Source Water Assessment
for
Cunningham Falls State Park
Hunting Creek Lake/Houck Area Supply

Prepared by
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A. Summary

The 1996 Safe Drinking Water Act Amendments require states to develop and implement source water assessment programs to evaluate the safety of all public drinking water systems. A Source Water Assessment (SWA) is a process for evaluating the vulnerability to contamination of the source of a public drinking water supply. The assessment does not address the treatment processes, or the storage and distribution aspects of the water system, which are covered under separate provisions of the Safe Drinking Water Act. The Maryland Department of the Environment (MDE) is the lead state agency in this source water assessment effort.

There are three main steps in the assessment process: (1) delineating the watershed drainage area that is likely to contribute to the drinking water supply, (2) identifying potential contaminants within that area and (3) assessing the vulnerability of the system to those contaminants. This document reflects all of the information gathered and analyzed required by those three steps. MDE looked at many factors to determine the vulnerability of this water supply to contamination, including the size and type of water system, available water quality data, the characteristics of potential contaminants, and the capacity of the natural environment to attenuate any risk.

Cunningham Falls State Park has three public water systems. The principle system is supplied from Hunting Creek Lake and serves public facilities around the lake and also serves the William Houck Area campground and related facilities west of the lake. This surface water system is the subject of this report.

In addition to the surface water system, two smaller ground water systems supply the facilities in the Manor Area, along US route 15, southwest of Thurmont. Source water assessments for these two systems are beyond the scope of this report. Instead, the two ground water systems will be included in a Source Water Assessment of all transient ground water systems in Frederick County.

Hunting Creek Lake was constructed in 1969 and developed as a water supply in 1971[1]. Hunting Creek Lake lies within Cunningham Falls State Park and 41% of the watershed is owned by either the State of the Federal government. Much of the remaining land is protected by "Resource Conservation" zoning that is intended to "allow low intensity uses which are compatible with the goal of resource conservation"[2]. Much of the land is forested and land use did not significantly change between 1990 and 2000. Because of its protected watershed, the potential of many contaminants to reach the reservoir is minimal. Hunting Creek Lake, like any other surface water, is subject to high turbidity during heavy storms and snowmelts and susceptible to contamination by giardia, cryptosporidium and other pathogens.

Continuous monitoring of contaminants is important to understand changes in raw water quality to assure delivery of safe drinking water to the parks employees and visitors. Furthermore, in order to maintain and/or improve the quality of the water supply, the park

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[1] Year of first appropriation

[2] Frederick Count Zoning Ordinance § 1-19-238

is encouraged to implement the recommendations for an active source water protection plan as included in Section I of this report.

B. History and Development of Cunningham Falls Water Supply

Cunningham Falls State Park is located in the Catoctin Mountains west of Thurmont, Maryland. The park includes a 78-foot cascading waterfall, and played an important part in the history in the industry of the early Americans that settled in the area. Thomas Johnson Jr., who later became the first governor of Maryland, discovered hematite ore in the Catoctin Mountains in the 1770's. Soon after the discovery, the Catoctin Furnace was built to produce pig iron. The iron was used in the manufacturing of car wheels and foundry rolling mills. At the beginning of the nineteenth century, the Catoctin Furnace produced the "Catoctin Stove". Cannons and cannonballs for George Washington's Army during the Revolutionary War and the plates for the famous Civil War vessel, the Monitor, were also produced by the Catoctin Furnace.

