Solid Phase Adsorption Toxin Trackers (SPATTs) for Detection of Cyanotoxins in Freshwater

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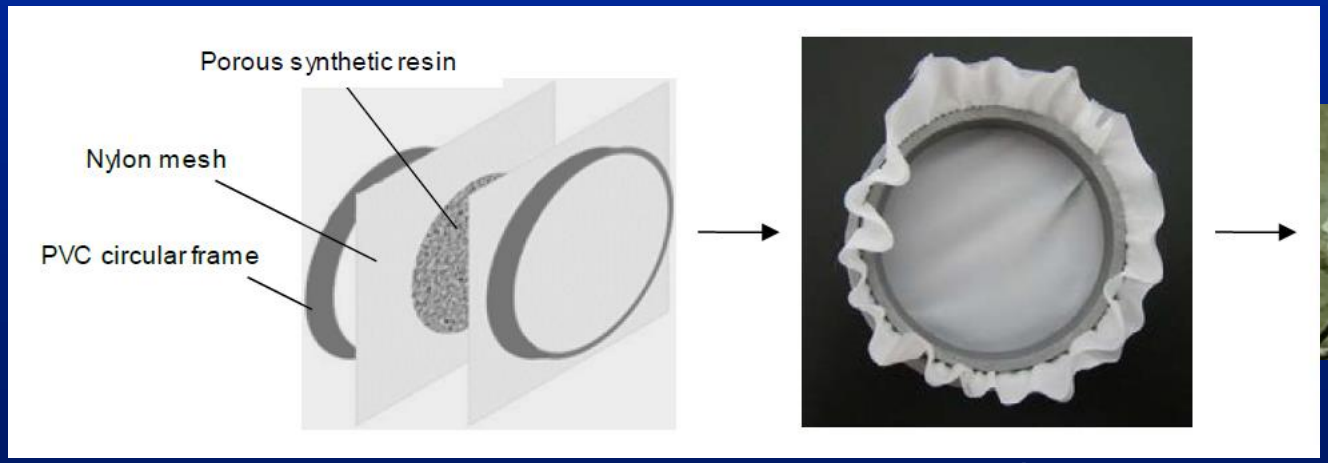
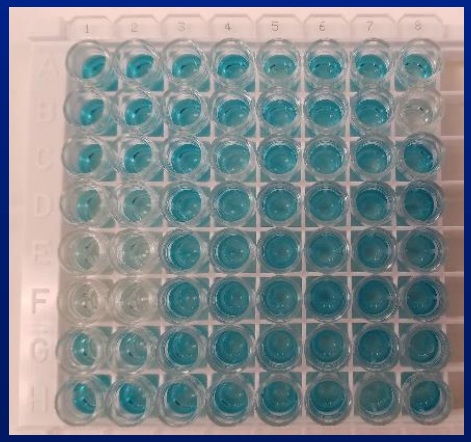


from Roué and others, 2018
Toxins 2018, 10, 167

SPATTs - Solid Phase Adsorption Toxin Trackers

- Time-integrating (hours to weeks) passive sampler
- Microbead resins (e.g., HP20 “Diaion”) adsorb toxins
- Resins washed with 50% methanol to desorb toxins
- Extracts filtered (1.2 µm), evaporated and reconstituted (< 2.5% MeOH)
- Four cyanotoxins analyzed using ELISA
- Positive detection when filtrate concentration exceeds the lowest standard
- Extract concentrations normalized to 10-day period



