

Central Coast Agricultural Waiver Bioassessment Results



CABW Meeting, UC Davis

Sarah Greene Lopez
Technical Program Manager
Central Coast Water Quality Preservation, Inc.
sgreene@ccwqp.org // 831-331-9051

November 10, 2011

Acknowledgements

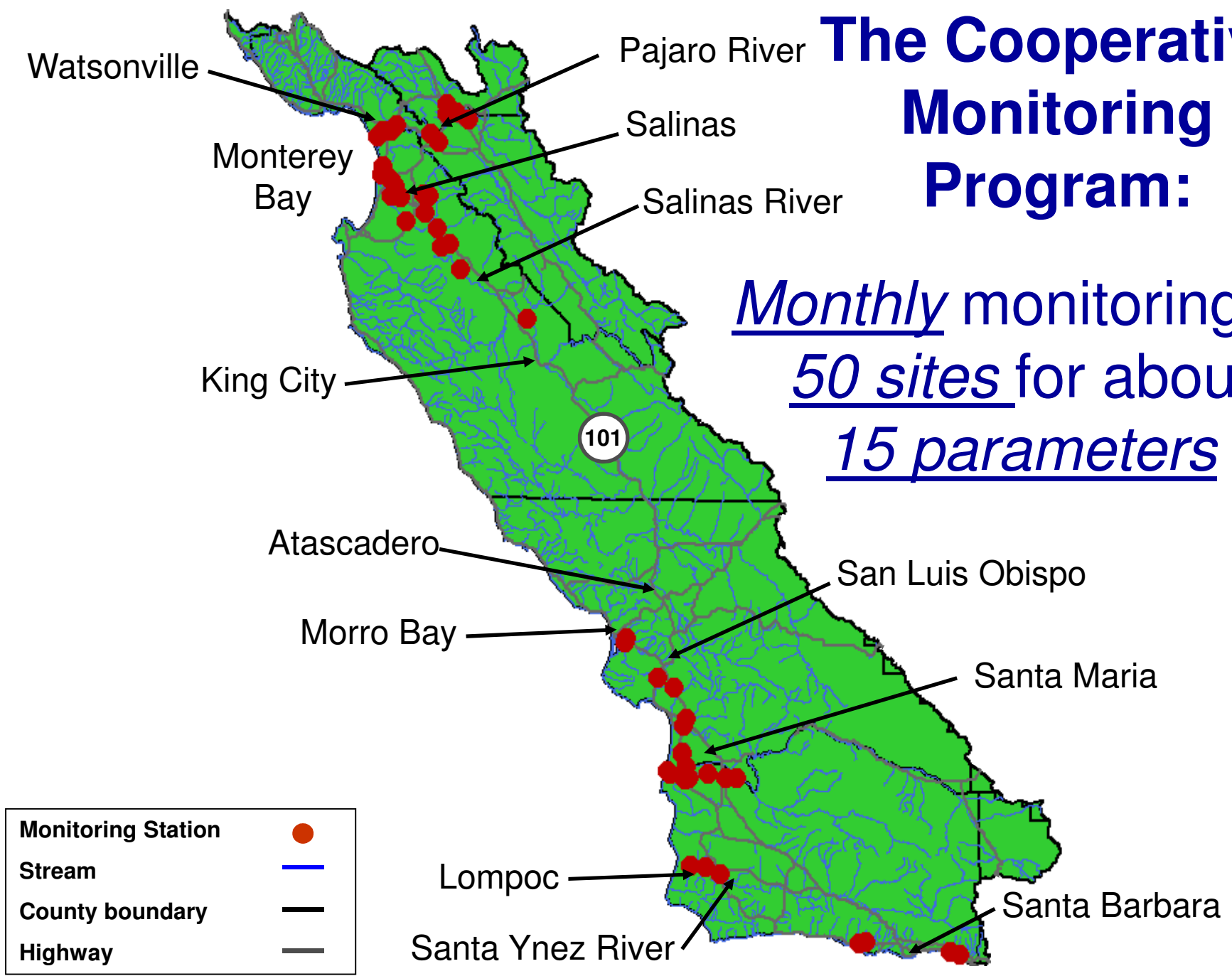
- Stephen Clark, Pacific EcoRisk
- Claus Suverkropp, Larry Walker & Associates

Outline

- The Cooperative Monitoring Program & role of Bioassessment
- Results of Benthic MacroInvertebrate sampling
- Artificial substrate study (Hester-Dendy)
- Results of Physical Habitat Assessment & sediment pesticide/toxicity monitoring
- Applicability of SoCal IBI (or not?)

The Cooperative Monitoring Program:

