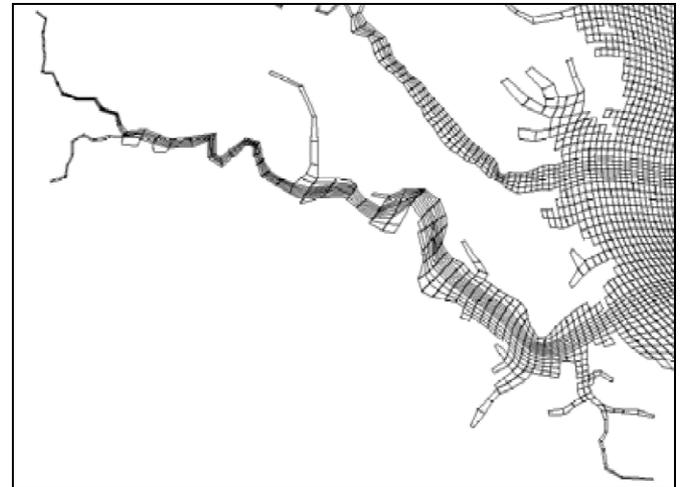
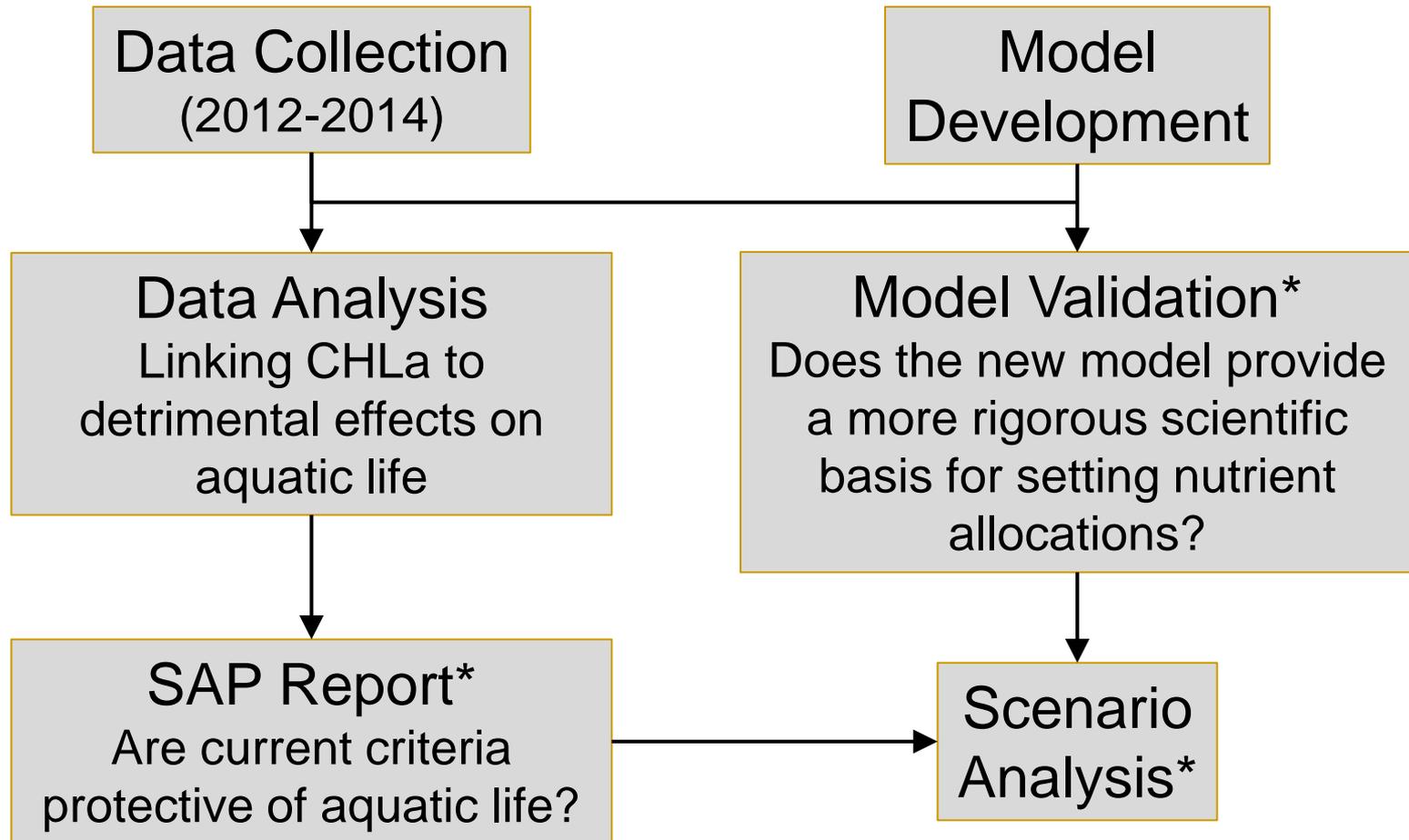

