ELEMENTS OF THE SAN DIEGO COUNTY COPERMITTEE STORMWATER PROGRAM REDESIGN

BIOASSESSMENT

- **Do the post-wet weather and post-dry weather stream assemblages tell us the same thing about the watersheds and their stations? If redundant, both are not needed.**
- **Analysis: Rank IBI scores among stations within season. If perfectly redundant get 100% match (correlation)**
  - **38-59% match**
  - **Indicates that some level of match, but other distinct information is carried in wet and dry weather samples.**

BIOASSESSMENT

- **Do the watersheds and stations line up the same way year after year for three years? If good correspondence, some years might be skipped. If partial correspondence, must keep sampling to assess what is causing shifts.**
- **Analyses: Kendall-Tau tests on IBI scores comparing years**
- **Results**
  - **Post Wet-weather**
    - **Somewhat: Year 1 and 2 similar (67% correlated) Year 3 different than Years 1 and 2 (38-41% correlation)**
  - **Post Dry-weather**
    - **Years 1, 2, and 3 not at all correlated**
    - **3-15% correlation; N.S.**
- **Conclusion: Insufficient Correlation to skip years**

BIOASSESSMENT

- **Do the watersheds bioassessment results lineup with the MLS results?**
  - **Do not have way to answer right now– the stations do not match up.**
- **Conclusion: Match MLS and Bioassessment Stations**
  -

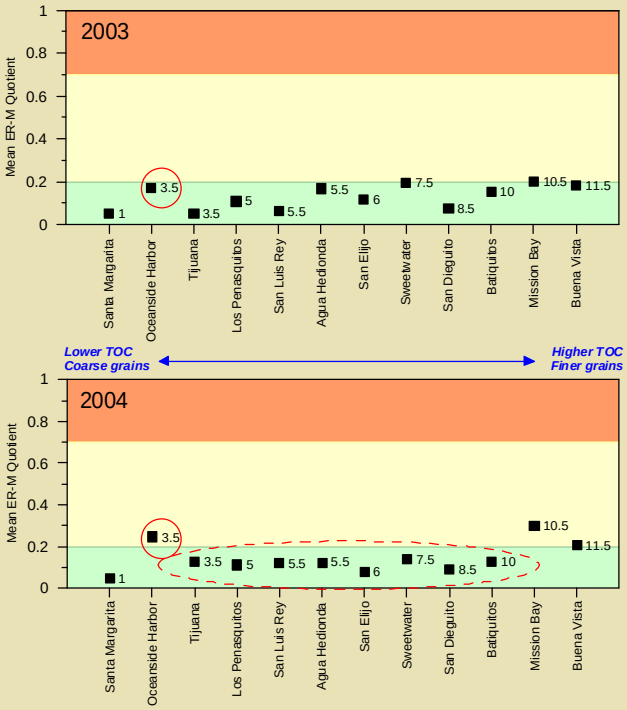
ABLM

- **Questions**
  - **What are the levels of chemicals and toxicity, and the states of biology in the ABLs? (Baseline)**
  - **Do concentrations of COCs, biology, and toxicity in embayment and lagoon sediments reflect those found at MLSs?**
  - **How do the ABLs compare to each other?**
- **Approach**
  - **Use Triad approach and measure sediments (This approach was later confirmed by SMC document)**
  - **Look at worst case states in ABLs**
  - **Establish Baseline and describe chemical, toxicological, and biological states**
  - **Answer above questions**
  - **Adapt program to study and understand most challenged ABLs**

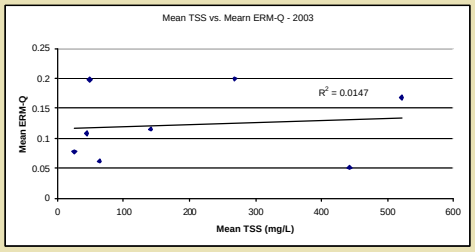
ABLM

- **Chemistry**
  - **How high are levels?**
  - **Are they consistent from**
    - **Year to year?**
    - **Lagoon to lagoon?**
  - **How program is dealt with in the future depends on the answers to these questions and what the biology and toxicity tell us.**

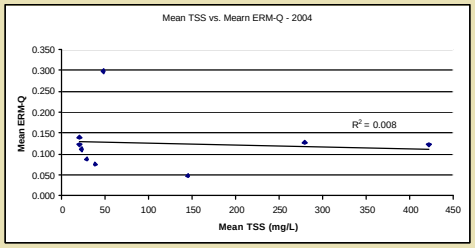
E R M-Qs



Is Chemistry At ABLs Related to Watershed MLSs?



