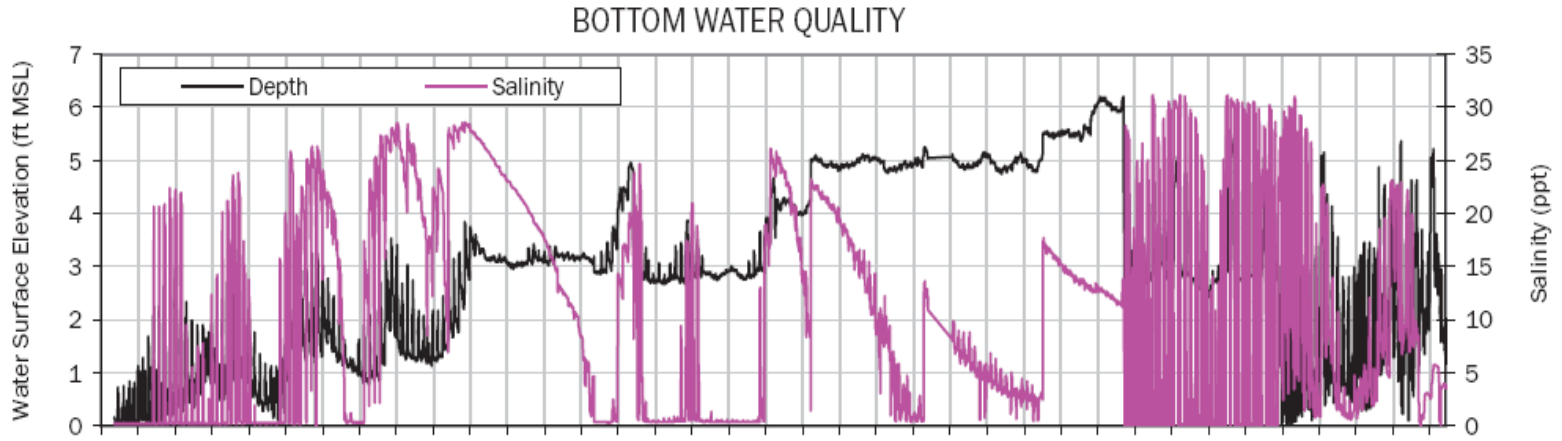
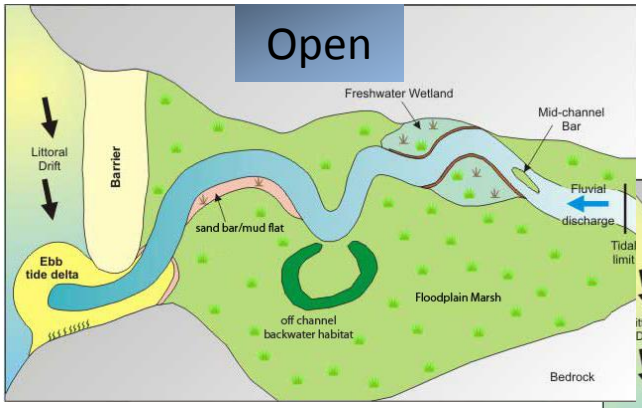
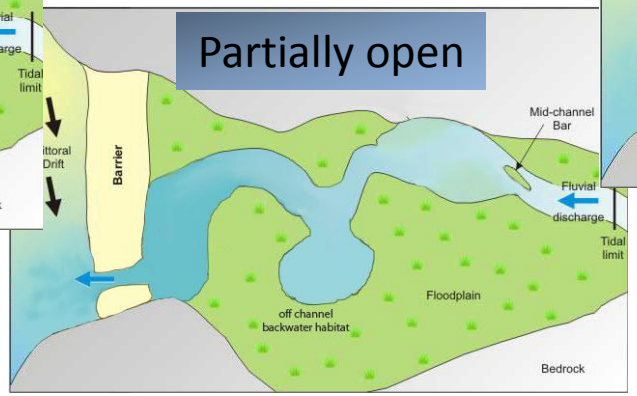
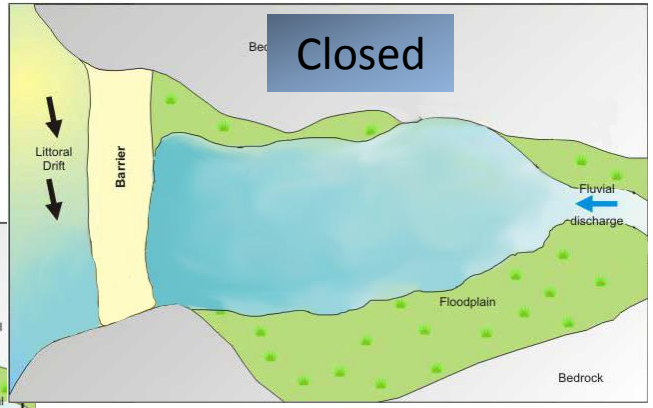
Validation of the California Rapid Assessment Methodology for Bar-built Estuaries



