



# **STATE WATER BOARD STAFF WORKPLAN FOR DEVELOPMENT OF NUTRIENT OBJECTIVES**

**Rik Rasmussen, State Water Resources  
Control Board**

**Nutrient Objectives Stakeholder  
Advisory Group Meeting**

**June 13, 2014**

**Sacramento, CA**

# WELCOME TO THE NUTRIENT OBJECTIVES STAKEHOLDER ADVISORY GROUP MEETING

## Goals:

- Water Board staff has a plan for nutrient objective development
  - We want to your feedback on that plan
- Stakeholders need to be organized in order to effectively provide feedback to us through out the process
  - Today we will help you to get organized and pick representatives
- We will be putting together a Science Panel to provide ongoing technical review
  - Today we want to get your feedback on the process and desired attributes of the Panel
  - Provide instructions for providing feedback on the candidates

# AGENDA (10 AM – 3 PM)

- Introductions, meeting goals
- Discussion of State Water Board workplan for nutrient objective development
  - Overarching plan (Rik Rasmussen, State Water Board)
  - Overview of technical elements (Martha Sutula, SCCWRP)
- Stakeholder organization and governance (Brock Bernstein)
- Science Panel Process and Selection Criteria (Martha Sutula, SCCWRP)
- Next steps and timing (Rik Rasmussen, State Water Board)

# NUTRIENT OBJECTIVES— WHY NOW?

- Adverse effects of nutrient pollution are evident across California's landscape as well as the nation
  - Well documented examples in streams, lakes, rivers and coastal waters
- Nutrient controls have largely not been implemented in California
  - Few of California NDPES permits have nitrogen limits
  - Ag Waiver programs have focused on monitoring, not on load reductions
- EPA has been pushing for Numeric Nutrient Criteria

# NUTRIENT OBJECTIVES NEED A DIFFERENT APPROACH THAN THAT OF TOXIC CONTAMINANTS

- Nutrients are required to support life
  - How do we establish the correct nutrient balance?
- Direct effects (e.g. toxicity) are often less important than indirect effects
  - Indirect effects occur at much lower levels than toxic effects
- Ambient concentrations can give false positives or negatives
- Need a different approach



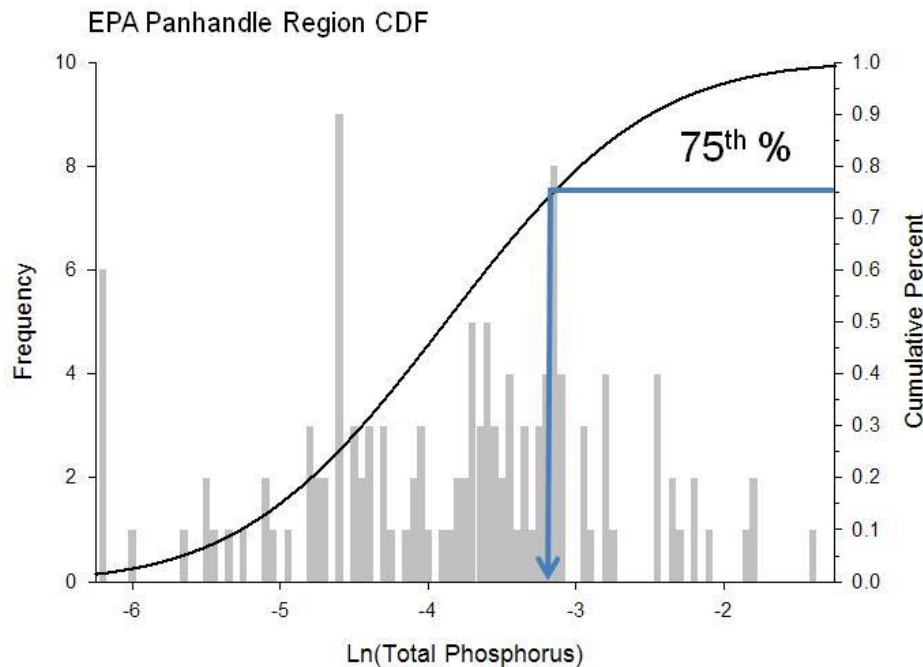
# THREE BASIC APPROACHES TO NUTRIENT OBJECTIVES

EPA guidance on nutrient criteria development suggests three basic approaches (EPA 2001)

- Reference
- Empirical stress-response
- Causal modeling

# REFERENCE APPROACH

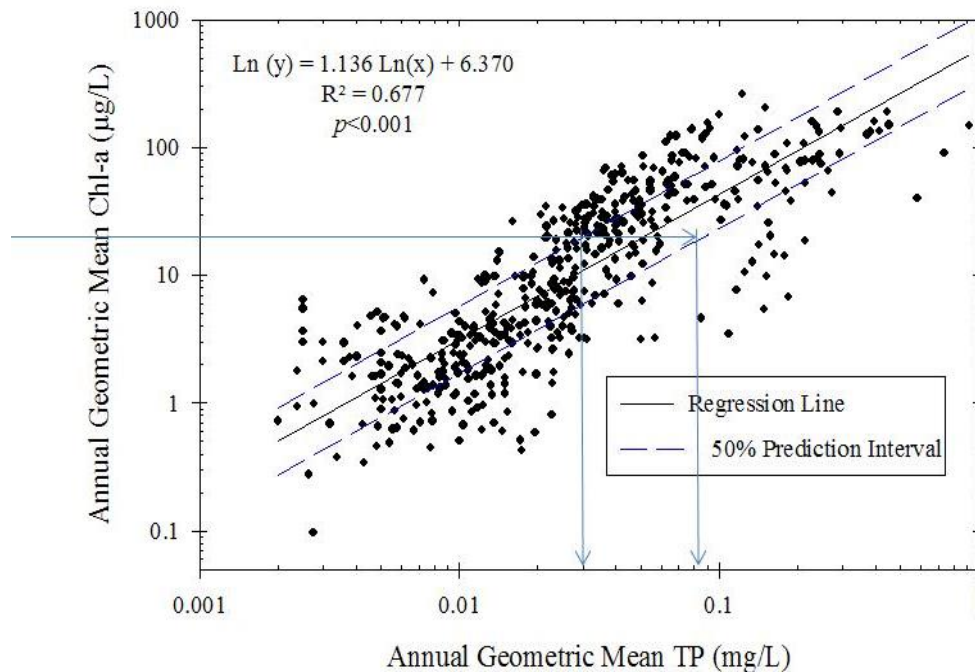
- Characterize distributions of nutrient in “minimally disturbed” waterbodies
- Choose nutrient concentrations at some statistical percentile of reference waterbodies



75<sup>th</sup> Percentile of Florida  
Panhandle Reference  
Streams

# EMPIRICAL STRESS-RESPONSE APPROACH

- Identify biological response indicator of interest (e.g. algal biomass)
- Analyze statistical relationships between nutrient concentrations and response



Correlation Between  
Chl a and TP in  
Alkaline Lakes



# SWRCB STAFF FAVOR CAUSE EFFECT APPROACH

- California's version of this is coined as "nutrient numeric endpoint (NNE) approach"
- Consists of two major components
  - Response indicators with numeric endpoints for waterbody assessment
  - Models to link response indicator numeric endpoints to nutrient targets (e.g. permits, TMDLs, etc.)

