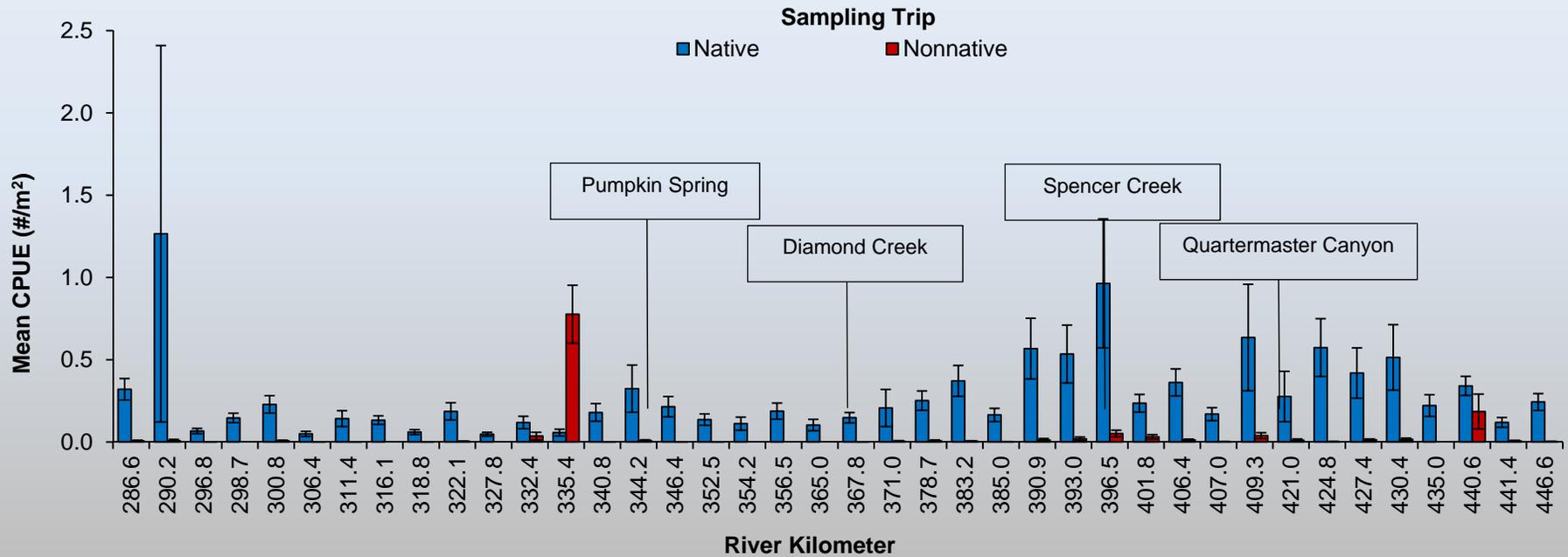
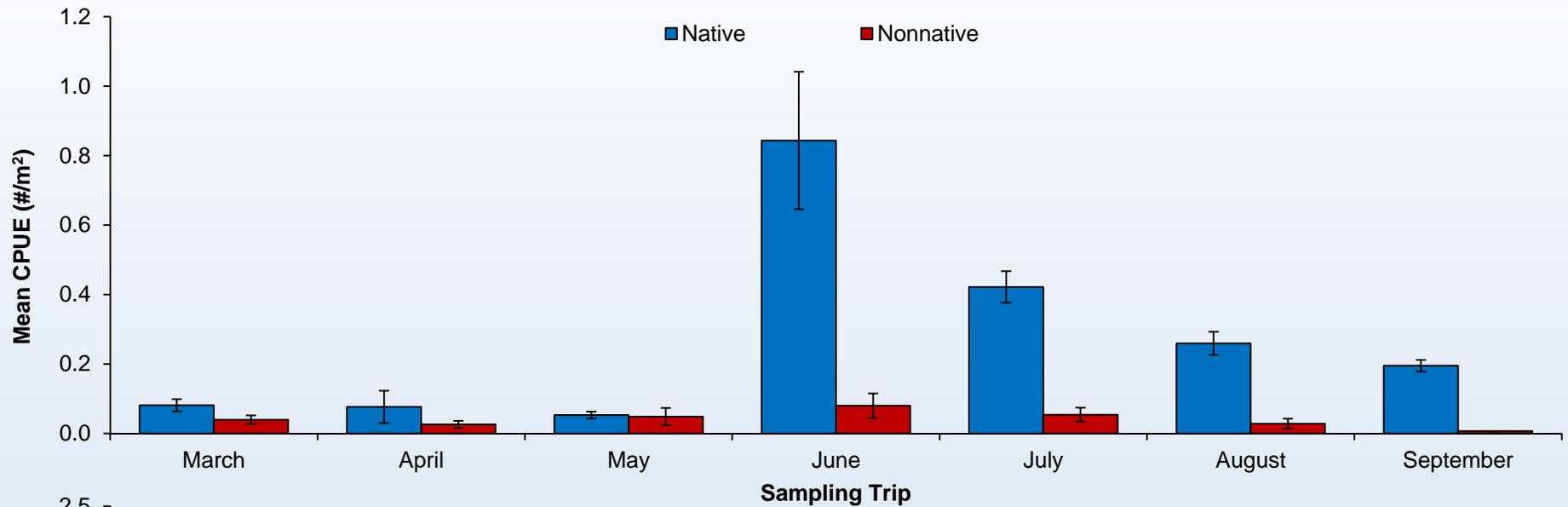