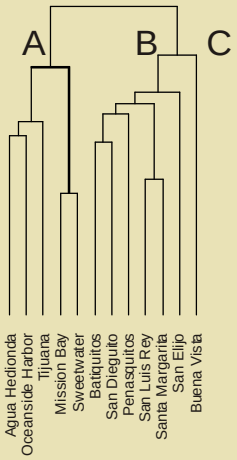
	2003	
	TSS	ER-M Q
Agua Hedionda	521	0.17
Tijuana	442	0.05
Mission Bay	268	0.20
San Elijo	142	0.12
San Luis Rey	64	0.06
Sweetwater	48	0.20
Penasquitos	44	0.11
San Dieguito	26	0.08
Santa Margarita	nd	0.05



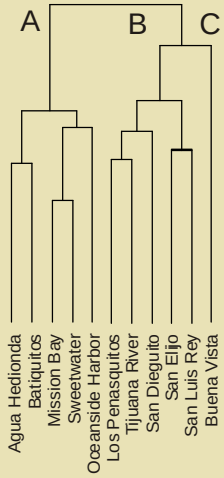
	2004	
	TSS	ER-M Q
Agua Hedionda	422	0.12
Tijuana	279	0.13
Santa Margarita	145	0.05
Mission Bay	47	0.30
San Elijo	38	0.08
San Dieguito	28	0.09
Penasquitos	22	0.11
San Luis Rey	20	0.12
Sweetwater	20	0.14

Biology: **ABL Faunal Assemblages Cluster According to Flushing and Fresh Water; ABL Bio-indices Are Negatively Correlated with ERM-Qs**

Conclusion: **Relation between Biology and Measured Chemistry Masked by Other Factors**



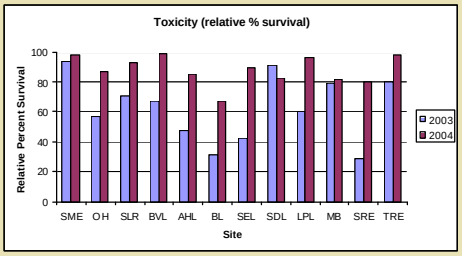
2003

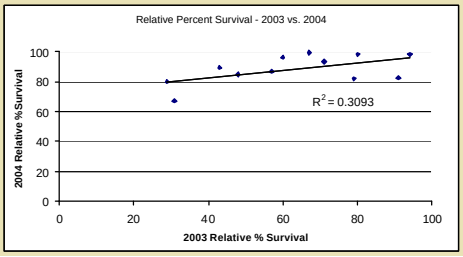


2004

Toxicity

Large Differences Between Years;
2/3 of Stations Below 80% Survivorship in 2003
Low, but Significant Correlation Between Years
Low, but Significant Correlation to ERM-Qs





Toxicity (relative survival)

Site	2003	2004
Santa Margarita	94	98
Oceanside Harbor	57	87
San Luis Rey	71	93
Buena Vista	67	99
Agua Hedionda	48	85
Batiquitos	31	67
San Elijo	43	89
San Dieguito	91	82.5
Penasquitos	60	96
Mission Bay	79	82
Sweetwater	29	80
Tijuana	80	98

Toxicity Conclusions

- **Something Important Is Occurring With Respect to Toxicology**
- **Not Well Related to Presently Measured Chemistry**
- **High Variability—Must Continue Sampling to Decipher Patterns**

ABLM CONCLUSIONS

- **ABLM Approach Still Valid**
  - **The Approach Was Reasonable and is Working as Designed**
  - **SMC Document Calls for Sampling Sediment with Triad Approach**
  - **Develop Baseline and Identify Worst Case Conditions**
- **After "t" years Analyze Baseline Data**
  - **Three Years Appears Sufficient for Chemistry (as presently Measured) and Biology; Possibly More For Toxicity**
  - **Change/Add Chemical Constituents After Third Year**
  - **Then do a focused assessment on the ABLs that appeared to be worst-off**
  - **Apply 2006, 2007, 2008 funds to**
    - **Focused Studies**
    - **Save A Portion of the Annual Funds and Use Them During Bight '08**

