





# California Approach for Addressing Nutrients



Dena McCann – State Water Resources  
Control Board, Division of Water Quality




# California's Nutrient Numeric Endpoints (CA NNE) Objectives

- Provide Basis for Sound Nutrient Management Decisions
  - Apply to a Large Range of Water body Types
  - Simple and Flexible in Application
  - Based on Sound Science
- 

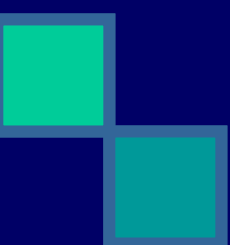



# Basic Structure of Approach

- Risk-based Approach to Protect Beneficial Uses
  - Conceptual Models
  - Secondary Indicators
  - A Water Body Classification Framework Using Three Beneficial Use Risk Classification Categories
  - Spreadsheet Tools to Estimate Nutrient Concentrations
  - TMDL Development
- 



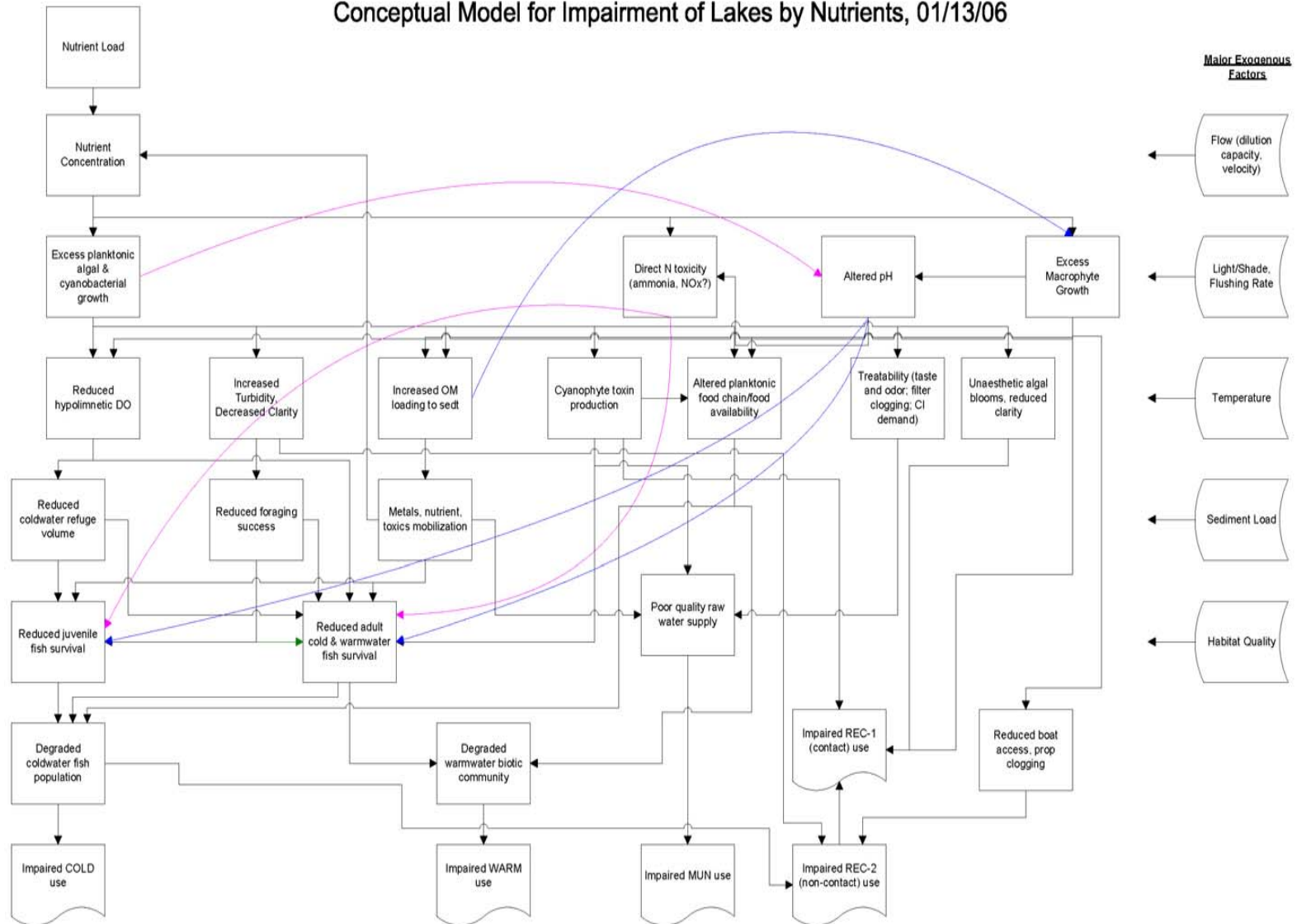
# Risk-based Approach

- 
- Designated Uses
  - Ecological Risk Assessment (ERA)
    - Pathways by which stressors cause ecological effects
    - Informative and representative assessment endpoints
  - Conceptual Models of Nutrient Impairment
    - Exogenous factors are critical to the process to maintain and restore water body integrity
  - Risk Hypotheses
- 

