Developing a New Chesapeake Bay Water Quality Indicator for Tracking Progress toward Bay Water Quality Standards Achievement

Water Quality Goal Implementation Team Conference Call
November 13, 2012
Annapolis, MD

Liza Hernandez
University of Maryland Center for Environmental Science at the Chesapeake Bay Program Office

Chesapeake Bay Executive Order's Water Quality Outcome

- Meet water quality standards for dissolved oxygen, water clarity/underwater grasses and chlorophyll *a* in the Bay and tidal tributaries by implementing 100% of the pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025

- 60% of tidal segments attaining water quality standards by 2025

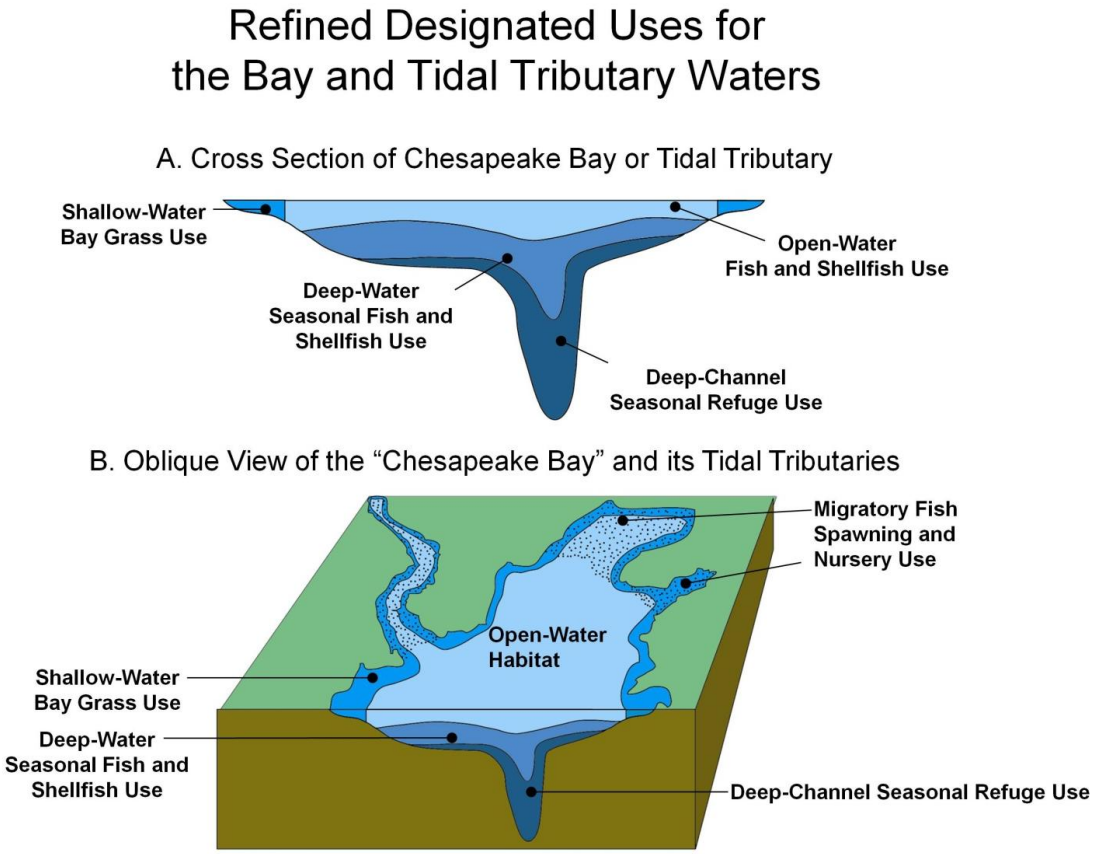
Chesapeake Bay Executive Order's Water Quality Outcome

- CBP Partnership needs to develop a combined indicator to measure progress towards the water quality outcome

- It could supplement or replace the individual dissolved oxygen, water clarity and chlorophyll *a* indicators currently reported by CBP

Designated Uses

- Unique combinations of water quality criteria applied to each of the five tidal water designated uses within each of the 92 tidal segments



Decisions…

1. How do we address the fact that the CBP Partnership has not fully developed, reached agreement on, published nor adopted into the tidal water jurisdictions' water quality standards regulations a full set of criteria assessment procedures for all the applicable dissolved oxygen criteria?

2. Do we take an area-based (or volume-based) approach vs. a count approach as the basis to reporting the water quality indicator?

Criteria Assessment Options

- Two options based on a count-approach
  - Difference between the options was directly related to Decision Question 1
- Recommendation:
  - For those designated use criteria where a full suite of dissolved oxygen criteria assessment procedures have not yet been agreed to by the Partnership, the segment is considered to be in non-attainment for that specific tidal water designated use