Monthly monitoring of 50 sites for about 15 parameters



Monitoring Station	●
Stream	—
County boundary	—
Highway	—



Salinas River



Blanco Drain



Warden Creek



Slough, Salinas

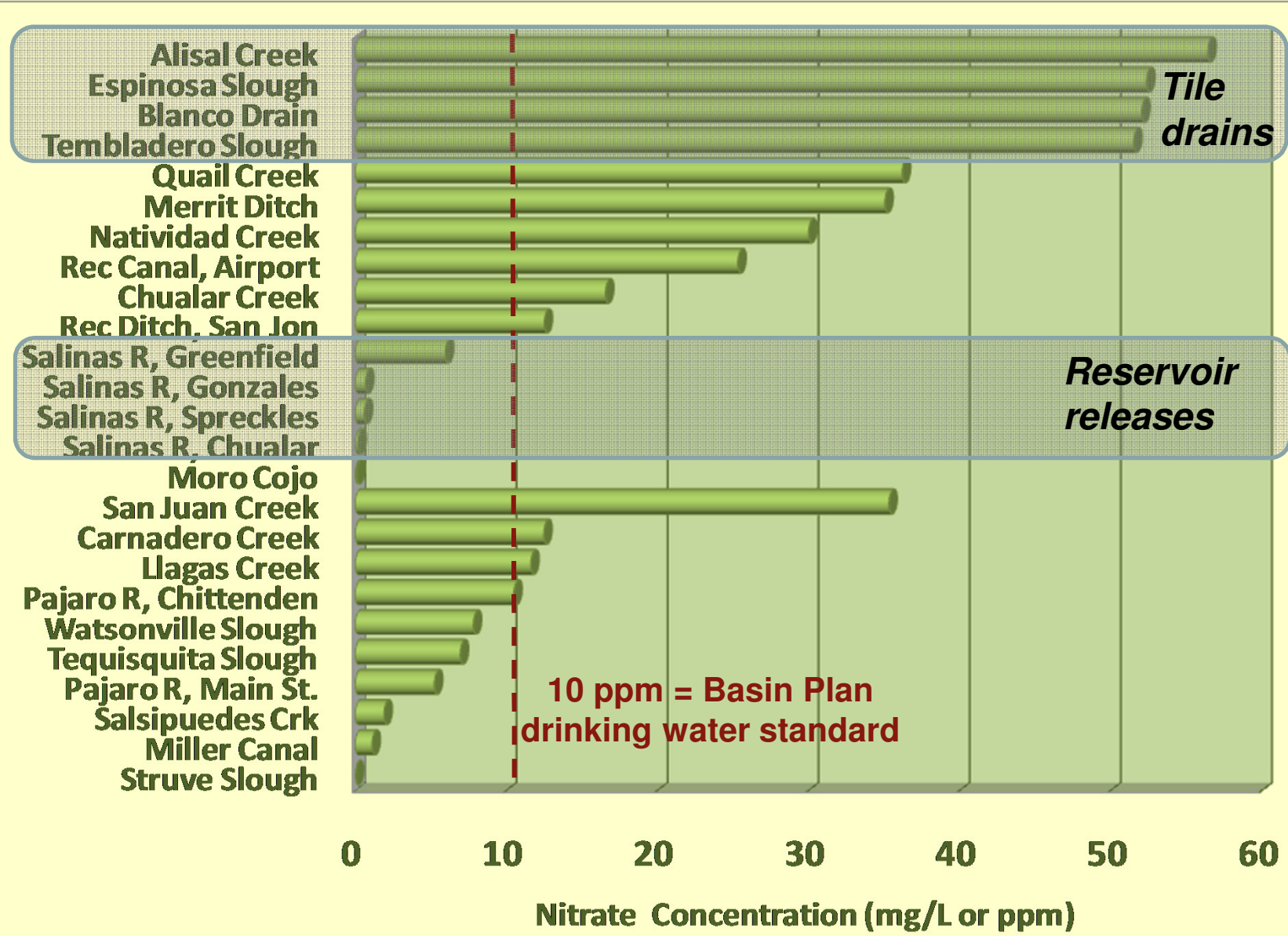


Franklin Creek

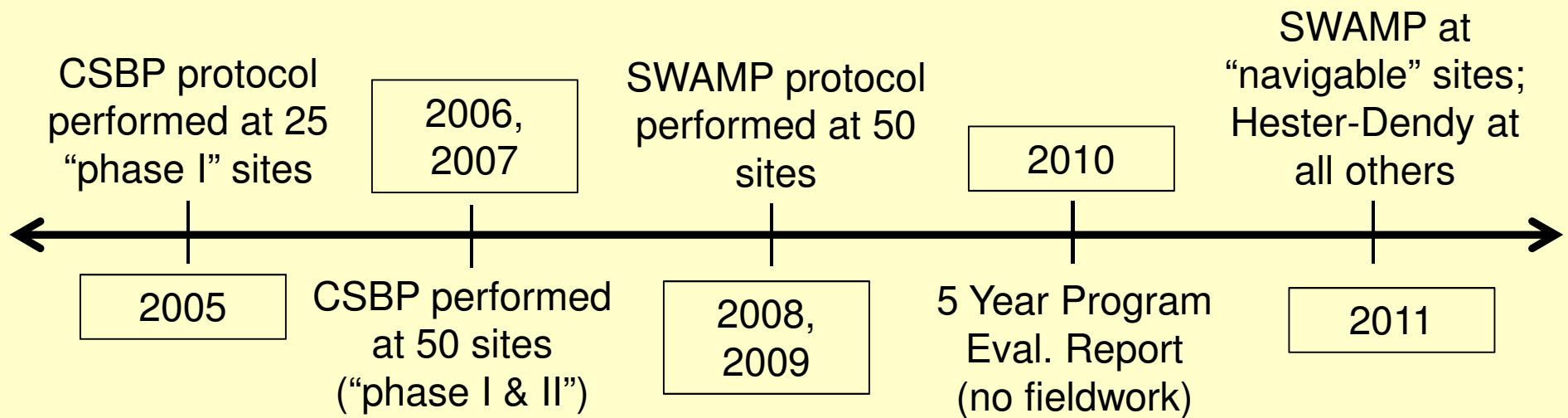
Summary of 1st Five Years

- More than half of CMP sites exceed numeric WQO's for Nitrate concentration on a regular basis
- More than half of CMP sites have average Turbidity levels >100 NTU
- ~13% of samples show toxicity to algae; ~5% show toxicity to fish
- About 37% of CMP water samples and 52% of sediment samples have shown lethal effects (i.e. low survival rates) to invertebrates

