

Steelhead of the Ventura River Basin

Monitoring, Evaluation, and Research



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Andrew Bonsignori

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*Ventura Basin *O. mykiss* Monitoring, Evaluations, and Research*

1--Biological Opinion Evaluations for Robles Fish Facility.

2--Baseline Biological and Environmental Monitoring.

3--Steelhead and Rainbow Trout Research.

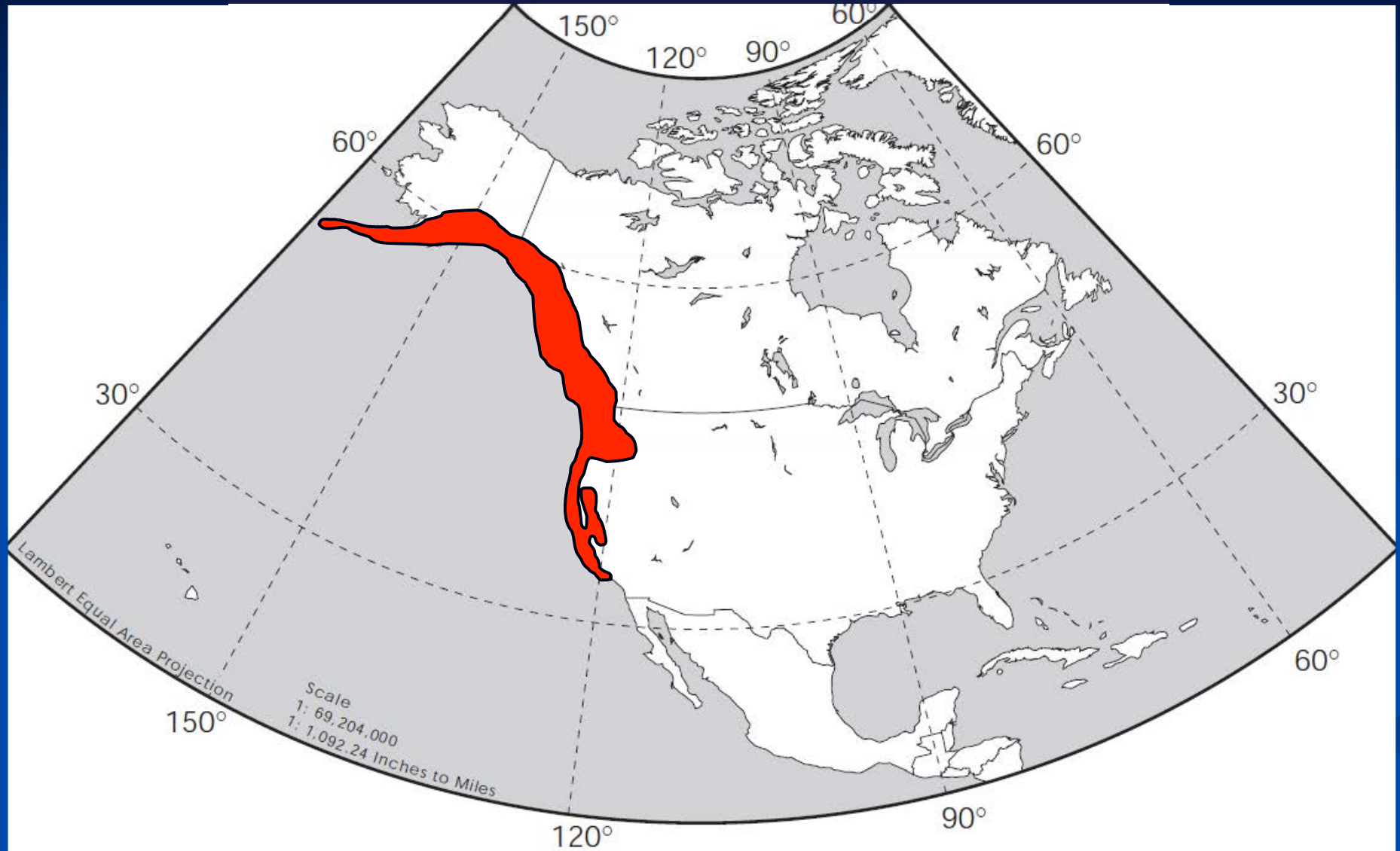
What is a Steelhead?

Oncorhynchus mykiss

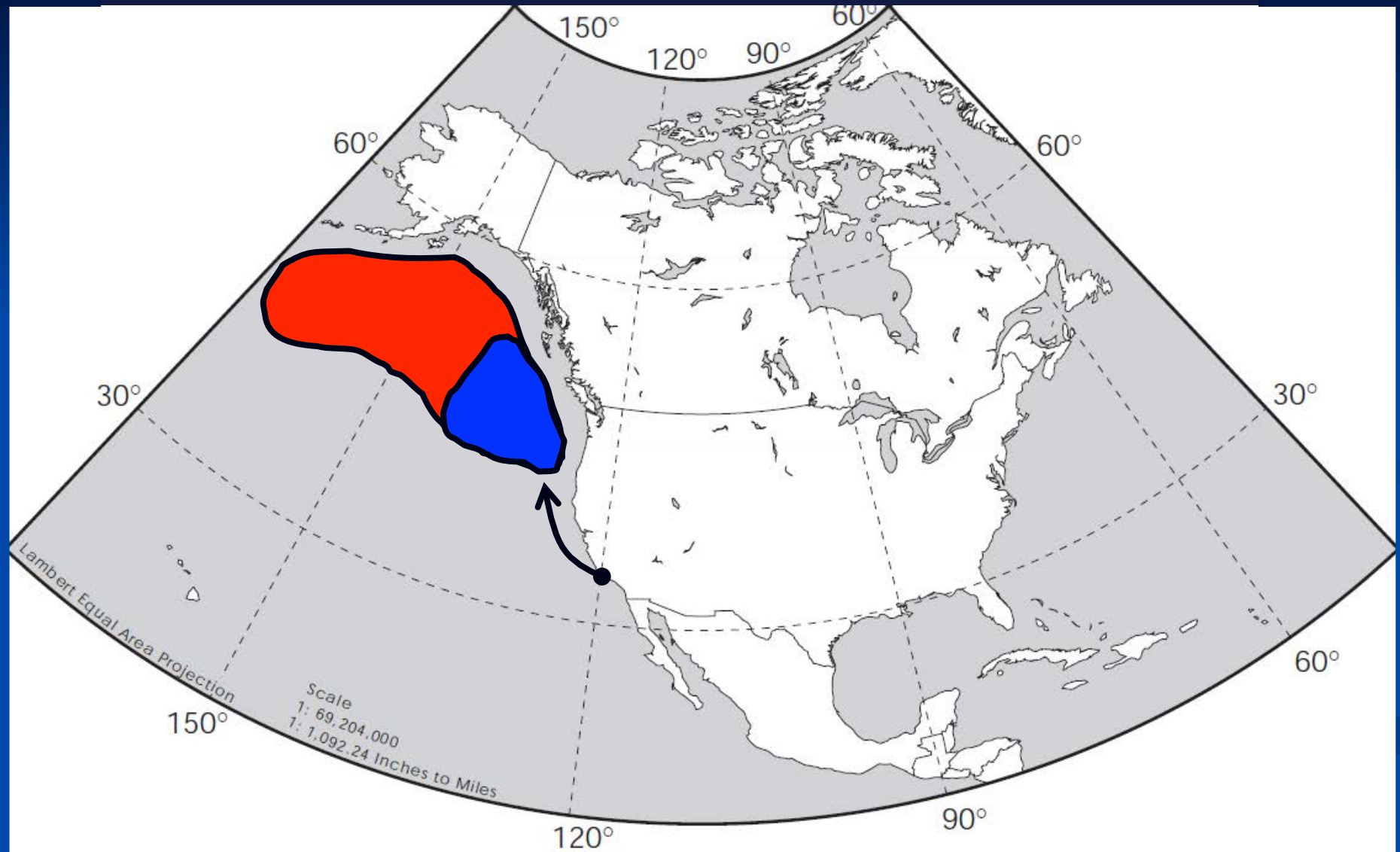
Rainbow Trout = *O. mykiss* that remain in freshwater throughout their lifecycle (resident life history form).

Steelhead Trout = *O. mykiss* that migrate to the ocean and then return to spawn in freshwater after 1-2 years (anadromous life history form).

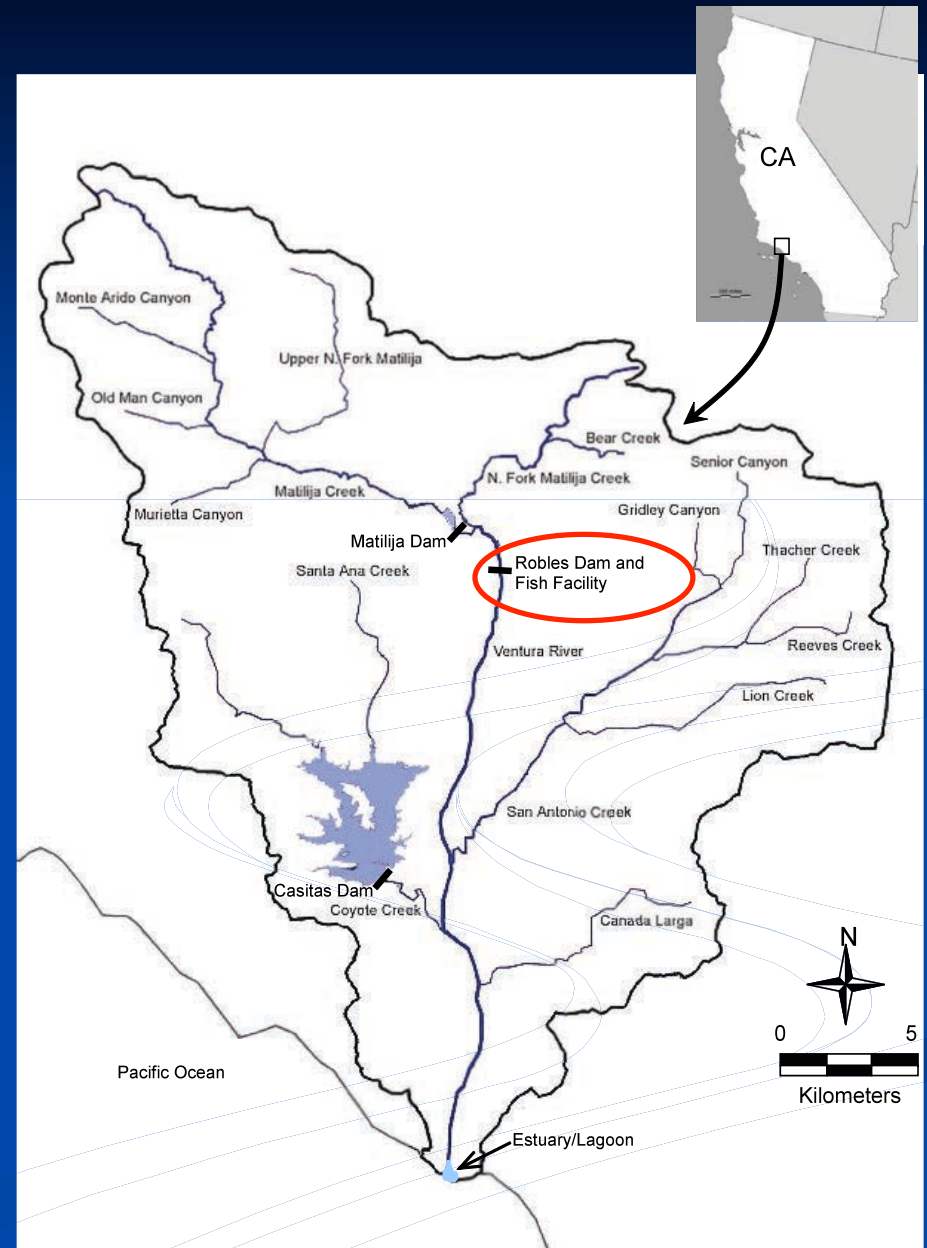
Freshwater Distribution



Steelhead Ocean Distribution



Passage Monitoring Robles Fish Facility (rkm 23)



