2018–2019 Razorback Sucker Studies on Lake Mead, Nevada and Arizona: Long-term Monitoring Annual Report

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BIO-WEST

Acknowledgements

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Lower Colorado River
Multi-Species Conservation Program

Lake Mead Workgroup

ARIZONA
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Southern Nevada
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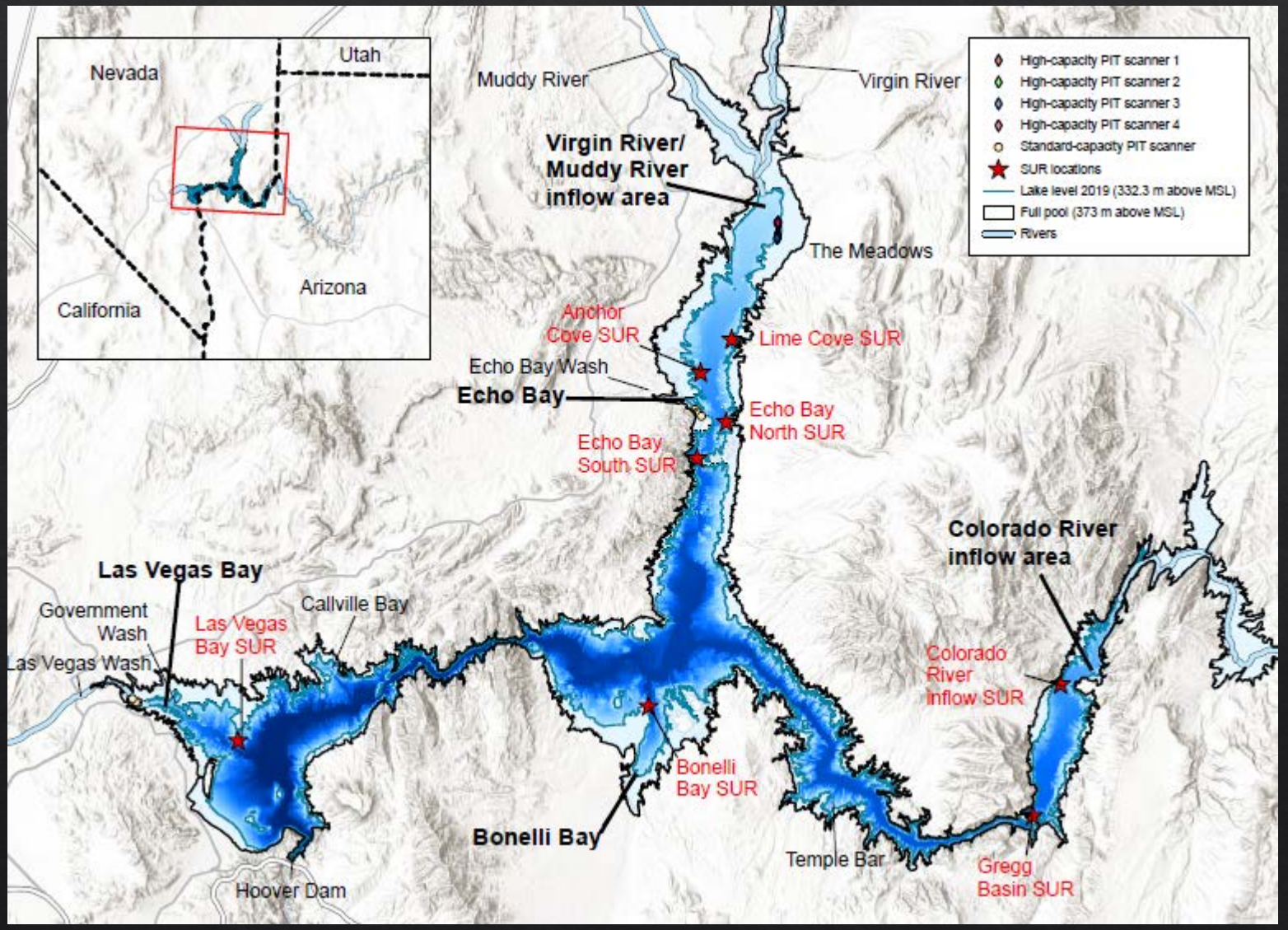
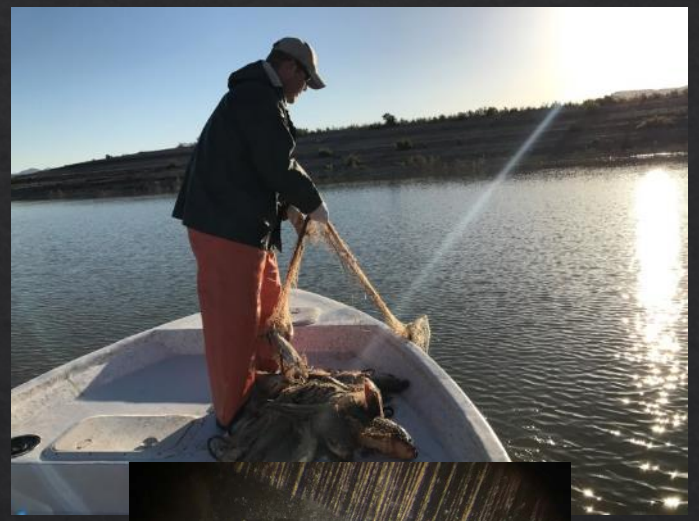
Study Sites and Objectives