## *Algae & Aquatic Plants*

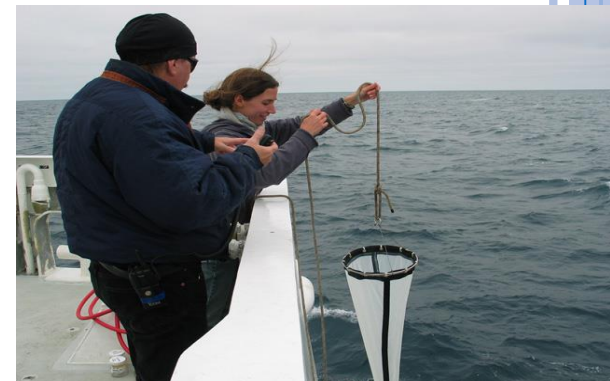


## *Dissolved Oxygen, pH*



# PREVIOUS WORK ON NUTRIENT OBJECTIVES

- Water Board work has focused on streams and lakes beginning in 2001
  - Significant technical foundation completed in 2006
  - Since then focused on TMDL as case studies and implementation guidance
  - Initiated CEQA scoping in Fall 2011
- Funding science to support estuarine nutrient WQOs since 2009
  - That science is still ongoing



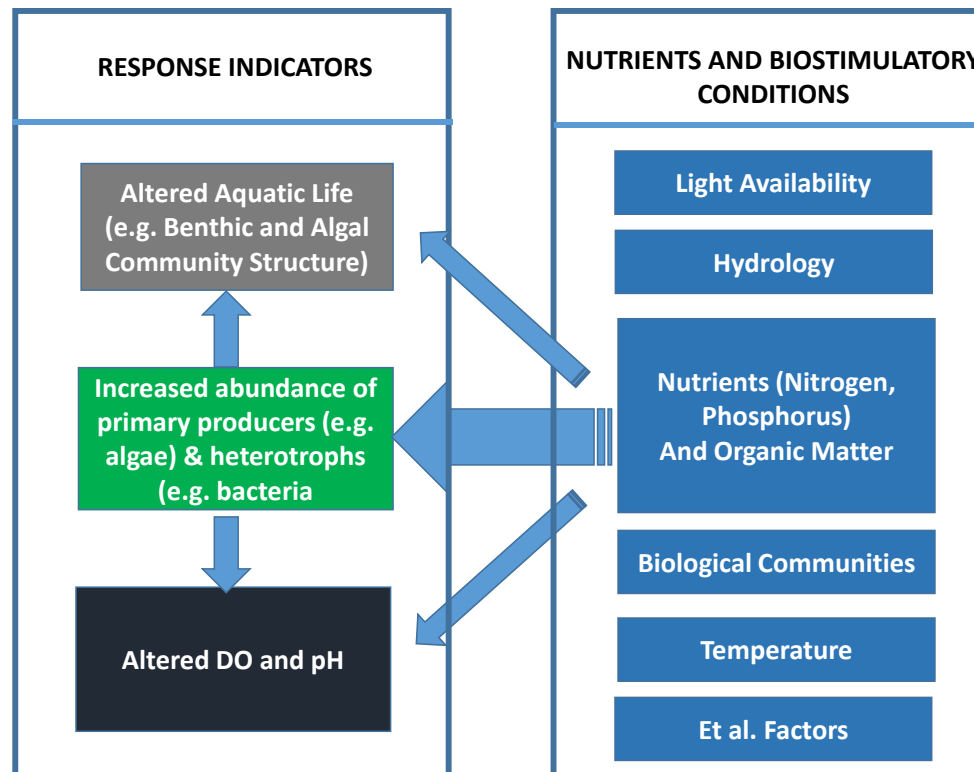
# CEQA SCOPING IDENTIFIED ADDITIONAL WORK NEEDED

- New peer-reviewed science and additional data now available for wadeable streams and lakes
- Not a traditional regulatory approach
  - Need for stakeholder input and independent science review throughout the process

# STAFF HAS DEVELOPED A WORKPLAN TO MOVE FORWARD ON NUTRIENT OBJECTIVES

## Five Guiding Principals:

- The policy should address nutrient pollution and biostimulatory substances and/or conditions.



# STAFF HAS DEVELOPED A WORKPLAN TO MOVE FORWARD ON NUTRIENT OBJECTIVES

## Five Guiding Principals:

- The policy should address nutrient pollution and biostimulatory substances and/or conditions.
- The state should develop narrative nutrient objectives with numeric guidance.
- Numeric guidance should have a strong linkage to beneficial use.
- The state should have numeric guidance for all waterbody types.
- There should be statewide consistency with regional flexibility.

# NUMERIC GUIDANCE WILL BE PHASED BY WATERBODY TYPE

Phase I (2016): **Establish narrative approach** applicable to all waterbodies and numeric guidance for **wadeable streams**

Phase II (2017): **Lakes**

Phase III: (2019): **Estuaries and non-wadeable rivers**

# PHASE I: NARRATIVE OBJECTIVE AND NUMERIC GUIDANCE FOR WADEABLE STREAMS

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## Phase I Tasks

- 1 Conceptual Approach, Waterbody Definition and Classification
  - 2 Conduct and Synthesize Science to Support Nutrient Objectives in Wadeable Streams
  - 3 Implementation Plan Development
  - 4 Rulemaking
  - 5 Outreach
  - 6 Training, Standardization, and Information Management
-

# TASK 1: CONCEPTUAL APPROACH, WATERBODY DEFINITION AND CLASSIFICATION

- Provides the problem statement for nutrient pollution and biostimulatory conditions
- Lays out the options considered for development of nutrient objectives
  - How each option was explored in California
  - Advantages and disadvantages of each
- Provides waterbody definitions and classification of habitat types relevant for interpretation of numeric guidance

Key Products: Technical report and presentations



## **TASK 2: CONDUCT & SYNTHESIZE SCIENCE TO SUPPORT NUTRIENT OBJECTIVES IN WADEABLE STREAMS**

- Evaluate candidate ecological response indicators
- Conduct & synthesize science on thresholds at which indicators support or adversely affect beneficial uses
- Summarize the distribution of these indicators in reference and ambient sites across the State
- Develop models to support the linkage of response indicators to nutrient management
- Identify technical considerations for implementation of numeric guidance

Key Products: Technical reports and presentations

# TASK 3: Implementation Plan Development

- Define how numeric guidance should be used in regulatory programs
  - Waterbody assessments and 303(d) listing
  - Total maximum daily loads
  - NPDES permitting and compliance
  - Non-point sources, etc.

Key Products: Implementation guidance that includes draft language relevant for each of the regulatory programs

## TASK 4: Rulemaking

- Follow the legislatively defined public process of developing, adopting, and implementing objectives
- Include public dissemination, review, and response process such as:
  - Public workshops
  - Response to comments
  - Informational meeting presentations
  - State Water Board briefing
  - California Environmental Quality Assessment (CEQA) document or equivalent

