SCIENCE ADVISORY PANEL MEETING

April 19-20, 2017

9 am – 5 pm

SCCWRP, Costa Mesa, California

Water Board Has Been Working on Two Policies for California Wadeable Streams

- Biointegrity Policy
  - direct protection of aquatic life
- Biostimulatory/Nutrients Policy
  - protection from nutrient pollution and eutrophication

Context for Today's Meeting

- California State Water Board staff was directed to combine the Biostimulatory substances and Biointegrity projects for wadeable streams
- Technical team, led by SCCWRP, has been reformulating science plan to accommodate the combined projects
- Science Panel has been reformed to review the technical work and its suitability for application to policy development, in three stages:
  - Science Plan
  - Preliminary findings
  - Final technical products (manuscripts/reports)

Last Month, We Held an Introductory Panel Webinar, Focused on Regulatory context for Science

- Introduced the project organization and the Team
- Brief background on state's bioassessment program, as the foundation for wadeable streams science and policy
- Discussed the referred regulatory option, as context for the science
- Discussed the timeline for completion of science vis-à-vis policy development

Meeting Goals and Charge Question Themes

Review and provide feedback on the Wadeable Streams Science Plan to support the State Water Board's Biostimulatory-Biointegrity Project

Charge Question Themes:

- Suggested refinements to the plan, or suggestions to specifically address stakeholder concerns
- Approach to development of the Algal Stream Condition Index; tradeoffs in tuning to generalized versus specific stressors, state versus regional.
- Statistical models linking CSCI and ASCI to eutrophication numeric targets.

Today's Agenda (April 19th, 2017)

Technical Presentations (morning and early afternoon)

- Overview of science plan (Sutula)
- Algal stream condition index development (Theroux)
- Biological condition gradient model development (Paul)
- Statistical model linking CSCI and ASCI to nutrients et al. eutrophication indicators (Mazor)
- GIS model to predict biointegrity across a gradient of landscape development (Mazor)

Stakeholders perspectives and concerns (mid afternoon; Bernstein and stakeholder sector leads)

Closed session (late afternoon)

Tomorrow's Agenda (April 20th, 2017)

Closed session (morning until mid-afternoon)

Panel report out on findings (3 pm)

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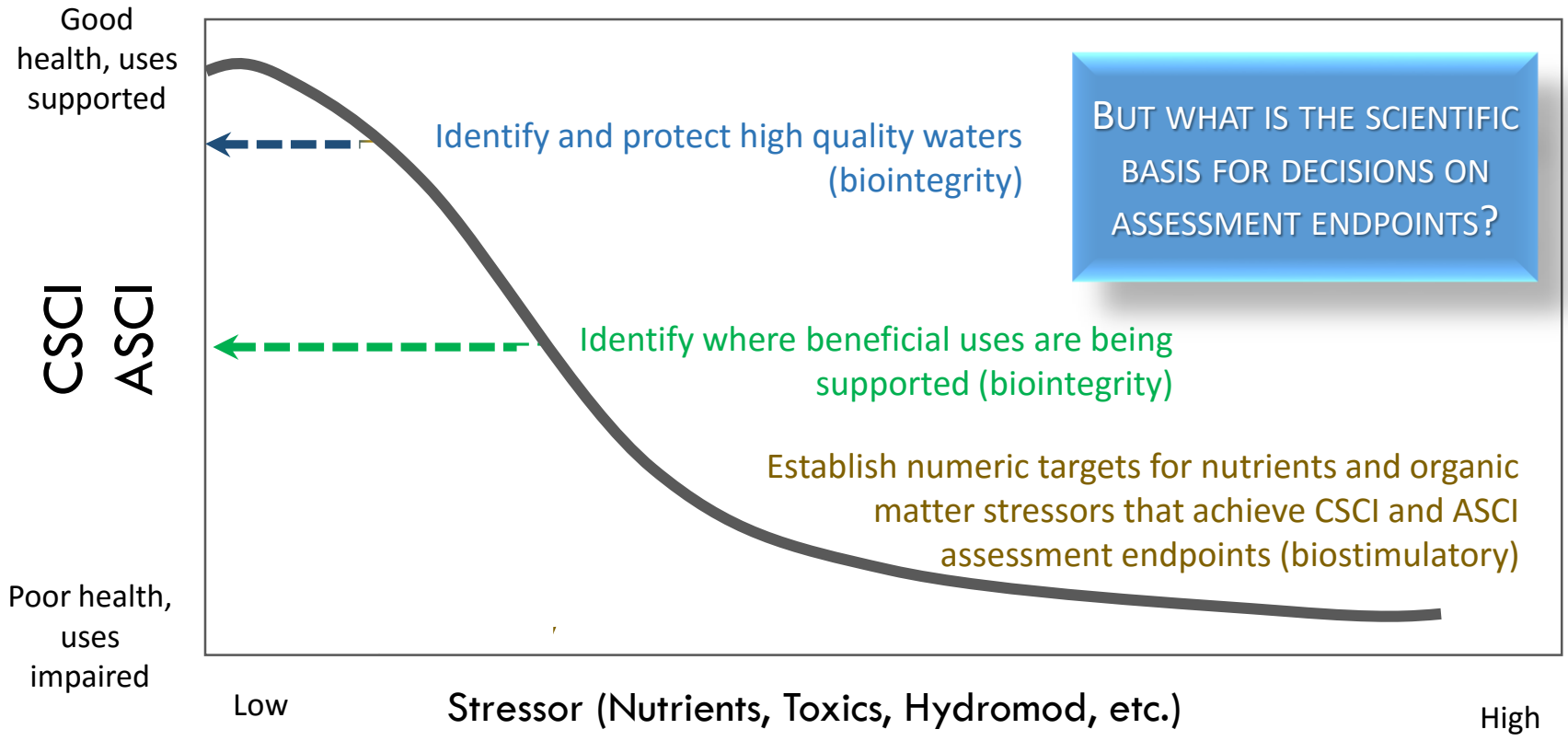
WADEABLE STREAMS SCIENCE PLAN SUPPORTING BIOSTIMULATORY AND BIOINTEGRITY PROJECTS: BRIEF OVERVIEW