Open Partially open Closed Open

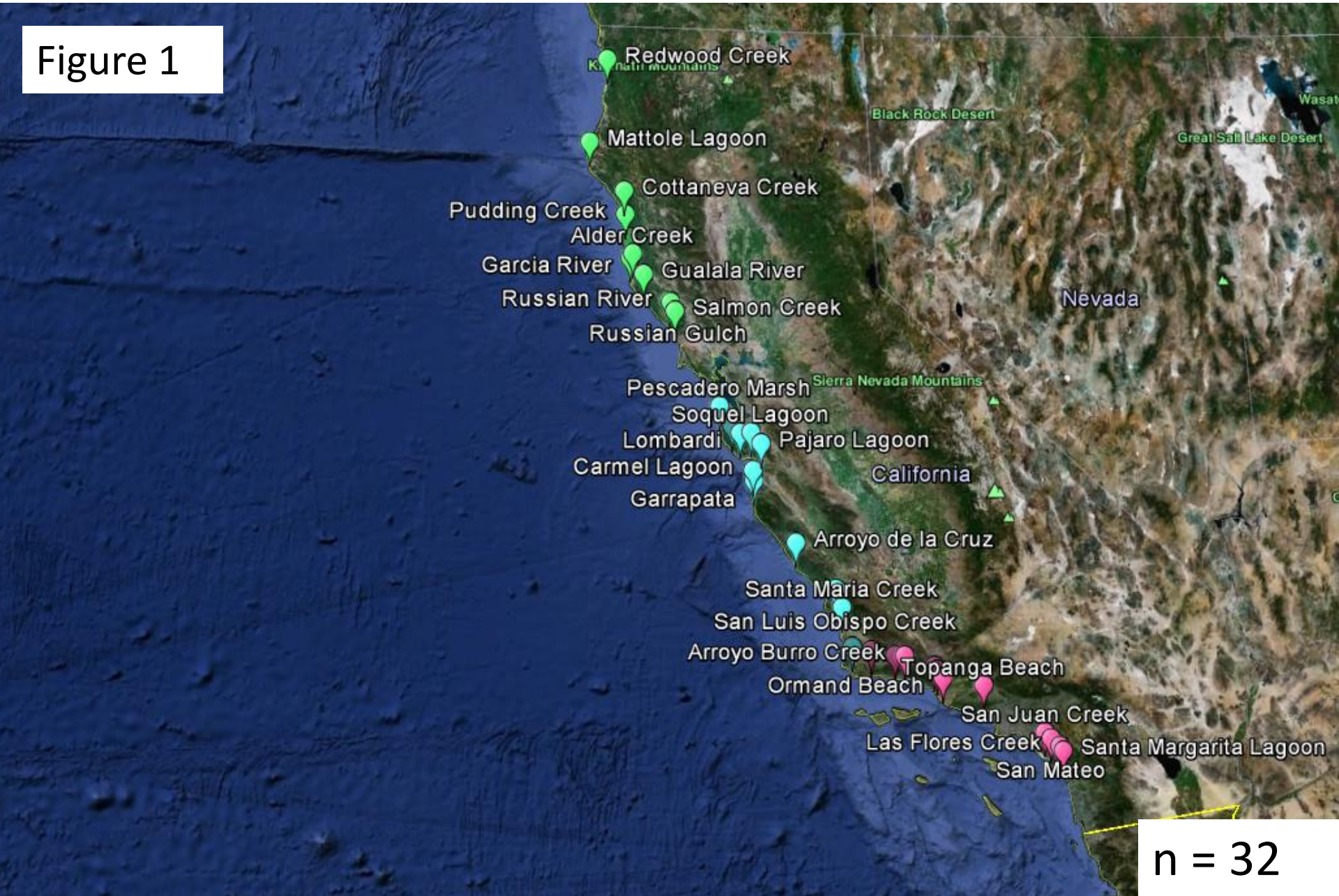






Lagoon CRAM validation sites

Figure 1



Lagoon CRAM validation sites

CRAM Data:

- **Buffer / Landscape**
- **Hydrology**
- **Physical structure**
- **Biotic structure**
- **Stressors**

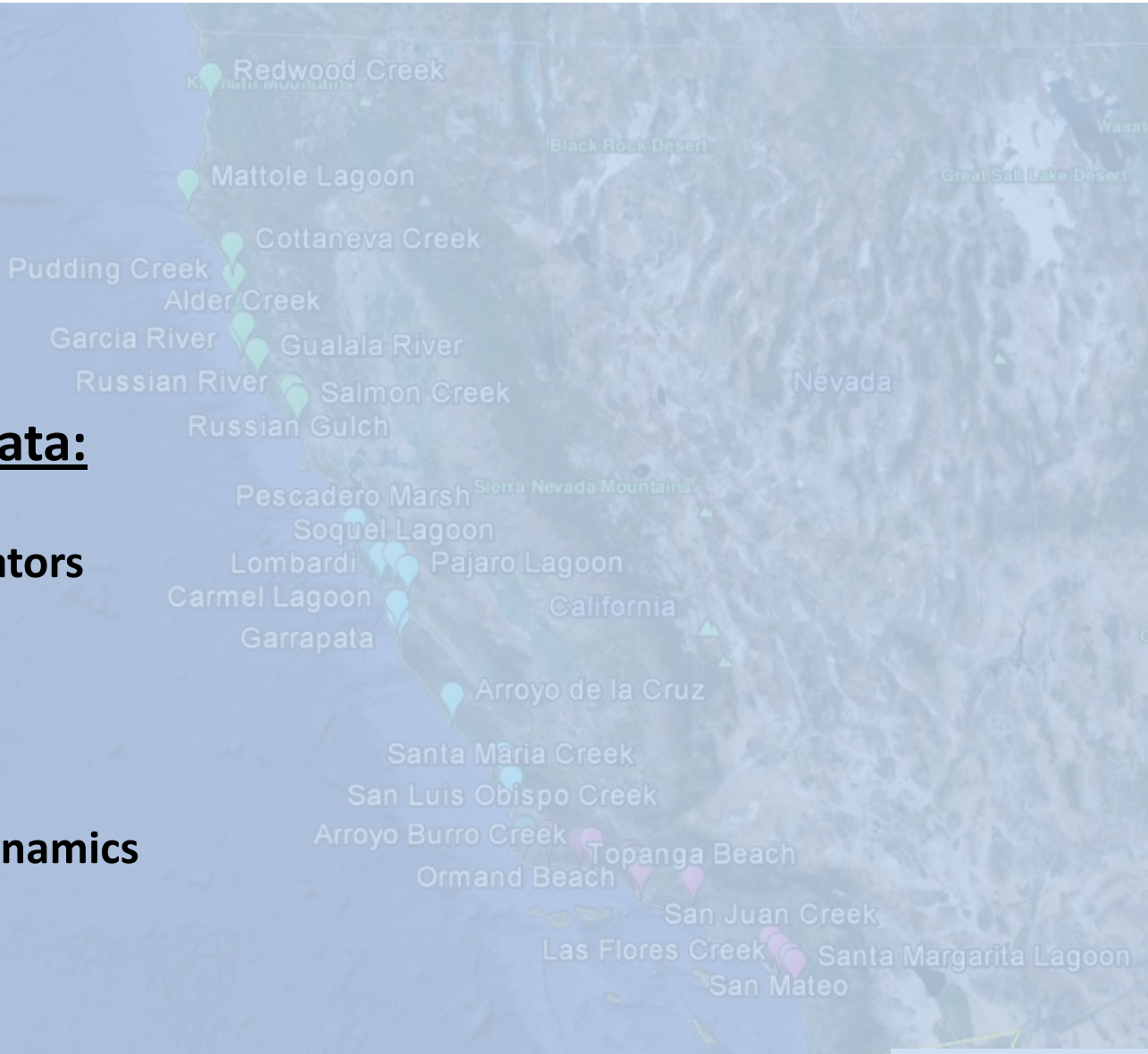
Concurrent focus data:

Find appropriate indicators

Correlate w/ CRAM

Challenges:

spatio-temporal dynamics



n = 32

Data collected at validation sites

CRAM Data:

- Buffer / Landscape
- Hydrology
- Physical structure
- Biotic structure
- Stressors

Bar measurements

Water Quality (3/site):

- Temp
- DO
- Salinity
- PH
- Clarity (Sechi-disc)

Water Chemistry

- Nitrogen (Ammonium, nitrate, nitrite)
- Phosphate

Productivity sources:

- Algae –Marine subsidy
- Emergent veg. (CRAM)
- Submergent veg. (CRAM)

