

Population Status and Movement of *Oncorhynchus mykiss* in the San Luis Obispo Creek Watershed

Project Update: February 24, 2026

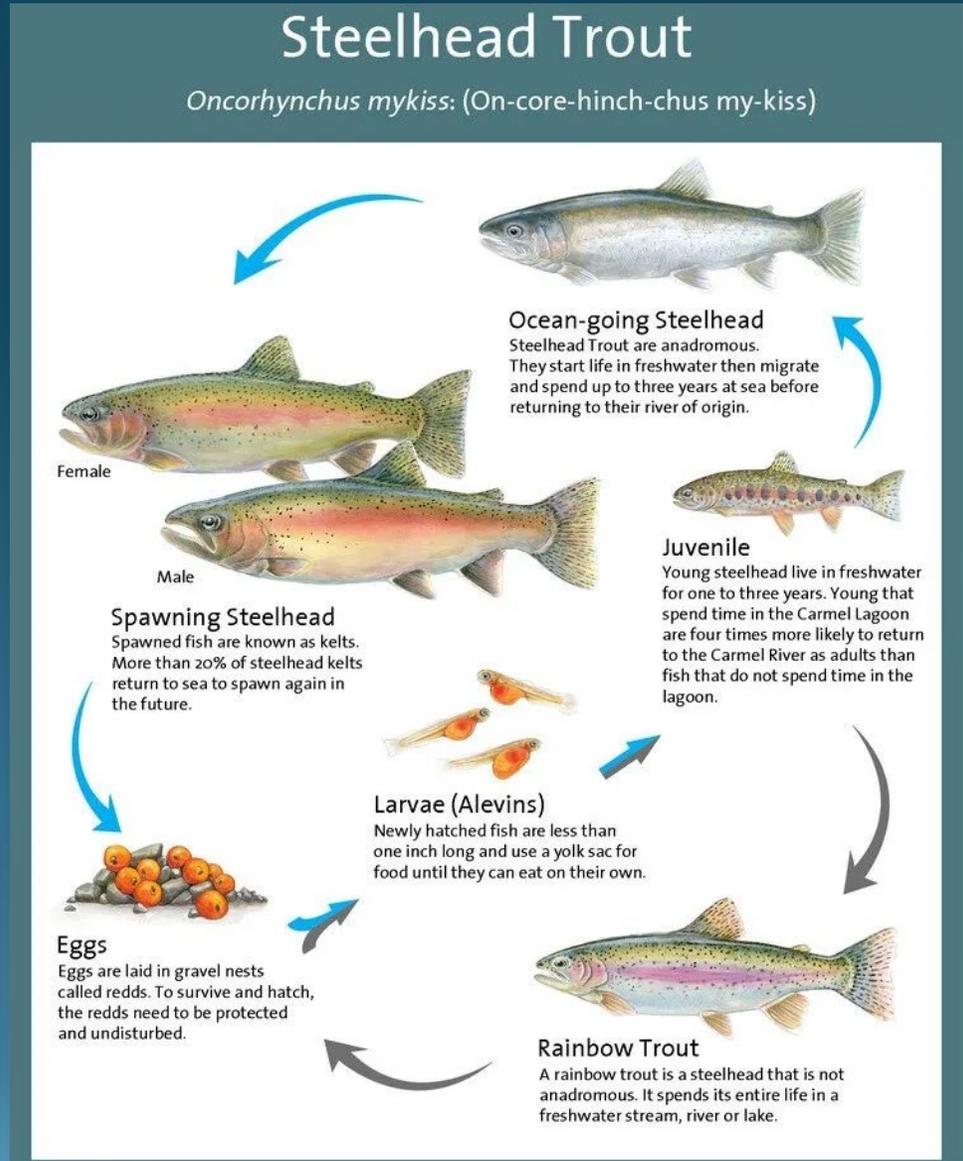
Zach Crum, M.S., CDFW Region 4 District Fisheries Biologist

Freddy Otte, City of San Luis Obispo Biologist

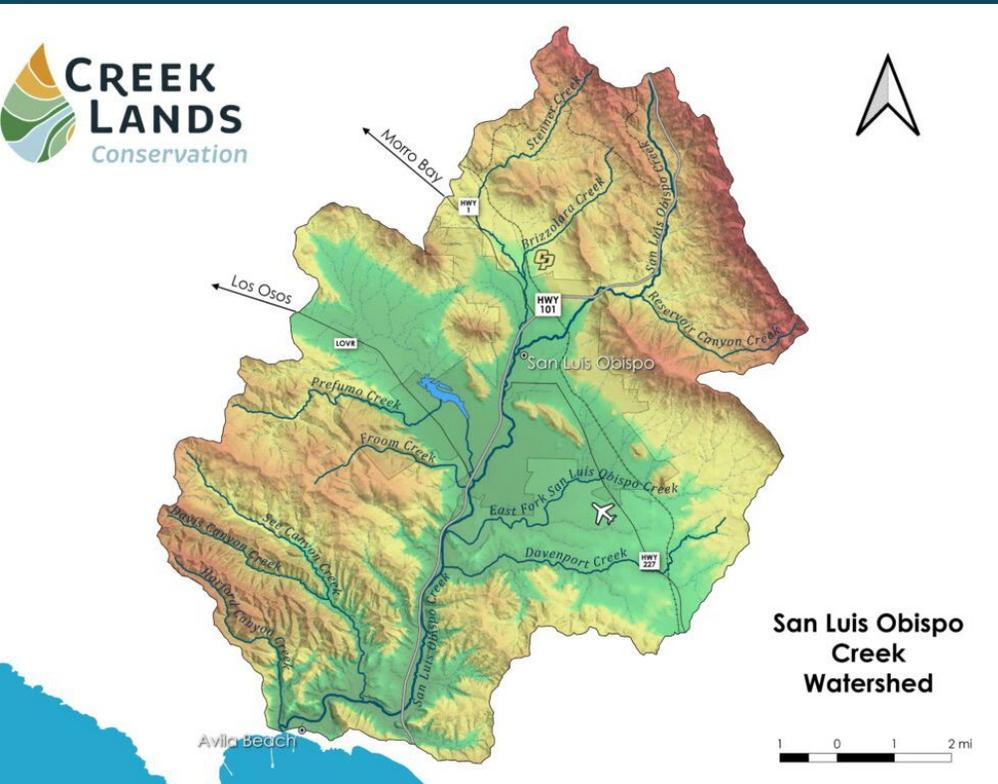


Introduction – Steelhead/Rainbow Trout *O. mykiss*

- Federally Threatened and California SSC
- Distinct Population Segment: South-Central California Coast
- Resident vs. Anadromous life histories



Introduction – San Luis Obispo Creek



- One of the southernmost populations of S-CCC steelhead
- Seasonal Drying
- Fish Passage Barriers
- City of SLO WRRF treated wastewater - lower mainstem
 - ❖ Ammonia release impacts (2023)

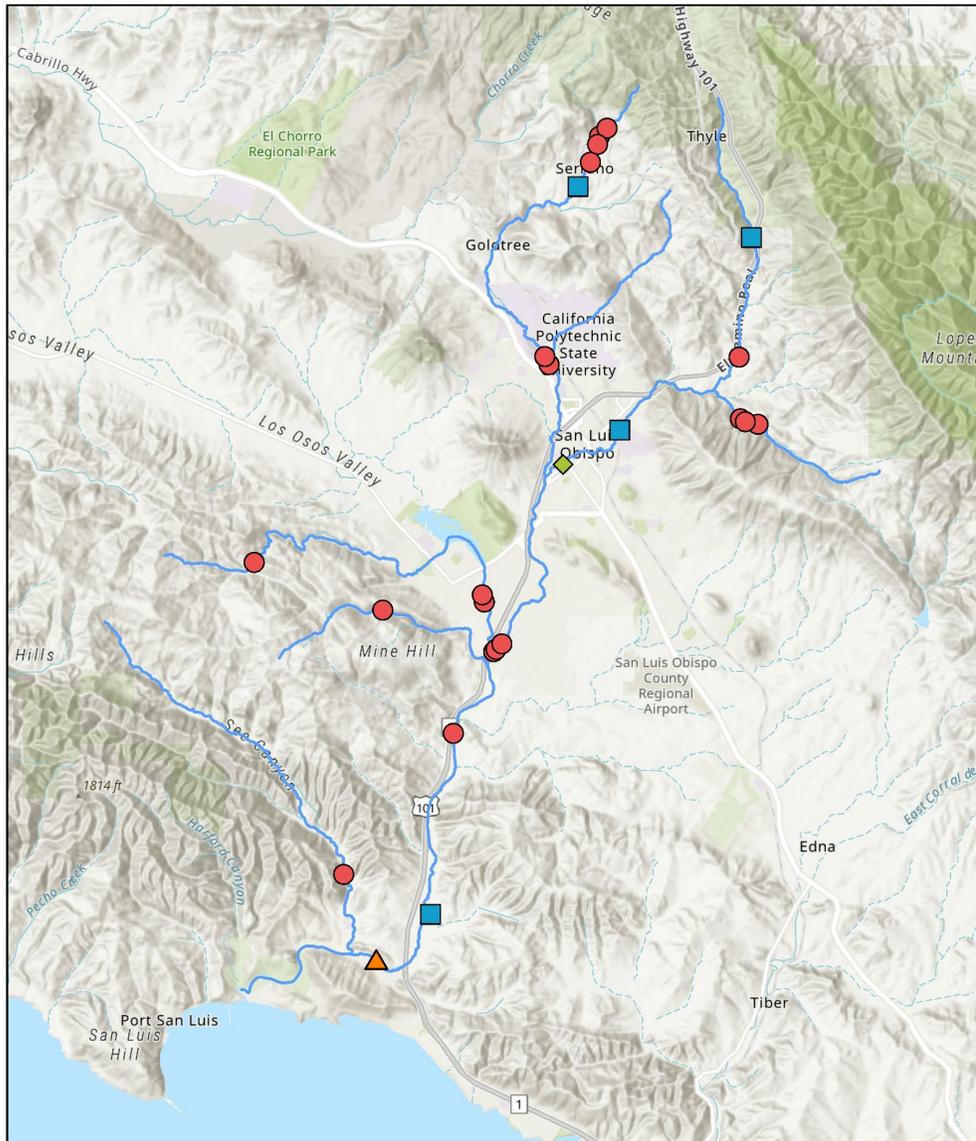


Photo: Don Baldwin



Methods – Data Collection

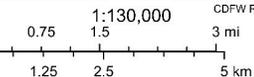
- Backpack electrofishing & PIT tagging
- Stationary pass-over PIT Antennae at Avila Valley Barn
- Mobile PIT antenna surveys
- Redd Surveys