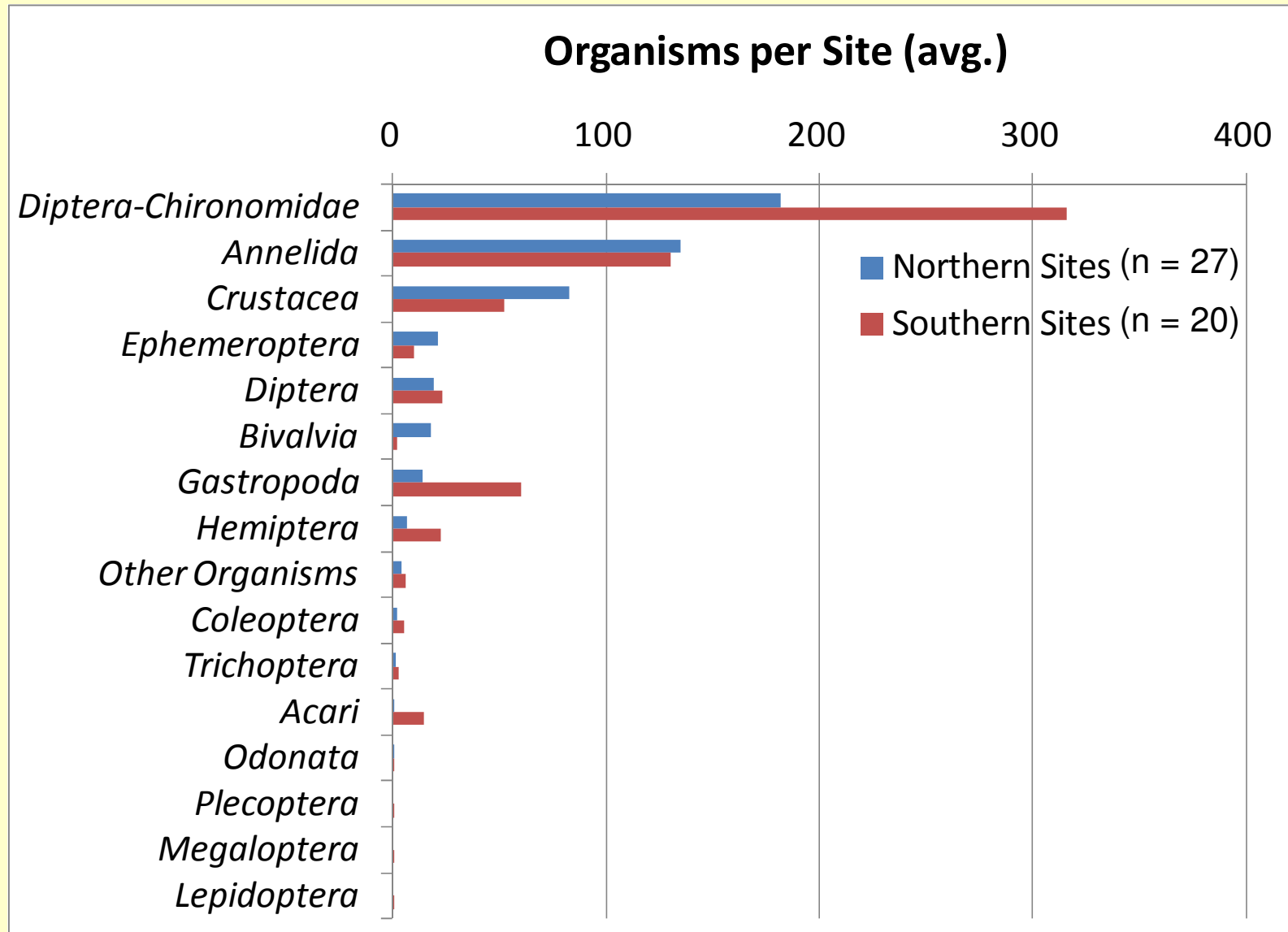
Influence of Hydrology on Water Quality



Bioassessment Program History



Taxa Results



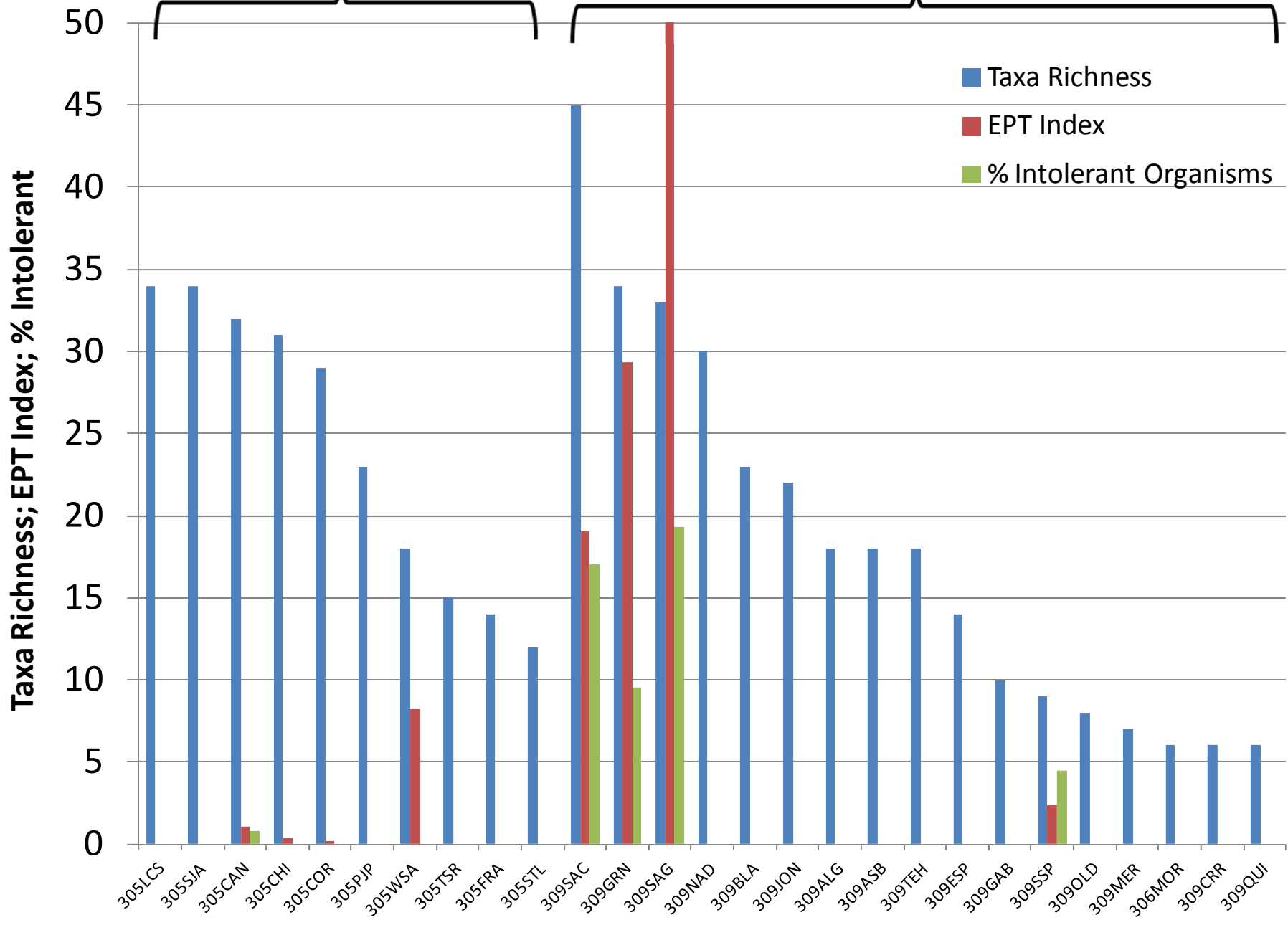
Benthic Macroinvertebrate Metrics

Table 7. Trends in biological metrics associated with disturbance.	
Biological Metrics	Response to Disturbance
<i>Richness Measures</i>	
Taxa Richness	Decrease
EPT Taxa	Decrease
<i>Composition Measures</i>	
EPT Index	Decrease
Sensitive EPT Index	Decrease
Percent Hydropsychidae	Increase
Percent Baetidae	Increase
<i>Tolerance/Intolerance Measures</i>	
Tolerance Value	Increase
Percent Intolerant Organisms	Decrease
Percent Tolerant Organisms	Increase
Percent Dominant Taxa	Increase
<i>Trophic Measures</i>	
Percent Collectors (CG)	Increase
Percent Filterers (FC)	Increase
Percent Scrapers (SC)	Variable
Percent Predators (P)	Variable
Percent Shredders (SH)	Decrease

