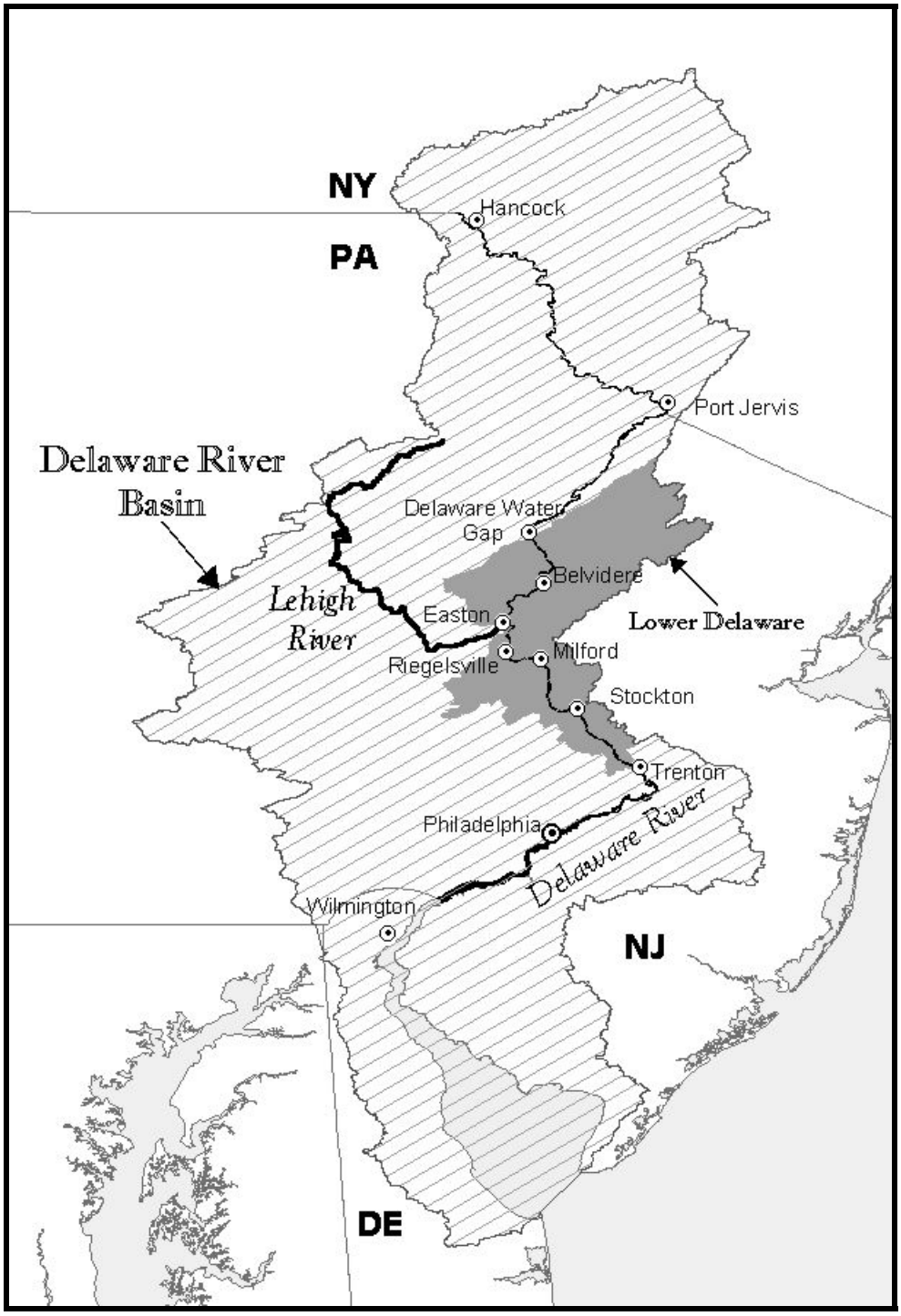
The Lower Delaware Monitoring Program
1999 Survey of the Lower Non-Tidal Delaware River and Pilot Study for a Long-Term Water-Quality Monitoring Network



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Executive Summary

The Delaware River is within a day's drive of 40% of the U.S. population, and the Lower non-tidal Delaware (the "Lower Delaware", or the reach located between Trenton, NJ, and the Delaware Water Gap) is intensively used for water-based recreation, tourism, public water supply, and industry. Unlike other segments of the non-tidal Delaware River, the Lower Delaware is more populated, more densely developed, and therefore more susceptible to water-quality impacts. In 2000, portions of the Lower Delaware were designated as part of the National Wild and Scenic River system. The Lower Delaware River Management Plan (Lower Delaware River Wild and Scenic River Study Task Force and National Park Service, 1997) designated the DRBC as the lead agency for monitoring and development of a water-quality management plan for the reach. By implementing a long-term monitoring program along the Lower Delaware, the DRBC, with state, federal, and non-governmental partners, can generate sufficient information to document existing water-quality and provide the basis for water-quality management decisions in this portion of the Delaware River and its tributaries. To serve planning needs, DRBC designed an intensive monitoring program to define, protect, and enhance existing water-quality.

This report presents findings of a June through August 1999 water-quality survey of the Delaware River and tributaries located between the Delaware Water Gap and Trenton, NJ. The survey included three bacteria sampling events and one water-quality survey. Fecal coliform and enterococcus bacteria were analyzed from the samples. The study area included 74 sampling locations at tributaries, bridges, and access areas along 75 miles of the Delaware River. Purposes of the survey were: 1) to assess water-quality; 2) to compare bacterial quality to the 1987 survey (DRBC 1988); and 3) to provide a basis for water-quality management plans that will maintain and enhance water-quality and designated uses. The survey was designed to support the Lower Delaware River Management Plan; improve the data record necessary for 305(b) assessments; and extend DRBC's monitoring efforts to cover the entire non-tidal river.

Findings and Recommendations

1. Bacterial water-quality of the Delaware River and its tributaries has apparently improved since 1987, considering the fecal coliform standard alone.

2. Fecal coliform and enterococcus counts are greater in near-shore areas of the Delaware River than in the main channel, though low levels were observed in the Delaware River.

3. Fecal coliform counts may have been affected by dilution in the Delaware River and large tributaries.

4. Fecal coliforms are valuable general water-quality indicators, and provide a tool to assess effects of urbanization. In future study designs, large tributaries should be broken into study units of 80 square miles or less, enabling study of population growth versus water-quality at an increased level of resolution for resource management decisions.

5. Enterococci appear to be more sensitive a measure of primary contact bacterial water-quality than fecal coliforms. Use of the enterococcus criterion would lead to a greater number of water bodies listed as impaired in Section 305(b) reports. Thirty-five tributaries exhibited

enterococcus densities above the federal guideline and New Jersey standard, as opposed to 11 tributaries exceeding the fecal coliform standard.

6. DRBC should consider establishing enterococcus standards for the non-tidal Delaware River, based upon federal criteria or existing water-quality.

7. Fecal coliform, E. coli and enterococcus testing should be added to DRBC's suite of basic water-quality parameters, measured as part of the Lower Delaware fixed monitoring network.

8. The Delaware River exhibits periods of oxygen super-saturation and high pH. This may be caused by excessive aquatic plant growth, possibly due to elevated nutrient inputs, especially during periods of stable and low flow. Further evaluation of river nutrient dynamics and aquatic plant productivity may indicate the underlying cause.

9. The upper limit of DRBC's pH stream quality objective (pH 8.5) should be evaluated since it is inconsistent with state standards.

10. Jericho Creek (Bucks County, PA) and Cain's Run AKA Warsaw Creek (Hunterdon County, NJ) displayed concentrations below dissolved oxygen standards (though the data set was very limited). Gallows Run (Bucks County, PA) displayed lower than normal dissolved oxygen saturation values. These tributaries should be investigated in greater detail by the states, DRBC, or a combination thereof. Agencies, non-governmental organizations, and local residents should cooperatively implement solutions to repeated water-quality problems.

11. The Delaware River exhibited lower counts of fecal coliforms and enterococci than tributaries. Other relatively bacteria-free Lower Delaware waters included the Lehigh River, Tohickon Creek, and Paulins Kill. Based on our very limited observations, these waters may be acceptable for primary contact recreation.

12. A water-quality monitoring network was established, and 2200 data were collected from 74 sites. These data begin a long-term data record for the Lower Delaware River corridor, which will contribute to a management approach that prevents degradation of this portion of the Delaware River, and assists in protecting the water resources of tributary watersheds.

Introduction

This report presents findings of the 1999 water-quality survey of the Delaware River and tributaries located between the Delaware Water Gap and Trenton, NJ. The study area included 74 sampling locations along 75 miles of the Lower Delaware River (see Figure 1). The 74 sampling sites were composed of 11 Delaware River bridges (2 sites per bridge), 10 Delaware River access areas, and 42 tributaries. An additional 8 tributaries were planned for study, but remained dry throughout the study period.

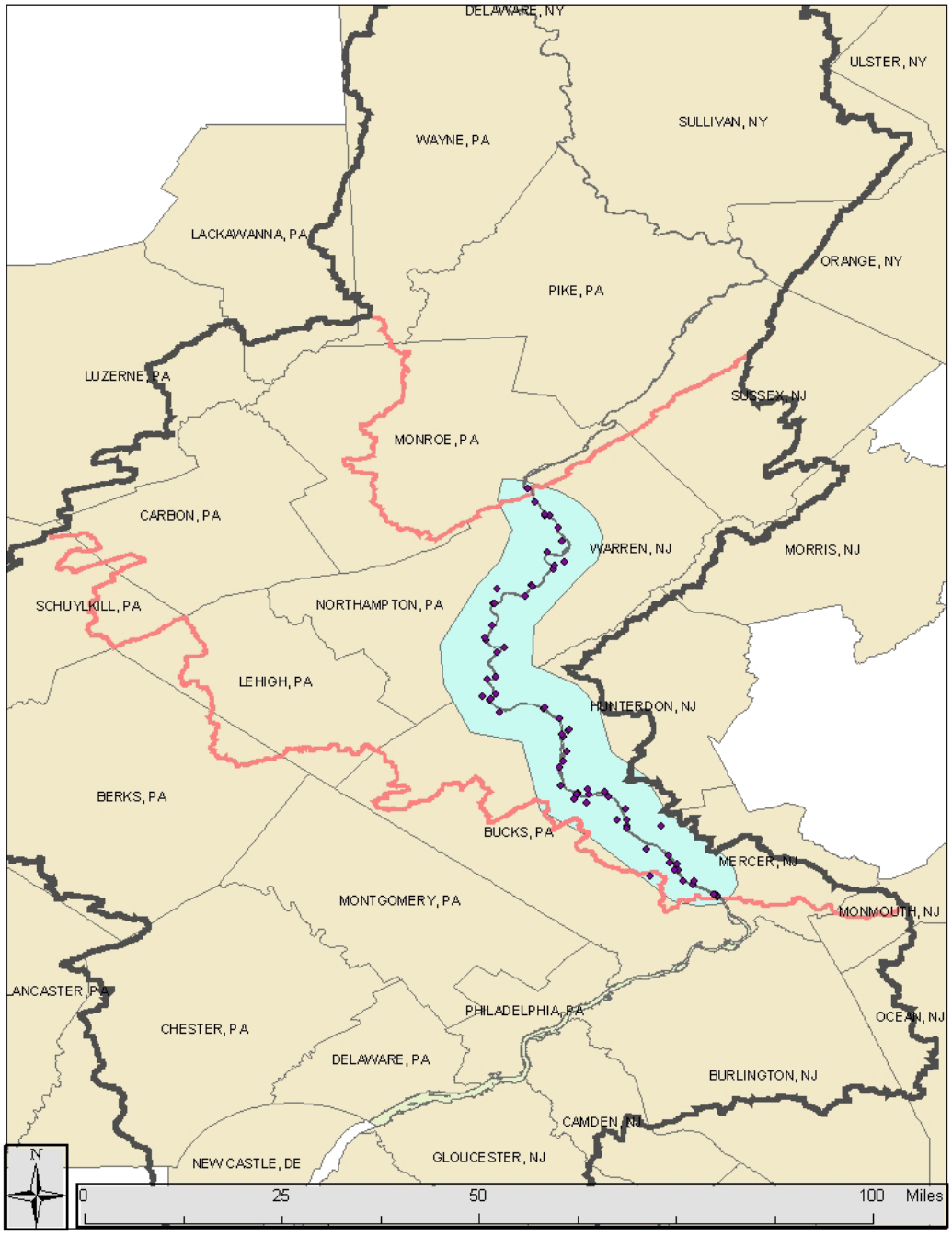

Figure 1.
The Lower Delaware River divides the states of New Jersey and Pennsylvania, flowing through portions of six counties along a 77-mile reach. DRBC established 74 sampling locations for the 1999 survey.

Purposes of the survey were threefold:

1) Assess water-quality throughout the lower non-tidal reach of the Delaware River, and continue to develop a baseline water-quality database.

2) Compare bacterial data to results of the DRBC 1987 bacterial survey.

3) Provide a scientific basis for management plans that will maintain and enhance, where practical, existing water quality.

Design of this study was guided by the following:

1) To repeat the summer 1987 bacterial survey (DRBC 1988), and to compare 1987 versus 1999 results.

2) To cover all public river access areas, describing water-quality conditions experienced by those who swim, canoe, tube, water ski and fish the Delaware River.

3) To sample tributaries to the Delaware River, seeking tributary sources of bacterial and chemical pollutants.

4) To support the Lower Delaware River Management Plan (Lower Delaware River Wild and Scenic River Study Task Force and National Park Service, 1997). On November 19, 1999, the U.S. Senate passed S. 1296, the Lower Delaware Wild and Scenic Rivers Act. Congress passed the bill in October 2000, designating segments of the study area as a recreational river, to be managed in accordance with the Lower Delaware River Management Plan. On November 1, 2000, the President of the United States signed the Act.

5) To improve the data record necessary to describe the water-quality of the Lower Delaware River, sufficient for 305(b) assessments, and to extend DRBC's monitoring efforts to cover the entire non-tidal river. The Scenic Rivers Monitoring Program (SRMP), a cooperative effort of two National Park Service units and the DRBC cover the Delaware River above the Delaware Water Gap. The Lower Delaware Monitoring Program links the SRMP to existing efforts in the Delaware Estuary and Bay, providing monitoring coverage of the entire river system by filling a 75-mile gap.

On January 28, 1998, the Delaware River Basin Commission passed Resolution No. 98-2, which endorsed the Lower Delaware River Management Plan and resolved to "…take such action as it deems appropriate to implement the goals of the plan commensurate with available resources." This survey is a component of DRBC's data collection effort toward fulfillment of goals stated in the Management Plan.

The first goal of the Management Plan relates to water-quality, stating a vision to "maintain existing water-quality in the Delaware River and its tributaries from measurably degrading and improve it where practical." To do so, existing water-quality must be defined.

Analysis of the historical monitoring network revealed that the data record is insufficient to describe the status and trends of Lower Delaware River water-quality.

The bacteria portion of this study was conducted as a special, single-season survey under a larger long-term monitoring effort designed to describe the physical, chemical, and ecological quality of the Lower Delaware River corridor. DRBC and the Delaware Riverkeeper Network, under the auspices of the Delaware River Greenway Partnership, began the Lower Delaware Monitoring Program (LDMP) in 1998. In 1999, the long-term monitoring network was expanded by the DRBC.

The LDMP is designed to develop a long-term data record of water-quality information at fixed river and tributary locations. Each year, chemical sampling is conducted biweekly from May through September, with concurrent short-term studies of chemical, biological, ecological and geomorphologic components of the Lower Delaware River corridor. The summer 1999 bacterial survey was one such short-term study, to be revisited as necessary to assess changes in the river's quality.

Study Area

The Delaware River, from the confluence of its east and west branches at Hancock, New York, flows 330 miles through the Appalachian Highlands, Valley and Ridge, Piedmont, Triassic Lowlands, and Coastal Plain geologic formations. The Delaware River basin drains 13,539 square miles. The non-tidal portion is about 200 miles long and drains about 6,780 square miles of the watershed above Trenton, NJ.

The Lower Delaware, or the reach extending from the Delaware Water Gap to Trenton, NJ, borders the states of New Jersey and Pennsylvania. New Jersey counties along this reach are Warren, Hunterdon, and Mercer. Pennsylvania counties are Monroe, Northampton, and Bucks. The Lower Delaware River's drainage area within the study reach is about 2,610 square miles from 51 named tributaries, along 75 miles of the main stem river. Major New Jersey tributaries, or those which comprise over 5% of the Lower Delaware River's drainage area within the reach, are the Paulins Kill, Pequest, and Musconetcong Rivers. Major Pennsylvania tributaries are the Lehigh River and Tohickon Creek. DRBC sampled these tributaries for bacteria, and established fixed long-term sampling sites near the mouth of each.

New Jersey and Pennsylvania classify many of their water resources along the study reach as being of high quality. New Jersey's high quality classifications relate to each stream's ability to support trout. Trout Production Waters are Buckhorn, Lopatcong, Merrill, and Pohatcong Creeks. Trout Maintenance Waters are Delawanna Creek, Hakihokake Creek, and the Musconetcong, Paulins Kill, and Pequest Rivers. Pennsylvania designates high quality streams according to water-quality or other recreational or ecological features. High Quality Waters of the Lower Delaware are Aquetong, Cuttalossa, and Paunacussing Creeks, Fry's Run, and Rapp and Beaver Creeks, which are headwaters of Tinicum Creek. Exceptional Value Waters are a section of Bushkill Creek through Forks Township in Northampton County, and Cooks, Tinicum, and Tohickon Creeks in Bucks County. These waterways receive special protection status from their states, and were thus included in this study. They also are represented in DRBC's fixed network of monitoring stations.

Many smaller creeks were included in this study because they seldom receive attention from the state agencies, yet might provide valuable insights to cause and effect relationships concerning water-quality. In smaller watersheds, causes of water-quality problems tend to stand out clearly. Pollution sources are fewer and easily isolated. In the case of bacterial pollution, where sources are varied and diffuse, the greatest chance of quick success at protective or preventative efforts may be realized within these small watersheds.

The Lower Delaware River is heavily used for recreation. Canoe and tube liveries, and numerous public access areas, provide opportunities for swimming, fishing, and boating. This intense recreational use of the river led to establishment of sampling sites at or near all public access areas and bridges. Sampling these locations provided a good picture of water-quality, related to areas used for recreation in this reach of the river.

Some tributaries flow into either the Delaware & Raritan Canal in New Jersey or the Delaware Canal in Pennsylvania. The Delaware Canal in Pennsylvania parallels the Delaware River from Easton to Bristol. The Delaware & Raritan Canal in New Jersey parallels the Delaware River from Bull's Island, where water is diverted from the Delaware River to northern New Jersey. The canal is operated by the New Jersey Water Supply Authority as a major source of water for the central part of the state.

Background: Fecal Coliform and Enterococcus Bacteria

Fecal Coliforms & Enterococci: Indicators of Fecal Pollution and Pathogens

The Delaware River Basin Commission uses a fecal coliform stream quality objective in Zones 1D and 1E as indicative of bacterial water-quality. Fecal coliforms were, for many years, preferred as the indicator group for recreational water-quality. This common standard (threshold of 200 colonies per 100 ml) was based upon studies conducted in the 1940's and 1950's, but the U.S. EPA (1986) later recognized deficiencies. Studies showed that enterococcus density was more strongly indicative of swimming-related gastroenteritis, where fecal coliform density showed little relationship to this and other swimming-related illnesses (U.S. EPA, 1986). U.S. EPA has recommended use of *E. coli* or enterococci as preferential indicators of fecal pollution for primary-contact recreation, in place of fecal coliforms. For this reason, DRBC chose to study both fecal coliforms, for which a standard exists, as well as enterococci, which are suggested to be more strongly associated with human health effects.

Fecal coliforms are part of the total coliform group, which includes the genera *Escherichia*, *Citrobacter*, *Enterobacter*, and *Klebsiella*. The predominant fecal coliform is *Escherichia coli*, which constitutes a large portion of the bacterial population of the human intestine. *E. coli* is a species indicative of fecal pollution and the possible presence of enteric pathogens. Fecal coliform bacteria are distinguished from total coliforms by their ability to grow at higher temperatures (Csuros and Csuros, 1999). For this study, fecal coliform density was measured using the membrane filter procedure 9222D, with m-FC media (Standard Methods for the Examination of Water and Wastewater, 20th edition, 1998).

The enterococcus group is a sub-group of the fecal streptococci. The enterococcus group is composed of *Streptococcus faecalis*, *S. faecium*, *S. gallinarum*, and *S. avium*. The occurrence of fecal streptococci in water indicates contamination originating from warm-blooded animals.

The enterococcus portion of the fecal streptococcus group is a valuable bacterial indicator of the extent of contamination of recreational surface waters. Enterococci are the most efficient bacterial indicators of water-quality associated with bathing (Dufour, 1984). The membrane filter procedure for enumerating enterococci detects mainly *S. faecalis* and *S. faecium*, found in the intestinal tracts of humans and such animals as cats, dogs, cows, horses, and sheep. The federal guideline for recreational freshwaters is 33/100 ml (U.S. EPA, 1986). For this study, enterococci densities were measured using the membrane filter procedure 9230C, with mE agar (Standard Methods 20th Edition, 1998; U.S. EPA, 1985; 1997). The U.S. EPA Region II laboratory in Edison, NJ, conducted these tests for DRBC.

Fecal coliforms and enterococci are easily detected and quantified, and indicate animal and human fecal pollution. They also represent potential presence of other enteric pathogens that are less-easily detected in a cost-efficient manner, and which were not examined in this survey. These waterborne pathogens enter a human host through intact or broken skin, inhalation, ingestion, aspiration, or through mucous membranes of the eye, ear, nose, mouth, or genitals. Surface water pathogens include *Salmonella*, *Shigella*, enteroviruses, protozoans such as *Cryptosporidium*, *Giardia*, and other multi-cellular parasites. If sufficient nutrients exist, other pathogens may opportunistically multiply, such as *Pseudomonas aeruginosa*, *Klebsiella*, *Vibrio*, and *Aeromonas hydrophila*. Another pathogen, associated with the skin, mouth, and nose of bathers, is *Staphylococcus aureus*. Useful references to these organisms and associated diseases include Dufour (1984), Olivieri et al. (1977), and Krieg (1984), as well as Standard Methods for the Examination of Water and Wastewater, 20th Ed. (1998).

The Centers for Disease Control and Prevention, USEPA, and the Council of State and Territorial Epidemiologists maintain a national surveillance program on waterborne diseases originating from drinking and recreational waters (Kramer et al., 1996a). Summary data from 1985-1994 (Kramer et al., 1996b) listed 21 outbreaks originating from outdoor recreational waters, though only one outbreak originated from stream water, and 20 came from lakes or ponds. Agents of disease included *Shigella*, *Pseudomonas*, *Legionella*, *Leptospira*, and *E. coli*. No outbreaks are known to have occurred from recreation in waters of the Delaware River Basin.

Watershed Sources and Pathways of Bacteria Contamination

Sources of bacteria in a watershed are difficult to track. The Center for Watershed Protection (1999), in its special issue bulletin on bacteria, reviewed existing knowledge concerning sources and pathways of bacteria within a watershed. Watershed sources include sewer lines, septic systems, livestock, wildlife, waterfowl, pets, soils, and plants. According to the U.S. Geological Survey (Smith et al., 1992), about 20% of all water-quality samples exceed the 200/100ml fecal coliform standard. Among those 20% of samples, highest fecal coliform densities were collected from agricultural and urban watersheds. Lowest densities were found in forested and pastured watersheds. There are such a wide variety of sources, however, that variability among samples is very high. This means that comparison of watersheds to one another can be very difficult. Each watershed is unique in its blend of bacteria sources. Some predictors of bacteria levels include population density, age of development, and percent of residential development (Glenne, 1984). Factors such as rainfall amount and intensity, time between rain events and sampling, turbidity, and suspended solids are commonly correlated with bacteria levels.

Coliform bacteria may be human or animal in origin. If human, the coliforms come mainly from sewage. Though waste treatment has improved greatly in the past 30 years, some plants are overloaded or inefficiently operated, producing high bacteria levels in streams. Other sources include: combined sewer overflows (CSO's); sanitary sewer overflows; illegal sanitary connections to storm drains; dumping of waste into storm drains and streams by septage trucks, RV's, or portable toilets; and failing septic systems.

Non-human sources of bacterial pollution may be associated with humans. The list of "wildlife" that are common sources in an urban or urbanizing watershed include animals associated with humans, such as dogs, cats, rats, raccoons, pigeons, gulls, ducks, and geese. Livestock and rural wildlife contribute as well and include cattle, horses, poultry, beaver, muskrats, deer, and waterfowl. Non-human contribution of bacteria to a watershed may be very significant. A study using human RNA coliphages (Alderiso et al., 1996) found that 95% of fecal coliforms in urban storm water were non-human in origin. Samadpour and Checkowitz (1998) conducted microbial tracking in a lightly developed Washington watershed, and found that the primary sources of fecal coliforms were dogs and livestock, especially in areas with horse farms and small ranches. They found that vulnerability to fecal coliform contamination increased in areas where livestock density was high, and where scant attention was paid to grazing and riparian management practices.

In addition to direct human and non-human sources of bacteria contamination, the drainage system itself provides a sink for bacteria sources. Burton et al. (1987) found that bacteria persist in bottom sediments for weeks or months, especially in warm, dark, moist and organic-rich conditions. Van Donsel and Geldreich (1971) found that sediment bacteria are found in densities 3-4 orders of magnitude higher than in the surrounding water column. Optimal bacteria growth conditions may be found in ponds, lakes, catchments, ditches, drains, roadway curbs, leaf piles, grass swales, and moist soils (Center for Watershed Protection 1999). Bannerman et al. (1993) and Steuer et al. (1997) found that residential lawns, driveways, and streets are major source areas for bacteria.

Regulatory Context

DRBC Guidelines and Standards

The study area covers most of Zone 1D and all of Zone 1E of the Delaware River, an interstate non-tidal river. The Delaware River Basin Commission Administrative Manual - Part III: Water Quality Regulations (DRBC 1996) contains stream quality objectives for Zones 1D and 1E, including fecal coliform bacteria. The standard states that fecal coliforms should not exceed 200 per 100 milliliters as a geometric average; samples shall be taken at such frequency and location as to permit valid interpretation.

No DRBC enterococcus criteria exist for the non-tidal Delaware River, though the U.S. EPA urges adoption of enterococci and *E. coli* as primary contact indicators of choice. Below the head of tide, DRBC set enterococcus standards by Resolution No. 91-6 in 1991, ranging from 33/100ml to 88/100ml, based upon attainable uses in Zones 2 through 5 of the Delaware Estuary. DRBC also retained fecal coliform standards for these Zones of the estuary, ranging according to location from 200 to 770/100ml. This study contributes data toward establishment of enterococcus standards for the non-tidal Delaware River.

Federal Guidelines and Criteria

The U.S. EPA freshwater enterococci criterion for bathing (full body contact) recreational waters is 33/100ml geometric mean. This criterion is based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period) with a 0.4 log standard deviation. Fecal coliform criteria remain at the historic 200/100ml geometric mean density. The U.S. EPA's Action Plan for Beaches and Recreational Waters (1999) states that "EPA will develop policies to ensure that states and tribes adopt the currently recommended Ambient Water Quality for Bacteria – 1986 and make the transition to monitoring for E. coli and enterococci indicators rather than total coliforms or fecal coliforms."

With three or less samples taken over the summer months at any given site, this study did not meet the statistical requirements for application of the U.S. EPA criteria. The summer 1999 sampling effort was sufficient, however, to begin describing water-quality conditions and to identify potential problem spots along the Delaware River corridor. Graphical presentations of results display criteria guidelines, though it should be recognized that sampling was not conducted with the necessary frequency to assess compliance with federal enterococcus criteria.

State Guidelines and Standards

Pennsylvania and New Jersey bacteria guidelines and standards are provided here for comparison with those of DRBC and U.S. EPA. A review of state guidelines is included in EPA's Bacterial Water Quality Standards Status Report (USEPA 1998). New Jersey uses the fecal coliform criterion of 200/100ml and an enterococcus criterion of 33/100ml for the state's freshwater. At present, only New Jersey's enterococcus criterion is applicable to the non-tidal Delaware River. Pennsylvania's Chapter 93 Water Quality Standards apply the fecal coliform standard of 200/100ml to meet the Water Contact use classification for the swimming season, and 2000/100 ml the rest of the year. The exception includes the Delaware River, where the 200/100 ml fecal coliform stream quality objective applies year-round.

Methods

Delaware River and tributary sampling sites are listed by river-mile in Table 1. For the Lower Delaware, all named tributaries are listed, even those which do not receive regular attention from monitoring agencies. This is a "check list" of tributaries used for study planning purposes, and shows all named tributaries between each Delaware River monitoring station.

Data were collected by DRBC according to methods established under DRBC's quality assurance project plan (DRBC, 1999a). The U.S. EPA Region II laboratory in Edison, NJ, provided microbiological analyses using the membrane filtration procedures described in Standard Methods for the Examination of Water and Wastewater, 20th Edition (1998). Routine water-quality parameters collected included dissolved oxygen (DO), air temperature, water temperature, DO percent saturation, conductivity, pH, and gage height (tributaries only). Two types of sampling runs were required to meet logistical requirements of establishing a fixed water-quality network and meeting holding times for bacteria and nutrient sampling. At bacteria survey (BA) sites, fecal coliform and enterococci samples were collected with routine water chemistry parameters. At fixed water-quality (WQ) sites, sampling included nutrients

(Nitrate+Nitrite Nitrogen, Ammonia+Ammonium Nitrogen, Orthophosphate, and Chlorophyll A) and routine parameters.

June through August 1999 daily precipitation data from National Weather Service climate stations in Allentown, PA (Lehigh Valley International Airport, station ABE), Belvidere Bridge, NJ (station BELN4), and Lambertville, NJ (station LBVN4) were downloaded from the National Climate Data Center web site. Stream flow records from U.S. Geological Survey gages along the Delaware River (Montague, Belvidere, Riegelsville, and Trenton) were also obtained for the study period. Sites were located on DRBC recreation maps for the Delaware River, and on USGS 7.5 minute topographic maps.

TABLE 1. Delaware River & Tributary Sampling Sites 1999

WQ sites: Basic chemistry, nutrients, bacteria; long-term sampling sites
BA sites: Special study only, incl. basic chemistry, fecal coliform and enterococcus (Jun, Jul, Aug 1999)
NO sites - Were not sampled in 1999, but listed here for reference and future study planning purposes.
n=# is number of bacteria samples collected summer 1999
DRY = All visits dry.

Name	River Mile	Drainage Area (sq. mi.)	Sample 1999, n=#
Lower Delaware stations			
Assunpink Creek, Trenton, NJ (future site)	133.80	91.40	NO
Delaware River @ Calhoun Street Bridge, NJ-PA	134.34	6780.00	WQ, n=6
Gold Run @ Trenton CC bridge, Trenton, NJ	137.25	1.66	NO
Buck Creek above Main St Bridge, Yardley, PA	138.00	6.99	WQ, n=3
Delaware River @ Yardley PAFBC Access, PA	138.80	6771.00	BA, n=3
Delaware River @ Scudders Falls Access, NJ	139.20	6770.00	BA, n=3
Dyers Creek @ Rt. 32 Bridge, PA	139.80	1.20	BA, n=3
Jacobs Creek above Rt. 29 Bridge, NJ	140.46	13.30	WQ, n=3
Houghs Creek @ Aqueduct & Taylorsville Rd, PA (dry most of study)	140.60	5.19	BA, n=1
Delaware River @ Washington Crossing Bridge, NJ-PA	141.80	6750.00	WQ, n=6
Fiddlers Creek @ Private Bridge off Fiddlers Creek Rd, NJ	143.20	2.02	BA, n=2
Jericho Creek @ Stony Brook Rd Bridge, PA (dry much of study)	144.20	9.63	BA, n=2
Moore Creek @ Iron Bridge Farm, NJ	145.20	10.20	BA, n=3
Pidcock Creek @ Bowmans Hill Wildflower Preserve Bridge, PA	146.30	12.70	BA, n=3
Dark Hollow Run, PA	148.20	0.71	DRY
Aquetong Creek @ Mechanic St Bridge, New Hope, PA	148.50	8.01	WQ, n=3
Delaware River @ Lambertville Boat Launch, NJ	148.55	6685.00	BA, n=3
Swan Creek @ Union St Bridge, Lambertville, NJ	148.60	3.28	BA, n=3
Delaware River @ Lambertville-New Hope Bridge, NJ-PA	148.70	6680.00	BA, n=6
Rabbit Run, PA	149.45	0.42	DRY
Alexauken Creek @ Rt. 29 Bridge, Lambertville, NJ	149.50	15.00	BA, n=3
Primrose Creek @ Rt. 32 Bridge, PA	150.50	est. 3.00	BA, n=3
Delaware River @ Stockton Bridge, NJ-PA	151.90	6660.00	WQ, n=6
Wickecheoke Creek @ Rt. 32 Bridge, NJ	152.51	26.60	WQ, n=3
Lockatong Creek @ Rosemont-Raven Rock Rd Bridge, NJ	154.00	23.20	WQ, n=3
Cuttalossa Creek @ Cuttalossa Rd, PA	154.50	est. 3.00	BA, n=3
Delaware River @ Lumberville-Raven Rock Foot Bridge, NJ-PA	155.40	6598.00	WQ, n=6
Paunacussing Creek @ Rt. 32 Bridge, PA	155.60	7.87	WQ, n=3
Delaware River @ Delaware & Raritan Canal Diversion (USGS site)	156.20	6588.00	NO
Hickory Creek, PA	156.98	1.50	DRY

TABLE 1. Delaware River & Tributary Sampling Sites 1999

WQ sites: Basic chemistry, nutrients, bacteria; long-term sampling sites
BA sites: Special study only, incl. basic chemistry, fecal coliform and enterococcus (Jun, Jul, Aug 1999)
NO sites - Were not sampled in 1999, but listed here for reference and future study planning purposes.
n=# is number of bacteria samples collected summer 1999
DRY = All visits dry.

