Amendment to the
Atlantic County Water Quality Management Plan,
Cape May County Water Quality Management Plan, Lower Raritan/Middlesex County Water Quality Management Plan, Monmouth County Water Quality Management Plan,
Ocean County Water Quality Management Plan and
Tri-County Water Quality Management Plan

Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region

Watershed Management Area 12
(Deal Lake, Lake Takanassee, and Hooks Creek Lake)
Watershed Management Area 13
(Bamber Lake, Carasaljo Lake, Deer Head Lake, Holiday Lake, Lake Barnegat, Manahawkin Lake, Ocean County Park Lake, Ocean Twp Bathing Beach, and Pine Lake)
Watershed Management Area 14
(Hammonton Lake)
Watershed Management Area 15
(Braddock Lake, Buena Vista Campground, and Cushman Lake)
Watershed Management Area 16
(Lake Laurie and Ludlams Pond)

Proposed: July 16, 2007
Established: September 21, 2007
Approved: September 28, 2007
Adopted: October 19, 2009

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With assistance provided by:
United States Environmental Protection Agency, Region 2

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EXECUTIVE SUMMARY

In accordance with Section 305(b) and 303(d) of the Federal Clean Water Act (CWA), the State of New Jersey, Department of Environmental Protection (Department) is required to assess the overall water quality of the State's waters and identify those waterbodies with a water quality impairment for which TMDLs may be necessary. A TMDL is developed to identify all the contributors of a pollutant of concern and the load reductions necessary to meet the Surface Water Quality Standards (SWQS) relative to that pollutant. The Department fulfills its assessment obligation under the CWA through the Integrated Water Quality Monitoring and Assessment Report, which includes the Integrated List of Waterbodies, issued biennially. On October 4, 2004 the Department adopted the *2004 Integrated List of Waterbodies* as an amendment to the Statewide Water Quality Management Plan (36 NJR 4543(a)), as part of the Department's continuing planning process pursuant to the Water Quality Planning Act at N.J.S.A. 58:11A-7 and the Water Quality Management Planning rules at N.J.A.C. 7:15-6.4(a). The *2004 Integrated List of Waterbodies* identifies eighteen lakes as impaired with respect to pathogens in the Atlantic Coastal Water Region.

The Department has recently adopted the *2006 Integrated Water Quality Monitoring and Assessment Report*, including the *2006 Integrated List of Waterbodies*, which identifies impairments based on HUC 14 Assessment Units rather than stream segments associated with discrete monitoring locations. This change in assessment methodology allows establishment of a stable base of assessment units for which the attainment or non-attainment status of all designated uses within each subwatershed or assessment unit will be identified. In addition, lakes are assessed and listed separately when impaired. The *2006 Integrated List of Waterbodies* identifies eighteen lakes that are impaired with respect to pathogens in the Atlantic Coastal Water Region. A lake is determined to be impaired if water quality data exceeds the SWQS or, when a bathing beach is present, if it does not fully support primary contact recreation as evidenced by beach closings in accordance with Health Department standards. TMDLs are adopted for the impaired lakes listed in Table 1.

Table 1. Lakes in the Atlantic Coastal Water Region impaired for pathogens for which TMDLs are adopted.

TMDL Number	WMA	Lake Assessment Unit Name	County(s)*
1	12	Hooks Creek Lake	Middlesex
2	12	Deal Lake+	Monmouth
3	12	Lake Takanassee+	Monmouth
4	13	Carasaljo Lake	Ocean
5	13	Bamber Lake	Ocean
6	13	Deer Head Lake	Ocean

TMDL Number	WMA	Lake Assessment Unit Name	County(s)*
7	13	Holiday Lake	Ocean
8	13	Lake Barnegat	Ocean
9	13	Manahawkin Lake	Ocean
10	13	Ocean County Park Lake	Ocean
11	13	Ocean Twp Bathing Beach	Ocean
12	13	Pine Lake	Ocean
13	14	Hammonton Lake	Atlantic
14	15	Braddock Lake	Atlantic
15	15	Buena Vista CG	Atlantic
16	15	Cushman Lake	Atlantic
17	16	Lake Laurie	Cape May
18	16	Ludlams Pond	Cape May

*The drainage area/lakeshed for each lake may encompass municipalities beyond the identified County in which the lake is located.
+Lake does not have a bathing beach

Nonpoint and stormwater point sources are the primary sources of fecal coliform loads to the impaired lakes. Source loads were estimated for land uses in each watershed using the Watershed Treatment Model (WTM) (WTM, 2001). The WTM model is a series of spreadsheets that quantifies the loading of pathogen indicators based on land use distribution, stream network length in the watershed, and annual rainfall. Traditional point sources, i.e., treatment facilities that have a sanitary waste component, were considered de minimus due to the use of effective disinfection practices by these facilities. TMDLs were developed based on an analysis of the existing pathogen indicator data compared to Health Department indicator criteria and the loading capacity has been allocated among the point and nonpoint sources.

This report establishes eighteen TMDLs that have been adopted as amendments to the appropriate areawide water quality management plan in accordance with N.J.A.C. 7:15-3.4(g). This report was developed consistent with EPA's May 20, 2002 guidance document entitled: "Guidelines for Reviewing TMDLs under Existing Regulations issued in 1992," (Sutfin, 2002) which describes the statutory and regulatory requirements for approvable TMDLs. These TMDLs were approved by EPA on September 28, 2007, and were adopted on October 19, 2009 as amendments to the Atlantic County, Cape May County, Lower

Raritan/Middlesex County, Monmouth County, Ocean County, and Tri-County Water Quality Management Plans in accordance with N.J.A.C. 7:15-3.4 (g).

1.0 INTRODUCTION

In accordance with Section 303(d) of the Federal Clean Water Act (CWA) (33 U.S.C. 1315(B)), the State of New Jersey, Department of Environmental Protection (Department) is required biennially to prepare and submit to the EPA a report that identifies waters that do not meet or are not expected to meet water quality standards after implementation of technology-based effluent limitations or other required controls. This report is commonly referred to as the 303(d) List. In accordance with Section 305(b) of the CWA, the Department is also required biennially to prepare and submit to the EPA a report addressing the overall water quality of the State's waters. This report is commonly referred to as the 305(b) Report or the Water Quality Inventory Report. The Integrated Water Quality Monitoring and Assessment Report combines these two assessments and assigns waterbodies to one of five sublists on the Integrated List of Waterbodies. Sublists 1 through 4 include waterbodies that are generally unimpaired (Sublist 1 and 2), have limited assessment or data availability (Sublist 3), are impaired due to pollution rather than pollutants, or have had a TMDL or other enforceable management measure approved by EPA (Sublist 4). Sublist 5 constitutes the traditional 303(d) list for waters impaired or threatened by one or more pollutants, for which a TMDL may be required.

In the New Jersey 2004 *Integrated Water Quality Monitoring and Assessment Report* the water quality impairments were identified by segment name and pollutant(s) or non-attained designated use responsible for the finding that the segment was impaired. Each segment was assessed using the data from one or more discrete monitoring locations that were determined to be representative of the water quality in that segment. This impaired segment delineation method was changed in 2006.

The *New Jersey 2006 Integrated Water Quality Monitoring and Assessment Report* now identifies impairments based on designated use attainment and then lists the parameters responsible for the non-attainment of the designated use. The assessments are conducted for each of the seven categories of designated use, which include aquatic life, recreational use (primary and secondary contact), drinking water, fish consumption, shellfish harvesting (if applicable), agricultural water supply use and industrial water supply use. In addition, lakes are assessed and listed separately if impaired. In the Atlantic Coastal Water Region, the *2006 Integrated List of Waterbodies* currently identifies eighteen lakes as impaired for pathogens. Sixteen of these lakes have bathing beaches that do not fully support primary contact recreation as evidenced by beach closings and water quality data that demonstrate exceedance of the water quality criterion that triggers closings. Deal Lake and Lake Takanassee do not have bathing beaches, therefore impairment is based on exceedance of the SWQS .

A TMDL represents the assimilative or carrying capacity of a waterbody, taking into consideration point and nonpoint sources of pollutants of concern, natural background, and surface water withdrawals. A TMDL quantifies the amount of a pollutant a waterbody can assimilate and still conform to applicable water quality standards and support designated uses. The TMDL or loading capacity is allocated to known point and nonpoint sources in the form of waste load allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Recent EPA guidance (Sutfin, 2002) describes the statutory and regulatory requirements for approvable TMDLs, as well as additional information generally needed for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations. These TMDLs address the following required items in the May 20, 2002 guideline document:

1. Identification of waterbody(ies), pollutant of concern, pollutant sources and priority ranking.
2. Description of applicable water quality standards and numeric water quality target(s).
3. Loading capacity – linking water quality and pollutant sources.
4. Load allocations.
5. Wasteload allocations.
6. Margin of safety.
7. Seasonal variation.
8. Reasonable assurances.
9. Monitoring plan to track TMDL effectiveness.
10. Implementation (USEPA is not required to and does not approve TMDL implementation plans).
11. Public Participation.

This report establishes eighteen TMDLs for pathogens to address the impaired lakes in the Atlantic Water Region. All of the impaired lakes were listed for fecal coliform and assigned a High priority on the *2004 Integrated List of Waterbodies* and a High priority ranking on the *2006 Integrated List of Waterbodies* Sublist 5. These TMDLs include management approaches to reduce pathogen contributions from various sources in order to attain applicable surface water quality standards and fully support the designated primary contact recreation use. These TMDLs affect the drainage areas of the impaired lakes due to the fact that the implementation measures must be applied to the contributing drainage areas, not just the impaired lakes. Following approval of the TMDLs by EPA, pathogens were removed as a basis of impairment in the next Integrated List. In addition to the pathogen impairments, Carasaljo Lake, Hammonton Lake, and Lake Takanassee were listed for mercury, unknown pollutants, and phosphorus, respectively, on the *2006 Integrated List*. These pollutants will be addressed in future TMDL efforts. Total phosphorus TMDLs were approved by EPA in 2003 for Deal Lake, Hook's Creek Lake and Hammonton Lake.

2.0 POLLUTANT OF CONCERN AND AREA OF INTEREST

The pollutant of concern for these TMDLs is pathogens. Standards are established in terms of indicator organisms which, when present in excess of the standard, suggest that the waterbody is not suitable for primary contact recreation because of an elevated risk of disease. New Jersey Surface Water Quality Standards (SWQS) include pathogen indicator criteria for the assessment of the recreational use (primary and secondary contact recreation) for all waterbodies. However, for lakes with bathing beaches, the New Jersey Health Department Standards N.J.A.C. 8:26-7.18 establish the basis for beach closings. These standards are more stringent than the Surface Water Quality Standards. As a result, the Health Department Standards will serve as the water quality target for these TMDLs. The Health Department Standards and SWQS are summarized as follows:

> **As stated in N.J.A.C. 8:26-7.18 Microbiological water quality standards for bathing beaches:**
>
> The multiple-tube fermentation technique for fecal coliform shall be conducted in accordance with the procedures set for in Method 9222D Fecal Coliform Membrane Filter Procedure or Method 9221E.2. Fecal Coliform MPN Procedure (A-1 medium) found in the 19th edition of "Standard Methods for the Examination of Water and Wastewater." American Public Health Association, incorporated herein by reference, as amended and supplemented. The estimated fecal coliform concentrations shall not exceed 200 fecal coliform per 100 milliliters.

As stated in N.J.A.C. 7:9B-1.14(d) of the New Jersey Surface Water Quality Standards and 7:9B-1.14(b) 2ii, Fresh Water 2 (FW2) and Pinelands (PL) waters:

1. Bacterial quality (Counts/100 ml)

    ii. Primary Contact Recreation:

        (2) E. Coli levels shall not exceed a geometric mean of 126/100 ml or a single sample maximum of 235/100 ml.

The lakes assessed as impaired based on water quality data and for which TMDLs have been developed are identified in Table 2 and depicted in Figures 1 and 2.

Table 2. Impaired Waterbodies as identified on the *2004 Integrated List of Waterbodies* and the *2006 Integrated List* for which Pathogen TMDLs are adopted.

TMDL Number	WMA	Lake Assessment Unit Name	Lake Assessment Unit ID	2004 Status	2006 Status	County(s)*	Proposed Action
1	12	Hooks Creek Lake	Hooks Creek Lake-12	Sublist 5	Sublist 5	Middlesex	Adopt TMDL
2	12	Deal Lake+	Deal Lake-12	Sublist 5	Sublist 5	Monmouth	Adopt TMDL
3	12	Lake Takanassee+	Lake Takanassee-12	Sublist 5	Sublist 5	Monmouth	Adopt TMDL
4	13	Carasaljo Lake	Carasaljo Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
5	13	Bamber Lake	Bamber Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
6	13	Deer Head Lake	Deer Head Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
7	13	Holiday Lake	Holiday Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
8	13	Lake Barnegat	Lake Barnegat-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
9	13	Manahawkin Lake	Manahawkin Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
10	13	Ocean County Park Lake	Ocean County Park Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
11	13	Ocean Twp Bathing Beach	Ocean Twp Bathing Beach-13	Sublist 5 (as Waretown Creek/Barnegat Bay South)	Sublist 5	Ocean	Adopt TMDL
12	13	Pine Lake	Pine Lake-13	Sublist 5	Sublist 5	Ocean	Adopt TMDL
13	14	Hammonton Lake	Hammonton Lake-14	Sublist 5	Sublist 5	Atlantic	Adopt TMDL
14	15	Buena Vista CG	Buena Vista CG-15	Sublist 5	Sublist 5	Atlantic	Adopt TMDL
15	15	Braddock Lake	Braddock Lake-15	Sublist 5	Sublist 5	Atlantic	Adopt TMDL
16	15	Cushman Lake	Cushman Lake-15	Sublist 5	Sublist 5	Atlantic	Adopt TMDL
17	16	Lake Laurie	Lake Laurie-16	Sublist 5	Sublist 5	Cape May	Adopt TMDL
18	16	Ludlams Pond	Ludlams Pond-16	Sublist 5	Sublist 5	Cape May	Adopt TMDL

*The drainage area/lakeshed for each lake may encompass municipalities beyond the identified County in which the lake is located.

+ Lake does not have a bathing beach

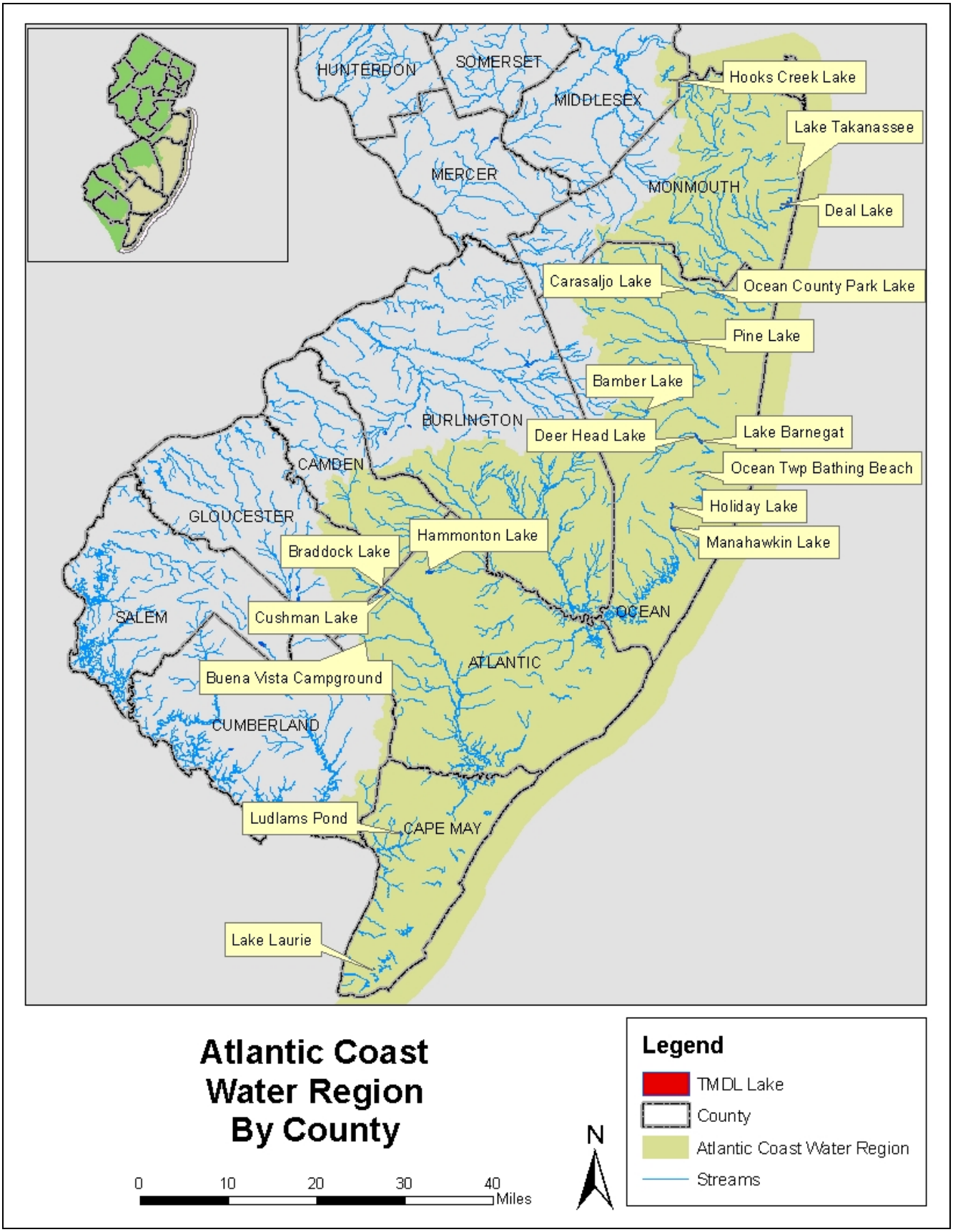

Figure 1. Pathogen impaired lakes in the Atlantic Coastal Water Region by county.

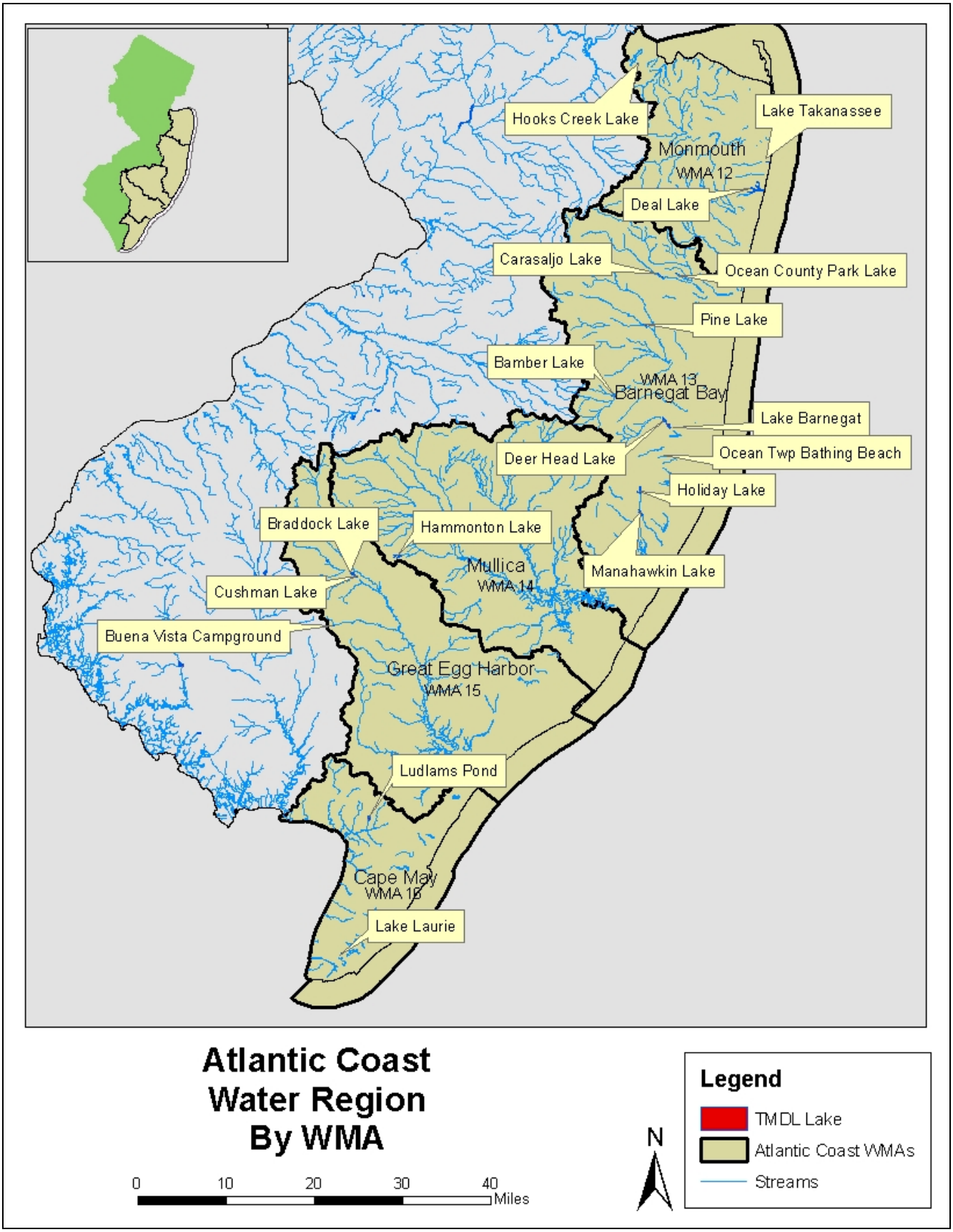

Figure 2. Pathogen impaired lakes in the Atlantic Coastal Water Region by WMA.

Bamber Lake, Braddock Lake, Buena Vista Campground, Cushman Lake, Hammonton Lake, Holiday Lake and Ludlams Pond are classified as Pinelands (PL). All other impaired lakes addressed in this document are classified as Fresh Water 2 (FW2), Non-Trout (NT).

In all PL waters the designated uses are:

1. Cranberry bog water supply and other agricultural uses;
2. Maintenance, migration and propagation of the natural and established biota indigenous to this unique ecological system;
3. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection;
4. Primary and secondary contact recreation; and
5. Any other reasonable uses.

In all FW2 waters, the designated uses are (NJAC 7:9B-1.12):

1. Maintenance, migration and propagation of the natural and established aquatic biota;
2. Primary and secondary contact recreation;
3. Industrial and agricultural water supply;
4. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and
5. Any other reasonable uses.

3.0 SOURCE ASSESSMENT

A source assessment was conducted to identify and characterize potential pathogen sources that may be impacting water quality in the listed waters. Both point and nonpoint sources were considered in TMDL development. Source assessment also includes the determination of the relative contribution of the primary bacteria sources to facilitate proper management responses through TMDL implementation. A variety of information was used to characterize possible pathogen sources including land use information gathered for each watershed, point source information, literature sources, and other available data.

3.2 Assessment of Point Sources

For TMDL development purposes, point sources include domestic and industrial wastewater treatment plants that discharge to surface waters, as well as surface water discharges of

stormwater subject to regulation under the National Pollutant Discharge Elimination System (NPDES). This includes facilities with individual or general industrial stormwater permits, Tier A municipalities, and federal, interstate agency, state, and county facilities regulated under the New Jersey Pollutant Discharge Elimination System (NJPDES) municipal stormwater permitting program. Tier A municipalities are generally located within the more densely populated regions of the state or along the coast. These municipalities meet the population size requirements of EPA's Municipal Separate Storm Sewer System (MS4) program for regulating urban stormwater discharges. Stormwater point sources, like stormwater nonpoint sources, derive their pollutant loads from runoff from land surfaces and load reduction is accomplished through the use of best management practices (BMPs). The distinction is that stormwater point sources are regulated under the Clean Water Act (under the MS4 program). Stormwater point sources will be addressed through the management practices required through the MS4 permits.

There are no current NJPDES wastewater permits within the Atlantic Coastal Water Region. Tier A municipalities that directly discharge to the pathogen impaired lakes in the Atlantic Coastal Water Region are identified in Appendix B. Stormwater loads from Tier A MS4 systems are point sources that can be significant. These loads were estimated using the watershed loading methods described in the nonpoint source section, as they will be addressed through BMPs.

3.3 Assessment of Nonpoint Sources

Nonpoint sources that may affect lakes include stormwater discharges that are not subject to regulation under the Clean Water Act, including Tier B municipalities, direct stormwater runoff from land surfaces, as well as malfunctioning sewage conveyance systems, failing or inappropriately located septic systems, and direct contributions from wildlife, livestock and pets. Tier B municipalities are generally located in more rural, non-coastal regions of the state.

Watershed Treatment Model (WTM), a steady-state spreadsheet model, was chosen to estimate nonpoint source bacteria loads for these TMDLs. WTM simulates loadings generated by watershed washoff processes. The WTM model was selected because it encompasses local rainfall data and stream length information to better tailor load estimates. In addition, it has been successfully applied in previous coastal TMDL studies, including the development of pathogen TMDLs for impaired shellfish waterbodies in New Jersey. The goal of applying WTM is to characterize all the point and nonpoint sources, as available data allows, in the existing system and to determine their relative contributions to the waterbody of interest. The loading values thus derived serve as the reference point from which reductions are made to meet TMDL targets.

The WTM model is a series of spreadsheets that quantifies the loading of pathogen indicators based on land use distribution, stream network length in the watershed, and annual rainfall. The model is designed as a planning level tool for watersheds that do not have sufficient data for complex modeling applications. Pathogen concentrations in runoff and receiving waters

are highly variable due to many factors, therefore average annual land use loads derived using the WTM model are gross estimates. Although the WTM model has several tiers of data specificity, loading estimates can be calculated with simple land use data, as they were for these lake TMDLs. Land use loads are calculated on an annual basis by using a series of coefficients for runoff volume and pathogen loading derived from scientific literature. General land use categories are assigned either a coefficient that is then multiplied by an annual runoff volume to calculate an annual load (e.g., urban land uses) or an annual unit area load that is applied as a function of land use (e.g., rural land uses). These coefficients are presented in Table 3 and discussed in the WTM user manual (Caraco, 2001). According to the WTM user manual, the urban loading coefficient was based on the median urban runoff value derived from Nationwide Urban Runoff Program (NURP) monitoring data (Pitt, 1998). Loading values for rural land uses were taken from Horner et. al., 1994. Note that barren land is not represented in the WTM model, therefore it was assumed that the forest loading value was reasonable for this land use type.

Table 3. Default WTM land use categories and loading variables.

WTM Land Use	Corresponding New Jersey Land Uses	Average % Impervious Cover	Fecal Coliform Conc. (MPN/100 ml) or Annual Load (billion/acre)
Low Density Residential	Low Density Residential, Rural Residential, Recreational Land, Athletic Fields	19	20,000
Medium Density Residential	Medium Density Residential, Mixed Residential, Mixed Urban or Built-Up, Other Urban or Built-Up, Military Reservations, No Longer Military	35	20,000
High Density Residential	High Density Residential	56	20,000
Commercial	Commercial Services	71	20,000
Roadway	Transportation/Communication/Utilities	39	20,000
Industrial	Industrial, Industrial/Commercial	78	20,000
Forest	Forest/Wetland	0	Load: 12 billion/acre
Rural	Agriculture	0	Load: 39 billion/acre
Barren (replaced "Vacant Lots" category in WTM)	Barren	2	Load: 12 billion/acre (estimated)

The watershed for each TMDL waterbody was delineated using the Hydrologic Unit Coverage (HUC-14 digit) developed by NJDEP, digital elevation model (DEM) data, the National Hydrography Dataset (NHD) stream coverage for New Jersey, and ArcHydro, a watershed delineation tool available as an extension for the ArcGIS geospatial mapping software suite. Land use data for each watershed was obtained from the 2002 land use coverage developed for New Jersey's WMAs. Land use categories were consolidated into broader groups for use in estimating land-based loads using the WTM model and for presenting the loading results. The percent impervious information for each land use category was derived from the percent impervious information in the Department's GIS land use coverage, averaged across similar land uses. The bacterial loads for urban areas in each watershed were calculated based on the default fecal coliform concentration literature value for urban

land uses, the average percent impervious cover, and the annual runoff volume calculated by the WTM model. Agricultural, forest, and barren land use loads were calculated based on the specific loading rate for each category. The literature loading rate for forested land was applied to wetland areas to estimate a wetland land use load. Waterways were not included in loading calculations based on WTM model assumptions.