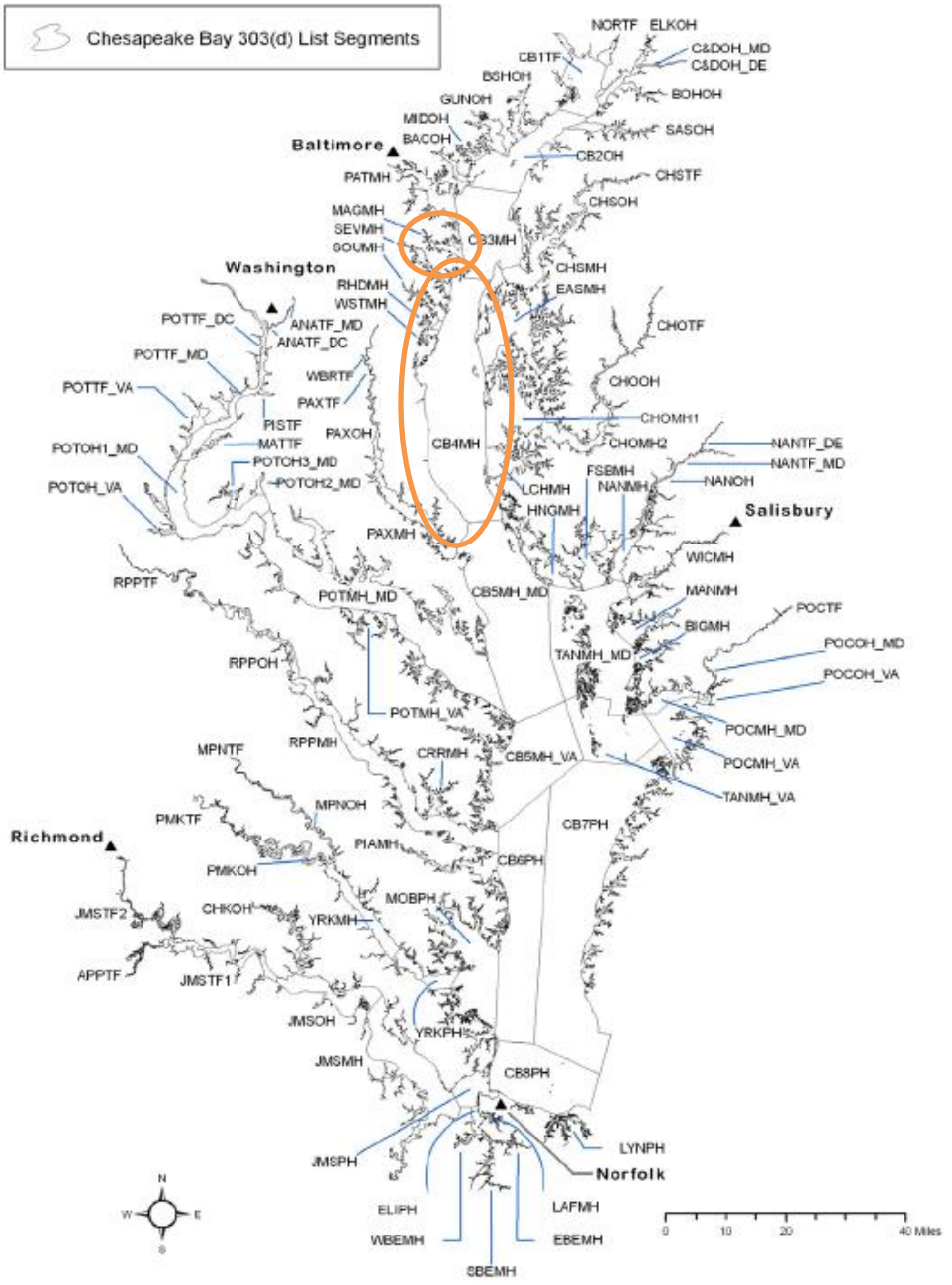
Attainment Accounting Options

1. Count-approach
   - Weighs segments equally
   - Does not provide an honest measure of how much of the Bay tidal waters are achieving water quality standards

COUNT APPROACH			
289 Designated Use Segments (making up the 92 CBP Segmentation Scheme)			
Designated Use	Total# DU Segments	# DU Segments IN ATTAINMENT	% in Attainment
Migratory Fish Spawning and Nursery	72	0	0
Open Water - DO	92	0	0
Open Water CHLA (spring + summer)	7	0	0
Deep Water - DO	10	1	10
Deep Channel - DO	18	0	0
Shallow-Water Bay Grasses - SAV/Water Clarity	90	27	30
Baywide Percentage of WQS Attainment	**289**	**28**	**10**

Attainment Accounting Options

2. Weighted-approach
   - Considers segment size differences (i.e., Magothy River vs. Middle Central Chesapeake Bay)
   - Area- vs. volume-based?



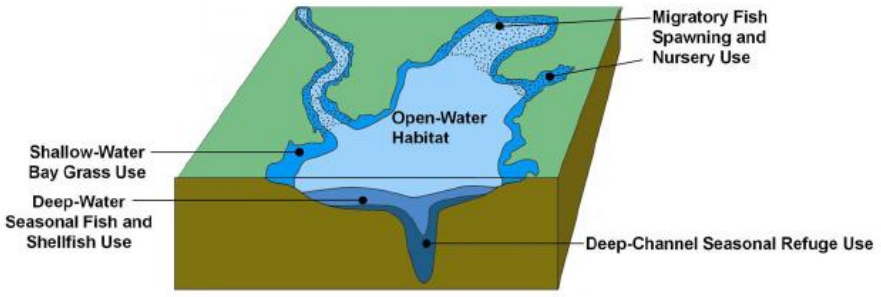
Calculating Segment Level Percent Attainment: (SA in attainment ÷ Total SA) * 100

