

San Diego Creek Causal Assessment Review: Steps Leading to Development of Lines-of-Evidence

February 11, 2016

Review Items

Previously Completed Steps

1. Biological Endpoints *(Dec 2014)*
2. Candidate Causes *(Feb 2015)*
3. Comparator Sites *(April & July 2015)*
 - Local
 - Regional
4. Lines of Evidence *(Jul-2015)*
5. Scoring Methodology

Data Issues/Preparation

Biological Endpoints

(median values shown in table)

Endpoint (Metric)	SD Creek Test Sites (n=6)	Local Comparators (n=3)	Regional Comparators (n=128)	Statewide Reference
CSCI	0.47	0.61	0.65	1.0
MMI	0.47	0.42	0.61	1.0
O/E	0.43	0.79	0.70	1.0
Clinger %	0.09	0.06	0.35	
Coleoptera %	0.06	0	0.09	
EPT %	0.1	0.08	0.33	
Intolerant %	0	0	1.0	
Shredder Taxa %	0	0	0.37	
Taxa Richness	16	23	13	

Candidate Causes

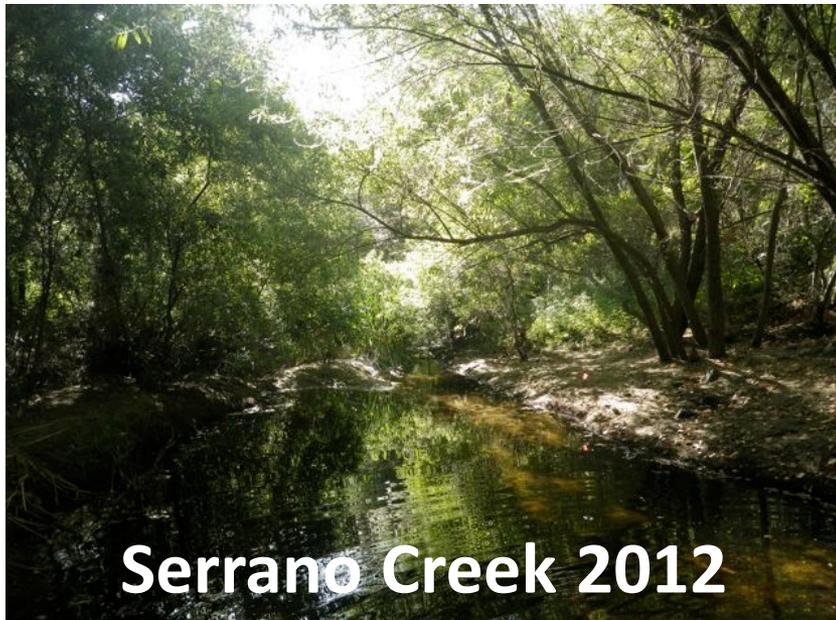
Candidate Cause	Proximate Stressors
Annual Sediment Accumulation	<ul style="list-style-type: none">• Burial of fauna• Loss of complex habitat
Channel Engineering	<ul style="list-style-type: none">• Loss of streambed complexity• Loss of stream gradient• Burial of fauna• Episodic flows
Pesticides	<ul style="list-style-type: none">• (Toxic) concentrations (Pyrethroids, OPs)• Vector control
Nutrients	<ul style="list-style-type: none">• Elevated concentrations• Excessive algal mats• Altered algal community• Low dissolved oxygen• Altered pH
Temperature	<ul style="list-style-type: none">• Increased temperature
Conductivity	<ul style="list-style-type: none">• Elevated Conductivity• Increased Ions/ Increased TDS

Comparator Sites - Local



Lines of Evidence:

- ✓ Spatial-Temporal
- ✓ Stressor Response from Local Comparator Sites

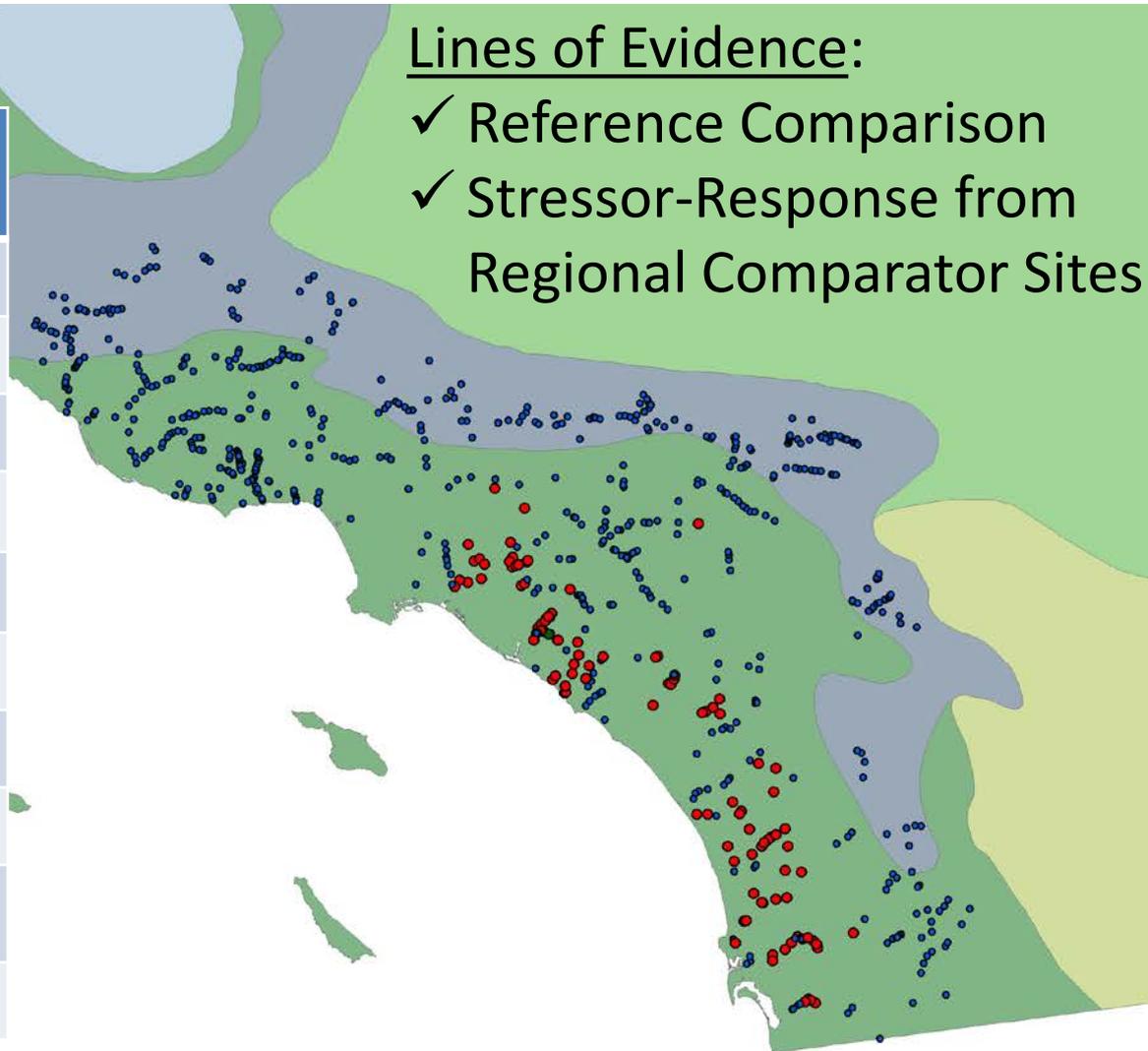


Comparator Sites - Regional

Selection Criteria: Natural Gradients	
Site	Lat./Long
	Elevation
Watershed	Area
	Elev. Range
Climate	Air Temp.
	Annual Precip.
	Summer Precip.
Geology	Soil erodibility
	Soil bulk density
	Soil phosphorus

Lines of Evidence:

- ✓ Reference Comparison
- ✓ Stressor-Response from Regional Comparator Sites



Selected Lines of Evidence

Evidence Type	Description	Analysis
Spatial Temporal Comparison	A comparison of measured proximate stressors at the test site and comparator sites. Scores based on the stressor at the each of the comparator sites being >, <, or = to that at the test site.	Statistical Summary
Stressor Response From Comparator Sites (local sites)	Correlation and visual inspection of biological condition and proximate stressor measures at the test and comparator sites combined together for each biological endpoint	Spearman's Correlation
Reference Comparison	Comparison of proximate stressor measurements from test site against measurements at ecologically similar reference sites	Box-plots
Stressor Response From Non-Comparator Sites (regional sites)	Contextualization of the stressor-biology relationship at the test site against the relationship at other ecologically similar reference and non-reference sites for each biological endpoint	Relative Risk

Fifteen lines of evidence described on EPA Caddis website

LOEs not assessed: Lab Tests of Site Media, Stressor Response from the Lab

Scoring Methodology

Supporting evidence: (+, ++, or +++)

Weakening evidence: (-, --, or ---)

Ambivalent evidence: (0)

No evidence : (NE)

Refute: (R)

Additional scoring details for each
line of evidence

Data Preparation

Replicates

- Second set of pHab typically not collected
- Second set of chemistry data missing
- Kept replicate in analysis if it added new data (at least partially)

Non-Detects

- Used $\frac{1}{2}$ reporting limit (if acceptable limit used)

Anomalous values/outliers

- None removed from test/local data
- One (TP=15 mg/L) removed from regional comparator sites

Other Data

- IRWD, County WYLSED station – not used
- Vector control – used # of applications matched by year