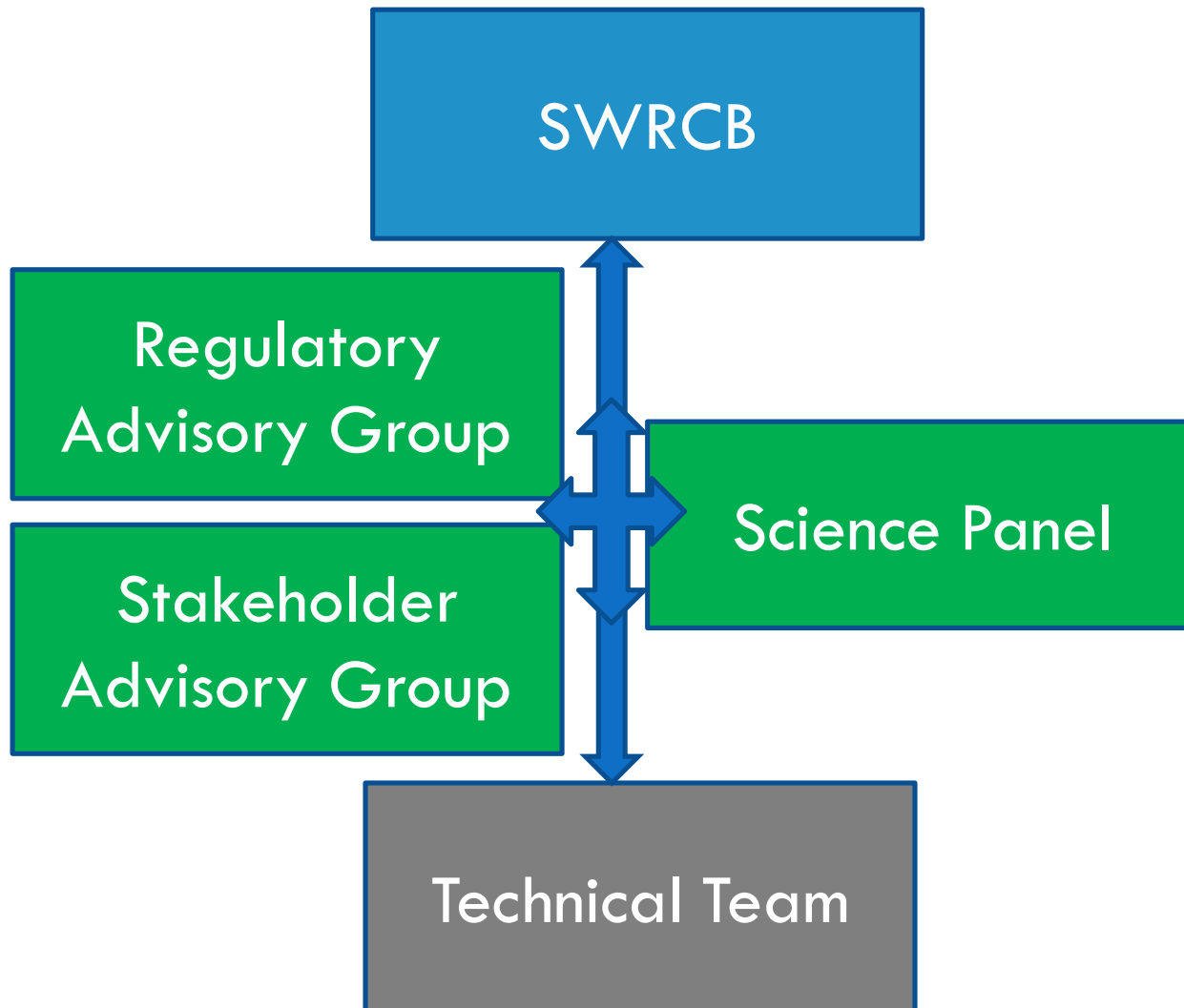
Key Products: Detailed staff report and proposed amendments to the State Water Board's Inland Surface Waters Plan

## TASK 5: Outreach

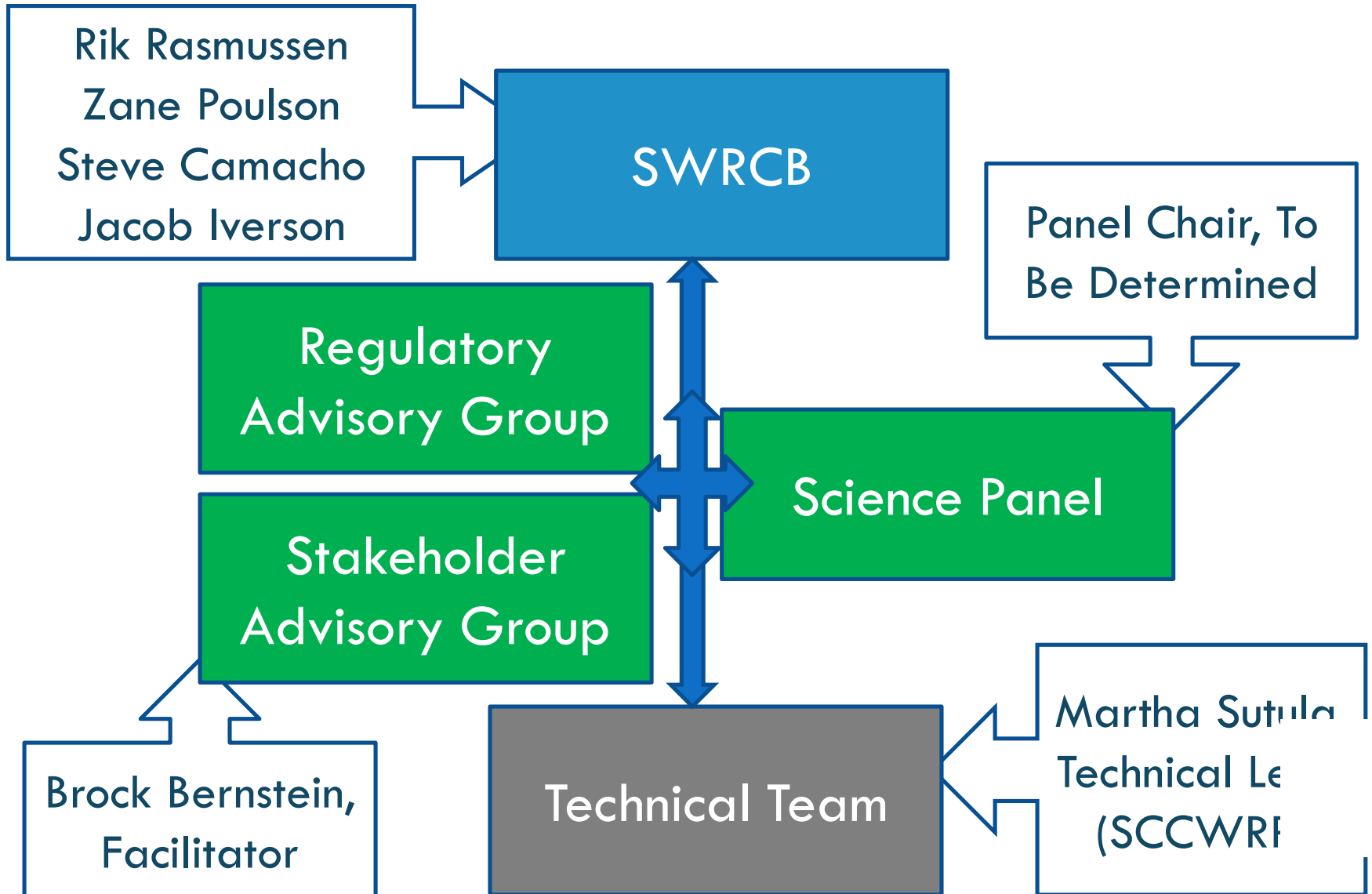
- Conducted in accordance with the State Water Boards Public Participation Plan
- The goal of this task is to actively reach out to stakeholders to ensure that their ideas and concerns are fully considered
- Covers three important areas
  - Transparency in development of policy
  - Opportunity to voice their opinions about the relative merits of the possible approach(es)
  - Technical aspects of the objectives should receive an independent and rigorous technical review

Key Products: 1) A Stakeholder Management Plan, 2) Facilitation of Advisory Groups and 3) Meeting materials and summaries

# STATEWIDE NUTRIENT OBJECTIVES PROGRAM: ORGANIZATION



# MEET THE TEAM



# TASK 6: TRAINING, STANDARDIZATION, AND INFORMATION MANAGEMENT

- Need to standardize:
  - How to collect data with prescribed quality assurance
  - How to interpret data with linkage to implementation guidance
- What we need:
  - Standard Operating Procedures, and Quality Assurance Plans
  - SWAMP standardized data transfer formats
- We are benefiting from investment in stream bioassessment
  - A lot of this work has already been done
- We will assess what else is required for implementation

# TIMING OF TASKS

<b>Phase I Tasks</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>1</b> Conceptual Approach	■		
<b>2</b> Stream Science	■		
<b>3</b> Implementation	■	■	
<b>4</b> Rulemaking			■
<b>5</b> Outreach	■	■	■
<b>6</b> Standardization and IM			■



# QUESTIONS? COMMENTS?

PLEASE SEND WRITTEN COMMENTS ON WATER BOARD WORK  
PLAN BY  
COB JULY 18, 2014  
TO [BROCK@BROCKBERNSTEIN.COM](mailto:BROCK@BROCKBERNSTEIN.COM)

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# **OVERVIEW OF TECHNICAL ELEMENTS SUPPORTING WADEABLE STREAM NUMERIC GUIDANCE**

Martha Sutula, Ph.D.