Direct contributions from illicit discharges, livestock, pets, and wildlife (e.g. seagulls, geese, and other waterfowl in particular) were not estimated based on the lack of site-specific information needed to represent these sources. Population estimates, bacteria production rates, and other information would be needed to estimate these sources. Bacteria may also be present in the sediment in some areas, as a result of contamination from stormwater, failing septic systems, malfunctioning sewer systems, agricultural runoff, and other sources. For these TMDLs, the loads contributed by wildlife, sediment, and the other sources were assumed to be included in the land use loading coefficients.

The drainage area for each impaired lake was delineated and land uses assessed as presented in Table 4. Maps of the watershed land use distributions are presented in Appendix C.

Table 4. Land use area distributions for impaired watersheds in the Atlantic Coastal Water region.

WMA	Lake Assessment Unit ID	Agriculture		Barren Land		Forest		Urban		Water		Wetland		Total Area
		km²	%	km²	%	km²	%	km²	%	km²	%	km²	%	km²
12	Deal Lake-12	0.05	0.3	0.56	3.3	1.85	10.8	12.69	73.7	0.65	3.8	1.42	8.2	17.23
12	Hooks Creek Lake-12	0.00	0.0	0.00	0.0	0.11	51.4	0.05	23.2	0.04	21.0	0.01	4.5	0.21
12	Lake Takanassee-12	0.19	1.1	0.40	2.3	2.27	12.9	12.05	68.3	0.18	1.0	2.56	14.5	17.64
13	Bamber Lake-13	0.04	0.1	0.22	0.4	42.97	84.3	0.32	0.6	0.32	0.6	7.10	13.9	50.97
13	Carasaljo Lake-13	2.39	3.9	1.42	2.3	20.23	32.8	19.95	32.4	0.65	1.0	16.98	27.6	61.61
13	Deer Head Lake-13	0.01	0.0	0.41	1.1	29.41	81.1	1.28	3.5	0.16	0.5	4.97	13.7	36.24
13	Holiday Lake-13	0.14	1.0	0.31	2.3	8.57	63.7	3.73	27.7	0.20	1.5	0.51	3.8	13.46
13	Lake Barnegat-13	0.01	0.0	0.43	1.1	29.46	77.2	2.73	7.2	0.43	1.1	5.09	13.3	38.15
13	Manahawkin Lake-13	0.28	0.5	1.23	2.3	32.42	61.7	14.12	26.9	0.58	1.1	3.89	7.4	52.52
13	Ocean County Park Lake-13	0.06	11.9	0.02	3.3	0.20	39.6	0.18	34.1	0.02	4.4	0.03	6.6	0.52

13	Ocean Twp Bathing Beach - 13	0.01	0.1	0.42	6.4	4.41	67.5	1.11	16.9	0.04	0.7	0.55	8.3	6.54
13	Pine Lake-13	3.33	2.1	5.52	3.5	83.13	52.1	26.63	16.7	2.48	1.6	38.51	24.1	159.60
14	Hammonton Lake-14	0.39	6.2	0.09	1.4	1.37	22.0	3.72	59.6	0.31	4.9	0.37	5.9	6.24
15	Braddock Lake-15	10.22	14.8	1.14	1.6	31.04	45.0	13.84	20.1	1.60	2.3	11.09	16.1	68.92
15	Buena Vista CG-15	0.10	19.6	0.00	0.0	0.03	6.1	0.35	71.0	0.02	3.3	0.00	0.1	0.50
15	Cushman Lake-15	10.21	14.5	1.14	1.6	31.24	44.4	14.78	21.0	1.88	2.7	11.09	15.8	70.34
16	Lake Laurie-16	0.04	23.4	0.00	0.0	0.03	20.3	0.07	43.7	0.02	12.4	0.00	0.3	0.17
16	Ludlams Pond-16	0.57	8.6	0.04	0.5	3.11	47.3	0.70	10.6	0.24	3.6	1.93	29.4	6.57

4.0 WATER QUALITY ANALYSIS

Relating pathogen sources to concentrations of indicator organisms in the impaired waters is distinguished from quantifying that relationship for other pollutants given the inherent variability in population size and dependence not only on physical factors such as temperature and soil characteristics, but also on less predictable factors such as re-growth media. Since bacteria loads and concentrations can vary many orders of magnitude over short distances and over time at a single location, dynamic water quality models can be very difficult to calibrate. Options available to control nonpoint sources of bacteria typically include measures such as sewage infrastructure improvements, goose management strategies, pet waste ordinances, agricultural conservation management plans, and septic system replacement and maintenance. The effectiveness of these control measures is not easily measured relative to observed ambient concentrations. Given these considerations, detailed water quality modeling was not selected for determining the load reductions needed to attain standards and support the designated primary contact recreation use.

Fecal coliform data collected by county and municipal health departments were used as the basis for TMDL development for the listed pathogen impaired lakes. These data were reviewed to identify potential data excursions in accordance with the Quality Assurance Project Plan (QAPP) that was developed for this study (QAPP, 2007). The percent reduction required to meet New Jersey bathing beach requirements was calculated based on comparing the maximum fecal coliform concentration recorded for each lake to the TMDL target (200 cfu/100 ml). The data available for each lake are included in Appendix D.

4.1 Seasonal Variation/Critical Conditions

The technical approach used to develop these TMDLs includes consideration of seasonal variability and critical conditions. The TMDL lakes are listed as impaired based on the designated primary contact bathing use. Water quality criteria for bathing beaches are

established by the New Jersey Department of Health (NJDOH), which conducts monitoring at the municipal level in support of meeting the applicable criteria. Bathing beaches are typically in use during the late spring and summer months and data collection efforts are coordinated to coincide with this time period (May-September). TMDL loading reductions are based on the single sample maximum concentration identified in the record of observed in-lake water quality, therefore, TMDL development is based on the highest concentration observed for the time period of greatest exposure. Seasonal variability is of less importance because of the need to meet NJDOH bathing beach requirements during the summer critical condition period. TMDL loads are presented as average annual loads, which incorporate the summer critical condition period and the average load contributed during the other seasons.

4.2 Margin of Safety

A Margin of Safety (MOS) is provided to account for "lack of knowledge concerning the relationship between effluent limitations and water quality" (40 CFR 130.7(c)). For these TMDLs, both an implicit and explicit Margin of Safety (MOS) were incorporated. An implicit MOS was incorporated by using conservative assumptions, including treating fecal coliform as a conservative substance (source loads were estimated without including die-off rates, soil incorporation, etc.) and using conservative methods to estimate land-based loads. In addition, a 5% explicit MOS was calculated for each lake.

5.0 TMDL CALCULATIONS

Pathogen load percent reductions were calculated by comparing the maximum fecal coliform concentration recorded for each lake to the TMDL target concentration (200 cfu/100 ml). Load capacities were the remaining loads after applying the required reductions on the current loads. In addition, 5% of the load capacity was reserved as the explicit MOS (see example below). The percent reduction specified for each lake was applied equally to pathogen sources in each watershed except in cases where load reductions could be met without reducing the loads contributed by forest, wetlands and barren lands: in such cases these loadings were not reduced in the TMDL allocation. In cases where load reductions on the these land use sources were greater than or equal to 99.5%, the percent reduction specified for each lake was applied equally to all pathogen sources including forest and barren land loads.

Percent Reduction = (1 – TMDL target conc./max conc.) x 100
Load Capacity = (1 – percent reduction) * overall current load (using WTM)
MOS = 5% * Load capacity
Overall percent reduction = 1 – (Load capacity – MOS) / overall current load
Overall current load = controllable land use loads + forest and barren land loads

When $1 - \frac{Load\ Capacity - MOS - Forest, Wetland\ and\ Barren\ Land\ Load}{Agricultural\ and\ Urban\ Land\ Use\ Load} \geq 99.5\%$,

Require the same percent reduction on Forest, Wetlands and Barren land loads as on other land use loads;

Otherwise,

Zero percent reduction on Forest, Wetlands and Barren lands loads

5.1 Wasteload Allocations and Load Allocations

WLAs were established for municipal stormwater discharges subject to regulation under the CWA. LAs were established for all stormwater sources that are not subject to regulation under the CWA and for all other nonpoint sources. Stormwater point sources that received a WLA were distinguished from stormwater sources receiving a LA on the basis of land use type and municipal tier designation (Tier A/Tier B).

This distribution of loading capacity between WLAs and LAs is consistent with recent EPA guidance that clarifies existing regulatory requirements for establishing WLAs for stormwater discharges (Wayland, November 2002). Stormwater discharges are captured within the runoff sources quantified according to land use, as described previously. Distinguishing between regulated and unregulated stormwater is necessary in order to express WLAs and LAs numerically; however, "EPA recognizes that these allocations might be fairly rudimentary because of data limitations and variability within the system" (Wayland, November 2002, p.1). Therefore, allocations are established according to source categories as shown in Table 5. This demarcation between WLAs and LAs based on land use source categories is not perfect, but it represents the best estimate defined as narrowly as data allow. The Department acknowledges that there may be stormwater sources in the residential, commercial, industrial, and mixed urban runoff source categories that are not NJPDES-regulated. Nothing in these TMDLs shall be construed to require the Department to regulate a stormwater source under NJPDES that would not already be regulated as such, nor shall anything in these TMDLs be construed to prevent the Department from regulating a stormwater source under NJPDES.

Table 5. Assignment of WLAs and LAs for stormwater point sources and nonpoint sources.

Land Use Source Category	Municipal Tier	TMDL Allocation Type
High density residential	A	WLA
Medium density residential (incl. mixed residential, mixed urban, other urban, military reservations, and no longer military)	A	WLA
Low density residential (incl. rural residential, recreational land, and athletic fields)	A	WLA
Commercial	A	WLA
Industrial	A	WLA
Roadways	A	WLA
High density residential	B	LA
Medium density residential (incl. mixed residential, mixed urban, other urban, military reservations, and no longer military)	B	LA
Low density residential (incl. rural residential, recreational land, and athletic fields)	B	LA
Commercial	B	LA
Industrial	B	LA
Roadways	B	LA
Agricultural	N/A	LA
Forest/wetland	N/A	LA
Barren land	N/A	LA

A summary of the WLAs, LAs, and MOS is provided for each lake in Table 6 and source loads and allocations are presented in Table 7. As described above, when the loads contributed by forest/wetland/barren lands were not reduced in the TMDL allocation table, the load reduction for urban lands and agricultural lands was increased proportionally to meet the overall percent reduction required for each lake. Note that the overall percent reduction shown in Tables 6 and 7 takes into account the 5% explicit MOS if not based on the previously established stream Fecal Coliform TMDL.

In cases where impaired lakeshed is hydrologically connected to a streamshed addressed in an established Fecal Coliform TMDL or to another impaired lakeshed, different approaches were utilized to calculate the load reduction for each "nested" watershed.

Lakeshed connected with the Fecal Coliform TMDL established streamshed

If the entire lakeshed is located within the impaired streamshed, the more stringent overall percent reduction between the lake and the stream is applied to the lakeshed. When the streamshed is part of the lakeshed, the rivershed is treated as an upper stream "lake" shed. The same approach, as described below for the nested lakesheds, was used to determine the adjusted load reduction for different areas.

Lakeshed connected with another impaired lakeshed

The following methodology was used to determine the adjusted percent reduction for the nested lake watersheds:

1. Existing pathogen loads calculated for each lake watershed (using WTM) were reduced based on the overall percent reduction that was calculated from the observed lake water quality data. The reduced load was termed the target load.
2. The target load for the upstream watershed was subtracted from the target load of the downstream watershed, giving a target load for the downstream (local) watershed area. The existing load for the downstream (local) watershed was calculated similarly.
3. If the target load for the downstream (local) watershed area was less than or equal to zero, the downstream lake's higher percent reduction needed to be applied to the upper stream lakeshed. This means that the entire drainage area of the downstream lake is ruled by the downstream lake's reduction percentage.
4. If the target load of the downstream (local) watershed area was higher than zero, the percent difference between the existing and target loads for the downstream (local) watershed was calculated. This adjusted percent reduction superseded the original downstream lake percent reduction and was used as the required percent reduction for the downstream (local) watershed area while the upstream lakeshed stayed with the original overall percent reduction. The adjusted percent reduction would be higher than the original overall percent reduction for the downstream lake when the upstream lake required a less percent reduction than the downstream lake and less than the original value if the upstream lake required a higher percent reduction than the downstream lake.

Table 6. TMDL calculations for pathogen impaired lakes in the Atlantic Coastal Water Region.

WMA	Lake Assessment Unit ID	WLA (10^6 colonies/yr)	LA (10^6 colonies/yr)	MOS (10^6 colonies/ yr)	TMDL (10^6 colonies/ yr)	Overall % Reduction	% MOS	Reduction from associated Stream TMDL
12	Deal Lake-12[e]	8.81E+04	1.53E+04	5.45E+03	1.09E+05	89.01%	5.00%	90%
12	Hooks Creek Lake-12	1.27E+02	1.90E+01	7.70E+00	1.54E+02	94.57%	5.00%	
12	Lake Takanassee-12[e]	7.13E+03	3.07E+02	3.91E+02	7.83E+03	87.82%	5.00%	51%
13	Bamber Lake-13	1.30E+03	1.06E+04	6.27E+02	1.25E+04	92.91%	5.00%	
13	Carasaljo Lake-13[f]	1.33E+04	1.31E+03	7.67E+02	1.53E+04	99.05%	5.00%	90%
13	Deer Head Lake-13[a]	7.83E+03	8.11E+03	8.39E+02	1.68E+04	92.15%	5.00%	
13	Holiday Lake-13[c]	7.42E+03	8.28E+02	4.34E+02	8.68E+03	97.16%	5.00%	
13	Lake Barnegat-13	8.51E+03	5.60E+02	4.77E+02	9.55E+03	92.15%	5.00%	
13	Manahawkin Lake-13[d]	4.05E+04	3.83E+03	2.33E+03	4.67E+04	95.49%	5.00%	
13	Ocean County Park Lake-13	5.98E+02	5.83E+01	3.46E+01	6.91E+02	95.68%	5.00%	
13	Ocean Twp Bathing Beach - 13	3.77E+03	7.61E+02	2.38E+02	4.77E+03	95.25%	5.00%	
13	Pine Lake-13	2.74E+04	7.80E+03	1.85E+03	3.70E+04	98.64%	5.00%	

WMA	Lake Assessment Unit ID	WLA (10^6 colonies/yr)	LA (10^6 colonies/yr)	MOS (10^6 colonies/ yr)	TMDL (10^6 colonies/ yr)	Overall % Reduction	% MOS	Reduction from associated Stream TMDL
14	Hammonton Lake-14[f]	0.00E+00	1.09E+04	5.76E+02	1.15E+04	96.21%	5.00%	72%
15	Braddock Lake-15[b]	2.72E+04	1.01E+05	6.75E+03	1.35E+05	81.00%	5.00%	
15	Buena Vista CG-15	4.30E+03	2.85E+02	2.41E+02	4.82E+03	78.89%	5.00%	
15	Cushman Lake-15	8.31E+04	4.02E+04	6.49E+03	1.30E+05	81.00%	5.00%	
16	Lake Laurie-16	9.52E+02	2.08E+02	6.11E+01	1.22E+03	70.77%	5.00%	
16	Ludlams Pond-16	2.72E+03	3.29E+03	3.17E+02	6.33E+03	90.00%	5.00%	

a located within the watershed of Lake Barnegat and goes with Lake Barnegat's reduction.
b located within the watershed of Cushman Lake and goes with Cushman Lake's reduction.
c. located within the watershed of Manahawkin Lake and stays with its own overall percent reduction
d. reduction on the local watershed is less than the original overall percent reduction (95.87%) after taking into account the upstream Holiday Lake's higher reduction.
e stream shed within the lake shed

- Reduction on the local Deal Lake watershed is less than the original overall percent reduction (89.14%) after taking into account Hollow Brook at Route 35's higher reduction of 90% which is required (NJDEP,2003).
- Lake Takanassee is nested with the watershed of Whale Pond Brook at Route 35 in Eatontown, on which a reduction of 51% was required (NJDEP, 2003)

f lake shed within the stream shed and the lake reduction is higher.

- Carasaljo Lake is nested with the watershed of Metedeconk River near Laurelton, on which a reduction of 90% was required (NJDEP, 2003).
- Hammonton Lake is nested with the watershed of Hammonton @ Westcoatville, on which a reduction of 72% was required (NJDEP, 2003).

Table 7. Atlantic Coastal Water Region land-based load allocations.

WMA	Lake Assessment Unit ID	Overall % Reduction	Agriculture			Barren Land			Forest/Wetland			Urban Total (WLA)			Urban Total (LA)		
			Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)
12	Deal Lake-12	89%	2.99E+02	90%	3.05E+01	1.37E+03	0%	1.37E+03	7.03E+03	0%	7.03E+03	8.65E+05	90%	8.81E+04	6.78E+04	90%	6.91E+03
12	Hooks Creek Lake-12	95%	0.00E+00	95%	0.00E+00	0.00E+00	95%	0.00E+00	3.50E+02	95%	1.90E+01	2.34E+03	95%	1.27E+02	0.00E+00	95%	0.00E+00
12	Lake Takanassee-12	88%	3.57E+02	88%	4.21E+01	1.02E+00	0%	1.02E+00	2.64E+02	0%	2.64E+02	6.04E+04	88%	7.13E+03	0.00E+00	88%	0.00E+00
13	Bamber Lake-13	93%	3.74E+02	93%	2.65E+01	6.60E+02	93%	4.68E+01	1.48E+05	93%	1.05E+04	1.84E+04	93%	1.30E+03	0.00E+00	93%	0.00E+00
13	Carasaljo Lake-13	99%	2.31E+04	99%	2.19E+02	4.21E+03	99%	4.00E+01	1.10E+05	99%	1.05E+03	1.40E+06	99%	1.33E+04	0.00E+00	99%	0.00E+00
13	Deer Head Lake-13	92%	1.36E+02	92%	1.07E+01	1.22E+03	92%	9.59E+01	1.02E+05	92%	8.00E+03	9.98E+04	92%	7.83E+03	0.00E+00	92%	0.00E+00
13	Holiday Lake-13	97%	1.34E+03	97%	3.80E+01	9.09E+02	97%	2.58E+01	2.69E+04	97%	7.64E+02	2.62E+05	97%	7.42E+03	0.00E+00	97%	0.00E+00
13	Lake Barnegat-13	92%	0.00E+00	93%	0.00E+00	4.28E+01	0%	4.28E+01	5.17E+02	0%	5.17E+02	1.15E+05	93%	8.51E+03	0.00E+00	93%	0.00E+00
13	Manahawkin Lake-13	95%	1.36E+03	95%	6.16E+01	2.73E+03	95%	1.23E+02	8.07E+04	95%	3.64E+03	8.98E+05	95%	4.05E+04	0.00E+00	95%	0.00E+00
13	Ocean County Park Lake-13	96%	5.93E+02	96%	2.56E+01	5.01E+01	96%	2.17E+00	7.07E+02	96%	3.05E+01	1.39E+04	96%	5.98E+02	0.00E+00	96%	0.00E+00

WMA	Lake Assessment Unit ID	Overall % Reduction	Agriculture			Barren Land			Forest/Wetland			Urban Total (WLA)			Urban Total (LA)		
			Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)	Existing Load (10^6 colonies/yr)	Percent Reduction	Allocated Load (10^6 colonies/yr)
13	Ocean Twp Bathing Beach -13	95%	7.47E+01	95%	3.55E+00	1.25E+03	95%	5.92E+01	1.47E+04	95%	6.98E+02	7.93E+04	95%	3.77E+03	0.00E+00	95%	0.00E+00
13	Pine Lake-13	99%	3.21E+04	99%	4.35E+02	1.64E+04	99%	2.22E+02	3.61E+05	99%	4.90E+03	2.02E+06	99%	2.74E+04	1.66E+05	99%	2.25E+03
14	Hammonton Lake-14	96%	3.72E+03	98%	7.25E+01	2.63E+02	0%	2.63E+02	5.15E+03	0%	5.15E+03	0.00E+00	98%	0.00E+00	2.80E+05	98%	5.46E+03
15	Braddock Lake-15	81%	4.75E+04	93%	3.09E+03	1.73E+03	0%	1.73E+03	9.62E+04	0%	9.62E+04	4.18E+05	93%	2.72E+04	0.00E+00	93%	0.00E+00
15	Buena Vista CG-15	79%	9.34E+02	79%	1.94E+02	0.00E+00	0%	0.00E+00	9.12E+01	0%	9.12E+01	2.07E+04	79%	4.30E+03	0.00E+00	79%	0.00E+00
15	Cushman Lake-15	81%	5.10E+04	82%	9.22E+03	1.64E+03	0%	1.64E+03	2.93E+04	0%	2.93E+04	4.60E+05	82%	8.31E+04	0.00E+00	82%	0.00E+00
16	Lake Laurie-16	71%	3.83E+02	73%	1.05E+02	0.00E+00	0%	0.00E+00	1.03E+02	0%	1.03E+02	3.48E+03	73%	9.52E+02	0.00E+00	73%	0.00E+00
16	Ludlams Pond-16	90%	5.45E+03	90%	5.45E+02	1.05E+02	90%	1.05E+01	1.49E+04	90%	1.49E+03	2.72E+04	90%	2.72E+03	1.24E+04	90%	1.24E+03

5.2 Reserve Capacity

Reserve capacity is an optional means of reserving a portion of the loading capacity to allow for future growth. Reserve capacities are not included for the lakes addressed in these TMDLs. Nonpoint source reduction strategies applied to land uses will be equally effective with respect to existing and future use of the land.

6.0 FOLLOW - UP MONITORING

Monitoring requirements for the listed lakes are established under NJDOH regulations for state bathing beaches. NJDOH regulations include sampling requirements before and during seasonal operation. Before bathing beaches are opened each year, NJDOH requires a pre-operational assessment, which includes

- A review of historical sampling and epidemiological data
- A field investigation of the bathing and surrounding areas to identify sources of potential contamination
- A sampling of waters in the bathing area and in areas of suspected sources of contamination

During the bathing season, NJDOH requires that bathing beach water be sampled one week prior to opening and at one-week intervals once in use. Samples are collected during periods of maximum user load and from depths used for bathing. In cases where water samples were found to meet the NJDOH water quality criterion for three consecutive months in the prior year, operators can apply for biweekly sampling responsibilities (NJDOH, 2004).

7.0 IMPLEMENTATION

Management measures are "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint and stormwater sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint and stormwater source pollution control practices, technologies, processes, citing criteria, operating methods, or other alternatives" (USEPA, 1993).

Development of effective management measures depends on accurate source assessment. Coliform bacteria are contributed to the environment from a number of categories of sources including human, domestic or captive animals, agricultural practices, and wildlife. Coliform bacteria from these sources can reach waterbodies directly, through overland runoff, or through sewage or stormwater conveyance facilities. Each potential source will respond to one or more management strategies designed to eliminate or reduce that source of coliform bacteria. Each management strategy has one or more entities that can take lead responsibility to effect the strategy. Various funding sources are available to assist in accomplishing the management strategies. The Department will address the sources of impairment by matching strategies with sources, selecting responsible entities and aligning available resources to effect implementation.

For example, the stormwater discharged to the impaired waterbodies through "municipal separate storm sewer systems" (MS4s) are regulated under the Department's Municipal Stormwater Regulation Program. Under these rules and associated general permits, many municipalities (and various county, State, and other agencies) are required to implement various control measures that should substantially reduce bacteria loadings, including measures to eliminate "illicit connections" of domestic sewage and other waste to the MS4s. Measures that are currently in effect include ordinances to manage pet waste, prohibit feeding of unconfined wildlife on public property, clean catch basins, perform good housekeeping at maintenance yards, and provide related public education and employee training. These measures are required in accordance with the Department's Municipal Stormwater Regulation program. The Department has provided State funds as well as a portion of its Clean Water Act 319(h) pass through grant funds to assist municipalities in meeting these requirements.

Sewage conveyance facilities are potential sources of fecal coliform in that equipment failure or operational problems may result in the release of untreated sewage. These sources, once identified, can be eliminated through appropriate corrective measures that can be affected through the Department's enforcement authority. Inadequate on-site sewage disposal can also be a source of fecal coliform. Systems that were improperly designed, located or maintained may result in surfacing of effluent; illicit remedies such as connections to storm sewers or streams add human waste directly to waterbodies. Once these problems have been identified through local health departments, sanitary surveys, or other means, alternatives to address the problems can be evaluated and the best solution implemented. The New Jersey Environmental Infrastructure Financing Program, which includes New Jersey's State Revolving Fund, provides low interest loans to assist in correction of water quality problems related to stormwater and wastewater management.

Carasaljo Lake in Lakewood Township has a known geese population problem. Geese are migratory birds that are protected by the Migratory Bird Treaty Act of 1918 and other Federal and State Laws. Resident Canada geese do not migrate, but are nevertheless protected by this and other legislation. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS)-Wildlife Services program reports that the 1999 estimated population of non-migratory geese in New Jersey was 83,000. Geese may produce up to 1½ pounds of fecal matter a day and when the congregate in large numbers they can represent a locally significant source of coliform bacteria. This may warrant taking steps to reduce populations in areas with excessive populations, such as Carasaljo Lake.

Because geese are free to move about and commonly graze and rest on large grassy areas associated with schools, parks, golf courses, corporate lawns, and cemeteries, measures to reduce populations, where necessary, are best developed and conducted at the community level through a community-based goose damage management program. USDA's Wildlife Services program recommends that a community prepare a written Canada Goose Damage Management Plan that may include the following actions:

- Initiate a fact-finding and communication plan
- Enact and enforce a "no feeding" ordinance (already required per MS4 permits)
- Conduct goose damage control activities such as habitat modification

- Review and update land use policies
- Reduce or eliminate goose reproduction (permit required)
- Hunt geese to reinforce nonlethal actions (permit required)

Procedures such as handling nests and eggs, capturing and relocating birds, and the hunting of birds require a depredation permit from either the USDA APHIS Wildlife Services or U.S. Fish and Wildlife Services. Procedures requiring permits should be a last resort after a community has exhausted the other listed measures. The Department's draft guide *Management of Canada Geese in Suburban Areas, March 2001,* which may be found at www.state.nj.us/dep/watershedmgt under publications, provides extensive guidance on how to modify habitat to serve as a deterrent to geese as well as other prevention techniques such as education through signage and ordinances.

In coastal areas, other waterfowl are naturally present in significant numbers and vary seasonally with migratory patterns. Other wildlife contributions may include deer populations, which have been identified as a potential fecal coliform source in the impaired watersheds. The forested and low-density residential areas that provide deer habitat can be found in close proximity to the impaired watersheds. Deer have been evaluated in fecal coliform TMDLs by other States (e.g. Alabama and South Carolina) and could be a fecal coliform source in New Jersey. Management measures to reduce coliform bacteria contributed by wildlife are not generally practicable, but could respond to measures such as improved riparian buffers.

Agricultural activities are another example of potential sources of coliform bacteria. Possible contributors are direct contributions from livestock permitted to traverse streams and stream corridors, manure management from feeding operations, or use of manure as a soil fertilizer/amendment. Implementation of conservation management plans and best management practices are the best means of controlling agricultural sources of coliform bacteria. Several programs are available to assist farmers in the development and implementation of conservation management plans and best management practices. The Natural Resource Conservation Service is the primary source of assistance for landowners in the development of resource management pertaining to soil conservation, water quality improvement, wildlife habitat enhancement, and irrigation water management. The USDA Farm Services Agency performs most of the funding assistance. All agricultural technical assistance is coordinated through the locally led Soil Conservation Districts. The funding programs include:

- **The Environmental Quality Incentive Program (EQIP)** is designed to provide technical, financial, and educational assistance to farmers/producers for conservation practices that address natural resource concerns, such as water quality. Practices under this program include integrated crop management, grazing land management, well sealing, erosion control systems, agri-chemical handling facilities, vegetative filter strips/riparian buffers, animal waste management facilities and irrigation systems.

- **The Conservation Reserve Program (CRP)** is designed to provide technical and financial assistance to farmers/producers to address the agricultural impacts on water quality and to maintain and improve wildlife habitat. CRP practices include the establishment of filter

strips, riparian buffers and permanent wildlife habitats. This program provides the basis for the Conservation Reserve Enhancement Program (CREP).