Robles Fish Facility



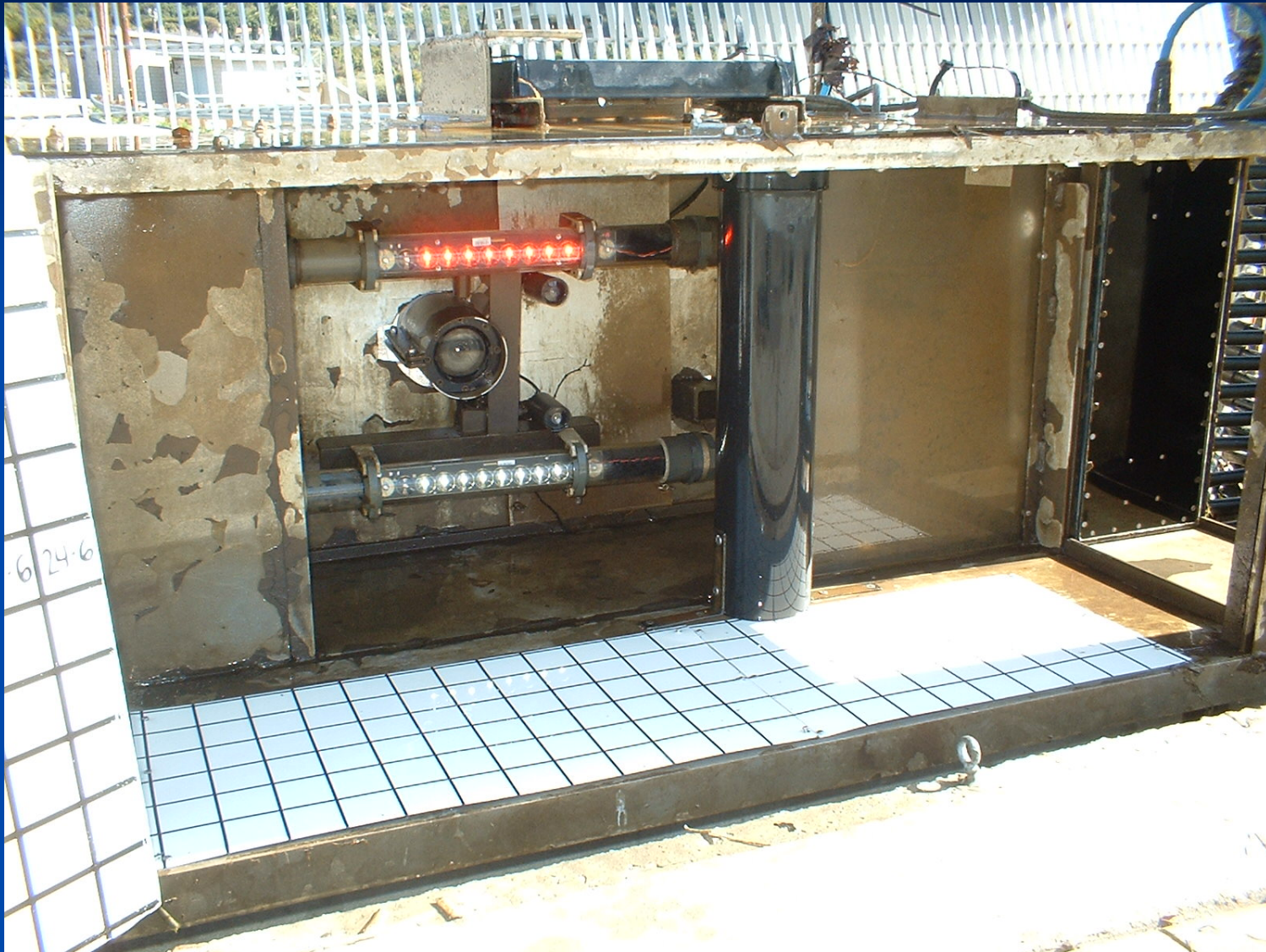




Passage Monitoring



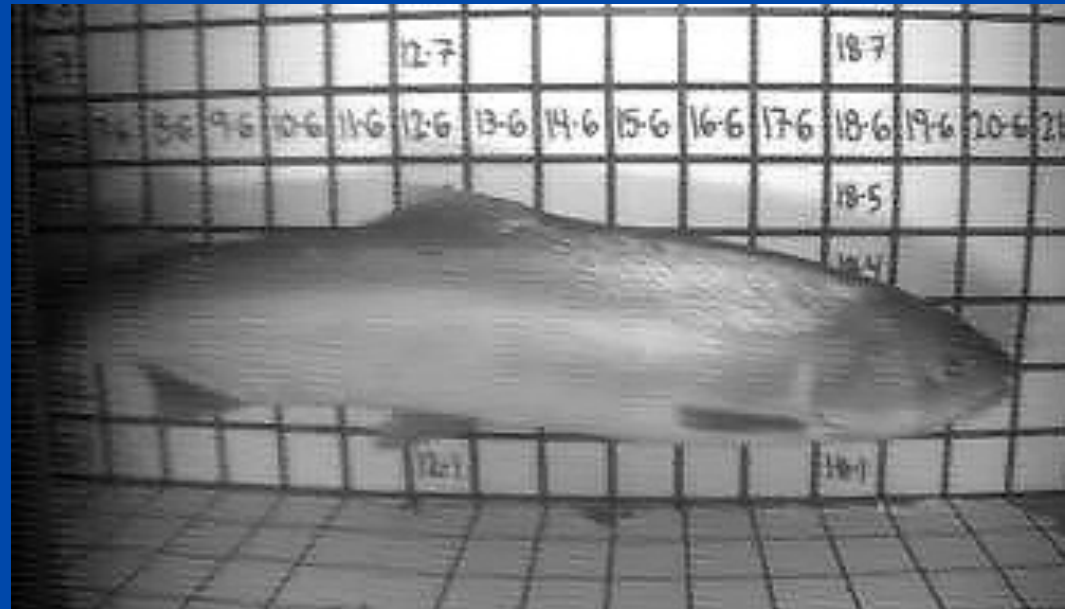
Vaki Riverwatcher



Vaki Riverwatcher

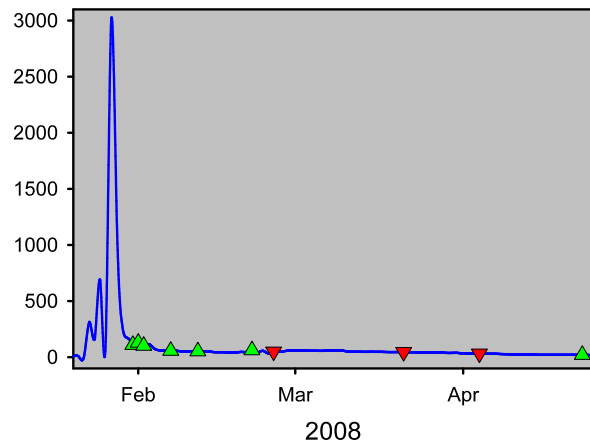


Silhouette



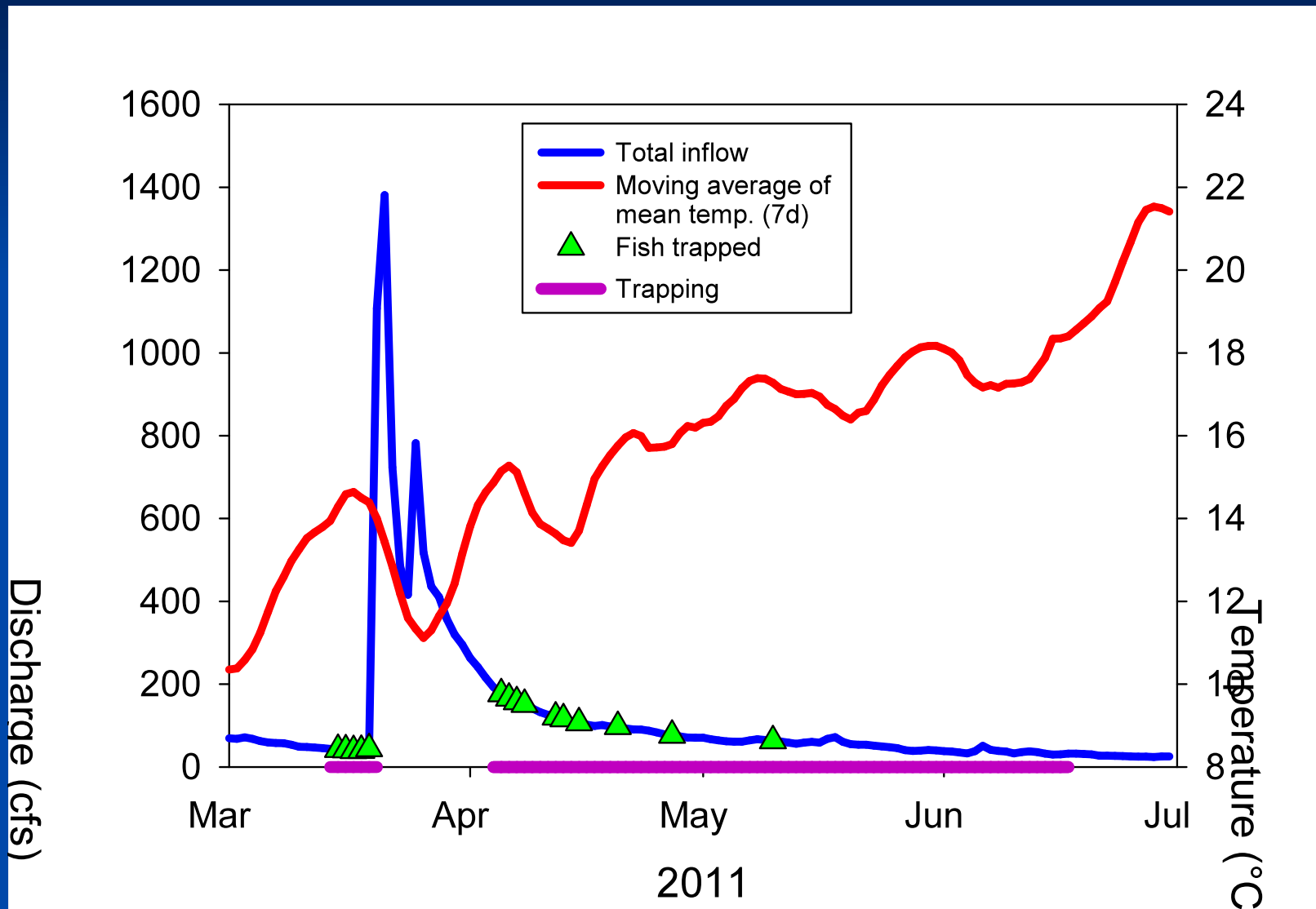
Video

Adult Passage and Discharge





Smolt Emigration Timing

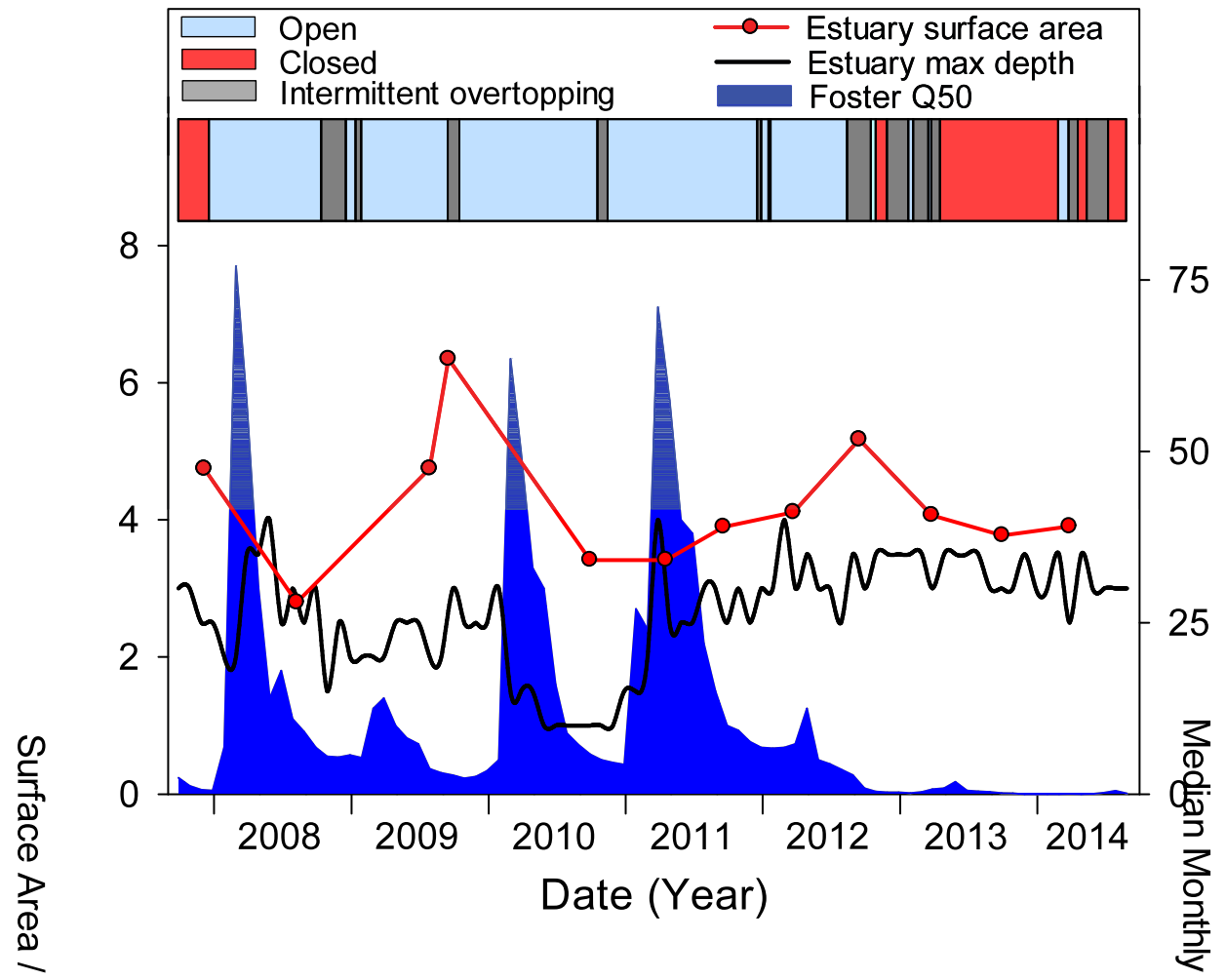