Principal Scientist, Biogeochemistry Department  
Southern California Coastal Water Research Project  
Authority (SCCWRP)

# PHASE I: NARRATIVE OBJECTIVE AND NUMERIC GUIDANCE FOR WADEABLE STREAMS

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## Phase I Tasks

1 Conceptual Approach, Waterbody Definition and Classification

2 **THESE TASKS HAVE TECHNICAL ELEMENTS**  
Conduct and Synthesize Science to Support Nutrient Objectives in Wadeable Streams

3 Implementation Plan Development

4 Rulemaking

5 Outreach

6 Training, Standardization, and Information Management

***THIS PRESENTATION FOCUSES ON TASK 2***

# GOAL OF TODAY'S PRESENTATION

- Give you sufficient detail to allow you to comment on the State Water Board work plan
- Not enough detail to allow you to comment on the technical workplan
  - Meant to be an orientation
- Opportunity for focused feedback on the technical workplan will happen at the next stakeholder meeting
  - We will give you a written workplan in advance to review

# WATER BOARD STAFF FAVOR CAUSE EFFECT APPROACH

- Coined as “nutrient numeric endpoint (NNE) approach”
- Consists of two major components
  - Response indicators with numeric endpoints for waterbody assessment
  - Models to link response indicator numeric endpoints to nutrient targets (e.g. permits, TMDLs, etc.)

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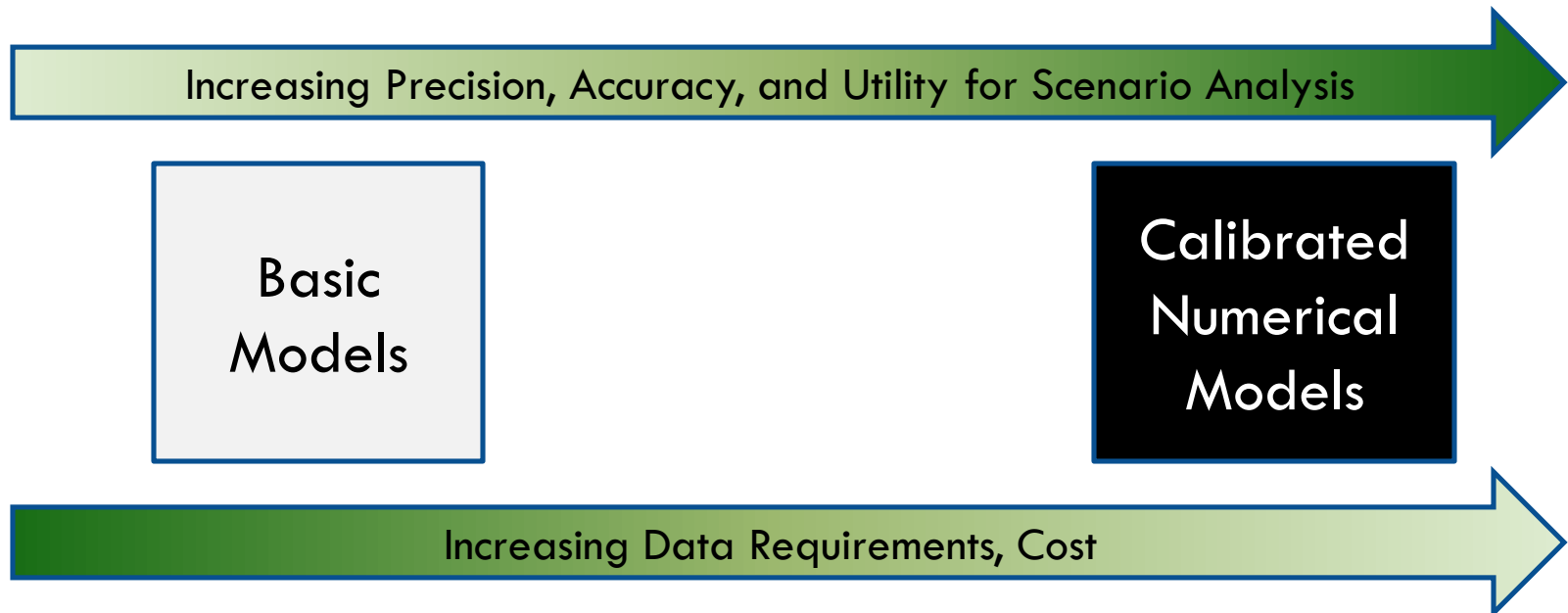


## *Dissolved Oxygen, pH*



# MODELS TO LINK TO NUTRIENT MANAGEMENT: TWO BOOK ENDS

- Calibrated numerical models
  - Site-specific, high precision, requires considerable expertise and expensive data
- Basic models
  - Regional or statewide, lower precision, low cost and expertise



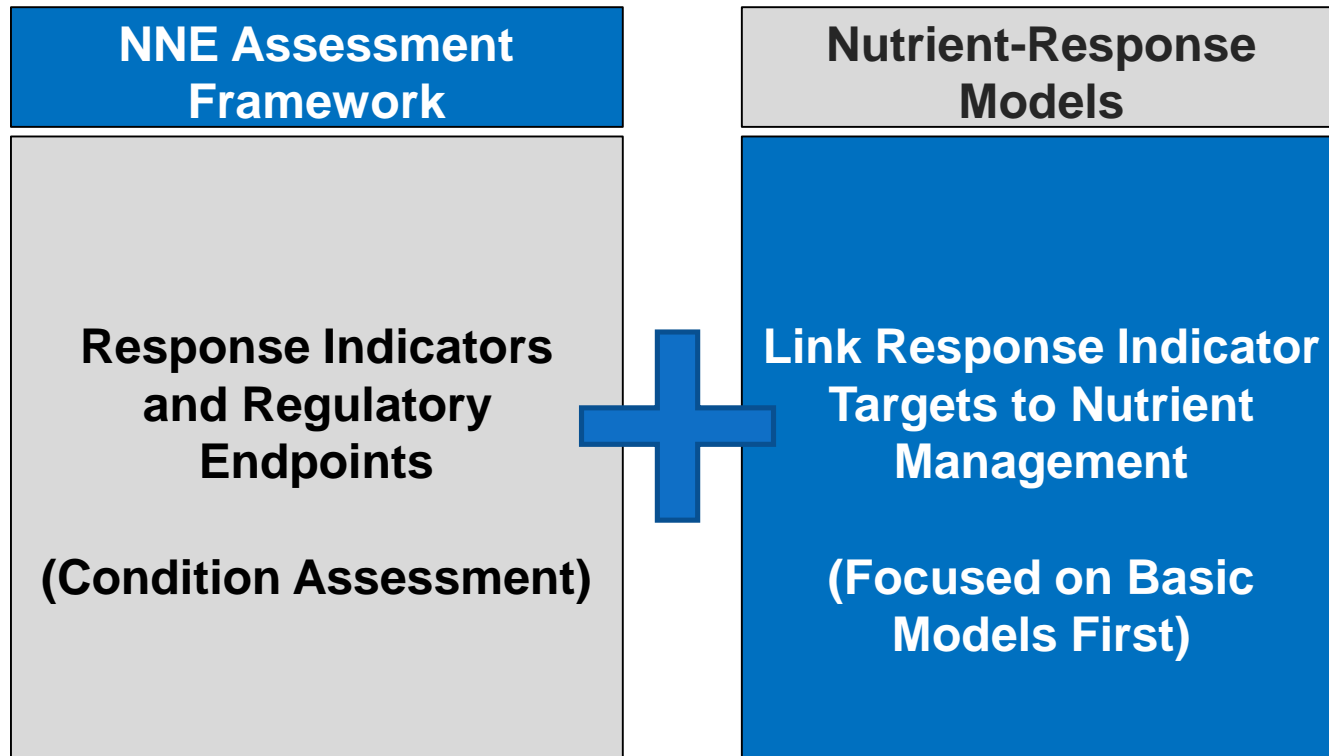
# STATE OFFERING BASIC MODELS TO SET “DEFAULT” NUTRIENT TARGETS

- Translates response indicator numeric endpoints to site-specific nutrient targets
  - Accounts for site-specific factors that control response to nutrients (canopy cover, temperature, etc.)
- “Default” nutrient targets resulting from model are a starting point for conversations on permits and TMDLs
- Flexibility offered to stakeholders to develop more sophisticated models if required
- Models available for wadeable stream and lakes (Tetra Tech 2006)