Survey Method

- Single-Pass
- ◆ Dewatering
- Depletion

▲ PIT Antennae



Esri, CGIAR, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community



regon RFID

Half Duplex PIT Tag Sizes

12 mm



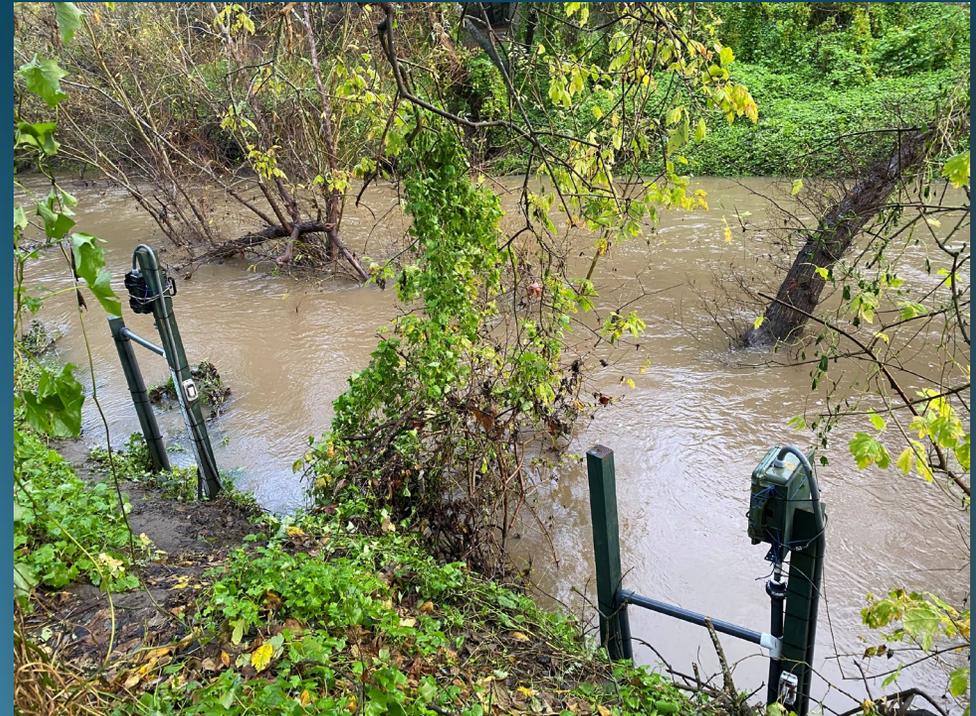
14 mm



23 mm



Stationary PIT Antenna Array – Lower SLO Creek



Mobile PIT Antenna



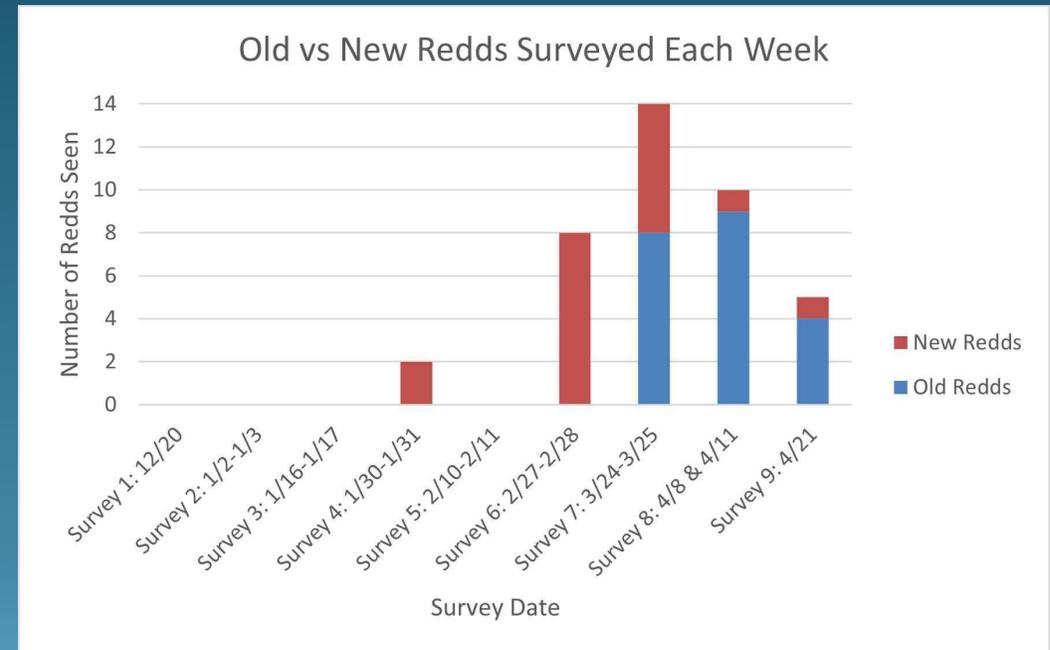
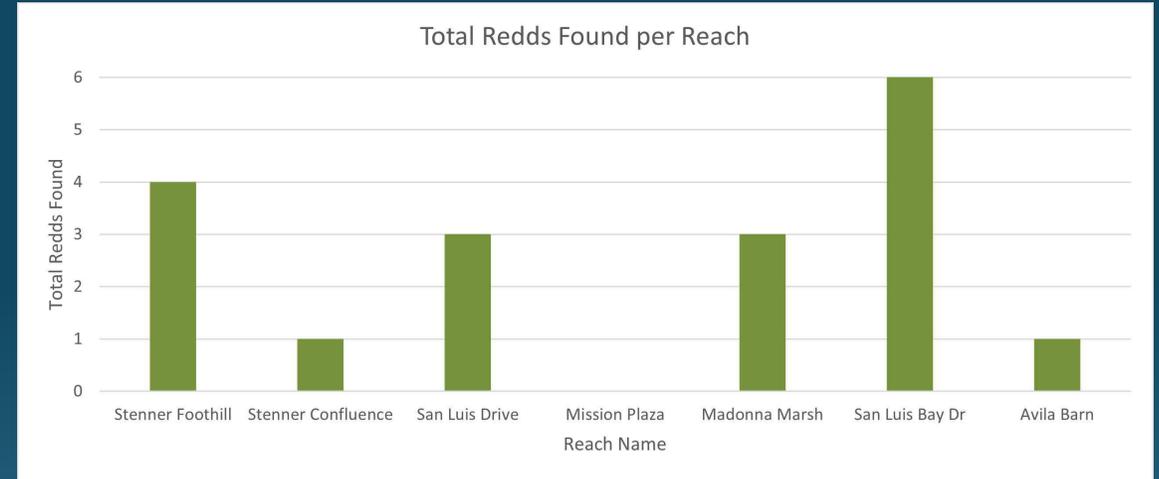
Photo from Oregon RFID



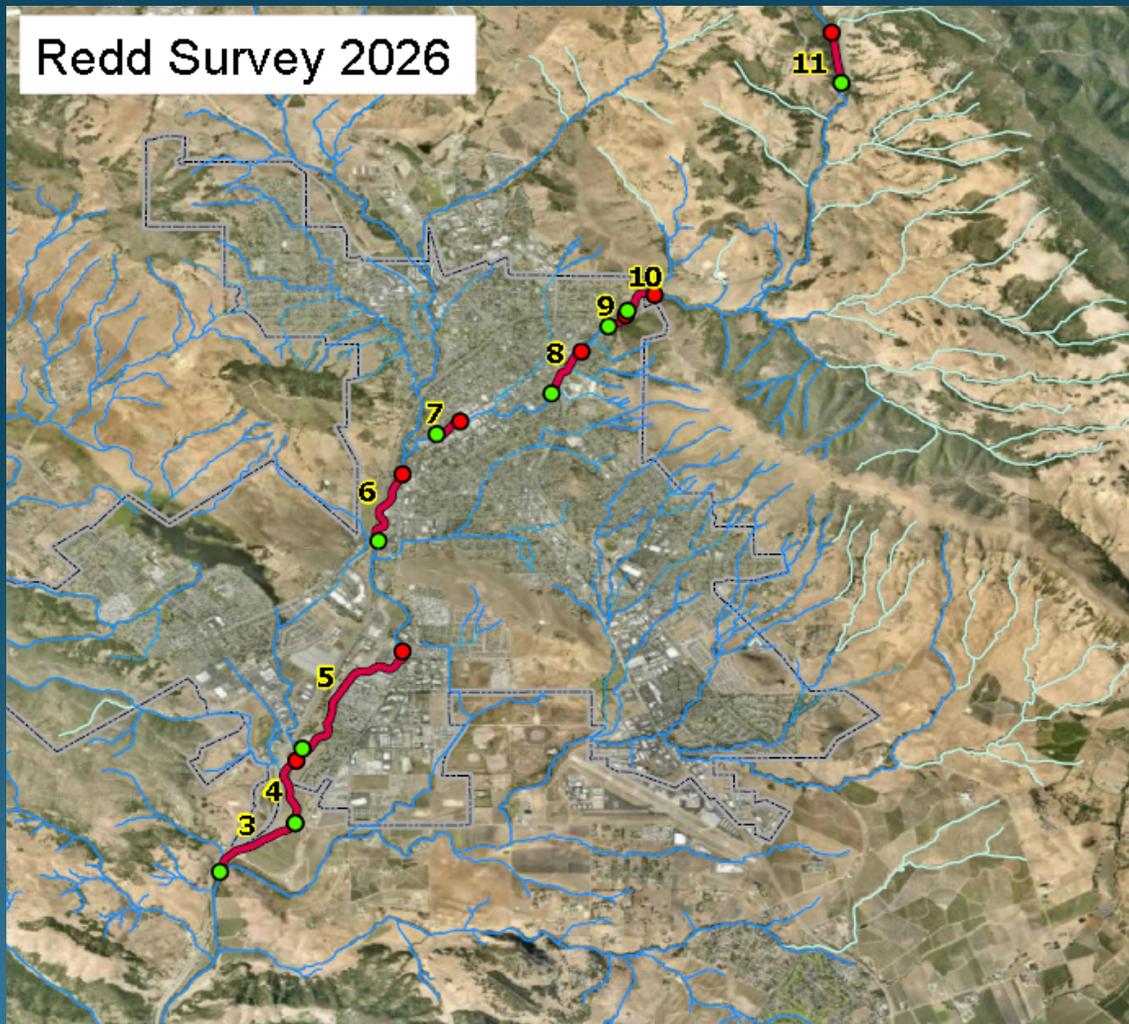
Methods – Data Analysis

- Relative abundance: Catch-per-unit Effort (fish/second)
- Abundance at index reaches: Closed population Mark-Recapture (Chapman) and/or depletion (Carle-Strub) estimates
- Calculated mobile antenna detection probabilities during depletion e-fishing in closed reaches (% tagged / % detected)
- Condition: Fulton's condition factor and Relative Weight (>120mm TL)
- Size Structure: Length frequency distribution

