

An aerial photograph of a city, likely San Marcos, California, with a dense residential and commercial area in the foreground and middle ground. In the background, a range of mountains with snow-capped peaks is visible under a blue sky with scattered white clouds. The text is overlaid on the upper half of the image.

Update on the SMC stream survey

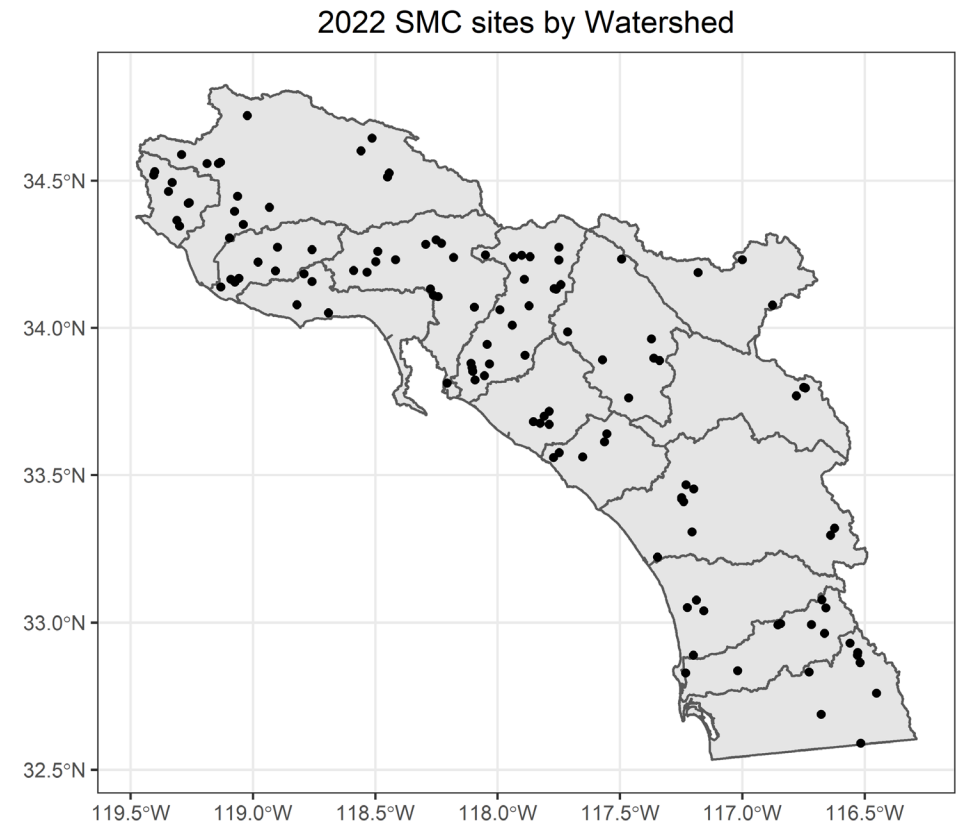
SMC steering committee

March 7, 2023

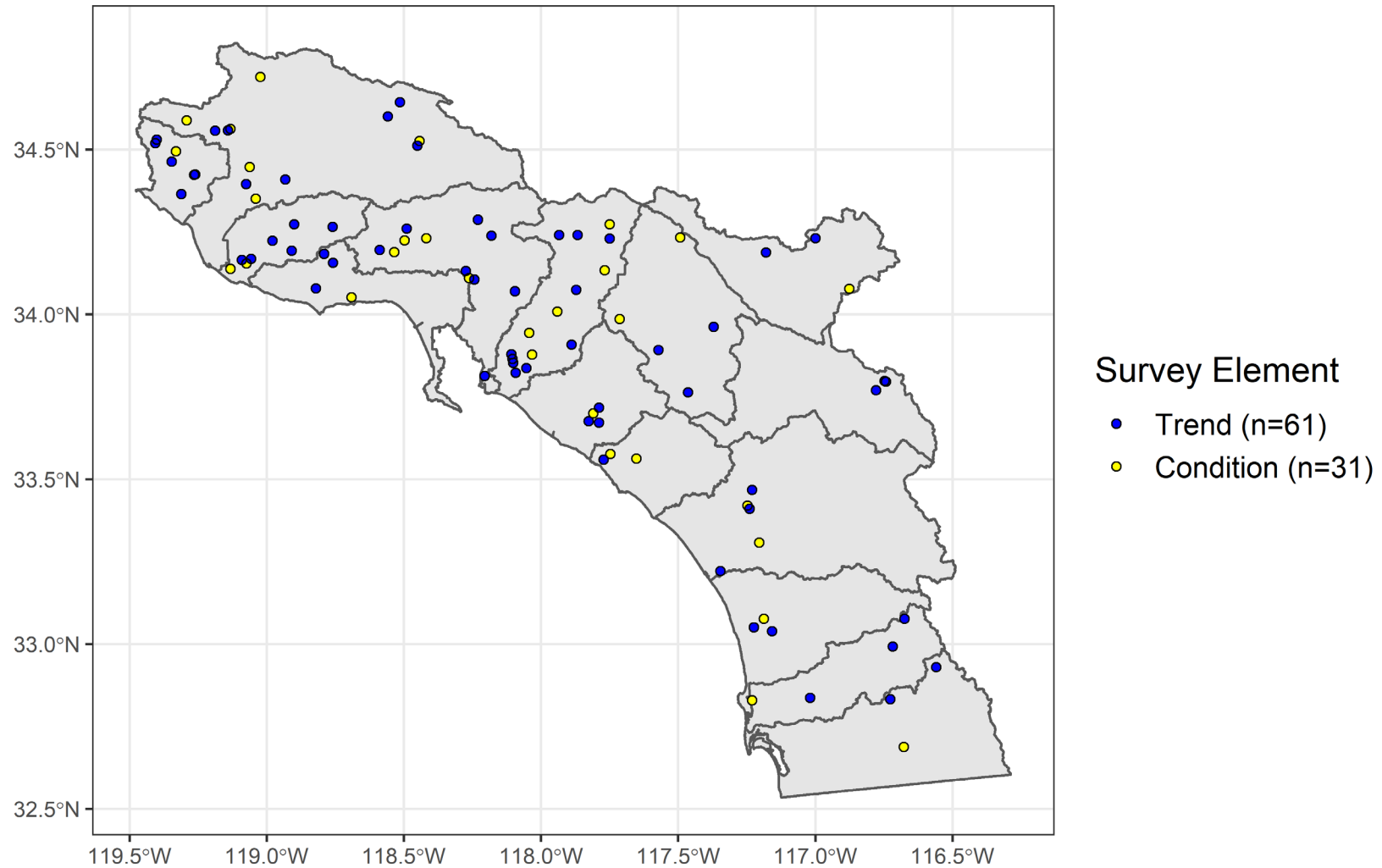
The 2021-2025 SMC survey design is the most comprehensive to date

We are entering the 3rd year of the survey

- 10 data owners
- 8 sampling agencies
- 121 sites sampled in 2022
- 5 survey elements
 - Trends
 - Condition
 - Targeted
 - Causal assessment
 - Wet/Dry mapping