Sandbar and Estuary/Lagoon

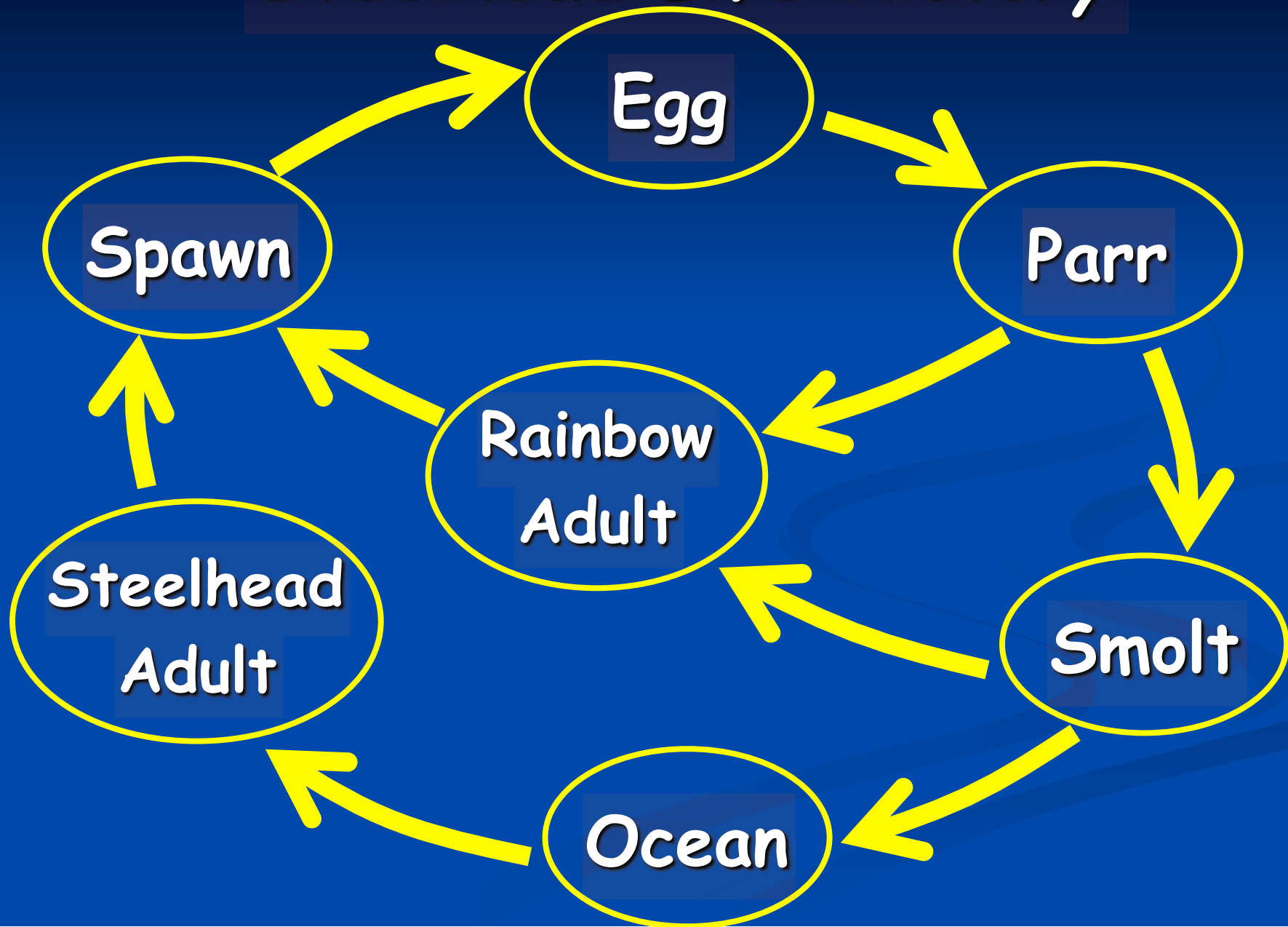




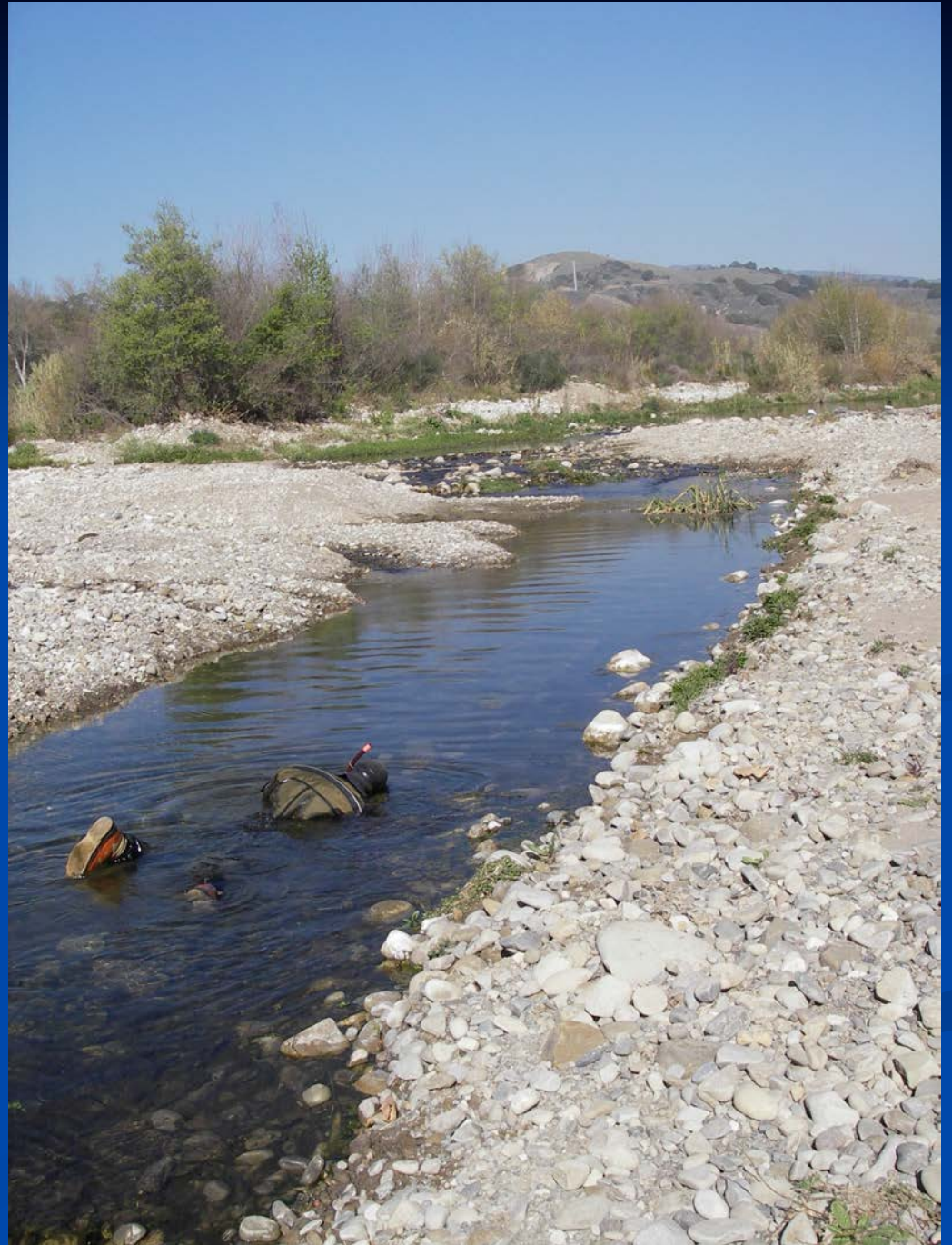
Biological and Environmental Monitoring

- Steelhead/Rainbow trout snorkel surveys.
- Spawning surveys.
- Ambient water quality monitoring.
- Photo-point monitoring.
- Ventura Basin subsurface water monitoring.
- Estuary/lagoon monitoring.
- Stream surveys.

