

Review of Current Chesapeake Bay Water Clarity Assessment Methodology

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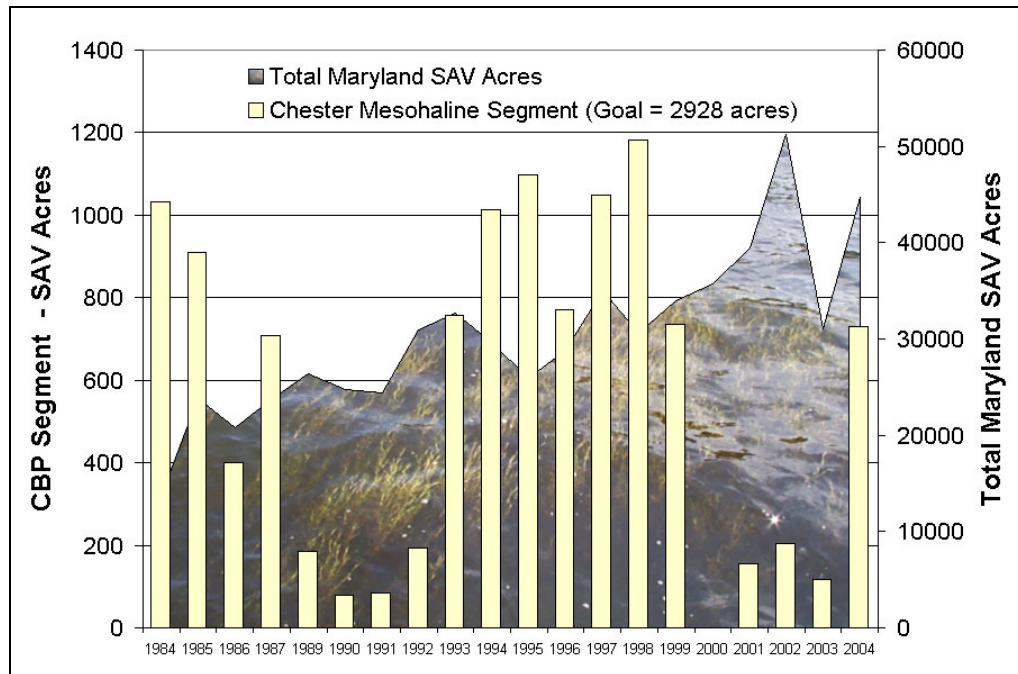


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Water clarity/SAV assessments are conducted biennially for each Chesapeake Bay segment, for the preceding three years.

Does a segment meet its SAV goal in any of the three years?
If yes, the segment **passes**.

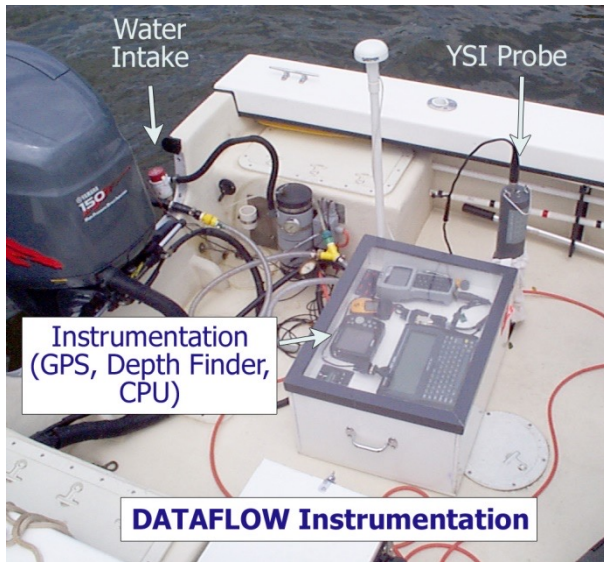
If a segment does not meet its SAV goal in any of the three years and surface mapping (DATAFLOW) water quality exists, a water clarity assessment is performed. If no data exists, the segment **fails**.



