Upper Patuxent River Fecal Coliform Bacteria TMDL

Source Document:	MDE (Maryland Department of the Environment). 2006. Total Maximum Daily Loads of Fecal Bacteria for the Patuxent River Upper Basin in Anne Arundel and Prince George's Counties, Maryland FINAL. Document Version September 16, 2010.
Water Body Type:	Non-tidal stream reaches of the Upper Patuxent River Basin in Maryland
Pollutant:	Fecal coliform bacteria
Designated Uses:	Use I Water Contact Recreation, and Protection of Non-tidal Warm Water Aquatic Life
Size of Watershed:	28.7 square miles (342 square miles located upstream)
Water Quality Standards:	Freshwater: *E. coli*: 126 MPN / 100 mL Steady state geometric mean Enterococci: 33 MPN / 100 mL
Indicators:	*E. coli*
Analytical Approach:	Flow duration curve with bacterial source tracking used to determine proportional contributions from sources.
Date Approved:	Approved August 9, 2011

Introduction

This Total Maximum Daily Load (TMDL) was developed to address the fecal coliform impairment in the Upper Patuxent River watershed. The listed portion begins at the confluence with the Little Patuxent River and ends at the crossing of Queen Anne Bridge Road. The watershed includes portions of Bowie, Mitchellville, and Davidsonville (Figure 1).

This fact sheet provides summary data related to the TMDL and includes specific information related to allocations made for Prince George's County, Maryland, regulated stormwater sources.

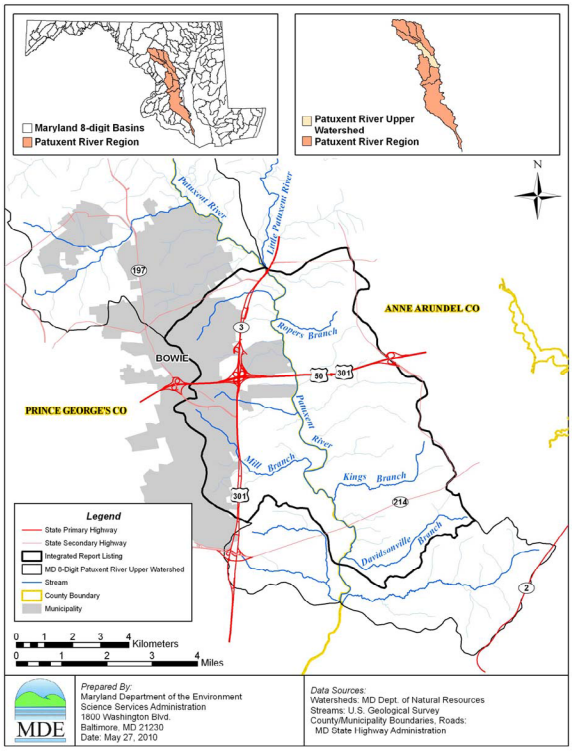

Figure 1. Upper Patuxent River watershed.

Source: MDE 2006.

Problem Identification and Basis for Listing

The watershed was originally assessed using fecal coliform bacteria. The Maryland Department of the Environment (MDE) conducted monitoring at three stations in the Upper Patuxent River watershed from October 2008 to October 2009; 25 observations were recorded at each station. Two U.S. Geological Survey (USGS) gages were used to identify flow strata (USGS 01592500 and USGS 01594440).

In Maryland, determination of impairment due to fecal bacteria is done by calculating the steady state geometric mean using data collected during the previous 2–5 years. Samples must be from steady state,

dry-weather conditions and during the beach season (May 31–Labor Day) to be representative of critical conditions. Data collected for each of the three stations resulted in steady state geometric means exceeding 126 MPN/100 mL (Table 1).

Table 1. Impairment Analysis Results

Station	N	Dry-Weather geometric mean (MPN/100 mL)	Criterion (MPN /100 mL)
PXT0630- Pax R at Rte. 3	5	159	126
PXT0613 - Pax R at Governor Bridge Rd	5	193	126
PXT0561- Pax R at Queen Anne Bridge Rd	5	160	126

Source: MDE 2006.

Applicable Data

TMDL analysis was performed using the data collected from October 2008 to October 2009, specifically for the TMDL.

Sources

Typical sources contribute bacteria in this watershed including wildlife and domestic animals via nonpoint loading from land surfaces, and humans via septic and sewer systems. The watershed also includes regulated stormwater and may experience sanitary sewer overflows, although none were reported during the year in which monitoring data were collected. The regulated stormwater sources also include industrial stormwater and federal municipal separate storm sewer systems (MS4s). No wastewater treatment plants discharge in the watershed. There is no separate accounting for federal lands in this TMDL.

Technical Approach

The TMDL used a flow duration curve approach coupled with bacteria source tracking at each monitoring station to identify baseline loads and the proportion of source contributions. Baseline loads are estimated first for each subwatershed by using bacteria monitoring data and long-term flow data. These baseline loads were divided into four bacteria source categories, using the results of bacteria source assessment analysis. Next, the percent reduction required to meet the water quality criterion in each subwatershed is estimated from the observed bacteria concentrations after accounting for critical condition and seasonality. Finally, TMDLs for each subwatershed were estimated by applying these percent reductions.

Allocations

Practicable Reduction Targets

After bacteria source distributions and baseline loads were determined for each of the three monitoring stations, MDE applied a process to identify practicable reduction targets. The process is based on review of the available literature and best professional judgment to identify reduction percentages to each source and subwatershed that is what MDE considers the maximum practicable reduction (MPR). Table 2 presents the MPR targets.

Table 2. MPR target reductions by source category

MPR per source	Human	Domestic (pet)	Livestock	Wildlife
Target percent reduction	95	75	75	0

Source: MDE 2006.

In the analysis of the MPR scenario, it was found that all three subwatersheds could meet water quality criteria under the MPR (Table 3).

Table 3. Required percent reduction by source category

Sub	Applied Reductions %				Total Reduction Percent
	Pet	Human	Live-stock	Wild	
0630	46.3	95	75	0	50.1
0613sub	66.2	95	75	0	49.9
0561sub	45.4	95	71.6	0	44.6

Source: MDE 2006.

Regulated Stormwater Baseline Loads, Allocations and Reductions

The TMDL report provides a baseline, TMDL, and percent reduction at the two monitoring stations (Table 4). The entire watershed is subject to MS4. Regulated stormwater includes other sources in addition to the County's MS4 (e.g., industrial stormwater); however, the TMDL provides no additional listing or accounting of sources, such as a list of affected permits.

Table 4. MS4 baseline loads, allocated loads, and percent reductions

Subwatershed	Baseline	Allocation	% Reduction
	(Billion MPN E. coli / yr)		
PXT0613	55,633.00	20,838.00	37%
PXT0561	55,584.00	30,995.00	56%

Source: MDE 2006.