GIS landscape stressors

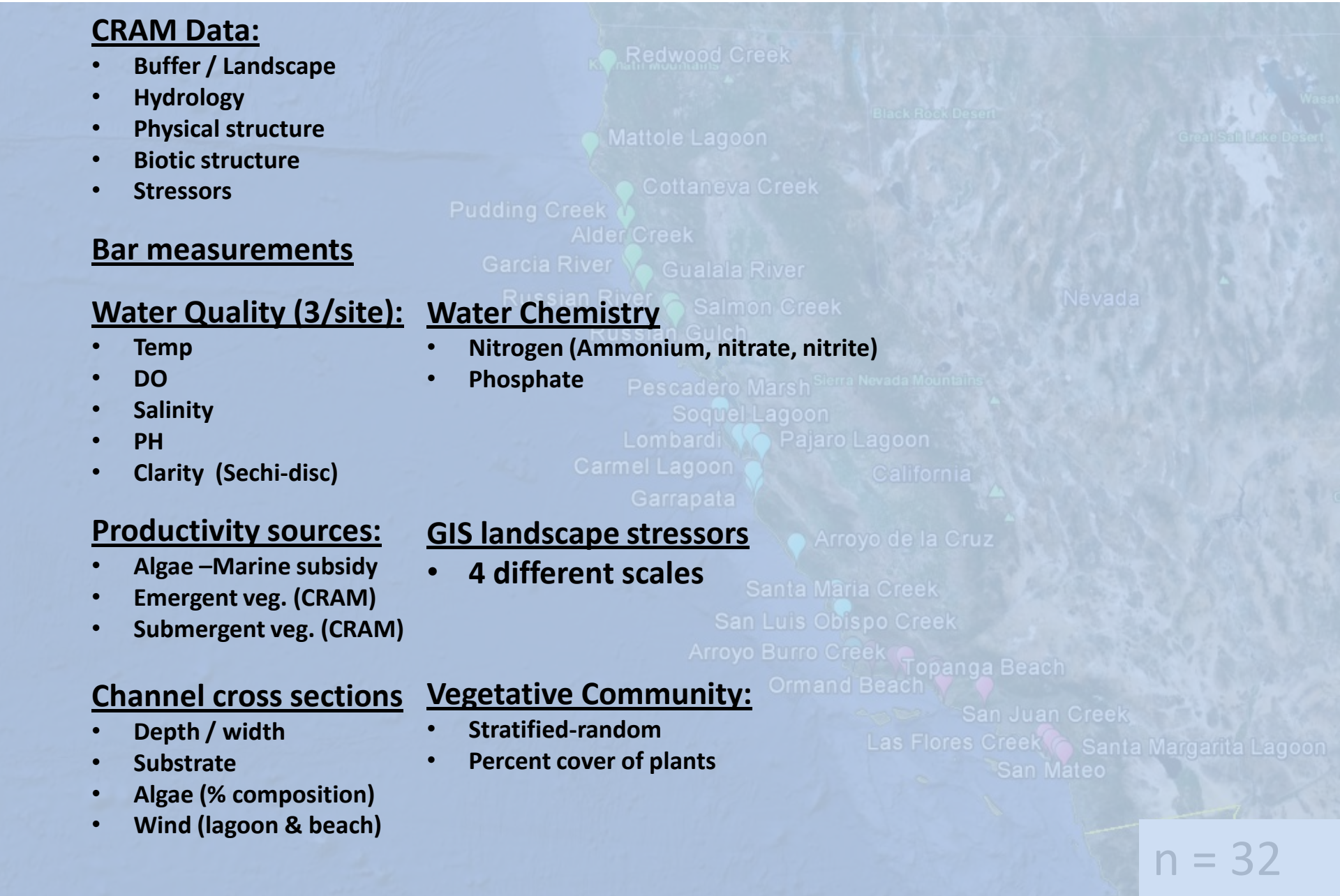
- 4 different scales

Channel cross sections

- Depth / width
- Substrate
- Algae (% composition)
- Wind (lagoon & beach)

Vegetative Community:

- Stratified-random
- Percent cover of plants



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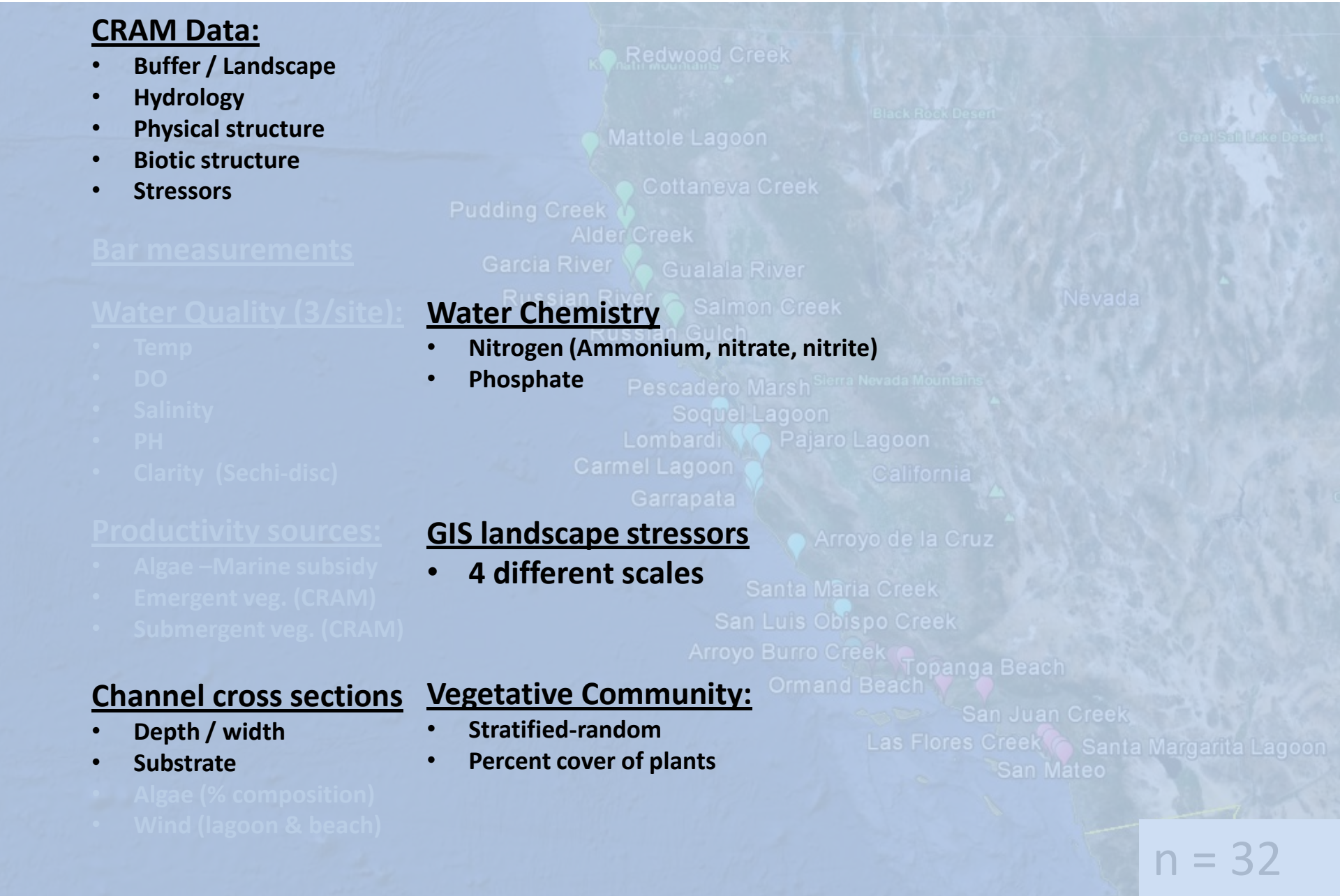