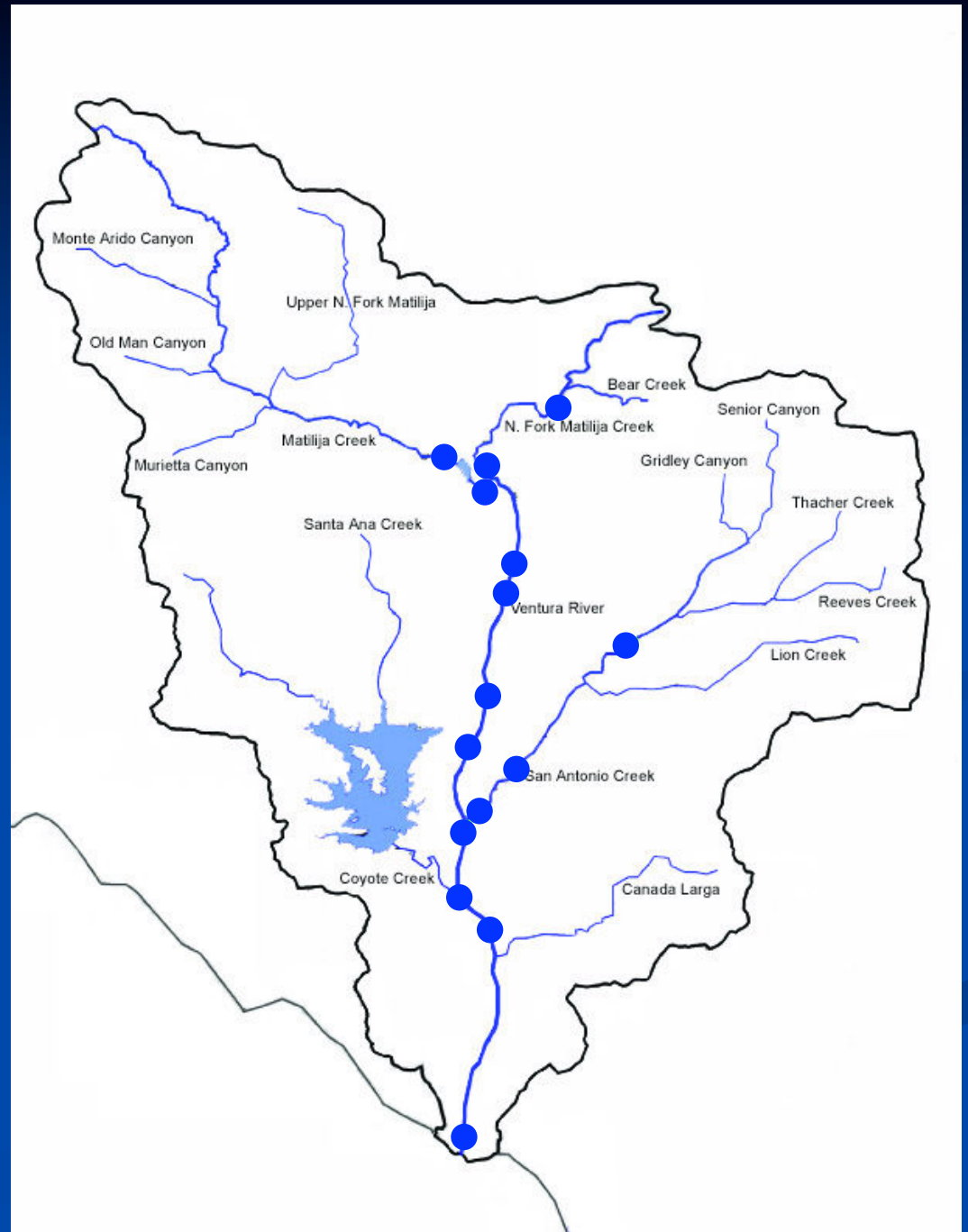
Steelhead Life History



O. mykiss
Snorkel Surveys



O. mykiss
Snorkel Surveys



Peak Monthly Snorkel Counts



Steelhead Redd Construction

Flow of Water



Tailspill

Egg Pocket

Flow of Water

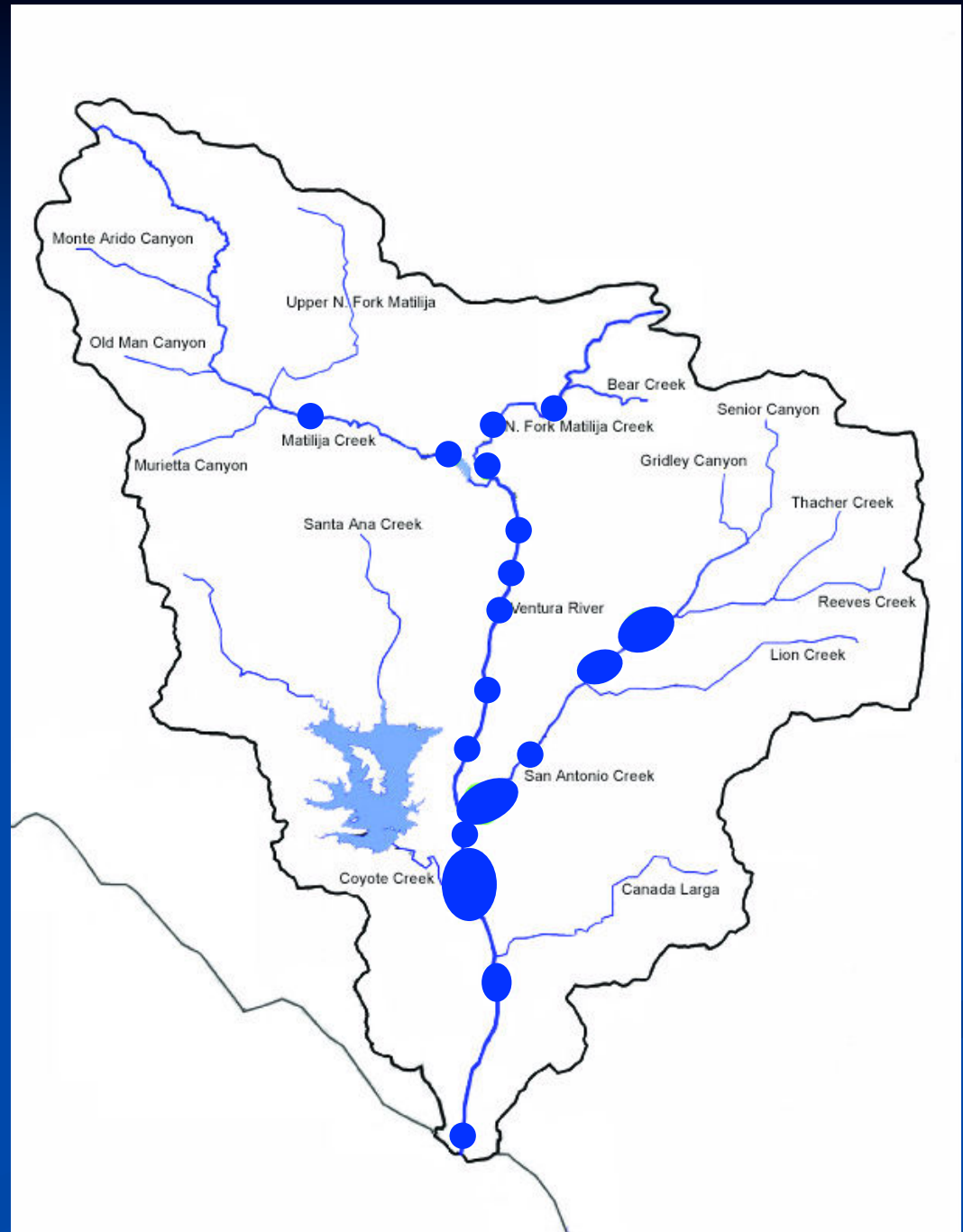


Pit

Steelhead Redds



O. mykiss
Spawning Surveys



Steelhead Redd Distribution

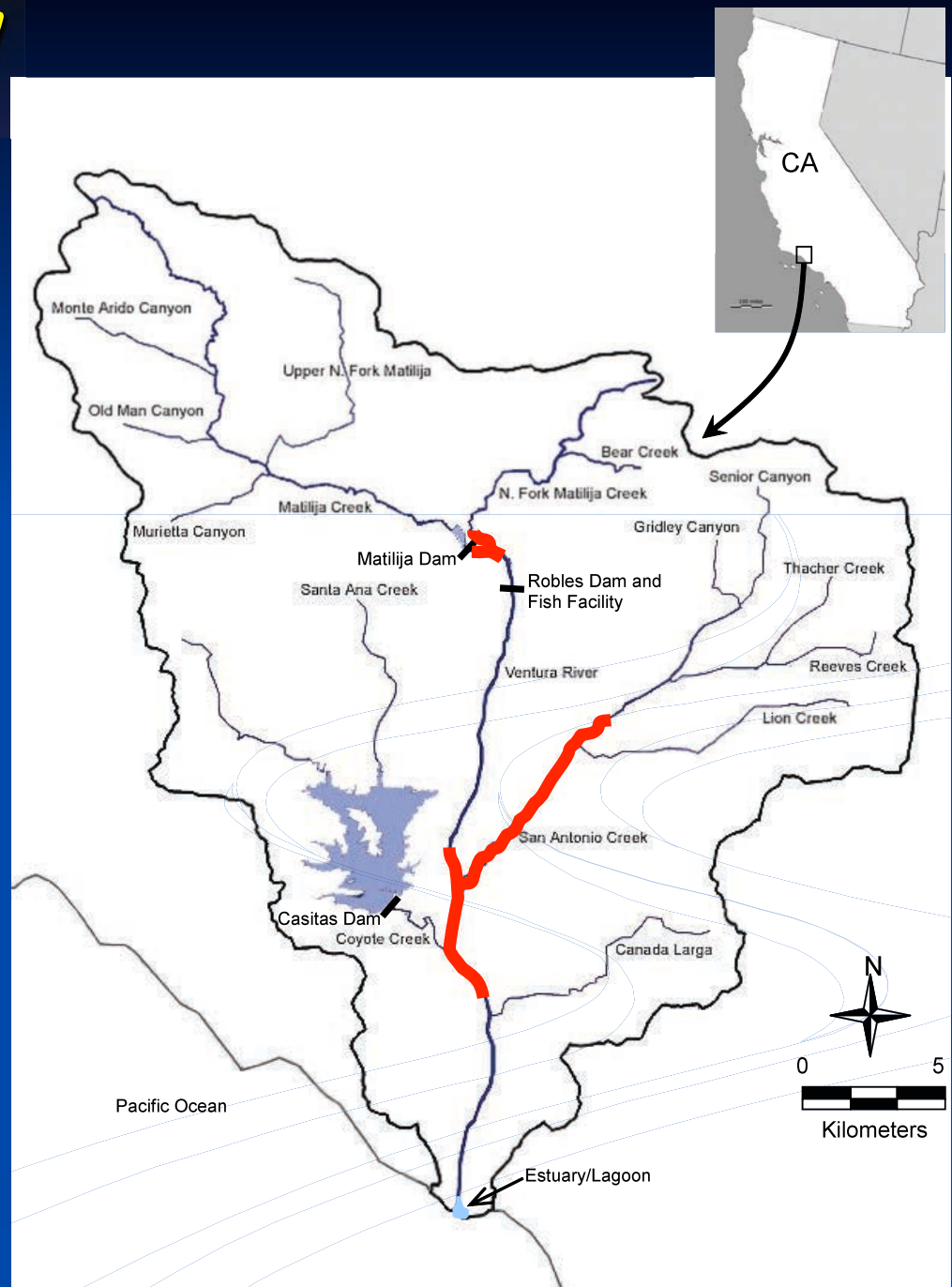
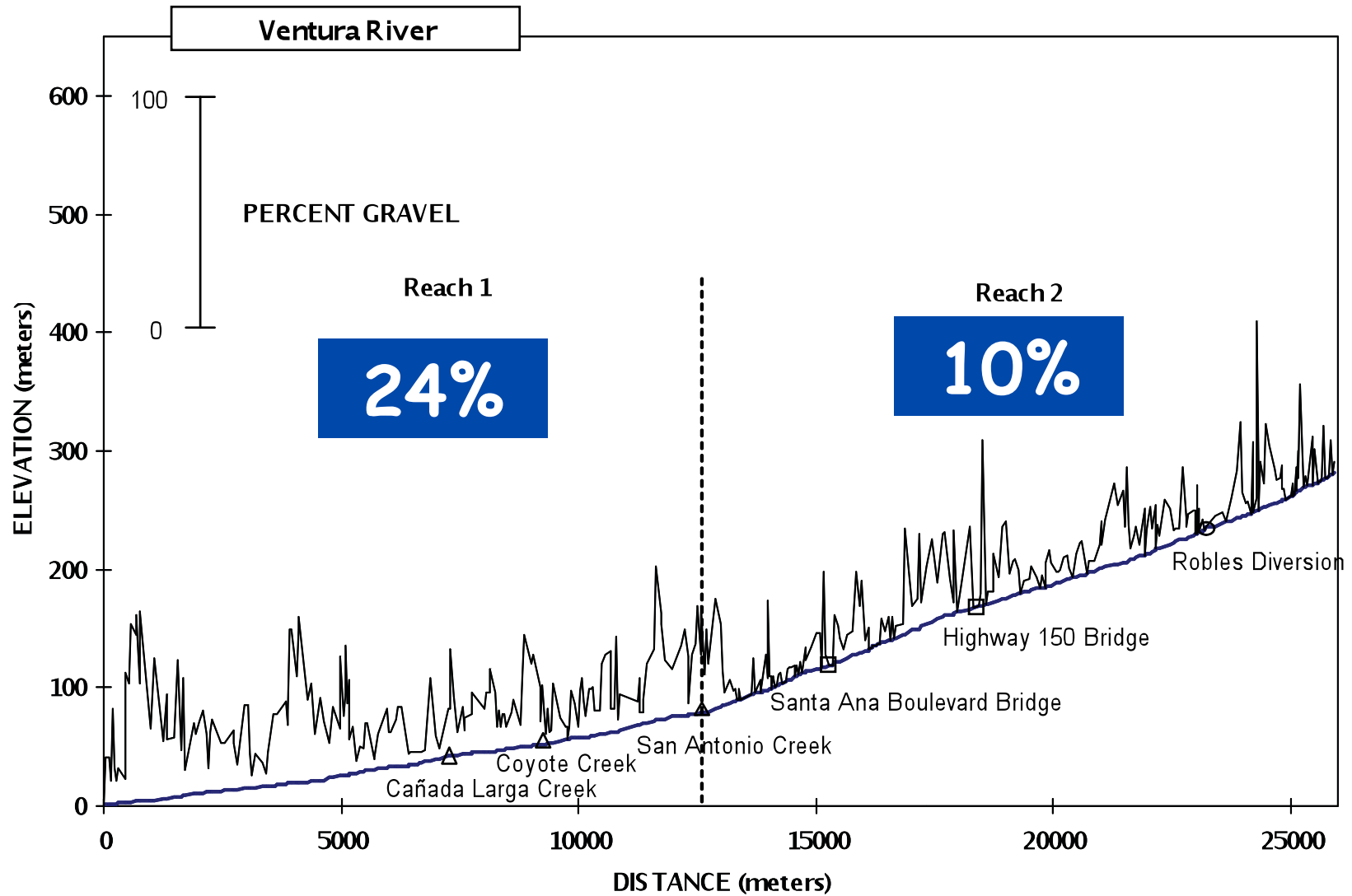