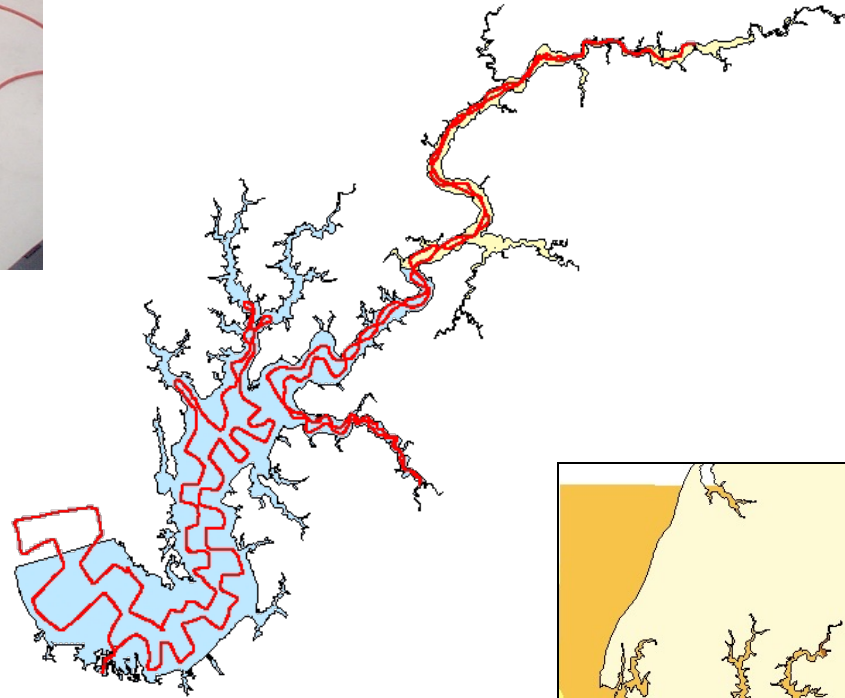
**CHSMH Goal =
2928 Acres**

**2004 Coverage=
731 Acres**

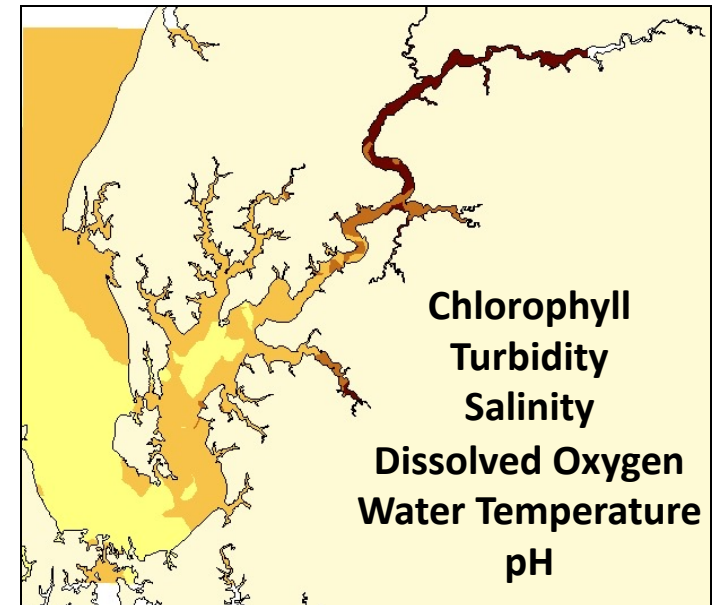
FAIL



DATAFLOW Mapping



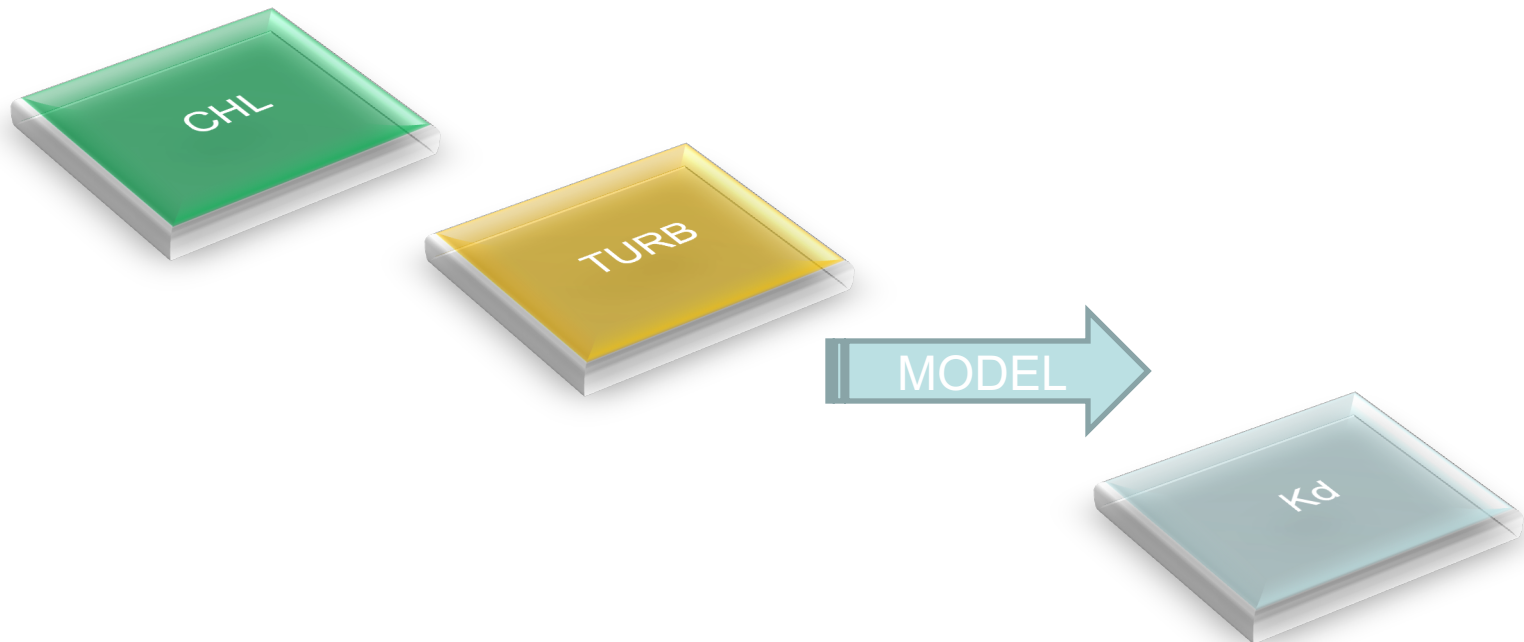
- Data collected near surface (~0.5m)
- Geolocated readings every 4 seconds
- Cruise tracks over nearshore & mid-channel
- Monthly cruises April - October
- Calibration sites with LICOR and profiles
- Conducted in tandem with continuous monitoring



Spatially and temporally coincident LICOR-derived Kd (light attenuation), turbidity and chlorophyll data, collected at DATAFLOW and continuous monitoring calibration stations, are used to derive models of Kd. Model coefficients are specific to month and segment.