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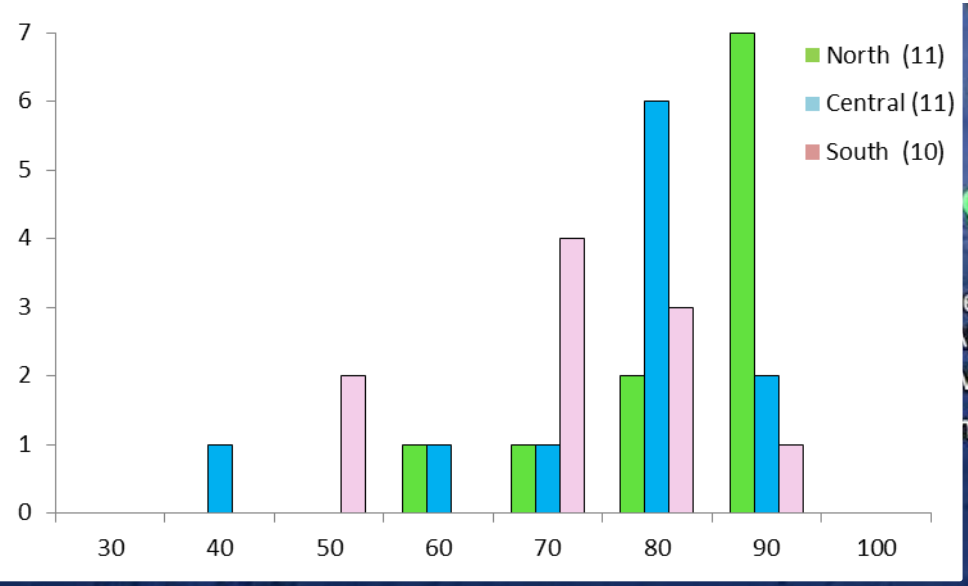
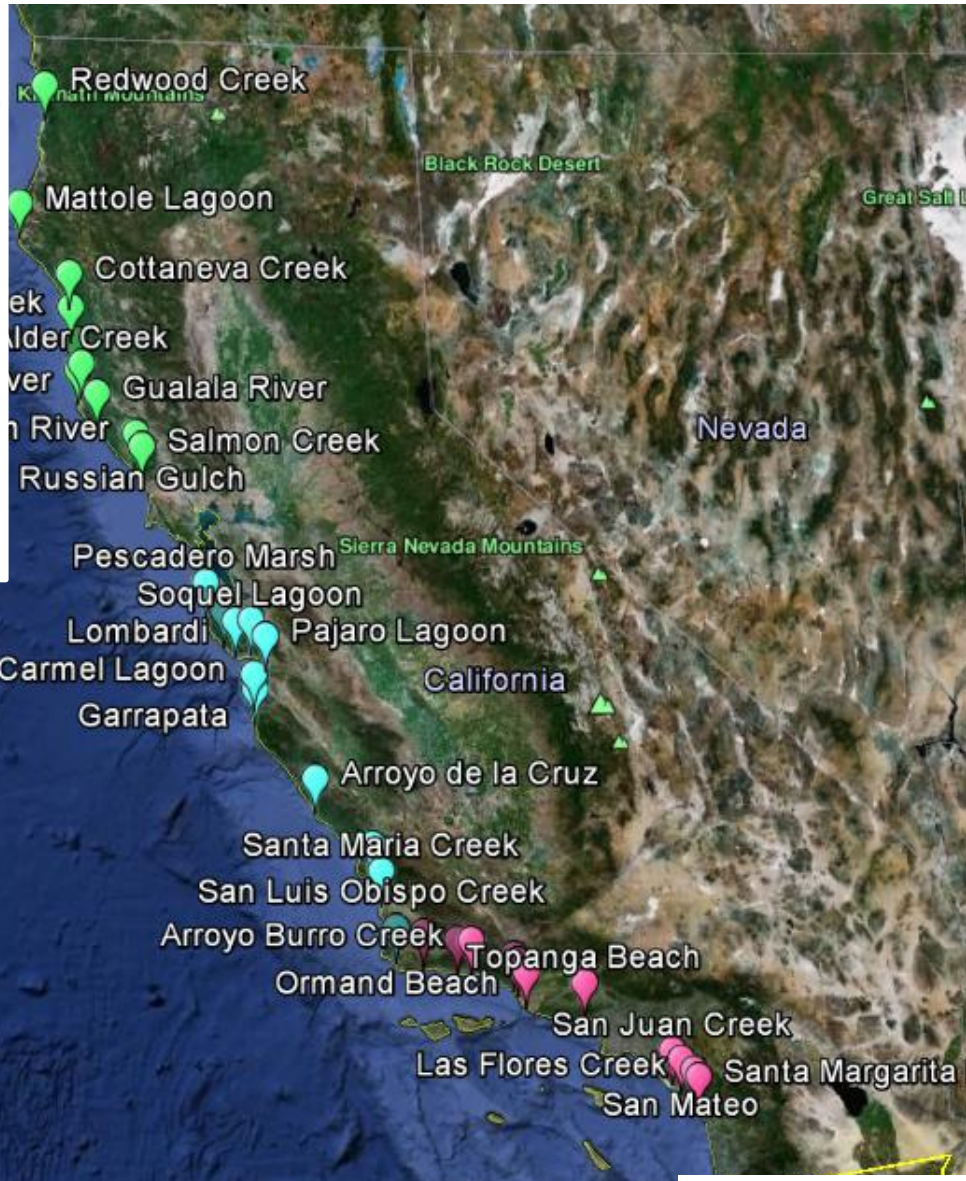
Validation site index scores by region