# CORE ELEMENTS OF NNE SCIENCE PLAN

## WILL FOCUS ON BASIC MODELS FIRST



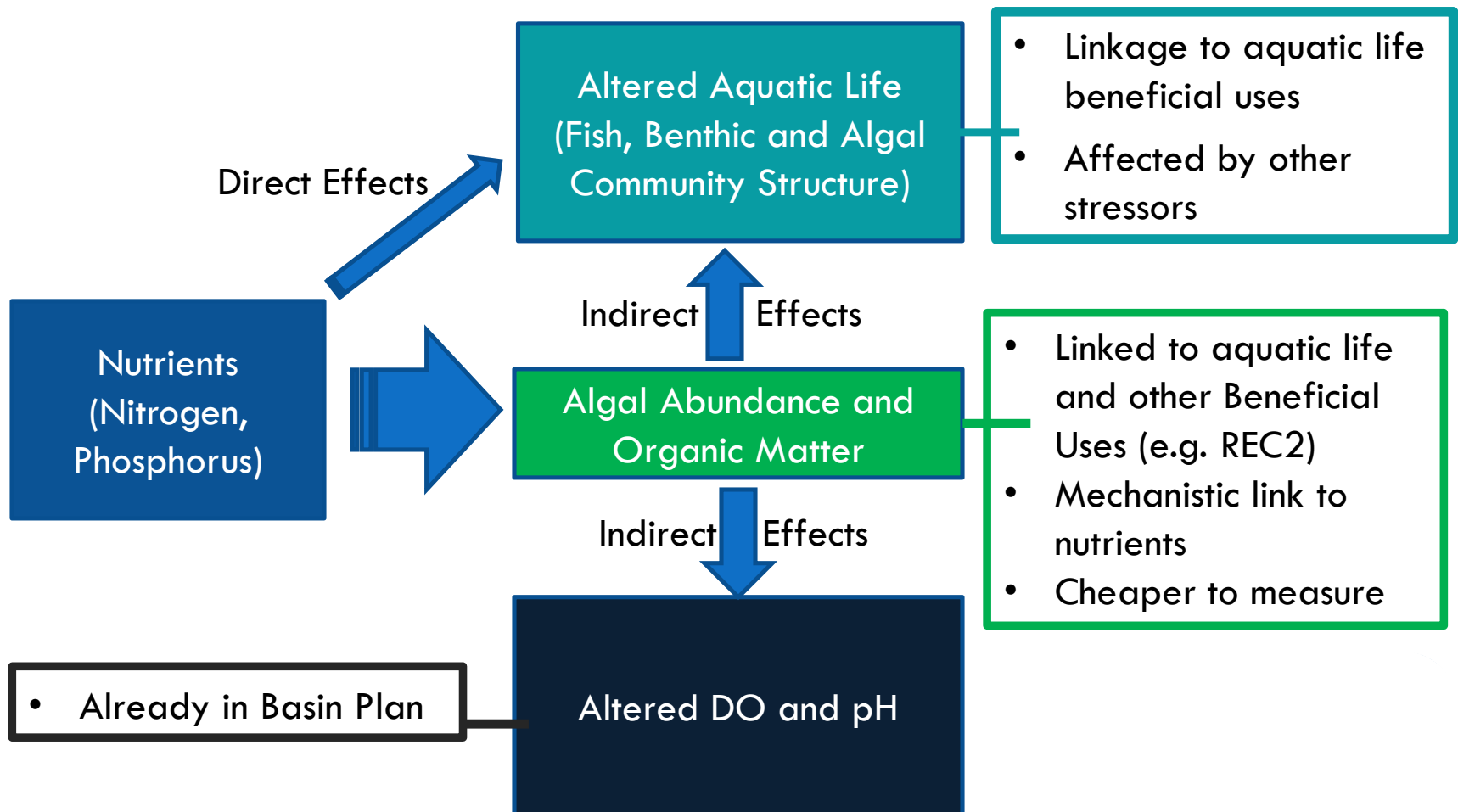
# TECHNICAL WORKPLAN FOR WADEABLE STREAM NUMERIC GUIDANCE

## Goals:

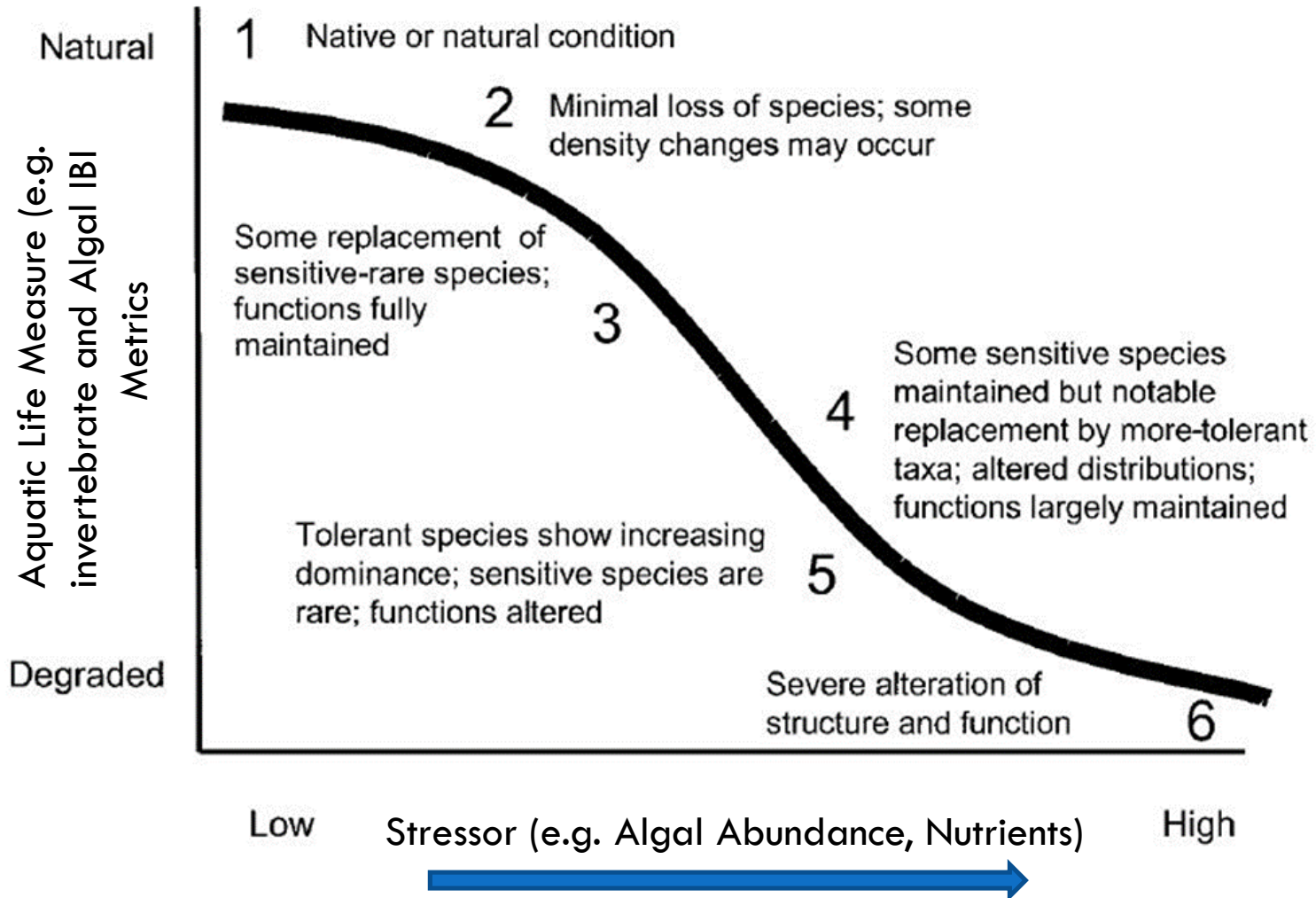
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2. Identify **thresholds of adverse effects of response indicators** on aquatic life to support decision on regulatory endpoints
  - **Relative to reference and ambient concentrations of those indicators** in wadeable streams
3. **Develop basic models** for wadeable streams
4. Identify key **technical elements** addressing **implementation**