CB4MH

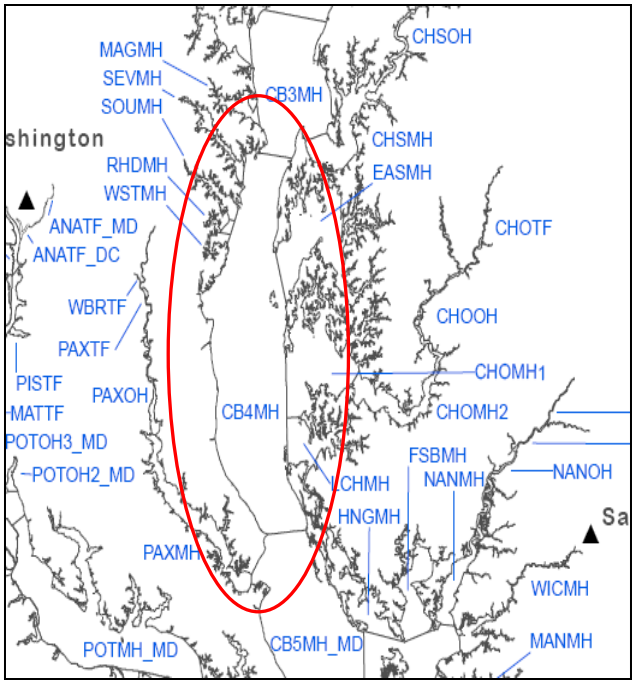
Segment surface area (SA) = 908,847,238.56 km²

Applicable Designated Uses (DU):

- ✓ Migratory Fish Spawning and Nursery
- ✓ Open Water
- ✓ Deep Water
- ✓ Deep Channel
- ✓ Shallow Water Bay Grasses



DU	Total SA (km²)	Attainment Status	SA in Attainment (km²)
MSN	908,847,238.56	No	0.00
OW	908,847,238.56	No	0.00
DW	908,847,238.56	No	0.00
DC	908,847,238.56	No	0.00
SW	908,847,238.56	No	0.00
Total	**4,544,236,193.00**	---	**0.00**
Percent Attainment for CB4MH			**0.00 %**



Calculating Segment Level Percent Attainment: (SA in attainment ÷ Total SA) * 100

GUNOH

Segment surface area (SA) = 41,597,124.45 km²

Applicable Designated Uses (DU):

