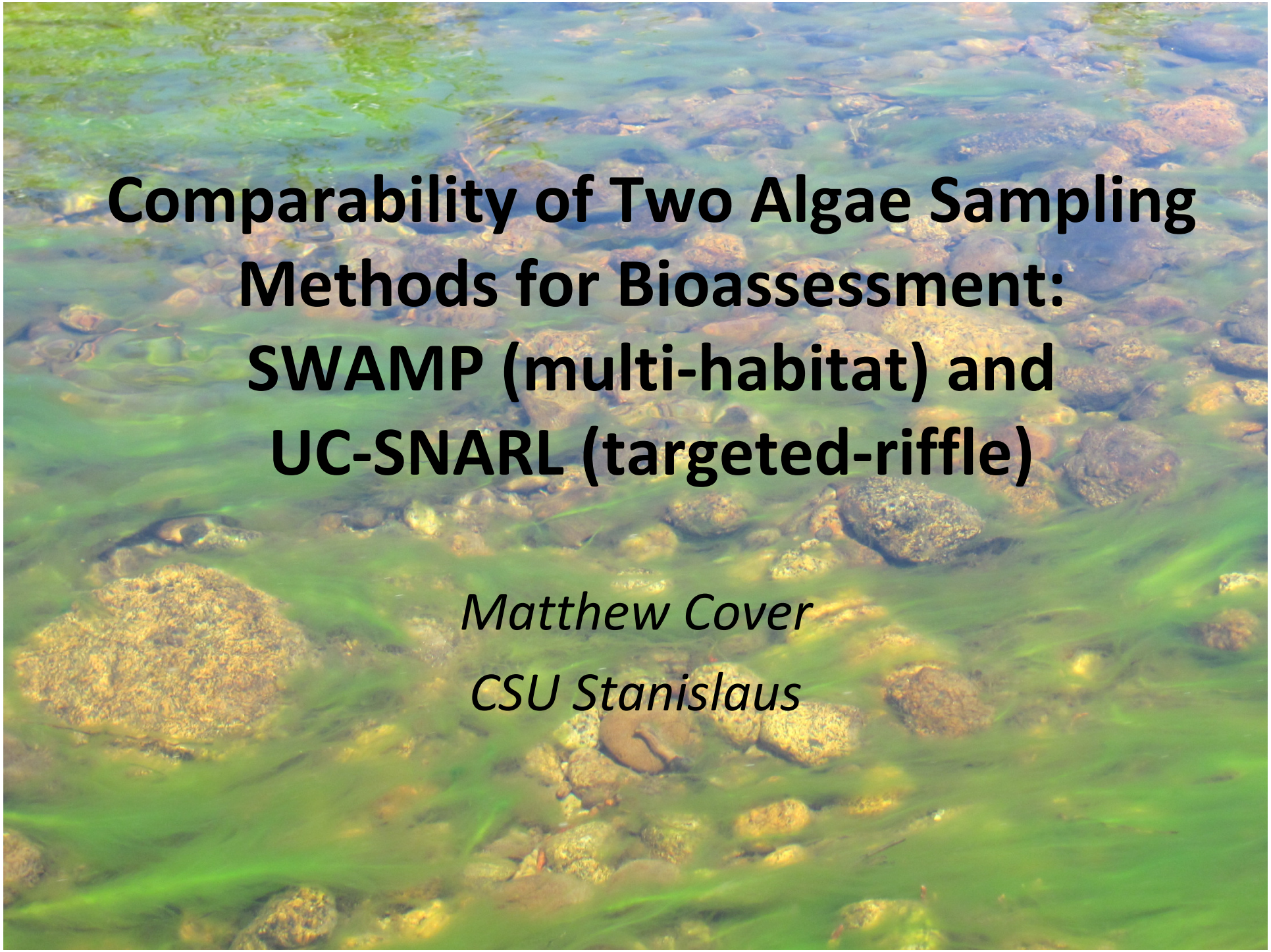
Comparability of Two Algae Sampling Methods for Bioassessment: SWAMP (multi-habitat) and UC-SNARL (targeted-riffle)