Results Redd Survey Data 2025



Redd Survey 2026



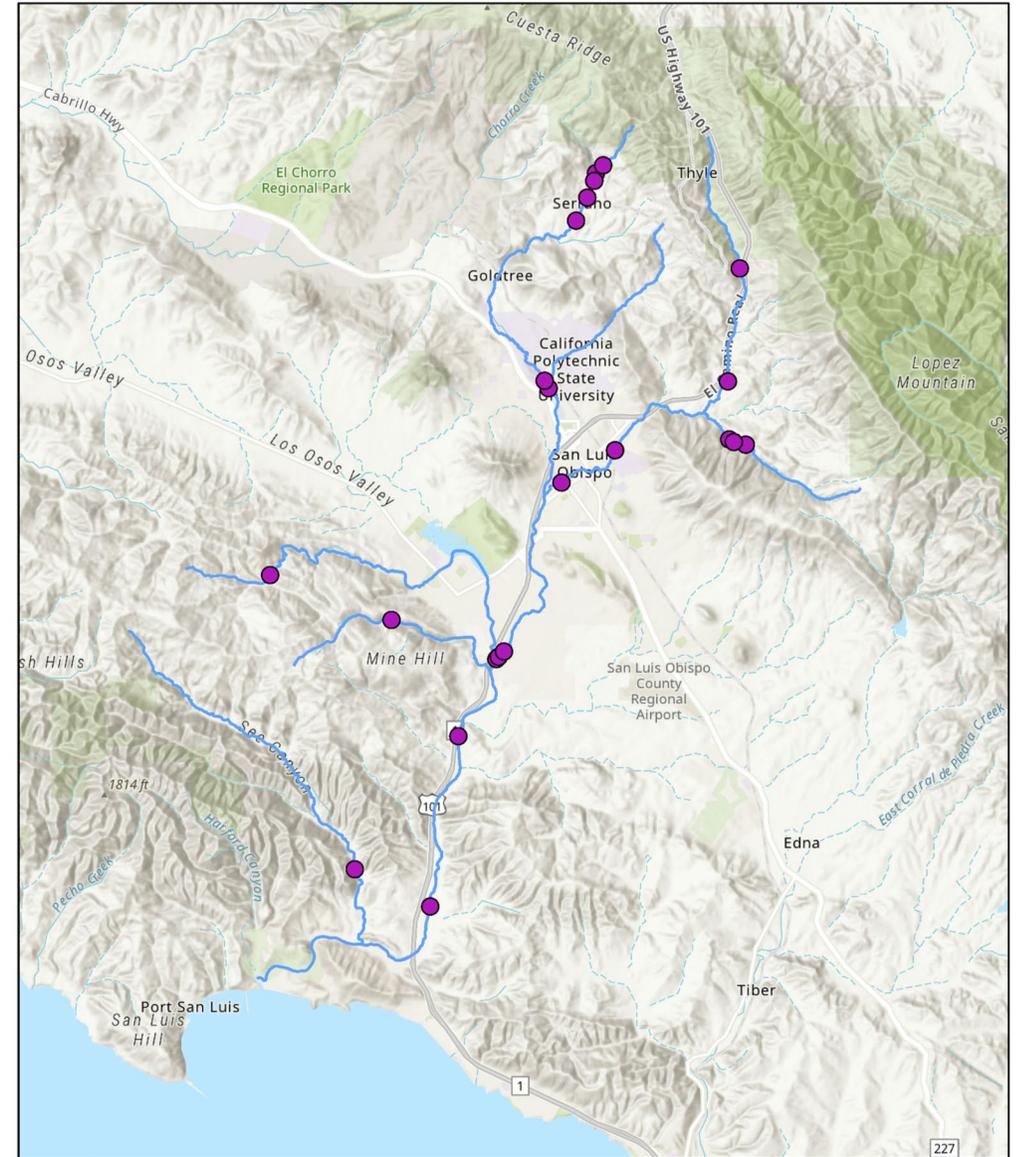
number	Site	PropertyOwnership
1	Avila Valley Barn Downstream Property Boundry to Antenna	A/B / SLO Co.
2	Land Conservancy Floodplain Preserve	LC SLO
3	East Fork confluence to Octagon Way Bridge	City of SLO / Hyashi
4	Octagon Way to Los Osos Valley Rd	Hyashi
5	City of SLO WRRF outfall to Prado Rd	City of SLO
6	Madonna Rd to Marsh St	City of SLO
7	Mission Plaza - Nipomo St to Tunnel Outlet	City of SLO
8	SLO HS - RR Trestle to Andrews St Bridge	City of SLO / Easement
9	SLO Creek City Property Below 101 Crossing DS of Cuesta Park	City of SLO / Easement
10	Cuesta Park - DS 101 crossing to US 101 Crossing	SLO Co.
11	Above 101 Crossing at Stagecoach Rd to Old Dam	City of SLO

- SLO City crews are just focusing on mainstem SLO Creek, CDFW is surveying Stenner Creek.
- Reach 2 is twice as long as in 2025.
- Added Reach 3, 4, and 5.
- Reach 9 and 10 may help determine passage around Cuesta Park culverts and the Arizona crossing.
- Reach 11 is a refugia population in upper SLO Creek above a potential barrier under Hwy 101.

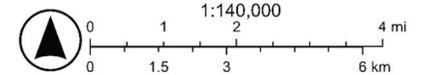


O. mykiss Presence Map

Fall 2025 Electrofishing Surveys



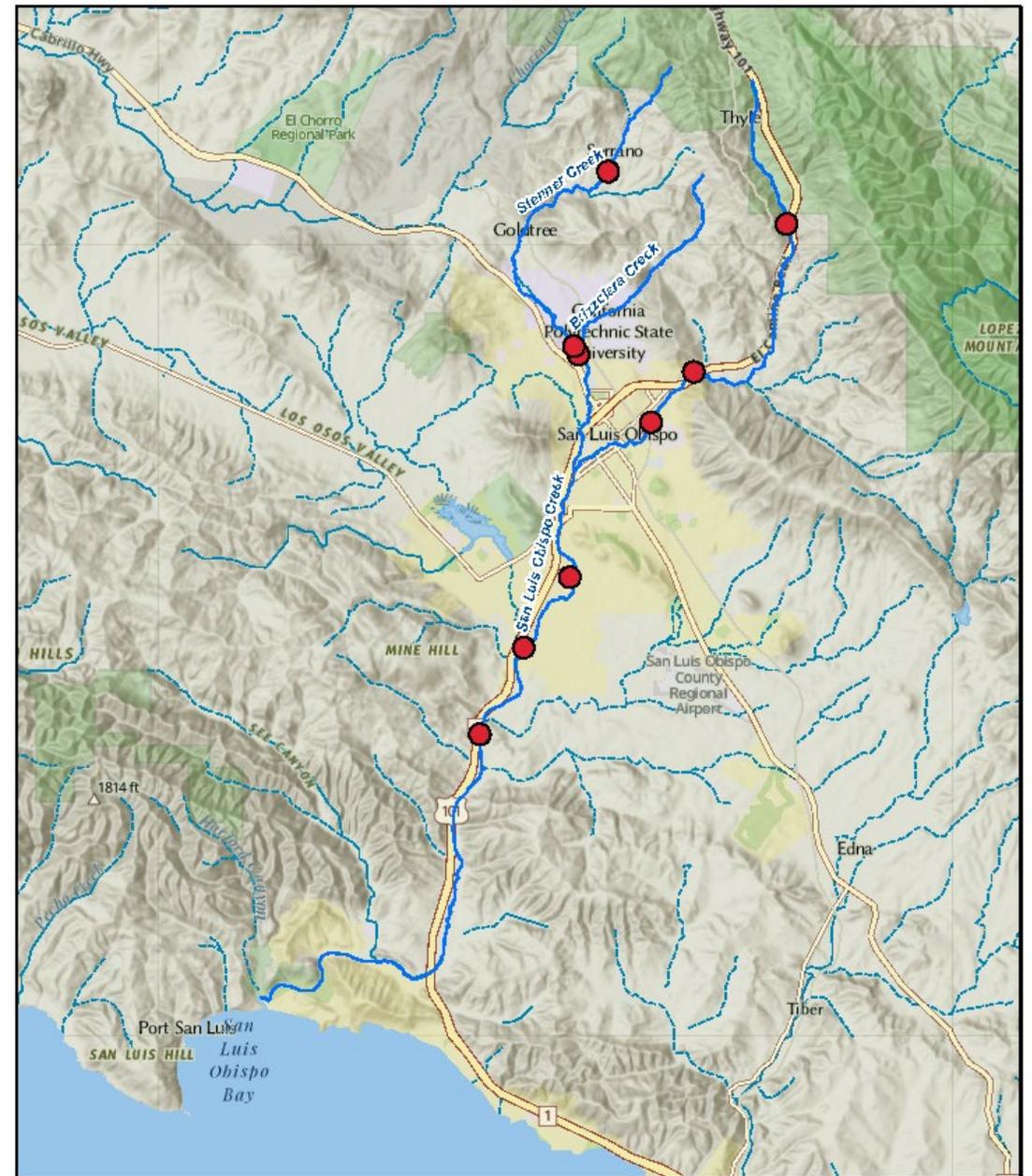
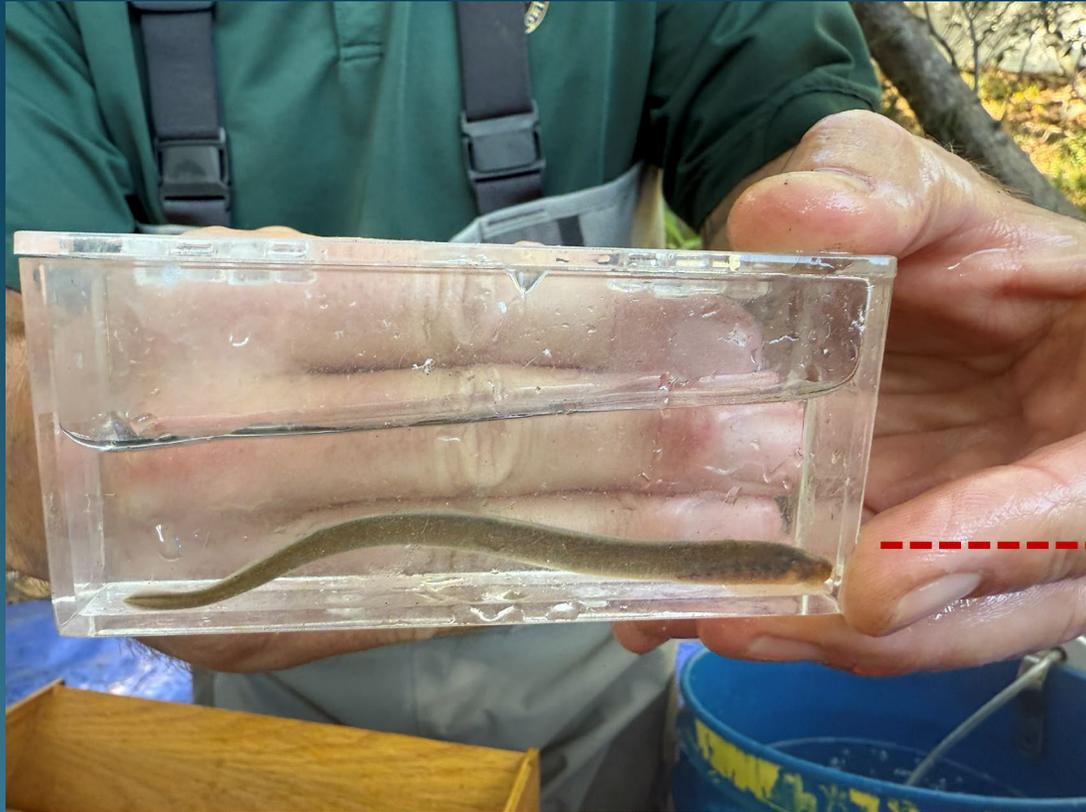
● *O. mykiss* Presence



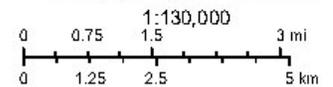
Esri, CGIAR, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community CDFW Region 4

