Amendment to the Atlantic, Cape May, Lower Delaware, Lower Raritan-Middlesex, Mercer, Monmouth, Northeast, Ocean, Sussex, Tri-County, Upper Delaware and Upper Raritan Water Quality Management Plans

Total Maximum Daily Load for Mercury Impairments Based on Concentration in Fish Tissue Caused Mainly by Air Deposition to Address 122 HUC 14s Statewide

Proposed: June 15, 2009
Established: September 10, 2009
Approved:
Adopted:

New Jersey Department of Environmental Protection
Division of Watershed Management
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TABLE OF CONTENTS

Appendices

Tables

Figures

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 or NJDEP) published the *2008 Integrated Water Quality Monitoring and Assessment Report*, which provides information on water quality conditions and trends, and various management strategies and actions being employed to protect and improve water quality. The report includes the List of Water Quality Limited Waters, also known as the 303(d) List, which identifies waters that do not attain an applicable designated use because of a known pollutant and for which a TMDL must be established. On March 3, 2008, the Department proposed the *2008 List of Water Quality Limited Waters* (40NJR4835(c)) as an amendment to the Statewide Water Quality Management Plan, pursuant to the Water Quality Planning Act at N.J.S.A.58:11A-7 in accordance with the Water Quality Management Planning rules at N.J.A.C. 7:15-6.4(a). The Environmental Protection Agency has approved this list. The *2008 List of Water Quality Limited Waters* identifies 256 waters as impaired with respect to mercury, as indicated by the presence of mercury concentrations in fish tissue in excess of New Jersey fish consumption advisories and/or not complying with the Surface Water Quality Standards (SWQS) for mercury at N.J.A.C. 7:9B.

A TMDL has been developed to address mercury impairment in 122 waters identified in Table 1 below. These are waters whose main source of contamination is air deposition. Waters that are tidal, where there are other significant sources of mercury or where cooperative efforts have been or are expected to be undertaken are not addressed in this TMDL pending additional study.

Table 1. Assessment Units Covered by this TMDL

Watershed Management Area (WMA)	Assessment Unit ID	Waterbody Name	2006 Integrated list	2008 Integrated list
01	02040104090020	Clove Brook (Delaware R)	Sublist 5	Sublist 5
01	02040104130010	Little Flat Brook (Beerskill and above)	Sublist 5	Sublist 5
01	02040104140010	Big Flat Brook (above Forked Brook)	Sublist 5	Sublist 5
01	02040105030020	Swartswood Lake and tribs	Sublist 5	Sublist 5
01	02040105030030	Trout Brook	Sublist 5	Sublist 5
01	02040105050040	Yards Creek	Sublist 3	Sublist 3*
01	02040105090040	Mountain Lake Brook	Sublist 5	Sublist 5
01	02040105140040	Merrill Creek	Sublist 5	Sublist 5
01	02040105140060	Pohatcong Ck (Springtown to Merrill Ck)	Sublist 3	Sublist 3*
01	02040105150020	Lake Hopatcong	Sublist 5	Sublist 5
01	02040105150060	Cranberry Lake / Jefferson Lake & tribs	Sublist 5	Sublist 5
02	02020007040040	Highland Lake/Wawayanda Lake	Sublist 5	Sublist 5
03	02030103050020	Pacock Brook	Sublist 5	Sublist 5
03	02030103050030	Pequannock R (above OakRidge Res outlet)	Sublist 5	Sublist 5
03	02030103050040	Clinton Reservior/Mossmans Brook	Sublist 5	Sublist 5

03	02030103050060	Pequannock R(Macopin gage to Charl'brg)	Sublist 5	Sublist 5
03	02030103050080	Pequannock R (below Macopin gage)	Sublist 5	Sublist 5
03	02030103070030	Wanaque R/Greenwood Lk(aboveMonks gage)	Sublist 5	Sublist 5
03	02030103070050	Wanaque Reservior (below Monks gage)	Sublist 5	Sublist 5
03	02030103110020	Pompton River	Sublist 5	Sublist 5
06	02030103010170	Passaic R Upr (Rockaway to Hanover RR)	Sublist 5	Sublist 5
06	02030103020040	Whippany R(Lk Pocahontas to Wash Val Rd)	Sublist 5	Sublist 5
06	02030103020080	Troy Brook (above Reynolds Ave)	Sublist 5	Sublist 5
06	02030103030030	Rockaway R (above Longwood Lake outlet)	Sublist 5	Sublist 5
06	02030103030040	Rockaway R (Stephens Bk to Longwood Lk)	Sublist 5	Sublist 5
06	02030103030070	Rockaway R (74d 33m 30s to Stephens Bk)	Sublist 5	Sublist 5
06	02030103030090	Rockaway R (BM 534 brdg to 74d 33m 30s)	Sublist 5	Sublist 5
06	02030103030110	Beaver Brook (Morris County)	Sublist 5	Sublist 5
06	02030103030140	Rockaway R (Stony Brook to BM 534 brdg)	Sublist 5	Sublist 5
06	02030103030150	Rockaway R (Boonton dam to Stony Brook)	Sublist 5	Sublist 5
06	02030103030170	Rockaway R (Passaic R to Boonton dam)	Sublist 5	Sublist 5
08	02030105010030	Raritan River SB(above Rt 46)	Sublist 5	Sublist 5
08	02030105010040	Raritan River SB(74d 44m 15s to Rt 46)	Sublist 3	Sublist 3*
08	02030105010050	Raritan R SB(LongValley br to 74d44m15s)	Sublist 3	Sublist 3*
08	02030105010060	Raritan R SB(Califon br to Long Valley)	Sublist 3	Sublist 3*
08	02030105020040	Spruce Run Reservior / Willoughby Brook	Sublist 5	Sublist 5
08	02030105020090	Prescott Brook / Round Valley Reservior	Sublist 5	Sublist 5
08	02030105020100	Raritan R SB(Three Bridges-Prescott Bk)	Sublist 3	Sublist 3*
08	02030105040010	Raritan R SB(Pleasant Run-Three Bridges)	Sublist 3	Sublist 3*
08	02030105040040	Raritan R SB(NB to Pleasant Run)	Sublist 3	Sublist 3*
09	02030105080020	Raritan R Lwr (Rt 206 to NB / SB)	Sublist 3	Sublist 3*
09	02030105080030	Raritan R Lwr (Millstone to Rt 206)	Sublist 3	Sublist 3*
09	02030105120080	South Fork of Bound Brook	Sublist 3	Sublist 3*
09	02030105120100	Bound Brook (below fork at 74d 25m 15s)	Sublist 3	Sublist 3*
09	02030105120140	Raritan R Lwr(I-287 Piscatway-Millstone)	Sublist 5	Sublist 5
09	02030105130050	Lawrence Bk (Church Lane to Deans Pond)	Sublist 3	Sublist 3*
09	02030105130060	Lawrence Bk (Milltown to Church Lane)	Sublist 3	Sublist 3*

09	02030105140020	Manalapan Bk(incl LkManlpn to 40d16m15s)	Sublist 3	Sublist 3*
09	02030105140030	Manalapan Brook (below Lake Manalapan)	Sublist 5	Sublist 5
09	02030105160030	Duhernal Lake / Iresick Brook	Sublist 3	Sublist 3*
10	02030105090050	Stony Bk(Province Line Rd to 74d46m dam)	Sublist 3	Sublist 3*
10	02030105100130	Bear Brook (below Trenton Road)	Sublist 3	Sublist 5
10	02030105110020	Millstone R (HeathcoteBk to Harrison St)	Sublist 3	Sublist 5
10	02030105110110	Millstone R (BlackwellsMills to BedenBk)	Sublist 3	Sublist 3*
10	02030105110140	Millstone R(AmwellRd to BlackwellsMills)	Sublist 3	Sublist 3*
10	02030105110170	Millstone River (below Amwell Rd)	Sublist 3	Sublist 3*
12	02030104060020	Matawan Creek (above Ravine Drive)	Sublist 3	Sublist 3*
12	02030104060030	Matawan Creek (below Ravine Drive)	Sublist 5	Sublist 5
12	02030104070070	Swimming River Reservior / Slope Bk	Sublist 3	Sublist 3*
12	02030104070090	Nut Swamp Brook	Sublist 3	Sublist 5
12	02030104090030	Deal Lake	Sublist 3	Sublist 3*
12	02030104090080	Wreck Pond Brook (below Rt 35)	Sublist 3	Sublist 5
12	02030104100050	Manasquan R (gage to West Farms Rd)	Sublist 5	Sublist 5
13	02040301030040	Metedeconk R SB (Rt 9 to Bennetts Pond)	Sublist 5	Sublist 5
13	02040301060050	Dove Mill Branch (Toms River)	Sublist 5	Sublist 5
13	02040301070010	Shannae Brook	Sublist 5	Sublist 5
13	02040301070030	Ridgeway Br (Hope Chapel Rd to HarrisBr)	Sublist 5	Sublist 5
13	02040301070040	Ridgeway Br (below Hope Chapel Rd)	Sublist 5	Sublist 5
13	02040301070080	Manapaqua Brook	Sublist 3	Sublist 5
13	02040301070090	Union Branch (below Blacks Br 74d22m05s)	Sublist 5	Sublist 5
13	02040301080030	Davenport Branch (above Pinewald Road)	Sublist 3	Sublist 5
13	02040301090050	Cedar Creek (GS Parkway to 74d16m38s)	Sublist 5	Sublist 5
13	02040301130030	Mill Ck (below GS Parkway)/Manahawkin Ck	Sublist 3	Sublist 3*
13	02040301130050	Westecunk Creek (above GS Parkway)	Sublist 5	Sublist 5
13	02040301140020	Mill Branch (below GS Parkway)	Sublist 3	Sublist 3*
13	02040301140030	Tuckerton Creek (below Mill Branch)	Sublist 3	Sublist 3*
14	02040301150080	Batsto R (Batsto gage to Quaker Bridge)	Sublist 5	Sublist 5
14	02040301160030	Mullica River (Rt 206 to Jackson Road)	Sublist 5	Sublist 5
14	02040301160140	Mullica River (39d40m30s to Rt 206)	Sublist 5	Sublist 5
14	02040301160150	Mullica R (Pleasant Mills to 39d40m30s)	Sublist 5	Sublist 5
14	02040301180060	Oswego R (Andrews Rd to Sim Place Resv)	Sublist 3	Sublist 3*
14	02040301180070	Oswego River (below Andrews Road)	Sublist 5	Sublist 5

14	02040301190050	Wading River WB (Jenkins Rd to Rt 563)	Sublist 5	Sublist 5
14	02040301200010	Beaver Branch (Wading River)	Sublist 5	Sublist 5
14	02040301200050	Bass River EB	Sublist 3	Sublist 3*
15	02040302030020	GEHR (AC Expressway to New Freedom Rd)	Sublist 5	Sublist 5
15	02040302040050	Collings Lakes trib (Hospitality Branch)	Sublist 5	Sublist 5
15	02040302040130	GEHR (Lake Lenape to Mare Run)	Sublist 5	Sublist 5
15	02040302050120	Middle River / Peters Creek	Sublist 3	Sublist 3*
16	02040206210050	Savages Run (above East Creek Pond)	Sublist 5	Sublist 5
16	02040206210060	East Creek	Sublist 5	Sublist 5
17	02040206030010	Salem River (above Woodstown gage)	Sublist 5	Sublist 5
17	02040206070030	Canton Drain (above Maskell Mill)	Sublist 5	Sublist 5
17	02040206080050	Cohansey R (incl CornwellRun - BeebeRun)	Sublist 3	Sublist 5
17	02040206090030	Cohansey R (Rocaps Run to Cornwell Run)	Sublist 5	Sublist 5
17	02040206100060	Nantuxent Creek (above Newport Landing)	Sublist 3	Sublist 3*
17	02040206130010	Scotland Run (above Fries Mill)	Sublist 5	Sublist 5
17	02040206130040	Scotland Run (below Delsea Drive)	Sublist 5	Sublist 5
17	02040206140010	MauriceR(BlkwtrBr to/incl WillowGroveLk)	Sublist 5	Sublist 5
17	02040206150050	Muddy Run (incl ParvinLk to Palatine Lk)	Sublist 3	Sublist 3*
17	02040206180050	Menantico Creek (below Rt 552)	Sublist 3	Sublist 3*
18	02040202100020	Pennsauken Ck NB (incl StrwbrdgLk-NJTPK)	Sublist 3	Sublist 5
18	02040202110030	Cooper River (above Evesham Road)	Sublist 5	Sublist 5
18	02040202110040	Cooper R (Wallworth gage to Evesham Rd)	Sublist 5	Sublist 5
18	02040202110050	Cooper River (Rt 130 to Wallworth gage)	Sublist 5	Sublist 5
18	02040202120010	Big Timber Creek NB (above Laurel Rd)	Sublist 5	Sublist 5
18	02040202120020	Big Timber Creek NB (below Laurel Rd)	Sublist 5	Sublist 5
18	02040202120030	Big Timber Creek SB (above Lakeland Rd)	Sublist 5	Sublist 5
18	02040202120040	Big T Ck SB(incl Bull Run to LakelandRd)	Sublist 5	Sublist 5
18	02040202120050	Big Timber Creek SB (below Bull Run)	Sublist 5	Sublist 5
18	02040202120060	Almonesson Creek	Sublist 5	Sublist 5
18	02040202120090	Newton Creek (LDRV-Kaighn Ave to LT Ck)	Sublist 5	Sublist 5
18	02040202120100	Woodbury Creek (above Rt 45)	Sublist 5	Sublist 5
18	02040202130030	Chestnut Branch (above Sewell)	Sublist 5	Sublist 5
18	02040202150020	Raccoon Ck (Rt 45 to/incl Clems Run)	Sublist 3	Sublist 3*
18	02040202150040	Raccoon Ck (Russell Mill Rd to Rt 45)	Sublist 5	Sublist 5
19	02040202030050	Bucks Cove Run / Cranberry Branch	Sublist 5	Sublist 5
19	02040202050050	Friendship Ck (below/incl Burrs Mill Bk)	Sublist 3	Sublist 3*

19	02040202050060	Rancocas Creek SB(above Friendship Ck)	Sublist 3	Sublist 3*
19	02040202050080	Rancocas Ck SB (Vincentown-FriendshipCk)	Sublist 3	Sublist 3*
19	02040202050090	Rancocas Ck SB (BobbysRun to Vincentown)	Sublist 3	Sublist 3*
20	02040201090030	LDRV tribs (Assiscunk Ck to Blacks Ck)	Sublist 5	Sublist 5

* Data became available in these assessment units after the 2008 list was approved indicating fish tissue levels that would result in listing of these waters in accordance with the current listing methodology; therefore, these assessment units will also be addressed in this TMDL.

The target for the TMDL is a concentration of 0.18 μ/g in fish tissue, which is the concentration at which the recommended rate of fish consumption for the high risk population is not more than 1 meal per week of top trophic level fish. At this concentration unlimited consumption is appropriate for the general population. An overall reduction of 84.3% in existing mercury loads is required to achieve the target. In its *New Jersey Mercury Reduction Plan*, the Department outlines measures needed to achieve these reductions.

The TMDLs in this report were proposed on June 15, 2009 and, having completed the public participation process, shall be adopted by the Department as amendments to the Atlantic, Cape May, Lower Delaware, Lower Raritan-Middlesex, Mercer, Monmouth, Northeast, Ocean, Sussex, Tri-County, Upper Delaware and Upper Raritan Water Quality Management Plans in accordance with N.J.A.C. 7:15-6.4. This TMDL report was developed consistent with the United States Environmental Protection Agency's (USEPA or EPA) May 20, 2002 guidance document entitled, "Guidelines for Reviewing TMDLs under Existing Regulations issued in 1992" (Sutfin, 2002), which describes the general statutory and regulatory requirements for approvable TMDLs, as well as EPA's more specific guidance memo for the subject type of TMDL, dated September 29, 2008 and entitled "Elements of Mercury TMDLs Where Mercury Loadings are Predominantly from Air Deposition" (Hooks, 2008).

1.0. Introduction

Mercury is a persistent, bio-accumulative toxin that can be found in solid, liquid, or vapor form. Mercury can cause a variety of harmful health effects including damage to the brain, central nervous system, and kidneys and is particularly harmful to children and pregnant and nursing women. Mercury comes from various natural and anthropogenic sources, including volcanic activity, burning of some forms of coal, use in dental procedures and manufacturing, use and disposal of products containing mercury. Most often, mercury enters the environment in gas or particulate form and is deposited on surfaces, often through precipitation, which washes deposited mercury into waterways. There it undergoes a natural chemical process and is converted to a more toxic form – methyl mercury. The methyl mercury builds up in the tissues of fish and animals, increasing its concentration as it moves up through the food chain, which results in high levels of mercury in some of the foods we eat. At certain levels, fish consumption advisories are triggered.

Mercury contamination in the environment is ubiquitous, not only in New Jersey, but worldwide. Mercury contamination is a global issue because the overwhelming source of mercury is air deposition. Consequently, mercury pollution will not be abated on a state by state basis alone, but must be controlled by regional, national and international efforts. In recognition of this, the New England Interstate Water Pollution Control Commission (NEIWPCC) established the *Northeast Regional Mercury Total Maximum Daily Load* dated October 24, 2007 (Northeast Regional TMDL), a regional TMDL for the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont which addressed impairments due to mercury contamination of waterbodies where the main source of mercury contamination is air deposition. It was approved by EPA on December 20, 2007. As EPA has approved establishment of regional TMDLs for mercury impairments where the primary source is air deposition using the NEIWPCC approach, the Department has determined that it is appropriate for New Jersey to develop a similar TMDL for comparable impairments in New Jersey, not only to recommend a course of action to reduce mercury contamination in New Jersey, but to further emphasize that substantial source reductions from outside New Jersey will be needed to achieve water quality objectives. Therefore, New Jersey has developed a statewide TMDL that will complement the Northeast Regional TMDL developed for the northeast states.

In accordance with Section 303(d) of the Federal Clean Water Act (CWA) (33 U.S.C. 1315(B)), the State of New Jersey is required biennially to prepare and submit to the USEPA a report that identifies waters that do not meet or are not expected to meet Surface Water Quality Standards (SWQS) 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 State of New Jersey is also required biennially to prepare and submit to the USEPA 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 Department combines these reports into the Integrated Water Quality Monitoring and Assessment Report and assigns each designated use within the assessment unit to one of five sublists. An assessment unit is listed as Sublist 1 if all designated uses are assessed and attained. (The Department does not include the fish consumption use for this sublist.) If some but not all uses are attained, an assessment unit is placed on Sublist 2 for attained uses. If the Department

did not have data to assess a use, the assessment unit is placed on Sublist 3 for that use. If a use is not attained, the assessment unit will be placed on Sublist 5, or Sublist 4 if there is an approved TMDL, there are other enforceable management measures in effect or the impairment is due to pollution, not a pollutant. Sublist 5 constitutes the list of waters for which a TMDL may be required, also known as the 303(d) list. In accordance with the *2008 Integrated Water Quality Monitoring and Assessment Methods*, although there is a State-wide fish consumption advisory for mercury, only waters with actual fish tissue monitoring data that exceed the threshold which results in a consumption restriction (greater than 0.07 mg/kg) are placed on Sublist 5. All other assessment units are listed on Sublist 3 for this use. Based on the TMDL analysis, which demonstrates that reduction of natural sources of mercury would be needed in order to achieve the level necessary to allow unlimited consumption for high risk populations, the Department intends to revise its Assessment Method when developing future Integrated Water Quality Monitoring and Assessment Reports to allow that a limit of 1 meal per week for the high risk population would be considered as attaining the use with respect to mercury-based fish consumption (listing threshold would be results greater than 0.18 μg/g).

The *2008 List of Water Quality Limited Waters* currently identifies 256 Assessment Units as impaired due to mercury in surface water and/or fish tissue. This report establishes 122 TMDLs for mercury contamination based on fish tissue concentration whose source is largely air deposition. Waters where there are other significant sources of mercury in a waterbody, as indicated by a water column concentration in excess of the Surface Water Quality Standards, documentation of high levels of mercury in ground water or the presence of hazardous waste sites where mercury is a contaminant of concern, are deferred at this time, pending additional study. Tidal waters are also excluded because the approach used in this TMDL is intended for waters not affected by tidal dynamics. In addition, areas that are included in the spatial extent of the on-going interstate effort to address mercury impairments in the New York/New Jersey Harbor are excluded from this TMDL. A similar interstate effort is an appropriate means of addressing mercury impairments in the shared waters of the Atlantic Ocean and the Delaware River and Estuary, and these waters are deferred as well.

