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Corsica River Watershed Characterization

**Excerpt Showing an Example of Use
Impairments and Restrictions Information**

October 2003

Use Impairments and Restrictions⁴

Some streams or other water bodies in the WRAS project area cannot be used to the full extent envisioned by their designated use in Maryland regulation due to water quality or habitat impairments. Tracking of these “impaired waters” is required under Section 303(d) of the Federal Clean Water Act. Each impairment that is identified in the list of impaired waters may require preparation of a Total Maximum Daily Load (TMDL) to address the water quality and/or habitat impairment in the affected water body.⁵ Maryland’s list of impaired waters for the Corsica River watershed includes several types of water quality or habitat problems:

- Nutrients (nitrogen and phosphorus)
- Fecal Coliform Bacteria
- Sediment
- Biological Limitations (poor or very poor fish or benthic organism populations/conditions)
- Toxics – PCBs, Dieldrin and Fish Consumption Advisory

These impairments affecting portions of the Corsica River watershed are addressed below. Each water body listed may require preparation of a Total Maximum Daily Load (TMDL) to address the water quality and/or habitat impairment.⁴

1. Nutrients

The tidal portion of the Corsica River is listed for impairment by nutrients in the 1996 303(d) list. The origins of these nutrients were listed: as natural and two types of human sources: point sources and nonpoint sources.

According to the April 2000 report *Total Maximum Daily Loads of Nitrogen and Phosphorus for Corsica River*, impairment by both nitrogen and phosphorus contribute to excessive algal blooms and concentrations of dissolved oxygen below the minimum State standard of 5.0 milligrams per liter (mg/l). The algae and dissolved oxygen problems impair local conditions and interfere with the designated uses of the Corsica River. (Also see section on TMDL.)

Nutrients, phosphorus and nitrogen, are essential to support aquatic life but excess nutrients can cause problems. In Maryland, most water bodies naturally have low levels of the nutrients nitrogen and phosphorus. However, in the tidal waters of the Corsica River either nitrogen or phosphorus can become too readily available. When this occurs under certain conditions with warm weather, sufficient light, etc., algae populations can grow to excessive levels. These algae can then crowd out other small organisms, cloud the water limiting light penetration, and eventually die-off consuming the dissolved oxygen that other aquatic life needs to survive.

[Nutrient pollution or over-enrichment](#) problems may arise from numerous sources including all types of land and from the atmosphere. Residential land can be an important contributor of nutrients depending on fertilizer use, extent of lawn and the status of septic systems. Farmers apply nutrients using different approaches, so nutrients entering waterways from crop land vary greatly depending on management techniques. Typically, streams and other surface waters receive relatively small amounts of nutrients from forest land and relatively large amounts from land uses that involve soil disturbance and application of fertilizer.

2. Fecal Coliform Bacteria and Shellfish Harvesting Restrictions

The tidal portion of the Corsica River is listed for impairment by fecal coliform bacteria in the 1996 303(d) list. The origins of these bacteria were listed: as natural and two types of human sources: point sources and nonpoint sources.

Fecal coliform bacteria are a class of bacteria typically found in the digestive tract of warm-blooded animals, including humans. They are always found in animal waste and human sewage unless it is treated to kill them. In unpolluted streams and tidal waters, it is common for water samples to contain very few of these bacteria. Water samples exhibiting significantly larger fecal coliform bacteria populations are “indicators” of contamination by animal, including human, waste. Depending on local conditions, sources of fecal contamination may include any combination of the following: inadequately treated sewage, failing septic systems, wild or domestic animals, urban stormwater carrying pet waste and similar sources.

When fecal coliform bacteria levels are too high in tidal waters containing shellfish, harvesting is restricted to prevent consumption of contaminated food. [Map 3 Designated Use and Use Restrictions](#), shows that portions of Corsica River are affected by shellfish harvesting restrictions. Tidal waters closest to Centreville are “restricted” which “means that no harvesting of oysters and clams is allowed at any time.” This restriction applies to all the waters of the Corsica River east of a line extending in a northeasterly direction from Wash Point (39E04'51.2"

North Latitude, 76E06'42.2" West Longitude) to Cedar Point (39E04'57.9" North Latitude, 76E06'29.6" West Longitude).