Pacific Lamprey

Fall 2025 Electrofishing Surveys

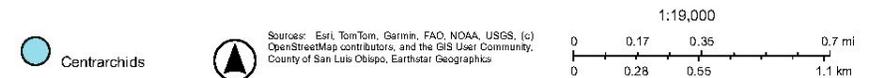
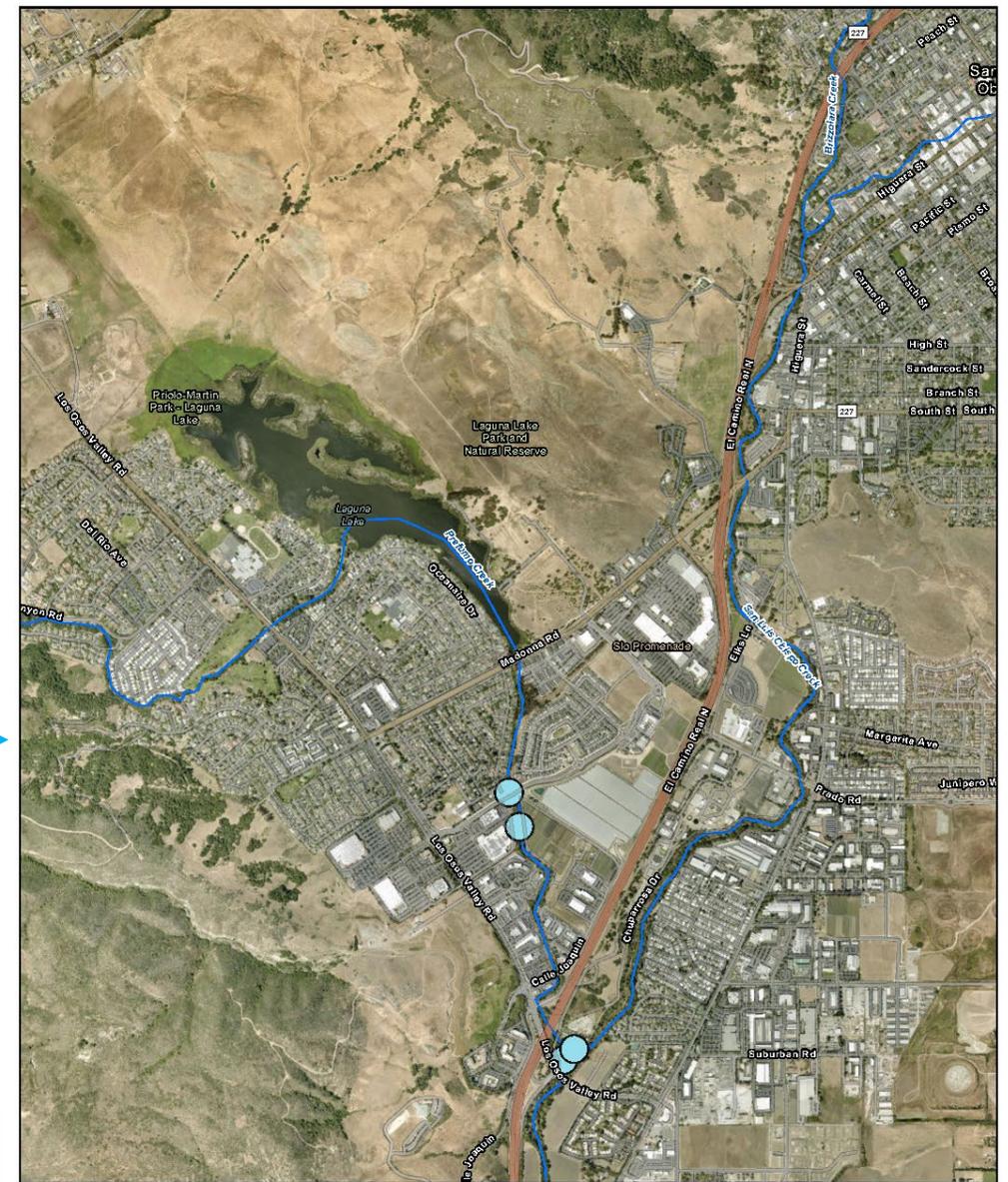


● Lamprey Detection



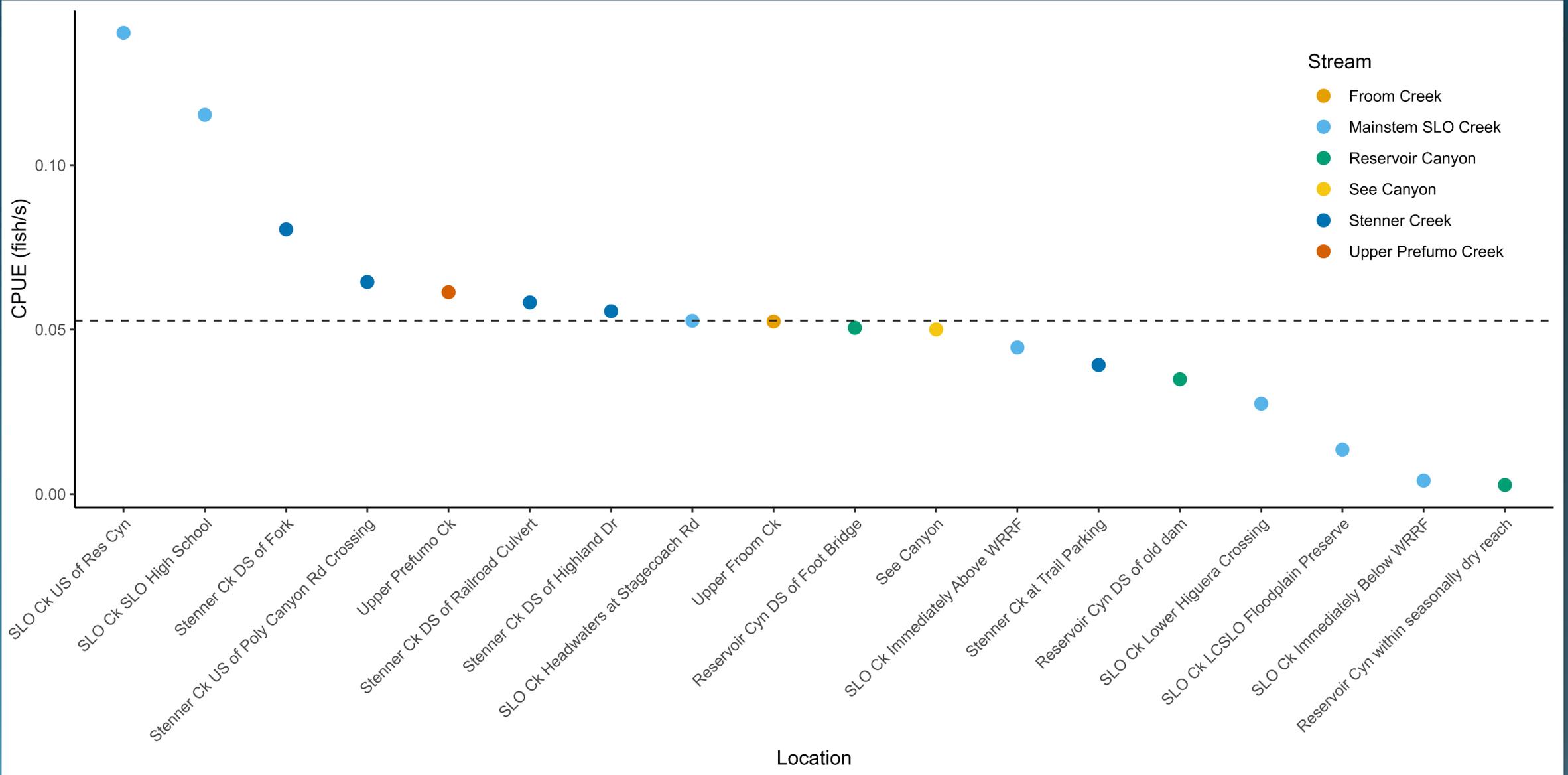
CDFW Region 4

Non-Native Centrarchids



Only detected in lower Prefumo Creek and at City of SLO WRRF near Prefumo Confluence

Results – Relative Abundance (*O. mykiss*)



Results – Abundance at Index Reaches

Area	Site	Fall 2024		Fall 2025		
		N (± 90% CI)	# 1 st Pass <i>O. mykiss</i>	# PIT Tagged Recaps	N (± 95% CI)	# 1 st Pass <i>O. mykiss</i>
SLO Headwaters	Stagecoach Rd.	182 ± 49	125	8	171 ± 11	160
SLO Upper	SLO High School	251 ± 39	221	1	672 ± 52	557
SLO Middle	Downstream of Los Osos Valley Rd.	19 ± 15	9	-	-	-
SLO Lower	LCSLO Floodplain Preserve	NA [^]	22	2	124 ± 24	101
Upper Stenner	Stenner Creek Trail Parking Area	-	-	-	123 ± 11	113