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 water body can assimilate without violating a state's water quality standards and allocates that load capacity 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).

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. EPA has also issued guidance for the development of TMDLs for mercury impairments that are due primarily to air deposition (Hooks, 2008).

2.0. Pollutant of Concern, Applicable Surface Water Quality Standards, and Area of Interest

2.1 Pollutant of Concern

The pollutant of concern for these TMDLs is mercury. According to the current assessment methodology, an assessment unit is listed as impaired for mercury if the data show water column concentrations in excess of the Surface Water Quality Standards (SWQS) or fish tissue concentrations that would result in any limitations on fish consumption. These advisories are not SWQS, but they do indicate a limitation on the use of the waters. As previously discussed, this TMDL is limited to assessment units where impairment is attributed to fish tissue in excess of advisory thresholds, where the mercury is primarily from air deposition. The assessment units addressed are identified in Table 1. These listings have a medium priority ranking in the *2008 List of Water Quality Limited Waters* (40NJR4835(c)).

2.2 Applicable Surface Water Quality Standards and Fish Consumption Advisory Criteria

Most of the waters addressed in this report are classified in the Surface Water Quality Standards (SWQS) at N.J.A.C. 7:9B as Fresh Water 2 (FW2), either Non-Trout (NT), Trout Maintenance (TM) or Trout Production (TP). Some waters are classified as Pinelands (PL) or Freshwater 1 (FW1). A few Assessment Units include waters classified as FW2-NT/SE1 or FW2-NT/SE2. If the measured salinity is less than 3.5 parts per thousand at mean high tide, the FW2-NT classification applies. The TMDL does not apply to fresh or saline tidal waters. If the majority of the waters in the HUC 14 subwatershed are fresh and non-tidal, that assessment unit was included in this TMDL. Therefore, even though portions of some assessment units are noted as including the SE (Saline Estuarine) designation, these designations are not affected and are not discussed below. Table 2 below lists the surface water classifications for the assessment units addressed in this document and Table 3 provides the numeric criteria for mercury.

Table 2. Surface Water Classifications for the Assessment Units Addressed Under this TMDL

WMA	Assessment Unit ID	Waterbody Name	Surface Water Classifications
01	2040104090020	Clove Brook (Delaware River)	FW1, FW1-TP, FW2-TPC1, FW2-TPMC1
01	2040104130010	Little Flat Brook (Beerskill And Above)	FW1, FW2-TP, FW2-TPC1, FW2-NTC1
01	2040104140010	Big Flat Brook (Above Forked Brook)	FW1, FW2-NTC1
01	2040105030020	Swartswood Lake And Tributaries	FW2-TM, FW2-TMC1, FW2-NT, FW2-NTC1
01	2040105030030	Trout Brook	FW2-TPC1, FW2-NT
01	2040105050040	Yards Creek	FW2-TPC1, FW2-NT
01	2040105090040	Mountain Lake Brook	FW2-TM, FW2-NT

01	2040105140040	Merrill Creek	FW2-TPC1, FW2-TM
01	2040105140060	Pohatcong Creek (Springtown To Merrill Creek)	FW2-TPC1, FW2-TMC1
01	2040105150020	Lake Hopatcong	FW2-TM, FW2-NT
01	2040105150060	Cranberry Lake / Jefferson Lake & Tributaries	FW2-TMC1, FW2-NT, FW2-NTC1
02	2020007040040	Highland Lake/Wawayanda Lake	FW2-NT, FW2-NTC1
03	2030103050020	Pacock Brook	FW1, FW1-TP, FW2-NTC1
03	2030103050030	Pequannock River (Above Oak Ridge Reservoir Outlet)	FW1-TP, FW1-TM, FW2-TP, FW2-TPC1, FW2-TMC1, FW2-NT
03	2030103050040	Clinton Reservior/Mossmans Brook	FW1, FW2-TPC1, FW2-TP, FW2-TMC1, FW2-NTC1
03	2030103050060	Pequannock River (Macopin Gage To Charl'brg)	FW1-TM, FW2-TPC1, FW2-TP, FW2-TM, FW2-TMC1, FW2-NT
03	2030103050080	Pequannock River (Below Macopin Gage)	FW2-TPC1, FW2-TP, FW2-NTC1, FW2-TM, FW2-NT
03	2030103070030	Wanaque River /Greenwood Lake (Above Monks Gage)	FW2-TPC1, FW2-TM, FW2-TMC1, FW2-NT, FW2-NTC1
03	2030103070050	Wanaque Reservoir (Below Monks Gage)	FW2-TPC1, FW2-TMC1, FW2-NTC1
03	2030103110020	Pompton River	FW2-NT
06	2030103010170	Passaic River Upper (Rockaway To Hanover Rr)	FW2-NT
06	2030103020040	Whippany River(Lake Pocahontas To Washington Valley Rd)	FW2-TM, FW2-NT
06	2030103020080	Troy Brook (Above Reynolds Ave)	FW2-NT
06	2030103030030	Rockaway River (Above Longwood Lake Outlet)	FW2-NTC1
06	2030103030040	Rockaway River (Stephens Brook To Longwood Lake)	FW2-NTC1
06	2030103030070	Rockaway RIVER (74d 33m 30s To Stephens Brook)	FW1, FW2-NTC1, FW2-TPC1, FW2-TMC1
06	2030103030090	Rockaway River (BM 534 Bridge To 74d 33m 30s)	FW2-NTC1, FW2-NT
06	2030103030110	Beaver Brook (Morris County)	FW2-TPC1, FW2-TMC1, FW2-NTC1
06	2030103030140	Rockaway River (Stony Brook To BM 534 Bridge)	FW2-NTC1
06	2030103030150	Rockaway River (Boonton Dam To Stony Brook)	FW2-TMC1, FW2-NTC1, FW2-NT
06	2030103030170	Rockaway River (Passaic River To Boonton Dam)	FW2-NT
08	2030105010030	Raritan River South Branch (Above Route 46)	FW2-NT, FW2-TM, FW2-NTC1
08	2030105010040	Raritan River South Branch(74d 44m 15s To Route 46)	FW2-NTC1, FW2-TPC1, FW2-NT, FW2-TMC1

08	2030105010050	Raritan River South BRANCH(Longvalley Brook To 74d44m15s)	FW2-TPC1, FW2-NT
08	2030105010060	Raritan River South Branch(Califon Brook To Long Valley)	FW2-TPC1, FW2-NT
08	2030105020040	Spruce Run Reservior / Willoughby Brook	FW2-TPC1, FW2-TMC1, FW2-TM, FW2-NT
08	2030105020090	Prescott Brook / Round Valley Reservoir	FW2-TPC1, FW2-TM, FW2-NT
08	2030105020100	Raritan River South Branch(Three Bridges-Prescott Brook)	FW2-TM, FW2-NT
08	2030105040010	Raritan River South Branch(Pleasant Run-Three Bridges)	FW2-NT
08	2030105040040	Raritan River South Branch(North Branch To Pleasant Run)	FW2-NT
09	2030105080020	Raritan River Lower (Route 206 To North Branch / South Branch)	FW2-NT
09	2030105080030	Raritan River Lower (Millstone To Route 206)	FW2-NT
09	2030105120080	South Fork Of Bound Brook	FW2-NT
09	2030105120100	Bound Brook (Below Fork At 74d 25m 15s)	FW2-NT
09	2030105120140	Raritan River Lwr(I-287 Piscatway-Millstone)	FW2-NT
09	2030105130050	Lawrence Brook (Church Lane To Deans Pond)	FW2-NT
09	2030105130060	Lawrence Brook (Milltown To Church Lane)	FW2-NT
09	2030105140020	Manalapan Brook(Incl Lakemanlpn To 40d16m15s)	FW2-NT
09	2030105140030	Manalapan Brook (Below Lake Manalapan)	FW2-NT
09	2030105160030	Duhernal Lake / Iresick Brook	FW2-NT
10	2030105090050	Stony Brook(Province Line Rd To 74d46m Dam)	FW2-NT
10	2030105100130	Bear Brook (Below Trenton Road)	FW2-NT
10	2030105110020	Millstone River (Heathcotebk To Harrison St)	FW2-NT
10	2030105110110	Millstone River (Blackwellsmills To Beden Brook)	FW2-NT
10	2030105110140	Millstone River(Amwellrd To Blackwellsmills)	FW2-NT
10	2030105110170	Millstone River (Below Amwell Rd)	FW2-NT
12	2030104060020	Matawan Creek (Above Ravine Drive)	FW2-NT/SE1
12	2030104060030	Matawan Creek (Below Ravine Drive)	FW2-NT/SE1
12	2030104070070	Swimming River Reservoir / Slope Brook	FW2-NTC1
12	2030104070090	Nut Swamp Brook	FW2-NT/SE1
12	2030104090030	Deal Lake	FW2-NT/SE1
12	2030104090080	Wreck Pond Brook (Below Route 35)	FW2-NT, FW2-NT/SE1
12	2030104100050	Manasquan River (Gage To West Farms Road)	FW2-TMC1, FW2-NTC1

13	2040301030040	Metedeconk River South Branch (Rt 9 To Bennetts Pond)	FW2-TMC1, FW2-NTC1
13	2040301060050	Dove Mill Branch (Toms River)	FW2-NTC1, PL
13	2040301070010	Shannae Brook	FW2-NT, PL
13	2040301070030	Ridgeway Brook (Hope Chapel Rd To Harrisbrook)	PL
13	2040301070040	Ridgeway Brook (Below Hope Chapel Rd)	PL, FW2-NT/SE1
13	2040301070080	Manapaqua Brook	PL, FW2-NT/SE1
13	2040301070090	Union Branch (Below Blacks Brook 74d22m05s)	PL, FW2-NT/SE1
13	2040301080030	Davenport Branch (Above Pinewald Road)	PL
13	2040301090050	Cedar Creek (GS Parkway To 74d16m38s)	PL
13	2040301130030	Mill Creek (Below Gs Parkway)/Manahawkin Creek	PL, FW2-NT, FW2-NTC1/SE1
13	2040301130050	Westecunk Creek (Above Garden State Parkway)	PL
13	2040301140020	Mill Branch (Below Garden State Parkway)	FW2-NT/SE1
13	2040301140030	Tuckerton Creek (Below Mill Branch)	PL, FW2-NTC1/SE1, FW2-NT/SE1
14	2040301150080	Batsto River (Batsto Gage To Quaker Bridge)	FW1, PL
14	2040301160030	Mullica River (Route 206 To Jackson Road)	PL
14	2040301160140	Mullica River (39d40m30s To Rt 206)	PL
14	2040301160150	Mullica RIVER (Pleasant Mills To 39d40m30s)	PL
14	2040301180060	Oswego River (Andrews Rd To Sim Place Reservoir)	PL
14	2040301180070	Oswego River (Below Andrews Road)	PL
14	2040301190050	Wading River West Branch (Jenkins Road To Route 563)	PL
14	2040301200010	Beaver Branch (Wading River)	PL
14	2040301200050	Bass River East Branch	PL, FW1
15	2040302030020	Great Egg Harbor (Atlantic City Expressway To New Freedom Road)	PL, FW2-NT
15	2040302040050	Collings Lakes Tributary (Hospitality Branch)	PL
15	2040302040130	Great Egg Harbor (Lake Lenape To Mare Run)	PL
15	2040302050120	Middle River / Peters Creek	FW1, /SE1 C1, FW2-NTC1/SE1
16	2040206210050	Savages Run (Above East Creek Pond)	FW1, PL,
16	2040206210060	East Creek	FW1, PL, FW2-NTC1/SE1, FW2-NT/SE1
17	2040206030010	Salem River (Above Woodstown Gage)	FW2-NTC1, FW2-NT
17	2040206070030	Canton Drain (Above Maskell Mill)	FW2-NT/SE1

17	2040206080050	Cohansey River (Including Cornwell Run – Beebe Run)	FW2-NT/SE1
17	2040206090030	Cohansey R (Rocaps Run To Cornwell Run)	FW2-NT/SE1
17	2040206100060	Nantuxent Creek (Above Newport Landing)	FW1, FW2-NTC1/SE1, FW2-NT/SE1
17	2040206130010	Scotland Run (Above Fries Mill)	FW2-NT
17	2040206130040	Scotland Run (Below Delsea Drive)	FW2-NT
17	2040206140010	Mauriceriver(Blackwater Book To Include Willow Grovelake)	FW2-NT, FW2-NTC1
17	2040206150050	Muddy Run (Including Parvin Lake To Palatine Lake)	FW2-NT, FW2-NTC1
17	2040206180050	Menantico Creek (Below Route 552)	FW2-NT, FW2-NTC1
18	2040202100020	Pennsauken Creek North Branch (Including Strawbridge Lake-Njtpk)	FW2-NT
18	2040202110030	Cooper River (Above Evesham Road)	FW2-NT
18	2040202110040	Cooper River (Wallworth Gage To Evesham Road)	FW2-NT
18	2040202110050	Cooper River (Route 130 To Wallworth Gage)	FW2-NT
18	2040202120010	Big Timber Creek North Branch (Above Laurel Road)	FW2-NT
18	2040202120020	Big Timber Creek North Branch (Below Laurel Road)	FW2-TPC1, FW2-NT
18	2040202120030	Big Timber Creek South Branch (Above Lakeland Road)	FW2-NT
18	2040202120040	Big Timber Creek South Branch(Including Bull Run To Lakeland Road)	FW2-NT
18	2040202120050	Big Timber Creek South Branch (Below Bull Run)	FW2-NT
18	2040202120060	Almonesson Creek	FW2-NT
18	2040202120090	Newton Creek (Ldrv-Kaighn Ave To Lt Creek)	FW2-NT
18	2040202120100	Woodbury Creek (Above Rt 45)	FW2-NT/SE2
18	2040202130030	Chestnut Branch (Above Sewell)	FW2-NT/SE2
18	2040202150020	Raccoon Creek (Rt 45 To/Include Clems Run)	FW2-NT/SE2
18	2040202150040	Raccoon Creek (Russell Mill Road To Route 45)	FW2-NT/SE2
19	2040202030050	Bucks Cove Run / Cranberry Branch	PL
19	2040202050050	Friendship Creek (Below/Including Burrs Mill Brook)	PL
19	2040202050060	Rancocas Creek South Branch(Above Friendship Creek)	PL
19	2040202050080	Rancocas Creek South Branch (Vincentown-Friendship Creek)	PL, FW2-NT
19	2040202050090	Rancocas Creek South Branch (Bobbys Run To Vincentown)	FW2-NT
20	2040201090030	Lower Delaware River Tributaries (Assiscunk Creek To Blacks Creek)	FW2-NT

C1 refers to Category One, a specific category of water relevant with respect to the antidegradation policies in the SWQS.

In all FW1 waters, the designated uses are (NJAC 7:9B-1.12):

1. Set aside for posterity to represent the natural aquatic environment and its associated biota;
2. Primary and secondary contact recreation;
3. Maintenance, migration and propagation of the natural and established aquatic biota; and
4. 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.

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

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.

Table 3. Mercury Water Column Criteria (µg/l)

Toxic substance	Fresh Water (FW2) Criteria		
	Aquatic		Human Health
	Acute	Chronic	
Mercury	1.4(d) (s)	0.77(d) (s)	0.05(h)(T)

d = criterion expressed as a function of the water effects ratio
T = total
h = noncarcinogenic effect-based human health criteria
s = dissolved

Surface water quality criteria for FW1 waters are that they shall be maintained as to quality in their natural state. PL waters shall be maintained as to quality in their existing state or that quality necessary to attain or protect the designated uses, whichever is more stringent.

In addition N.J.A.C. 7:9B-1.5(a) 4 includes the requirement that "Toxic substances in water shall not be at levels that are toxic to humans or the aquatic biota so as to render them unfit for human consumption."

Fish consumption advisories are jointly issued by the New Jersey Department of Environmental Protection and the New Jersey Department of Health and Senior Services. They provide advice to the general population and high-risk individuals (for example, women of childbearing age and children) concerning the number of meals that represent safe levels of consumption of recreational fish from New Jersey waters. Fish consumption advisories for mercury include information on how to limit risk by providing guidance on the types and sizes of fish and the number of meals to eat. They are not promulgated standards, but they are used for determining whether the fish consumption use is met. Where fish tissue levels exceed the advisory thresholds, a waterbody is listed on the 303(d) list. The New Jersey fish consumption advisories are as follows:

Table 4. New Jersey Fish Consumption Advisory Thresholds (from Toxics in Biota Committee 1994)

Advisories for the high risk population*	
Mercury (TR) Concentration in Fish Tissue	**Advisory**
Greater than 0.54 µg/g (ppm)	Do not eat
Between 0.19 and 0.54 µg/g (ppm)	One meal per month
Between 0.08 and 0.18 µg/g (ppm)	One meal per week
0.07 µg/g (ppm) or less	Unlimited consumption
Advisories for the general population	
Mercury (TR) Concentration in Fish Tissue	**Advisory**
Greater than 2.81 µg/g (ppm)	Do not eat
Between 0.94 and 2.81 µg/g (ppm)	One meal per month
Between 0.35 and 0.93 µg/g (ppm)	One meal per week
0.34 µg/g (ppm) or less	Unlimited consumption

TR – Total Recoverable Mercury

* The high risk population consists of women of childbearing years, pregnant and nursing mothers and children.

Under the current assessment methodology, an assessment unit was listed as not attaining the fish consumption use if fish tissue data indicated that any restriction of consumption would be necessary, in other words if the fish tissue concentration was above 0.07 µg/g. However, based on this TMDL analysis, this level in fish tissue can be caused solely by natural sources of mercury in some waters (see Section 5 *TMDL Calculations* below). Therefore, the Department intends to revise the assessment methodology in the development of future lists (2010) to reflect a minimal level of consumption advisory for the high risk population. It is expected that the

future assessment method will use a tissue concentration of greater than 0.18 µg/g as the listing threshold, which would allow consumption by the high risk population of one meal per week. Therefore, the target for this TMDL is 0.18 µg/g total mercury fish tissue concentration. Big Timber Creek would not have been listed using this listing threshold, however, because it is listed on the 2008 303(d) list, it will be included in this TMDL document. All other waters included in this TMDL exceed the 0.18 ug/g fish tissue target.

Because fish consumption advisories are not SWQS and a TMDL must demonstrate attainment of the applicable SWQS, it is necessary to demonstrate that using this fish tissue target will also attain the applicable SWQS for mercury. This is done using bioaccumulation factors (BAFs), to convert the levels found in the fish tissue to a water column value so there can be a direct comparison with the State's current water quality criterion of 0.050 µg/L as total mercury. There is no numerical standard for waters classified as PL or FW1. The 0.18 ug/g fish tissue target is a human health endpoint which is protective of all waters, regardless of a waterbody's designation. NJAC 7:9B-1.5(a) 4's narrative standard regarding toxic substances is applicable to all waters. Absent a numeric standard for FW1 and PL waters, the narrative standard was applied and implemented using the 0.18 ug/g mercury fish tissue target. In addition the target of 0.18 µg/L requires the reduction of mercury to near natural background levels (see TMDL calculations in section 5 below) and as such is protective of waters with PL and FW1 designations.

New Jersey is engaged in an ongoing effort to develop regional BAFs. As this work is not complete, the EPA national default values will be used for this TMDL. A BAF of 1,690,000 L/kg was selected, which is based on the averaging of EPA national default values for trophic level 3 and trophic level 4 fish of 2,700,000 and 680,000 L/kg, respectively. Averaging the two values assumes a diet of 50% of these higher trophic level fish. This BAF is for methyl mercury. A further conversion to a corresponding total mercury concentration in the water column can be calculated by using the ratio of dissolved methyl mercury to total mercury. Data available from the various regions of New Jersey show that the ratios range from 0.059 to 0.005 (pers. comm. G. A. Buchanan, NJDEP, May 5, 2009). A ratio of 0.055 can be calculated from national data (EPA, 1997). The water column mercury concentration, 0.021 ug/L, expressed as total mercury using the selected BAF and the most conservative conversion factor (0.005) is lower than the mercury surface water criterion of 0.050 ug/L. Therefore, the use of a fish tissue criterion as a TMDL target ensures that the SWQS will be met if the TMDL fish tissue target is met.

The following formula was used for this comparison:

WCV (µg/L) =[Fish Tissue Value (mg/kg)/BAF (L/kg) x 1000 µg/mg] / dissolved MeHg to total Hg

Where:

WCV = water column mercury concentration
Fish Tissue Value = 0.18 mg/kg
BAF = 1,690,000 L/kg

Therefore:

WCV (µg/L)(as total Hg) = [0.18 mg/Kg/1,690,000 L/kg x 1000 µg/mg]/ 0.005 = **0.021 µg/L total Hg**

In other words, when a fish tissue target of 0.18 mg/kg is met, the water column mercury concentration would be 0.021 µg/L, which is below the surface water quality criterion of 0.050 µg/L).

