

2014 annual summary of remote PIT scanning efforts in Reach 3



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Background



Abraham Karam

- Lake Havasu
 - LCR MSCP Reach 3
 - Between Davis and Parker dams
 - Suite of non-native sport fish
- Razorback sucker
 - No natural population in Lake Havasu
 - Over 50,000 stocked since 2006
 - Population numbers in thousands
 - Post-stocking survival unknown
 - Spawning aggregates observed
 - ✦ From Laughlin downstream to Needles

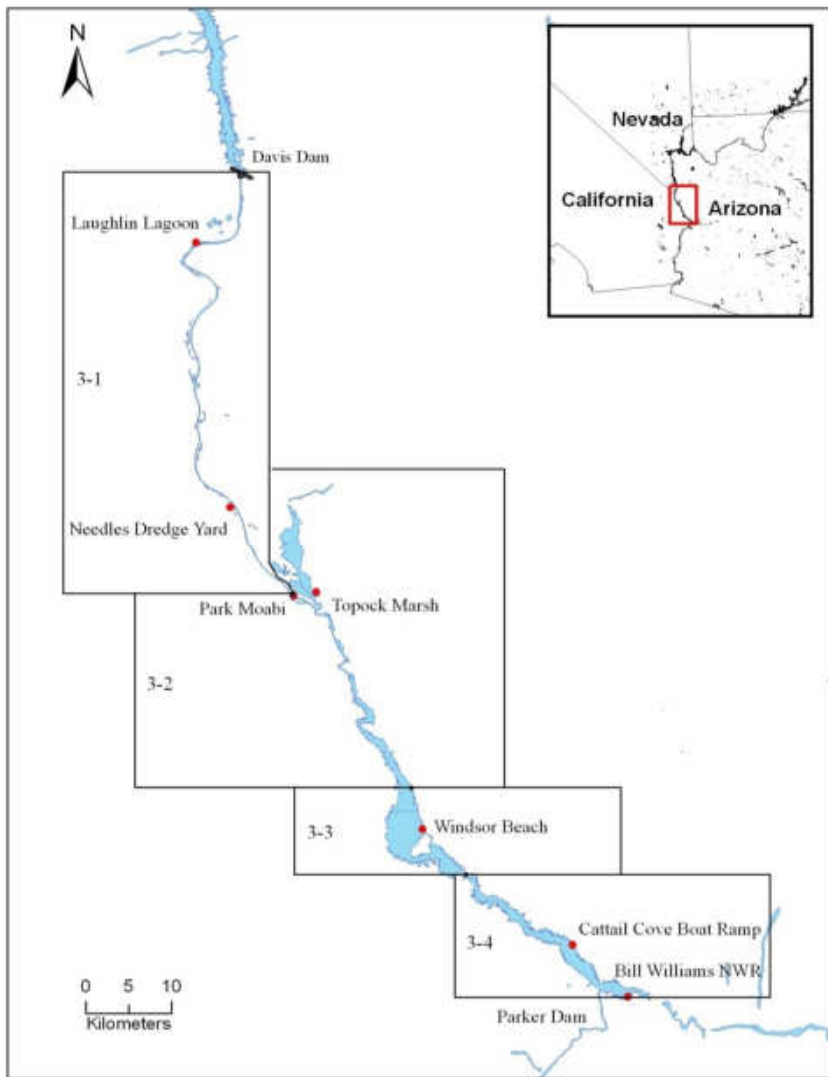


Objectives



- **Increase contacts through PIT scanning**
- **Assimilate all razorback sucker release and capture data**
- **Estimate current repatriate razorback sucker population**
- Estimate survival of razorback sucker
- Participate in annual multi-agency native fish survey

