



Virginia Chlorophyll-a Assessment

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STAC Workshop: Advanced Monitoring of Water Clarity and Chlorophyll-a

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In 2019, Virginia adopted updated chlorophyll-a criteria for the tidal James River. These criteria reflected the findings of an 8-year long study of the:

- Phytoplankton composition in the James River, especially of HAB-forming taxa
- Toxicity of HAB-forming taxa in the James River
- Water quality parameters correlated with phytoplankton biomass (DO, pH, and clarity).
- Ambient chlorophyll-a concentrations in the James River.

These questions were addressed using advanced monitoring approaches, along with more “old school” techniques.



Dataflow datasets enabled a refined characterization of ambient chlorophyll-a concentrations



Dataflow system (pump+flow-through chamber + multiprobe sonde)

For a big segment like JMSMH, a single Dataflow cruise will result in ~4,000 observations of chlorophyll (via fluorescence)

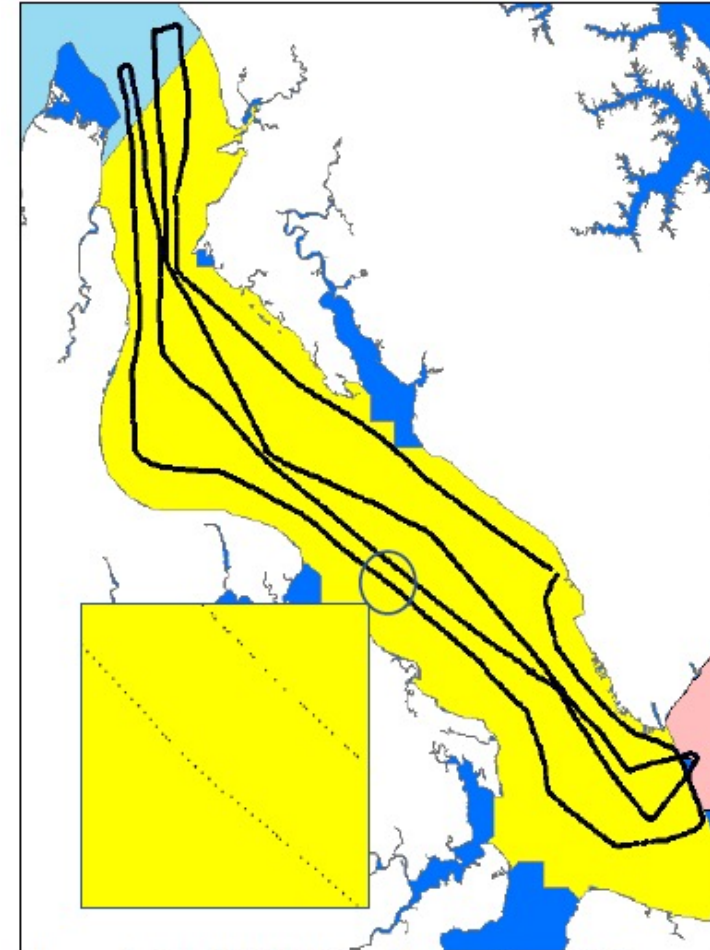


Figure 4. The JMSMH Dataflow cruisetrack, in which observations (represented here as points) are taken approximately every 60-80 meters.

Modified Seasonal Mean Criteria

(Not to be exceeded more than twice in a six year period)

James River segment-season	Old Seasonal Mean Criteria (ug/L)	Updated Seasonal Mean Criteria (ug/L)
JMSTF2 – spring	10	8
JMSTF2 – summer	15	21
JMSTF1 – spring	15	10
JMSTF1 - summer	23	24
JMSOH - spring	15	13
JMSOH – summer	22	11
JMSMH - spring	12	7
JMSMH – summer	10	7
JMSPH – spring	12	8
JMSPH - summer	10	7