2.3 Area of Interest

In accordance with the *2008 Integrated Water Quality Monitoring and Assessment Methods*, although there is a State-wide fish consumption advisory for mercury, only waters with actual fish tissue monitoring data that exceed the threshold which results in a consumption restriction (greater than 0.07 mg/kg) are placed on Sublist 5. All other assessment units are listed on Sublist 3 for this use.

The *2008 List of Water Quality Limited Waters* currently identifies 256 assessment units as impaired due to mercury in surface water and/or fish tissue. This report establishes 122 TMDLs for mercury contamination based on fish tissue concentration whose source is largely air deposition. Waters where there are other significant sources of mercury in a waterbody, as indicated by a water column concentration in excess of the Surface Water Quality Standards (61 listings), documentation of high levels of mercury in ground water (15 listings) or the presence of hazardous waste sites where mercury is a contaminant of concern (8), are deferred at this time, pending additional study. Tidal waters (35) are also excluded because the approach used in this TMDL is intended for waters not affected by tidal dynamics. In addition, areas that are included in the spatial extent of the on-going interstate effort to address mercury impairments in the New York/New Jersey Harbor are excluded from this TMDL (6). A similar interstate effort is an appropriate means of addressing mercury impairments in the shared waters of the Atlantic Ocean (37) and the Delaware River and Estuary (9) and these waters are deferred as well. See Appendix A for a listing of the deferred assessment units.

Additional fish tissue data not available when the *2008 List of Water Quality Limited Waters* was developed were evaluated and 37 additional assessment units were found to have fish tissue concentrations that would have resulted in listing of those assessment units under the current assessment methodology (see those indicated with an asterisk in Table 1). These assessment units also meet the other criteria for being addressed under this TMDL (no other significant sources, non-tidal, outside the spatial extent of interstate study). Therefore, these assessment units will be addressed under this TMDL.

As additional fish tissue data is obtained, it is expected that other assessment units will be identified that conform to the parameters established for this TMDL approach and would appropriately be addressed by this TMDL, had the data been available. Therefore, in addition to the impaired waters listed Table 1, this TMDL may, in appropriate circumstances, also apply to waterbodies that are identified in the future as being impaired for mercury. For such waterbodies, this TMDL may apply if, after listing the waters for mercury impairment and taking into account all relevant comments submitted on the Impaired Waters List, the Department determines, with EPA approval of the list, that this TMDL should apply to future mercury impaired waterbodies. Under these circumstances, the assessment units will be placed on Sublist 4.

The assessment units addressed in this TMDL are listed in Table 1 and depicted in Figure 1. The assessment units encompass 724,236 acres throughout the state.

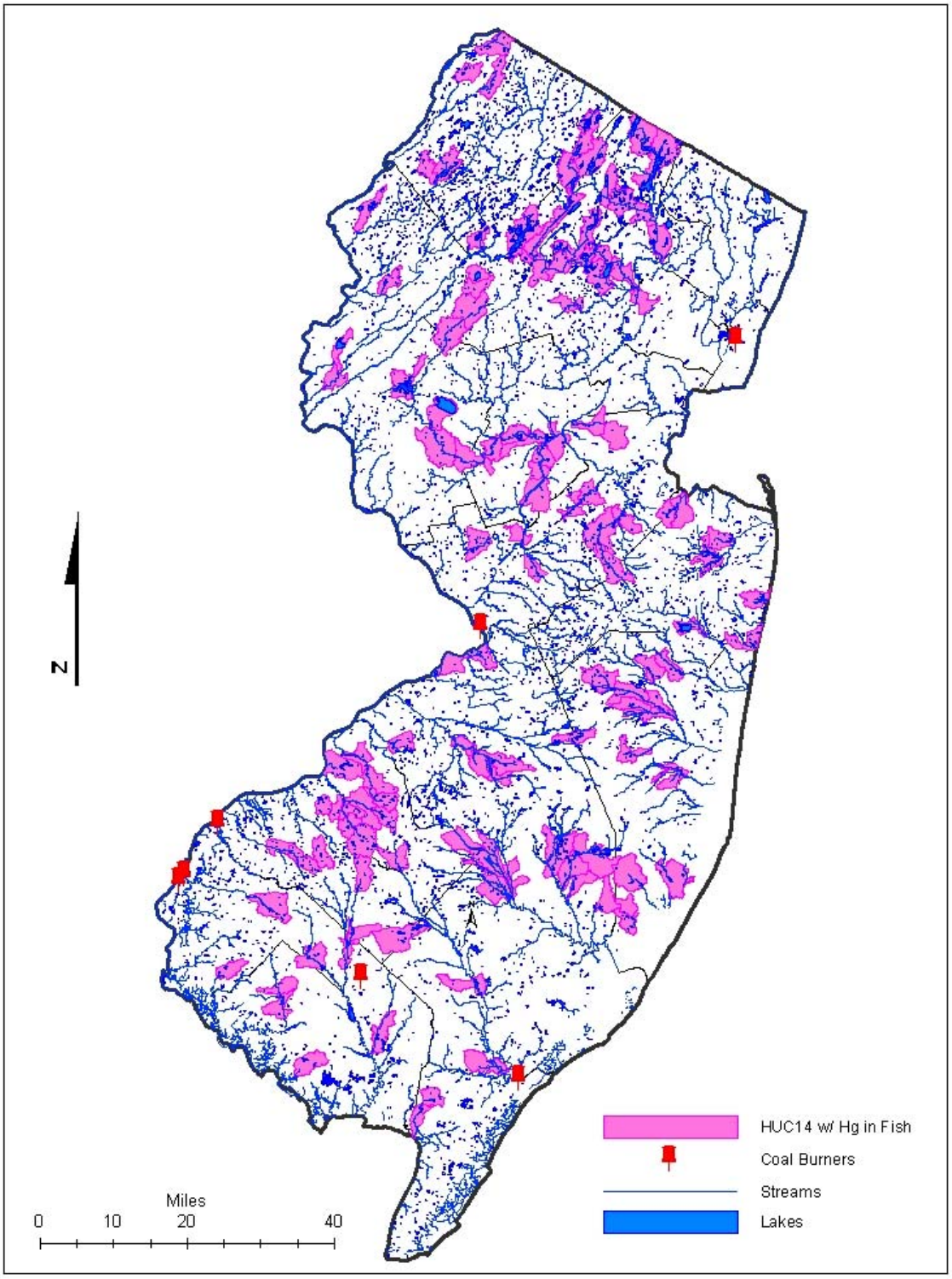


Figure 1. Assessment Units Addressed in this TMDL

3.0. Data Analysis

3.1 Fish Tissue Data

Beginning in 1994, research on freshwater fish found mercury concentrations exceeding the risk-based health advisories established by the State of New Jersey. Additional data were developed and reported in Academy of Natural Sciences, Philadelphia (ANSP) (1999), Ashley and Horwitz (2000), Horwitz et al. (2005) and Horwitz et al. (2006). The Department's Routine Monitoring Program for fish tissue began in 2002. The purpose of this monitoring program is to enhance waterbody assessments; amend existing advisories or, if necessary, develop new advisories; assist the NJDEP in evaluating trends in contaminant concentrations of these selected species; and to determine the need for additional research and monitoring studies. The sampling program is based on a rotating assessment of contamination in five regions of the state on a 5-year cycle. The regions consist of:

1. Passaic River Region;
2. Marine/Estuarine Coastal Region;
3. Raritan River Region;
4. Atlantic Coastal Inland Waterways Region; and
5. Upper and Lower Delaware River Region.

Sampling in the Passaic Region was conducted in 2002-2003 and the Marine/Estuarine Region in 2004-06. The results were reported in Horwitz, et al. (2005 and 2006). In the third year of the cycle, the Raritan River Region was sampled for freshwater fish, blue crabs and marine fish. In 2006-2007, species important to recreational anglers in the Raritan estuaries and adjacent oceanic waters and in two southern New Jersey coastal bays were sampled.

The initial data set consulted included 2,474 samples that had been analyzed for mercury in fish tissue in the waters of New Jersey collected through the above sampling programs and from localized investigations. All fish were analyzed using microwave digestion and cold vapor atomic absorption. Based on an evaluation of data quality, all samples before 1990 were excluded because of issues with background contamination in the labs analyzing samples. A small number of fish tissue samples were derived from whole fish samples. Only samples where the fillets were analyzed were retained to ensure a consistent basis for comparison. Locations with known mercury contamination from other sources were eliminated to avoid influences beyond air deposition (water column exceedances, presence of hazardous sites with mercury, groundwater levels with elevated mercury). All tidal areas were excluded, including those from the areas of on-going or anticipated interstate studies (New York/New Jersey Harbor, Atlantic Ocean and Delaware River and Bay). The final data set used for this TMDL analysis included 1,368 samples from 26 different species (see Appendix B).

This TMDL is based on the linear relationship between mercury levels in the air and water and that a BAF can relate fish tissue concentration to water column concentration. This means that if the existing load is responsible for the observed mercury levels in fish, then one can calculate the load that will result in the target concentration in fish and the associated water column

concentration using the BAF, to ensure the SWQS are attained. The steady state bioaccumulation equation is:

$$C_{\text{fish t1}} = BAF * C_{\text{water t1}}$$

where:
$C_{\text{fish t1}}$ and $C_{\text{water t1}}$ represent methyl mercury concentration in fish and water at time t_1, respectively;
BAF represents the bioaccumulation factor, which is constant for a given age and length fish in a specific water body.

For a future time, t_2, when mercury concentrations have changed, but all other parameters remain constant, the following equation applies:

$$C_{\text{fish t2}} = BAF * C_{\text{water t2}}.$$

Combining both equations produces the following:

$$C_{\text{fish t1}} / C_{\text{fish t2}} = C_{\text{water t1}} / C_{\text{water t2}}.$$

Then, with methyl mercury water column concentrations being proportional to mercury air deposition load, therefore:

$$C_{\text{fish t1}} / C_{\text{fish t2}} = L_{\text{air t1}} / L_{\text{air t2}}$$

where:
$L_{\text{air t1}}$ and $L_{\text{air t2}}$ represent mercury loads from the air deposition at time 1 and time 2.

Mercury concentration in fish increases with both age and length (see Figure 2). In order to derive a representative existing fish tissue concentration as a basis to calculate the load reduction required to achieve the target concentration, it is necessary to statistically standardize the data. The fish tissue mercury concentrations were statistically adjusted to a "standard-length fish". Because many fish are larger than the standard length and therefore higher in mercury, the TMDL analysis targets the 90^{th} percentile mercury tissue concentration of the distribution of all length-standardized fish evaluated. This will provide an implicit margin of safety and be more protective than using a mean or median concentration value. In addition, because growth rates and levels of mercury accumulation will vary between waterbodies, using the 90^{th} percentile tissue concentration will be protective of waterbodies with higher levels of accumulation.

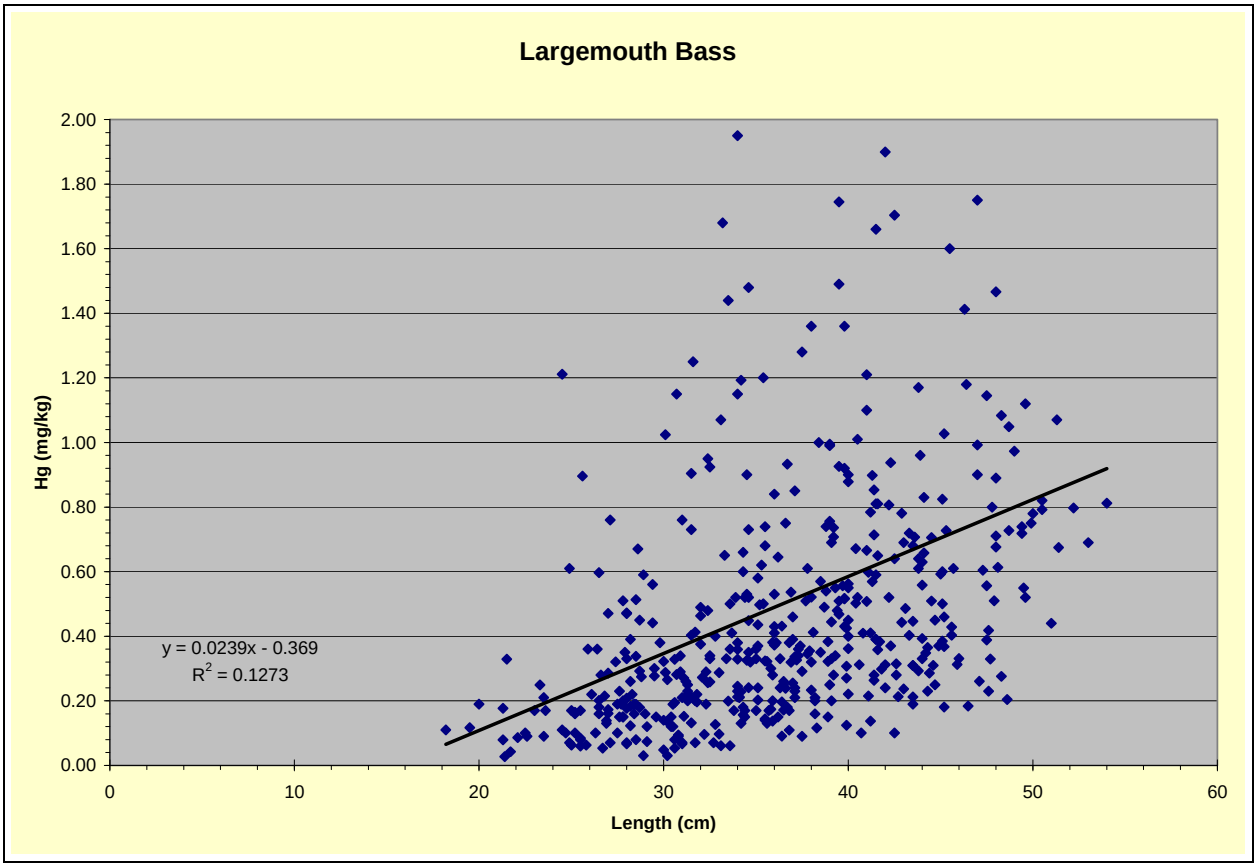


Figure 2. Relationship Between Length and Mercury Concentration in Fish Tissue

The Northeast Regional TMDL analyzed four different species of top trophic level fish, comparing the mean, 80th and 90th percentile concentrations. The authors chose the smallmouth bass (*Micropterous dolomieu*), because of the rate of bioaccumulation of mercury and its ubiquitous distribution throughout the Northeast States. The smallmouth bass is not well distributed throughout New Jersey, therefore it was not an appropriate indicator species for this TMDL. However, the largemouth bass (*Micropterus salmoides*), of the same genus and with the same diet of crayfish, frogs and fish, is well distributed throughout New Jersey. Samples are available from 69% of the listed assessment areas. The chain pickerel was also considered because it is represented by the second largest number of samples in the data set and has a high average mercury concentration (see tables 5 and 6 below). Its diet consists of invertebrates and fish. However, it is not as well distributed throughout New Jersey. Because of the larger sample size and better distribution, the largemouth bass was chosen to be the indicator for this TMDL effort. Using either fish yields a similar reduction factor.

Table 5. Data on Methyl Mercury Concentration in Fish Fillet Samples (n = number of samples, Average = arithmetic mean concentration)

Species List	2000-2007		1990-1999	
	n	Average	n	Average
American Eel	72	0.4	6	0.47
Black Crappie	15	0.15	32	0.19
Bluegill	75	0.14	2	0.03
Bluegill Sunfish	3	0.07	20	0.18
Brown Bullhead	32	0.07	79	0.19
Brown Trout	2	0.08	1	0.2
Chain Pickerel	82	0.658	166	0.685
Channel Catfish	9	0.22	10	0.15
Common Carp	36	0.11	5	0.04
Hybrid Striped Bass	0		6	0.27
Lake Trout	5	0.14	12	0.46
Largemouth Bass	152	0.54	224	0.56
Mud sunfish	0		3	1.01
Northern Pike	6	0.29	6	0.24
Pike	0		3	0.39
Pumpkinseed Sunfish	0		19	0.37
Rainbow Trout	0		6	0.11
Redbreast Sunfish	16	0.16	4	0.24
Rock Bass	19	0.33	4	0.46
Smallmouth Bass	13	0.34	22	0.47
Striped x White Bass Hybrid	5	0.29	0	
Walleye	10	0.4	6	0.74
White Catfish	8	0.19	15	0.27
White perch	12	0.18	22	0.42
White Sucker	3	0.23	0	
Yellow Bullhead	33	0.23	32	0.63
Yellow Perch	27	0.36	28	0.51

An analysis of covariance model was used to estimate the length-adjusted concentrations of mercury in largemouth bass. Scatter plots indicated that a log transformation for mercury would approximately linearize the relationship between mercury and length, so the model used the log to the base 10 of mercury as the dependent variable. The independent variables were length and water body. Water bodies were considered to be fixed effects. The result of this analysis was to create a length-adjusted mercury concentration for each water body.

A model was also run in order to determine whether the length-adjusted concentrations changed over time. In order to do this, an independent variable defining the decade in which the sample was taken (1992 – 1999 vs. 2000 – 2007) was included in the model along with length and water body. This model was significant ($p < 0.001$) with an R-square of 82%. Mercury concentrations varied significantly ($p < 0.001$) with length, waterbody and the decade in which the samples were taken.

Because decade was a significant effect, the two decades were analyzed separately. The adjusted estimates were calculated at the mean length of 35.11cm for data collected from 1992-1999 and 39.78 cm for data collected from 2000-2007.

For the 1992-1999, the data set included 49 water bodies. The number of fish sampled from each water body ranged from 1 to 12. The independent variables included length and water body. This model run was significant ($p < 0.001$) with an R-square of 89%. Mercury concentration varied significantly ($p < 0.001$) with both length and waterbody. The 90th percentile of the length-adjusted mercury concentration is $10^{(0.0448)} = 1.109$ µg/g.

The 2000-2007 dataset included 46 water bodies. The number of fish sampled from each water body ranged from 3 to 5. The independent variables included length and water body. This model run was significant ($p < 0.001$) with an R-square of 85%. Mercury concentration varied significantly ($p < 0.001$) with both length and waterbody. The 90th percentile of the length adjusted mercury concentration is $10^{(0.0607)} = 1.150$ µg/g.

The statistical analyses were performed in SAS version 9.1.3.

Because the mercury concentration varies with the waterbody, the 90th percentile fish tissue concentration is used to calculate the reduction factor. This will be protective of all the waterbodies, even those with higher fish tissue mercury concentrations.

Table 6. Mercury Concentrations Related to Fish Length for 2000-2007 Data

Species	Standard Length (cm)	Mean Hg Concentration (ppm) at Standard Length	80th percentile Hg Concentration (ppm) at Standard Length	90th percentile Hg Concentration (ppm) at Standard Length
Largemouth bass	35.11	0.531	0.64	1.15
Chain pickerel	41.61	0.59	1.26	1.29

Figure 3 shows the distribution of methyl mercury concentrations in all species in the 2000–2007 data set and concentrations in the largemouth bass for the same period. The graph shows that targeting the 90th percentile concentration in largemouth bass corresponds to the 93rd percentile concentration for all fish species. Therefore, targeting the concentration of 90th percentile for largemouth bass, means that approximately 93% of all fish populations tested will comply with

the TMDL target concentration. There is much environmental variability. Some lakes will show decreases in mercury more quickly, some more slowly. Both the Minnesota and the Northeast States regional TMDLs were based on the 90th percentile concentration. Therefore the 90th percentile target is in keeping with mercury TMDLs EPA has previously approved.