n = 32

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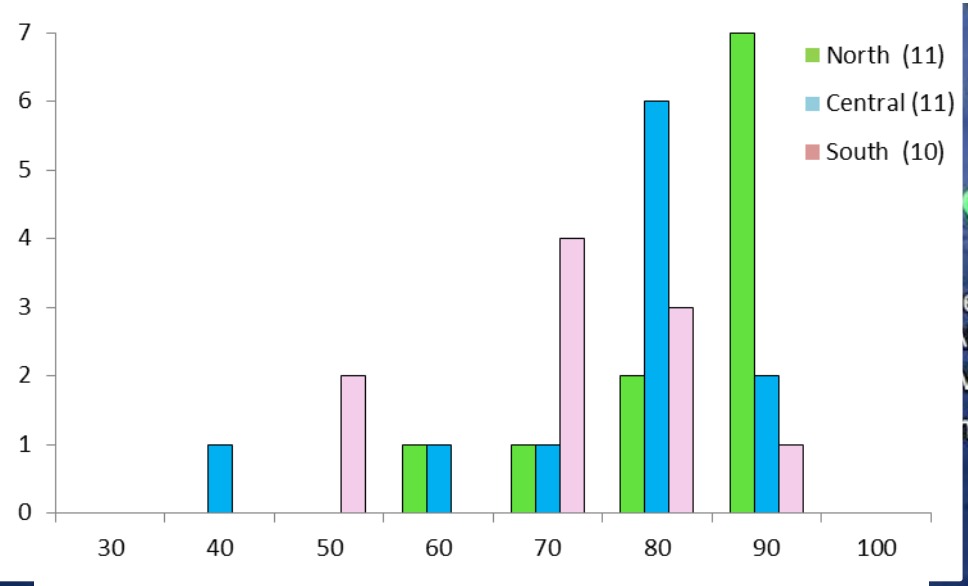
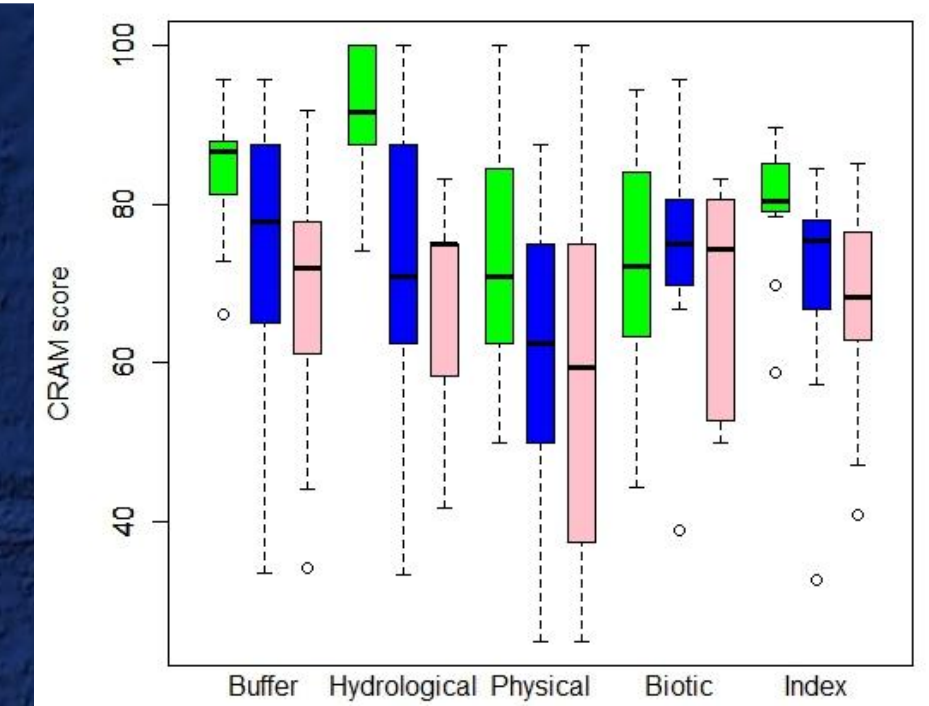
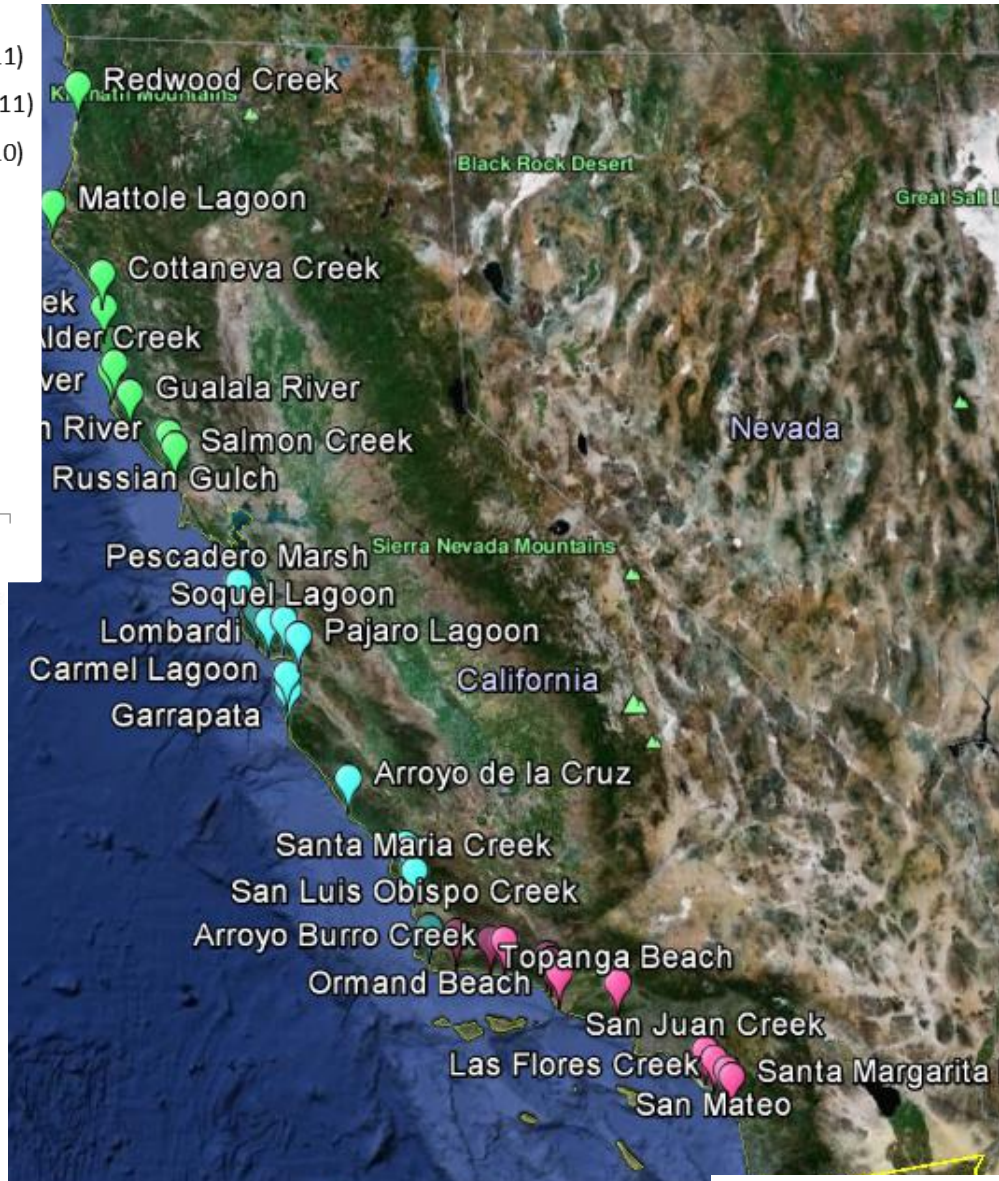