Figure 1. Study area of Ventura River basin and its major tributaries and location of the basin in southern California.



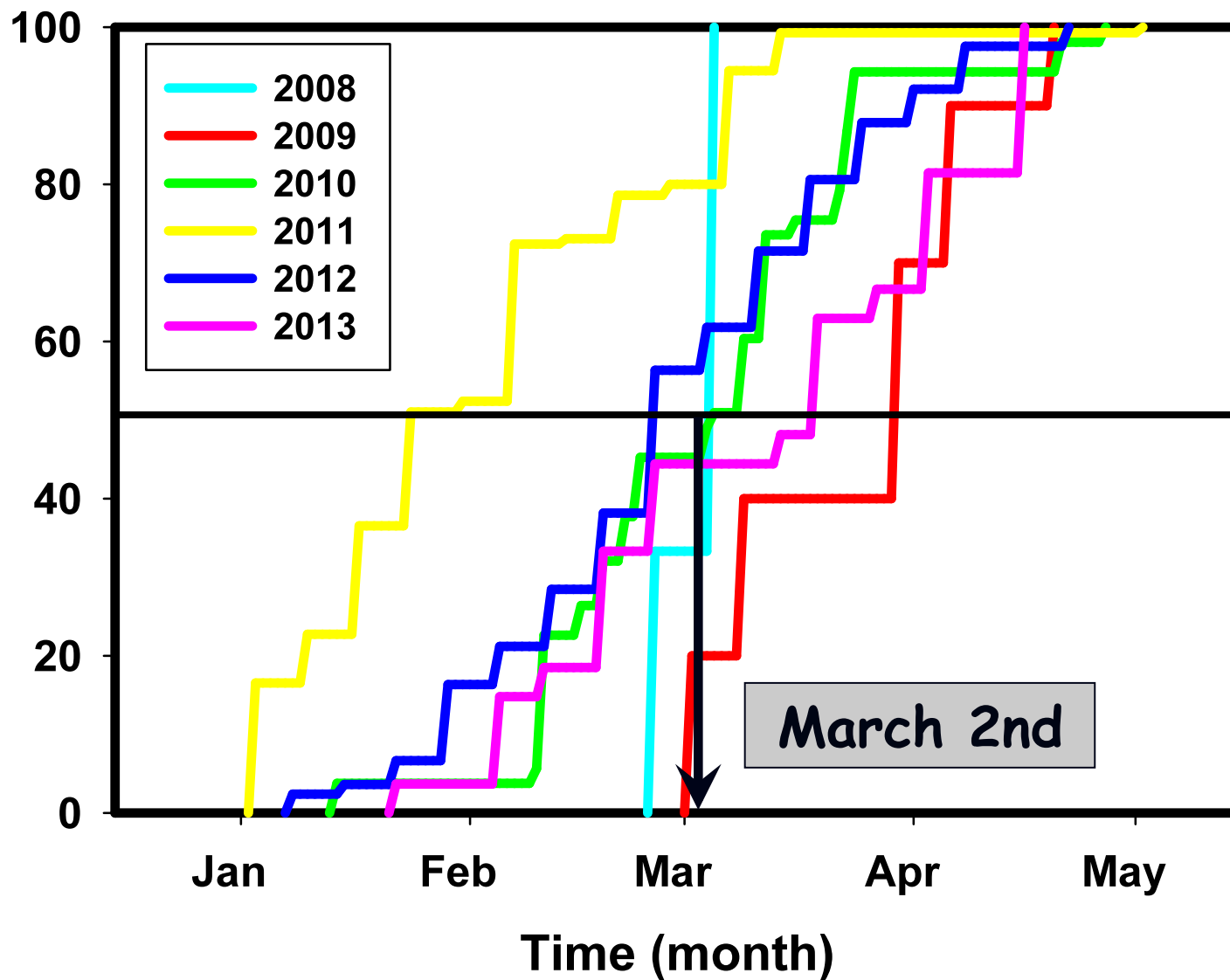
Spawning Gravel



O. mykiss Redds 2008-2014

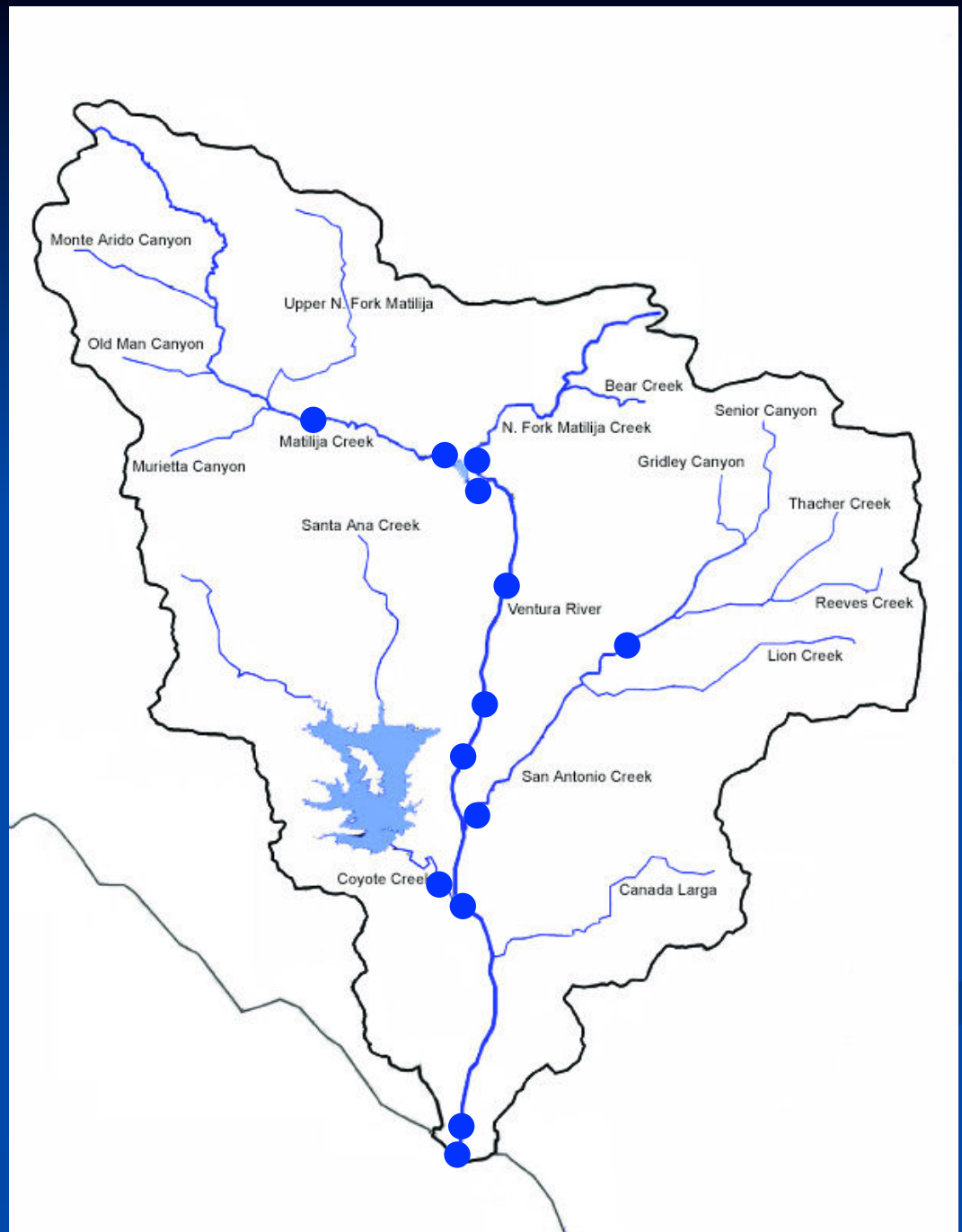


Spawn Timing



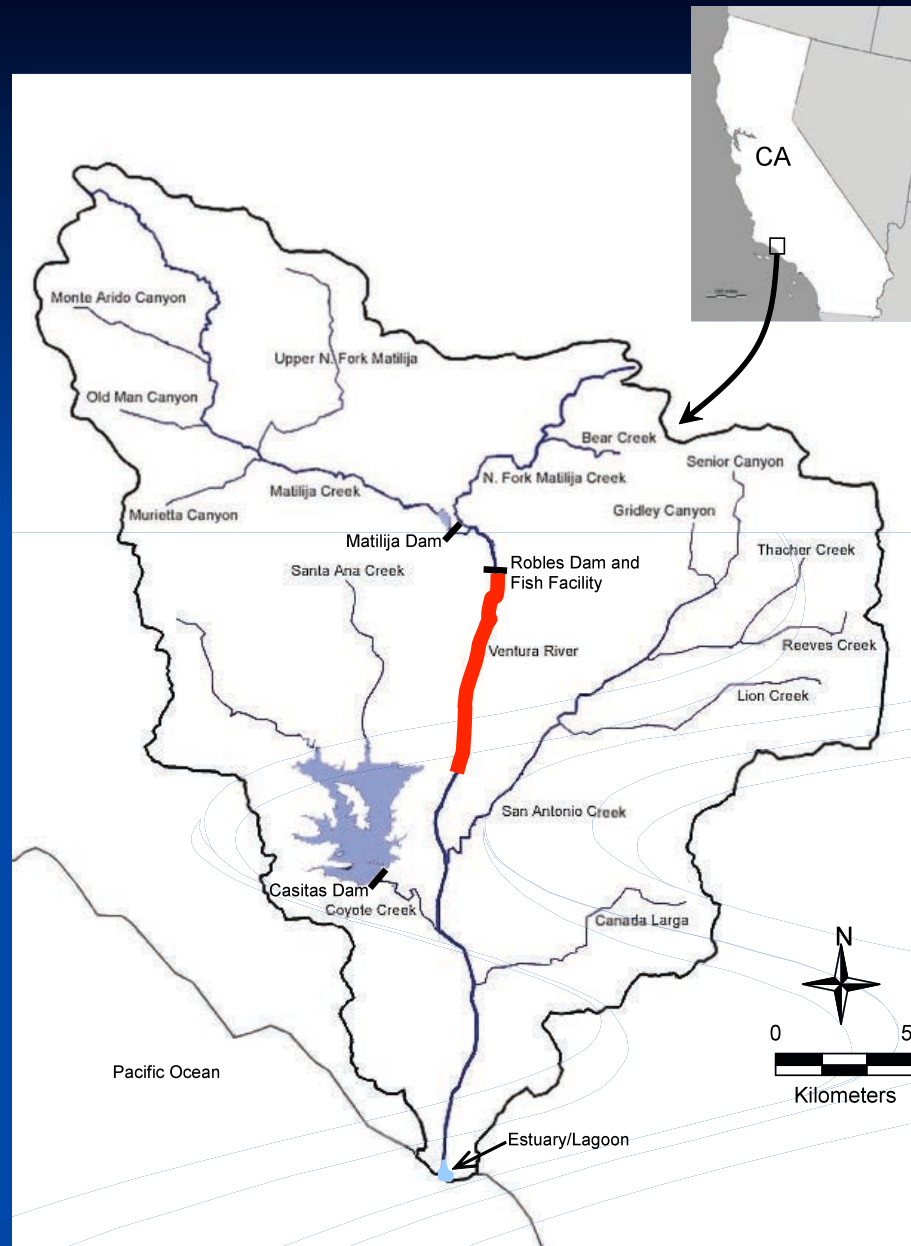
Ambient Water Quality

- Dissolved Oxygen
- pH
- Turbidity
- Salinity
- Conductivity
- Temperature
(30-min logging)
- TDS