[^] Indicates failed mark-recapture estimate due to insufficient # of recaptures

- Indicates no data

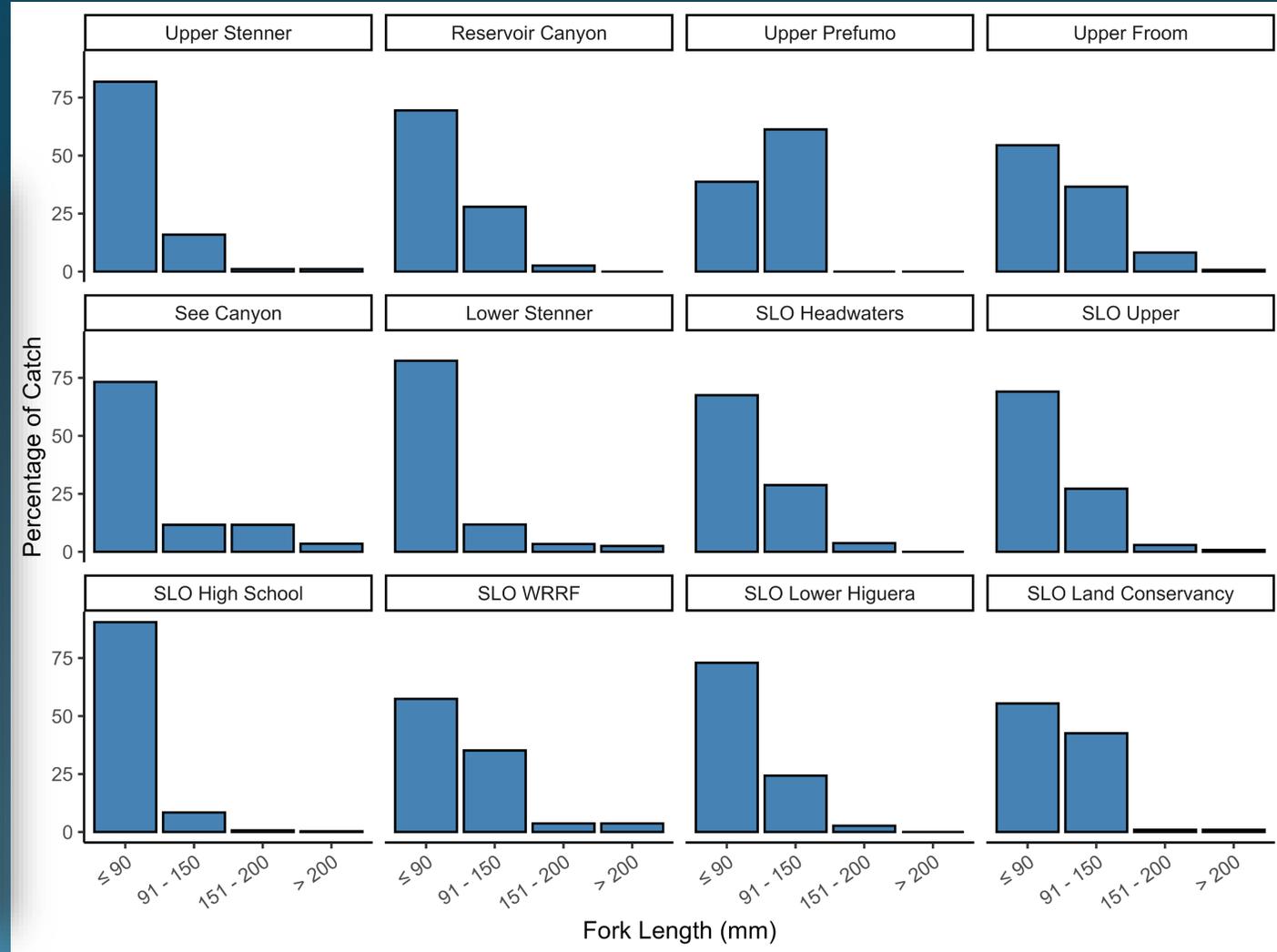
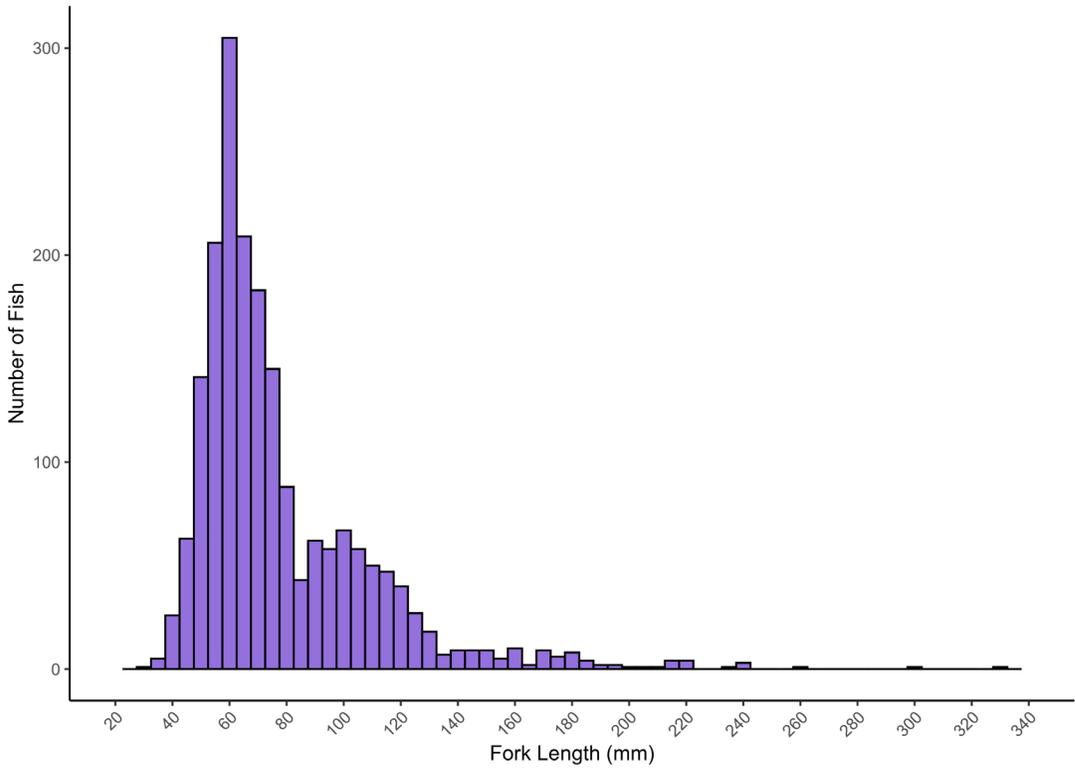
Notes: Upper Stenner not sampled in 2024; SLO Middle not sampled in 2025 due to high water temperature

Creek Repair / Enhancement at SLO High School

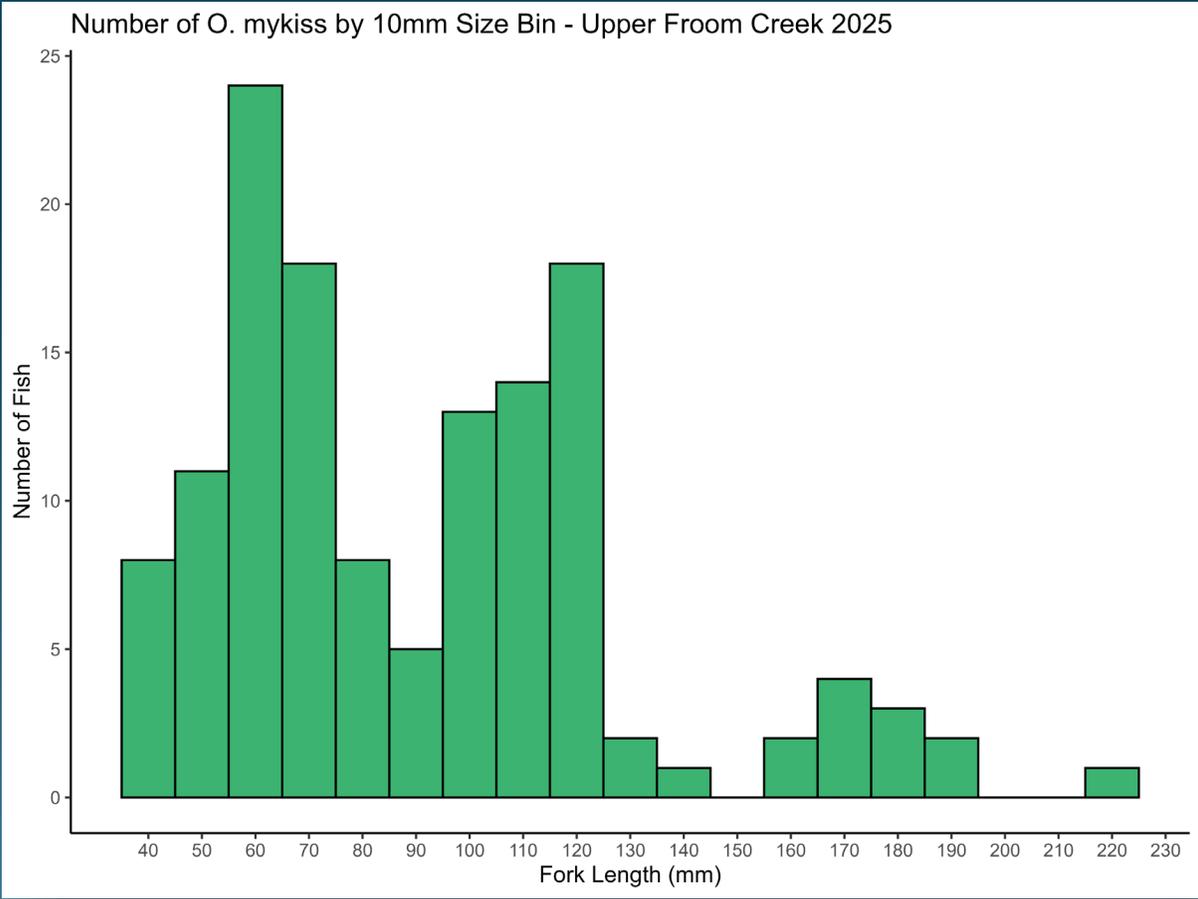


Results – Size Structure

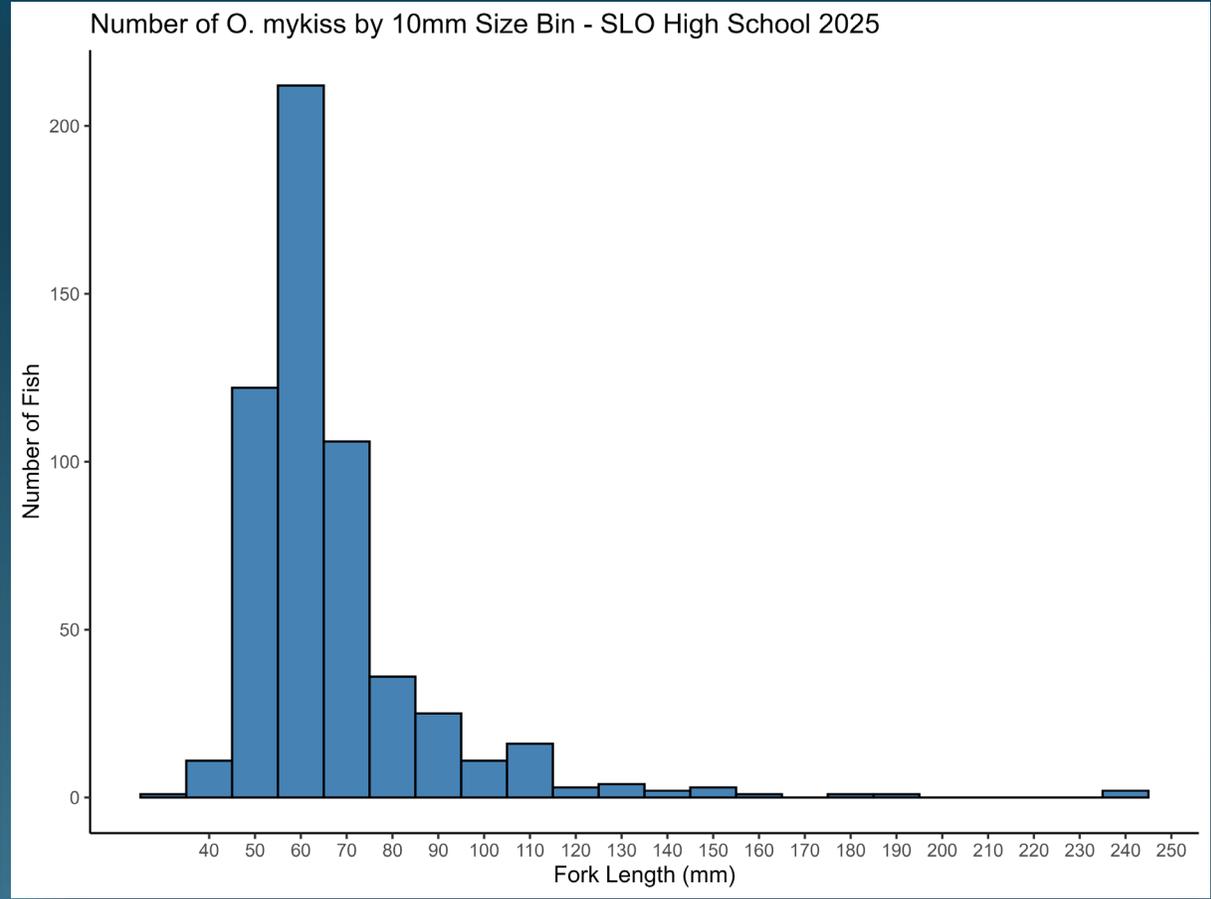
O. mykiss Length Frequency Distribution - All Sites 2025