Name	River Mile	Drainage Area (sq. mi.)	Sample 1999, n=#
Lower Delaware stations			
Tohickon Creek @ Rt. 32 Bridge, PA	157.00	112.00	WQ, n=3
Delaware River @ Point Pleasant Diversion (future site)	157.20	6472.00	NO
Cain's Run (AKA Warsaw Creek) @ Rt. 29 Bridge, NJ	159.50	1.60 (est.)	BA, n=1
Smithtown Creek, PA	159.90	est. 1.00	DRY
Warford Creek @ Rt. 29 Bridge, NJ	160.50	1.60 (est.)	BA, n=1
Tinicum Creek @ Tinicum Creek Rd above Rt. 32 Bridge, PA	161.60	24.00	WQ, n=3
Copper Creek @ Rt. 29 Bridge, NJ	162.90	3.27	DRY
Delaware River @ Kingwood Access, NJ	163.10	6440.00	BA, n=3
Little Nishisakawick Creek @ Rt. 29 Bridge, Frenchtown, NJ	164.00	3.51	BA, n=1
Nishisakawick Creek @ Kingwood Ave/Rt. 12 Bridge, Frenchtown, NJ	164.10	11.10	WQ, n=3
Delaware River @ Frenchtown-Uhlerstown Bridge, NJ-PA	164.30	6430.00	WQ, n=6
Harihokake Creek @ Rt. 29 Bridge near Milford, NJ	165.70	9.85	BA, n=2
Hakihokake Creek @ Bridge St Bridge, Milford, NJ	167.20	17.50	WQ, n=3
Delaware River @ Milford-Upper Black Eddy Bridge, NJ-PA	167.70	6380.00	WQ, n=6
Gallows Run @ Rt. 611/32 Jct. Bridge, PA	171.80	8.72	BA, n=3
Cooks Creek @ Red Bridge Rd Bridge, PA	173.70	29.50	WQ, n=3
Delaware River @ PAFBC Riegelsville Access, PA	173.90	6331.00	BA, n=3
Musconetcong River @ River Rd/Rt. 627 Bridge, Riegelsville, NJ	174.60	156.00	WQ, n=3
Delaware River @ Riegelsville Bridge, NJ-PA	174.80	6175.00	WQ, n=6
Frys Run (AKA Frya Run) @ Northampton Co. Park Bridge abv Rt. 611, PA	176.60	6.14	WQ, n=3
Pohatcong Creek @ River Rd Bridge, NJ	177.36	57.10	WQ, n=3
Delaware River @ Wy-Hit-Tuk Access off Rt. 611, PA	181.00	6112.00	BA, n=3
Lopatcong Creek @ Main St Bridge, Phillipsburg, NJ	182.00	14.70	WQ, n=3
Lehigh River @ Rt. 611 Bridge, Easton, PA	183.66	1361.00	WQ, n=3
Delaware River @ Easton Northampton Street Bridge, NJ-PA	183.82	4717.00	WQ, n=6
Bushkill Creek @ Rt. 611 Bridge, Easton, PA	184.10	80.00	WQ, n=3
Delaware River @ Eddyside Park Access (private), PA	185.00	4630.00	BA, n=3
Mud Run @ Rt. 611 Bridge, PA	189.10	6.00	DRY
Delaware River @ Sandt's Eddy Access, PA	189.20	4620.00	BA, n=3
Martins Creek @ Little Creek Rd Bridge off Rt. 611, PA	190.65	44.50	WQ, n=3
Buckhorn Creek @ Hutchinson Rd Bridge off Rt. 519, NJ	192.90	11.80	WQ, n=3
Oughoughton Creek @ Depues Rd Bridge, PA	194.32	11.90	DRY
Delaware River @ PP&L Martins Creek Access, PA	194.40	4540.00	BA, n=3
Pophandusing Brook @ Spring St Bridge, Belvidere, NJ	197.66	5.62	BA, n=3
Pequest River @ Orchard St Bridge, Belvidere, NJ	197.80	157.00	WQ, n=3
Delaware River @ Belvidere-Riverton Bridge, NJ-PA	197.84	4377.00	WQ, n=6
Allegheny Creek @ River Rd Bridge, PA	199.76	9.06	BA, n=3
Delaware River @ Driftstone Campground Access (private), PA	203.00	4365.00	BA, n=3
Delawanna Creek @ Rt. 46 Bridge, NJ	205.20	4.49	WQ, n=3
Paulins Kill @ Rt. 46 Bridge near Rt. 94 Ramp, NJ	207.16	177.00	WQ, n=3
Jacoby Creek @ Rt. 611 Bridge, Portland, PA	207.48	6.45	BA, n=3
Delaware River @ Columbia-Portland Foot Bridge, NJ-PA	207.50	4177.0	WQ, n=6

TABLE 1. Delaware River & Tributary Sampling Sites 1999

WQ sites: Basic chemistry, nutrients, bacteria; long-term sampling sites
BA sites: Special study only, incl. basic chemistry, fecal coliform and enterococcus (Jun, Jul, Aug 1999)
NO sites - Were not sampled in 1999, but listed here for reference and future study planning purposes.
n=# is number of bacteria samples collected summer 1999
DRY = All visits dry.

Name	River Mile	Drainage Area (sq. mi.)	Sample 1999, n=#
Lower Delaware stations			
Stony Brook @ access road culvert above I-80, NJ	208.76	est. 2.0	DRY
Slateford Creek @ National Park Rd Bridge, DWGNRA, PA	209.58	2.95	BA, n=3
Dunnfield Creek @ Appalachian Trail Footbridge off I-80, NJ	211.48	3.56	WQ, n=3

A field manual was created to document sampling logistics and facilitate study replication. See Appendix A for applicable portions of the 1999 Lower Delaware Cooperative Monitoring Program Field Instruction Manual (DRBC 1999c). The manual includes checklists, dates, staffing, sites visited, driving directions, and collection and transport procedures for two types of sampling runs. WQ runs pertain to collection procedures for fixed sites, without collection of bacteria samples, but including nutrient samples. BAC runs pertain to bacterial sampling trips, where holding times are critical to data quality, and transport to Edison, NJ (USEPA Region II laboratory) dictated the number of sites visited per day. Listed in Appendix B are descriptions of Lower Delaware sampling sites, with locations of DRBC flow gage marks.

Table 2 lists water-quality parameters and methods used for the Lower Delaware Monitoring Program. Reach-wide characterizations were conducted for dissolved oxygen, dissolved oxygen percent saturation, temperature, pH, conductivity, fecal coliforms, and enterococci (n=3 to 8, depending upon site). Insufficient data were collected for nutrients (nitrate + nitrite nitrogen, phosphate phosphorus, chlorophyll a, pheophytin a) to conduct reach-wide characterization (n=1). Nutrient data were included in Appendix C, but are not discussed here.

TABLE 2: Lower Delaware Monitoring Program Water Chemistry and Bacterial Parameters.

Parameter	**Standard Methods[1] – Number**	**Equipment**	**Min – Max**	**Accuracy (±)**
Flow	See Appendix B for locations	Pygmy meter	0.07-3.00 fps	5%
Air temperature	2550 – thermometric	Thermometer	-10-110 °C	1 °C
Water temperature	2550 – thermometric	Thermometer	-10-110 °C	1 °C
		Thermistor probe (DO meter)	-5-45 °C	0.7 °C
		Thermistor probe (conductivity meter)	-2-50 °C	0.6 °C
Dissolved oxygen	4500-O C. - azide modification of Winkler titration method	Kit	0-20 mg/l	20-60 µg/l
	4500-O G. – membrane electrode	YSI Meter	0-20 mg/l	0.2 mg/l
Specific conductance	2510 - platinum electrode conductivity cell	YSI Meter	0-19,999 µmhos /cm	2 µmhos/cm
PH	4500-H+	pH Testr 2 meter	4-10 units	0.25 units
Nitrate+Nitrite Nitrogen	Palintest Method – Zinc Reduction, Photometer 570 nm	YSI 9100 photometer	0.-1 mg/l N 0-20 mg/l N	.02 mg/l .2 mg/l
Ammonia	4500-NH3 F. Phenate Method	YSI 9100 photometer	0.01-1.00 mg/l	0.05 mg/l
Ortho-phosphate	4500-P E. Ascorbic acid reduction	YSI 9100 photometer	0.01-3.00 mg/l	0.01 mg/l
Chlorophyll a, Pheophytin a	10200-Spectrophotometric (DMSO extraction), by NJDEP Bureau of Marine Water Monitoring	NJDEP Spectrophotometer	> 0.42 ppb	1 ppb
Enterococcus (EPA Region 2 Lab)	9230 C. mE agar for enterococci	Membrane filtration	> 0 colonies/100 ml	NA
Fecal coliform (EPA Region 2 Lab)	9222 D. m-FC media	Membrane filtration	> 0 colonies/100 ml	NA

[1] Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.

Results and Discussion

Refer to the appendices for monitoring data (Appendix C), bacteria summaries (Appendix D) and daily precipitation at selected stations (Appendix E). In the results sections, graphical presentations include trend lines, though it should be noted that sampling frequency was insufficient to derive strong statistical relationships. As data collection continues over future years, statistical power of the data set should improve, revealing spatial and temporal trends. All graphs present water-quality and bacteria data organized by Delaware River mile. Delaware River mile locations of tributaries are at the confluence of the tributary to the Delaware River.

Delaware River Flow and Rainfall, Drought of Summer 1999

As the study period began in June 1999, the Delaware River Basin above Trenton was experiencing a rainfall deficit of 6.23 inches since August 1998 (Figure 2). From June through August 1999, rainfall above Trenton averaged 7.16 inches, a deficit of 4.82 inches from the normal rainfall of 11.98 inches. By the end of August 1999, the precipitation deficit reached 11.05 inches since the previous August, prompting drought emergency actions by DRBC and the states of New Jersey and Pennsylvania. The study therefore represents water-quality conditions during a drought, with severe drought conditions in some watersheds.

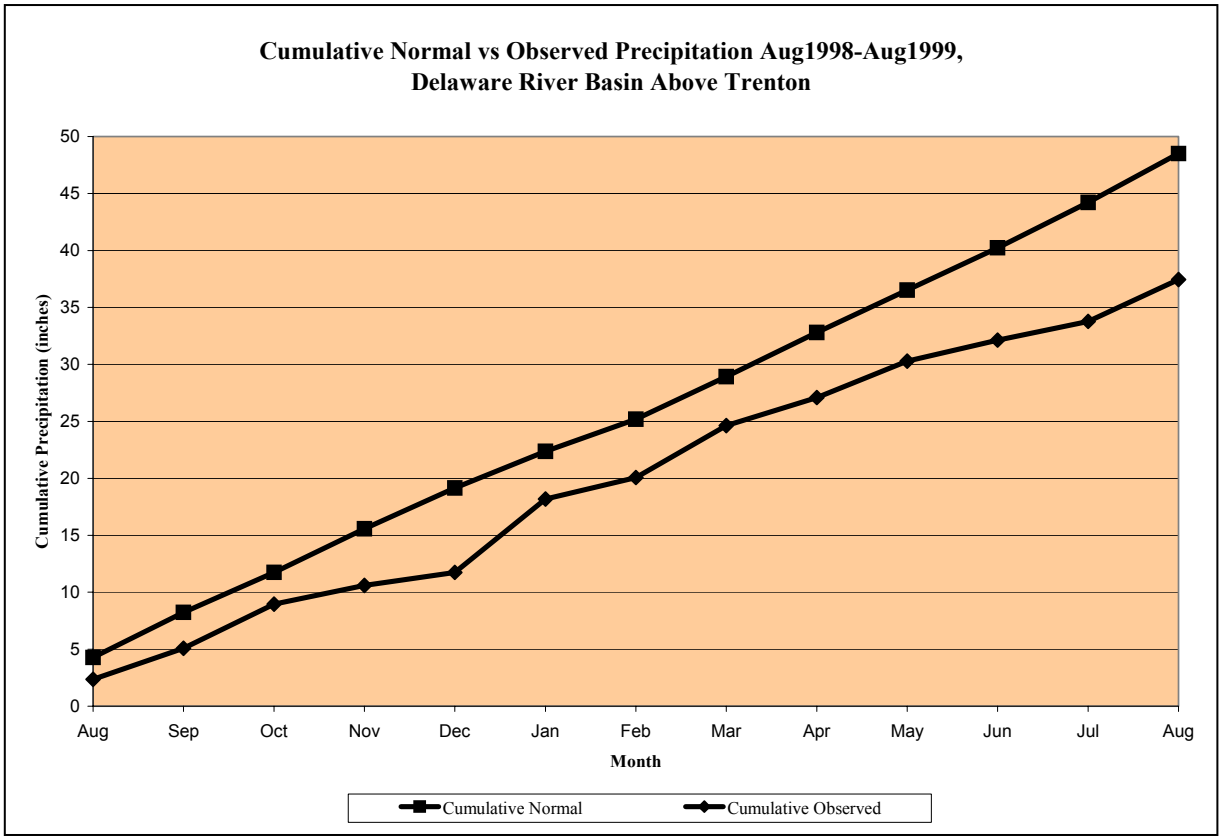

Figure 2.
Cumulative normal versus observed precipitation for the study period.

Drought circumstances created optimal dry-weather bacteria sampling conditions, and all sampling events save the last were conducted under conditions unaffected by heavy antecedent rainfall. During the study period, up to 66% of the flow of the Delaware River at Trenton originated from upper-basin reservoir releases, and many tributaries were completely dry. Pennsylvania tributaries found dry during all or part of the study period included Houghs, Jericho, Dark Hollow Run, Rabbit Run, Hickory, Smithtown, Tinicum, Mud Run, and Oughoughton Creeks. New Jersey tributaries found dry included Jacobs, Fiddler, Lockatong, Warsaw, Warford, Copper, Little Nishisakawick, Nishisakawick, Harihokake, Stony Brook, and Dunnfield Creeks. Dry creeks were either missed completely or insufficiently sampled for calculation of averages. Figure 3 shows June through August 1999 daily average flow of the Delaware River at Trenton, NJ. Rain and sampling events are marked along the study timeline.

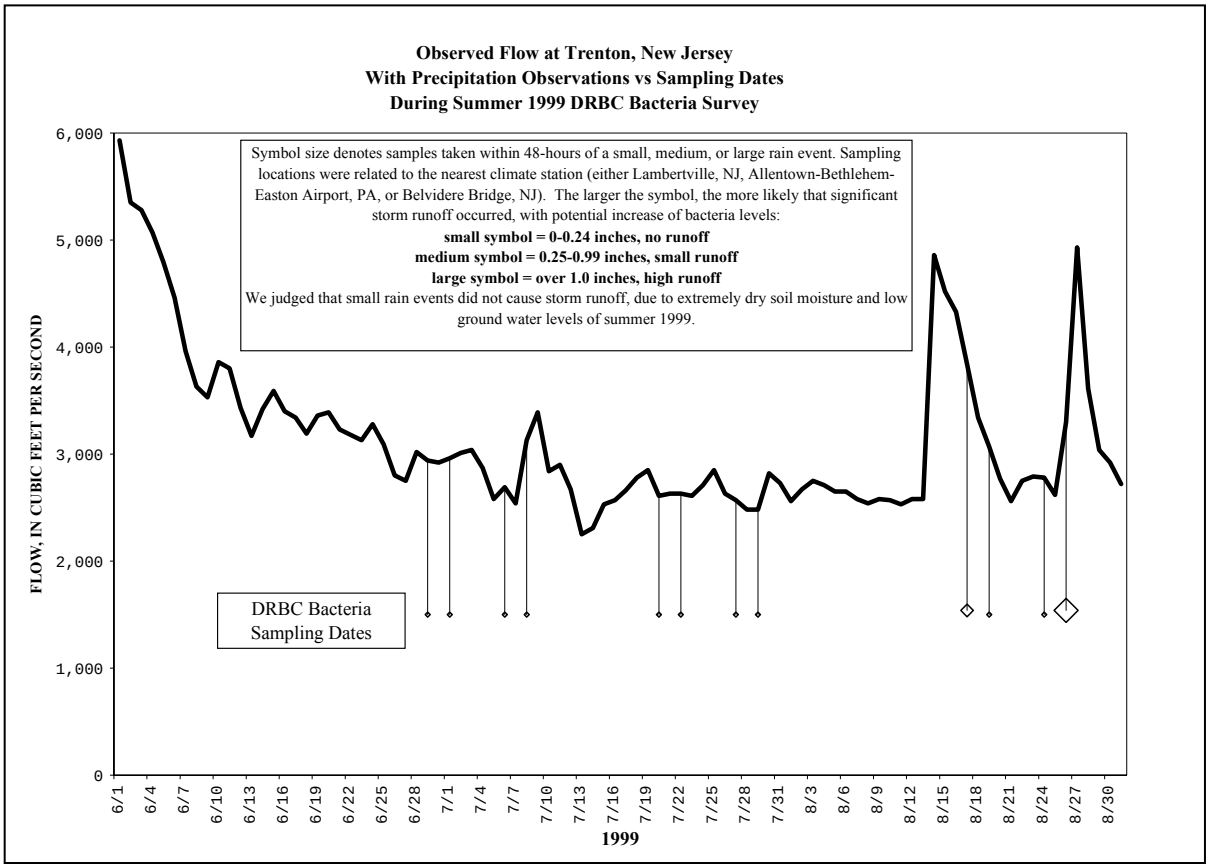

Figure 3.
Observed Flow at Trenton, NJ, with precipitation related to sampling dates during the 1999 DRBC Bacteria Survey. Only the last sampling event was conducted within 48 hours of a large rain event, though inclusion of this data did not significantly change average bacteria densities.

Water Quality – Main Stem Delaware River

To facilitate water-quality trend analysis and comparison along the non-tidal Delaware River from the confluence of the East and West Branches at Hancock, NY, to Trenton, NJ, the DRBC/National Park Service Scenic Rivers Monitoring Program (SRMP) provided water-quality data for the study period. National Park Service personnel collect water-quality data under DRBC/NPS quality assurance protocols (DRBC, 1999b), sampling the Delaware River from Hancock, NY, to the Delaware Water Gap. SRMP data are included in all figures that display results above river-mile 210.

Delaware River water-quality generally met standards and criteria throughout the non-tidal Delaware River. Though average dissolved oxygen values (Figure 4) declined somewhat from Hancock (River-Mile 332) to Trenton (River-Mile 134), trending downward from around 8.5 to 7.9 mg/l, the dissolved oxygen saturation trend remained steady near 101% (Figure 5). Since the river warms as it flows from the Delaware Water Gap to Trenton (Figure 6), its oxygen-holding capacity declines. Some areas of the river reached super-saturated conditions, commonly attributed to heavy aquatic plant growth, which was observed at many river stations through the summer months.

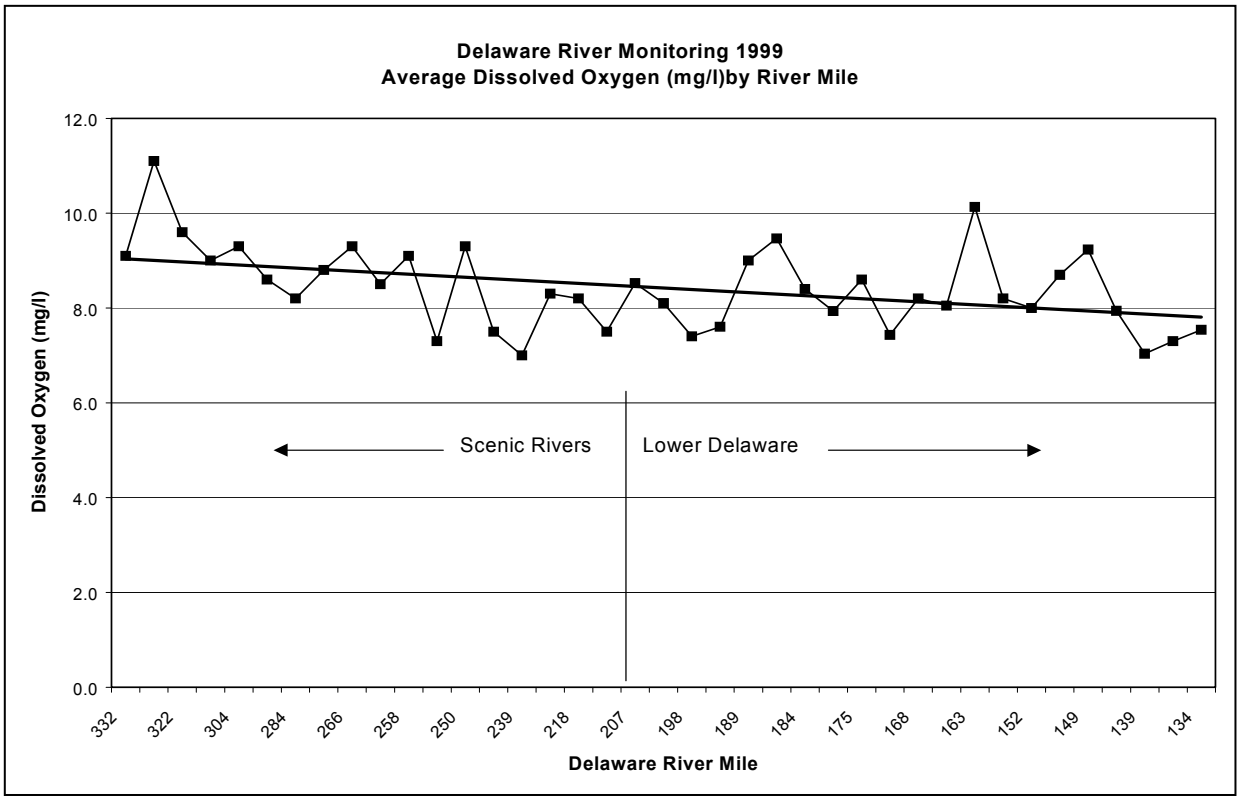

Figure 4.

Delaware River average dissolved oxygen concentration (mg/l), Hancock, NY to Trenton, NJ (n=3 to 6, dependent upon site). Trends show that concentration declines downstream, though saturation remains steady (See Figure 5).

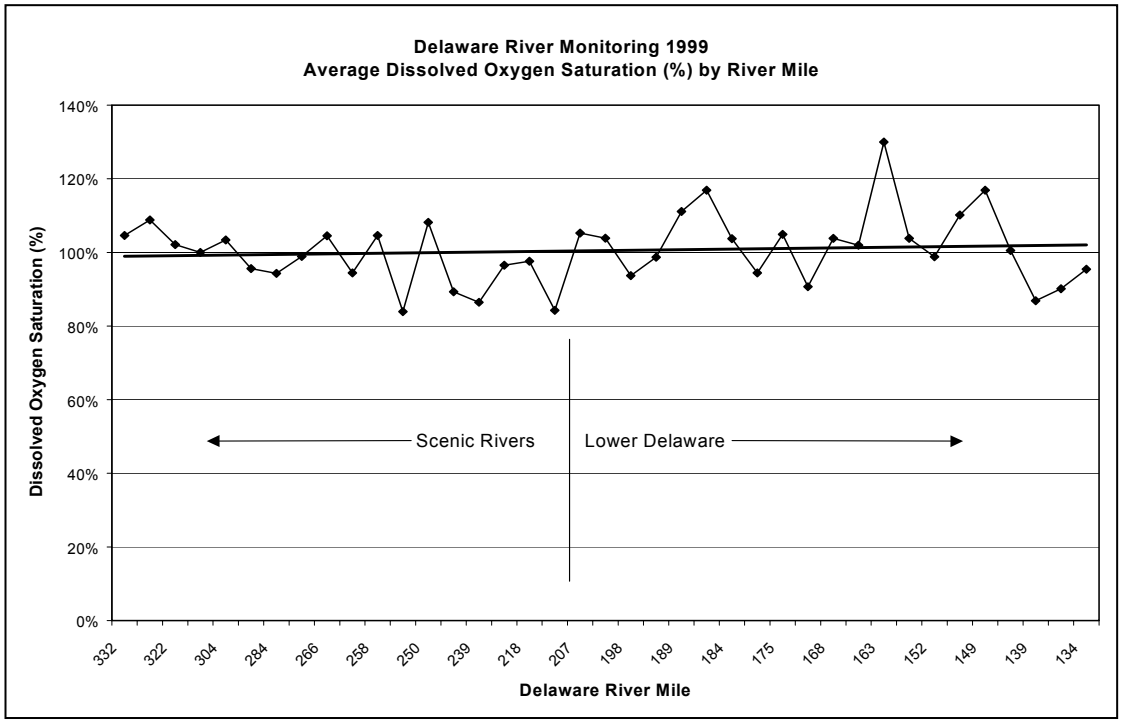

Figure 5.

Delaware River Dissolved Oxygen Saturation (%), Hancock, NY, to Trenton, NJ. The upstream-downstream saturation trend line remained steady around 101% (n=3 to 6, depending on site), due to declining oxygen-holding capacity with rising temperature (see Figure 6).

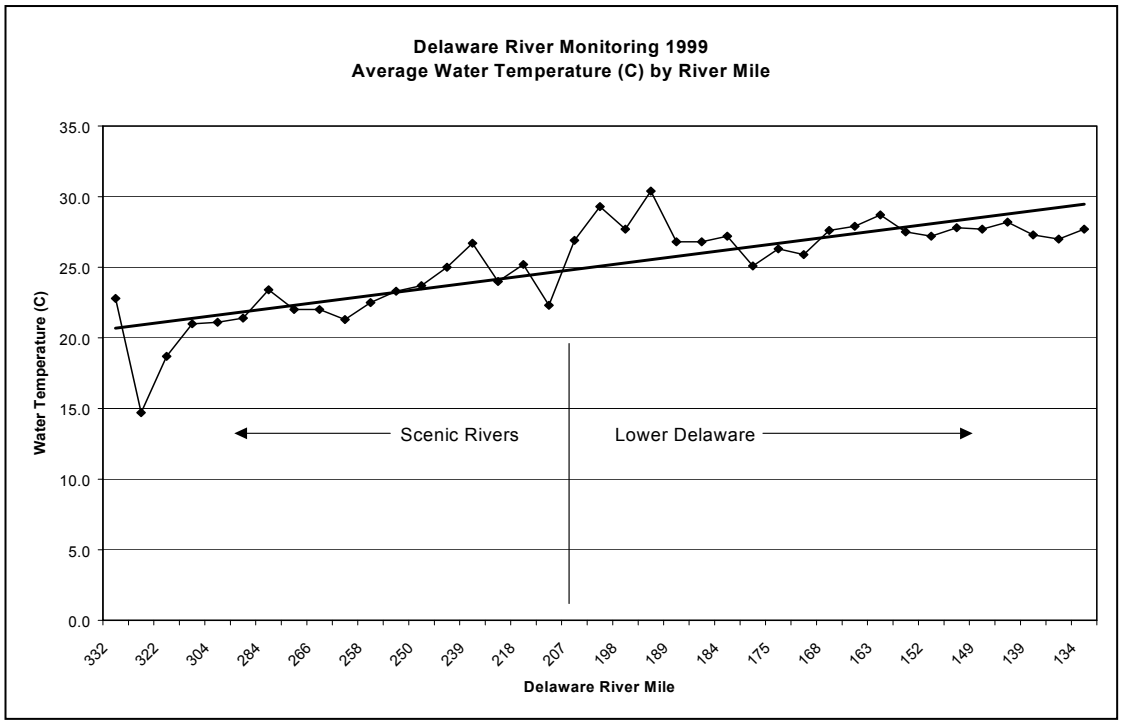

Figure 6.

Delaware River average water temperature (°C) from Hancock, NY, to Trenton, NJ. Average water temperature trended upward from upstream to downstream (n=3 to 6, dependent upon site). The low point to the left of the graph (14.9 °C, n=3) was taken from the West Branch Delaware River, which is affected by bottom-releases from Cannonsville Reservoir. The highest average temperature at river-mile 194 (30.4°C, n=3) was taken just downstream from the PP&L Martins Creek power plant's waste stream.

Figure 7 displays average pH during the summer months along the Delaware River. DRBC's pH standard for Zones 1D and 1E specifies that values should fall between 6.0 and 8.5. The lower limit was never crossed during this study, but the upper limit was exceeded in two areas of the Delaware River. High pH average values were observed at Lambertville Boat Access (avg. pH 8.6, n=3) on the New Jersey side of the river, and along a reach above Easton, PA, at Sandt's Eddy Fishing Access (avg. pH 8.6, n=3). In July and August, pH values exceeded 8.5 from Martins Creek Access to Sandt's Eddy to Eddyside Park. pH values are typically high during the day, due to photosynthesis by submerged aquatic vegetation, periphyton, and phytoplankton. This may be a natural condition, subsiding with increased flows and plant senescence in fall. However, the presence of high nutrient concentrations may trigger an increase in aquatic plant growth, leading to the unusually high pH values observed. Further study may reveal whether the high pH values observed in 1999 result from natural conditions, or from nutrient enrichment. If natural conditions cause pH values to exceed standards, perhaps the upper limit of the pH standard should be re-examined. In the case of pH, DRBC Stream Quality Objectives are inconsistent with State pH standards, which designate an upper limit of pH 9.0.

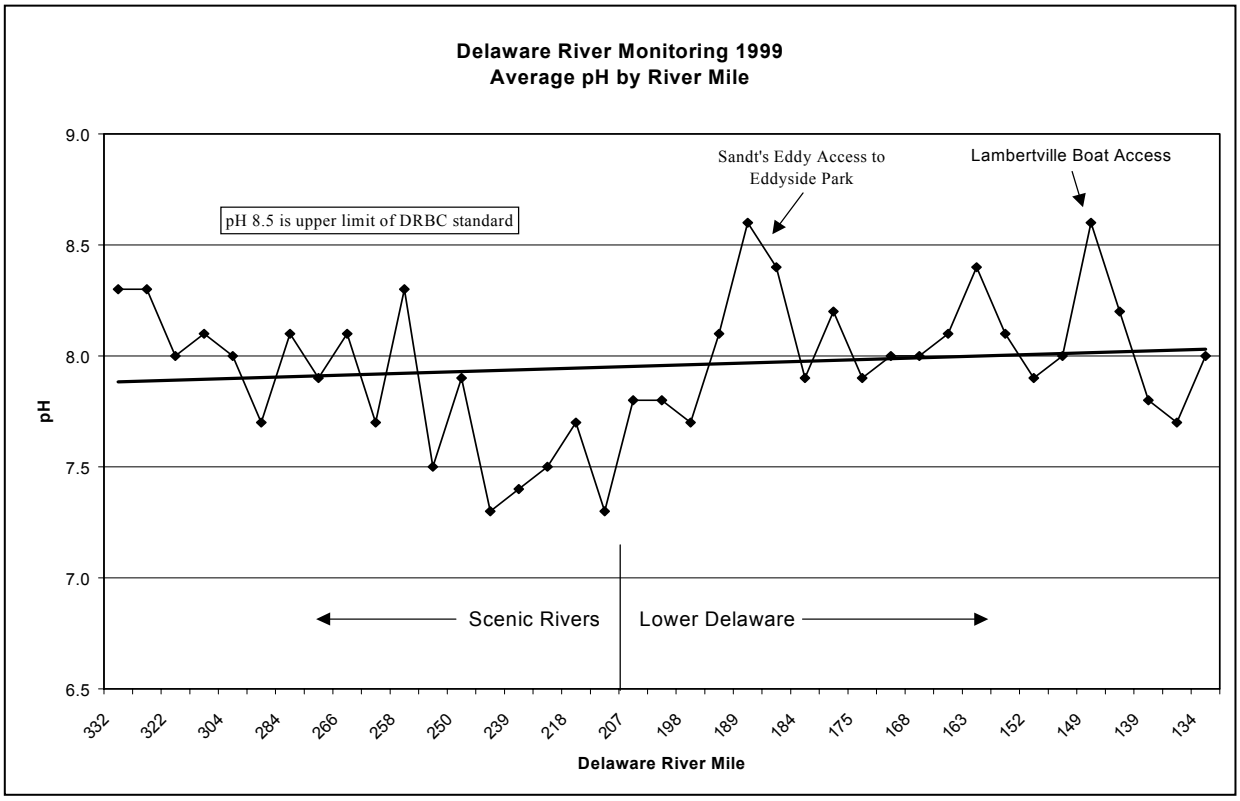

Figure 7.
Average pH along the Delaware River from Hancock, NY, to Trenton, NJ (n=3 to 8, depending on site). The upper limit of pH 8.5 was exceeded at the two labeled areas.

Conductivity measures the ability of an aqueous solution to carry an electric current, which depends on the presence and concentration of inorganic ions in the stream, and is also a function of temperature. In Figure 8, conductivity (in µmhos/cm) increases as the river flows from Hancock to Trenton. The pattern shows that as tributaries contribute flow, human and industrial activities cumulatively contribute waste products. An average conductivity spike of 296 µmhos/cm (n=3) is shown at the Martins Creek Boat Access, where several possible upstream sources contribute ion loads. The PPL Martins Creek Generating Station discharge enters just upstream of the access sampling site. The power plant may or may not be a source of

the increase in conductivity observed. In this area, the Delaware River passes through a band of typically high-conductivity carbonate rock. Another possible contributor is the Pequest River, a major New Jersey tributary to the Delaware, where average conductivity measured 451 µmhos/cm (n=4). Groundwater inflow also contributes ions, as wells in the near vicinity display conductivity values over 500 µmhos/cm (Pers. Comm., DRBC Project Review Branch).

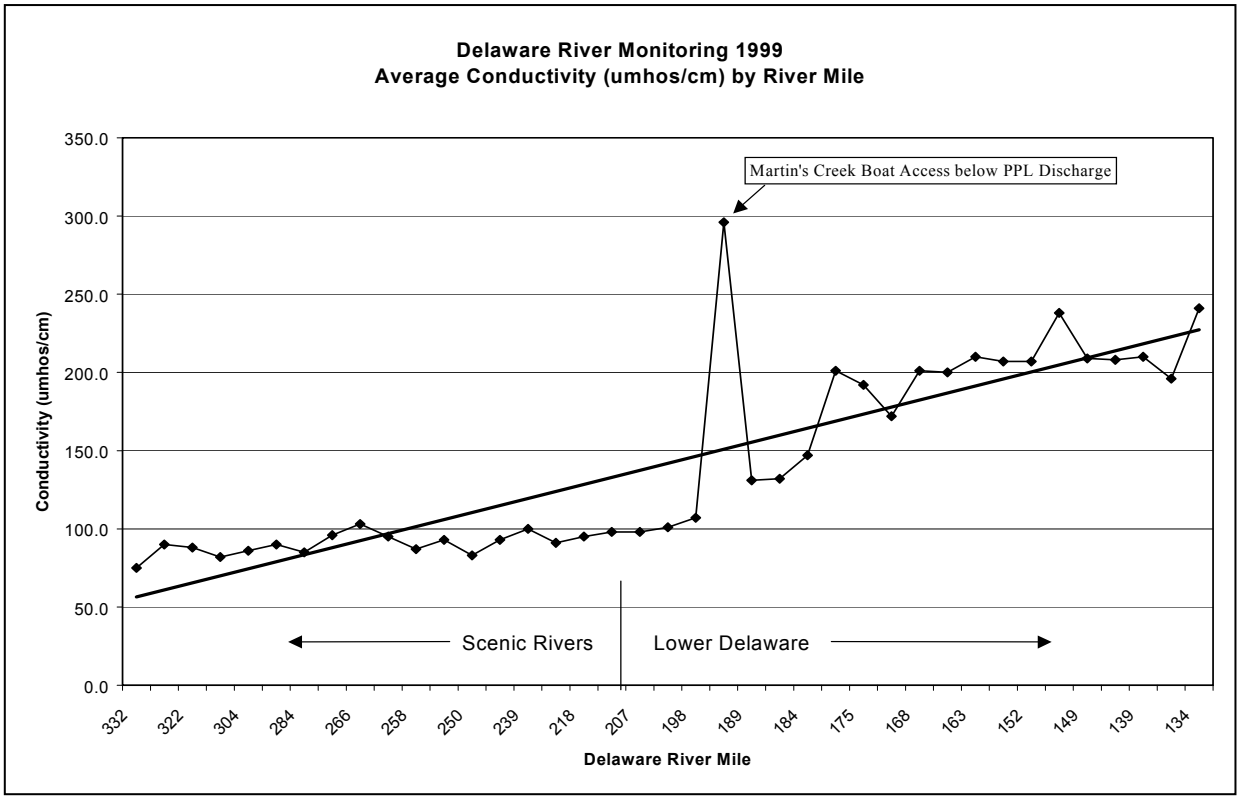

Figure 8.

Average conductivity (µmhos/cm) of the Delaware River between Hancock, NY, and Trenton, NJ (n=3 to 8, depending on site). Increasing drainage area, tributary inputs, and human activity account for the upward trend. Unusually high peak at Martin's Creek boating access merits further investigation of sources near the sampling site.

Fecal Coliform Bacteria - Mainstem Delaware River

The fecal coliform standard of 200/100ml was not exceeded in the main stem Delaware River. Although there were too few samples taken over the study period at any single location to determine compliance with water-quality standards, available data were compared to bacteria standards. There were relatively high (>100/100 ml) geometric means at 3 locations: Stockton Bridge (103/100ml, n=6), Lambertville Boat Access (188/100ml, n=3), and Scudders Falls Access (114/100ml, n=3). The Stockton Bridge mean value was affected by a single high fecal coliform sample. Bacteria sources are unknown in the vicinity of Stockton and Scudders Falls. A large population of waterfowl was observed at Lambertville, and may have some impact on fecal coliform values. Figure 9 displays Delaware River geometric mean fecal coliform densities during the summer 1999 survey, and shows an increasing trend toward higher fecal coliform counts from Hancock, NY, to Trenton, NJ. Appendix D summarizes geometric mean values at Delaware River stations, and Appendix C lists individual sample data.