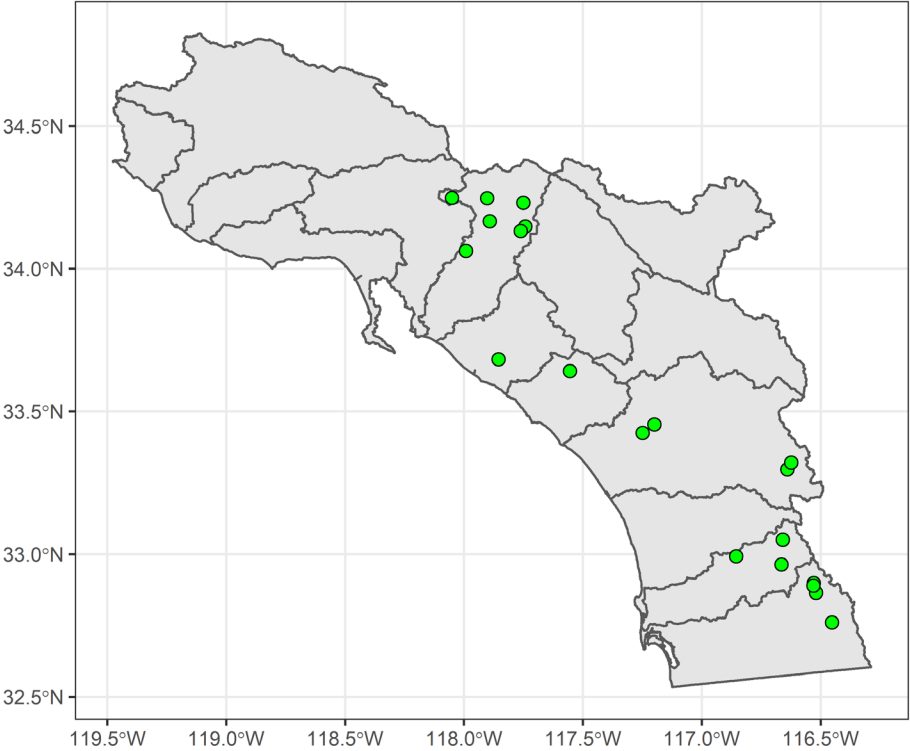


Trend and Condition made up the bulk of the sampling

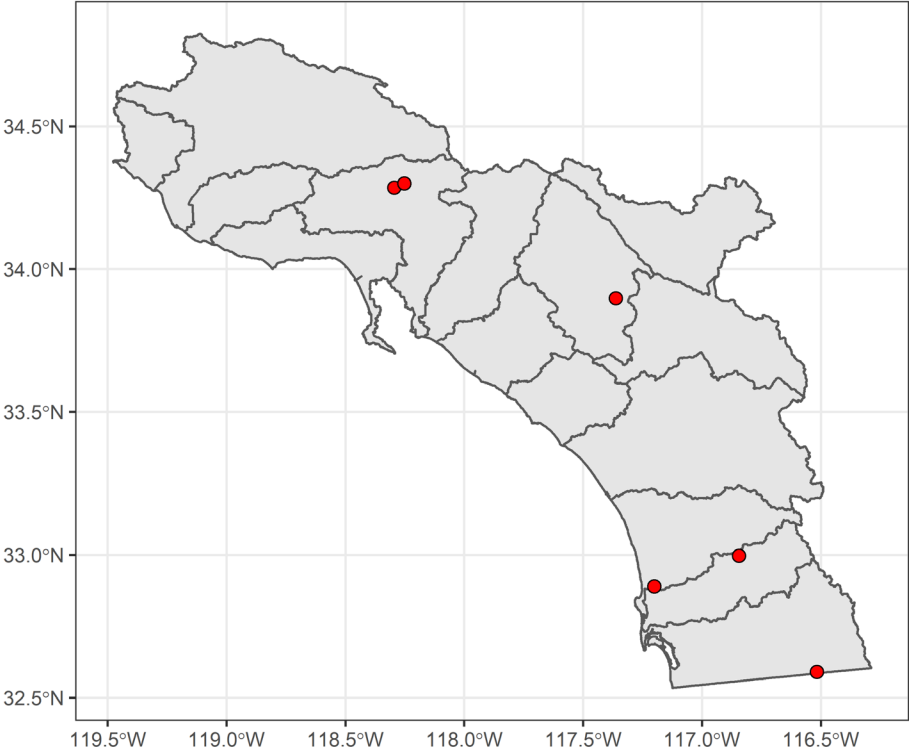


Targeted, Causal and Wet/Dry at fewer locations

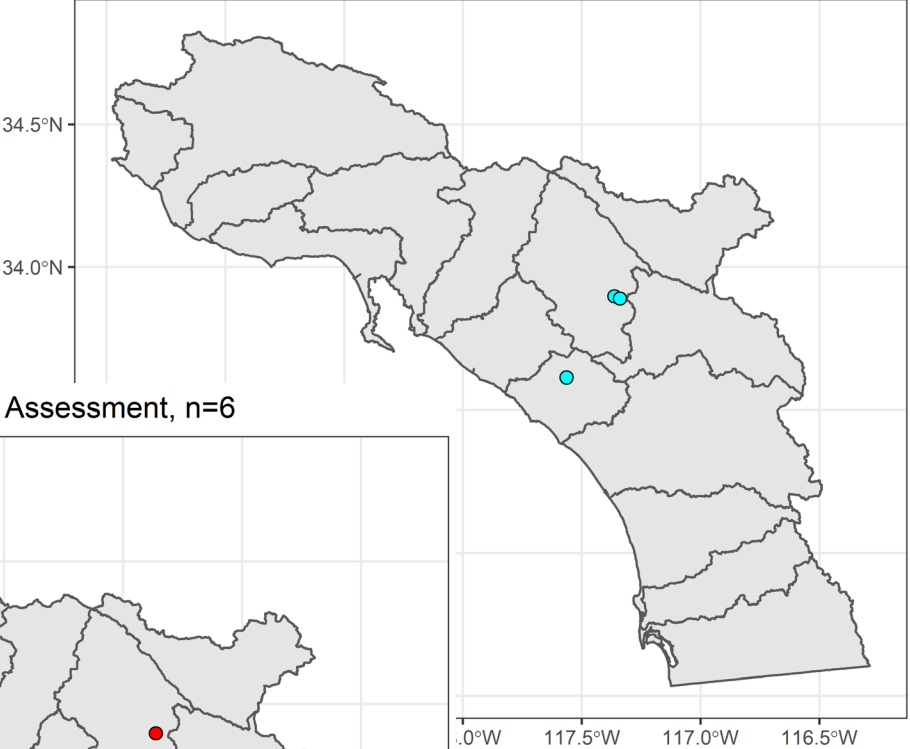
2022 Targeted, n=20



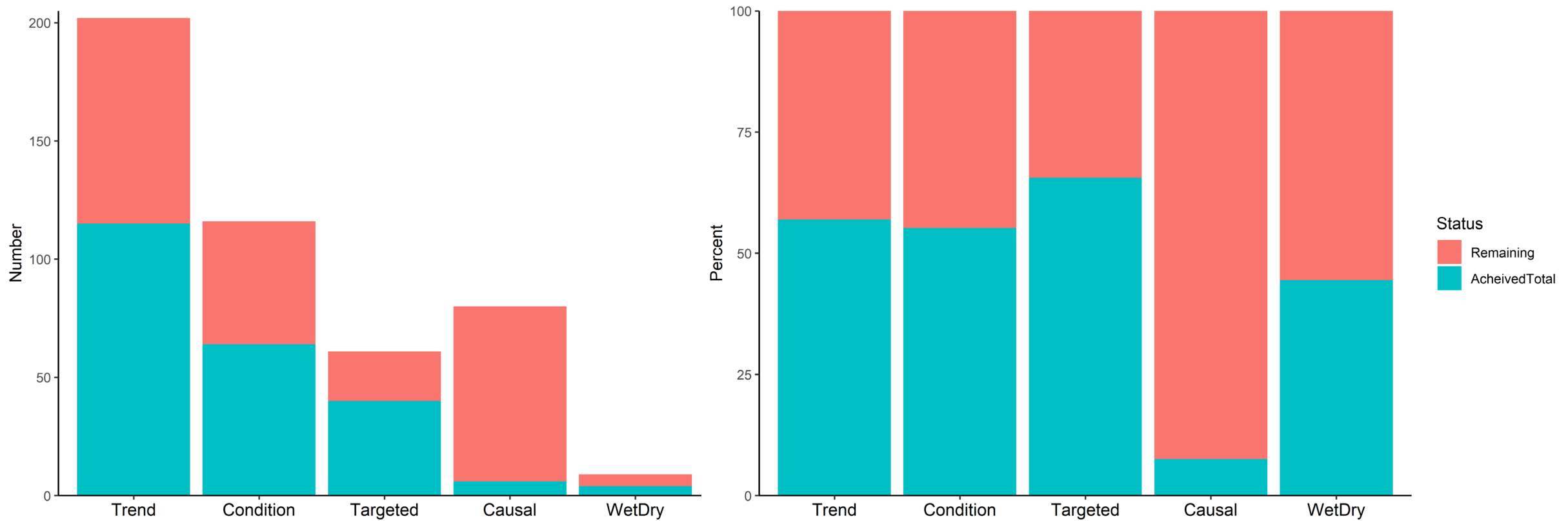
2022 Causal Assessment, n=6



2022 Wet/Dry Assessment, n=3



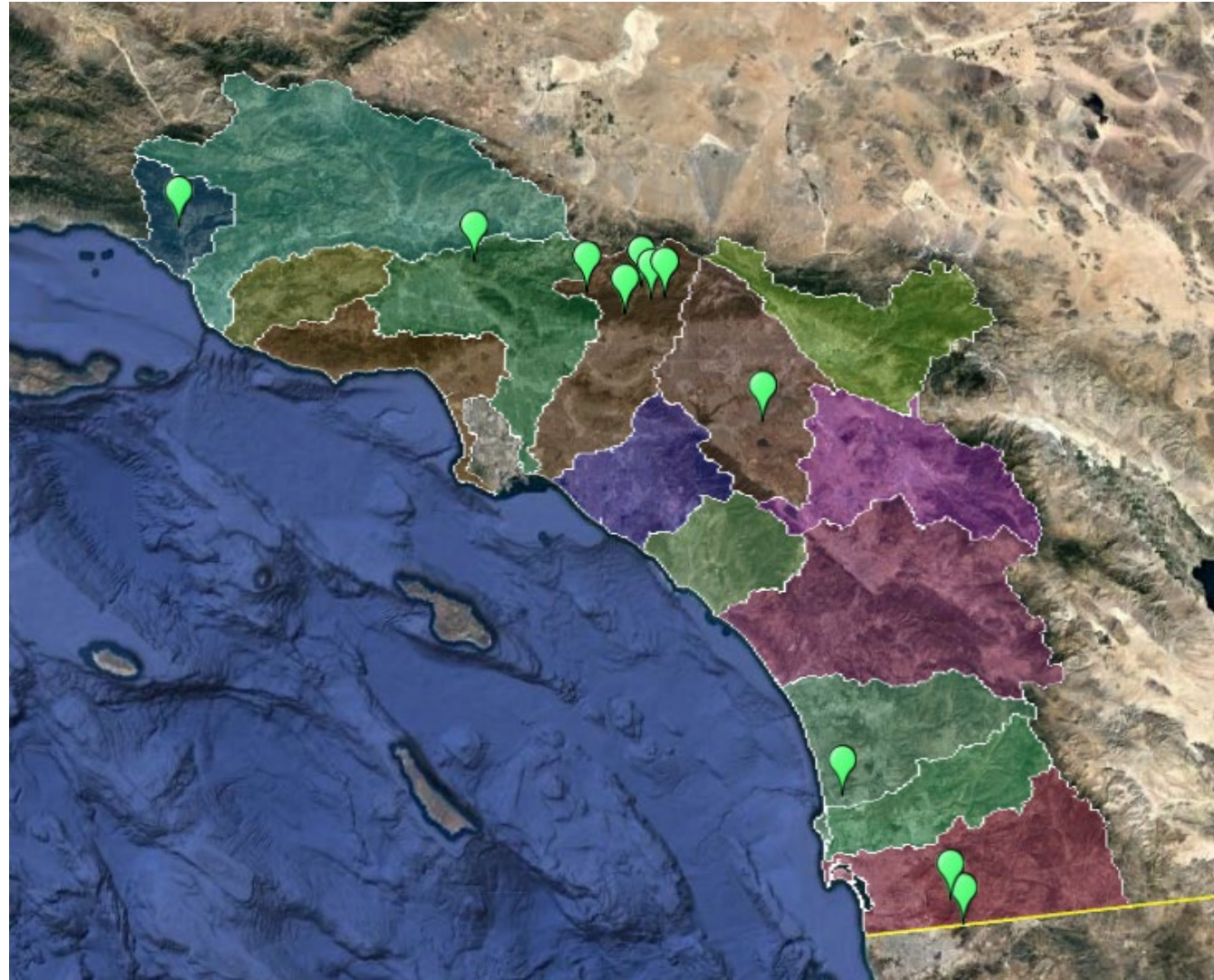
Sampling Summary by Survey Element



On track to complete most elements!