Eleventh Science Advisory Panel
Meeting for James River CHLa Study
March 18, 2016



Project Overview



▼ STAC Review

*Today's Meeting

Today's Meeting

10:00 am	Meeting Overview
10:15	Update on Empirical Relationships Report (Paul Bukaveckas)
10:45	CHLa Model Validation (Jian Shen)
11:15	HAB Model Validation (Jim Fitzpatrick)
12:00	Lunch
12:30	Scenario Analysis (Nikolai Gurdian)
1:00	CHLa Model Scenarios (Jian Shen)
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2:00	Panel Discussion
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Empirical Relationships Report

How do results from the analysis of deleterious effects of algal blooms in the James (SAP report) compare to Claire's analysis of Bay-wide reference conditions?

Current criteria 

Reference-based protective range

Effects-based defensible range

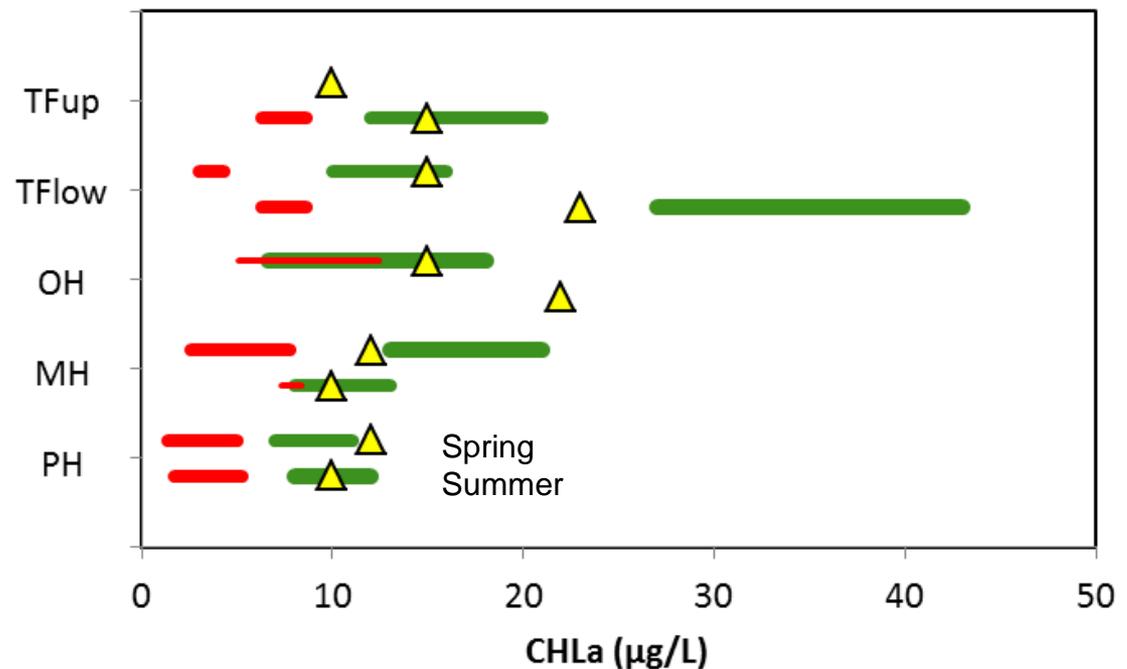


Figure 17 (Draft)

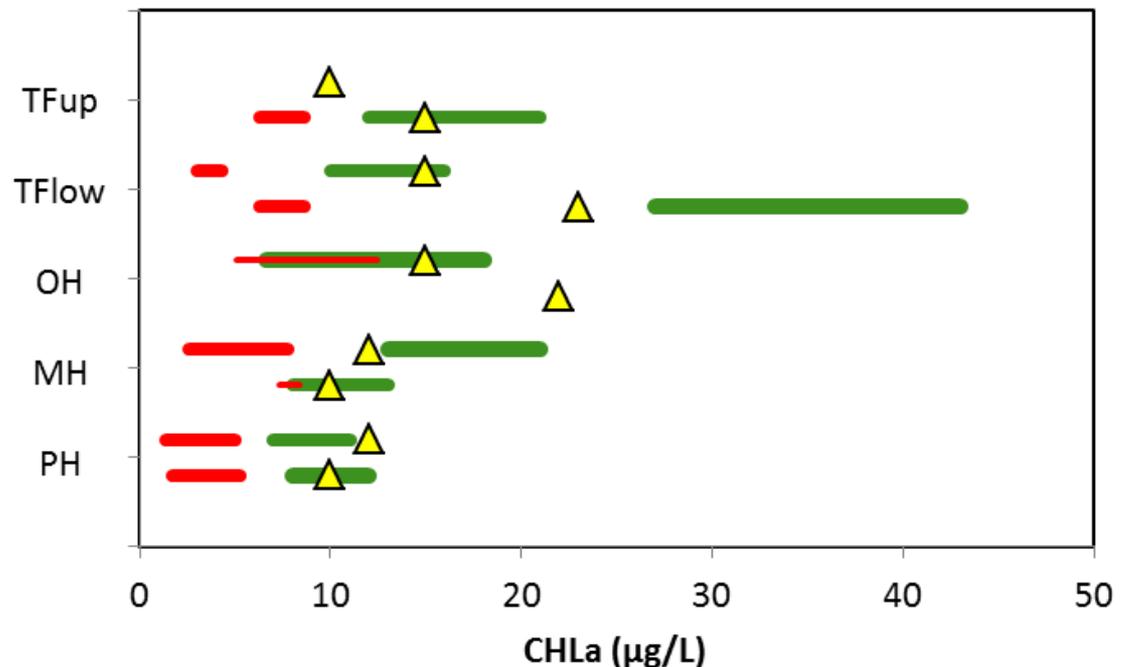
Principal Findings:

1. Current criteria fall within or below defensible ranges delineated by effects-based approach (exception Spr-PH) and therefore considered protective.
2. Current criteria fall above reference-based ranges and therefore considered not protective.

Current criteria 

Reference-based protective range

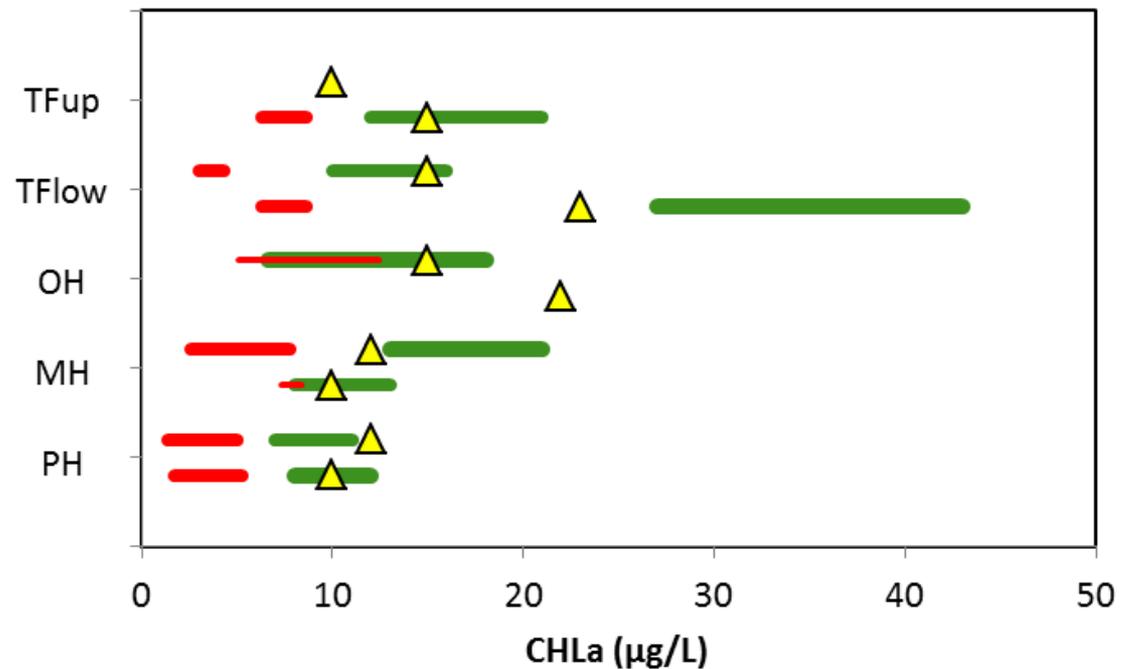
Effects-based defensible range



Complications with this comparison:

1. Defensible ranges from effects-based analysis are arithmetic means.
2. Reference-based ranges incorporate various measures of central tendency.

Criteria originally assessed as arithmetic means; currently assessed as geometric means.



Choice of Means

- Geometric: considered a better measure of central tendency in log-normal data (e.g., CHLa)
- Arithmetic: more sensitive to outliers (rare high CHLa) and therefore a better predictor of threshold exceedance (e.g., low DO, HABs).

Generally the two measures are strongly related, though not always, and relationships are site-specific.