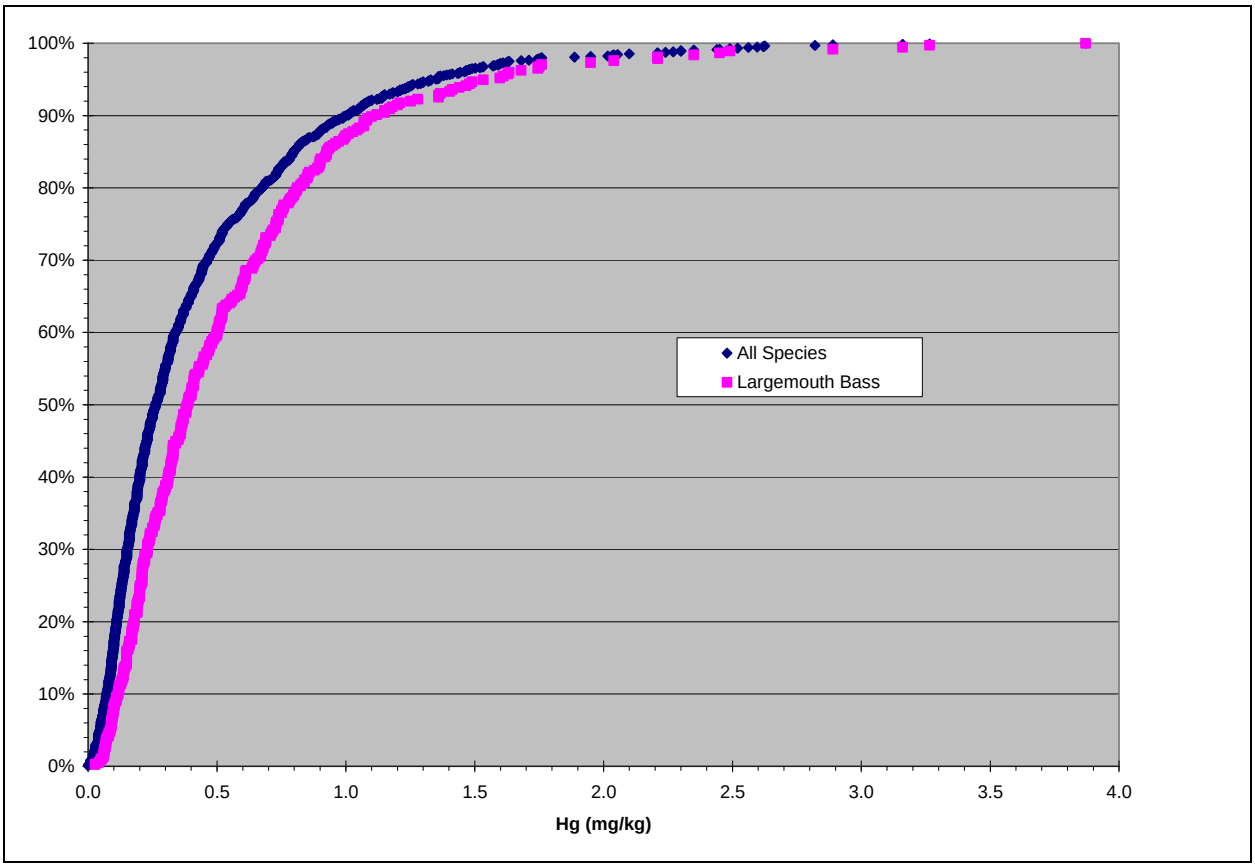


Figure 3. Cumulative Distribution of Mercury Concentrations in Fish Tissues

Based on the linear relationship premise, a Reduction Factor (RF) based on the existing and target fish tissue concentrations is calculated as follows:

RF= (EFMC-TFMC)/EFMC

where:
EFMC = the existing fish mercury concentration for the selected fish species.
TFMC = target fish mercury concentration

or:
0.84 = (1.15 µg/g-0.18 µg/g) /1.15 µg/g

As discussed above, the EFCM for this study is 1.15 µg/g, which represents the 90th percentile concentration based on standard length for largemouth bass. The target fish tissue concentration is 0.18 µg/g, which will allow a consumption rate of 1 meal per week for the high risk population. For unlimited consumption of fish for the high risk population, the reduction factor would need to be 0.94. As discussed below, natural sources of mercury, which cannot be reduced, make this reduction factor unattainable. However, the TMDL calculation includes an implicit margin of safety based on a number of conservative assumptions. Therefore, it is possible that unlimited consumption for the high risk population may be attainable if the identified anthropogenic reductions are achieved. In any case, although this TMDL target will not allow unlimited consumption of top trophic level fish for high risk groups using the multiple conservative assumptions in this analysis, mercury will be reduced at all trophic levels, allowing greater options for safe consumption of fish at the lower trophic levels and one meal per week of the top trophic levels by the high risk population.

4.0. Source Assessment

In order to evaluate and characterize mercury loadings on a statewide basis source assessments are critical. Source assessments include identifying the types of sources and their relative contributions to mercury loadings and are necessary to develop proper management responses to reduce loadings and attain water quality targets.

Air deposition is the primary source of the mercury impairments addressed in this TMDL. A recent study was undertaken in partnership with the states and USEPA Regional Air and Water Offices to use atmospheric deposition modeling to quantify contributions of specific sources and source categories to mercury deposition within each of the lower 48 states (ICF, 2008). The annual simulation was performed based on data that represented late 90's emission profiles for most source categories. The primary modeling system used for this study is the Regional Modeling System for Aerosols and Deposition (REMSAD). REMSAD is a three-dimensional grid model designed to calculate the concentrations of pollutants by simulating the physical and chemical processes in the atmosphere that affect pollutant concentrations. REMSAD simulates both wet and dry deposition of mercury. REMSAD also includes algorithms for the reemission of previously deposited mercury (originating from anthropogenic and natural sources) into the atmosphere from land and water surfaces. The Particle and Precursor Tagging Methodology (PPTM) feature allows the user to tag or track emissions from selected sources or groups of sources, and quantify their contribution to mercury deposition throughout the modeling domain and simulation period. Results from the Community Multiscale Air Quality (CMAQ) modeling system were used to enhance the analysis of the effects of global background on mercury deposition. The outputs from three global models were used to specify the boundary conditions for both REMSAD and CMAQ and thus represent a plausible range of global background contributions based on current scientific understanding.

Preparation and quality assurance of the mercury emissions inventory were critical for the air deposition load modeling. Based on the emissions data utilized by USEPA in the Clean Air Mercury Rule (CAMR) modeling, detailed summaries of the top emitters in the CAMR mercury inventory for each state were prepared and provided to the appropriate EPA regional offices and

state agencies for review. An effort was made to update emissions to the 2001 timeframe in addition to the general QA/QC that performed by the states and EPA regions. Then based on the state's input, any errors in the data were corrected. Table 7 lists New Jersey's emission inventory as it was used in the model. This inventory was developed based on the Department's 2001 mercury emission estimates (ICF, 2008). For the total of the three forms of mercury emission load, approximately 60% was due to air point sources and 40% from air nonpoint sources. Air point sources include fuel combustion-electric utilities, industrial facilities and other combustion facilities. Air nonpoint sources include human cremation, fluorescent lamp breakage, miscellaneous volatilization and other non-stationary sources.

Table 7. Summary of Emissions Inventory of New Jersey in Tons per Year (tpy) (ICF, 2008)

Facility Name	HG0* (tpy)	HG2* (tpy)	HGP* (tpy)	Total (tpy)
B.L. England	0.094	0.016	0.004	0.114
Hudson*	0.011	0.028	0.003	0.041
Mercer	0.030	0.015	0.011	0.057
Deepwater	0.002	0.004	0.000	0.006
Logan Generating Company - L.P.	0.001	0.000	0.000	0.002
Chambers Cogeneration - L.P.	0.010	0.006	0.004	0.021
Co Steel Raritan	0.090	0.011	0.011	0.112
Atlantics States Cast Iron Pipe	0.033	0.004	0.004	0.041
U.S. Pipe & Fndy. Co	0.019	0.011	0.000	0.030
Co Steel Sayreville*	0.178	0.022	0.022	0.222
Essex County RRF*	0.047	0.123	0.042	0.212
Camden RRF*	0.011	0.029	0.010	0.050
Union County RRF	0.003	0.008	0.003	0.014
Gloucester County	0.002	0.005	0.002	0.009
Warren Energy RF	0.001	0.001	0.001	0.003
Howarddown	0.002	0.001	0.001	0.004
Hoeganese	0.005	0.003	0.002	0.010
Camden County Muassi	0.005	0.003	0.002	0.010
Stony Brook Regional Sewerage Authority	0.011	0.007	0.005	0.023
Bayshore Regional Sewerage Authority	0.004	0.002	0.002	0.008
Somerset Raritan Valley Sewerage Authority	0.007	0.004	0.003	0.014
Northwest Bergen County Utilities Authority	0.005	0.003	0.002	0.010
Parsippany – Troy Hills Township WWTP	0.004	0.003	0.002	0.009
Atlantic County Utilities Authority	0.003	0.002	0.001	0.006
Gloucester County Utilities Authority	0.001	0.001	0.000	0.002
Point Source Total	0.579	0.312	0.137	1.030
Non-point Source	0.464	0.096	0.055	0.613
Total	1.043	0.408	0.192	1.643

*HG0 - elemental mercury vapor; HG2 - divalent mercury compounds in gas phase; HGP - divalent mercury compounds in particulate phase.

As summarized in Table 8 below, a total of 594 kg of annual mercury load due to air deposition was estimated for New Jersey. "Background" refers to the effects of initial and boundary concentrations and embodies the effects of global emissions, altogether, about 52% of the total

load. Emissions from New Jersey are contributing 12.5% of the total load. The emissions from five surrounding states contribute 26% of the total load.

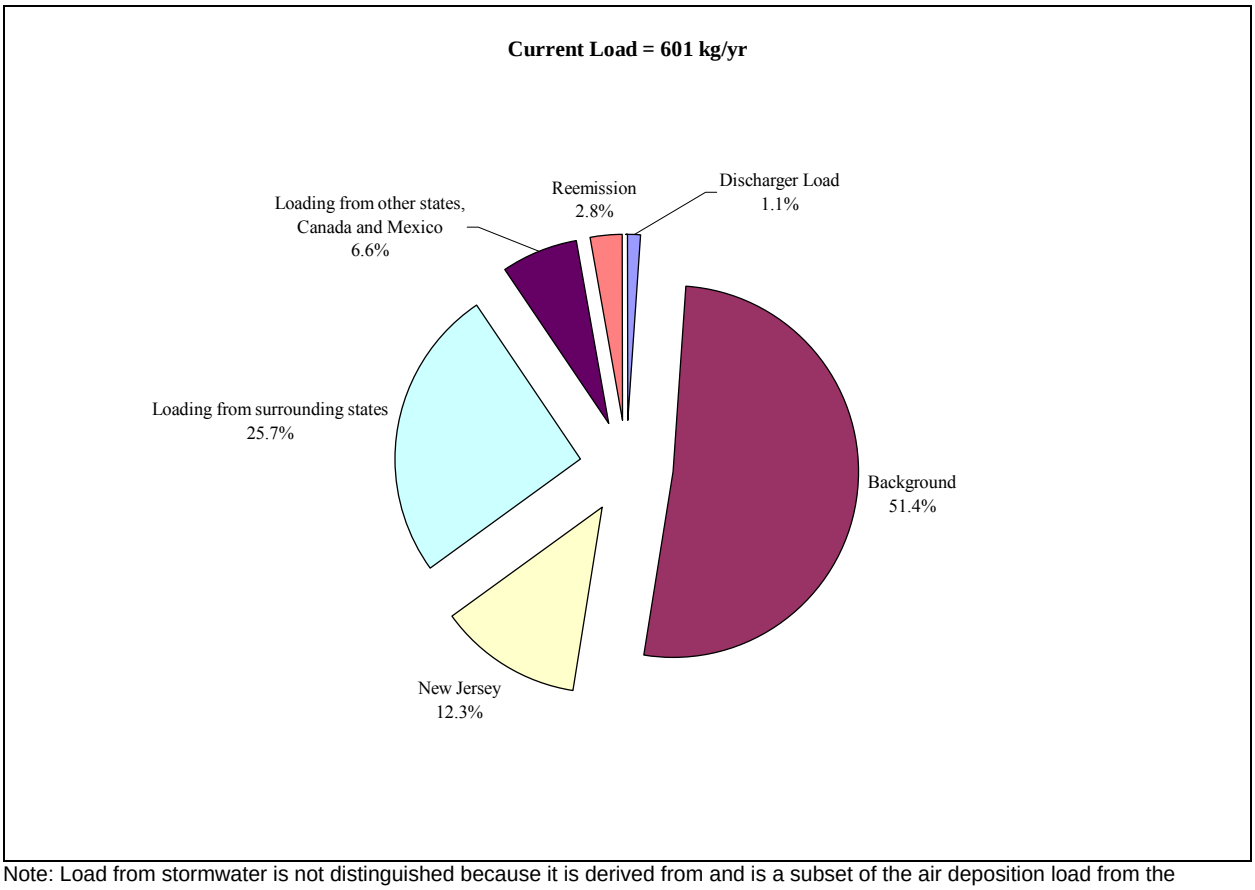
Table 8. Mercury Air Deposition Load for New Jersey (pers. com. D. Atkinson, March 26, 2009, see Appendix D)

Category	Load (kg/yr)	Percent of Total Load
Background	309.0	52.0%
Background-reemission	16.9	2.8%
New Jersey	74.1	12.5%
Loading from the surrounding state (Total)	154.6	26.0%
Pennsylvania	102.8	17.3%
Maryland	25.1	4.2%
New York	13.7	2.3%
Delaware	11.1	1.9%
Connecticut	1.8	0.3%
Loading from other states, Canada and Mexico	39.6	6.7%
Total	594.2	100%

Under the Clean Water Act (CWA), air deposition is a nonpoint source of mercury. Mercury deposited from air sources reaches the surface water as the result of direct deposition on the water surface and through stormwater runoff. Under the CWA, stormwater discharges subject to regulation under the National Pollutant Discharge Elimination System (NPDES) are a point source. In New Jersey, this includes facilities with individual or general industrial stormwater permits and Tier A municipalities and state and county facilities regulated under the New Jersey Pollutant Discharge Elimination System (NJPDES) municipal stormwater permitting program. Stormwater discharges that are not subject to regulation under NPDES, such as Tier B municipalities regulated under the NJPDES municipal stormwater permitting program, and direct stormwater runoff from land surfaces are nonpoint sources. Stormwater point sources derive their pollutant load from runoff from land surfaces and the necessary load reduction for this TMDL will be accomplished in the same way as for stormwater that is a nonpoint source, that is by reducing the air deposition load. The distinction is that, under the Clean Water Act stormwater point sources are assigned a WLA while nonpoint sources are assigned a LA. For this TMDL, the proportion of the air deposition loading attributed to stormwater point sources has been estimated by determining the amount of urban land located within Tier A municipalities. Based on NJDEP's 2002 land use coverage, the area of urban land use within the Tier A municipalities is about 25.6% of the entire state. Applying this percentage to the entire load due to air deposition is the best approximation of the air deposition load subject to stormwater regulation and this proportion of the air deposition load will be assigned a WLA.

Surface water discharges of sanitary and industrial wastewater that have the potential to discharge mercury are the other potential point source category which must be assigned a WLA. The Department reviewed over 240 existing major and minor municipal surface water discharge locations. Industrial surface water dischargers with mercury limits in their permits regulated under the New Jersey Pollutant Discharge Elimination System (NJPDES) were also included as the potential point sources for this TMDL. Since this TMDL is limited to non-tidal water, facilities discharging to coastal water were excluded. By examining the locations of the outfall pipes, approximately two-thirds of initially identified municipal and industrial surface water discharge facilities were used to estimate the point source loading from them.

Various sources of data were assessed in order to estimate an appropriate loading to attribute to discharge facilities. Due to the high detection limit of the standard method for analyzing the samples collected from the dischargers, mercury concentrations reported to date were generally listed as non-detected in the Monitoring Report Forms. Dental facilities are believed to be the largest source of mercury reaching wastewater treatment plants. Through the recently adopted New Jersey Pollutant Discharge Elimination System, Requirements for Indirect Users – Dental Facilities rules, N.J.A.C. 7:14A-21.12, dental facilities that generate amalgam waste are required to comply with best management practices and install amalgam separators. The amalgam separators will allow the mercury containing amalgam to be collected and recycled, thereby reducing the amount entering the environment through sludge incineration. The Department required major wastewater treatment facilities to carryout baseline monitoring of their effluent to determine mercury levels prior to implementation of the new dental requirements. However, the data from this monitoring effort are not yet available for use in this TMDL. As part of the New York-New Jersey Harbor TMDL development, in 2000 and 2001 a total of 30 samples were collected from 11 Publicly Owned Treatment Works (POTWs) in New Jersey which discharge to the Harbor (GLEC, 2008). Total recoverable mercury concentrations ranged from 8.32 to 74.9 ng/L, with a mean of 30.09 ng/L and a median of 19.75 ng/L. The Department believes that the mercury effluent concentrations found in these facilities will serve as an appropriate representation of effluent quality in the state. Therefore, the median concentration of 19.75 ng/L was used as a typical mercury concentration for treatment facilities. The total permitted flows for selected facilities is about 250 MGD. Using that flow and the selected median concentration, the total mercury load from these facilities is estimated to be 6.8 kg/year. This loading (6.8 kg/yr) is also a conservative assumption of the existing point source load since the permitted flow was used instead of the actual flow. The loading attributed to discharge facilities is insignificant at approximately 1% of the total load. Figure 4 shows the distribution of the current total load of mercury.



Note: Load from stormwater is not distinguished because it is derived from and is a subset of the air deposition load from the different air sources identified.

Figure 4. Distribution of the Current Mercury Load

5.0. TMDL Calculation

Methods similar to those used in the *Northeast Regional TMDL* (2007) are employed below to calculate the TMDL. A total source load (TSL), described in Section 4, and reduction factor (RF), as described in Section 3, are used to define the TMDL by applying the reduction factor to the total source load, as shown in Equation 1 below.

$$TMDL = TSL \times (1-RF)$$

where:

- TMDL is the total maximum daily load (kg/yr) that is expected to result in attainment of the target fish tissue mercury concentration.
- TSL is the existing total source load (kg/yr), and is equal to the sum of the existing point source load and the existing nonpoint source load
- RF is the reduction factor required to achieve the target fish mercury concentration.

To allow a consumption rate for the high risk population of one meal per week, the required reduction is 84.3 % (1 - 0.18/1.15 = 84.3%). The total existing loading from air deposition and the treatment facilities discharging into non-tidal waters is 601.kg/yr. In this load, 6.8 kg/yr (about 1%) comes from NJPDES regulated facilities with discharges to surface water in non-tidal waters. Due to the insignificant percentage contribution from this source category, reductions from this source category are not required in this TMDL. Therefore, individual WLAs are not being assigned to the various facilities through this TMDL. Individual facilities have been and will continue to be assessed to determine if a water quality based effluent limit should be assigned to prevent localized exceedances of SWQS and to ensure that the aggregate WLA is not exceeded. As discussed above and in the Reasonable Assurance section below, the recently implemented dental amalgam rules are expected to significantly reduce the amounts of mercury entering wastewater treatment facilities. At this time, it is not known what effect this will have on effluent concentrations. The post-implementation monitoring will be assessed to determine the effect of best management practices (BMPs) for the handling of dental amalgam waste and installation and proper operation of amalgam separators and the need for adaptive management with regard to this source in air deposition impacted waterbodies. Waterbodies that may be impacted by NJPDES regulated facilities with discharges to surface water (those with water column exceedances of the SWQS) have been excluded from the TMDL and will be addressed individually at a later date.

Based on results of several paleolimnological studies (NEIWPCC, et.al. 2007) in the Northeast, the natural mercury deposition is estimated to range between 15 % and 25 % of deposition fluxes for circa 2000. Natural sources cannot be controlled and are expected to remain at the same long-term average. It is assumed, in this study, that 25% of the background and background reemission is due to natural sources and can not be reduced (Ruth Chemerys and John Graham Pers. Comm. April 28, 2009). Twenty-five percent of the background and background reemission load is about 81.5 kg/yr, which is 13.6% of the total existing load. Including the load of 6.8 kg/yr attributed to surface water dischargers, the portion of the existing load that is not expected to be reduced is about 14.7%. If 0.07 ug/g (the fish concentration for unlimited consumption by the high risk population) were used as the TMDL target, the required reduction would be 93.9% of the existing load, which is greater than the entire anthropogenic load of 85.3% (1-14.7%) and clearly unattainable. For this reason, the concentration level (0.18 ug/g) that allows the high risk population to consume fish once per week was used as the target for this TMDL and will also be used as the threshold in future assessments of impairment. In order to achieve the overall 84.3% reduction of the existing load to attain the target of 0.18 mg/kg in fish tissue, a reduction of 98.8% of the anthropogenic source load would be needed. An implicit margin of safety (MOS) is used in this study, therefore, the MOS term of the TMDL equation is set to zero. Figure 5 presents the distribution of the TMDL to achieve the target concentration that will allow one meal per week by the high risk population.