Several causal assessments are currently underway as part of SMC survey

- Start with RSCA, move towards detailed over 5-year cycle
- So far, we've used it to inform adaptive monitoring strategies. E.g., select sites for follow-up monitoring:
 - Flow data
 - Pesticides
 - Nutrient sources
- We'll draw final conclusions at end of our survey (after 2025 sampling season)




Causal assessment sites: Plans for sampling

Region	Site(s)	Team members	Plan for 2022
Ventura	Ventura River	Ventura County, RB4	Resample to confirm condition, log temperature and flow
Los Angeles	Big Tujunga	LA County, LARWMP, RB4	Resample to confirm condition, log temperature and flow
San Gabriel	Several upper watershed sites	LA County, SGRRMP, RB4	Resample to confirm condition, assess flow
Riverside	Goldenstar Canyon	Riverside County, RB8	Resample to confirm condition, conduct wet-dry mapping, assess nutrient inputs, pyrethroids
San Diego	Carrol Canyon	SD County, SD City, RB9	Resample to confirm condition, assess pyrethroids
San Diego	Jamul Creek	SD County, SD City, RB9, and Imperial Beach	Resample to confirm condition, assess DO, evaluate stream gage
San Diego	Campo Creek	SD County, SD City, RB9, and Imperial Beach	Resample to confirm condition, assess pyrethroids

Causal assessment sites: What happened?

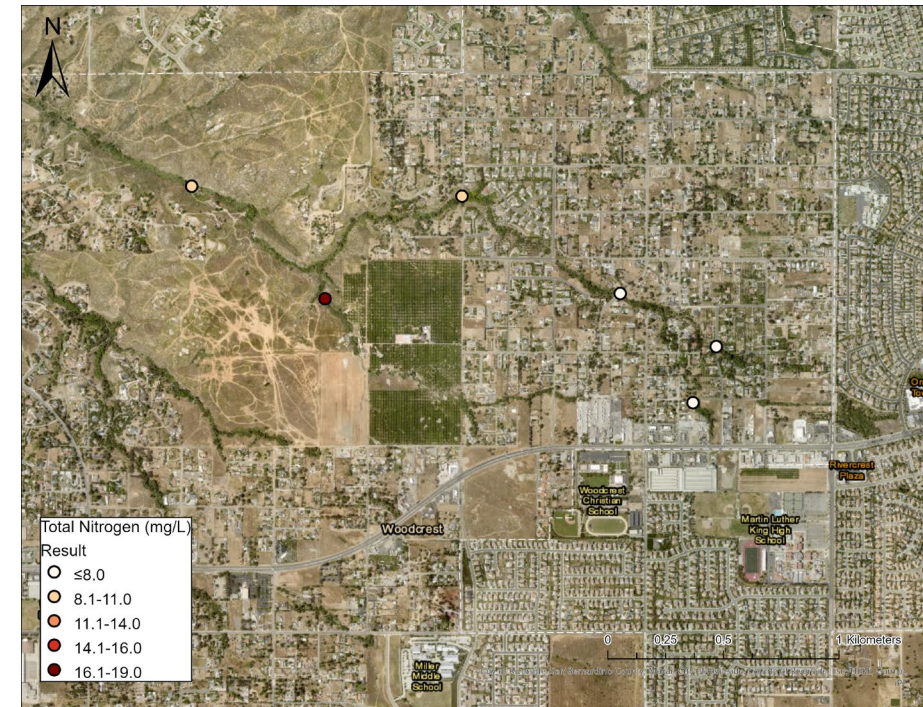
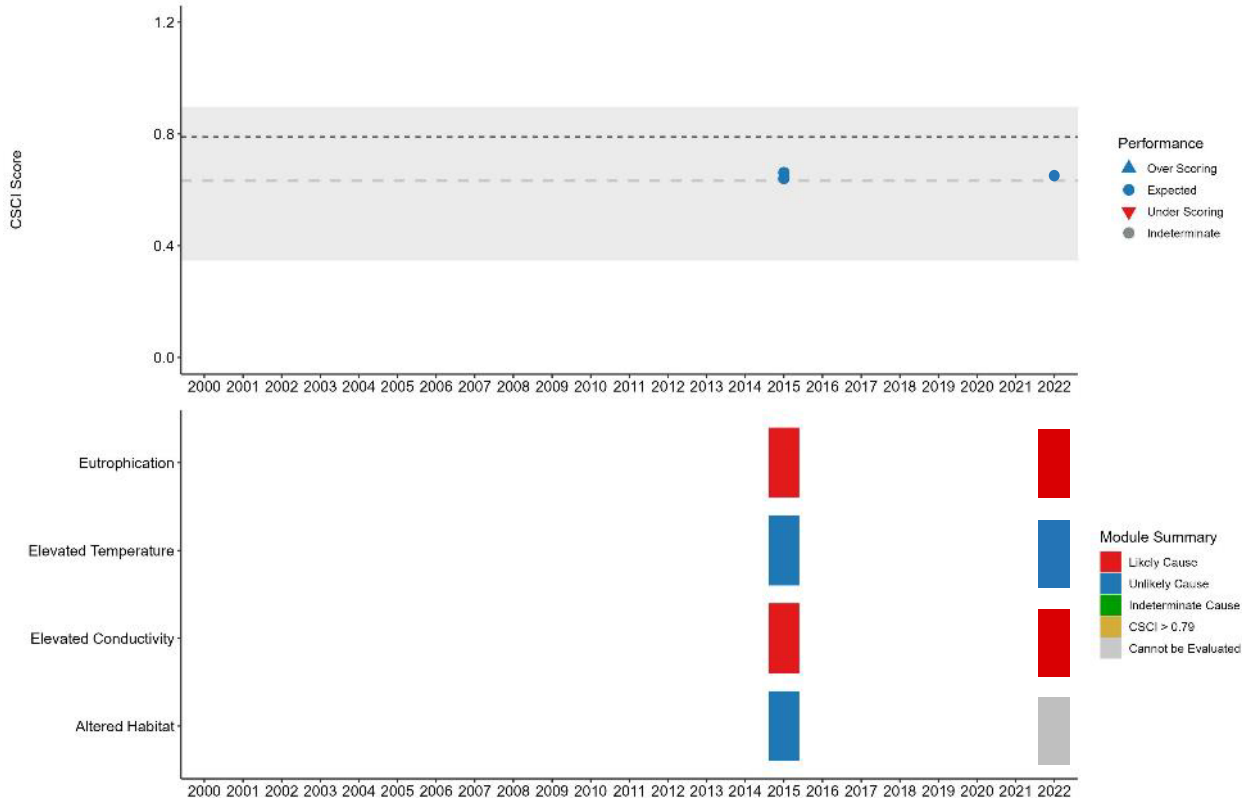
- Insufficient flow to resample: 2 sites
 - Ventura River, Jamul Creek
 - Plan: Resample in 2023
- Resampled, conditions improved: 1 site
 - Big Tujunga
- Resampled, conditions still poor, or worse: 4 sites
 - Campo Creek (San Diego)
 - Carroll Canyon (San Diego)
 - Goldenstar Canyon (Riverside)
 - San Vicente (San Diego)



We are mostly shifting away from confirmation, favoring:

- Analysis of other data sources
- Stressor-focused data collection (e.g., upstream tribs)

Goldenstar Canyon: Poor conditions confirmed



- Nutrient concentrations are still very high
- Tribs show that this is widespread
- GW suspected source, likely due to legacy agriculture contamination
- Review other data sources, role of Arundo
- No new bioassessment planned until 2024