# Conceptual Model for Impairment of Lakes by Nutrients, 01/13/06

STRESSOR

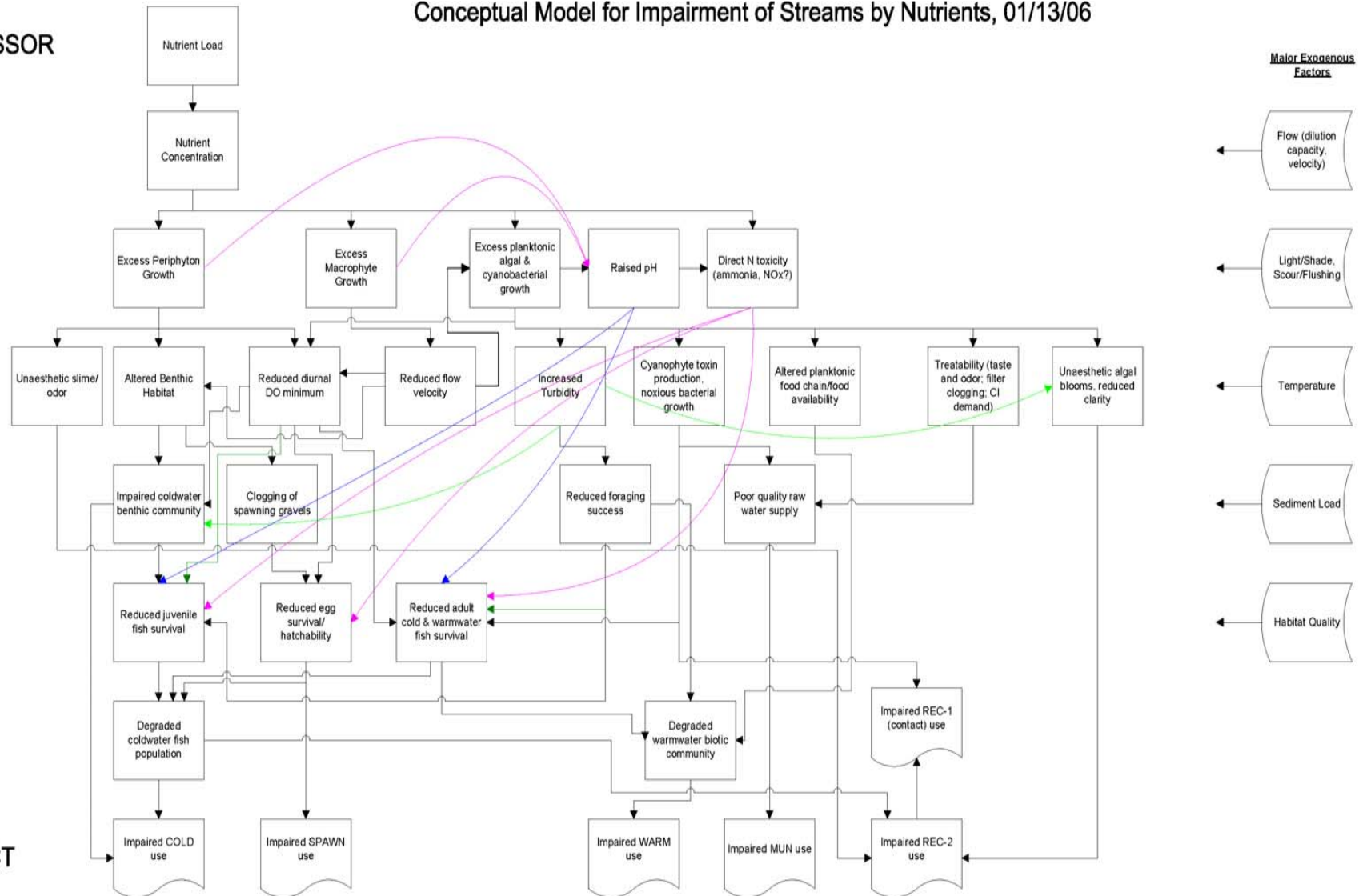
Major Exogenous Factors



# Conceptual Model for Impairment of Streams by Nutrients, 01/13/06

STRESSOR