Table 9. Mercury TMDL for One Meal per Week by High Risk Population

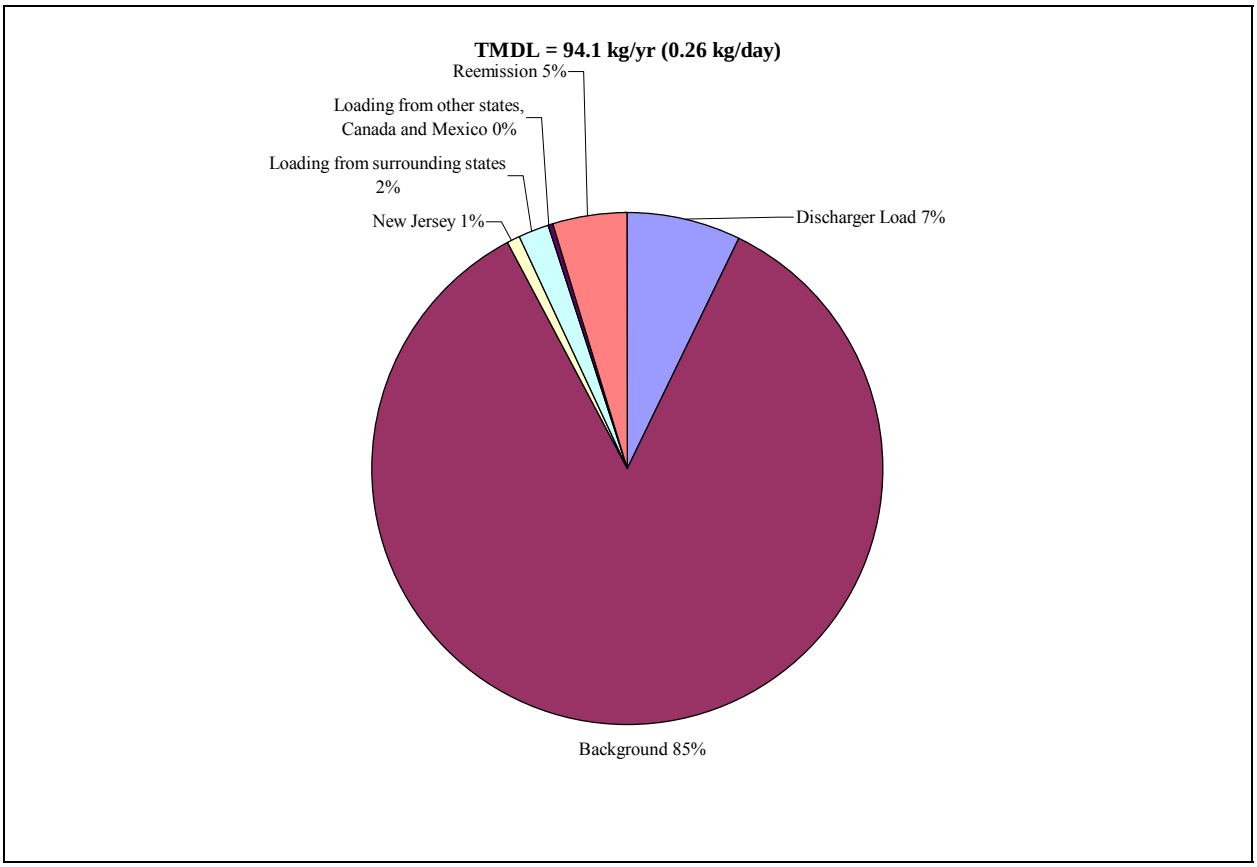
Category	Existing Load (kg/yr)	TMDL Load		Percent Reduction
		kg/yr	kg/day	
Total Annual Load	**601.0**	**94.1**	**0.26**	**84.3%**
Discharger Load (WLA)	6.8	6.8	0.02	-
Air Deposition Load (LA/WLA)	594.2	87.3	0.24	85.3%
Background due to natural source	77.3	77.3	0.21	-
Background due to anthropogenic sources	231.8	2.6	0.01	98.9%
New Jersey	74.1	0.8	0.002	98.9%
Loading from surrounding states	154.6	1.8	0.005	98.9%
Loading from other states, Canada and Mexico	39.6	0.4	0.001	98.9%
reemission due to natural source	4.2	4.2	0.01	-
Reemission due to anthropogenic source	12.7	0.1	0.0004	98.9%

Note: The TMDL loadings presented in the above table were rounded to 0.1 kg/yr. Percents of required reductions were calculated based on values with more significant digits. Using the values from the table to calculate the percent reduction may generate inaccurate results.

Table 10. Distribution of Air Deposition Load between LA and WLA under the TMDL Condition

Air Deposition Load	Annual Load (kg/yr)	Daily Load (kg/day)	Percent of Loading Capacity
Total	87.3	0.24	92.8%
WLA	22.3	0.06	23.7%
LA	65.0	0.18	69.1%

The urban storm water WLA portion of the air deposition load is derived by applying the percentage of urban land within Tier A municipalities (25.6%) to the overall air deposition load (87.3 kg/yr) based on the assumption that this load reaches the water bodies through regulated stormwater sources (see discussion in Section 4). Thus, under the TMDL conditions the WLA has been approximated to be 22.3 kg/yr (87.3 * 0.256), equivalent to 0.06 kg/day (Table 10). The air deposition rate under the TMDL condition is not available to conduct a more precise calculation of the stormwater WLA. More accuracy in developing this WLA is not necessary because the major source of mercury in stormwater is air deposition. Mercury in stormwater must be reduced by reducing air deposition and not through the usual stormwater measures. Therefore a WLA that represents an approximation of the total stormwater load is sufficient for the purposes of this TMDL. Individual stormwater WLAs would not change the response.



Note: Load from stormwater is not distinguished because it is derived from and is a subset of the air deposition load from the different air sources identified.

Figure 5. Distribution of TMDL for One Meal per Week by High Risk Population

As discussed in Section 5.2, multiple conservative assumptions have been made so that the calculated TMDL includes an implicit Margin of Safety (MOS). Therefore, the MOS term of the TMDL equation is set equal to zero. As explained above, a reduction of 85.3% (1-88.3/601) is the highest possible overall reduction that can be expected. The required reduction to achieve unlimited consumption for the high risk population is higher, (1 – 0.07/1.15 = 93.9%). Nevertheless, given the multiple conservative assumptions, this reduction may be achievable. Data gathered following implementation of the TMDL will be used to evaluate success in achieving goals.

5.1. Seasonal Variation/Critical Conditions

40 CFR 130.7(c)(1) requires that "TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS with seasonal variations". Calculated TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters."

The relative contribution of local, regional, and long-range sources of mercury to fish tissue levels in a waterbody are affected by the speciation of natural and anthropogenic emission sources. The amount of bioavailable methyl mercury in water and sediments is a function of the relative rates of mercury methylation and demethylation. Factors such as pH, length of the aquatic food chain, temperature and dissolved organic carbon can affect bioaccumulation. (EPA, 2009). These factors influence the extent to which mercury bioaccumulates in fish and may vary seasonally and spatially. However, mercury concentrations in fish tissue represent accumulation of the life span of a fish. Use of a fish tissue target integrates spatial and temporal variability, making seasonal variation and critical conditions less significant. In addition, the TMDL fish target value is human health-based, reflecting a longer- term exposure.

In New Jersey, data show levels of mercury in some species of fish in the Pinelands sampling region are generally higher compared to fish in other sampling regions of the state. The reductions called for in this TMDL will attain the target fish tissue concentration in the Pinelands, thereby ensuring that the target is met statewide, within the areas addressed by the TMDL.

5.2. Margin of Safety

A TMDL must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA 303(d)(1)(C), 40C.F.R.130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described.

The MOS included in this TMDL is implicit because of the following conservative assumptions:

- The 90th percentile fish mercury concentration based on the largemouth bass, *Micropterus salmoides*. This species of fish has the highest concentration of the species that are ubiquitous throughout the state
- The percent reduction does not account for additional reductions in methyl mercury that may occur as a result of the implementation of ongoing state and federal programs to reduce sulfur emissions. Reductions in sulfur deposition and sulfate-reducing bacterial activity will decrease the rate of mercury methylation. This TMDL does not account for potential mercury reductions associated with decreased sulfur deposition.

6.0. Monitoring

The Department has engaged in various monitoring efforts that have provided significant insight into mercury contamination issues, some of which are described below. In order to effectively assess progress toward achieving mercury reduction objectives, several monitoring programs are recommended, including:

- A primary monitoring strategy for measuring the levels of mercury and calculating trends is the previously mentioned Routine Fish Monitoring Program for Toxics in Fish. This comprehensive program divides the State's waters into five regions that are sampled on a rotating basis for contaminants in fish. Since mercury is persistent in the environment, accumulates in biological tissue, and biomagnifies in the food chain, adverse impacts to non-aquatic, piscivorous (fish eating) organisms may arise from very low surface water concentrations. Fish tissue sampling provides a cost-effective measure to understanding the effects of mercury in the food chain and the environment.

- A mercury water monitoring program is needed to understand the extent and magnitude of the State's mercury contamination and its effect on aquatic organisms. Such a program must have a comprehensive scope and long-term sampling period. Recent mercury studies from the United State Geological Survey (USGS) have suggested the use of screening tools to target areas where elevated concentrations of mercury may occur. These studies have suggested looking at the presence of wetlands within watersheds, dissolved organic carbon and suspended sediment concentrations, and stream flow. High dissolved oxygen content (DOC) and suspended sediment concentrations, increased stream flow, and larger wetland areas may point to elevated mercury concentrations. The sampling requirements would consist of total and methyl mercury in the water column as well as methyl mercury in fish tissue. The locations would extend to all regions of the state such as the Pinelands, Northern New Jersey, Delaware Estuary, and Atlantic Estuary. Each region would have at least five randomized sampling locations as well as a reference site, which are small undeveloped watersheds with no known sources of mercury contamination other than air deposition. This sampling is not needed on a yearly basis, but quarterly sampling once every 2-5 years is appropriate. An ongoing project, that is targeting local air source reduction by sampling for mercury in fish, water column, and leaves at four locations from 2007 to 2013, is expected to impact the development of the statewide mercury monitoring program by refining sampling frequencies, protocols, and objectives. In addition, an ongoing study in collaboration with USGS involves establishing a baseline for natural background levels for mercury in surface waters to discern the location of impairments that may have anthropogenic sources in addition to atmospheric deposition e.g. mercurial pesticides on orchard, crops and golf courses and which may have other natural sources, e.g. geologic. This evaluative monitoring has been completed in the Inner and Outer Coastal Plain, Raritan River Basin, Papakating and Wallkill River Watersheds. The investigation is ongoing in the Millstone River Basin, Crosswicks Creek Watershed and Passaic River Basin.

- One hundred POTWs in New Jersey submitted baseline data on mercury concentrations in their treatment plant effluent. These samples were analyzed using the most sensitive analytical method for mercury in wastewater, Method 1631E. This baseline data will be used to determine the effectiveness of the implementation of the dental BMPs and the installation of the amalgam separators. These POTWs are

required to conduct additional mercury sampling and analyses, using the same analytical method, after amalgam separator installation.

- In-stream monitoring to evaluate effectiveness of the dental amalgam rule is required at target locations upstream and downstream of the POTW discharge. The monitoring sites will be sampled semi-annually to evaluate ambient water quality before and after the rule's implementation to observe the significance of the reductions. Currently, only one site has been targeted. This project needs to expand by selecting suitable locations based on reviewing the POTW effluent data.

- Air sampling under the National Mercury Monitoring Deposition Network is required to continue to monitor long-term loadings and trends from atmospheric deposition. This program currently has only one site in the New Brunswick area. Additional sites in southern and northern portions of the state this network are needed to improve knowledge of depositional rates for different regions of the state and assist in atmospheric deposition source track down.

Monitoring studies already carried out have provided the following information:

- The Department's Air Program has collected speciated ambient mercury concentration data from several Tekran units that can be used to estimate dry deposition. To date, over two years' data from units at two locations, Elizabeth and New Brunswick have been checked for quality and are in the process of being evaluated. Data on wet deposition is being collected in New Brunswick and is analyzed by the National Mercury Deposition Network.

- Water monitoring data collected by NJDEP/USGS in the Ambient and Supplemental Surface Water Networks show that of the 1,752 results since 1997, nearly 67% had concentrations less than the detection levels. None of the total mercury values exceeded the current acute freshwater aquatic life criterion for dissolved mercury of 1.4 microgram per liter (ug/l) or the chronic criterion of 0.77 ug/l, but 3% of the samples exceeded the human health criterion of 0.05 ug/l. Other mercury studies and projects by NJDEP and USGS over the years show similar results, the majority of mercury concentrations are below detection levels. Detection levels have improved since 1997 with detection levels between 0.04 and 0.1 ug/l to detection levels between 0.01 and 0.02 ug/l since 2004.

- In response to the need for detection of low levels of mercury, the Department initiated a preliminary study of low level mercury occurrence in surface waters. Using EPA's method 1631E, the project consisted of 33 filtered samples with accompanying field blanks at 23 unique stations across the state. The detection level at the Wisconsin laboratory being used was 0.04 ppt. Results did not exceed any of the existing surface water quality criteria. Mercury concentrations did not appear to be influenced by land use, but did appear to increase with stream flow. The findings suggest that air deposition is a major influence on in-stream mercury concentrations. In 2007, the Department conducted a follow-up study to determine seasonal

variability in total and methyl mercury concentrations at 7 reference stations, small undeveloped watersheds with no known sources of mercury contamination other than air deposition. Although total mercury showed no seasonal patterns, methyl mercury had elevated levels during the summer due to higher methylation rates during the warmer months. In addition, the project verified new sampling protocols that allow one person to conduct low level mercury sampling, thereby reducing manpower requirements and allowing this sampling to be incorporated into an ambient or routine program.

- A 150 well, statewide, shallow Ground Water Quality Monitoring Network, which was stratified as a function of land use, has been established and is sampled on a 5 year cycle for mercury and other contaminants. During the first 5 year sampling cycle from 1999 to 2004, mercury concentrations were found to range from <0.01 to 1.7 ug/L in ground water from 148 wells and only 5 of those were detectable above the laboratory reporting limits. In addition, other ground water data has been collected under the Private Well Testing Act that required private wells in 9 Southern New Jersey counties to test for mercury. A total of 25,270 wells were tested with a concentration range of 114.2 ug/l to "not detected". Approximately 1% had concentrations above the drinking water maximum contaminate level (MCL) of 2 ug/l. An analysis of the data showed no obvious geographic or land use patterns for the elevated mercury results.

7.0. Reasonable Assurance

New Jersey has a long history of working toward the reduction of mercury contamination within the state and working with interstate organizations to reduce the mercury both coming into and leaving the state. Much progress has been made. Because of New Jersey's past successes in the reduction of mercury, the actions New Jersey has underway and its commitment to implementing further actions as necessary, including working with neighboring states to reduce sources originating from outside the state, there is reasonable assurance that the goals of the TMDL will be met.

New Jersey began working to reduce mercury releases to the environment in 1992 with the formation of a Mercury Task Force. That Task Force examined the many routes and sources of mercury exposure and found air emissions to be the number one source of mercury contamination in New Jersey. The Task Force identified the largest source of mercury air emissions in New Jersey as Municipal Solid Waste (MSW) Incinerators. The Task Force recommended a statewide mercury emission standard for MSW Incinerators, which was implemented in 1996. In addition to the MSW incinerator standards, New Jersey passed the "Dry Cell Battery Management Act" in 1992, banning the use of mercury in certain batteries. These two efforts reduced MSW incinerator mercury emissions by 97% between 1992 and 2006.

In 1998, New Jersey convened a second Mercury Task Force. The second Task Force consisted of representatives from government, emission sources, public interest groups, academia, and fishing organizations. This Task Force was charged with reviewing the current science on

mercury impacts on human health and ecosystems, inventorying and assessing mercury sources, and developing a comprehensive mercury reduction plan for NJ. The "New Jersey Mercury Task Force Report" published in December 2001 established a goal of the virtual elimination of anthropogenic sources of mercury and provided recommendations and targets for further reducing mercury emissions in New Jersey. The Task Force Report is available at http://www.nj.gov/dep/dsr/mercury_task_force.htm

In 2007 the Department's Mercury Workgroup evaluated New Jersey's progress towards meeting the goals and recommendations of the Task Force and began putting together a Mercury Reduction Plan to identify the necessary additional actions to continue to reduce mercury emissions in New Jersey. The reduction plan will serve as the implementation plan for these TMDLs.

Below is a summary of actions that have been taken to reduce New Jersey's mercury loadings.

- To participate in and support regional, national, and global efforts to reduce mercury uses, releases, and exposures New Jersey is a member of the Interstate Mercury Education and Reduction Clearinghouse (IMERC), a member of the Northeast Waste Management Officials Association (NEWMOA), the Quicksilver Caucus, Northeast States for Consolidated Air Use Management (NESCAUM), Environmental Council of the States (ECOS), and Toxics in Packaging.

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- In conjunction with NEWMOA, informational brochures were developed for tanning salons and property managers concerning the management of mercury containing fluorescent lamps. The brochures were sent to every tanning salon and property management company in the state.

- New Jersey works with interstate organizations to assist in the development of federal legislation that minimizes the use of mercury in products. The Department is a member of and works with the Northeast Waste Management Officials Association (NEWMOA) on mercury issues. The Department will participate in any effort conducted by NEWMOA or other interstate organization to develop federal legislation to minimize the use of mercury in products.

- On December 6, 2004, New Jersey adopted regulations to establish new requirements for coal-fired boilers, in order to decrease emissions of mercury. These rules are located at http://www.state.nj.us/dep/aqm/Sub27-120604.pdf.

- On December 6, 2004, New Jersey adopted regulations to establish new requirements for iron or steel melters in order to decrease emissions of mercury. The Department provided three years to reduce mercury contamination of scrap through elimination and separation measures. If the source reduction measures do not achieve emission reduction, the rule requires the installation and operation of mercury air pollution control and requires achieving mercury standard starting 1/2010. These rules are located at http://www.state.nj.us/dep/aqm/Sub27-120604.pdf.

- On December 6, 2004, New Jersey adopted regulations to establish new requirements for Hospital/medical/infectious waste (HMIW) incinerators in order to prevent or decrease emissions of mercury by ensuring that the mercury emissions from HMIW incinerators will be maintained at low levels. These rules are located at http://www.state.nj.us/dep/aqm/Sub27-120604.pdf.

- The Department has closely monitored mercury sewage sludge levels and has taken action where existing authority would allow the imposition of a sewage sludge limit or a discharge limitation. For example, the POTW with the highest sewage sludge mercury concentrations was identified and the industry responsible voluntarily agreed to shut down all production of mercury-containing diagnostic kits. Increased focus on removing mercury from products, as well as the proposed dental rule noted above, should continue the decreasing trend of detectable concentrations of mercury found in sewage sludge.

- On December 6, 2004, New Jersey adopted revised regulations to establish new requirements for municipal solid waste (MSW) incinerators in order to prevent or decrease emissions of mercury by requiring MSW incinerators to further reduce their mercury emissions. These rules are located at http://www.state.nj.us/dep/aqm/Sub27-120604.pdf.

- The Department has included all mercury containing products in the Universal Waste Rule which allows generators of waste mercury containing products to manage the waste under less stringent regulations than the Hazardous Waste Regulations. In addition, every county in the state holds at least one household hazardous waste (HHW) collection per year. Most counties hold multiple collections and 3 counties (Burlington, Monmouth, and Morris) have permanent collection sites. Households generating mercury containing products can properly dispose of the items at their county's collection.

- Legislation banning the sale of mercury thermometers was passed in April 2005.

- The New Jersey Legislature passed the Mercury Switch Removal Act of 2005 requiring automobile recycling facilities to remove mercury auto switches from vehicles prior to sending the vehicles for recycling. Automobile recyclers located in New Jersey were required to begin removing the mercury auto switches in May 2006. Manufacturers have stopped using mercury switches in convenience lighting.

- The Department adopted new rules on October 1, 2007 to curtail the release of mercury from dental facilities into the environment. The new rules, under most circumstances, exempt a dental facility from the requirement to obtain an individual permit for its discharge to a POTW, if it implements best management practices (BMPs) for the handling of dental amalgam waste and installs and properly operates an amalgam separator. Dental facilities were required to implement the BMPs by October 1, 2008 and must install and operate an amalgam separator by October 1, 2009. These measures are expected to prevent at least 95 percent of the mercury wastes from being sent to the

POTW and result in approximately 2,550 pounds of mercury removed from the environment each year.

- The Department participated in the Quicksilver Caucus, which developed methods for the retirement and sequestering of mercury.