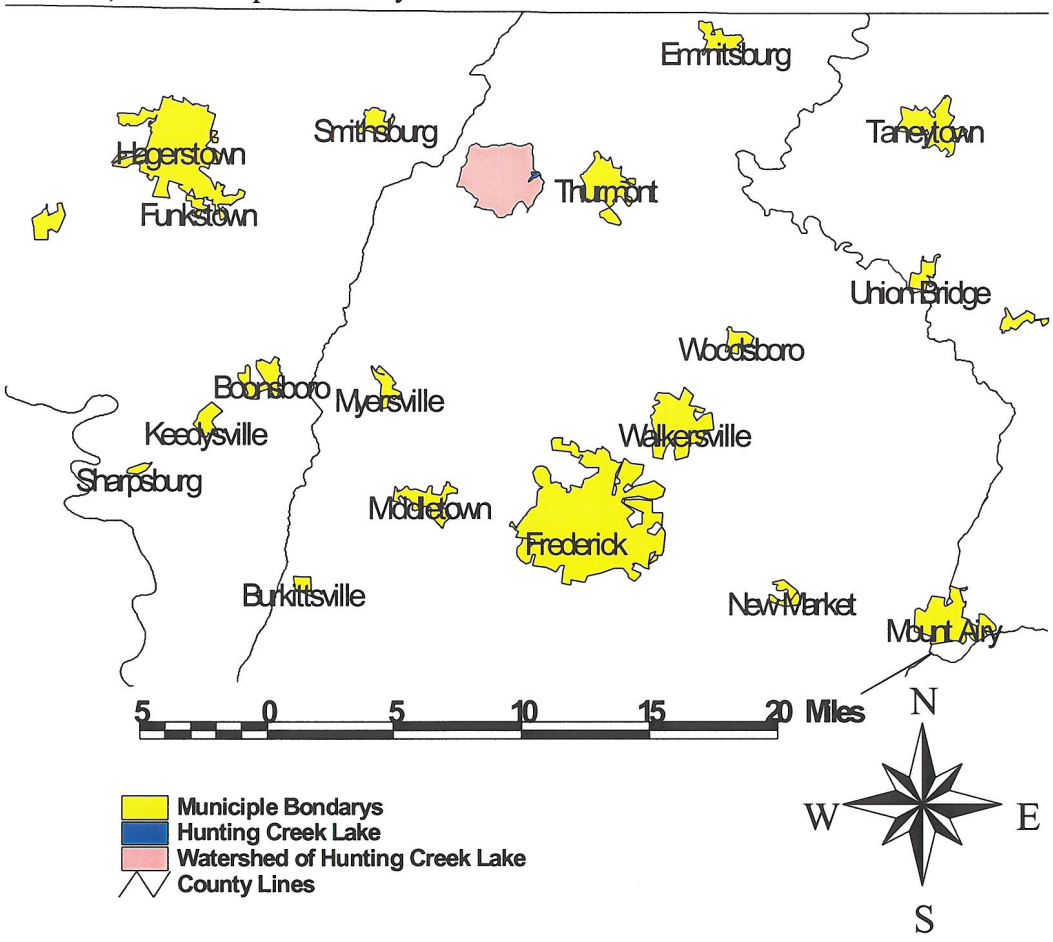

Figure 1. Location of Cunningham Falls State Park

The facility finally ceased operation in 1903, a victim of changing technology in both iron making and transportation. Although the furnace stacks themselves were located along Catoctin Furnace Rd, about 3 miles to the south of Thurmont, the industrial facility had an influence over a much larger area. Over the hundred years of operation, much of the surrounding forest had been cut down and burned in the furnace as charcoal. The abandoned iron mines were also polluting the surrounding area with toxic storm water

runoff. In 1936, the Federal Government acquired over 10,000 acres as one of the first displays of natural restoration of designated parks from overused lands. In 1954, the Federal Government retained the 5,770 acres north of MD Route 77, which is now Catoctin Mountain National Park, and the 4,230 acres south of MD Route 77 was named Cunningham Falls State Park; operated by the Maryland Forest, Park, and Wildlife Service. In 1969, Hunting Creek Lake was constructed and in 1971, the lake was first used as a water supply.

The surface water treatment plant for Cunningham Falls State Park is operated by Maryland Environmental Services (MES) and is in operation from March through November during the peak of public water use. Peak in service hours occur between the months of July and August according to the monthly operating reports (Figure 2). The plant runs on average 7 hours per day and produces 4000-8000 gallons of water during typical weekdays and up to 20,000 gallons during summer weekends. The water treatment plant contains two finished water storage tanks that hold a total of 100,000 gallons; one tank for the campground use, the other is located 0.5 miles from the treatment plant and is for day use at the beaches on Hunting Creek Lake. Typical treatment methods include coagulation, pre-chlorination, post-chlorination, soda ash, and sand filtration, with an initial 12,000-gallon pre-settlement tank.

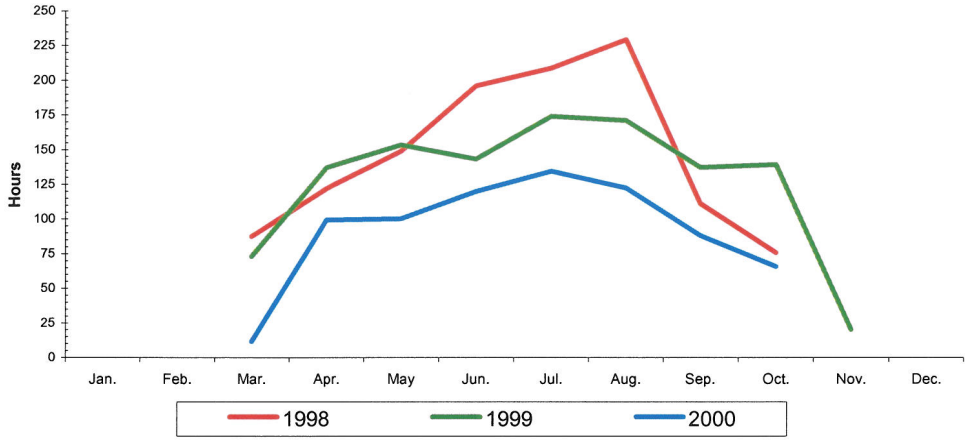

Figure 2. Cunningham Falls WTP monthly total in service hours based on the Maryland Department of the Environment, Water Supply Program, Filtration Plant Monthly Operating Report

In addition to the surface water supply, which is the principle water supply for the park, there are also two small ground water systems serving the Manor Area along US route 15, southwest of Thurmont. Delineating a wellhead protection area for these groundwater systems is beyond the scope of this report and will be addressed as part of a general report for all Frederick County transient groundwater systems.

C. Description of Surface Water Source

Water is obtained from Hunting Creek Lake, which is located within Cunningham Falls State Park. The lake is impounded by an earthen dam 79 feet in height and has a surface area of 44 acres. When the lake is filled to the spillway crest, it has a depth of 60 feet and a volume of 771 acre-feet.