Preferred Regulatory option: Staff Wants to Set CSCI & ASCI "Assessment Endpoints" to Assess Aquatic Life



Elements of the Science Plan

1. Conduct and synthesize science supporting development of numeric guidance for wadeable streams

   1.1 Develop biological indices indicative of aquatic life use support

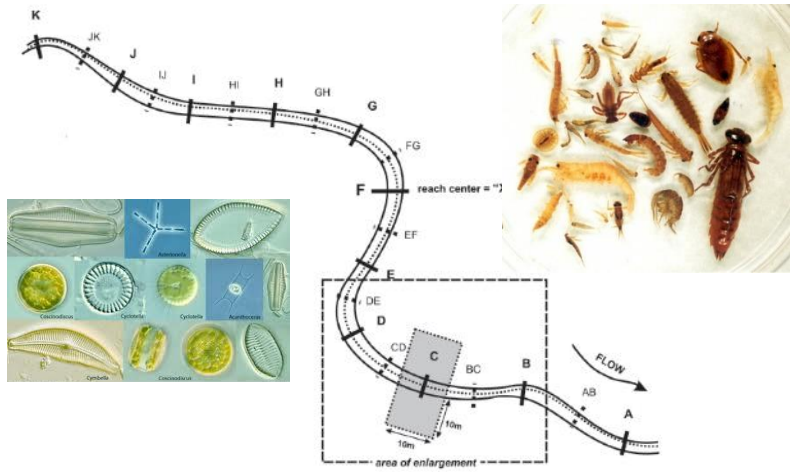
   1.2 Determine the numeric range of biological indices that correspond to attainment of beneficial uses

   1.3. Determine the numeric range of stream nutrients and intermediate eutrophication response indicators that correspond to attainment of beneficial uses

2. Implementation plan technical support

Statewide Bioassessment Program and Standardized Indices Make A Combined Policy Feasible

- Standardized protocols and extensive sampling of benthic macroinvertebrates (BMI) & benthic algae
- Assessment of nutrients and biostimulatory conditions relies on these standardized protocols for determining beneficial use support.
- Statewide bioassessment scoring tools:
  - California Stream Condition Index (CSCI) for BMI (Mazor et al. 2016)
  - Water Board is supporting the development of a statewide algal stream condition index (ASCI)



Susie Theroux's presentation will provide greater details

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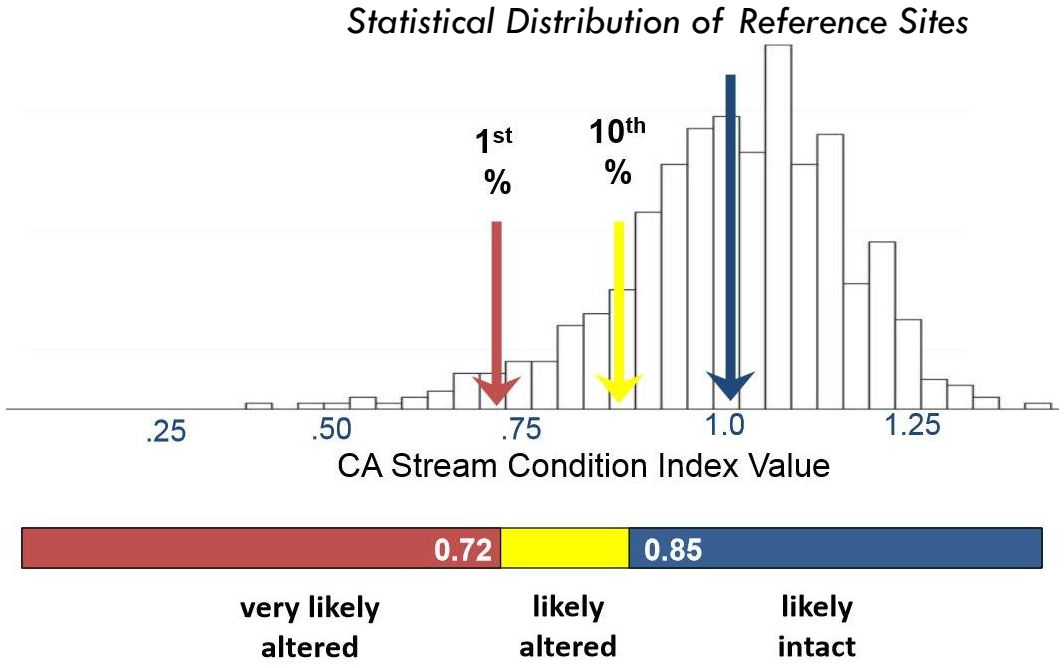
    2.1 Mapping channels in developed landscapes

