

# Estuarine NNE Project

## STRTAG Meeting

### August 17, 2009 Conference Call



# Last STRTAG Meeting

---

- Recommended to SWRCB interpretation of “enclosed bays” and “estuaries” definition
  - Target population for project
  - Priority subpopulations or classes?
- Clarified that E-NNE indicators should assess eutrophication rather than nutrient overenrichment (consistent with freshwater NNE)



# Technical Team Work Plan

---

- Recommend interpretation of definition of estuary **(done)**
- Develop an inventory of California estuaries **(draft complete)**
  - SWRCB & advisory group feedback on draft inventory **(September)**
- Generate list of candidate indicators **(draft complete)**
  - SWRCB & advisory group feedback on indicator types **(late August)**
- Refine estuarine classification **(August 4 Tech Team mtg, ongoing)**
  - SWRCB & advisory group feedback on classification study plan **(September)**
- Conduct detailed review of status of science for endpoint development **(next 4-6 months)**
  - Dissolved oxygen review, other indicators?

# Goals of Today's Discussion

---

- Discuss EPA Headquarters feedback on NNE framework
- Discuss remaining policy questions arising from Coastal SAG meeting
- Provide feedback to Technical Team on types of indicators that should be considered for E-NNE development

# EPA Headquarters Feedback on NNE Framework

---

- EPA Region 9 and SWRCB met with EPA Headquarters in San Francisco on July 31<sup>st</sup>
- Impetus for meeting: EPA Headquarters expressed concern with Arizona's approach to nutrient criteria – similar to California's approach
- Meeting goal: Discuss EPA Headquarters and California's approaches to setting nutrient criteria and reconcile, to extent possible, any differences

# Technical and Implementation Issues

---

## ■ Technical Issues

- Indicator selection (relationship between indicator and uses)
- Setting expectations (classification issue)
- Relationship between indicator and nutrients

## ■ Policy Issues

- Statewide narrative with tools for site specific application
- Multiple lines of evidence
- Use in permits, NPS, 303(d) listings, TMDLs



# Nutrient Criteria Approach & Implementation: Florida vs Arizona and California

	Florida	Arizona	California
Indicator	Stressor variables primary, Response variables secondary	Response variables primary, Stressor variables secondary	Response variables primary. Linkage to stressors with spreadsheet tool
Assessment	Impairment if: stressor variable within or above range <b><u>unless</u></b> other data disprove	Impairment if: a. response variable above range <b><u>or</u></b> b. response variable w/i range and secondary variables above range	Impairment if: Response variable above range
Permitting	Lower nutrient value used to establish permit limit	Framework with permitting done on a case by case basis.	Permitting done on a case by case; use BURC I/II threshold to calculate to nutrient value

# Goals of Today's Discussion

---

- Discuss EPA Headquarters feedback on NNE framework
- Discuss remaining policy questions arising from Coastal SAG meeting
  - Is E-NNE addressing nutrient overenrichment in particular, or eutrophication in general? ALREADY DISCUSSED
  - Could STRTAG/SWRCB articulate how NNE will be incorporated into RWQCB basins plans? What will be incorporated into actual permits?
  - How would RWQCB deal with actual versus potential beneficial uses?
- Provide feedback to TT on types of indicators that should be considered for E-NNE development



# Feedback to Tech Team on Indicators

---

- Process for indicator development
- Proposed criteria for indicator selection
- Eutrophication conceptual model – defining indicator groups
- Feedback on indicator groups
  - Priority indicators?

# Process for Indicator Development

---

- ID for criteria for indicator selection and generates a master list of candidate indicators
- SWRCB et al. provides feedback to Technical Team to help narrow the list (today and September meeting)
- Tech Team reviews existing science supporting endpoint development for a subset of indicators
  - Develop conceptual model for each candidate indicator with explicit linkages to BUs and management controls
  - Summarize science that would assist in endpoint selection
- Science Advisory Board peer reviews Technical Team work
- SWRCB et al. review Tech Team products and make a final selection of E-NNE indicators for further development

# Proposed Criteria for Indicator Selection

---

## Indicators Must:

- Clear link to beneficial uses
- Scientifically sound and practical measurement process
- Show a trend either towards increasing or/and decreasing eutrophication (signal: noise good)
- Predictive relationships with causal factors (nuts, hydrology etc)