These restrictions are applied by the Maryland Dept. of the Environment (MDE) to protect public health because elevated fecal coliform counts are commonly found in this area of the River estuary. The elevated counts suggest the presence of contamination by animal or human waste. Restrictions are necessary because oysters and clams are filter feeders that readily absorb pathogens in animal or human waste.

3. Sediment

The tidal portion of the Corsica River is listed for impairment due to suspended sediments in the 1996 303(d) list. The origins of these suspended sediments were listed: as natural and two types of human sources: point sources and nonpoint sources.

Suspended sediment can cause water quality and habitat problems in several ways. Most unpolluted streams and tidal waters naturally have limited amounts of sediment moving "suspended" in the water. Excessive amounts of suspended sediment in waterways are considered pollution because they can inhibit light penetration, prevent plant growth, smother fish eggs, clog fish gills, etc. Sediment in streams tends to arise from stream bed and bank erosion and from land that is poorly vegetated or disturbed. Suspended sediment pollution may arise from construction sites, crop land, bare ground and exposed soil generally. The amount of sediment contributed varies greatly site to site depending upon stream stability, hydrology, management controls and other factors.

4. Biological Impairment

One segment of the nontidal stream Gravel Run in the Corsica River watershed is listed for biological impairment in the draft 2002 303(d) list based on poor ratings for fish and benthic organisms (population and/or habitat).

In selected stream segments statewide, populations of benthic macroinvertebrates and fish and their associated physical habitat have been assessed by the Maryland Biological Stream Program. Based on criteria developed for each physiographic/ecological zone in Maryland, each stream segment is rated as either good, fair, poor or very poor. Ratings of poor and very poor were listed as biological impairment for the first time in Maryland in the draft 2002 303(d) list of impaired waters. In the Corsica River watershed, one stream site appears in the list because of biological impairment. Gravel Run is listed based on 1995 sampling of the stream in the Town of Centreville. See the section on [Maryland Biological Stream Survey Findings](#) for additional details.

5. Toxics – PCBs, Dieldrin, Methylmercury and Fish Consumption Advisory

The tidal portion of the Corsica River is listed as an impaired water body for toxic compounds because fish tissue sampling conducted in 2000 by MDE and the University of Maryland Center for Estuarine Studies found elevated concentrations of Polychlorinated Biphenyls (PCBs) and Dieldrin.

PCBs are listed as the cause for listing of the Corsica River area for impairment by toxic compounds. PCBs are a category of synthetic organic compounds that were widely used for several decades but they are now banded from use in the United States. Their resistance to high

temperatures and generally very stable chemical characteristics made them popular for use in high voltage electrical equipment like transformers including the type previously used in local electricity distribution networks. PCBs' stability and organic characteristics in the environment allow them to accumulate in the food chain including in fish that humans eat and in humans. These compounds are associated with toxic and carcinogenic effects.

Dieldrin is mentioned in the 303(d) list as a toxic compound found in Corsica River area channel catfish tissue but it was not listed as a factor in the river's listing for impairment. Dieldrin is a synthetic organic herbicide that was once widely used but is now no longer in use in the United States. It is known to accumulate in the food chain including in fish that humans eat and in humans. This compound is associated with toxic and carcinogenic effects.

The Fish Consumption Advisory for channel catfish in the Chester River/Corsica River area arose because of the elevated levels of PCBs and/or dieldrin found in the fish that were tested. Based on these findings, there is a risk that health problems could occur in people who eat these local fish too frequently. Fish tissue sampling conducted in 2001 by MDE led to issuance of a fish consumption advisory in late 2001 and an update to the advisory was issued by MDE in January 2003. The purpose of the advisory is to recommend that human consumption of channel catfish from the Chester River/Corsica River area be limited as described in the table below. For more information on the fish consumption advisory see www.mde.state.md.us/CitizensInfoCenter/FishandShellfish

