Use of remote PIT scanners to monitor razorback sucker in Lake Mohave

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MARSH & ASSOCIATES, LLC

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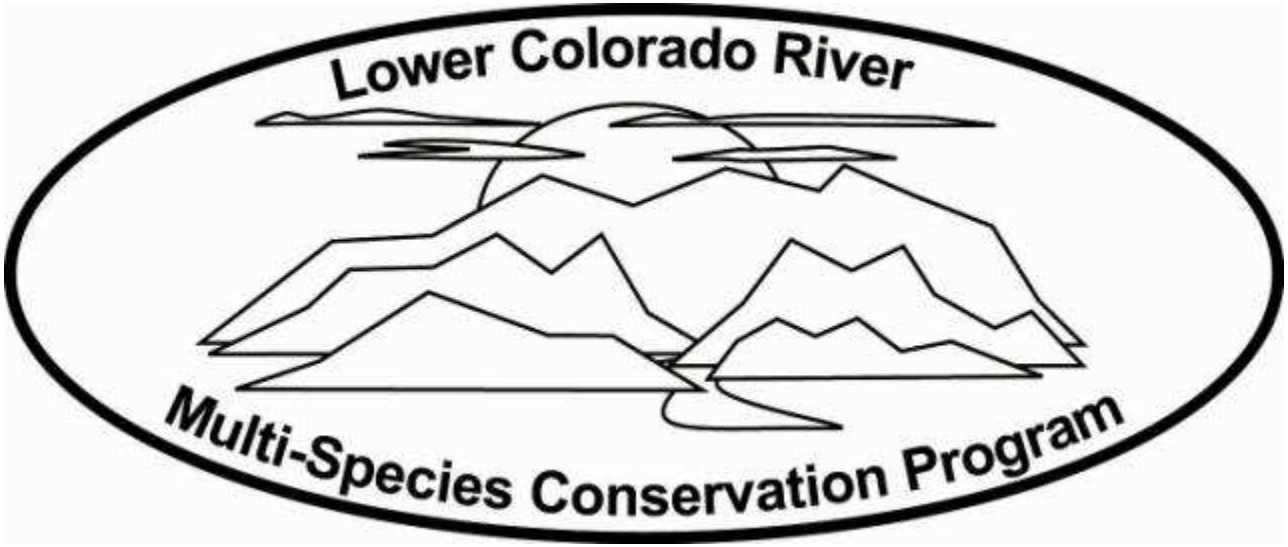
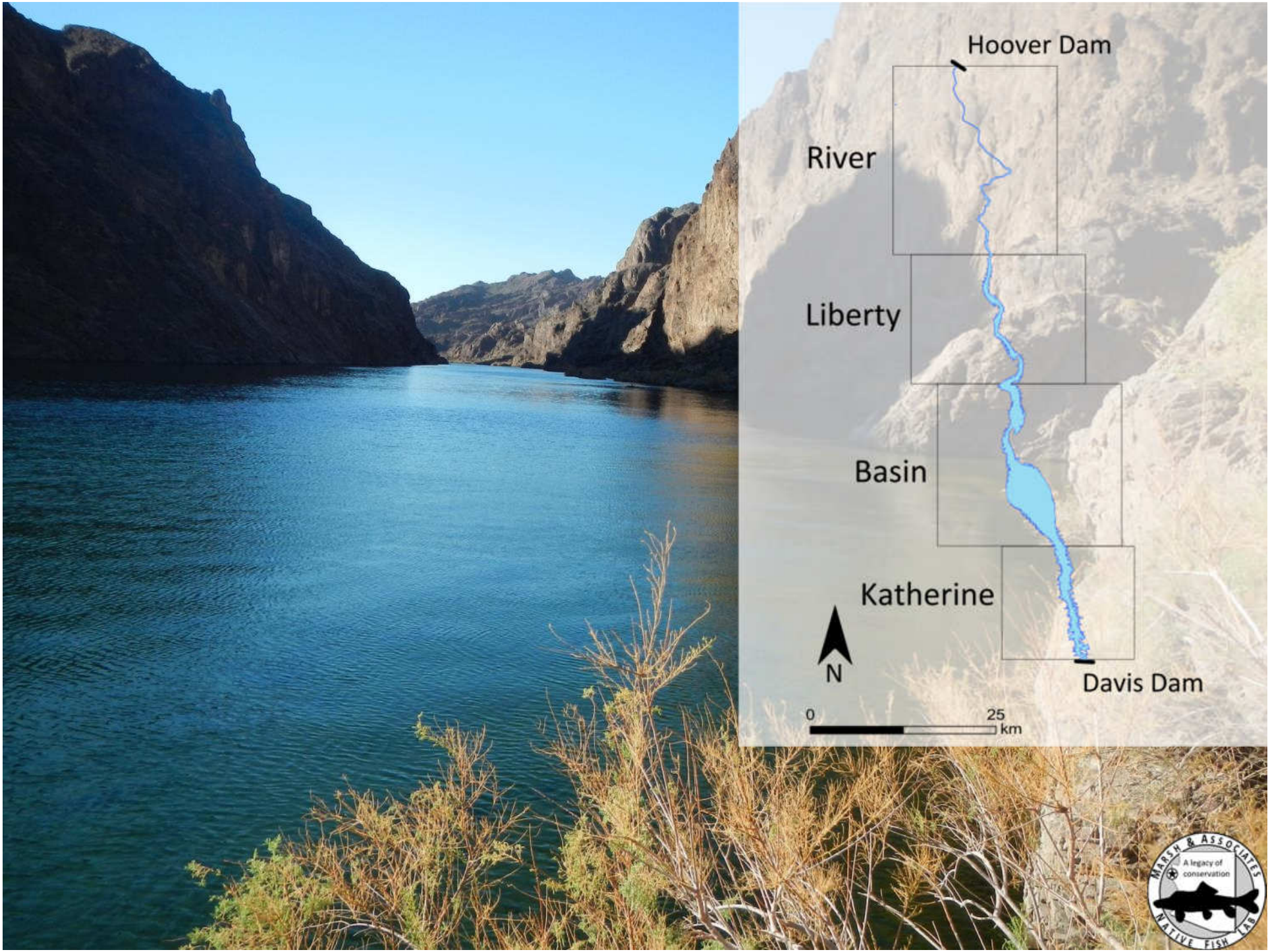


