Technical Progress Report

April 6, 2011

Today's Goal

- Refresh your memory
  - Remind you what the technical work was supposed to accomplish
- Progress to date
  - Focused on reference conditions today
  - Prescreen our results before the Science Panel
- Get your feedback
  - Ask lots of questions
  - Want to ensure your opinions are represented at the Science Review Panel

9-Step Bio-Objectives Workplan

- Reference condition
- Stressor response models
- Waterbody classification and scoring
- Stressor identification
- Information management
- Implementation Plan Development
- Rulemaking
- Outreach
- Training and standardization

Technical Elements

Technical Overview

TASK	GOAL
Reference Condition	Identify biogeographic regions, set biological expectations for reference sites
Stressor-Response Model	Set biological expectations for non-reference sites
Waterbody Classification	Assign biological expectations to every waterbody
Stressor Identification	Provide guidance for when bio-objectives are not achieved
Information Management	Transparent and standardized way to submit, store, access, and analyze bioassessment data

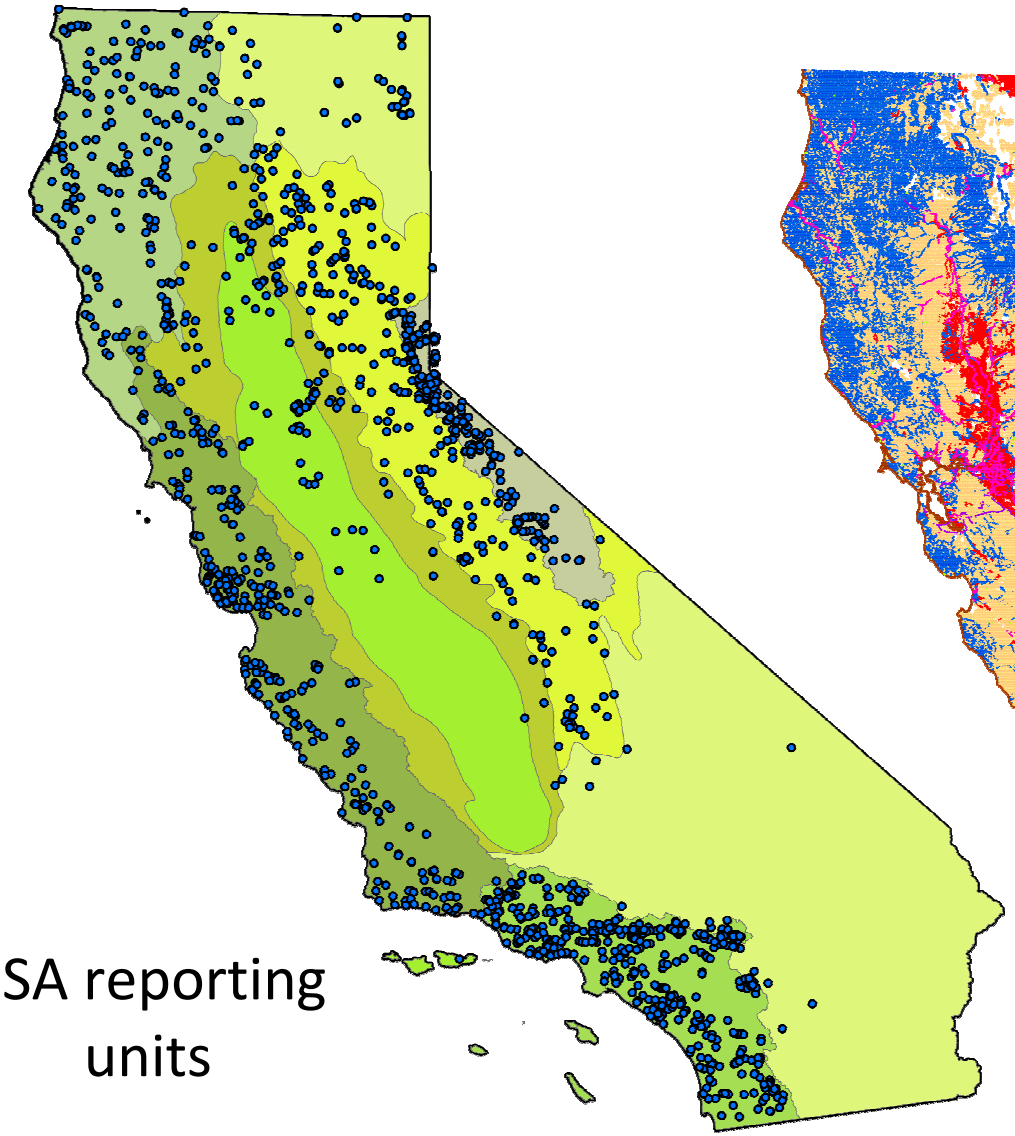
Reference Condition Management Plan

- Assemble candidate data
- Calculate metrics
  - natural gradients, anthropogenic alterations
- Develop initial screening thresholds
- Evaluate gradients
  - Data gaps?
- Identify reference biological assemblages
- Align threshold setting process among regions/assemblages