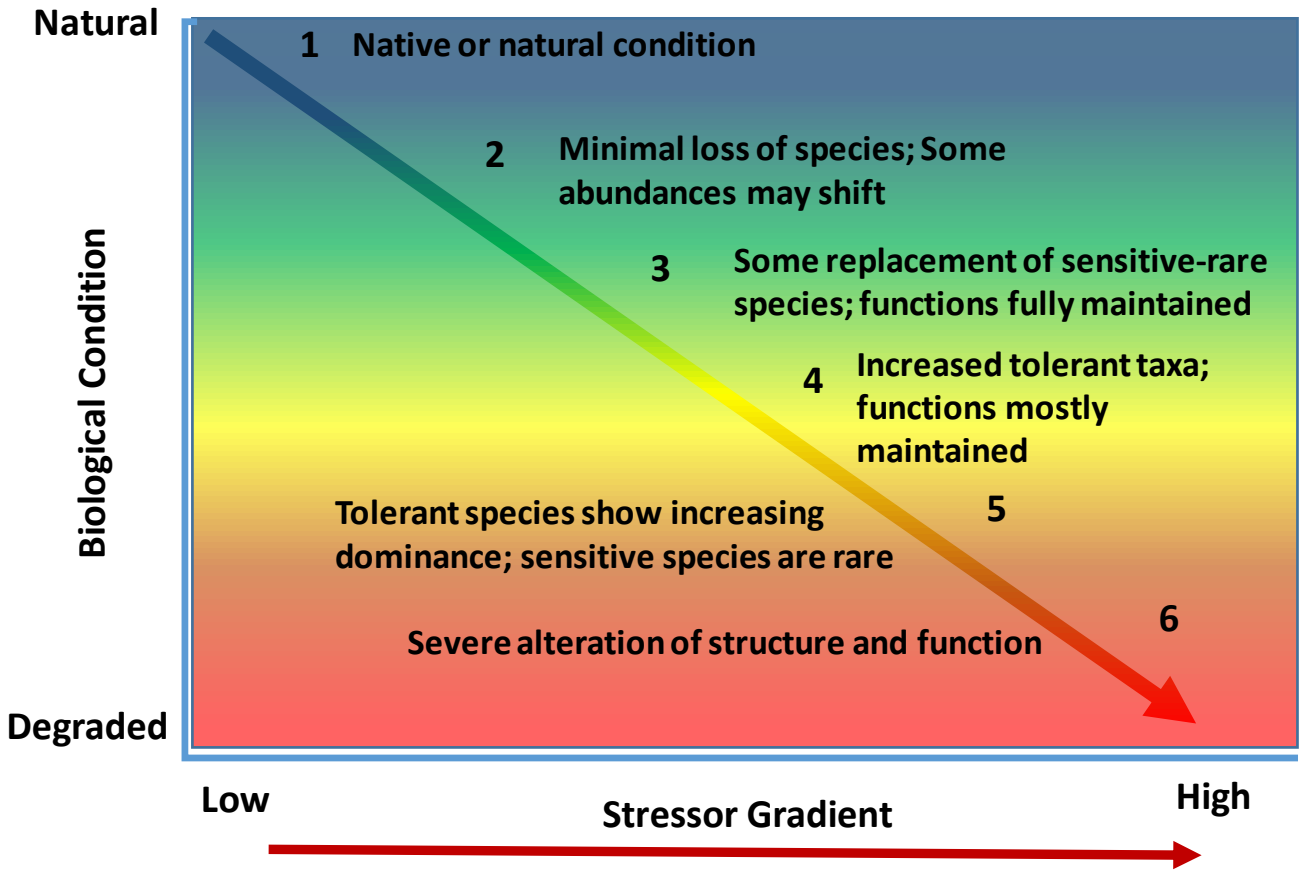
We Could Set CSCI and ASCI Endpoints based on Statistical Distribution of Reference Sites



…But it's hard to communicate the relevance of a percentile of reference to policy makers and the public