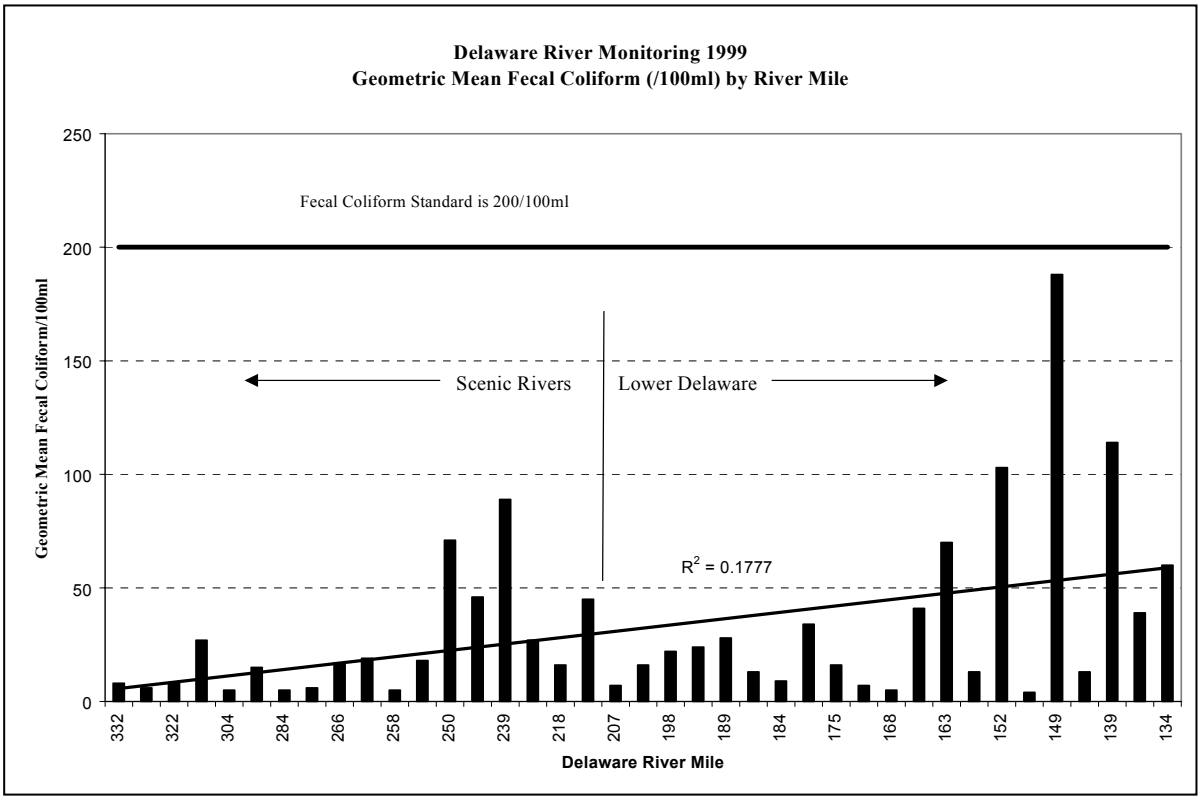

Figure 9.

Delaware River geometric mean fecal coliforms, Hancock, NY to Trenton, NJ (n=3 to 6, depending on site). No violation of the 200/100ml standard occurred, though three locations exceeded 100/100ml. Note the poor regression coefficient for trend analysis. Increased sampling frequency is necessary to reduce data variability and reveal potential spatial and temporal trends.

Statistical Comparison - Delaware River main Channel vs. Near Shore Fecal Coliforms

Student T-Test comparison of logarithmically transformed fecal coliform counts in Delaware River near-shore samples (n=65) versus main-channel samples (n=95) revealed that fecal coliform counts were significantly higher near the shore ($\alpha = 0.05$). Throughout the length of the Delaware River, near-shore fecal coliforms averaged 29/100 ml geometric mean, and main-channel fecal coliforms averaged 13/100 ml geometric mean.

The near-shore versus main channel comparison was repeated for three regions of the non-tidal Delaware River, the Upper Delaware (UPDE), Middle Delaware (DEWA), and Lower Delaware (LDEL). In the Upper Delaware, geometric means were universally low (8/100ml in the main channel, n=26; 9/100ml near shore, n=10), and no significant difference was detected. In the Middle Delaware, geometric mean fecal coliforms averaged 18/100ml (n=3) in the main channel, and 38/100ml (n=25) near shore, though data were too variable and few for a valid comparison. In the Lower Delaware, the difference became definitive and pronounced, averaging 16/100ml (n=66) in the main channel and 33/100ml (n=30) near shore. When accessing the Lower Delaware River, it is likely that higher fecal coliform densities will be encountered near the shore than in the main channel. Future monitoring designs must account for this difference.

Water Quality - Lower Delaware Tributaries

Figure 10 shows average dissolved oxygen concentrations measured from tributaries to the Lower Delaware River during summer 1999. Single-sample dissolved oxygen violations occurred at Jericho Creek, Bucks County, PA (DO 2.5 and 4.5 mg/l) and Warsaw Creek, Hunterdon County, NJ (DO 2.6 mg/l). In Pennsylvania, the minimum dissolved oxygen limit in Jericho Creek, which is designated a Warm Water Fishery (WWF) stream by PADEP, is 4.0 mg/l (Pennsylvania Code, Title 25. Chapter 93. Water Quality Standards, 1999). The same single-sample standard applies in New Jersey, where the NJDEP (Surface Water Quality Standards N.J.A.C. 7:9B, as of April 1998) classifies Warsaw Creek as a FW2-NT (Fresh water, non-Pinelands, non-trout waters). A possible oxygen depletion problem exists on Gallows Run, Bucks County, PA, where saturation values averaged 64% (n=3). No violations occurred, but saturation values were significantly lower than those observed in other study tributaries.

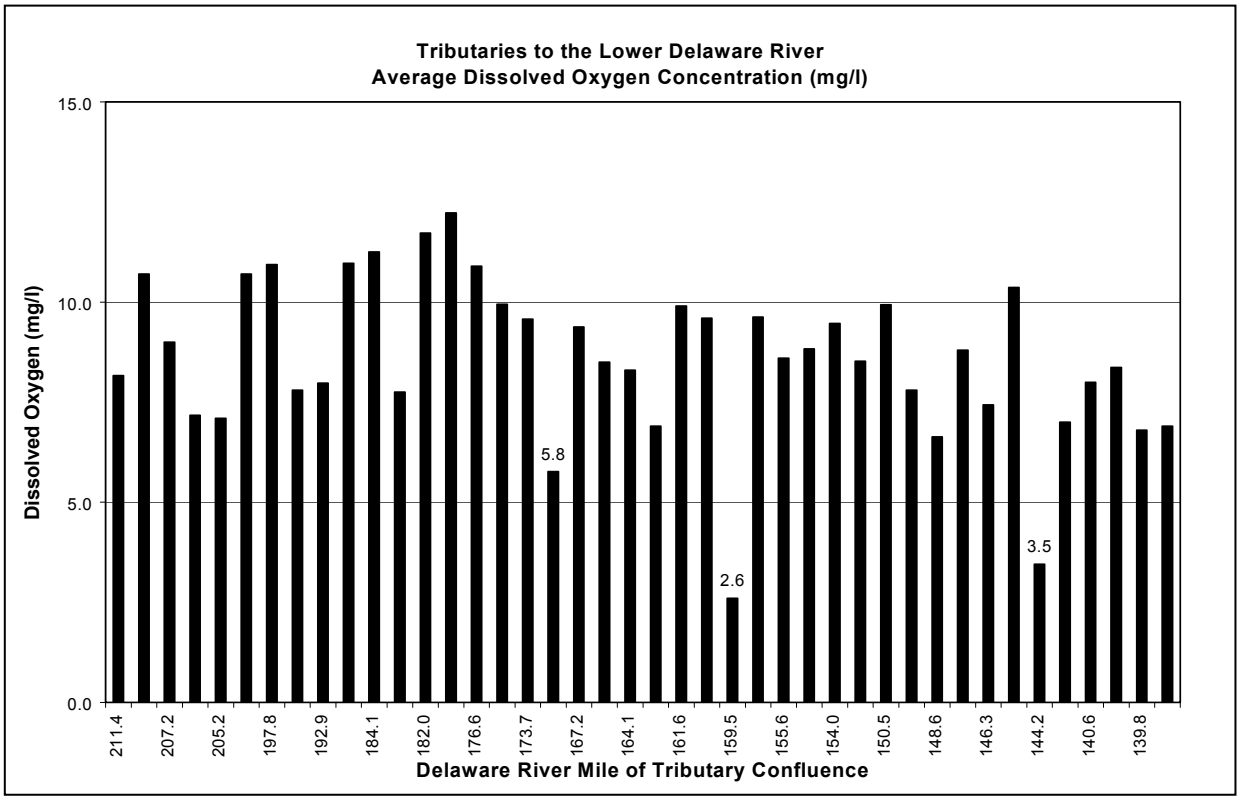

Figure 10.

Average dissolved oxygen concentrations measured from tributaries to the Lower Delaware River, June-August 1999. Single-sample dissolved oxygen concentrations below 4.0 mg/l were measured from Warsaw Creek, Hunterdon County, NJ (2.6 mg/l), and Jericho Creek, Bucks County, PA (2.5 and 4.5 mg/l, avg. 3.5 mg/l). Gallows Run, Bucks County, PA, (avg. DO 5.8 mg/l, n=3) displayed DO saturation values (68%) below most Lower Delaware River tributaries, which collectively averaged 104% DO saturation.

Some tributaries displayed unusually high or low conductivity. Mean conductivity of Lower Delaware tributaries was 295 µmhos/cm. An unusually high or low value was judged by whether or not the average conductivity for a particular tributary was outside one standard deviation around the reach-wide mean. Unusually low conductivity (µmhos/cm) was found in four tributaries to the Lower Delaware: Dunnfield Creek, NJ (38), Harihokake Creek, NJ (158), Lockatong Creek, NJ (169), and Moore Creek, NJ (144). Unusually high conductivity was

found in three tributaries: the Paulins Kill (455), Pequest River, NJ (445), and Bushkill Creek in Easton, PA (792). Origins of these high or low conductivity values may be natural (geologic) or anthropogenic. Speculation as to origin of extreme values is unwarranted given the limited data set. Each of these tributaries has been marked for further evaluation during future sampling investigations. Figure 11 shows average conductivity values for all Lower Delaware tributaries.

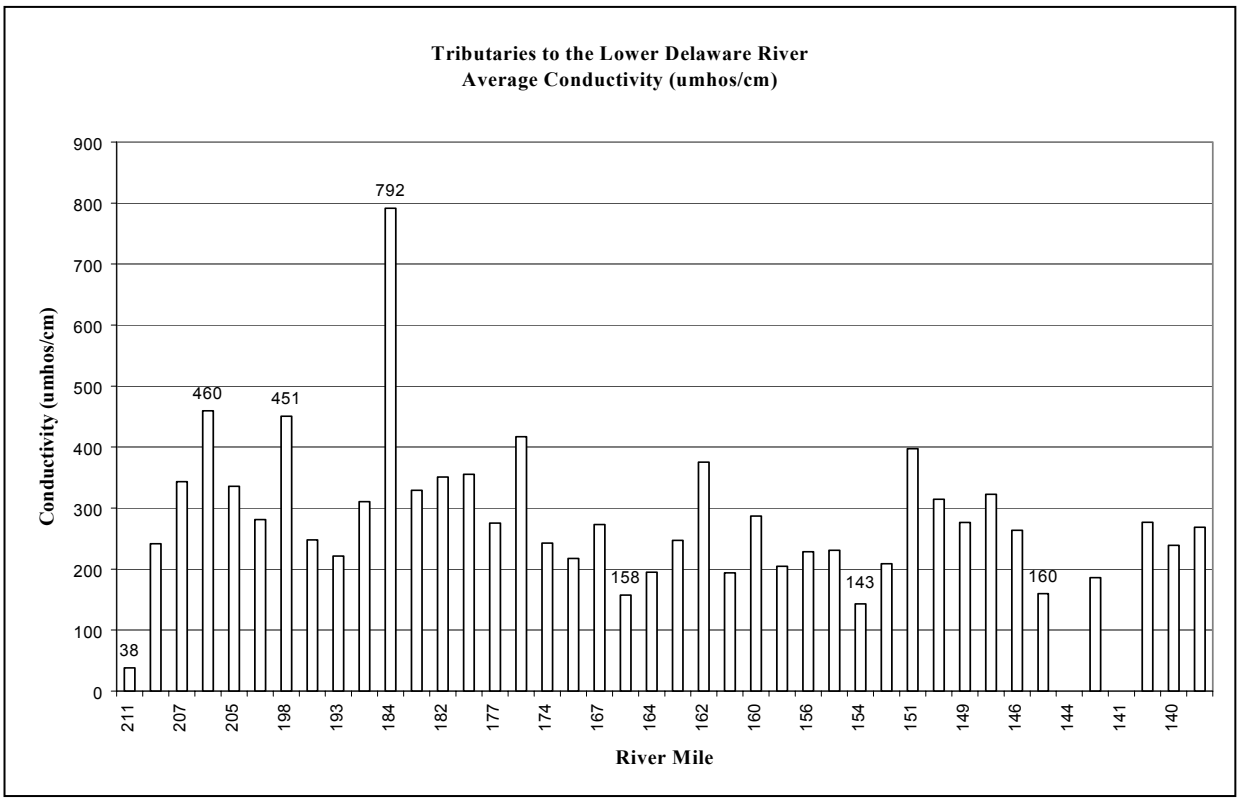

Figure 11.

Average conductivity of Lower Delaware tributaries (n=3). Unusually low and high values are labeled, noting tributaries' average conductivity outside one standard deviation around the reach-wide mean of 295 µmhos/cm.

Fecal Coliform Bacteria - Tributaries to the Delaware River

Among tributaries to the Delaware River, five Pennsylvania streams and six New Jersey streams exceeded the fecal coliform standard of 200/100 ml (Table 3). See Appendices C (raw data) and D (summary data) for fecal coliform counts in tributaries of the Lower Delaware River. Some streams listed in Table 3 presented additional water-quality problems, including low dissolved oxygen, high enterococcus densities, high pH, and high nutrient concentrations.

In tributaries where fecal coliform pollution was not observed, some displayed other water-quality problems. As mentioned previously, Cain's Run (AKA Warsaw Creek) and Jericho Creek showed very low dissolved oxygen concentration and saturation.

Table 3.

Fecal Coliform concentrations above 200/100ml during summer 1999. (Valid application of data to statistical requirements and measurement against standards would require 5 samples within a 30-day period. We did not achieve this sampling intensity. Geometric mean values are based upon, at most, 3 samples within a 60-day period).

River Mile	Tributary Name	n = # samples	Geometric Mean FC/100ml	Other Observations
Pennsylvania Lower Delaware Tributaries				
138.00	Buck Creek, Bucks Co.	3	709	high enterococcus
140.60	Houghs Creek, Bucks Co.	1 (single sample)	740	high enterococcus
144.20	Jericho Creek, Bucks Co.	2	1,885	low DO, high enterococci
184.10	Bushkill Creek, Northampton Co.	3	383	high conductivity, nutrients, entero.
190.58	Martins Creek, Northampton Co.	3	230	high enterococcus
New Jersey Lower Delaware Tributaries				
140.50	Jacobs Creek, Mercer Co.	3	344	high pH, enterococcus
143.20	Fiddlers Creek, Mercer Co.	2	340	high enterococcus
148.60	Swan Creek, Hunterdon Co	3	273	high enterococcus
177.40	Pohatcong Creek, Warren Co.	3	878	high nitrates, enterococcus
197.40	Pophandusing Brook, Warren Co.	3	544	high enterococcus
205.20	Delawanna Creek, Warren Co.	3	446	high enterococcus

Statistical Comparison - Fecal Coliform Densities in Large Rivers vs. Small Streams.

Comparisons using t-tests of fecal coliform samples taken from large streams (drainage area >200 sq. km., geometric mean 22/100ml, n=199) versus small streams (geometric mean 73/100ml, n=151) revealed significant difference in mean values between the two data sets. This suggests that dilution in large streams, or perhaps shading of bacteria-killing UV light by canopy cover in small streams, significantly affects fecal coliform densities. Many tributaries exceeded 200/100 ml, while Delaware River densities remained well below the threshold.

Fecal coliform samples from large rivers versus small streams were compared by Delaware River region. The Upper Delaware small streams averaged 22/100ml (n=25), and large rivers averaged 9/100ml (n=48), and significantly differed using the t-test ($\alpha = 0.05$), though fecal coliform densities were universally low compared to the Middle and Lower Delaware. Middle Delaware small streams averaged 63/100ml (n=29), and large rivers 46/100ml (n=37), but no significant difference was found by t-test ($\alpha = 0.05$). In the Middle Delaware, fecal coliform densities remain low. In the Lower Delaware, small streams averaged 104/100ml (n=97), and large rivers averaged 25/100ml (n=114), a significant difference ($\alpha = 0.05$). In the Lower Delaware region, fecal coliform pollution is more pronounced in streams possessing drainage areas of less than 200 square kilometers than in larger rivers. Small streams within the Lower Delaware region are more likely to be impacted by fecal coliform pollution.

Comparison - Population Density versus Fecal Coliform Density

Fecal coliform densities from the three regions' (Upper, Middle, and Lower Delaware) small (drainage area <200 km^2), large (drainage area > 200 km^2), and combined streams were compared with regional 1990 population density (U.S. Department of Commerce, Bureau of the Census) apportioned to watershed areas within the regions. No relation was found (by scatter

plot) between fecal coliform density and watershed area. However, a relationship was observed between fecal coliform density of small streams and regional population density. Table 4 shows geometric mean fecal coliform density, drainage area, population, and population density for the three regions. A relationship exists between small streams' fecal coliform density and regional population density in drainage areas of less than 80 square miles (207 square kilometers). Figure 12 suggests that fecal coliforms may be useful as an indicator of urbanization in small watersheds. Future regional studies should be broken into study units of less than 80 square miles for maximum ability to track urbanization using fecal coliforms as an indicator.

TABLE 4.

Fecal coliform density, drainage area, and population of the Upper, Middle, and Lower Delaware River Basin. See Figure 12 for graphical relationships. From the Upper to the Lower Delaware, all fecal coliform densities differed using t-tests, except for all vs. small stream comparisons between the Middle and Lower Delaware.

	Upper (UPDE)	Middle (DEWA)	Lower (LDEL)
FC geo. mean, all streams	13 (n=73)	53 (n=66)	48 (n=211)
FC geo. mean, large rivers	9 (n=48)	46 (n=37)	25 (n=114)
FC geo. mean, small streams	22 (n=25)	63 (n=29)	104 (n=97)
Sq. mi. drainage area (in-reach)	1,557	740	2,610
Sq. km drainage area (in-reach)	4,033	1,917	6,760
Population 1990 (Census)	172,345	176,628	891,147
People / sq. mi.	111	239	342
People / sq. km.	43	93	132

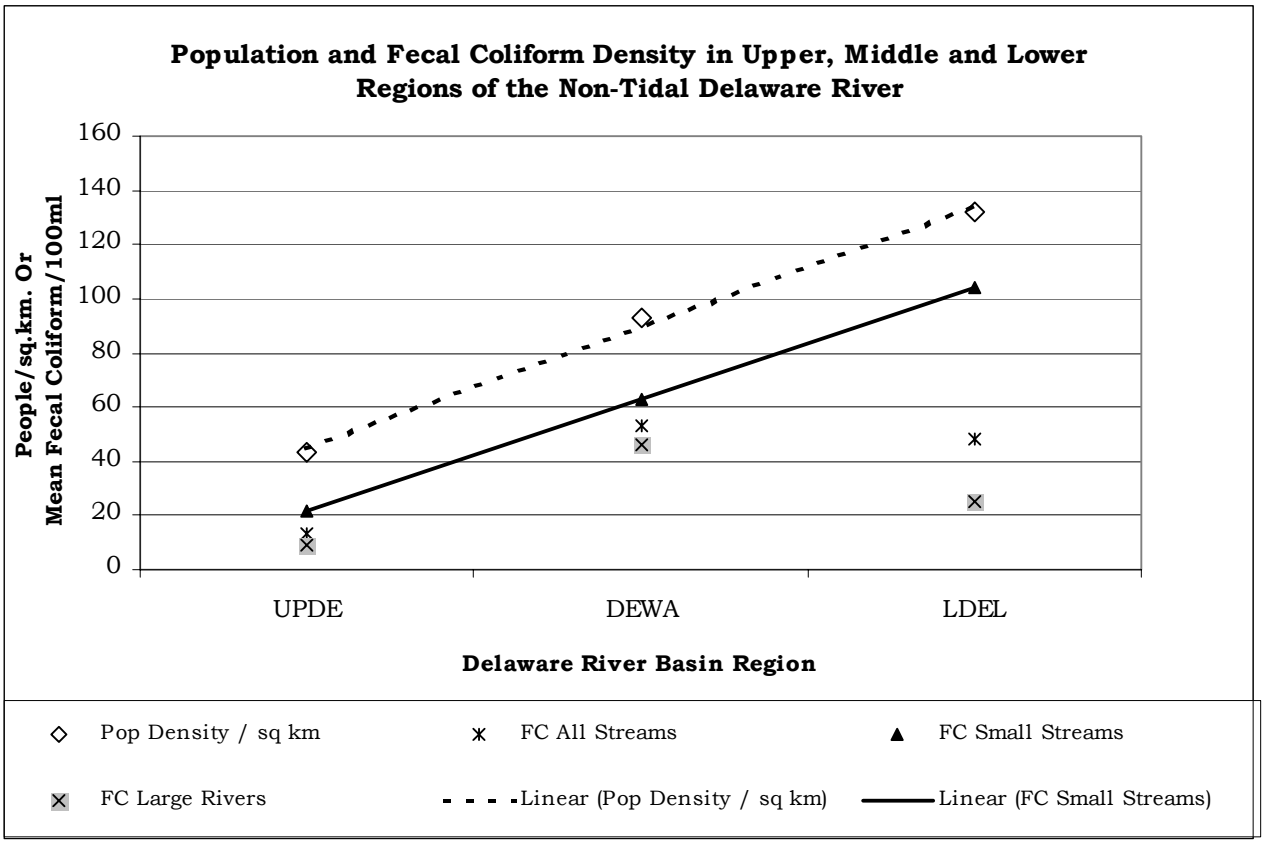

Figure 12.

Fecal coliform geometric means and people per sq. kilometer in the Upper, Middle, and Lower Delaware (number of samples are listed in Table 4). The small streams trend line and population density trend line did not significantly

differ for similarity of slopes. Population density may predict fecal coliform density in smaller watersheds.

Fecal Coliforms - Comparison with 1987 DRBC bacteria survey

The summer 1987 bacteria survey, like the 1999 survey, was an intensive effort designed to develop a baseline for assessment of water-quality changes, locate water-quality problems in the Delaware River, and recommend water-quality management actions (DRBC, 1988). In 1987, problem identification was based on comparison of fecal coliform results with the 200/100ml standard. The 1987 survey also measured *E. coli* and fecal streptococci. The 1999 survey sampled both fecal coliforms and enterococci. Although enterococci are a subgroup of fecal streptococci, the two cannot be compared with one another, due to interference by other members of the fecal streptococcus group. Comparison of 1987 to 1999 results is thus based upon fecal coliform results alone.

In 1987, two fecal coliform problem areas were discovered on the Delaware River in the vicinity of Wy-Hit-Tuk access (along the Pennsylvania shore below the Easton, PA sewage treatment plant), and Kingwood access (along the New Jersey shore below the Frenchtown, NJ sewage treatment plant). Remedial action was taken by state agencies, and upstream treatment plants have since improved the quality of their discharge. No such problems were found in 1999.

In addition, the 1987 survey found elevated fecal coliforms in a number of tributaries. This result was similar to that found in 1999. Table 5 displays 1987 and 1999 geometric mean fecal coliform densities for each tributary displaying elevated fecal coliform levels. In 1987, 14 more creeks exceeded the standard than in 1999. The magnitude of 1987 concentrations was generally greater than those found in 1999, indicating a slight improvement in bacterial water-quality from 1987 to 1999. Five creeks had higher fecal coliform average concentrations in 1999 than 1987, and these are shown in bold print in Table 5. The 1999 drought may have had some effect on this comparison, as precipitation and flow differed. Many streams sampled repeatedly in 1987 were dry in 1999. It is recommended that further and more detailed study be conducted of those waterways exceeding the standard in both 1987 and 1999.

Table 5.

Fecal Coliform concentrations above 200/100 ml, summer 1987 versus 1999. Counts are expressed as geometric mean density per 100 ml. (Valid application of data to statistical requirements and measurement against standards would require 5 samples within a 30-day period. Neither survey achieved this sampling intensity. Geometric mean values are based upon, at most, 3 samples within a 60-day period). **BOLD** print denotes creeks with higher fecal coliform concentrations in 1999 than 1987.

Pennsylvania Lower Delaware Tributaries

River Mile	Tributary Name	1999 FC/100ml	1987 FC/100ml
138.00	Buck Creek, Bucks Co.	709 (n=3)	1636 (n=2)
139.70	Dyers Creek, Bucks Co.	< 200	602 (n=3)
140.60	**Houghs Creek, Bucks Co.**	**740 (n=1)**	**580 (n=2)**
144.20	**Jericho Creek, Bucks Co.**	**1885 (n=2)**	**1360 (n=3)**
146.30	Pidcock Creek, Bucks Co.	< 200	224 (n=4)
148.50	Aquetong Creek, Bucks Co.	< 200	1264 (n=3)
173.70	Cooks Creek, Bucks Co.	< 200	340 (n=1)
176.60	Fry's Run, Bucks Co.	< 200	1019 (n=5)
184.10	Bushkill Creek, Northampton Co.	383 (n=3)	2631 (n=4)
190.58	Martins Creek, Northampton Co.	230 (n=3)	820 (n=5)
207.30	Jacoby Creek, Northampton Co.	< 200	400 (n=1)

New Jersey Lower Delaware Tributaries

133.80	Assunpink Creek, Mercer Co	no survey	5589 (n=4)
140.50	**Jacobs Creek, Mercer Co.**	**344 (n=3)**	**212 (n=2)**
143.20	Fiddlers Creek, Mercer Co.	340 (n=2)	397 (n=2)
145.20	Moore Creek, Mercer Co.	< 200	737 (n=2)
148.60	Swan Creek, Hunterdon Co	273 (n=3)	409 (n=3)
149.50	Alexauken Creek, Hunterdon Co.	< 200	477 (n=7)
152.50	Wickecheoke Cr., Hunterdon Co.	< 200	1739 (n=2)
164.10	Nishisakawick Cr., Hunterdon Co.	< 200	460 (n=1)
174.60	Musconetcong Riv, Hunt/Warren	< 200	663 (n=2)
177.40	**Pohatcong Creek, Warren Co.**	**878 (n=3)**	**812 (n=2)**
182.00	Lopatcong Creek, Warren Co.	< 200	4606 (n=2)
192.90	Buckhorn Creek, Warren Co.	< 200	429 (n=2)
197.40	**Pophandusing Brook, Warren Co.**	**544 (n=3)**	**no survey**
197.80	Pequest River, Warren Co.	< 200	775 (n=6)
205.20	Delawanna Creek, Warren Co.	446 (n=3)	500 (n=1)
207.00	Paulins Kill, Warren Co.	< 200	3300 (n=1)

Enterococci - Delaware River and Lower Delaware Tributaries

On the Lower Delaware River, the federal enterococcus guideline (and NJ standard) of 33/100ml was exceeded at Stockton Bridge (geometric mean 54/100ml), though this average was pushed over 33 by a single very high value (4540/100ml on 7/27/99, taken from the NJ side of the main channel). The source of this enterococcus bacteria is unknown. Figure 13 shows mean enterococcus densities observed on the Lower Delaware River during summer 1999.

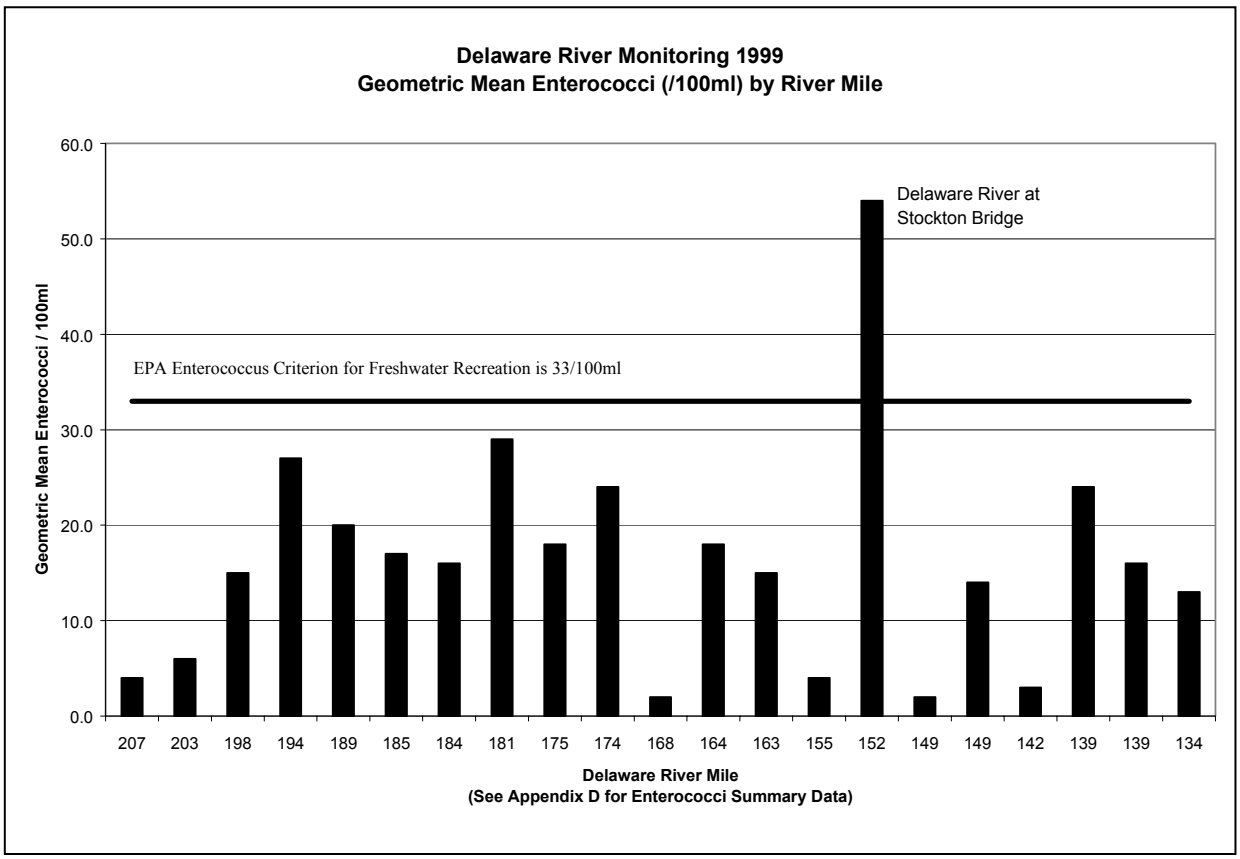

Figure 13.

Geometric Mean enterococci/100 ml for the Lower Delaware River, summer 1999 (n=3 at near-shore sites, n=6 at bridge sites). Source of the high value observed at Stockton Bridge, NJ-PA is unknown.

Table 6 lists tributaries where geometric mean enterococcus densities exceeded the federal guidelines (and NJ freshwater standard) of 33/100ml. Pennsylvania does not use enterococci for their standards, and like DRBC continues to use only fecal coliforms. Judging by the lengthy list of tributaries exceeding federal guidelines, use of the enterococcus standard might substantially expand the list of impaired waters, as tributaries with enterococcus densities exceeding the 33/100 ml federal guideline were more numerous than tributaries exceeding the 200/100 ml fecal coliform standard. Future investigations should include source-tracking studies of fecal coliforms, enterococci, and perhaps *E. coli*.

Table 6.

Enterococcus concentrations above federal guideline and NJ freshwater standard of 33/100ml, summer 1999. (Sampling intensity required for valid application of data to standards is 5 within a 30-day period. DRBC did not meet this frequency. Geometric mean values are based upon, at most, 3 samples within a 60-day period).

Pennsylvania Lower Delaware Tributaries

River Mile	Trib Name	Geometric Mean Enterococci/100ml	n = # of samples
138.00	Buck Creek, Bucks Co.	675	3
139.80	Dyer Creek, Bucks Co.	135	3
140.60	Houghs Creek, Bucks Co.	960*	1 (*single sample)
144.20	Jericho Creek, Bucks Co.	600	2
146.30	Pidcock Creek, Bucks Co.	122	3
148.50	Aquetong Creek, Bucks Co.	101	3
155.60	Paunacussing Creek, Bucks Co.	47	3
161.60	Tinicum Creek, Bucks Co.	82	3
171.80	Gallows Run, Bucks Co.	112	3
173.70	Cooks Creek, Bucks Co.	105	3
176.6	Fry's Run, Northampton Co.	405	3
184.10	Bushkill Creek, Northampton Co.	128	3
190.58	Martins Creek, Northampton Co.	57	3
199.76	Allegheny Creek, Northampton Co.	219	3
207.2	Jacoby Creek, Northampton Co.	421	3
209.58	Slateford Creek, Northampton Co.	171	3

New Jersey Lower Delaware Tributaries

140.50	Jacobs Creek, Mercer Co.	413	3
143.20	Fiddlers Creek, Mercer Co.	671	2
145.20	Moore Creek, Mercer Co.	131	3
148.60	Swan Creek, Hunterdon Co.	970	3
149.50	Alexauken Creek, Hunterdon Co.	61	3
152.50	Wickecheoke Creek, Hunterdon Co.	64	3
159.50	Caine's Run (Warsaw Creek), Hunterdon Co.	144*	1 (*single sample)
160.50	Warford Creek, Hunterdon Co.	300*	1 (*single sample)
164.00	Little Nishisakawick Creek, Hunterdon Co.	52*	1 (*single sample)
165.70	Harihokake Creek, Hunterdon Co.	150	2
167.20	Hakihokake Creek, Hunterdon Co.	42	3
174.60	Musconetcong River, Hunterdon/Warren Co.	94	3
177.40	Pohatcong Creek, Warren Co.	202	3
182.00	Lopatcong Creek, Warren Co.	473	3
192.90	Buckhorn Creek, Warren Co.	564	3
197.40	Pophandusing Brook, Warren Co.	636	3
197.80	Pequest River, Warren Co.	78	3
205.20	Delawanna Creek, Warren Co.	780	3
211.40	Dunnfield Creek, Warren Co.	135	3

Conclusions and Recommendations

1. Bacterial water-quality has apparently improved since 1987, considering the fecal coliform standard alone. Both the Delaware River and its tributaries showed improvement in fecal coliform densities measured from 1987 to 1999, though the 1999 drought may have affected this comparison, because there were fewer storm and runoff events in 1999, while the 1987 survey was conducted under normal hydrologic and climatic conditions.

2. This study should be repeated periodically (every 5 years is suggested), and sampling frequency should meet requirements for statistical validity at each site.

3. Fecal coliform and enterococcus density is greater in near-shore areas of the Delaware River than in the main channel, though very low levels were observed in most areas of the Delaware River.

4. Fecal coliform density may have been affected by dilution in the Delaware River and large tributaries, and by shading of UV light penetration in small tributaries.

5. A relationship was observed between population density and fecal coliform density, and was best observed in streams possessing a watershed size of less than 80 square miles (200 square kilometers). Fecal coliforms are valuable as general water-quality indicators, and provide a tool to follow effects of urbanization.

6. In future study designs, large tributaries should be broken into study units of 80 square miles or less, enabling study of population growth versus water-quality at an increased level of resolution for resource management decisions.

7. Enterococci appear to be more sensitive a measure of bacterial water-quality than fecal coliforms. Use of the enterococcus criterion would lead to a greater number of water bodies listed as impaired in Section 305(b) reports. Thirty-five tributaries contained enterococcus densities above the federal guideline and the New Jersey standard, as opposed to eleven tributaries where fecal coliform density exceeded standards.