From Buchanan (2016)

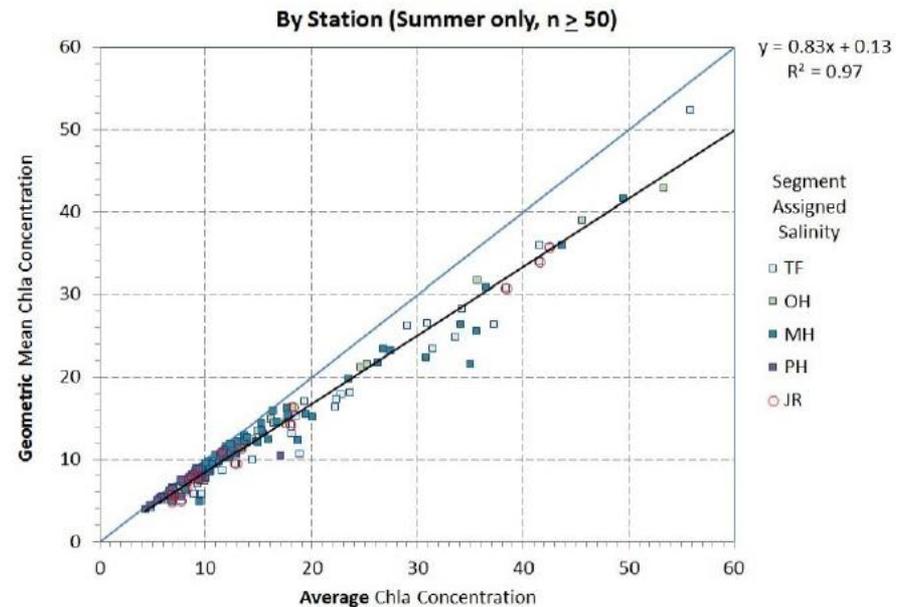
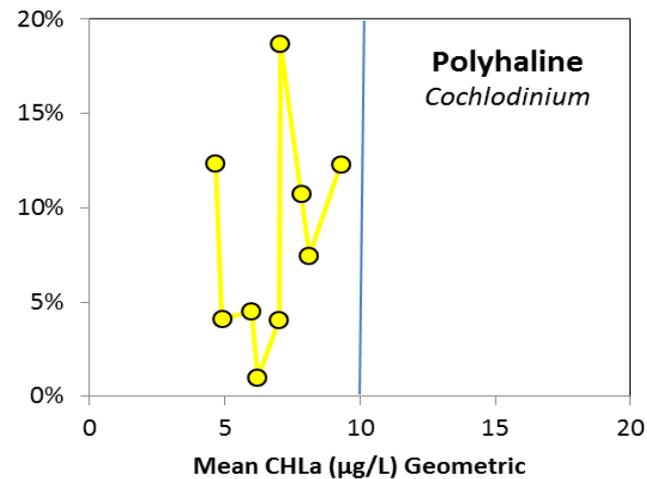
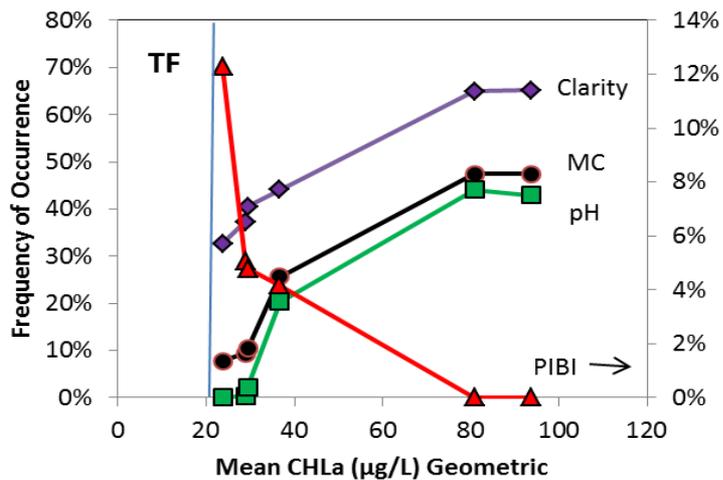
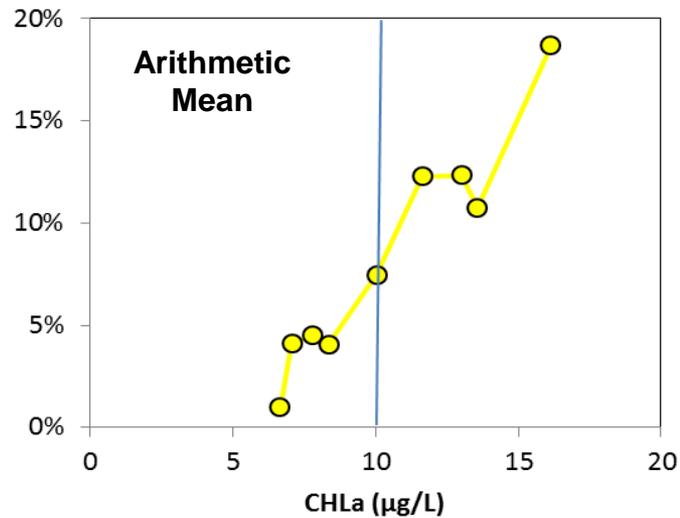
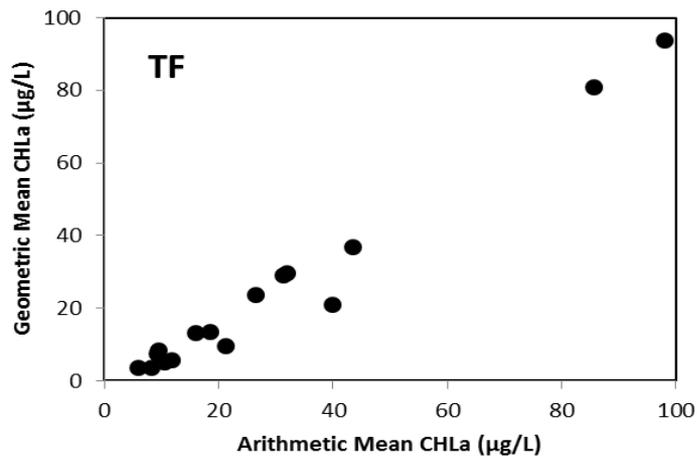