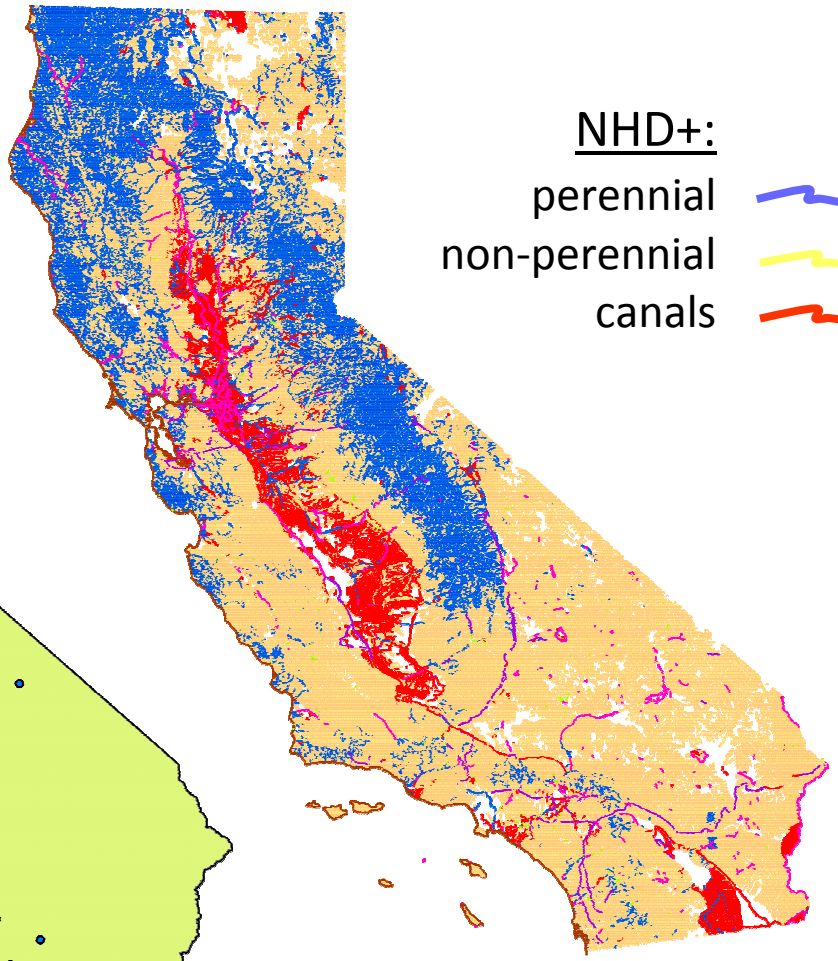
Large-Scale California Programs

Program	Approx Number of Sites	Geographic Distribution	Study Design	Indicators			
				BMI	PHab	Chemistry	Algae
EMAP	230	Statewide	Probabilistic	X	X	X	X
CMAP	200	Statewide	Probabilistic	X	X	X	X
PSA	200	Statewide	Probabilistic	X	X	X	X
USFS	200	Forest Lands	Targeted	X	X		
SMC	200	So Cal	Probabilistic	X	X	X	X
RWQCBs	>400	Many regions	Targeted and Probabilistic	X	X	X	

> 1700 sites Statewide



PSA reporting units



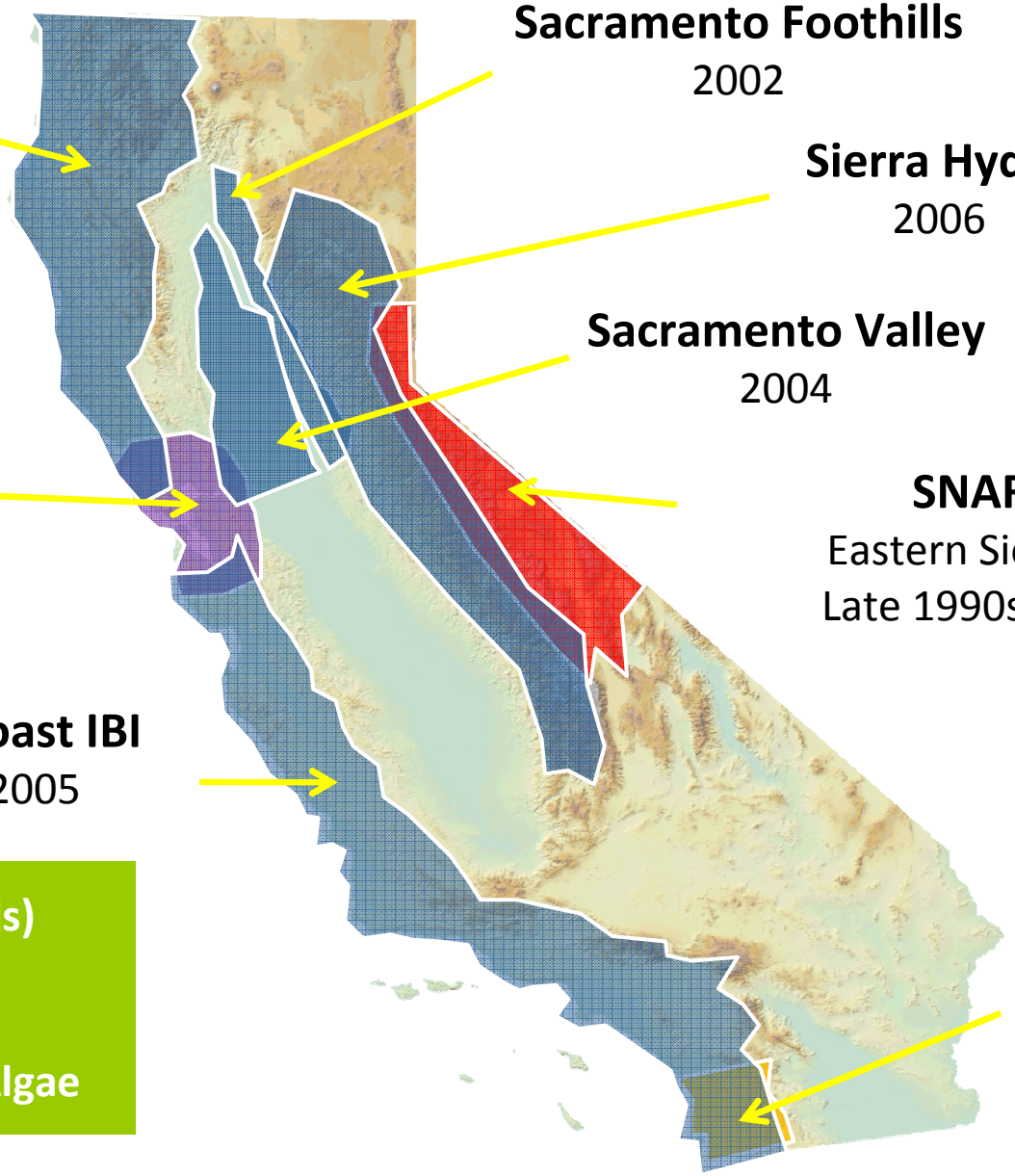
NHD+:

perennial

non-perennial

canals

Significant CA Reference Projects (1997 – 2010)



