North Coast Regional Water Quality Control Board
Cyanobacteria Harmful Algal Bloom Monitoring & Response Program

Copco Reservoir

Russian River

Photo Credit: KarukTribe
What are Harmful Algal Blooms? (HABs)
CyanoHAB Toxins

- **Cyanotoxins**
  - Dermatoxins – affect the skin
  - Hepatotoxins – affect the liver
  - Cytotoxins – affect the kidneys
  - Neurotoxins – affect the nervous system

- **Wildlife effects:**
  - Toxins found in fish organs and tissue
  - Accumulation in shellfish
  - Acute poisoning of wildlife

- **Pet and livestock health effects:**
  - Diarrhea
  - Vomiting
  - Convulsions
  - Death

- **Humans health effects:**
  - Skin rash
  - Eye irritation
  - Diarrhea
  - Vomiting
  - Seizures
  - Paralysis

Photo Credit: Miller et al. 2010, PLOS ONE
## Harmful Algal Bloom
### Water Quality Risk Factors

### Risk Factors
(Modified from Paerl and Otten, 2013)

- Climate Change / changing precipitation patterns
- Warm water temperatures
- Nutrient over-enrichment
- High light/solar radiation
- High dissolved organic matter
- Low flow (rivers)
- Long residence time (lakes)
- Persistent stratification (lakes)

### Co-Factors
(Biostimulatory Conditions)

- Reduced Riparian Canopy
- Channel Morphology
- Impoundments
- Reduced Flows
- Pollutant Loading
- Watershed Conditions
CyanoHABs
Where do they occur in the North Coast Region?
Focus on Areas with recurring CyanoHABs

- Klamath River & Reservoirs
- Russian River
- Eel River, South Fork Eel River, & Lake Pillsbury
Pilot Program for 2016 & 2017

1. Public health monitoring
   ✓ Weekly Toxin Monitoring at 10 beaches
     • Sonoma County Department of Health Services

2. Improve understanding of algae and cyanobacteria dynamics
   ✓ Weekly Ambient Water Quality Data Summary & Bi-weekly Algae/Cyanobacteria Monitoring
     • Sonoma County Water Agency
   ✓ Bi-weekly Ambient Toxin Monitoring
     North Coast Regional Water Board
   ✓ Visual Monitoring
     • Russian Riverkeeper / Business Owners on the River / Sonoma County Parks
Russian River between Healdsburg & Riverfront Park

- **Toxins present June – October** (sampling conducted mid-June – early October 2016)
- 3 sample methods = 3 different pictures of toxin conditions
- High concentrations of anatoxin-a in algae; non-detects in water; microcystin detected in SPATTs

<table>
<thead>
<tr>
<th>Samples collected 9/11 (SPATT 8/29-9/11)</th>
<th>Microcystin (Liver Toxin)</th>
<th>Anatoxin (Neurotoxin)</th>
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<tbody>
<tr>
<td>Water Grab</td>
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*(SPATT 8/29 - 9/11)*

Microcystin (Liver Toxin)

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**Solid Phase Adsorption Toxin Tracking (SPATT)**
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Innovative Technology
Lakes & Rivers

Cyanoscopy

Toxin Test Strips

Cyanobacteria & Cyanotoxin Field Screening Tools
Innovative Technology - Lakes
Satellite Imagery for Early Bloom Detection
Thank You

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