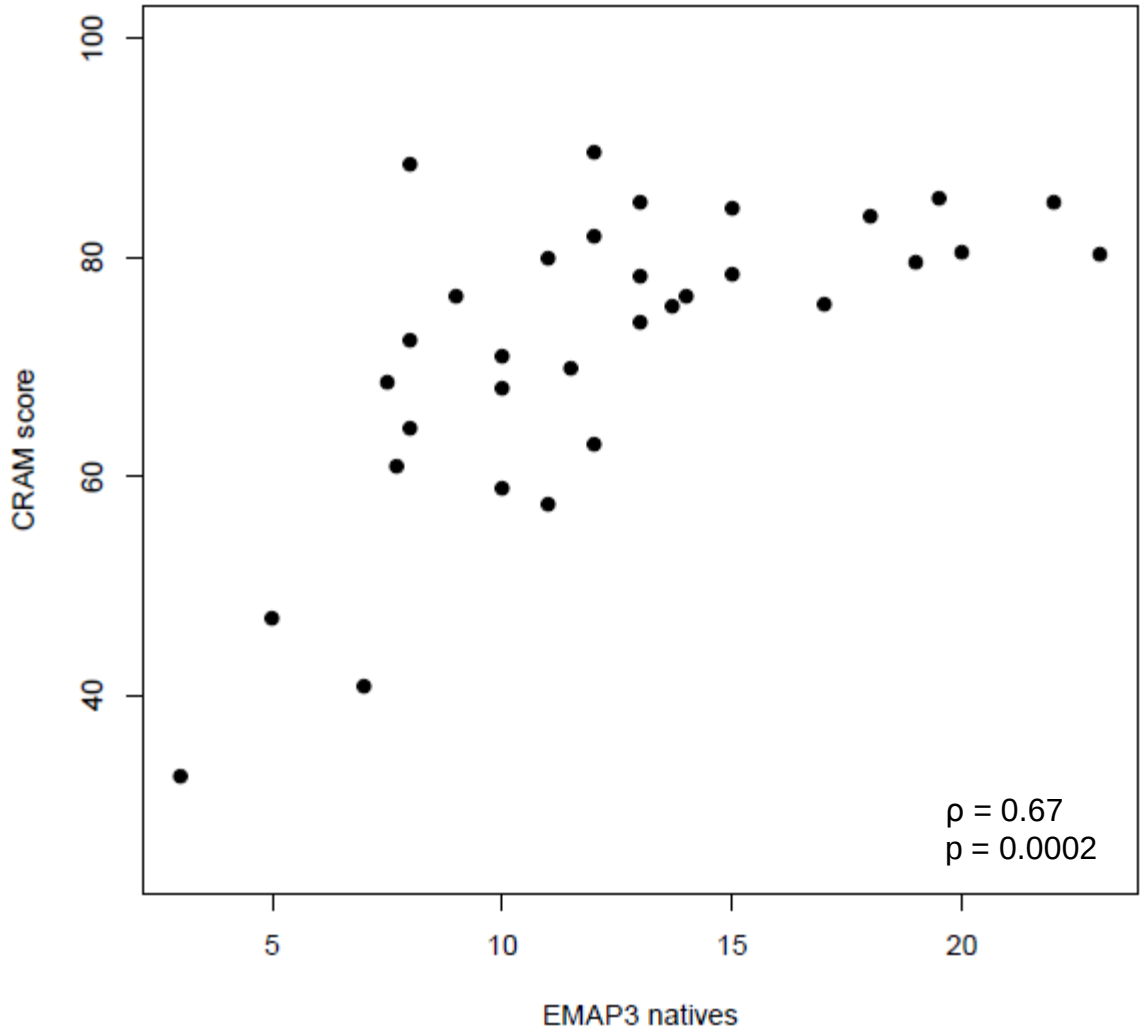
n = 32

significant correlations
CRAM & EMAP

Metric	L3	ρ	p-value
Buffer and Landscape	Number of natives	0.59	0.0069
buffer width	Total species richness	0.55	0.0105
Hydrology	Number of natives	0.51	0.0135
Hydrology	Total species richness	0.46	0.0262
hydroperiod	Total species richness	0.45	0.0260
hydrologic connectivity	Number of natives	0.54	0.0156
Physical	Number of natives	0.53	0.0146
topographic complexity	Number of natives	0.49	0.0195
Biotic	Number of natives	0.51	0.0282
number of codominants	Number of natives	0.51	0.0141
number of invasives	Percent non-natives	-0.50	0.0117
number of invasives	Percent non-natives along backshore	-0.42	0.0397
Index	Number of natives	0.67	0.0002