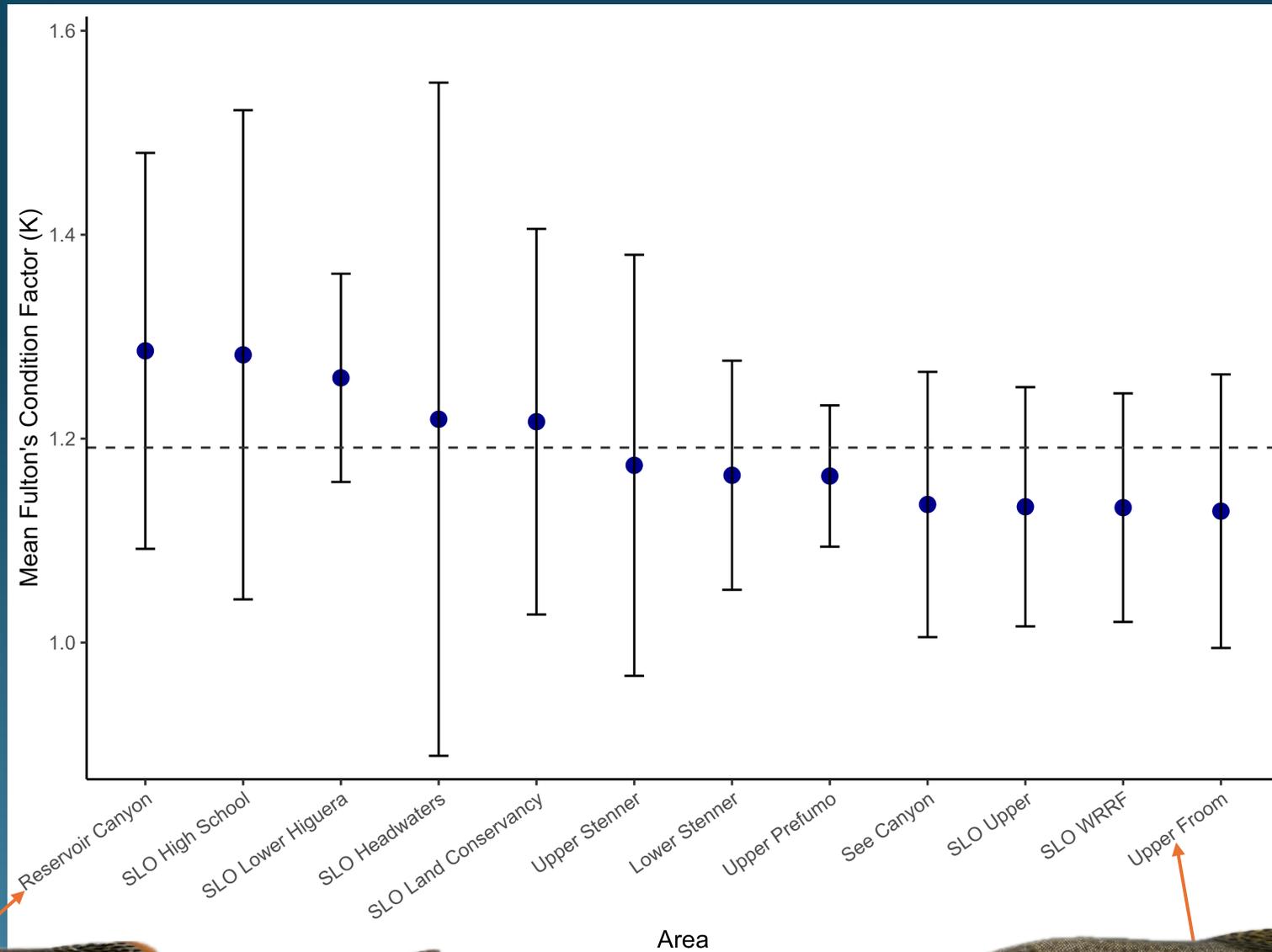
Primarily Resident Population



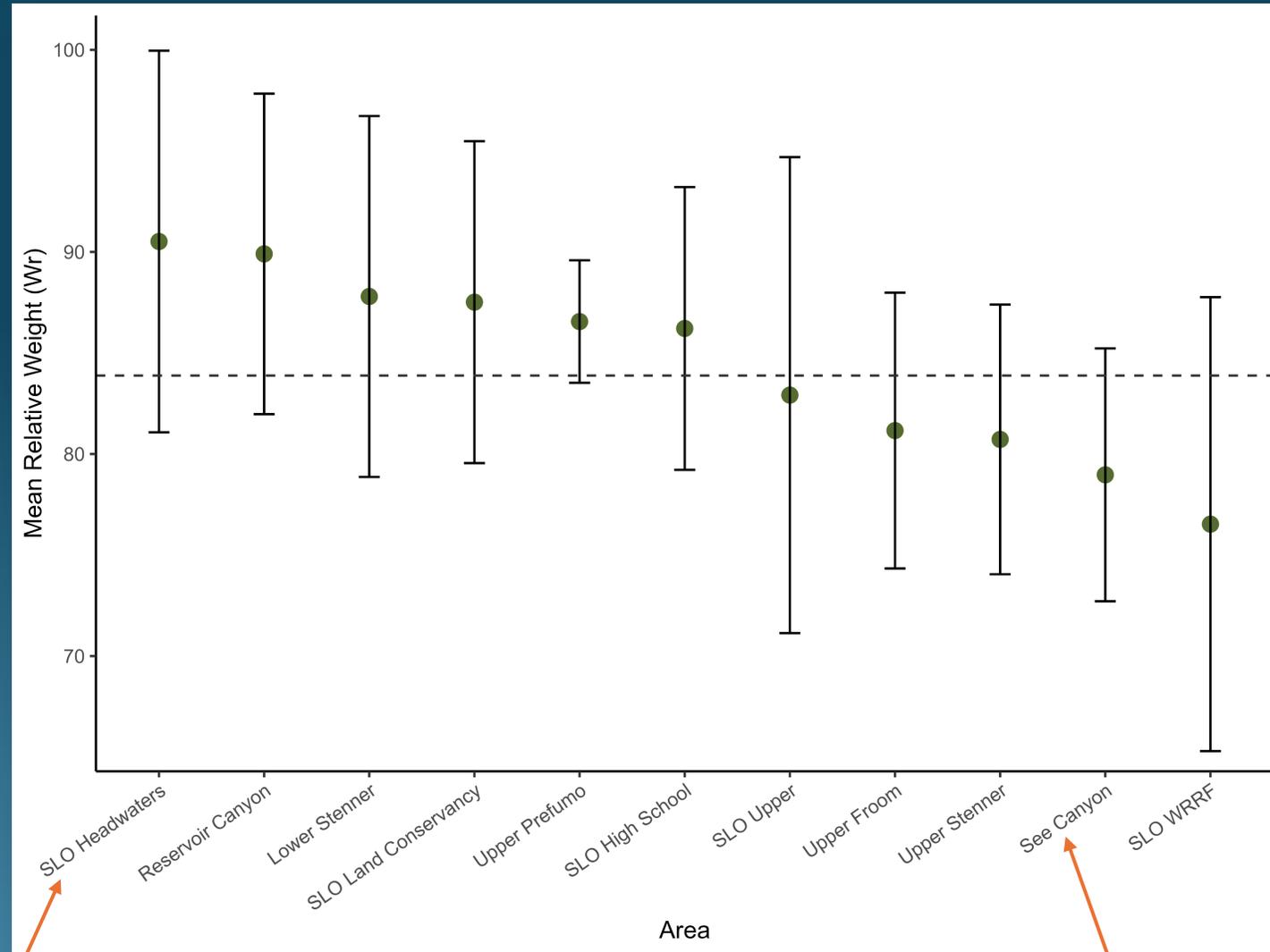
Anadromous Influence in Population



Results – Fulton's Condition Factor (K)



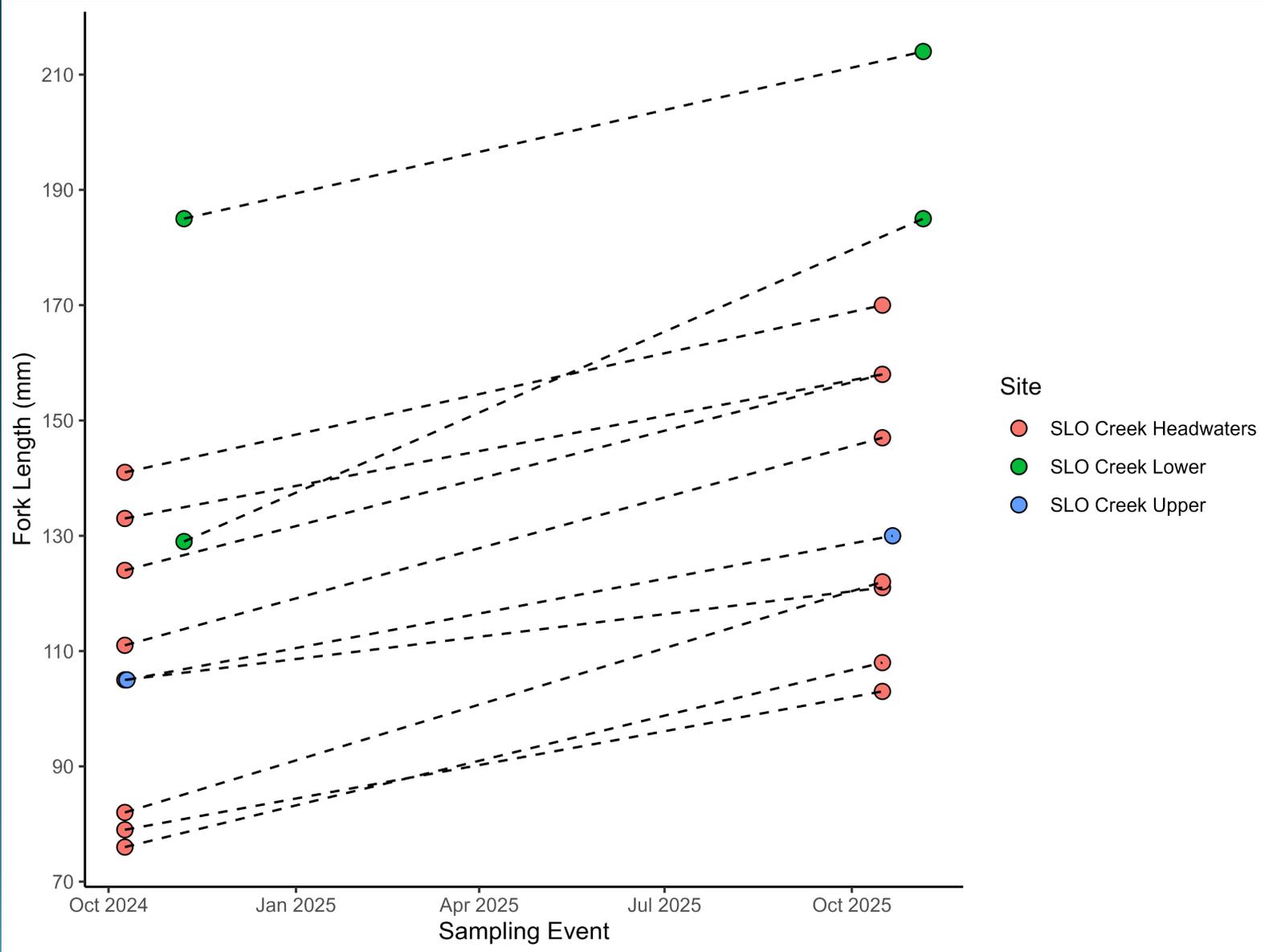
Results – Relative Weight* (W_r)