# WHAT ARE THE APPROPRIATE RESPONSE INDICATORS IN WADEABLE STREAMS?

## Response Indicators



# TEST STRENGTH OF STRESS-RESPONSE RELATIONSHIPS ALONG BIOLOGICAL CONDITION GRADIENT

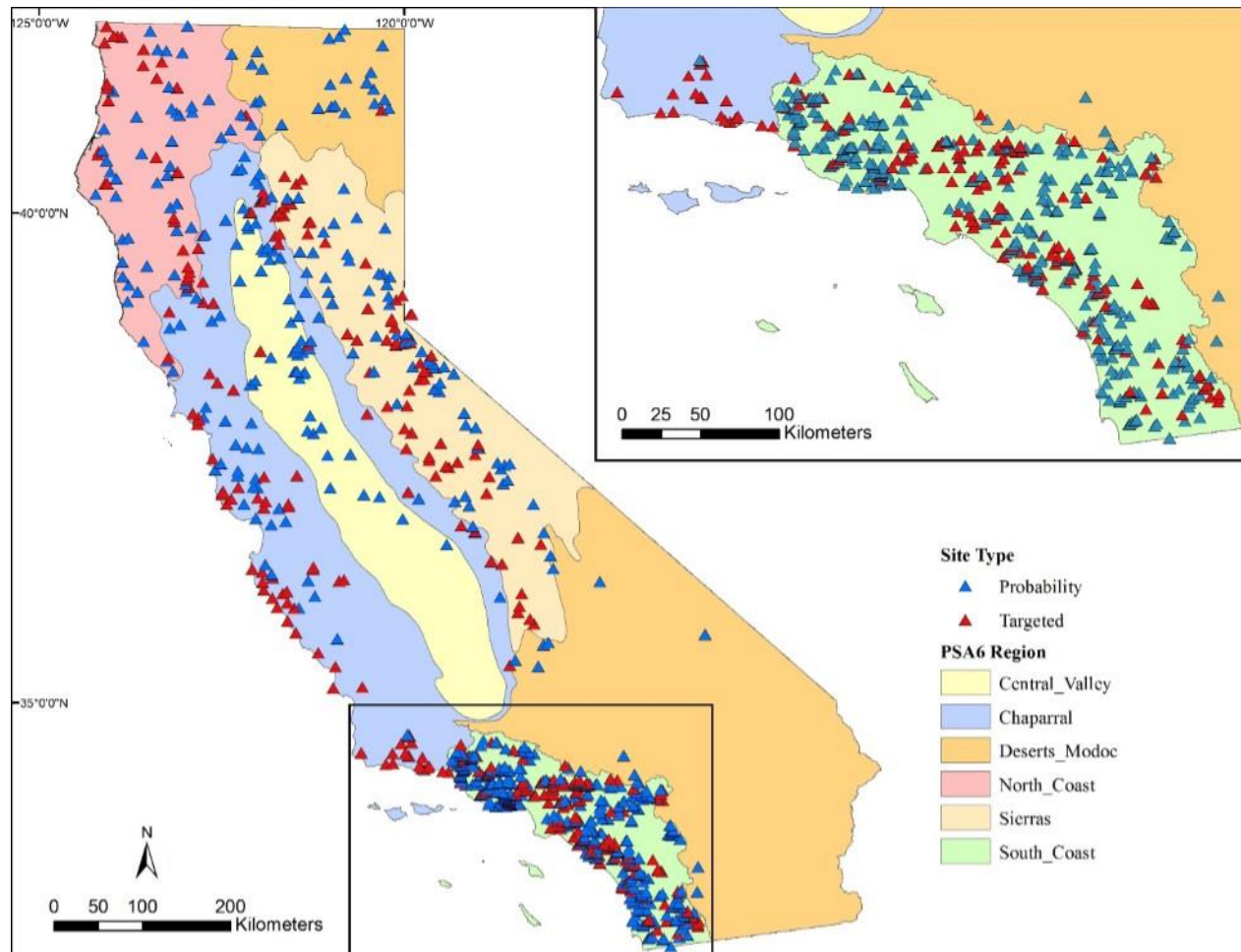


# STREAM BIOASSESSMENT PROGRAM PROVIDES ROBUST DATASET FOR STRESS-RESPONSE ANALYSIS

Available data from combined surveys (>1,000 wadeable stream reaches)

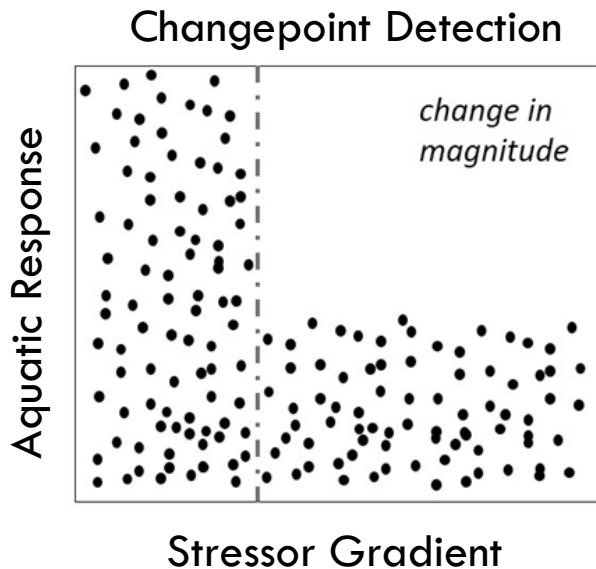
Includes both ambient and reference sites