Matthew Cover

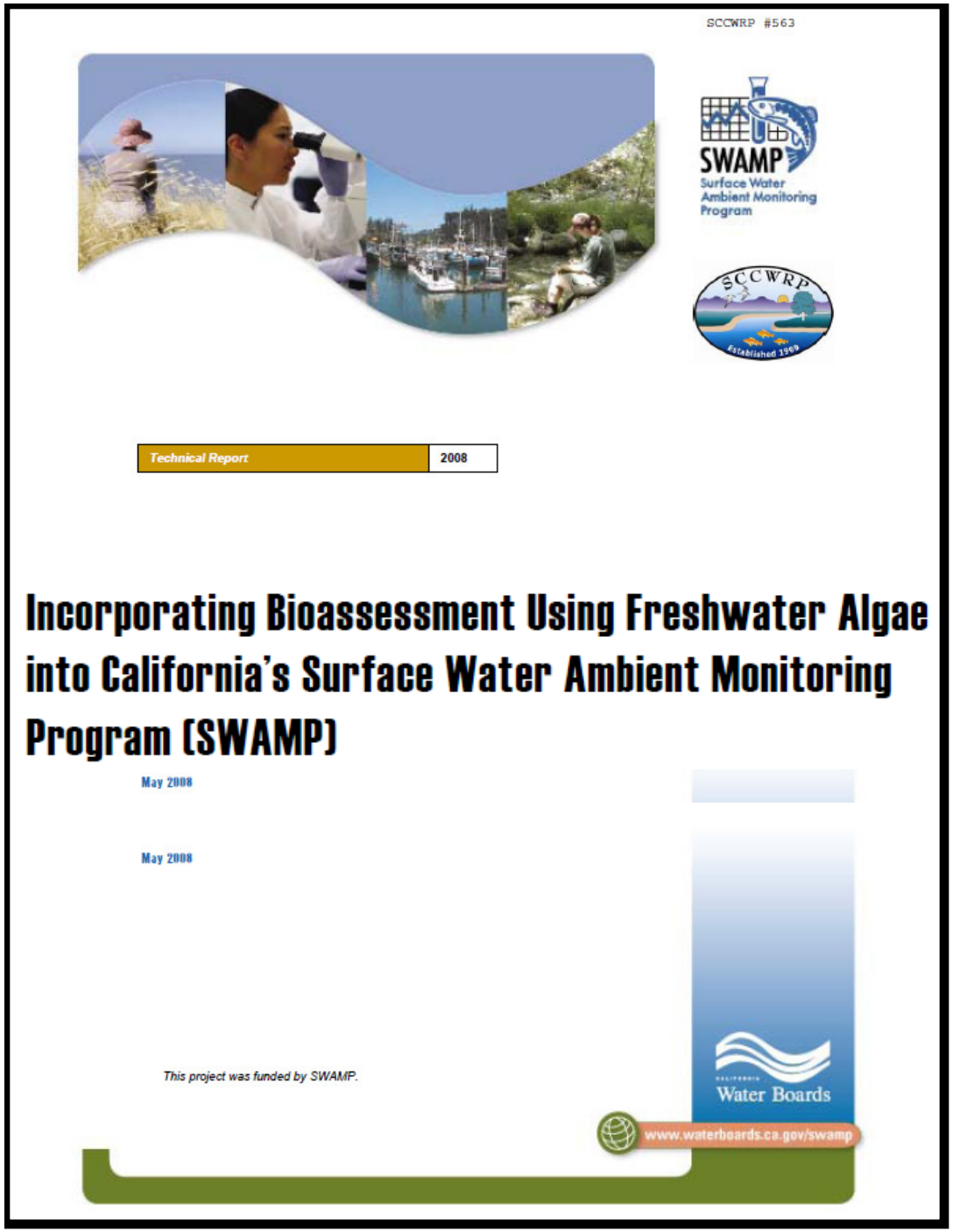
CSU Stanislaus



Comparability of Two Algae Sampling Methods for Bioassessment: SWAMP (multi-habitat) and UC-SNARL (targeted-riffle)

Matthew Cover

CSU Stanislaus



SWAMP Algae Plan (May 2008)

- Formed TAC
- Evaluated existing programs
- Synthesized state-of-knowledge

http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf

SWAMP Algae Plan: Recommendations

California should:

- form workgroup to establish standard taxonomy conventions (ongoing)
- adopt standardized procedures for measuring algae cover
- adopt a standardized MH/RW sampling procedure for both diatoms & soft algae

SWAMP Algae Plan: Recommendations

"…SWAMP [should] utilize the **multihabitat/ reachwide** approach for sample collection due to its versatility and anticipated applicability to a variety stream types... However, SWAMP should fund a **methods-calibration study** whereby targeted and reachwide methods are compared side-by-side in a set streams in the Lahontan Region…This will facilitate an assessment of whether, and how, datasets derived from samples collected in different ways can be integrated."