8. Pending additional sampling and variability assessments, DRBC should consider establishing enterococcus standards for the non-tidal Delaware River, based upon either federal criteria or existing water-quality.

9. Enterococcus and probably E. coli should be tested in DRBC's suite of basic water-quality parameters, measured as part of the Lower Delaware fixed monitoring network. Fecal coliform testing already is part of the Scenic Rivers Monitoring Program, and that program might consider enterococcus testing for its parameter list.

10. The Delaware River exhibits periods of oxygen super-saturation and high pH. This may be caused by excessive aquatic plant growth, possibly due to excessive nutrient inputs, especially during periods of stable and low flow when river levels and temperatures are favorable for aquatic plant production. Further evaluation of river nutrient dynamics may indicate the underlying cause.

11. The upper limit of DRBC's pH stream quality objective (pH 8.5), should be evaluated since it is inconsistent with the state standard of 9.0.

12. Three tributaries may be experiencing dissolved oxygen problems. Jericho Creek (Bucks County, PA) and Cain's Run AKA Warsaw Creek (Hunterdon County, NJ) displayed concentrations below dissolved oxygen standards. Gallows Run (Bucks County, PA) displayed lower than normal dissolved oxygen saturation values. These tributaries, at the least, should be investigated in greater detail by the states, DRBC, or a combination thereof. Solutions to repeated water-quality problems should be implemented with cooperation of other agencies, non-governmental organizations, and local residents.

13. The Delaware River presently exhibits lower densities of fecal coliforms and enterococci than tributaries. Other relatively bacteria-free Lower Delaware waters include the Lehigh River, Tohickon Creek, and Paulins Kill. Based on our very limited observations, these waters may be acceptable for primary contact recreation. Verification of primary contact suitability should include toxicity as well as bacterial testing.

14. A fixed network of water-quality monitoring sites was established, and approximately 2200 data were collected from 74 sites. These data contribute to a long-term data record for the Lower Delaware River corridor, which will contribute to a management approach that prevents degradation of this portion of the Delaware River, and assists in protecting the water resources of tributary watersheds. These objectives would fulfill the goals outlined in the Lower Delaware Management Plan.

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NATIONAL ATMOSPHERIC DEPOSITION PROGRAM

A Cooperative Research Support Program of the
State Agricultural Experiment Stations (NRSP-3)
Federal and State Agencies
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- History and Overview
- Collaborating Agencies
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- NADP 2002 Scientific Symposium and Technical Committee Meeting
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NADP Networks

- NADP/NTN: National Trends Network
- NADP/AIRMoN: Atmospheric Integrated Research Monitoring Network
- NADP/MDN: Mercury Deposition Network

Your Comments and Suggestions are always welcome!

Appendix A

Selections from the 1999 Lower Delaware River Monitoring Program Field Instruction Manual (DRBC, June 1999).

This appendix is useful for future study design and logistics.

Description of Summer 1999 Program Logistics

On the attached schedule, several categories of trips are listed. This document explains logistics of each sampling run.

WQ series: Lists regular water-quality runs at fixed sites, sampled at least 5x/yr. DRBC does field and lab analyses. No flow measurements will be collected this year, though we have set up stream gage marks for future measurement. During the WQ series runs, we will measure DO, pH, conductivity, air temperature, water temperature, and gage height on-site, and collect water samples in glass bottles for lab analysis of nutrients (PO4, NH4, NO2+NO3, chlorophyll A).

BACT series: 1999 special study consisting of fixed sites plus river recreation accesses and smaller tributaries chosen to be part of the 1999 effort only, not to be sampled in a regular future monitoring program unless severe problems exist, or until DRBC pursues enterococcus standards for Zone 1. EPA does lab work. On-site we will measure DO, air temp, water temp, pH, and specific conductance. We will collect water samples in sterilized plastic bottles and transport in coolers to EPA lab in Edison, NJ for fecal coliform and enterococcus analyses (holding time is 6 hours from 1st sample collected).

SAFETY FIRST!

Routes 29, 46, 32, and 611 are winding and narrow two-lanes with blind curves and pullouts. If we are running close to violating holding times for bacteria samples, just deliver what you are able and don't worry about finishing the run at all costs. Drive slowly and safely, use the orange vests at bridge crossings, and watch your footing at the access areas. Dress for the weather, and plan on getting wet.

WQ Run 1, Trenton to Stockton

6 sites, 9 samples

Dates: 8/5

Staff: 8/5: Limbeck, Wilcox

Sites: Calhoun St Bridge (PA & NJ sides)
Buck Creek, Yardley, PA
Aquetong Creek, New Hope, PA
Stockton Bridge (PA & NJ sides)
Washington Crossing Bridge (PA & NJ sides)
Jacobs Creek, Hopewell Twp, NJ

Driving Directions

Begin at **Calhoun St Bridge**. Park on PA side in small lot just US of bridge. Continue to **Buck Creek**. Park at small lot next to site on Coldspring Ave off Main St bridge over Buck Creek. Continue N to **Aquetong Creek**, West Mechanic St bridge - park at Bucks Co W&S Auth lot next to bridge. Continue N on Rt. 32 to **Stockton Bridge** - park on NJ side. Go South to **Washington Crossing Bridge**, park in lot on NJ side. Go south to **Jacobs Creek** - pull in private drive just before creek (Foritano property, old Yardley Mill).

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled nutrient bottles, store nutrient samples in cooler for lab analysis (same day). Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in undisturbed water. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form.

WQ Run 2, Stockton to Milford

10 sites, 13 samples

Dates: 8/5 **Staff:** **8**/5: Limbeck, Wilcox

Sites: Paunacussing Creek, PA
Tohickon Creek, PA
Tinicum Creek, PA (need survey equipment)
Milford Bridge (PA and NJ sides) - park NJ side
Hakihokake Creek, Milford, NJ
Frenchtown Bridge (PA & NJ sides) - park NJ side
Nishisakawick Creek, Frenchtown, NJ
Lumberville-Raven Rock Foot Bridge at Bulls Island SP, NJ (PA & NJ sides)
Lockatong Creek, NJ
Wickecheoke Creek, NJ

Driving Directions

Begin at **Paunacussing Creek** bridge over Rt. 32 in Lumberville, PA. Park just short of bridge (open area on right). On to **Tohickon Creek**, cross over creek, bear left and park in first small lot on left. On to **Tinicum Creek**, take Rt. 32 N, turn left on Tinicum Creek Road, pass yellow house, turn left into first driveway (private drive). Approach tributary creek, follow on foot to confluence with Tinicum Creek, where survey marks can be found a short distance DS to left. On to **Milford Bridge**, continue N on Rt. 32 and park in boat access lot just short of bridge. To **Hakihokake Creek**, cross to NJ and park in municipal lot approx. 1/4 mi. on right (just past creek). Go South on Rt. 29 to Frenchtown, park on NJ side by restaurant for **Frenchtown Bridge**. Go back through town to Rt. 12 (Kingwood Ave), turn left into municipal park, take sample from **Nishisakawick Creek** in park, and gage height from Rt. 12 bridge. Go South on Rt. 29 to Bulls Island SP, and take samples from **Lumberville-Raven Rock Foot Bridge** over Delaware. Go South on Rt. 29, turn Left on Federal Twist Road, Right on Rosemont-Raven Rock Road, cross over **Lockatong Creek** and park in small open spot on left. Go back to Rt. 29S, cross **Wickecheoke Creek** and park in D&R Canal SP office lot. Walk back to Rt. 29 bridge over Wickecheoke.

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled nutrient bottles, store nutrient samples in cooler for lab analysis (same day). Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in undisturbed water. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form.

WQ Run 3, Milford to Easton

9 sites, 11 samples

Dates: 8/3 **Staff:** **8**/3: Limbeck, Wilcox

Sites: Cooks Creek, PA; Frys Run, PA; Lehigh River, PA; Bushkill Creek, PA; Easton Northampton St Bridge (PA, NJ); Lopatcong Creek, NJ; Pohatcong Creek, NJ; Riegelsville Bridge (PA, NJ); Musconetcong River, NJ

Driving Directions

Cooks Creek, PA: Route 611 N, then make a Left onto Route 212, and lastly make a Right onto Red Bridge Road and follow the Road until you reach the bridge. Park before the bridge and walk to the downstream side to take the sample and gage height reading.
Fry's Run, PA: Route 611 N to Northampton County Park. Pull into the parking lot. Sample from the old bridge located just upstream from the Route 611 bridge. **DO NOT SAMPLE FROM THE ROUTE 611 BRIDGE - too dangerous!!**
Lehigh River, PA: Continue on Route 611 N and pull into the McDonalds parking lot in Easton (on the Left). From the parking lot walk across the street to sample and take a gage height measurement.
Bushkill Creek, PA: 611N bears right to cross under Rt. 22. Where 611 makes Right turn to continue North, first bridge is over Bushkill Creek. Park wherever you can and take sample from US side of bridge.
Easton Northampton Street Bridge, PA/NJ: Continue down South Main Street (Phillipsburg, NJ) to the bridge. Park in the lot just short of the guard shack on the NJ side and walk out on the bridge to retrieve the samples.
Lopatcong Creek, NJ: From Pohatcong Creek, continue North on River Road (pay attention to the bends) to Carpentersville Road, then make a Left onto High Street and then make another left towards Phillipsburg, NJ (Main Street?). Park on the right side of the road by the Railroad Bridge Trestle. Walk back to the upstream side of the bridge over Lopatcong Creek.
Pohatcong Creek, NJ: From the Riegelsville Bridge, continue North on River Road to the bridge over Pohatcong Creek. Park near the bridge and sample from the upstream side.
Riegelsville Bridge (NJ-PA): Go North on River Road, then make a Left onto Route 627 and take 627 N to the bridge. Walk out on the bridge and take samples.
Musconetcong River, NJ: From DRBC take Route 29 N to Milford, NJ, at the light in Milford turn Left onto Bridge Street, then turn Right onto Church Street. Follow Church Street around the curve (it will become a narrow road that runs along the river, Route 627). Use the River Road/Route 627 bridge to sample from.

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled nutrient bottles, store nutrient samples in cooler for lab analysis (same day). Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in undisturbed water. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form.

WQ Run 4, Easton to Belvidere

5 sites, 7 samples (MAY BE COMBINED WITH WQ RUN 5 FOR LONG DAY)

Dates: 8/3 **Staff:** **8**/3: Limbeck, Wilcox

Sites: Martins Creek, PA
PA Railroad Bridge, Martins Creek, PA/NJ
Belvidere-Riverton Bridge, PA/NJ
Pequest River, Belvidere, NJ
Buckhorn Creek, NJ

Driving Directions

Martins Creek, PA: From DRBC take Route 29 N to Milford, NJ, cross the Milford-Upper Black Eddy Bridge to PA, turn Right onto Route 32 N, then take Route 611 N, make a Left onto Little Creek Road. The site is on the upstream side of the bridge. Park and walk to the bridge to take the sample.
Belvidere-Riverton Bridge, PA/NJ: This site is also in the town of Belvidere, NJ. To get there head towards the river, park near the bridge and walk out to take samples.
Pequest River: There are two sampling sites on the Pequest River. The first is the bacteria sampling site, located on the Market Street bridge over the Pequest River in Belvidere, NJ. The second is the Fixed water-quality monitoring site, located about one mile upstream at the Orchard Street bridge over the Pequest River. Take the gage height reading from this site.
Buckhorn Creek, NJ: From DRBC take Route 29 N to Milford, NJ. At Milford get on Route 519 N. Take Route 519 N to Roxbury Station Road to Hutchinson Road. The sampling site is located on the Hutchinson Road bridge over Buckhorn Creek

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled nutrient bottles, store nutrient samples in cooler for lab analysis (same day). Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in undisturbed water. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form.

WQ Run 5, Belvidere to Delaware Water Gap

4 sites, 5 samples (MAY BE COMBINED WITH WQ RUN 4 FOR LONG DAY)

Dates: 8/3 **Staff:** **8**/3: Limbeck, Wilcox

Sites: Columbia/Portland Foot Bridge, PA/NJ
Dunnfield Creek, NJ
Paulins Kill, NJ
Delawanna Creek, NJ

Driving Directions

Columbia/Portland Foot Bridge, PA/NJ: Use PA Rt. 611N, park at foot bridge on PA side.
Dunnfield Creek, NJ: cross I-80 East bridge, exit at visitors center, cross under I-80, make left to ramp for I-80 West, park in hikers lot on right. Use foot bridge over Dunnfield Creek. Get back on I-80 West, take last exit back into visitors center, then back onto I-80 East. Proceed to Paulins Kill.
Paulins Kill Creek, NJ: Route 46 N bridge. Cross over the bridge over Paulins Kill Creek, just before the Route 94 N off ramp. Park in the Colombia Lake Wildlife Management Area Lot. Walk back to the bridge to take the sample and the gage height reading.
Delawanna Creek, NJ: Take Route 620 out of Belvidere, then get on Route 46 N and park at the end of the ACI Truck Stop (on the Right). Cross the road to the downstream side to take the sample and the gage height

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled nutrient bottles, store nutrient samples in cooler for lab analysis (same day). Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in undisturbed water. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form.

BACT Run 1, Trenton to Lambertville

16 sites, 19 samples

Dates: 6/29, 7/20, 8/10

Staff: 6/29: Limbeck, Wilcox; Tsai, Suk (Suk or Tsai is Edison Runner)
7/20: Limbeck, Wilcox; Tsai, Heinicke (Tsai is Edison Runner)
8/10: Limbeck, Wilcox; Kratzer + 1 other (Fikslin, Santoro, Tsai or Suk is Edison Runner)

Sites: (2 cars: 1 up PA side, 1 up NJ side, meet & deliver samples to Edison)
Note Sampling Start Time: from that point you have 4 hours to complete this run.
Samples must be at Edison Lab less than 6 hours from 1st sample collection.
Keep in contact using DRBC cell phones - each hour and at end of run.

NJ CAR 1	PA CAR 2
Calhoun St Bridge (PA,NJ)	Buck Creek
Scudders Falls Access	Yardley Access
Jacobs Creek	Dyers Creek
Washington Crossing Bridge (PA,NJ)	Houghs Creek
Fiddlers Creek	Jericho Creek
Moore Creek	Pidcock Creek
Lambertville Boat Launch	Aquetong Creek
Swan Creek	Lambertville/New Hope Bridge (PA,NJ)

meet spot: Swan Creek site off Union St in Lambertville (grocery store parking lot)

Driving Directions - see next page

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled Whirl-Pak bag, store samples in cooler for transport to Edison lab. Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in water undisturbed by your actions. if sampling in the Delaware, wade out to approximately 3 feet depth and open Whirl-Pak bag underwater at 1/2 depth, facing upstream. Do not contaminate the sample by allowing your hands to come in contact with the inside of the bottle. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form. Complete chain of custody form for bacterial samples, these are to accompany bacterial samples to EPA Edison lab.

DRIVING DIRECTIONS

BACT Run 1, Trenton to Lambertville

NJ Car 1:
Calhoun Street Bridge (PA-NJ): Take Route 29 S from DRBC to the bridge. Park on the PA side in the small lot just upstream of the bridge. **Scudders Falls Access:** Cross back over the Calhoun Street Bridge to NJ. Take Route 29 N to Scudders Falls Access, just past the bridge over Route 179 and the D&R Canal. Make a left into the access area, cross the canal bridge and park down the hill on the right. **Jacobs Creek:** Get back on Route 29 N and make a Right into driveway which exits Route 29N just past Jacobs Creek bridge (Foritano Property). Park in the lot and walk down to the creek. **Washington Crossing Bridge (PA-NJ):** Continue on Route 29 N to the light at the Washington Crossing Bridge. Make a right and bear left into the parking lot. Park there and walk out onto the bridge. **Fiddlers Creek:** Continue on Route 29 N and turn Right onto Fiddlers Creek Road, just North of Washington Crossing Park (just past gas station). The site is located at the entrance to Goiten property off Fiddlers Creek Road (house number 43). Do not block drive. **Moore Creek:** Continue on Route 29 N to Pleasant Valley Road. Turn Right onto Pleasant Valley Road and continue to Iron Bridge Farm on the Left (about ½ mile up Moore Creek). Park next to bridge. **Lambertville Boat Launch:** Continue on Route 29 N to Bridge Street (the street that crosses the bridge between Lambertville and New Hope) in Lambertville. Turn Left onto Bridge Street and then turn Left into the parking lot of the Lambertville Station. Go all the way through the parking lot to the far left and after you hit the gravel road the boat access just upstream of the SA. **Swan Creek:** Exit the Lambertville Station parking lot to the Left. Make a Right onto South Union Street. Park in the grocery store parking lot. When done wait for the other car to arrive.

PA Car 2:
Buck Creek: Take Route 29 S from DRBC to the Calhoun Street Bridge and cross over into PA. Make a Right onto Route 32 N and follow it to West Afton Avenue. Make a Right onto W. Afton Avenue, then make another Right onto Main Street, followed by a final Right onto Coldspring Avenue just past the bridge over Buck Creek. Park on the Left in the grass. **Yardley Access:** Get back on Route 32 N and go about a mile and the Yardley Access will be on the Right. See the sign. **Dyers Creek:** Continue on Route 32 N and pull off to the left into the gravel driveway for the pump station just past the bridge over Dyers Creek. **Houghs Creek:** Get back onto Route 32 South. Make a Right onto Woodside Road, then make another Right onto Taylorsville Road. Follow Taylorsville Road to Aqueduct Road. Make a Left onto Aqueduct Road (right before bridge crossing Houghs Creek. Park on the side of the road and walk down to the creek . **Jericho Creek:** Continue on Taylorsville Road until it intersects Route 32. Take Route 32 N (make a Left) and turn right onto Stony Brook Road. Park on side of the road before the bridge over Jericho Creek. **Pidcock Creek:** Get back onto Route 32 N and make a Left into Bowmans Hill Wildflower Preserve. Press the button at the metal gate. Enter the preserve and park at the gate just below the visitors center (do not block access). Walk to the stone bridge just down the hill from the visitor center. **Aquetong Creek:** Continue on Route 32 N into New Hope, PA. Make a Left onto West Mechanics Street, follow the road all the way up and take the fork in the road to the Right. There is an area to park just past the bridge over Aquetong Creek on the Right. **Lambertville/New Hope Bridge (PA-NJ):** Continue on Route 32 N to Bridge Street and make a Right onto the bridge. Cross into NJ and park in Lambertville in the Lambertville Station parking lot. Walk out onto the bridge to take samples.

BACT Run 2, Lambertville to Milford

20 sites, 24 samples

Dates: 7/6, 7/27, 8/17

Staff: 7/6: Limbeck, Wilcox; Kratzer, Santoro (Santoro is Edison Runner)
7/27: Limbeck, Wilcox; Tsai, 1 other (Tsai is Edison Runner)
8/17: Kratzer, Wilcox + 2 others (Fikslin, Santoro, Tsai or Suk is Edison Runner)

Sites: (2 cars: 1 up PA side, 1 up NJ side, meet & deliver samples to Edison)
Note Sampling Start Time: from that point you have 4 hours to complete this run.
Samples must be at Edison Lab less than 6 hours from 1st sample collection.
Keep in contact using DRBC cell phones - each hour and at end of run.

NJ CAR 1
Alexauken Creek
Wickecheoke Creek
Lockatong Creek
Bulls Island Foot Bridge (NJ,PA)
Warsaw Creek
Warford Creek
Copper Creek
Kingwood Access
Little Nishisakawick Creek
Nishisakawick Creek
Harihokake Creek

PA CAR 2
Primrose Creek
Stockton Bridge (NJ,PA)
Paunacussing Creek
Cuttalossa Creek
Tohickon Creek
Tinicum Creek
Frenchtown-Uhlerstown Bridge (PA,NJ)
Milford-Upper Black Eddy Bridge (PA,NJ)
Hakihokake Creek (NJ)

meet spot: Country Corner diner, Rt. 29, N. Frenchtown, NJ

Driving Directions - see next page

Collection & Transport Procedures
Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled Whirl-Pak bag, store samples in cooler for transport to Edison lab. Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in water undisturbed by your actions. if sampling in the Delaware, wade out to approximately 3 feet depth and open Whirl-Pak bag underwater at 1/2 depth, facing upstream. Do not contaminate the sample by allowing your hands to come in contact with the inside of the bottle. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form. Complete chain of custody form for bacterial samples, these are to accompany bacterial samples to EPA Edison lab.

Equipment Checklist: see BACT Run checklist.

DRIVING DIRECTIONS

BACT Run 2, Lambertville to Milford

NJ CAR 1:
Alexauken Creek: From DRBC take Route 29 N to the bridge over Alexauken Creek. Park stream Right of the bridge on the downstream side. Walk across the road to take sample/gage reading. **Wickecheoke Creek:** Continue on Route 29 N to the old mill (Prattsville Mill). Pull in and park in the Delaware & Raritan Canal State Park Office and walk to the Route 29 bridge over the Wickecheoke. **Lockatong Creek:** There are two sites for this creek. *Site one (bacteria):* Continue on Route 29 N and pull off at the picnic area stream Left of Lockatong Creek. Use the area above the riffle upstream for bacteria samples. *Site two (fixed/gage height site):* Continue on Route 29 N then make a Right onto Federal Twist Road, and make another Right onto Rosemont-Raven Rock Road. Park on the Left side of the bridge over Lockatong Creek. **Bulls Island Foot Bridge (NJ-PA):** Get back onto Route 29 N and make a Left into the Bulls Island Access Area. Cross the canal bridge and continue as far as you can go and then park. Walk to the foot bridge to take the samples. **Warsaw Creek:** Continue on Route 29 N and make a Right onto Warsaw Road. Pull off to the Left in the shoulder. Walk down to the Route 29 bridge over Warsaw Creek. **Warford Creek:** Continue on Route 29 N and pull off to the shoulder at the sign that reads, "speed limit 50 mph, no stopping or standing, 1008-160/30.72" (just before mile marker 31. The site is at the bridge over Warford Creek about 30 feet past the sign. **Copper Creek:** Continue on Route 29 N and pull off to the shoulder after the driveway to the yellow house just before the bridge over Copper Creek (just south of the pipeline). Kingwood Access: Continue on Route 29 N and make a left into the Kingwood Access Area. Park and walk down to the boat launch and sample from there. **Little Nishisakawick Creek:** Continue on Route 29 N and make a left into the parking lot for the Blue Fish just before the bridge over the Little Nishisakawick Creek. **Nishisakawick Creek:** Continue on Route 29 N to Frenchtown, NJ, make a Right onto "Main Street," then make another Right onto Kingwood Avenue/Route 12. The site is located on the Route 12 bridge over Nishisakawick Creek, park in the convenient store just over the bridge. **Harihokake Creek:** Get back onto Route 29 N and follow it to the bridge over Harihokake Creek. Park in the Liquor Store parking lot just North of the bridge and cross the street to take the sample/gage height.

PA CAR 2:
Primrose Creek: From DRBC take Route 29 N to Washington Crossing. Make a left and cross over to PA on the Washington Crossing Bridge. Make a Left onto Route 32 N. Continue on Route 32 N to the bridge over Primrose Creek (outside of New Hope). Park in the shoulder and walk to the bridge to take sample. **Stockton Bridge (NJ-PA):** Continue on Route 32 N to the Stockton Bridge. Park on the PA side at Dilly's Corner (restaurant) and walk across the bridge to take samples. **Cuttalossa Creek:** Continue on Route 32 N, make a Left onto Cuttalossa Road (just past the Cuttalossa Inn), then park just before the first bridge which crosses Cuttalossa Creek. Walk to the bridge to take sample/gage height. **Paunacussing Creek:** Continue on Route 32 N to the bridge over Paunacussing Creek. Park before the bridge and walk across the street to sample. **Tohickon Creek:** Continue on Route 32 N to Point Pleasant, PA. This site is located on the Route 32 bridge over the creek. Park in a parking lot across the bridge to the Left and walk out onto the bridge to take the sample. **Tinicum Creek:** Continue on Route 32 N, make a Left onto Tinicum Creek Road, go past the yellow house, then make a Left into the first driveway (private drive). Drive to the tributary creek, get out of the car and walk downstream to the confluence with Tinicum Creek. Take sample downstream of the confluence and use surveying equipment or staff gage to get a gage height reading. **Frenchtown-Uhlerstown Bridge (PA-NJ):** Get back onto Route 32 N and follow it to Uhlerstown. Find a place to park near the bridge and walk across to take samples. **Milford-Upper Black Eddy Bridge (PA-NJ):** Continue on Route 32 N to the Milford Bridge, make a Right and park in the boat access lot just short of the bridge. **Hakihokake Creek (NJ):** Cross the Milford-Upper Black Eddy Bridge to NJ, continue on Bridge Street (don't turn once crossing the bridge), park in the municipal lot approximately ¼ mile on the Right (just past the creek).

BACT Run 3, Milford to Easton Area

14 sites, 16 samples

Dates: 7/1, 7/22, 8/12

Staff: 7/1: Limbeck, Wilcox; Kratzer, + 1 other (Ed or Tom - to Edison)
7/22: Limbeck, Kratzer, Wilcox; + 1 other (Ed, Tom, Jason, Namsoo = Edison Runner))
8/12: Limbeck, Kratzer, Wilcox + 1 other (Fikslin, Santoro, Tsai or Suk is Edison Runner)

Sites: (2 cars: 1 up PA side, 1 up NJ side, meet & deliver samples to Edison)
Note Sampling Start Time: from that point you have 4 hours to complete this run.
Samples must be at Edison Lab less than 6 hours from 1st sample collection.
Keep in contact using DRBC cell phones - each hour and at end of run.

NJ CAR 1	PA CAR 2
Musconetcong River	Gallows Run
Riegelsville Bridge (PA,NJ)	Cooks Creek
Pohatcong Creek	Riegelsville PA Fish Comm Access
Lopatcong Creek	Fry's Run
Easton Northampton St Bridge (PA, NJ)	Wy-Hit-Tuk Access
Bushkill Creek, PA	Lehigh River
Eddyside Park Beach Access, PA (private)	Sandt's Eddy Access

Check Mud Run, PA, and sample if flowing (was dry on 6/15)

meet spot: Sandt's Eddy Access, runner use 22/78 to Edison

Driving Directions - see next page

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled Whirl-Pak bag, store samples in cooler for transport to Edison lab. Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in water undisturbed by your actions. if sampling in the Delaware, wade out to approximately 3 feet depth and open Whirl-Pak bag underwater at 1/2 depth, facing upstream. Do not contaminate the sample by allowing your hands to come in contact with the inside of the bottle. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form. Complete chain of custody form for bacterial samples, these are to accompany bacterial samples to EPA Edison lab.

DRIVING DIRECTIONS

BACT Run 3, Milford to Easton

NJ CAR 1:
Musconetcong River: From DRBC take Route 29 N to Milford, NJ, at the light in Milford turn Left onto Bridge Street, then turn Right onto Church Street. Follow Church Street around the curve (it will become a narrow road that runs along the river, Route 627). Use the River Road/Route 627 bridge to sample from. **Riegelsville Bridge (NJ-PA):** Go North on River Road, then make a Left onto Route 627 and take 627 N to the bridge. Walk out on the bridge and take samples. **Pohatcong Creek:** From the Riegelsville Bridge, continue North on River Road to the bridge over Pohatcong Creek. Park near the bridge and sample from the upstream side. **Lopatcong Creek:** From Pohatcong Creek, continue North on River Road (pay attention to the bends) to Carpentersville Road, then make a Left onto High Street and then make another left towards Phillipsburg, NJ (Main Street?). Park on the right side of the road by the Railroad Bridge Trestle. Walk back to the upstream side of the bridge over Lopatcong Creek. **Easton-Northampton Street Bridge (NJ-PA):** Continue down South Main Street (Phillipsburg, NJ) to the bridge. Park in the lot just short of the guard shack on the NJ side and walk out on the bridge to retrieve the samples. **Bushkill Creek:** Follow Route 611 N, go under Route 22 and then Bushkill Creek is to the immediate Right. It is tough to find parking at this location. Walk to the upstream side of the bridge to take sample and gage height measurement. **Eddyside Park Beach Access, PA (private):** Take Route 611 N to Eddyside Park. Park in lot. If no entry is possible, use the trail on the downstream fence of the park and take samples from upstream of the beach. **Check Mud Run, PA, and sample if flowing (was dry on 6/15):** Continue on Route 611 N to the bridge over Mud Run, just short of Sandt's Eddy, park and walk to the bridge to sample.

PA CAR 2:
Gallows Run: From DRBC take Route 29 N to Milford, NJ, then cross the Milford Bridge into PA. Take Route 32 N from the Milford-Upper Black Eddy Bridge to Route 611 N. The site is located at the Route 611 bridge over Gallows Run. Park at Philip Andrews Country Furniture/Pottery. **Cooks Creek:** Take Route 611 N, then make a Left onto Route 212, and lastly make a Right onto Red Bridge Road and follow the Road until you reach the bridge. Park before the bridge and walk to the downstream side to take the sample and gage height reading. **Riegelsville PA Fish Commission Access**: Continue on Route 611 N to the Riegelsville PA Fish Comm Access, make a right into the parking lot, and walk downstream to the access. **Fry's Run:** Continue on Route 611 N to Northampton County Park. Pull left into the parking lot. Sample from the old bridge located just upstream from the Route 611 bridge. DO NOT SAMPLE FROM THE ROUTE 611 BRIDGE: too dangerous!! **Wy-Hit-Tuk Access:** Continue on Route 611 N to Wy-Hit-Tuk Park. Pull off right and park by the canal bridge gate to left. Cross the canal and there is a path to the Delaware River about 10 yards to the Right, sample there. Careful, as slope may be slippery & steep in spots. **Lehigh River:** Continue on Route 611 N and pull into the McDonalds parking lot in Easton (on the Left). From the parking lot walk to bridge to sample upstream side. River is backed up by Easton Dam and is wide here, so take composite sample consisting of pours from bridge sampler at 1/3 and 2/3 channel. **Sandt's Eddy Access:** Continue on Route 611 N to Sandt's Eddy. Park in the parking lot and sample from the access area.

BACT Run 4, Easton Area to Delaware Water Gap

15 sites, 17 samples (get an early start, this day is long!)

Dates: 7/8, 7/29, 8/19

Staff: 7/8: Limbeck, Wilcox; Kratzer, Suk (Edison runner)
7/29: Limbeck, Wilcox; + 2 others (need Edison Runner)
8/19: Kratzer, Wilcox + 2 others (need Edison Runner)

Sites: (2 cars: 1 up PA side, 1 up NJ side, meet & deliver samples to Edison)
Note Sampling Start Time: from that point you have 4 hours to complete this run.
Samples must be at Edison Lab less than 6 hours from 1st sample collection.
Keep in contact using DRBC cell phones - each hour and at end of run.

NJ CAR 1	PA CAR 2
Buckhorn Creek	Martins Creek
Pophandusing Brook	Oughoughton Creek (dry 6/16)
Pequest River	PPL Access @ Martins Creek plant
Belvidere-Riverton Bridge (PA,NJ)	Allegheny Creek
Delawanna Creek	Driftstone Campground Access
Paulins Kill	Columbia-Portland Footbridge (PA,NJ)
Dunnfield Creek	Jacoby Creek
r	Slateford Creek

meet spot: NPS Information Center, I-80 eastbound side, Delaware Water Gap

Driving Directions - see next page

Collection & Transport Procedures

Use meters to either measure instream if accessible or collect sample using bridge sampler (rope & metal case holding plastic sampling bottle). On bridges, sample at 1/3 and 2/3 channel (PA & NJ sides), lower sampler into river, allow to rinse thoroughly, retrieve sampler and pour into pre-labeled Whirl-Pak bag, store samples in cooler for transport to Edison lab. Repeat sample, use for pH and conductivity meters. Instream collection should be done by facing upstream and collecting sample in water undisturbed by your actions. if sampling in the Delaware, wade out to approximately 3 feet depth and open Whirl-Pak bag underwater at 1/2 depth, facing upstream. Do not contaminate the sample by allowing your hands to come in contact with the inside of the bottle. Air-calibrate DO meter, record air temperature, then lower probe by 100 ft cable into river. Read DO and water temperature. Record all results on water-quality form. Complete chain of custody form for bacterial samples, these are to accompany bacterial samples to EPA Edison lab.

DRIVING DIRECTIONS

BACT Run 4, Easton Area to Delaware Water Gap

NJ CAR 1:
Buckhorn Creek: From DRBC take Route 29 N to Milford, NJ. At Milford get on Route 519 N. Take Route 519 N to Roxbury Station Road to Hutchinson Road. The sampling site is located on the Hutchinson Road bridge over Buckhorn Creek. **Pophandusing Brook:** Continue on Route 519 N and follow signs for Belvidere, NJ. Once in Belvidere, take Greenwich Street to Fifth Street, and then make a Left onto Spring Street (a Dead End Road). This road crosses Pophandusing Brook. Park past the bridge and the house adjacent to the bridge on the Left hand side of the road. Walk back to the bridge to take the sample and the gage height reading. **Pequest River:** There are two sampling sites on the Pequest River. The first is the bacteria sampling site, located on the Market Street bridge over the Pequest River in Belvidere, NJ. The second is the Fixed water-quality monitoring site, located about one mile upstream at the Orchard Street bridge over the Pequest River. Take the gage height reading from this site. **Belvidere-Riverton Bridge (PA-NJ):** This site is also in the town of Belvidere, NJ. To get there head towards the river, park near the bridge and walk out to take samples. **Delawanna Creek:** Take Route 620 out of Belvidere, then get on Route 46 N and park at the end of the ACI Truck Stop (on the Right). Cross the road to the downstream side to take the sample and the gage height. **Paulins Kill Creek:** Continue on Route 46 N. Cross over the bridge over Paulins Kill Creek, just before the Route 94 N off ramp. Park in the Colombia Lake Wildlife Management Area Lot. Walk back to the bridge to take the sample and the gage height reading. **Dunnfield Creek:** Continue on Route 46 to Interstate-80 E. Exit I-80 at the NPS Visitor Center. From the visitor center, cross under Interstate-80, turn left toward the westbound ramp and pull into the hiker parking lot. Walk down the trail to the foot bridge and take the sample and gage height reading there.

PA CAR 2:
Martins Creek: From DRBC take Route 29 N to Milford, NJ, cross the Milford-Upper Black Eddy Bridge to PA, turn Right onto Route 32 N, then take Route 611 N, make a Left onto Little Creek Road. The site is on the upstream side of the bridge. Park and walk to the bridge to take the sample. **Oughoughton Creek (dry 6/16):** Continue on Route 611 N, and when 611 makes a sharp "L" go straight to the PPL Access. Then make a Right onto Foul Rift Road (PPL sign), and then make another Right onto Depues Road (PPL sign to access). Just past the left turn for the boat access is Oughoughton Creek bridge. Park and walk to the bridge to take the sample and the gage height reading. **PPL Access @ Martins Creek plant:** Turn around on Depues Road, and make a Right into the fishing access area. (Make Right into lot just before the railroad tracks.) Park in the lot and walk to the access to take the sample. **Allegheny Creek:** Go back out to Foul Rift Road (toward the Belvidere Bridge), make the last Left before the bridge (at sign: Portland 9 miles). Then make a Right (UPHILL) onto River Road. Allegheny Creek is the second bridge. Park at the intersection with Shady Lane past the bridge. Walk to the upstream side of the bridge to take the sample and the gage height reading. **Driftstone Campground Access:** Continue North on River Road. See campground on Right. Enter just after a sharp Right curve. Park in the grass to the Right of the boat ramp behind the office. Walk to the boat launch and take the sample. **Colombia-Portland Footbridge (PA-NJ):** Continue North on River Road to Route 611. Go through the light and park on the Right past the depot. Walk out onto the foot bridge and take the samples. **Jacoby Creek:** Continue on Route 611 N to the small bridge just past the off ramp for the toll bridge. (See the Service Star on the Right and the Portland Diner on the Right just past the bridge). Park near the bridge and walk to the upstream side to take the sample and the gage height reading. **Slateford Creek:** Continue on Route 611 N to National Park Road (it will be a Left off of Route 611 N). The first bridge on this road is the sampling site. Park just short of the bridge and walk to the upstream side to take the sample and gage height reading.