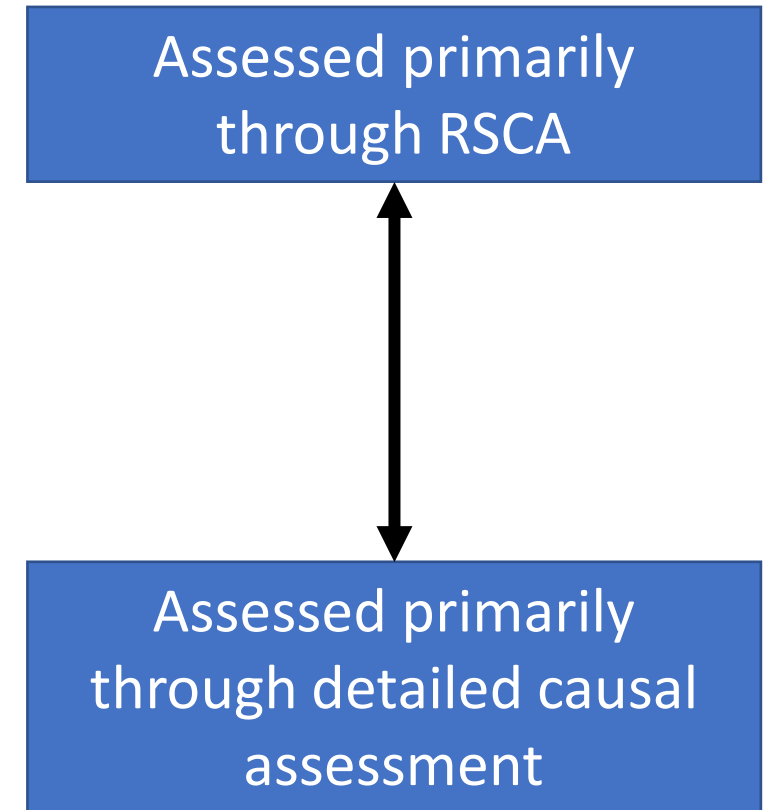
Causal assessment sites: Plans for sampling

Region	Site(s)	Team members	Plan for 2023
Ventura	Ventura River	Ventura County, RB4	Resample to confirm condition , log temperature and flow
Los Angeles	Big Tujunga	LA County, LARWMP, RB4	Confirm recovery in future years (not 2023)
San Gabriel	Several upper watershed sites	LA County, SGRRMP, RB4	Resample in high-flow year (2023)
Riverside	Goldenstar Canyon	Riverside County, RB8	Review other data on groundwater as source of nutrients. No sampling in 2023.
San Diego	Carrol Canyon	SD County, SD City, RB9	Review other data on sources of ions. No sampling in 2023.
San Diego	San Vicente Creek	SD County, SD City, RB9	Sample upstream sources of nutrients.
San Diego	Jamul Creek	SD County, SD City, RB9, and Imperial Beach	Resample to confirm condition , assess DO , evaluate stream gage
San Diego	Campo Creek	SD County, SD City, RB9, and Imperial Beach	Evaluate impact of storms on streambed, resample if appropriate
Santa Ana	Big Bear tributaries	RB8	Resample to confirm condition.

What does a “complete” causal assessment look like?

- Have you confirmed the biological condition?
- Are the standard stressors adequately evaluated?
- Are there additional stressors we need to look at?
- Can we identify the “source” of the stress?
- Do we know who might be able to “fix” the problem, and how?

SMC can set standards for what constitutes a complete causal assessment.



Other workplan updates

- Small adjustments in planned sample allocations
 - Set aside samples for future modified channel study
 - Cut back on over-allocated causal assessments
- New causal assessment sites (San Diego, San Bernardino Counties)
- New targeted sites of interest (mostly reference sites)

What's next?

- Can you provide approval of the workplan today, or do you need more time for review?
- Intercalibration has been scheduled!
 - March 24 at Serrano Creek in Lake Forest
 - You and your staff are welcome to join and observe, even if you aren't collecting data yourself



Biological integrity in modified channels

Project 5.3

Workplan review for the SMC Steering Committee

Raphael Mazor

raphaelm@sccwrp.org

Katie Irving

katiei@sccwrp.org

Goals of the study

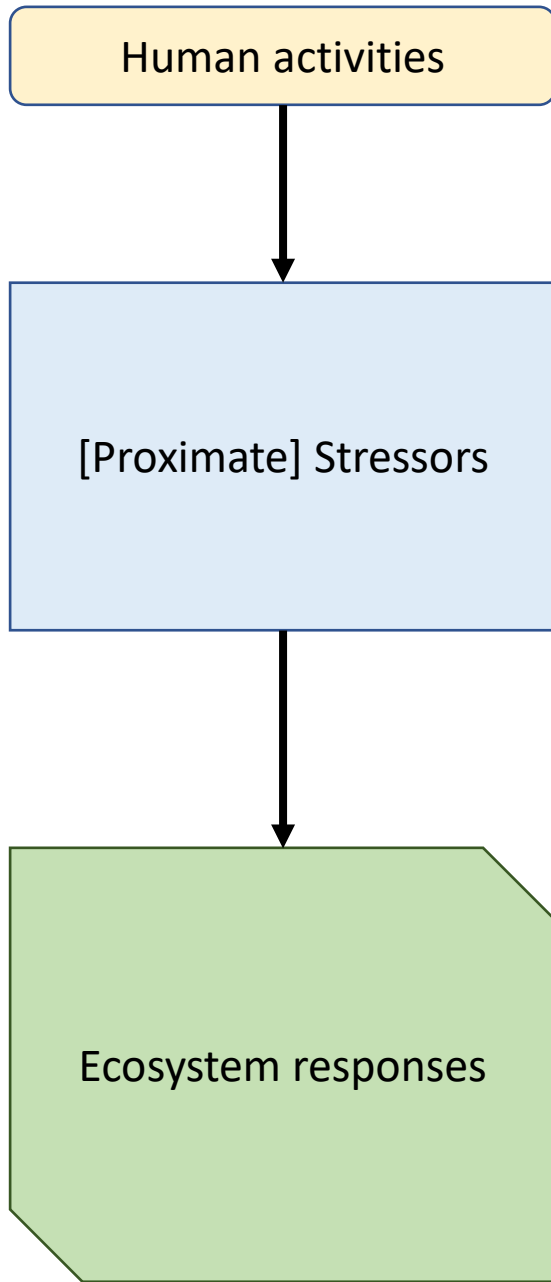
- Desired outcomes:
 - Support management decisions that maintain healthy conditions *and* flood control goals in modified streams.
 - Create tools to support healthy streams by targeting restorations, water quality improvement, and flow management activities in locations with the greatest likelihood of success
- Key questions:
 - What are ranges of conditions in different types of modified streams?
 - How can we improve conditions within existing channel forms? I.e., how do conditions in modified streams respond to changes in WQ and flow?
 - How can we improve conditions by restoring natural forms/features?

What have we accomplished so far?

- We've assembled a technical working group (TWG)
- We've developed a conceptual model for biointegrity impacts in modified channels
- We've reviewed and finalized a classification system based on bed and bank material
- We've developed options for two types of studies
 - Analysis of existing data
 - Collection of new data
- We've developed a workplan for new data collection we'd like you to approve

Our TWG:

- Includes representatives from several SMC agencies:
 - Orange County Public Works
 - San Diego County Public Works
 - City of San Diego
 - Riverside County Flood Control & Water Conservation District
 - San Diego Water Quality Control Board
 - Santa Ana Water Quality Control Board



Our Conceptual Model

Simplified, generic conceptual model derived from EPA's CADDIS framework

Let's apply to channel modifications!

- What kinds of human activities are associated with channel modification?
- What stressors do they introduce or exacerbate?
- How do ecosystems respond to those stresses?