SWAMP Algae SOPs (May 2010)

- standardized statewide MH/RW field protocols for diatoms, soft algae, and algae cover

http://swamp.mpsl.mlml.calstate.edu/resources-and-downloads/standard-operating-procedures#bioassessment

SWAMP Multihabitat/Reachwide Field Sampling Methods

Figure 3. PVC Delimiter

Figure 4. Syringe Scrubber


1
2
3
4
5
6
7
8
9
10cc
B-D

Collection Methods	**Targeted Riffle**	**Multi-Habitat**
Sampling Location	One cobble-sized rock randomly selected from riffle habitat within each of three 50 m-long segments	One location on each of 11 transects spaced 15 m apart
Habitat	Riffles	Any wet habitat
Substrate	Cobble (5-25 cm diameter)	Any: cobble, gravel, sand, silt, organic matter, bedrock, macrophyte, etc.
Sampling Device and Frame	Wire brush- entire rock	Nylon tooth-brush with rubber delimeter, syringe sampler, or PVC coring device

Sampling Area	Three cobble, variable in size (each between ~100 and ~1000 cm^2), for a total area of 300-2000 cm^2.	11 locations, each an area of 12.6 cm^2 (delimeters) or 5.3 cm^2 (syringe scrubber), for a total of 58-139 cm^2.
Qualitative Soft Algae Sample	Not collected	Collected
Removal of non-algal material	Fine mesh net to remove inorganics and large organics (soft algae caught in net is placed back in sample)	Elutiration to separate inorganics (sand, silt, gravel); hand-picking to remove non-algae organics

Taxonomy samples and preservation method	Three samples of 20 mL. Note: for this study, one 45 mL subsample will be preserved with 5 mL of 37% formaldehyde.	Two; 40 mL diatom sample preserved with 10 mL formalin 10%, and a 45 mL soft algae sample preserved with 5 mL of glutaraldehyde.
Filtered Samples (chlorophyll a and AFDM)	5-20 mL of sample through a 25 mm glass fiber filter with syringe filtration device	25 mL of sample through a 47 mm glass fiber filter with a tower and hand pump vacuum device

Laboratory Analysis		
Taxonomy	Algae taxonomy: Dr. Dean Blinn	Soft algae: Dr. Robert Sheath (CSUSM); Diatoms: Dr. Patrick Kociolek (UColor)
AFDM and Chlorophyll a	Chl a in-house, SNARL. Note: for this project, filtered samples will be analyzed by the WPCL using SWAMP Lab Methods	WPCL, SWAMP Lab Methods

