Biostimulatory/Biointegrity Watershed Approach

Proposed Implementation of Narrative Water Quality Objectives

July 21, 2017
Background

- Numerous Meetings to discuss fundamentals of “CASA Watershed Approach” – Since 2014
  - Regulated community
  - SWRCB – Board members, management, staff
  - SCCWRP
- Stakeholder Advisory Group meetings
- Independent Science Panel meetings
  - June 2015
  - April 2017
Key Elements of Approach

- Address Achievability of WQOs per CA Water Code Section 13241
- Address Program of Implementation per CWC Section 13242
- Use Available USEPA WQ Standards tools – Use Attainability Analysis
- Sound scientific basis
Highest Attainable Use

Setting Highest Attainable Use (Biointegrity)

- Likely High Quality
  - Antidegradation Analysis
    - Should there be any Nutrient WQOs?
- Meets (≥2) Aspirational Index
- Not Likely High Quality or Lack Data
  - Use Attainability Analysis (UAA)
    - Statewide
    - Categorical Water Bodies
    - Watershed
  - Highest Attainable Use (HAU)

Fundamentals of UAA Approach

- Section 1 Source Identification
- Section 2 Control Options/Scenarios
- Section 3 Effectiveness/Capability
- Section 4 Cost
- Section 5 Environmental
Ongoing SWRCB work is setting Aspirational Indices/Conditions

- Roughly 17% of CA streams “likely high quality” (i.e. meet “aspirational” index values).
  - Maintain high quality through Antidegradation Policy
- Other streams are either not “likely high quality” or lacking data
  - Require different approach – Categorical or Watershed
  - Address through UAA/HAU/TALU policy approach

Can tailor site-specific index values to protect HAU as determined in a UAA at watershed scale
Policy Implementation

1. Define Aspirational Value
2. Establish Index Value for Waterbody
3. Meets Aspirational Value?
   - Yes
   - No
4. Antidegradation
   - Yes
   - No
5. Improve Index?
6. Meets Categorical Expectations?
   - Yes
   - No
7. Antidegradation
   - Yes
   - No
8. Add to 303d List
9. Take Action to Meet Categorical Expectations
   - Yes
   - No
10. Antidegradation
11. Conduct Watershed-scale HAU Determination
12. Set Reasonable Expectations

Questions to Consider:
- Spatial, temporal averaging (method?)
- Reach vs. Entire Waterbody?
- How to determine categories?
- How to determine categorical expectations? [Range? HAU Process? BCG?]
Categorical Waters or Watershed Approach

- Biosimulatory – Numeric Implementation of Narrative Objectives
- Biointegrity – Narrative Objectives

Watershed Group Formation

- Establish Goals and Objectives for the Watershed

Achieve/Protect the Highest Attainable Use (HAU)

Develop Categorical Watershed Specific Conceptual Model

Tool Development
- Data Synthesis
- Data Collection

Identify Other Controllable Factors

- Hydrodynamics
- Water Quality
- Other Factors

Temperature
Light
Turbidity
Residence Time
Physical Constraints

Nutrient Source Identification and Quantification

Nutrients Source Control Scenarios

Planned, Plausible, Extreme
POTW, Stormwater, Agriculture, Other Non-point Sources

Management Scenarios for Other Controllable Factors

Holistic Hydrodynamic and Water Quality Modeling to Predict Ambient Nutrient Concentrations

Modeling to Predict Biological Outcomes

Identify the Range of Achievable Outcomes

Evaluation of 40 CFR 131.10(g) Factors

Identify/Define HAU

Designate Tiered Aquatic Life Use (TALU)
Categorical Waters/Watershed Approach

- Setting Appropriate Expectations at Categorical Water Body or Watershed scale
- Develop Categorical default values with option for watershed-scale analysis
- Meets CWA and CWC

- Biostimulatory – Numeric Implementation of Narrative Objectives
- Biointegrity – Narrative Objectives

Watershed Group Formation (where applicable)

Establish Goals and Objectives for the Watershed

Achieve/Protect the Highest Attainable Use (HAU)
Conceptual Model

Develop Category or Watershed Specific Conceptual Model

Tool Development

Data Synthesis

Data Collection
Conceptual Model

- Relationships of watershed factors to B/B
  - Nutrient sources and cycling
  - Hydrologic characteristics
  - Geologic conditions
  - Riparian shading
  - Stream gradients
  - Channel conditions
  - Other factors [e.g. Invasive species]

- Determine required data synthesis, monitoring, and modeling efforts
Quantification of Influencing Factors

- Identify Other Controllable Factors
- Nutrient Source Identification and Quantification

- Hydrodynamics
- Water Quality
- Other Factors

- Temperature
- Light
- Turbidity
- Residence Time
- Physical Constraints
Quantification of Influencing Factors

- Categorical or Local data
- Link ambient nutrient levels and other factors to biological indices and biostimulation
- Implement monitoring
  - Support for modeling tools
  - Validate watershed management influences on biological indices
Model Development

Nutrients Source Control Scenarios

Planned, Plausible, Extreme
POTW, Stormwater, Agriculture,
Other Non-point Sources

Holistic Hydrodynamic and Water Quality Modeling to Predict Ambient Nutrient Concentrations
Model Development

- Predictive model(s) for biological response to watershed management
  - Nutrients
  - Flow regimes
  - Temperature
  - Light
  - Invasive species
- Include nutrient source controls and other factors
Development of Management Scenarios

Management Scenarios for Other Controllable Factors
Development of Management Scenarios

- Range of Scenarios
  - Planned
  - Plausible
  - Extreme

- Watershed management
  - Nutrient load controls
  - Shading
  - Erosion control, buffers, wetlands
  - Flow management
  - Invasive species management
Evaluate Effects of Management

Management Scenarios for Other Controllable Factors

Holistic Hydrodynamic and Water Quality Modeling to Predict Ambient Nutrient Concentrations

Modeling to Predict Biological Outcomes

Identify the Range of Achievable Outcomes
Evaluate Effects of Management

- Use of modeling tools to determine biological outcome to changes from Management
- Evaluate impacts to beneficial use attainment.
Identification of Highest Attainable Use and Metrics

- Evaluation of 40 CFR 131.10(g) Factors
- Identify/Define HAU
- Designate Tiered Aquatic Life Use (TALU)
Identification of Highest Attainable Use and Metrics

- Six 40 CFR 131.10(g) factors for prevention of use
  - Naturally occurring pollutant
  - Flow or water levels
  - Human-caused conditions that cannot be remedied
  - Dams, diversions, or other hydrologic modifications
  - Physical conditions/natural features of waterbody
  - Controls more stringent than Section 201(b) and 306 would be required
Summary

- Solution-oriented framework
- Development of scientifically defensible information and modeling
- Synthesis to determine achievable/attainable water quality benefits and beneficial use improvements
- Determine HAUs to set appropriate TALUs and associated objectives
Questions/Next Steps

- Craft Policy Implementation Language
- Science Needs
  - Categorical Approach
  - Conceptual Model
  - Modeling Tools
  - Guidance document