Additional measure = abundance (i.e. total # of orgs in 11ft² composite (i.e. 1 ft² x 11 transects))

Pajaro River

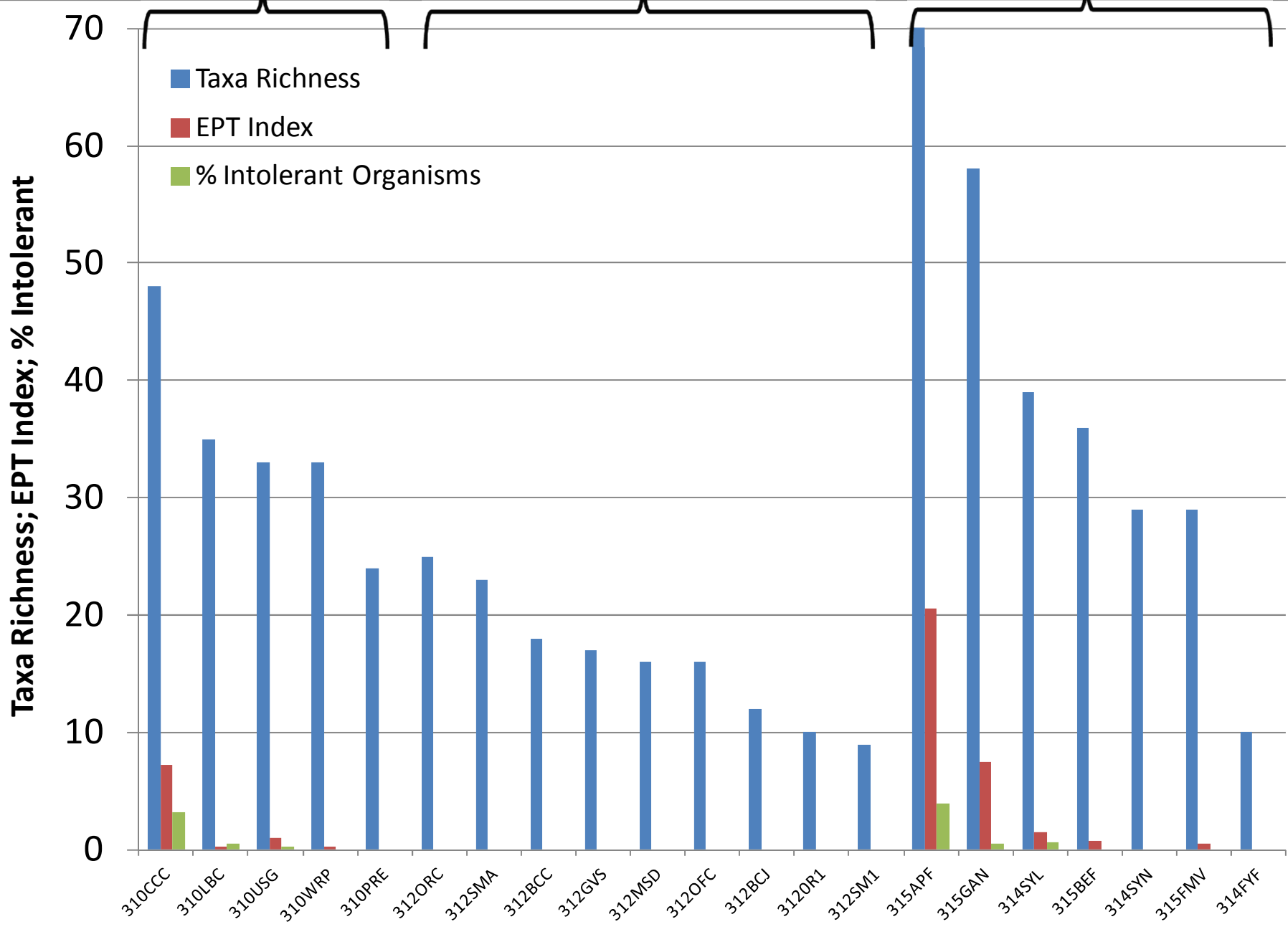
Lower Salinas R. & Reclamation Canal



Estero Bay Tribs

Santa Maria River

Sta Ynez & South Coast



Artificial Substrates

- Limited access to perform SWAMP transects 100 m upstream of entry point
- Need indicator of biological community
- Hester-Dendy samplers
- Data interpreted differently
 - Samplers create hard surface in mostly soft-bottom streams
 - Collects colonizing BMI's, rather than members of existing communities
 - Influenced by water chemistry more than physical habitat

Hester-Dendy Results

- Generally lower abundance numbers with artificial substrates than with SWAMP transects
- Other than abundance, no pattern in differences between the two protocols for other metrics
- Results may differ depending on length of deployment, exact timing of deployment, etc.