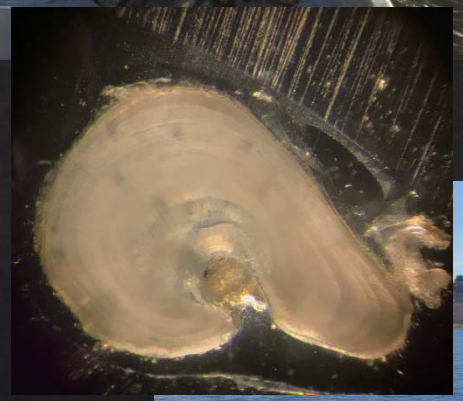


- Capture all life stages of Razorback Sucker
- Identify spawning areas
- Monitor movement patterns
- Population and survival estimation
- Collected biological data (i.e.: sex ratios, length and weight, age, etc.)

Methods

- Field
  - Sonic Telemetry
    - Implant sonic tags and track
      - Trammel netting
        - Non-lethal aging
      - Larval sampling
      - PIT tag scanners
- Office
  - Data analysis
  - Prepare and age fin rays in lab
  - Population and survival estimates





Sonic Telemetry

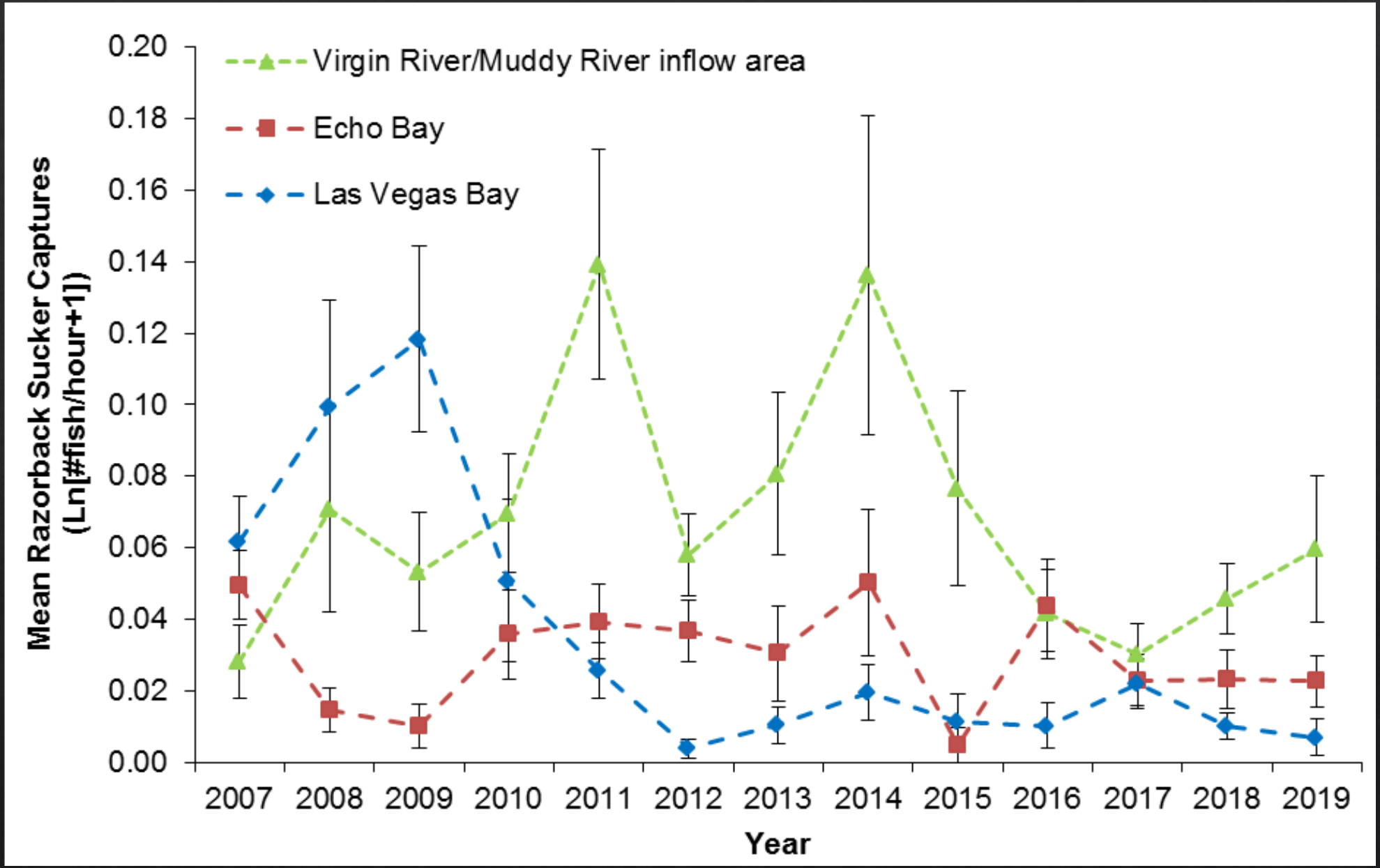
- 3 wild Razorback Sucker sonic tagged (*n*=2 Virgin River/Muddy River inflow area and *n*=1 Echo Bay)
- 19 unique fish detected
- 46 active contacts of 13 individuals plus 20 contacts from r-code 30XX
  - 548 SUR contacts of 10 fish; plus 124 contacts from fish 555 in Las Vegas Wash (Reclamation Biologists)
- 4 sonic-tagged fish moved between Echo Bay and the Virgin River/Muddy River inflow area

Trammel Netting

Month	Las Vegas Bay	Echo Bay	Virgin River/Muddy River inflow area	Total
January	15	0	0	15
February	5	9	7	21
March	4	9	10	23
April	1	8	3	12
Total Number of Nets	25	26	20	71
Total Net-Hours	397.2	361.2	311.0	1,069.4

- A total of 34 Razorback Suckers 1 hybrid (Razorback Sucker x Flannelmouth Sucker
- 15 recaptures/19 new wild
- Las Vegas Bay
  - 3 juvenile Razorback Suckers (311–402 mm TL)
- Echo Bay
  - 9 Razorback Suckers
- Virgin River/Muddy River inflow area
  - 22 Razorback Suckers and 1 hybrid