Appendix B

Tributary Flow-Monitoring Sites Adjacent to the Lower Delaware River

Tributary Flow-Monitoring Sites
Adjacent to the Lower Delaware River

Assunpink Creek, NJ (not in 1999 sampling run)

Gage station is located on Warren Street bridge over Assunpink Creek, as it emerges from underground culvert. Park across one-way street, cross to downstream side. Gage mark is painted Y.

Calhoun Street Bridge, Delaware River (Fixed Site)

Park on PA side, unpaved small lot across street from guard shack. Sample 1/3, center, and 2/3 channel (see marks on bridge railings).

Gold Run, NJ (not in 1999 sampling run)

Gage station is located on bridge over 13th hole of the Trenton Country Club (the first footbridge downstream of the Lower Ferry Road Bridge over Gold Run). Park either in vacant lot on right side of Lower Ferry Road Bridge, or up next to the D&R Canal (respect privacy of property owner located adjacent to canal lot). Permission was obtained from Tom Tuttle, Superintendent of Trenton CC for use of the footbridge as our gage site. Gage is unmarked, so use 5th fitting from left side on upper rail, measuring from line on top of fitting of upper rail. Flow measurements were taken from US side of Lower Ferry Road Bridge over Gold Run (level entry to culvert just below boulders – use point where flow stabilizes and is no longer affected by the boulders). US side of bridge was located by GPS during Water Snapshot '98. Address of property owner: Thomas A. Tuttle, Golf Course Superintendent, Trenton Country Club, 201 Sullivan Way, West Trenton, NJ 08628.

Buck Creek, PA (Fixed Site)

Site is located at Main Street Bridge over Buck Creek, just below Lake Afton overspill. Park at pull-off of Coldspring Ave next to site. Gage is located on left side of Buck Creek Bridge support (under span). Use line above eroded concrete. Flow monitoring site is upstream of bridge approximately 30 yards. Area sometimes smells strongly of sewage discharge (unknown), so WEAR WADERS! This is an urban site.

Dyers Creek, PA (Bacteria Sampling Site)

Located at Route 32 (River Road) bridge over Dyer Creek, next to pump station above Yardley. There is a good walkway from which to sample, with parking on north side of bridge. Gage is marked on upstream side of bridge with chiseled Y painted orange. Flow monitoring site is located at the head of the upstream riffle above bridge.

Jacobs Creek, NJ (Fixed Site)

Owned by J. Foritano, located at driveway which exits Route 29N just past Jacobs Creek bridge (large stone house, old mill). Call before entering. Gage constructed at nail in tree on right bank at upstream end of Foritano property – use rod and levels to obtain gage height.

Houghs Creek, PA (Bacteria Sampling Site)

Gage is located off Taylorsville Road at Aqueduct Road, next to bridge crossing Houghs Creek. Permission was obtained to enter property. DO NOT SAMPLE FROM TAYLORSVILLE ROAD BRIDGE – EXTREMELY DANGEROUS TRAFFIC! Mark was chiseled and painted orange, located underneath bridge on left side. Flow measurement taken from site upstream of bridge, at downstream edge of rock overhang on right side.

Fiddler Creek, NJ (Bacteria Sampling Site)

On property of Mr. & Mrs. Goiten, 43 Fiddlers Creek Road, Titusville NJ. Gage established on small bridge entering property. Call before making site visit. Park at entrance to property off Fiddlers Creek Road, do not block drive. Fiddlers Creek Road is located off Route 29 just north of Washington Crossing Park (just past gas station).

Jericho Creek, PA (Bacteria Sampling Site)

Gage located off PA Route 32, on Stony Brook Road Bridge over Jericho Creek. The gage is marked by a chiseled Y on upstream side of bridge, 23'10" from right side of bridge. Measure from lower bevel edge to the water surface. Flow measurement was taken 9 feet downstream from DS side of bridge. Land use looks to be low density houses & agriculture, and a golf course located ½ mile upstream of sampling site. Sedimentation problems apparent.

Moore Creek, NJ (Bacteria Sampling Site)

Call property owner Mr. Pizzini, Iron Bridge Farm, 28 Pleasant Valley Road, Titusville, NJ, 08650. Permission has been received, but call as a courtesy! Route 29 North, right turn onto Pleasant Valley Road (just below prison work farm), Iron Bridge is located about ½ mile up Moore Creek. Park next to bridge (do not block driveway!). Gage is located on DS side of Iron Bridge, 20.2 feet from right edge (measure level at small hole in rail of bridge, from corner edge of bridge railing). Flow measurements taken approx. 30 yards DS of bridge, just below dead sycamore tree. Interesting geology at this site, displaying characteristic red-rock faces of Brunswick formation.

Pidcock Creek, PA (Bacteria Sampling Site)

Route 32 North, left into Bowmans Hill Wildflower Preserve, press button at metal gate, enter preserve and park at gate just below visitors center (do not block access). Gage is located on stone bridge just down the hill from visitors center. Inform director that we are sampling. See orange-marked Y on downstream side of bridge, above the main channel of flow at the middle culvert. Level reference is chiseled X at orange-painted stone located 28 feet downstream of bridge marker and 5 feet left of left edge of water. Reference mark is 11.725 feet lower than the bridge datum. Bridge datum location was located by GPS (filename R0526118). Flow measurements are taken in cross-section located at bench that sits 104 feet downstream of bridge along the Azalea Trail.

Lambertville-New Hope Bridge, Delaware River (Fixed Site)

Park in restaurant parking lot on NJ side, close to and behind guard shack. Sample 1/3, center, and 2/3 channel (see marks on bridge railings).

Lambertville Boat Launch, NJ (Bacteria Sampling Location)

Sampling site is located off of the boat launch. The Lambertville Boat Launch is approximately 0.1 miles upstream of the Lambertville Sewage Authority (SA) discharge. Directions: Turn off of Bridge Street (the street that crosses the bridge between Lambertville and New Hope) into the parking lot of the Lambertville Station. Go through the parking lot to the far left and after you hit the gravel road the boat access just upstream of the SA.

Aquetong Creek, PA (Fixed Site)

Site located on West Mechanic Street Bridge in New Hope, PA. Turn Left off Route 32 onto W Mechanics Street in New Hope, follow the road all the way up, and take the fork in the road to the Right. There is an area to park just over the bridge on the Right. The gage mark is a chiseled "Y" painted orange on the downstream side of the bridge approximately 11 feet from the right edge. Take the reading from the vertical bevel.

Swan Creek, NJ (Bacteria Sampling Site)

Site is located on the bridge at South Union Street, in Lambertville, NJ. Park in the supermarket parking lot (note collapsed retaining wall). The gage is marked on the upstream side of bridge with a chiseled "Y" painted orange. Read the gage height from the lower edge of the bevel on the vertical post.

Alexauken Creek, NJ (Bacteria Sampling Site)

Gage station is located on the Route 29 bridge over Alexauken Creek, just outside of Lambertville. The gage is marked with an orange painted "Y," on the upstream side of the bridge, 5 ½ metal posts from the right edge (the mark is 28 feet from the South edge of the metal railing on the upstream side of the bridge). Read the gage height from the top edge of the bevel.

Stockton Bridge, Delaware River (Fixed Site)

Park in small area adjacent to guard shack (usually unoccupied). Sample 1/3, center, and 2/3 channel (see marks).

Wickecheoke Creek, NJ (Fixed Site)

Gage is on the Route 29 Bridge over Wickecheoke Creek just north of the old mill. Park at the Delaware & Raritan Canal State Park Office and walk to the Route 29 Bridge. The gage is marked on the downstream side of the bridge, over the left channel and just right of the center pier at the painted orange chiseled "Y." Measure the gage from the edge of the top facing of the bridge.

Lockatong Creek, NJ (Fixed Site)

Site located on Rosemont-Raven Rock Road Bridge over Lockatong Creek. Directions: take Route 29 North and make a Right onto Federal Twist Road then make another Right onto Rosemont-Raven Rock Road. Park on the Left side of the metal bridge. The gage is marked by a notch in the paint on the downstream side of the bridge. The mark is to the right of the first vertical post on the right side of the bridge (24.5 feet from the right edge).

Bulls Island Area, NJ - Lumberville-Raven Rock Foot Bridge (Fixed Site)

Lumberville-Ravenrock footbridge – (Fixed Site) This is the footbridge that crosses the Delaware River from Bulls Island to Lumberville, PA. There will be two samples taken off of the bridge, one from each side. Sample marked locations at 1/3, center, and 2/3 of the distance across river.

Paunacussing Creek, PA (Fixed site)

The gage station is located on the Route 32 bridge over the Paunacussing Creek in Lumberville, PA. The mark is on the Right upstream wingwall on the top edge of the stone. It is close to the metal fence post on the upstream walkway. The mark is a chiseled "Y" painted orange. Take the reading from the top edge of the stone. Also it is easier to decipher the distance to the water level if someone makes the call from a lower vantage point. Note: bridge was removed and replaced in 2001 – re-establish gage in 2002.

Tohickon Creek, PA (Fixed site)

The site is located on the Route 32 bridge over the Tohickon Creek in Point Pleasant, PA. The gage mark is on the Right upstream side of the bridge, see the mark (a notch painted orange) on the sign post (sign says "Bucks County River Country/Tube Canoe Raft"). Measure the gage height from the top corner of the concrete wall near the mark.

Caines Run (AKA Warsaw Creek), NJ (Bacteria Sampling Site)

The gage is located on the upstream side of Route 29 Bridge near the middle of the headwall. A painted orange "Y" on the edge of the bridge marks the gage site. Use the bevel edge on the vertical side to take the gage height reading.

Tinicum Creek, PA (Fixed site)

The gage station is located off of Route 32N (PA). Make a Left onto Tinicum Creek Road, go past yellow house, then make a Left into the first driveway (private drive). Permission was obtained from landowner. Drive to the tributary creek, get out of the car and walk downstream to the confluence with Tinicum Creek. Use surveying equipment for gage height - use rod at Left side orange mark, then place rod at water level near the Right side orange mark, the difference is the water level change. The site was surveyed on June 9, 1999 to establish the gage. The staff gage will be set up in pool near orange mark on the Right side, but it is not in place yet (6/9/99). Note: staff gage was emplaced in 2001.

Cuttalossa Creek, PA (Bacteria Sampling Site)

The gage station is located on the Cuttalossa Road bridge over Cuttalossa Creek. Take Route 32N and make a Left just after the Cuttalossa Inn onto Cuttalossa Road. The gage is on the first bridge the road crosses and it is approximately 1/3 mile from the Inn. The gage mark is a chiseled "Y" painted orange located on the Left downstream wingwall approximately 4 feet from the edge.

Warford Creek, NJ (Bacteria Sampling Site)

The site is located on the Route 29 Bridge over Warford Creek, about 30 feet past sign that says "speed limit 50 mph, no stopping or standing, 1008-160/30.72" (just before mile marker 31). The gage station is set up on the upstream side of the bridge on top of the left wingwall, 2 feet from the headwall of the bridge. A painted orange "Y" on the edge of the bridge marks the gage. When taking the reading use the bevel edge on the vertical side.

Copper Creek, NJ (Bacteria Sampling Site)

The site is on the upstream side of the Route 29 bridge over Copper Creek which sits just south of the pipeline and north of the driveway to a yellow house. The gage mark is on the right wingwall approximately 1 ½ feet from the headwall.

Little Nishisakawick Creek, NJ (Bacteria Sampling Site)

Park in the lot for Blue Fish off of Route 29 to access this sampling site. The gage mark is on the downstream side of the Route 29 bridge over the Little Nishisakawick Creek, on the left side of the concrete culvert base approximately 2 feet from the downstream end.

Nishisakawick Creek, NJ (Fixed & NJDEP Site)

The gage height mark is located on the Route 12 bridge in Frenchtown on the upstream side (Route 12 is also called Kingwood Ave. at this location). The mark is on the left side of the bridge deck next to the fence post. Gage height will be taken from this location, but sampling will take place in the park adjacent to the creek.

Frenchtown Bridge, Delaware River (Fixed Site)

Park on NJ side in lot along dirt road. Sample 1/3, center, and 2/3 channel (see marks on railings).

Harihokake Creek, NJ (Bacteria Sampling Site)

Gage station is on the downstream side of the Route 29 bridge over the Harihokake Creek. Park in Liquor Store parking lot across the street. WEAR ORANGE VESTS WHILE SAMPLING! Gage mark is on the downstream side of the bridge on the left wingwall 1 ½ feet from the downstream headwall (also just above staff gage). Measure the gage height to the bevel on the vertical. Lastly, watch out for large population of water snakes.

Hakihokake Creek, NJ (Bacteria Sampling Site)

Gage station on the Bridge Street Bridge in Milford, NJ. The gage mark is on the upstream edge of the I-beam that supports the flower baskets on the fourth I-beam from the left edge of the railing, on the right edge of the I-beam and on the highest bevel. Note: Staff gage set up on left downstream wingwall (owner unknown).

Milford Bridge, Delaware River (Fixed Site)

Park on the Milford side of bridge, small lot next to bridge. Sample 1/3, center, and 2/3 channel (see marks on railings).

Gallows Run, PA (Fixed site)

This site is located at the intersection of Route 611 and Route 32. The site is located at the Route 611 bridge over Gallows Run. Park at Philip Andrews Country Furniture/Pottery. The gage mark is on the upstream side of the Route 611 bridge. STAY ON SIDEWALK! WEAR ORANGE VESTS! The gage mark is an orange chiseled "Y" located stream Right on the upstream side of the Route 611 bridge.

Cooks Creek, PA (Fixed site)

Located on the Red Bridge Road over Cooks Creek. Take Route 611 N, make a Left onto Route 212, and make a Right onto Red Bridge Road to the bridge. The gage mark is the orange chiseled "Y" on the downstream left side of the bridge. Measure the gage height from the lower (vertical edge) of the bevel. Note: Small side tributary just downstream of bridge was dry on June 15, 1999. Whenever sampling, note whether tributary is running or not.

Musconetcong River, NJ (Fixed site)

Sampling site is located on the Route 627 bridge over the Musconetcong River. Park just South of the bridge on the left side (small space by "Narrow Road" sign). The Gage mark is on the downstream side (see double yellow hash mark over the main channel). Measure the gage height from the chiseled "Y" with the orange spot.

Riegelsville Bridge, NJ/PA (Fixed site)

Sampling sites are located on the bridge, at 1/3, center, and 2/3 of the way across the bridge. Go North on River Road, then make a Left onto Route 627 and take 627 N to the bridge.

Fry's Run, PA (Fixed site)

Sampling site is located at the bridge over Fry's Run at Northampton County Park, PA. Directions: Take Route 611 N to Northampton County Park. Pull into the parking lot. Sample from the old bridge located just upstream from the Route 611 bridge. Do not sample from the Route 611 bridge: too dangerous! The gage mark is on the upstream side of the old bridge at the orange spray paint mark on the lower surface, beside the stone post over main channel.

Pohatcong Creek, NJ (Fixed site)

Gage station is located on the River Road bridge over Pohatcong Creek. Directions: from the Riegelsville Bridge, continue North on River Road to the bridge over Pohatcong Creek. The gage mark is located on the upstream side of the bridge, on the fourth I-beam from the Left edge.

Wy-Hit-Tuk Access, PA (Bacteria Sampling Site)

Site is located off of Route 611. Directions: Take Route 611 N to Wy-Hit-Tuk Park. Pull off and park by the canal bridge gate. Cross the canal and there is a path to the Delaware River about 10 yards to the Right. Wade out into the river to take the sample. Note: Trail to site is steep, use care.

Lopatcong Creek, NJ (Fixed site)

This site is in an urban location. Directions: from Pohatcong Creek, continue North on River Road (pay attention to the bends) to Carpentersville Road, then make a Left onto High Street and then make another left towards Phillipsburg, NJ (Main Street). Park on the right side of the road by the Railroad Bridge Trestle. Walk back to the upstream side of the bridge over Lopatcong Creek. The gage mark is on the Left side of the creek at the chiseled "Y" painted orange near the wingwall. Measure the gage height from the top of the bevel in the concrete.

Lehigh River, PA (Fixed site)

Sampling site is located at the bridge over the Lehigh River in Easton. Sample near the McDonalds above the dam. DRBC can receive data from several agencies which sample the Lehigh. The Wildlands Conservancy will forward YSI HydroLab data from upstream locations, Parkland School District uses HydroLabs at two locations, the Lehigh University Earth Observatory lab operates a hydrolab at Bethlehem Boat Club, and the PADEP has fixed sites along the Lehigh. Wildlands Conservancy with the Army COE has been conducting studies of reservoir tailwaters, also with data available. Contact at Wildlands Conservancy: Chris Kocher. At Parkland School District: Bob Miller.

Easton Northampton Street Bridge, NJ/PA (Fixed site)

This site is located on the Easton Northampton Street bridge over the Delaware River. Directions: South Main Street (Phillipsburg, NJ) to the bridge. Park in the lot just short of the guard shack on the NJ side. Sample 1/3, center, and 2/3 of the distance across the bridge (see marks).

Bushkill Creek, PA (Fixed site)

The site is located on the Route 611 bridge over Bushkill Creek. Directions: follow Route 611 N, go under Route 22 and then Bushkill Creek is to the immediate right. It is tough to find parking at this location. The gage mark is an orange chiseled "Y" on the upstream side of the Route 611 bridge.

Eddyside Park, PA (Bacteria Sampling Site)

This site is a private beach. Directions: Take Route 611 N to Eddyside Park. Park in lot. Sample just upstream of the beach. If no entry is possible, use trail along the downstream fence of the park.

Mud Run, PA (Bacteria Sampling Site)

Just short of Sandt's Eddy Boat Access, where Route 611 is squeezed into single lane with light at either end of constriction, is the bridge which crosses over Mud Run. This trib was dry in 1999. Sample if creek is flowing.

Sandt's Eddy PA Fish Commission Access, PA (Bacteria Sampling Site)

Access is located off of Route 611. Directions: Take Route 611 N to the PA Fish Commission Access (on the right). Park in the lot and walk downstream to the fishing access area.

Martins Creek, PA (Fixed site)

Sampling site is on the Little Creek Road bridge over Martins Creek. Directions: Take Route 611 N, then make a Left onto Little Creek Road. The site is on the upstream side of the bridge. The gage mark is on the upstream side of the bridge, stream Left, marked by an orange chiseled "Y." Measure the gage height from the bevel on the vertical. Note: Interesting modifications to the stream channel.

Buckhorn Creek, NJ (Fixed site)

Site is located at the Hutchinson Road bridge over Buckhorn Creek. Directions: Take Route 519 N to Roxbury Station Road to Hutchinson Road. The sampling site is located on the Hutchinson Road bridge. The gage mark is an orange painted "Y" located in the center of the upstream side of the bridge.

Oughoughton Creek, PA (Bacteria Sampling Site)

Site is located on Depues Road bridge over Oughoughton Creek. Directions: Take Route 611N; where 611 makes a sharp Left go straight to the PPL Access. Then make a Right onto Foul Rift Road (PPL sign), and then make another Right onto Depues Road (PPL sign to access). Just past the left turn for the boat access is Oughoughton Creek bridge. The gage mark is on the downstream side of the bridge towards stream Left, and it is marked with a chiseled "Y" painted orange. If flowing take sample. The creek was dry at this location through 1999 (limestone stream, flows undeground here).

PP&L Access @ Martins Creek plant, PA (Bacteria Sampling Site)

This site is across the street from the Oughoughton Creek sampling site. Directions: Make a Right into the fishing access area. (Make Right into lot just before the railroad tracks.) Take the sample at approximately three feet depth from the fishing access area.

Pophandusing Brook, NJ (Bacteria Sampling Site)

Site is located on the Spring Street bridge over the Pophandusing Brook in Belvidere, NJ. Directions: Once in Belvidere, take Greenwich Street to Fifth Street, and then make a Left onto Spring Street (a Dead End Road). This road crosses Pophandusing Brook. Park past the bridge and the house adjacent to the bridge on the Left hand side of the road. Walk back to the bridge to take the sample and the gage height reading. The gage mark is on the upstream side of the Spring Street bridge on the second vertical I-beam from the right wing wall. An orange spot marks the edge to be used for the gage height measurement. Measure from the left of the vertical I-beam.

Pequest River, NJ (Fixed Site)

Site is located at the Orchard Street bridge over the Pequest River, about 1 mile upstream from town. The gage mark on the Orchard Street bridge is on the downstream side on the third metal post from the Left side and it is denoted by an orange spot. Measure the gage height from the edge of the vertical post.

Belvidere Bridge, Delaware River (Fixed Site)

Site is located at the Belvidere-Riverton bridge over the Delaware River. Get rainfall data from the guard, then sample at 1/3, center, and 2/3 channel (see marks on railing).

Allegheny Creek, PA (Bacteria Sampling Site)

Site is located at the River Road bridge over Allegheny Creek. Directions: Foul Rift Road (toward the Belvidere Bridge), make the last Left before the bridge (sign reads "Portland 9 miles"). Then make a Right (uphill) onto River Road. Allegheny Creek is the second bridge. Park at the intersection with Shady Lane past the bridge. The gage mark is a chiseled "Y" painted orange, located in the middle of the upstream side of the bridge.

Driftstone Campground Access, PA (Bacteria Sampling Site)

Site at the Driftstone Campground is located at the boat launch. Directions: Go North on River Road. See campground on Right. Enter just after a sharp Right curve. Park in the grass to the Right of the boat ramp behind the office. Sample at this site at approximately three feet depth in the vacinity of the boat ramp.

Delawanna Creek, NJ (Fixed site)

Site is located on the Route 46 bridge over Delawanna Creek. Directions: (To get to Route 46 N take Route 620 out of Belvidere) Take Route 46 N and park at the end of the ACI Truck Stop (on the Right). Cross the road to the downstream side to take the sample and the gage height. The gage mark is in the center of the downstream side of the bridge with an orange chiseled "Y" denoting the location from which the gage height should be read.

Paulins Kill, NJ (Fixed & NJDEP site)

This site is located on the Route 46 N bridge over the Paulins Kill Creek. Directions: Take Route 46 N. Cross over the bridge over Paulins Kill Creek, just before the Route 94 N off ramp. Park in the Colombia Lake Wildlife Management Area Lot. Walk back to the bridge. The gage mark is located on the upstream side of the Route 46 N bridge next to the center pier and is denoted by an orange painted chiseled "Y." Also note the staff gage on the Left downstream wingwall.

Portland-Colombia Foot Bridge, NJ-PA (Fixed site)

This sampling site is on the Delaware River. Directions: Go North on River Road to Route 611. Go through the light and park on the Right past the depot. Take two samples at this site, one 1/3 of the distance across the bridge and another 2/3 of the way across. Use the bridge samplers to retrieve the samples.

Jacoby Creek, PA (Bacteria Sampling Site)

This site is located on the Route 611 bridge over Jacoby Creek. Directions: Take Route 611 N to the small bridge just past the off ramp for the toll bridge. (See the Service Star on the Right and the Portland Diner on the Right just past the bridge). The gage mark is on the upstream side, in the center of the bridge and it is designated by an orange chiseled "Y." Measure the gage height from the vertical at the bevel.

Slateford Creek, PA (Bacteria Sampling Site)

Site is located at the NPS (National Parks Service) Boundary on the National Park Road bridge over Slateford Creek. Directions: Route 611 N to National Park Road. Park just short of the bridge. The gage mark is a blue "Y" at center of the upstream span. To take a sample at this site, walk down to the creek via the lower end of the bridge.

Dunnfield Creek, NJ (Fixed & NJDEP site)

Site is located on the Appalachian Trail foot bridge at parking lot across from the NPS Information Center. Directions: From the visitor center, cross under Interstate-80, turn left toward the westbound ramp and pull into the hiker parking lot. Sample from the footbridge. The gage mark is on the downstream side of the footbridge (see nail). Measure the gage height from the nail head.

Appendix C

Lower Delaware River and Tributaries

1999 Monitoring Data

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990708	1107	8.8	96%	5.27	40	7.1
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990729	1032	8.7	95%	5.32	41	7.5
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990805	1425	DRY	DRY	DRY	DRY	DRY
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990826	1025	7.0	75%	4.88	34	7.2
	211.40	**Dunnfield Creek @ Appalachian Trail footbridge**	**AVERAGE**		**8.2**	**88%**		**38**	**7.3**
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990708	1110	11.8	129%	29.77	258	7.6
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990729	1105	9.6	105%	29.84	285	8.0
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990826	1110	MISS	MISS	28.98	182	7.9
	209.58	**Slateford Creek @ National Park Rd Bridge**	**AVERAGE**		**10.7**	**117%**		**242**	**7.8**
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990708	1330	DRY	DRY		DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990729	1325	DRY	DRY		DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990805	1520	DRY	DRY		DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990826	1300	DRY	DRY		DRY	DRY
	208.76	**Stony Brook @ Access Rd above Rt 80**	**AVERAGE**						
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990708	1145	8.6	111%		100	7.3
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990729	1135	7.6	97%		93	7.6
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990805	1450	9.4	118%		100	8.0
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990826	1055	MISS	MISS		96	7.8
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990708	1135	8.5	110%		104	7.7
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990729	1130	7.6	97%		98	7.6
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990805	1500	9.5	119%		102	8.8
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990826	1100	MISS	MISS		94	7.8
	207.40	**Delaware River @ Columbia-Portland Footbridge (composite)**	**AVERAGE**		**8.5**	**108%**		**98**	**7.8**
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990708	1200	9.5	111%	17.64	363	7.2
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990729	1155	8.5	100%	17.47	361	8.3
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990826	1125	MISS	MISS	17.18	306	8.2
	207.20	**Jacoby Creek @ Rt 611 Bridge, Portland**	**AVERAGE**		**9.0**	**106%**		**343**	**7.9**
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990708	1132	7.1	92%	23.61	472	6.9
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990729	1100	6.7	84%	23.51	466	8.0
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990805	1410	8.7	109%	23.69	473	8.2

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990826	1055	6.2	73%	22.90	427	8.5
	207.00	**Paulins Kill Creek @ Rt 46 Bridge nr I-80**	**AVERAGE**		**7.2**	**89%**		**460**	**7.9**
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990708	1159	8.1	93%	15.81	280	6.9
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990729	1114	6.9	81%	15.88	276	8.2
	205.20	Delawanna Creek @ Rt 46 bridge	990805	1400	DRY	DRY	DRY	DRY	DRY
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990826	1115	6.3	74%	15.06	451	8.9
	205.20	**Delawanna Creek @ Rt 46 bridge**	**AVERAGE**		**7.1**	**83%**		**336**	**8.0**
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990708	1220	8.6	114%		107	7.1
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990729	1210	7.5	98%		99	8.5
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990826	1140	MISS	MISS		98	7.7
	203.00	**Delaware River @ Driftstone Campground Access, PA**	**AVERAGE**		**8.1**	**106%**		**101**	**7.8**
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990708	1235	12.6	124%	15.20	278	7.1
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990729	1230	8.8	86%	15.31	277	7.2
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990826	1153	MISS	MISS	15.09	288	7.5
	199.76	**Allegheny Creek @ River Rd Bridge**	**AVERAGE**		**10.7**	**105%**		**281**	**7.3**
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990708	1242	8.2	109%		109	7.4
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990729	1142	7.3	96%		105	7.8
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990805	1345	7.9	102%		111	8.0
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990826	1150	6.8	84%		105	7.8
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990708	1230	7.8	104%		108	7.3
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990729	1152	7.1	93%		102	7.8
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990805	1335	7.9	102%		110	7.8
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990826	1145	6.5	80%		108	7.8
	197.84	**Delaware River @ Belvidere-Riverton Bridge (composite)**	**AVERAGE**		**7.4**	**96%**		**107**	**7.7**
DRBCNJ0032	197.80	Pequest River @ Market St Bridge, Belvidere (spillway)	990708	1256	10.3	123%		468	
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990708	1258	15.8	189%	14.96		
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990729	1206	9.6	115%	15.07	464	8.0
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990805	1315	11.8	141%	15.05	461	8.7
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990826	1200	7.2	81%	14.84	409	8.5
	197.80	**Pequest River @ Orchard St Bridge (fixed), Belvidere**	**AVERAGE**		**10.9**	**130%**		**451**	**8.4**
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990708	1335	8.7	102%	10.88	284	6.9
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990729	1233	8.7	104%	12.40	254	8.4
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990826	1220	6.0	68%	12.61	206	8.1

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
	197.40	**Pophandusing Brook @ Spring St Bridge, Belvidere**	**AVERAGE**		**7.8**	**91%**		**248**	**7.8**
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990708	1310	7.7	102%		296	7.1
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990729	1300	7.4	100%		272	9.2
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990826	1212	MISS	MISS		320	7.9
	194.40	**Delaware River @ PPL Martins Cr Boat Access, PA**	**AVERAGE**		**7.6**	**101%**		**296**	**8.1**
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990708	1330	DRY	DRY	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990729	1325	DRY	DRY	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990805	1520	DRY	DRY	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990826	1300	DRY	DRY	DRY	DRY	DRY
	194.32	**Oughoughton Creek @ PPL Martins Creek Plant**	**AVERAGE**						
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990708	1406	8.6	104%	9.81	217	7.1
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990729	1255	8.3	101%	10.52	224	8.2
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990805	1255	9.0	106%	10.53	226	8.2
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990826	1245	6.0	68%	10.22	219	8.0
	192.90	**Buckhorn Creek @ Hutchinson Rd Bridge**	**AVERAGE**		**8.0**	**95%**		**222**	**7.9**
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990708	1330	10.3	119%	9.20	362	7.0
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990729	1325	10.9	128%	9.16	327	8.4
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990805	1520	11.7	135%	9.34	323	8.4
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990826	1240	MISS	MISS	8.66	231	7.7
	190.58	**Martins Creek @ Little Creek Rd Bridge off 611**	**AVERAGE**		**11.0**	**127%**		**311**	**7.9**
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990701	1257	9.2	115%		159	8.5
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990722	1250	7.9	101%		101	8.2
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990819	1220	9.9	126%		133	9.0
	189.20	**Delaware River @ Sandt's Eddy Access, PA**	**AVERAGE**		**9.0**	**114%**		**131**	**8.6**
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990708	1330	DRY	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990729	1325	DRY	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990805	1520	DRY	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990826	1300	DRY	DRY	DRY	DRY	DRY
	189.10	**Mud Run @ Rt 611 Bridge**	**AVERAGE**						
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990701	1315	8.0	97%		139	8.1
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990722	1248	6.6	85%		131	7.7
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990819	1310	13.8	178%		126	9.3
	185.00	**Delaware River @ Eddyside Park Swimming Area, PA**	**AVERAGE**		**9.5**	**120%**		**132**	**8.4**

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height
Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990701	1335	7.9	88%	34.83	753	8.2
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990722	1235	9.7	108%	34.84	824	8.3
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990805	1545	12.6	145%	miss	812	8.4
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990819	1258	14.8	167%	34.94	777	8.4
	184.10	**Bushkill Creek @ Rt 611 Bridge, PA**	**AVERAGE**		**11.3**	**127%**		**792**	**8.3**
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990701	1250	6.7	85%		140	7.8
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990722	1212	6.5	84%		133	7.6
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990805	1227	8.5	110%		131	8.0
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990819	1240	11.2	142%		125	8.2
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990701	1240	6.5	81%		179	7.8
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990722	1220	6.8	88%		164	7.7
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990805	1215	8.8	114%		160	8.2
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990819	1225	12.2	155%		143	8.2
	183.82	**Delaware River @ Easton, Northampton St Bridge (composite)**	**AVERAGE**		**8.4**	**107%**		**147**	**7.9**
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990701	1216	6.4	78%		336	8.0
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990722	1205	7.6	94%		258	8.0
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990805	1600	9.4	116%		417	8.3
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990819	1245	7.6	94%		306	8.0
	183.66	**Lehigh River @ Rt 611, Easton, PA**	**AVERAGE**		**7.8**	**95%**		**329**	**8.1**
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990701	1215	10.0	98%	15.54	454	7.8
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990722	1150	9.6	94%	15.57	218	8.0
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990805	1150	13.1	131%	15.58	379	8.0
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990819	1200	14.2	142%	15.56	353	7.9
	182.00	**Lopatcong Creek @ Main St, Phillipsburg**	**AVERAGE**		**11.7**	**116%**		**351**	**7.9**
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990701	1150	8.0	94%		238	8.2
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990722	1150	7.2	92%		172	8.0
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990819	1200	8.6	109%		192	8.5
	181.00	**Delaware River @ Wy-Hit-Tuk Park Access, PA**	**AVERAGE**		**7.9**	**98%**		**201**	**8.2**
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990701	1140	9.5	105%	19.92	358	8.0
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990722	1120	9.7	108%	19.98	388	8.3
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990805	1125	13.2	144%	20.04	360	8.4
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990819	1140	16.5	180%	20.03	315	8.3

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
	177.40	**Pohatcong Creek @ River Road Bridge**	**AVERAGE**		**12.2**	**134%**		**355**	**8.3**
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990701	1128	8.9	93%	20.23	309	8.2
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990722	1125	10.9	112%	20.18	224	8.3
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990805	1625	13.0	139%	20.21	279	8.4
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990819	1140	10.8	113%	20.26	290	8.4
	176.60	**Fry's Run @ Old Bridge off Rt 611**	**AVERAGE**		**10.9**	**114%**		**276**	**8.3**
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990701	1115	7.2	90%		198	7.8
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990722	1050	6.5	83%		203	8.0
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990805	1100	9.6	122%		197	8.1
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990819	1105	11.2	140%		170	7.7
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990701	1050	7.7	96%		199	7.7
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990722	1100	6.7	85%		204	7.7
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990805	1055	9.2	117%		195	8.2
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990819	1100	10.8	135%		169	7.8
	174.80	**Delaware River @ Riegelsville Bridge (composite)**	**AVERAGE**		**8.6**	**109%**		**192**	**7.9**
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990701	1030	8.3	96%	23.98	407	7.9
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990722	1030	7.6	89%	24.17	421	8.3
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990805	1040	9.9	116%	24.22	430	8.2
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990819	1045	14.0	161%	24.16	410	8.2
	174.60	**Musconetcong River @ River Rd (Rt627) Bridge**	**AVERAGE**		**10.0**	**116%**		**417**	**8.2**
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990701	1055	7.6	95%		198	8.2
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990722	1105	6.6	83%		161	7.7
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990819	1130	8.1	101%		157	8.0
	173.90	**Delaware River @ Riegelsville, PA Fish Comm Access**	**AVERAGE**		**7.4**	**93%**		**172**	**8.0**
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990701	1030	8.5	96%		275	8.2
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990722	1050	8.6	97%	17.10	171	8.2
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990805	1645	11.0	129%	17.16	272	8.9
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990819	1055	10.2	115%	16.77	253	8.5
	173.70	**Cooks Creek @ Red Bridge Road**	**AVERAGE**		**9.6**	**109%**		**243**	**8.5**
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990701	1013	5.8	64%	18.53	237	7.4
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990722	1025	5.0	55%	18.54	177	7.1
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990819	1035	6.5	74%	18.73	238	7.2
	171.80	**Gallows Run @ Rt 611 & 32**	**AVERAGE**		**5.8**	**64%**		**217**	**7.2**