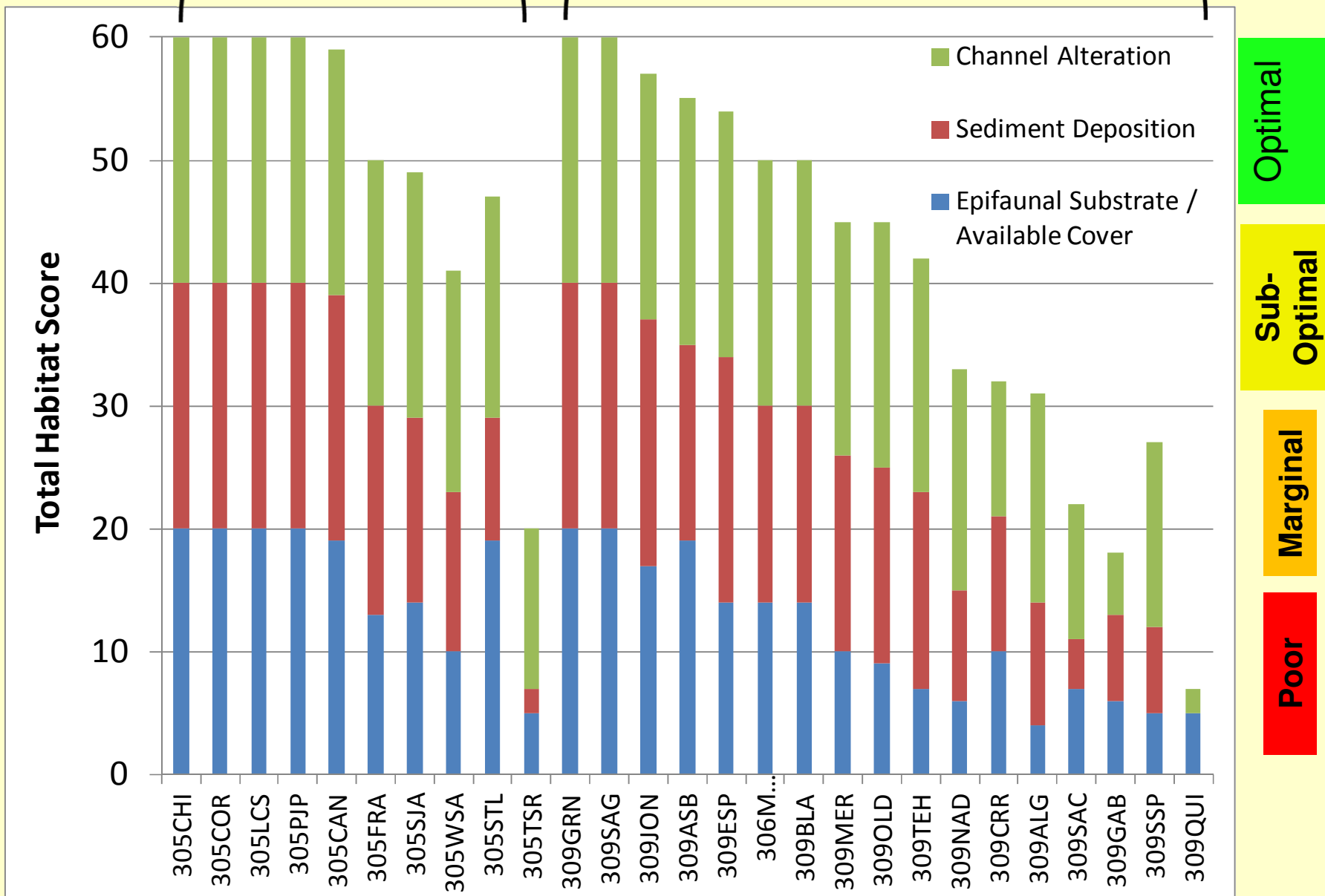


Physical Habitat Assessment

- Benthic Particle Size Composition
(11 transects + 11 inter-transects)
- Riparian Vegetation, Instream Habitat Complexity, Physical Parameters
- Total Habitat Score
 - Epifaunal substrate/cover
 - Sediment deposition
 - Channel alteration