The lake drains an area of 4448 acres (6.95 square miles) bound on the east by the Catoctin Mountains, including 1263 acres of Cunningham Falls State Park and 572 acres of Catoctin National Park. Two point eight miles of MD Route 77 run through the watershed, which includes a total of 18.8 miles of paved roads. Three tributaries feed Hunting Creek Lake.

The northern most tributary, Cunningham Falls[3], is approximately 5390 meters (3 1/3 miles) from headwater to lake. This makes up most of the drainage area that supplies the lake. Two smaller tributaries lie south of the lake. The second tributary, Hunting Creek, extends southwest approximately 3630 meters (2 1/4 miles) from headwater to the lake. The third tributary is unnamed and extends 798 meters (1/2 mile) from the southeast shore of the lake. A natural spring is located southeast of the lake.

Most of the watershed is covered by a climax deciduous forest community. Two beaches are open for public use in the reservoir as well as non gas-powered boating in the reservoir. The western beach is located approximately 160 yards from the intake while the northern beach is approximately 100 yards from the intake.

D. Source Water Protection Site Visit

On March 24, 1999, the site was visited by personal from Water Supply Program of the Maryland Department of the Environment (MDE). The purpose of this visit was to conduct a site survey of the Cunningham Falls surface water source in order to accomplish the following tasks:

- To collect information regarding the locations of raw water sources and intakes by using Global Position System (GPS) equipment;
- To determine the general conditions and structural integrity of intakes and other raw water facilities;
- To discuss source water issues and concerns with the City's water system operators, and
- To conduct a windshield survey of the watershed and to document potential problem areas. Photographs of the sight survey appear in **Appendix A.**

The findings of the visit were as follows:

Intake Integrity and Location

The intake was not visited as it is in the middle of the lake. According the Maryland Environmental Services (MES) plant operator, the intake is a circular concrete structure. A GPS location was taken on the bank directly in front of the vault on shore.

Raw water is pumped from a vault along shore to package water treatment plant. The plant has an actual capacity of 72 gpm and is usually run 7 hours per day from March

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[3] There is a conflict in recorded names for the two principle tributaries to the Lake. USGS quadrangle maps, MPD Tax Maps, Frederick County Zoning Maps, SCS soil maps and Alexandria Drafting Company (ADC) maps refer to the tributary continuing southwest of the lake as "Hunting Creek". The tributary going west-northwest of the lake is labeled as "Cunningham Falls" on most of the above maps and is unlabeled on the remainder. One map retrieved from the National Park Service, however, refers to the west-northwest tributary as "Big Hunting Creek" and the southwest tributary as "Hauver Branch". As seen in Figure 6, at the end of this report, we have adopted the convention of USGS and others in this report.

thru November. Finished water is stored in two storage tanks with a capacity of 100,000 gallons each.

Issues and Concerns

The operator indicated that:

- Maximum turbidity is usually 4 Nephlometric Turbidity Units (NTU).
- Water quality does not change that drastically.
- Swimming and boating were not a significant source of contaminants.
- That there was no algae problem.
- Power outages sometimes occur
- MES has a contract to run the plant, but the park is responsible for the distribution system.

Raw water turbidity on the day of the site visit was 1.7 NTU and finished water was .031 NTU.

Watershed Survey

During the site visit of March 24, 1999, a windshield survey was done in the watershed. There were several concerns in the private portions of the watershed. Two lumberyards were in operation along Foxtower Rd. (gravel road) and evidence of erosion from those properties was noted. Also, there were more low-density residential properties observed then covered in the 1997 MOP Land Use Data. Some homes looked new, and one area, characterized as cropland in the 1997 MOP data, was a new small subdivision. Finally, a potential pig/chix farm was observed on Stottlemeyer Rd.

E. Watershed Characterization

Source Water Assessment Area Delineation Method

An important aspect of the source water assessment process is to delineate the watershed that contributes to the source of drinking water. A source water protection area is the whole watershed area upstream from a water plant's intake. Delineation of the source water area was performed by using version 3.2 of the Environmental Systems Research Institute's (ESRI®) ArcView Geographic Information System (GIS) software, utilizing existing GIS data, and by collecting location data using a Global Positioning System (GPS). A GPS point location was taken at the Hunting Creek Lake intake during the initial site visit and differentially corrected (for an accuracy of ± 2 meters) at MDE. Once the intake location was established, the watershed was delineated based on existing Maryland Department of Natural Resources digital watershed data and Maryland State Highway Administration digital stream coverage. Digital USGA 7.5 topographical quad maps were also used to perform "heads up" digitizing, or editing, of watershed boundaries when needed.

General Characteristics

The Cunningham Falls watershed is geographically bound by the Catoctin Mountains to the north and east and by the eastern ends of South Mountain on the west of the watershed. The 4448-acre watershed drains into via three tributaries, Cunningham Falls, Hunting Creek and an unnamed tributary to the southeast side of the lake.