**Note that this is for fish ≥ 120 mm TL*



Recap Growth



Mobile Antenna Detection Probabilities

Tag Size (mm)	Site	Detection Probability (%)	# Fish Tagged
12	Stenner Headwaters	75	8
	SLO Headwaters	58	12
	SLO High School	50	60
	SLO Land Conservancy	20	44
14	Stenner Headwaters	58	19
	SLO Headwaters	35	37
	SLO High School	44	52
	SLO Land Conservancy	45	44
23	Stenner Headwaters	100	1
	SLO Headwaters	67	6
	SLO High School	70	10
	SLO Land Conservancy	0	1
All	Stenner Headwaters	64	28
	SLO Headwaters	36	55
	SLO High School	47	122
	SLO Land Conservancy	47	89

} **12 mm PIT tags**
Range: ~20 – 75%
Average: ~51%

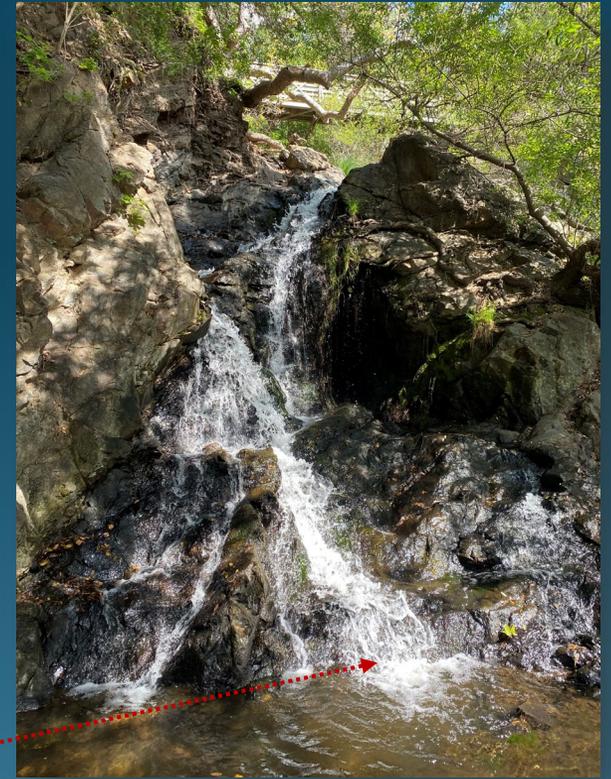
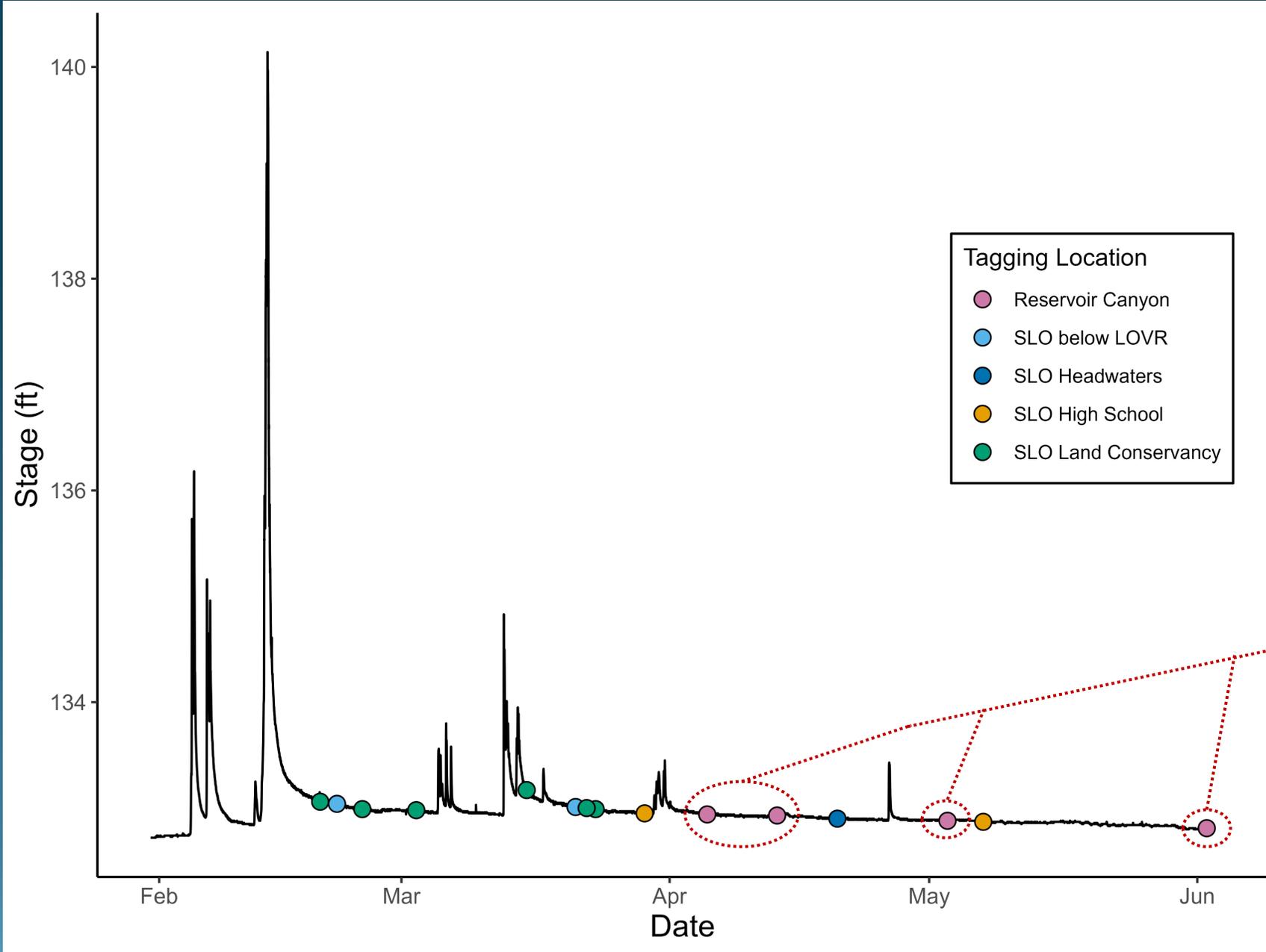
} **14 mm PIT tags**
Range: ~35 – 58%
Average: 46%

} **23 mm PIT tags**
Average: ~59%
Note: low sample size

- Detection probability varied between tag sizes and reaches

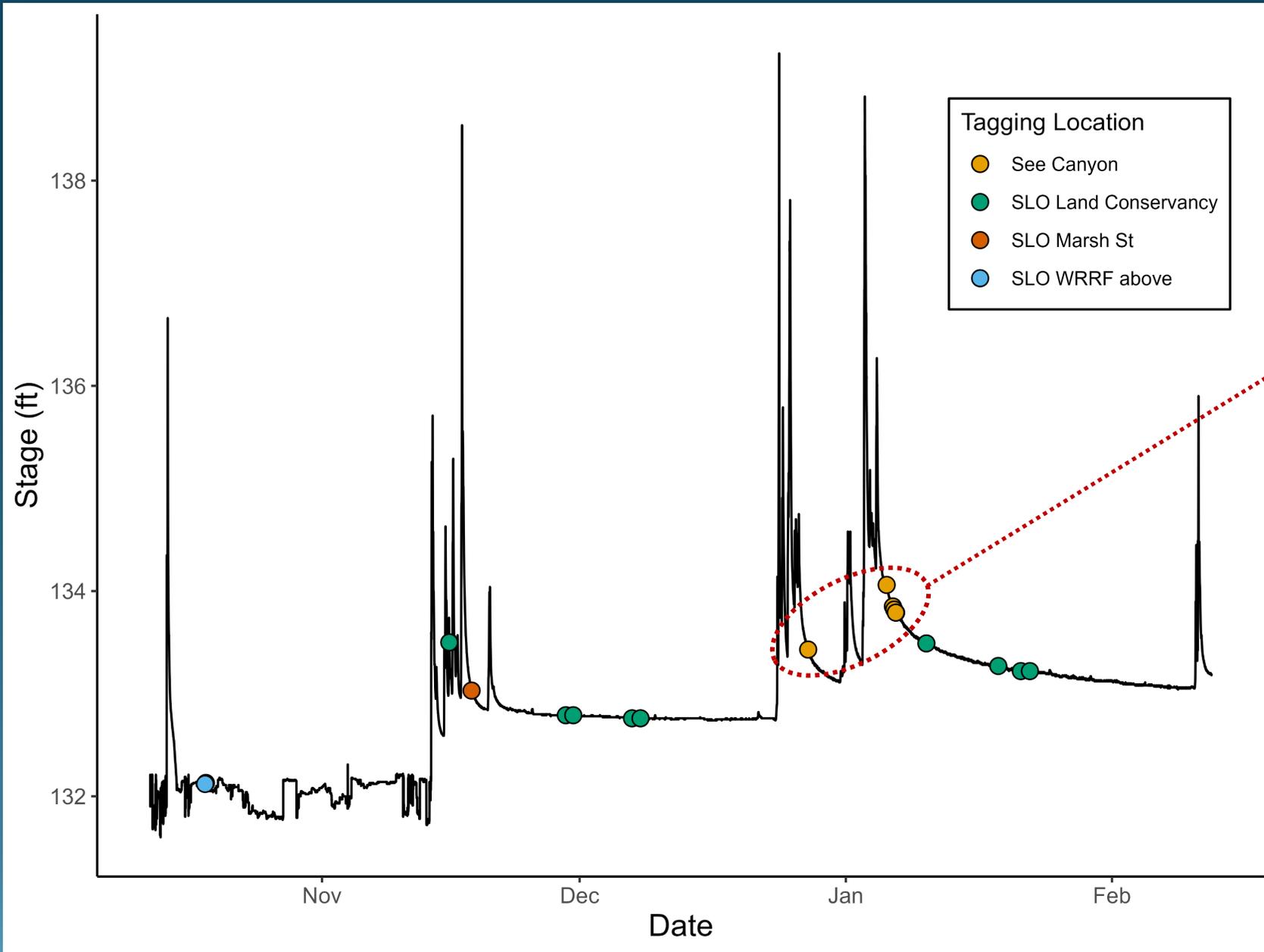
Results – Movement (Feb – June 2025)