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height
Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990706	1307	8.2	109%		212	7.5
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990727	1330	9.4	121%		187	7.9
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990802	1335	7.3	96%		199	8.1
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990824	1320	8.0	95%		200	8.3
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990706	1300	8.4	112%		211	7.7
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990727	1325	9.5	123%		201	7.8
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990802	1327	7.1	93%		198	8.1
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990824	1325	7.9	94%		202	8.4
	167.70	**Delaware River @ Milford Bridge (composite)**	**AVERAGE**		**8.2**	**105%**		**201**	**8.0**
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990706	1320	9.0	116%	19.13	266	8.1
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990727	1330	11.0	136%	19.11	272	8.9
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990802	1345	8.6	108%	19.14	285	8.7
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990824	1345	8.9	103%		269	8.8
	167.20	**Hakihokake Creek @ Bridge St Bridge, Milford NJ**	**AVERAGE**		**9.4**	**115%**		**273**	**8.6**
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990706	1336	8.0	100%	19.51	157	7.4
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990727	1320	DRY	DRY	DRY	DRY	DRY
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990824	1345	9.0	104%	19.53	158	7.4
	165.70	**Harihokake Creek @ Rt 29 Bridge**	**AVERAGE**		**8.5**	**102%**		**158**	**7.4**
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990706	1220	9.0	120%		219	7.8
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990727	1225	8.4	108%		183	7.8
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990802	1425	7.0	93%		199	8.2
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990824	1245	8.1	98%		203	8.4
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990706	1225	8.0	106%		211	7.6
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990727	1220	9.7	125%		184	7.9
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990802	1415	6.6	86%		197	8.5
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990824	1255	7.6	92%		200	8.6
	164.30	**Delaware River @ Frenchtown Bridge (composite)**	**AVERAGE**		**8.1**	**104%**		**200**	**8.1**
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990706	1311	7.5	100%	15.80	190	7.7
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990727	1240	7.7	98%	15.94	209	7.8
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990802	1435	DRY	DRY	DRY	DRY	DRY
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990824	1330	9.7	116%	15.93	186	8.6
	164.10	**Nishisakawick Creek @ Rt 12 Bridge, Frenchtown**	**AVERAGE**		**8.3**	**104%**		**195**	**8.0**

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height
Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990706	1300	DRY	DRY	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990727	1230	DRY	DRY	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990824	1315	6.9	77%		247	7.4
	164.00	**Little Nishisakawick Creek @ Rt 29 Bridge**	**AVERAGE**		**6.9**	**77%**		**247**	**7.4**
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990706	1244	9.4	127%		217	8.0
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990727	1211	8.6	113%		193	8.2
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990824	1257	12.4	155%		220	9.1
	163.10	**Delaware River @ Kingwood Access, NJ**	**AVERAGE**		**10.1**	**131%**		**210**	**8.4**
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990706	1230	DRY	DRY	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990727	1200	DRY	DRY	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990824	1300	DRY	DRY	DRY	DRY	DRY
	162.90	**Copper Creek @ Rt 29**	**AVERAGE**						
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990706	1155	9.9	130%		262	7.7
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990727	1200	9.0	111%		582	7.4
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990802	1245	DRY	DRY	DRY	DRY	DRY
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990824	1220	10.8	124%	2.26 below Reference Mark	282	8.6
	161.60	**Tinicum Creek below 1st trib, off Tinicum Cr Rd**	**AVERAGE**		**9.9**	**122%**		**375**	**7.9**
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990706	1223	DRY	DRY	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990727	1203	DRY	DRY	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990824	1240	9.6	111%	8.58	194	7.7
	160.50	**Warford Creek @ Rt 29 Bridge**	**AVERAGE**		**9.6**	**111%**		**194**	**7.7**
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990706	1213	DRY	DRY	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990727	1156	DRY	DRY	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990824	1210	2.6	28%	9.28	287	6.9
	159.50	**Warsaw Creek @ Rt 29 Bridge**	**AVERAGE**		**2.6**	**28%**		**287**	**6.9**
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990706	1130	10.0	133%	27.18	211	7.6
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990727	1130	10.7	138%	27.52	195	9.0
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990802	1245	8.6	116%	27.27	210	9.1
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990824	1200	9.2	115%	27.27	202	9.3
	157.00	**Tohickon Creek @ Rt 32 Bridge**	**AVERAGE**		**9.6**	**125%**		**205**	**8.8**

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height
Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990706	1105	8.4	105%	15.56	221	7.6
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990727	1100	9.1	110%	15.68	227	7.7
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990802	1225	8.3	102%	15.51	236	8.1
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990824	1000	8.6	97%	15.45	229	8.8
	155.60	**Paunacussing Creek @ Rt 32 Bridge**	**AVERAGE**		**8.6**	**104%**		**228**	**8.1**
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990706	1130	8.4	112%		219	7.9
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990727	1134	8.0	102%		194	8.0
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990802	1500	7.7	102%		200	8.3
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990824	1140	8.9	106%		208	8.2
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990706	1150	8.5	113%		221	8.0
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990727	1122	7.7	98%		197	7.9
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990802	1455	7.5	100%		207	8.3
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990824	1135	8.8	109%		209	8.1
	155.40	**Delaware River @ Bulls Island Footbridge (composite)**	**AVERAGE**		**8.2**	**105%**		**207**	**8.1**
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990706	1050	8.4	100%	11.60	233	7.2
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990727	1045	9.7	114%	11.68	224	7.8
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990824	1120	8.4	93%	11.65	235	7.7
	154.50	**Cuttalossa Creek @ Cuttalossa Road off Rt 32**	**AVERAGE**		**8.8**	**102%**		**231**	**7.6**
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990706	1052	6.5	80%	20.60	91	7.5
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990727	1050	12.5	149%	20.82	165	8.6
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990802	1515	DRY	DRY	DRY	DRY	DRY
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990824	1115	9.4	106%	20.77	173	7.4
	154.00	**Lockatong Creek @ Rosemont-Raven Rock Rd Bridge**	**AVERAGE**		**9.5**	**112%**		**143**	**7.8**
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990706	1025	6.5	80%	18.25	208	7.5
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990727	1025	8.4	102%	18.33	207	7.5
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990802	1525	8.7	109%	18.36	208	7.8
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990824	1055	10.5	117%	17.94	212	8.0
	152.50	**Wickecheoke Creek @ Rt 29 Bridge**	**AVERAGE**		**8.5**	**102%**		**209**	**7.7**
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990706	1020	7.7	102%		224	7.4
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990727	1025	8.1	103%		192	7.7
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990802	1545	8.6	113%		203	8.2
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990824	1045	7.2	86%		208	8.3

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990706	1017	7.7	102%		225	7.2
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990727	1020	7.9	101%		191	7.7
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990802	1540	9.1	119%		206	8.2
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990824	1057	7.4	88%		210	8.3
	151.90	**Delaware River @ Stockton Bridge (composite)**	**AVERAGE**		**8.0**	**102%**		**207**	**7.9**
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990706	0951	10.8	133%		390	7.6
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990727	0955	10.6	124%		392	6.6
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990824	1025	8.4	95%		410	8.4
	150.50	**Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury**	**AVERAGE**		**9.9**	**117%**		**397**	**7.5**
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990706	0950	5.5	67%	22.70	295	7.6
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990727	1000	6.0	73%	22.76	328	7.2
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990824	1020	11.9	135%	22.75	321	8.5
	149.50	**Alexauken Creek @ Rt 29 bridge**	**AVERAGE**		**7.8**	**91%**		**315**	**7.8**
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990629	1130	7.9	102%		335	7.4
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990720	1228	9.2	120%		192	8.5
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990817	1325	9.1	116%		MISS	8.3
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990629	1140	7.8	101%		230	7.6
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990720	1220	9.9	130%		195	8.5
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990817	1315	8.4	107%		MISS	7.9
	148.70	**Delaware River @ New Hope / Lambertville Bridge (composite)**	**AVERAGE**		**8.7**	**113%**		**238**	**8.0**
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990629	1203	6.8	84%	12.52	192	7.0
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990720	1150	7.5	91%	12.57	313	7.6
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990817	1225	5.6	68%	12.25	324	7.4
	148.60	**Swan Creek @ Union St Bridge, Lambertville**	**AVERAGE**		**6.6**	**81%**		**276**	**7.3**
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990629	1205	9.2	119%		246	8.5
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990720	1207	10.0	129%		196	9.2
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990817	1205	8.5	108%		186	8.2
	148.55	**Delaware River @ Lambertville Boat Access, NJ**	**AVERAGE**		**9.2**	**119%**		**209**	**8.6**
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990629	1106	8.0	97%	9.37	323	7.7
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990720	1120	9.7	118%	9.40	318	8.3
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990802	1155	8.6	104%	9.47	327	8.2
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990817	1240	8.9	106%	9.46	MISS	8.2

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
	148.50	**Aquetong Creek @ West Mechanic St Bridge, New Hope**	**AVERAGE**		**8.8**	**106%**		**323**	**8.1**
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990629	1044	7.1	88%	15.99	263	7.4
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990720	1050	7.9	94%	16.11	264	7.8
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990817	1145	7.3	88%	16.04	MISS	7.3
	146.30	**Pidcock Creek @ Bowmans Wildflower Preserve Bridge**	**AVERAGE**		**7.4**	**90%**		**264**	**7.5**
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990629	1142	11.0	136%	12.56	191	8.8
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990720	1142	10.9	134%	12.59	94	9.0
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990817	1150	9.2	110%	12.55	194	8.2
	145.20	**Moore Creek @ Iron Bridge Farm**	**AVERAGE**		**10.4**	**127%**		**160**	**8.7**
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990629	1018	2.4	29%	15.77	MISS	7.2
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990720	1030	DRY	DRY	DRY	DRY	DRY
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990817	1125	4.5	54%	15.97	MISS	6.9
	144.20	**Jericho Creek @ Stony Brook Rd Bridge**	**AVERAGE**		**3.5**	**41%**			**7.1**
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990629	1114	7.9	94%	5.94	185	7.6
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990720	1130	DRY	DRY	DRY	DRY	DRY
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990817	1132	6.1	72%	5.92	187	7.4
	143.20	**Fiddler Creek @ private bridge, Fiddler Creek Rd**	**AVERAGE**		**7.0**	**83%**		**186**	**7.5**
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990629	1042	7.2	93%		247	8.1
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990720	1110	7.7	101%		190	8.2
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990802	1625	9.1	121%		204	8.6
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990817	1111	7.7	96%		188	7.8
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990629	1055	7.4	95%		252	8.3
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990720	1100	7.2	93%		190	8.0
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990802	1620	9.8	130%		206	8.6
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990817	1105	7.4	93%		185	7.9
	141.80	**Delaware River @ Washington Crossing Bridge (composite)**	**AVERAGE**		**7.9**	**103%**		**208**	**8.2**
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990629	0927	DRY	DRY	DRY	DRY	DRY
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990720	0945	DRY	DRY	DRY	DRY	DRY
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990817	1110	8.0	94%	4.59	MISS	7.6
	140.60	**Houghs Creek above Taylorsville Rd Bridge**	**AVERAGE**		**8.0**	**94%**			**7.6**
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990629	1022	10.4	128%		329	8.6
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990720	1045	6.9	84%		253	7.4
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990802	1640	DRY	DRY	DRY	DRY	DRY

Lower Delaware Monitoring 1999

Dissolved Oxygen, Gage Height Conductivity, pH

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	DO mg/l	DO%Sat	Gage Ht	Conductiv umhos	pH
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990817	1046	7.8	93%		248	10.5
	140.50	**Jacobs Creek above Rt 29**	**AVERAGE**		**8.4**	**102%**		**277**	**8.8**
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990629	1000	6.4	81%	15.41	240	7.1
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990720	1020	7.4	94%	15.43	238	7.7
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990817	1040	6.6	80%	15.63	MISS	7.1
	139.80	**Dyers Creek @ Rt 32 Bridge**	**AVERAGE**		**6.8**	**85%**		**239**	**7.3**
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990629	1007	7.6	98%		244	7.8
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990720	1027	6.5	84%		194	7.9
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990817	1030	7.0	88%		191	7.7
	139.20	**Delaware River @ Scudders Falls Access, NJ**	**AVERAGE**		**7.0**	**90%**		**210**	**7.8**
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990629	0940	6.9	89%		197	7.6
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990720	0955	7.6	98%		194	8.0
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990817	0945	7.3	91%		MISS	7.6
	138.80	**Delaware River @ Yardley Access, PA**	**AVERAGE**		**7.3**	**93%**		**196**	**7.7**
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990629	0905	7.5	91%	3.06	251	7.4
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990720	0930	7.1	86%	3.07	267	7.6
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990802	1125	6.5	80%	3.19	288	7.6
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990817	1010	6.5	78%	3.08	MISS	7.1
	138.00	**Buck Creek above Main St, Yardley**	**AVERAGE**		**6.9**	**84%**		**269**	**7.4**
DRBCNJ1369	137.10	Delaware River @ Rotary Island, NJ channel	990624	1240	9.9	124%		221	8.1
DRBCPA1369	137.10	Delaware River @ Rotary Island, PA channel	990624	1240	9.9	124%		221	8.1
DRBCPA1370	137.10	Delaware River @ Rotary Island, US point	990624	1240	9.9	124%		221	8.1
	137.10	**Delaware River @ Rotary Island (composite)**	**AVERAGE**		**9.9**	**124%**		**221**	**8.1**
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990629	0935	7.5	95%		246	8.1
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990720	0945	7.5	97%		194	8.3
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990802	1056	7.7	101%		206	8.0
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990817	0956	7.7	96%		184	7.7
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990629	0915	7.0	90%		271	7.8
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990720	0955	7.4	95%		196	8.3
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990802	1104	7.5	98%		206	8.1
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990817	1005	8.0	100%		188	7.7
	134.34	**Delaware River @ Calhoun St Bridge (composite)**	**AVERAGE**		**7.5**	**97%**		**211**	**8.0**
Grand Average		**LOWER DELAWARE GRAND AVERAGE**	**AVERAGE**		**8.6**	**104%**		**241**	**8.0**

Lower Delaware Monitoring 1999 — Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990708	1107	18.6	65.5	17.6	63.7
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990729	1032	23.7	74.7	17.8	64.0
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990805	1425	DRY	DRY	DRY	DRY
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990826	1025	21.7	71.1	17.3	63.1
	211.40	**Dunnfield Creek @ Appalachian Trail footbridge**	**AVERAGE**		**21.3**	**70.4**	**17.6**	**63.6**
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990708	1110	31.1	88.0	18.2	64.8
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990729	1105	21.1	70.0	18.4	65.1
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990826	1110	MISS	MISS	MISS	MISS
	209.58	**Slateford Creek @ National Park Rd Bridge**	**AVERAGE**		**26.1**	**79.0**	**18.3**	**64.9**
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990708	1330	DRY	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990729	1325	DRY	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990805	1520	DRY	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990826	1300	DRY	DRY	DRY	DRY
	208.76	**Stony Brook @ Access Rd above Rt 80**	**AVERAGE**					
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990708	1145	27.7	81.9	27.7	81.9
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990729	1135	25.6	78.1	26.9	80.4
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990805	1450	27.6	81.7	25.6	78.1
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990826	1055	MISS	MISS	MISS	MISS
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990708	1135	29.2	84.6	28.0	82.4
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990729	1130	26.1	79.0	26.9	80.4
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990805	1500	27.5	81.5	26.0	78.8
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990826	1100	MISS	MISS	MISS	MISS
	207.40	**Delaware River @ Columbia-Portland Footbridge (composite)**	**AVERAGE**		**27.3**	**81.1**	**26.9**	**80.3**
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990708	1200	32.0	89.6	21.8	71.2
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990729	1155	28.1	82.6	22.1	71.8
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990826	1125	MISS	MISS	MISS	MISS
	207.20	**Jacoby Creek @ Rt 611 Bridge, Portland**	**AVERAGE**		**30.1**	**86.1**	**22.0**	**71.5**
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990708	1132	30.1	86.2	27.5	81.5
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990729	1100	28.2	82.8	26.0	78.8
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990805	1410	24.6	76.3	25.9	78.6
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990826	1055	22.5	72.5	21.7	71.1
	207.00	**Paulins Kill Creek @ Rt 46 Bridge nr I-80**	**AVERAGE**		**26.4**	**79.4**	**25.3**	**77.5**
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990708	1159	33.9	93.0	20.9	69.6
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990729	1114	29.5	85.1	22.1	71.8

Lower Delaware Monitoring 1999

Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
	205.20	Delawanna Creek @ Rt 46 bridge	990805	1400	DRY	DRY	DRY	DRY
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990826	1115	25.0	77.0	22.0	71.6
	205.20	**Delawanna Creek @ Rt 46 bridge**	**AVERAGE**		**29.5**	**85.0**	**21.7**	**71.0**
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990708	1220	35.1	95.2	29.7	85.5
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990729	1210	27.2	81.0	28.8	83.8
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990826	1140	MISS	MISS	MISS	MISS
	203.00	**Delaware River @ Driftstone Campground Access, PA**	**AVERAGE**		**31.2**	**88.1**	**29.3**	**84.7**
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990708	1235	33.1	91.6	12.7	54.9
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990729	1230	24.8	76.6	13.1	55.6
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990826	1153	MISS	MISS	MISS	MISS
	199.76	**Allegheny Creek @ River Rd Bridge**	**AVERAGE**		**29.0**	**84.1**	**12.9**	**55.2**
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990708	1242	29.9	85.8	29.7	85.5
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990729	1142	29.3	84.7	28.6	83.5
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990805	1345	27.3	81.1	27.5	81.5
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990826	1150	22.5	72.5	24.9	76.8
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990708	1230	30.0	86.0	29.7	85.5
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990729	1152	30.3	86.5	28.7	83.7
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990805	1335	27.3	81.1	27.5	81.5
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990826	1145	22.5	72.5	24.8	76.6
	197.84	**Delaware River @ Belvidere-Riverton Bridge (composite)**	**AVERAGE**		**27.4**	**81.3**	**27.7**	**81.8**
DRBCNJ0032	197.80	Pequest River @ Market St Bridge, Belvidere (spillway)	990708	1256	30.0	86.0	22.9	73.2
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990708	1258	30.0	86.0	22.9	73.2
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990729	1206	31.9	89.4	22.6	72.7
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990805	1315	28.0	82.4	22.9	73.2
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990826	1200	23.3	73.9	19.9	67.8
	197.80	**Pequest River @ Orchard St Bridge (fixed), Belvidere**	**AVERAGE**		**28.6**	**83.6**	**22.2**	**72.0**
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990708	1335	33.8	92.8	22.1	71.8
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990729	1233	32.0	89.6	23.0	73.4
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990826	1220	22.2	72.0	19.5	67.1
	197.40	**Pophandusing Brook @ Spring St Bridge, Belvidere**	**AVERAGE**		**29.3**	**84.8**	**21.5**	**70.8**
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990708	1310	33.1	91.6	29.7	85.5
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990729	1300	28.1	82.6	31.1	88.0
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990826	1212	MISS	MISS	MISS	MISS
	194.40	**Delaware River @ PPL Martins Cr Boat Access, PA**	**AVERAGE**		**30.6**	**87.1**	**30.4**	**86.7**
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990708	1330	DRY	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990729	1325	DRY	DRY	DRY	DRY

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990805	1520	DRY	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990826	1300	DRY	DRY	DRY	DRY
	194.32	**Oughoughton Creek @ PPL Martins Creek Plant**	**AVERAGE**					
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990708	1406	30.4	86.7	23.7	74.7
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990729	1255	32.3	90.1	24.2	75.6
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990805	1255	26.6	79.9	22.2	72.0
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990826	1245	23.4	74.1	20.2	68.4
	192.90	**Buckhorn Creek @ Hutchinson Rd Bridge**	**AVERAGE**		**28.2**	**82.7**	**22.6**	**72.6**
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990708	1330	34.4	93.9	21.2	70.2
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990729	1325	29.3	84.7	22.0	71.6
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990805	1520	26.2	79.2	21.3	70.3
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990826	1240	MISS	MISS	MISS	MISS
	190.58	**Martins Creek @ Little Creek Rd Bridge off 611**	**AVERAGE**		**30.0**	**85.9**	**21.5**	**70.7**
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990701	1257	26.3	79.3	26.0	78.8
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990722	1250	27.1	80.8	27.0	80.6
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990819	1220	28.9	84.0	27.3	81.1
	189.20	**Delaware River @ Sandt's Eddy Access, PA**	**AVERAGE**		**27.4**	**81.4**	**26.8**	**80.2**
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990708	1330	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990729	1325	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990805	1520	DRY	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990826	1300	DRY	DRY	DRY	DRY
	189.10	**Mud Run @ Rt 611 Bridge**	**AVERAGE**					
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990701	1315	26.6	79.9	24.3	75.7
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990722	1248	26.4	79.5	28.0	82.4
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990819	1310	28.6	83.5	28.1	82.6
	185.00	**Delaware River @ Eddyside Park Swimming Area, PA**	**AVERAGE**		**27.2**	**81.0**	**26.8**	**80.2**
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990701	1335	26.4	79.5	19.3	66.7
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990722	1235	26.6	79.9	19.0	66.2
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990805	1545	27.5	81.5	21.2	70.2
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990819	1258	30.5	86.9	19.9	67.8
	184.10	**Bushkill Creek @ Rt 611 Bridge, PA**	**AVERAGE**		**27.8**	**82.0**	**19.9**	**67.7**
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990701	1250	24.2	75.6	26.7	80.1
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990722	1212	24.0	75.2	28.0	82.4
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990805	1227	28.0	82.4	27.9	82.2
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990819	1240	28.8	83.8	26.5	79.7

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990701	1240	24.2	75.6	26.2	79.2
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990722	1220	26.3	79.3	27.6	81.7
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990805	1215	28.0	82.4	27.8	82.0
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990819	1225	28.2	82.8	26.8	80.2
	183.82	**Delaware River @ Easton, Northampton St Bridge (composite)**	**AVERAGE**		**26.5**	**79.6**	**27.2**	**80.9**
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990701	1216	25.2	77.4	24.1	75.4
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990722	1205	24.6	76.3	25.0	77.0
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990805	1600	26.0	78.8	25.3	77.5
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990819	1245	23.8	74.8	25.0	77.0
	183.66	**Lehigh River @ Rt 611, Easton, PA**	**AVERAGE**		**24.9**	**76.8**	**24.9**	**76.7**
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990701	1215	24.6	76.3	13.4	56.1
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990722	1150	24.3	75.7	13.3	55.9
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990805	1150	23.0	73.4	13.7	56.7
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990819	1200	27.2	81.0	14.1	57.4
	182.00	**Lopatcong Creek @ Main St, Phillipsburg**	**AVERAGE**		**24.8**	**76.6**	**13.6**	**56.5**
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990701	1150	22.9	73.2	21.9	71.4
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990722	1150	23.4	74.1	26.5	79.7
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990819	1200	28.9	84.0	27.0	80.6
	181.00	**Delaware River @ Wy-Hit-Tuk Park Access, PA**	**AVERAGE**		**25.1**	**77.1**	**25.1**	**77.2**
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990701	1140	26.4	79.5	18.5	65.3
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990722	1120	25.0	77.0	18.8	65.8
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990805	1125	25.2	77.4	18.3	64.9
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990819	1140	25.9	78.6	18.2	64.8
	177.40	**Pohatcong Creek @ River Road Bridge**	**AVERAGE**		**25.6**	**78.1**	**18.5**	**65.2**
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990701	1128	23.6	74.5	16.4	61.5
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990722	1125	24.2	75.6	14.9	58.8
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990805	1625	26.0	78.8	16.7	62.1
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990819	1140	23.5	74.3	15.7	60.3
	176.60	**Fry's Run @ Old Bridge off Rt 611**	**AVERAGE**		**24.3**	**75.8**	**15.9**	**60.7**
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990701	1115	24.8	76.6	26.1	79.0
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990722	1050	23.7	74.7	26.6	79.9
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990805	1100	25.0	77.0	26.7	80.1
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990819	1105	26.0	78.8	26.0	78.8
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990701	1050	24.8	76.6	26.1	79.0
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990722	1100	24.4	75.9	26.6	79.9

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990805	1055	23.8	74.8	26.7	80.1
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990819	1100	25.2	77.4	25.9	78.6
	174.80	**Delaware River @ Riegelsville Bridge (composite)**	**AVERAGE**		**24.7**	**76.5**	**26.3**	**79.4**
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990701	1030	23.7	74.7	21.1	70.0
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990722	1030	23.8	74.8	22.1	71.8
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990805	1040	28.9	84.0	21.6	70.9
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990819	1045	25.3	77.5	21.4	70.5
	174.60	**Musconetcong River @ River Rd (Rt627) Bridge**	**AVERAGE**		**25.4**	**77.8**	**21.6**	**70.8**
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990701	1055	23.5	74.3	25.8	78.4
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990722	1105	24.0	75.2	26.1	79.0
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990819	1130	28.4	83.1	25.8	78.4
	173.90	**Delaware River @ Riegelsville, PA Fish Comm Access**	**AVERAGE**		**25.3**	**77.5**	**25.9**	**78.6**
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990701	1030	22.7	72.9	19.7	67.5
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990722	1050	23.8	74.8	20.3	68.5
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990805	1645	24.1	75.4	22.2	72.0
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990819	1055	24.4	75.9	19.7	67.5
	173.70	**Cooks Creek @ Red Bridge Road**	**AVERAGE**		**23.8**	**74.8**	**20.5**	**68.9**
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990701	1013	23.1	73.6	18.6	65.5
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990722	1025	24.9	76.8	19.1	66.4
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990819	1035	23.4	74.1	19.9	67.8
	171.80	**Gallows Run @ Rt 611 & 32**	**AVERAGE**		**23.8**	**74.8**	**19.2**	**66.6**
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990706	1307	28.4	83.1	30.2	86.4
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990727	1330	26.0	78.8	28.0	82.4
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990802	1335	29.8	85.6	29.0	84.2
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990824	1320	27.8	82.0	23.2	73.8
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990706	1300	33.3	91.9	30.3	86.5
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990727	1325	30.8	87.4	28.1	82.6
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990802	1327	29.8	85.6	29.0	84.2
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990824	1325	27.8	82.0	23.3	73.9
	167.70	**Delaware River @ Milford Bridge (composite)**	**AVERAGE**		**29.2**	**84.6**	**27.6**	**81.7**
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990706	1320	34.1	93.4	27.7	81.9
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990727	1330	33.0	91.4	25.1	77.2
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990802	1345	27.0	80.6	25.7	78.3
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990824	1345	28.6	83.5	20.9	69.6
	167.20	**Hakihokake Creek @ Bridge St Bridge, Milford NJ**	**AVERAGE**		**30.7**	**87.2**	**24.9**	**76.7**

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990706	1336	35.7	96.3	25.6	78.1
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990727	1320	DRY	DRY	DRY	DRY
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990824	1345	28.7	83.7	21.2	70.2
	165.70	**Harihokake Creek @ Rt 29 Bridge**	**AVERAGE**		**32.2**	**90.0**	**23.4**	**74.1**
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990706	1220	37.1	98.8	30.3	86.5
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990727	1225	25.5	77.9	28.1	82.6
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990802	1425	28.7	83.7	29.5	85.1
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990824	1245	26.5	79.7	23.5	74.3
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990706	1225	35.7	96.3	30.4	86.7
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990727	1220	25.2	77.4	28.2	82.8
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990802	1415	28.7	83.7	29.4	84.9
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990824	1255	26.5	79.7	23.6	74.5
	164.30	**Delaware River @ Frenchtown Bridge (composite)**	**AVERAGE**		**29.2**	**84.6**	**27.9**	**82.2**
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990706	1311	38.6	101.5	29.9	85.8
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990727	1240	35.7	96.3	27.2	81.0
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990802	1435	DRY	DRY	DRY	DRY
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990824	1330	26.0	78.8	23.1	73.6
	164.10	**Nishisakawick Creek @ Rt 12 Bridge, Frenchtown**	**AVERAGE**		**33.4**	**92.2**	**26.7**	**80.1**
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990706	1300	DRY	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990727	1230	DRY	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990824	1315	26.1	79.0	18.6	65.5
	164.00	**Little Nishisakawick Creek @ Rt 29 Bridge**	**AVERAGE**		**26.1**	**79.0**	**18.6**	**65.5**
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990706	1244	32.6	90.7	31.4	88.5
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990727	1211	30.5	86.9	28.9	84.0
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990824	1257	25.8	78.4	25.7	78.3
	163.10	**Delaware River @ Kingwood Access, NJ**	**AVERAGE**		**29.6**	**85.3**	**28.7**	**83.6**
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990706	1230	DRY	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990727	1200	DRY	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990824	1300	DRY	DRY	DRY	DRY
	162.90	**Copper Creek @ Rt 29**	**AVERAGE**					
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990706	1155	30.1	86.2	28.7	83.7
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990727	1200	29.7	85.5	24.5	76.1
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990802	1245	DRY	DRY	DRY	DRY
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990824	1220	27.4	81.3	20.7	69.3
	161.60	**Tinicum Creek below 1st trib, off Tinicum Cr Rd**	**AVERAGE**		**29.1**	**84.3**	**24.6**	**76.3**

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990706	1223	DRY	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990727	1203	DRY	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990824	1240	26.9	80.4	20.9	69.6
	160.50	**Warford Creek @ Rt 29 Bridge**	**AVERAGE**		**26.9**	**80.4**	**20.9**	**69.6**
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990706	1213	DRY	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990727	1156	DRY	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990824	1210	26.7	80.1	18.4	65.1
	159.50	**Warsaw Creek @ Rt 29 Bridge**	**AVERAGE**		**26.7**	**80.1**	**18.4**	**65.1**
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990706	1130	35.1	95.2	30.3	86.5
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990727	1130	32.5	90.5	28.2	82.8
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990802	1245	27.3	81.1	30.9	87.6
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990824	1200	30.4	86.7	25.9	78.6
	157.00	**Tohickon Creek @ Rt 32 Bridge**	**AVERAGE**		**31.3**	**88.4**	**28.8**	**83.9**
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990706	1105	30.3	86.5	25.7	78.3
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990727	1100	24.5	76.1	23.9	75.0
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990802	1225	26.0	78.8	25.2	77.4
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990824	1000	27.6	81.7	20.3	68.5
	155.60	**Paunacussing Creek @ Rt 32 Bridge**	**AVERAGE**		**27.1**	**80.8**	**23.8**	**74.8**
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990706	1130	37.0	98.6	30.0	86.0
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990727	1134	26.1	79.0	27.3	81.1
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990802	1500	29.5	85.1	29.6	85.3
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990824	1140	26.4	79.5	22.7	72.9
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990706	1150	37.0	98.6	29.5	85.1
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990727	1122	28.5	83.3	27.0	80.6
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990802	1455	29.5	85.1	29.5	85.1
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990824	1135	26.4	79.5	24.5	76.1
	155.40	**Delaware River @ Bulls Island Footbridge (composite)**	**AVERAGE**		**30.1**	**86.1**	**27.5**	**81.5**
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990706	1050	29.8	85.6	23.1	73.6
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990727	1045	26.3	79.3	21.7	71.1
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990824	1120	26.4	79.5	18.6	65.5
	154.50	**Cuttalossa Creek @ Cuttalossa Road off Rt 32**	**AVERAGE**		**27.5**	**81.5**	**21.1**	**70.0**
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990706	1052	30.7	87.3	24.5	76.1
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990727	1050	29.3	84.7	22.8	73.0
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990802	1515	DRY	DRY	DRY	DRY
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990824	1115	27.4	81.3	20.4	68.7

Lower Delaware Monitoring 1999 — Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
	154.00	**Lockatong Creek @ Rosemont-Raven Rock Rd Bridge**	**AVERAGE**		**29.1**	**84.4**	**22.6**	**72.6**
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990706	1025	31.2	88.2	25.1	77.2
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990727	1025	28.1	82.6	23.9	75.0
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990802	1525	29.7	85.5	26.4	79.5
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990824	1055	30.0	86.0	18.8	65.8
	152.50	**Wickecheoke Creek @ Rt 29 Bridge**	**AVERAGE**		**29.8**	**85.6**	**23.6**	**74.4**
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990706	1020	30.8	87.4	29.8	85.6
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990727	1025	27.5	81.5	27.1	80.8
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990802	1545	29.3	84.7	29.0	84.2
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990824	1045	27.1	80.8	22.9	73.2
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990706	1017	28.2	82.8	29.5	85.1
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990727	1020	26.1	79.0	27.3	81.1
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990802	1540	29.3	84.7	28.8	83.8
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990824	1057	27.1	80.8	23.1	73.6
	151.90	**Delaware River @ Stockton Bridge (composite)**	**AVERAGE**		**28.2**	**82.7**	**27.2**	**80.9**
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990706	0951	34.0	93.2	24.5	76.1
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990727	0955	23.5	74.3	21.8	71.2
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990824	1025	27.6	81.7	20.1	68.2
	150.50	**Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury**	**AVERAGE**		**28.4**	**83.1**	**22.1**	**71.8**
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990706	0950	32.3	90.1	24.3	75.7
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990727	1000	28.0	82.4	24.0	75.2
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990824	1020	25.8	78.4	20.1	68.2
	149.50	**Alexauken Creek @ Rt 29 bridge**	**AVERAGE**		**28.7**	**83.7**	**22.8**	**73.0**
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990629	1130	32.8	91.0	28.3	82.9
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990720	1228	27.6	81.7	28.8	83.8
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990817	1325	32.1	89.8	26.5	79.7
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990629	1140	32.8	91.0	28.0	82.4
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990720	1220	27.7	81.9	28.6	83.5
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990817	1315	32.1	89.8	26.8	80.2
	148.70	**Delaware River @ New Hope / Lambertville Bridge (composite)**	**AVERAGE**		**30.9**	**87.5**	**27.8**	**82.1**
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990629	1203	35.0	95.0	24.9	76.8
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990720	1150	33.8	92.8	24.1	75.4
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990817	1225	31.3	88.3	24.2	75.6
	148.60	**Swan Creek @ Union St Bridge, Lambertville**	**AVERAGE**		**33.4**	**92.1**	**24.4**	**75.9**
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990629	1205	32.2	90.0	28.4	83.1

Lower Delaware Monitoring 1999 — Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990720	1207	27.0	80.6	28.2	82.8
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990817	1205	28.9	84.0	26.6	79.9
	148.55	**Delaware River @ Lambertville Boat Access, NJ**	**AVERAGE**		**29.4**	**84.9**	**27.7**	**81.9**
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990629	1106	32.7	90.9	24.3	75.7
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990720	1120	30.5	86.9	23.8	74.8
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990802	1155	27.0	80.6	24.0	75.2
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990817	1240	33.3	91.9	22.9	73.2
	148.50	**Aquetong Creek @ West Mechanic St Bridge, New Hope**	**AVERAGE**		**30.9**	**87.6**	**23.8**	**74.8**
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990629	1044	32.8	91.0	25.1	77.2
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990720	1050	29.0	84.2	23.2	73.8
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990817	1145	29.4	84.9	23.6	74.5
	146.30	**Pidcock Creek @ Bowmans Wildflower Preserve Bridge**	**AVERAGE**		**30.4**	**86.7**	**24.0**	**75.1**
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990629	1142	32.2	90.0	25.2	77.4
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990720	1142	27.0	80.6	25.2	77.4
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990817	1150	28.2	82.8	22.9	73.2
	145.20	**Moore Creek @ Iron Bridge Farm**	**AVERAGE**		**29.1**	**84.4**	**24.4**	**76.0**
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990629	1018	30.0	86.0	22.7	72.9
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990720	1030	DRY	DRY	DRY	DRY
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990817	1125	26.9	80.4	22.9	73.2
	144.20	**Jericho Creek @ Stony Brook Rd Bridge**	**AVERAGE**		**28.5**	**83.2**	**22.8**	**73.0**
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990629	1114	29.2	84.6	23.1	73.6
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990720	1130	DRY	DRY	DRY	DRY
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990817	1132	27.6	81.7	22.1	71.8
	143.20	**Fiddler Creek @ private bridge, Fiddler Creek Rd**	**AVERAGE**		**28.4**	**83.1**	**22.6**	**72.7**
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990629	1042	28.8	83.8	27.8	82.0
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990720	1110	27.6	81.7	28.5	83.3
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990802	1625	29.7	85.5	30.2	86.4
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990817	1111	26.1	79.0	26.3	79.3
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990629	1055	29.7	85.5	28.1	82.6
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990720	1100	27.6	81.7	28.4	83.1
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990802	1620	29.7	85.5	30.2	86.4
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990817	1105	26.3	79.3	26.4	79.5
	141.80	**Delaware River @ Washington Crossing Bridge (composite)**	**AVERAGE**		**28.2**	**82.7**	**28.2**	**82.8**
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990629	0927	DRY	DRY	DRY	DRY
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990720	0945	DRY	DRY	DRY	DRY