- **The Conservation Reserve Enhancement Program** The New Jersey Departments of Environmental Protection and Agriculture, in partnership with the Farm Service Agency and Natural Resources Conservation Service, have established a $100 million dollar CREP agreement. The program matches $23 million of State money with $77 million from the Comodity Credit Corporation within USDA. Through CREP, financial incentives are offered for agricultural landowners to voluntarily implement conservation practices on agricultural lands. NJ CREP will be part of the USDA's Conservation Reserve Program (CRP). There will be a ten-year enrollment period, with CREP leases ranging between 10-15 years. The State intends to augment this program thereby making these leases permanent easements. The enrollment of farmland into CREP in New Jersey is expected to improve stream health through the installation of water quality conservation practices on New Jersey farmland.

Management strategies are summarized below in Table 8.

Table 8. Implementation management strategies.

Source Category	Responses	Potential Responsible Entity	Funding options
Human Sources			
Inadequate (per design, operation, maintenance, location, density) on-site disposal systems	Sanitary surveys, septic management programs/ordinances	Municipality	CWA 604(b) for confirmation of inadequate condition; Environmental Infrastructure Financing Program for construction of selected option
Inadequate or improperly maintained stormwater facilities; illicit connections	Measures required under Municipal Stormwater permitting program including any additional measures determined in the future to be needed through TMDL process	Municipality, State and County regulated entities, stormwater utilities	CWA 319(h); Environmental Infrastructure Financing Program for construction of selected option
Malfunctioning sewage conveyance facilities	Identify through source trackdown and repair	Owner of malfunctioning facility--compliance issue	User fees
Domestic/captive animal sources			
Pets	Pet waste ordinances	Municipalities for ordinance adoption and compliance	State source and CWA 319(h) assistance to municipalities to implement municipal stormwater regulations

Source Category	Responses	Potential Responsible Entity	Funding options
Horses, livestock, zoos	Confirm through source trackdown: SCD/NRCS develop conservation management plans	Property owner	EQIP, CRP, CREP
Agricultural practices	Confirm through source trackdown; SCD/NRCS develop conservation management plans, exercise CAFO/AFO authority if applicable	Property owner	EQIP, CRP, CREP
Wildlife			
Locally excessive populations of resident Canada geese or other waterfowl	Feeding ordinances; Goose Management BMPs	Municipality for ordinance; local community groups for BMPs	State source; CWA 319(h)
Indigenous wildlife	Confirm through trackdown; riparian buffer restoration; consider revising designated uses	State	State source

7.1 Specific Projects

In addition to the more generalized strategies described previously, a number of projects have been undertaken which are expected to aid in achieving the load reductions assigned to the impaired waterbodies. Ongoing activities to develop and implement watershed restoration plans are expected to result in additional specific projects to reduce pollutant loads.

Table 9. Atlantic Coastal Outreach and Restoration Projects

WMA	FY	Funding Source	Recipient	Project Title	Grant Amount
12	2003	319	Monmouth University School of Science, Technology and Engineering	Innovative Assessment of Sources of Fecal E Coli in Pathogen Impaired Waterbodies of the Monmouth Coastal Watersheds Region	$124,762.00
12	2004 2006	319(h)	The Deal Lake Commission c/o Borough of Allenhurst	The Development of a Regional Stormwater Management Plan for the Deal Lake Watershed For the Purpose of the Managing Existing and future Stormwater Impact. Additional funding was provided in 2006 to complete the plan.	$99,400.00 $10,781.00

Microbial Source Tracking Efforts

Microbial Source Tracking Efforts (MST) methods have already been successfully employed at the Department in the past decade. Since 1988, the Department has worked cooperatively with the University of North Carolina in developing and determining the application of RNA coliphage as a pathogen indicator. This research was funded through USEPA and Hudson River Foundation grants. These studies showed that the RNA coliphages are useful as an indicator of fecal contamination, particularly in chlorinated effluents and that they can be serotyped to distinguish human and animal fecal contamination. Through these studies, the Department has developed an extensive database of the presence of coliphages in defined contaminated areas (point human, nonpoint human, point animal, and non-point animal).

More recently, the Department has established a MST methodolgy that utilizes both genotype (genotyping of F+RNA coliphages) and phenotype (MAR testing) tests. The results of these tests are collectively evaluated to best determine sources of fecal contamination. The Bureau's methodology includes evaluation of long-term microbial results as well as data (GIS Land use coverage, aerial photographs, visual assesments) of actual and potential sources, stormwater monitoring to deliniate location of major sources and the use of MAR and F+ coliphage in conjunction with conventional microbial indicators. This methodology has been successfully applied in several areas including; Seaside Park, Long Swamp, Atlantic City, and Parvin State Park. As a result of established stream Fecal coliform TMDLs, a TMDL source tracking project was completed which included this MST methodology as well as collection of additional conventional microbial indicators. Data has been collected at over 220 sites in select TMDL watersheds throughout the state. Four of these sites fall within the lakesheds of Deal Lake, Carasaljo Lake, Cushman Lake and Braddock Lake as identified below. The table summarizes the results of the conventional microbial indicator sampling as well as the MST tests.

Lake	**MST Station ID**	**Station Name**	**Fecal Coliform* CFU/100ml**			**Potential Sources**	
			Min	**Max**	**Geo Mean**	**Coliphage Genotype**	**MAR Profile**
Deal Lake	BA 1	Hollow Brook on Neptune Blvd in Whitesville/Neptune	40	16000	775	NA	NA
	BA2	Hollow Brook off Rt 35, upstream of bridge in Neptune/White	20	16000	828	NA	NA
Carasaljo Lake	BA26	S Br Metedeconk Riv downstream of N Cooks Bridge Rd	Non Detect	700	298	NA	NA
Cushman Lake & Braddock Lake (nested)	BA38	Hospitality Br on Rt 633 (Blue Bell Rd) Williamstown	10*	100*	40*	No Phage+	Wildlife

*E.coli in CFU/100ml

+No coliphage was found in sample and therefore was not used in source assessment, further monitoring is recommended during adverse pollution conditions.

8.0 REASONABLE ASSURANCE

With the implementation of source reduction measures such as reducing the number of failing septic systems, leaching sewer lines, and controlling agricultural runoff, the Department has reasonable assurance that a significant improvement in the support of primary contact recreation in the impaired lakes will be attained. The results from on-going existing monitoring programs will be evaluated to determine effectiveness of the identified measures and if additional measures are needed.

9.0 PUBLIC PARTICIPATION

The Water Quality Management Planning Rules at N.J.A.C. 7:15-7.2 require the Department to initiate a public process prior to the development of each TMDL and to allow public input to the Department on policy issues affecting the development of the TMDL. Further, the Department proposed each TMDL as an amendment to the appropriate area-wide water quality management plan in accordance with procedures at N.J.A.C. 7:15-3.4(g). As part of the public participation process for the development and implementation of the subject TMDLs, the Department solicited information from stakeholder groups and from the general public directly and through a web posting beginning in October 2006. Additionally in November 2006, the list of impaired lakes was distributed to the New Jersey volunteering monitoring community, through the Watershed Watch Network. The Watershed Watch Network is a program acting as an umbrella for all of the volunteer monitoring programs within New Jersey. Interested parties had the opportunity to supply the Department with information about each via e-mail. The Department specifically solicited information regarding potential sources and/or current non point sources of pollution reduction projects within the impaired watersheds. Information received regarding potential sources of fecal contamination were assessed in the development of these TMDLs.

10.0 AMENDMENT PROCESS

Notice proposing these TMDLs appeared in the July 16, 2007 New Jersey Register and in a newspaper of general circulation in order to provide the public an opportunity to review the TMDL document and submit formal comments. In addition, a public hearing was held on August 17, 2007 at the New Jersey Department of Environmental Protection Public Hearing Room, 401 E. State St., Trenton, NJ 08608. There was an informal presentation from 1:00 p.m. to 2:00 p.m., followed by the public hearing from 2:00 p.m. until the end of testimony, whichever was earlier. Notice of the proposal and hearing was provided to affected counties, municipalities, and lake associations in the watershed.

There were no comments received during the public notice period or at the public hearing. This TMDL was approved by EPA on September 28, 2007 and was adopted on October 19, 2009 as an amendment to the Atlantic County, Cape May County, Lower Raritan/Middlesex County, Monmouth County, Ocean County, and Tri-County Water Quality Management Plans in accordance with New Jersey's Water Quality Management Planning Rules at N.J.A.C. 7:15-3.4 (g).

APPENDIX A: REFERENCES

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"NJDEP Lakes (Open Water Areas) by County", published by NJDEP, Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA), Online at: http://www.nj.gov/dep/gis/lakesshp.html

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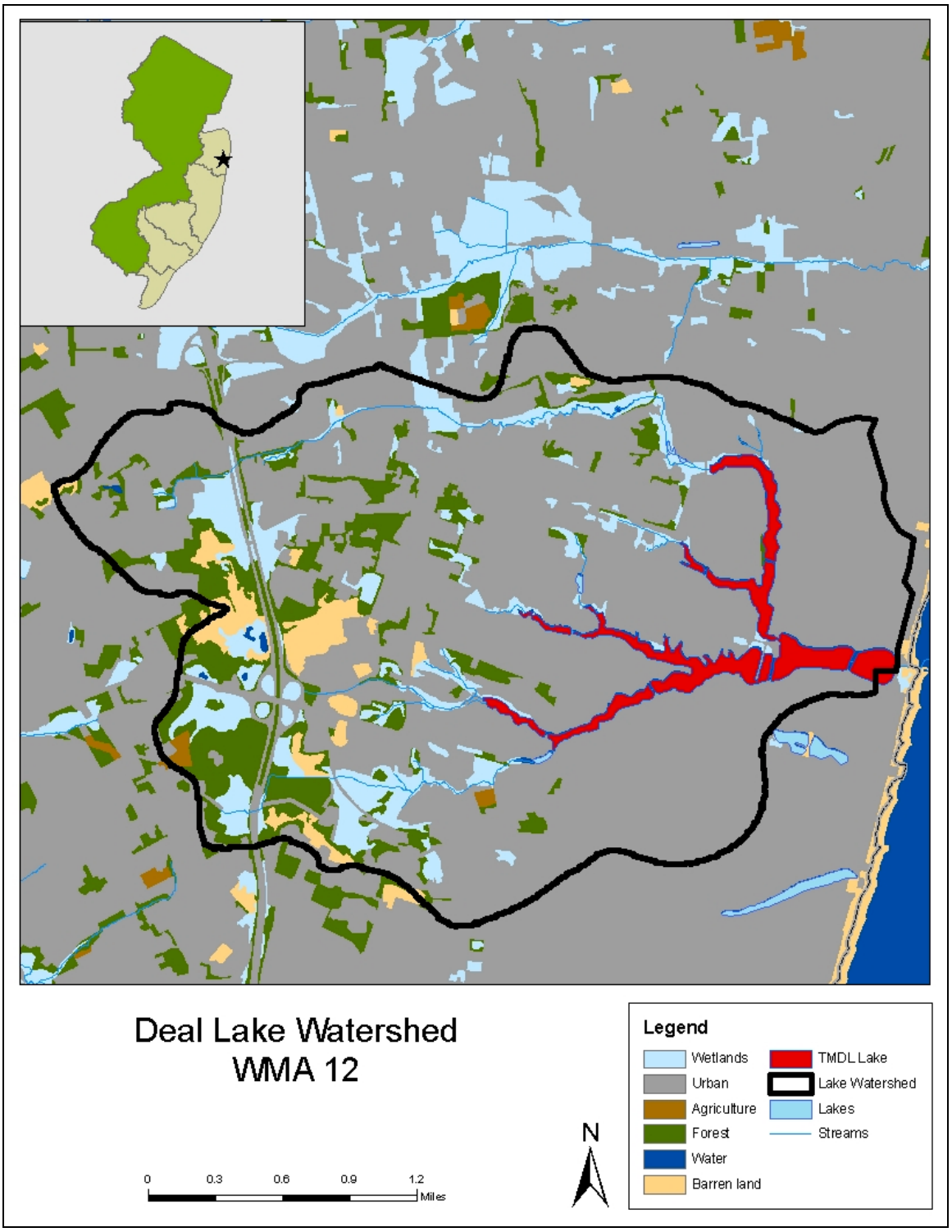
APPENDIX B: TIER A MUNICIPALITIES, TIER B MUNICIPALITIES

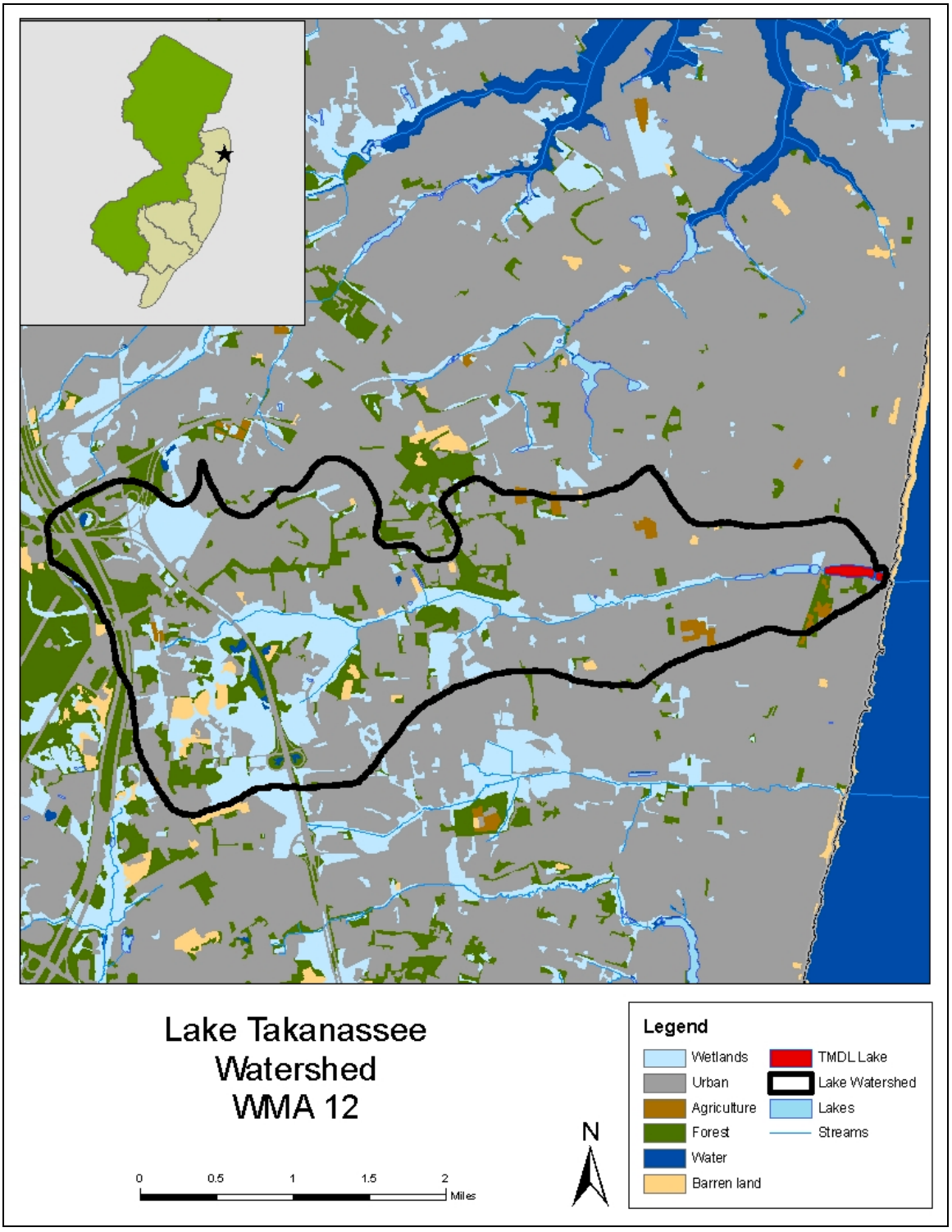
Atlantic Coastal Water Region Tier A and Tier B Municipalities

Tier	Watershed	Municipality	WMA	Permit #
A	Lake Takanassee	Tinton Falls Boro	12	NJG0150070
		Long Branch City	12	NJG0150410
		Eatontown Boro	12	NJG0148008
		West Long Branch Boro	12	NJG0153257
		Ocean Twp	12	NJG0150860
	Deal Lake	Ocean Twp	12	NJG0150860
		Deal Boro	12	NJG0153460
		Allenhurst Boro	12	NJG0153605
		Loch Arbour Village	12	NJG0153516
		Neptune Twp	12	NJG0150631
		Asbury Park City	12	NJG0153591
	Hooks Creek Lake	Old Bridge Twp	12	NJG0152552
	Bamber Lake	Manchester Twp	13	NJG0152951
		Lacey Twp	13	NJG0148491
	Carasaljo Lake	Freehold Twp	13	NJG0150797
		Millstone Twp	13	NJG0153532
		Jackson Twp	13	NJG0150665
		Lakewood Twp	13	NJG0148067
	Ocean County Park Lake	Lakewood Twp	13	NJG0148067
	Ocean Twp Bathing	Ocean Twp	13	NJG0150860
		Barnegat Twp	13	NJG0152111
	Manahawkin Lake	Ocean Twp	13	NJG0150860
		Barnegat Twp	13	NJG0152111
		Stafford Twp	13	NJG0149080
	Holiday Lake	Ocean Twp	13	NJG0150860
		Barnegat Twp	13	NJG0152111
		Stafford Twp	13	NJG0149080
	Deer Head Lake	Lacey Twp	13	NJG0148491
		Ocean Twp	13	NJG0150860
		Barnegat Twp	13	NJG0152111
	Lake Barnegat	Ocean Twp	13	NJG0150860
		Barnegat Twp	13	NJG0152111
		Lacey Twp	13	NJG0148491
	Pine Lake	Jackson Twp	13	NJG0150665
		Manchester Twp	13	NJG0152951
		Lakehurst Boro	13	NJG0147761
	Buena Vista Campground	Buena Vista Twp	15	NJG0154989
		Buena Boro	15	NJG0149314
	Braddock Lake	Monroe Twp	15	NJG0148318
		Franklin Twp	15	NJG0153311
		Folsom Boro	15	NJG0151343
		Buena Vista Twp	15	NJG0154989
	Cushman Lake	Monroe Twp	15	NJG0148318
		Franklin Twp	15	NJG0153311
		Folsom Boro	15	NJG0151343
		Buena Vista Twp	15	NJG0154989

	Ludlams Pond	Dennis Twp	16	NJG0150291
	Lake Laurie	Lower Twp	16	NJG0151092
B	Deal Lake	Interlaken Boro	12	NJG0151955
	Pine Lake	Plumsted Twp	13	NJG0154351
	Hammonton Lake	Hammonton Town	14	NJG0149870
	Ludlams Pond	Woodbine Boro	16	NJG0149721

APPENDIX C: LAKE WATERSHED MAPS

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Urban
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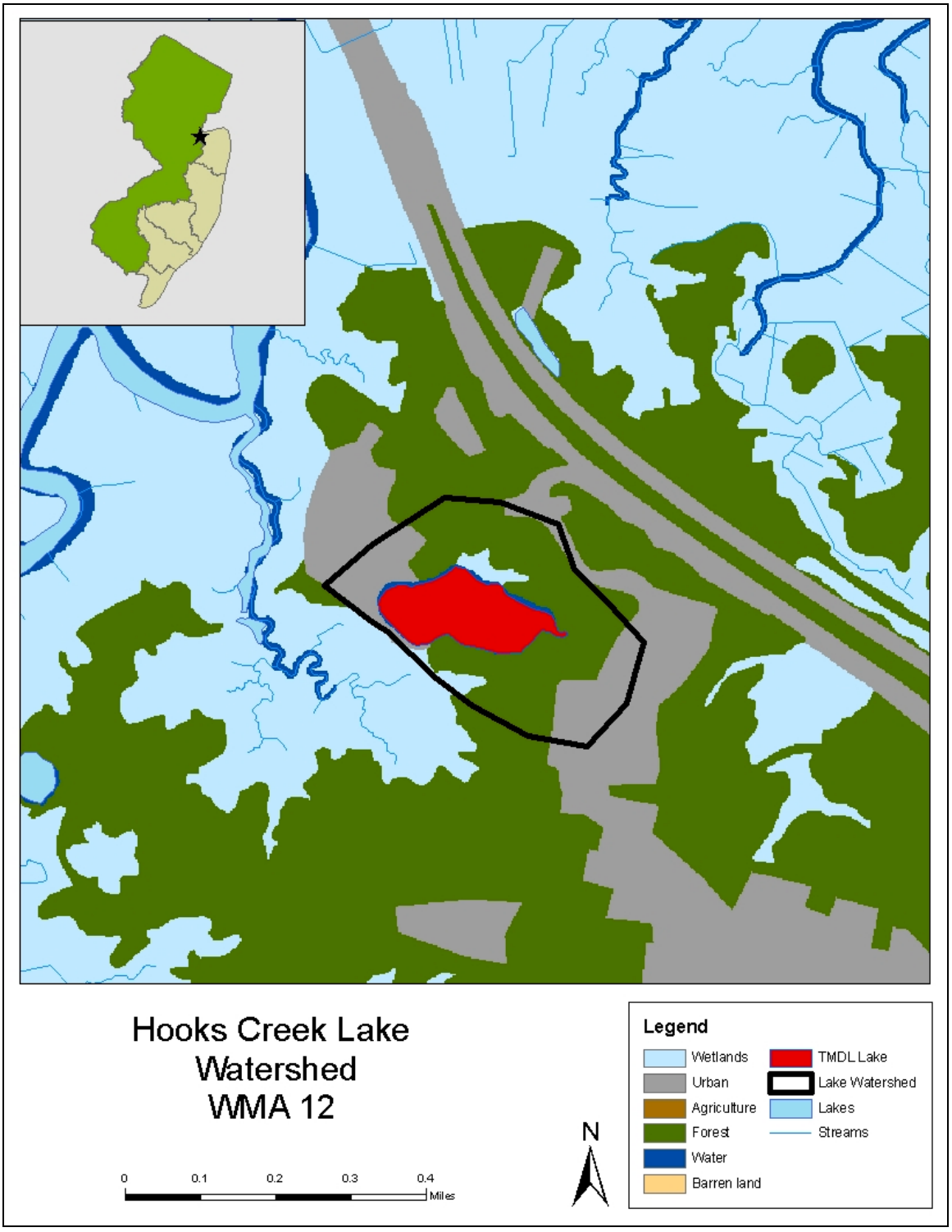
Forest
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams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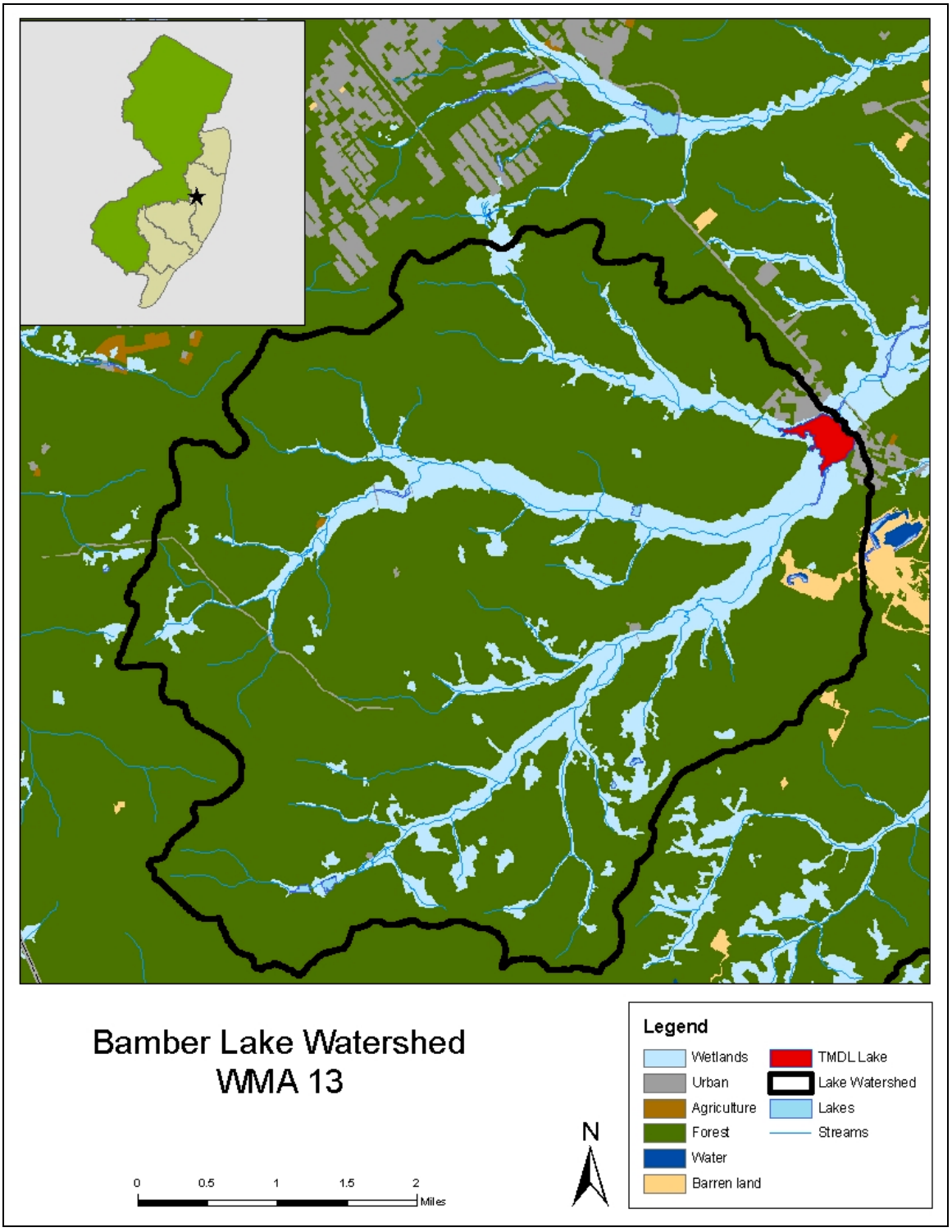
Urban
Agriculture
Forest
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams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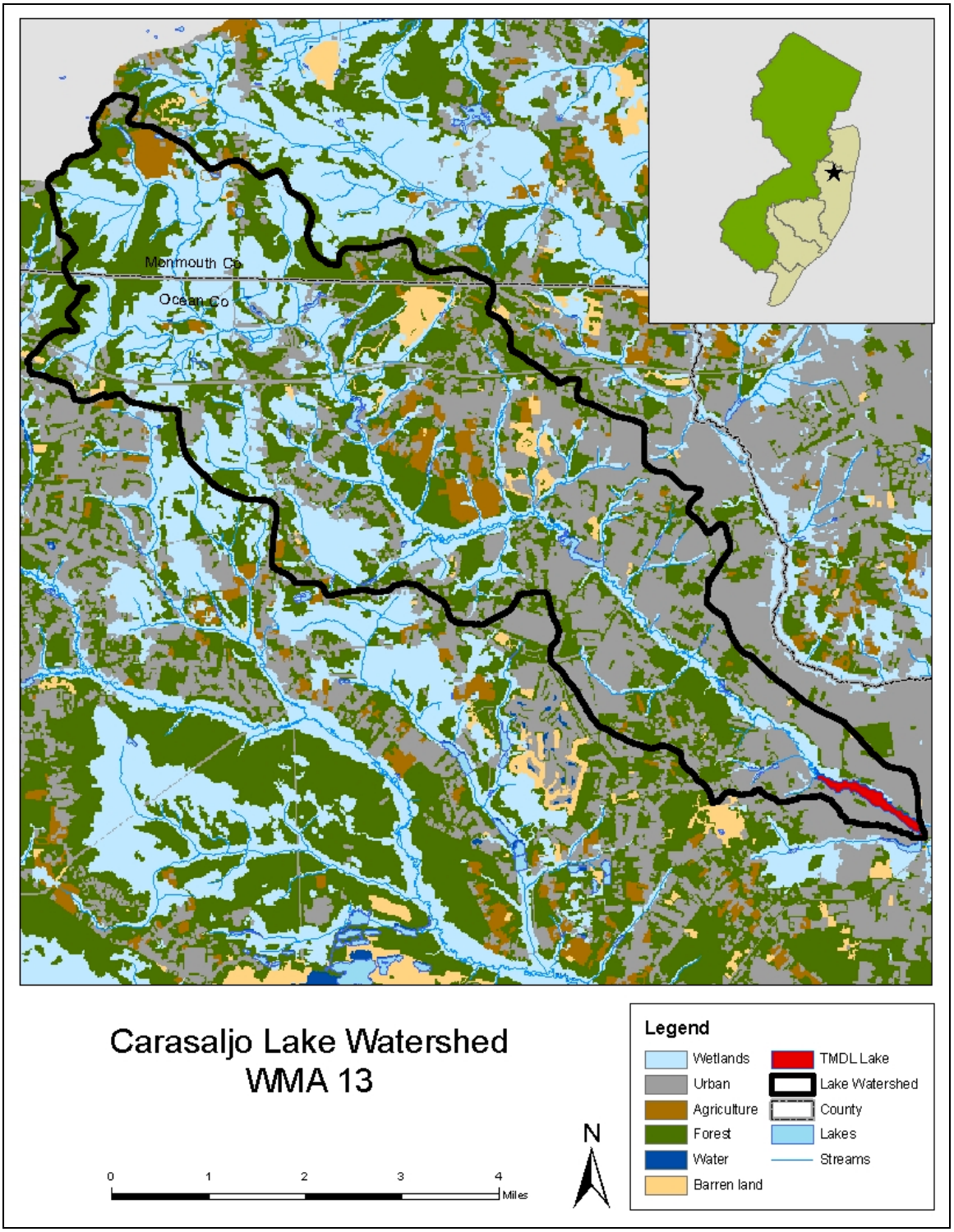
Forest
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams


Monmouth Co.
Ocean Co.
Carasaljo Lake Watershed
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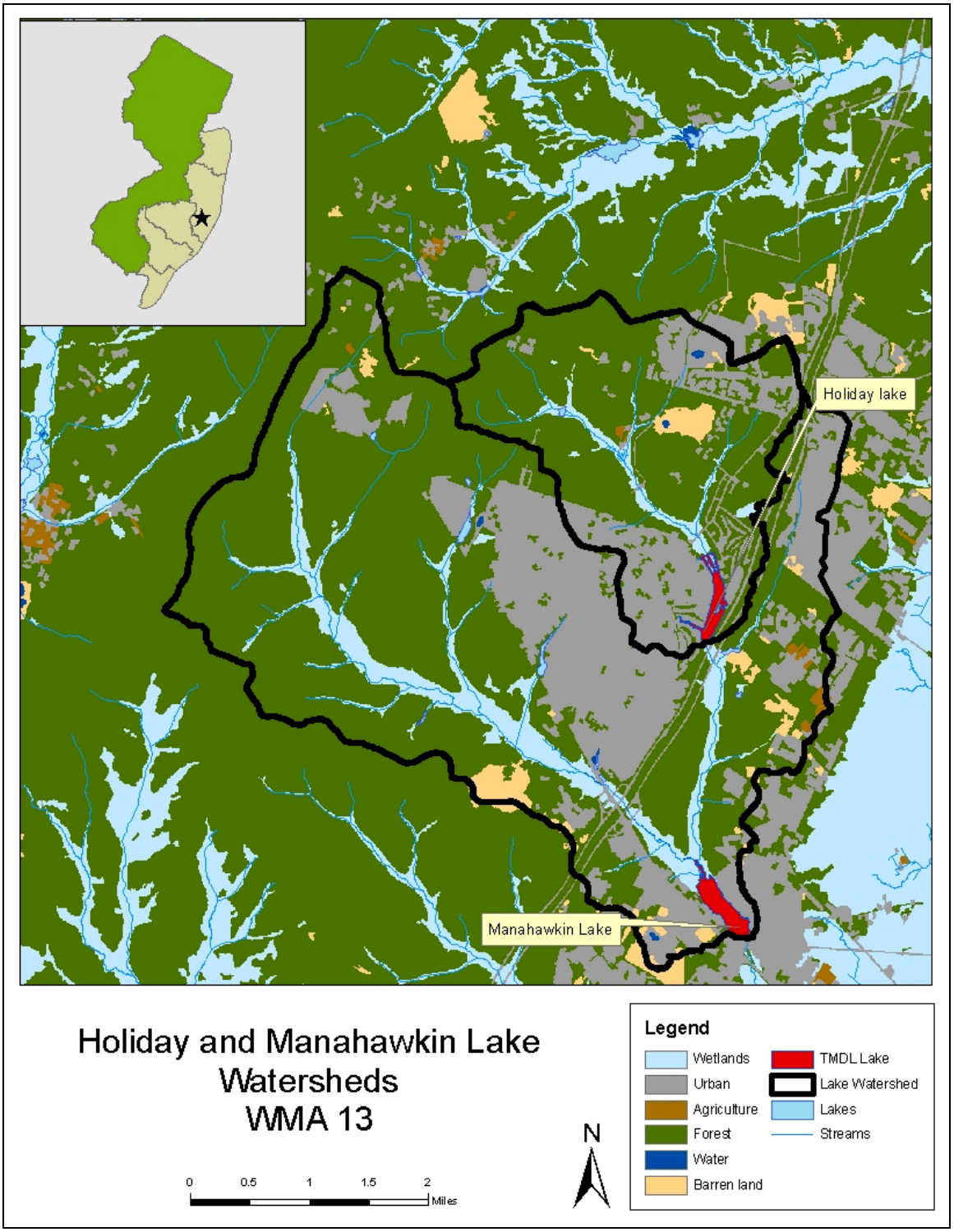
Wetlands
Urban
Agriculture
Forest
Water
Barren land
TMDL Lake
Lake Watershed
County
Lakes
Streams


Holiday lake
Manahawkin Lake
Holiday and Manahawkin Lake
Watersheds
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1.5
2
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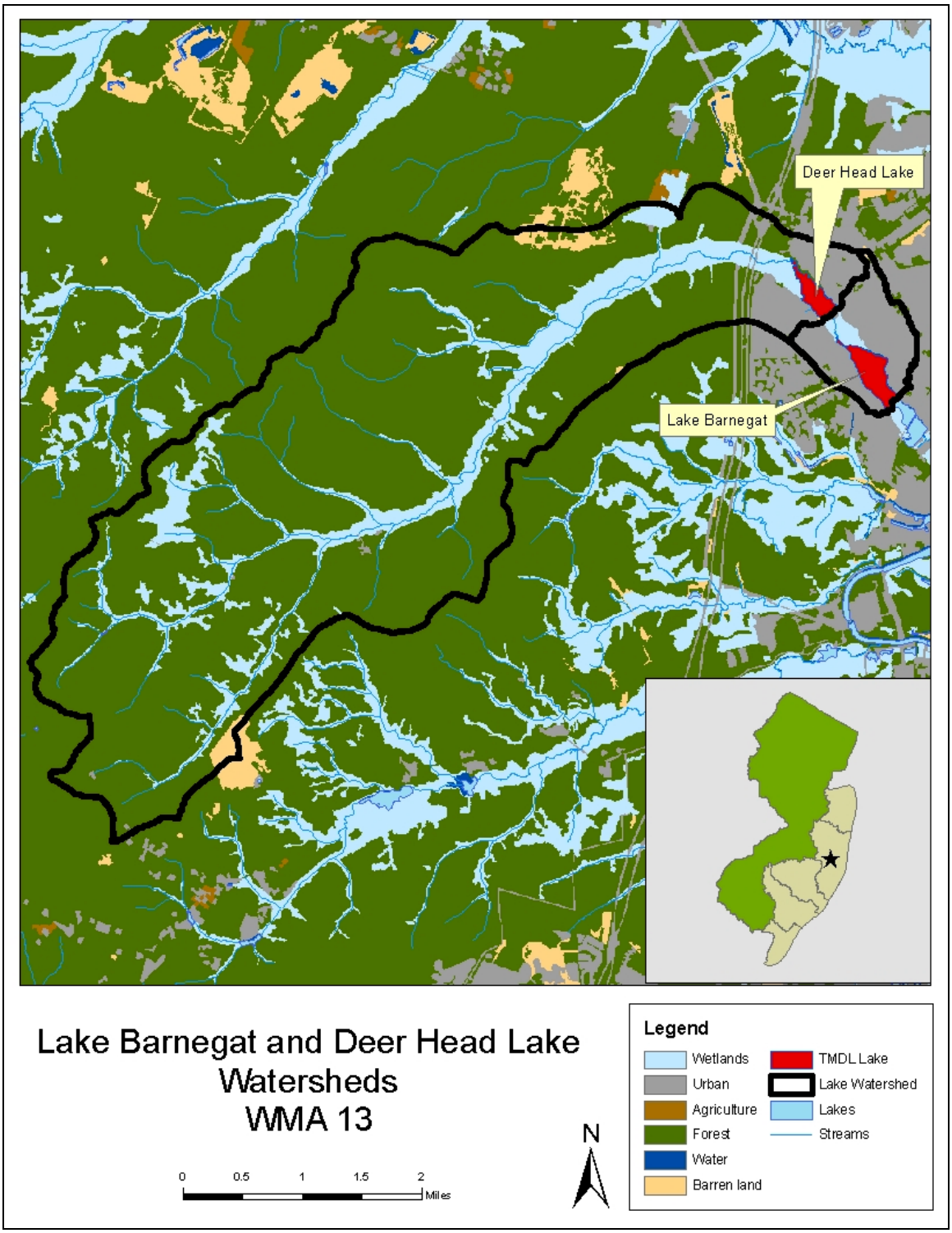
Legend
Wetlands
Urban
Agriculture
Forest
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams


Deer Head Lake
Lake Barnegat
Lake Barnegat and Deer Head Lake
Watersheds
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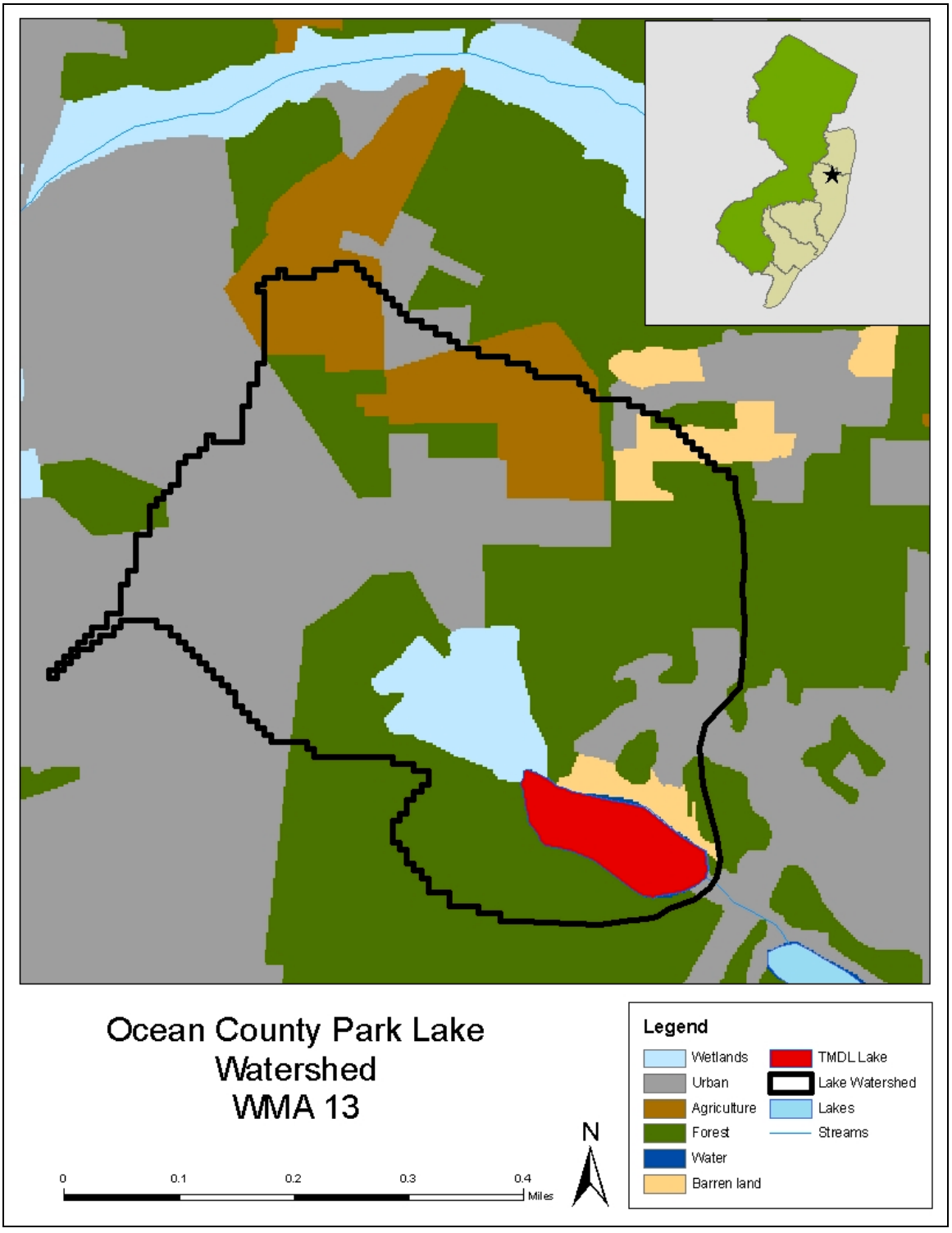
Lakes
Streams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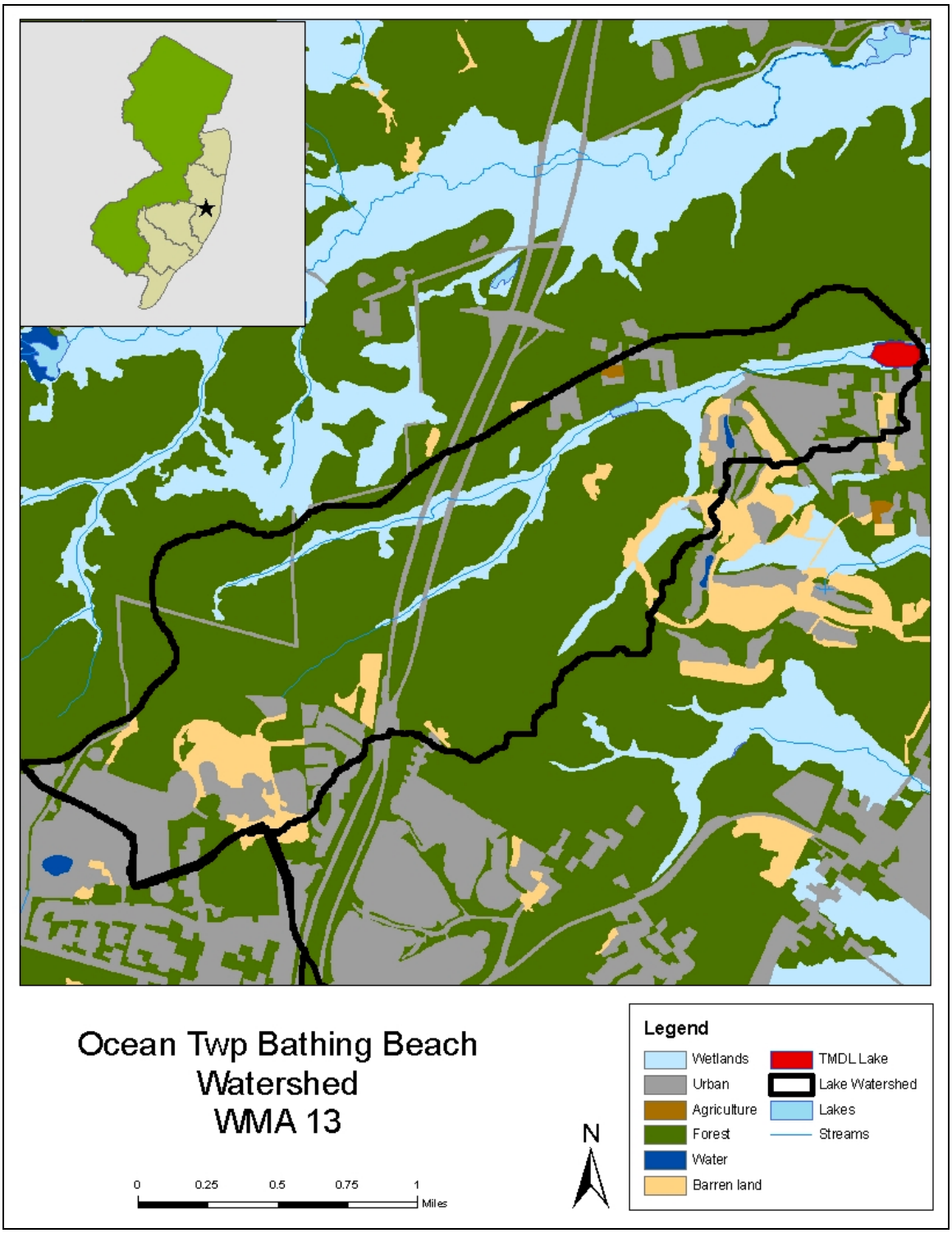
Lake Watershed
Lakes
Streams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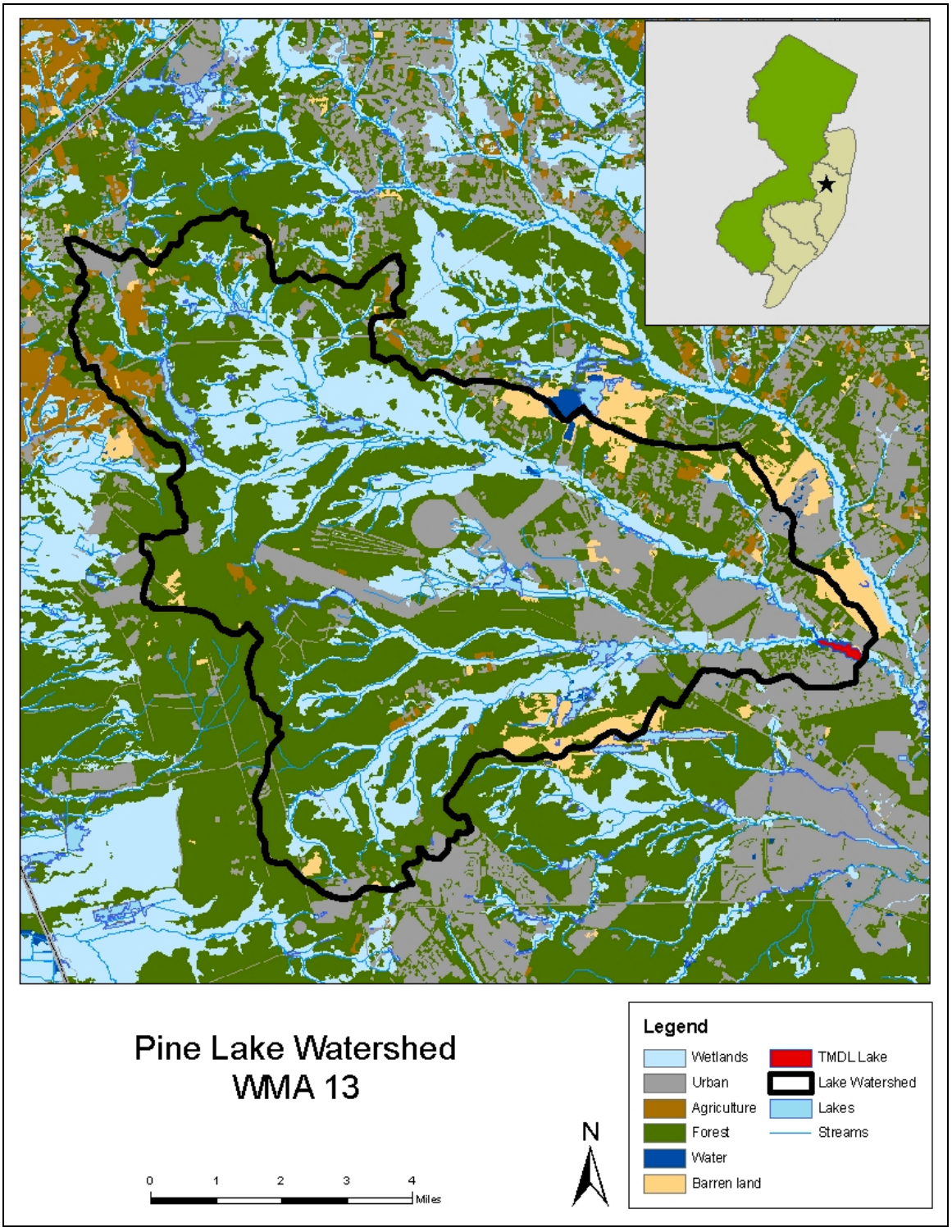
Lakes
Streams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Agriculture
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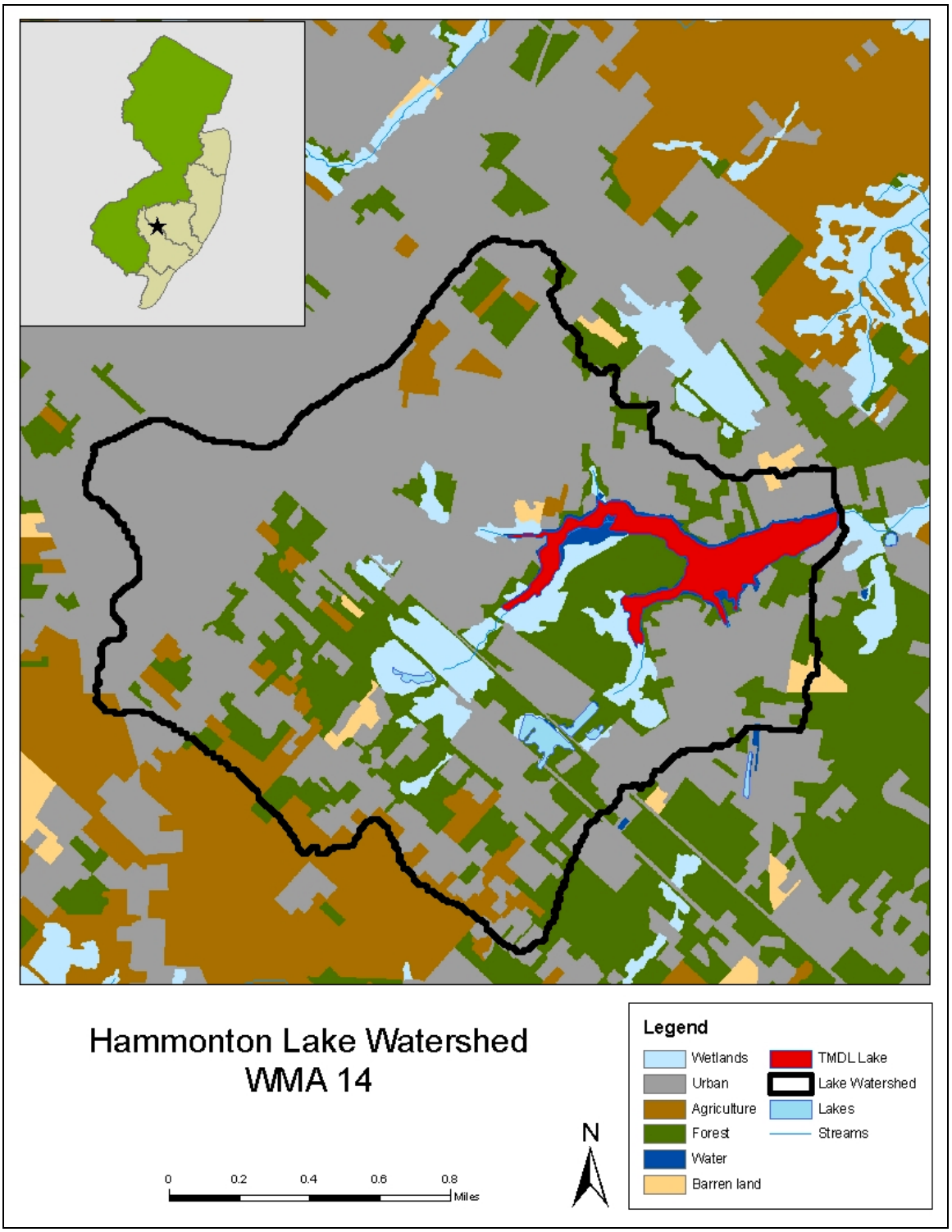
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams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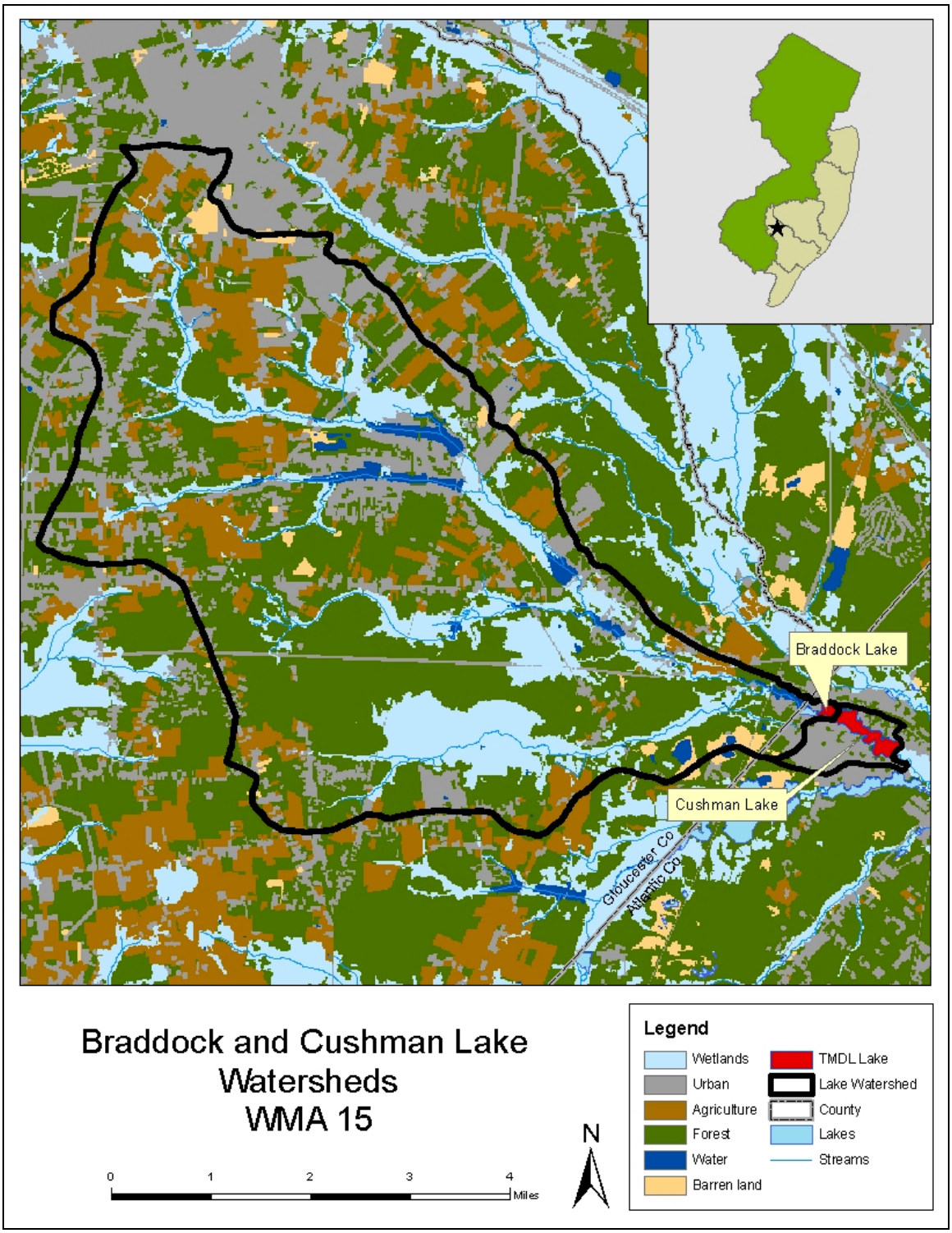
Braddock Lake
Cushman Lake
Gloucester Co
Atlantic Co
Braddock and Cushman Lake
Watersheds
WMA 15
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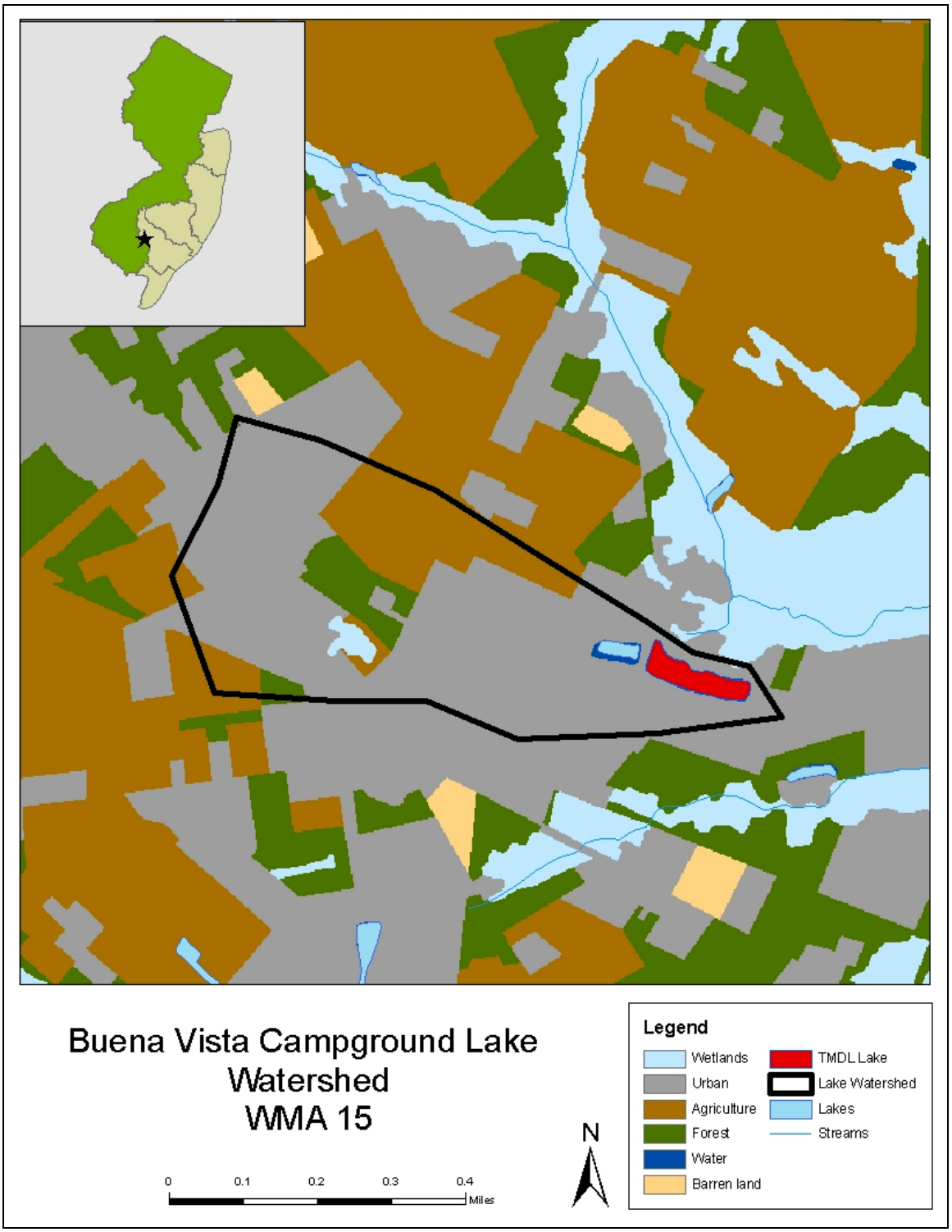
TMDL Lake
Lake Watershed
County
Lakes
Streams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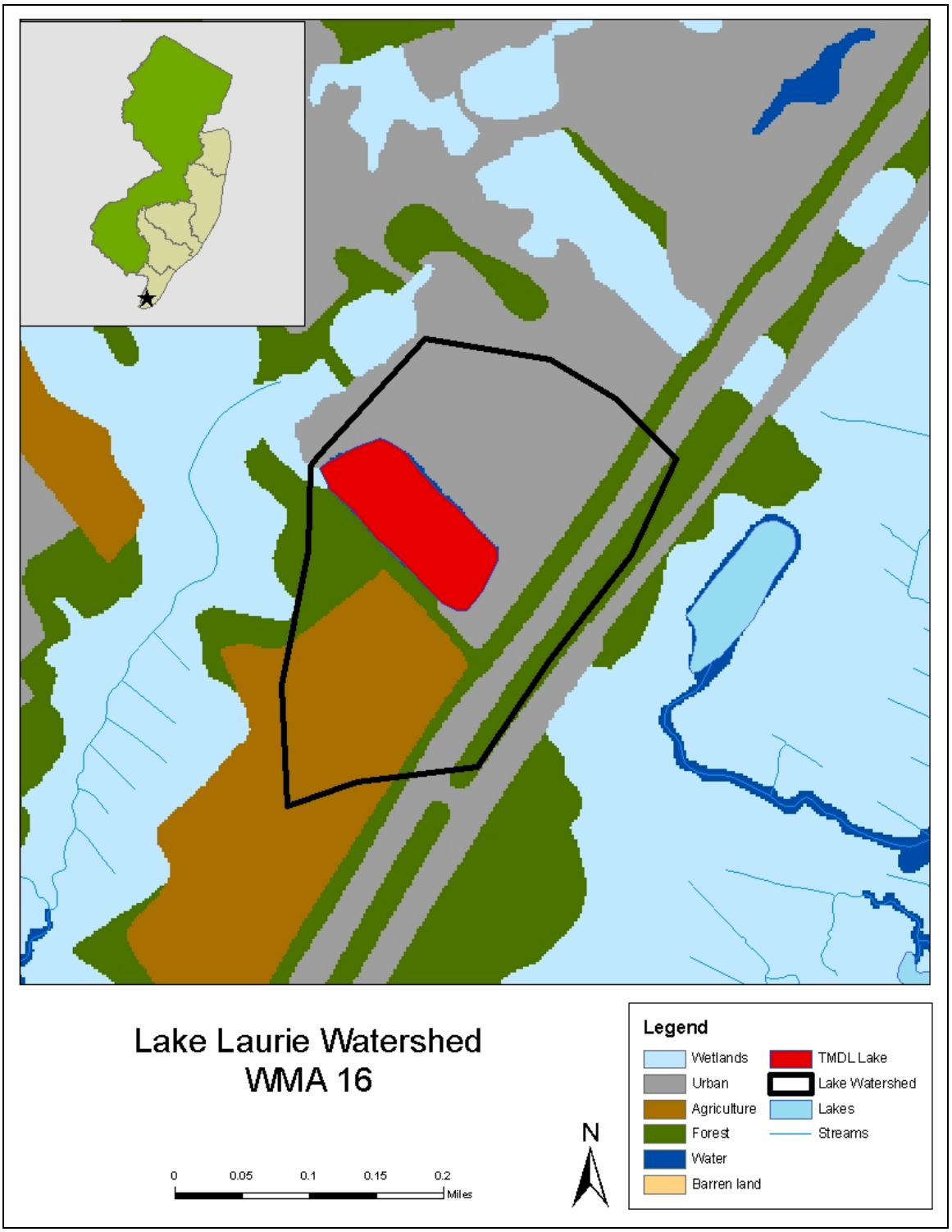
Lake Watershed
Lakes
Streams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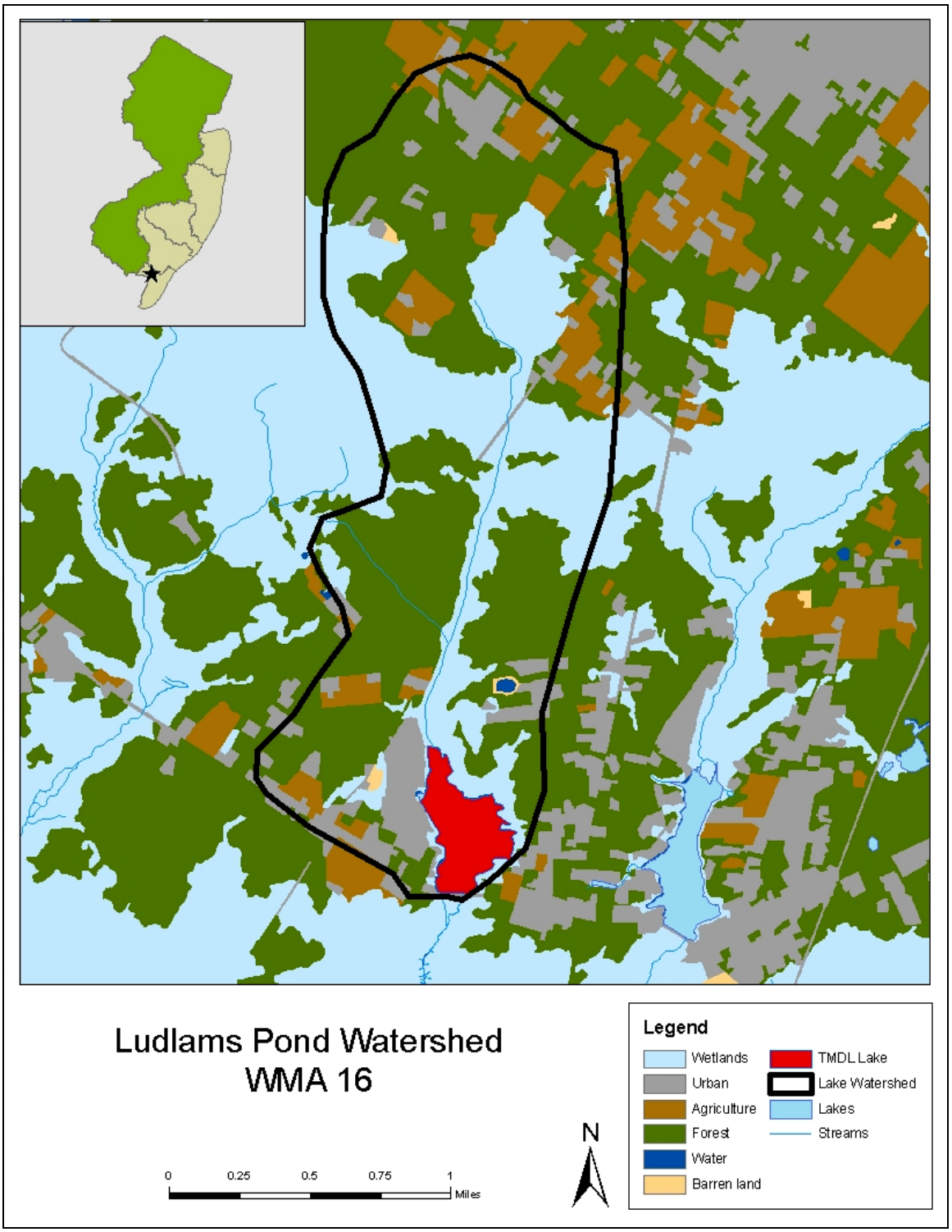
Lakes
Streams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Urban
Agriculture
Forest
Water
Barren land
TMDL Lake
Lake Watershed
Lakes
Streams