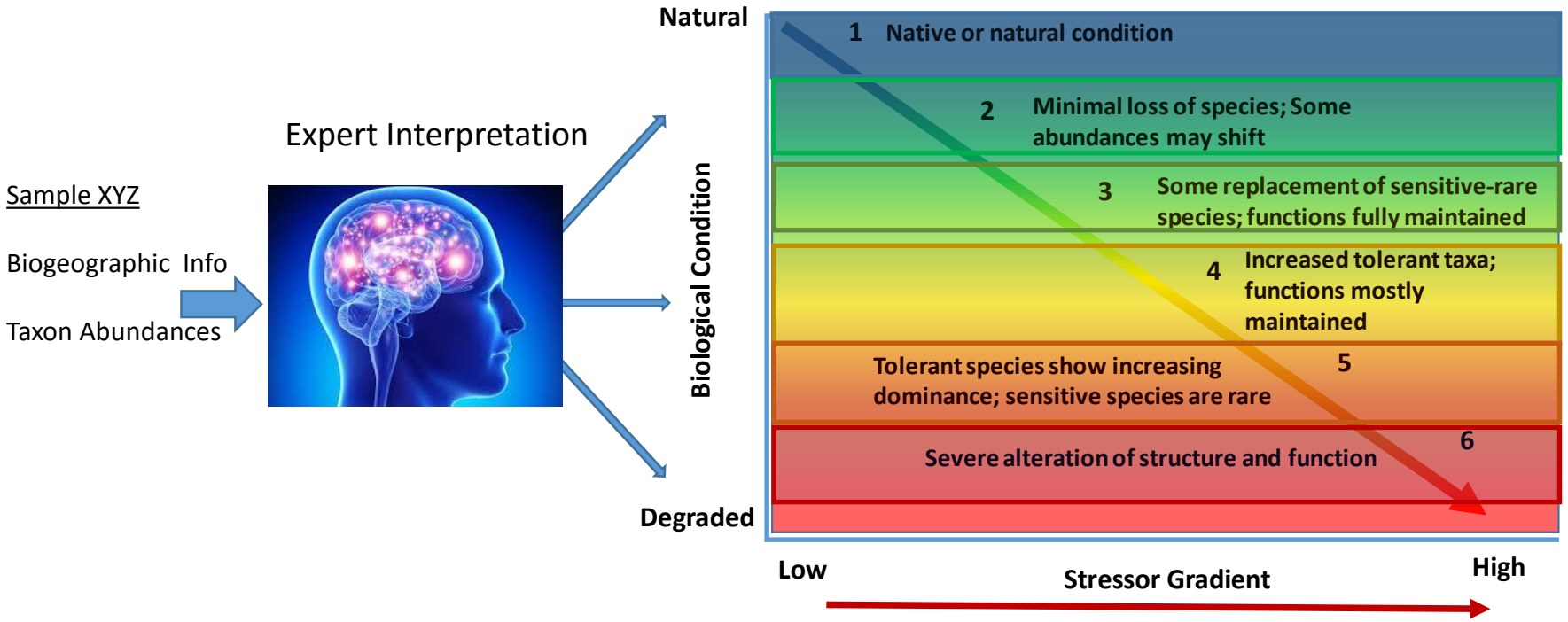
Use A Biological Condition Gradient Model to Support Policy Decisions on Assessment Endpoints

The Biological Condition Gradient: *as stress increases, community composition changes in predictable ways*



Davies and Jackson (2006)

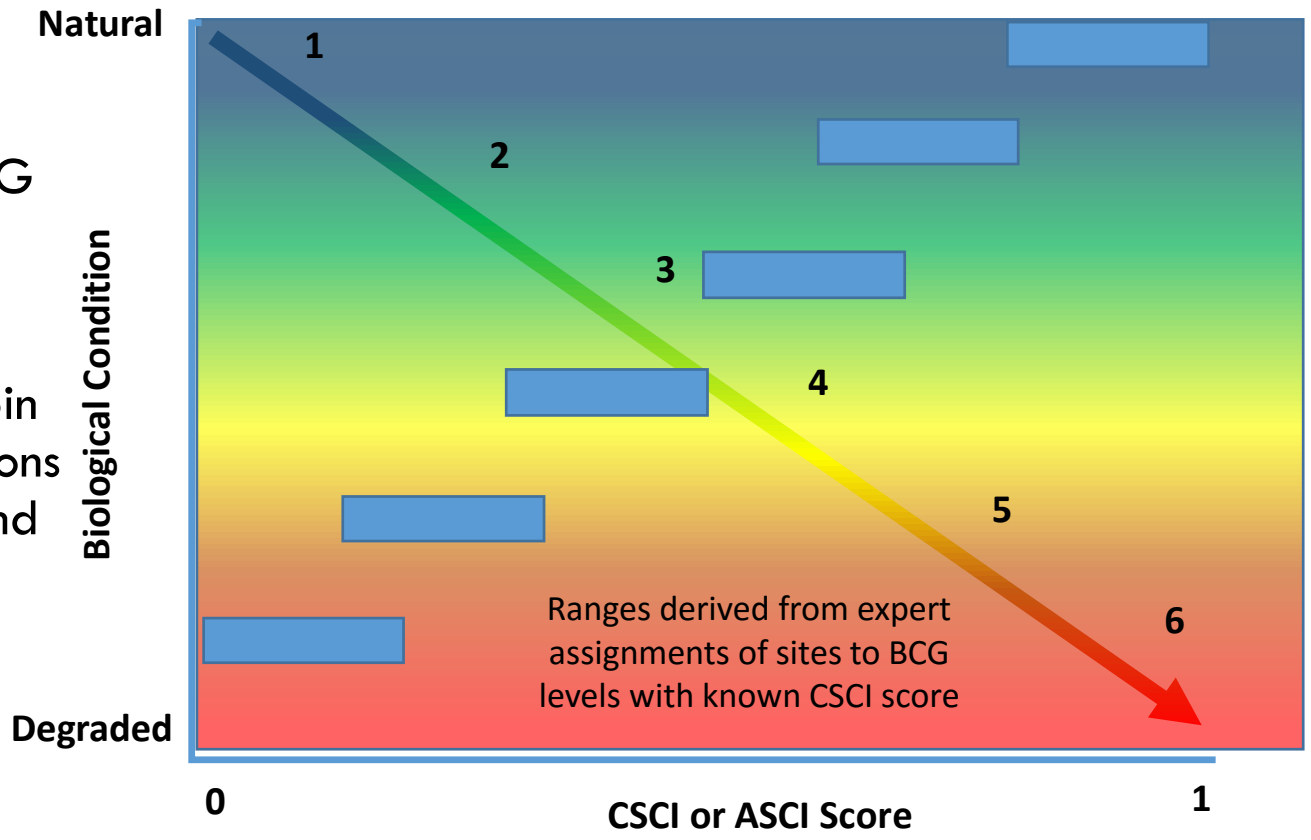
BCG Model is Developed Via Expert Interpretation of Taxonomic Information to Infer Condition