MLS TRENDS

- **Trade off sampling every year for moving upstream**
- **Effect of tradeoff on tracking trends**

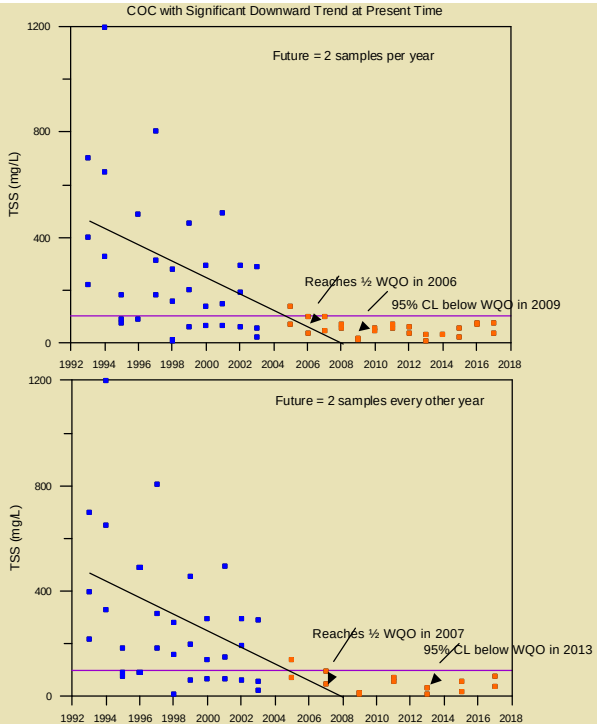
POWER ANALYSES ON TRENDS FOR REDUCTION OF MLS WET WEATHER SAMPLING FROM YEARLY TO EVERY OTHER YEAR

- **Assumptions and Procedures**
  - **Reduction of sampling 2 times per year from every year to every other year.**
  - **2004 data not included**
  - **Std Dev proportional to mean**
  - **Used slope (trend) values and randomized with Std Dev**
  - **Once mean concentration reached ½ WQO, kept it at ½ WQO**
  - **Use 2005, 2007, etc. for every other year sampling**
- **Slope (trend) and Standard Deviation will determine power (As expressed by time to reach target).**

COC WITH SIGNIFICANT DOWNWARD TREND AT THE PRESENT TIME

TSS-- ½ of the WQO is 50 mg/L for TSS

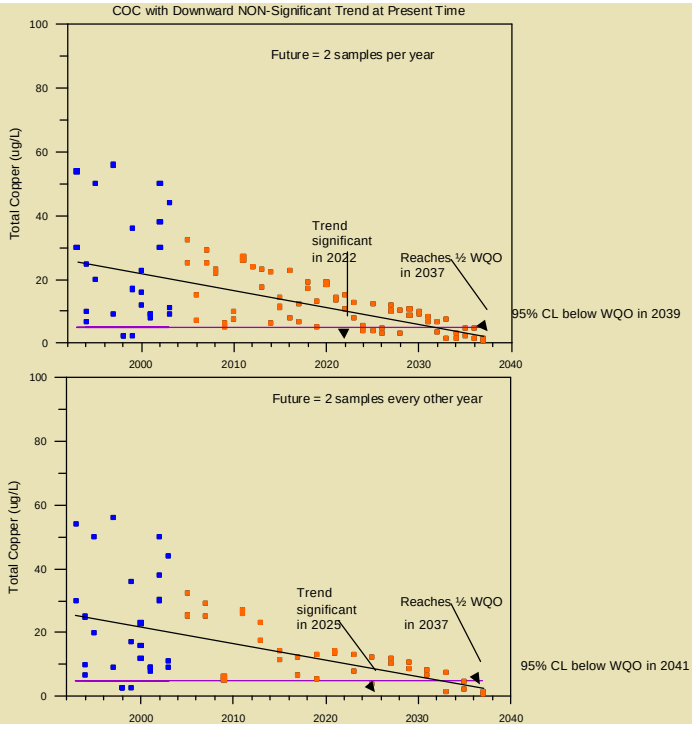
- **Q1: With the present trend, how many years to get to ½ of the WQO (50 mg/L) for TSS?**
  - **Sampling every year, it will take 2 more years of sampling effort or through 2006 to reach 50 mg/L**
  - **sampling every other year, it will take 2 more years of sampling effort or through 2007 to reach 50 mg/L.**
- **Q2: How long after the trend reaches ½ of the WQO will it take to have 95% confidence that the concentration is below the WQO?**
  - **Eight sampling events are needed to reach this confidence level**
  - **Sampling every year, this would occur in 2009**
  - **Sampling every other year, this would occur in 2013**