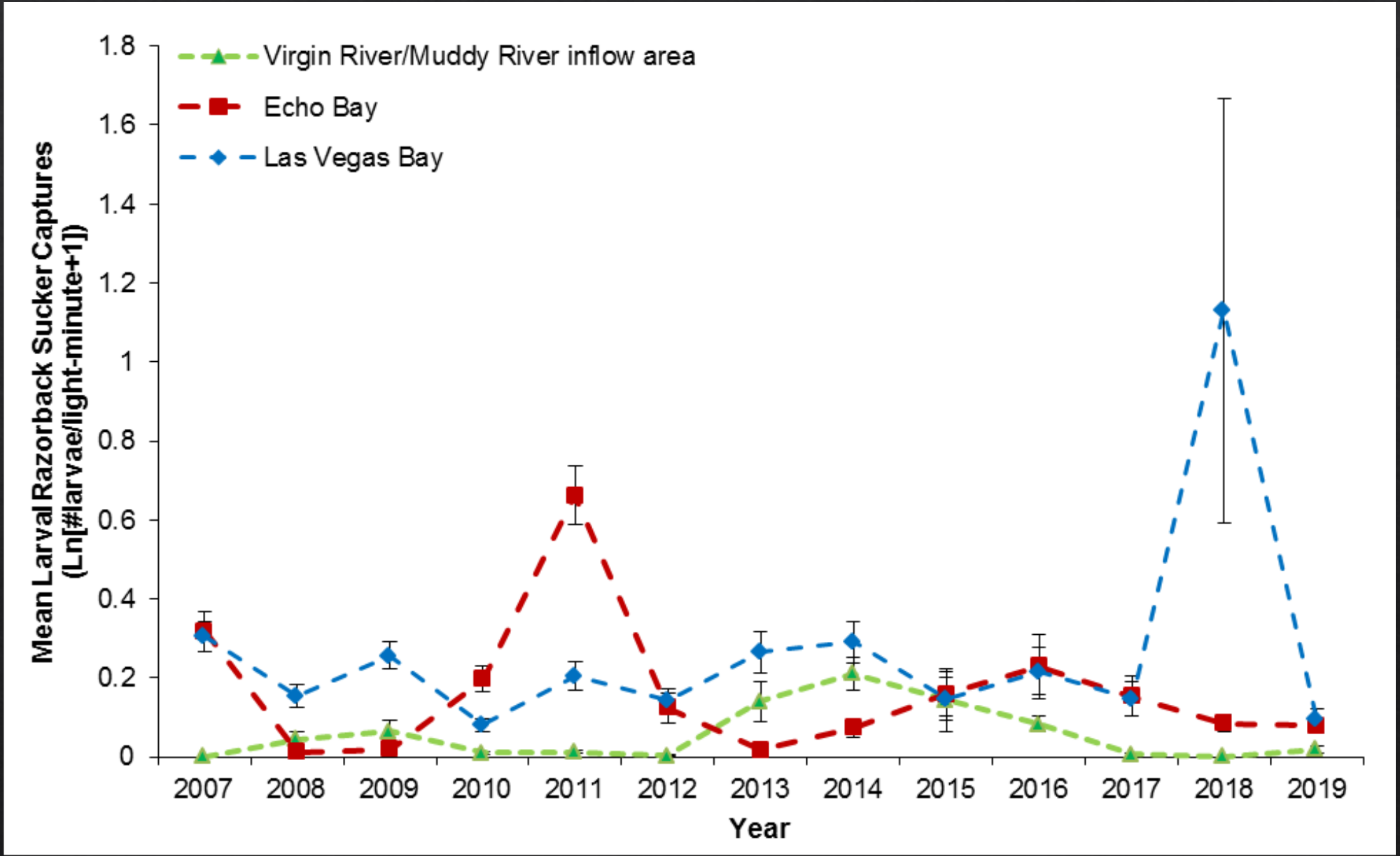
Trammel Netting CPUE



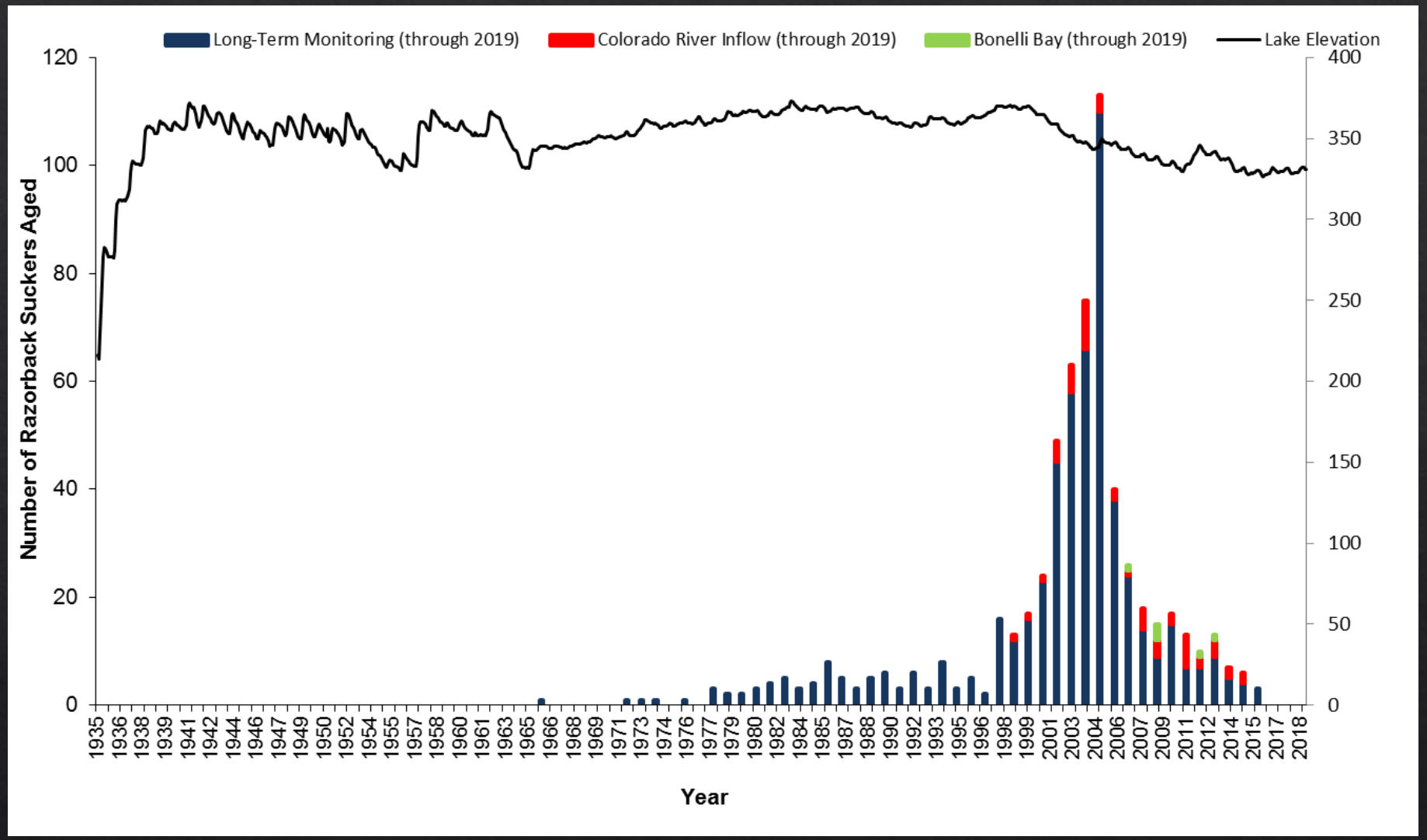
Larval Numbers and Timing

- Las Vegas Bay
  - Sampling began Jan 3rd (first capture Jan 28th)
  - 156 larvae captured during 850 minutes
  - Temperature ranged from 12.9–21.0 °C
- Echo Bay
  - Sampling began Feb 5th (first capture Feb 26th)
  - 127 larvae captured during 1,340 minutes
  - Temperature ranged from 12.4–21.1 °C
- Virgin River/Muddy River inflow area
  - Sampling began Feb 6th (first capture Mar 19th)
  - 21 larvae captured during 736 minutes
  - The temperature 17.3–19.0 °C

Larval CPUE


Virgin River/Muddy River inflow area
Echo Bay
Las Vegas Bay
Mean Larval Razorback Sucker Captures
(Ln[#larvae/light-minute+1])
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year