Lower Delaware Monitoring 1999 — Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990817	1110	27.5	81.5	22.2	72.0
	140.60	**Houghs Creek above Taylorsville Rd Bridge**	**AVERAGE**		**27.5**	**81.5**	**22.2**	**72.0**
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990629	1022	27.6	81.7	25.3	77.5
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990720	1045	26.7	80.1	24.0	75.2
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990802	1640	DRY	DRY	DRY	DRY
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990817	1046	26.2	79.2	22.9	73.2
	140.50	**Jacobs Creek above Rt 29**	**AVERAGE**		**26.8**	**80.3**	**24.1**	**75.3**
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990629	1000	29.5	85.1	26.8	80.2
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990720	1020	26.0	78.8	26.5	79.7
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990817	1040	27.8	82.0	23.8	74.8
	139.80	**Dyers Creek @ Rt 32 Bridge**	**AVERAGE**		**27.8**	**82.0**	**25.7**	**78.3**
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990629	1007	30.0	86.0	27.7	81.9
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990720	1027	26.4	79.5	27.9	82.2
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990817	1030	26.9	80.4	26.4	79.5
	139.20	**Delaware River @ Scudders Falls Access, NJ**	**AVERAGE**		**27.8**	**82.0**	**27.3**	**81.2**
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990629	0940	28.9	84.0	27.5	81.5
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990720	0955	26.2	79.2	27.8	82.0
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990817	0945	26.9	80.4	25.8	78.4
	138.80	**Delaware River @ Yardley Access, PA**	**AVERAGE**		**27.3**	**81.2**	**27.0**	**80.7**
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990629	0905	28.0	82.4	23.7	74.7
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990720	0930	25.9	78.6	24.2	75.6
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990802	1125	28.1	82.6	25.1	77.2
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990817	1010	27.2	81.0	23.2	73.8
	138.00	**Buck Creek above Main St, Yardley**	**AVERAGE**		**27.3**	**81.1**	**24.1**	**75.3**
DRBCNJ1369	137.10	Delaware River @ Rotary Island, NJ channel	990624	1240	33.0	91.4	25.6	78.1
DRBCPA1369	137.10	Delaware River @ Rotary Island, PA channel	990624	1240	33.0	91.4	25.6	78.1
DRBCPA1370	137.10	Delaware River @ Rotary Island, US point	990624	1240	33.0	91.4	25.6	78.1
	137.10	**Delaware River @ Rotary Island (composite)**	**AVERAGE**		**33.0**	**91.4**	**25.6**	**78.1**
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990629	0935	29.0	84.2	27.4	81.3
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990720	0945	29.2	84.6	28.2	82.8
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990802	1056	24.0	75.2	28.8	83.8
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990817	0956	26.0	78.8	26.4	79.5
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990629	0915	29.0	84.2	27.6	81.7
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990720	0955	29.2	84.6	28.2	82.8
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990802	1104	26.2	79.2	28.5	83.3

Lower Delaware Monitoring 1999 — Temperature

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	AirTempC	AirTempF	Water Temp C	Water Temp F
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990817	1005	26.4	79.5	26.2	79.2
	134.34	**Delaware River @ Calhoun St Bridge (composite)**	**AVERAGE**		**27.4**	**81.3**	**27.7**	**81.8**
Grand Average		**LOWER DELAWARE GRAND AVERAGE**	**AVERAGE**		**28.0**	**82.5**	**24.6**	**76.3**

Lower Delaware Monitoring 1999: Bacteria Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990708	1107	13	1.114		73	1.863	
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990729	1032	184	2.265		27	1.431	
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990805	1425	DRY			DRY		
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990826	1025	224	2.350		1240	3.093	
	211.40	**Dunnfield Creek @ Appalachian Trail footbridge**	**AVERAGE**		**140**	**1.910**	**81**	**447**	**2.129**	**135**
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990708	1110	36	1.556		55	1.740	
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990729	1105	16	1.204		120	2.079	
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990826	1110	68	1.833		760	2.881	
	209.58	**Slateford Creek @ National Park Rd Bridge**	**AVERAGE**		**40**	**1.531**	**34**	**312**	**2.233**	**171**
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990708	1330	DRY			DRY		
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990729	1325	DRY			DRY		
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990805	1520	DRY			DRY		
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990826	1300	DRY			DRY		
	208.76	**Stony Brook @ Access Rd above Rt 80**	**AVERAGE**							
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990708	1145	23	1.362		1	0.000	
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990729	1135	3	0.477		1	0.000	
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990805	1450						
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990826	1055	5	0.699		30	1.477	
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990708	1135	32	1.505		9	0.954	
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990729	1130	8	0.903		1	0.000	
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990805	1500						
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990826	1100	1	0.000		9	0.954	
	207.40	**Delaware River @ Columbia-Portland Footbridge (composite)**	**AVERAGE**		**12**	**0.824**	**7**	**9**	**0.564**	**4**
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990708	1200	184	2.265		232	2.365	
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990729	1155	92	1.964		268	2.428	
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990826	1125	200	2.301		1200	3.079	
	207.20	**Jacoby Creek @ Rt 611 Bridge, Portland**	**AVERAGE**		**159**	**2.177**	**150**	**567**	**2.624**	**421**
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990708	1132	100	2.000		11	1.041	
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990729	1100	25	1.398		4	0.602	
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990805	1410						
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990826	1055	28	1.447		40	1.602	
	207.00	**Paulins Kill Creek @ Rt 46 Bridge nr I-80**	**AVERAGE**		**51**	**1.615**	**41**	**18**	**1.082**	**12**
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990708	1159	2380	3.377		760	2.881	
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990729	1114	31	1.491		400	2.602	

Lower Delaware Monitoring 1999: Bacteria Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
	205.20	Delawanna Creek @ Rt 46 bridge	990805	1400	DRY			DRY		
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990826	1115	1200	3.079		1560	3.193	
	205.20	**Delawanna Creek @ Rt 46 bridge**	**AVERAGE**		**1204**	**2.649**	**446**	**907**	**2.892**	**780**
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990708	1220	16	1.204		7	0.845	
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990729	1210	10	1.000		1	0.000	
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990826	1140	24	1.380		38	1.580	
	203.00	**Delaware River @ Driftstone Campground Access, PA**	**AVERAGE**		**17**	**1.195**	**16**	**15**	**0.808**	**6**
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990708	1235	5	0.699		30	1.477	
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990729	1230	5	0.699		292	2.465	
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990826	1153	180	2.255		1200	3.079	
	199.76	**Allegheny Creek @ River Rd Bridge**	**AVERAGE**		**63**	**1.218**	**17**	**507**	**2.341**	**219**
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990708	1242	14	1.146		4	0.602	
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990729	1142	5	0.699		3	0.477	
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990805	1345						
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990826	1150	100	2.000		65	1.813	
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990708	1230	17	1.230		6	0.778	
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990729	1152	5	0.699		18	1.255	
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990805	1335						
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990826	1145	172	2.236		124	2.093	
	197.84	**Delaware River @ Belvidere-Riverton Bridge (composite)**	**AVERAGE**		**52**	**1.335**	**22**	**37**	**1.170**	**15**
DRBCNJ0032	197.80	Pequest River @ Market St Bridge, Belvidere (spillway)	990708	1256	15	1.176		30	1.477	
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990708	1258						
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990729	1206	120	2.079		16	1.204	
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990805	1315						
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990826	1200	540	2.732		980	2.991	
	197.80	**Pequest River @ Orchard St Bridge (fixed), Belvidere**	**AVERAGE**		**225**	**1.996**	**99**	**342**	**1.891**	**78**
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990708	1335	320	2.505		880	2.944	
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990729	1233	420	2.623		244	2.387	
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990826	1220	1200	3.079		1200	3.079	
	197.40	**Pophandusing Brook @ Spring St Bridge, Belvidere**	**AVERAGE**		**647**	**2.736**	**544**	**775**	**2.804**	**636**
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990708	1310	14	1.146		21	1.322	
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990729	1300	51	1.708		12	1.079	
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990826	1212	20	1.301		80	1.903	
	194.40	**Delaware River @ PPL Martins Cr Boat Access, PA**	**AVERAGE**		**28**	**1.385**	**24**	**38**	**1.435**	**27**
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990708	1330	DRY			DRY		

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990729	1325	DRY			DRY		
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990805	1520	DRY			DRY		
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990826	1300	DRY			DRY		
	194.32	**Oughoughton Creek @ PPL Martins Creek Plant**	**AVERAGE**							
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990708	1406	940	2.973		680	2.833	
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990729	1255	1	0.000		220	2.342	
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990805	1255						
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990826	1245	1200	3.079		1200	3.079	
	192.90	**Buckhorn Creek @ Hutchinson Rd Bridge**	**AVERAGE**		**714**	**2.017**	**104**	**700**	**2.751**	**564**
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990708	1330	216	2.334		31	1.491	
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990729	1325	47	1.672		5	0.699	
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990805	1520						
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990826	1240	1200	3.079		1200	3.079	
	190.58	**Martins Creek @ Little Creek Rd Bridge off 611**	**AVERAGE**		**488**	**2.362**	**230**	**412**	**1.757**	**57**
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990701	1257	58	1.763		10	1.000	
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990722	1250	24	1.380		17	1.230	
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990819	1220	15	1.176		45	1.653	
	189.20	**Delaware River @ Sandt's Eddy Access, PA**	**AVERAGE**		**32**	**1.440**	**28**	**24**	**1.295**	**20**
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990708	1330	DRY			DRY		
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990729	1325	DRY			DRY		
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990805	1520	DRY			DRY		
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990826	1300	DRY			DRY		
	189.10	**Mud Run @ Rt 611 Bridge**	**AVERAGE**							
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990701	1315	17	1.230		7	0.845	
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990722	1248	4	0.602		5	0.699	
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990819	1310	33	1.519		144	2.158	
	185.00	**Delaware River @ Eddyside Park Swimming Area, PA**	**AVERAGE**		**18**	**1.117**	**13**	**52**	**1.234**	**17**
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990701	1335	740	2.869		84	1.924	
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990722	1235	81	1.908		132	2.121	
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990805	1545						
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990819	1258	940	2.973		188	2.274	
	184.10	**Bushkill Creek @ Rt 611 Bridge, PA**	**AVERAGE**		**587**	**2.584**	**383**	**135**	**2.106**	**128**
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990701	1250	40	1.602		80	1.903	
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990722	1212	1	0.000		7	0.845	
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990805	1227						

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990819	1240	20	1.301		6	0.778	
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990701	1240	20	1.301		7	0.845	
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990722	1220	1	0.000		22	1.342	
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990805	1215						
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990819	1225	43	1.633		38	1.580	
	183.82	**Delaware River @ Easton, Northampton St Bridge (composite)**	**AVERAGE**		**21**	**0.973**	**9**	**27**	**1.216**	**16**
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990701	1216	18	1.255		1	0.000	
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990722	1205	48	1.681		36	1.556	
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990805	1600						
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990819	1245	24	1.380		17	1.230	
	183.66	**Lehigh River @ Rt 611, Easton, PA**	**AVERAGE**		**30**	**1.439**	**27**	**18**	**0.929**	**8**
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990701	1215	13	1.114		340	2.531	
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990722	1150	80	1.903		1560	3.193	
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990805	1150						
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990819	1200	196	2.292		200	2.301	
	182.00	**Lopatcong Creek @ Main St, Phillipsburg**	**AVERAGE**		**96**	**1.770**	**59**	**700**	**2.675**	**473**
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990701	1150	61	1.785		5	0.699	
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990722	1150	14	1.146		26	1.415	
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990819	1200	45	1.653		184	2.265	
	181.00	**Delaware River @ Wy-Hit-Tuk Park Access, PA**	**AVERAGE**		**40**	**1.528**	**34**	**72**	**1.460**	**29**
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990701	1140	880	2.944		164	2.215	
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990722	1120	2400	3.380		100	2.000	
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990805	1125						
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990819	1140	320	2.505		500	2.699	
	177.40	**Pohatcong Creek @ River Road Bridge**	**AVERAGE**		**1200**	**2.943**	**878**	**255**	**2.305**	**202**
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990701	1128	268	2.428		1020	3.009	
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990722	1125	480	2.681		1300	3.114	
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990805	1625						
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990819	1140	44	1.643		50	1.699	
	176.60	**Fry's Run @ Old Bridge off Rt 611**	**AVERAGE**		**264**	**2.251**	**178**	**790**	**2.607**	**405**
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990701	1115	288	2.459		72	1.857	
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990722	1050	1	0.000		5	0.699	
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990805	1100						
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990819	1105	61	1.785		19	1.279	
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990701	1050	12	1.079		11	1.041	

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990722	1100	1	0.000		3	0.477	
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990805	1055						
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990819	1100	75	1.875		160	2.204	
	174.80	**Delaware River @ Riegelsville Bridge (composite)**	**AVERAGE**		**73**	**1.200**	**16**	**45**	**1.260**	**18**
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990701	1030	148	2.170		82	1.914	
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990722	1030	120	2.079		66	1.820	
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990805	1040						
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990819	1045	136	2.134		152	2.182	
	174.60	**Musconetcong River @ River Rd (Rt627) Bridge**	**AVERAGE**		**135**	**2.128**	**134**	**100**	**1.972**	**94**
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990701	1055	11	1.041		5	0.699	
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990722	1105	1	0.000		28	1.447	
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990819	1130	26	1.415		104	2.017	
	173.90	**Delaware River @ Riegelsville, PA Fish Comm Access**	**AVERAGE**		**13**	**0.819**	**7**	**46**	**1.388**	**24**
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990701	1030	132	2.121		49	1.690	
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990722	1050	272	2.435		220	2.342	
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990805	1645						
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990819	1055	52	1.716		108	2.033	
	173.70	**Cooks Creek @ Red Bridge Road**	**AVERAGE**		**152**	**2.090**	**123**	**126**	**2.022**	**105**
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990701	1013	172	2.236		88	1.944	
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990722	1025	40	1.602		200	2.301	
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990819	1035	40	1.602		80	1.903	
	171.80	**Gallows Run @ Rt 611 & 32**	**AVERAGE**		**84**	**1.813**	**65**	**123**	**2.050**	**112**
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990706	1307	17	1.230		1	0.000	
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990727	1330	3	0.477		2	0.301	
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990802	1335						
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990824	1320	4	0.602		3	0.477	
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990706	1300	4	0.602		1	0.000	
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990727	1325	32	1.505		3	0.477	
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990802	1327						
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990824	1325	1	0.000		3	0.477	
	167.70	**Delaware River @ Milford Bridge (composite)**	**AVERAGE**		**10**	**0.736**	**5**	**2**	**0.289**	**2**
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990706	1320	264	2.422		30	1.477	
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990727	1330	9	0.954		43	1.633	
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990802	1345						
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990824	1345	1	0.000		58	1.763	

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
	167.20	**Hakihokake Creek @ Bridge St Bridge, Milford NJ**	**AVERAGE**		**91**	**1.125**	**13**	**44**	**1.625**	**42**
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990706	1336	15	1.176		152	2.182	
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990727	1320	DRY					
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990824	1345	600	2.778		148	2.170	
	165.70	**Harihokake Creek @ Rt 29 Bridge**	**AVERAGE**		**308**	**1.977**	**95**	**150**	**2.176**	**150**
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990706	1220	16	1.204		4	0.602	
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990727	1225	60	1.778		136	2.134	
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990802	1425						
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990824	1245	10	1.000		8	0.903	
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990706	1225	108	2.033		10	1.000	
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990727	1220	268	2.428		124	2.093	
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990802	1415						
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990824	1255	16	1.204		7	0.845	
	164.30	**Delaware River @ Frenchtown Bridge (composite)**	**AVERAGE**		**80**	**1.608**	**41**	**48**	**1.263**	**18**
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990706	1311	8	0.903		1	0.000	
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990727	1240	1	0.000		1	0.000	
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990802	1435	DRY			DRY		
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990824	1330	20	1.301		31	1.491	
	164.10	**Nishisakawick Creek @ Rt 12 Bridge, Frenchtown**	**AVERAGE**		**10**	**0.735**	**5**	**11**	**0.497**	**3**
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990706	1300	DRY			DRY		
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990727	1230	DRY			DRY		
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990824	1315	1	0.000		52	1.716	
	164.00	**Little Nishisakawick Creek @ Rt 29 Bridge**	**AVERAGE**		**1**	**0.000**	**1**	**52**	**1.716**	**52**
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990706	1244	1020	3.009		46	1.663	
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990727	1211	33	1.519		3	0.477	
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990824	1257	10	1.000		25	1.398	
	163.10	**Delaware River @ Kingwood Access, NJ**	**AVERAGE**		**354**	**1.842**	**70**	**25**	**1.179**	**15**
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990706	1230	DRY			DRY		
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990727	1200	DRY			DRY		
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990824	1300	DRY			DRY		
	162.90	**Copper Creek @ Rt 29**	**AVERAGE**							
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990706	1155	45	1.653		42	1.623	
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990727	1200	244	2.387		620	2.792	
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990802	1245	DRY			DRY		
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990824	1220	37	1.568		21	1.322	

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
	161.60	**Tinicum Creek below 1st trib, off Tinicum Cr Rd**	**AVERAGE**		**109**	**1.870**	**74**	**228**	**1.913**	**82**
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990706	1223	DRY			DRY		
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990727	1203	DRY			DRY		
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990824	1240	40	1.602		300	2.477	
	160.50	**Warford Creek @ Rt 29 Bridge**	**AVERAGE**		**40**	**1.602**	**40**	**300**	**2.477**	**300**
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990706	1213	DRY			DRY		
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990727	1156	DRY			DRY		
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990824	1210	8	0.903		144	2.158	
	159.50	**Warsaw Creek @ Rt 29 Bridge**	**AVERAGE**		**8**	**0.903**	**8**	**144**	**2.158**	**144**
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990706	1130	500	2.699		192	2.283	
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990727	1130	6	0.778		1	0.000	
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990802	1245						
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990824	1200	18	1.255		12	1.079	
	157.00	**Tohickon Creek @ Rt 32 Bridge**	**AVERAGE**		**175**	**1.577**	**38**	**68**	**1.121**	**13**
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990706	1105	112	2.049		164	2.215	
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990727	1100	15	1.176		12	1.079	
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990802	1225						
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990824	1000	132	2.121		54	1.732	
	155.60	**Paunacussing Creek @ Rt 32 Bridge**	**AVERAGE**		**86**	**1.782**	**61**	**77**	**1.675**	**47**
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990706	1130	13	1.114		1	0.000	
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990727	1134	3	0.477		1	0.000	
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990802	1500						
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990824	1140	18	1.255		45	1.653	
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990706	1150	17	1.230		6	0.778	
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990727	1122	17	1.230		1	0.000	
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990802	1455						
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990824	1135	20	1.301		22	1.342	
	155.40	**Delaware River @ Bulls Island Footbridge (composite)**	**AVERAGE**		**15**	**1.101**	**13**	**13**	**0.629**	**4**
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990706	1050	304	2.483		200	2.301	
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990727	1045	1	0.000		1	0.000	
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990824	1120	52	1.716		62	1.792	
	154.50	**Cuttalossa Creek @ Cuttalossa Road off Rt 32**	**AVERAGE**		**119**	**1.400**	**25**	**88**	**1.364**	**23**
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990706	1052	188	2.274		58	1.763	
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990727	1050	27	1.431		23	1.362	
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990802	1515	DRY			DRY		

Lower Delaware Monitoring 1999: Bacteria Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990824	1115	160	2.204		24	1.380	
	154.00	**Lockatong Creek @ Rosemont-Raven Rock Rd Bridge**	**AVERAGE**		**125**	**1.970**	**93**	**35**	**1.502**	**32**
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990706	1025	128	2.107		80	1.903	
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990727	1025	200	2.301		80	1.903	
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990802	1525						
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990824	1055	57	1.756		41	1.613	
	152.50	**Wickecheoke Creek @ Rt 29 Bridge**	**AVERAGE**		**128**	**2.055**	**113**	**67**	**1.806**	**64**
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990706	1020	18	1.255		12	1.079	
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990727	1025	2620	3.418		4540	3.657	
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990802	1545						
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990824	1045	304	2.483		17	1.230	
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990706	1017	20	1.301		4	0.602	
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990727	1020	101	2.004		292	2.465	
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990802	1540						
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990824	1057	42	1.623		24	1.380	
	151.90	**Delaware River @ Stockton Bridge (composite)**	**AVERAGE**		**518**	**2.014**	**103**	**815**	**1.736**	**54**
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990706	0951	108	2.033		28	1.447	
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990727	0955	20	1.301		25	1.398	
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990824	1025	104	2.017		49	1.690	
	150.50	**Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury**	**AVERAGE**		**77**	**1.784**	**61**	**34**	**1.512**	**32**
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990706	0950	27	1.431		40	1.602	
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990727	1000	33	1.519		288	2.459	
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990824	1020	126	2.100		20	1.301	
	149.50	**Alexauken Creek @ Rt 29 bridge**	**AVERAGE**		**62**	**1.683**	**48**	**116**	**1.787**	**61**
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990629	1130	14	1.146		2	0.301	
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990720	1228	1	0.000		1	0.000	
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990817	1325	4	0.602		5	0.699	
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990629	1140	11	1.041		6	0.778	
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990720	1220	1	0.000		1	0.000	
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990817	1315	4	0.602		1	0.000	
	148.70	**Delaware River @ New Hope / Lambertville Bridge (composite)**	**AVERAGE**		**6**	**0.565**	**4**	**3**	**0.296**	**2**
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990629	1203	96	1.982		1340	3.127	
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990720	1150	4420	3.645		568	2.754	
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990817	1225	48	1.681		1200	3.079	
	148.60	**Swan Creek @ Union St Bridge, Lambertville**	**AVERAGE**		**1521**	**2.436**	**273**	**1036**	**2.987**	**970**

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990629	1205	328	2.516		27	1.431	
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990720	1207	232	2.365		16	1.204	
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990817	1205	88	1.944		7	0.845	
	148.55	**Delaware River @ Lambertville Boat Access, NJ**	**AVERAGE**		**216**	**2.275**	**188**	**17**	**1.160**	**14**
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990629	1106	252	2.401		268	2.428	
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990720	1120	108	2.033		104	2.017	
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990802	1155						
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990817	1240	34	1.531		37	1.568	
	148.50	**Aquetong Creek @ West Mechanic St Bridge, New Hope**	**AVERAGE**		**131**	**1.989**	**97**	**136**	**2.004**	**101**
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990629	1044	96	1.982		50	1.699	
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990720	1050	88	1.944		264	2.422	
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990817	1145	360	2.556		136	2.134	
	146.30	**Pidcock Creek @ Bowmans Wildflower Preserve Bridge**	**AVERAGE**		**181**	**2.161**	**145**	**150**	**2.085**	**122**
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990629	1142	40	1.602		224	2.350	
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990720	1142	380	2.580		45	1.653	
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990817	1150	212	2.326		224	2.350	
	145.20	**Moore Creek @ Iron Bridge Farm**	**AVERAGE**		**211**	**2.169**	**148**	**164**	**2.118**	**131**
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990629	1018	3700	3.568		500	2.699	
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990720	1030	DRY			DRY		
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990817	1125	960	2.982		720	2.857	
	144.20	**Jericho Creek @ Stony Brook Rd Bridge**	**AVERAGE**		**2330**	**3.275**	**1885**	**610**	**2.778**	**600**
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990629	1114	252	2.401		900	2.954	
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990720	1130	DRY			DRY		
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990817	1132	460	2.663		500	2.699	
	143.20	**Fiddler Creek @ private bridge, Fiddler Creek Rd**	**AVERAGE**		**356**	**2.532**	**340**	**700**	**2.827**	**671**
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990629	1042	53	1.724		6	0.778	
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990720	1110	2	0.301		2	0.301	
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990802	1625						
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990817	1111	48	1.681		16	1.204	
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990629	1055	24	1.380		3	0.477	
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990720	1100	1	0.000		1	0.000	
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990802	1620						
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990817	1105	40	1.602		3	0.477	
	141.80	**Delaware River @ Washington Crossing Bridge (composite)**	**AVERAGE**		**28**	**1.115**	**13**	**5**	**0.540**	**3**
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990629	0927	DRY			DRY		

Lower Delaware Monitoring 1999: Bacteria Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990720	0945	DRY			DRY		
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990817	1110	740	2.869		960	2.982	
	140.60	**Houghs Creek above Taylorsville Rd Bridge**	**AVERAGE**		**740**	**2.869**	**740**	**960**	**2.982**	**960**
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990629	1022	144	2.158		112	2.049	
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990720	1045	1240	3.093		2460	3.391	
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990802	1640	DRY			DRY		
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990817	1046	228	2.358		256	2.408	
	140.50	**Jacobs Creek above Rt 29**	**AVERAGE**		**537**	**2.537**	**344**	**943**	**2.616**	**413**
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990629	1000	184	2.265		136	2.134	
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990720	1020	136	2.134		112	2.049	
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990817	1040	152	2.182		160	2.204	
	139.80	**Dyers Creek @ Rt 32 Bridge**	**AVERAGE**		**157**	**2.193**	**156**	**136**	**2.129**	**135**
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990629	1007	40	1.602		10	1.000	
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990720	1027	92	1.964		28	1.447	
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990817	1030	400	2.602		52	1.716	
	139.20	**Delaware River @ Scudders Falls Access, NJ**	**AVERAGE**		**177**	**2.056**	**114**	**30**	**1.388**	**24**
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990629	0940	12	1.079		8	0.903	
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990720	0955	46	1.663		17	1.230	
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990817	0945	104	2.017		33	1.519	
	138.80	**Delaware River @ Yardley Access, PA**	**AVERAGE**		**54**	**1.586**	**39**	**19**	**1.217**	**16**
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990629	0905	352	2.547		500	2.699	
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990720	0930	4220	3.625		3580	3.554	
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990802	1125						
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990817	1010	240	2.380		172	2.236	
	138.00	**Buck Creek above Main St, Yardley**	**AVERAGE**		**1604**	**2.851**	**709**	**1417**	**2.829**	**675**
DRBCNJ1369	137.10	Delaware River @ Rotary Island, NJ channel	990624	1240						
DRBCPA1369	137.10	Delaware River @ Rotary Island, PA channel	990624	1240						
DRBCPA1370	137.10	Delaware River @ Rotary Island, US point	990624	1240						
	137.10	**Delaware River @ Rotary Island (composite)**	**AVERAGE**							
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990629	0935	44	1.643		4	0.602	
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990720	0945	144	2.158		7	0.845	
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990802	1056						
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990817	0956	88	1.944		33	1.519	
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990629	0915	46	1.663		19	1.279	
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990720	0955	18	1.255		2	0.301	

Lower Delaware Monitoring 1999: Bacteria Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	Fecal Coli col/100ml	LOG FC	Geomean FC	Entero col/100ml	Log Ent	Geomean Ent
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990802	1104						
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990817	1005	100	2.000		128	2.107	
	134.34	**Delaware River @ Calhoun St Bridge (composite)**	**AVERAGE**		**73**	**1.777**	**60**	**32**	**1.109**	**13**
Grand Average		**LOWER DELAWARE GRAND AVERAGE**	**AVERAGE**		**236**	**1.682**	**48**	**225**	**1.589**	**39**

Lower Delaware Monitoring 1999 — Nutrient Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990708	1107			
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990729	1032			
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990805	1425	DRY	DRY	DRY
DRBCNJ0038	211.40	Dunnfield Creek @ Appalachian Trail footbridge	990826	1025			
	211.40	**Dunnfield Creek @ Appalachian Trail footbridge**	**AVERAGE**				
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990708	1110			
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990729	1105			
DRBCPA0038	209.58	Slateford Creek @ National Park Rd Bridge	990826	1110			
	209.58	**Slateford Creek @ National Park Rd Bridge**	**AVERAGE**				
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990708	1330	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990729	1325	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990805	1520	DRY	DRY	DRY
DRBCNJ0042	208.76	Stony Brook @ Access Rd above Rt 80	990826	1300	DRY	DRY	DRY
	208.76	**Stony Brook @ Access Rd above Rt 80**	**AVERAGE**				
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990708	1145			
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990729	1135			
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990805	1450	0.06	0.01	1.30
DRBCNJ0037	207.40	Delaware River @ Columbia-Portland Footbridge, NJ side	990826	1055			
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990708	1135			
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990729	1130			
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990805	1500	0.05	0.08	0.01
DRBCPA0036	207.40	Delaware River @ Columbia-Portland Footbridge, PA side	990826	1100			
	207.40	**Delaware River @ Columbia-Portland Footbridge (composite)**	**AVERAGE**		**0.06**	**0.05**	**0.66**
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990708	1200			
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990729	1155			
DRBCPA0037	207.20	Jacoby Creek @ Rt 611 Bridge, Portland	990826	1125			
	207.20	**Jacoby Creek @ Rt 611 Bridge, Portland**	**AVERAGE**				
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990708	1132			
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990729	1100			
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990805	1410	0.06	0.08	0.03
DRBCNJ0036	207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80	990826	1055			
	207.00	**Paulins Kill Creek @ Rt 46 Bridge nr I-80**	**AVERAGE**		**0.06**	**0.08**	**0.03**
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990708	1159			

Lower Delaware Monitoring 1999 — Nutrient Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990729	1114			
	205.20	Delawanna Creek @ Rt 46 bridge	990805	1400	DRY	DRY	DRY
DRBCNJ0035	205.20	Delawanna Creek @ Rt 46 bridge	990826	1115			
	205.20	**Delawanna Creek @ Rt 46 bridge**	**AVERAGE**				
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990708	1220			
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990729	1210			
DRBCPA0035	203.00	Delaware River @ Driftstone Campground Access, PA	990826	1140			
	203.00	**Delaware River @ Driftstone Campground Access, PA**	**AVERAGE**				
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990708	1235			
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990729	1230			
DRBCPA0034	199.76	Allegheny Creek @ River Rd Bridge	990826	1153			
	199.76	**Allegheny Creek @ River Rd Bridge**	**AVERAGE**				
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990708	1242			
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990729	1142			
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990805	1345	0.08	0.03	0.19
DRBCNJ0034	197.84	Delaware River @ Belvidere-Riverton Bridge, NJ side	990826	1150			
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990708	1230			
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990729	1152			
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990805	1335	0.09	0.10	0.00
DRBCPA0033	197.84	Delaware River @ Belvidere-Riverton Bridge, PA side	990826	1145			
	197.84	**Delaware River @ Belvidere-Riverton Bridge (composite)**	**AVERAGE**		**0.09**	**0.07**	**0.10**
DRBCNJ0032	197.80	Pequest River @ Market St Bridge, Belvidere (spillway)	990708	1256			
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990708	1258			
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990729	1206			
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990805	1315	1.20	0.47	0.06
DRBCNJ0033	197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere	990826	1200			
	197.80	**Pequest River @ Orchard St Bridge (fixed), Belvidere**	**AVERAGE**		**1.20**	**0.47**	**0.06**
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990708	1335			
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990729	1233			
DRBCNJ0031	197.40	Pophandusing Brook @ Spring St Bridge, Belvidere	990826	1220			
	197.40	**Pophandusing Brook @ Spring St Bridge, Belvidere**	**AVERAGE**				
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990708	1310			
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990729	1300			
DRBCPA0032	194.40	Delaware River @ PPL Martins Cr Boat Access, PA	990826	1212			
	194.40	**Delaware River @ PPL Martins Cr Boat Access, PA**	**AVERAGE**				

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990708	1330	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990729	1325	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990805	1520	DRY	DRY	DRY
DRBCPA0040	194.32	Oughoughton Creek @ PPL Martins Creek Plant	990826	1300	DRY	DRY	DRY
	194.32	**Oughoughton Creek @ PPL Martins Creek Plant**	**AVERAGE**				
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990708	1406			
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990729	1255			
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990805	1255	0.43	0.26	0.00
DRBCNJ0030	192.90	Buckhorn Creek @ Hutchinson Rd Bridge	990826	1245			
	192.90	**Buckhorn Creek @ Hutchinson Rd Bridge**	**AVERAGE**		**0.43**	**0.26**	**0.00**
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990708	1330			
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990729	1325			
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990805	1520	2.00	0.68	0.06
DRBCPA0031	190.58	Martins Creek @ Little Creek Rd Bridge off 611	990826	1240			
	190.58	**Martins Creek @ Little Creek Rd Bridge off 611**	**AVERAGE**		**2.00**	**0.68**	**0.06**
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990701	1257			
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990722	1250			
DRBCPA0030	189.20	Delaware River @ Sandt's Eddy Access, PA	990819	1220			
	189.20	**Delaware River @ Sandt's Eddy Access, PA**	**AVERAGE**				
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990708	1330	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990729	1325	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990805	1520	DRY	DRY	DRY
DRBCPA0041	189.10	Mud Run @ Rt 611 Bridge	990826	1300	DRY	DRY	DRY
	189.10	**Mud Run @ Rt 611 Bridge**	**AVERAGE**				
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990701	1315			
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990722	1248			
DRBCPA0029	185.00	Delaware River @ Eddyside Park Swimming Area, PA	990819	1310			
	185.00	**Delaware River @ Eddyside Park Swimming Area, PA**	**AVERAGE**				
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990701	1335			
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990722	1235			
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990805	1545	4.40	0.27	0.29
DRBCPA0028	184.10	Bushkill Creek @ Rt 611 Bridge, PA	990819	1258			
	184.10	**Bushkill Creek @ Rt 611 Bridge, PA**	**AVERAGE**		**4.40**	**0.27**	**0.29**
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990701	1250			
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990722	1212			

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990805	1227	0.18	0.13	0.52
DRBCNJ0029	183.82	Delaware River @ Easton, Northampton St Bridge, NJ side	990819	1240			
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990701	1240			
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990722	1220			
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990805	1215	0.22	0.06	0.00
DRBCPA0027	183.82	Delaware River @ Easton, Northampton St Bridge, PA side	990819	1225			
	183.82	**Delaware River @ Easton, Northampton St Bridge (composite)**	**AVERAGE**		**0.20**	**0.10**	**0.26**
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990701	1216			
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990722	1205			
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990805	1600	2.60	1.35	0.08
DRBCPA0026	183.66	Lehigh River @ Rt 611, Easton, PA	990819	1245			
	183.66	**Lehigh River @ Rt 611, Easton, PA**	**AVERAGE**		**2.60**	**1.35**	**0.08**
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990701	1215			
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990722	1150			
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990805	1150	5.40	0.24	0.00
DRBCNJ0028	182.00	Lopatcong Creek @ Main St, Phillipsburg	990819	1200			
	182.00	**Lopatcong Creek @ Main St, Phillipsburg**	**AVERAGE**		**5.40**	**0.24**	**0.00**
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990701	1150			
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990722	1150			
DRBCPA0025	181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	990819	1200			
	181.00	**Delaware River @ Wy-Hit-Tuk Park Access, PA**	**AVERAGE**				
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990701	1140			
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990722	1120			
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990805	1125	3.60	0.24	0.02
DRBCNJ0027	177.40	Pohatcong Creek @ River Road Bridge	990819	1140			
	177.40	**Pohatcong Creek @ River Road Bridge**	**AVERAGE**		**3.60**	**0.24**	**0.02**
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990701	1128			
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990722	1125			
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990805	1625	0.18	0.34	0.03
DRBCPA0024	176.60	Fry's Run @ Old Bridge off Rt 611	990819	1140			
	176.60	**Fry's Run @ Old Bridge off Rt 611**	**AVERAGE**		**0.18**	**0.34**	**0.03**
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990701	1115			
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990722	1050			
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990805	1100	0.60	0.34	0.04
DRBCNJ0026	174.80	Delaware River @ Riegelsville Bridge, NJ side	990819	1105			