Ventura River Surface Flow Patterns

Robles Reach of Mainstem
(6.5 km)



Robles Reach Upstream of Hwy 150

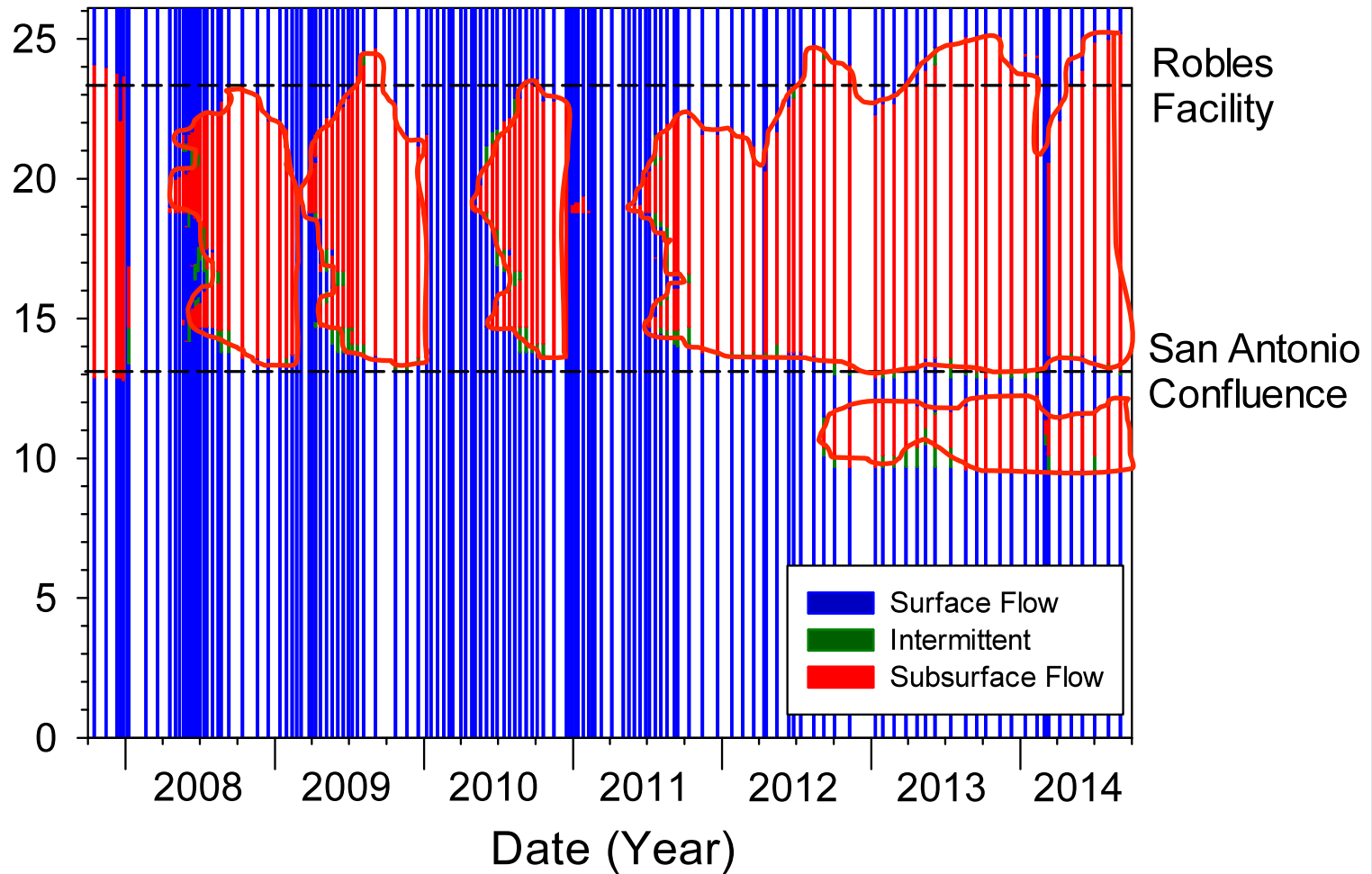
2007



2015



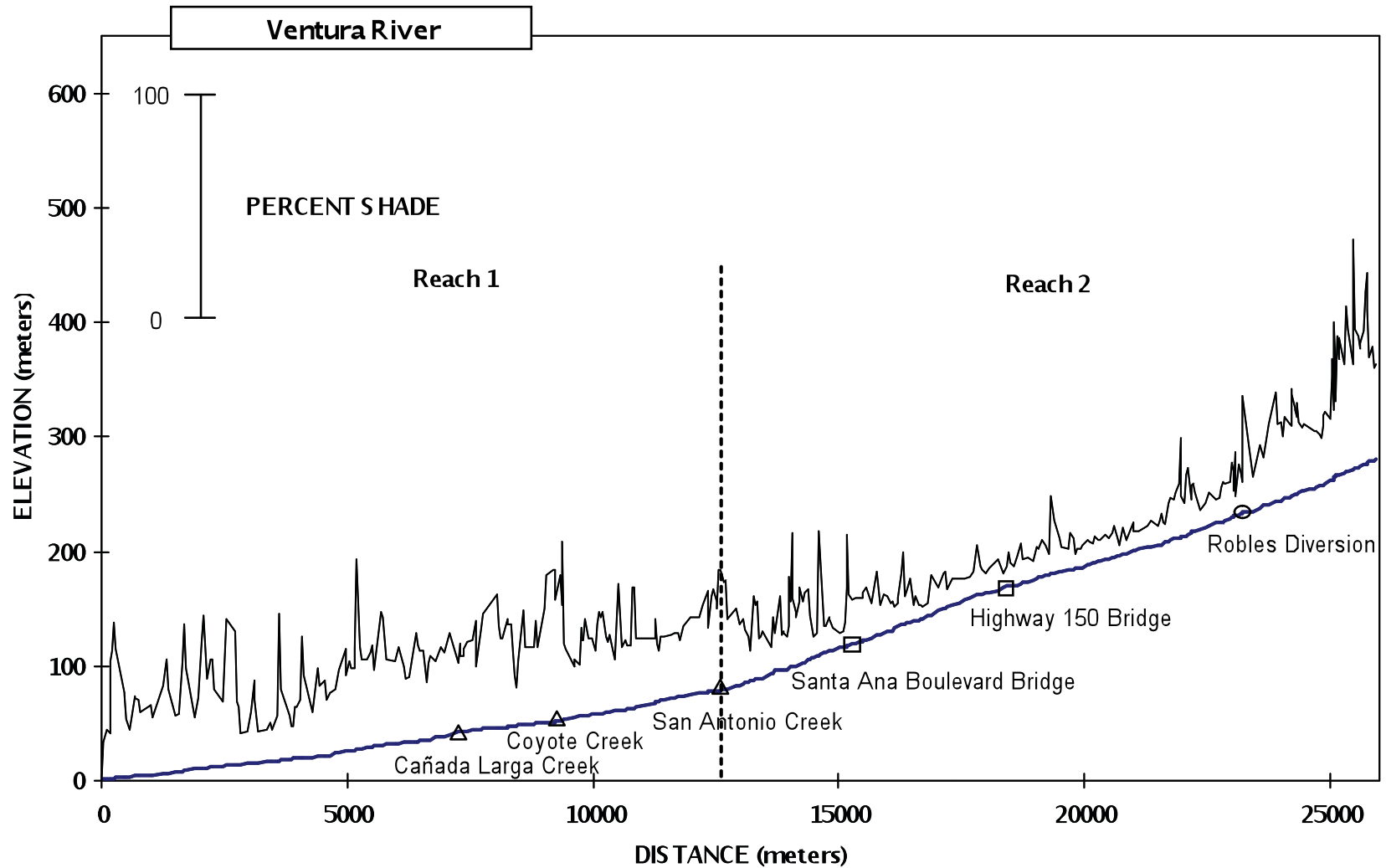
Ventura River Surface Flow Patterns



Shell Rd. Upstream



Channel Shade



Population Structure, Smoltification
Patterns, and Juvenile Migration of
Coastal Steelhead and Rainbow Trout
(*Oncorhynchus mykiss irideus*) in the
Ventura River Basin, California