Hypotheses

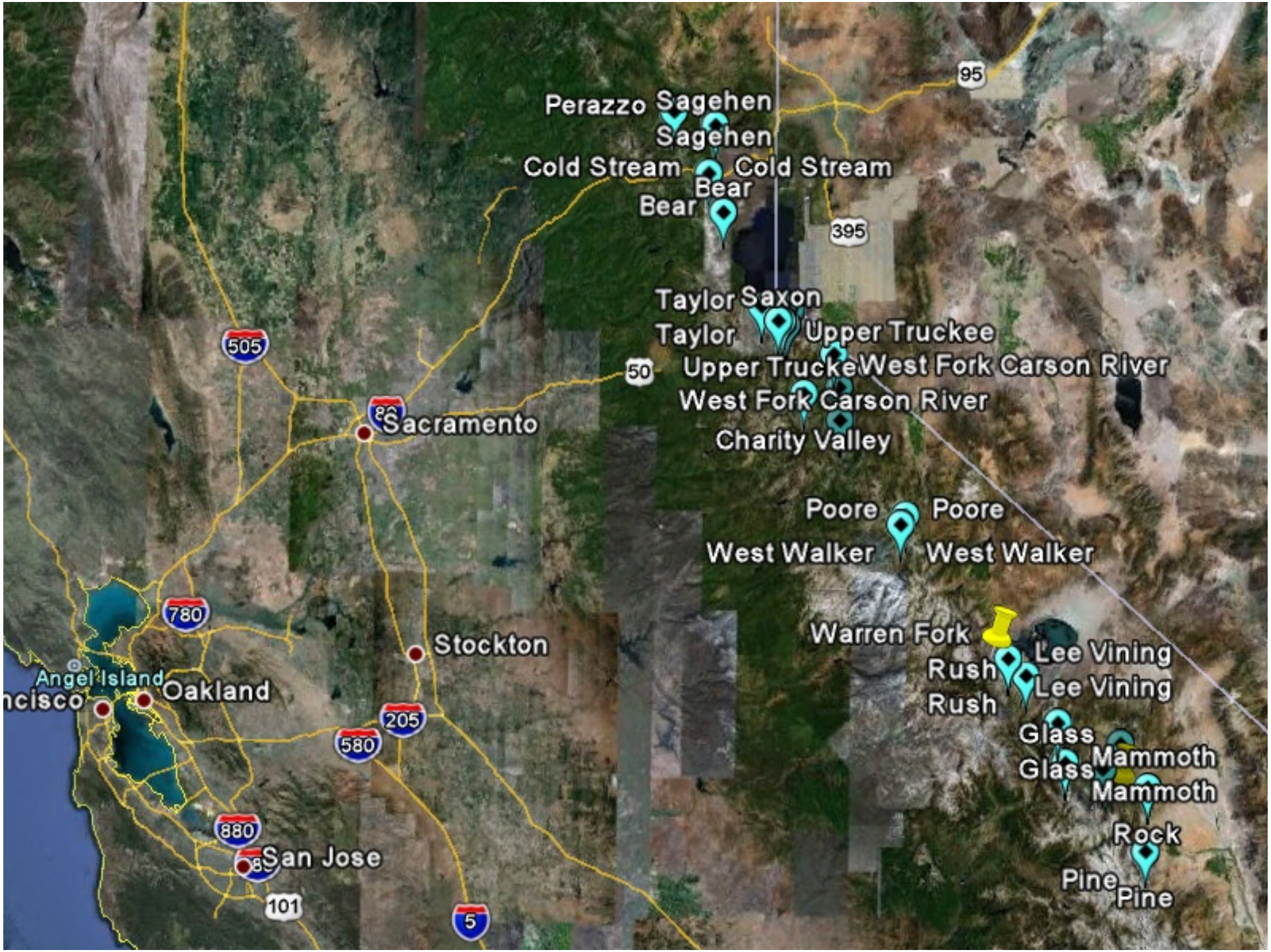
1. Taxonomy should be most similar in cobble-bed streams; most dissimilar in low-gradient, sandy streams
2. AFDM: Systematic differences between methods, as a result of different pools of organic matter
   - Relationships between Chl a and AFDM
3. Differences in Lab Taxonomy?

Study Sites

- 25 Study Sites- Eastern Sierra (Lahontan, R6)
- 5 sites: Triplicate samples, both methods

Criteria:

- Mix of steep (13) and low-gradient (12)
- Mix of reference (15) and test (10)
- “Easy” access
- Few invasive species concerns (NZMS, Didymo)


Perazzo
Sagehen
Sagehen
Cold Stream
Cold Stream
Bear
Bear
95
395
Taylor
Saxon
Taylor
Upper Truckee
Upper Truckee
West Fork Carson River
West Fork Carson River
Charity Valley
50
505
Sacramento
Poore
Poore
West Walker
West Walker
780
Stockton
Warren Fork
Lee Vining
Rush
Lee Vining
Rush
Angel Island
Oakland
205
580
Glass
Glass
Mammoth
Mammoth
Rock
880
San Jose
Pine
Pine
101
5

Field Sampling

- Water Chemistry (basic, nutrients)
- Algae: both methods, side-by-side
- (Algae Processing)
- Full “Algae” PHAB (minus slope)

Observations

- Time requirements
  - Collection: SWAMP >> SNARL
  - Processing: SWAMP < SNARL (*modficiations)
  - Total per method: 1-2 hours
- Patchiness a big issue: # of each sample type highly variable
- Presence/Absence of fine substrate (coring device) very important

Thanks

Tom Suk, R6

Lillian Busse, R9

Dave Herbst, SNARL

Betty Fetscher, SCCWRP

Kelly Huck, R6

Nancy Au