COC WITH NON-SIGNIFICANT DOWNWARD TREND AT THE PRESENT TIME

COPPER-- ½ of the WQO is 5ug/L for Total Copper

- **Q1: With the present trend, how many years until the regression line is significant**
  - **Sampling two times every year, the trend will become significant in 2022**
  - **Sampling two times every other year, the trend will become significant in 2025**
- **Q2: With the present trend, how many years will it take to get to ½ of the WQO for total copper?**
  - **Sampling every year, it will take 33 more years of sampling effort or through 2037 to reach 5 ug/L.**
  - **Sampling every other year, it will take 17 more years of sampling effort or through 2037 to reach 5 ug/L.**
- **Q3: How long after the trend reaches ½ of the WQO will it take to have 95% confidence that the concentration is below the WQO?**
  - **Six sampling events are needed to reach this confidence level**
  - **Sampling every year, this would occur in 2039**
  - **Sampling every other year, this would occur in 2041**



COC with Increasing Trend Reaching Threshold

- **TSS: Use TSS at mean concentration of last 2 years as threshold**
- **Q1: How long until slope = "0"**
  - **Sampling every year, target slope (slope = 0) is reached in 2010 or 6 years of sampling effort over the 6 year period**
  - **Sampling every other year, target slope is reached in 2013 or 5 years of sampling effort over a 9 year period.**

MLS TRENDS CONCLUSIONS

- **By going to every other year sampling, there appears to be a relatively small increase in time to reach a threshold objective over what it would take to reach the same objective by sampling every year.**
- **The sampling effort would be significantly reduced (halved) for this increase in time.**
- **A few more examples should be analyzed to ensure these conclusions are consistent.**

Recommended MLS Approach

- Add MLS to watersheds with no information but interest or future/impending land use changes
- Add additional stations in each watershed to begin to understand conditions

Questions - Are conditions protective or likely to be protective of beneficial use?

Allow further understanding of extent and magnitude of receiving water problems if they are found.

SMC Program Approach Consistency

- Compliance Approach – comparison to WQOs
- Assessment Approach – weight of evidence to understand actual conditions, biological, chemical and ecological.

- Two approaches should be complementary as per SMC recommendations
- Finding impacts- either exceeding WQOs or impacts to conditions results in management actions

Design Criteria

Design/station selection criteria

- As water mass passes through one type of land use area to another (land use changes)
- Areas not yet sampled/assessed
- Creek/tributary confluences (tributary)

- Two wet weather and two dry weather events
- Rotate stations

SMC supports this strategy…

- Obtaining information relating to dry weather and wet weather load in watersheds supported by SMC Model Monitoring program.
  - "Rotating designs, in which a different subset of stations is sampled during each sampling event, with the goal of sampling the entire set over a certain period of time. … Maximizes the impact of limited monitoring resources. Locations of stations can be random, systematic, or early warning depending upon the type of questions asked."

Management Actions – Defined by SMC

- Source identification studies
- Source control efforts
- Further iterative monitoring and management actions
- Timeframe long enough to encompass iterations of monitoring and management efforts.

Information from Redesigned Program

- Uses weight of evidence PLUS compliance approach
- Provides additional watershed information to identify problems (if they exist) and if so begin to obtain information relative to magnitude and extent.
- Provides more spatial coverage to focus management efforts in those problem locations.

Moving upstream…

- provides empirical evidence that allows you to focus source tracking efforts.
- allows program to obtain load information both in wet and dry weather to support copermittee TMDL efforts as well as other management activities.

Moving upstream…

- provides indication of assimilative capacity of system.
- provides information for potential source tracking and other special studies should they be required.