Based on 2000 land use data from the Maryland Department of Planning (MDP), the land within the entire source water protection area (watershed) is as follows:

Table 1. 2000 Land Use for Hunting Creek Lake Watershed

Land Use	Total Area in Acres	Percent of Total Watershed
Low-density Residential	137.146	3%
Cropland	461.42	10%
Pasture	68.779	2%
Forest	3731.428	84%
Open Water	49.176	1%

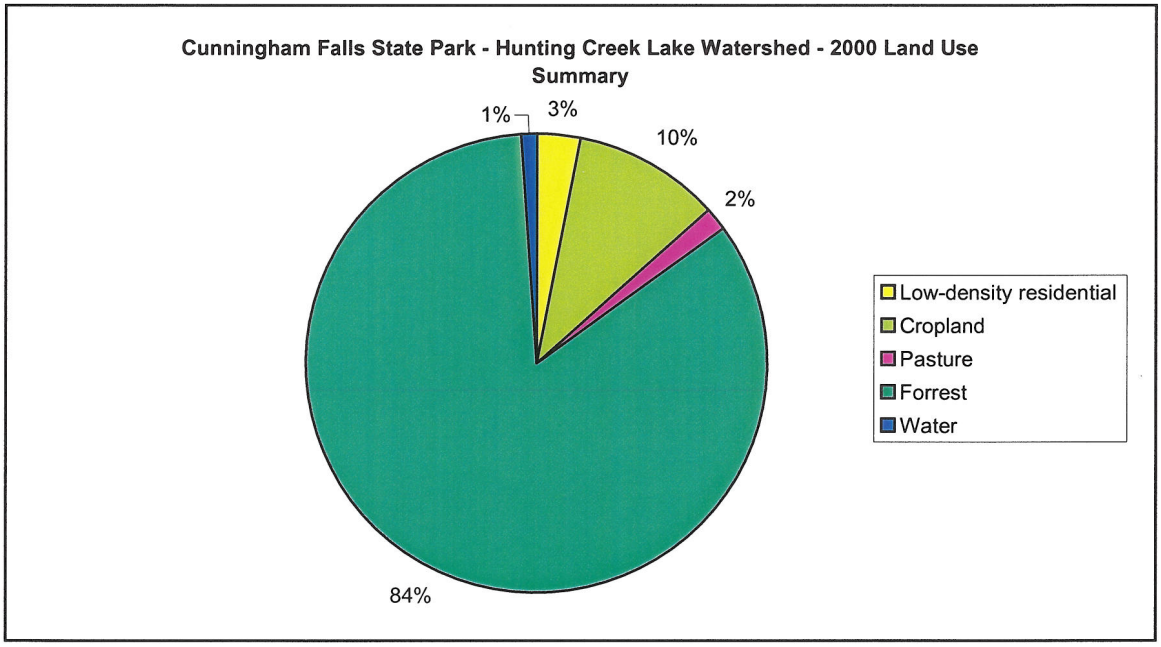

Figure 3. Cunningham Falls State Park Watershed Land Use Summary

The watershed is made up of mostly forested area. According to the MDP data, most of the watershed is characteristic of a climax deciduous forest community (Figure 3). The most abundant species include oak, hickory, sycamore, birch, polar, elm, and maple. The residential areas are made up mostly of campgrounds and recreational areas. The commercial area is composed of a concession stand by the beaches and a very few small local convenience stores.

A map of year 2000 land use as determined by MDP is provided as Figure 7.

F. Significant Sources of Contamination

Non-Point Concerns

Approximately 84% of the Cunningham Falls Watershed is forested and protected from urban non-point pollution runoff. The analysis of land use maps and satellite imagery

shows that the source of Cunningham Falls is located in a small but dense agricultural area that composes approximately 11% of the total watershed. Application of fertilizers and pesticides on cropland could result in potential sources of nitrates and Synthetic Organic Compounds (SOCs) to the water supply.

Hunting Creek Lake is one of the centers of attraction in Cunningham Falls State Park. The park allows a number of activities around the reservoir, including fishing, boating, and swimming. Large public showers and bathrooms are located approximately 30 feet from the reservoir and operate using an underground septic system. The parks beaches attract hundreds of guests during the summer seasons. This combined with the possibility of leaks in the underground septic system impose a possible threat of elevated levels of fecal coliform. Private boat launchings are permitted off Catoctin Hollow Road. Gasoline motors are prohibited to the public but regularly used by the employed lifeguards and rental boat operators. Use of gasoline-powered boats adds harmful SOCs and volatile organic compounds (VOCs) directly to the water supply. A large public parking lot is located north of Hunting Creek Lake that slopes toward the lake. Approximately 100% of the runoff from the parking lot will be deposited into the water supply, which also increases the risk of elevated levels of VOCs and SOCs in the reservoir.

Point Discharge Pollution Concerns

There are no point sources of pollution in the Cunningham Falls watershed.

Transportation Related Concerns

Cunningham Fall's watershed includes several small roads surrounding the park. The major road, Foxville Road (MD-77), cuts east/west through the watershed just north of Cunningham Falls State Park bisecting hunting creek at three locations. Total length of paved surfaces totals approximately 20 miles and an estimate of 63 acres or just over 1% of the total watershed. Runoff from these roads during storm events may contribute to erosion problems, but the likelihood of a major spill involving organic or inorganic compounds is minimal.

Land Use Planning Concerns

Over 41% of the total watershed is owned by the state and federal government and protected from further development.

Frederick County zoning maps for the Cunning Falls area were examined. At this writing, there maps are not available as a GIS layer; so exact area computations were not made. It is readily apparent, however, that most of the land outside of the parks is zoned as a Resource conservation zoning district (RC). The Frederick County zoning ordinance states that "The purpose of the resource conservation zoning district is to allow low intensity uses and activities which are compatible with the goal of resource conservation to be located with mountain and rural wooded areas."