Human activities

Streambed
hardening

Bank
hardening

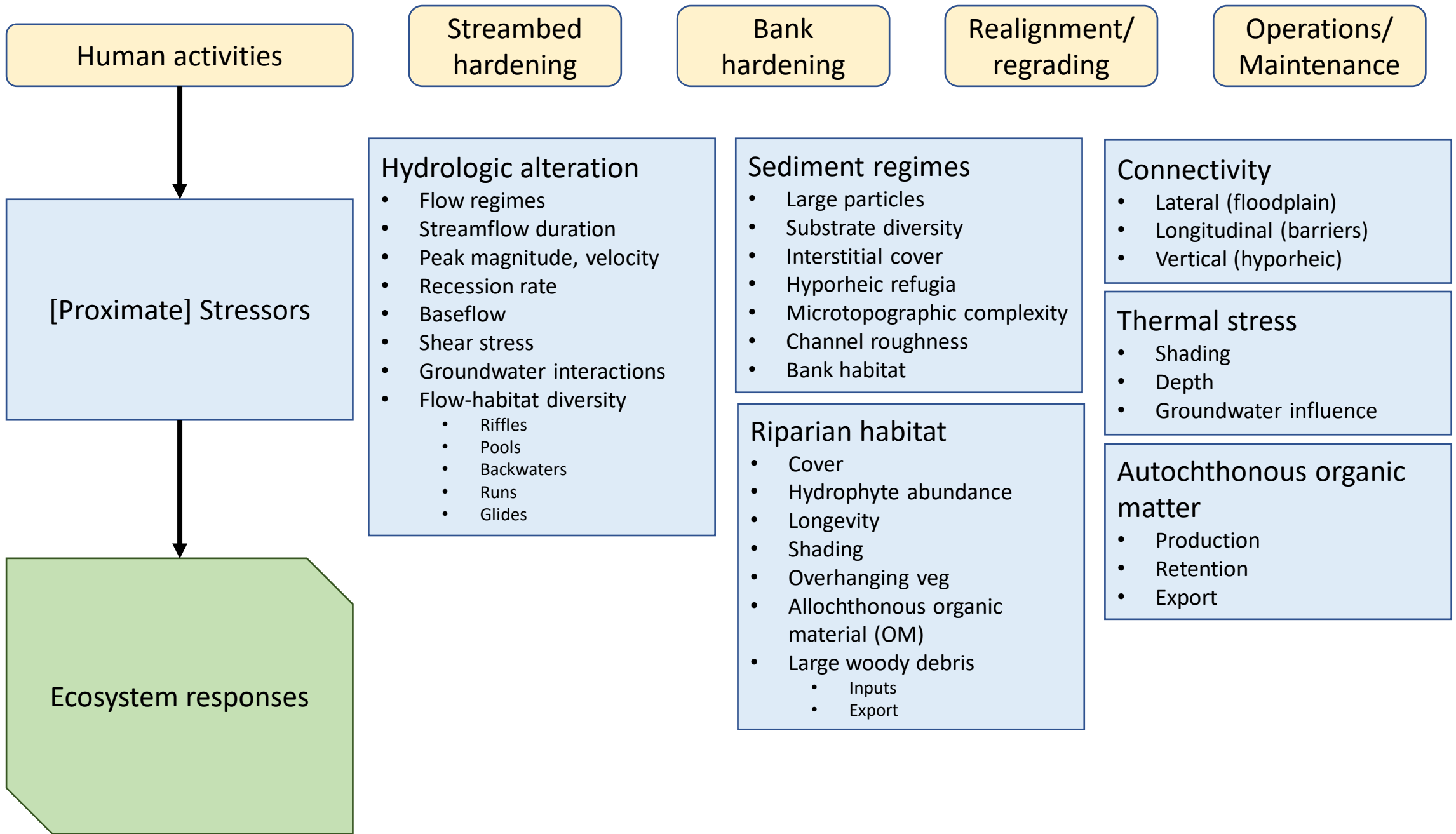
Realignment/
regrading

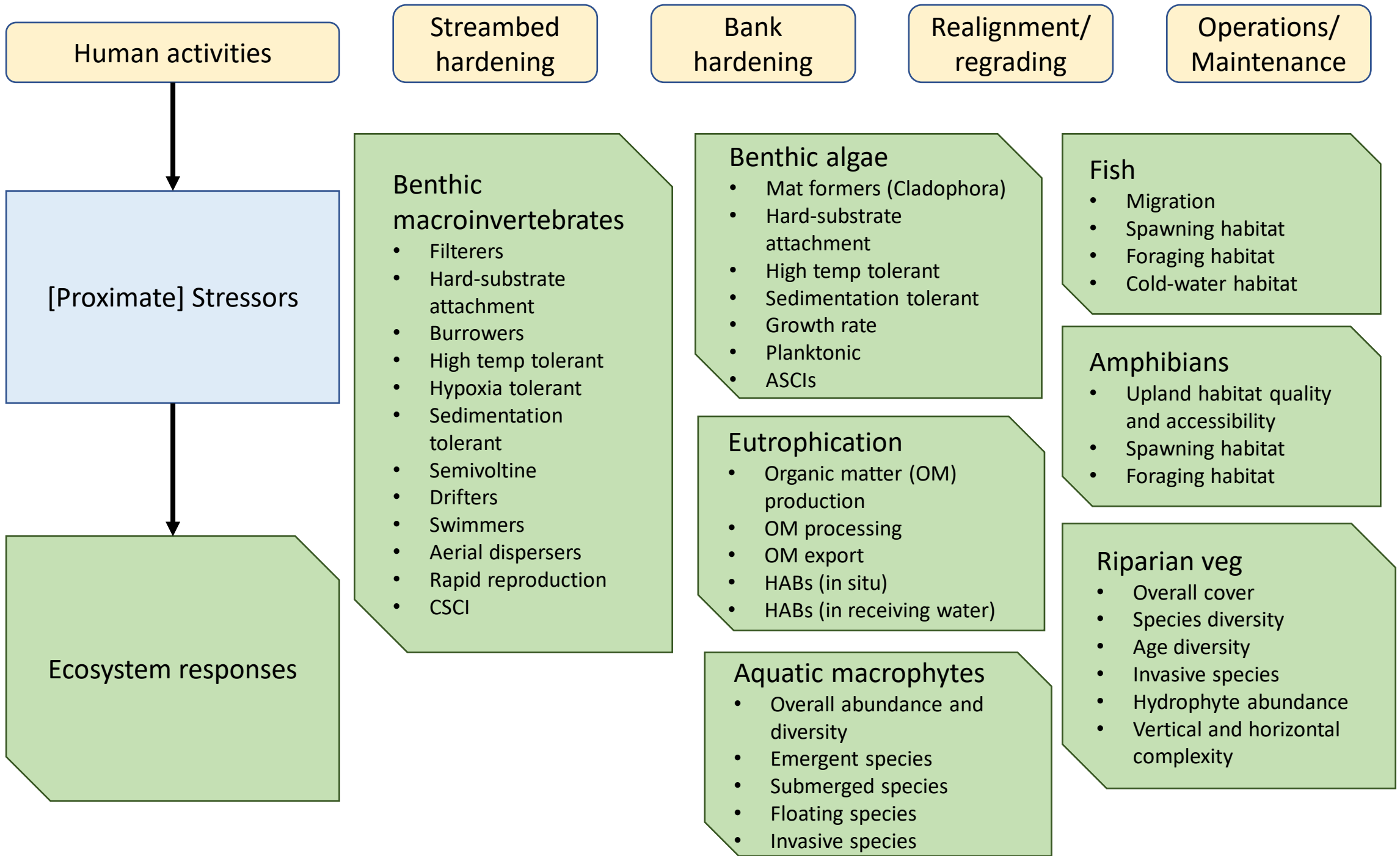
Operations/
Maintenance

[Proximate] Stressors

Ecosystem responses













We have a modified channel classification system

- Natural
- Engineered, based primarily on bed and bank material
 - Hard bottom
 - Soft bottom, 2 hard sides
 - Soft bottom, 1 hard side
 - Soft bottom, 0 hard sides
- Constructed, with ambiguous watersheds

Study options for new data collection

- Impacts of restoring natural channel forms
 -  Directly addresses a goal of the project
 -  Hard to identify sites
 -  Not directly related to member agency's management activities
- Impacts of channel maintenance activities
 -  Directly addresses a goal of the project
 -  Also hard to identify sites?
 -  Directly related to member agency's management activities

Recommendation:

- Continue gathering data about sites
- Defer for future studies

Recommendation:

- Pursue this option for the present project

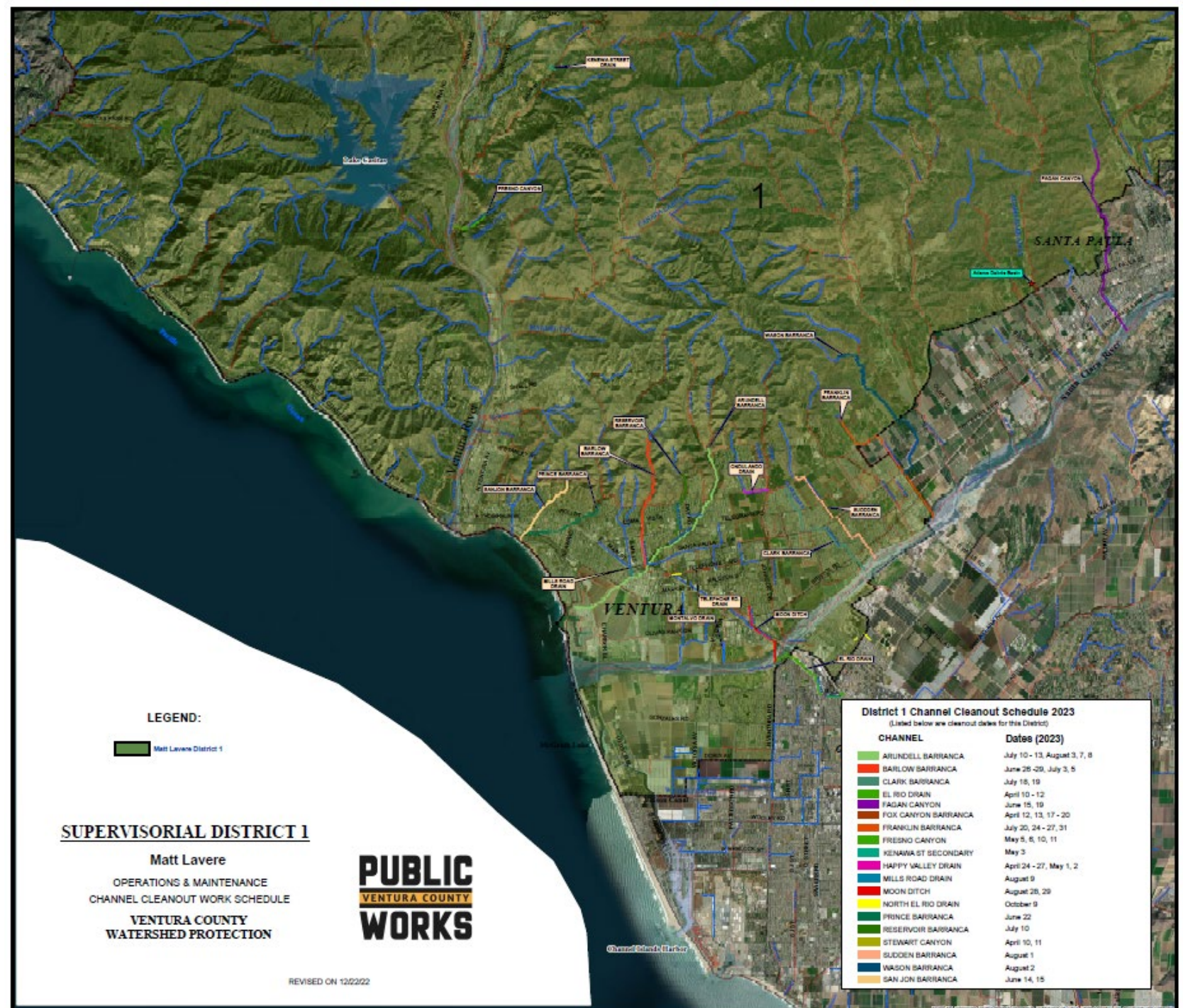
Optimal study design

- Collect a sample before maintenance occurs
 - Only possible if maintenance occurs in Summer or Fall
- Collect a sample shortly after maintenance occurs
 - Ideally, ~4 weeks
- Collect a third sample the following year, before maintenance re-occurs
- Aim for ~10 sites across region
 - Insufficient for statistical testing
 - Review as case studies
 - Identify factors that relate to short- and long-term impacts

How did we identify sites?