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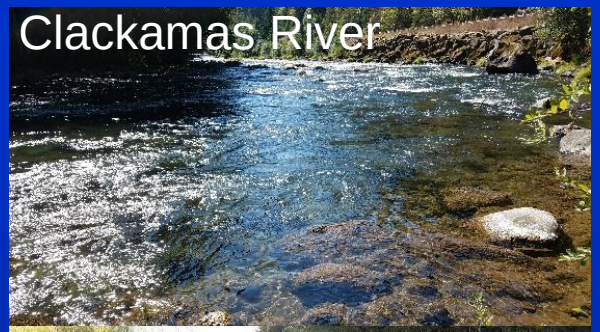
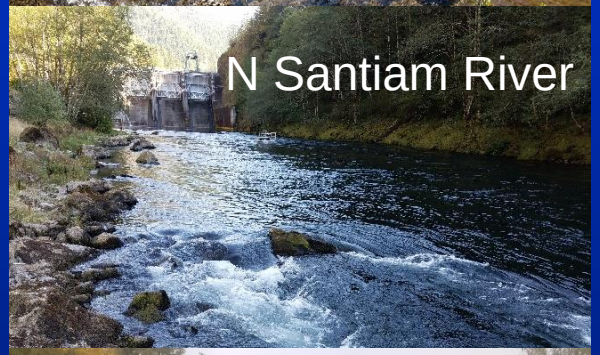
2016-18 USGS Study Characterized Cyanotoxins in Three Cascade River Basins Used for Drinking Water





Multiple Sampling Approaches

- SPATTs (122 deployments)
- Benthic Cyanobacteria (direct testing of colonies and mats, 78 samples)
- River Seston (plankton net collections, 84 samples)
- Reservoir Cyanobacteria (plankton net collections, 5 samples)

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Results by Sampling Approach

- 544 cyanotoxin detections in 289 samples from 59 sites
- Anatoxin-*a* and microcystins were detected in 63% and 60% of SPATTs
- All 4 cyanotoxins detected in 8% of samples (all sample types)

		Total (ADDA) Microcystins/ Nodularins	Cylindro-spermopsin	Anatoxin-*a*	Saxitoxin
All 289 samples	Detections	202	78	135	129
	% detection	70%	27%	47%	45%
84 net tows	Detections	66	21	23	66
	% detection	79%	25%	27%	79%
** 122 SPATTs	Detections	73	21	77	32
	% detection	60%	17%	63%	26%
78 Cyanobacteria colonies/mats	Detections	59	32	34	31
	% detection	76%	41%	44%	40%
5 Planktonic cyanobacteria		4	4	1	0
		80%	80%	20%	0%
	Color Legend:	> 50%	40-50%	15-30%	0%