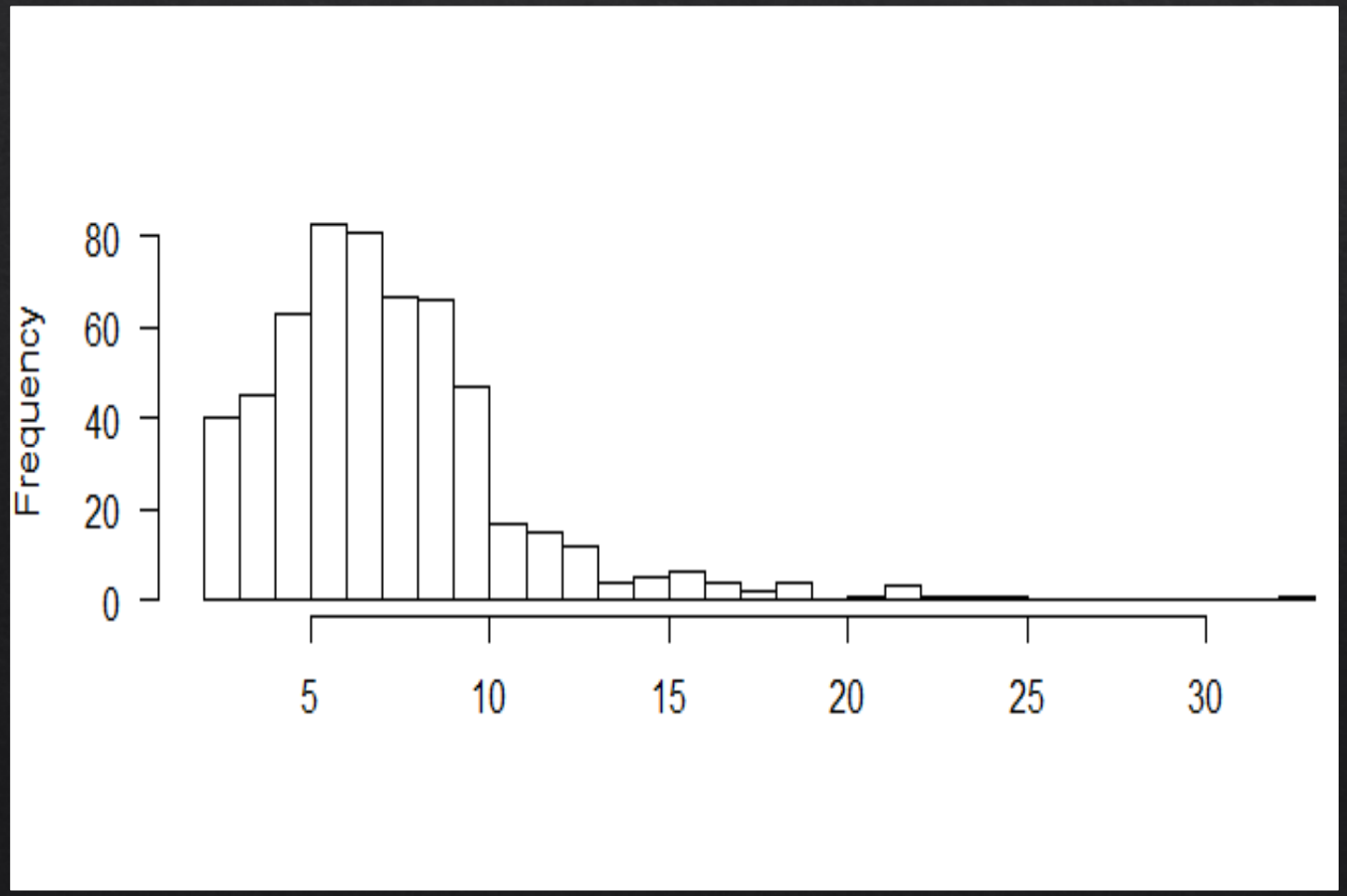
Aging



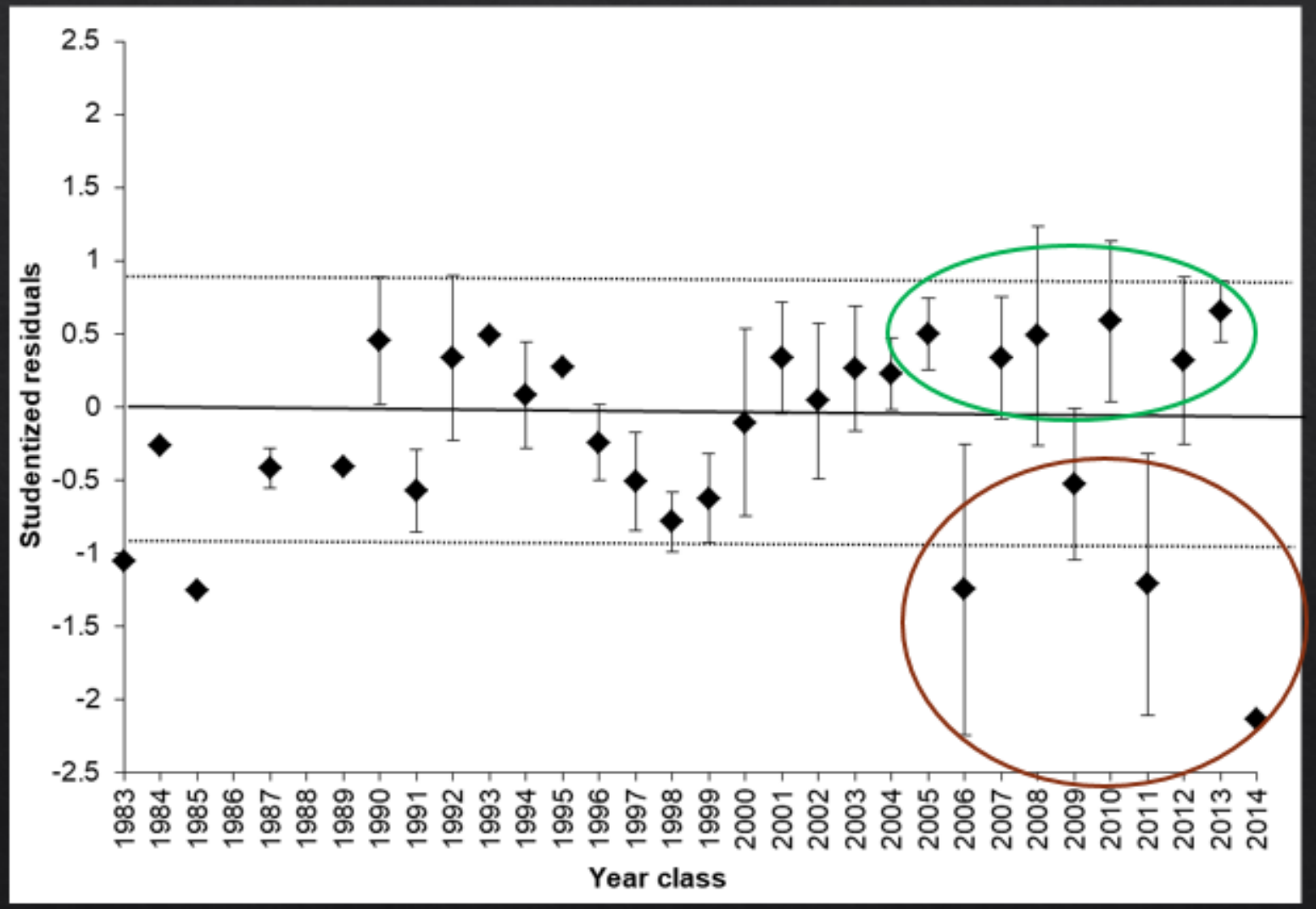
- 570 RZs aged in LTM study areas to date
- 20 aged at 2019 LTM, a total of 46 from CRI (2010–2019), a total of 6 from Bonelli Bay (2019)
- 2016 year class documented