CRAM Index vs EMAP natives

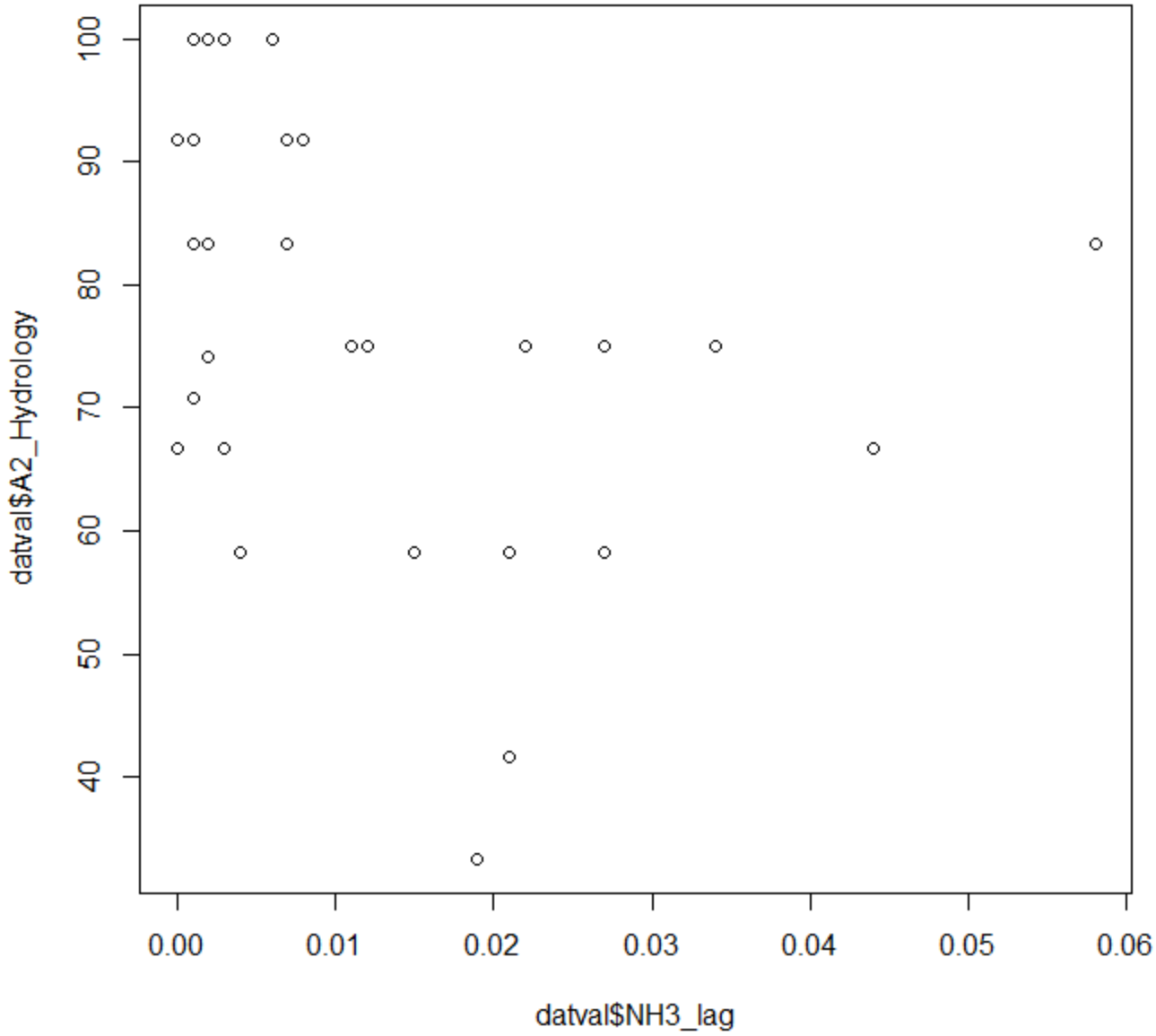
Figure 3.



significant correlations
CRAM & Nutrients

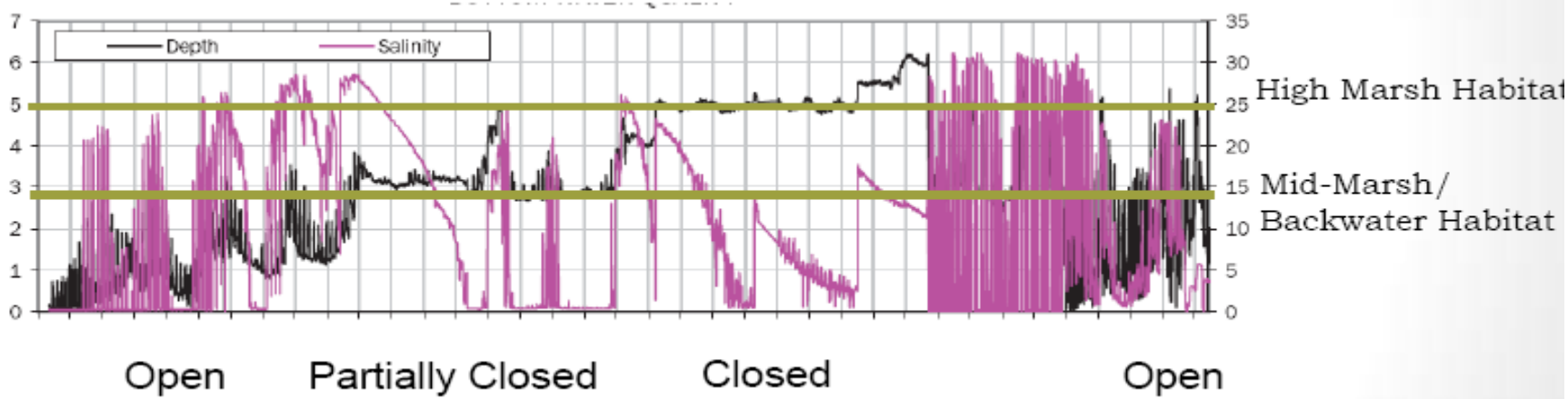
CRAM	Nutrient	ρ	p-value
Hydrology	NH_3	-0.45	0.0321
Hydrology	NO_2^-	-0.59	0.0022
Hydrology	NO_3^-	-0.40	0.0469
hydrologic connectivity	NO_2^-	-0.43	0.0385
water source	NH_3	-0.66	0.0003
water source	NO_2^-	-0.73	0.0000
water source	NO_3^-	-0.41	0.0453
water source	PO_4^{-3}	-0.48	0.0238

Hydrology vs. NH3



Next Steps

Quantify linkage between mouth dynamics and ecosystem services of marsh plain



Overlap with focal research to tie long-term one-site studies to one-time wide-geographic approach

Species services / nursery role

Estuary- Open to Ocean (Jan.-June)

Lagoon- Sand Bar Closed (July-Dec.)

Steelhead in Scott Creek

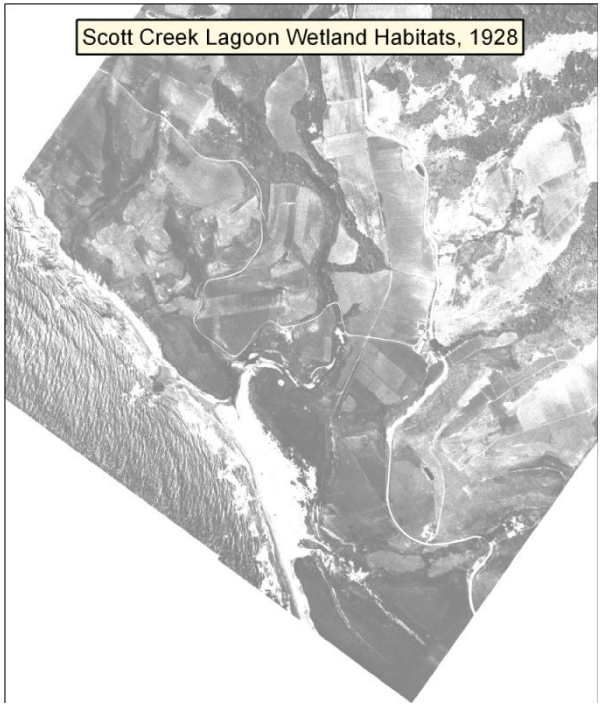
Typical spring downstream migrant (smolt?)