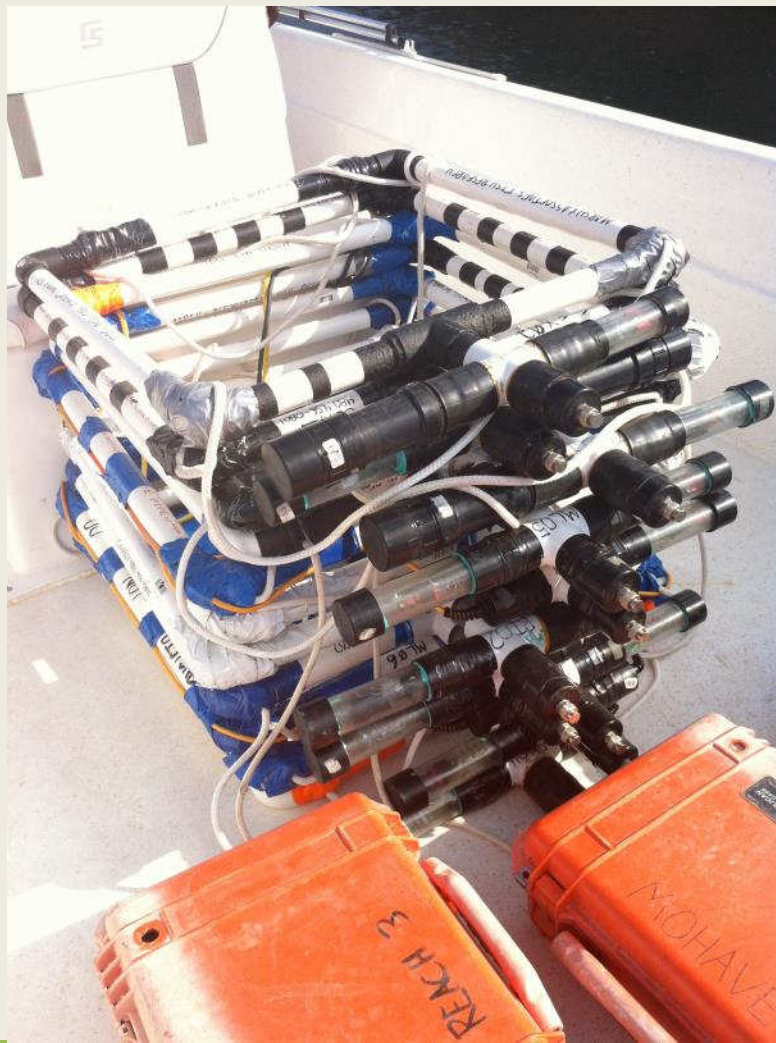
Study Area



- Divided into four 'zones'
 - **3-1** - Riverine clear waters downstream of Davis Dam
 - **3-2** - Topock Marsh, Lake Havasu delta
 - **3-3** - Wide basin of Lake Havasu
 - **3-4** - Lower Lake Havasu, Bill Williams River NWR



PIT Scanning - Equipment



- Submersible PIT scanners (8)
 - 80 x 80 cm antenna
 - Fully submersible to 10 meters
 - Retrieved via boat hook
 - 24 hour battery life
- Neutrally buoyant submersible (1)
 - 120 x 80 cm antennae
 - Submersible up to 10 meters
 - Can be equipped with weights to stand up or lie flat
 - 96 hour battery life
- Shore based unit (2)
 - 190 x 80 cm antenna
 - 50 meter cable connects logger to antenna
 - 96 hour battery life