Pajaro River

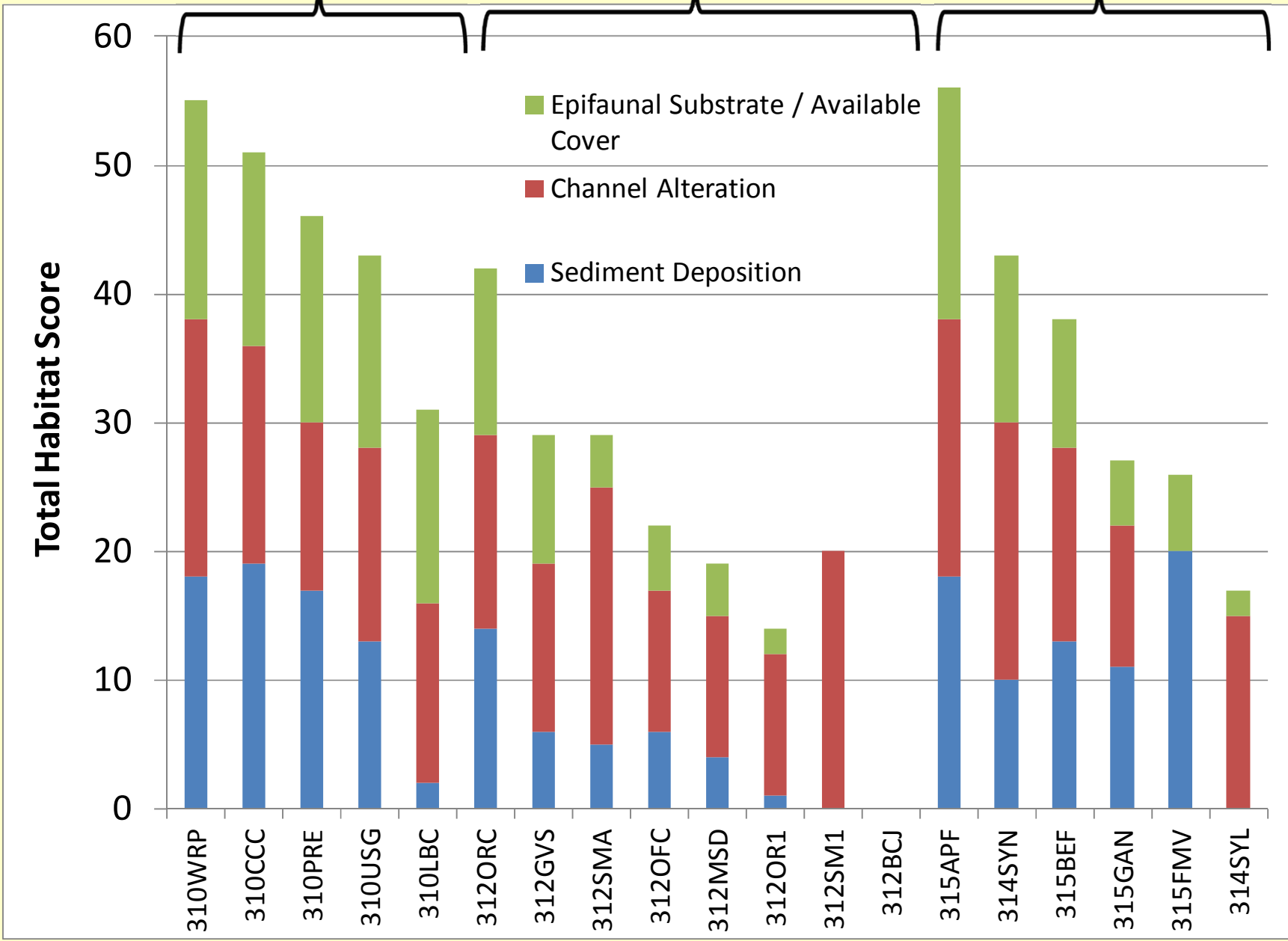
Lower Salinas R. & Reclamation Canal



Estero Bay Tribs

Santa Maria River

Sta Ynez & South Coast



Optimal

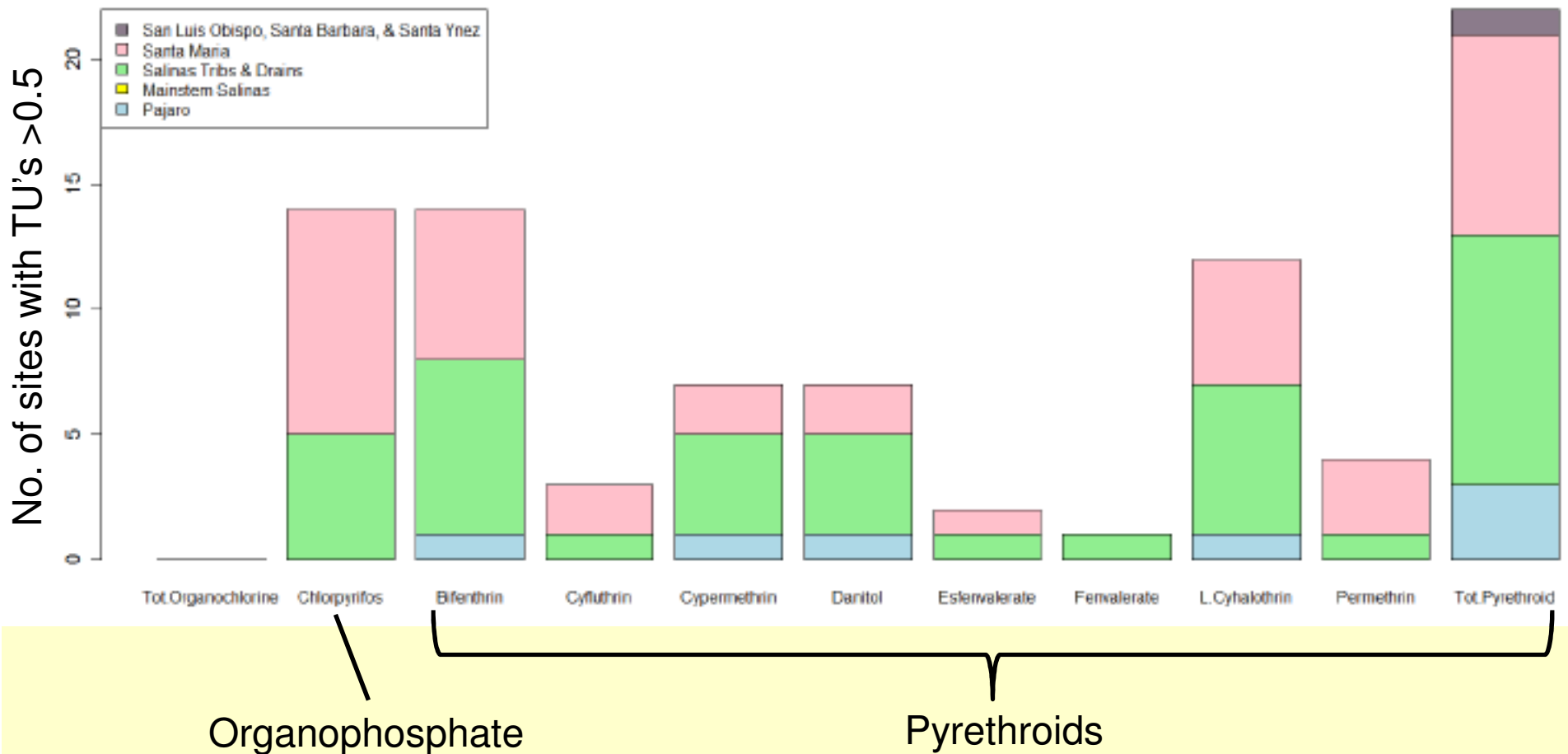
Sub-Optimal

Marginal

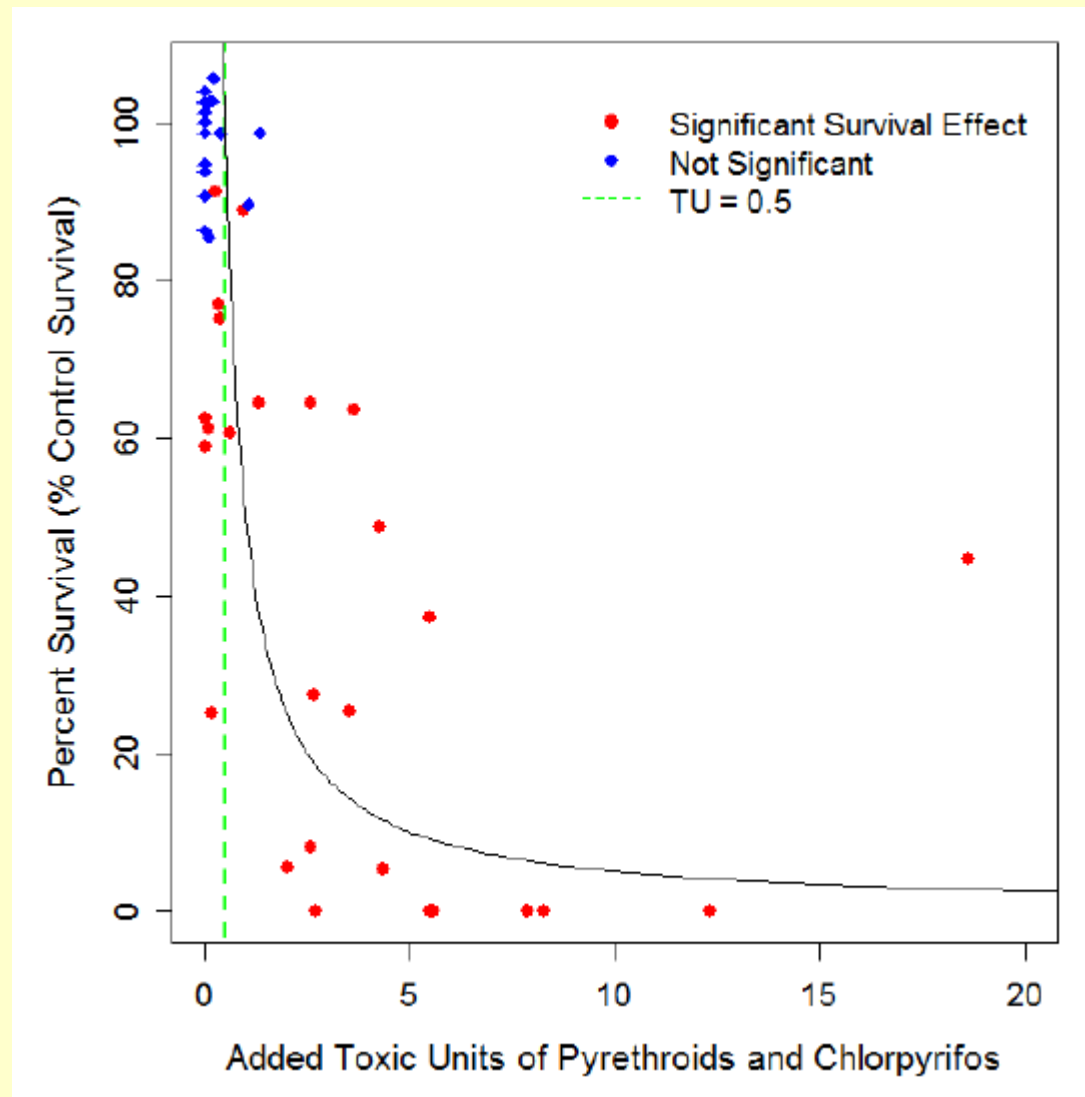
Poor

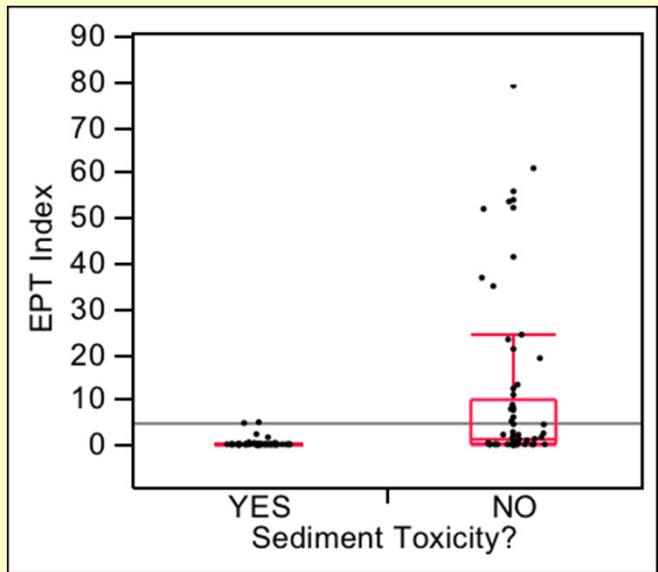
Sediment Toxicity –

‘Toxic Units’ of various pest control chemistries detected, by region

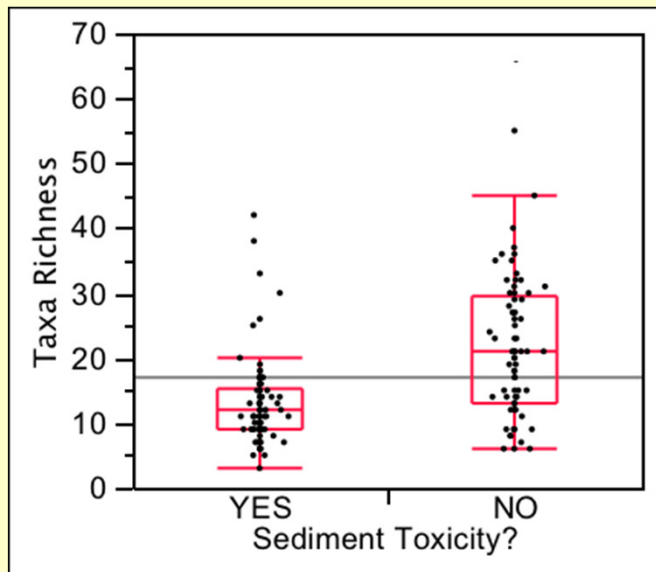


Relationship between “toxic units” and invertebrate survival



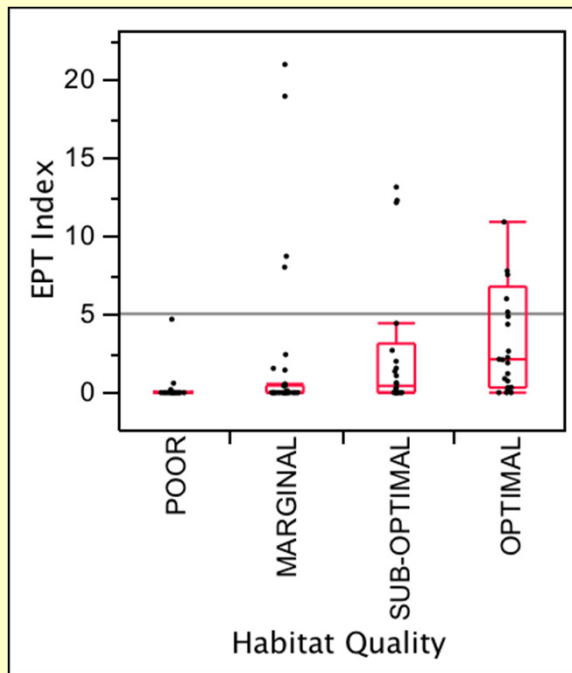