APPENDIX D: ATLANTIC COASTAL WATER REGION WATER QUALITY DATA

* Highlighted values are greater than 200 cfu/100 ml of fecal coliform bacteria

WMA 12

Deal Lake			
count	31	mean+3stdev	1787
median	140	% reduction	89%
max	1750		
stdev	480	**no data excluded**	
mean	348		
mean+3stdev	1787		

Collection Date	Fecal
6/27/2006	610
3/16/2006	30
12/12/2005	110
9/28/2005	10
6/28/2005	1100
3/22/2005	10
12/8/2004	360
9/15/2004	250
6/3/2004	30
3/18/2004	10
11/17/2003	140
9/29/2003	530
6/26/2003	70
3/26/2003	450
12/3/2002	60
10/9/2002	170
6/4/2002	30
4/17/2002	20
3/5/2002	990
12/11/2001	450
10/2/2001	1750
6/5/2001	20
3/13/2001	30
12/5/2000	10
10/3/2000	210
6/6/2000	1520
3/21/2000	50
12/7/1999	1270
10/5/1999	300
6/8/1999	160
3/2/1999	50

Hooks Creek Lake			
count	225	mean+3stdev	1249
median	40	%reduction	94%
max	3500		
stdev	368	**no data excluded**	
mean	146		
mean+3stdev	1249		

Station	Date	Value	Remark
?????	07/25/00	20	K
?????	07/25/00	80	
Center	05/26/98	20	K
Center	08/19/98	790	
Center	09/02/98	50	
Left	05/02/98	80	
Left	05/21/98	20	K
Left	05/26/98	20	
Left	06/09/98	20	
Left	06/16/98	20	K
Left	06/23/98	20	
Left	06/30/98	20	K
Left	07/07/98	20	K
Left	07/14/97	20	K
Left	07/21/98	50	
Left	07/28/98	50	
Left	08/04/98	20	K
Left	08/12/98	20	
Left	08/18/98	330	
Left	08/25/98	70	
Left	08/27/98	110	
Left	09/02/98	330	
Left	05/23/00	80	
Left	05/30/00	20	
Left	06/06/00	50	
Left	06/13/00	110	
Left	06/14/00	50	
Left	06/15/00	80	
Left	06/20/00	50	
Left	06/27/00	20	
Left	07/05/00	20	
Left	07/11/00	20	K
Left	07/18/00	50	
Left	08/01/00	330	
Left	08/03/00	110	
Left	08/04/00	1300	
Left	08/07/00	330	
Left	08/09/00	20	K
Left	08/15/00	130	
Left	08/22/00	80	
Left	08/29/00	20	
Right	05/02/98	170	
Right	05/21/98	20	K
Right	06/09/98	20	
Right	06/16/98	20	
Right	06/23/98	20	
Right	06/30/98	110	
Right	07/07/98	50	
Right	07/21/98	20	K
Right	07/28/98	20	
Right	08/04/98	40	
Right	08/12/98	40	
Right	08/18/98	80	
Right	08/25/98	210	
Right	08/27/98	20	
Right	09/02/98	330	
Right	05/23/00	140	
Right	05/30/00	20	K
Right	06/06/00	80	
Right	06/13/00	790	
Right	06/14/00	790	
Right	06/15/00	50	
Right	06/20/00	20	
Right	06/27/00	20	K
Right	07/05/00	20	
Right	07/11/00	50	
Right	07/18/00	80	
Right	08/01/00	490	
Right	08/03/00	490	
Right	08/04/00	1300	
Right	08/07/00	20	
Right	08/09/00	70	
Right	08/15/00	130	
Right	08/22/00	170	
Right	08/29/00	20	
Right	07/14/98	20	K
Right	05/23/01	20	
Right	05/29/01	80	
Right	06/12/01	20	k
Right	06/19/01	80	
Right	06/26/01	110	
Right	07/03/01	1700	
Right	07/05/01	70	
Right	07/17/01	20	
Right	07/24/01	20	
Right	07/31/01	20	
Right	08/07/01	80	
Right	08/15/01	1300	
Right	08/16/01	1700	
Right	08/28/01	20	
Left	05/23/01	20	

Left	05/29/01	80	
Left	06/12/01	20	
Left	06/19/01	70	
Left	06/26/01	110	
Left	07/03/01	700	
Left	07/05/01	170	
Left	07/17/01	40	
Left	07/24/01	50	
Left	07/31/01	110	
Left	08/07/01	50	
Left	08/15/01	3500	
Left	08/16/01	2400	
Left	08/28/01	20	
Right	05/28/02	20	
Right	06/04/02	40	
Right	06/11/02	20	k
Right	06/18/02	20	
Right	06/23/02	20	k
Right	06/25/02	20	k
Right	07/02/02	20	
Right	07/09/02	20	
Right	08/13/02	40	
Right	08/20/02	40	
Right	08/27/02	20	
Left	05/21/02	20	
Left	05/28/02	40	
Left	06/04/02	40	
Left	06/11/02	40	
Left	06/18/02	80	
Left	06/25/02	40	
Left	07/02/02	20	k
Left	07/09/02	110	
Left	07/23/02	20	
Left	08/13/02	40	
Left	08/20/02	80	
Left	08/27/02	20	k
HOOK'S LAKE R	05/27/03	20	K
HOOK'S LAKE R	06/03/03	20	K
HOOK'S LAKE R	06/10/03	20	K
HOOK'S LAKE R	06/17/03	20	K
HOOK'S LAKE R	06/24/03	20	
HOOK'S LAKE R	07/01/03	20	
HOOK'S LAKE R	07/08/03	170	
HOOK'S LAKE R	07/15/03	20	K
HOOK'S LAKE R	07/22/03	500	
HOOK'S LAKE R	07/24/03	40	
HOOK'S LAKE R	07/29/03	20	
HOOK'S LAKE R	08/05/03	40	
HOOK'S LAKE R	08/12/03	20	K
HOOK'S LAKE R	08/19/03	20	
HOOK'S LAKE R	08/25/03	170	
HOOK'S LAKE L	05/27/03	20	
HOOK'S LAKE L	06/03/03	20	

HOOK'S LAKE L	06/10/03	20	K
HOOK'S LAKE L	06/17/03	20	K
HOOK'S LAKE L	06/24/03	20	K
HOOK'S LAKE L	07/01/03	20	K
HOOK'S LAKE L	07/08/03	500	
HOOK'S LAKE L	07/10/03	20	
HOOK'S LAKE L	07/15/03	20	
HOOK'S LAKE L	07/22/03	300	
HOOK'S LAKE L	07/24/03	20	
HOOK'S LAKE L	07/29/03	20	K
HOOK'S LAKE L	08/05/03	130	
HOOK'S LAKE L	08/12/03	20	
HOOK'S LAKE L	08/19/03	20	
HOOK'S LAKE L	08/25/03	20	
Right	05/26/04	20	K
Right	06/02/04	80	K
Right	06/08/04	40	K
Right	06/15/04	20	K
Right	06/22/04	20	K
Right	06/29/04	130	K
Right	07/07/04	60	K
Right	07/13/04	40	K
Right	07/20/04	60	K
Right	07/27/04	130	K
Right	07/29/04	230	RESAMPLE
Right	08/03/04	20	K
Right	08/10/04	80	K
Right	08/17/04	20	K
Right	08/23/04	20	K
Right	08/03/04	20	K
Left	05/26/04	110	K
Left	06/02/04	20	K
Left	06/08/04	40	K
Left	06/15/04	20	K
Left	06/22/04	20	K
Left	06/29/04	20	K
Left	07/07/04	110	K
Left	07/13/04	20	K
Left	07/20/04	40	K
Left	07/27/04	220	
Left	07/29/04	130	K, RESAMPLE
Left	08/03/04	130	K
Left	08/10/04	40	K
Left	08/17/04	80	K
Left	08/23/04	80	K
Left	08/03/04	20	K
	05/23/05	20	K
	05/31/05	20	
	06/06/05	20	K
	06/13/05	20	K
	06/20/05	20	
	06/26/05	170	
	06/29/05	20	

	07/05/05	20	
	07/11/05	110	
	07/18/05	230	
	07/20/05	500	
	07/21/05	20	resample
	07/25/05	40	
	08/01/05	80	
	08/08/05	20	K
	08/15/05	110	
	08/22/05	80	
	05/23/05	20	K
	05/31/05	20	K
	06/06/05	70	K
	06/13/05	20	K
	06/20/05	20	K
	06/26/05	700	
	06/29/05	170	
	07/05/05	40	
	07/11/05	40	
	07/18/05	500	
	07/20/05	500	
	07/21/05	20	K, resample
	07/25/05	40	
	08/01/05	80	
	08/08/05	20	K
	08/15/05	40	
	08/22/05	130	
	08/29/05	20	

Lake Takanassee			
Count	30	mean+3stdev	1434
median	175	% reduction	87%
max	1560		
stdev	381	**no data excluded**	
mean	291		
mean+3stdev	1434		

Collection Date	**Fecal**
06/27/06	720
03/16/06	190
12/12/05	20
09/28/05	50
06/28/05	580
03/22/05	10
12/08/04	190
09/15/04	470
05/27/04	100
03/18/04	50
11/17/03	130
09/29/03	1320

06/26/03	100
03/26/03	10
12/03/02	10
10/09/02	210
06/04/02	50
03/05/02	210
12/11/01	440
10/02/01	80
06/05/01	220
03/13/01	300
12/05/00	10
10/03/00	200
06/06/00	1560
03/07/00	20
12/07/99	440
10/05/99	830
06/08/99	160
03/02/99	50

WMA 13

Bamber Lake			
count	169	mean+3stdev	1102
median	24	%reduction	93%
max	2680		
stdev	325	**no data excluded**	
mean	127		
mean+3stdev	1102		

Station	**Date**	**Result**	**Remark**
west			
LAC5	05/27/98	48	
LAC5	06/02/98	10	
LAC5	06/08/98	26	
LAC5	06/08/98	8	
LAC5	06/15/98	744	
LAC5	06/16/98	270	Resample
LAC5	06/17/98	40	Resample
LAC5	06/22/98	20	
LAC5	06/25/98	70	
LAC5	06/29/98	20	
LAC5	07/02/98	2	K
LAC5	07/06/98	30	
LAC5	07/09/98	30	
LAC5	07/13/98	20	
LAC5	07/17/98	24	
LAC5	07/20/98	12	
LAC5	07/23/98	2	K
LAC5	07/27/98	16	
LAC5	07/30/98	72	
LAC5	08/03/98	8	
LAC5	08/10/98	68	
LAC5	08/13/98	16	
LAC5	08/17/98	24	
LAC5	08/25/98	30	
LAC5	08/31/98	540	
LAC5	09/01/98	60	Resample
LAC6	05/27/98	28	
LAC6	06/02/98	10	
LAC6	06/15/98	204	
LAC6	06/17/98	30	Resample
LAC6	06/22/98	12	
LAC6	06/29/98	4	
LAC6	07/02/98	12	
LAC6	07/06/98	50	
LAC6	07/09/98	20	
LAC6	07/13/98	12	
LAC6	07/17/98	12	
LAC6	07/20/98	40	
LAC6	07/23/98	2	K
LAC6	07/27/98	8	
LAC6	07/30/98	44	
LAC6	08/03/98	4	
LAC6	08/10/98	40	
LAC6	08/13/98	16	
LAC6	08/17/98	4	
LAC6	08/25/98	30	
LAC6	08/31/98	604	
LAC6	09/01/98	20	Resample
Bamber East	06/02/99	8	
	06/08/99	4	
	06/15/99	1	K
	06/24/99	10	
	06/28/99	800	L
	06/29/99	67	
	07/06/99	44	
	07/08/99	40	
	07/12/99	104	
	07/15/99	4	
	07/19/99	4	
	07/22/99	1	K
	07/26/99	60	
	07/29/99	36	
	08/02/99	32	
	08/09/99	40	
	08/12/99	10	
	08/16/99	83	
	08/24/99	10	
	08/30/99	64	
Bamber W	06/02/99	8	
	06/08/99	64	
	06/15/99	1	K
	06/24/99	30	
	06/28/99	800	L
	06/29/99	1	K
	07/06/99	16	
	07/08/99	110	
	07/12/99	152	
	07/15/99	4	
	07/19/99	4	
	07/22/99	16	
	07/26/99	68	
	07/29/99	24	
	08/02/99	36	
	08/09/99	20	
	08/12/99	20	
	08/16/99	117	
	08/24/99	10	
	08/30/99	64	
LAC6	05/31/00	10	
LAC6	06/06/00	17	
LAC6	06/13/00	80	
LAC6	06/20/00	20	
LAC6	06/26/00	26	
LAC6	06/29/00	200	
LAC6	07/06/00	80	
LAC6	07/10/00	32	
LAC6	07/13/00	96	
LAC6	07/17/00	90	
LAC6	07/24/00	1	K
LAC6	07/27/00	920	
LAC6	07/28/00	180	
LAC6	07/31/00	10	
LAC6	08/03/00	20	
LAC6	08/07/00		RESAMPLE
LAC6	08/08/00	30	
LAC6	08/10/00	80	
LAC6	08/14/00	120	
LAC6	08/17/00	40	
LAC6	08/21/00	20	
LAC6	08/24/00	80	
LAC6	08/28/00	50	
LAC5	05/31/00	20	
LAC5	06/06/00	50	
LAC5	06/13/00	640	
LAC5	06/14/00	116	
LAC5	06/20/00	30	
LAC5	06/26/00	132	
LAC5	06/29/00	50	
LAC5	07/06/00	30	
LAC5	07/10/00	64	
LAC5	07/13/00	124	
LAC5	07/17/00	40	
LAC5	07/24/00	1	
LAC5	07/27/00	580	
LAC5	07/28/00	280	

LAC5	07/31/00	10	
LAC5	08/03/00	40	
LAC5	08/07/00	200	
LAC5	08/10/00	190	
LAC5	08/14/00	40	
LAC5	08/17/00	50	
LAC5	08/21/00	10	
LAC5	08/24/00	160	
LAC5	08/28/00	40	
LAC6:Bamber Lake East Beach	05/31/01	20	
LAC6:Bamber Lake East Beach	06/05/01	10	
LAC6:Bamber Lake East Beach	06/12/01	20	
LAC6:Bamber Lake East Beach	06/18/01	560	
LAC6:Bamber Lake East Beach	06/20/01	60	Resample
LAC6:Bamber Lake East Beach	06/21/01	20	
LAC6:Bamber Lake East Beach	06/26/01	40	
LAC6:Bamber Lake East Beach	07/02/01	20	
LAC6:Bamber Lake East Beach	07/10/01	20	
LAC6:Bamber Lake East Beach	07/17/01	10	
LAC6:Bamber Lake East Beach	07/24/01	2	K
LAC6:Bamber Lake East Beach	07/31/01	10	
LAC6:Bamber Lake East Beach	08/07/01	2	K
LAC6:Bamber Lake East Beach	08/14/01	200	
LAC6:Bamber Lake East Beach	08/21/01	2	K
LAC6:Bamber Lake East Beach	08/28/01	600	
LAC6:Bamber Lake East Beach	08/29/01	366	Resample
LAC6:Bamber Lake East Beach	08/30/01	350	Resample
LAC6:Bamber Lake East Beach	08/31/01	2	K-Resample
LAC5:Bamber Lake West Beach	05/31/01	10	
LAC5:Bamber Lake West Beach	06/05/01	10	
LAC5:Bamber Lake West Beach	06/12/01	2	K
LAC5:Bamber Lake West Beach	06/18/01	1600	L
LAC5:Bamber Lake West Beach	06/20/01	220	Resample
LAC5:Bamber Lake West Beach	06/21/01	60	Resample
LAC5:Bamber Lake	06/26/01	2	K

West Beach			
LAC5:Bamber Lake West Beach	07/02/01	20	
LAC5:Bamber Lake West Beach	07/10/01	20	
LAC5:Bamber Lake West Beach	07/17/01	10	
LAC5:Bamber Lake West Beach	07/24/01	2	K
LAC5:Bamber Lake West Beach	07/31/01	2	K
LAC5:Bamber Lake West Beach	08/07/01	10	
LAC5:Bamber Lake West Beach	08/14/01	100	
LAC5:Bamber Lake West Beach	08/21/01	10	
LAC5:Bamber Lake West Beach	08/28/01	900	
LAC5:Bamber Lake West Beach	08/29/01	433	Resample
LAC5:Bamber Lake West Beach	08/30/01	350	Resample
LAC5:Bamber Lake West Beach	08/31/01	2	K-Resample
Bamber Lake East Beach	05/29/02	10	
	06/04/02	10	
	06/11/02	1	K
	06/18/02	20	
	06/25/02	40	
	07/02/02	1	K
	07/09/02	1	K
	07/16/02	10	
	07/23/02	1	K
	07/30/02	30	
	08/06/02	1	K
	08/13/02	1	K
	08/20/02	10	
	08/27/02	10	
Bamber Lake-East	06/03/03	1	K
	06/10/03	2060	
	06/11/03	80	Resample
	06/17/03	20	
	06/24/03	1	K
	07/01/03	20	
	07/08/03	10	
	07/15/03	20	
	07/22/03	20	
	07/29/03	10	
	08/05/03	1	K
	08/12/03	40	
	08/19/03	100	
	08/26/03	1	K
Bamber Lake East Beach	08/17/04	120	
	08/31/04	10	K

	06/02/04	600	L
	06/03/04	40	
	06/08/04	30	
	06/15/04	57	
	06/22/04	20	K
	06/29/04	20	
	07/07/04	30	
	07/13/04	2680	
	07/14/04	620	
	07/15/04	420	
	07/16/04	20	
	07/20/04	50	
	07/27/04	10	K
	08/03/04	20	K
	08/10/04	20	
	08/24/04	10	

Carasaljo Lake			
count	157	mean+3stdev	6151
median	266	%reduction	99%
max	20000		
stdev	1815	**no data excluded**	
mean	708		
mean+3stdev	6151		