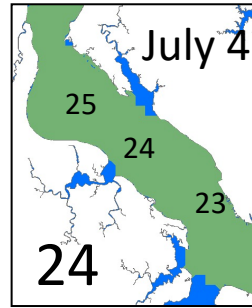
Short-Duration Criteria

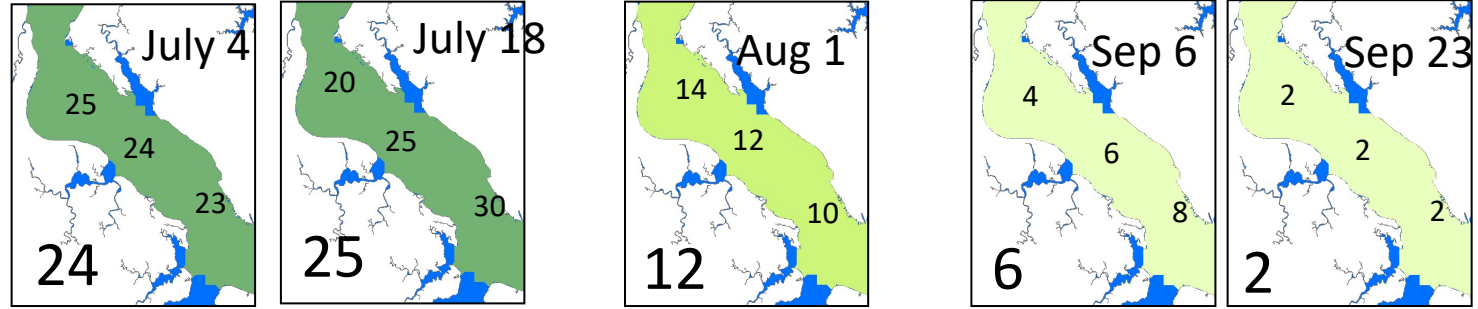
(Not to be exceeded more than 10% of time over a six year period)

James River segment	Spatial Application	Magnitude (ug/L)	Duration
JMSTF2	Upstream boundary to river mile 95	--	--
JMSTF2	River mile 95 to downstream boundary	52	1-month median
JMSTF1	Upstream boundary to river mile 67	52	1-month median
JMSTF1	River mile 67 to downstream boundary	34	1-month median
JMSOH	Entire segment	--	--
JMSMH	Entire segment	59	1-day median
JMSPH	Entire segment	20	1-day median

The assessment methodology

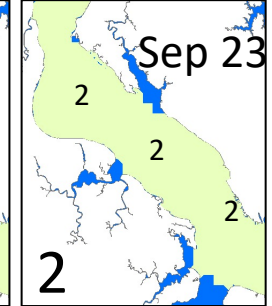
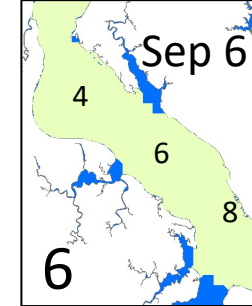
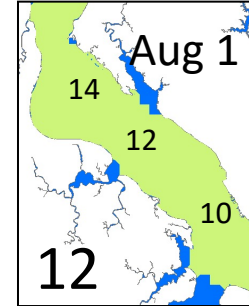
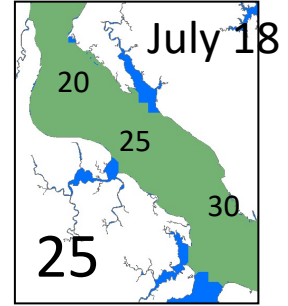
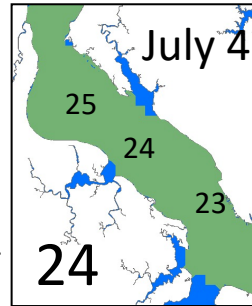
A monitoring run in JMSMH





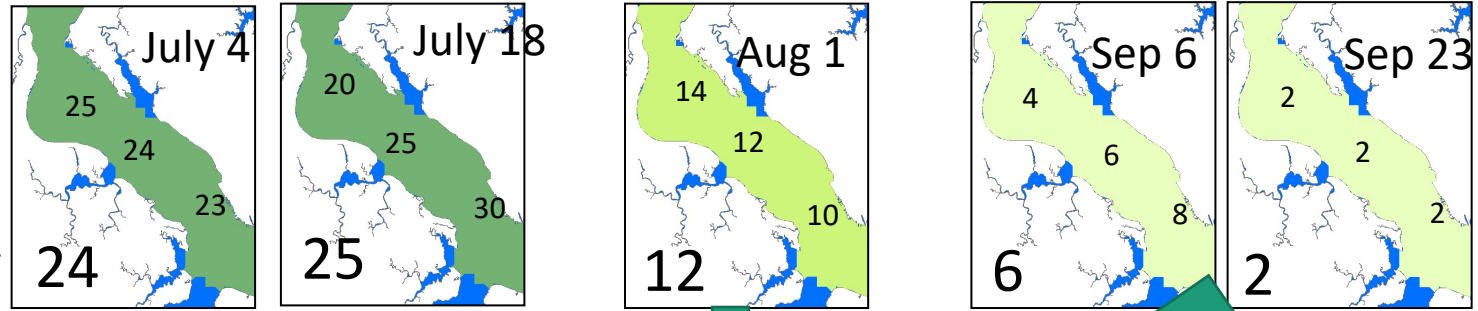
1-Day Median Criteria (MH and PH)

(Samples pooled over a day-
MEDIAN)