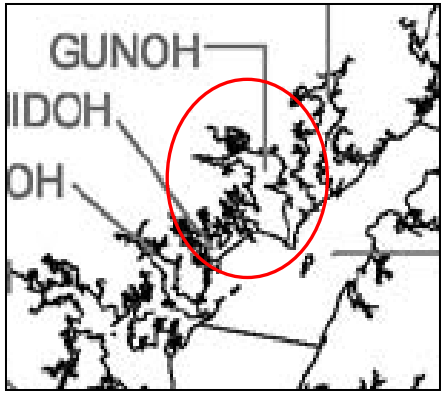
✓ Migratory Fish Spawning and Nursery

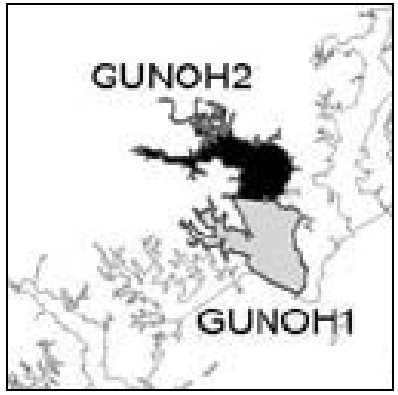
✓ Open Water

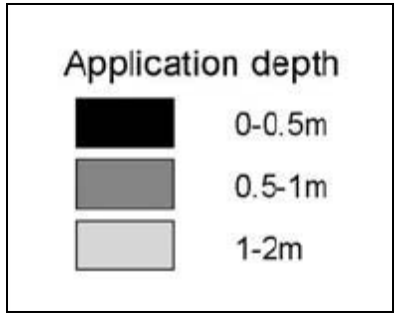
✓ Shallow Water Bay Grasses

GUNOH1 → SA = 22,936,790.65 km²

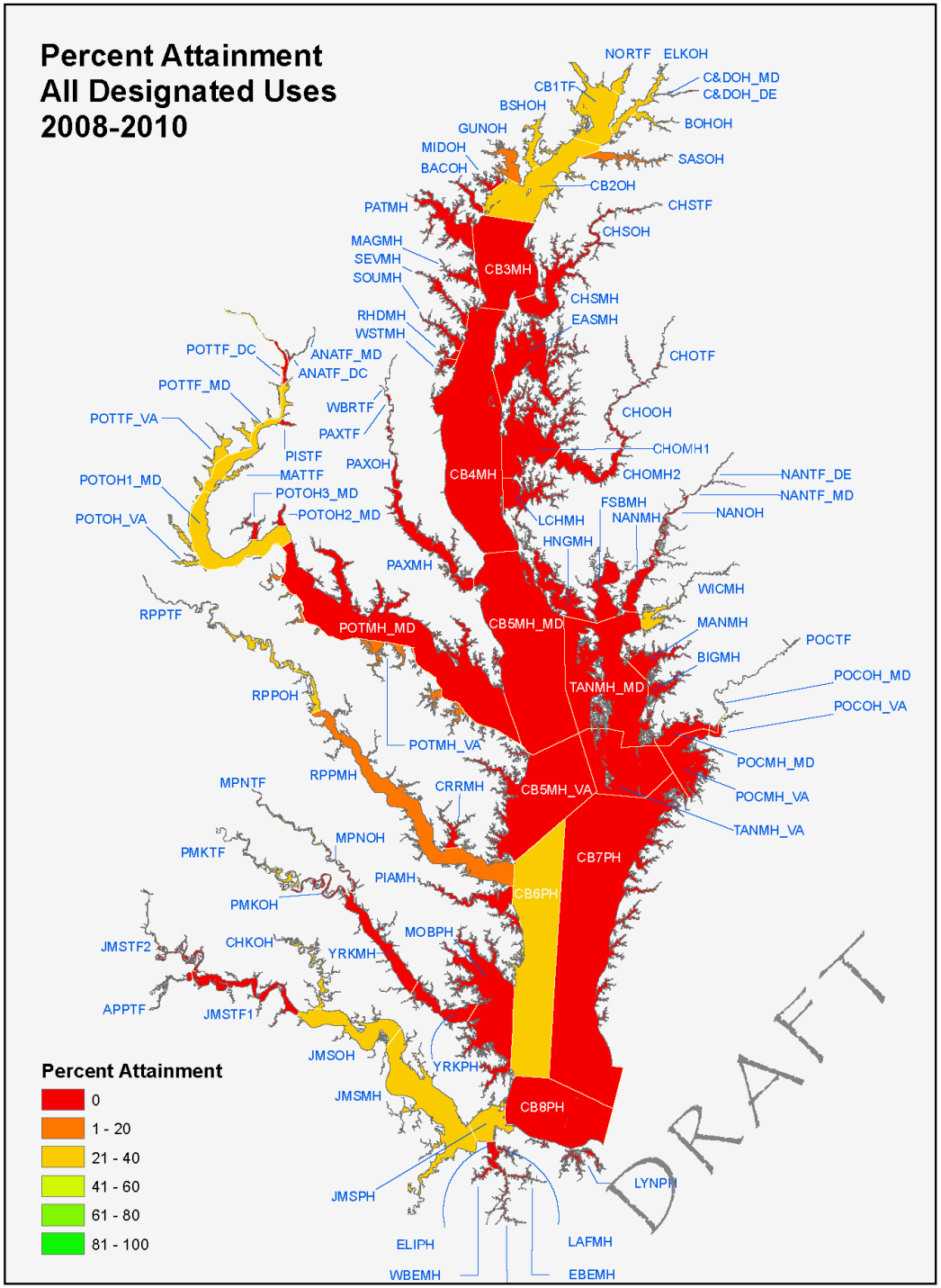
GUNOH2 → SA = 18,660,333.79 km²







DU	Total SA (km²)	Attainment Status	SA in Attainment (km²)
MSN	41,597,124.45	No	0.00
OW	41,597,124.45	No	0.00
SW – Split Segments ----------			
GUNOH1	22,936,790.65	No	0.00
GUNOH2	18,660,333.79	Yes	18,660,333.79
Total	**124,791,373.35**	---	**18,660,333.79**
Percent Attainment for GUNOH			**14.95 %**


Percent Attainment
All Designated Uses
2008-2010
NORTF
ELKOH
C&DOH_MD
C&DOH_DE
CB1TF
BSHOH
BOHOH
GUNOH
MIDOH
SASOH
BACOH
CB2OH
PATMH
CHSTF
CHSOH
MAGMH
SEVMH
CB3MH
SOUMH
CHSMH
RHDMH
EASMH
WSTMH
CHOTF
POTTF_DC
ANATF_MD
ANATF_DC
POTTF_MD
WBRTF
CHOOH
POTTF_VA
PAXTF
CHOMH1
PISTF
PAXOH
CB4MH
CHOMH2
NANTF_DE
POTOH1_MD
MATTF
NANTF_MD
POTOH3_MD
FSBMH
POTOH_VA
POTOH2_MD
LCHMH
NANMH
NANOH
HNGMH
PAXMH
WICMH
RPPTF
POTMH_MD
CB5MH_MD
MANMH
POCTF
BIGMH
TANMH_MD
POCOH_MD
RPPOH
POCOH_VA
POTMH_VA
POCMH_MD
RPPMH
MPNTF
CRRMH
CB5MH_VA
POCMH_VA
TANMH_VA
MPNOH
CB7PH
PMKTF
PIAMH
CB6PH
PMKOH
MOBPH
JMSTF2
CHKOH
YRKMH
APPTF
JMSTF1
JMSOH
YRKPH
JMSMH
CB8PH
LYNPH
JMSPH
ELIPH
LAFMH
WBEMH
EBEMH
Percent Attainment
0
1 - 20
21 - 40
41 - 60
61 - 80
81 - 100
DRAFT