PIT Scanning

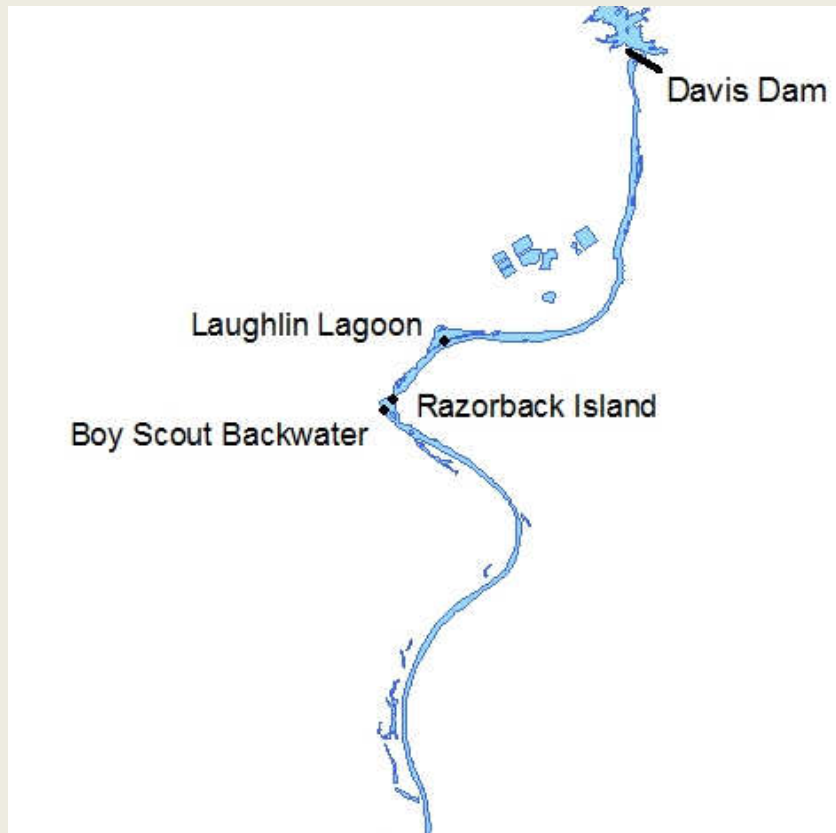


- January through April
 - ✦ Seven sampling trips
 - ✦ 3 overnight deployments
 - ✦ Up to 8 submersibles
 - ✦ 2 shore based
 - ✦ 1 neutrally buoyant submersible

- Also assimilated all Reach 3 scanning data from any entity
 - ✦ October 2013 to May 2014
 - ✦ M&A scanning in Reach 3-2 for bonytail
 - ✦ BOR scanning in Reaches 3-1 and 3-2



PIT Scanning in Zone 3-1 (Laughlin Reach)



- Shore based units deployed at Razorback Island and Laughlin Lagoon
- Submersible units were deployed at Laughlin Lagoon
- Neutrally buoyant unit was deployed at Laughlin Lagoon
- BOR deployed antennas in Boy Scout Backwater



PIT Scanning in Zone 3-1 (Needles Reach)



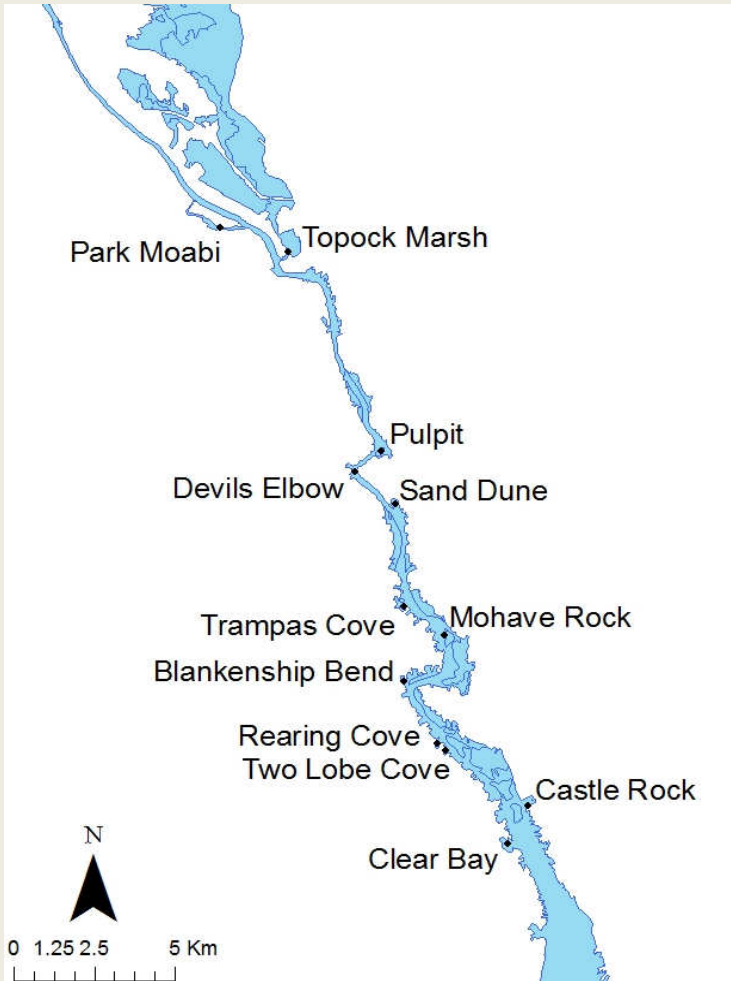
- Submersibles – Needles

- Palms
- Cliffs
- Cabana
- Tower
- White Wall
- Power Lines
- US 95 bridge
- Needles Dredge Yard

- The neutrally buoyant unit was deployed at Needles Dredge Yard.