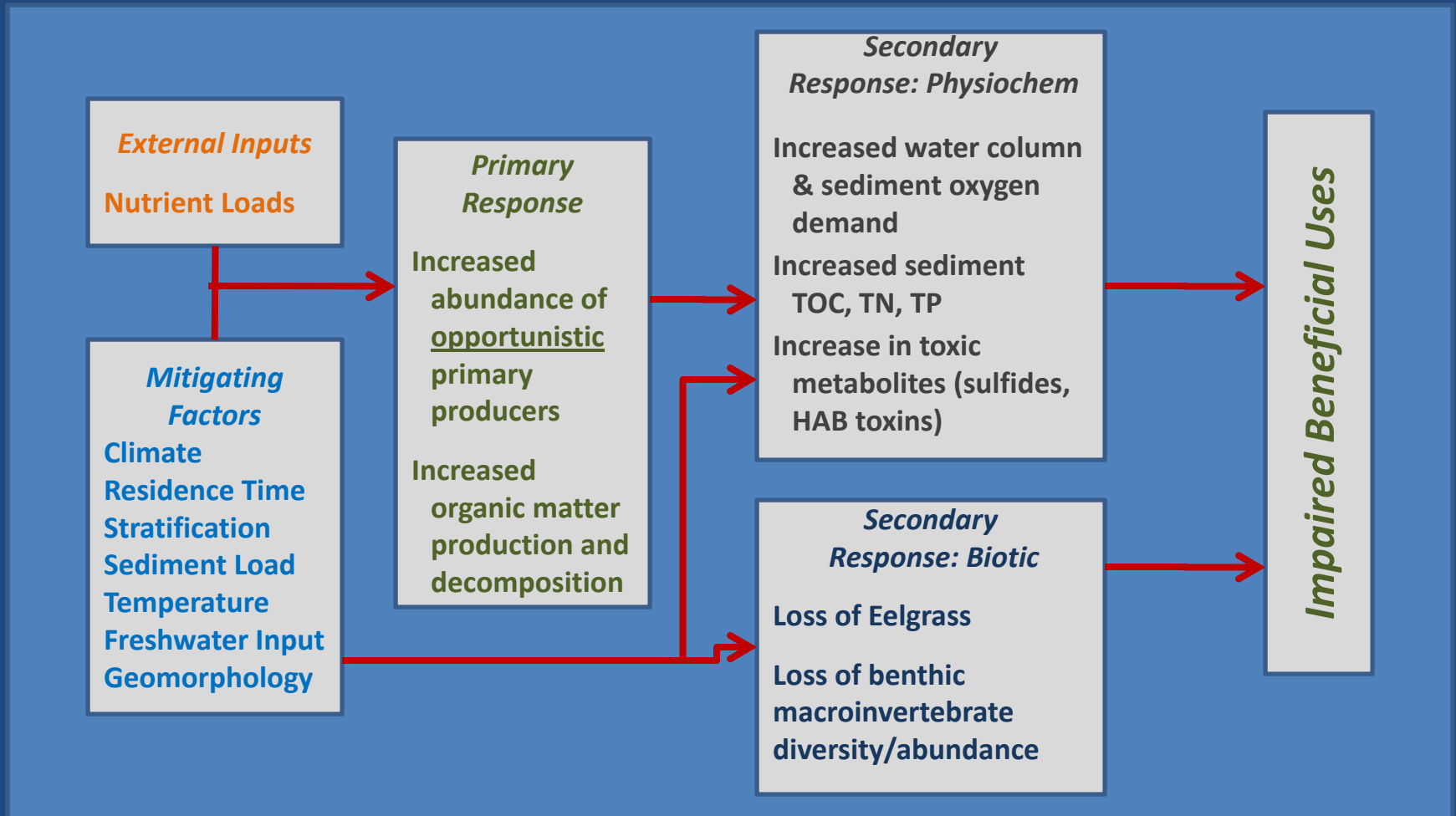
# Proposed Criteria for Indicator Selection

---

It would be nice if indicators also:

- Were easy to understand to a non-technical audience (unambiguous)
- Provide early warning of emerging problems
- Adaptable for use at a range of spatial scales
- Can use it to diagnose multiple causative factors, not necessarily just eutrophication.
- Shows detectable trends in both directions (improving or degrading).

# Conceptual Model – Indicator Types





# Indicators Types

---

- Causal indicators (focused on nutrients)
- Response indicators
  - Primary Biological Response ( $\uparrow$  1<sup>0</sup> producer biomass and/or change in species composition; e.g. macroalgae)
  - Secondary Response
    - Physiochem -- System metabolism (surface water DO, Productivity: Respiration Ratio), Water Clarity
    - Biological Response -- Change in biomass or species composition as a result of primary biological response; e.g. eelgrass decline, benthic macroinverts



# Discussion Questions

---

- Are proposed evaluation criteria appropriate?
- What do you think of the candidate indicator list?
  - Anything missing?
  - Anything that doesn't belong?
- Tech Team will place on emphasis on exploring primary biological response indicators and secondary physiochem indicators (DO)– do you agree?
- Should secondary biological response indicators be included in those under consideration for E-NNE?
- Given that we are focusing on eutrophication, is there any reason why we should consider causal indicators in our framework?
- How much emphasis should be placed on aesthetic indicators (e.g. odor, taste)?