Calculating Baywide Percent Attainment: (Σ SA in attainment ÷ Σ Total SA) * 100

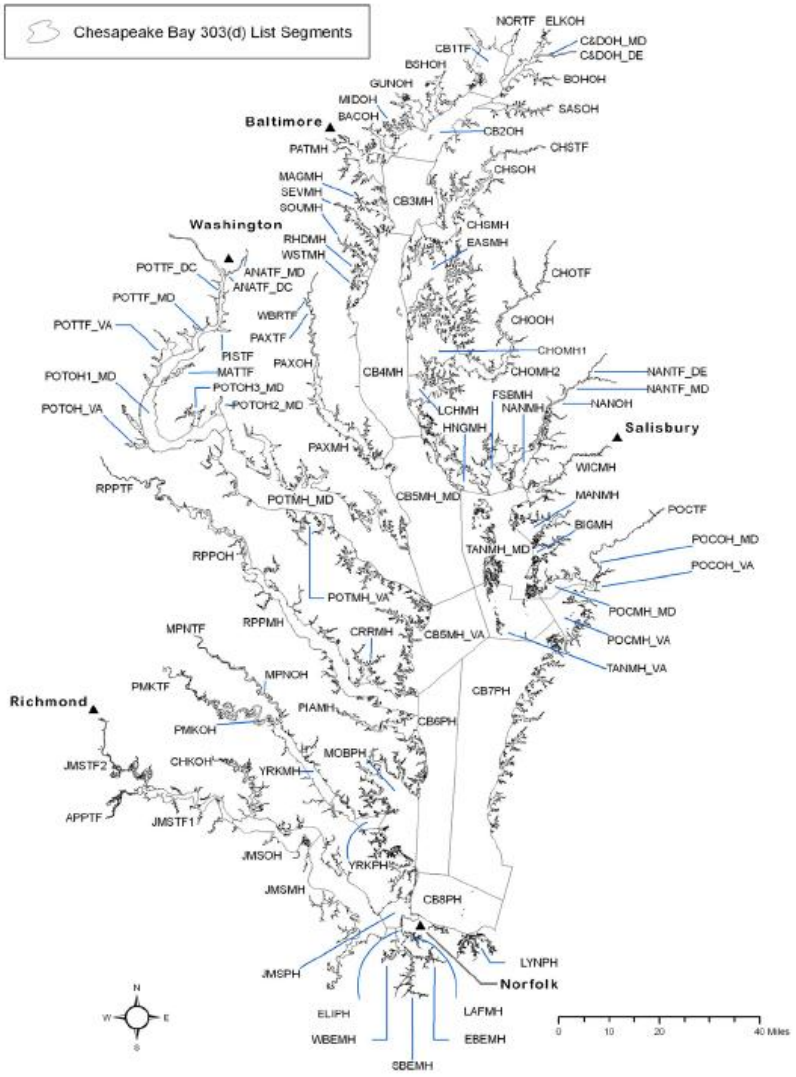
All Segments Combined

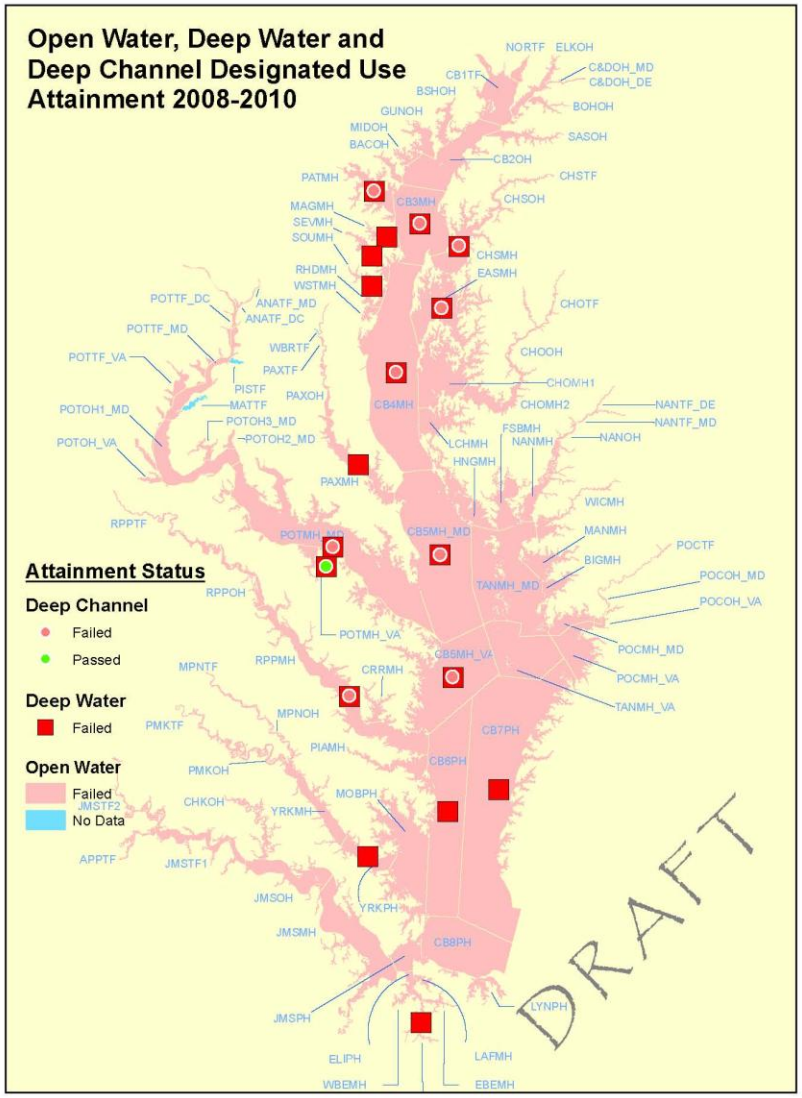
Σ surface area (SA) of each segment's applicable designated use and criteria = 40,740,997,335.07 km²

Designated Uses (DU) and Criteria:

- ✓ Migratory Fish Spawning and Nursery
- ✓ Open Water
- ✓ Deep Water
- ✓ Deep Channel
- ✓ Shallow Water Bay Grasses
- ✓ Chlorophyll-a

DU	Σ SA of DU Segments & Criteria (km²)	Σ SA of DU Segments & Criteria in Attainment (km²)
MSN	5,565,101,169.36	0.00
OW	11,660,174,083.95	0.00
Chl-a	620,327,627.29	0.00
DW	6,932,558,324.18	0.00
DC	4,404,190,644.45	83,660,695.00
SW	11,558,645,485.84	2,616,220,341.04
Total	**40,740,997,335.07**	**2,699,881,036.04**
BAYWIDE Percent Attainment		**7%**