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Stan Gregory-OSU

Michael Banks-OSU

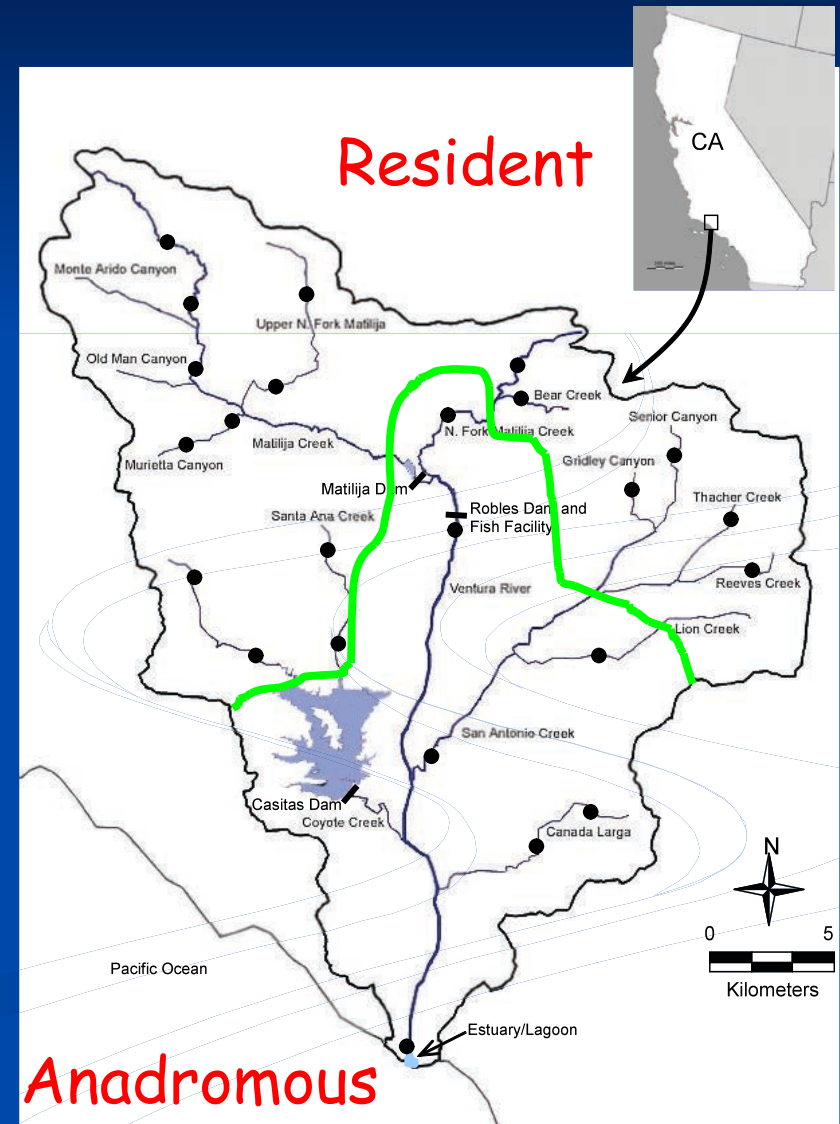
Chris Zimmerman-USGS

Steelhead and Rainbow Trout Research

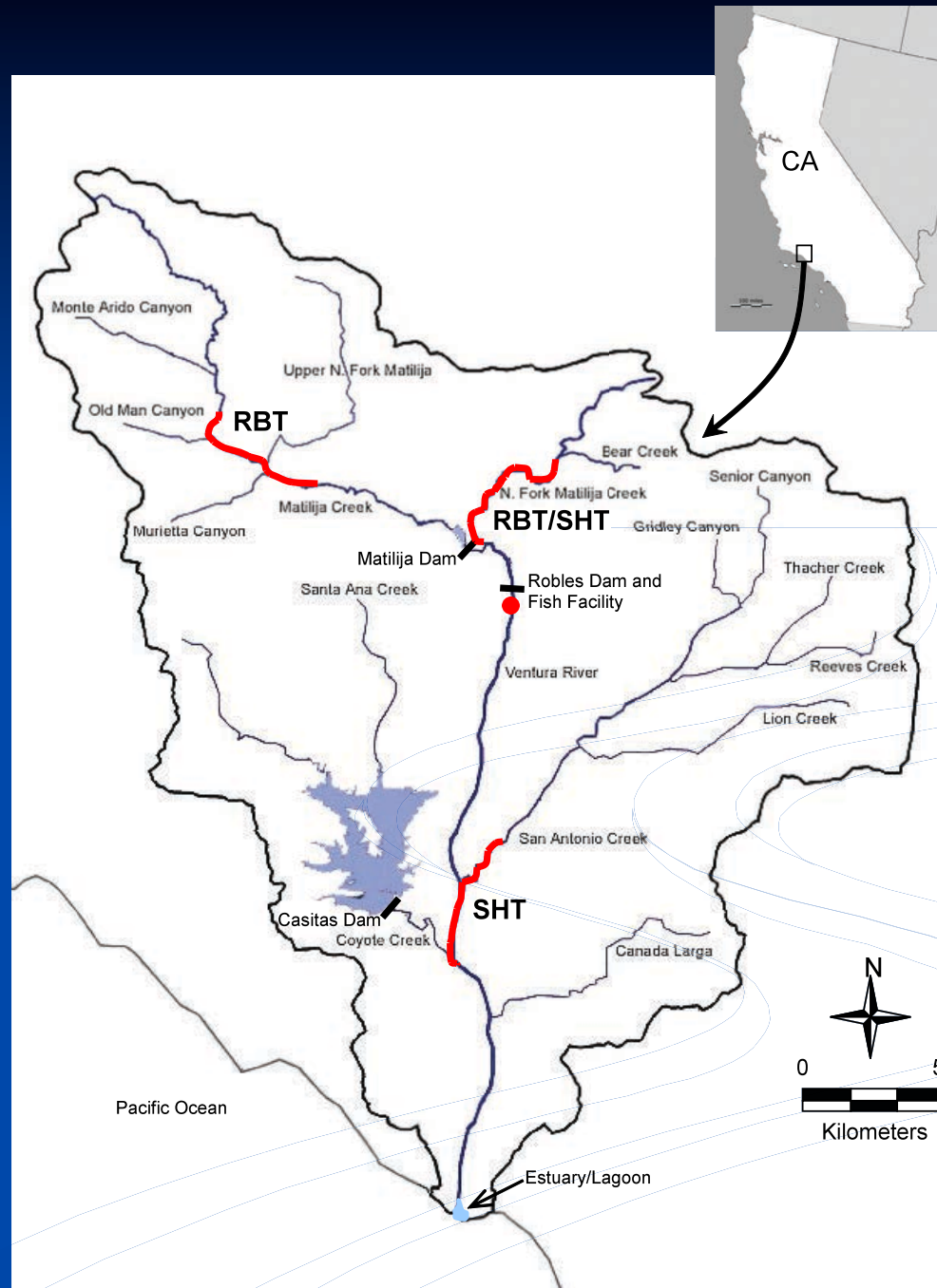
1. Determine genetic structure within the steelhead and rainbow trout population and identify possible causes and implications.
2. Identify smolt migration patterns of steelhead and rainbow trout.
3. Determine smoltification patterns of steelhead and rainbow trout.

O. mykiss Population Structure

- Five subbasins, migrant trap, and estuary (24 sites).
- Three dams.
- Many natural barriers.
- Anadromous and resident *O. mykiss*.
- 16 microsatellite loci
- Use GIS to investigate landscape models for structure.



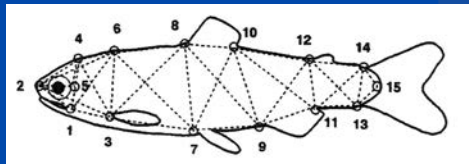
Smolting and Migration Study Reaches



Methods for Determining Smolting/ Anadromy



Measure physiological changes that are associated with smolting (ATPase).

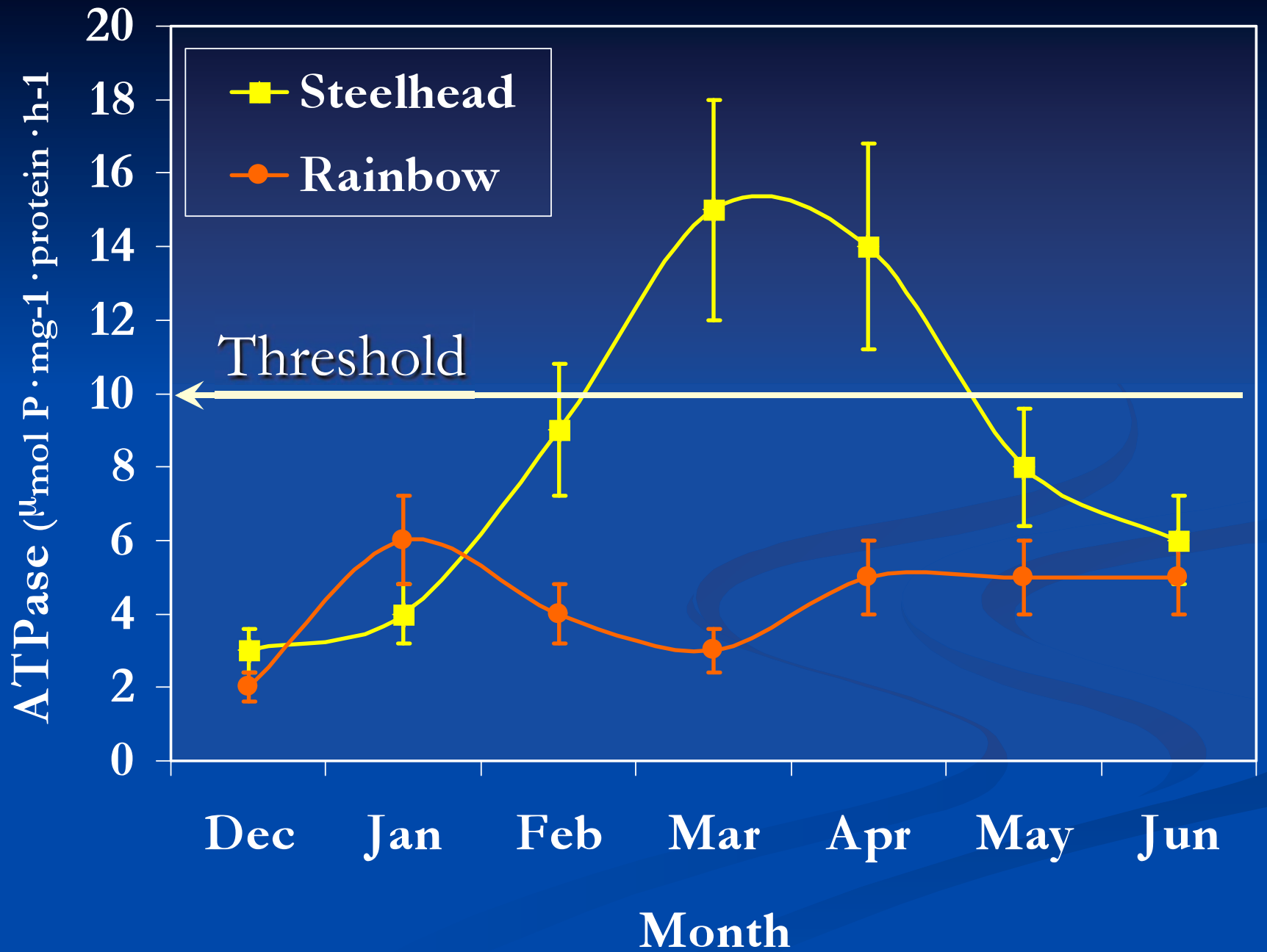


Measure physical changes that are associated with smolting (condition factor, silvering, and phase change).



Movements of smolts from the river, to the ocean, and back as adults.





Steelhead Smolting Transition Phases

Parr—dark brown to yellowish green, dark belly, distinct parr marks along the lateral line, ventral and anal fins dark with white margins.

T₁—first signs of silvering on body and parr marks are still easily visible.

T₂—parr marks still visible, but starting to disappear below the lateral line. Silvering more noticeable and the margin of the dorsal fin is darker.

T₃—parr marks much lighter but starting to disappear more from the head and tail. The margin of the dorsal and caudal fins are black.

Smolt—body is very silvery obscuring parr marks, or just visible, and the dorsal fin margin is deep black. The dorsal surface of the fish has a bluish or greenish tinge.