Station	**Date**	**Result**	**Remark**
LKW1	05/27/98	100	
LKW1	06/02/98	2	K
LKW1	06/09/98	180	
LKW1	06/16/98	780	
LKW1	06/17/98	240	Resample
LKW1	06/18/98	140	Resample
LKW1	06/23/98	40	
LKW1	06/30/98	50	
LKW1	07/07/98	60	
LKW1	07/14/98	30	
LKW1	07/21/98	2	K
LKW1	07/28/98	2	K
LKW1	08/04/98	40	
LKW1	08/11/98	33	
LKW1	08/18/98	1600	L
LKW1	08/25/98	100	Resample
LKW1	09/01/98	100	
LKW2	05/27/98	110	
LKW2	06/02/98	180	
LKW2	06/09/98	110	
LKW2	06/16/98	960	
LKW2	06/17/98	1060	Resample
LKW2	06/18/98	140	Resample
LKW2	06/23/98	540	
LKW2	06/24/98	390	Resample

LKW2	06/25/98	80	Resample
LKW2	06/30/98	470	
LKW2	07/01/98	120	Resample
LKW2	07/07/98	60	
LKW2	07/14/98	1320	
LKW2	07/15/98	100	Resample
LKW2	07/21/98	230	
LKW2	07/22/98	80	Resample
LKW2	07/28/98	310	
LKW2	07/29/98	190	Resample
LKW2	08/04/98	180	
LKW2	08/11/98	300	
LKW2	08/12/98	800	Resample
LKW2	08/14/98	420	Resample
LKW2	08/18/98	383	
LKW2	08/19/98	480	Resample
LKW2	08/20/98	620	Resample
LKW2	08/21/98	220	Resample
LKW2	08/25/98	880	Resample
LKW2	08/26/98	400	Resample
LKW2	08/28/98	1120	Resample
LKW2	09/01/98	240	Resample
Carasaljo North	06/02/99	30	
	06/08/99	60	
	06/15/99	420	
	06/16/99	160	
	06/22/99	317	
	06/23/99	120	
	06/29/99	1,700	
	06/30/99	317	
	07/01/99	240	
	07/02/99	420	
	07/03/99	860	
	07/04/99	40	
	07/07/99	120	
	07/13/99	280	
	07/14/99	117	
	07/15/99	40	
	07/21/99	1	K
	07/27/99	100	
	08/03/99	20	
	08/10/99	500	
	08/11/99	300	
	08/12/99	620	
	08/13/99	266	
	08/17/99	295	
	08/18/99	260	
	08/19/99	4,000	L
	08/20/99	1,656	
	08/24/99	460	
	08/25/99	133	
	08/31/99	233	
Carasaljo South	06/02/99	670	

	06/03/99	70	
	06/08/99	100	
	06/15/99	1,100	
	06/16/99	780	
	06/17/99	83	
	06/22/99	880	
	06/29/99	520	
	07/07/99	240	
	07/13/99	160	
	07/20/99	250	
	07/27/99	200	
	08/03/99	1	K
	08/10/99	2,000	
	08/17/99	246	
	08/24/99	17	
	08/31/99	100	
LKW2	05/31/00	70	
LKW2	06/06/00	1200	
LKW2	06/07/00	133	
LKW2	06/13/00	283	
LKW2	06/14/00	350	
LKW2	06/15/00	780	
LKW2	06/16/00	2600	
LKW2	06/20/00	250	
LKW2	06/21/00	780	
LKW2	06/22/00	840	
LKW2	06/23/00	800	
LKW2	06/27/00	1233	
LKW2	06/28/00	420	
LKW2	06/29/00	233	
LKW2	06/30/00	133	
LKW2	07/05/00	262	
LKW2	07/06/00	480	
LKW2	07/07/00	680	
LKW2	07/11/00	50	
LKW2	07/18/00	217	
LKW2	07/19/00	267	
LKW2	07/20/00	1300	
LKW2	07/21/00	520	
LKW2	07/25/00	720	
LKW2	07/26/00	20000	
LKW2	07/27/00	9000	
LKW2	07/28/00	714	
LKW2	07/31/00	17	
LKW2	08/08/00	233	
LKW2	08/09/00	250	
LKW2	08/10/00	250	
LKW2	08/11/00	1020	
LKW2	08/15/00	2117	
LKW2	08/16/00	1200	
LKW2	08/17/00	640	
LKW2	08/18/00	317	
LKW2	08/22/00	233	

LKW2	08/23/00	133	
LKW2	08/29/00	420	
LKW1	05/31/00	30	
LKW1	06/06/00	20	
LKW1	06/13/00	233	
LKW1	06/20/00	720	
LKW1	06/27/00	133	
LKW1	07/05/00	820	
LKW1	07/11/00	480	
LKW1	07/18/00	350	
LKW1	07/25/00	67	
LKW1	08/01/00	4000	
LKW1	08/08/00	167	
LKW1	08/15/00	2033	
LKW1	08/22/00	440	
LKW1	08/29/00	1080	
LKW2:Lake Carasaljo North Beach	05/31/01	130	
LKW2:Lake Carasaljo North Beach	06/05/01	67	
LKW2:Lake Carasaljo North Beach	06/12/01	1400	
LKW2:Lake Carasaljo North Beach	06/13/01	260	Resample
LKW2:Lake Carasaljo North Beach	06/14/01	50	Resample
LKW2:Lake Carasaljo North Beach	06/19/01	1600	L
LKW2:Lake Carasaljo North Beach	06/20/01	667	Resample
LKW2:Lake Carasaljo North Beach	06/21/01	360	Resample
LKW2:Lake Carasaljo North Beach	06/22/01	67	Resample
LKW2:Lake Carasaljo North Beach	06/26/01	67	
LKW2:Lake Carasaljo North Beach	07/02/01	520	
LKW2:Lake Carasaljo North Beach	07/05/01	167	Resample
LKW2:Lake Carasaljo North Beach	07/10/01	133	
LKW2:Lake Carasaljo North Beach	07/17/01	133	
LKW2:Lake Carasaljo North Beach	07/24/01	390	
LKW2:Lake Carasaljo North Beach	07/25/01	1600	L-Resample
LKW2:Lake Carasaljo North Beach	07/26/01	67	Resample
LKW2:Lake Carasaljo North Beach	07/31/01	217	
LKW2:Lake Carasaljo North Beach	08/01/01	2	K-Resample
LKW2:Lake Carasaljo North Beach	08/07/01	367	
LKW2:Lake Carasaljo North Beach	08/08/01	33	Resample
LKW2:Lake Carasaljo	08/14/01	1600	L

North Beach			
LKW2:Lake Carasaljo North Beach	08/15/01	660	Resample
LKW2:Lake Carasaljo North Beach	08/16/01	680	Resample
LKW2:Lake Carasaljo North Beach	08/17/01	67	Resample
LKW2:Lake Carasaljo North Beach	08/21/01	1200	
LKW2:Lake Carasaljo North Beach	08/22/01	133	Resample
LKW2:Lake Carasaljo North Beach	08/28/01	1600	L
LKW2:Lake Carasaljo North Beach	08/29/01	2	K-Resample
LKW1:Lake Carasaljo South Beach	05/31/01	50	
LKW1:Lake Carasaljo South Beach	06/05/01	217	
LKW1:Lake Carasaljo South Beach	06/06/01	33	Resample
LKW1:Lake Carasaljo South Beach	06/12/01	216	
LKW1:Lake Carasaljo South Beach	06/13/01	1220	Resample
LKW1:Lake Carasaljo South Beach	06/14/01	50	Resample
LKW1:Lake Carasaljo South Beach	06/19/01	1600	L
LKW1:Lake Carasaljo South Beach	06/20/01	600	Resample
LKW1:Lake Carasaljo South Beach	06/21/01	1460	Resample
LKW1:Lake Carasaljo South Beach	06/22/01	333	Resample
LKW1:Lake Carasaljo South Beach	06/26/01	zero	Error
LKW1:Lake Carasaljo South Beach	06/27/01	200	Resample
LKW1:Lake Carasaljo South Beach	06/28/01	1600	L-Resample
LKW1:Lake Carasaljo South Beach	07/02/01	216	
LKW1:Lake Carasaljo South Beach	07/05/01	420	Resample
LKW1:Lake Carasaljo South Beach	07/06/01	780	Resample
LKW1:Lake Carasaljo South Beach	07/10/01	66	
LKW1:Lake Carasaljo South Beach	07/17/01	2	K
LKW1:Lake Carasaljo South Beach	07/24/01	360	
LKW1:Lake Carasaljo South Beach	07/25/01	1600	L-Resample
LKW1:Lake Carasaljo South Beach	07/26/01	2	K-Resample
LKW1:Lake Carasaljo South Beach	07/31/01	2	K
LKW1:Lake Carasaljo South Beach	08/07/01	133	
LKW1:Lake Carasaljo South Beach	08/14/01	383	
LKW1:Lake Carasaljo South Beach	08/15/01	233	Resample
LKW1:Lake Carasaljo South Beach	08/16/01	67	Resample
LKW1:Lake Carasaljo South Beach	08/21/01	117	
LKW1:Lake Carasaljo South Beach	08/28/01	1600	L
LKW1:Lake Carasaljo South Beach	08/29/01	100	Resample

Deer Head Lake			
count	118	mean+3stdev	926
median	40	%reduction	87%
max	1500		
stdev	263	**no data excluded**	
mean	135		
mean+3stdev	926		

Station	**Date**	**Result**	**Remark**
LAC4	05/27/98	2	K
LAC4	06/02/98	20	
LAC4	06/08/98	2	
LAC4	06/15/98	712	
LAC4	06/16/98	120	Resample
LAC4	06/17/98	80	
LAC4	06/22/98	16	
LAC4	06/25/98	20	
LAC4	06/29/98	18	
LAC4	07/02/98	12	
LAC4	07/06/98	10	
LAC4	07/09/98	2	K
LAC4	07/13/98	2	K
LAC4	07/17/98	4	
LAC4	07/20/98	12	
LAC4	07/23/98	2	K
LAC4	07/27/98	16	
LAC4	07/30/98	4	
LAC4	08/03/98	8	
LAC4	08/10/98	76	
LAC4	08/13/98	4	
LAC4	08/17/98	8	
LAC4	08/25/98	2	K
LAC4	08/31/98	204	
LAC4	09/01/98	10	Resample
Deerhead Upper	06/02/99	20	
	06/08/99	4	
	06/15/99	1	K
	06/24/99	20	
	06/28/99	800	L
	06/29/99	17	
	07/06/99	20	
	07/08/99	20	
	07/12/99	800	L
	07/13/99	90	
	07/15/99	36	
	07/19/99	8	
	07/22/99	1	K
	07/28/99	32	
	07/29/99	40	
	08/02/99	46	
	08/09/99	40	
	08/12/99	30	
	08/16/99	183	
	08/24/99	50	
	08/30/99	44	
LAC4	05/31/00	1	K
LAC4	06/06/00	1060	
LAC4	06/07/00	50	
LAC4	06/13/00	120	
LAC4	06/20/00	30	
LAC4	06/26/00	28	
LAC4	06/29/00	1	
LAC4	07/06/00	20	
LAC4	07/10/00	44	
LAC4	07/13/00	72	
LAC4	07/17/00	10	
LAC4	07/24/00	4	
LAC4	07/27/00	720	
LAC4	07/28/00	160	
LAC4	07/31/00	20	
LAC4	08/03/00	20	
LAC4	08/08/00	20	
LAC4	08/09/00	20	
LAC4	08/10/00	180	
LAC4	08/14/00	70	
LAC4	08/17/00	20	
LAC4	08/21/00	40	
LAC4	08/24/00	110	
LAC4	08/28/00	40	
LAC4:Deerhead Lake Upper Beach	05/31/01	2	K
LAC4:Deerhead Lake Upper Beach	06/05/01	10	
LAC4:Deerhead Lake Upper Beach	06/12/01	10	
LAC4:Deerhead Lake Upper Beach	06/18/01	800	L
LAC4:Deerhead Lake Upper Beach	06/20/01	80	Resample
LAC4:Deerhead Lake Upper Beach	06/21/01	20	
LAC4:Deerhead Lake Upper Beach	06/26/01	20	
LAC4:Deerhead Lake Upper Beach	07/02/01	2	K

LAC4:Deerhead Lake Upper Beach	07/10/01	260	
LAC4:Deerhead Lake Upper Beach	07/11/01	2	K-Resample
LAC4:Deerhead Lake Upper Beach	07/17/01	60	
LAC4:Deerhead Lake Upper Beach	07/24/01	60	
LAC4:Deerhead Lake Upper Beach	07/31/01	90	
LAC4:Deerhead Lake Upper Beach	08/07/01	870	
LAC4:Deerhead Lake Upper Beach	08/08/01	80	Resample
LAC4:Deerhead Lake Upper Beach	08/14/01	1500	
LAC4:Deerhead Lake Upper Beach	08/15/01	1332	Resample
LAC4:Deerhead Lake Upper Beach	08/16/01	220	Resample
LAC4:Deerhead Lake Upper Beach	08/17/01	40	Resample
LAC4:Deerhead Lake Upper Beach	08/21/01	60	
LAC4:Deerhead Lake Upper Beach	08/28/01	250	
LAC4:Deerhead Lake Upper Beach	08/29/01	2	K-Resample
Deer Head Upper Beach	05/29/02	1	K
	06/04/02	20	
	06/11/02	30	
	06/18/02	80	
	06/25/02	1	K
	07/02/02	1	K
	07/09/02	1	K
	07/16/02	1	K
	07/23/02	660	
	07/24/02	120	Resample
	07/30/02	10	
	08/06/02	160	
	08/13/02	30	
	08/20/02	120	
	08/27/02	140	
Deer Head-Upper Beach	06/03/03	20	
	06/10/03	150	
	06/17/03	10	
	06/24/03	80	
	07/01/03	70	
	07/08/03	1	K
	07/15/03	20	
	07/22/03	40	
	07/29/03	10	
	08/05/03	50	
	08/12/03	70	
	08/19/03	10	

	08/26/03	140	
Deer Head Upper Beach	08/17/04	180	
	08/31/04	600	L
	09/01/04	260	
	09/01/04	340	
	09/01/04	340	
	09/02/04	20	
	09/02/04	460	
	09/02/04	100	
	06/02/04	80	
	06/08/04	20	
	06/15/04	20	K
	06/22/04	40	
	06/29/04	40	
	07/07/04	10	
	07/13/04	160	
	07/20/04	20	
	07/27/04	10	
	08/03/04	160	
	08/10/04	40	
	08/24/04	10	K
	09/03/04	40	
	09/03/04	30	
	09/03/04	20	

Holiday Lake			
count	130	mean+3stdev	2561
median	95	% reduction	97%
max	6700		
stdev	750	**no data excluded**	
mean	310		
mean+3stdev	2561		

Station	**Date**	**Result**	**Remark**
STA3	05/18/98	6	
STA3	05/27/98	28	
STA3	06/02/98	36	
STA3	06/08/98	6	
STA3	06/15/98	2	
STA3	06/16/98	370	Resample
STA3	06/17/98	80	Resample
STA3	06/23/98	2	K
STA3	06/30/98	20	
STA3	07/07/98	40	
STA3	07/14/98	20	
STA3	07/21/98	120	
STA3	07/28/98	236	
STA3	07/29/98	428	Resample
STA3	07/30/98	180	Resample
STA3	08/04/98	160	

STA3	08/11/98	1280	
STA3	08/12/98	500	Resample
STA3	08/14/98	1540	Resample
STA3	08/17/98	140	Resample
STA3	08/18/98	50	
STA3	08/25/98	20	
STA3	08/31/98	90	
Ocean Acres	06/02/99	64	
	06/08/99	52	
	06/15/99	240	
	06/16/99	80	
	06/22/99	640	
	06/23/99	420	
	06/24/99	100	
	06/29/99	1680	
	06/30/99	20	
	07/01/99	36	
	07/07/99	1	K
	07/13/99	10	
	07/20/99	433	
	07/21/99	140	
	07/27/99	80	
	08/03/99	800	L
	08/04/99	233	
	08/05/99	120	
	08/10/99	40	
	08/17/99	200	
	08/24/99	290	
	08/25/99	140	
	08/26/99	167	
	08/31/99	50	
STA3	05/22/00	260	
STA3	05/23/00	140	
STA3	05/31/00	10	
STA3	06/06/00	440	
STA3	06/07/00	3000	
STA3	06/08/00	460	
STA3	06/09/00	140	
STA3	06/13/00	740	
STA3	06/14/00	350	
STA3	06/15/00	333	
STA3	06/16/00	316	
STA3	06/19/00	800	
STA3	06/20/00	2200	
STA3	06/21/00	6700	
STA3	06/22/00	540	
STA3	06/23/00	200	
STA3	06/27/00	233	
STA3	06/28/00	83	
STA3	07/05/00	480	
STA3	07/06/00	116	
STA3	07/11/00	233	
STA3	07/12/00	83	

STA3	07/18/00	500	
STA3	07/19/00	116	
STA3	07/25/00	50	
STA3	08/01/00	1120	
STA3	08/02/00	50	
STA3	08/08/00	3300	
STA3	08/09/00	183	
STA3	08/15/00	1283	
STA3	08/16/00	117	
STA3	08/22/00	1	K
STA3	08/29/00	1	
STA3:Ocean Acres	05/23/01	2	K
STA3:Ocean Acres	05/31/01	20	
STA3:Ocean Acres	06/05/01	30	
STA3:Ocean Acres	06/12/01	30	
STA3:Ocean Acres	06/19/01	1600	L
STA3:Ocean Acres	06/20/01	200	Resample
STA3:Ocean Acres	06/26/01	20	
STA3:Ocean Acres	07/02/01	40	
STA3:Ocean Acres	07/10/01	20	
STA3:Ocean Acres	07/17/01	10	
STA3:Ocean Acres	07/24/01	40	
STA3:Ocean Acres	07/31/01	10	
STA3:Ocean Acres	08/07/01	30	
STA3:Ocean Acres	08/14/01	350	
STA3:Ocean Acres	08/15/01	80	Resample
STA3:Ocean Acres	08/21/01	50	
STA3:Ocean Acres	08/28/01	300	
STA3:Ocean Acres	08/29/01	133	Resample
Ocean Acres Beach	05/21/02	30	
	05/29/02	1	K
	06/04/02	10	
	06/11/02	230	
	06/12/02	100	Resample
	06/18/02	1	K
	06/25/02	120	
	07/02/02	40	
	07/09/02	10	
	07/16/02	60	
	07/23/02	80	
	07/30/02	20	
	08/06/02	90	
	08/13/02	1	K
	08/20/02	100	
	08/27/02	260	
	08/28/02	200	Resample
Ocean Acres Beach	05/28/03	20	
	06/03/03	10	
	06/10/03	520	
	06/11/03	80	Resample
	06/17/03	20	
	06/24/03	40	

	07/01/03	10	
	07/08/03	40	
	07/15/03	30	
	07/22/03	90	
	07/29/03	20	
	08/05/03	1	K
	08/12/03	70	
	08/19/03	270	
	08/20/03	140	Resample
	08/26/03	20	
Ocean Acres Beach	08/17/04	180	
	08/31/04	120	
	05/28/04	58	
	06/02/04	190	
	06/08/04	90	
	06/15/04	14	
	06/22/04	20	K
	06/29/04	23	
	07/07/04	17	
	07/13/04	620	
	07/14/04	480	
	07/15/04	167	
	07/27/04	8	
	08/03/04	400	
	08/04/04	340	
	08/04/04	620	
	08/04/04	310	
	08/05/04	67	
	08/05/04	100	
	08/05/04	83	
	08/10/04	42	
	08/24/04	10	

Lake Barnegat			
count	158	mean+3stdev	1533
median	100	%reduction	92%
max	2420		
stdev	423	**no data excluded**	
mean	264		
mean+3stdev	1533		

Station	**Date**	**Result**	**Remark**
LAC3	05/27/98	2	K
LAC3	06/02/98	50	
LAC3	06/08/98	54	
LAC3	06/15/98	800	
LAC3	06/16/98	210	Resample
LAC3	06/17/98	180	Resample
LAC3	06/22/98	60	
LAC3	06/25/98	140	

LAC3	06/29/98	16	
LAC3	07/02/98	2	K
LAC3	07/06/98	110	
LAC3	07/09/98	40	
LAC3	07/13/98	28	
LAC3	07/17/98	2	K
LAC3	07/20/98	12	
LAC3	07/23/98	2	K
LAC3	07/27/98	24	
LAC3	07/30/98	44	
LAC3	08/03/98	2	K
LAC3	08/10/98	52	
LAC3	08/13/98	4	
LAC3	08/17/98	8	
LAC3	08/25/98	30	
LAC3	08/31/98	536	
LAC3	09/01/98	80	Resample
	06/03/99	90	
	06/08/99	24	
	06/15/99	100	
	06/24/99	10	
	06/28/99	800	L
	06/29/99	1120	
	06/30/99	1	K
	07/06/99	12	
	07/08/99	60	
	07/12/99	120	
	07/15/99	12	
	07/19/99	8	
	07/22/99	4	
	07/26/99	48	
	07/29/99	104	
	08/02/99	60	
	08/09/99	40	
	08/12/99	10	
	08/16/99	180	
	08/24/99	10	
	08/30/99	72	
LAC3	05/31/00	1	K
LAC3	06/06/00	860	
LAC3	06/07/00	50	
LAC3	06/13/00	180	
LAC3	06/20/00	120	
LAC3	06/26/00	336	
LAC3	06/27/00	60	
LAC3	06/29/00	90	
LAC3	07/06/00	10	
LAC3	07/10/00	88	
LAC3	07/13/00	44	
LAC3	07/17/00	130	
LAC3	07/24/00	144	
LAC3	07/27/00	520	
LAC3	07/28/00	160	

LAC3	07/31/00	40	
LAC3	08/03/00	40	
LAC3	08/07/00	270	
LAC3	08/08/00	2000	
LAC3	08/09/00	60	
LAC3	08/10/00	310	
LAC3	08/11/00	40	
LAC3	08/14/00	90	
LAC3	08/17/00	10	
LAC3	08/21/00	1	
LAC3	08/24/00	90	
LAC3	08/28/00	30	
LAC3:Lake Barnegat Middle Beach	05/31/01	60	
LAC3:Lake Barnegat Middle Beach	06/05/01	40	
LAC3:Lake Barnegat Middle Beach	06/12/01	60	
LAC3:Lake Barnegat Middle Beach	06/18/01	312	
LAC3:Lake Barnegat Middle Beach	06/20/01	260	Resample
LAC3:Lake Barnegat Middle Beach	06/21/01	360	Resample
LAC3:Lake Barnegat Middle Beach	06/22/01	160	Resample
LAC3:Lake Barnegat Middle Beach	06/26/01	60	
LAC3:Lake Barnegat Middle Beach	07/02/01	20	
LAC3:Lake Barnegat Middle Beach	07/10/01	160	
LAC3:Lake Barnegat Middle Beach	07/17/01	60	
LAC3:Lake Barnegat Middle Beach	07/24/01	140	
LAC3:Lake Barnegat Middle Beach	07/31/01	90	
LAC3:Lake Barnegat Middle Beach	08/07/01	930	
LAC3:Lake Barnegat Middle Beach	08/08/01	20	Resample
LAC3:Lake Barnegat Middle Beach	08/14/01	1400	
LAC3:Lake Barnegat Middle Beach	08/15/01	699	Resample
LAC3:Lake Barnegat Middle Beach	08/16/01	100	Resample
LAC3:Lake Barnegat Middle Beach	08/21/01	200	
LAC3:Lake Barnegat Middle Beach	08/28/01	100	
Lake Barnegat Middle Beach	05/29/02	1	K
	06/04/02	10	
	06/11/02	1	K
	06/18/02	50	
	06/25/02	40	
	07/02/02	30	
	07/09/02	30	
	07/16/02	170	
	07/23/02	70	
	07/30/02	20	
	08/06/02	340	
	08/07/02	130	Resample
	08/13/02	120	
	08/20/02	860	
	08/21/02	10	Resample
	08/27/02	210	
	08/28/02	30	Resample
Lake Barnegat	06/03/03	1	K
	06/10/03	80	
	06/17/03	180	
	06/24/03	720	
	06/25/03	220	Resample
	06/26/03	340	Resample
	06/27/03	340	Resample
	06/28/03	20	Resample
	07/01/03	20	
	07/08/03	80	
	07/15/03	30	
	07/22/03	40	
	07/29/03	20	
	08/05/03	40	
	08/12/03	530	
	08/13/03	120	Resample
	08/19/03	80	
	08/26/03	1	K
Lake Barnegat Middle Beach	08/17/04	680	
	08/31/04	1460	
	09/01/04	500	
	09/01/04	200	
	09/01/04	300	
	09/02/04	190	
	09/02/04	90	
	09/02/04	80	
	06/02/04	240	
	06/03/04	50	
	06/08/04	80	
	06/15/04	71	
	06/22/04	20	
	06/29/04	60	
	07/07/04	20	
	07/13/04	1200	L
	07/14/04	440	
	07/15/04	217	
	07/16/04	60	
	07/20/04	250	
	07/21/04	117	
	07/27/04	120	
	08/03/04	400	
	08/04/04	750	
	08/04/04	790	
	08/04/04	760	
	08/05/04	2380	
	08/05/04	2420	
	08/05/04	1860	
	08/06/04	183	
	08/06/04	150	
	08/06/04	300	
	08/09/04	20	
	08/09/04	60	
	08/09/04	20	
	08/10/04	630	
	08/11/04	183	
	08/11/04	83	
	08/11/04	75	
	08/18/04	460	
	08/18/04	500	
	08/18/04	1420	
	08/19/04	117	
	08/19/04	83	
	08/19/04	100	
	08/24/04	480	
	08/25/04	220	
	08/25/04	220	
	08/25/04	300	
	08/26/04	280	
	08/26/04	540	
	08/26/04	310	
	08/30/04	100	
	08/30/04	130	
	08/30/04	80	

Manahawkin Lake			
count	179	mean+3stdev	2971
median	209	%reduction	96%
max	4600		
stdev	836	**no data excluded**	
mean	462		
mean+3stdev	2971		

