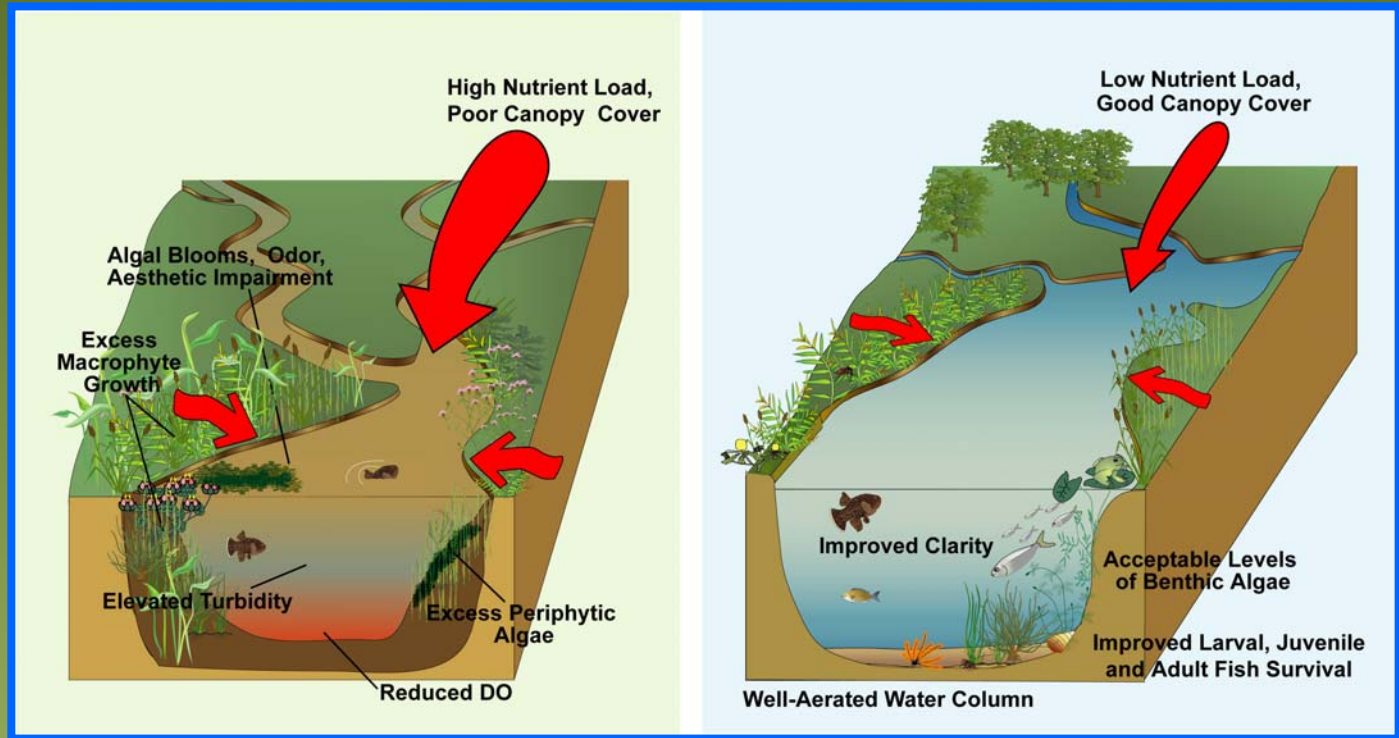




# The CA NNE Framework: Overview and Example



**CABW - November 30, 2006**

**Jon Butcher, Gene Welch, and Clayton Creager**



# CA NNE Background

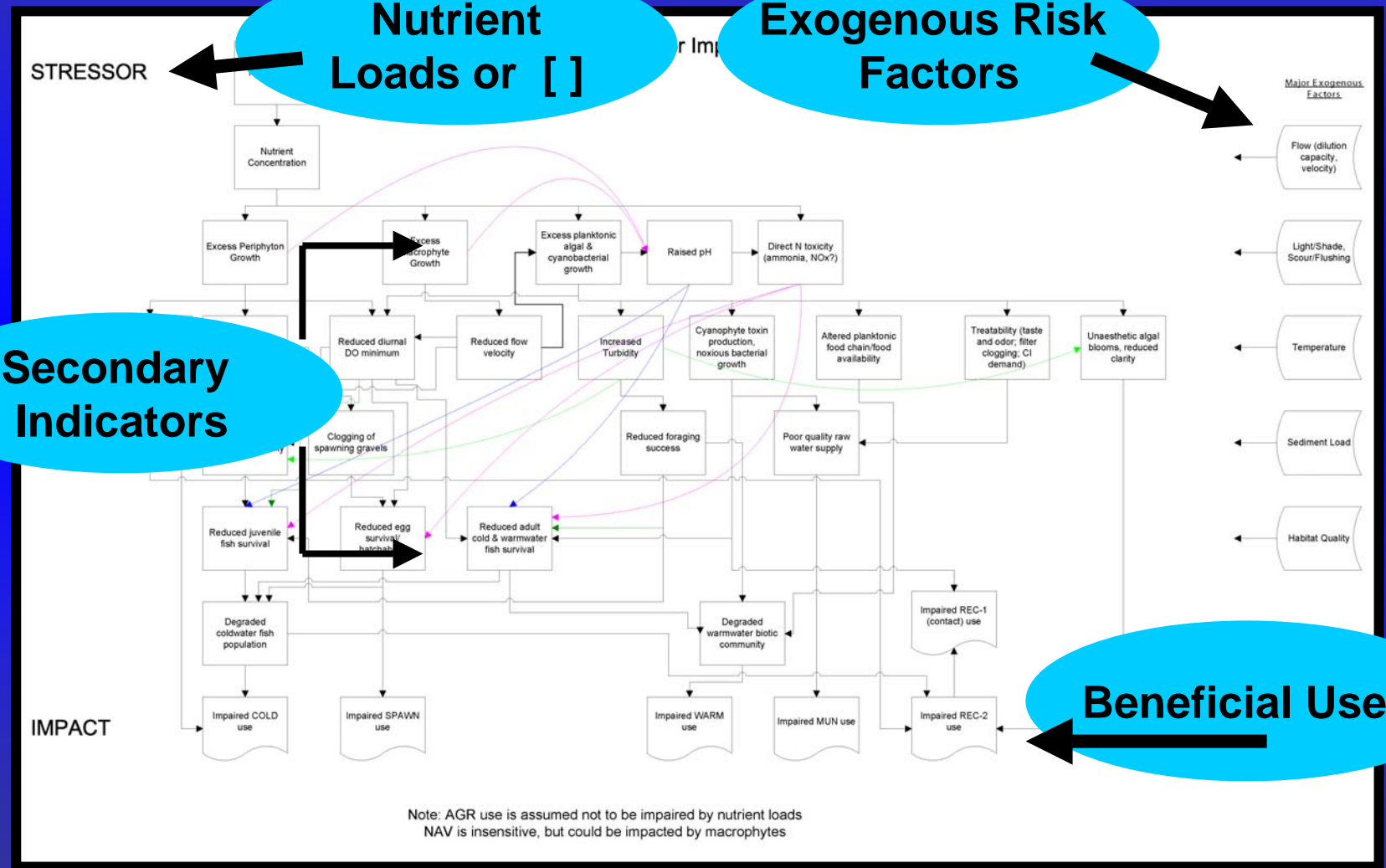
- EPA Nutrient Management Policy 1998
- EPA Guidance
- EPA Region IX & SWRCB RTAG / STRTAG
- Evaluate several different approaches
- Near consensus support of STRTAG
- Project Website:

[www.rd.tetrattech.com/epa](http://www.rd.tetrattech.com/epa)

# Primary Elements of the CA NNE Approach

- Risk-based approach to protect BUs
- Conceptual Models
- Secondary Indicators
- Beneficial Use Risk Categories
- Nutrient TMDL NNE development
- Spreadsheet Tools for estimating nutrient concentrations
- Triennial Review - Adaptive Management