The number of EPT taxa present are generally low or absent from sites where there is sediment toxicity. For sites without sediment toxicity, some have high numbers of EPT taxa and some do not.

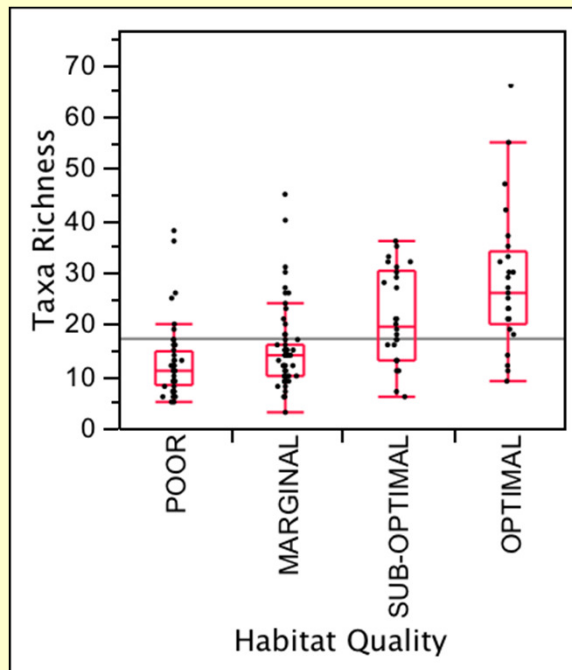


Taxa richness at CMP sites with sediment toxicity is generally lower than at sites without sediment toxicity.

BMI's and Sediment Quality



There is also a relationship between EPT taxa and “Habitat Quality” scores. Sites with higher habitat quality scores tend to have more EPT taxa present.