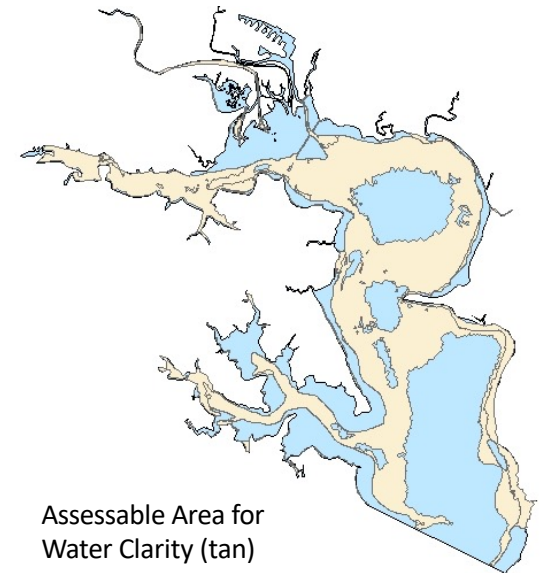
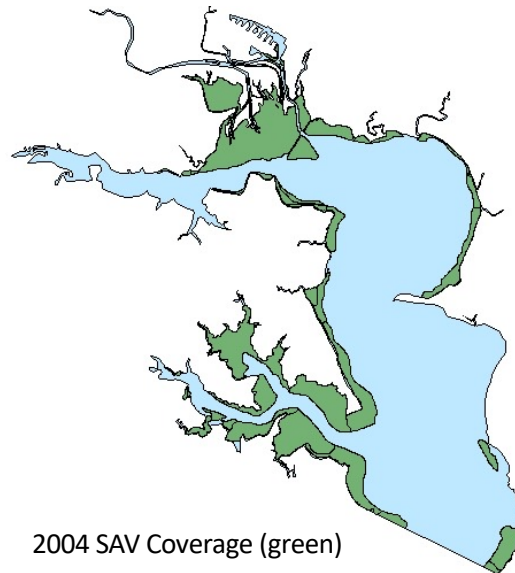
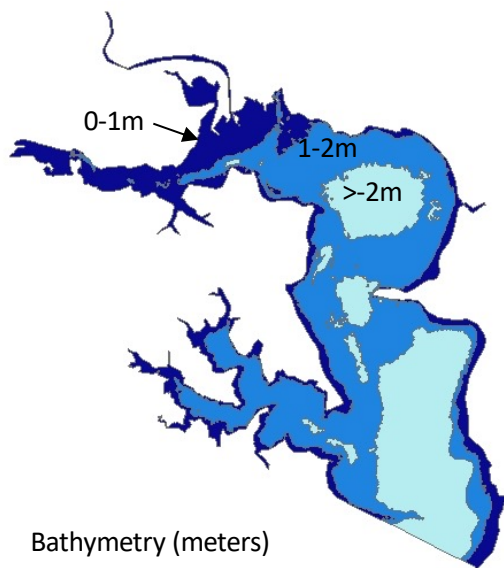
$$Kd = \underline{0.94018117} + (\underline{0.166222913} * (\text{turbidity}^{(1/1.25)})) + (\underline{0.019740392} * (\text{chlorophyll}))$$

Monthly DATAFLOW chlorophyll and turbidity data are spatially interpolated to a 25m² resolution. Map algebra is used to calculate the models and produce a monthly surface of Kd



The interpolated Kd surface is cropped to the segment shoreline.

Depths greater than 2 meters, areas with existing SAV for the assessment year, and SAV no-grow zones are excluded for the analysis.



No-grow zones are also excluded (not shown in graphic)

Total Kd acres that meet the clarity criteria are calculated for each cruise using the appropriate depth zone and PLL (percent light at leaf) requirements.

Kd Threshold

PLL	Zones	
	0-1m	1-2m
0.22	1.51	0.76
0.13	2.04	1.02

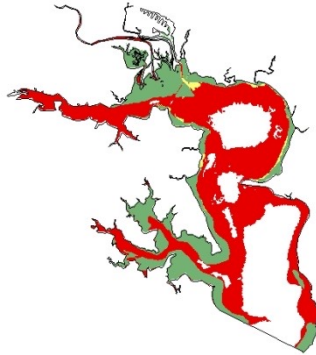
The passing Kd acreage totals for the seven monthly cruises in a year are averaged.

The annual average must exceed the following for the segment to pass:

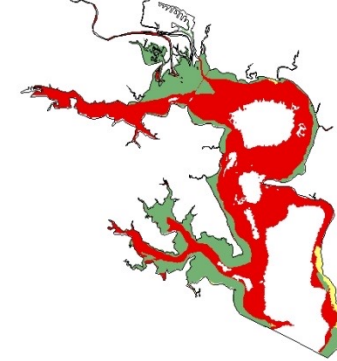
$$2.5((\text{Segment SAV goal}) - (\text{Existing SAV acreage}))$$



