2 Patuxent Reservoirs Description

WSSC owns and operates two drinking water supply reservoirs, the Rocky Gorge (T. Howard Duckett) Reservoir and the Triadelphia Reservoir. The reservoirs are located in the upper, non-tidal reaches of the Patuxent River (Figure 2-1). WSSC also owns and manages approximately 5,500 acres of reservoir buffer that represents about 5 percent of the total Patuxent River watershed drainage area of approximately 85,000 acres. The buffer areas were purchased during creation of the reservoirs and were fully paid for using funds provided by the WSSC customers for the sole purpose of protecting the reservoirs' water quality and storage capacity. The reservoirs' watershed drainage area exists primarily in Howard and Montgomery Counties, with a small portion located in Prince George's and Frederick Counties. These reservoirs are primarily used as a drinking water supply for more than 600,000 WSSC customers, mostly residing in Montgomery and Prince George's Counties, but also serving a small population within Howard County. A big challenge to protection of these reservoirs is that WSSC controls, via its property holdings surrounding the reservoirs, only 5 percent of the total Patuxent River watershed.

2.1 Rocky Gorge Reservoir and Public Uses

Rocky Gorge Reservoir (basin code 02-13-11-07) is located on the Patuxent River in Howard County, Montgomery County and Prince George's County (Figure 2-2). It was created in 1952 by the construction of the T. Howard Duckett Dam on the Patuxent River. Rocky Gorge Reservoir has a surface area of approximately 773 acres (MDE 2008).

WSSC currently authorizes recreational use in designated areas of its Rocky Gorge property. Approved recreational activities at Rocky Gorge include picnicking, fishing, boating, horseback riding, and hunting. Most recreational activities require a watershed use permit, and are subject to activity-specific and seasonal regulations that are subject to change with or without prior notice.

2.2 Triadelphia Reservoir and Public Uses

The Triadelphia Reservoir (basin code 02-13-11-08) is located on the Patuxent River in Howard County and Montgomery County (Figure 2-3). The reservoir was created by construction of the Brighton Dam in 1943 on the Patuxent River. Located upstream of the Rocky Gorge Reservoir, the Triadelphia Reservoir has a surface area of approximately 800 acres (MDE 2008).

WSSC currently authorizes recreational uses in designated areas of the Triadelphia property. Approved recreational activities at Triadelphia include picnicking, fishing, boating, and hunting. Horseback riding is not currently allowed on WSSC-owned property surrounding the Triadelphia Reservoir. Most recreational activities require a watershed use permit, and are subject to activity-specific and seasonal regulations that are subject to change with or without prior notice.

2.3 Water Quality Impairments and Total Maximum Daily Loads (TMDLs)

There are a number of potential threats to surface waters, some of which include chemicals, animal and human wastes, microbial pathogens, and naturally-occurring substances that can

contaminate drinking water supply sources. WSSC's mission is to provide safe and reliable drinking water in an ethically, environmentally and financially responsible manner.

The Triadelphia and Rocky Gorge Reservoirs are designated by MDE as Use IV-P and Use 1-P waterbodies, respectively (COMAR 26.08.02.08M), and were identified on the State's Clean Water Act §303(d) list as being water quality impaired for nutrients (in 1998); and impacts to the biological community (in 2002 and 2004). In addition, the Triadelphia Reservoir was listed as impaired by sediments in 1998. As a result of these listings, MDE issued a TMDL for the Triadelphia Reservoir to manage loads of phosphorus and sediments, and a TMDL for the Rocky Gorge Reservoir for phosphorus (MDE 2008), which was approved by USEPA in November 2008. The intent of the nutrient TMDL is to reduce high chlorophyll-*a* concentrations that reflect excessive algal blooms, and maintain dissolved oxygen concentrations that support designated uses for aquatic life. The sediment TMDL for Triadelphia is intended to maintain the long-term storage capacity of the reservoir.

Additionally, the Triadelphia Reservoir is also listed by MDE under Category 2 as impaired for mercury (in fish tissue), but no TMDL is required at this time because there are insufficient data to determine if water quality standards are being violated. The 1st through 4th order streams feeding the reservoir are also listed by MDE under Category 2 for biological impairment (fish and benthic IBI metrics, cause unknown), but no TMDL is required at this time because there are insufficient data to determine if water quality standards are not being met (MDE 2011).

Similarly, the 1st through 4th order streams feeding the Rocky Gorge Reservoir are listed by MDE under Category 5 for biological impairment (fish and benthic IBI metrics, cause unknown), meaning that the streams are impaired and a TMDL is required. In 2010 MDE listed the reservoir as impaired for mercury in fish tissues (Category 5) meaning that the waterbody is impaired and a TMDL is required. MDE notes that the "cause is unknown" for these elevated fish tissues (MDE 2011). Note that these §303(d) water quality impairment listings are unchanged in MDE's 2012 draft listing.

Another important issue that must be addressed by water utilities is microbiological contamination from fecal material that is transported into public water supplies from animals and humans. The most notable concerns are: *Crytposporidium, Giardia lamblia,* and the fecal coliform bacteria *Escherichia coli*.