# Are Proposed Criteria Appropriate?

---

## Indicators Must:

- Clear link to beneficial uses
- Scientifically sound and practical measurement process
- Show a trend either towards increasing or/and decreasing eutrophication (signal: noise good)
- Predictive relationships with causal factors (nuts, hydrology etc)

# Discussion Questions

---

- Are proposed evaluation criteria appropriate?
- What do you think of the candidate indicator list?
  - Anything missing?
  - Anything that doesn't belong?
- Tech Team will place on emphasis on exploring primary biological response indicators and secondary physiochem indicators (DO)– do you agree?
- Should secondary biological response indicators be included in those under consideration for E-NNE?
- Given that we are focusing on eutrophication, is there any reason why we should consider causal indicators in our framework?
- How much time to spend on aesthetic indicators (e.g. odor, taste)?

# Tech Team will Emphasize Primary Biological Response Indicators...Do You Agree?

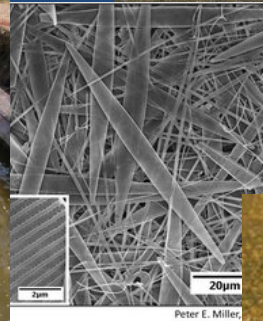
Opportunistic macroalgae



Opportunistic submerged aquatic vegetation



Phytoplankton



Benthic Microphytobenthos



# Emphasize Secondary Physiochemical Response Indicators...Do You Agree?

---

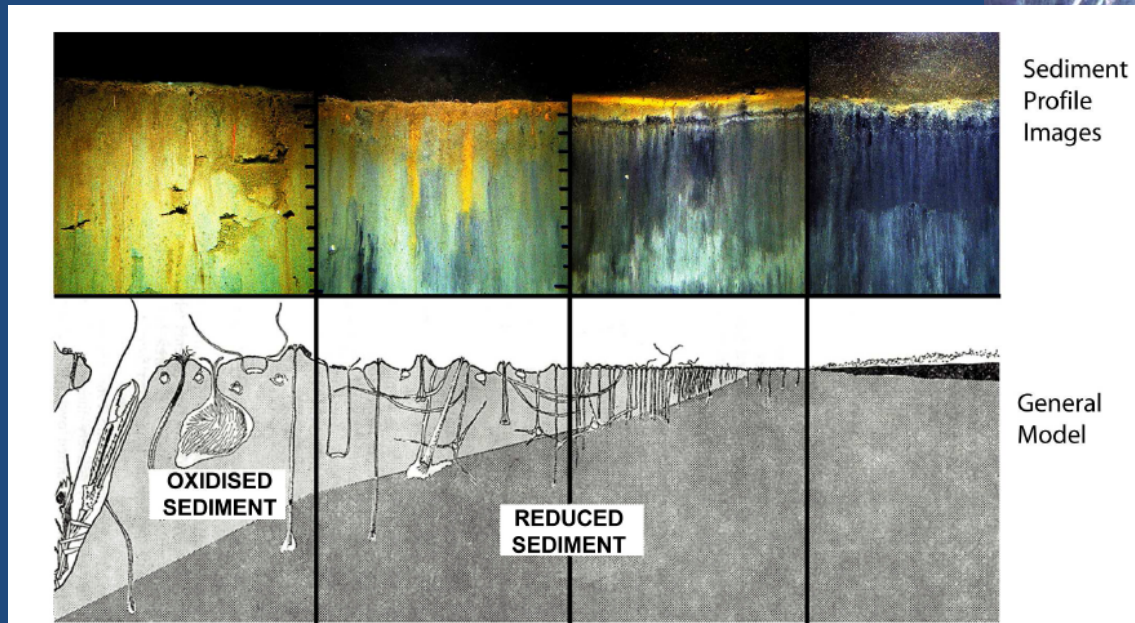
- ✓ System Metabolism -- Surface Water DO
- Surface Water Clarity (already exist??)
- Organic Matter Accumulation



# Should Secondary Biological Response Indicators Be Included for Consideration?

What are the indicators?

- Eelgrass (*Zoster* spp.)