The remaining land includes land zoned for Agriculture, primarily along Stottlemeyer Road near the west edge of the watershed; land zoned for low density residential use, primarily along Foxville Road west of Stottlemeyer Road and a small amount of land near Foxville zoned as a VC or "village center district" that "is intended to provide commercial services … utilizing established commercial areas".

As can be seen in Table 2, a comparison between 1990 and 2000 MDP land use shows no significant changes in the watershed.

Table 2. 1990 and 2000 MDP Land Use for Hunting Creek Lake Watershed

Type of Land Use	Percent of Watershed in 1990	Percent of Watershed in 2000
Residential	3%	3%
Cropland	11%	11%
Pasture	1%	1%
Forest	83%	83%
Open Water	1%	1%

Given the restrictive zoning, the 41 percent of the land that is owned by the State and Federal government and the lack of significant land use change during economically favorable times, it is unlikely that development will take place within the source watershed in the future.

G. Review of Water Quality Data

Water quality data was reviewed from the Water Supply Program's database for Safe Drinking Water Contaminates. Data from the water source and water plant will be compared with Maximum Contaminate Levels (MCLs). If any monitoring data is greater than 50% of an MCL, a detailed susceptibility analysis will be performed for that contaminate and its probable source. MDE is unaware of other water quality data collected from Hunting Creek Lake. This review will rely mostly on the raw water data collected by the water treatment plant operators, water quality data from two stations operated by the U.S. Geological Survey (USGS) that were located immediately upstream of the lake and water quality data from a site sampled by the United States Environmental Protection Administration (EPA) approximately 0.8 miles downstream from the intake.

Turbidity

Average monthly turbidity levels range from less than 1 to 16 NTU (Nephlometric Turbidity Unit) during the months the plant is in service from 1998-2000 (Figure 4). The highest recorded turbidity reading in those three years was in October of 1998 with a value of 25.3 NTU. The average turbidity for the same period is 2.9 NTU. Elevated levels in turbidity can carry harmful microorganisms and organic mater as well as harmful synthetic or inorganic materials carried into the reservoir from surface runoff. Particulates provide attachment sites for heavy metals such as cadmium, mercury and lead, and many toxic organic contaminants such as PCBs, PAHs, and many pesticides. The sediment load within Hunting Creek is low because of the heavily forested area, which makes up most of the watershed. Therefore, the reservoir in turn will have very modest turbidity levels. Although the forests may account for much of the surface runoff and erosion attenuation, the mountainous topography decreases travel time and increases storm water runoff velocities. A 5.2-acre parking lot is located west of the intake creates an impervious surface that drains directly into the reservoir and may increase turbidity during storm events.

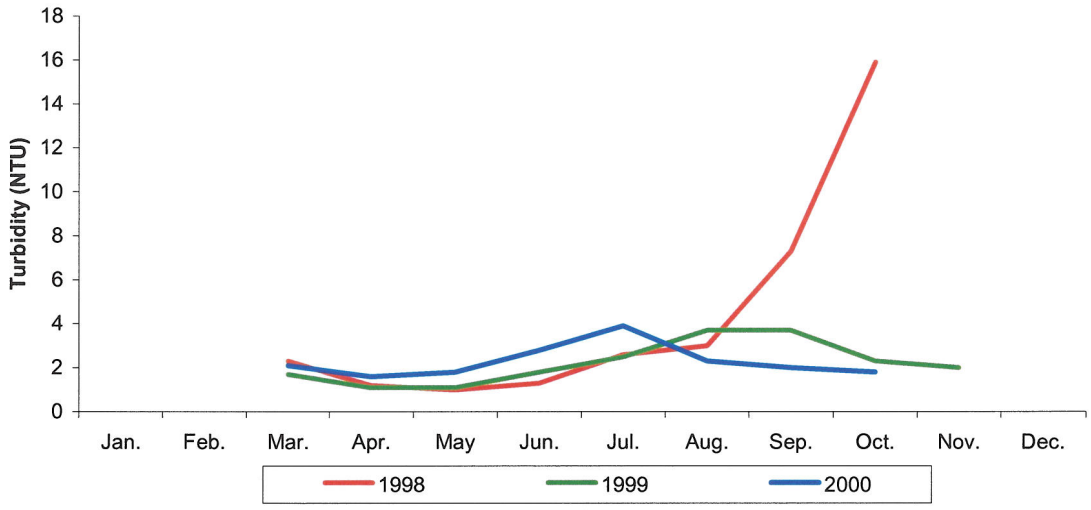

Figure 4. Cunningham Falls WTP monthly average turbidity based on the Maryland Department of the Environment, Water Supply Program, Filtration Plant Monthly Operating Report

pH

The pH of water determines the solubility and biological availability of chemical constituents such as nutrients phosphorus, nitrogen, and carbon and heavy metals such as lead, copper, cadmium, etc. For example, in addition to affecting how much and what form of phosphorus is most abundant in the water, pH may also determine whether aquatic life can use it. In the case of heavy metals, the degree to which they are soluble determines their toxicity. Metals tend to be more toxic at lower pH because they are more soluble. For the three years from 1998 through 2000, the pH monthly averages ranged between 7.3 and 6.6. The highest recorded pH level occurred in October of 2000 with a level of 8.2 and the lowest recorded, or most acidic recording occurred in September of 1998 at 5.4. The pH levels in Hunting Creek Lake generally follow a trend of being more basic during the winter months and more acidic during the summer months (Figure 5).