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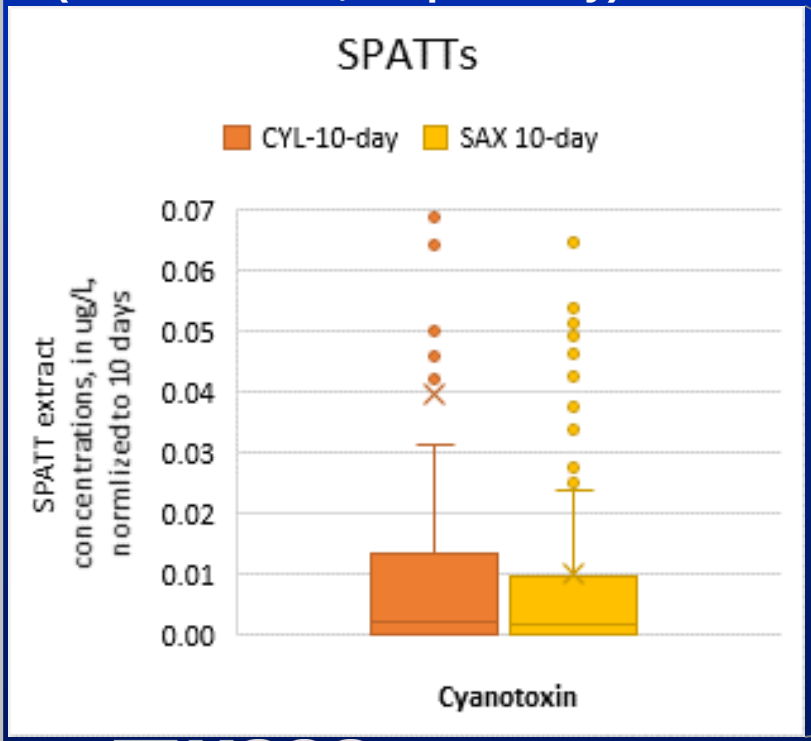
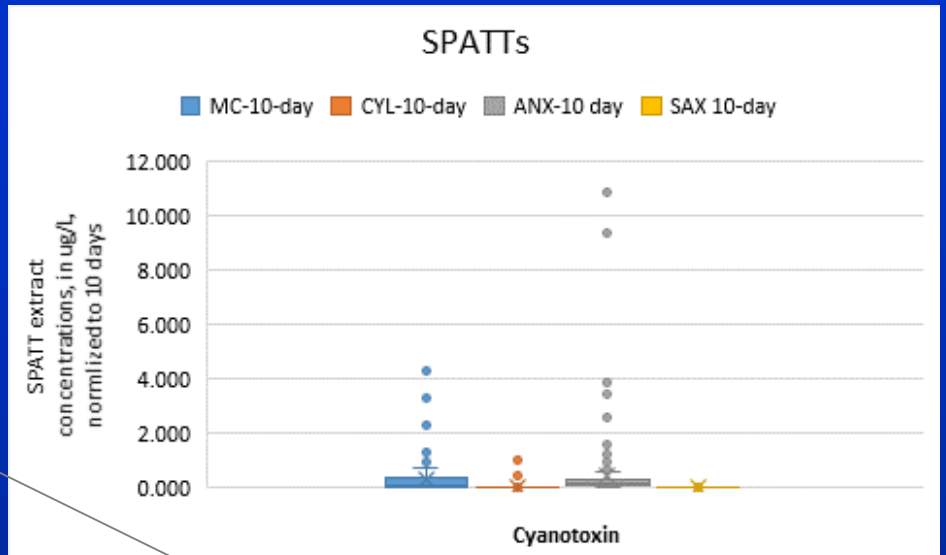
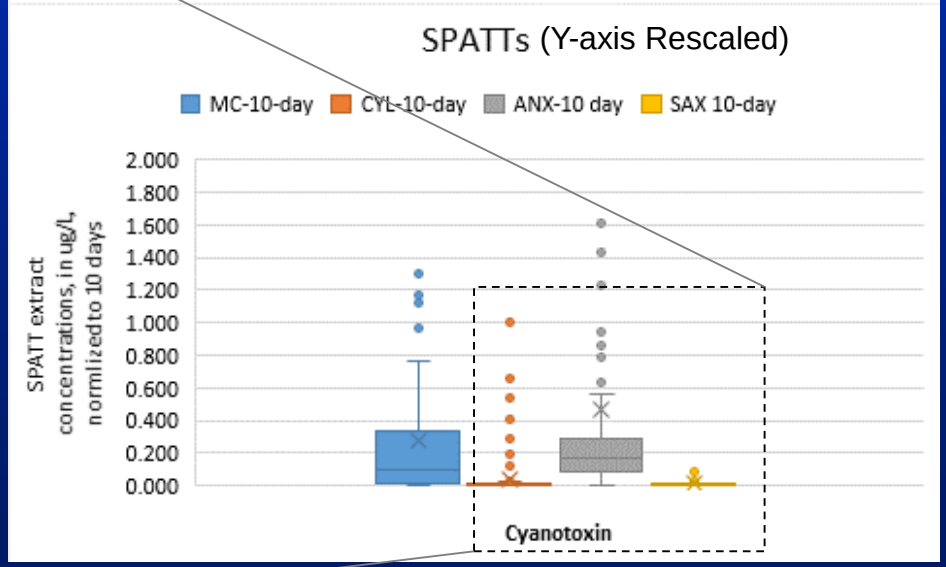
SPATT Extract Concentrations (10-d Normalized)

- **Highest median and maximum extract concentrations were for anatoxin-*a* (ANX) - highest in Clackamas Basin**
- **Microcystins (MC) were a close second**
- **Saxitoxin (SAX) and Cylindro-spermopsin (CYL) concentrations were lower, with lower detection frequencies (26% and 17%, respectively)**







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