- Example from Ventura County
- VCWPD sent us maps of reaches and schedules for cleanout in 2023
 - We assume cleanout affects the sampling reach in the depicted area
 - We assume that no cleanout is planned for non-highlighted reaches
 - May need to verify with other agencies
 - We assume that locations of historic bioassessment sites is evidence that the site will be sampleable in 2023

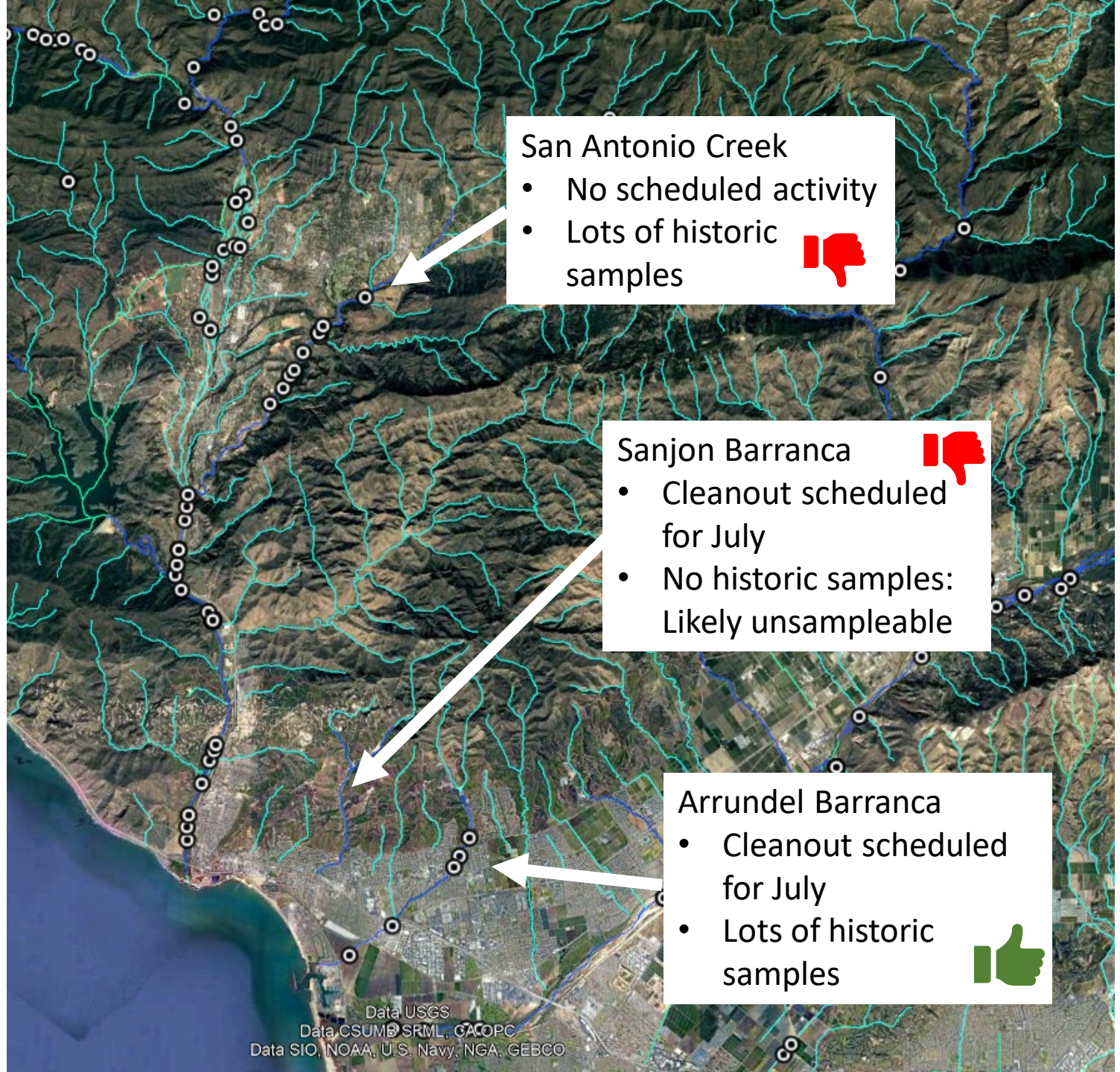
- Clearly identifies spatial extent and timing of planned activities



- We compared this map to map of known sampling locations

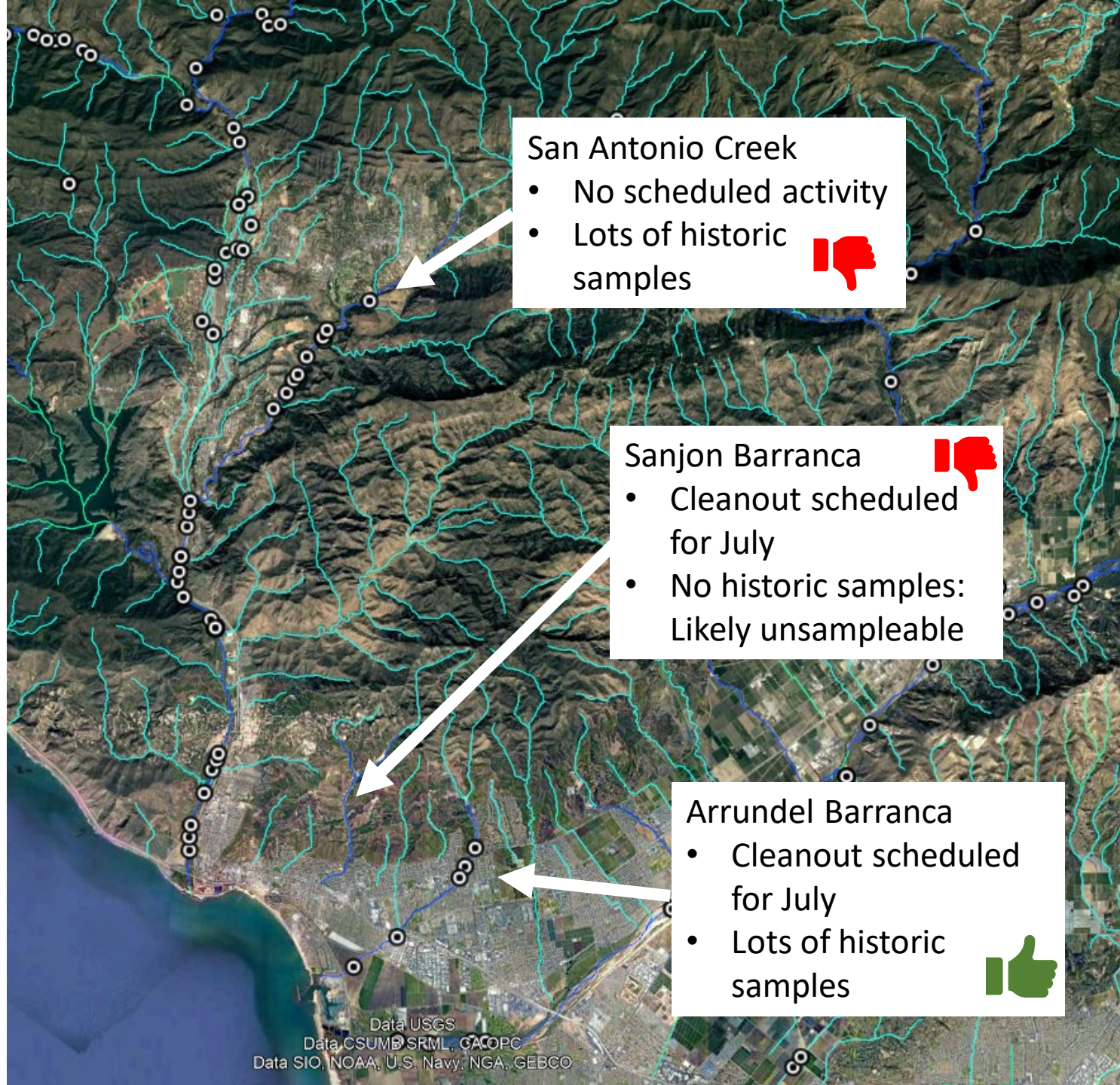


- We found reaches that are likely to suit our study
- We can revisit the same sites and use historic data for comparison




We're already learning new things!