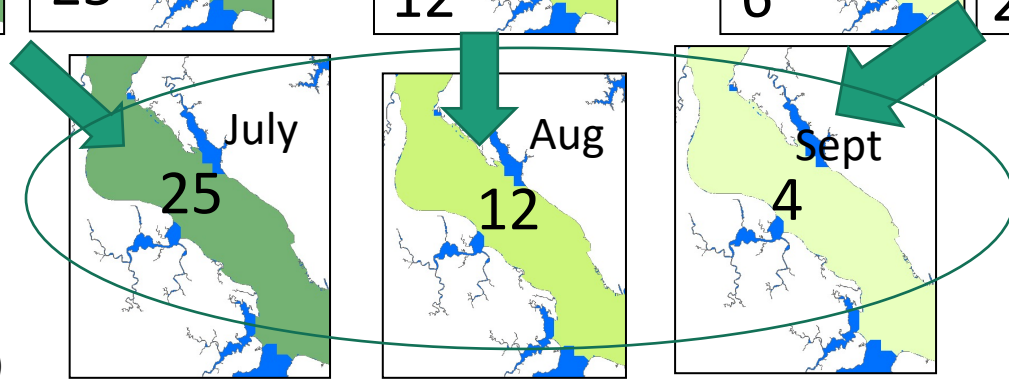
1-Day Median Criteria (MH and PH)

(Samples pooled over a day-
MEDIAN)



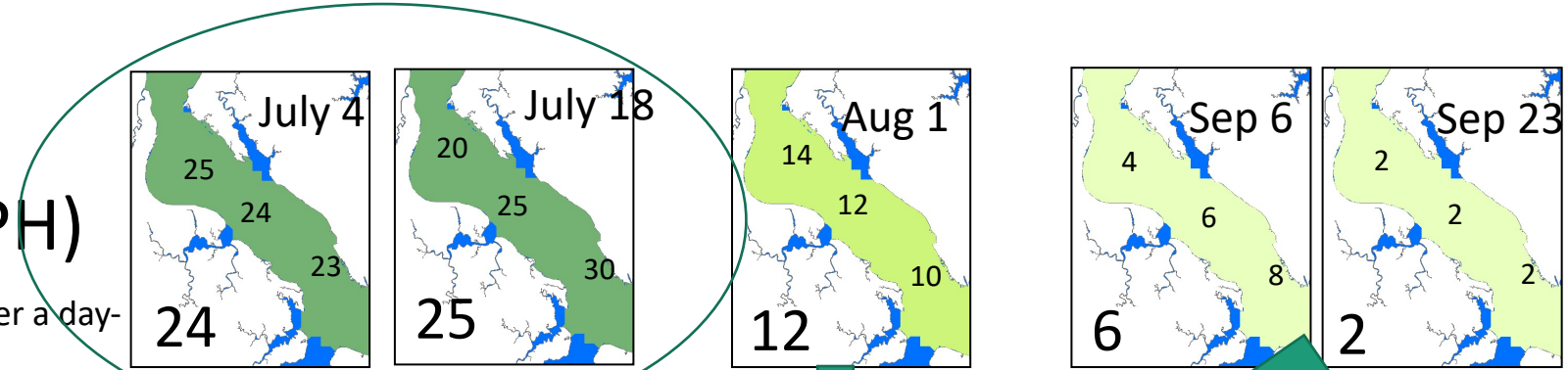
1-Month Median Criteria (TF segments)

(Daily values pooled over a month -MEDIAN)



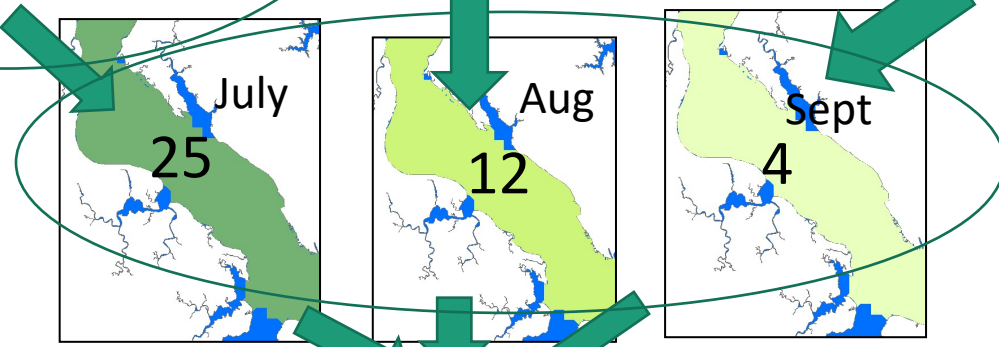
1-Day Median Criteria (MH and PH)

(Samples pooled over a day-
MEDIAN)



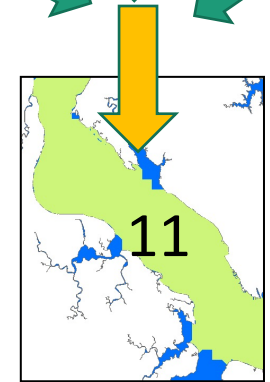
1-Month Median Criteria (TF segments)

(Daily values pooled over a month -MEDIAN)



Seasonal Mean Criteria (All JR segments)

(Monthly values pooled over a season -GEOMETRIC MEAN)



The status of the tidal James with respect to the updated chlorophyll criteria will be presented in the 2022 Integrated Report.

Questions?