North Coast IBI
2000-2005

Sacramento Foothills
2002

Sierra Hydro
2006

Sacramento Valley
2004

SF Bay Area
In progress

SNARL
Eastern Sierra, some Sierra
Late 1990s - 2008

South Coast IBI
2000-2005

San Diego IBI
2001

- **USFS (OE models)**
- **EMAP**
- **SoCal Algae**
- **Central Coast Algae**

Calculating Metrics

- Metrics are just variables that describe each site
- Metrics come in different flavors
  - Natural, anthropogenic
- Metrics have different scales
  - Site, reach, watershed

Example Natural Metrics

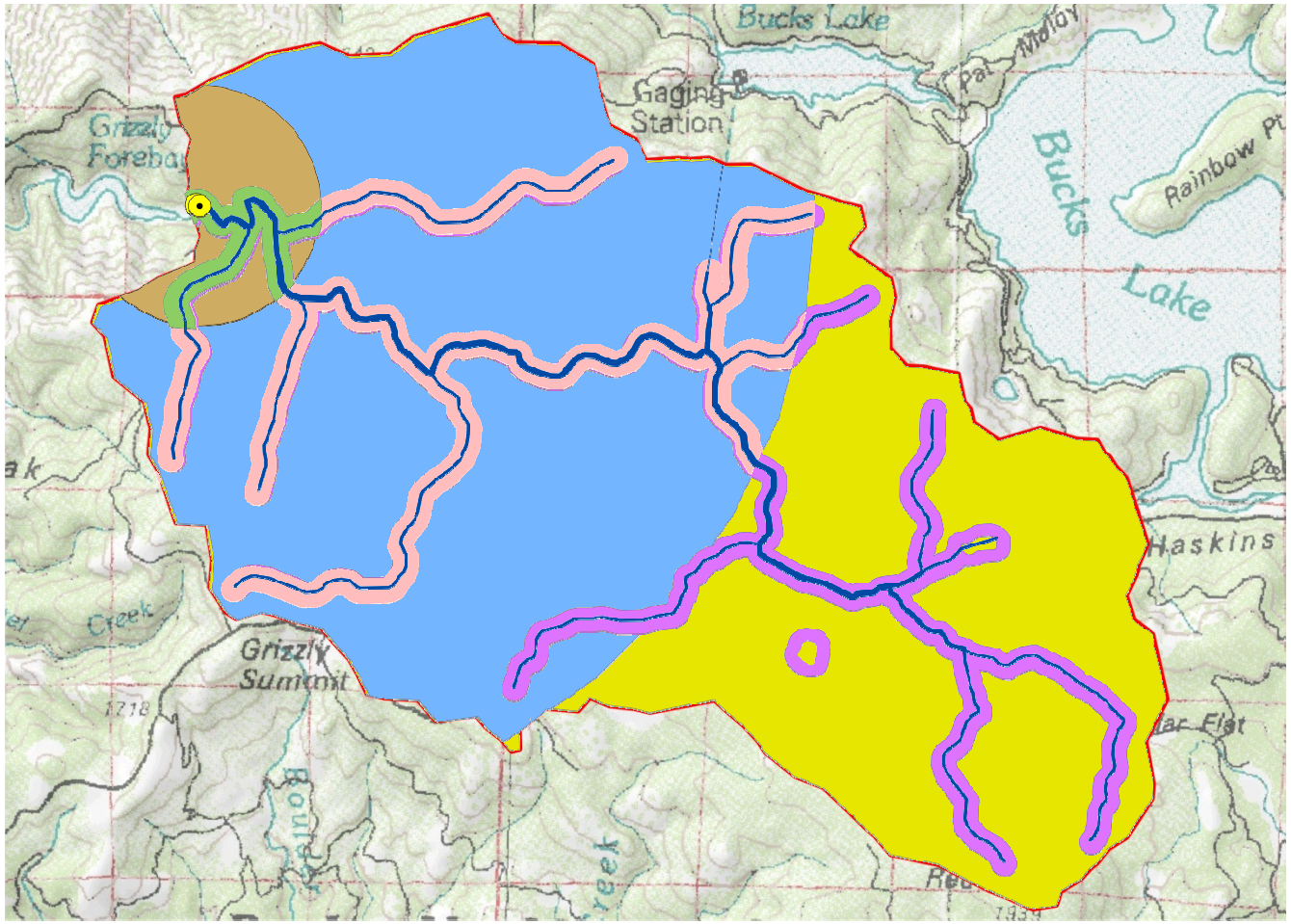
- Elevation
- Slope
- Precipitation
- Stream gradient
- Geology
- Volume
- Stream order

Example Anthropogenic Metrics (Stressors)

- Infrastructure
  - roads, railroads
- Population
- Hydromodification
  - manmade channels, canals, pipelines
- Land use
  - NLCD metrics, NLCD change (1992-2001), NLCD % Impervious
  - Timber Harvest, Grazing
- Fire history, dams, mines
- 303d list, NPDES/CWIQS discharges
- Invasive invertebrates, plants