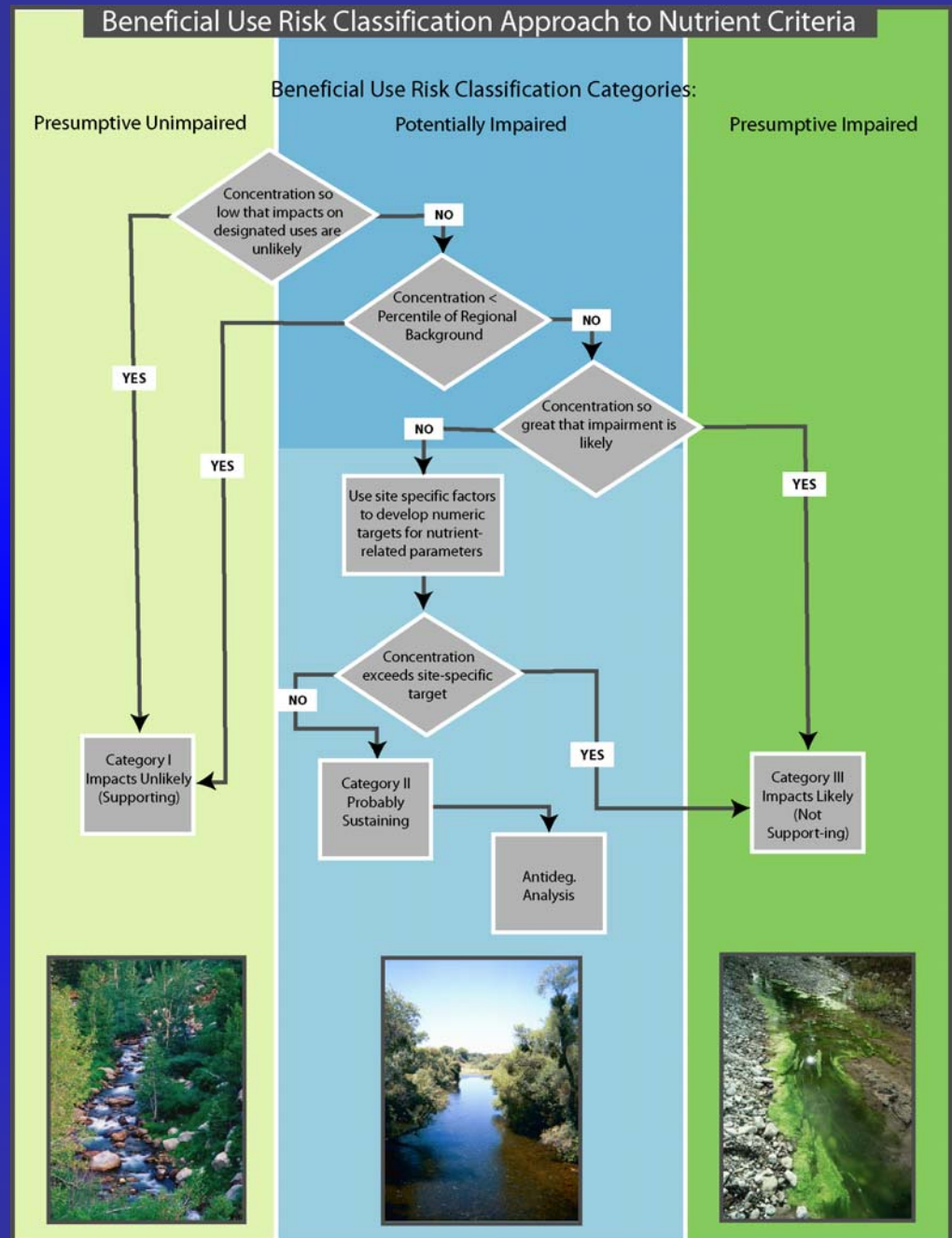
# Risk-based conceptual models



# Secondary Indicators

- Benthic Algal Biomass - streams
- Chl a - lakes and reservoirs
- Clarity (Secchi depth) - lakes and reservoirs
- Dissolved Oxygen - streams
- pH Maximums (photosynthesis driven) - streams
- DOC

# Beneficial Use Risk Categories



# Spreadsheet Tools for Estimating Nutrient Concentrations

- Tools provide preliminary [ ] targets
- Account for exogenous factors
- Work for a subset of secondary indicators
- Framework is based on lines of evidence, tools are one component

USER INPUTS			
<i>Nutrient Concentrations (mg/L)</i>			
	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		
<i>Unshaded Solar Radiation (cal/cm2/d)</i>			
	Average	Minimum	Maximum
	658	400	700
<i>Stream Inputs</i>			
Stream Depth (m)	1		
Stream Velocity (m/s)	0.3		
Water Temperature (°C)	20.0		
Days of Accrual (optional)	80		
Canopy Closure	<input type="checkbox"/> 0%		
	<input checked="" type="checkbox"/> 20%		
	<input type="checkbox"/> 40%		
	<input type="checkbox"/> 80%		
<i>Target Selection</i>			
Select Method:	QUAL2K, max algal density		
Target (g/m <sup>2</sup> AFDW)	100		

# Example of Secondary Indicators Streams – Benthic Algal Biomass

- Literature consensus - nuisance conditions expected if benthic algal biomass exceeds 100 to 200 mg chl-*a*/m<sup>2</sup>
- (Welch et al., 1988; Dodds et al., 1998; Sosiak, 2002; Dodds and Welch, 2000; USEPA, 2000a, Biggs 2000a)



# Clark Fork River, MT



Out of water – average 50 mg chl a /m  
Range <20 - 225 mg chl a/ m<sup>2</sup>



# Clark Fork River, MT



# **NNE Pilot Studies**

## **TMDL Numeric Endpoint Support**

- **Klamath River**
- **Santa Margarita River**
- **Chorro Creek**
- **Malibu Creek & lakes**
- **Others**

# *Next Steps for CA NNE*

- **Establish SWAMP & CIWQS as database**
- **Consider use of BURCs**
- **Monitoring guidelines for secondary indicators**
- **Develop more secondary indicators (bring it on bug guys!)**
- **Long-term potential for RWQCB Basin Plan amendments**