Narrow down 10+ algal abundance available

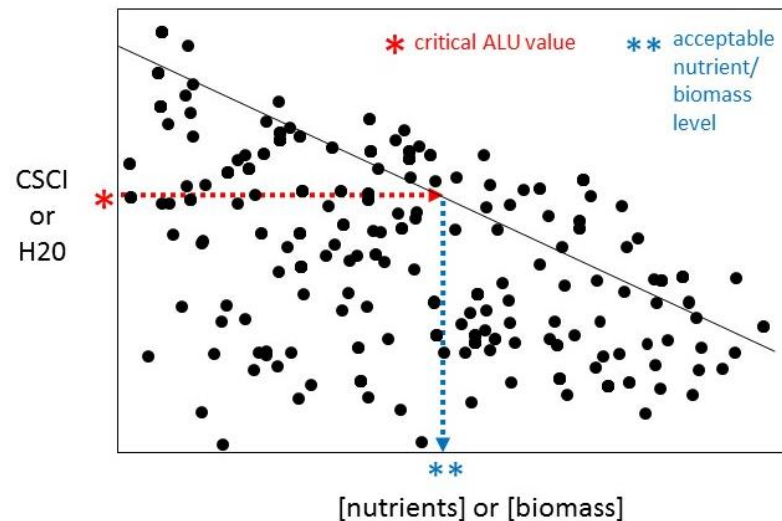


# HOW DO WE IDENTIFY THRESHOLDS? TWO APPROACHES

*Let the Data Speak for Itself*



*Identify quantitative thresholds for an indicator of beneficial use*



Threshold = Science; Endpoint = Policy Decision

# SCIENTIFIC FOUNDATION FOR WADEABLE STREAM NUMERIC GUIDANCE

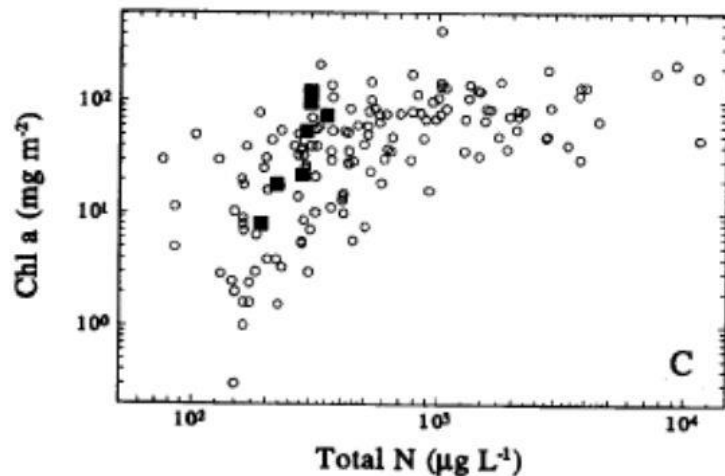
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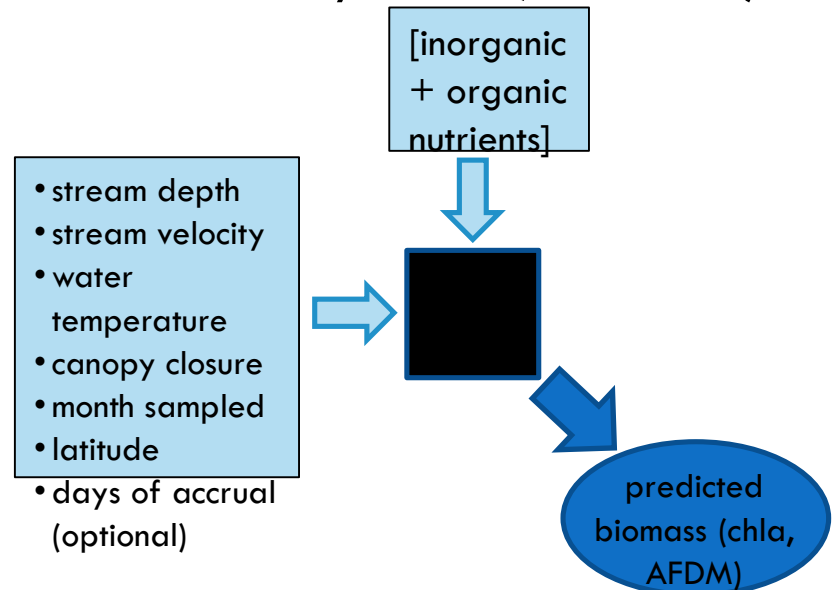
# STATE ALREADY HAS BASIC MODEL FOR WADEABLE STREAMS: NNE BENTHIC BIOMASS SPREADSHEET TOOL

*Two basic types of model:*

Empirical (Dodds et al. 1997 and 2002):



Mechanistic (River and Stream Water Quality Model; QUAL2K):



*First step is to validate them and consider refinements...*



# RECENTLY COMPLETED EPA-ORD STUDY BEGINS TO ADDRESS THREE OF FOUR TECHNICAL GOALS

## Goals:

1. Identify **appropriate response indicators**
2. Identify **thresholds of adverse effects of response indicators** on aquatic life to support decision on regulatory endpoints
  - **Relative to reference and ambient concentrations of those indicators** in wadeable streams
3. **Evaluate the performance of the Benthic Biomass Spreadsheet Tool** for wadeable streams and recommend avenues for refinement

# CONTEXT AND STATUS OF EPA-ORD REPORT

- Research project conducted in collaboration with EPA-ORD and SCCWRP
  - Not meant to give the final word on neither thresholds nor basic models!
- Additional analysis and synthesis is planned to address other aspects
  - This will be detailed in the technical work plan
- Report currently in expert peer review
- Expecting final version to be available for public distribution in early August

# WHAT WILL THE PRODUCTS LOOK LIKE— TARGETED FOR SPRING 2015

- Synthesis of appropriate response indicators, thresholds relative to reference and ambient condition, and options for how to get to default nutrient targets
- Supporting technical reports
  - EPA-ORD ReSERV
  - Supplemental analyses to support decisions on numeric endpoints for response indicators
  - Basic models of nutrient-algal abundance
  - And others...

# SCIENTIFIC FOUNDATION FOR WADEABLE STREAM NUMERIC GUIDANCE

## Goals:

1. Identify **appropriate response indicators** representative of beneficial uses
2. Identify **thresholds of adverse effects of response indicators** on aquatic life to support decision on regulatory endpoints
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3. **Develop basic models** for wadeable streams
4. Identify key **technical elements** addressing **implementation**
  - This work element is not in contract

# TECHNICAL ELEMENTS ADDRESSING IMPLEMENTATION

Two Flavors:

1. Key technical products needed to ease policy into implementation
  - Training, Standardization, and Information Management (e.g. Task 6)
2. Science needed to address key data gaps identified during implementation discussions
  - Science plan should evolve to capture these needs

# PARTING THOUGHTS ON TECHNICAL WORKPLAN...

- Today was meant to give you sufficient detail to allow you to comment on the State Water Board work plan
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- Focused feedback on the technical workplan will happen at the next stakeholder meeting
  - We will give you the written technical workplan and EPA-ORD report in advance to review

# QUESTIONS AND COMMENTS?

**Martha Sutula**

**[www.sccwrp.org](http://www.sccwrp.org)**

**[Marthas@sccwrp.org](mailto:Marthas@sccwrp.org)**

**714-755-3222**

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# **OVERVIEW OF STAKEHOLDER ORGANIZATION AND GOVERNANCE**

**Brock Bernstein, Ph.D.**

# ROLE OF STAKEHOLDER GROUP

- Based on experience with other statewide stakeholder groups
- Foster transparent process
- Provide review and input to State Board, technical team, Scientific Advisory Committee
- Address both scientific and implementation issues
- Communicate information to and from constituencies
- Examine sources and implications of disagreement
- Goal is NOT to reach consensus

# POTENTIAL ISSUE AREAS

- Agriculture
- Environmental protection
- Land managers
- Municipalities
- POTWs
- Resource managers
- Stormwater: municipal, industrial
- Tribes
- Water agencies
- Others? (Builders, fire fighting, hatcheries, mining, mosquito abatement, pesticide manufacturers, recreation)

# COMMITTEE MEMBERSHIP

- Primary and alternate for each issue area
  - Responsible for communication and outreach to constituencies
  - One or the other should attend all (or most) meetings
- Meetings open to all other interested parties
- All attendees participate equally
- Information provided to all interested parties