Background

- The largest, most genetically diverse remaining population of razorback sucker is in Lake Mohave
- Monitored for more than 30 years, augmented by stocking for 20 years
- Two types of monitoring:
  - Routine monitoring (roundup)
  - Remote PIT scanning

Photos by: Abraham Karam


Hoover Dam
River
Liberty
Basin
Katherine
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25
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A legacy of conservation
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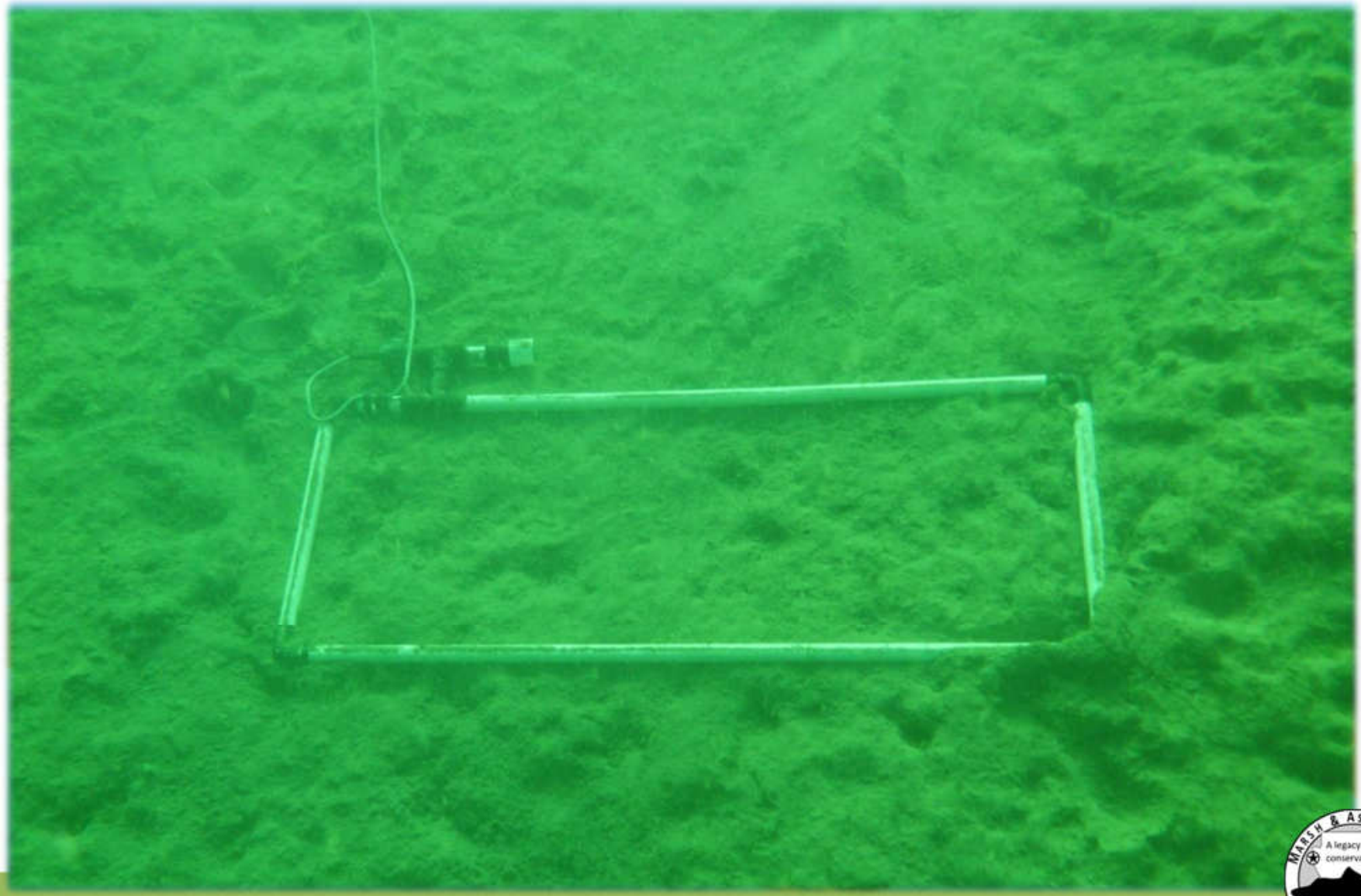
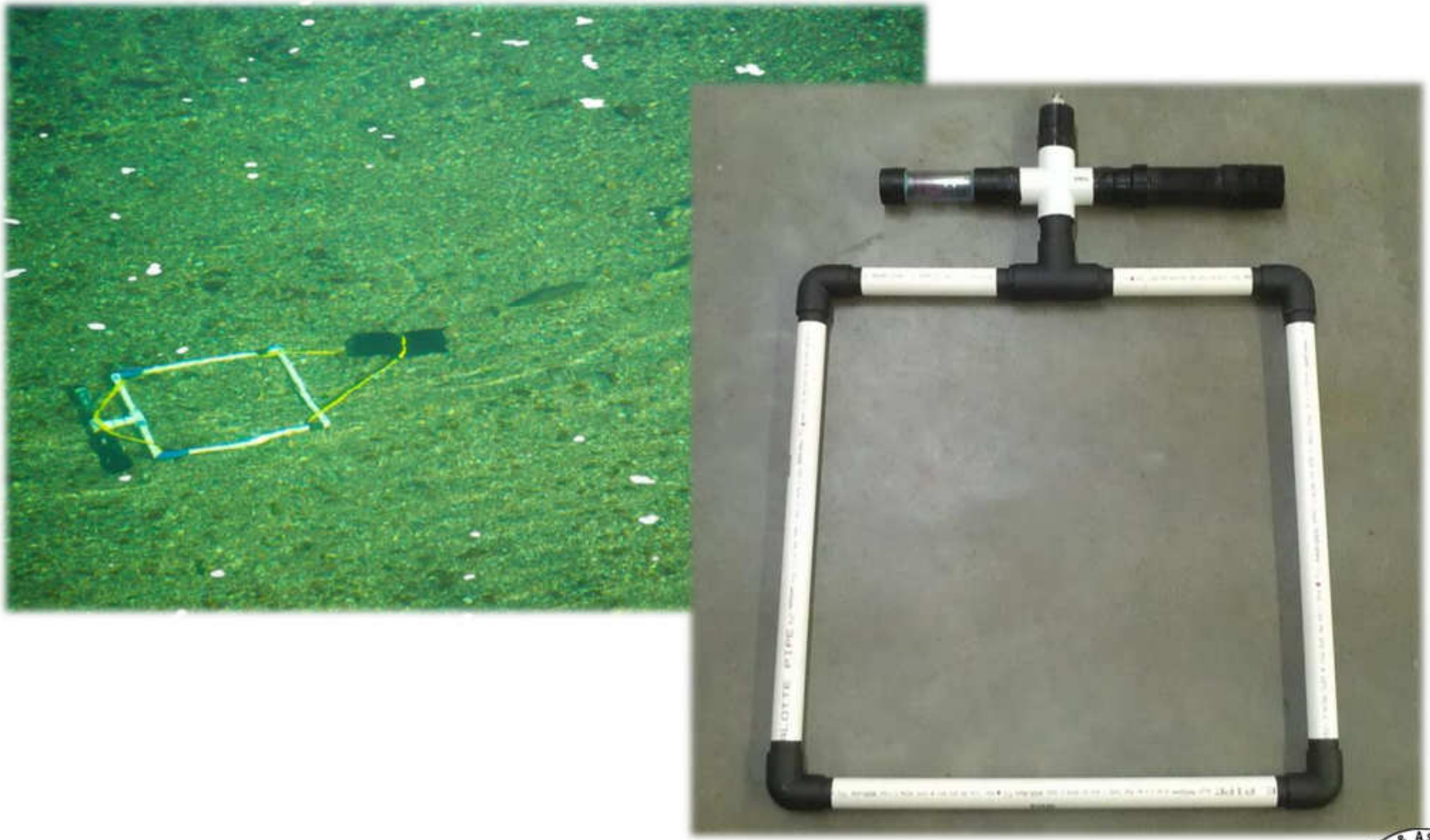
Shore-based PIT scanning units