Standardized Spatial Analysis

Position of stressors in watershed influences their impact



Inventory of Metrics

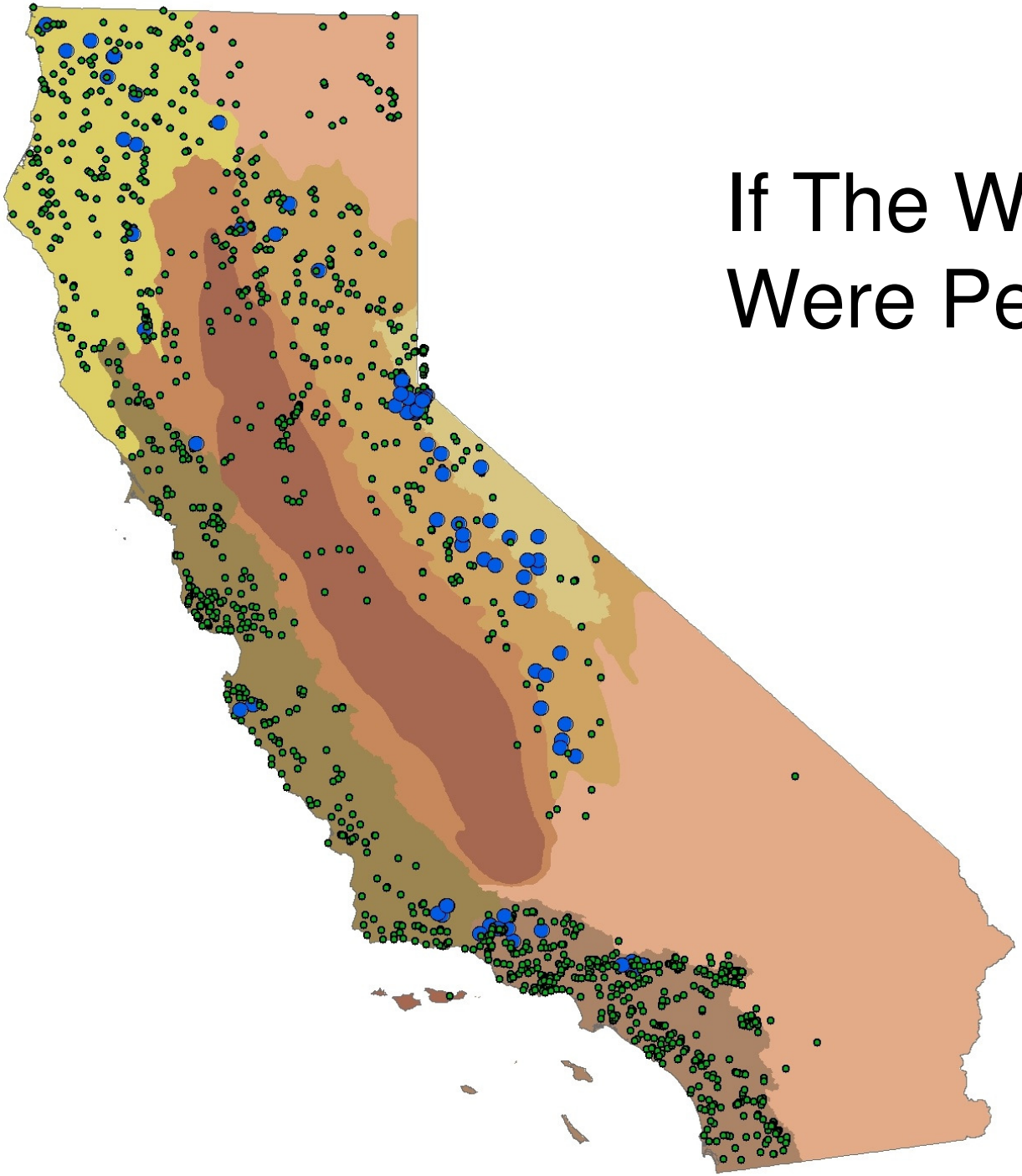
- 180 metrics
- 6 spatial scales
- 1,700 sites
- 1.8 million data points

Developing Screening Thresholds

- Multiple approaches exist
  - Single metric(s), multi-metric, multi-variate
- Not the first time this has been done
  - Foundation for every Index of Biotic Integrity
- Use a straightforward example of single metrics
  - Sufficient for illustrating decision points

List of Metrics For Our Example

- Land use
  - % Ag, % Urban
- Local disturbance
  - W1_Hall, Code 21
- Road density
- Mines
- Upstream modifications
  - dams, channels
- Water chemistry
  - Total N, Total P