Open Water, Deep Water and
Deep Channel Designated Use
Attainment 2008-2010
NORTF
ELKOH
C&DOH_MD
C&DOH_DE
CB1TF
BSHOH
BOHOH
GUNOH
MIDOH
SASOH
BACOH
CB2OH
PATMH
CHSTF
CHSOH
MAGMH
CB3MH
SEVMH
SOUMH
CHSMH
EASMH
RHDMH
WSTMH
CHOTF
POTTF_DC
ANATF_MD
ANATF_DC
POTTF_MD
WBRTF
CHOOH
POTTF_VA
PAXTF
CHOMH1
PISTF
PAXOH
CB4MH
CHOMH2
NANTF_DE
POTOH1_MD
MATTF
NANTF_MD
POTOH3_MD
FSBMH
POTOH_VA
POTOH2_MD
LCHMH
NANMH
NANOH
HNGMH
PAXMH
WICMH
RPPTF
MANMH
POTMH_MD
CB5MH_MD
POCTF
BIGMH
TANMH_MD
POCOH_MD
RPPOH
POCOH_VA
POTMH_VA
CB5MH_VA
POCMH_MD
MPNTF
RPPMH
CRRMH
POCMH_VA
TANMH_VA
MPNOH
CB7PH
PMKTF
PIAMH
CB6PH
PMKOH
MOBPH
CHKOH
YRKMH
JMSTF2
APPTF
JMSTF1
JMSOH
YRKPH
JMSMH
CB8PH
JMSPH
LYNPH
ELIPH
LAFMH
WBEMH
EBEMH
Attainment Status
Deep Channel
Failed
Passed
Deep Water
Failed
Open Water
Failed
No Data
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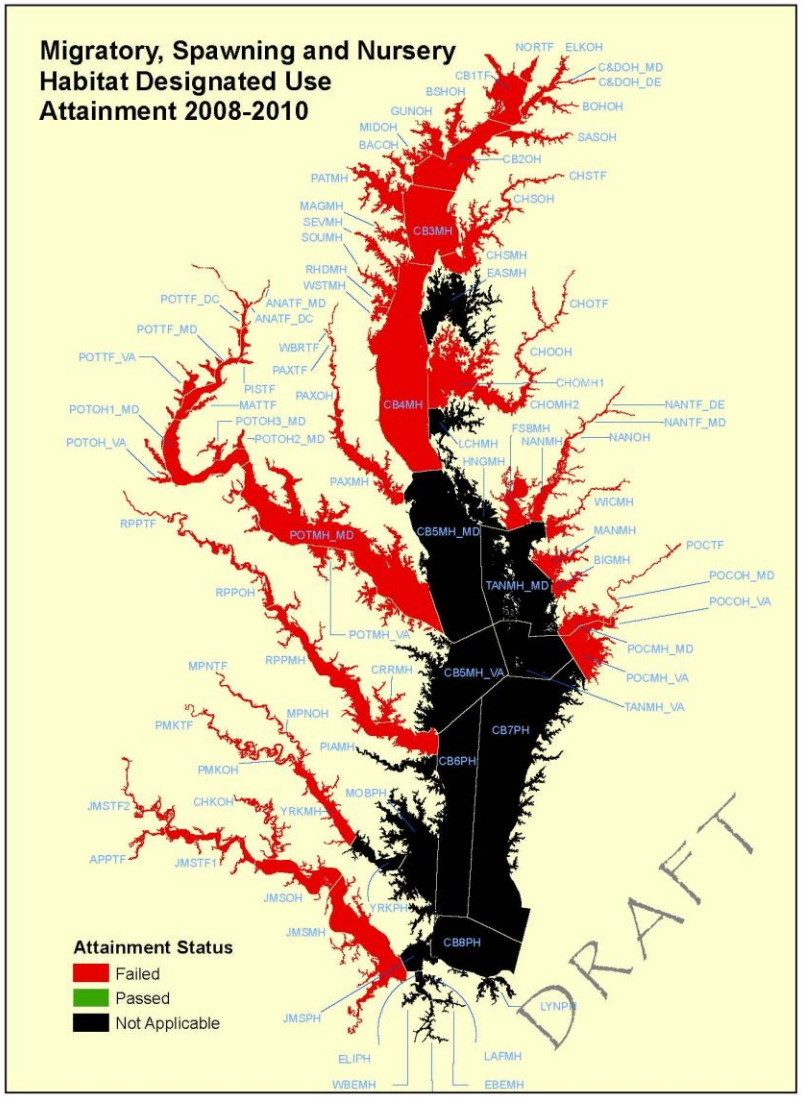
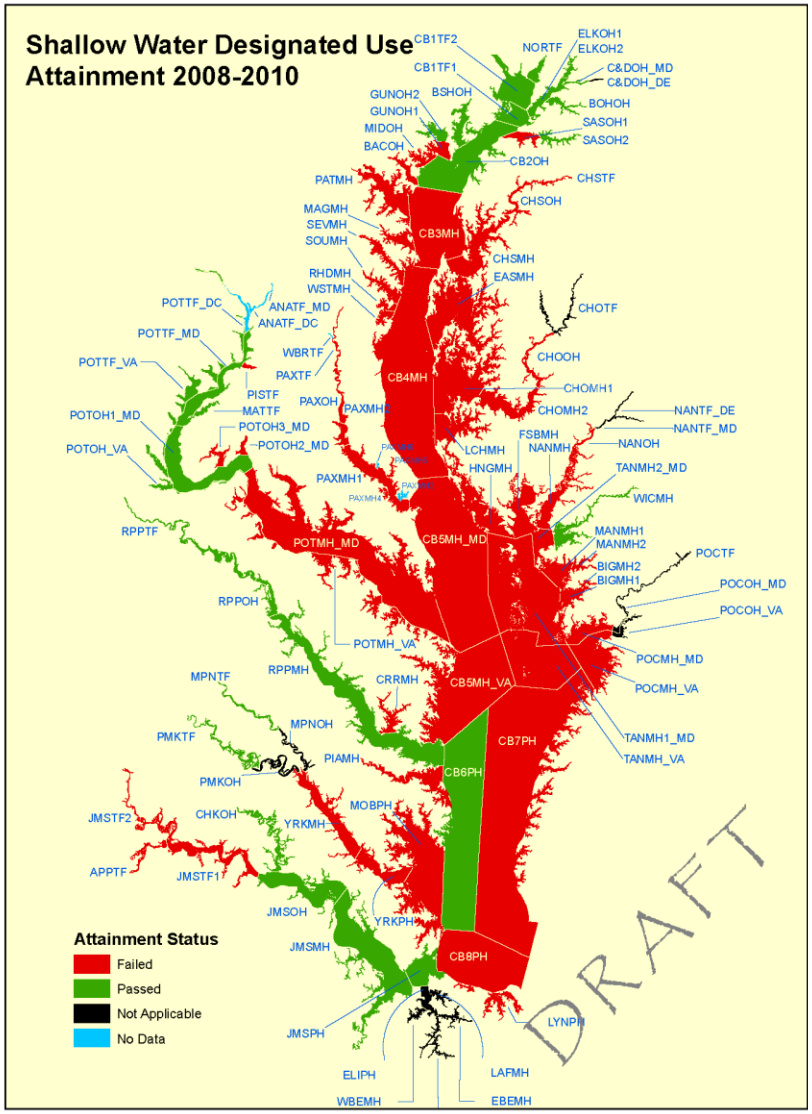
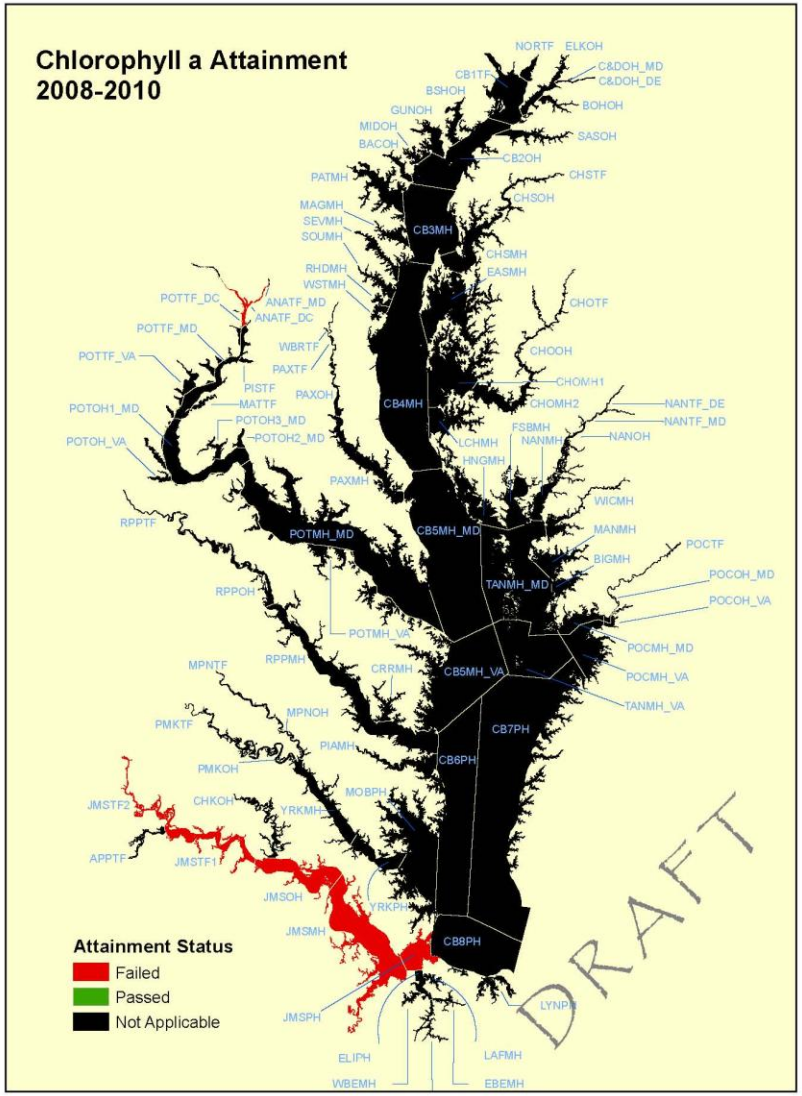