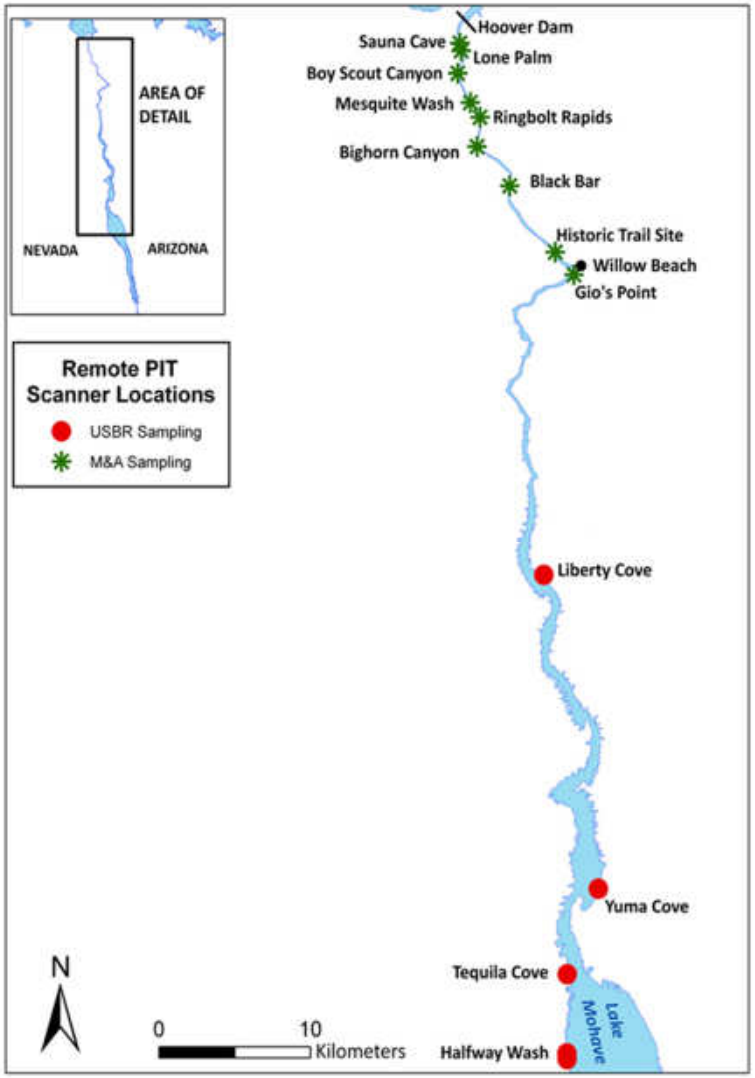


Submersible PIT scanning units



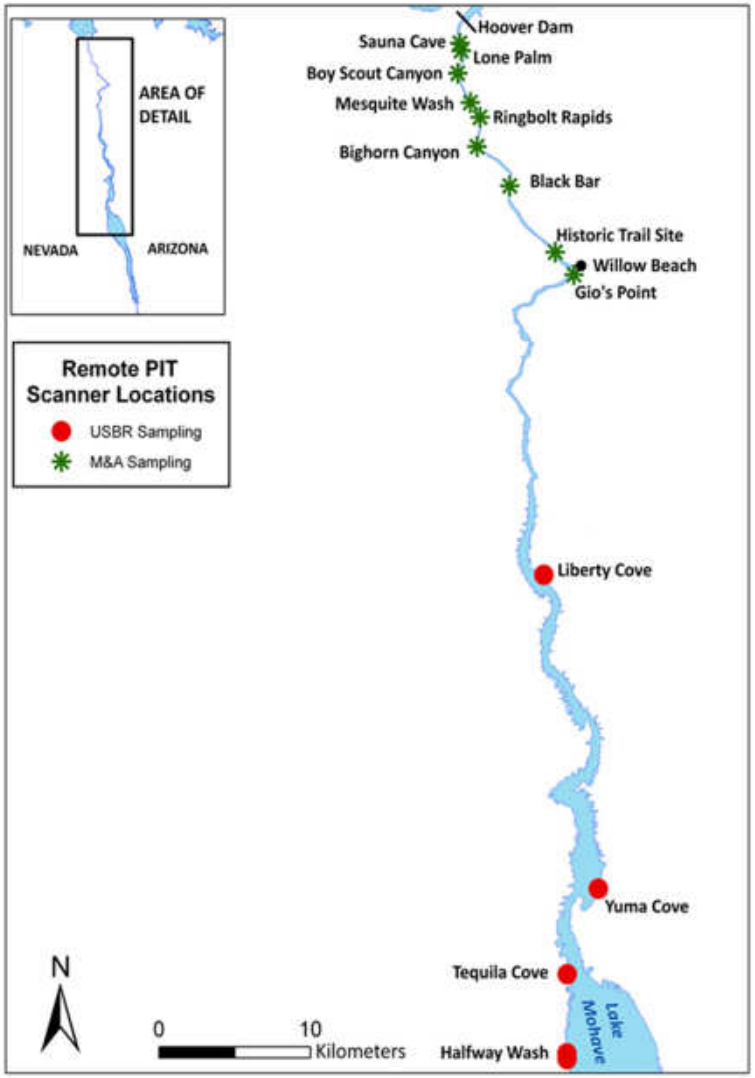
New Submersible Design

River Scanning



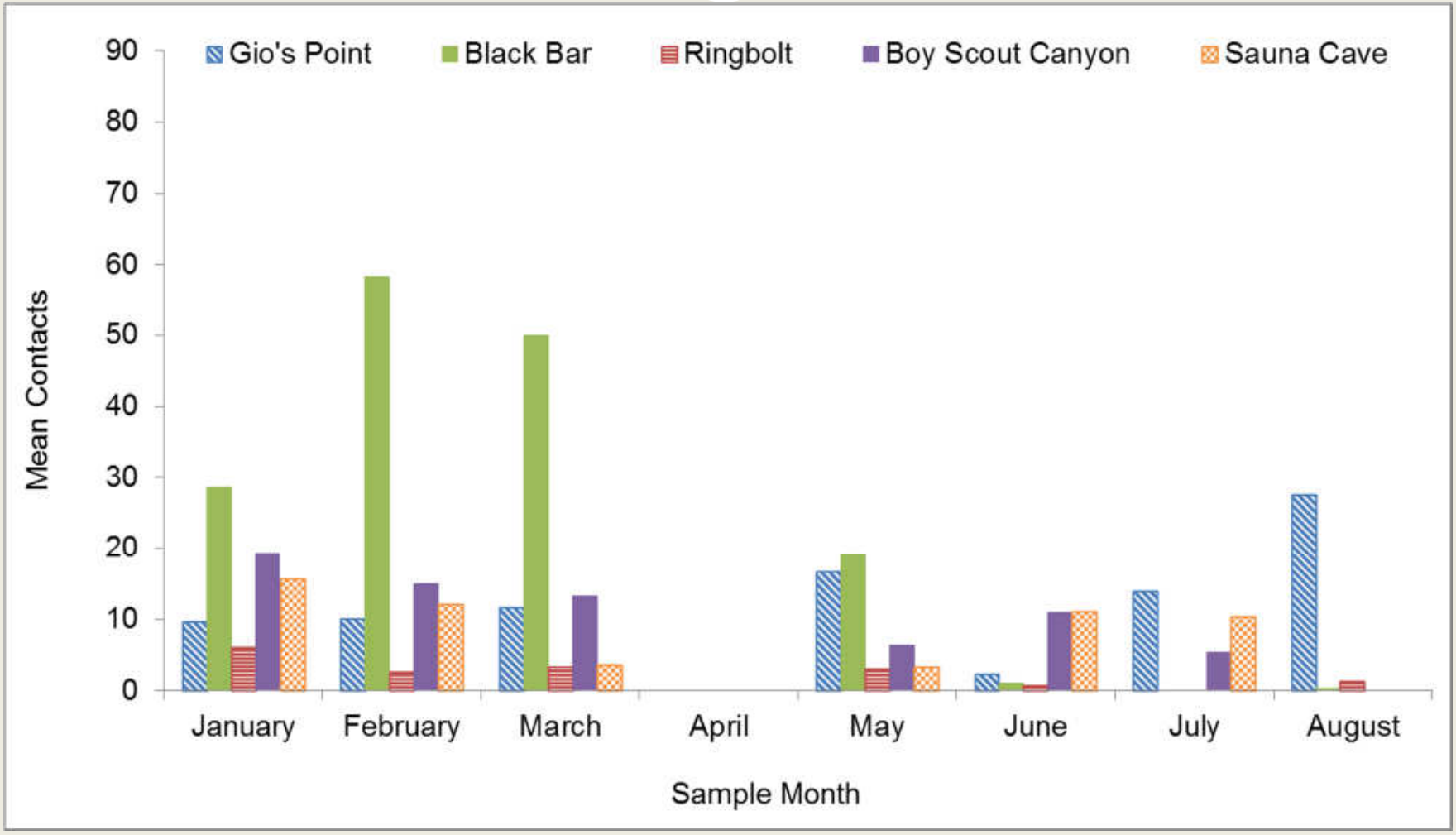
- M&A – 2 person field crew
- 5 fixed sampling stations
  - Sauna Cave, Boy Scout Canyon, Ringbolt Rapids, Black Bar, Gio's Point
- Scanners deployed 1 week per month
  - Jan 2014 – Aug 2014
- Shore-based unit at Boy Scout Jan - Aug