BCG models can convey the importance of ecological change in a way that statistical distributions often cannot.

Example Output of BCG Model: BCG Binned Ranges of Bioassessment Indices

- Ranges of CSCI & ASCI scores by BCG bins from 1 to 6
- Paired with BCG bin narrative descriptions of what is intact and what is lost

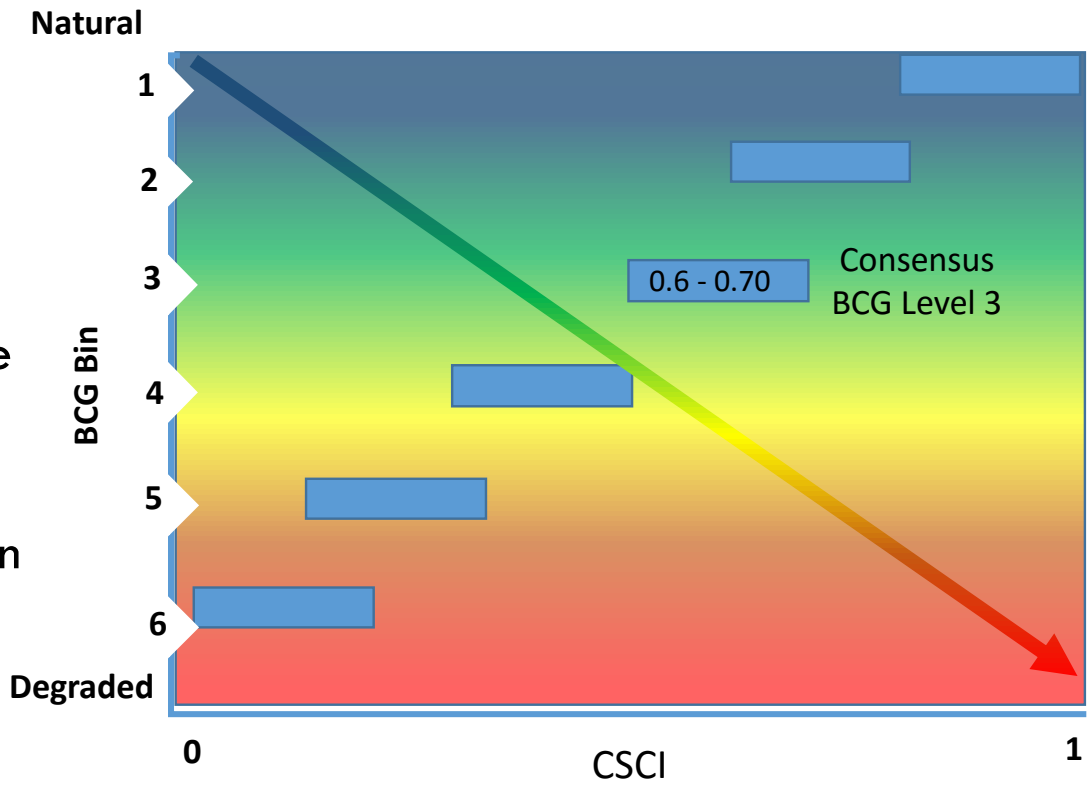


How BCG Can Be Used: Support Policy Decisions on Assessment Endpoints for CSCI and ASCI

For example:

"A CSCI of 0.6 is associated with a loss of many sensitive taxa and is just above where tolerant taxa may begin replacing these taxa.

Alteration of food web often begins below this as well."