- The vast majority of maintenance activities occurs in channels with no bioassessment samples




San Antonio Creek

- No scheduled activity
- Lots of historic samples




Sanjon Barranca

- Cleanout scheduled for July
- No historic samples: Likely unsamplable



Arrundel Barranca

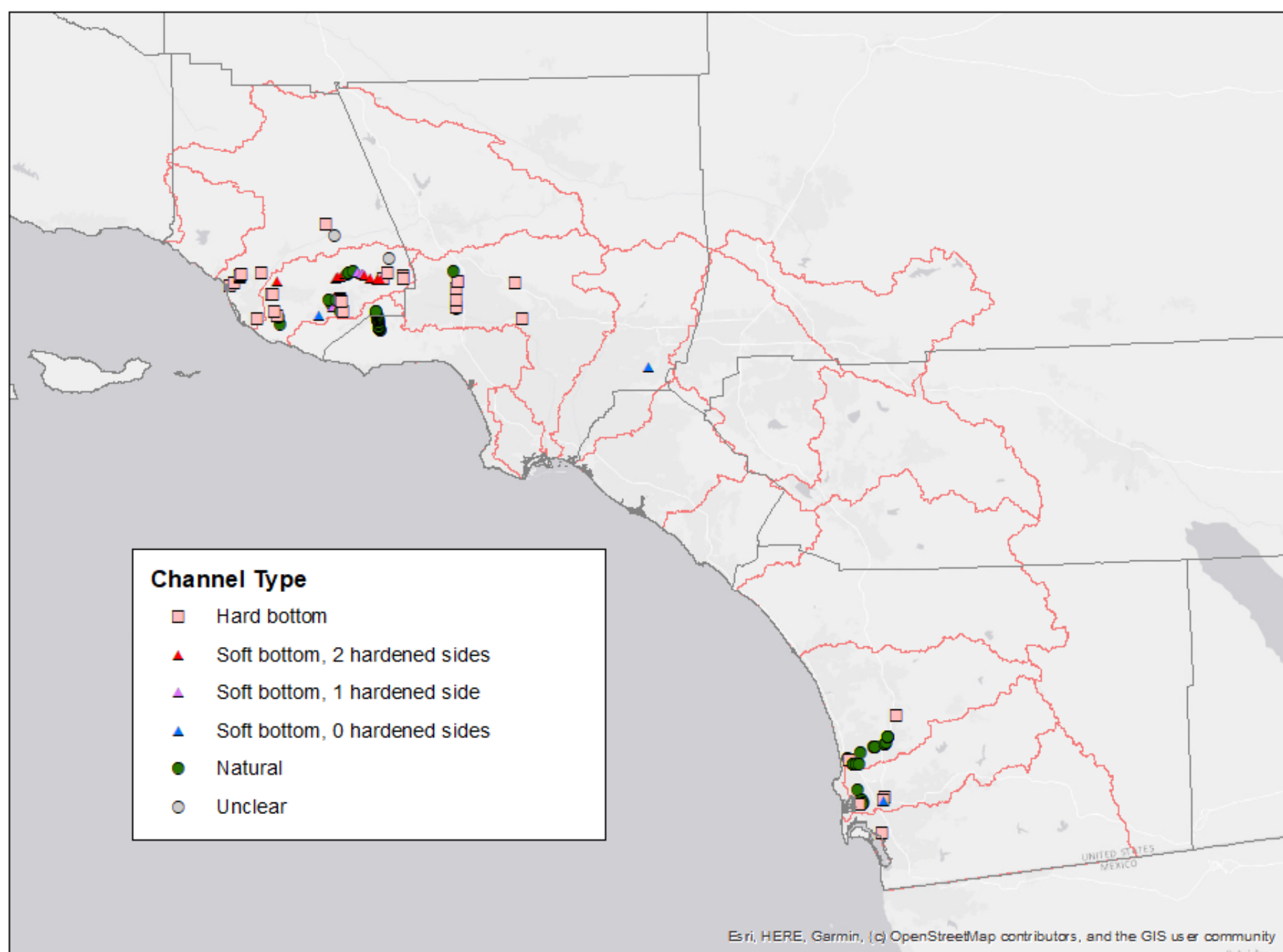
- Cleanout scheduled for July
- Lots of historic samples



Data USGS
Data CSUMB SRML, CACOPC
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

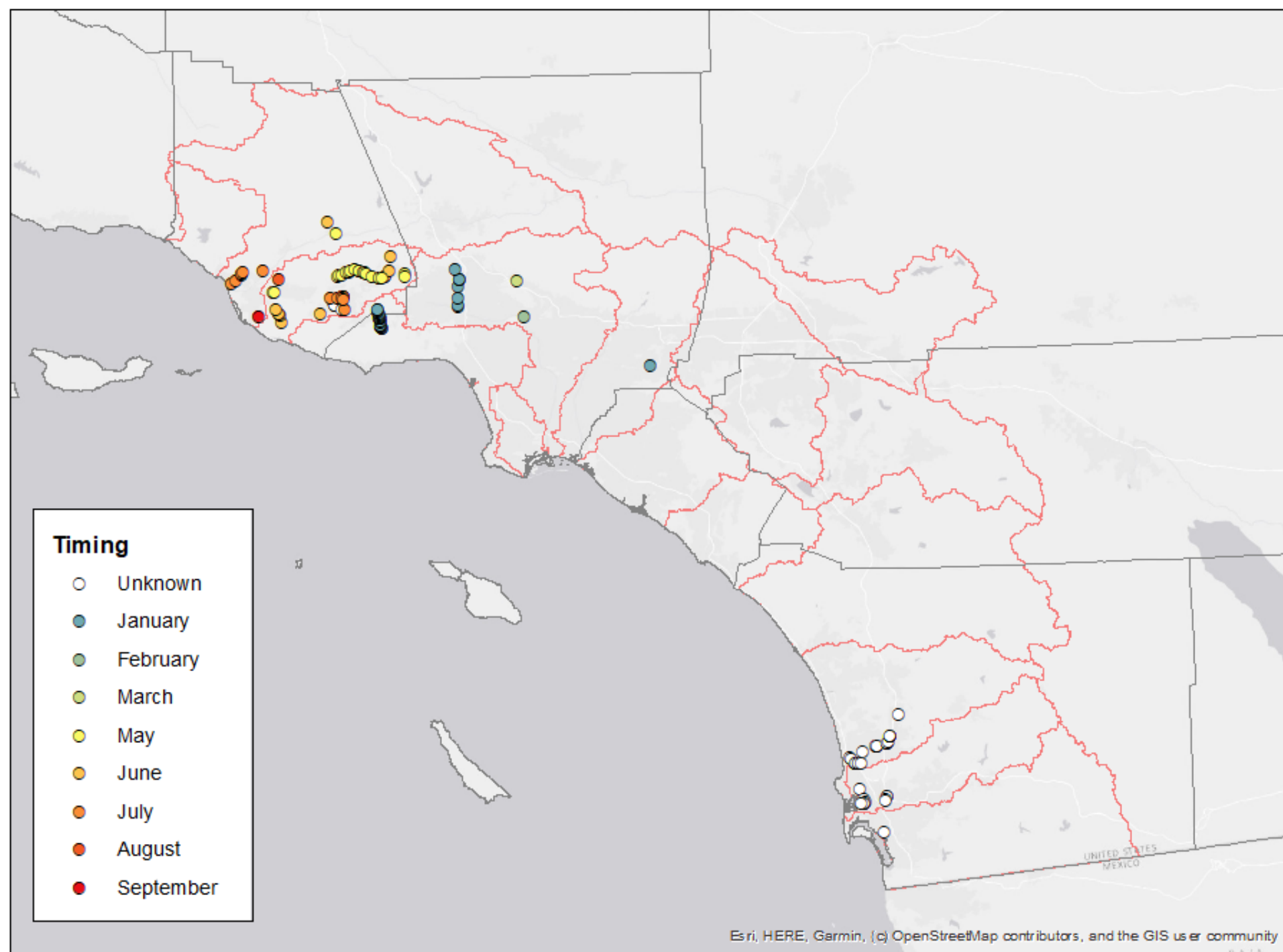
Channel types

- These are sites that have been previously sampled and are on channels scheduled for maintenance in 2023



Timing

- LA County is mostly in Winter
- Ventura is mostly in late Spring and Summer
- SD County not yet known (but some sites are cleaned after nesting season, aka Summer)



What will we measure?

- Standard survey analytes
 - Bugs, diatoms, physical habitat, ions, nutrients
- Add sediment pesticides in catchments where we think pesticide application occurs
- Add water level, temperature loggers where feasible
 - May require temporary removal during channel maintenance

Some agencies had difficulty identifying appropriate channels

Could be due to any number of challenges:

- Few modified channels have sufficient flow?
- Poor communication within agencies?
- Poor tracking of info?

Our recommendations:

- Extend the project another year
 - Complete project in 2025
- Take more time to get maintenance schedules
 - Gather more data on number of channels with and without bioassessment data
- Conduct pilot at one or two sites in Riverside County
 - Murrieta Creek
 - Temescal Wash
- Adapt plan, and conduct more widespread sampling in 2024
- Concurrently, pursue other project elements (e.g., analyses of existing data)

Our workgroup identified 3 priority analyses of existing data

- Retrospective analysis of channel maintenance
- Update of causal assessment tools for modified channels
- Update flow ecology models for modified channels

We will provide preliminary results from these analyses at a subsequent meeting

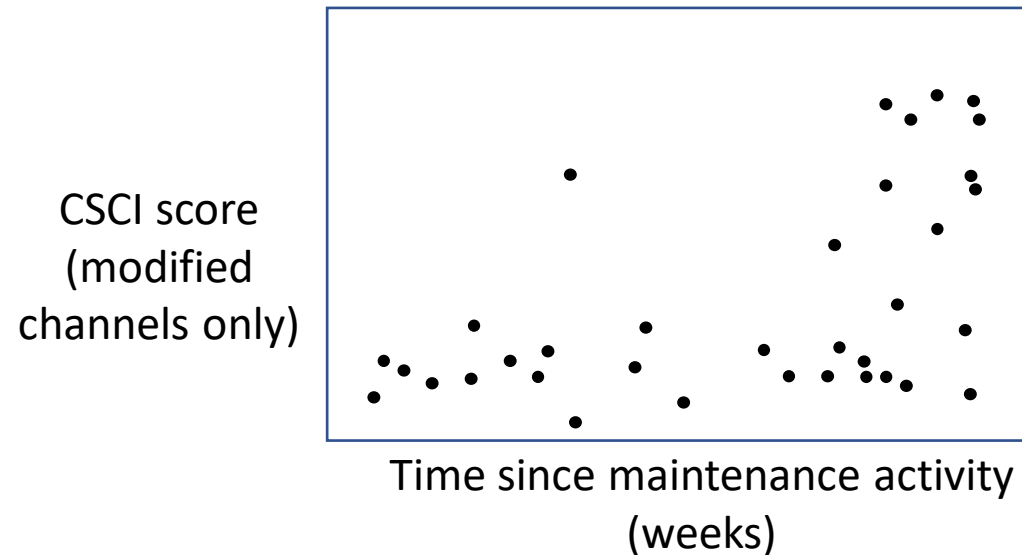
Retrospective analysis of channel maintenance

- We have hundreds of bioassessment samples collected from modified channels in southern California, dating back to the early 2000s
- Do we have records of channel maintenance activities to supplement our new data collection effort?