Figure A-1. Relationships between arithmetic mean (average) and geometric mean in bay-wide Chesapeake data.

James-specific Results



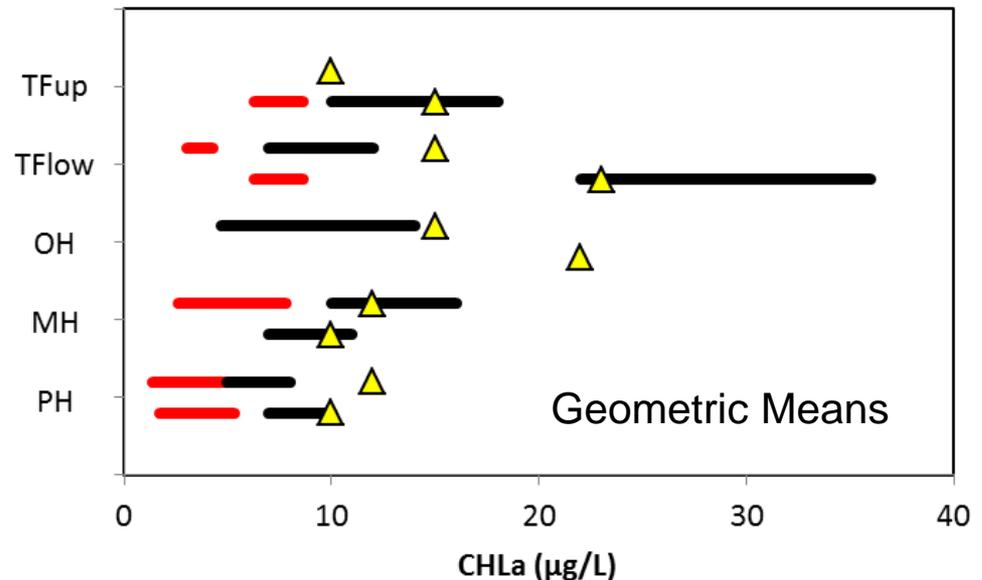
From SAP Report (Supplemental Information)

Options

Replace arithmetic means with geometric means.

- Advantage: allows for direct comparison to criteria which are currently assessed as geometric means.
- Disadvantage: underlying data do not support usage of geometric means for inferring protective ranges.

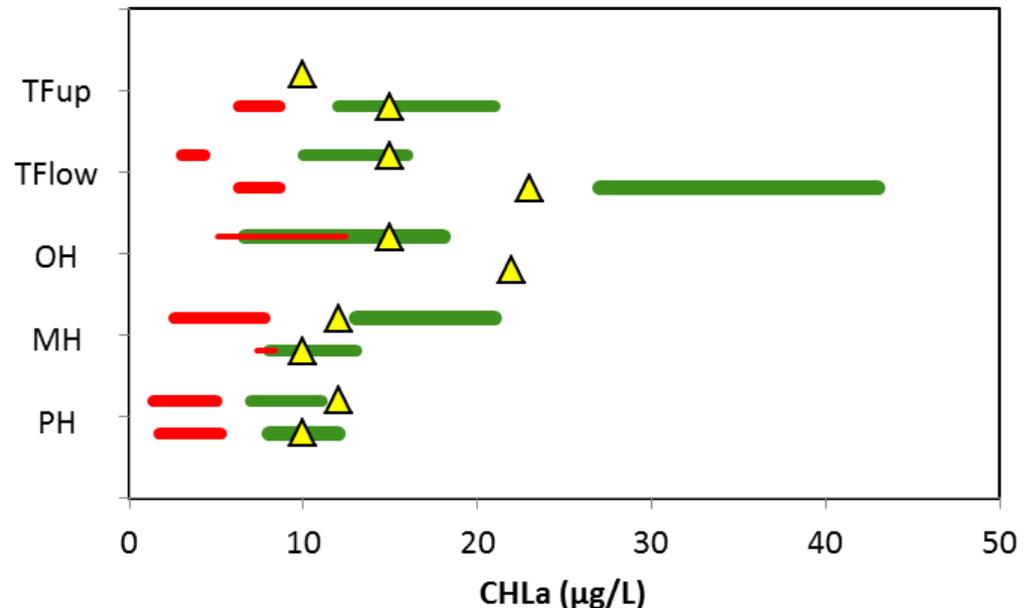
Outcome: fewer of the existing criteria considered protective when ranges converted to geometric means.
Differences between reference- and effects- based ranges still apparent.