The out of state contributions to the depositional load of mercury are too great for New Jersey to eliminate mercury contamination of fish tissue by reducing sources originating within its borders alone. New Jersey will work with EPA and other states to eliminate mercury sources nationwide. EPAs efforts to issue MACT (Maximum Achievable Control Technology) standards for utilities to reduce the depositional load of mercury are supported by New Jersey. In October 2008, the New England Interstate Water Pollution Control Commission (NEIWPCC), on behalf of seven states, submitted a petition under the Clean Water Act Section 319(g) requesting EPA to convene an interstate conference to address mercury deposition to the Northeast from upwind states. The petition builds on the Northeast States' regional mercury TMDL (approved by EPA in 2007), which indicates that reductions in mercury deposition from outside the region are needed to meet water quality standards. New Jersey will participate actively in this conference when it is held.

8.0. Implementation Plan

The implementation actions below are the recommendations of the Department's Mercury Task Force (NJDEP, 2009) intended to reduce anthropogenic sources of mercury:

1) Consider developing legislation that reflects the provisions of the Mercury Education and Reduction Model Act prepared by the Northeast Waste Management Officials' Association (NEWMOA), as part of the New England Governors' Mercury Action Plan. This plan addresses mercury-containing products and limits the sale of mercury for approved purposes. Provisions of the model legislation have been adopted by 16 states, including all of the New England states.

2) Continue monitoring of mercury in environmental media. Needed follow-up monitoring is described in Section 6 and is essential for determining the effectiveness of the mercury Total Maximum Daily Load (TMDL).

3) New Jersey contributes only 12.5% to the state mercury deposition; 52% is background deposition (natural and anthropogenic) and the remaining percentage comes from surrounding states, Mexico, and Canada. Reductions required in this TMDL can not be achieved from the New Jersey anthropogenic air sources alone. Mercury reductions on the nationwide and global scales are necessary to meet the TMDL targets set up above.

4) The Department plans to update its mercury water quality criteria based upon the EPA recommended Clean Water Act Section 304(a) for methyl mercury in fish tissue. This criterion requires the development of regional bioaccumulation factors (BAFs) to address differences in the rate of methylation based on other water quality parameters such as pH and

dissolved organic carbon. While the EPA's recommended Clean Water Act Section 304(a) water quality criterion is based on a methyl mercury fish tissue concentration value of 0.3 mg/kg, New Jersey plans to develop criteria based upon a methyl mercury fish tissue concentration of 0.18 mg/kg which is based upon consumption of 1 meal per week by high risk individuals. Updating the mercury criteria based on EPA's recommendation will require calculating BAFs for New Jersey that involves additional surface water and fish tissue sampling. This information will also be used to reevaluate the previously proposed wildlife mercury criteria using updated regional BAFs. The revised mercury criteria will be used to develop TMDLs for areas of the State not covered by the Total Maximum Daily Load for Mercury Impairments Based on Concentration in Fish Tissue Caused Mainly by Air Deposition. In calculating an updated, revised mercury SWQS for human health and wildlife, the Department will divide the state into four regional waters: Pinelands, Non-Pinelands, Delaware Estuary tidal waters, and Atlantic tidal waters. Surface water and fish tissue data will be collected and used to develop new BAFs for each region of the state. The data results will then be applied in calculating the mercury criteria for each region. In 2009, the Department expects to begin data collection in the Pinelands region with plans to continue collection in non-Pinelands water the following year. The next action is to collect data for the Delaware Estuary and Atlantic tidal waters.

5) The existing regulations concerning mercury will continue to be implemented, enforced, and evaluated for effectiveness. This includes the regulations on mercury emissions from air sources, the removal of automobile mercury switches and the dental amalgam regulations.

9.0. Public Participation

There have been various efforts to inform and educate the general public as well as the regulated community about the effects of mercury and the need to reduce anthropogenic sources. The regulatory controls regarding mercury are described in Section 7 and some of the outreach to the general public are noted below.

Over the years the Department, in cooperation with the Department of Health and Senior Services has conducted a great deal of public outreach to the fishing community to inform them of the fish consumption advisories. Surveys were done to determine how best to reach the public. As a result the fish advisories are posted in both Spanish and English. Brochures have been developed and are distributed to doctors and WIC (the federal Women, Infants and Children nutrition program) centers. The Department of Health seafood inspectors distribute and check for postings as part of their inspections.

Currently the Department's Urban Fishing Program educates children from the Newark Bay Complex and throughout New Jersey about their local watershed. Children learn about how people's actions affect the water and human health, and what they can do to help. The NJDEP's Divisions of Watershed Management and Science, Research and Technology in conjunction with the Division of Fish and Wildlife, the Hackensack RiverKeeper, the City of Bayonne and the Municipal Utilities Authority of Bayonne have offered the program for over 10 years. The first several years of the Urban Watershed Program were conducted only in the Newark Bay

Complex. The program has now expanded to other urban areas around the state. Trenton and Camden have participated over the last three years, and we hope to add several more cities in the future.

In conjunction with NEWMOA, informational brochures were developed for tanning salons and property managers concerning the management of mercury containing fluorescent lamps. The brochures were sent to every tanning salon and property management company in the state.

There has been additional public outreach and opportunity for comment for the TMDL itself. In accordance with N.J.A.C. 7:15–7.2(g), this TMDL was proposed by the Department as an amendment to the Atlantic, Cape May, Lower Delaware, Lower Raritan-Middlesex, Mercer, Monmouth, Northeast, Ocean, Sussex, Tri-County, Upper Delaware and Upper Raritan Water Quality Management Plans.

Notice proposing this TMDL was published on June 15, 2009 in the New Jersey Register and in newspapers of general circulation in the affected area in order to notify the public of the opportunity to review the TMDL and submit comments. In addition, an informational presentation followed by a public hearing for the proposed TMDL was held on July 15, 2009. Notice of the proposal and the hearing was also provided to affected Designated Planning Agencies and dischargers in the affected watersheds. One member of the public attended the hearing and declined to comment. No comments were submitted during the public comment period. Various minor edits to the proposal document have been made for clarification.

10.0. Data Sources

Geographic Information System (GIS) data from the Department was used extensively to describe the areas addressed in this document.

- State Boundary of New Jersey, Published by New Jersey Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), May 20, 2008. On line at: https://njgin.state.nj.us/NJ_NJGINExplorer/jviewer.jsp?pg=DataDownloads

- Watersheds (Subwatersheds by name - DEPHUC14), Drainage basins are delineated from 1:24,000-scale (7.5-minute) USGS quadrangles. The delineations have been developed for general purpose use by USGS District staff over the past 20 years. Arc and polygon attributes have been included in the coverage with basin names and ranks of divides, and 14-digit hydrologic unit codes. *Originator:* U.S. Geological Survey, William H. Ellis, Jr. *Publication_Date:* 19991222 http://www.state.nj.us/dep/gis/digidownload/zips/statewide/dephuc14.zip

- NJDEP 2002 Waters of New Jersey (Lakes and Ponds), *Edition* 2008-05-01. The data was created by extracting water polygons which represented lakes and ponds from the 2002 land use/land cover (LU/LC) layer from NJ DEP's geographical information systems (GIS) database http://www.state.nj.us/dep/gis/digidownload/zips/statewide/njwaterbody.zip

- NJDEP 2002 Waters of New Jersey (Rivers, Bays and Oceans), *Version* 20080501; *Edition:* 20080501. The data was created by extracting water polygons which represented Rivers, Bays and Oceans from the 2002 land use/land cover (LU/LC) layer from NJ DEP's geographical information systems (GIS) database. *Online Linkage* http://www.state.nj.us/dep/gis/digidownload/zips/statewide/njarea.zip

- NJPDES Surface Water Discharges in New Jersey, (1:12,000), Version 20090126, *Edition:* 2009-01-26. This is a 2009 update of the 2002 data. New Jersey Pollutant Discharge Elimination System (NJPDES) surface water discharge pipe GIS point coverage compiled from GPSed locations, NJPDES databases, and permit applications. This coverage contains the surface water discharge points and the receiving waters coordinates for the active as well as terminated pipes. *Online Linkeage*: http://www.state.nj.us/dep/gis/digidownload/zips/statewide/njpdesswd.zip

- NJDEP Surface Water Quality Standards of New Jersey *Edition:* 200812. This data is a digital representation of New Jersey's Surface Water Quality Standards in accordance with "Surface Water Quality Standards for New Jersey Waters" as designated in N.J.A.C. 7:9 B. The Surface Water Quality Standards (SWQS) establish the designated uses to be achieved and specify the water quality (criteria) necessary to protect the State's waters. Designated uses include potable water, propagation of fish and wildlife, recreation, agricultural and industrial supplies, and navigation. These are reflected in use classifications assigned to specific waters. When interpreting the stream classifications and anti-degradation designations, the descriptions specified in the SWQS at N.J.A.C. 7:9B-1.15 always take precedence. The GIS layer reflects the stream classifications and anti-degradation designations adopted as of June 16, 2008, and it is only supplemental to SWQS and is not legally binding. http://www.state.nj.us/dep/gis/digidownload/zips/statewide/swqs.zip

- "Water Management Areas", created 03/2002 by NJDEP, Division of Watershed Management, the last update January, 2009. *Online Linkage*. http://www.state.nj.us/dep/gis/digidownload/zips/statewide/depwmas.zip

- NJDEP Known Contaminated Site List for New Jersey, 2005, *Edition:* 200602; The Known Contaminated Sites List for New Jersey 2005 are those sites and properties within the state where contamination of soil or ground water has been identified or where there has been, or there is suspected to have been, a discharge of contamination. This list of Known Contaminated Sites may include sites where remediation is either currently under way, required but not yet initiated or has been completed. http://www.state.nj.us/dep/gis/digidownload/zips/statewide/kcsl.zip

- Groundwater Contamination Areas (CKE); this data layer contains information about areas in the state which are specified as the Currently Known Extent (CKE) of ground water pollution. CKE areas are geographically defined areas within which the local ground water resources are known to be compromised because the water quality exceeds drinking water and ground water quality standards for specific contaminants. NJDEP Currently Known Extent of Groundwater Contamination (CKE) for New Jersey, 2007. *Edition:* 200703. *Online Linkage:* http://www.state.nj.us/dep/gis/digidownload/zips/statewide/cke.zip

11.0. References

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Academy of Natural Sciences of Philadelphia (ANSP). 1999. Phase II Assessment of total mercury concentrations in fishes from rivers, lakes and reservoirs of New Jersey. Report 99-7. Submitted to New Jersey Department of Environmental Protection and Energy, Division of Science and Research. 155 pp.

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Hooks, Craig, Director, Office of Wetlands, Oceans and Watersheds, September 29, 2008."Elements of Mercury TMDLs Where Mercury Loadings are Predominantly from Air Deposition" http://www.epa.gov/owow/tmdl/pdf/cover_memo_mercury_tmdl_elements.pdf
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Horwitz, R. J., P. Overbeck, J. Ashley, D. Velinsky and L. Zadoudeh. 2006. Final Report: Monitoring Program for Chemical Contaminants in Fish from the State of New Jersey. Contract SR04-073. ANS Report No. 06-04F. August 17, 2006. 77pp.

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New England Interstate Water Pollution Control Commission, New Hampshire Department of Environmental Services, New York State Department of Environmental Conservation, Rhode Island Department of Environmental Management, Vermont Department of Environmental Conservation, Connecticut Department of Environmental Protection, Maine Department of Environmental Protection, Massachusetts Department of Environmental Protection
October 24, 2007, Northeast Regional Mercury Total Maximum Daily Load.
http://www.neiwpcc.org/mercury/mercury-docs/FINAL Northeast Regional Mercury TMDL.pdf

NJDEP, 2001 New Jersey's Mercury Task Force Final Report Volume I: Executive Summary and Recommendations, Volume II: Exposure and Impacts, Volume III: Sources of Mercury to New Jersey's Environment. http://www.nj.gov/dep/dsr/mercury_task_force.htm

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NJDEP 2008 NJ Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)). Water Assessment Team. NJDEP.
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Appendix A

Listed Assessment units that were excluded from the Statewide TMDL

Waterbody	Name	Reason for Exclusion from TMDL
02030103120070-01	Passaic River Lwr (Fair Lawn Ave to Goffle)	Mercury in surface water
02030103120080-01	Passaic River Lwr (Dundee Dam to F.L. Ave)	Mercury in surface water
02030103120090-01	Passaic River Lwr (Saddle R to Dundee Dam)	Mercury in surface water
02030103150030-01	Passaic River Lwr (Second R to Saddle R)	Mercury in surface water
02030103150040-01	Passaic River Lwr (4th St br to Second R)	Mercury in surface water
02030103150050-01	Passaic River Lwr (Nwk Bay to 4th St brdg)	Mercury in surface water
02030103170030-01	Hackensack River (above Old Tappan gage)	Mercury in surface water
02030103170060-01	Hackensack River (Oradell to Old Tappan gage)	Mercury in surface water
02030103180030-01	Hackensack River (Ft Lee Rd to Oradell gage)	Mercury in surface water
02030103180080-01	Hackensack River (Rt 3 to Bellmans Ck)	Mercury in surface water
02030103180090-01	Hackensack River (Amtrak bridge to Rt 3)	Mercury in surface water
02030103180100-01	Hackensack River (below Amtrak bridge)	Mercury in surface water
02030104010020-01	Kill Van Kull West	Mercury in surface water
02030104010020-02	Newark Bay / Kill Van Kull (74d 07m 30s)	Mercury in surface water
02030104010030-01	Kill Van Kull East	Mercury in surface water
02030104010030-02	Upper NY Bay / Kill Van Kull (74d07m30s)	Mercury in surface water
02030104020030-01	Arthur Kill North	Mercury in surface water
02030104030010-01	Arthur Kill South	Mercury in surface water
02030104050120-01	Arthur Kill waterfront (below Grasselli)	Mercury in surface water
02040105210060-01	Jacobs Creek (above Woolsey Brook)	Mercury in surface water
02040105230050-01	Assunpink Creek (Shipetaukin to Trenton Rd)	Mercury in surface water
02040201050040-01	Crosswicks Creek (Walnford to Lahaway Ck)	Mercury in surface water
02040201050050-01	Crosswicks Creek (Ellisdale trib - Walnford)	Mercury in surface water
02040201050070-01	Crosswicks Creek (Doctors Ck-Ellisdale trib)	Mercury in surface water
02040206140040-01	Blackwater Branch (above/incl Pine Br)	Mercury in surface water
02040206140050-01	Blackwater Branch (below Pine Branch)	Mercury in surface water
02040206200010-01	Middle Branch / Slab Branch	Mercury in surface water
02040206200020-01	Muskee Creek	Mercury in surface water
02040301020040-01	Muddy Ford Brook	Mercury in surface water
02040301070080-01	Manapaqua Brook	Mercury in surface water
02040301170010-01	Hammonton Creek (above 74d43m)	Mercury in surface water
02040301170020-01	Hammonton Creek (Columbia Rd to 74d43m)	Mercury in surface water
02040302020020-01	Absecon Creek SB	Mercury in surface water
02040302020030-01	Absecon Creek (AC Reserviors) (gage to SB)	Mercury in surface water
02030103010180-01	Passaic River Upr (Pine Bk br to Rockaway)	Mercury in surface water
02030103040010-01	Passaic River Upr (Pompton R to Pine Bk)	Mercury in surface water
02030103120100-01	Passaic River Lwr (Goffle Bk to Pompton R)	Mercury in surface water
02030103180060-01	Berrys Creek (above Paterson Ave)	Mercury in surface water
02030103180070-01	Berrys Creek (below Paterson Ave)	Mercury in surface water
02030105160070-01	South River (below Duhernal Lake)	Mercury in surface water
02040202020030-01	Rancocas Creek NB (incl Mirror Lk-Gaunts Bk)	Mercury in surface water
02040202020040-01	Rancocas Creek NB (NL dam to Mirror Lk)	Mercury in surface water
02040202100060-01	Pennsauken Creek (below NB / SB)	Mercury in surface water
02040301020050-01	Metedeconk River NB (confluence to Rt 9)	Mercury in surface water
02040301040020-01	Metedeconk River (Beaverdam Ck to confl)	Mercury in surface water
02040302050060-01	Great Egg Harbor River (Miry Run to Lake Lenape)	Mercury in surface water

02040302050130-01	Great Egg Harbor River (GEH Bay to Miry Run)	Mercury in surface water
Delaware River 1	Delaware River 1C2	Mercury in surface water
Delaware River 2	Delaware River 1C3	Mercury in surface water
Delaware River 3	Delaware River 1C4	Mercury in surface water
Delaware River 4	Delaware River 1D1	Mercury in surface water
Delaware River 5	Delaware River 1D2	Mercury in surface water
Delaware River 6	Delaware River 1D3	Mercury in surface water
Delaware River 7	Delaware River 1D4	Mercury in surface water
Delaware River 8	Delaware River 1D5	Mercury in surface water
Delaware River 9	Delaware River 1D6	Mercury in surface water
Delaware River 10	Delaware River 1E1	Mercury in surface water
Delaware River 11	Delaware River 1E2	Mercury in surface water
Delaware River 12	Delaware River 1E3	Mercury in surface water
Delaware River 13	Delaware River 1E4	Mercury in surface water
Delaware River 14	Delaware River 1E5	Mercury in surface water
Delaware River 15	Delaware River 2	Mercury in surface water
Delaware River 16	Delaware River 3	Mercury in surface water
Delaware River 17	Delaware River 4	DRBC
Delaware River 18	Delaware River 5A	DRBC
Delaware River 19	Delaware River 5B	DRBC
Delaware River 20	Delaware River 5C	DRBC
02040204910010-02	Delaware Bay (Cape May Pt to Dennis Ck) offshore	DRBC
02040204910010-01	Delaware Bay (CapeMay Pt to Dennis Ck) inshore	DRBC
02040204910040-01	Delaware Bay (Cohansey R to FishingCk)	DRBC
02040204910020-02	Delaware Bay (Dennis Ck to Egg Islnd Pt) offshore	DRBC
02040204910020-01	Delaware Bay (DennisCk to Egg Islnd Pt) inshore	DRBC
02040301200030-02	Wading River (below Rt 542)	Tidal
02040301200080-02	Mullica River (GSP bridge to Turtle Ck)	Tidal
02040301210010-02	Mullica River (below GSP bridge)	Tidal
02030104020030-02	Elizabeth River (below Elizabeth CORP BDY)	Tidal
02030104030010-02	Morses Creek / Piles Creek	Tidal
02030104080040-01	Shrewsbury River (above Navesink River)	Tidal
02030104090040-01	Shark River (above Remsen Mill gage)	Tidal
02030104090060-01	Shark River (below Remsen Mill gage)	Tidal
02030104910020-01	Sandy Hook Bay (east of Thorns Ck)	Tidal
02040201030010-01	Duck Creek and UDRV to Assunpink Ck	Tidal
02030104060010-01	Cheesequake Creek / Whale Creek	Tidal
02030104070110-01	Navesink River (below Rt 35) / Lower Shrewsbury	Tidal
02040301080060-01	Toms River Lwr (Rt 166 to Oak Ridge Pkwy)	Tidal
02030104070110-01	Navesink River (below Rt 35) / Lower Shrewsbury	Tidal
02030104060060-01	Pews Creek to Shrewsbury River	Tidal
02040301080060-01	Toms River Lwr (Rt 166 to Oak Ridge Pkwy)	Tidal
02040301200030-02	Wading River (below Rt 542)	Tidal
02030104080010-01	Little Silver Creek / Town Neck Creek	Tidal
02040301200080-02	Mullica River (GSP bridge to Turtle Ck)	Tidal
02040301210010-02	Mullica River (below GSP bridge)	Tidal
02040302020010-01	Absecon Creek NB	Tidal
02040302020040-01	Absecon Creek (below gage)	Tidal

