Appendix M.
Chesapeake Bay Water Quality/Sediment Transport Model Management Scenario Criteria
Attainment Assessment Results and 2008 303(d) List Assessment Results

This appendix presents the Chesapeake Bay water quality criteria attainment assessment results of various Chesapeake Bay Water Quality and Sediment Transport Model (Bay Water Quality Model) management scenarios in the stoplight format used by the U.S. Environmental Protection Agency and its partner jurisdictions in developing the Chesapeake Bay TMDL. The stoplight spreadsheets summarize the percentage of space and time exceeding the four Bay jurisdictions' water quality criteria for each of the 92 Chesapeake Bay segments. The spreadsheets are produced from an assessment of Bay Water Quality Model outputs and Bay water quality monitoring data as described in Sections 6.2.4 and 6.4.4. The spreadsheets were used to evaluate whether a management scenario met all applicable criteria across all designated use-segments. Green highlighted percentages represent attainment of the applicable water quality standards. Red highlighted percentages represent a violation or an exceedance of applicable water quality standards. The assessment results provided in this appendix are in three spreadsheets:

- Appendix M-1: Chesapeake Bay Dissolved Oxygen Criteria Attainment Assessment Results (AppendixM1_DO_Stoplight.xls)

- Appendix M-2: Chesapeake Bay Chlorophyll *a* Criteria Attainment Assessment Results (AppendixM2_Chlor_Stoplight.xls)

- Appendix M-3: Chesapeake Bay SAV/Water Clarity Criteria Attainment Assessment Results (AppendixM3_SAV-Clarity_Stoplight.xls)

The loading values in appendices M-1 and M-2 were derived in one of two ways. Loading values for the 1985 Scenario, 2009 Scenario, Tributary Strategy, and E3 2010 Scenario were derived from explicit management scenarios and described further in Appendix J. Loading values for the remaining scenarios were calculated as ratios of existing management scenarios to achieve particular basinwide loading targets.

This appendix also contains the Chesapeake Bay segments 2008 303(d) list assessment results spreadsheet.

Interpreting the Spreadsheets

Appendix M-1: Chesapeake Bay Dissolved Oxygen Criteria Attainment Assessment Results

The dissolved oxygen water quality criteria stoplight plots describe the degree of nonattainment (as percent of volume and time) of dissolved oxygen water quality criteria for each Chesapeake Bay segment by designated use criteria. The dissolved oxygen criteria attainment assessment results are based on assessing the open-water 30-day mean, deep-water 30-day mean, and deep-channel instantaneous minimum criteria during the June 1 through September 30 summer period (see Table 3-4 in Section 3.1.2). The green highlighted percentages represent attainment of the applicable dissolved oxygen criterion. The red highlighted percentages represent nonattainment of dissolved oxygen criterion. The rows show the percent nonattainment by Bay segment. The

columns show the percent nonattainment by the respective Bay Water Quality Model scenario and are listed from left to right in descending order of loading values for total nitrogen (TN), total phosphorous (TP), and total suspended solids (TSS). The Bay Water Quality scenarios are grouped by 3-year water quality model assessment windows and are ordered chronologically. The Bay Water Quality Model scenarios marked with an asterisk (*) had loading values derived from the key management scenario spreadsheets (see Appendix J). All other scenarios' loading values were calculated as ratios of existing management scenarios to achieve particular basinwide loading targets. The critical period for the Chesapeake Bay TMDL was selected as 1993–1995 for assessment of the dissolved oxygen criteria (see Section 6.2.1).

Appendix M-2: Chesapeake Bay Chlorophyll a Criteria Attainment Assessment Results

The chlorophyll *a* water quality criteria stoplight plots show the percent nonattainment of chlorophyll *a* (CL) criteria by two periods: CL Spring Seasonal (March 1 through May 31) and CL Summer Seasonal (July 1 through September 30). The green highlighted percentages represent attainment of chlorophyll *a* criteria. The red highlighted percentages represent nonattainment of chlorophyll *a* criteria. The rows show percent nonattainment by Bay segment. The columns show the percent attainment by Bay Water Quality Model scenario and are listed from left to right in descending order by loading values for TN and TP. The Bay Water Quality Model scenarios are grouped by 3-year water quality model assessment windows and are ordered chronologically. For the allocation scenarios specific to the James River Basin, loading values were calculated as ratios of existing management scenarios to achieve particular loading targets. Analyses failed to identify a critical period for the chlorophyll *a* water quality criteria, so all 3-year periods had equal weight in the Bay TMDL assessment (see Section 6.2.1).

Appendix M-3: Chesapeake Bay SAV/Water Clarity Criteria Attainment Assessment Results

The submerged aquatic vegetation (SAV)/water clarity stoplight spreadsheets describe the degree of nonattainment (as percent of SAV acreage + water clarity acres—see Section 6.4.4 and Appendix P) of SAV/water clarity criteria for each of the Bay segments assigned a shallow-water bay grass designated use. The green highlighted percentages represent the percent nonattainment of SAV/water clarity criteria. The red highlighted percentages represent the percent nonattainment of SAV/water clarity criteria. The rows show the percent nonattainment by Bay segment. The columns show the percent nonattainment by Bay Water Quality Model scenario and are listed from left to right in descending order of loading values for TN, TP, and TSS.

The Bay Water Quality scenarios are grouped by 3-year water quality model assessment windows and are ordered chronologically. The Bay Water Quality Model scenarios marked with an asterisk (*) had loading values derived from the key management scenario spreadsheets (see Appendix J). All other scenarios' loading values were calculated as ratios of existing management scenarios to achieve particular basinwide loading targets. The critical period for the Chesapeake Bay TMDL was selected as 1993–1995 for assessment of the SAV/water clarity criteria (see Section 6.4.1).

Appendix M-4: Chesapeake Bay Segments 2008 303(d) List Assessment Results

The following are short descriptions of the information/data in each column in the Appendix M-4 Chesapeake Bay segments 2008 303(d) list assessment results spreadsheet (AppendixM4_Bay_Segments_2008_303d.xls). Green means the criterion/designated use was attained; red means the criterion/designated use was not attained; and yellow means insufficient data for criterion assessment or no published criteria assessment protocol. The key to each lettered column of information and data are as follows:

A: Chesapeake Bay segment

B: Jurisdiction

C: Designated used: MSN-migratory spawning and nursery; SWSAV-shallow-water bay grass, OW- open water; DW-deep-water; DC-deep-channel

D: Season for criteria application: Summer-June 1 through September 30; Rest of year (ROY)-October 1 through May 31

E: 30-day mean dissolved oxygen criterion with the value being the applicable criterion

F: 7-day mean dissolved oxygen criterion with the value being the applicable criterion

G: 1-day mean dissolved oxygen criterion with the value being the applicable criterion

H: Instantaneous minimum dissolved oxygen criterion with the value being the applicable criterion

I: Temperature based dissolved oxygen criterion protective of shortnose sturgeon (species listed as endangered)

J: Numerical chlorophyll *a* criteria assessment results

K: SAV restoration acreage criteria assessment results with the value being the applicable SAV restoration acreage

L: Water clarity acreage assessment results

M: Combined SAV restoration acreage + water clarity acreage assessment results

N: Water clarity criteria assessment results

O: Description of criteria attainment assessment results by designated use-segment

P: 303(d) listing category

Q: Benthic community impairment status