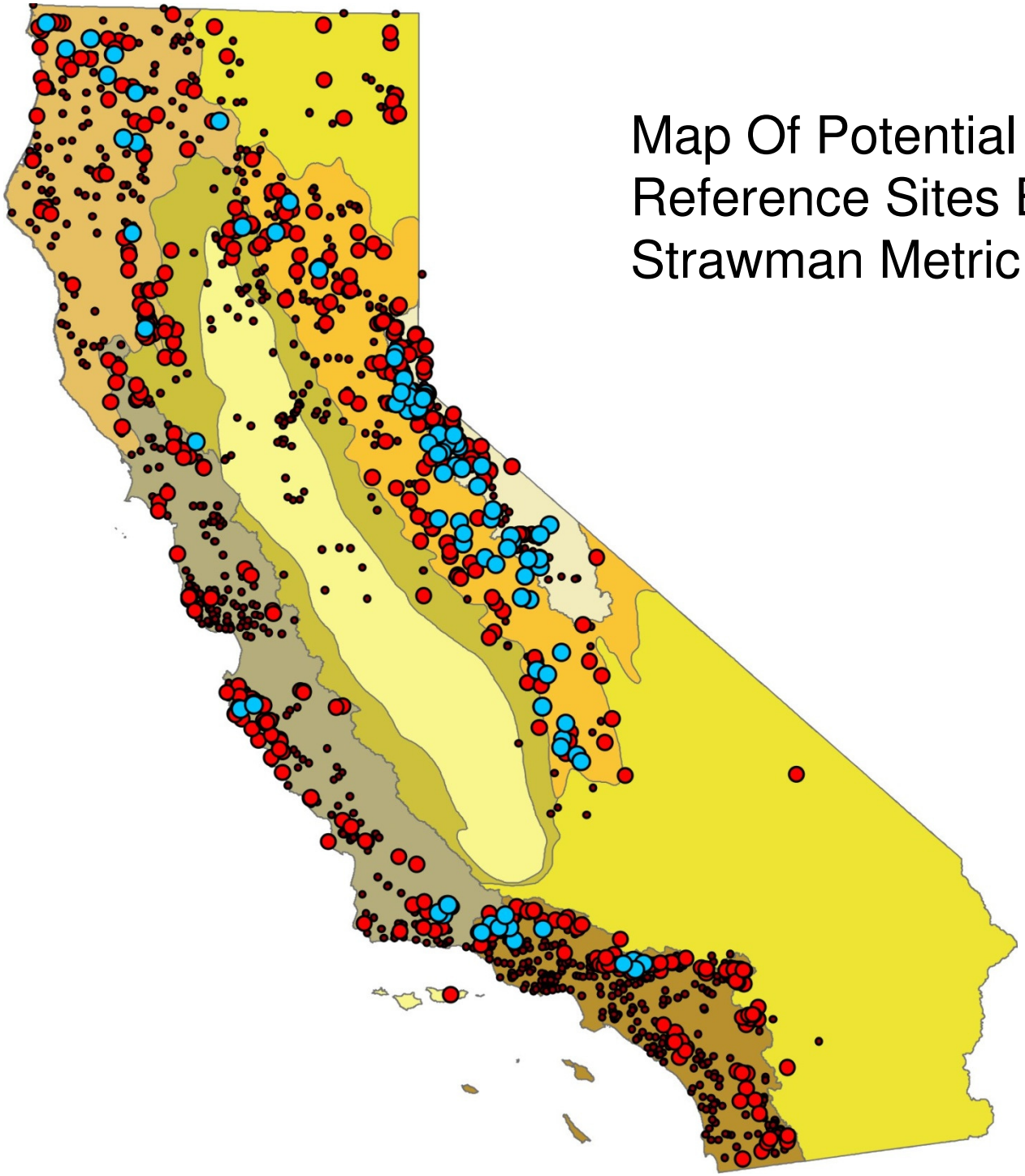
If The World Were Perfect

Minimally Disturbed may be Sufficient

Metric	Perfect World (1k, 5k)	Strawman (1k,5k, ws)				
Local Disturbance (W1_Hall)	0	1.0				
%Ag	0	3, 10				
%Urb	0	3, 10				
Watershed Development (%Code 21)	0	10				
Road Dens (k/k^2)	0	1.5				
Road x-ings (#/k)	-	-				
Pop Density	-	-				
TN, TP	1.5, 0.1	10, 3				
Dam Storage (MG)	0	10^4				
Mines	-	0.1				
% canal&pipes	-	10				

Minimally Disturbed may be Sufficient

Metric	Perfect World (1k, 5k)	Strawman (1k,5k, ws)	South Coast IBI (5k,ws)	North Coast IBI (1k, ws)	Western Sierra IBI	Eastern Sierra IBI
Local Disturbance (W1_Hall)	0	1.0	-	-	-	-
%Ag	0	3, 10	5,5	5,5	5,5	-
%Urb	0	3, 10	3,3	3,3	3,3	-
Watershed Development (%Code 21)	0	10	in urban	in urban	in urban	-
Road Dens (k/k^2)	0	1.5	2.0	1.5, 2.0	2.0	-
Road x-ings (#/k)	-	-	-	-	-	0.2
Pop Density	-	-	150	25, 50	-	-
TN, TP	1.5, 0.1	10, 3	-	-	-	-
Dam Storage (MG)	0	10^4	-	-	-	-
Mines	-	0.1	-	-	-	-
% canals&pipes	-	10	-	-	-	-