Options

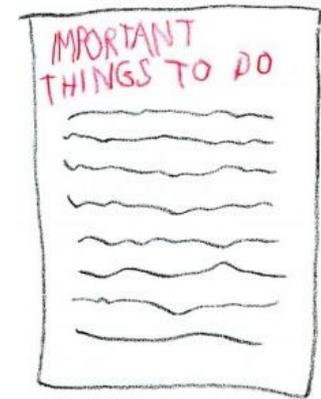
Retain arithmetic means.

- Advantage: supported by underlying patterns used to establish protective ranges.
- Disadvantage: is this an apples-to-oranges comparison with current criteria?



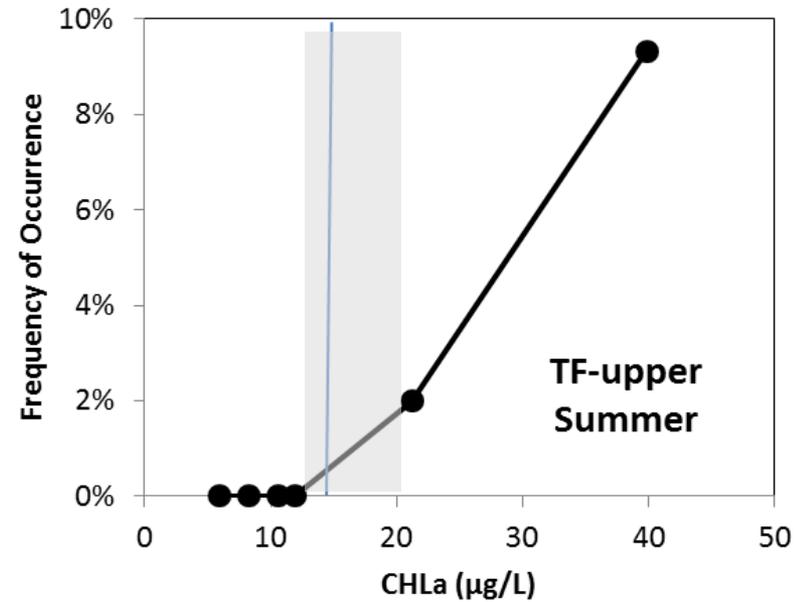
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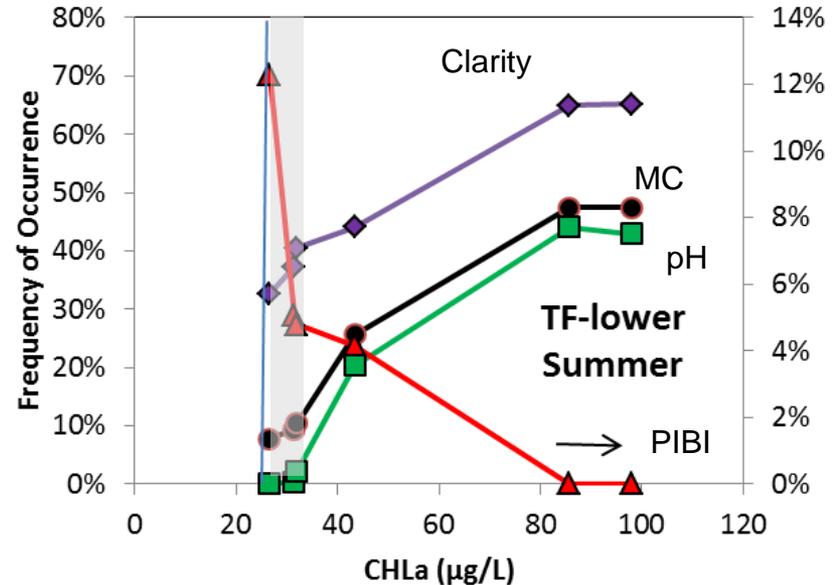
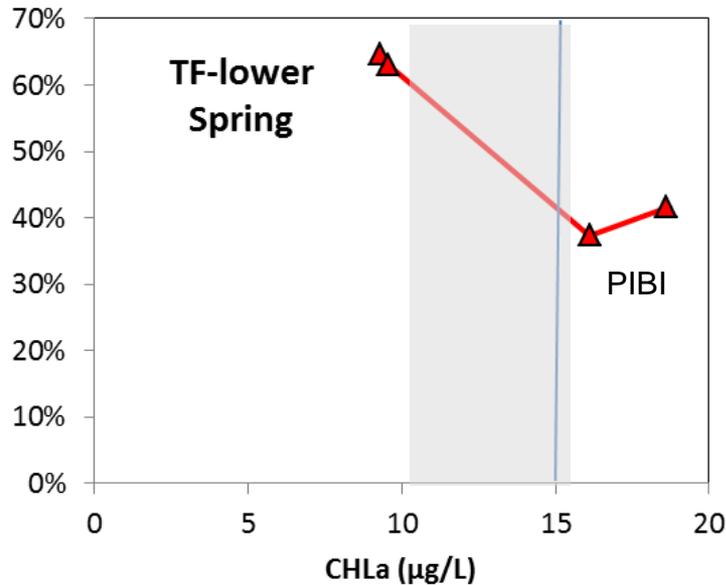
SUPPLEMENTAL INFORMATION