• *Cryptosporidium* is a single-celled protozoan parasite found in lakes and rivers, especially when the water is contaminated with sewage or animal waste. The parasite is protected by an outer shell that allows it to survive outside the host body for long periods of time and makes it very resistant to chlorine disinfection. This parasite is introduced to the environment primarily in fecal matter. While this parasite can be spread in several different ways, exposure via drinking water and recreational waters are the most common methods of transmission. *Cryptosporidium* is one of the most frequent causes of waterborne disease among humans in the United States. It can cause gastrointestinal illness (e.g., diarrhea, vomiting, cramps), and flu-like symptoms. There have been notable outbreaks of *Cryptosporidium* recently. In 2009 an outbreak at a summer camp in North Carolina infected 46 individuals. More recently, in March 2012 there was an

outbreak of cryptosporidiosis infecting 97 individuals who swam at the Edgewater Resort and Water Park in Duluth, MN. While these are relatively recent, the most notable outbreak was in 1993 in Milwaukee, WI that infected over 403,000 individuals and at least 104 deaths that were attributed to the outbreak (MacKenzie 1994, Corso 2003).

- *Giardia lamblia* is a single-celled protozoan parasite that lives in the intestine of infected animals and humans, and is transmitted to the environment via fecal materials. The disease it causes, giardiasis, is most frequently associated with the consumption of contaminated water. The associated ailments caused by *Giardia lamblia* include nausea, cramps and diarrhea that can last as long as 2 weeks. The parasite is protected by an outer shell that allows it to survive outside the host body for long periods of time, and while this parasite can be spread in several different ways, exposure via drinking or recreational waters are the most common methods of transmission.
- Coliforms are a group of bacteria that occur naturally in the environment, and while not usually harmful they are used as an indicator for other potentially harmful pathogens that may be present in drinking waters. Coliform presence, specifically fecal coliforms and *Escherichia coli*, indicate that water may be contaminated with human or animal wastes. *Enterococci* are also a bacterial indicator for fecal contamination. Disease-causing bacteria in fecal wastes can cause illnesses such as diarrhea, cramps, nausea, and may pose a special health risk for infants, young children, and people with weakened immune systems.

Under the Safe Drinking Water Act, USEPA has established numeric standards (Maximum Contaminant Levels, MCLs) in finished drinking waters to ensure that these microorganisms are below levels which have known or expected to be a risk to human health. MCLs for these constituents are presented in 63 Fed Reg 69478-69521 (December 16, 1998). Minimizing the introduction of these microbial contaminants from the adjacent lands into reservoirs is the first barrier in USEPA's multi-barrier approach for source water protection, with successive barriers provided by the water treatment and distribution systems that are designed to produce and deliver safe finished drinking water.

2.4 Water Quality Studies

WSSC conducts a large water quality monitoring program and each year publishes a Patuxent Watershed Annual Report (and an accompanying detailed Supplemental Documentation report) that is posted on WSSC's website. The Annual Reports and Supplemental Documentation for the years 2005 through 2011 are included on WSSC's website at: http://www.wsscwater.com/home/jsp/content/prcireports.faces?pgurl=/Communication/env-reports.html

These annual reports present not only water quality measurements, but also address the broad range of environmental studies and actions within the larger Patuxent watershed. Discussion topics typically include: water quality monitoring, habitat and biological studies, stream corridor management, agricultural issues, forestry management, new regulatory issues, public outreach activities, and any other watershed related issues addressed during the calendar year.

WSSC has conducted water quality monitoring of the reservoir for almost 20 years to provide data for technical analyses and long-term trend evaluations to support protection of the reservoirs and drinking water supplies. Typically, three sites on each reservoir are monitored monthly, except during winter months. The reservoirs are monitored for phosphorus, nitrogen, total organic carbon, specific metals, turbidity, and chlorophyll. In addition, in-situ transparency and depth profile measurements of pH, conductivity, temperature, reduction-oxidation potential and dissolved oxygen are performed.

For the 2009 annual report, WSSC's Environmental Group conducted an evaluation of historic water quality data (1993-2008). That evaluation focused on eleven indicators to assess the condition of the Patuxent Reservoirs including: chlorophyll-*a*, dissolved oxygen, total and orthophosphate phosphorous, total nitrogen (Total Kjeldahl, nitrate-nitrite and ammonia), total organic carbon, water transparency (using Secchi depth), chloride, and total algal counts. The eleven indicators were chosen for inclusion in the 2009 report because of their relevance to address required nutrient reductions associated with the TMDLs issued by MDE, and their usefulness to operators at the Patuxent Water Filtration Plant.

2.5 WSSC's Current Watershed Regulations

The watershed user regulations governing the public use of WSSC's Triadelphia and Rocky Gorge Reservoirs are presented on the Commission's website: <u>http://www.wsscwater.com/home/jsp/content/watershed.faces</u>; and in a WSSC produced brochure (dated 2011) which is available at the Brighton Dam Information Center. These two documents detail the permitted activities, prohibited activities, required permits and user fees, and penalties for violating these regulations. They also provide detailed activity-specific requirements for boating and boat mooring, fishing, hunting, picnicking, and horseback riding.



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Data Sources: NRCS SSURGO WSSC ESRI Imagery





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