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990701	1050			
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990722	1100			
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990805	1055	0.55	0.41	0.01
DRBCPA0023	174.80	Delaware River @ Riegelsville Bridge, PA side	990819	1100			
	174.80	**Delaware River @ Riegelsville Bridge (composite)**	**AVERAGE**		**0.58**	**0.38**	**0.03**
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990701	1030			
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990722	1030			
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990805	1040	2.60	0.57	0.22
DRBCNJ0025	174.60	Musconetcong River @ River Rd (Rt627) Bridge	990819	1045			
	174.60	**Musconetcong River @ River Rd (Rt627) Bridge**	**AVERAGE**		**2.60**	**0.57**	**0.22**
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990701	1055			
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990722	1105			
DRBCPA0022	173.90	Delaware River @ Riegelsville, PA Fish Comm Access	990819	1130			
	173.90	**Delaware River @ Riegelsville, PA Fish Comm Access**	**AVERAGE**				
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990701	1030			
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990722	1050			
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990805	1645	1.80	0.26	0.05
DRBCPA0021	173.70	Cooks Creek @ Red Bridge Road	990819	1055			
	173.70	**Cooks Creek @ Red Bridge Road**	**AVERAGE**		**1.80**	**0.26**	**0.05**
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990701	1013			
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990722	1025			
DRBCPA0020	171.80	Gallows Run @ Rt 611 & 32	990819	1035			
	171.80	**Gallows Run @ Rt 611 & 32**	**AVERAGE**				
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990706	1307			
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990727	1330			
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990802	1335	0.51	0.32	0.00
DRBCNJ0024	167.70	Delaware River @ Milford Bridge, NJ side	990824	1320			
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990706	1300			
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990727	1325			
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990802	1327	0.38	0.34	0.02
DRBCPA0019	167.70	Delaware River @ Milford Bridge, PA side	990824	1325			
	167.70	**Delaware River @ Milford Bridge (composite)**	**AVERAGE**		**0.45**	**0.33**	**0.01**
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990706	1320			
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990727	1330			
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990802	1345	0.90	0.47	0.80

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0023	167.20	Hakihokake Creek @ Bridge St Bridge, Milford NJ	990824	1345			
	167.20	**Hakihokake Creek @ Bridge St Bridge, Milford NJ**	**AVERAGE**		**0.90**	**0.47**	**0.80**
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990706	1336			
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990727	1320			
DRBCNJ0022	165.70	Harihokake Creek @ Rt 29 Bridge	990824	1345			
	165.70	**Harihokake Creek @ Rt 29 Bridge**	**AVERAGE**				
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990706	1220			
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990727	1225			
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990802	1425	0.33	0.35	0.20
DRBCNJ0021	164.30	Delaware River @ Frenchtown Bridge, NJ side	990824	1245			
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990706	1225			
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990727	1220			
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990802	1415	0.37	0.39	0.77
DRBCPA0018	164.30	Delaware River @ Frenchtown Bridge, PA side	990824	1255			
	164.30	**Delaware River @ Frenchtown Bridge (composite)**	**AVERAGE**		**0.35**	**0.37**	**0.49**
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990706	1311			
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990727	1240			
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990802	1435	DRY	DRY	DRY
DRBCNJ0020	164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown	990824	1330			
	164.10	**Nishisakawick Creek @ Rt 12 Bridge, Frenchtown**	**AVERAGE**				
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990706	1300	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990727	1230	DRY	DRY	DRY
DRBCNJ0019	164.00	Little Nishisakawick Creek @ Rt 29 Bridge	990824	1315			
	164.00	**Little Nishisakawick Creek @ Rt 29 Bridge**	**AVERAGE**				
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990706	1244			
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990727	1211			
DRBCNJ0018	163.10	Delaware River @ Kingwood Access, NJ	990824	1257			
	163.10	**Delaware River @ Kingwood Access, NJ**	**AVERAGE**				
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990706	1230	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990727	1200	DRY	DRY	DRY
DRBCNJ0017	162.90	Copper Creek @ Rt 29	990824	1300	DRY	DRY	DRY
	162.90	**Copper Creek @ Rt 29**	**AVERAGE**				
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990706	1155			
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990727	1200			
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990802	1245			

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCPA0017	161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd	990824	1220			
	161.60	**Tinicum Creek below 1st trib, off Tinicum Cr Rd**	**AVERAGE**				
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990706	1223	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990727	1203	DRY	DRY	DRY
DRBCNJ0016	160.50	Warford Creek @ Rt 29 Bridge	990824	1240			
	160.50	**Warford Creek @ Rt 29 Bridge**	**AVERAGE**				
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990706	1213	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990727	1156	DRY	DRY	DRY
DRBCNJ0015	159.50	Warsaw Creek @ Rt 29 Bridge	990824	1210			
	159.50	**Warsaw Creek @ Rt 29 Bridge**	**AVERAGE**				
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990706	1130			
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990727	1130			
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990802	1245	0.01	0.35	0.84
DRBCPA0015	157.00	Tohickon Creek @ Rt 32 Bridge	990824	1200			
	157.00	**Tohickon Creek @ Rt 32 Bridge**	**AVERAGE**		**0.01**	**0.35**	**0.84**
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990706	1105			
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990727	1100			
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990802	1225	0.34	0.28	0.20
DRBCPA0016	155.60	Paunacussing Creek @ Rt 32 Bridge	990824	1000			
	155.60	**Paunacussing Creek @ Rt 32 Bridge**	**AVERAGE**		**0.34**	**0.28**	**0.20**
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990706	1130			
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990727	1134			
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990802	1500	0.38	0.34	0.06
DRBCNJ0029	155.40	Delaware River @ Bulls Island Footbridge, NJ side	990824	1140			
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990706	1150			
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990727	1122			
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990802	1455	0.38	0.34	1.36
DRBCPA0013	155.40	Delaware River @ Bulls Island Footbridge, PA side	990824	1135			
	155.40	**Delaware River @ Bulls Island Footbridge (composite)**	**AVERAGE**		**0.38**	**0.34**	**0.71**
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990706	1050			
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990727	1045			
DRBCPA0014	154.50	Cuttalossa Creek @ Cuttalossa Road off Rt 32	990824	1120			
	154.50	**Cuttalossa Creek @ Cuttalossa Road off Rt 32**	**AVERAGE**				
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990706	1052			
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990727	1050			

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990802	1515	DRY	DRY	DRY
DRBCNJ0013	154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge	990824	1115			
	154.00	**Lockatong Creek @ Rosemont-Raven Rock Rd Bridge**	**AVERAGE**				
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990706	1025			
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990727	1025			
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990802	1525	0.38	0.28	0.05
DRBCNJ0012	152.50	Wickecheoke Creek @ Rt 29 Bridge	990824	1055			
	152.50	**Wickecheoke Creek @ Rt 29 Bridge**	**AVERAGE**		**0.38**	**0.28**	**0.05**
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990706	1020			
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990727	1025			
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990802	1545	0.39	0.30	0.02
DRBCNJ0011	151.90	Delaware River @ Stockton Bridge, NJ side	990824	1045			
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990706	1017			
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990727	1020			
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990802	1540	0.52	0.39	0.46
DRBCPA0012	151.90	Delaware River @ Stockton Bridge, PA side	990824	1057			
	151.90	**Delaware River @ Stockton Bridge (composite)**	**AVERAGE**		**0.46**	**0.35**	**0.24**
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990706	0951			
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990727	0955			
DRBCPA0011	150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury	990824	1025			
	150.50	**Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury**	**AVERAGE**				
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990706	0950			
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990727	1000			
DRBCNJ0010	149.50	Alexauken Creek @ Rt 29 bridge	990824	1020			
	149.50	**Alexauken Creek @ Rt 29 bridge**	**AVERAGE**				
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990629	1130			
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990720	1228			
DRBCNJ0009	148.70	Delaware River @ New Hope / Lambertville Bridge, NJ side	990817	1325			
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990629	1140			
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990720	1220			
DRBCPA0010	148.70	Delaware River @ New Hope / Lambertville Bridge, PA side	990817	1315			

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Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
	148.70	**Delaware River @ New Hope / Lambertville Bridge (composite)**	**AVERAGE**				
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990629	1203			
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990720	1150			
DRBCNJ0008	148.60	Swan Creek @ Union St Bridge, Lambertville	990817	1225			
	148.60	**Swan Creek @ Union St Bridge, Lambertville**	**AVERAGE**				
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990629	1205			
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990720	1207			
DRBCNJ0007	148.55	Delaware River @ Lambertville Boat Access, NJ	990817	1205			
	148.55	**Delaware River @ Lambertville Boat Access, NJ**	**AVERAGE**				
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990629	1106			
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990720	1120			
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990802	1155	2.04	0.15	0.03
DRBCPA0009	148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope	990817	1240			
	148.50	**Aquetong Creek @ West Mechanic St Bridge, New Hope**	**AVERAGE**		**2.04**	**0.15**	**0.03**
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990629	1044			
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990720	1050			
DRBCPA0008	146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge	990817	1145			
	146.30	**Pidcock Creek @ Bowmans Wildflower Preserve Bridge**	**AVERAGE**				
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990629	1142			
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990720	1142			
DRBCNJ0006	145.20	Moore Creek @ Iron Bridge Farm	990817	1150			
	145.20	**Moore Creek @ Iron Bridge Farm**	**AVERAGE**				
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990629	1018	2.04	.77	
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990720	1030	DRY	DRY	DRY
DRBCPA0007	144.20	Jericho Creek @ Stony Brook Rd Bridge	990817	1125			
	144.20	**Jericho Creek @ Stony Brook Rd Bridge**	**AVERAGE**				
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990629	1114			
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990720	1130	DRY	DRY	DRY
DRBCNJ0005	143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd	990817	1132			
	143.20	**Fiddler Creek @ private bridge, Fiddler Creek Rd**	**AVERAGE**				
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990629	1042			
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990720	1110			
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990802	1625	0.16	0.67	2.00
DRBCNJ0004	141.80	Delaware River @ Washington Crossing Bridge, NJ side	990817	1111			

Lower Delaware Monitoring 1999 — Nutrient Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990629	1055			
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990720	1100			
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990802	1620	0.43	0.50	0.98
DRBCPA0006	141.80	Delaware River @ Washington Crossing Bridge, PA side	990817	1105			
	141.80	**Delaware River @ Washington Crossing Bridge (composite)**	**AVERAGE**		**0.30**	**0.59**	**1.49**
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990629	0927	DRY	DRY	DRY
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990720	0945	DRY	DRY	DRY
DRBCPA0003	140.60	Houghs Creek above Taylorsville Rd Bridge	990817	1110			
	140.60	**Houghs Creek above Taylorsville Rd Bridge**	**AVERAGE**				
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990629	1022			
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990720	1045			
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990802	1640	DRY	DRY	DRY
DRBCNJ0003	140.50	Jacobs Creek above Rt 29	990817	1046			
	140.50	**Jacobs Creek above Rt 29**	**AVERAGE**				
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990629	1000			
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990720	1020			
DRBCPA0005	139.80	Dyers Creek @ Rt 32 Bridge	990817	1040			
	139.80	**Dyers Creek @ Rt 32 Bridge**	**AVERAGE**				
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990629	1007			
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990720	1027			
DRBCNJ0002	139.20	Delaware River @ Scudders Falls Access, NJ	990817	1030			
	139.20	**Delaware River @ Scudders Falls Access, NJ**	**AVERAGE**				
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990629	0940			
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990720	0955			
DRBCPA0004	138.80	Delaware River @ Yardley Access, PA	990817	0945			
	138.80	**Delaware River @ Yardley Access, PA**	**AVERAGE**				
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990629	0905	1.76	0.34	
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990720	0930			
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990802	1125	0.43	0.27	0.00
DRBCPA0002	138.00	Buck Creek above Main St, Yardley	990817	1010			
	138.00	**Buck Creek above Main St, Yardley**	**AVERAGE**		**0.43**	**0.31**	**0.00**
DRBCNJ1369	137.10	Delaware River @ Rotary Island, NJ channel	990624	1240			
DRBCPA1369	137.10	Delaware River @ Rotary Island, PA channel	990624	1240			
DRBCPA1370	137.10	Delaware River @ Rotary Island, US point	990624	1240			
	137.10	**Delaware River @ Rotary Island (composite)**	**AVERAGE**				

Lower Delaware Monitoring 1999 — Nutrient Data

Sampling Site#	RivMile	Site Name	Sample Date	Sample Time	NO2+NO3 as N	PO4 as P	NH4
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990629	0935			
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990720	0945			
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990802	1056	0.47	0.39	0.21
DRBCNJ0001	134.34	Delaware River @ Calhoun St Bridge, NJ side	990817	0956			
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990629	0915			
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990720	0955			
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990802	1104	0.39	0.58	0.02
DRBCPA0001	134.34	Delaware River @ Calhoun St Bridge, PA side	990817	1005			
	134.34	**Delaware River @ Calhoun St Bridge (composite)**	**AVERAGE**		**0.43**	**0.49**	**0.12**
Grand Average		**LOWER DELAWARE GRAND AVERAGE**	**AVERAGE**		**0.94**	**0.34**	**0.30**

Appendix D

Bacteria Monitoring Summary

Average Fecal Coliform and Enterococci,
Delaware River and Tributaries

Including Scenic Rivers Monitoring Program and
Lower Delaware Monitoring Program Data

DRBC/NPS Bacteria Monitoring 1999

Delaware River and Tributaries: Fecal Coliform and Enterococci Averages

RivMile	Site Name	Fecal Coliform	LOG FC	Fecal GEOMEAN	Enterococcus	LOG Ent	GEOEnt
	Delaware River						
332.00	Delaware River East Branch @ Rt 97 Bridge, Hancock, NY	10	0.9008	**8**			
331.90	Delaware River West Branch @ Rt 191 Bridge, Hancock, NY	16	0.7418	**6**			
321.60	Delaware River @ Lordville Bridge, PA-NY (composite)	11	0.8876	**8**			
303.71	Delaware River @ Callicoon Access Area, NY	39	1.4241	**27**			
303.70	Delaware River @ Callicoon Bridge, PA-NY (composite)	6	0.6931	**5**			
298.60	Delaware River @ Cochecton Bridge, PA-NY (composite)	22	1.1622	**15**			
284.00	Delaware River @ Ten Mile River Access, NY	5	0.6931	**5**			
273.50	Delaware River @ Barryville Bridge, PA-NY (composite)	8	0.7518	**6**			
265.70	Delaware River by Pond Eddy, NY	17	1.2304	**17**			
265.50	Delaware River @ Pond Eddy Bridge, PA-NY (composite)	21	1.2708	**19**			
258.40	Delaware River @ Millrift, PA	6	0.7224	**5**			
254.75	Delaware River @ Port Jervis/Matamoras Bridge, PA-NY (comp)	36	1.2494	**18**			
250.20	Delaware River @ Northern DEWA boundary, PA	98	1.8506	**71**			
246.38	Delaware River @ Milford Beach, PA	70	1.6605	**46**			
238.67	Delaware River @ Dingmans Access, PA	104	1.9482	**89**			
228.11	Delaware River @ Bushkill Access, PA	32	1.4336	**27**			
218.36	Delaware River @ Smithfield Access Area, PA	18	1.2128	**16**			
211.58	Delaware River @ Kittatinny Access, NJ	52	1.6534	**45**			
207.40	Delaware River @ Columbia-Portland Footbridge, NJ-PA (comp)	12	0.8243	**7**	9	0.5643	**4**
203.00	Delaware River @ Driftstone Campground Access, PA	17	1.1948	**16**	15	0.8083	**6**
197.84	Delaware River @ Belvidere-Riverton Bridge, NJ-PA (comp)	52	1.3350	**22**	37	1.1698	**15**
194.40	Delaware River @ PPL Martins Cr Boat Access, PA	28	1.3849	**24**	38	1.4348	**27**
189.20	Delaware River @ Sandt's Eddy Access, PA	32	1.4399	**28**	24	1.2946	**20**
185.00	Delaware River @ Eddyside Park Swimming Area, PA	18	1.1170	**13**	52	1.2341	**17**
183.82	Delaware River @ Easton, Northampton St Bridge, NJ-PA (comp)	21	0.9729	**9**	27	1.2156	**16**
181.00	Delaware River @ Wy-Hit-Tuk Park Access, PA	40	1.5282	**34**	72	1.4596	**29**
174.80	Delaware River @ Riegelsville Bridge, NJ-PA (comp)	73	1.1998	**16**	45	1.2596	**18**
173.90	Delaware River @ Riegelsville, PA Fish Comm Access, PA	13	0.8188	**7**	46	1.3877	**24**
167.70	Delaware River @ Milford Bridge, NJ-PA (comp)	10	0.7361	**5**	2	0.2887	**2**
164.30	Delaware River @ Frenchtown Bridge, NJ-PA (comp)	80	1.6080	**41**	48	1.2629	**18**
163.10	Delaware River @ Kingwood Access, NJ	354	1.8424	**70**	25	1.1793	**15**
155.40	Delaware River @ Bulls Island Footbridge, NJ-PA (comp)	15	1.1014	**13**	13	0.6290	**4**
151.90	Delaware River @ Stockton Bridge, NJ-PA (comp)	518	2.0142	**103**	815	1.7357	**54**
148.70	Delaware River @ Lambertville/New Hope Bridge, NJ-PA (comp)	6	0.5653	**4**	3	0.2964	**2**
148.55	Delaware River @ Lambertville Boat Access, NJ	216	2.2753	**188**	17	1.1602	**14**

DRBC/NPS Bacteria Monitoring 1999

Delaware River and Tributaries: Fecal Coliform and Enterococci Averages

RivMile	Site Name	Fecal Coliform	LOG FC	Fecal GEOMEAN	Enterococcus	LOG Ent	GEOEnt
141.80	Delaware River @ Washington Crossing Bridge, NJ-PA (comp)	28	1.1148	**13**	5	0.5396	**3**
139.20	Delaware River @ Scudders Falls Access, NJ	177	2.0560	**114**	30	1.3877	**24**
138.80	Delaware River @ Yardley Access, PA	54	1.5863	**39**	19	1.2174	**16**
134.34	Delaware River @ Calhoun St Bridge, NJ-PA (comp)	73	1.7774	**60**	32	1.1088	**13**
	TRIBUTARIES						
322.50	Equinunk Creek @ Twp Bridge in Equinunk, PA (near mouth)	26	1.3477	**22**			
312.70	Little Equinunk Creek @ Bridge nr Del R Confluence, PA	159	1.7233	**53**			
305.20	Hollister Creek @ Bridge nr Del R confluence, PA	60	1.7782	**60**			
303.60	Callicoon Creek @ Rt 97 Bridge, NY	55	1.6872	**49**			
295.60	Calkins Creek nr Delaware River confluence, PA	23	1.3238	**21**			
284.20	Tenmile River @ Stone Bridge above Rt 97, NY	38	1.2915	**20**			
282.50	Masthope Creek @ RR Bridge, PA (near mouth)	19	1.2118	**16**			
277.70	Lackawaxen River @ Rt 590 Bridge, PA (near mouth)	12	1.0666	**12**			
275.50	Beaver Brook @ Rt 97 Bridge, NY (near mouth)	38	1.5267	**34**			
273.40	Halfway Brook @ Rt 97 Bridge, NY (near mouth)	21	1.3067	**20**			
273.20	Shohola Creek @ RR Bridge, PA (near mouth)	17	1.1338	**14**			
265.60	Mill Brook @ Rt 97 Bridge, NY	18	1.2553	**18**			
261.10	Mongaup River @ Rt 97 Bridge, NY (near mouth)	3	0.4601	**3**			
258.70	Shingle Kill @ Rt 97 Bridge, NY (near mouth)	17	1.0558	**11**			
253.60	Neversink River @ Rt 6 bridge, NY (near mouth)	114	2.0513	**113**			
247.30	Vandermark Creek @ Rt 209 bridge, PA (near mouth)	33	1.4064	**25**			
247.00	Sawkill Creek @ Rt 209 bridge, PA (near mouth)	89	1.8955	**79**			
246.60	Shimers Brook @ Rt 521 bridge, NJ (near mouth)	5	0.6990	**5**			
243.90	Raymondskill Creek @ DWGNRA boundary, PA	31	1.4084	**26**			
226.91	Little Bushkill Cr @ DWGNRA boundary, PA	38	1.5528	**36**			
226.90	Bushkill Creek @ DWGNRA boundary, PA	124	2.0541	**113**			
225.31	Little Flatbrook 200 yds US of Flatbrook (also DRBC/NPS00), NJ	99	1.9765	**95**			
225.30	Big Flatbrook @ DEWA bdy (US LFB confl, DRBC/NPS0), NJ	157	2.0389	**109**			
220.10	Van Campens Brook @ Old Mine Bridge, NJ (near mouth)	52	1.7069	**51**			
214.40	Shawnee Creek @ Shawnee Resort parking lot, PA (at gage)	315	2.4716	**296**			
213.00	Brodhead Creek @ Rt 402 bridge, PA (near mouth)	153	2.0137	**103**			
213.01	Marshalls Creek in Minisink Hills at bridge, PA (near mouth)	70	1.8055	**64**			
212.60	Cherry Cr near Rt 80 bridge, PA (near mouth)	134	2.1267	**134**			
211.40	Dunnfield Creek @ Appalachian Trail footbridge, NJ	140	1.9097	**81**	447	2.1294	**135**
209.58	Slateford Creek @ National Park Rd Bridge, PA	40	1.5310	**34**	312	2.2335	**171**
207.20	Jacoby Creek @ Rt 611 Bridge, Portland, PA	159	2.1765	**150**	567	2.6243	**421**
207.00	Paulins Kill Creek @ Rt 46 Bridge nr I-80, NJ	51	1.6150	**41**	18	1.0818	**12**
205.20	Delawanna Creek @ Rt 46 bridge, NJ	1204	2.6490	**446**	907	2.8920	**780**
199.76	Allegheny Creek @ River Rd Bridge, PA	63	1.2177	**17**	507	2.3406	**219**
197.80	Pequest River @ Orchard St Bridge (fixed), Belvidere, NJ	225	1.9959	**99**	342	1.8908	**78**

DRBC/NPS Bacteria Monitoring 1999

Delaware River and Tributaries: Fecal Coliform and Enterococci Averages

RivMile	Site Name	Fecal Coliform	LOG FC	Fecal GEOMEAN	Enterococcus	LOG Ent	GEOEnt
197.40	Pophandusing Brook @ Spring St Bridge, Belvidere, NJ	647	2.7359	**544**	775	2.8037	**636**
192.90	Buckhorn Creek @ Hutchinson Rd Bridge, NJ	714	2.0174	**104**	700	2.7514	**564**
190.58	Martins Creek @ Little Creek Rd Bridge off 611, PA	488	2.3619	**230**	412	1.7565	**57**
184.10	Bushkill Creek @ Rt 611 Bridge, PA	587	2.5836	**383**	135	2.1063	**128**
183.66	Lehigh River @ Rt 611, Easton, PA	30	1.4389	**27**	18	0.9289	**8**
182.00	Lopatcong Creek @ Main St, Phillipsburg, NJ	96	1.7698	**59**	700	2.6752	**473**
177.40	Pohatcong Creek @ River Road Bridge, NJ	1200	2.9433	**878**	255	2.3046	**202**
176.60	Fry's Run @ Old Bridge off Rt 611, PA	264	2.2509	**178**	790	2.6072	**405**
174.60	Musconetcong River @ River Rd (Rt627) Bridge, NJ	135	2.1277	**134**	100	1.9717	**94**
173.70	Cooks Creek @ Red Bridge Road, PA	152	2.0904	**123**	126	2.0220	**105**
171.80	Gallows Run @ Rt 611 & 32, PA	84	1.8132	**65**	123	2.0495	**112**
167.20	Hakihokake Creek @ Bridge St Bridge, Milford, NJ	91	1.1253	**13**	44	1.6247	**42**
165.70	Harihokake Creek @ Rt 29 Bridge, NJ	308	1.9771	**95**	150	2.1761	**150**
164.10	Nishisakawick Creek @ Rt 12 Bridge, Frenchtown, NJ	10	0.7347	**5**	11	0.4971	**3**
164.00	Little Nishisakawick Creek @ Rt 29 Bridge, NJ	1	0.0000	**1**	52	1.7160	**52**
161.60	Tinicum Creek below 1st trib, off Tinicum Cr Rd, PA	109	1.8696	**74**	228	1.9126	**82**
160.50	Warford Creek @ Rt 29 Bridge, NJ	40	1.6021	**40**	300	2.4771	**300**
159.50	Warsaw Creek @ Rt 29 Bridge, NJ	8	0.9031	**8**	144	2.1584	**144**
157.00	Tohickon Creek @ Rt 32 Bridge, PA	175	1.5775	**38**	68	1.1208	**13**
155.60	Paunacussing Creek @ Rt 32 Bridge, PA	86	1.7820	**61**	77	1.6755	**47**
154.50	Cuttalossa Creek @ Cuttalossa Road bridge off Rt 32, PA	119	1.3996	**25**	88	1.3645	**23**
154.00	Lockatong Creek @ Rosemont-Raven Rock Rd Bridge, NJ	125	1.9699	**93**	35	1.5018	**32**
152.50	Wickecheoke Creek @ Rt 29 Bridge, NJ	128	2.0547	**113**	67	1.8063	**64**
150.50	Primrose Creek @ Phillips Mill Rd off Rt 32, Solebury, PA	77	1.7838	**61**	34	1.5118	**32**
149.50	Alexauken Creek @ Rt 29 bridge, NJ	62	1.6834	**48**	116	1.7875	**61**
148.60	Swan Creek @ Union St Bridge, Lambertville, NJ	1521	2.4363	**273**	1036	2.9869	**970**
148.50	Aquetong Creek @ West Mechanic St Bridge, New Hope, PA	131	1.9888	**97**	136	2.0045	**101**
146.30	Pidcock Creek @ Bowmans Wildflower Preserve Bridge, PA	181	2.1610	**145**	150	2.0847	**122**
145.20	Moore Creek @ Iron Bridge Farm, NJ	211	2.1694	**148**	164	2.1179	**131**
144.20	Jericho Creek @ Stony Brook Rd Bridge, PA	2330	3.2752	**1885**	610	2.7782	**600**
143.20	Fiddler Creek @ private bridge, Fiddler Creek Rd, NJ	356	2.5321	**340**	700	2.8266	**671**

DRBC/NPS Bacteria Monitoring 1999

Delaware River and Tributaries: Fecal Coliform and Enterococci Averages

RivMile	Site Name	Fecal Coliform	LOG FC	Fecal GEOMEAN	Enterococcus	LOG Ent	GEOEnt
140.60	Houghs Creek above Taylorsville Rd Bridge, PA	740	2.8692	**740**	960	2.9823	**960**
140.50	Jacobs Creek above Rt 29, NJ	537	2.5366	**344**	943	2.6161	**413**
139.80	Dyers Creek @ Rt 32 Bridge, PA	157	2.1934	**156**	136	2.1290	**135**
138.00	Buck Creek above Main St, Yardley, PA	1604	2.8507	**709**	1417	2.8295	**675**

Appendix E

Climate and Precipitation Data

Precipitation and Temperature Records During 1999 Bacteria Study
Belvidere, Flemington 5 NNW, and Lambertville, NJ
Allentown, Pennsylvania

date	Belv prec	Belv thi (f)	Belv tlo (f)	Flem prec	Flem thi (f)	Flem tlo (f)	Lamb prec	Lamb thi (f)	Lamb tlo (f)	AlleT Hi	AlleTLo	Alle Prec	Alle Norm Hi	Alle Norm Lo
06/01/1999	0	88	55	0	91	56	0	93	58	86	57	0	77	53
06/02/1999	0	88	57	0	87	64	0	89	57	87	65	0.17	77	54
06/03/1999	0.08	85	66	0.12	89	66	0	89	55	78	61	0.1	77	54
06/04/1999	0.01	79	55	0.001	81	56	0	89	54	76	54	0	78	54
06/05/1999	0	79	48	0	78	47	0	81	51	78	58	0	78	55
06/06/1999	0	79	50	0	82	49	0	82	51	82	50	0	78	55
06/07/1999	0	83	53	0	85	50	0	85	59	94	69	0	79	55
06/08/1999	0.04	96	66	0	96	66	0	98	67	91	65	0	79	56
06/09/1999	0	91	62	0	92	62	0	96	66	86	62	0	79	56
06/10/1999	0	88	61	0	87	61	0	92	60	73	55	0	79	56
06/11/1999	0	74	50	0	79	47	0	78	52	80	49	0	80	57
06/12/1999	0	82	49	0	82	47	0	80	44	79	47	0	80	57
06/13/1999	0	78	48	0.001	78	61	0	78	42	81	67	0	80	57
06/14/1999	0.04	81	67	0.05	81	66	0.41	80	61	81	66	0.23	81	57
06/15/1999	0.15	79	58	0.14	83	58	0.43	85	43	80	57	0	81	58
06/16/1999	0	81	52	0	81	52	0	84	41	74	51	0	81	58
06/17/1999	0	82	52	0.01	77	54	0.08	77	40	65	55	0.3	81	58
06/18/1999	0.23	63	54	0.13	65	55	0.07	69	39	75	52	0.02	82	59
06/19/1999	0	76	48	0	76	46	0	78	38	79	46	0	82	59
06/20/1999	0	80	49	0	82	51	0	83	53	75	55	0	82	59
06/21/1999	0.19	77	56	0.19	77	56	0.18	77	55	70	55	0.1	82	59
06/22/1999	0.05	70	55	0.01	70	52	0	81	50	84	52	0	82	59
06/23/1999	0	85	55	0	87	56	0	86	52	87	52	0	83	60
06/24/1999	0	87	54	0	91	55	0	91	52	86	52	0	83	60
06/25/1999	0	86	56	0	88	54	0	81	51	84	54	0	83	60
06/26/1999	0	82	57	0	86	59	0	87	64	92	65	0	83	60
06/27/1999	0	92	66	0	92	68	0	93	68	92	66	0	84	61
06/28/1999	0	91	68	0	96	68	0	94	73	89	74	0	84	61
06/29/1999	0.22	88	74	0.07	93	72	0.01	90	72	91	71	0.05	84	61
06/30/1999	0.03	89	65	0.001	92	65	0.04	96	67	77	63	0	84	61
07/01/1999	0	80	64	0.001	82	66	0	82	66	84	65	0	84	61
07/02/1999	0.05	80	68	0.1	85	69	0	85	69	86	71	0	84	61
07/03/1999	0	85	69	0.08	87	68	1.47	88	68	93	68	0	84	62
07/04/1999	0	91	71	0	93	73	0	95	71	98	75	0	85	62
07/05/1999	0	98	78	0	99	81	0	100	76	98	76	0	85	62
07/06/1999	0	101	76	0	100	74	0	102	74	100	74	0	85	62
07/07/1999	0	98	73	0	102	75	0	101	74	90	67	0	85	62
07/08/1999	0	92	59	0	92	58	0	94	60	86	58	0	85	62
07/09/1999	0	86	61	0	87	57	0	96	49	93	60	0	85	62
07/10/1999	0.07	90	63	0.05	95	64	0	94	59	85	60	0.11	85	63
07/11/1999	0	85	52	0.01	85	54	0	84	54	81	51	0	85	63
07/12/1999	0	83	51	0	82	51	0	85	53	77	50	0	85	63
07/13/1999	0	77	53	0	81	57	0	81	46	83	56	0	86	63
07/14/1999	0	84	55	0	86	55	0	84	57	79	57	0	86	63
07/15/1999	0	81	53	0	82	51	0	81	45	91	52	0	86	63
07/16/1999	0	90	54	0	92	55	0	92	48	97	64	0	86	63
07/17/1999	0	97	68	0	100	69	0	98	61	99	67	0	86	63
07/18/1999	0	97	68	0.59	103	69	0	100	63	98	71	0	86	63
07/19/1999	0	96	68	0	99	69	0	103	64	96	67	0	86	63
07/20/1999	0.03	94	68	0.43	97	69	0.05	101	64	89	67	0.12	86	63
07/21/1999	0	90	68	0	89	69	0	88	60	85	68	0	86	63
07/22/1999	0.09	83	69	0.19	84	67	0	88	61	87	69	0.09	86	63
07/23/1999	0.1	85	70	0.03	86	68	0.02	90	62	97	68	0.01	86	63
07/24/1999	0	98	70	0	97	69	0	99	63	95	69	0	86	63
07/25/1999	0	94	69	0	95	71	0	98	64	95	68	0	86	63
07/26/1999	0	97	66	0	96	67	0	100	60	90	65	0	86	63
07/27/1999	0	92	65	0	92	64	0	95	57	96	63	0	85	63
07/28/1999	0	98	64	0	96	63	0	100	59	96	65	0	85	63
07/29/1999	0.01	95	63	0	96	64	0	99	59	93	65	0	85	63

Precipitation and Temperature Records During 1999 Bacteria Study
Belvidere, Flemington 5 NNW, and Lambertville, NJ
Allentown, Pennsylvania

date	Belv prec	Belv thi (f)	Belv tlo (f)	Flem prec	Flem thi (f)	Flem tlo (f)	Lamb prec	Lamb thi (f)	Lamb tlo (f)	AlleT Hi	AlleTLo	Alle Prec	Alle Norm Hi	Alle Norm Lo
07/30/1999	0.68	95	63	0.001	95	63	0	98	65	95	62	0	85	63
07/31/1999	0.001	95	64	0	98	70	0	98	57	99	66	0	85	63
08/01/1999	0	97	69	0.001	101	75	0	100	55	97	75	0	85	63
08/02/1999	0	98	63	0	98	67	0	99	54	90	63	0	85	63
08/03/1999	0	91	59	0	91	64	0	95	58	87	57	0	85	63
08/04/1999	0	89	57	0	88	56	0	92	55	91	56	0	85	62
08/05/1999	0	89	57	0	93	57	0	93	58	89	61	0	85	62
08/06/1999	0	90	56	0.24	90	56	0	95	54	88	56	0	85	62
08/07/1999	0	89	57	0	89	57	0	92	48	90	60	0	84	62
08/08/1999	0.01	91	58	0.01	90	59	0.02	92	43	80	70	0.29	84	62
08/09/1999	0.15	80	60	0.27	79	63	0.54	83	47	79	60	0	84	62
08/10/1999	0	82	52	0	80	51	0	83	46	81	51	0	84	62
08/11/1999	0.03	81	51	0.001	83	59	0.001	86	45	90	60	0	84	62
08/12/1999	0	89	60	0	92	61	0	94	44	93	62	0	84	62
08/13/1999	0	92	67	0	96	69	0	95	62	92	66	0.01	84	61
08/14/1999	1.25	90	67	1.66	94	70	3.12	93	43	91	70	0.24	83	61
08/15/1999	0.23	87	67	0.04	91	69	0.35	92	68	81	67	0	83	61
08/16/1999	0.01	82	60	0.001	81	64	0	85	65	86	60	0	83	61
08/17/1999	0	87	61	0	88	65	0	90	64	91	62	0	83	61
08/18/1999	0	89	65	0	91	66	0	92	64	84	65	0	83	61
08/19/1999	0	87	60	0	86	62	0	90	61	84	59	0	83	60
08/20/1999	0	86	61	0	87	64	0	86	60	70	60	0.26	82	60
08/21/1999	0.42	70	57	0.31	74	58	0.73	73	58	65	59	0	82	60
08/22/1999	0.04	63	57	0.04	64	57	0	67	57	72	56	0	82	60
08/23/1999	0	71	54	0	70	52	0	76	54	84	51	0	82	60
08/24/1999	0	86	54	0	85	56	0	87	60	84	51	0	82	60
08/25/1999	0	83	59	0	87	59	0	85	60	83	60	0	82	59
08/26/1999	1.55	84	60	1.55	87	59	2.23	86	59	76	65	1.19	81	59
08/27/1999	0.27	74	63	0.43	83	66	1.06	87	59	81	65	0	81	59
08/28/1999	0	81	64	0	83	64	0	83	58	86	63	0	81	59
08/29/1999	0	90	64	0	87	65	0	90	65	84	58	0	81	59
08/30/1999	0	90	53	0	86	52	0	90	52	72	51	0	80	58
08/31/1999	0	71	52	0	70	54	0	71	51	76	51	0	80	58