Major Exogenous Factors

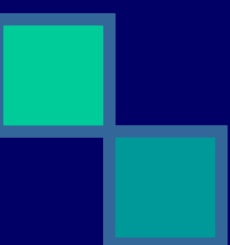



IMPACT

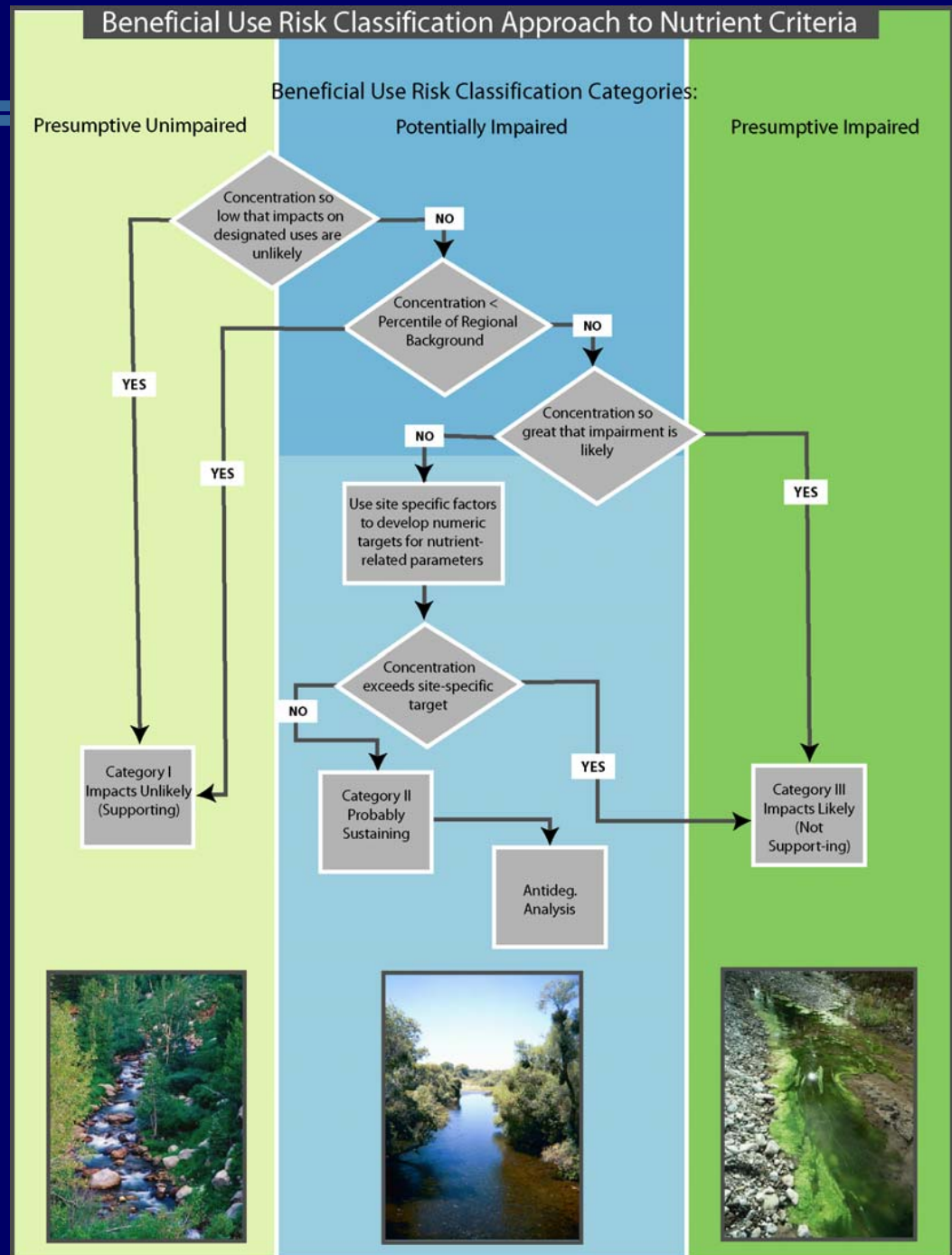
Note: AGR use is assumed not to be impaired by nutrient loads  
NAV is insensitive, but could be impacted by macrophytes



