

Water Clarity Assessments for 2008-2010

Maryland DNR is responsible for conducting water clarity assessments to determine if Maryland Chesapeake Bay segments ([Segment map via EPA Chesapeake Bay Program](#)) have an adequate light environment for submerged aquatic vegetation (SAV) to grow. The Virginia Institute of Marine Science (VIMS) conducts annual aerial surveys of the Bay to determine the SAV acreages in each segment ([VIMS SAV site](#)). If those segments don't pass their acreage goals and there are available water quality mapping data, water clarity is assessed to determine if there are enough acres that have suitable acres of clear water to support healthy SAV communities, but may be limited by seed sources or other factors. Visit documents at the EPA CBP site for the [technical methods for assessing water clarity](#) and more on the [science behind clarity and SAV](#).

Chesapeake Bay segments were analyzed for SAV/water clarity criteria acreage. The segments that met or surpassed their SAV goal are listed in Table 1.

Table 1.

Segment	Goal	Single Best Year Acreage(2008-10)	Best Year of SAV
BOHOH	354	546.9	2009
BSHOH	350	519.13	2008
C&DOH	7	15.74	2010
CB1TF1	754	1078.83	2009
CB1TF2	12149	14193.78	2008
CB2OH	705	745.46	2009
ELKOH1	1844	2070.16	2009
ELKOH2	190	475.29	2010
GUNOH2	572	1033.14	2009
MATTF	792	877.02	2008
NORTF	89	240.14	2009
POTOH1			
VA	1503	2939.92	2009
POTTF			
VA	2093	3684.26	2010
POTTF			
MD	2142	3150.75	2008
SASOH2	95	127.01	2010

Segments that failed to meet their SAV goal and had no applicable intensive monitoring data for assessment during the 2008-2010 period are listed in table 2.

Table 2.

Segment	Goal	Single Best Year Acreage(2008-10)	Best Year of SAV	Percentage of SAV Goal
BIGMH2	22.00	0.00	n/a	0.00%
CHSOH	77	0.00	n/a	0.00%
CHSTF	230	0.00	n/a	0.00%
NANMH	3.00	0.00	n/a	0.00%
NANOH	12.00	0.00	n/a	0.00%
PAXMH2	172.00	0.00	n/a	0.00%
PAXMH4	1.00	0.00	n/a	0.00%
PAXMH5	2.00	0.00	n/a	0.00%
POCOH	22.00	0.00	n/a	0.00%
RHDMH	60.00	0.00	n/a	0.00%
SOUMH	479.00	0.00	n/a	0.00%
WSTMH	238.00	0.00	n/a	0.00%
BACOH	340	0.02	2010	0.01%
CB4MH	2533	0.37	2009	0.01%
PAXMH1	1,459.00	39.64	2009	2.72%
CHSMH	2928	95.34	2009	3.26%
LCHMH	4,076.00	176.61	2009	4.33%
TANMH2	74.00	4.67	2009	6.31%
EASMH	6,209.00	473.24	2009	7.62%
MAGMH	579	89.65	2008	15.48%
POCMH MD	877.00	151.45	2010	17.27%
MANMH1	4,294.00	871.16	2010	20.29%
MANMH2	59.00	12.90	2010	21.86%
CB5MH MD	8,270.00	2,280.03	2009	27.57%
TANMH1 MD	24,683.00	7,912.93	2010	32.06%
GUNOH1	1860	857.03	2010	46.08%
BIGMH1	2,021.00	949.22	2010	46.97%
POCMH VA	4,066.00	1,932.50	2010	47.53%
SEVMH	455.00	311.24	2008	68.40%
FSBMH	197.00	147.20	2009	74.72%
PAXTF	205.00	164.03	2009	80.02%
PAXOH	115.00	101.74	2008	88.47%
MIDOH	879	826.68	2008	94.05%

Segments that have no SAV goal are listed in Table 3.

Table 3.

Segment	Goal	Single Best Year Acreage(2008-10)	Best Year of SAV
PAXMH3	0	0	no goal
PAXMH6	0	0	no goal
CHOTF	0	0	no goal
NANTF	0	0	no goal
WBRTF	0	0	no goal
POCTF	0	0	no goal

Water Clarity Acreage Assessment

The remaining thirteen segments consist of segments that failed their SAV goals, but had some portion of intensive monitoring data during 2008-2010 for assessment purposes. In order to pass the combined SAV/water clarity acres, the passing water clarity acres must be greater than or equal to the 2.5 times the SAV goal minus the single best year of SAV. Those passing water clarity acres must also be located outside of existing SAV and SAV no-grow areas and within the 2 to 0-meter bathymetric contours. Individual short discussions of the analysis and results are shown below as well as a summary table at the end (Table 4).