- Benthic infauna community structure

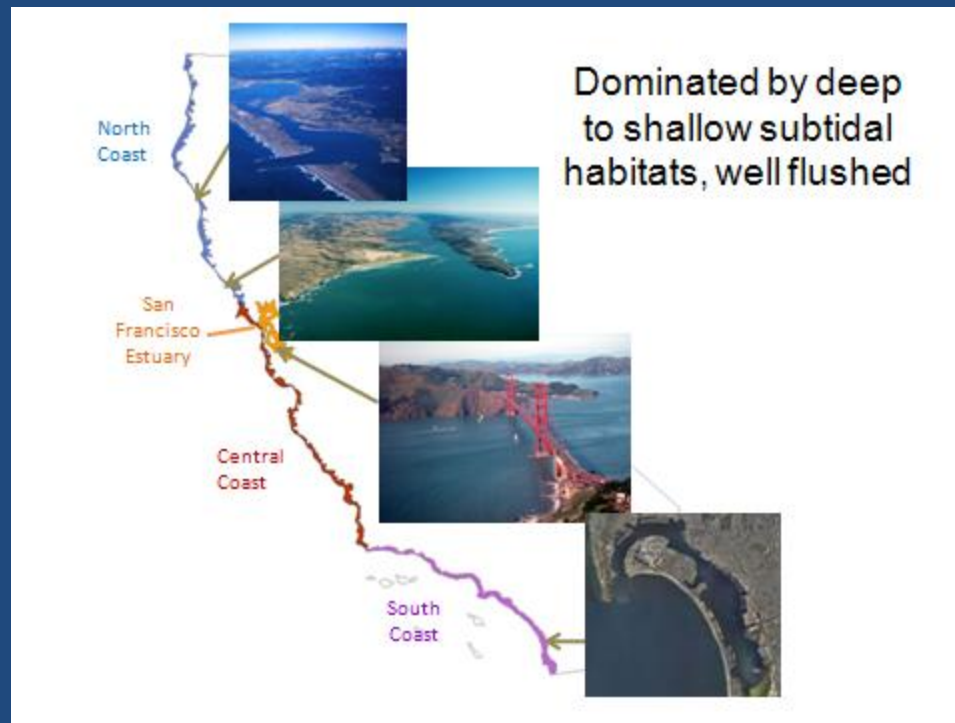


# Should Secondary Biological Response Indicators Be Included for Consideration?

---

Where can they be applied most readily?

Enclosed Bays and Some Perennially Tidal Lagoons



# Should Secondary Biological Response Indicators Be Included for Consideration

---

## What are the advantages?

- Direct link with beneficial uses (habitat and food for COMM, RARE, WILD, MIGR)
- Scientific basis for thresholds exist
  - California benthic response index
  - Studies on water clarity requirements for eelgrass

## What are the disadvantages?

- Policy shift toward bioassessment
- Can be complicated to model predictive relationships with nutrients (benthic infauna)

# Is There Any Reason to Consider Causal Indicators (Given we are Focusing on Eutrophication)?

<b>Water Column</b>	N Load	<b>Expensive</b>
	P Load	
	N Conc.	<b>No good correlation with response</b>
	P Conc.	
	Ammonia:DIN ratio	<b>Indicative of recycling rather than sources</b>
<b>Sediment</b>		
<b>Sediment</b>	OC/N Ratio	<b>For systems that tend to accumulate (basins) – Maybe</b>
	TP normalized to Fe or Al	
<b>Tissue</b>		
<b>Tissue</b>	Tissue C:N Ratio	<b>Maybe</b>
	Tissue Stable Isotope signature	<b>Source tracking – not always unambiguous</b>

# Should Secondary Biological Response Indicators Be Included for Consideration

---

## What are the advantages?

- Direct link with beneficial uses (habitat and food for COMM, RARE, WILD, MIGR)
- Scientific basis for thresholds exist
  - California benthic response index
  - Studies on water clarity requirements for eelgrass

## What are the disadvantages?

- Policy shift toward bioassessment
- Can be complicated to model predictive relationships with nutrients (benthic infauna)

# Discussion Questions

---

- Are proposed evaluation criteria appropriate?
- What do you think of the candidate indicator list?
  - Anything missing?
  - Anything that doesn't belong?
- Tech Team will place on emphasis on exploring primary biological response indicators and secondary physiochem indicators (DO)– do you agree?
- Should secondary biological response indicators be included in those under consideration for E-NNE?
- Given that we are focusing on eutrophication, is there any reason why we should consider causal indicators in our framework?
- How much time to spend on aesthetic indicators (e.g. odor, taste)?

# Next Steps/ Action Items

---

- Review for accuracy inventory of “estuaries” and check designated BUs
- Provide feedback on classification study plan
- Provide feedback on conceptual approach for DO endpoint development