Upper Tidal Fresh



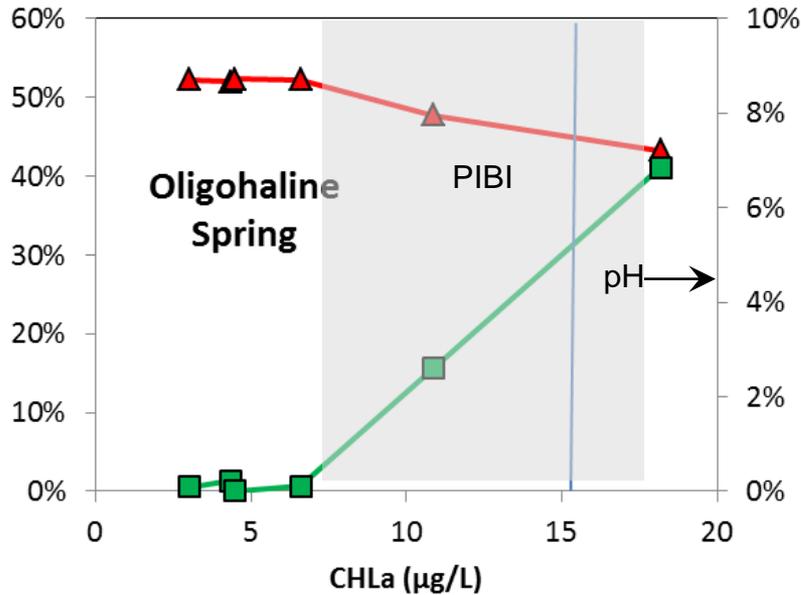
Upper TF	Spring	Summer
Current Criteria	10	15
Metrics (p<0.05)	None	microcystin
Protective Range	NA	12-21

Lower Tidal Fresh



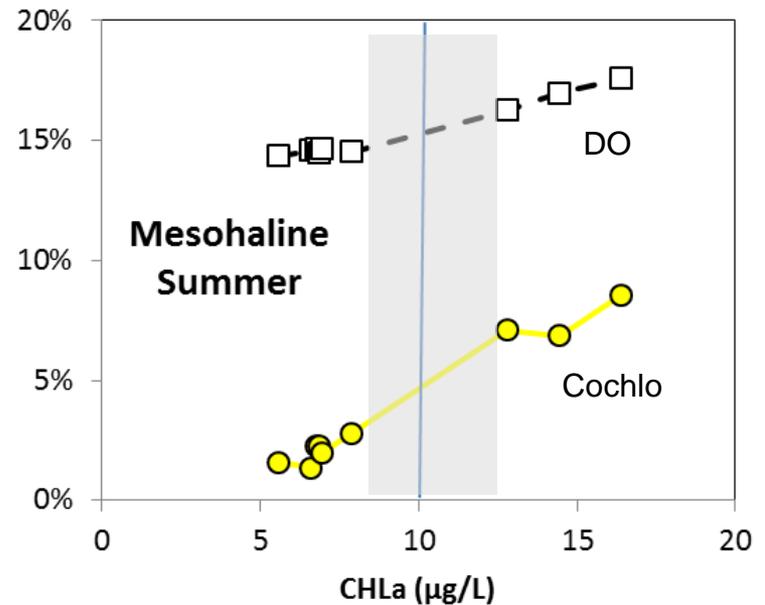
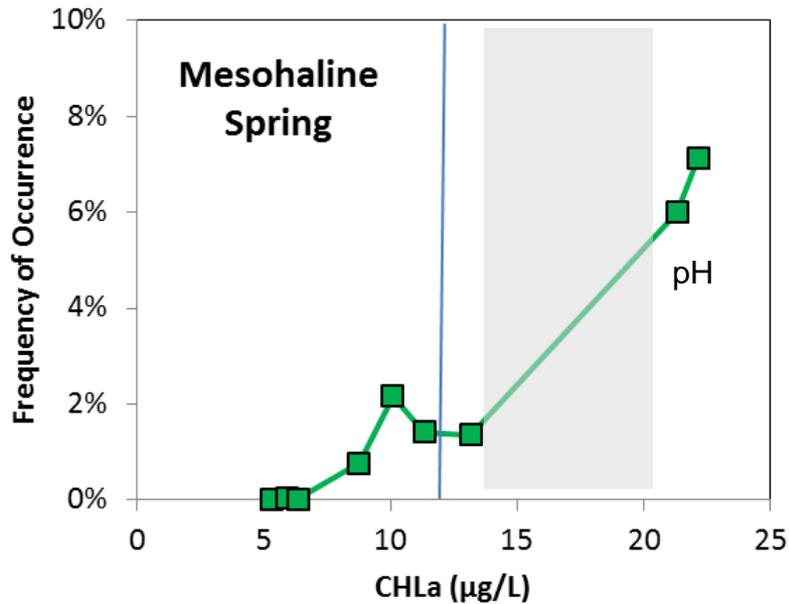
Lower TF	Spring	Summer
Current Criteria	15	23
Metrics (p<0.05)	PIBI	Clarity, MC, pH, PIBI
Protective Range	10-16	27-31