1. **CB3MH** – This is a large open water main Bay segment. Much of the shallow water in this segment is considered a no-grow zone. Data were analyzed for 2009 where SAV acreage was 234 acres out of a needed 1370 goal. Therefore, 2839 acres of passable water clarity were needed. The best month of chlorophyll and turbidity was October 2009, but it was atypical of the normal higher chlorophyll and turbidity conditions throughout the rest of the year. The assessment for October found 2830 acres of passable water clarity acres, falling just 9 acres short of the goal. An additional month (May 2009) which was more typical of average conditions was calculated and found to have only 794 acres passing for water clarity. Based on these results, the CB3MH segment **FAILS**.
2. **CHOOH** – The Choptank was sampled 2006-2008. The best cruise (October) for 2008 was assessed and 0 acres passed with no Kd values falling below the 2.1 KD value needed to pass in the shallowest 0-1 meter zone.
3. **CHOMH1**- May 2008 was analyzed. The water clarity goal to achieve for this segment is 19,309 or 91.4% of available shallow water habitat. Only 10,287 acres passed, solely in the 0-1 meter zone. With only 53% of the water clarity goal met in the best month, this segment **FAILS**.
4. **CHOMH2** – October 2008 was analyzed. The water clarity goal to achieve for this segment is 4053 or 2.5 times the SAV goal since zero acres were observed in the segment for 2008 (and previous years). Zero acres passed in the 1-2 meter zone and 1783 acres passed in the 0-1 meter zone. Only 44% of the water clarity goal was met in the best month, therefore, this segment **FAILS**.

5. **WICMH** – This segment was analyzed within the previous round of assessments for 2008. Only the October 2008 cruise was analyzed and 1886 acres passed. All remaining cruises could have 0 acres passing and the average of the seven available cruises would still **PASS** the meager clarity goal of 8 acres.
6. **HNGMH** – The Honga has a large area of SAV but is only 63% towards its SAV goal of 7761 acres. The best month of 2009 for chlorophyll and turbidity was September (9/23/2011). That best month was assessed and determined to have 0 acres of passable water clarity in the 1-2 meter zone and 5396 acres in the 0-1 meter zone which was short of the 7098 water clarity acres needed, so this segment **FAILS**.
7. **PATMH**-The Patapsco has a relatively small goal of 389 acres but only had 11.54 acres of SAV in 2009. 944 acres of acceptable water clarity acres are needed to pass. The available shallow water habitat, however is only about 3000 acres because a large percentage of the Patapsco in the harbor region is delineated as a no-grow zone. The best month in 2009 for chlorophyll and turbidity was April, but turbidity values were still generally above 15NTU. Less than 1 acre was found to have suitable habitat in April, so the segment **FAILS**.
8. **SASOH1** – This segment was assessed for 2009. A total of 662.5 acres of water clarity acres was needed to pass with only 929 acres of available shallow water habitat in 2009. Only 405 of those acres were in the 0-1 meter zone which is by far most likely to produce passing results. The best month for chlorophyll and turbidity was September 2009. The analysis of September’s data reveals 45 acres passed in the 1-2 meter zone and 398 acres passed in the 0-1 meter zone. The total of 443 acres means that only 67% of the water clarity was achieved in the best month, so this segment **FAILS**.
9. **PISOH** – This segment was analyzed in the previous round of assessments and the same conclusion holds true: “The Piscataway has an SAV goal which is very high in relation to its available shallow water habitat. The only portions of the river that do not have SAV are a small shallow channel down river and an inaccessible upriver portion. The portion of the channel assessed by DNR’s cruises represents only about 50 acres of 2 meter habitat and a total of 61 acres are needed. This segment technically **FAILS**, but could be considered as ‘**incomplete data**.’” See Figure 1.
10. **POTOH1** – This segment needed an average of 417.6 passing water clarity acres per month. The four best months were calculated and their sum (3242.5 acres) exceeded the 2923.2 total acres (417.6 acres * 7 months of sampling) needed to PASS. This segment **PASSES** the water clarity goal and was already at 88% of its SAV goal.

	1-2 meter zone	0-1 meter zone	Total
June 2008	129	222.9	351.9
July 2008	185.92	896.03	1082
August 2008	23.04	702.16	725.2
October 2008	57.56	1025.8	1083.4

11. **POTOH2**- This segment requires 218 passable water clarity acres with 1015 available acres of shallow water habitat. Analysis of the best month (October) of

chlorophyll and turbidity in 2008, only 57.6 acres passed. This segment **FAILS** the water clarity criteria.

12. **POTOH3** – This segment **FAILS** because the available shallow water area for assessment is 2419 acres and 2618 water clarity acres are needed to pass it.
13. **POTMH** – POTMH is a very large segment. As such calculating the Kd on the normal 25sq meter scale was computationally prohibitive. A resolution of 100sq meters was used for the analysis. The best year of SAV coverage was 2008 with 395.55 acres. The restoration goal is 7088 acres, therefore, 16,731 acres of passable water clarity need to be obtained. October was the best month for clarity and chlorophyll in 2008 and only 1521 acres passed in the 1-2 meter zone, and 11,720 acres passed in the 0-1 meter zone for a total of 13,241. This analysis was done without even excluding the existing 395.55 acres of SAV and the segment still fell short of its goal by 3,490 acres. This segment **FAILS** the water clarity criteria.