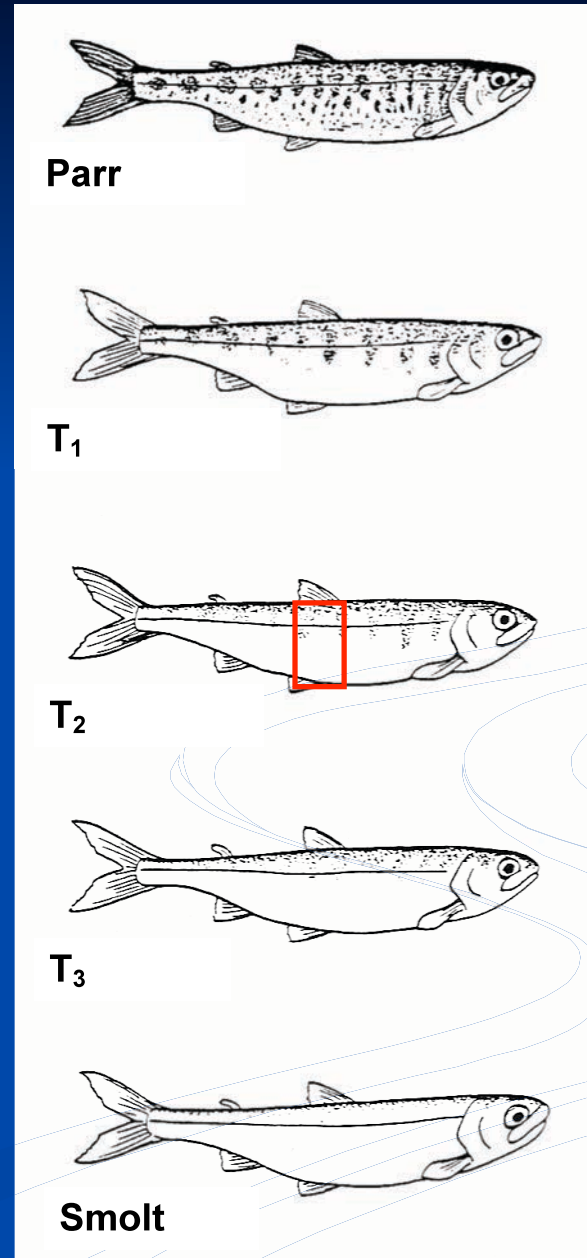


Figure 4. Parr-smolt transition phases that will be used to classify sampled *O. m. irideus* in the Ventura Basin (adapted from Hasler and Scholz 1983).

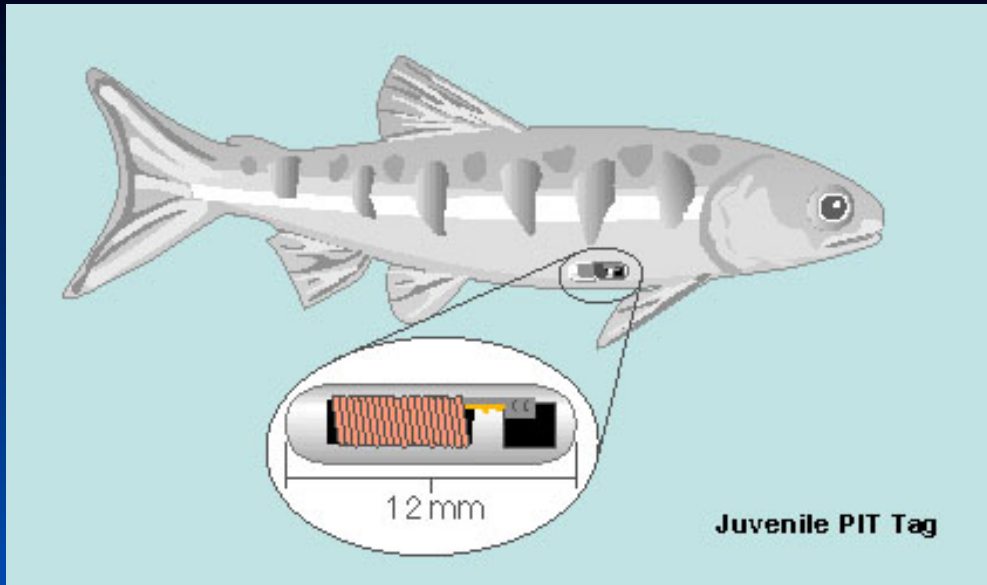




Feb 2014



Mar 2014



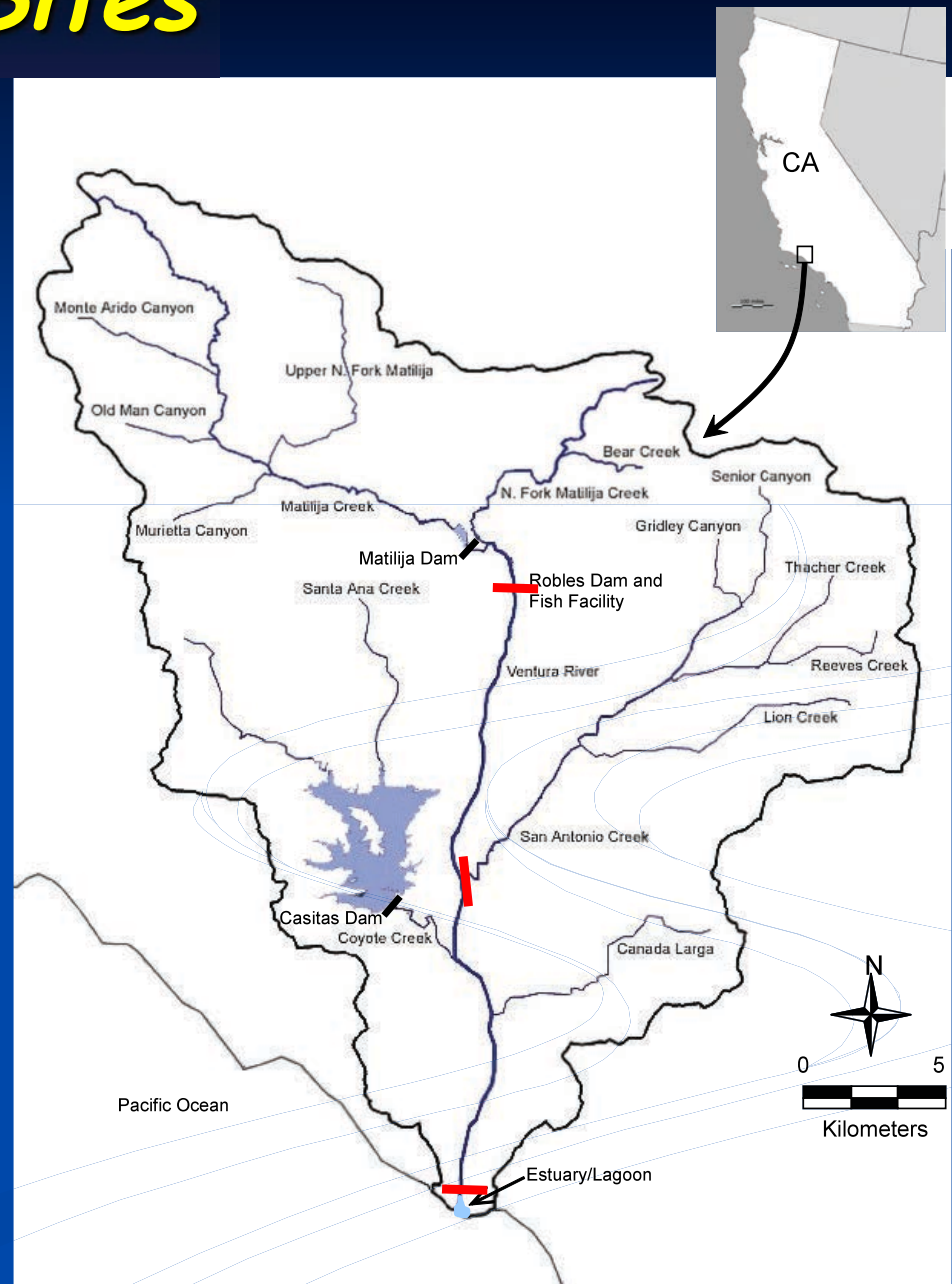
PIT Tagging

- 12 mm tags
- Tag with syringe
- > 70 mm in length
- 400 tags per reach



PIT Tag Antenna Sites

- Robles Fish Ladder
- San Antonio Cr.
- Mouth of Ventura R.



Ventura River



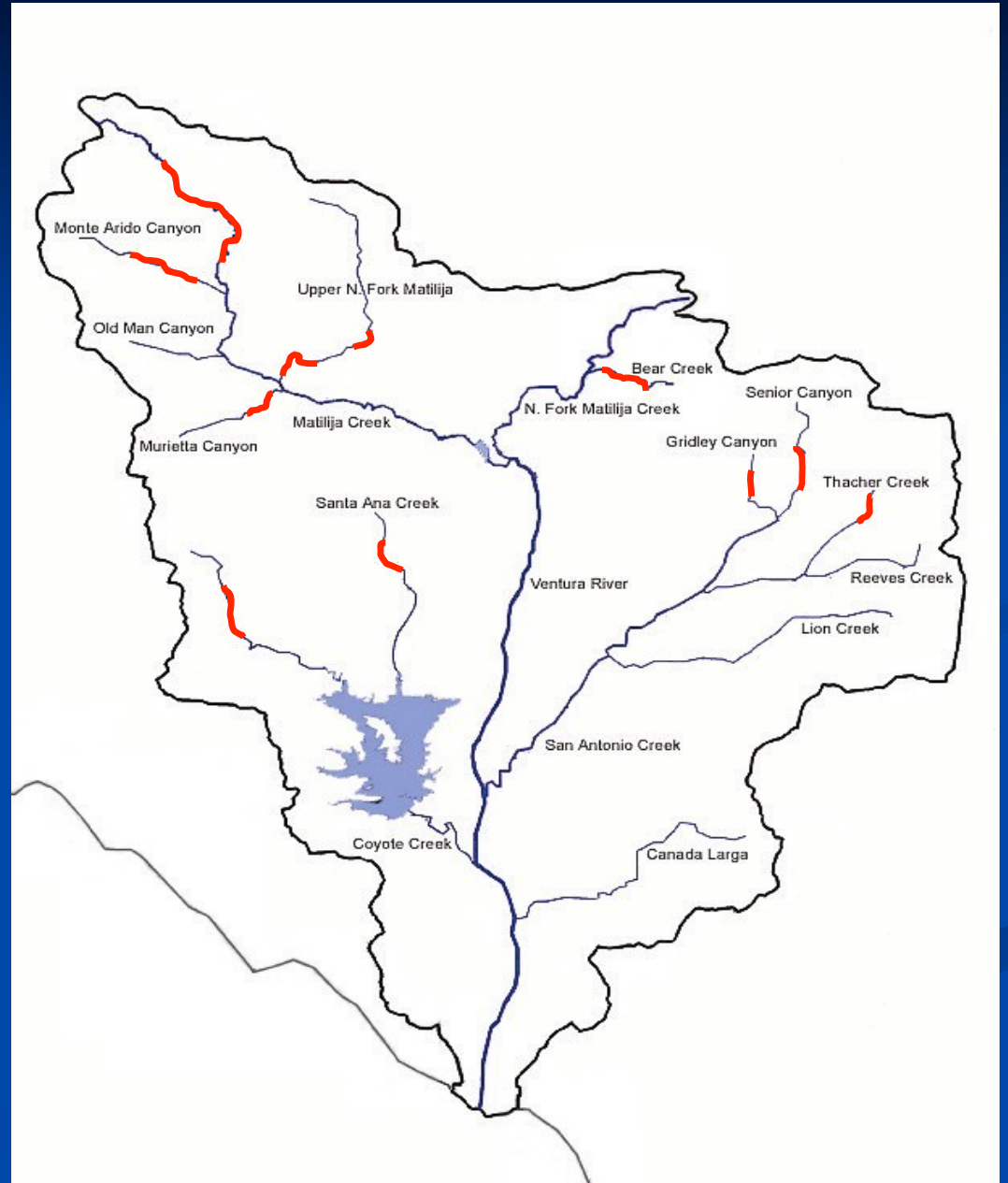
San Antonio Cr.



Fish Ladder



1st Order Refuges



O. mykiss Population Enhancement Opportunities

- Reintroduction of *O. mykiss* to viable habitats in 1st order tributaries ($p = 1$ in metapopulation model).
- Pool habitat (>1m in depth) rearing enhancement in San Antonio Creek (1/km vs 6/km NF).
- Spawning gravel augmentation to North Fork Matilija Creek (13% vs 33% in SA).

O. mykiss

Rainbow

Steelhead