Oligohaline



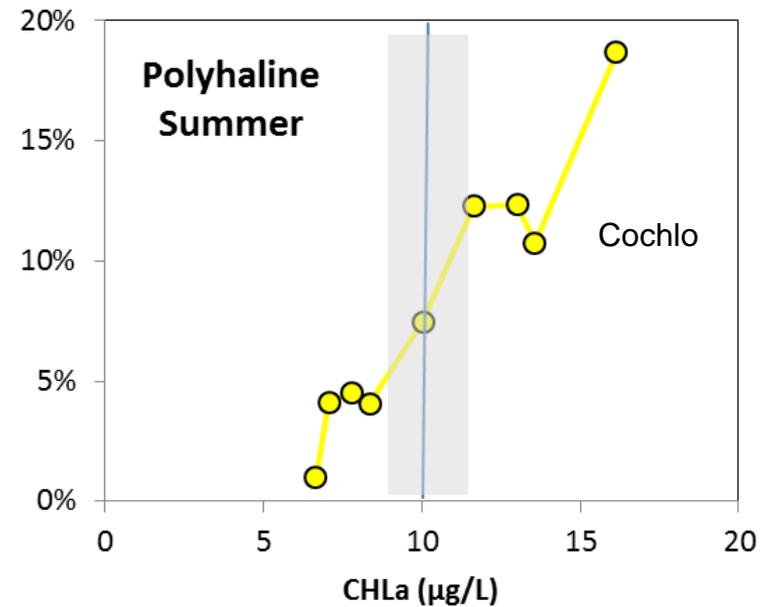
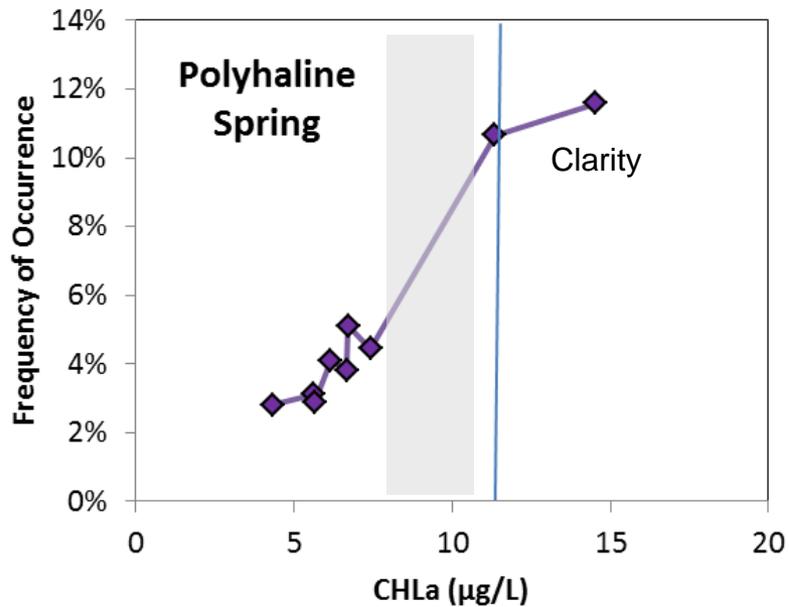
Oligohaline	Spring	Summer
Current Criteria	15	22
Metrics (p<0.05)	PIBI, pH	None
Protective Range	7-18	NA

Mesohaline



Mesohaline	Spring	Summer
Current Criteria	12	10
Metrics (p<0.05)	pH	DO, Cochlo
Protective Range	13-21	8-13

Polyhaline



Polyhaline	Spring	Summer
Current Criteria	12	10
Metrics (p<0.05)	Clarity	Cochlo
Protective Range	7-11	8-12