Figure 1.

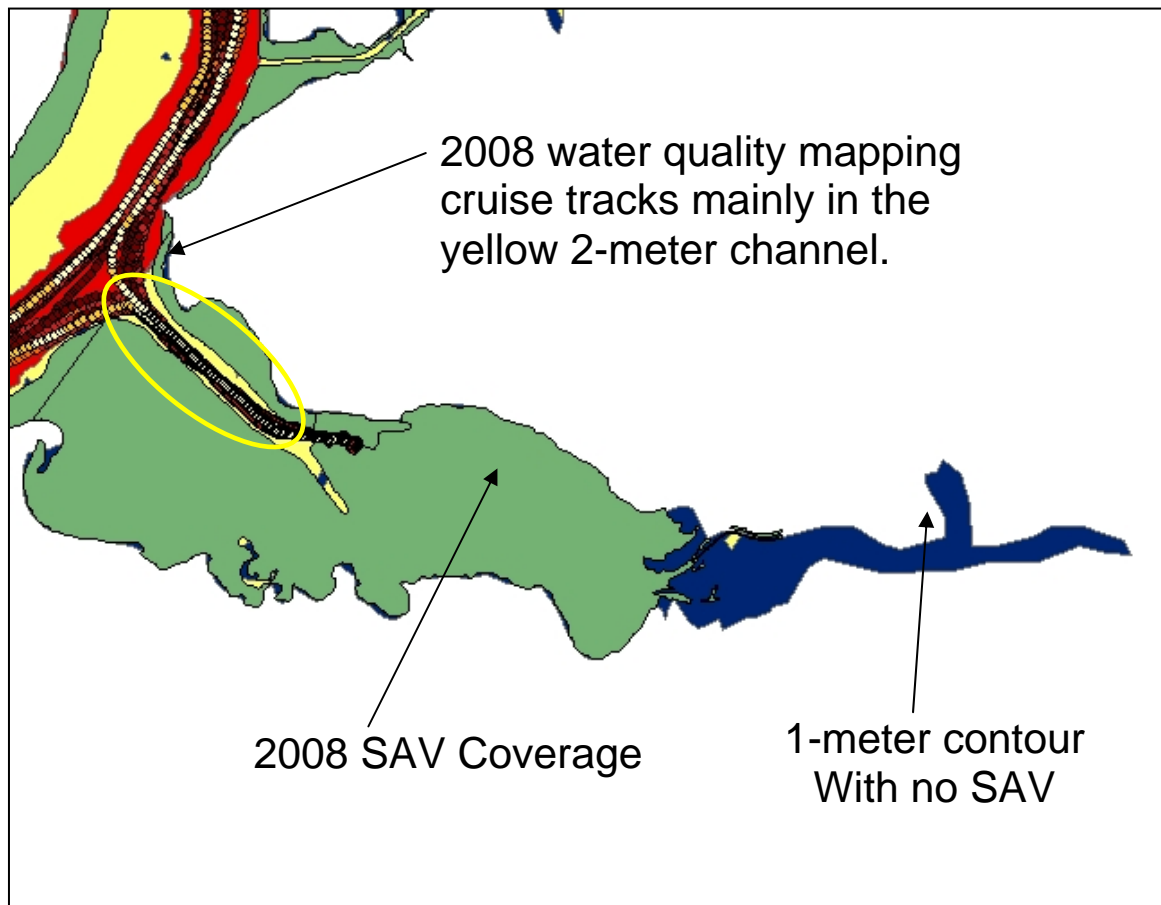


Table 4. Results of water clarity acres assessment.

Segment	Goal	Best Year SAV Acreage (2008-10) With DFLOW Data	Year Assessed	Average Clarity Needed	Final Assessment Result
CHOMH1	8,184	460.51	2008	19,309	Fail
CHOMH2	1,621	0	2008	4,053	Fail
SASOH1	1,073	808	2009	662.5	Fail
CBMH3	1,370	234.46	2009	2,839	Fail
CHOOH	72	0.0	2008	180	Fail
WICMH	3	0.0	2008	8	Pass
HNGMH	7761	4922	2009	7,098	Fail
PATMH	389	11.54	2009	944	Fail
PISTF	789	764.6	2008	61	Fail/Incomplete
POTOH1					Pass
MD	1,387	1,219.96	2008	417.6	
POTOH2	262	174.73	2008	218	Fail
POTOH3	1,153	105.73	2008	2,618	Fail
POTMH	7,088	395.55	2008	16,731	Fail

Report and assessment was produced by Mark Trice, Maryland DNR. December 22, 2011.

POTMH data analysis updated 1/24/2012. mtrice@dnr.state.md.us 410-260-8649