River Scanning

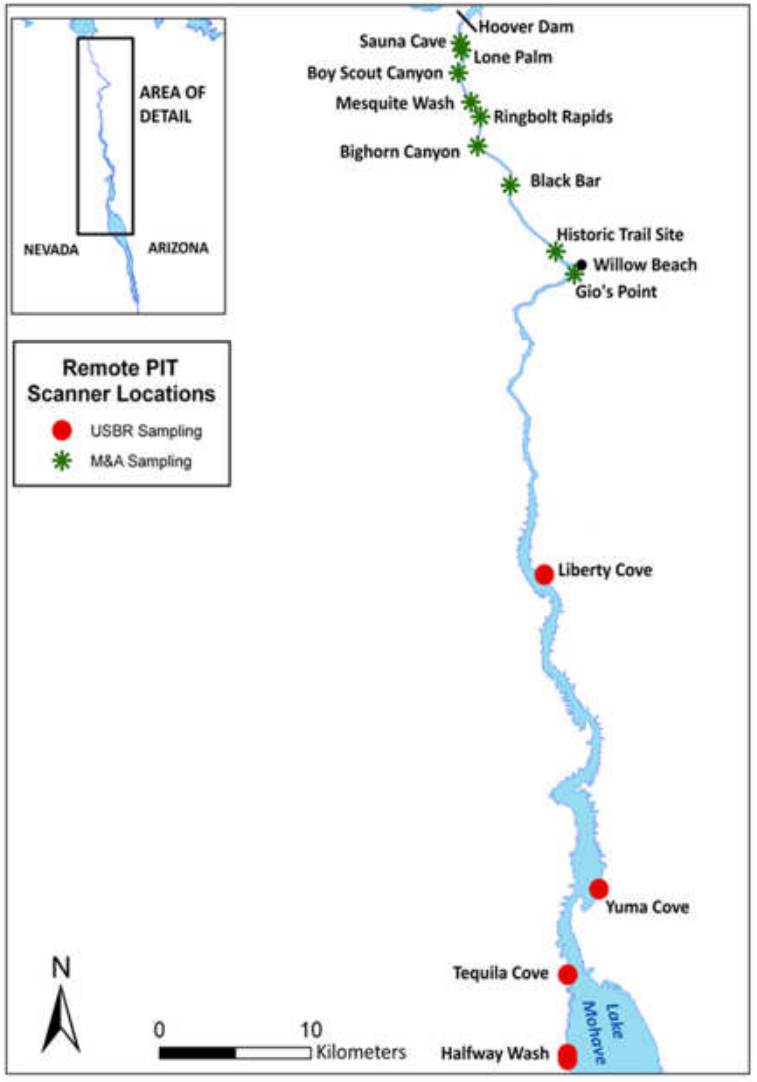


- 4,091 total scan hours
  - 3,097 h with submersible units
  - 994 h with shore-based units
- 8,253 total PIT tag contacts
- 1,430 unique razorback sucker
  - 1,414 with marking history
  - 1,405 repatriates
  - 9 wild