Migratory, Spawning and Nursery
Habitat Designated Use
Attainment 2008-2010
NORTF
ELKOH
C&DOH_MD
C&DOH_DE
CB1TF
BSHOH
BOHOH
GUNOH
MIDOH
SASOH
BACOH
CB2OH
PATMH
CHSTF
CHSOH
MAGMH
CB3MH
SEVMH
SOUMH
CHSMH
EASMH
RHDMH
WSTMH
CHOTF
POTTF_DC
ANATF_MD
ANATF_DC
POTTF_MD
WBRTF
CHOOH
POTTF_VA
PAXTF
CHOMH1
PISTF
PAXOH
CB4MH
CHOMH2
NANTF_DE
POTOH1_MD
MATTF
NANTF_MD
POTOH3_MD
FSBMH
POTOH_VA
POTOH2_MD
LCHMH
NANMH
NANOH
HNGMH
PAXMH
WICMH
RPPTF
MANMH
POTMH_MD
CB5MH_MD
POCTF
BIGMH
TANMH_MD
POCOH_MD
RPPOH
POCOH_VA
POTMH_VA
CB5MH_VA
POCMH_MD
MPNTF
RPPMH
CRRMH
POCMH_VA
TANMH_VA
MPNOH
CB7PH
PMKTF
PIAMH
CB6PH
PMKOH
MOBPH
CHKOH
YRKMH
JMSTF2
APPTF
JMSTF1
JMSOH
YRKPH
JMSMH
CB8PH
JMSPH
LYNPH
ELIPH
LAFMH
WBEMH
EBEMH
Attainment Status
Failed
Passed
Not Applicable
DRAFT