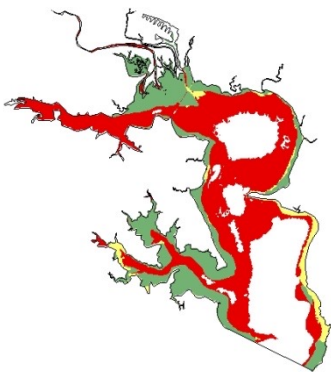
April 2004



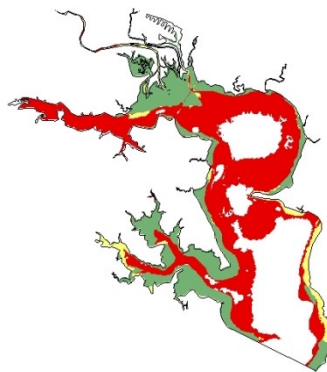
May 2004



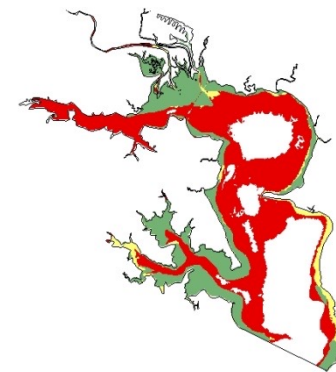
June 2004



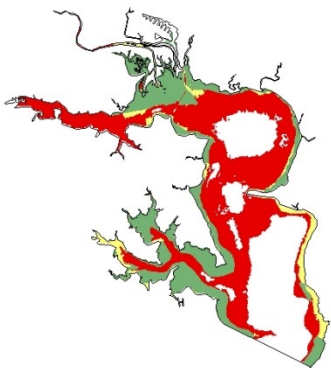
July 2004






Aug 2004



Sept. 2004



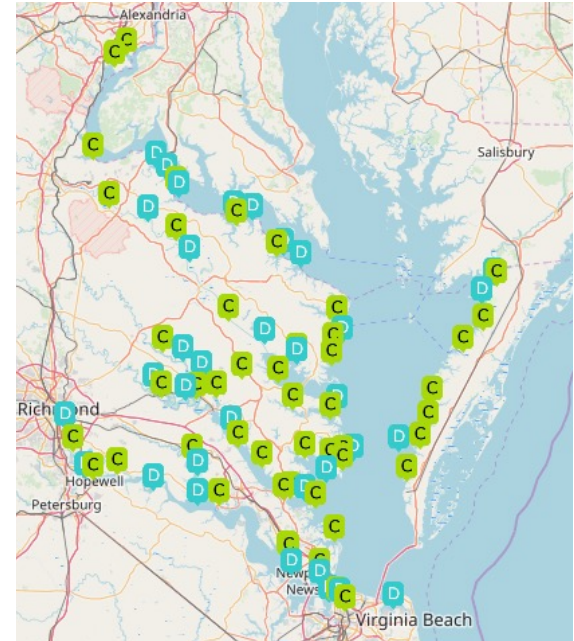
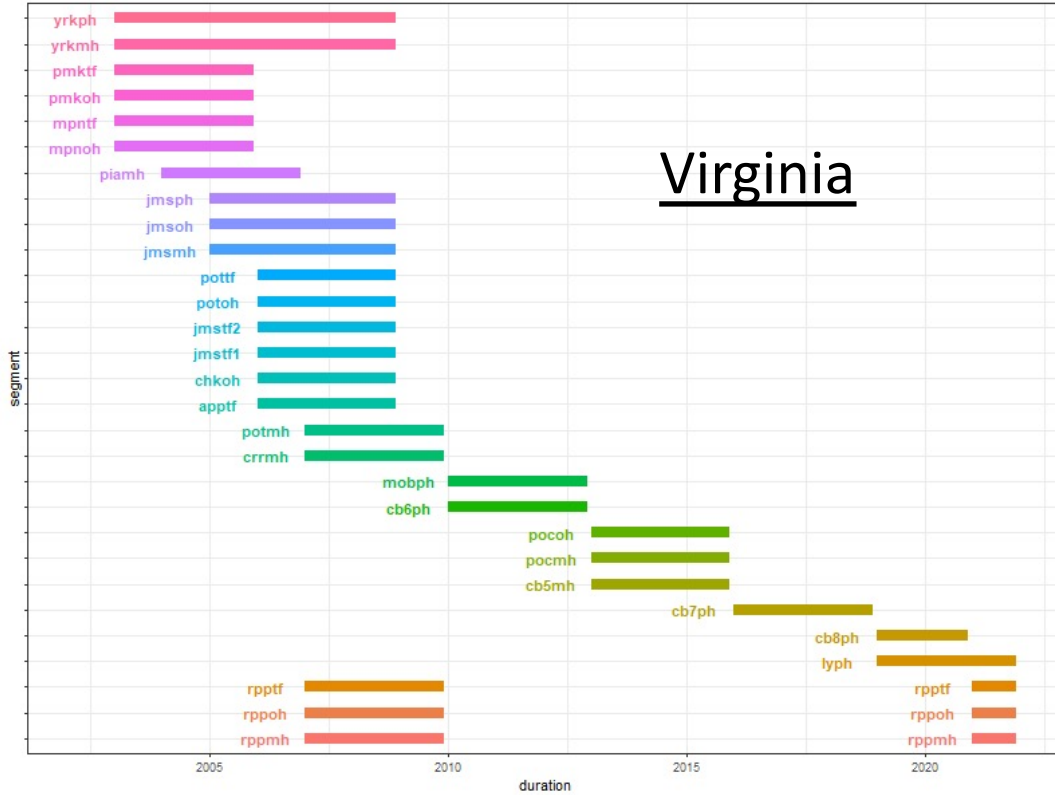
Oct. 2004