Fixed Station Sampling



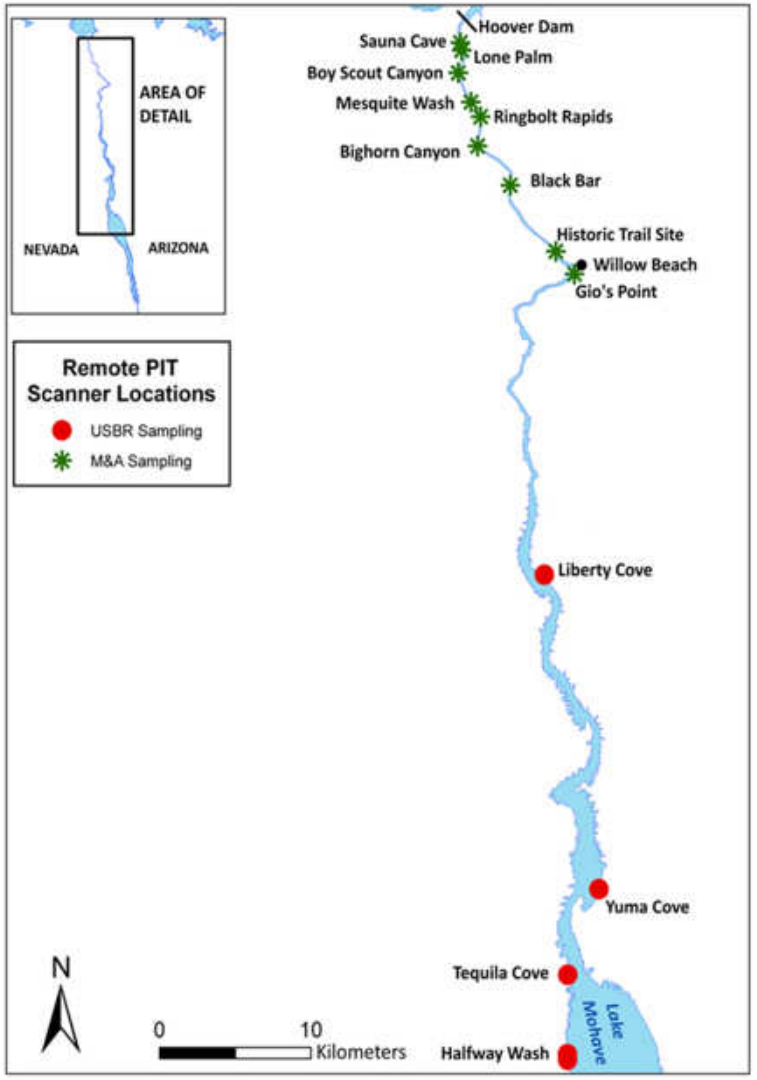
Liberty Scanning



- USBR – 1+ person field crew
- Liberty Cove
- 1 shore-based unit

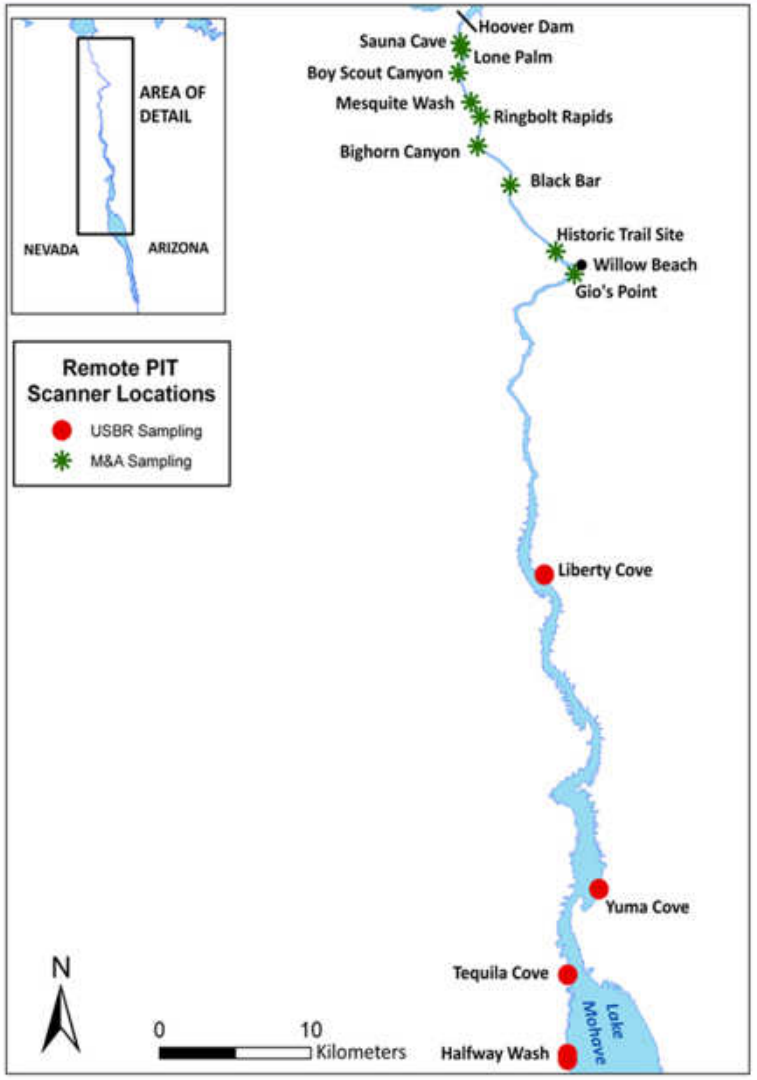
- 112 total scan hours
- 0 total PIT tag contacts

Basin Scanning



- USBR – 1+ person field crew
- 2 scanning locations
  - Yuma Cove and Tequila Cove