02030104080010-01	Little Silver Creek / Town Neck Creek	Tidal
02030104080020-01	Parkers Creek / Oceanport Creek	Tidal
02030104080030-01	Branchport Creek	Tidal
02040201070030-01	Shady Brook / Spring Lake / Rowan Lake	Tidal
02040202120080-01	Big Timber Creek (below NB/SB confl)	Tidal
02040202130040-01	Mantua Creek (Edwards Run to rd to Sewell)	Tidal
02040202140040-01	Moss Branch / Little Timber Creek (Repaupo)	Tidal
02040202140050-01	Repaupo Creek (below Tomlin Sta Rd) / Cedar Swamp	Tidal
02040202160020-01	Oldmans Creek (Rt 45 to Commissioners Rd)	Tidal
02040206090080-01	Cohansey River (Greenwich to 75d17m50s)	Tidal
02040206090100-01	Cohansey River (below Greenwich)	Tidal
02030104010010-01	Newark Airport Peripheral Ditch	Tidal
02040206100040-01	Cedar Creek (above Rt 553)	Tidal
02040206160030-01	Maurice River (Union Lake to Sherman Ave)	Other sources of Hg
02030103030070-01	Rockaway River (74d 33m 30s to Stephens Bk)	Other sources of Hg
02030103100070-01	Ramapo River (below Crystal Lake bridge)	Other sources of Hg
02040201050060-01	Ellisdale Trib (Crosswicks Creek)	Other sources of Hg
02040201070020-01	Crosswicks Creek (below Doctors Creek)	Other sources of Hg
02030103100060-01	Crystal Lake / Pond Brook	Other sources of Hg
02030104060040-01	Chingarora Creek to Thorns Creek	Other sources of Hg
02030104060050-01	Waackaack Creek	Other sources of Hg
02030105160090-01	Red Root Creek / Crows Mill Creek	Hg in groundwater
02030105160100-01	Raritan River Lwr (below Lawrence Bk)	Hg in groundwater
02040105230020-01	Assunpink Creek (New Sharon Br to/incl Lake)	Hg in groundwater
02040105230030-01	New Sharon Branch (Assunpink Creek)	Hg in groundwater
02040105230040-01	Assunpink Creek (Trenton Rd to New Sharon Br)	Hg in groundwater
02040105240010-01	Shabakunk Creek	Hg in groundwater
02040105240050-01	Assunpink Creek (below Shipetaukin Ck)	Hg in groundwater
02040201030010-01	Duck Creek and UDRV to Assunpink Ck	Hg in groundwater
02040201040040-01	Jumping Brook (Monmouth Co)	Hg in groundwater
02040301160020-01	Mullica River (above Jackson Road)	Hg in groundwater
02040301170040-01	Mullica River (Batsto R to Pleasant Mills)	Hg in groundwater
02040301170060-01	Mullica River (Rt 563 to Batsto River)	Hg in groundwater
02040301170080-01	Mullica River (Lower Bank Rd to Rt 563)	Hg in groundwater
02040301170130-01	Mullica River (Turtle Ck to Lower Bank Rd)	Hg in groundwater
02040301190050-01	Wading River WB (Jenkins Rd to Rt 563)	Hg in groundwater
02040301200020-01	Wading River (Rt 542 to Oswego River)	Hg in groundwater
02030103180040-01	Overpeck Creek	HEP
02030103180050-01	Hackensack River (Bellmans Ck to Ft Lee Rd)	HEP
02030104050060-01	Rahway River (Robinsons Br to Kenilworth Blvd)	HEP
02030104050100-01	Rahway River (below Robinsons Branch)	HEP
02030105120170-01	Raritan River Lwr (Lawrence Bk to Mile Run)	HEP
02030105160100-01	Raritan River Lwr (below Lawrence Bk)	HEP
02040302940010-01	Atlantic Ocean (34th St to Corson Inl) inshore	Tidal
02040302940010-02	Atlantic Ocean (34th St to Corson Inl) offshore	Tidal
02040302920010-01	Atlantic Ocean (Absecon In to Ventnor) inshore	Tidal
02040302920010-02	Atlantic Ocean (Absecon In to Ventnor) offshore	Tidal
02040301920010-02	Atlantic Ocean (Barnegat to Surf City) offshore	Tidal
02040301920010-01	Atlantic Ocean (Barnegat to Surf City)inshore	Tidal

02040302940050-01	Atlantic Ocean (CM Inlet to Cape May Pt) inshore	Tidal
02040302940050-02	Atlantic Ocean (CM Inlet to Cape May Pt) offshore	Tidal
02030902940020-01	Atlantic Ocean (Corson to Townsends Inl) inshore	Tidal
02030902940020-02	Atlantic Ocean (Corson to Townsends Inl) offshore	Tidal
02040302930010-01	Atlantic Ocean (Great Egg to 34th St) inshore	Tidal
02040302930010-02	Atlantic Ocean (Great Egg to 34th St) offshore	Tidal
02040301920030-01	Atlantic Ocean (Haven Bch to Lit Egg) inshore	Tidal
02040301920030-02	Atlantic Ocean (Haven Bch to Lit Egg) offshore	Tidal
02040302940040-01	Atlantic Ocean (Hereford to Cape May In) inshore	Tidal
02040302940040-02	Atlantic Ocean (Hereford to Cape May In) offshore	Tidal
02040301910020-01	Atlantic Ocean (Herring Is to Rt 37) inshore	Tidal
02040301910020-02	Atlantic Ocean (Herring Is to Rt 37) offshore	Tidal
02040302910010-01	Atlantic Ocean (Ltl Egg to Absecon In) inshore	Tidal
02040302910010-02	Atlantic Ocean (Ltl Egg to Absecon In) offshore	Tidal
02040301910010-01	Atlantic Ocean (Manasquan/Herring Is) inshore	Tidal
02040301910010-02	Atlantic Ocean (Manasquan/Herring Is) offshore	Tidal
02030104920020-01	Atlantic Ocean (Navesink R to Whale Pond) inshore	Tidal
02030104920020-02	Atlantic Ocean (Navesink R to Whale Pond) offshore	Tidal
02040301910030-01	Atlantic Ocean (Rt 37 to Barnegat Inlet) inshore	Tidal
02040301910030-02	Atlantic Ocean (Rt 37 to Barnegat Inlet) offshore	Tidal
02030104920010-01	Atlantic Ocean (Sandy H to Navesink R) inshore	Tidal
02030104920010-02	Atlantic Ocean (Sandy H to Navesink R) offshore	Tidal
02030104930020-01	Atlantic Ocean (Shark R to Manasquan) inshore	Tidal
02030104930020-02	Atlantic Ocean (Shark R to Manasquan) offshore	Tidal
02040301920020-01	Atlantic Ocean (Surf City to Haven Be) inshore	Tidal
02040301920020-02	Atlantic Ocean (Surf City to Haven Be) offshore	Tidal
02030902940030-01	Atlantic Ocean (Townsends to Hereford In) inshore	Tidal
02030902940030-02	Atlantic Ocean (Townsends to Hereford In) offshore	Tidal
02040302920020-01	Atlantic Ocean (Ventnor to Great Egg) inshore	Tidal
02040302920020-02	Atlantic Ocean (Ventnor to Great Egg) offshore	Tidal
02030104930010-01	Atlantic Ocean (Whale Pond to Shark R) inshore	Tidal

Appendix B

Fish Tissue Data

Location	Species	Field (or lab) Total Length (cm)	Hg (mg/kg) ug/g wet wt	Year
Alcyon Lake	Largemouth Bass	28.6	0.67	1992
Alcyon Lake	Largemouth Bass	33.7	0.41	1992
Batsto Lake	Yellow Bullhead	23.7	0.23	1992
Batsto Lake	Brown Bullhead	26.5	0.18	1992
Batsto Lake	Chain Pickerel	57.3	1.06	1992
Batsto Lake	Largemouth Bass	27.1	0.76	1992
Batsto Lake	Largemouth Bass	35.4	1.20	1992
Batsto Lake	Largemouth Bass	37.5	1.28	1992
Big Timber Creek	Black Crappie	15.5	0.07	1992
Big Timber Creek	Brown Bullhead	29.4	0.05	1992
Big Timber Creek	Brown Bullhead	31	0.06	1992
Big Timber Creek	Channel Catfish	42.3	0.09	1992
Big Timber Creek	White Catfish	33.4	0.08	1992
Big Timber Creek	White Catfish	29.6	0.09	1992
Big Timber Creek	Largemouth Bass	33.0	0.10	1992
Big Timber Creek	Largemouth Bass	28.2	0.12	1992
Big Timber Creek	Largemouth Bass	25.5	0.06	1992
Clementon Lake	Chain Pickerel	35.5	0.14	1992
Clementon Lake	Chain Pickerel	33	0.16	1992
Clementon Lake	Chain Pickerel	40	0.16	1992
Clementon Lake	Chain Pickerel	50.5	0.32	1992
Clementon Lake	Chain Pickerel	48.6	0.37	1992
Clementon Lake	Chain Pickerel	47.6	0.38	1992
Clementon Lake	Largemouth Bass	35.9	0.28	1992
Clementon Lake	Largemouth Bass	38.7	0.49	1992
Clinton Reservoir	Largemouth Bass	28.2	0.39	1992
Clinton Reservoir	Largemouth Bass	34.3	0.60	1992
Clinton Reservoir	Largemouth Bass	34.6	0.73	1992
Clinton Reservoir	Largemouth Bass	44.1	0.83	1992
Clinton Reservoir	Largemouth Bass	36.0	0.84	1992
Clinton Reservoir	Largemouth Bass	37.1	0.85	1992
Cooper River Park Lake	Black Crappie	16.7	0.04	1992
Cooper River Park Lake	Black Crappie	18.1	0.10	1992
Cooper River Park Lake	Black Crappie	18.4	0.12	1992
Cooper River Park Lake	Largemouth Bass	19.5	0.12	1992
Cooper River Park Lake	Largemouth Bass	21.4	0.03	1992
Cooper River Park Lake	Largemouth Bass	21.7	0.04	1992
Cooper River Park Lake	Largemouth Bass	25.5	0.08	1992
Cooper River Park Lake	Largemouth Bass	28	0.07	1992
Cooper River Park Lake	Largemouth Bass	30.8	0.09	1992

Cooper River Park Lake	Largemouth Bass	32.2	0.10	1992
Cooper River Park Lake	Largemouth Bass	32.8	0.13	1992
Cooper River Park Lake	Largemouth Bass	35.5	0.14	1992
Cooper River Park Lake	Largemouth Bass	43.5	0.31	1992
Cooper River Park Lake	Largemouth Bass	44	0.56	1992
Cooper River Park Lake	Largemouth Bass	22.1	0.09	1992
Cooper River Park Lake	Largemouth Bass	25.5	0.08	1992
Cooper River Park Lake	Largemouth Bass	28	0.07	1992
Cooper River Park Lake	Largemouth Bass	30.8	0.09	1992
Cooper River Park Lake	Largemouth Bass	35.5	0.14	1992
Cooper River Park Lake	Largemouth Bass	43.5	0.31	1992
Cranberry Lake	Chain Pickerel	42.4	0.27	1992
Cranberry Lake	Chain Pickerel	56.9	0.37	1992
Cranberry Lake	Chain Pickerel	55.5	0.37	1992
Cranberry Lake	Hybrid Striped Bass	38.2	0.29	1992
Cranberry Lake	Hybrid Striped Bass	37	0.31	1992
Cranberry Lake	Hybrid Striped Bass	52	0.43	1992
Crystal Lake	Brown Bullhead	19.8	0.02	1992
Crystal Lake	Brown Bullhead	20	0.05	1992
Dundee Lake	Brown Bullhead	27.1	0.19	1992
Dundee Lake	Brown Bullhead	29.3	0.20	1992
East Creek Lake	Chain Pickerel	31.5	0.79	1992
East Creek Lake	Chain Pickerel	34..5	1.03	1992
East Creek Lake	Chain Pickerel	41.4	1.33	1992
East Creek Lake	Chain Pickerel	39	1.33	1992
East Creek Lake	Chain Pickerel	51	1.59	1992
East Creek Lake	Chain Pickerel	40	1.76	1992
East Creek Lake	Chain Pickerel	50	2.30	1992
East Creek Lake	Chain Pickerel	46.2	2.44	1992
East Creek Lake	Chain Pickerel	52.5	2.82	1992
East Creek Lake	Yellow Bullhead	26.8	1.29	1992
East Creek Lake	Yellow Bullhead	27.4	1.47	1992
Evans Lake	Largemouth Bass	27.8	0.15	1992
Evans Lake	Largemouth Bass	21.5	0.33	1992
Harrisville Lake	Chain Pickerel	40	0.99	1992
Harrisville Lake	Chain Pickerel	33.5	1.21	1992
Harrisville Lake	Chain Pickerel	28.3	1.71	1992
Harrisville Lake	Chain Pickerel	45.7	1.74	1992
Harrisville Lake	Chain Pickerel	51.4	2.10	1992
Harrisville Lake	Yellow Bullhead	27.5	1.36	1992
Lake Carasaljo	Chain Pickerel	34.9	0.28	1992
Lake Hopatcong	Chain Pickerel	35.1	0.19	1992
Lake Hopatcong	Chain Pickerel	48	0.22	1992
Lake Hopatcong	Chain Pickerel	47.3	0.35	1992
Lake Hopatcong	Chain Pickerel	45	0.37	1992
Lake Hopatcong	Chain Pickerel	53	0.64	1992
Lake Hopatcong	Largemouth Bass	39.9	0.27	1992
Lake Hopatcong	Largemouth Bass	41.4	0.28	1992
Lake Hopatcong	Largemouth Bass	29.5	0.30	1992

Lake Nummy	Chain Pickerel	35	1.36	1992
Lake Nummy	Yellow Bullhead	26.7	0.32	1992
Lake Nummy	Yellow Bullhead	27.8	0.32	1992
Lake Nummy	Yellow Bullhead	28.1	0.32	1992
Lenape Lake	Chain Pickerel	35.5	0.25	1992
Lenape Lake	Chain Pickerel	44.8	0.54	1992
Lenape Lake	Chain Pickerel	49.7	0.89	1992
Marlton Lake	Largemouth Bass	38	1.36	1992
Maskells Mill Lake	Chain Pickerel	28	0.37	1992
Merrill Creek	Rainbow Trout	25.3	0.04	1992
Merrill Creek	Rainbow Trout	24.7	0.08	1992
Merrill Creek Reservoir	Rainbow Trout	32.1	0.14	1992
Merrill Creek Reservoir	Rainbow Trout	37.5	0.14	1992
Merrill Creek Reservoir	Rainbow Trout	38.6	0.24	1992
Merrill Creek Reservoir	Lake Trout	51.3	0.44	1992
Merrill Creek Reservoir	Lake Trout	51.6	0.77	1992
Merrill Creek Reservoir	Lake Trout	53.2	0.79	1992
Merrill Creek Reservoir	Lake Trout	56.4	0.69	1992
Merrill Creek Reservoir	Largemouth Bass	30.9	0.29	1992
Merrill Creek Reservoir	Largemouth Bass	43.9	0.96	1992
Merrill Creek Reservoir	Largemouth Bass	41.0	1.21	1992
Monksville Reservoir	Chain Pickerel	39.3	0.21	1992
Monksville Reservoir	Chain Pickerel	42.4	0.36	1992
Monksville Reservoir	Chain Pickerel	64	1.14	1992
Monksville Reservoir	Largemouth Bass	28.7	0.45	1992
Monksville Reservoir	Largemouth Bass	33.9	0.52	1992
Monksville Reservoir	Largemouth Bass	38.4	1.00	1992
Mountain Lake	Largemouth Bass	31.8	0.22	1992
Mountain Lake	Largemouth Bass	37.4	0.37	1992
Mountain Lake	Largemouth Bass	47.0	0.90	1992
New Brooklyn Lake	Chain Pickerel	18.7	0.10	1992
New Brooklyn Lake	Chain Pickerel	37.7	0.23	1992
New Brooklyn Lake	Chain Pickerel	46.6	0.79	1992
Newton Creek, North	Brown Bullhead	29	0.02	1992
Newton Creek, North	Brown Bullhead	34.4	0.03	1992
Newton Creek, North	Brown Bullhead	32.3	0.03	1992
Newton Creek, North	Brown Bullhead	32.4	0.03	1992
Newton Creek, North	Channel Catfish	36.5	0.08	1992
Newton Creek, North	Channel Catfish	47.1	0.12	1992
Newton Creek, South	Brown Bullhead	25.9	0.04	1992
Newton Creek, South	Brown Bullhead	26.1	0.06	1992
Newton Creek, South	Brown Bullhead	29.5	0.18	1992
Newton Creek, South	Chain Pickerel	25.3	0.10	1992
Newton Creek, South	Largemouth Bass	37.1	0.23	1992
Newton Creek, South	Largemouth Bass	36.6	0.24	1992
Newton Creek, South	Largemouth Bass	30.7	1.15	1992
Newton Lake	Black Crappie	18.4	0.09	1992
Newton Lake	Black Crappie	19.4	0.11	1992
Newton Lake	Black Crappie	20.4	0.13	1992

Newton Lake	Largemouth Bass	30	0.05	1992
Newton Lake	Largemouth Bass	30.6	0.05	1992
Newton Lake	Largemouth Bass	33.6	0.06	1992
Newton Lake	Largemouth Bass	33.1	0.06	1992
Newton Lake	Largemouth Bass	25.8	0.06	1992
Newton Lake	Largemouth Bass	25.0	0.06	1992
Newton Lake	Largemouth Bass	31.0	0.07	1992
Newton Lake	Largemouth Bass	31.0	0.07	1992
Newton Lake	Largemouth Bass	29.1	0.07	1992
Newton Lake	Largemouth Bass	45.2	0.18	1992
Newton Lake	Largemouth Bass	41.1	0.22	1992
Newton Lake	Largemouth Bass	45.6	0.40	1992
Rancocas Creek	Channel Catfish	45.6	0.11	1992
Rockaway River	Brown Bullhead	31	0.12	1992
Rockaway River	Chain Pickerel	34	0.15	1992
Rockaway River	Chain Pickerel	30.6	0.15	1992
Rockaway River	Chain Pickerel	38.8	0.25	1992
Rockaway River	Chain Pickerel	40.7	0.29	1992
Rockaway River	Chain Pickerel	44.7	0.31	1992
Rockaway River	Rainbow Trout	53.6	0.04	1992
Rockaway River	Yellow Bullhead	21.2	0.15	1992
Rockaway River near Whippany	Largemouth Bass	26.4	0.36	1992
Rockaway River near Whippany	Largemouth Bass	28.9	0.59	1992
Rockaway River near Whippany	Largemouth Bass	31.5	0.73	1992
Round Valley Reservoir	Lake Trout	40	0.06	1992
Round Valley Reservoir	Lake Trout	54.4	0.14	1992
Round Valley Reservoir	Lake Trout	75.5	0.14	1992
Saw Mill Lake	Brown Bullhead	36.5	0.05	1992
Saw Mill Lake	Brown Bullhead	33.1	0.06	1992
Saw Mill Lake	Brown Bullhead	39.5	0.07	1992
Saw Mill Lake	Brown Bullhead	37.9	0.07	1992
Saw Mill Lake	Northern Pike	53.4	0.27	1992
Shadow Lake	Largemouth Bass	29.1	0.12	1992
Shadow Lake	Largemouth Bass	30.4	0.15	1992
Shadow Lake	Largemouth Bass	36.7	0.18	1992
Shadow Lake	Largemouth Bass	31.2	0.26	1992
Spring Lake	Largemouth Bass	37.1	0.21	1992
Spring Lake	Largemouth Bass	49.9	0.75	1992
Spring Lake	Largemouth Bass	47.8	0.80	1992
Spruce Run Reservoir	Hybrid Striped Bass	33.1	0.17	1992
Spruce Run Reservoir	Hybrid Striped Bass	37.1	0.19	1992
Spruce Run Reservoir	Hybrid Striped Bass	38.2	0.22	1992
Spruce Run Reservoir	Largemouth Bass	25.2	0.10	1992
Spruce Run Reservoir	Largemouth Bass	28.4	0.19	1992
Spruce Run Reservoir	Largemouth Bass	41.2	0.41	1992
Spruce Run Reservoir	Largemouth Bass	43.8	0.64	1992
Stafford Forge Main Line	Chain Pickerel	26.6	0.59	1992
Stafford Forge Main Line	Chain Pickerel	27.7	0.63	1992
Stafford Forge Main Line	Chain Pickerel	29.9	0.85	1992