Station	**Date**	**Result**	**Remark**
STA1	05/27/98	12	
STA1	06/02/98	76	
STA1	06/08/98	40	
STA1	06/15/98	2	
STA1	06/16/98	220	Resample
STA1	06/17/98	120	Resample
STA1	06/23/98	50	
STA1	06/30/98	190	
STA1	07/07/98	70	
STA1	07/14/98	210	
STA1	07/15/98	60	Resample
STA1	07/21/98	240	
STA1	07/22/98	80	Resample
STA1	07/28/98	304	
STA1	07/29/98	116	Resample
STA1	08/04/98	80	
STA1	08/11/98	60	
STA1	08/18/98	150	
STA1	08/25/98	20	
STA1	08/31/98	40	
A Paul King	06/02/99	60	
	06/08/99	116	
	06/15/99	260	
	06/16/99	500	
	06/17/99	250	
	06/18/99	80	
	06/22/99	1080	
	06/23/99	460	
	06/24/99	160	
	06/30/99	340	
	07/01/99	1118	
	07/02/99	240	
	07/03/99	120	
	07/07/99	300	
	07/09/99	216	
	07/10/99	50	
	07/13/99	340	
	07/14/99	140	
	07/20/99	167	
	07/27/99	120	
	08/03/99	72	
	08/10/99	100	
	08/17/99	33	
	08/24/99	160	
	08/31/99	200	
STA1	05/31/00	10	
STA1	06/06/00	4600	
STA1	06/07/00	680	
STA1	06/08/00	340	
STA1	06/09/00	160	
STA1	06/13/00	760	
STA1	06/14/00	1000	
STA1	06/15/00	300	
STA1	06/16/00	100	
STA1	06/20/00	3600	
STA1	06/21/00	880	
STA1	06/22/00	420	
STA1	06/23/00	100	
STA1	06/27/00	50	
STA1	07/05/00	150	
STA1	07/11/00	1	
STA1	07/18/00	67	
STA1	07/25/00	183	
STA1	08/01/00	250	
STA1	08/02/00	150	
STA1	08/08/00	740	
STA1	08/09/00	133	
STA1	08/15/00	100	
STA1	08/22/00	1	K
STA1	08/29/00	200	
STA1:A. Paul King Park Beach	05/31/01	40	
STA1:A. Paul King Park Beach	06/05/01	20	
STA1:A. Paul King Park Beach	06/13/01	80	Resample
STA1:A. Paul King Park Beach	06/20/01	20	Resample
STA1:A. Paul King Park Beach	06/26/01	240	
STA1:A. Paul King Park Beach	06/27/01	60	Resample
STA1:A. Paul King Park Beach	07/02/01	720	
STA1:A. Paul King Park Beach	07/03/01	140	Resample
STA1:A. Paul King Park Beach	07/10/01	20	
STA1:A. Paul King Park Beach	07/17/01	100	
STA1:A. Paul King Park Beach	07/24/01	10	
STA1:A. Paul King Park Beach	07/31/01	150	
STA1:A. Paul King Park Beach	08/07/01	50	
STA1:A. Paul King Park Beach	08/14/01	350	
STA1:A. Paul King Park Beach	08/15/01	280	Resample
STA1:A. Paul King Park Beach	08/16/01	20	Resample
STA1:A. Paul King Park Beach	08/21/01	300	
STA1:A. Paul King Park Beach	08/22/01	130	Resample
STA1:A. Paul King Park Beach	08/28/01	50	
A. Paul King Beach	05/21/02	30	
	05/29/02	130	
	06/04/02	230	
	06/05/02	510	Resample
	06/06/02	1600	L-Resample
	06/10/02	220	Resample
	06/11/02	1	K-Resample
	06/18/02	40	
	06/25/02	80	
	07/02/02	100	
	07/09/02	10	
	07/16/02	60	
	07/23/02	1	K
	07/30/02	470	
	07/31/02	40	Resample
	08/06/02	130	
	08/13/02	10	
	08/20/02	260	
	08/21/02	50	Resample
	08/27/02	70	
A.Paul King Park Beach	05/28/03	280	
	05/29/03	120	Resample
	06/03/03	60	
	06/10/03	240	
	06/11/03	160	Resample
	06/17/03	120	
	06/24/03	1	K
	07/01/03	50	
	07/08/03	150	
	07/15/03	110	
	07/22/03	450	
	07/24/03	233	Resample
	07/25/03	140	Resample
	07/29/03	140	
	08/05/03	240	
	08/06/03	540	Resample
	08/07/03	250	Resample
	08/08/03	240	Resample
	08/09/03	2880	Resample
	08/11/03	600	Resample
	08/12/03	230	Resample
	08/13/03	80	Resample

	08/19/03	230	
	08/20/03	50	Resample
	08/26/03	90	
A. Paul King Park Beach	06/18/04	3600	
	06/18/04	3200	
	06/18/04	500	
	06/19/04	300	
	08/17/04	960	
	08/31/04	780	
	09/01/04	60	
	09/01/04	260	
	09/01/04	160	
	09/02/04	160	
	09/02/04	670	
	09/02/04	230	
	06/02/04	600	
	06/03/04	140	
	06/08/04	60	
	06/15/04	300	
	06/16/04	4600	
	06/17/04	4000	
	06/22/04	280	
	06/23/04	600	
	06/24/04	60	
	06/29/04	209	
	06/30/04	92	
	07/07/04	240	
	07/08/04	130	
	07/13/04	258	
	07/14/04	1040	
	07/15/04	1417	
	07/16/04	750	
	07/27/04	530	
	07/28/04	250	
	07/28/04	420	
	07/28/04	467	
	07/29/04	740	
	07/29/04	740	
	07/29/04	917	
	07/30/04	120	
	07/30/04	320	
	07/30/04	280	
	08/03/04	1267	
	08/04/04	420	
	08/04/04	480	
	08/04/04	580	
	08/05/04	333	
	08/05/04	267	
	08/05/04	233	
	08/06/04	158	
	08/06/04	67	
	08/06/04	100	
	08/10/04	42	

	08/18/04	3220	
	08/18/04	3440	
	08/18/04	3340	
	08/19/04	333	
	08/19/04	283	
	08/19/04	283	
	08/20/04	60	
	08/20/04	140	
	08/20/04	220	
	08/24/04	133	
	08/24/04	100	
	08/24/04	75	
	09/03/04	210	
	09/03/04	180	
	09/03/04	180	

Ocean County Park Lake			
count	206	mean+3stdev	2960
median	265	% reduction	95%
max	4400		
stdev	784	**no data excluded**	
mean	608		
mean+3stdev	2960		

Station	**Date**	**Result**	**Remark**
LKW3	05/27/98	880	
LKW3	06/09/98	10	
LKW3	06/16/98	1420	
LKW3	06/17/98	180	Resample
LKW3	06/23/98	280	
LKW3	06/24/98	580	Resample
LKW3	06/25/98	290	Resample
LKW3	06/26/98	140	Resample
LKW3	06/30/98	190	
LKW3	07/07/98	1420	
LKW3	07/08/98	460	Resample
LKW3	07/09/98	340	Resample
LKW3	07/10/98	120	Resample
LKW3	07/14/98	40	
LKW3	07/21/98	790	
LKW3	07/22/98	110	Resample
LKW3	07/28/98	550	
LKW3	07/29/98	280	Resample
LKW3	07/30/98	280	Resample
LKW3	07/31/98	1600	L
LKW3	08/04/98	40	Resample
LKW3	08/11/98	1183	
LKW3	08/12/98	680	Resample
LKW3	08/14/98	480	Resample
LKW3	08/18/98	1600	L
LKW3	08/19/98	820	Resample

LKW3	08/20/98	480	Resample
LKW3	08/21/98	700	Resample
LKW3	08/25/98	440	Resample
LKW3	08/26/98	660	Resample
LKW3	08/27/98	1600	Resample
LKW3	08/27/98	580	Resample
LKW3	08/28/98	1020	Resample
LKW3	09/01/98	240	Resample
LKW3	09/02/98	340	Resample
LKW3	09/03/98	560	Resample
LKW3	09/04/98	600	Resample
Ocean County Park	06/02/99	80	
	06/08/99	20	
	06/15/99	17	
	06/22/99	183	
	06/29/99	17	
	07/07/99	120	
	07/13/99	40	
	07/20/99	100	
	07/27/99	100	
	08/03/99	60	
	08/10/99	3200	
	08/11/99	2767	
	08/12/99	4100	
	08/13/99	2283	
	08/17/99	3200	
	08/18/99	2000	
	08/19/99	1180	
	08/20/99	2400	
	08/24/99	333	
	08/25/99	800	
	08/26/99	1967	
	08/27/99	2300	
	08/31/99	1160	
LKW3	05/31/00	40	
LKW3	06/06/00	400	
LKW3	06/07/00	233	
LKW3	06/08/00	1	K
LKW3	06/13/00	167	
LKW3	06/20/00	16	
LKW3	06/21/00	50	
LKW3	06/27/00	350	
LKW3	06/28/00	480	
LKW3	06/29/00	960	
LKW3	07/01/00	920	
LKW3	07/03/00	0	Confluent Growth
LKW3	07/05/00	115	
LKW3	07/11/00	183	
LKW3	07/18/00	133	
LKW3	07/25/00	480	
LKW3	07/26/00	3000	
LKW3	07/27/00	1500	
LKW3	07/28/00	381	

LKW3	07/31/00	67	
LKW3	08/08/00	720	
LKW3	08/09/00	1060	
LKW3	08/10/00	2000	
LKW3	08/11/00	1160	
LKW3	08/15/00	300	
LKW3	08/16/00	1733	
LKW3	08/17/00	200	
LKW3	08/22/00	117	
LKW3	08/29/00	800	
LKW3	08/30/00	860	
LKW3	08/31/00	4400	
LKW3	09/01/00	1900	
LKW3:Ocean County Park Beach	05/31/01	900	
LKW3:Ocean County Park Beach	06/01/01	20	Resample
LKW3:Ocean County Park Beach	06/05/01	33	
LKW3:Ocean County Park Beach	06/12/01	100	
LKW3:Ocean County Park Beach	06/19/01	1600	L
LKW3:Ocean County Park Beach	06/20/01	33	Resample
LKW3:Ocean County Park Beach	06/26/01	2	K
LKW3:Ocean County Park Beach	07/02/01	300	
LKW3:Ocean County Park Beach	07/03/01	133	Resample
LKW3:Ocean County Park Beach	07/10/01	100	
LKW3:Ocean County Park Beach	07/17/01	67	
LKW3:Ocean County Park Beach	07/24/01	1600	L
LKW3:Ocean County Park Beach	07/25/01	250	Resample
LKW3:Ocean County Park Beach	07/26/01	1600	L-Resample
LKW3:Ocean County Park Beach	07/27/01	1600	Resample
LKW3:Ocean County Park Beach	07/31/01	1600	L
LKW3:Ocean County Park Beach	08/01/01	1040	Resample
LKW3:Ocean County Park Beach	08/02/01	0	ConFC
LKW3:Ocean County Park Beach	08/03/01	350	Resample
LKW3:Ocean County Park Beach	08/07/01	960	
LKW3:Ocean County Park Beach	08/08/01	760	Resample
LKW3:Ocean County Park Beach	08/09/01	320	Resample
LKW3:Ocean County Park Beach	08/10/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/14/01	1600	L
LKW3:Ocean County Park Beach	08/15/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/16/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/17/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/21/01	1600	L
LKW3:Ocean County Park Beach	08/22/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/23/01	1500	Resample
LKW3:Ocean County Park Beach	08/24/01	1600	L-Resample
LKW3:Ocean County Park Beach	08/28/01	1600	L
LKW3:Ocean County Park Beach	08/29/01	550	Resample
LKW3:Ocean County Park Beach	08/30/01	150	Resample
Ocean County Park Beach	05/29/02	333	
	05/30/02	33	Resample
	06/04/02	67	
	06/11/02	140	
	06/18/02	1	K
	06/25/02	1	K
	07/02/02	20	
	07/09/02	1	K
	07/16/02	60	
	07/23/02	70	
	07/30/02	1	K
	08/06/02	1600	L
	08/07/02	700	Resample
	08/08/02	240	Resample
	08/09/02	100	Resample
	08/13/02	690	
	08/14/02	1600	L-Resample
	08/15/02	590	Resample
	08/16/02	120	Resample
	08/20/02	1600	
	08/21/02	140	Resample
	08/27/02	1600	
	08/28/02	1600	Resample
	08/29/02	380	Resample
	08/30/02	560	Resample
	09/04/02	1600	Resample
	09/05/02	190	Resample
Ocean County Park Beach	06/03/03	10	
	06/10/03	60	
	06/17/03	20	
	06/24/03	40	
	07/01/03	1	K
	07/08/03	60	
	07/16/03	87	Resample
	07/22/03	200	
	07/29/03	520	
	07/30/03	120	Resample
	08/05/03	480	
	08/06/03	780	Resample
	08/07/03	900	Resample
	08/08/03	1440	Resample
	08/09/03	2660	Resample
	08/11/03	283	Resample
	08/12/03	200	Resample
	08/19/03	217	
	08/20/03	1	K Resample
	08/26/03	1167	
	08/27/03	183	Resample
Ocean County Park Beach	08/17/04	300	
	08/17/04	67	
	08/17/04	283	
	08/23/04	125	
	08/23/04	208	
	08/23/04	260	
	08/31/04	60	
	06/02/04	7	
	06/08/04	100	
	06/15/04	17	
	06/22/04	17	
	06/29/04	70	
	07/07/04	117	
	07/13/04	283	
	07/14/04	133	
	07/20/04	75	
	07/27/04	280	
	07/28/04	433	
	07/28/04	540	
	07/28/04	480	
	07/29/04	183	
	07/29/04	183	
	07/29/04	100	
	07/30/04	100	
	07/30/04	60	
	07/30/04	240	
	08/03/04	300	
	08/04/04	290	
	08/04/04	180	
	08/04/04	410	
	08/05/04	720	
	08/05/04	740	
	08/05/04	1583	
	08/06/04	480	
	08/06/04	460	
	08/06/04	600	

	08/09/04	340	
	08/09/04	67	
	08/09/04	210	
	08/10/04	210	
	08/10/04	270	
	08/10/04	260	
	08/11/04	175	
	08/11/04	158	
	08/11/04	220	
	08/12/04	310	
	08/12/04	230	
	08/12/04	290	
	08/16/04	480	
	08/16/04	283	
	08/16/04	233	
	08/18/04	150	
	08/18/04	383	
	08/18/04	183	
	08/19/04	250	
	08/19/04	217	
	08/19/04	233	
	08/20/04	420	
	08/20/04	240	
	08/20/04	20	k
	08/24/04	470	
	08/24/04	410	
	08/24/04	440	
	08/25/04	460	
	08/25/04	30	
	08/25/04	200	
	08/26/04	117	
	08/26/04	133	
	08/26/04	125	

Ocean Twp Bathing Beach			
Count	118	mean+3stdev	2191
Median	40	%reduction	95%
Max	4000		
stdev	648	**no data excluded**	
mean	247		
mean+3stdev	2191		

Station	**Date**	**Result**	**Remark**
OCN1	05/27/98	8	
OCN1	06/02/98	12	
OCN1	06/08/98	4	
OCN1	06/16/98	201	
OCN1	06/17/98	140	Resample
OCN1	06/23/98	2	K
OCN1	06/30/98	10	
OCN1	07/07/98	2	K

OCN1	07/14/98	2	K
OCN1	07/21/98	2	K
OCN1	07/28/98	2	K
OCN1	08/04/98	2	K
OCN1	08/11/98	40	
OCN1	08/18/98	60	
OCN1	08/25/98	2	K
OCN1	08/31/98	30	
Ocean Township	06/02/99	12	
	06/08/99	20	
	06/15/99	1	K
	06/22/99	3900	
	06/23/99	760	
	06/24/99	210	
	06/25/99	40	
	06/29/99	1	K
	07/07/99	1	K
	07/13/99	1	K
	07/20/99	40	
	07/27/99	1	K
	08/03/99	72	
	08/10/99	20	
	08/17/99	120	
	08/24/99	10	
	08/31/99	40	
OCN1	05/31/00	1	K
OCN1	06/05/00	20	
OCN1	06/06/00	1360	
OCN1	06/07/00	333	
OCN1	06/08/00	160	
OCN1	06/12/00	48	
OCN1	06/13/00	220	
OCN1	06/14/00	50	
OCN1	06/20/00	300	
OCN1	06/21/00	134	
OCN1	06/27/00	1	
OCN1	07/05/00	10	
OCN1	07/11/00	1	
OCN1	07/18/00	1	
OCN1	07/25/00	40	
OCN1	08/01/00	180	
OCN1	08/08/00	90	
OCN1	08/15/00	60	
OCN1	08/22/00	80	
OCN1	08/29/00	4000	
OCN1	08/30/00	1160	
OCN1	08/31/00	283	
OCN1	09/01/00	3000	
OCN1:Ocean Township Bathing Beach	05/24/01	10	
OCN1:Ocean Township Bathing Beach	05/31/01	10	
OCN1:Ocean Township Bathing Beach	06/05/01	20	

OCN1:Ocean Township Bathing Beach	06/12/01	20	
OCN1:Ocean Township Bathing Beach	06/19/01	470	
OCN1:Ocean Township Bathing Beach	06/20/01	60	Resample
OCN1:Ocean Township Bathing Beach	06/26/01	2	K
OCN1:Ocean Township Bathing Beach	07/02/01	40	
OCN1:Ocean Township Bathing Beach	07/10/01	2	K
OCN1:Ocean Township Bathing Beach	07/17/01	70	
OCN1:Ocean Township Bathing Beach	07/24/01	40	
OCN1:Ocean Township Bathing Beach	07/31/01	110	
OCN1:Ocean Township Bathing Beach	08/07/01	1030	
OCN1:Ocean Township Bathing Beach	08/08/01	2	K-Resample
OCN1:Ocean Township Bathing Beach	08/14/01	1550	
OCN1:Ocean Township Bathing Beach	08/15/01	33	Resample
OCN1:Ocean Township Bathing Beach	08/21/01	10	
OCN1:Ocean Township Bathing Beach	08/28/01	2	K
Ocean Township Beach	05/29/02	90	
	06/04/02	50	
	06/11/02	70	
	06/18/02	1	K
	06/25/02	1	K
	07/02/02	120	
	07/09/02	1	K
	07/16/02	1	K
	07/23/02	1	K
	07/30/02	10	
	08/06/02	20	
	08/13/02	1	K
	08/20/02	40	
	08/27/02	20	
Ocean Twp Bathing Beach	06/03/03	20	
	06/10/03	280	
	06/11/03	80	Resample
	06/17/03	30	
	06/24/03	60	
	07/01/03	1	K
	07/08/03	10	
	07/15/03	10	
	07/22/03	10	
	07/29/03	1	K
	08/05/03	30	
	08/12/03	20	

	08/19/03	10	
	08/20/03	20	
	08/26/03	1	K
Ocean Twp. Beach	08/17/04	220	
	08/31/04	200	
	06/02/04	40	
	06/08/04	10	
	06/15/04	14	
	06/22/04	20	
	06/29/04	20	K
	07/07/04	10	K
	07/13/04	540	
	07/14/04	2400	
	07/15/04	350	
	07/16/04	220	
	07/27/04	210	
	07/28/04	460	
	07/28/04	800	
	07/28/04	640	
	07/29/04	117	
	07/29/04	333	
	07/29/04	317	
	07/30/04	40	
	07/30/04	100	
	07/30/04	140	
	08/03/04	300	
	08/04/04	70	
	08/04/04	100	
	08/04/04	70	
	08/10/04	10	K
	08/18/04	80	
	08/18/04	20	
	08/18/04	40	
	08/24/04	10	

Pine Lake			
count	189	mean+3stdev	6271
median	240	%reduction	99%
max	14000		
stdev	1819	**no data excluded**	
mean	814		
mean+3stdev	6271		

Station	**Date**	**Result**	**Remark**
MCH1	05/21/98	460	
MCH1	06/23/98	150	
MCH1	07/07/98	70	
MCH1	07/14/98	20	
MCH1	07/21/98	40	
MCH1	07/28/98	140	
Pine Lake	05/28/99	60	

	06/02/99	20	
	06/08/99	280	
	06/09/99	480	
	06/10/99	80	
	06/15/99	80	
	06/22/99	1,400	
	06/23/99	160	
	06/29/99	20	
	07/07/99	80	
	07/13/99	60	
	07/20/99	20	
	07/27/99	10	
	08/03/99	16	
	08/10/99	40	
	08/17/99	60	
	08/24/99	10	
	08/31/99	60	
MCH2	05/17/00	136	
MCH2	05/23/00	60	
MCH2	05/31/00	70	
MCH2	06/06/00	80	
MCH2	06/13/00	120	
MCH2	06/20/00	290	
MCH2	06/21/00	250	
MCH2	06/22/00	67	
MCH2	06/28/00	148	
MCH2	07/05/00	80	
MCH2	07/11/00	20	
MCH2	07/18/00	240	
MCH2	07/19/00	260	
MCH2	07/20/00	380	
MCH2	07/21/00	1750	
MCH2	07/25/00	680	
MCH2	07/26/00	117	
MCH2	08/01/00	180	
MCH2	08/08/00	50	
MCH2	08/15/00	240	
MCH2	08/16/00	460	
MCH2	08/17/00	233	
MCH2	08/18/00	233	
MCH2	08/22/00	150	
MCH2	08/29/00	117	
MCH2:Pine Lake Park	07/11/01	500	
MCH2:Pine Lake Park	07/12/01	540	Resample
MCH2:Pine Lake Park	07/13/01	440	Resample
MCH2:Pine Lake Park	07/17/01	410	
MCH2:Pine Lake Park	07/18/01	1340	Resample
MCH2:Pine Lake Park	07/19/01	1600	Resample
MCH2:Pine Lake	07/20/01	1600	L-Resample

Park			
MCH2:Pine Lake Park	07/24/01	210	
MCH2:Pine Lake Park	07/25/01	300	Resample
MCH2:Pine Lake Park	07/26/01	280	Resample
MCH2:Pine Lake Park	07/27/01	220	Resample
MCH2:Pine Lake Park	07/31/01	410	
MCH2:Pine Lake Park	08/01/01	1400	Resample
MCH2:Pine Lake Park	08/02/01	470	Resample
MCH2:Pine Lake Park	08/03/01	240	Resample
MCH2:Pine Lake Park	08/07/01	540	
MCH2:Pine Lake Park	08/08/01	480	Resample
MCH2:Pine Lake Park	08/09/01	1420	Resample
MCH2:Pine Lake Park	08/10/01	840	Resample
MCH2:Pine Lake Park	08/14/01	1600	L
MCH2:Pine Lake Park	08/15/01	1265	Resample
MCH2:Pine Lake Park	08/16/01	580	Resample
MCH2:Pine Lake Park	08/17/01	180	Resample
MCH2:Pine Lake Park	08/21/01	1600	L
MCH2:Pine Lake Park	08/22/01	640	Resample
MCH2:Pine Lake Park	08/23/01	1167	Resample
MCH2:Pine Lake Park	08/24/01	1600	L-Resample
MCH2:Pine Lake Park	08/28/01	1600	L
MCH2:Pine Lake Park	08/29/01	1600	L-Resample
MCH2:Pine Lake Park	08/30/01	1600	L-Resample
MCH2:Pine Lake Park	08/31/01	100	Resample
Pine Lake Beach	05/21/02	30	
	05/29/02	50	
	06/04/02	180	
	06/11/02	120	
	06/18/02	90	
	06/25/02	50	
	07/02/02	1	K
	07/09/02	110	
	07/16/02	100	
	07/23/02	120	

	07/30/02	230	
	07/31/02	1	K-Resample
	08/06/02	270	
	08/07/02	50	Resample
	08/13/02	40	
	08/20/02	1520	
	08/21/02	430	Resample
	08/22/02	220	Resample
	08/23/02	740	Resample
	08/27/02	560	
	08/28/02	440	Resample
	08/29/02	1	Error
	08/30/02	20	Resample
Pine Lake Park	05/20/03	50	
	05/28/03	540	
	05/29/03	370	Resample
	05/30/03	130	Resample
	06/04/03	350	Resample
	06/05/03	1140	Resample
	06/06/03	93	Resample
	06/10/03	600	
	06/11/03	80	Resample
	06/17/03	250	
	06/18/03	80	Resample
	06/24/03	20	
	07/01/03	100	
	07/08/03	80	
	07/15/03	70	
	07/22/03	160	
	07/29/03	210	
	07/30/03	410	Resample
	07/31/03	180	Resample
	08/05/03	750	
	08/06/03	700	Resample
	08/07/03	1180	Resample
	08/07/03	167	Resample
	08/12/03	120	
	08/19/03	730	
	08/20/03	1860	Resample
	08/21/03	4000	L Resample
	08/22/03	660	Resample
	08/23/03	420	Resample
	08/25/03	340	Resample
	08/26/03	140	Resample
Pine Lake Beach	08/17/04	14000	
	08/31/04	220	
	09/01/04	4650	
	09/01/04	3650	
	09/01/04	4850	
	09/02/04	100	
	09/02/04	150	
	09/02/04	100	
	05/28/04	133	

	06/02/04	510	
	06/03/04	160	
	06/08/04	40	
	06/15/04	257	
	06/16/04	390	
	06/17/04	69	
	06/22/04	33	
	06/29/04	160	
	07/07/04	140	
	07/13/04	1700	
	07/14/04	2800	
	07/15/04	960	
	07/16/04	240	
	07/21/04	208	
	07/22/04	108	
	07/22/04	100	
	07/22/04	58	
	07/27/04	480	
	07/28/04	8100	
	07/28/04	3233	
	07/28/04	10600	
	07/29/04	960	
	07/29/04	381	
	07/29/04	480	
	07/30/04	180	
	07/30/04	120	
	07/30/04	220	
	08/02/04	2400	
	08/02/04	2133	
	08/02/04	1400	
	08/03/04	450	
	08/03/04	500	
	08/03/04	760	
	08/04/04	160	
	08/04/04	200	
	08/04/04	120	
	08/10/04	150	
	08/18/04	460	
	08/18/04	350	
	08/18/04	100	
	08/19/04	8100	
	08/19/04	10900	
	08/19/04	4600	
	08/20/04	279	
	08/20/04	163	
	08/20/04	256	
	08/24/04	370	
	08/24/04	1000	
	08/24/04	400	
	08/25/04	180	
	08/25/04	180	
	08/25/04	160	

WMA 14

Hammonton Lake			
Count	490	mean+3 std dev	1485
median	69	% reduction	96%
Max	5011		
std dev	429	**no data excluded**	
mean	197		
mean+3 std dev	1485		

Station ID	Date	Fecal Coli/100	Remark
CENTER	05/19/00	211	
CENTER	05/19/00	437	
CENTER	05/19/00	1684	
CENTER	05/20/00	420	
CENTER	05/20/00	355	
CENTER	05/20/00	976	
CENTER	05/22/00	427	
CENTER	05/22/00	323	
CENTER	05/22/00	410	
CENTER	05/29/00	396	
CENTER	05/29/00	317	
CENTER	05/29/00	464	
CENTER	05/30/00	94	
CENTER	05/30/00	47	
CENTER	05/30/00	37	
CENTER	05/31/00	32	
CENTER	05/31/00	41	
CENTER	05/31/00	34	
CENTER	06/01/00	23	
CENTER	06/01/00	26	
CENTER	06/01/00	20	
CENTER	06/02/00	31	
CENTER	06/02/00	28	
CENTER	06/02/00	30	
CENTER	06/03/00	98	
CENTER	06/04/00	88	
CENTER	06/05/00	417	
CENTER	06/06/00	925	
CENTER	06/06/00	471	
CENTER	06/07/00	153	
CENTER	06/07/00	196	
CENTER	06/07/00	235	
CENTER	06/09/00	66	
CENTER	06/09/00	171	
CENTER	06/09/00	105	
CENTER	06/10/00	24	
CENTER	06/10/00	45	
CENTER	06/10/00	49	
CENTER	06/11/00	123	
CENTER	06/12/00	147	

CENTER	06/20/00	829	
CENTER	06/20/00	711	
CENTER	06/20/00	600	
CENTER	06/21/00	450	
CENTER	06/21/00	491	
CENTER	06/21/00	607	
CENTER	06/22/00	209	
CENTER	06/22/00	232	
CENTER	06/22/00	284	
CENTER	06/23/00	77	
CENTER	06/23/00	66	
CENTER	06/23/00	268	
CENTER	06/24/00	134	
CENTER	06/24/00	49	
CENTER	06/24/00	418	
CENTER	06/25/00	147	
CENTER	06/25/00	267	
CENTER	06/25/00	671	
CENTER	06/26/00	511	
CENTER	06/26/00	352	
CENTER	06/26/00	243	
CENTER	06/27/00	3441	
CENTER	06/27/00	1431	
CENTER	06/27/00	2417	
CENTER	06/28/00	5011	
CENTER	06/28/00	3737	
CENTER	06/28/00	2769	
CENTER	06/29/00	289	
CENTER	06/29/00	365	
CENTER	06/29/00	486	
CENTER	06/30/00	71	
CENTER	06/30/00	64	
CENTER	07/01/00	139	
CENTER	07/01/00	67	
CENTER	07/01/00	56	
CENTER	07/02/00	10	
CENTER	07/02/00	27	
Center	07/02/00	17	
Center	07/03/00	33	
Center	07/03/00	26	
Center	07/03/00	43	
Center	07/04/00	278	
Center	07/04/00	214	
Center	07/04/00	264	
Center	07/05/00	226	
Center	07/05/00	379	
Center	07/05/00	153	
Center	07/06/00	611	
Center	07/06/00	127	
Center	07/06/00	146	
Center	07/07/00	16	
Center	07/07/00	28	
Center	07/07/00	27	
Center	07/08/00	22	
Center	07/08/00	17	
Center	07/08/00	42	
Center	07/09/00	48	
Center	07/09/00	34	