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2. Implementation plan technical support

BIOINTEGRITY

BIOSTIMULATORY

Eutrophication Synthesis Key Components

- Conceptual model of how nutrients and eutrophication impair beneficial uses

- Review of candidate indicators and causal assessment metrics that are diagnostic of eutrophication
  - Synthesis of science supporting decisions on assessment endpoints

- Synthesis of science supporting decisions on nutrient targets
  - Statistical models that can be used to link assessment endpoints to nutrient concentrations, in order to set “default” targets

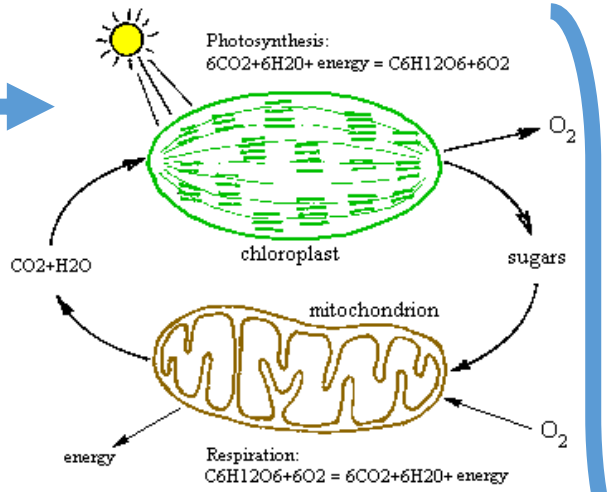
Stream Eutrophication Conceptual Model

↑ N, P

nutrient enrichment

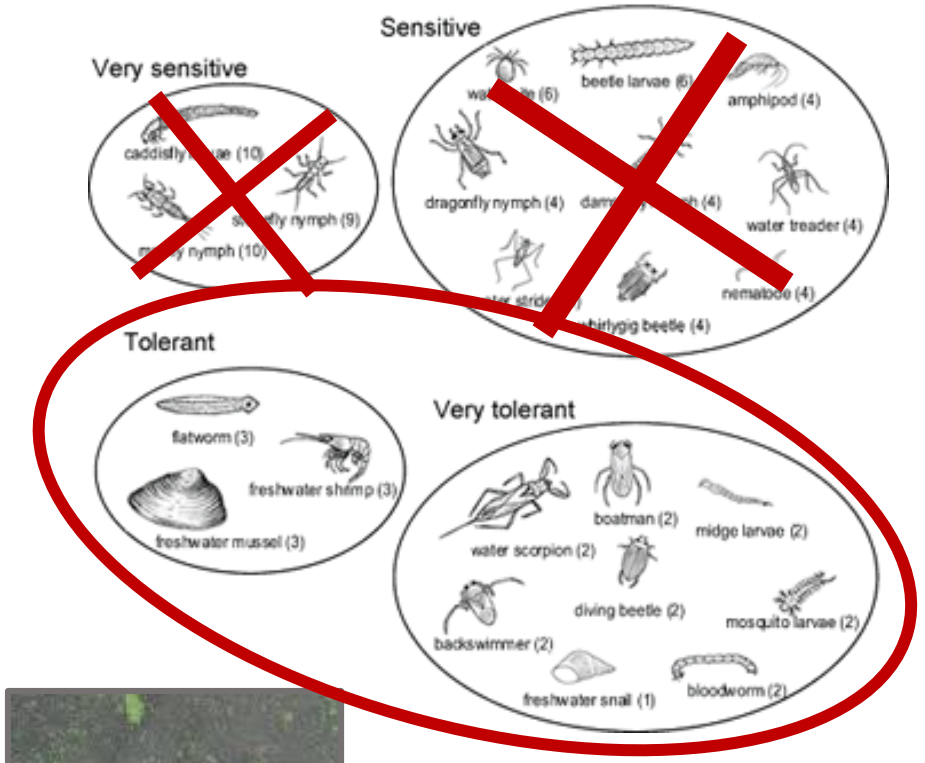
excessive growth of primary producers (algae and/or higher plants)

nighttime algal respiration can deplete oxygen & cause wide pH fluctuations



primary producers eventually die

bacteria consume decaying organic matter, using up dissolved oxygen



from multiple standpoints, eutrophication alters aquatic life

Candidate Eutrophication Response Indicators, by Pathway

Routinely Monitored

- *Altered Aquatic Diversity, Food Webs*
  - CSCI, ASCI
- *Organic Matter accumulation*
  - ✓ benthic algal chlorophyll *a*,
  - ✓ benthic ash-free dry mass (AFDM)
  - ✓ algal & macrophyte percent cover

Not Routinely Sampled

- *Altered Water Quality*
  - ✓ dissolved oxygen/pH
  - algal toxins
  - turbidity
  - trihalomethanes

✓ Denotes diagnostic for eutrophication

Benthic Invertebrate and Algal Attributes can Provide "Eutrophication" Metrics for Rapid Causal Assessment

