Cyanobacteria and Citizens in the Eel River

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The Eel River

Drainage Area (km^2)
- 1 - 200
- 201 - 1000
- 1001 - 2000
- 2001 - 5000
- 5001 - 9534

[Map of the Eel River Watershed]

[Images of the Eel River]

[Image: Keith Bouma-Gregson]
Algae fuels aquatic summer food webs

Algae kill dogs in the Eel river

Power, Bouma-Gregson, et al. 2015, *Copeia*
What is the temporal and spatial distribution of cyanobacteria in the Eel River?

Monitoring sites:
- Collected algal samples
- Measured cyanotoxin concentrations (SPATT)
Eel River Recovery Project

2015 and 2016 cyano. monitoring by ERRP and Round Valley Tribes

http://www.eelriverrecovery.org/algae.html
Cyanobacteria in the Eel

Benthic mats, not planktonic soups
Observed common cyanobacterial taxa

Anabaena spp.: slow water, fragile, on algae
Observed common cyano. taxa

*Phormidium* spp.: fast water, robust, on rocks
Floating Cyanobacteria
SPATT Samplers

**Solid Phase Adsorption Toxin Tracking (SPATT)**

- Time integrative
- Multiple toxins detected (anatoxin-a and microcystins)
- Low limit of detection
- Easy to deploy and analyze
- HP20 DIAION resin not expensive
- Difficult to compare to regulatory limits

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SPATT Samplers

Map showing drainage areas with different colors for different size ranges. The map highlights various points labeled with codes such as LE9357, VD653, LE7908, and SF1571, among others.
SPATT Results

Higher anatoxin-a (ATX) levels than microcystin (MCY)
SPATT 2015: Presence/Absence

N = 47

ATX: 77% positive

MCY: 87% positive
Cyano. Mat Cyanotoxins

Higher ATX concentrations than MCY concentrations
More frequent ATX detections
2015 H$_2$O Samples

Unfiltered H$_2$O samples

![Graph showing data points for different river forks (CR, LE, MF, MS, NF, SF) with concentrations in micrograms per liter (µg/L) for ATX and MCY.]
Lessons Learned: Monitoring

• Main public safety threat is ingestion of actual cells, rather than river water.

• Anatoxin-a more of a threat than microcystins.

• SPATT sampling can be conducted by citizen groups.

• Different regulatory metrics and sampling methods for rivers & streams with benthic cyanobacteria, versus lakes and open water with planktonic cyanobacteria.
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Questions?

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