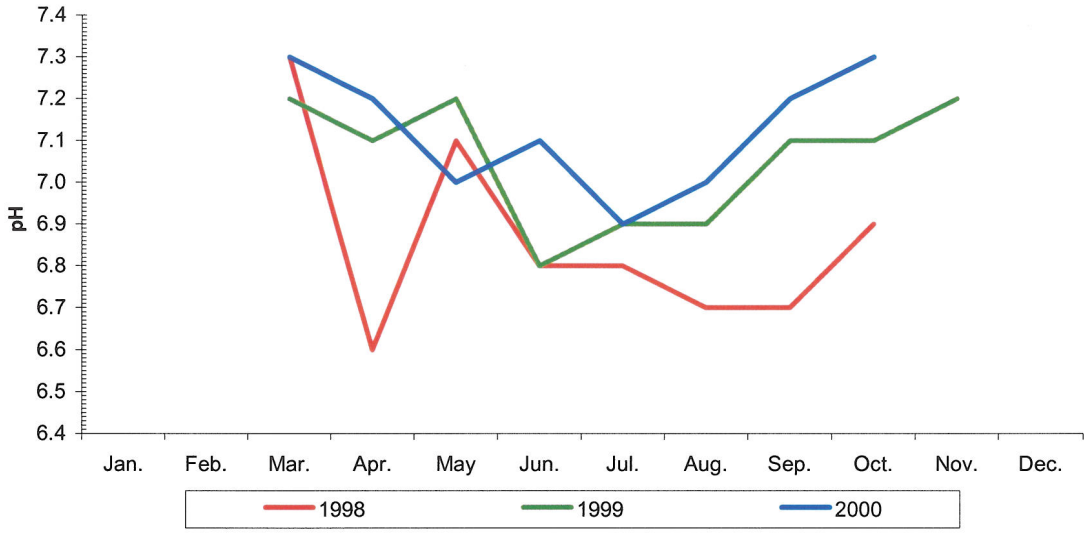

Figure 5. Cunningham Falls WTP monthly average pH based on the Maryland Department of the Environment, Water Supply Program, Filtration Plant Monthly Operating Report

Microbiological Contaminants

As part of the Source Water Protection study, MDE sponsored the collection and analysis of raw water samples from the treatment plant. As shown in Table 3, the low counts for Coliforms in these samples indicate the high quality and protected nature of this water source.

Table 3. Bacteriological Results from Raw Water at Intake

Date	Fecal Coliforms (MPN/100mL)	E.Coliforms (MPN/100mL)
10/03/2000	4.5	2
10/17/2000	2	1
10/31/2000	1	<1
04/17/2001	1	<1
05/01/2001	1	<1
05/15/2001	1	<1
05/29/2001	4	3
06/12/2001	1	<1
06/25/2001	2	5
07/24/2001	<2	<1
08/10/2001	<2	4
09/04/2001	2	4
09/25/2001	<2	<1
10/02/2001	9	5
10/16/2001	2	4
04/16/2002	<2	Lab Accident
04/07/2002	<2	<1
05/14/2002	<2	<1
06/17/2002	<2	<1
06/25/2002	2	1
07/09/2002	<2	<1
Average	1.55	1.45
Std Deviation	2.14	1.93

No sample was evaluated for viruses or Protozoa.

Inorganic Contaminants

The first source of data for inorganic contaminant was the monitoring data from the treatment plant that had been previously submitted to MDE. Because this is a transient system, the only two inorganic contaminants that had been monitored for were Nitrate and Nitrite. Nitrite was sampled for once and was not detected. Nitrate was sampled for four times as shown in Table 4 (below). All of the results are well below the level of 10 mg/L Maximum Contaminate Level for Nitrate as nitrogen.

Table 4. Results of Nitrate Samples at Treatment Plant

Date	Results – mg/L	MCL – mg/L
3/16/99	0.602	10
5/30/00	<0.06	10
9/21/01	0.06	10
4/17/02	0.321	10

Another source of data was USGS site number 01640965 (Hunting Creek Near Foxville, MD). This site was located on the southwest tributary to Hunting Creek Lake, just upstream of the lake. The drainage area to this station was 2.14 square miles. The monitoring results from this station were well within accepted standards and are shown in Table 5.