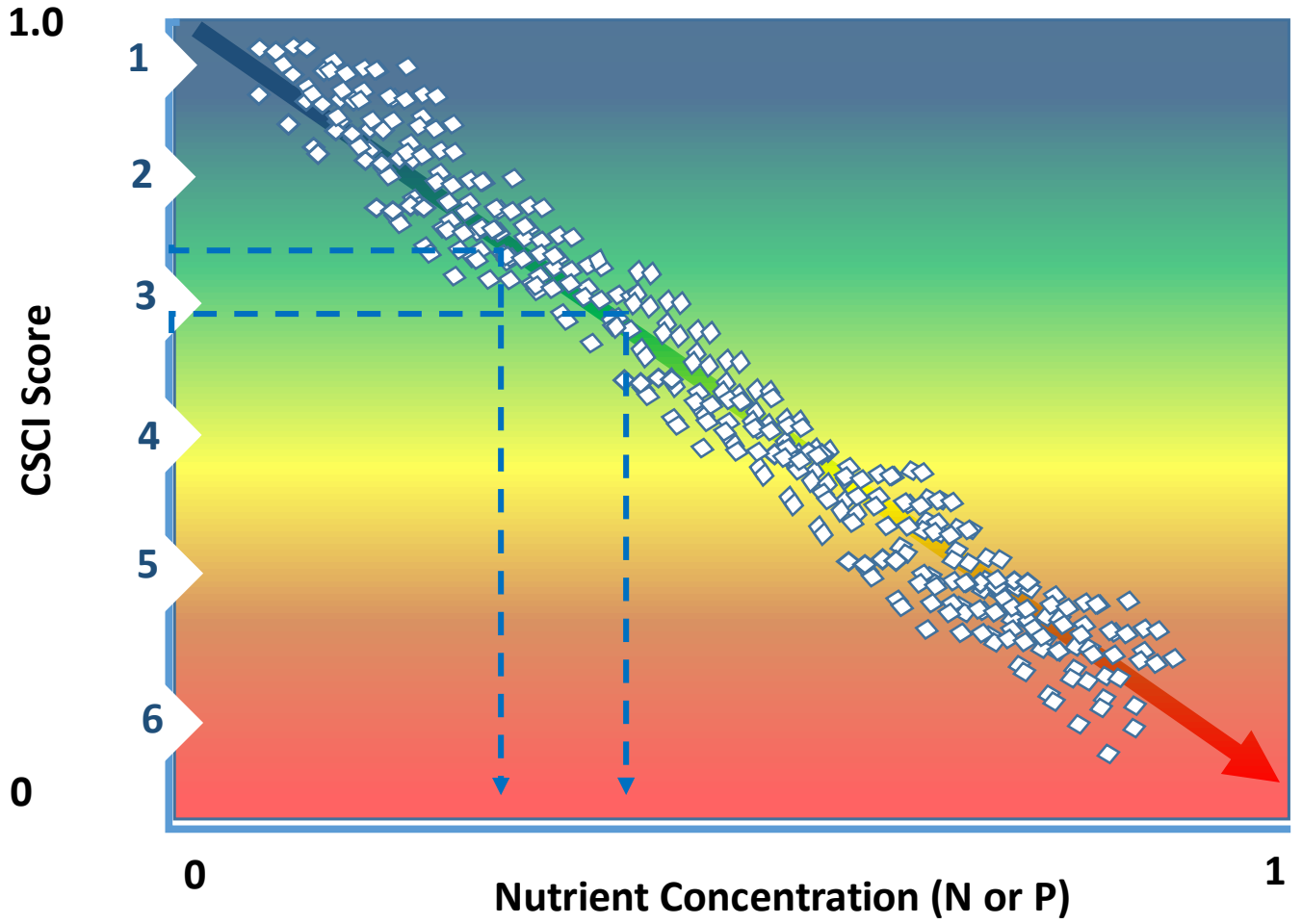
Metrics Can Indicate Pathways of Impairment, for Example..

- Organic matter enrichment
- DO and pH tolerance
- Toxicity or tolerance for nutrient species (Nitrate, phosphate)

Long-term goals is to build this into a "dashboard" of output from bioassessment results (rapid causal assessment)

But for eutrophication synthesis, this will be a curated list

Basis for Decisions on Biostimulatory Objectives: Statistical Models to Link Bioassessment Indices to Nutrients Et al. Eutrophication Response Indicators



RECAP-TIMING OF PRODUCTS: ELEMENT 1

July 2017

- Oral presentation on findings (ASCI, BCG)

September 2017

- Draft reports (ASCI, BCG)
- Oral findings (eutrophication synthesis with statistical models linking to nutrients/OM)

November 2017

- Draft report (eutrotrophication synthesis with statistical models linking to nutrients/OM)

January 2018

- Revised reports (ASCI, BCG, eutrophication synthesis)