Shallow Water Designated Use
Attainment 2008-2010
CB1TF2
CB1TF1
GUNOH2
GUNOH1
MIDOH
BACOH
BSHOH
NORTF
ELKOH1
ELKOH2
C&DOH_MD
C&DOH_DE
BOHOH
SASOH1
SASOH2
CB2OH
PATMH
CHSTF
CHSOH
MAGMH
SEVMH
SOUMH
CB3MH
CHSMH
EASMH
RHDMH
WSTMH
CHOTF
POTTF_DC
ANATF_MD
ANATF_DC
POTTF_MD
WBRTF
POTTF_VA
PAXTF
CHOOH
CB4MH
PISTF
PAXOH
MATTF
CHOMH1
CHOMH2
NANTF_DE
NANTF_MD
POTOH1_MD
POTOH3_MD
POTOH_VA
POTOH2_MD
FSBMH
NANMH
NANOH
LCHMH
HNGMH
TANMH2_MD
PAXMH1
WICMH
RPPTF
POTMH_MD
CB5MH_MD
MANMH1
MANMH2
POCTF
BIGMH2
BIGMH1
POCOH_MD
RPPOH
POCOH_VA
POTMH_VA
POCMH_MD
RPPMH
MPNTF
CRRMH
CB5MH_VA
POCMH_VA
MPNOH
TANMH1_MD
PMKTF
CB7PH
TANMH_VA
PIAMH
CB6PH
PMKOH
MOBPH
JMSTF2
CHKOH
YRKMH
APPTF
JMSTF1
JMSOH
YRKPH
JMSMH
CB8PH
LYNPH
JMSPH
ELIPH
LAFMH
WBEMH
EBEMH
Attainment Status
Failed
Passed
Not Applicable
No Data
DRAFT


Chlorophyll a Attainment
2008-2010
NORTF
ELKOH
CB1TF
C&DOH_MD
C&DOH_DE
BSHOH
BOHOH
GUNOH
MIDOH
SASOH
BACOH
CB2OH
PATMH
CHSTF
CHSOH
MAGMH
SEVMH
SOUMH
CB3MH
CHSMH
EASMH
RHDMH
WSTMH
CHOTF
POTTF_DC
ANATF_MD
ANATF_DC
POTTF_MD
WBRTF
POTTF_VA
PAXTF
CHOOH
PISTF
CHOMH1
PAXOH
MATTF
CB4MH
CHOMH2
NANTF_DE
NANTF_MD
POTOH1_MD
POTOH3_MD
POTOH_VA
POTOH2_MD
FSBMH
NANMH
NANOH
LCHMH
HNGMH
PAXMH
WICMH
RPPTF
POTMH_MD
CB5MH_MD
MANMH
POCTF
BIGMH
TANMH_MD
POCOH_MD
RPPOH
POCOH_VA
POTMH_VA
POCMH_MD
RPPMH
MPNTF
CRRMH
CB5MH_VA
POCMH_VA
TANMH_VA
MPNOH
PMKTF
CB7PH
PIAMH
CB6PH
PMKOH
MOBPH
JMSTF2
CHKOH
YRKMH
APPTF
JMSTF1
JMSOH
YRKPH
JMSMH
CB8PH
LYNPH
JMSPH
ELIPH
LAFMH
WBEMH
EBEMH
Attainment Status
Failed
Passed
Not Applicable
DRAFT

Indicator Recommendations

- Based on an accounting of attainment of all Bay water quality criteria applicable to the 289 number of designated-use segments
- Reported annually as a baywide percentage based on a weighted-approach
- Where a full suite of dissolved oxygen assessment procedures have not been agreed to by the Partnership, those respective designated use segments where these dissolved oxygen criteria apply will be considered to be in non-attainment
- The indicator will be graphically illustrated

Commitment by Partnership

- By 2015, EPA and its seven jurisdictional partners are committed to working collaboratively on developing, subjecting to independent scientific peer review, agreeing to, and then publishing criteria assessment procedures for the remaining dissolved oxygen criteria currently without Partnership approved assessment procedures.

Recommended Next Steps

- Work up a refined set of visual illustrations of the indicator and work to address any comments/ concerns raised by WQGIT members.

- Work through the CAP Workgroup and: 1) bring forward a recommend suite of approaches to illustrating the results of this water quality indicator, 2) seek final WQGIT review at the January 14, 2013 WQGIT conference call, and 3) ask for approval to bring the new indicator forward to the Management Board for final Partnership adoption.