What does this get us?

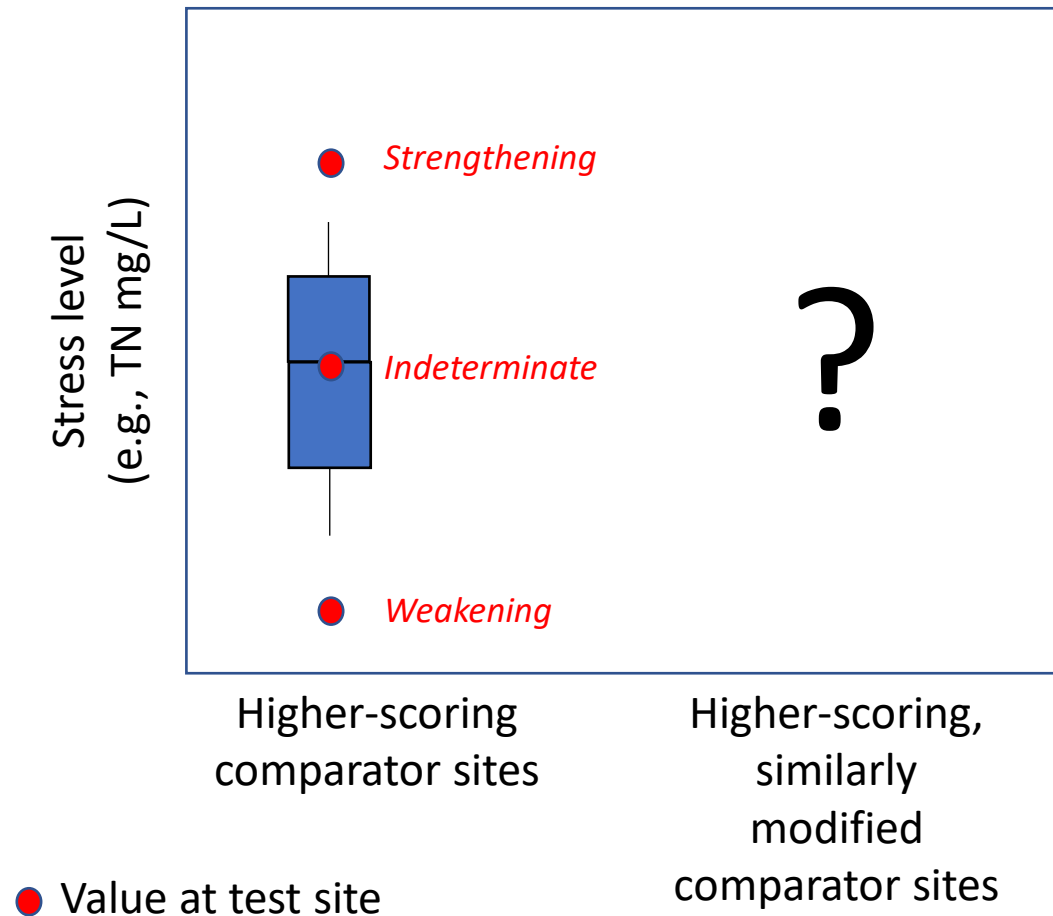
- Much more power to detect differences in treatment types, or to track trajectories

Sample figure: Recovery
from maintenance



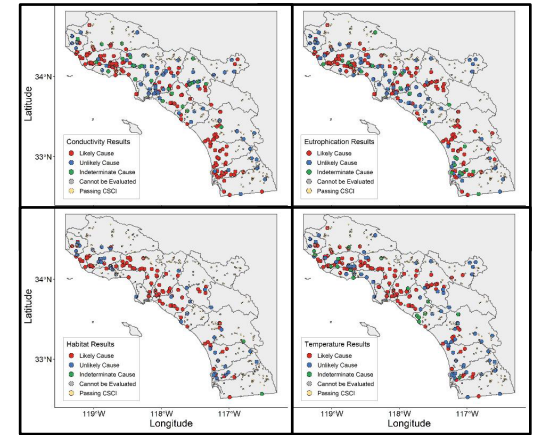
Adapt causal assessment analyses for modified channels

- Causal assessment approaches (e.g., EPA CADDIS) derive lines of evidence by comparing values at *comparator sites*
- We created Rapid Screening Causal Assessment (**RSCA**) for large-scale application. We can apply to all modified channels in our region.
- We can explore new lines of evidence by constraining comparators to *similarly modified sites*



What does this get us?

- Recommendations for improving conditions in specific modified channels
- RSCA-level assessment of likely causes of poor conditions in all modified channels in SoCal
 - Prioritize sites for management intervention
- Enhancement of RSCA tool



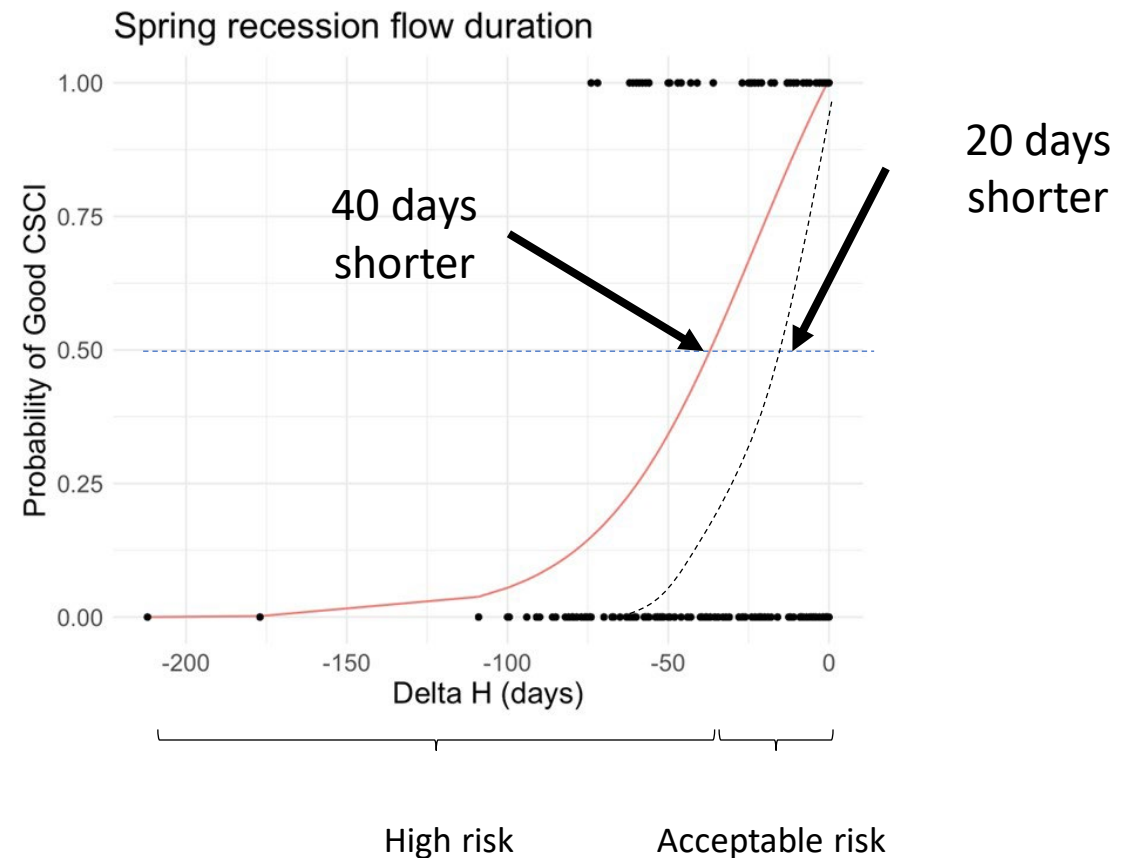
Example output:

% of modified channels where eutrophication is...

Channel type	Likely	Unlikely	Indeterminate
Hard-bottom	15%	60%	25%
Soft-bottom, 2 hard sides	30%	30%	40%
Soft-bottom, 1 hard side	45%	11%	44%
Soft-bottom, 0 hard sides	65%	5%	30%

Adapt flow-ecology models for modified channels

- We've identified target values for several functional flow metrics representing maximum tolerable change to prevent likely declines in index scores.
- Can we re-calibrate models for different modified channel types?



What does this get us?

- New flow alteration estimates at lots of new sites
- Functional flow targets calibrated for classes of modified channels
- Potentially, enhancement of RSCA tools (i.e., add flow alteration stressor module)

What do we need from you now?

- Can you provide approval of the workplan today (covering the pilot study), or do you need more time for review?
- We'll update you on other project elements in future meetings.