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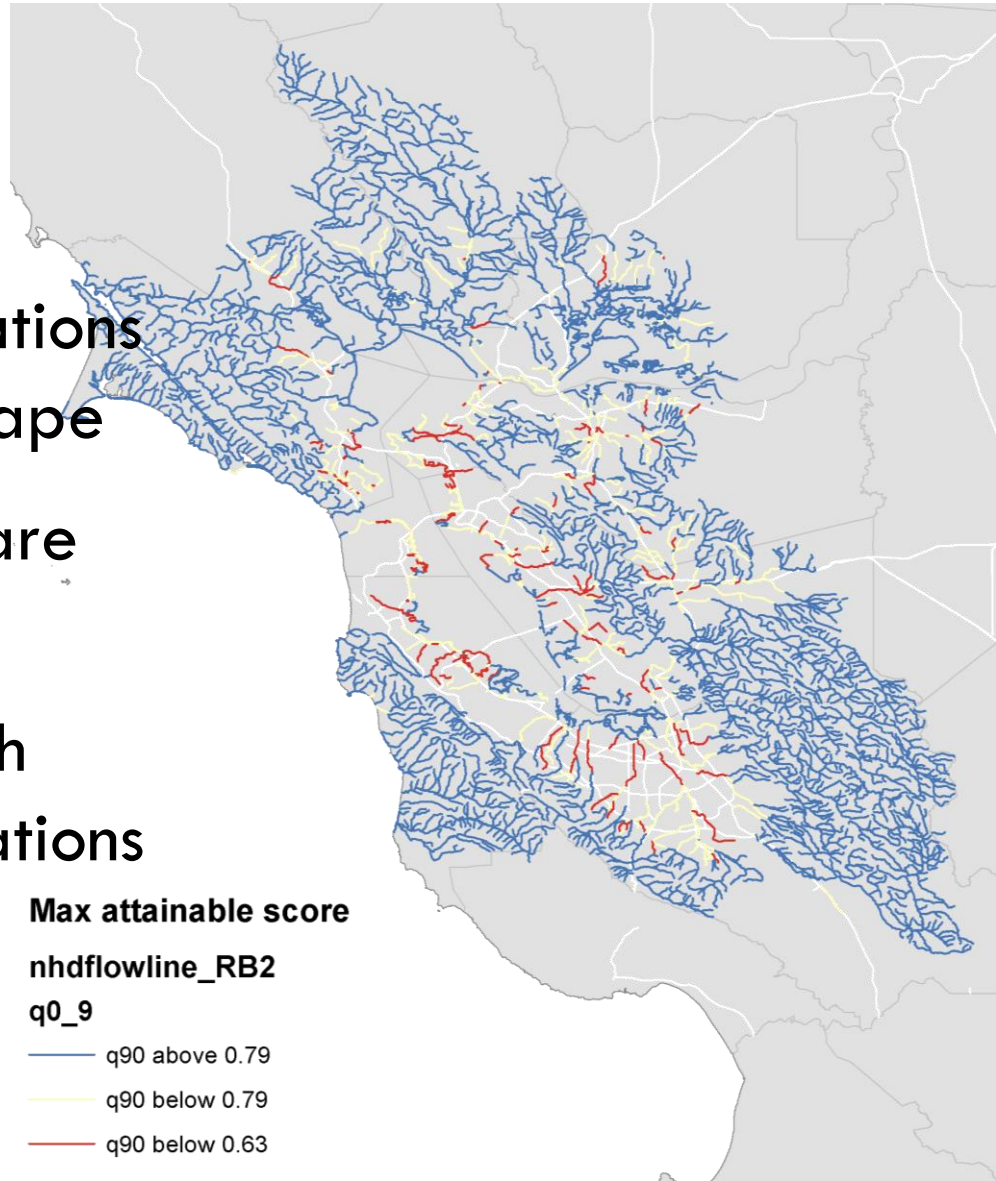
2. **Implementation plan technical support**

Science Supporting Implementation Plan

- Number of technical elements funded to support biointegrity and biostimulatory policy implementation
  - We want to recognize in Science Panel that this work has been completed or is underway
  - Other elements have yet to be identified and funded, pending more specific policy options under consideration
- Opportunities for RG and SAG to identify needed science and co-fund/contribute

CHANNELS IN DEVELOPED LANDSCAPES

- Defining policy for "Modified channels" is challenging
- Need screening tool to support policy conversations re: variety of channels found across the landscape
- Define "developed" landscapes as those that are unlikely to support high index scores
- Predict max scores likely to be attained in each watershed, based on landscape-scale modifications
- Apply to maps



Tentative Schedule for SAG Meetings:

January 2017 and ongoing – Webinars - implementation related work plans and updates

Feb/March 2017- Meeting (South)

- Interim Updates, Science Plan and Panel Charge

July 2017- Meeting (North)

- Oral findings (ASCI, BCG)

September 2017 – Meeting (South)

- Draft reports (ASCI, BCG)
- Oral findings (eutrophication synthesis statistical models linking to nutrients/OM)

November 2017 – Meeting (North)

- Revised reports (ASCI, BCG)
- Draft report (eutro synthesis & linkage to nutrients/OM)

Tentative Schedule for Science Panel Meetings

January 2017 – Webinar orientation

March 2017- Meeting (South)

- Science Plan
- Interim updates (ASCI, BCG, eutrophication synthesis)

October 2017 – Meeting (South)

- Draft reports (ASCI, BCG)
- Oral findings (eutrophication synthesis statistical models linking to nutrients and OM indicators)

January 2018– Meeting (South)

- Revised reports (ASCI, BCG)
- Written report (eutrophication synthesis and linkage to nutrients)
- Implementation Science

Questions?

Comments?