Year Class Strength

- Catch-curve method was used to analyze year class strength and annual recruitment in Lake Mead
- Fish 5–20 years old were selected for this analysis



Year Class Strength



- Annual recruitment is not homogenous
  - Saw a decline in YC strength from 1990–1998, then a increase in YC strength from 1999–present been fairly consistent from 2001–present
- 2006, 2009, 2011, and 2014 are the weakest YC (so far)
- 2005, 2007, 2010, 2012, and 2013 are the strongest YC (so far)

BOR PIT Scanning

- Las Vegas Bay:
  - 576.1 hours
  - 30 unique fish detected
    - Includes a stocked juvenile (290 mm TL) RZ PIT tagged at the Virgin River/Muddy River inflow area tagged in 2014
- Echo Bay:
  - 124.4 hours
  - 0 fish detected
- Virgin River/Muddy River inflow area:
  - 8,213.0 hours
  - 107 unique fish detected (RZ=102, HYB=1, and CP=4)
  - 63:102 (62%) RZ detections occurred in Jan-Feb
  - 16 RZ tagged in EB moved north

Credit: Eric Loomis

Population and Survival Estimate

Model	Population estimate (95% confidence bounds)	Capture events	Standard error
Reservoir-wide population estimate			
Mt	248 (160–385)	42	56

- 2016-2018: 360 (95% CI 289–470)
- 2015–2017: 421 (95% CI 305–615)
- 2014–2016: 418 (95% CI 327–559)
- 2013–2015: No estimate

Model	Annual apparent survival rate estimate (95% confidence bounds)	Capture events	Standard error	Min/Max Recapture probability
Cormack-Jolly-Seber				
Φ (.)p(t)	0.78 (0.75–0.81)	24	0.01	0.05–0.44

- 1996–2018: 0.77 (95% CI 0.74–0.80)
- 1996–2017: 0.77 (95% CI 0.74–0.81)
- 1996–2016: 0.77 (95% CI 0.74–0.81)
- 1996–2015: 0.77 (95% CI 0.73–0.81)

Summary

- 19 unique sonic-tagged Razorback Suckers contacted
  - Help determine trammel netting, larval fishing and PIT scanner locations
- 34 Razorback Suckers captured in 2019
  - Razorback Sucker captured at all LTM sites
  - 19 new wild Razorback Suckers were captured (55.9% of the catch new, wild fish)
  - Unmarked juvenile captures in Las Vegas Bay (n=3)
- Larvae captured at all LTM sites
- Recruitment varies through time but continues
- Scanner data helped with timing and movement-other areas?
- Declining population estimate since 2010
- Stable survival since 2014, CPUE, TL and age since 2010 all stable
- Sampling will continue at the LTM sites in 2020 and explore other areas with our partners

Questions?
Thank You!