Note: Stage Data from Elks Lane Gage (County of San Luis Obispo)



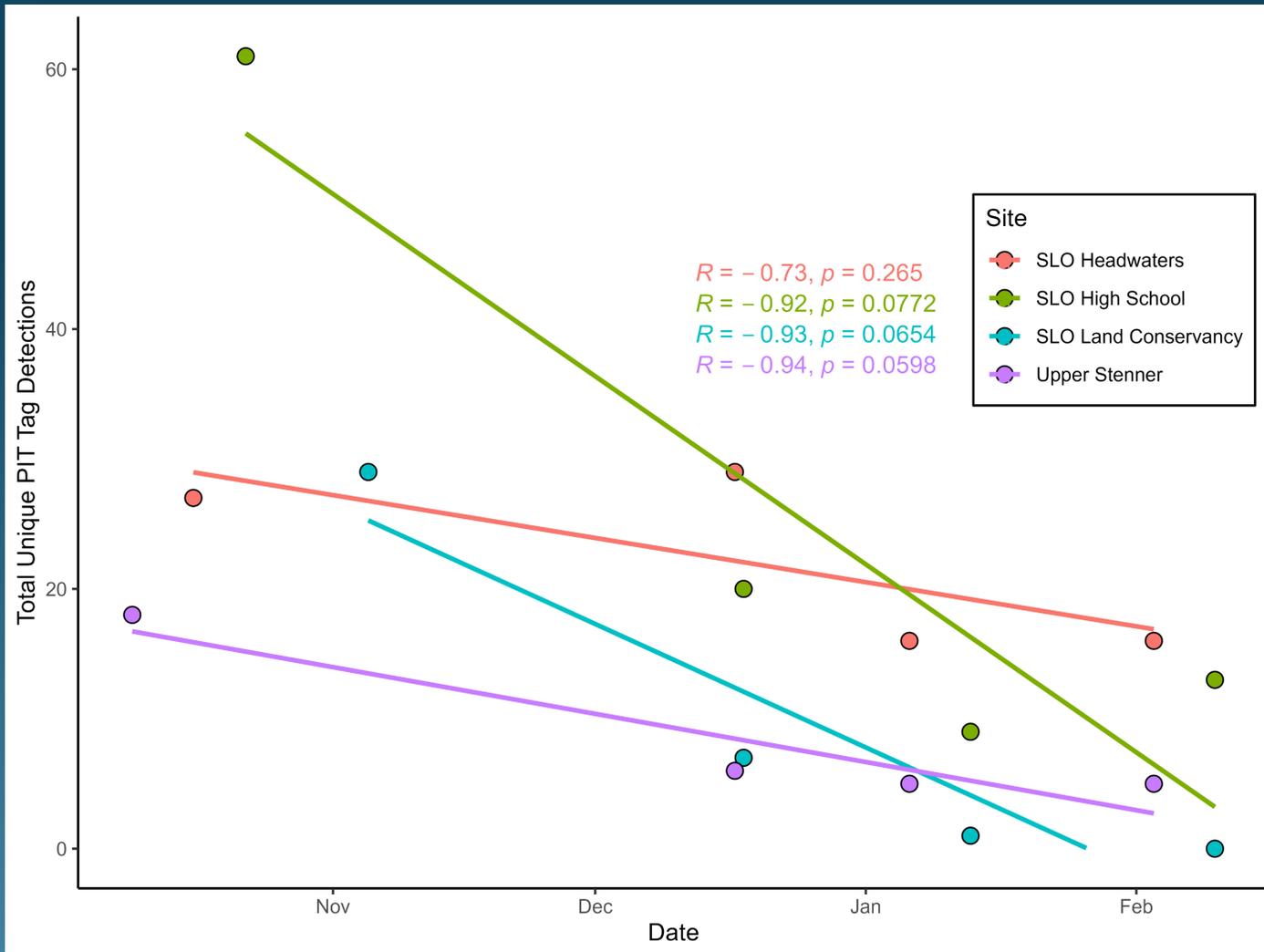
- Emigration from above ~25ft waterfall
- Emigration from all tagging sites
- Lower watershed fish emigrated earlier

Results – Movement (Fall 2025–mid February 2026)



- Upstream movement from See Canyon
- Fall downstream migration
- 10% of fish tagged at SLO Land Conservancy detected since tagging in Nov. 2025

Mobile Antenna Detections



- Number of fish detected generally declined over time for each site
- Higher flows in January surveys likely reduced detection probability
- SLO Headwaters – remained most consistent, suggesting high residency
- SLO Land Conservancy – high emigration from reach; total of 9 fish detected at stationary antenna since tagging
- Upper Stenner – Relatively high emigration from reach; 4 individuals detected downstream **below two total barriers** since tagging
- One SLO High School fish detected in Mission Plaza

Summary

- *O. mykiss* / Lamprey: Widely distributed; Non-native centrarchids: Limited to near Laguna Lake
- *O. mykiss* emigration from above total barriers
- Upstream movement through mainstem SLO Creek from See Canyon
- 1–2 steelhead redds in SLO High School reach led to very high YOY recruitment in 2025
- Some evidence of recruitment / recovery below WRRF following ammonia release (2023)
- Variability in: CPUE / Abundance / Condition by reach
 - Mobile antenna effectively detects fish and provides info on emigration / residency
 - Pass-over stationary PIT antenna effectively assesses migration

Acknowledgements

- CDFW Region 4 – Carrie Smith, Kayli Tibbs, Dennis Valentine, Kristine Atkinson
- CDFW Volunteers – Mike Elkins and Dave Highland
- CA Conservation Corps – Meredith Hardy, Rachel Condensa, and other Corpsmembers
- CCCs / Watershed Stewardship Program – Ruby Raheja and Taylor Cockrell
- Landowners – Avila Valley Barn, SLO Land Conservancy, City of SLO, County of SLO, private landowners



References

- Baldwin, D. 2023. San Luis Obispo Creek Unionized Ammonia Release Fish Kill Summary (Draft). California Department of Fish and Wildlife, Central Region (Region 4).
- Banish, N. P., Burdick, S. M., and Moyer, K. R. 2016. Efficiency of portable antennas for detecting passive integrated transponder tags in stream-dwelling salmonids. *Plos one* 11(2): e0149898.
- Brewitt, K. S., and Danner, E. M. 2014. Spatio-temporal temperature variation influences juvenile steelhead (*Oncorhynchus mykiss*) use of thermal refuges. *Ecosphere* 5(7):1–26.
- Burnett, N. J., Stamplecoskie, K. M., Thiem, J. D., and Cooke, S. J. 2013. Comparison of detection efficiency among three sizes of half-duplex passive integrated transponders using manual tracking and fixed antenna arrays. *North American Journal of Fisheries Management* 33(1):7–13.
- Crum, Z., Mead, C., O'Rourke, T., Del Core, A. 2023. Drought Monitoring on South-Central California Coastal Watersheds during 2022–2023. Annual Report. California Department of Fish and Wildlife, Central Region (Region 4).
- Crum, Z, Smith, C. 2024. Technical Report (Draft) in review. San Luis Obispo Creek Fisheries Monitoring and Assessment Fiscal Year 2024–25 . California Department of Fish and Wildlife, Central Region (Region 4).
- Dodson, J.J., Aubin-Horth, N., Thériault, V., and Páez, D.J. 2013. The evolutionary ecology of alternative migratory tactics in salmonid fishes. *Biol. Rev.* 88(3): 602–625. doi:10.1111/brv.12019.
- Dressler, T. L., Han Lee, V., Klose, K., and Eliason, E. J. 2023. Thermal tolerance and vulnerability to warming differ between populations of wild *Oncorhynchus mykiss* near the species' southern range limit. *Scientific reports* 13(1):14538.
- D.W. ALLEY & Associates. 2008. 2007 Juvenile Steelhead Distribution and Population Estimate for the San Luis Obispo Creek Watershed, San Luis Obispo County, California.
- Heincke, F. 1908. Bericht über die Untersuchungen der Biologischen Anstalt auf Helgoland zur Naturgeschichte der Nutzfische. Die Beteiligung Deutschlands an der Internationalen Meeresforschung 1908:4/5:67–155.
- Kobayashi, K. M., Bond, R. M., Reid, K., Garza, J. C., Kiernan, J. D., and Palkovacs, E. P. 2024. Genetic divergence and one-way gene flow influence contemporary evolution and ecology of a partially migratory fish. *Evolutionary applications* 17(6):e13712.
- McMillan, J. R., Dunham, J. B., Reeves, G. H., Mills, J. S., and Jordan, C. E. 2012. Individual condition and stream temperature influence early maturation of rainbow and steelhead trout, *Oncorhynchus mykiss*. *Environmental Biology of Fishes* 93(3):343–355.
- Saboret, G., Dermond, P., & Brodersen, J. 2021. Using PIT-tags and portable antennas for quantification of fish movement and survival in streams under different environmental conditions. *Journal of Fish Biology* 99(2):581–595.
- Stillwater Sciences. 2024. San Luis Obispo Creek Steelhead Restoration Action Plan. Prepared by Stillwater Sciences, Morro Bay, California for Creek Lands Conservation, Arroyo Grande, California.
- Sibbald, G. 2023. State of California Department of Fish and Wildlife Memorandum: Biological Effects of Ammonia to Fish and Aquatic Life.
- Simpkins, D. G., & Hubert, W. A. 1996. Proposed revision of the standard-weight equation for rainbow trout. *Journal of Freshwater Ecology* 11(3):319–325.
- Sloat, M. R., Baker, P. F., and Ligon, F. K. 2011. Estimating habitat-specific abundances of PIT-tagged juvenile salmonids using mobile antennas: a comparison with standard electrofishing techniques in a small stream. *North American Journal of Fisheries Management* 31(5):986–993.
- Sloat, M. R., & Reeves, G. H. 2014. Individual condition, standard metabolic rate, and rearing temperature influence steelhead and rainbow trout (*Oncorhynchus mykiss*) life histories. *Canadian Journal of Fisheries and Aquatic Sciences* 71(4):491–501.
- Spina, A. P., Allen, M. A., and Clarke, M. 2005. Downstream migration, rearing abundance, and pool habitat associations of juvenile steelhead in the lower main stem of a south-central California stream. *North American Journal of Fisheries Management* 25(3):919-930.
- Temple, G. M., and T. N. Pearsons. 2006. Evaluation of the recovery period in mark recapture population estimates of Rainbow Trout in small streams. *North American Journal of Fisheries Management* 26:941-948.
- Thompson, S. K. 2012. Sampling, third edition. John Wiley & Sons, Inc., Hoboken, NJ, USA.
- Weber, C., Scheuber, H., Nilsson, C., and Alfredsen, K. T. 2016. Detection and apparent survival of PIT-tagged stream fish in winter. *Ecology and Evolution* 6(8):2536–2547.
- Zentner, D. L., Wolf, S. L., Brewer, S. K., and Shoup, D. E. 2021. A review of factors affecting PIT tag detection using mobile arrays and use of mobile antennas to detect PIT-tagged suckers in a wadeable Ozark stream. *North American Journal of Fisheries Management*, 41(3):697–710.

Questions?