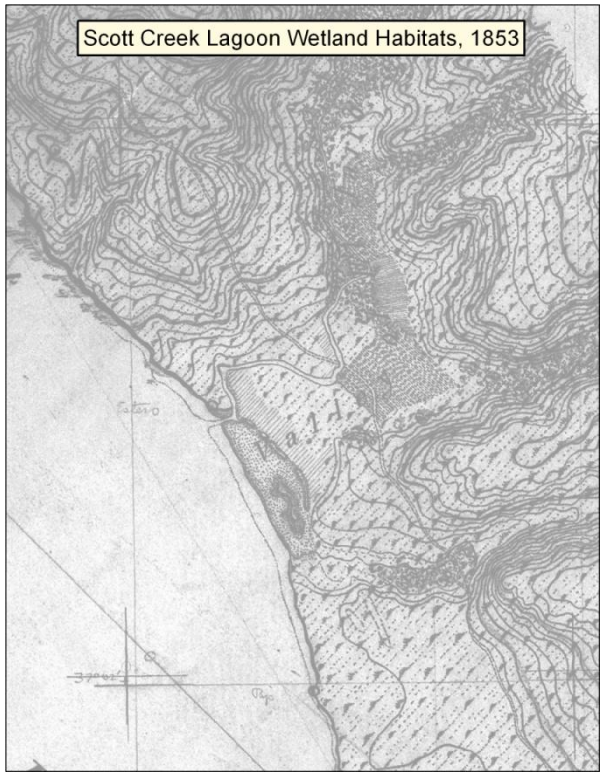
After 5-6 months rearing in estuary

100mm

Sean Hayes SWFSC

Historical Ecology





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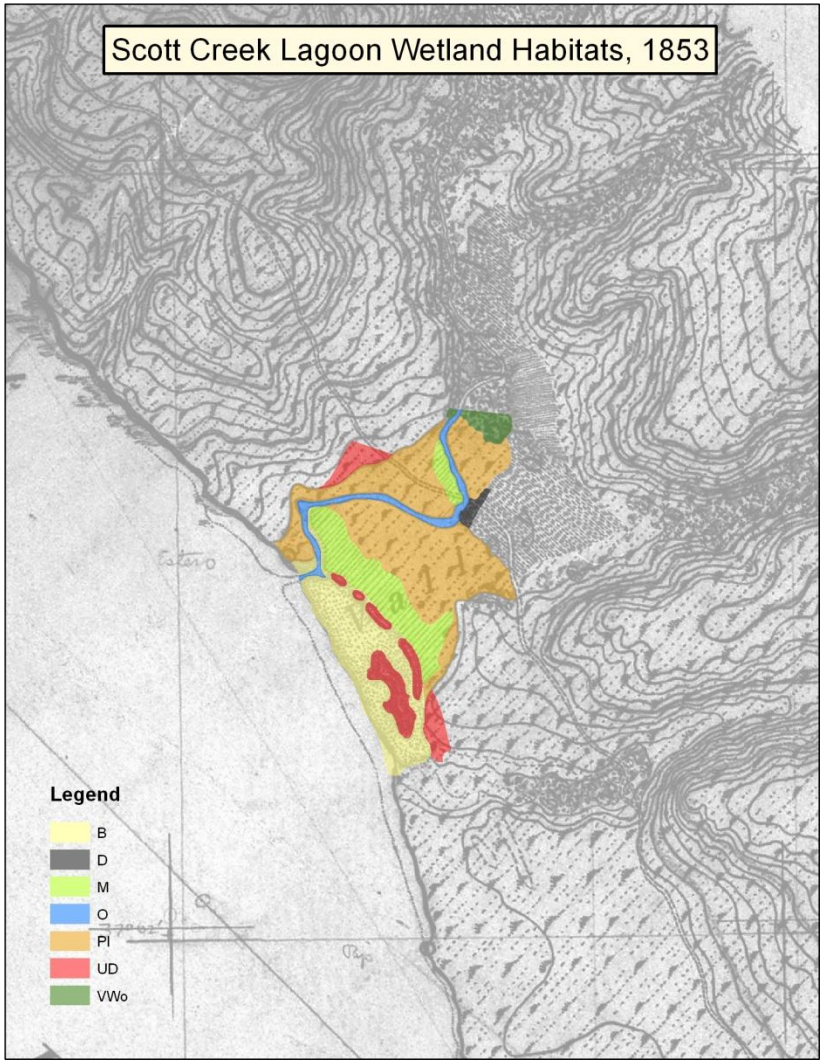

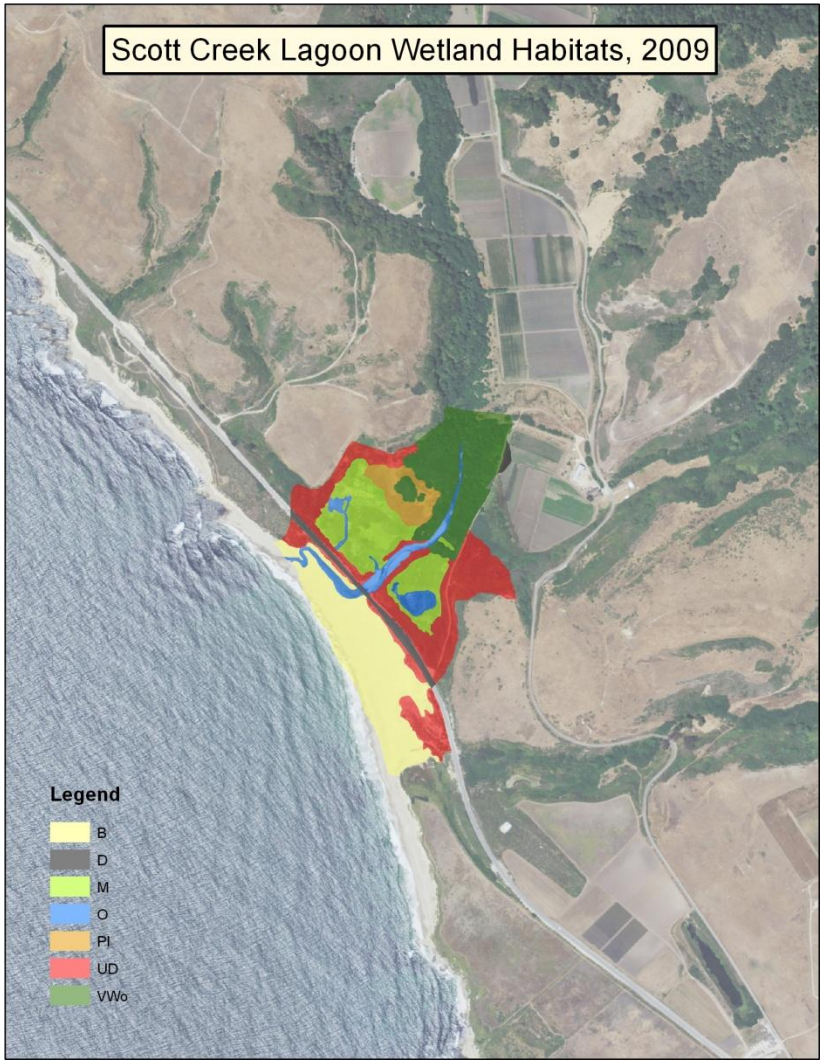

Questions?