- Shore-based units continuously scanned
  - November 2013 – May 2014

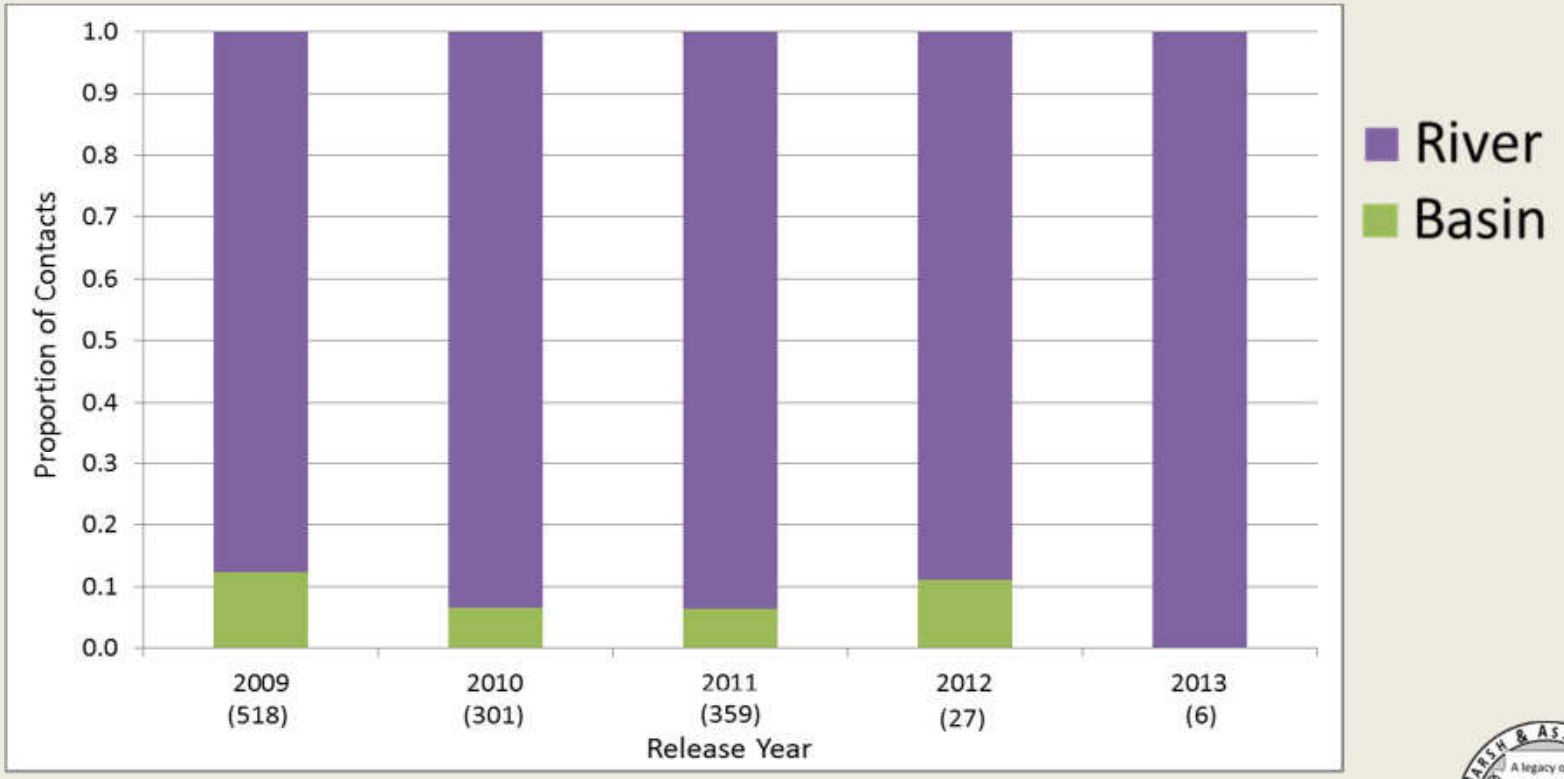
Basin Scanning



- 4,753 total scan hours
  - 4,685 h with shore-based units
  - 68 h w submersible units
- 230,917 total PIT tag contacts
- 1,347 unique razorback sucker
  - 1,284 with marking
  - 1,282 repatriates
  - 2 wild