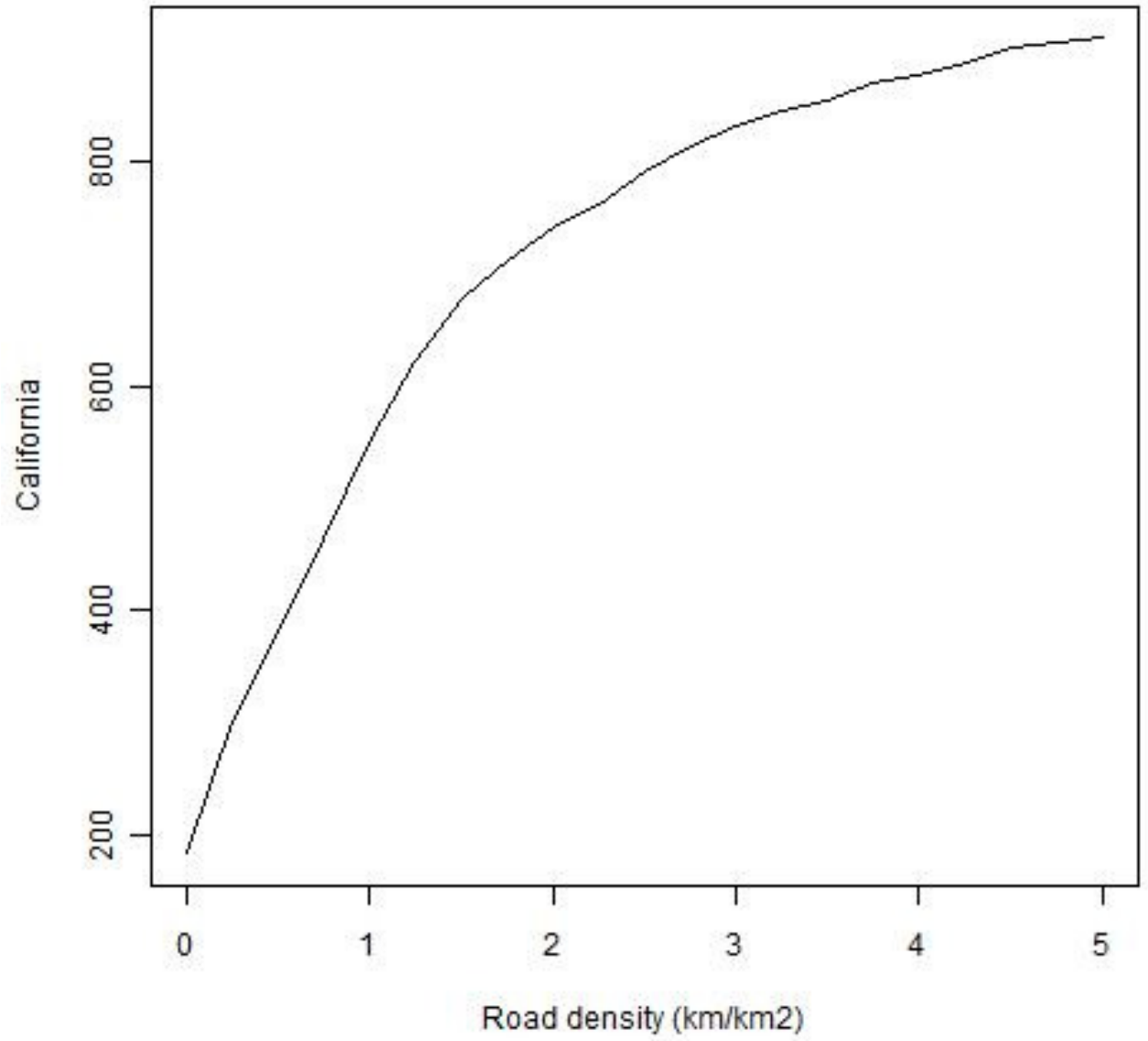


Map Of Potential
Reference Sites Based on
Strawman Metric cutoffs

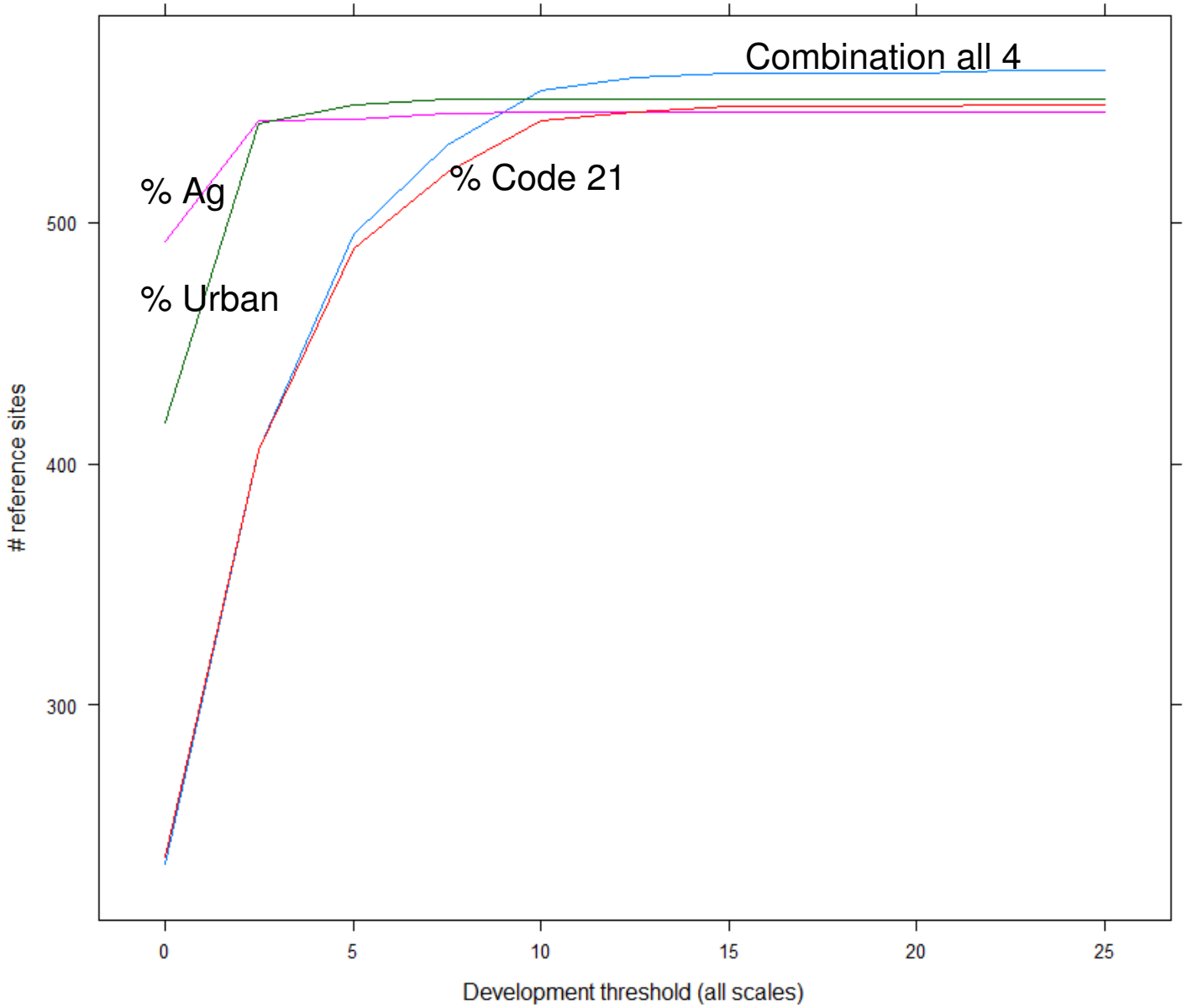
Number of Potential Reference Sites

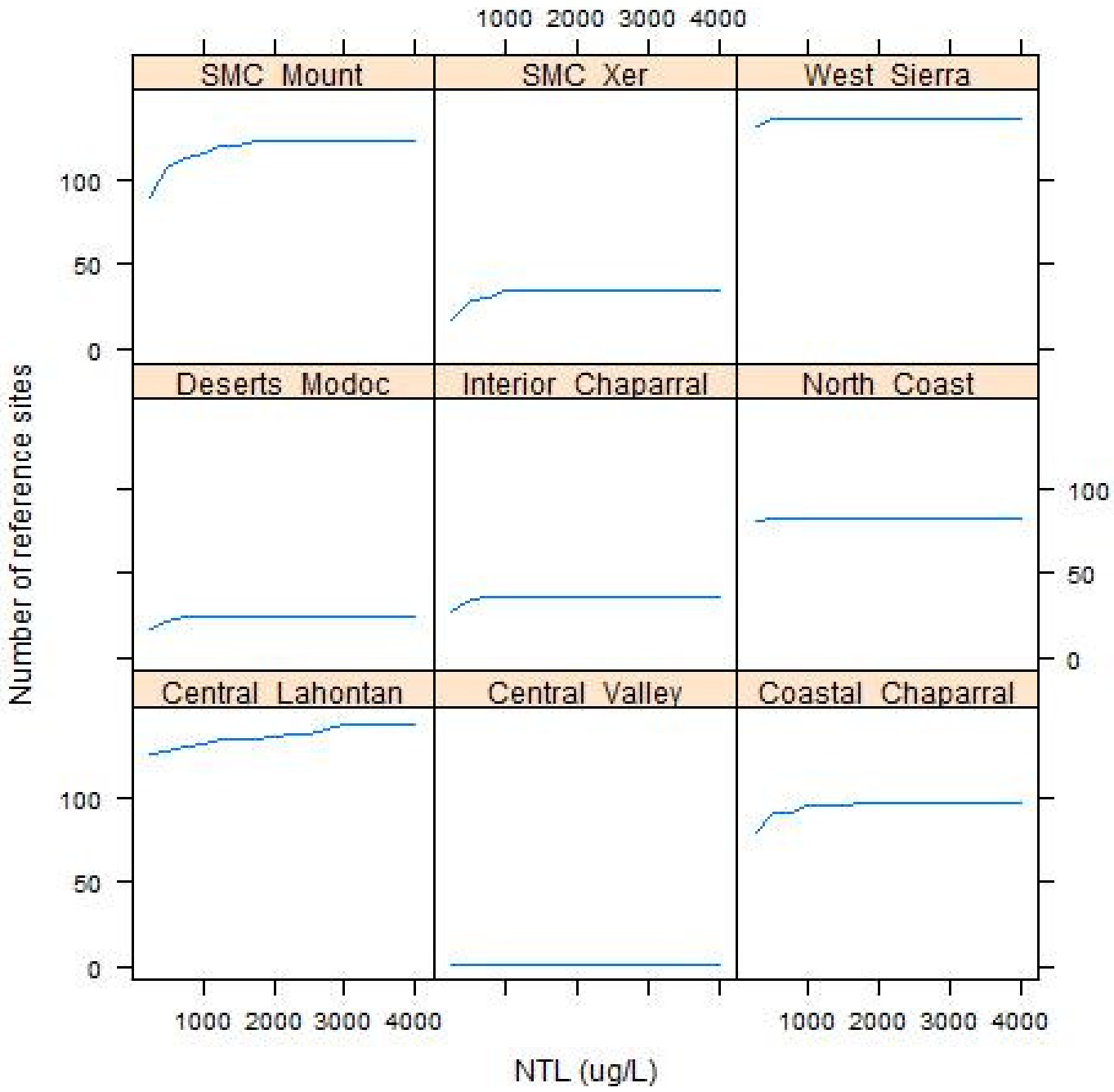
REGION	Perfect World	Strawman
Lahontan	40	135
Central Valley	0	2
Coastal Chaparral	8	93
Interior Chaparral	0	35
Northern Calif	14	73
Southern Calif	11	154
Western Sierra	35	124
Other	0	21
TOTAL	118	637

How Much Do Threshold Cutoffs Matter?