Graphic modified from McKinstry and Valdez 2012 presentation

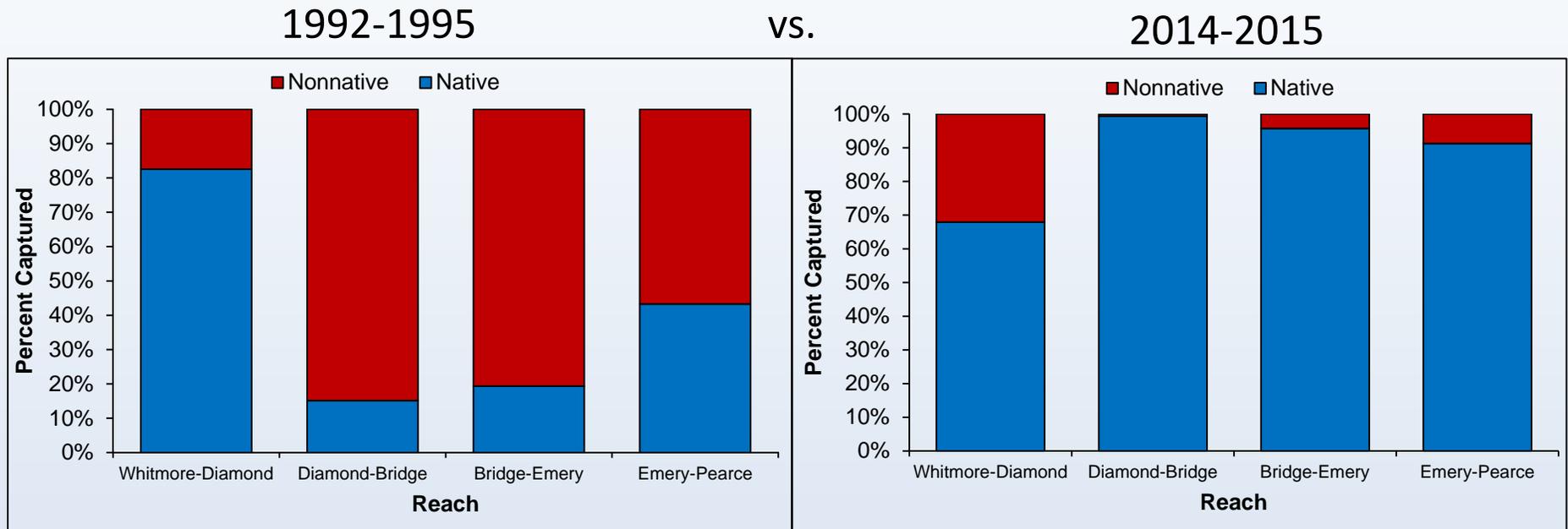
# Distance Moved (CRI and LGC)



# LGC Small-Bodied Sampling



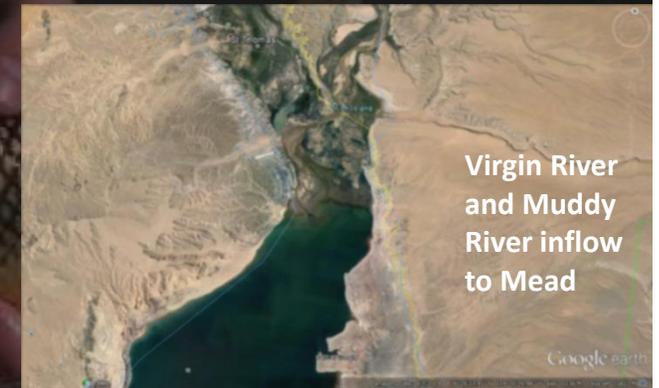
# Historical perspectives are important



*Valdez et al. (1995)*

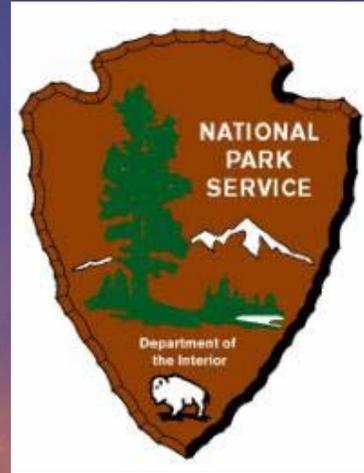
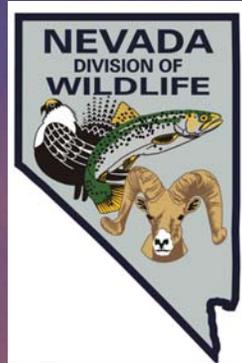
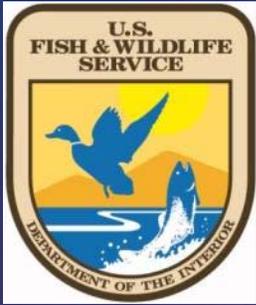
*Albrecht et al (2014) and Kegerries et al. (2015)*

- ~20 years of change
- Strange story of positive news for native fishes!
- Looking forward to future findings regarding Razorback Sucker, Humpback Chub, and native fishes of the Lower Grand Canyon!!



**Inflow  
habitats  
appear to be  
important  
for native  
fishes!  
Questions?**

# Acknowledgements



Lake Mead Workgroup