# Secondary Indicators

- 
- Benthic Algal Biomass
  - Chlorophyll-a
  - Clarity
  - Dissolved Oxygen
  - pH Maximums
  - Dissolved Organic Carbon
- 


# Beneficial Use Risk Assessment Categories





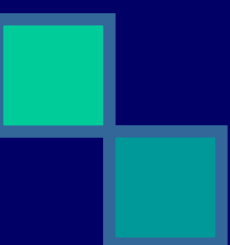



# Beneficial Use Risk Classification Categories (BURC)

- Category I/II – Impacts Unlikely (Supporting Beneficial Uses)
  - Category II/III – Impacts Likely (Not Supporting Beneficial Uses)
  - Category II – Uncertainties Exist
    - Water body specific cofactors to determine appropriate target
    - Further analysis including anti-degradation or reasonable potential analysis
- 



# Spreadsheet Tools

- 
- Created to Estimate Nutrient Concentrations
  - Provide Preliminary Targets
  - Account for Exogenous Factors
  - Subset of Secondary Indicators
  - Lines of Evidence
- 

## USER INPUTS

### Nutrient Concentrations (mg/L)

	Average	Minimum	Maximum
Ammonia	0.03	0.02	0.05
Nitrite	0.001	0.001	0.001
Nitrate	0.14	0.05	0.2
Organic N	0.318		
Phosphate	0.00618	0.003	0.01
Organic P	0.00363		

### Unshaded Solar Radiation (cal/cm2/d)

Average	Minimum	Maximum
658	400	700

### Stream Inputs

Stream Depth (m)	1
Stream Velocity (m/s)	0.3
Water Temperature (°C)	20.0
Days of Accrual (optional)	80
Canopy Closure	<input type="radio"/> 0% <input type="radio"/> 20% <input type="radio"/> 40% <input type="radio"/> 80%

### Target Selection

Select Method:	QUAL2K, max algal density
Target (g/m <sup>2</sup> AFDW)	100

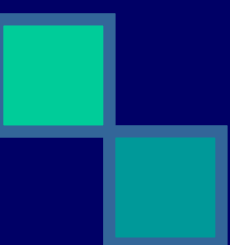

## RESULTS

Method	Max algal density, ave conditions (g/m <sup>2</sup> AFDW)	Benthic chlorophyll a estimate (mg/m <sup>2</sup> )
QUAL2K	116	132
QUAL2K with accrual adj	82	93
Dodds '97, mean Chl a	28	32
Dodds '97, max Chl a	80	91
Dodds '02, mean Chl a	15	17
Dodds '02, max Chl a	76	86

Max algal contribution to DO deficit (mg/L)	3.73
---	------



# TMDL Development

- 
- 268 Listed Waters
  - Consistency
  - Consolidate Peer Review
  - Group TMDLs through the Regional Board/State Board Process
- 



# Next Steps

- Pilot TMDLs
  - Establish SWAMP and CIWQS for Centralized Databases
  - Classify Waterbodies
  - Provide Monitoring Guidelines for Secondary Indicators
  - Basin Plan Amendments
- 