2003 Advisory On Fish Consumption for Corsica River Area Waterbodies Recommended Maximum Allowable Meals Per Month (unless noted as meals per year)					
Species	Area	General Population 8oz meal	Women 6oz meal	Children 3oz. meal	Contaminant
Channel Catfish	Chester River (Corsica Creek)	< 18" 1/mo.	11 per year	11 per year	PCBs, Pesticides
		>18" 11/yr.	9/year	7 per year	
White Perch	Chester River mainstem	1	1	1	
Smallmouth & Largemouth Bass, Pickerel, Northern Pike, Walleye	Lakes and other impoundments	4	4	2	Methyl- mercury
	Rivers and streams	no advisory	8	8	
Bluegill	Lakes and other impoundments	8	8	8	

Water Quality Analysis

The water quality analysis presented here is based on two water quality surveys conducted in summer 1997 by the State of Maryland for the TMDL. This limited data set allows for identification of warm weather problems but does not provide a complete understanding of variability throughout the year. Locations referenced in this section are shown on [Map 4 Monitoring Water Quality](#).

1. Dissolved Oxygen

Based on the 1997 water quality monitoring, dissolved oxygen concentrations in the lower Corsica River from the mouth to Miller Creek were consistently higher than the minimum 5.0 mg/l standard which indicates good water quality. Upstream of Miller Creek dissolved oxygen concentrations were commonly near or below the 5.0 milligrams per liter (mg/l) minimum standard. As dissolved oxygen concentrations decline below 5.0 mg/l, aquatic life has increasing difficulty respiring and must leave the area or face suffocation. Violations of this standard in estuarine waters, accompanied by high algae populations, indicate that poor water quality (eutrophic conditions) are present.

2. Algae

Upper reaches of the Corsica River experience persistent season algae blooms. Based on the two water quality surveys conducted in the summer of 1997, chlorophyll-a concentrations in the Corsica River upstream of Miller Creek occasionally reached between 50 micrograms per liter (Fg/l) and 146 Fg/l. These chlorophyll-a concentrations indicate significant eutrophication existed in this part of the river. Downstream of Miller Creek, chlorophyll-a concentrations were consistently less than 50 Fg/l which suggests a relatively less significant concern for eutrophication.

3. Phosphorus

Inorganic phosphorus concentrations measured in the Corsica River in 1997 ranged between 0.02 mg/l and 0.10 mg/l in most areas. However, in the vicinity of the Mill Stream Branch confluence with the Corsica River inorganic phosphorus concentrations slightly higher than 0.10 mg/l were measured. Though there is no water quality standard for phosphorus, concentrations higher than 0.10 mg/l total phosphorus are commonly considered to be an indication of eutrophication in estuarine waters.

In the Corsica River downstream of Miller Creek, inorganic phosphorus concentrations of 0.05 mg/l and less were typical. This finding of lower inorganic phosphorus concentrations near the Chester River compared to upstream areas of the Corsica River suggests that the sources of the elevated phosphorus concentrations within the Corscia River watershed are more important than those potentially entering from the Chester River.

4. Nitrogen

Total nitrogen concentrations in the upper tidal waters of the Corsica River (upstream of Emory Creek) ranged from around 1.0 mg/l to over 3.0 mg/l based on monitoring conducted in 1997. The tidal waters around Centreville exhibited total nitrogen concentrations greater than 2.0

mg/l. Though there is no water quality standard for total nitrogen, concentrations of 1.0 mg/l and higher in estuarine water are commonly considered to be an indication of eutrophication.

Between the mouth of the Corsica River and Emory Creek, total nitrogen concentrations for summer 1997 ranged between 0.5 mg/l and 1.0 mg/l. The concentrations of less than 1.0 mg/l suggests less concern about eutrophication in the lower tidal waters of the Corsica River.

5. Toxics

In 2000, MDE collected fish across Maryland, including the Corsica River, so that their tissue could be sampled for contamination by toxic materials as described in the prior section [Use Impairments and Restrictions](#).

A 1999 report by the Chesapeake Bay Program listed the Chester River (including tributary areas like the Corsica River) as an *Area of Emphasis*.¹⁴ This designation means that available data indicate that there is significant potential for a chemical contaminant-related problem. The monitoring data used to support this finding was collected in the Chester River mainstem in the vicinity of the Corsica River in both water column and sediment sampling stations. However, none of these sampling sites were in the Corsica River.