2004 SAV Acres		2392.1	GUNOH - 2004	
SAV Goal		2432		SAV acreage
(Goal-SAV Acres) * 2.5		99.75		Passes SAV light criteria
Average Water Clarity Acres		311.8		Fails SAV light criteria for shallow water

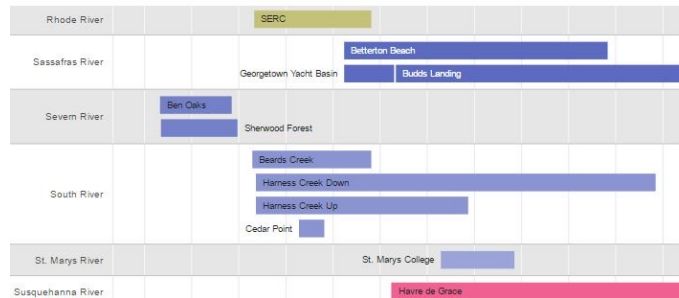
Methodology Challenges

- Segments with low goals like the Wicomico River can easily pass the water clarity acres goal by having one cruise with good clarity. (Goal 8 acres – Oct 2008 had 1886 acres pass)
- Segments with high SAV, but not meeting their goal, may not pass water clarity acres due to unmonitorable regions (upriver shallows of the Piscataway).
- Segments with high SAV goals and moderate/high SAV, may not pass water clarity acres due to insufficient remaining shallow water habitat due to the 2.5 multiplication factor. (CHOMH2, LCHMH, CHSMH, EASMH, CHOMH1, HNGMH, POTOH in 2006-2008 assessments)
- Segmentation may unrealistically affect assessment. The Rhode River has a large bay front section of shoreline that passes clarity, but may not be suitable SAV growth zone.
- Amount of habitat that passes in the 1-2 meter zone is woefully small across all segments.
- Temporal/spatial timing of clarity pass/fail is not considered.
- Calibration data may not capture the full range of data and therefore can produce models where no data could pass the criteria.

Assessment Timelines



Maryland



Attainment Summary

Virginia

- 27 segments monitored over ~ 20 years
- 15 segments meet standards based on SAV coverage or water clarity attainment
- 2 segments with no established goals (MPNOH, PMKOH)

Maryland

- 58 segments/subsegments assessed over ~ 20 years
- 10 segments meet standards based on water clarity assessment
- 26 segments did not meet standards based on water clarity assessment
- 14 segments passed on SAV goals
- 6 segments with no established goals
- 2 sub-segments in progress (Tangier Sound)
- Some segments may have passed the SAV goal in years that had failed SAV goals and where water clarity assessment was assessed.