Table 5. USGS Site 01640965 – Hunting Creek Near Foxville, MD

Quantities with Multiple Measurements (1981 - 1993)	**Number of Measurements**	**Average**	**Maximum**	**Minimum**
Chloride Dissolved (mg/L as Cl)	278	4.85	15	2.2
Nitrogen, Nitrate, Dissolved (mg/L **as NO_3**)	275	1.58	12	0.019
PH	523	7.10	7.7	5.5
Specific Conductance (microsiemens/cm at 25 Deg. C)	354	75.22	104	31
Quantities Measured Once, On 8/04/1994		**Value**		
Phosphorus Dissolved (mg/L As P)		<.01		
Phosphorus Total (mg/L As P)		<.01		
Nitrogen Ammonia Plus Organic Dissolved (mg/L as N)		<.02		
Nitrogen Ammonia Plus Organic Total (mg/L as N)		<.02		
Nitrogen Nitrite Plus Nitrate Dissolved (mg/L as N)		0.31		

Data from USGS Site 01640970 (Hunting Creek Tributary Near Foxville, MD) was also reviewed. This site was located on the northeastern tributary to Hunting Creek Lake, just upstream of the lake. The drainage area to this site was 4.01 square miles. The results from monitoring this site also exceed all water quality standards and are shown in **Table 6.**

Table 6. USGS Site 01640970 - Hunting Creek Tributary Near Foxville, MD

Contaminant	**Number of Measurements**	**Average**	**Maximum**	**Minimum**
Chloride Dissolved (mg/L as Cl)	238	11.39	42.1	2.5
Nitrogen, Ammonia, Dissolved (mg/L as NH_4)	25	0.08	0.26	0.01
Nitrogen, Nitrate, Dissolved (mg/L **as NO_3**)	235	2.62	5.6	0.031
PH	380	7.33	8.1	6.2
Specific Conductance (Microsiemens/Cm At 25 Deg. C)	243	108.72	217	71
Sulfate Dissolved (mg/L As SO_4)	239	6.17	13	2.7

The final source of data reviewed was EPA station number 2B042922L, which is located on Hunting Creek approximately 0.8 miles downstream of the dam. Data from this site is

shown in **Table 7.** While one of the two Nitrate levels measured downstream of the dam at the EPA site exceeds all of the 515 measurements made upstream of the lake or at the source, both of the measurements from the EPA site are less then 50 percent of the MCL

Table 7 - Water Quality Data

	03/26/1986	04/10/1986
Specific Conductance (UMHOS/CM @ 25 °C)	98.7	95.45
Oxygen Dissolved (mg/l)	10.9	11.6
PH	7.43	7.54
Phosphorus Dissolved (mg/l)	0.004	0.007
Carbon, Dissolved Organic	2.71	1.015
Chloride, Dissolved (mg/l)	13.13	13.69
Sulfate, Dissolved	6.08	5.65
Fluoride, Dissolved (mg/L)	0.03	0.03
Manganese, Dissolved (ug/L	1	2
Aluminum, Total (ug/L)	70.05	3.6
Nitrate Nitrogen, Dissolved (mg/L **as NO_3**)	3.9	20.49
Iron (ug/L)	8.99	20.49
Turbidity (NTU)	0.8	1.15

H. Susceptibility Analysis

The Hunting Creek Lake watershed is 84% forested and the streams above the reservoir are protected by forest. This reduces the potential for many contaminants to ever reach the reservoir. The average turbidity in the reservoir during the three years 1998 thru 2000 while the plant was being operated was 2.9 NTU and the highest raw water turbidity recorded for that period was 25.3 NTU. Hunting Creek Lake, like any other surface source, is subject to higher turbidity during heavy storms and snowmelt. Higher turbidity levels can be associated with harmful microorganisms entering drinking water supplies. When compared to other source of water, the high turbidity levels experienced in Hunting Creek Lake are quite low. A sampling program carried out with the cooperation of MES and MDE from Oct 2000 thru September 2002 for Fecal and E.coli bacteria shows that the median values was only 1 colony per 100 milliliter for Fecal Coliforms and was less then one colony per 100 mL for E. Coli. The highest levels reported were 9 colonies per 100 mL for Fecal and 5 colonies per 100 mL for E. Coli. These results indicate that this source meet the State standard of 200 colonies per 100 milliliters for fecal coliform bacteria and is generally not susceptible to microbial contamination.

Because it is a transient system, the Hunting Creek source was not evaluated for volatile organic or synthetic organic chemicals. Because of it's protected source, it is not susceptible to inorganic chemicals. Like most all surface water sources, the supply is susceptible to contamination by giardia, cryptosporidium and other pathogens. Wildlife (such as beaver and deer) and livestock are potential sources of pathogens.

I. Recommendations

This report is compiled based on the existing and available data from several sources. It provides general information as a first step toward establishing and implementing a source water protection plan for Cunningham Falls State Park. Most of the watershed is protected by either government land ownership or by restrictive RC zoning by Frederick County. As such, little needs to be done to further protect this resource. The following is a list of recommendations regarding watershed management.

- Road signs explaining to the public that they are entering a protected drinking water supply watershed are an effective way of keeping the relationship of land use and water quality in the public eye, and help in the event of spill notification and response.
- Continue to monitor for all Safe Drinking Water Act as required by MDE, including raw water sources when feasible.
- Continue monitoring for fecal coliform and E. Coli for raw water.
- Consider incorporating Urban BMPs that are intended to improve the quality of stormwater runoff in the design of any future parking lots or other facilities near the lake.
- Encourage farmers in the watershed to contact the Frederick County soil conservation district for cost share payments and technical assistance concerning resource conservation practices such as diverting runoff from animal waste storage areas, planting and maintaining buffer strips, fencing to exclude livestock from streams and other practices intended to improve the quality of streamflow.