Center	07/09/00	26	
Center	07/10/00	1	
Center	07/10/00	75	
Center	07/11/00	34	
Center	07/11/00	48	
Center	07/11/00	26	
Center	07/12/00	35	
Center	07/12/00	30	
Center	07/12/00	86	
Center	07/13/00	27	
Center	07/13/00	19	
Center	07/13/00	54	
Center	07/14/00	29	
Center	07/14/00	35	
Center	07/14/00	14	
Center	07/15/00	1	
Center	07/15/00	1	
Center	07/15/00	122	
Center	07/16/00	107	
Center	07/16/00	1	
Center	07/16/00	1	
Center	07/17/00	29	
Center	07/18/00	32	
Center	07/19/00	50	
Center	07/20/00	176	
Center	07/21/00	35	
Center	07/22/00	25	
Center	07/23/00	14	
Center	07/24/00	32	
Center	07/25/00	315	
Center	07/26/00	2045	
Center	07/26/00	221	
Center	07/26/00	257	
Center	07/27/00	1535	
Center	07/27/00	1210	
Center	07/27/00	1395	
Center	07/28/00	192	
Center	07/28/00	366	
Center	07/28/00	258	
Center	07/29/00	337	
Center	07/29/00	432	
Center	07/29/00	383	
Center	07/30/00	141	
Center	07/30/00	213	
Center	07/30/00	105	
Center	07/31/00	65	
Center	07/31/00	88	
Center	07/31/00	73	
Center	08/21/00	56	
Center	08/22/00	34	
Center	08/23/00	144	
Center	08/24/00	4	
Center	08/25/00	178	

CENTER	08/26/00	285	
CENTER	08/27/00	548	
CENTER	08/27/00	20	
CENTER	08/27/00	462	
CENTER	08/28/00	389	
CENTER	08/28/00	410	
CENTER	08/28/00	379	
CENTER	08/29/00	636	
CENTER	08/29/00	70	
CENTER	08/29/00	217	
CENTER	08/30/00	186	
CENTER	08/30/00	105	
CENTER	08/30/00	122	
CENTER	08/31/00	39	
CENTER	09/01/00	103	
CENTER	09/02/00	15	
CENTER	09/03/00	409	
CENTER	09/04/00	392	
CENTER	09/04/00	252	
CENTER	09/04/00	412	
CENTER	06/06/00	393	
CENTER	06/08/00	37	
CENTER	06/08/00	56	
CENTER	06/08/00	267	
CENTER	07/08/00	17	
CENTER	07/08/00	42	
CENTER	08/01/00	79	
CENTER	05/25/01	33	closed
CENTER	05/26/01	853	
CENTER	05/27/01	58	closed
CENTER	05/28/01	270	
CENTER	06/01/01	36	closed
CENTER	06/02/01	33	closed
CENTER	06/03/01	211	closed
CENTER	06/08/01	178	closed
CENTER	06/09/01	48	
CENTER	06/10/01	37	
CENTER	06/15/01	44	
CENTER	06/16/01	19	
CENTER	06/17/01	1041	
CENTER	06/18/01	925	closed
CENTER	06/19/01	631	closed
CENTER	06/20/01	244	closed
CENTER	06/21/01	125	closed
CENTER	06/22/01	699	closed
CENTER	06/23/01	259	closed
CENTER	06/24/01	489	closed
CENTER	06/25/01	126	closed
CENTER	06/26/01	169	closed
CENTER	06/27/01	127	
CENTER	06/28/01	101	
CENTER	06/29/01	28	
CENTER	06/30/01	310	

CENTER	07/01/01	411	closed
CENTER	07/02/01	88	closed
CENTER	07/03/01	28	
CENTER	07/04/01	2117	closed
CENTER	07/05/01	324	closed
CENTER	07/06/01	131	closed
CENTER	07/07/01	364	
CENTER	07/08/01	375	closed
CENTER	07/09/01	98	closed
CENTER	07/10/01	68	
CENTER	07/11/01	75	
CENTER	07/12/01	56	
CENTER	07/13/01	44	
CENTER	07/14/01	69	
CENTER	07/16/01	58	closed
CENTER	07/17/01	95	
CENTER	07/18/01	73	
CENTER	07/19/01	63	
CENTER	07/20/01	46	
CENTER	07/21/01	76	
CENTER	07/25/01	62	
CENTER	07/26/01	47	closed
CENTER	07/27/01	102	closed
CENTER	07/28/01	58	
CENTER	07/30/01	76	closed
CENTER	07/31/01	71	closed
CENTER	08/01/01	44	
CENTER	08/02/01	86	
CENTER	08/03/01	67	
CENTER	08/04/01	54	
CENTER	08/06/01	82	closed
CENTER	08/07/01	97	
CENTER	08/08/01	74	
CENTER	08/09/01	58	
CENTER	08/10/01	44	
CENTER	08/11/01	58	
CENTER	08/13/01	63	closed
CENTER	08/14/01	85	
CENTER	08/15/01	46	
CENTER	08/16/01	67	
CENTER	08/17/01	57	
CENTER	08/18/01	59	
LEFT	08/20/01	85	closed
LEFT	08/21/01	15	
LEFT	08/22/01	63	
LEFT	08/23/01	40	
LEFT	08/24/01	5	
LEFT	08/25/01	257	
LEFT	05/25/01	27	closed
LEFT	05/26/01	377	
LEFT	05/27/01	41	closed
LEFT	05/28/01	407	
LEFT	06/01/01	41	closed

LEFT	06/02/01	217	closed
LEFT	06/03/01	149	closed
LEFT	06/08/01	55	closed
LEFT	06/18/01	1190	closed
LEFT	06/19/01	763	closed
LEFT	06/20/01	97	closed
LEFT	06/21/01	98	closed
LEFT	06/22/01	562	closed
LEFT	06/23/01	360	closed
LEFT	06/24/01	609	closed
LEFT	06/25/01	95	closed
LEFT	06/26/01	118	closed
LEFT	06/27/01	159	
LEFT	07/01/01	335	closed
LEFT	07/02/01	79	
LEFT	07/05/01	390	closed
LEFT	07/06/01	157	closed
LEFT	07/08/01	258	closed
LEFT	07/09/01	104	closed
LEFT	05/25/01	36	closed
LEFT	05/26/01	32	
LEFT	05/27/01	33	closed
LEFT	05/28/01	325	
LEFT	06/01/01	22	closed
LEFT	06/02/01	64	closed
LEFT	06/03/01	178	closed
LEFT	06/08/01	46	closed
LEFT	06/18/01	766	closed
LEFT	06/19/01	456	closed
LEFT	06/20/01	185	closed
LEFT	06/21/01	114	closed
LEFT	06/22/01	852	closed
LEFT	06/23/01	403	closed
LEFT	06/24/01	386	closed
LEFT	06/25/01	364	closed
LEFT	06/26/01	108	closed
LEFT	06/27/01	117	
LEFT	07/01/01	225	closed
LEFT	07/02/01	23	closed
LEFT	07/05/01	285	closed
Left	07/06/01	177	closed
Left	07/08/01	594	closed
Left	07/09/01	73	closed
Left	05/22/02	10	
Left	05/23/02	2	
Left	05/24/02	6	
Left	05/25/02	10	
Left	05/26/02	21	
Left	05/27/02	20	
Left	05/28/02	3	
Left	05/29/02	4	
Left	06/02/02	12	
Left	06/08/02	7	

Left	06/10/02	17	
Left	06/15/02	4	
Left	06/18/02	10	
Left	06/19/02	12	
Left	06/20/02	38	
Left	06/21/02	36	
Left	06/22/02	27	
Left	06/24/02	6	
Left	06/25/02	15	
Left	06/26/02	31	
Left	06/27/02	95	
LEFT	06/28/02	29	
LEFT	06/29/02	46	
LEFT	07/01/02	14	
LEFT	07/02/02	12	
LEFT	07/03/02	6	
LEFT	07/04/02	25	
LEFT	07/05/02	7	
LEFT	07/06/02	2	
LEFT	07/08/02	3	
LEFT	07/09/02	16	
LEFT	07/10/02	120	
RIGHT	07/11/02	30	
RIGHT	07/12/02	6	
RIGHT	07/13/02	7	
RIGHT	07/15/02	8	
RIGHT	07/16/02	9	
RIGHT	07/17/02	2	
RIGHT	07/18/02	8	
RIGHT	07/19/02	11	
RIGHT	07/20/02	17	
RIGHT	07/22/02	27	
RIGHT	07/23/02	21	
RIGHT	07/24/02	70	
RIGHT	07/25/02	42	
RIGHT	07/26/02	33	
RIGHT	07/27/02	38	
RIGHT	07/29/02	44	
RIGHT	07/30/02	60	
RIGHT	07/31/02	24	
RIGHT	08/01/02	37	
RIGHT	08/02/02	56	
RIGHT	08/03/02	44	
RIGHT	08/06/02	66	
RIGHT	08/07/02	22	
RIGHT	08/08/02	40	
RIGHT	08/09/02	33	
RIGHT	08/10/02	37	
RIGHT	08/12/02	47	
RIGHT	08/13/02	18	
RIGHT	08/14/02	22	
RIGHT	08/15/02	46	
RIGHT	08/16/02	48	

RIGHT	08/17/02	52	
RIGHT	08/19/02	40	
RIGHT	08/20/02	21	
RIGHT	08/21/02	22	
RIGHT	08/22/02	15	
RIGHT	08/23/02	48	
RIGHT	08/24/02	88	
RIGHT	08/26/02	19	
RIGHT	08/27/02	48	
RIGHT	08/30/02	75	
RIGHT	08/31/02	95	
RIGHT	05/22/02	3	
RIGHT	07/01/02	3	
RIGHT	05/22/02	6	
RIGHT	07/01/02	6	
RIGHT	05/28/03	124	
RIGHT	05/29/03	174	
RIGHT	05/30/03	24	
RIGHT	06/06/03	31	
Right	06/13/03	52	
Right	06/20/03	27	
Right	06/24/03	12	
Right	06/25/03	183	
Right	06/26/03	105	
Right	06/27/03	20	
Right	06/28/03	155	
Right	06/30/03	33	
Right	07/01/03	25	
Right	07/03/03	100	
Right	07/04/03	63	
Right	07/05/03	59	
Right	07/07/03	43	
Right	07/08/03	38	
Right	07/09/03	65	
Right	07/11/03	156	
Right	07/12/03	140	
Right	07/14/03	185	
Right	07/15/03	15	
Right	07/16/03	164	
Right	07/17/03	185	
Right	07/18/03	160	
Right	07/19/03	37	
Right	07/21/03	93	
RIGHT	07/25/03	309	
RIGHT	07/26/03	186	
RIGHT	07/28/03	23	
RIGHT	07/29/03	53	
RIGHT	07/30/03	37	
RIGHT	07/31/03	33	
RIGHT	08/01/03	45	
RIGHT	08/02/03	45	
RIGHT	08/04/03	58	
RIGHT	08/05/03	164	

RIGHT	08/06/03	189	
	08/11/03	46	
	08/12/03	48	
	08/13/03	41	
	08/15/03	54	
	08/16/03	44	
	08/19/03	160	
	08/20/03	85	
	08/21/03	20	
	08/22/03	45	
	08/23/03	18	
	08/26/03	76	
	05/28/03	106	
	05/29/03	54	
	05/30/03	52	
	06/06/03	45	
	06/20/03	38	
	06/24/03	15	
	07/25/03	242	
	07/26/03	97	
	07/28/03	22	
	05/28/03	118	
	05/29/03	43	
	05/30/03	32	
	06/06/03	21	
	06/20/03	42	
	06/24/03	30	
	07/25/03	325	
	07/26/03	330	
	07/28/03	45	
CENTER	06/03/04	38	
CENTER	06/04/04	25	
CENTER	06/08/04	19	
CENTER	06/09/04	44	
CENTER	06/10/04	30	
CENTER	06/12/04	90	
CENTER	06/15/04	80	
CENTER	06/16/04	80	
CENTER	06/22/04	100	
CENTER	06/23/04	46	
CENTER	06/24/04	60	
CENTER	06/25/04	70	
CENTER	06/26/04	150	
CENTER	06/28/04	44	
CENTER	06/29/04	88	
CENTER	06/30/04	90	
CENTER	07/01/04	99	
CENTER	07/02/04	58	
CENTER	07/03/04	58	
CENTER	07/06/04	187	
CENTER	07/07/04	125	
CENTER	07/08/04	188	
CENTER	07/09/04	95	

CENTER	07/10/04	121	
CENTER	07/16/04	179	
CENTER	07/20/04	165	
CENTER	07/21/04	18	
CENTER	07/22/04	90	
CENTER	07/24/04	85	
CENTER	07/27/04	44	
CENTER	07/29/04	81	
CENTER	07/30/04	75	
CENTER	07/31/04	25	
CENTER	08/02/04	193	
CENTER	08/03/04	88	
CENTER	08/04/04	151	
CENTER	08/06/04	123	
CENTER	08/07/04	163	
CENTER	08/09/04	50	
CENTER	08/10/04	75	
CENTER	08/11/04	44	
CENTER	08/12/04	35	
CENTER	08/13/04	88	
CENTER	08/17/04	53	

WMA 15

Braddock Lake			
count	58	mean+3 std dev	521
median	73	% reduction	72%
Max	716		
std dev	131	**no data excluded**	
mean	129		
mean+3 std dev	521		

station id	**date**	**Fecal coli/100ml**	**remarks**
ACL2595-01	06/18/98	111	
ACL2595-01	06/22/98	50	
ACL2595-01	06/26/98	50	
ACL2595-01	07/01/98	123	
ACL2595-01	07/09/98	70	
ACL2595-01	07/13/98	68	
ACL2595-01	07/13/98	40	
ACL2595-01	07/20/98	20	
ACL2595-01	07/21/98	24	
ACL2595-01	07/24/98	60	
ACL2595-01	08/03/98	20	
ACL2595-01	08/10/98	30	
ACL2595-01	08/17/98	50	
ACL2595-01	08/24/98	20	
CL1	07/15/99	184	
CL1	08/05/99	200	
CL1	08/12/99	173	
CL1	08/19/99	401	

CL1	08/26/99	159	
CL1	08/26/99	162	
CL1	08/26/99	178	
CL1	09/02/99	46	
2595-01	05/31/00	21	
2595-01	05/31/00	16	
2595-01	06/27/00	172	
2595-01	07/05/00	67	
2595-01	07/11/00	55	
2595-01	07/18/00	186	
2595-01	08/22/00	400	L
2595-01	08/22/00	56	
2595-01	08/29/00	209	
Collings Lakes 1	05/31/01	103	closed
Collings Lakes 1	06/05/01	47	closed
Collings Lakes 1	06/12/01	111	closed
Collings Lakes 1	06/19/01	212	closed
Collings Lakes 1	06/21/01	273	closed
Collings Lakes 1	06/25/01	460	closed
Collings Lakes 1	07/02/01	53	closed
Collings Lakes 1	07/09/01	329	closed
Collings Lakes 1	07/12/01	67	resample, closed
Collings Lakes 1	07/17/01	49	closed
Collings Lakes 1	07/24/01	119	closed
Collings Lakes 1	07/31/01	35	closed
Collings Lakes 1	08/07/01	59	closed
Collings Lakes 1	08/13/01	116	closed
Collings Lakes 1	08/21/01	83	closed
Collings Lakes 1	08/28/01	225	closed
Collings Lakes 1	08/30/01	47	closed
Collings Lakes 1	06/03/02	40	
	06/17/02	35	
	06/23/02	19	
	07/01/02	29	
	07/08/02	20	
	07/18/02	49	
	07/23/02	33	
	07/24/02	40	
	08/05/02	183	
	08/13/02	5	
	08/22/02	51	
	08/29/02	716	L
	09/05/02	44	
Collings Lakes 1	05/27/03	79	
	06/03/03	37	
	06/25/03	63	
	06/30/03	145	
	07/10/03	196	
	07/15/03	47	
	07/22/03	25	
	07/29/03	273	
	08/04/03	39	
	08/12/03	160	
	08/19/03	80	

Buena Vista CG			

count	71	mean+3 std dev	816
median	50	% Reduction	78%
Max	900		
std dev	224	**no data excluded**	
mean	145		
mean+3 std dev	816		

station id	**date**	**Fecal coli/100ml**	**remarks**
AC0130-01	05/31/98	78	
AC0130-01	06/10/98	58	
AC0130-01	07/24/98	82	
AC0130-01	08/04/98	28	
BVC	06/18/99	10	K
BVC	06/27/99	3	K
BVC	07/04/99	30	
BVC	07/11/99	60	
BVC	07/17/99	72	
BVC	07/26/99	10	K
BVC	07/31/99	10	K
BVC	08/08/99	10	K
0130-01	06/01/00	6	
0130-01	06/06/00	30	
0130-01	07/04/00	80	
0130-01	07/14/00	80	
0130-01	07/23/00	68	
0130-01	08/15/00	60	
0130-01	08/22/00	40	
Buena Vista Campground	06/25/01	900	resample, closed
Buena Vista Campground	06/27/01	510	resample, closed
Buena Vista Campground	06/28/01	300	resample, closed
Buena Vista Campground	06/29/01	590	resample, closed
Buena Vista Campground	07/02/01	40	reopen
Buena Vista Campground	07/11/01	750	closed
Buena Vista Campground	07/18/01	670	closed
Buena Vista Campground	07/19/01	150	resample, reopen
Buena Vista Campground	07/23/01	10	k
Buena Vista Campground	07/30/01	10	
Buena Vista Campground	08/06/01	20	
Buena Vista Campground	08/13/01	140	
Buena Vista Campground	08/20/01	30	
Buena Vista Campground	08/27/01	80	closed for season
Buena Vista CG	05/24/02	10	

	05/31/02	10	
	06/07/02	830	L
	06/20/02	100	
	06/28/02	160	
	07/05/02	20	
	07/12/02	100	
	07/19/02	10	
	07/25/02	200	
	08/02/02	7	
	08/09/02	70	
	08/23/02	50	
	08/30/02	360	L
	08/30/02	600	L
	09/03/02	200	RETEST
	09/03/02	100	RETEST
	09/03/02	30	RETEST
	09/04/02	70	RETEST
Buena Vista CG	06/13/03	490	L
	06/16/03	60	Retest
	06/25/03	10	K
	06/30/03	10	
	07/09/03	50	
	07/16/03	10	K
	07/23/03	20	
	07/31/03	10	K
	08/08/03	90	
	08/15/03	80	
	08/22/03	10	K
	08/29/03	200	
Buena Vista CG	06/28/04	10	k
Buena Vista CG	07/06/04	10	k
Buena Vista CG	07/14/04	10	k
Buena Vista CG	07/21/04	10	
Buena Vista CG	07/27/04	10	k
Buena Vista CG	08/02/04	30	
Buena Vista CG	08/11/04	10	k
Buena Vista CG	08/18/04	260	
Buena Vista CG	08/20/04	600	L, retest
Buena Vista CG	08/25/04	580	RE-TEST
Buena Vista CG	08/26/04	10	RE-TEST
Buena Vista CG	09/01/04	50	

Cushman Lake			
Count	116	mean + 3 stdev	659
median	113	%reduction	80%
max	1000		
St dev	166	**no data excluded**	
Mean	160		
mean + 3 stdev	659		

station id	**date**	**Fecal coli/100ml**	**remarks**
ACL2595-02	06/18/98	135	

ACL2595-02	06/22/98	62	
ACL2595-02	06/26/98	62	
ACL2595-02	07/01/98	103	
ACL2595-02	07/13/98	104	
ACL2595-02	07/21/98	51	
ACL2595-03	06/18/98	110	
ACL2595-03	06/22/98	18	
ACL2595-03	06/26/98	18	
ACL2595-03	07/01/98	105	
ACL2595-03	07/13/98	82	
ACL2595-03	07/21/98	125	
CL2	07/15/99	105	
CL2	08/05/99	178	
CL2	08/12/99	186	
CL2	08/19/99	192	
CL2	08/26/99	97	
CL2	09/02/99	50	
CL3	07/15/99	81	
CL3	08/05/99	342	
CL3	08/12/99	224	
CL3	08/16/99	312	
CL3	08/16/99	290	
CL3	08/16/99	364	
CL3	08/19/99	321	
CL3	08/26/99	244	
CL3	08/26/99	223	
CL3	08/26/99	210	
CL3	09/02/99	165	
CL3	09/02/99	177	
CL3	09/02/99	180	
2595-02	06/27/00	180	
2595-02	07/11/00	64	
2595-02	07/18/00	87	
2595-02	08/22/00	147	
2595-02	08/22/00	37	
2595-02	08/29/00	67	
2595-03	06/27/00	189	
2595-03	07/11/00	162	
2595-03	07/18/00	200	
2595-03	08/22/00	400	L
2595-03	08/22/00	400	L
2595-03	08/29/00	286	
Collings Lakes 2	05/31/01	119	closed
Collings Lakes 2	06/05/01	52	closed
Collings Lakes 2	06/12/01	19	closed
Collings Lakes 2	06/19/01	428	closed
Collings Lakes 2	06/21/01	181	closed
Collings Lakes 2	06/25/01	108	closed
Collings Lakes 2	07/02/01	85	closed
Collings Lakes 2	07/09/01	236	closed
Collings Lakes 2	07/12/01	148	closed
Collings Lakes 2	07/17/01	44	closed
Collings Lakes 2	07/24/01	85	closed
Collings Lakes 2	07/31/01	37	closed
Collings Lakes 2	08/07/01	48	closed

Collings Lakes 2	08/13/01	120	closed
Collings Lakes 2	08/21/01	125	closed
Collings Lakes 2	08/28/01	376	closed
Collings Lakes 2	08/30/01	159	closed
Collings Lakes 3	05/31/01	35	closed
Collings Lakes 3	06/05/01	40	closed
Collings Lakes 3	06/12/01	57	closed
Collings Lakes 3	06/19/01	403	closed
Collings Lakes 3	06/21/01	224	closed
Collings Lakes 3	06/25/01	28	closed
Collings Lakes 3	07/02/01	43	closed
Collings Lakes 3	07/09/01	460	closed
Collings Lakes 3	07/12/01	109	closed
Collings Lakes 3	07/17/01	25	closed
Collings Lakes 3	07/24/01	103	closed
Collings Lakes 3	07/31/01	55	closed
Collings Lakes 3	08/07/01	21	closed
Collings Lakes 3	08/13/01	151	closed
Collings Lakes 3	08/21/01	96	closed
Collings Lakes 3	08/28/01	369	closed
Collings Lakes 3	08/30/01	116	closed
Collings Lakes 2	06/03/02	125	
	06/17/02	28	
	06/23/02	9	
	07/01/02	12	
	07/08/02	67	
	07/18/02	44	
	07/23/02	44	
	07/24/02	41	
	07/30/02	235	L
	08/01/02	169	
	08/05/02	161	
	08/13/02	15	
	08/22/02	11	
	08/29/02	151	
	09/05/02	59	
Collings Lakes 3	06/03/02	143	
	06/17/02	124	
	06/23/02	12	
	07/01/02	200	
	07/08/02	123	
	07/18/02	576	L
	07/23/02	157	
	07/24/02	40	
	08/05/02	1000	L
	08/08/02	98	
	08/13/02	40	
	08/22/02	695	L
	08/29/02	381	L
	09/05/02	47	
Collings Lakes 2	05/27/03	23	
	06/03/03	31	
	06/25/03	195	
	06/30/03	21	

	07/10/03	189	
	07/15/03	28	
	07/22/03	32	
	07/29/03	27	
	08/04/03	51	
	08/12/03	41	
	08/19/03	560	L
Collings Lakes 3	05/27/03	18	
	06/03/03	41	
	06/25/03	23	
	06/30/03	8	
	07/10/03	139	
	07/15/03	40	
	07/22/03	59	
	07/29/03	80	
	08/04/03	500	
	08/12/03	81	
	08/19/03	700	L

WMA 16

Lake Laurie			
count	69	mean+3stdev	426
median	20	%reduction	69%
max	650		
Stdev	115	**no data excluded**	
mean	80		
mean+3stdev	426		

Station	**DATE**	**VALUE**	**REMARK**
Lake Laurie Campground	06/03/98	2	K
	06/11/98	10	
	06/18/98	100	
	06/25/98	50	
	07/02/98	80	
	07/08/98	10	
	07/15/98	10	
	07/22/98	100	
	07/28/98	190	
	08/05/98	300	
	08/11/98	40	
	08/17/98	50	
	08/24/98	2	K
	08/31/98	70	
CCL2410	05/27/99	110	
CCL2410	07/07/99	60	
CCL2410	07/13/99	220	
CCL2410	07/20/99	190	
CCL2410	07/28/99	2	K

CCL2410	08/04/99	2	K
CCL2410	08/11/99	2	K
CCL2410	08/18/99	2	K
CCL2410	08/25/99	50	
CCL2410	06/23/00	220	
CCL2410	06/27/00	260	HELP
CCL2410	06/29/00	180	RESAMPLE
CCL2410	06/30/00	190	
CCL2410	07/06/00	40	
CCL2410	07/08/00	2	K
CCL2410	08/03/00	190	
Lake Laurie	05/23/01	20	
	06/01/01	10	
	06/06/01	10	
	06/14/01	20	
	06/20/01	10	
	06/28/01	10	K
	07/10/01	170	
	07/19/01	200	
	07/25/01	40	
	08/02/01	50	
	08/07/01	650	
	08/14/01	430	
	08/16/01	10	
	06/13/02	20	k
	06/20/02	10	k
	07/06/02	10	k
	07/12/02	20	k
	07/19/02	190	k
	07/26/02	260	l
	08/16/02	200	l
Lake Laurie Campground	07/02/03	10	k
	07/11/03	10	k
	07/18/03	100	k
	07/25/03	20	k
	08/01/03	20	k
	08/08/03	20	k
	08/15/03	10	k
	08/21/03	10	k
	08/29/03	10	k
Laurie	06/10/04	130	
Campground	624/04	10	
	07/02/04	10	
	07/09/04	10	
	07/16/04	10	
	07/23/04	10	
	08/05/04	10	
	08/19/04	10	
	08/26/04	10	
	09/03/04	10	

Ludlams Pond			
count	85	mean+3stdev	1136
median	60	% reduction	89%
max	1900		
Stdev	317	**no data excluded**	
mean	184		
mean+3stdev	1136		

Station	**DATE**	**VALUE**	**REMARK**
Holly Lake Campground	06/04/98	90	
	06/11/98	30	
	06/19/98	20	
	06/26/98	200	
	07/02/98	320	
	07/08/98	240	
	07/13/98	40	
	07/22/98	90	
	07/27/98	340	
	07/29/98	250	RESAMPLE
	07/31/98	290	RESAMPLE
	08/03/98	190	
	08/10/98	240	
	08/11/98	560	RESAMPLE
	08/13/98	1600	L RESAMPLE
	08/26/98	40	RESAMPLE
N	08/17/98	780	RESAMPLE
S	08/17/98	760	RESAMPLE
N	08/20/98	200	BRACKET
S	08/20/98	140	BRACKET
N	08/24/98	970	BRACKET
S	08/24/98	670	BRACKET
N	08/26/98	70	BRACKET
S	08/26/98	50	BRACKET
N	09/02/98	2	K
S	09/02/98	2	K
CCL2084	05/25/99	100	
CCL2084	06/02/99	2	K
CCL2084	06/10/99	40	
CCL2084	06/15/99	1900	L
CCL2084	06/17/99	60	RESAMPLE
CCL2084	06/22/99	10	
CCL2084	06/28/99	60	
CCL2084	07/07/99	60	
CCL2084	07/12/99	30	
CCL2084	07/19/99	10	

CCL2084	07/27/99	10	
CCL2084	08/03/99	10	
CCL2084	08/09/99	20	
CCL2084	08/16/99	360	
CCL2084	08/18/99	10	RESAMPLE
CCL2084	08/26/99	223	
CCL2084N	06/17/99	460	BRACKET
CCL2084S	06/17/99	390	BRACKET
CCL2084	06/22/00	30	
CCL2084	06/29/00	10	
CCL2084	07/07/00	10	
CCL2084	09/21/00	10	
CCL2084	09/27/00	20	
CCL2084	10/04/00	360	
CCL2084	10/06/00	10	RESAMPLE
CCL2084	10/14/00	223	
	05/23/02	140	k
	05/31/02	10	k
	06/06/02	70	k
	06/11/02	20	k
	06/19/02	20	k
	06/27/02	20	k
	07/05/02	10	k
	07/26/02	80	k
	08/23/02	10	k
Holly Lake Campground	05/29/03	340	L
	05/30/03	600	resample
	06/03/03	190	k
	06/06/03	120	k
	06/20/03	60	k
	06/27/03	70	k
	07/02/03	10	k
	07/03/03	10	k
	07/18/03	10	k
	07/25/03	10	k
	08/01/03	60	k
	08/08/03	180	k
Holly	05/25/04	170	
Lake	06/18/04	40	
Condo	06/25/04	10	
Association	07/02/04	10	
	07/09/04	10	
	07/16/04	10	
	08/06/04	480	
	08/09/04	150	Resample
	08/20/04	30	
	08/27/04	70	
	09/03/04	10	
	09/10/04	10	