# CONTACT INFORMATION

Dr. Brock Bernstein

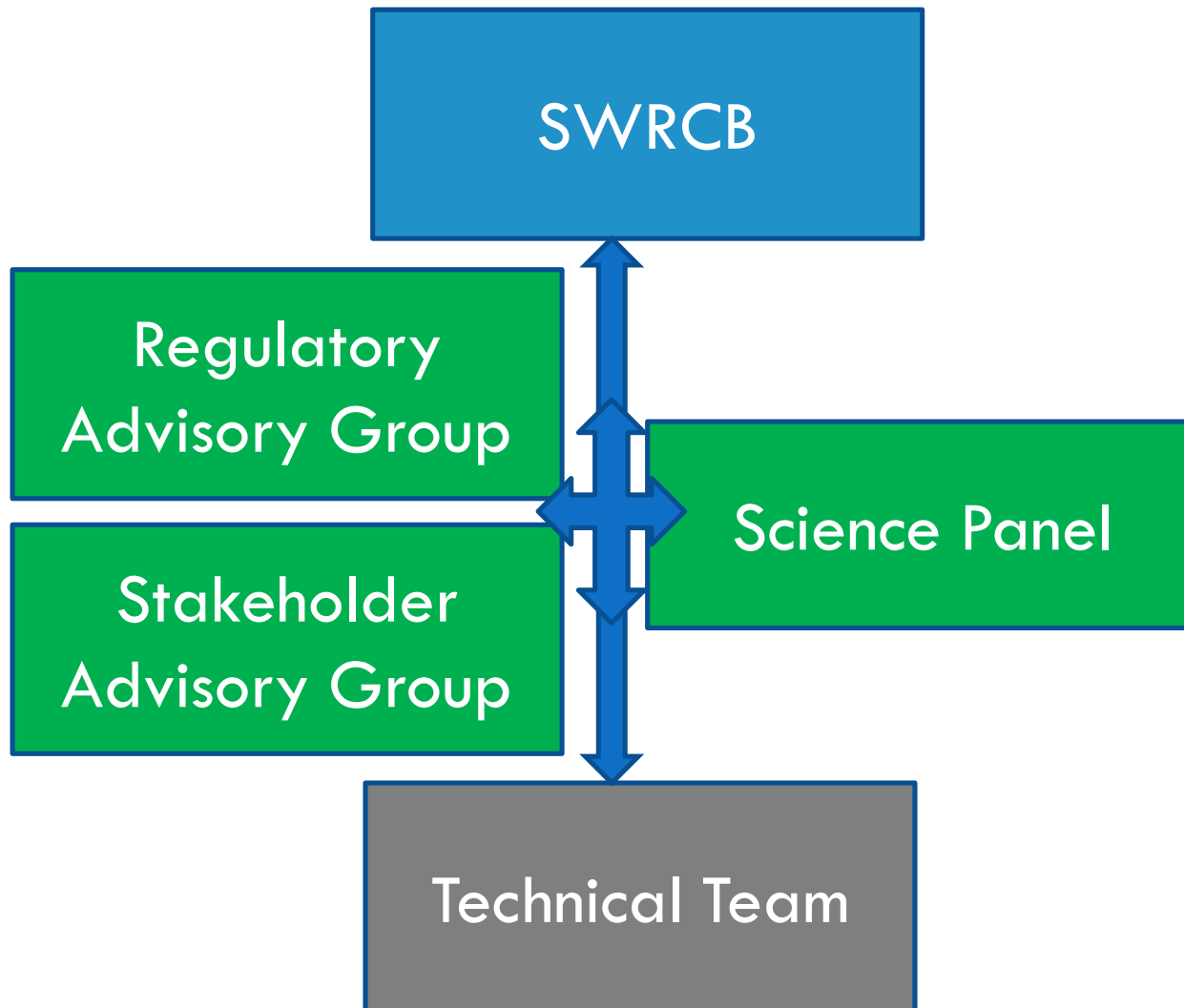
805-646-8369

[brock@brockbernstein.com](mailto:brock@brockbernstein.com)

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# STATEWIDE NUTRIENT OBJECTIVES PROGRAM: ORGANIZATION



# ROLE OF SCIENCE PANEL

- Provide independent technical review of policy development products
  - Includes the workplan and individual tasks
- Provide critical scientific insight based on extensive real world experience
  - Data gaps, alternative approaches, limits of interpretation
  - Potential management implications
- Like the SAG, their role is not approval
  - Its advisory



# CONTEXT

- Vetted criteria for Science Panel previously with stakeholder groups for SF Bay and other estuaries
- Expanding work to freshwater habitats
  - Need to expand the expertise on panel
  - Allow involve new stakeholders in process

# ADDITIONAL GUIDANCE FROM STATE WATER BOARD

- Keep relatively small
  - Four members
- Needs to cover streams, lakes and estuaries
- Ensure no conflicts of interest
  - Try to choose from outside California to avoid potential conflicts
- Pick necessary disciplines for representation
  - Provide optional candidates for each

# PROCESS

- Technical Team lead (SCCWRP) identifies candidates, based on desired attributes of SP panel members
- Representatives of the Regulatory Advisory Group (RAG) and SAG:
  - Review nominated candidates
  - ~~Representatives have right to reject individual candidates~~
  - Rank the candidates in the preferred order, and tell us if you really dislike a candidate
- Technical Team lead (SCCWRP) summarizes stakeholder input and provides to SWRCB staff
- SWRCB staff makes final decision

# DESIRED ATTRIBUTES

- Four panel members, internationally or nationally recognized in one of four areas:
  - Nutrient and organic biogeochemistry and/or ecology with experience in management of eutrophication in estuaries;
  - Nutrient and organic biogeochemistry and/or ecology with experience in management of eutrophication in freshwater habitats;
  - Development of statistical and computational models of nutrients, environmental variables and ecological response;
  - Creation of nutrient-related water quality criteria and/or numeric targets and implementation of management actions to address eutrophication.
- No conflict of interest
  - Has not conducted significant work in California freshwater and estuarine habitats that would likely be subjected to technical review

# CANDIDATES- ESTUARINE ECOLOGIST/ BIOGEOCHEMIST

- Walter Boynton, Professor, University of Maryland
- Ivan Valiela, Professor, Boston University
- Robert Twilley, Professor, Louisiana State University
- Robert Diaz, Professor, Virginia Institute of Marine Science

# CANDIDATES- FRESHWATER ECOLOGIST/ BIOGEOCHEMIST

- Hans Pearl, Professor, University of North Carolina
- Judith Meyer, Professor, University of Georgia
- Robert (Jan) Stevenson, Professor, Michigan State University
- Stephen Carpenter, Professor, University of Wisconsin

# CANDIDATES- MODELER

- Ken Reckhow, Professor Emeritus, Duke University
- Dominic DiToro, Professor, University of Delaware
- Victor Bierman, LimnoTech Inc.
- Don Scavia, Professor, University of Michigan

# CANDIDATES- NUTRIENT MANAGEMENT

- Richard Batiuk, Assistant Director, US EPA Chesapeake Bay Program
- Holly Greening, Executive Director, Tampa Bay Estuary Program
- Paul Stacey, Connecticut Department of Environmental Protection
- Ephraim King, Former Director of EPA OST



# WHAT HAPPENS NOW?

- You gave us feedback on process and desired attributes today
- You give us recommendations for candidates by June 25, 2014
- SCCWRP will send out new candidates by June 30, 2014
- Submit candidate ranks (and let me know if there is anyone you have an issue with, if needed) by COB July 18, 2014

# FEEDBACK?

- Comments on process and desired attributes?
- Comments on candidates at this point?

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# **SAG INFORMATIONAL WEBINAR**

**JULY 7, 2014, 9:30 AM-12:30 PM PST**

- Make sure that interested stakeholders understand how to get involved in the process
- Same content presented today
- If you are here, no need to attend again

# NEXT STEPS AND TIMING OF SAG MEETINGS

- **Late Summer 2014- SAG meeting**
  - Presentation on EPA-ORD ReSERV study findings
  - Presentation of proposed technical workplan
  - Stakeholder presentation of feedback on technical workplan
- **Early Fall 2014–SAG meeting**
  - Presentation of revised technical workplan
  - Brainstorming of implementation issues to address in policy
- **Late Fall 2014– Science Panel meeting**
  - Presentation of state of science and proposed workplan
  - Stakeholder presentation of issues
- **Early 2015– SAG meeting**
  - Technical Team Response to Science Panel comments
  - Beginning of focused discussion of implementation issues