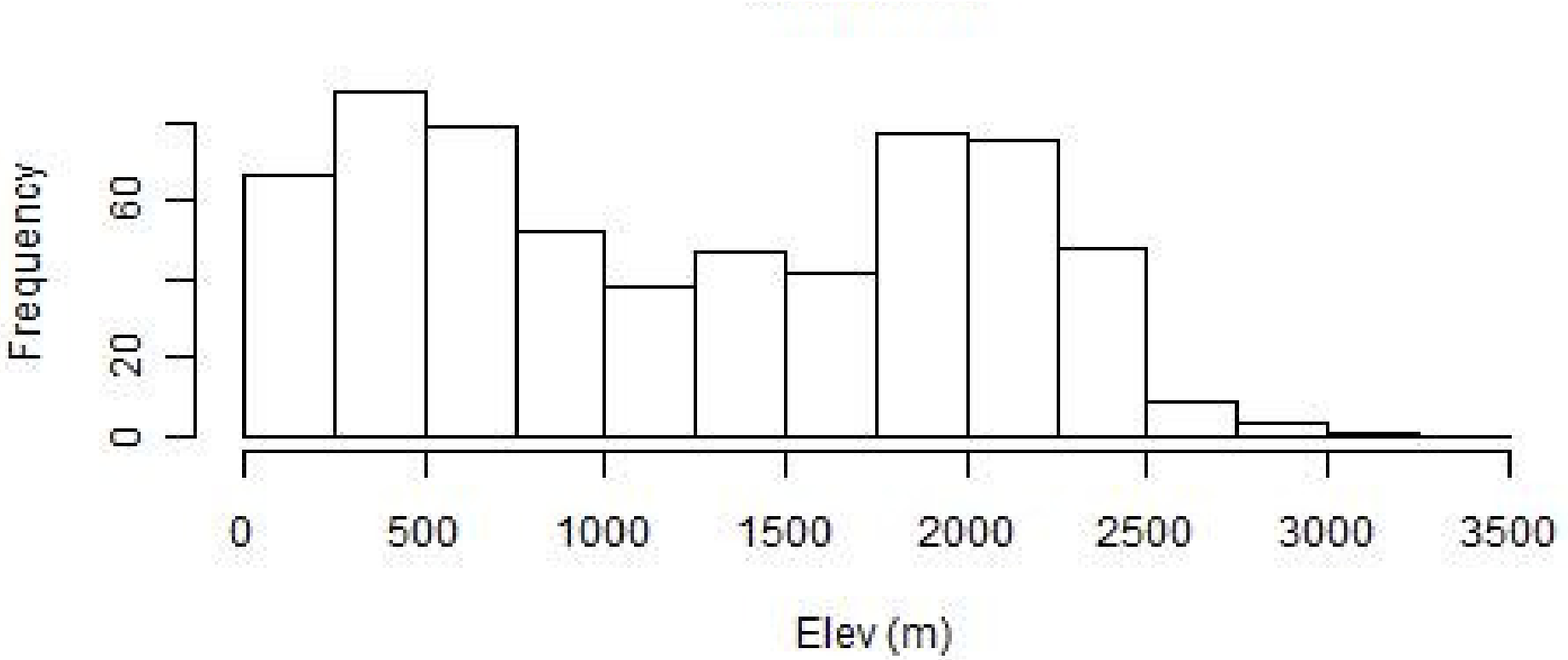


Sensitivity Analysis For Watershed Development




SMC Mount
SMC Xer
West Sierra
Deserts Modoc
Interior Chaparral
North Coast
Central Lahontan
Central Valley
Coastal Chaparral
1000 2000 3000 4000
0
50
100
Number of reference sites
NTL (ug/L)

Do We Have Adequate Coverage?



REGION	Elevation	Watershed Area	%CaO	%Ngeo	PPT	SedGeo	Slope	Stream Order
North Coast	Good	Low on largest watersheds = non-wadeable (> 10^4 km^2)	Good	Good, but under-represents higher values (> 0.1)	OK, but few on the dry end	Good	Good	Good, but none > 4th
Coastal Chaparral	OK	Good up to 10^6 km^2	Good	Good, but under-represents higher values (> 0.1)	Good	Good	Good	Good
Interior Chaparral	Need low elevation	Distribution is good, but low numbers overall (no sites <100km2)	Good	Good, but under-represents higher values (> 0.1)	OK, but few on dry end	Good	Good	Good
Other	Few sites < 1000m, but very few streams there	OK, but low numbers overall	Good	Good, but under-represents higher values (> 0.1)	Ok, but few in wet end	Good	Good	OK, but note gap at 3rd order
SMC-Mtn	Good	Good	Good	Good, but under-represents higher values (> 0.1)	Good	Good	Good	Good
SMC-Xer	OK, but need more <500m	Low overall, Need more small watersheds (1,000) and more large watersheds	Good	Good, but under-represents higher values (> 0.1)	OK, but few on dry end	Good	?	Very few high order streams
West Sierra	Good, but few in low elevation areas	Good. Might be a little short on largest streams	Good	Good, but under-represents higher values (> 0.1)	Good, but light on wet/dry ends	Good	?	OK, but few high order streasms
Central Lahontan	Good	Ok, but may be missing very small watersheds (<10 km2)	Good	Good, but under-represents higher values (> 0.1)	?	Good	Good	Good
Statewide	Good	Good up to 1,000,000 km2, but generally need more very small watersheds	Good, but low n above 10	Good, but under-represents higher values (> 0.1)	Good, but a little light on dry end	Good – most are 0% or 100%	Good	Good, but few sites > 4th +

Selecting a Pilot Study Area

- The Science Advisory Panel recommended using a pilot region
  - testing our technical approaches/tools
- Pilot region becomes a function of sample size
  - Coverage across gradients
- We selected two pilot study regions
  - So Cal mountains
  - Coastal chaparral
- How/what would you choose?

Progress Summary

- Large effort resulted in enormously useful data set
  - Will be needed for subsequent tasks
- Buoyed by the outcome of our reference site selection process
  - Even simplistic approaches generated hundreds of sites
- Reasonable coverage across many areas of the state
  - Produced two Pilot Study areas

Additional Progress By the Science Team

- Stressor response modeling
  - This will come up this afternoon
- Monitoring infrastructure
  - I'll talk about this later this morning

For the Next Science Advisory Group Meeting

- Presentation of reference condition assessment
- Progress report on Pilot Study
  - Reference gradients
  - Assess stressor response modeling approaches
  - Evaluation of waterbody classification schemes
- Methods standardization