PIT Scanning in Zone 3-2



- Deployed submersibles and shore-based antennas at Golden Shores.
- Reclamation and bonytail scanning
 - Park Moabi
 - Golden Shores
 - Pulpit
 - Devils Elbow
 - Sand Dune
 - Trampas Cove
 - Mohave Rock
 - Blankenship Bend
 - Two Lobe Cove
 - Rearing Cove
 - Castle Rock
 - Clear Bay



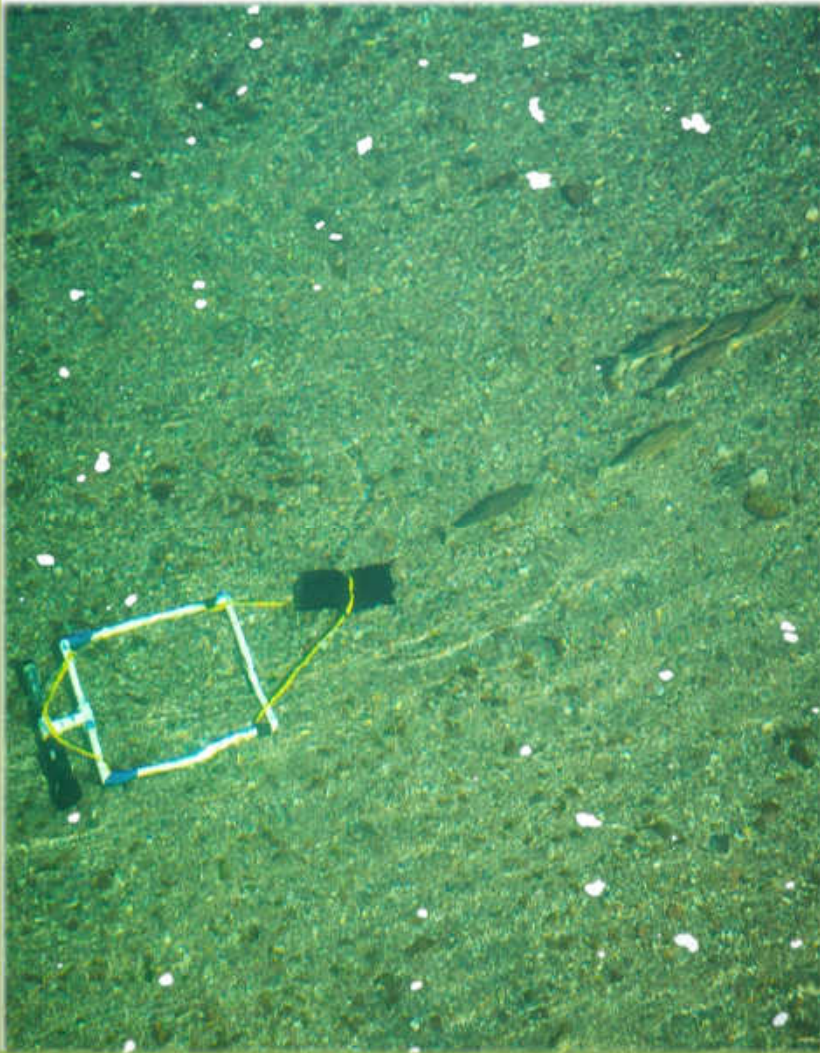
Population Estimates



- Single census estimate
 - Modified Peterson formula
 - ✦
$$N^* = \frac{(M+1)(C+1)}{R+1}$$
 - 2013 Marking period
 - 2014 Capture period
 - 134 kHz PIT tagged fish
 - PIT scanned or captured



Results – PIT scanning 2014



- M&A
 - 3820 total hours scanning
 - 1518 individuals
- M&A (bonytail scanning)
 - 6958 total hours scanning
 - 463 individuals
- Reclamation
 - 2599.3 total hours scanning
 - 414 individuals
- Combined
 - 2324 individuals
 - 1972 razorback sucker with a 134 kHz PIT tag release record



Results – Population Estimates



Year	Number Marked	Number Captured	Number Recaptured	Population Estimate (95% C.I.)
2011	228	642	59	2496 (1935-3220)
2012	934	1373	284	4524 (4027-5081)
2013	1335	1730	518	4456 (4089-4855)

$$N^* = \frac{(M + 1)(C + 1)}{R + 1}$$



Discussion



- PIT scanning greatly increased contact rates
- Population estimates have increased since 2011
 - Utilization of PIT scanning has greatly improved precision of the estimate
- Population dynamics appear to differ from similar studies in Lake Mohave.



Thanks to our partners for their support

- USBR



- USFWS



- NPS



- NDOW



- Cross Country Consulting, LLC