J. References

Frederick County Comprehensive Plan - A Countywide Plan for Frederick Co. Maryland July 1997, Frederick County Department of Planning and Zoning for the Frederick County Planning Commission and Board of Commissioners

Frederick County Zoning Ordinance (Ord. No. 77-1-78 § 40-10, 1-24-77)

Inventory of Maryland Dams and Assessment of Hydropower Resources, June 1985, 2nd Printing, prepared by Stephen B. Weisberg and Kenneth A. Rose of Martin Marietta Environmental Systems and Brian S. Clevenger and Jeffrey O. Smith of the Dam Safety Division of the (now defunct) Water Resources Administration which was part of the Maryland Department of Natural Resources. The Dam Safety Division is currently part of the Maryland Department of the Environment.

National Park Service, ParkNet - http://www.nps.gov

Maryland's Source Water Assessment Plan, 1999, Maryland Department of the Environment, Water Supply Program

Other Sources of Data

Cunningham Falls State Park Monthly Operating Reports (MORs) and Self-Monitoring Reports.

EPA Storet – http://www.epa.gov/storet/

MDE Water Appropriation Permit database
MDE Water Supply Inspection Reports
MDE Water Supply Oracle Database
Maryland Department of Planning 1990, 1997 and 2000 land use shape files.
Maryland Department of Planning 2002 Tax Map, Frederick County.

USGS - NWIS web – http://waterdata.usgs.gov/nwis/

Appendix B – Additional Figures

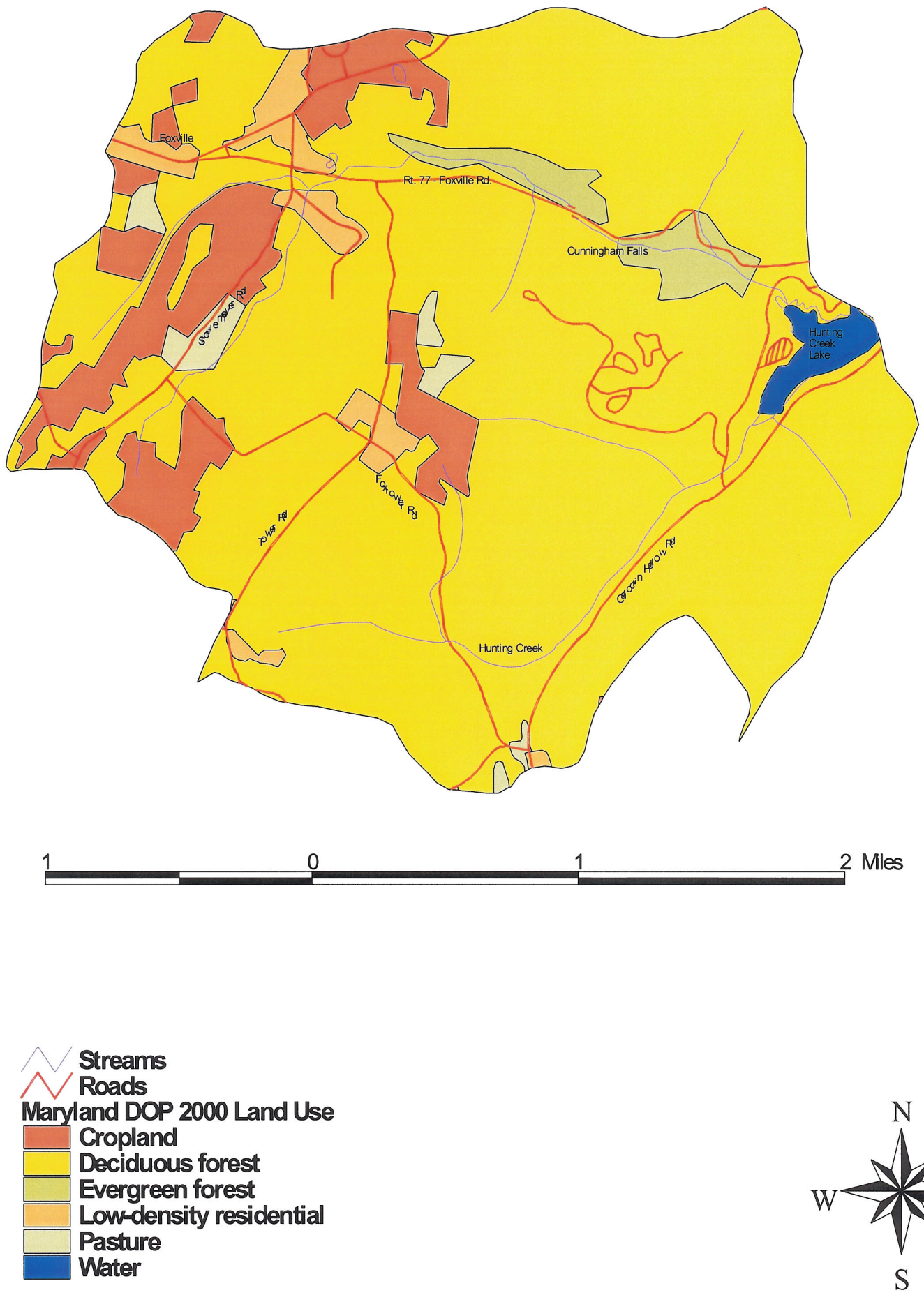

Figure 7. Cunningham Falls Year 2000 Land Use from MDP