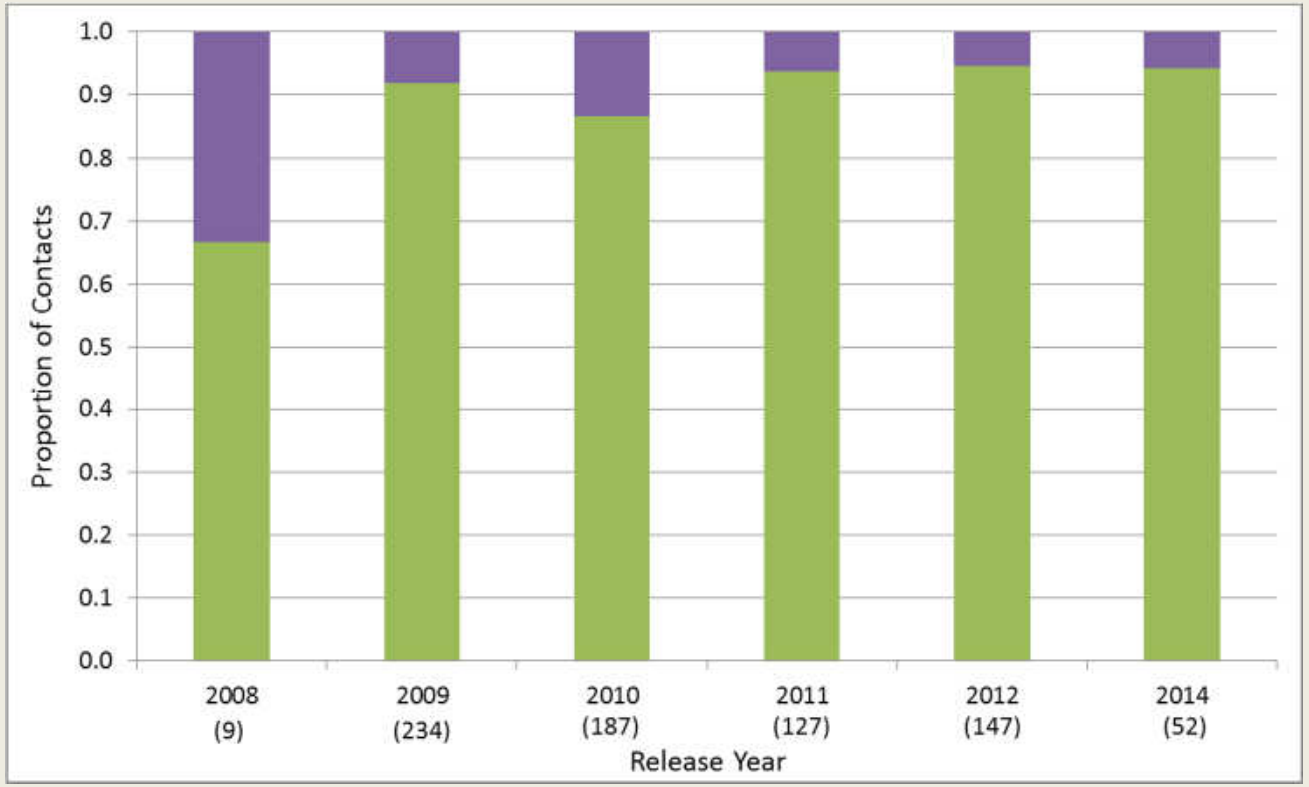
2014 PIT Scanning in River – release zone comparison

- Little directional movement
- Fish released in River zone generally remained there



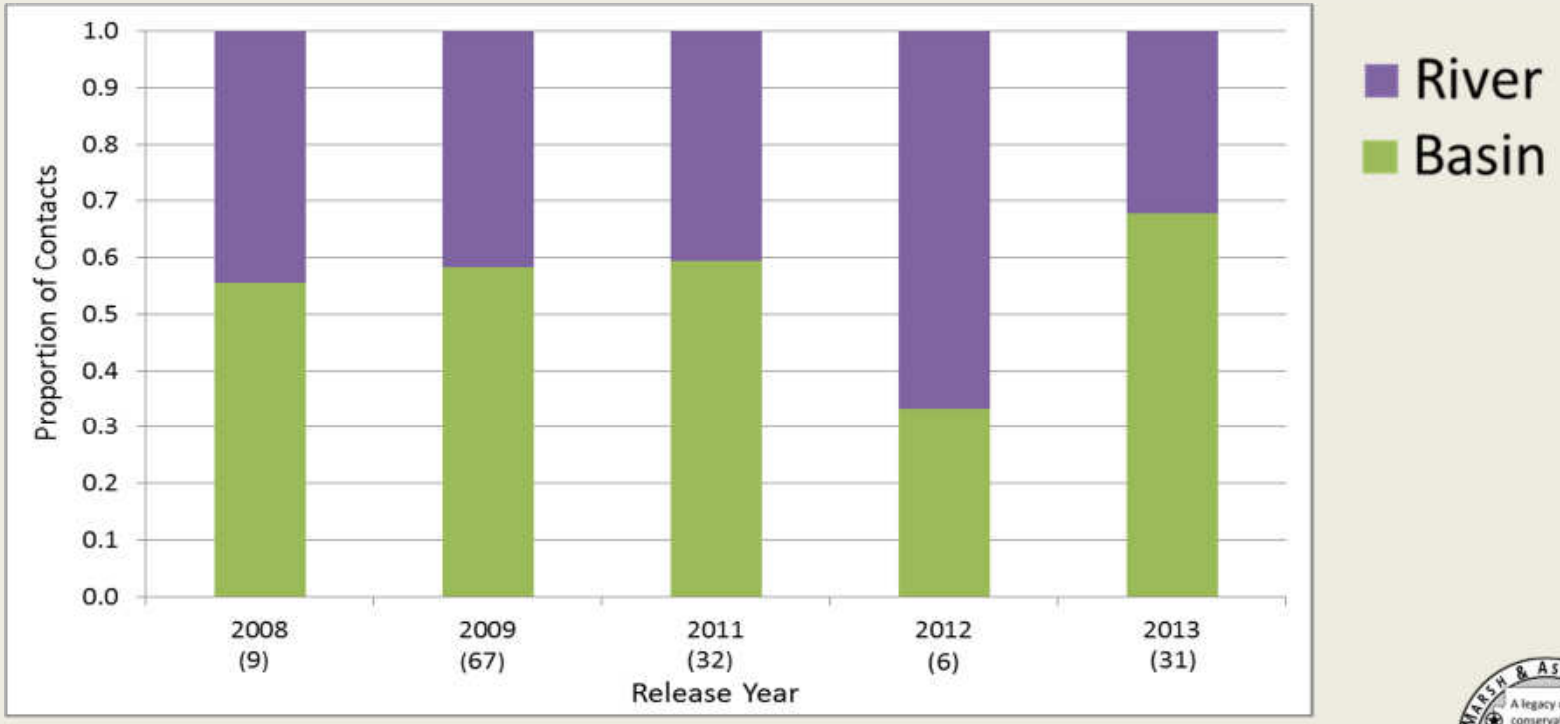
2014 PIT scanning in Basin – release zone comparison