There is also a relationship between overall Taxa Richness and habitat quality. Sites with higher habitat quality scores tend to have a greater overall number of taxa (Family or Genus) present.

BMI's and Habitat Quality

Which factor(s) is/are most important in determining BMI community?

- Sediment toxicity?
- Water quality?
- Physical habitat?
- Other?
- All of the above?

There is more work to be done...

SoCal IBI & Numeric Biocriteria

- Existing IBI's fit poorly...
 - Low gradient, “valley floor” environment
 - Lack of reference sites
 - Lack of water; hydromodification
 - In some cases, non-agricultural channel modification
- Perhaps the newer and more regionally-applicable Southern California IBI can help?
- Movement at State level towards numeric Biocriteria

SITE ID	PHAB	SED TOX	SOCAL IBI
305CAN	Optimal	Never	Very Poor
305CHI	Optimal	Never	Poor
309GRN	Optimal	Never	Poor
309SAG	Optimal	Never	Poor
305FRA	Optimal	Rare	Very Poor
305LCS	Optimal	Rare	Very Poor
305PJP	Optimal	Rare	Very Poor
310CCC	Optimal	Rare	Fair
310WRP	Optimal	Rare	Fair
314SYF	Optimal	Rare	Very Poor
315APF	Optimal	Frequent	Good
305COR	Optimal	Frequent	Very Poor
305SJA	Optimal	Frequent	Very Poor
306MOR	Optimal	Frequent	Very Poor
309ASB	Optimal	Frequent	Very Poor
309BLA	Optimal	Frequent	Very Poor
309ESP	Optimal	Frequent	Very Poor
309JON	Optimal	Frequent	Very Poor
310PRE	Optimal	Frequent	Very Poor
314SYN	Suboptimal	Never	Very Poor
315BEF	Suboptimal	Never	Poor
305STL	Suboptimal	Rare	Very Poor
310LBC	Suboptimal	Rare	Poor
305WSA	Suboptimal	Frequent	Very Poor
309ALG	Suboptimal	Frequent	Very Poor
309CRR	Suboptimal	Frequent	Very Poor
309MER	Suboptimal	Frequent	Very Poor
309NAD	Suboptimal	Frequent	Very Poor
309OLD	Suboptimal	Frequent	Very Poor
309TEH	Suboptimal	Frequent	Very Poor
310USG	Suboptimal	Frequent	Very Poor
312ORC	Suboptimal	Frequent	Poor
314SYL	Marginal	Never	Fair
315GAN	Marginal	Never	Fair
305TSR	Marginal	Rare	Very Poor
309SAC	Marginal	Rare	Poor
309SSP	Marginal	Rare	Very Poor
309GAB	Marginal	Frequent	Very Poor
312GVS	Marginal	Frequent	Very Poor
312MSD	Marginal	Frequent	Very Poor
312OFC	Marginal	Frequent	Very Poor
312SMA	Marginal	Frequent	Very Poor
315FMV	Marginal	Frequent	Very Poor
309QUI	Poor	Frequent	Very Poor
312BCJ	Poor	Frequent	Very Poor
312OR1	Poor	Frequent	Very Poor
312SM1	Poor	Frequent	Very Poor

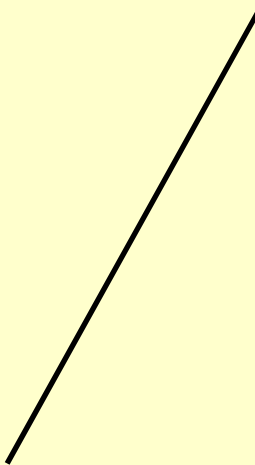
SITE ID	PHAB	SED TOX	SOCAL IBI
305CAN	Optimal	Never	Very Poor
305CHI	Optimal	Never	Poor
309GRN	Optimal	Never	Poor
309SAG	Optimal	Never	Poor
305FRA	Optimal	Rare	Very Poor
305LCS	Optimal	Rare	Very Poor
305PJP	Optimal	Rare	Very Poor
310CCC	Optimal	Rare	Fair
310WRP	Optimal	Rare	Fair
314SYF	Optimal	Rare	Very Poor
315APF	Optimal	Frequent	Good
305COR	Optimal	Frequent	Very Poor
305SJA	Optimal	Frequent	Very Poor
306MOR	Optimal	Frequent	Very Poor
309ASB	Optimal	Frequent	Very Poor
309BLA	Optimal	Frequent	Very Poor
309ESP	Optimal	Frequent	Very Poor
309JON	Optimal	Frequent	Very Poor
310PRE	Optimal	Frequent	Very Poor

Accuracy?

SITE ID	PHAB	SED TOX	SOCAL IBI
305CAN	Optimal	Never	Very Poor
305CHI	Optimal	Never	Poor
309GRN	Optimal	Never	Poor
309SAG	Optimal	Never	Poor

Sensitivity?

SITE ID	SOCAL IBI
305CAN	Very Poor
305FRA	Very Poor
305LCS	Very Poor
305PJP	Very Poor
314SYF	Very Poor
305COR	Very Poor
305SJA	Very Poor
306MOR	Very Poor
309ASB	Very Poor
309BLA	Very Poor
309ESP	Very Poor
309JON	Very Poor
310PRE	Very Poor
314SYN	Very Poor
305STL	Very Poor
305WSA	Very Poor
309ALG	Very Poor
309CRR	Very Poor
309MER	Very Poor
309NAD	Very Poor
309OLD	Very Poor
309TEH	Very Poor
310USG	Very Poor
305TSR	Very Poor
309SSP	Very Poor
309GAB	Very Poor
312GVS	Very Poor
312MSD	Very Poor
312OFC	Very Poor
312SMA	Very Poor
315FMV	Very Poor
309QUI	Very Poor
312BCJ	Very Poor
312OR1	Very Poor
312SM1	Very Poor
305CHI	Poor
309GRN	Poor
309SAG	Poor
315BEF	Poor
310LBC	Poor
312ORC	Poor
309SAC	Poor
310CCC	Fair
310WRP	Fair
314SYL	Fair
315GAN	Fair
315APF	Good



Summary

- Several years of BMI data (1x/yr sampling)
 - Artificial substrates may be useful, but do not provide same info as SWAMP transects
- Range of Physical Habitat conditions, often related to current water body use/modification
- Clear relationship between sediment quality and toxicity; also sed. qual. and BMI metrics
 - Similar relationship btwn habitat qual. & BMI metrics
- State movement towards numeric Biocriteria, but current numeric tools have questionable utility in Central Coast ag watersheds

END