- Little directional movement
- Fish released in Basin zone generally remained there



2014 PIT scanning in Liberty – release zone comparison

- Fish released in Liberty zone generally moved up or downstream from their stocking location
- Few fish released in Liberty are contacted



Subpopulation Dynamics – year to year movement

- Razorback sucker that were contacted by remote PIT scanning in 2013 that were contacted again in 2014

	2014	
2013	River	Basin
River	893	37
Basin	56	635
	949	672

49 fish contacted in multiple zones in 2013

44 fish contacted in multiple zones in 2014

10 fish contacted in multiple zones in 2013 and 2014

Population Estimates

- Based on 2013 and 2014 PIT scanning
  - Tagged repatriate population – 3,284 (3,067 to 3,516)
  - River subpopulation – 2,053 (1,853 to 2,275)
  - Basin subpopulation – 1,492 (1,357 to 1,640)

- Based on 2013 and 2014 March roundup
  - Tagged repatriate population – 2,525 (1,180 to 5,741)

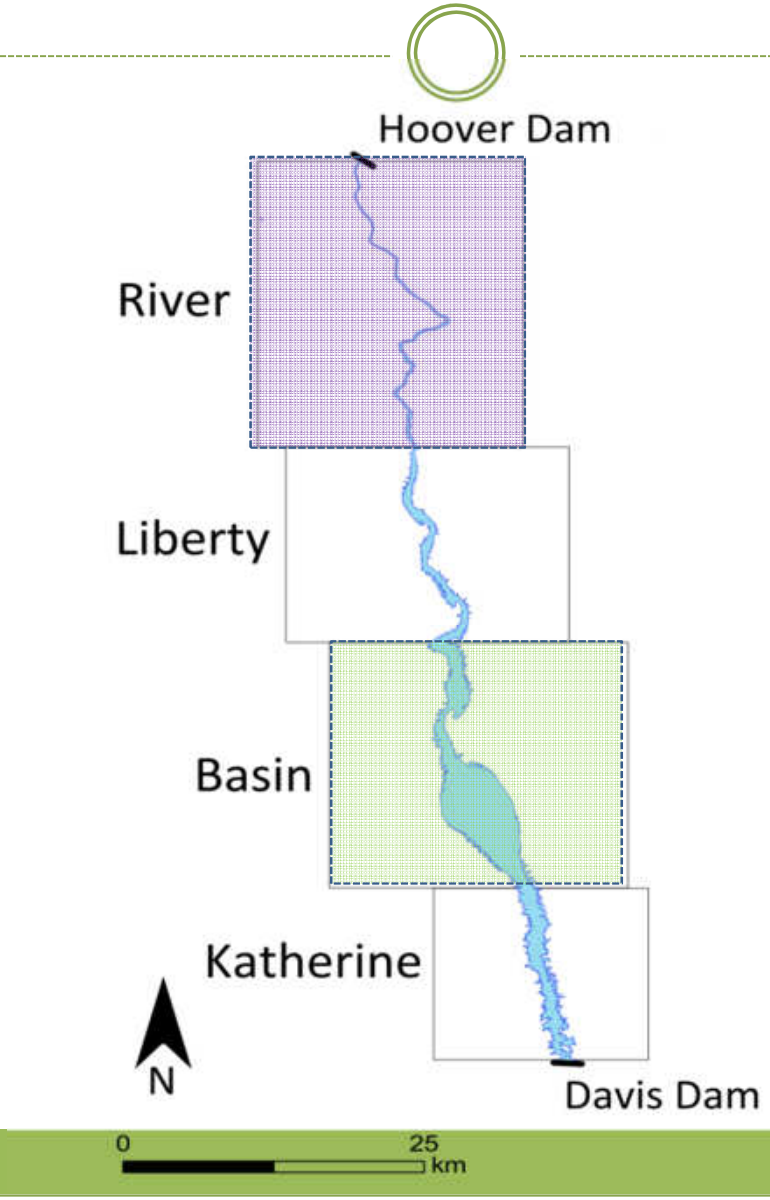
Conclusions

- PIT scanning is an effective method for monitoring razorback sucker in Lake Mohave
- Routine monitoring is necessary to meet genetic and demographic needs
- Movement of razorback sucker between zones is minimal
- Population estimates based on roundup data does not accurately represent the entire reservoir population

Thanks to our partners for their support

Cross Country Consulting, LLC

Subpopulation dynamics – Basin and River



Methods Comparison

- PIT scanning
  - Sampling season from November 2013 – September 2014
  - 210 PIT scanner deployments
  - 3,216 razorback sucker

- 2014 March roundup
  - Netting efforts by USBR, FWS, NDOW, NPS, M&A
  - 89 trammel net nights
  - 214 razorback sucker

Discussion

- There are two demographically distinct razorback sucker subpopulations
- Remote sensing is effective at contacting approximately 80% or more of the known population in a sample year
- Routine monitoring is necessary to meet genetic and demographic needs
- In River, 2009 and 2010 cohorts dominate scanning data, but the number contacted has declined each year. 2011 and 2012 cohorts were not scanned in similar numbers, indicating lower survival. Additional years of this poor post-release survival could put this subpopulation at risk
- Month to month transition rate estimates from mark-recapture analysis indicate a net migration of fish from Basin to River