Strawbridge Lake	Black Crappie	15.3	0.13	1992
Strawbridge Lake	Black Crappie	14.8	0.24	1992
Strawbridge Lake	Black Crappie	14.3	0.24	1992
Swartswood Lake	Chain Pickerel	39.6	0.09	1992
Swartswood Lake	Chain Pickerel	43.3	0.10	1992
Swartswood Lake	Chain Pickerel	42.3	0.12	1992
Swartswood Lake	Smallmouth Bass	30.8	0.12	1992
Swartswood Lake	Smallmouth Bass	35.5	0.18	1992
Swartswood Lake	Smallmouth Bass	37.5	0.29	1992
Wading River	Chain Pickerel	39.4	0.66	1992
Wading River	Chain Pickerel	40.8	0.68	1992
Wading River	Chain Pickerel	34.3	0.82	1992
Wading River	Chain Pickerel	37.3	1.09	1992
Wading River	Chain Pickerel	43.6	1.23	1992
Wanaque Reservoir	Chain Pickerel	38.7	0.33	1992
Wanaque Reservoir	Chain Pickerel	55.5	0.93	1992
Wanaque Reservoir	Smallmouth Bass	27.5	0.34	1992
Wanaque Reservoir	Smallmouth Bass	37.9	0.51	1992
Wanaque Reservoir	Largemouth Bass	32.8	0.40	1992
Wanaque Reservoir	Largemouth Bass	37.8	0.61	1992
Wanaque Reservoir	Largemouth Bass	36.6	0.75	1992
Wanaque Reservoir	Largemouth Bass	40.5	1.01	1992
Wanaque Reservoir	Largemouth Bass	43.8	1.17	1992
Wanaque Reservoir	Largemouth Bass	46.4	1.18	1992
Wilson Lake	Chain Pickerel	37.8	0.24	1992
Wilson Lake	Chain Pickerel	36.3	0.38	1992
Wilson Lake	Chain Pickerel	50.6	1.06	1992
Wilson Lake	Chain Pickerel	34.4	1.53	1992
Woodstown Memorial Lake	Black Crappie	17.5	0.08	1992
Woodstown Memorial Lake	Largemouth Bass	24.5	0.11	1992
Woodstown Memorial Lake	Largemouth Bass	27.8	0.20	1992
Woodstown Memorial Lake	Largemouth Bass	27.6	0.23	1992
Woodstown Memorial Lake	Largemouth Bass	39.3	0.34	1992
Woodstown Memorial Lake	Largemouth Bass	45.1	0.50	1992
Big Timber Creek	Channel Catfish	42.3	0.09	1993
Budd Lake	White Catfish	33.8	0.17	1993
Budd Lake	Northern Pike	54.8	0.11	1993
Budd Lake	Northern Pike	64	0.11	1993
Budd Lake	Northern Pike	68.5	0.14	1993
Canistear Reservoir	Largemouth Bass	36	0.41	1993
Canistear Reservoir	Largemouth Bass	42.2	0.52	1993
Canistear Reservoir	Largemouth Bass	40	0.55	1993
Canistear Reservoir	Largemouth Bass	45.7	0.61	1993
Canistear Reservoir	Largemouth Bass	43.5	0.68	1993
Canistear Reservoir	Largemouth Bass	39.1	0.69	1993
Canistear Reservoir	Largemouth Bass	38.8	0.74	1993
Carnegie Lake	Largemouth Bass	39.1	0.20	1993
Carnegie Lake	Largemouth Bass	32.3	0.29	1993
Carnegie Lake	Largemouth Bass	35.1	0.37	1993

Carnegie Lake	Largemouth Bass	44.7	0.45	1993
Carnegie Lake	Largemouth Bass	35.1	0.58	1993
Carnegie Lake	Largemouth Bass	51.3	1.07	1993
Corbin City Impoundment #3	Brown Bullhead	26.7	0.07	1993
Crystal Lake	Black Crappie	19.1	0.04	1993
Crystal Lake	Black Crappie	20.7	0.18	1993
Crystal Lake	Largemouth Bass	23.5	0.09	1993
Crystal Lake	Largemouth Bass	30.0	0.14	1993
Crystal Lake	Largemouth Bass	42.6	0.28	1993
Manasquan Reservoir	Largemouth Bass	31	0.76	1993
Manasquan Reservoir	Largemouth Bass	38.9	2.35	1993
Manasquan Reservoir	Largemouth Bass	36.4	2.45	1993
Manasquan Reservoir	Largemouth Bass	40	2.49	1993
Manasquan Reservoir	Largemouth Bass	38	2.89	1993
Manasquan Reservoir	Largemouth Bass	41.1	3.16	1993
Manasquan Reservoir	Largemouth Bass	40.3	3.87	1993
Maskells Mill Lake	Black Crappie	20.8	0.20	1993
Maskells Mill Lake	Black Crappie	26.3	0.29	1993
Maskells Mill Lake	Brown Bullhead	25.4	0.23	1993
Maskells Mill Lake	Brown Bullhead	28.9	0.31	1993
Maskells Mill Lake	Brown Bullhead	28.9	0.47	1993
Maskells Mill Lake	Largemouth Bass	25.9	0.36	1993
Maskells Mill Lake	Largemouth Bass	32.4	0.48	1993
Mullica River	Chain Pickerel	40.7	1.21	1993
New Brooklyn Lake	Chain Pickerel	46.2	0.82	1993
New Brooklyn Lake	Chain Pickerel	59.7	1.30	1993
Round Valley Reservoir	Largemouth Bass	25.2	0.16	1993
Round Valley Reservoir	Largemouth Bass	37.1	0.24	1993
Round Valley Reservoir	Largemouth Bass	35.1	0.24	1993
Spruce Run Reservoir	Northern Pike	63.2	0.41	1993
Spruce Run Reservoir	Northern Pike	64.2	0.39	1993
Woodstown Memorial Lake	Black Crappie	19.5	0.10	1993
Woodstown Memorial Lake	Black Crappie	37.3	0.22	1993
Batsto Lake	Bluegill sunfish	18.5	0.31	1994
Batsto Lake	Bluegill sunfish	22	0.33	1994
Batsto Lake	Bluegill sunfish	20	0.56	1994
Batsto Lake	Brown bullhead	30.5	0.16	1994
Batsto Lake	Brown bullhead	30	0.16	1994
Batsto Lake	Brown bullhead	28	0.16	1994
Batsto Lake	Brown bullhead	30	0.21	1994
Batsto Lake	Brown bullhead	30	0.25	1994
Batsto Lake	Chain pickerel	29	0.38	1994
Batsto Lake	Chain pickerel	29.5	0.43	1994
Batsto Lake	Chain pickerel	28.5	0.44	1994
Batsto Lake	Chain pickerel	30	0.44	1994
Batsto Lake	Chain pickerel	38	0.79	1994
Batsto Lake	Largemouth bass	27	0.47	1994
Batsto Lake	Largemouth bass	26.5	0.60	1994
Batsto Lake	Largemouth bass	31.5	0.90	1994

Batsto Lake	Largemouth bass	32.5	0.92	1994
Batsto Lake	Largemouth bass	34	1.15	1994
Carnegie Lake	Bluegill sunfish	16.2	0.06	1994
Carnegie Lake	Bluegill sunfish	16.8	0.02	1994
Carnegie Lake	Bluegill sunfish	17.5	0.05	1994
Carnegie Lake	White perch	20	0.13	1994
Carnegie Lake	White perch	20.5	0.19	1994
Carnegie Lake	White perch	21.1	0.11	1994
Carnegie Lake	White perch	21.2	0.20	1994
Carnegie Lake	White perch	21.4	0.19	1994
Carnegie Lake	Largemouth bass	43.0	0.24	1994
Carnegie Lake	Largemouth bass	45.2	0.37	1994
Carnegie Lake	Largemouth bass	43.5	0.45	1994
Carnegie Lake	Largemouth bass	48.0	0.68	1994
Carnegie Lake	Largemouth bass	54.0	0.81	1994
Merrill Creek Reservoir	Largemouth bass	41.0	0.67	1994
Merrill Creek Reservoir	Largemouth bass	39.5	0.93	1994
Merrill Creek Reservoir	Largemouth bass	36.7	0.93	1994
Merrill Creek Reservoir	Largemouth bass	41.0	1.10	1994
Merrill Creek Reservoir	Largemouth bass	49.6	1.12	1994
Monksville Reservoir	Largemouth bass	31.3	0.20	1994
Monksville Reservoir	Largemouth bass	31.2	0.21	1994
Monksville Reservoir	Largemouth bass	28.5	0.51	1994
Monksville Reservoir	Largemouth bass	41.2	0.78	1994
Monksville Reservoir	Largemouth bass	39	1.00	1994
Wilson Lake	Pumpkinseed sunfish	20.4	0.26	1994
Wilson Lake	Pumpkinseed sunfish	18.5	0.60	1994
Wilson Lake	Pumpkinseed sunfish	18.2	1.52	1994
Wilson Lake	Yellow perch	22	0.48	1994
Wilson Lake	Yellow perch	24.5	0.65	1994
Wilson Lake	Yellow perch	26.1	0.72	1994
Wilson Lake	Yellow perch	30	1.08	1994
Wilson Lake	Yellow perch	2.95	1.23	1994
Wilson Lake	Largemouth bass	35.5	0.74	1994
Wilson Lake	Largemouth bass	40.0	0.88	1994
Wilson Lake	Largemouth bass	25.6	0.90	1994
Wilson Lake	Largemouth bass	34.5	0.90	1994
Wilson Lake	Largemouth bass	47.0	1.75	1994
Carnegie Lake	Brown bullhead	30.1	0.03	1995
Carnegie Lake	Brown bullhead	31.1	0.05	1995
Carnegie Lake	Brown bullhead	28.2	0.06	1995
Carnegie Lake	Brown bullhead	28.5	0.10	1995
Carnegie Lake	Brown bullhead	29.4	0.12	1995
Carnegie Lake	Channel catfish	56.6	0.12	1995
Carnegie Lake	Channel catfish	61.8	0.16	1995
Carnegie Lake	Channel catfish	56.2	0.18	1995

Carnegie Lake	Channel catfish	41.2	0.44	1995
East Creek Lake	Brown bullhead	33.2	2.62	1995
East Creek Lake	Chain pickerel	31.2	0.65	1995
East Creek Lake	Chain pickerel	33.5	0.78	1995
East Creek Lake	Chain pickerel	35	0.99	1995
East Creek Lake	Chain pickerel	33.3	1.14	1995
East Creek Lake	Chain pickerel	33.7	1.35	1995
East Creek Lake	Pumpkinseed sunfish	11.3	0.35	1995
East Creek Lake	Pumpkinseed sunfish	11.4	0.43	1995
East Creek Lake	Pumpkinseed sunfish	11.4	0.53	1995
East Creek Lake	Yellow bullhead	11.7	0.30	1995
East Creek Lake	Yellow bullhead	22.3	0.73	1995
East Creek Lake	Yellow perch	18	0.67	1995
East Creek Lake	Yellow perch	20	0.82	1995
East Creek Lake	Yellow perch	22	0.90	1995
East Creek Lake	Yellow perch	24	0.95	1995
East Creek Lake	Yellow perch	20.1	1.01	1995
East Creek Lake	Largemouth bass	33.1	1.07	1995
East Creek Lake	Largemouth bass	33.5	1.44	1995
East Creek Lake	Largemouth bass	34	1.95	1995
East Creek Lake	Largemouth bass	38	2.04	1995
East Creek Lake	Largemouth bass	42	2.21	1995
Harrisville Lake	Chain pickerel	27.5	0.90	1995
Harrisville Lake	Chain pickerel	24.5	0.94	1995
Harrisville Lake	Chain pickerel	25	1.20	1995
Harrisville Lake	Chain pickerel	33.5	1.48	1995
Harrisville Lake	Chain pickerel	45	2.27	1995
Harrisville Lake	mud sunfish	11.1	0.76	1995
Harrisville Lake	mud sunfish	17.5	0.95	1995
Harrisville Lake	mud sunfish	18.5	1.32	1995
Harrisville Lake	Yellow bullhead	15.5	0.96	1995
Harrisville Lake	Yellow bullhead	32.5	2.52	1995
Lake Nummy	Chain pickerel	33.3	0.47	1995
Lake Nummy	Chain pickerel	33.3	0.49	1995
Lake Nummy	Chain pickerel	33.6	0.60	1995
Lake Nummy	Chain pickerel	33.7	0.63	1995
Lake Nummy	Chain pickerel	33.2	0.64	1995
Lake Nummy	Yellow bullhead	25.7	0.21	1995
Lake Nummy	Yellow bullhead	11	0.23	1995
Lake Nummy	Yellow bullhead	25.5	0.31	1995
Lake Nummy	Yellow bullhead	25.1	0.34	1995
Lake Nummy	Yellow perch	22.3	0.52	1995
Lake Nummy	Yellow perch	20	0.53	1995
Lake Nummy	Yellow perch	22.3	0.53	1995
Lake Nummy	Yellow perch	22.3	0.54	1995
Lake Nummy	Yellow perch	22.1	0.59	1995

Manasquan Reservoir	Black crappie	17.5	0.35	1995
Manasquan Reservoir	Black crappie	16.5	0.51	1995
Manasquan Reservoir	Black crappie	16.5	0.53	1995
Manasquan Reservoir	Bluegill sunfish	15	0.16	1995
Manasquan Reservoir	Bluegill sunfish	15.5	0.22	1995
Manasquan Reservoir	Bluegill sunfish	16.8	0.22	1995
Manasquan Reservoir	Bluegill sunfish	16.5	0.31	1995
Manasquan Reservoir	Bluegill sunfish	16.5	0.37	1995
Manasquan Reservoir	Brown bullhead	24	0.06	1995
Manasquan Reservoir	Brown bullhead	21.5	0.11	1995
Manasquan Reservoir	Brown bullhead	22	0.12	1995
Manasquan Reservoir	Brown bullhead	26	0.15	1995
Manasquan Reservoir	Brown bullhead	24	0.16	1995
Manasquan Reservoir	Chain pickerel	21.6	0.08	1995
Manasquan Reservoir	Chain pickerel	20	0.13	1995
Manasquan Reservoir	Chain pickerel	24.1	0.15	1995
Manasquan Reservoir	Chain pickerel	39.8	0.48	1995
Manasquan Reservoir	Yellow perch	19.5	0.11	1995
Manasquan Reservoir	Yellow perch	18	0.12	1995
Manasquan Reservoir	Yellow perch	21	0.17	1995
Manasquan Reservoir	Largemouth bass	27	0.29	1995
Manasquan Reservoir	Largemouth bass	28	0.47	1995
Manasquan Reservoir	Largemouth bass	39.5	1.49	1995
Manasquan Reservoir	Largemouth bass	39.5	1.75	1995
Manasquan Reservoir	Largemouth bass	44.5	2.21	1995
Merrill Creek Reservoir	Black crappie	25.3	0.09	1995
Merrill Creek Reservoir	Black crappie	26.1	0.12	1995
Merrill Creek Reservoir	Bluegill sunfish	14.6	0.05	1995
Merrill Creek Reservoir	Bluegill sunfish	172	0.09	1995
Merrill Creek Reservoir	Bluegill sunfish	25.4	0.16	1995
Merrill Creek Reservoir	Brown bullhead	26	0.12	1995
Merrill Creek Reservoir	Brown bullhead	27.9	0.14	1995
Merrill Creek Reservoir	Brown bullhead	29.5	0.14	1995
Merrill Creek Reservoir	Brown bullhead	25.4	0.16	1995
Merrill Creek Reservoir	Brown bullhead	25.1	0.17	1995
Merrill Creek Reservoir	Lake trout	56.7	0.38	1995
Merrill Creek Reservoir	Lake trout	56.5	0.44	1995
Merrill Creek Reservoir	Lake trout	60	0.46	1995
Merrill Creek Reservoir	Lake trout	58.6	0.51	1995
Merrill Creek Reservoir	Lake trout	64	0.73	1995
Merrill Creek Reservoir	Smallmouth bass	38.5	0.44	1995
Merrill Creek Reservoir	Smallmouth bass	40.1	0.44	1995
Merrill Creek Reservoir	Smallmouth bass	42.5	0.49	1995
Merrill Creek Reservoir	Smallmouth bass	39.3	0.63	1995
Merrill Creek Reservoir	Smallmouth bass	43.3	0.68	1995
Merrill Creek Reservoir	Yellow perch	31.2	0.20	1995
Merrill Creek Reservoir	Yellow perch	30.1	0.22	1995
Merrill Creek Reservoir	Yellow perch	34	0.32	1995
Monksville Reservoir	Brown bullhead	31.8	0.04	1995

Monksville Reservoir	Brown bullhead	31	0.06	1995
Monksville Reservoir	Brown bullhead	29	0.06	1995
Monksville Reservoir	Brown bullhead	28.5	0.09	1995
Monksville Reservoir	Brown bullhead	29.2	0.13	1995
Monksville Reservoir	Brown trout	45	0.20	1995
Monksville Reservoir	Pumpkinseed sunfish	19.2	0.09	1995
Monksville Reservoir	Pumpkinseed sunfish	18.1	0.14	1995
Monksville Reservoir	Pumpkinseed sunfish	18	0.25	1995
Monksville Reservoir	Smallmouth bass	31.6	0.26	1995
Monksville Reservoir	Smallmouth bass	27	0.28	1995
Monksville Reservoir	Smallmouth bass	37	0.33	1995
Monksville Reservoir	Walleye	35.5	0.30	1995
Monksville Reservoir	Walleye	41.4	0.42	1995
Monksville Reservoir	Walleye	42	0.48	1995
Monksville Reservoir	Walleye	47.6	0.80	1995
Monksville Reservoir	Walleye	45.9	0.98	1995
Monksville Reservoir	Walleye	52.2	1.44	1995
Monksville Reservoir	White perch	24.5	0.19	1995
Monksville Reservoir	White perch	26.8	0.55	1995
Monksville Reservoir	White perch	27	0.58	1995
Monksville Reservoir	White perch	28.5	0.74	1995
Monksville Reservoir	White perch	32.1	0.79	1995
Mullica River	Brown bullhead	25.5	0.26	1995
Mullica River	Brown bullhead	24.5	0.28	1995
Mullica River	Brown bullhead	22	0.40	1995
Mullica River	Chain pickerel	23.5	0.25	1995
Mullica River	Chain pickerel	30	0.45	1995
Mullica River	Chain pickerel	33.2	0.49	1995
Mullica River	Chain pickerel	46	0.62	1995
Mullica River	Chain pickerel	50.5	0.92	1995
Mullica River	Pumpkinseed sunfish	13	0.12	1995
Mullica River	Pumpkinseed sunfish	13	0.21	1995
Mullica River	Pumpkinseed sunfish	17	0.52	1995
Mullica River	White catfish	29.6	0.23	1995
Mullica River	White catfish	29	0.25	1995
Mullica River	White catfish	29	0.35	1995
Mullica River	White perch	18.3	0.34	1995
Mullica River	White perch	17.4	0.35	1995
Mullica River	White perch	20	0.36	1995
Mullica River	White perch	19	0.36	1995
Mullica River	White perch	21	0.51	1995
New Brooklyn Lake	Black crappie	21	0.08	1995
New Brooklyn Lake	Black crappie	21.8	0.16	1995
New Brooklyn Lake	Black crappie	21.5	0.19	1995

New Brooklyn Lake	Chain pickerel	20.5	0.13	1995
New Brooklyn Lake	Chain pickerel	29.7	0.20	1995
New Brooklyn Lake	Chain pickerel	34	0.25	1995
New Brooklyn Lake	Chain pickerel	43.9	0.48	1995
New Brooklyn Lake	Chain pickerel	32.5	0.64	1995
New Brooklyn Lake	Pumpkinseed sunfish	15.4	0.22	1995
New Brooklyn Lake	Pumpkinseed sunfish	16	0.28	1995
New Brooklyn Lake	Pumpkinseed sunfish	16.5	0.30	1995
New Brooklyn Lake	Yellow bullhead	20	0.05	1995
New Brooklyn Lake	Yellow bullhead	24.1	0.06	1995
New Brooklyn Lake	Yellow bullhead	23,8	0.08	1995
New Brooklyn Lake	Yellow bullhead	25.9	0.09	1995
New Brooklyn Lake	Yellow bullhead	26.9	0.20	1995
New Brooklyn Lake	Largemouth bass	23.3	0.25	1995
New Brooklyn Lake	Largemouth bass	27.4	0.32	1995
New Brooklyn Lake	Largemouth bass	31.7	0.41	1995
Wading River	Brown bullhead	31.5	0.62	1995
Wading River	Chain pickerel	42.5	0.46	1995
Wading River	Chain pickerel	35.1	0.49	1995
Wading River	Chain pickerel	28.5	0.55	1995
Wading River	Chain pickerel	22.3	0.55	1995
Wading River	Chain pickerel	32	0.71	1995
Wading River	White catfish	30.3	0.49	1995
Wading River	White catfish	30	0.60	1995
Wading River	Yellow bullhead	20.2	1.01	1995
Wading River	Yellow bullhead	30.3	1.59	1995
Wanaque Reservoir	Bluegill sunfish	17.2	0.07	1995
Wanaque Reservoir	Brown bullhead	35.8	0.01	1995
Wanaque Reservoir	Brown bullhead	36.2	0.03	1995
Wanaque Reservoir	Brown bullhead	34	0.07	1995
Wanaque Reservoir	Chain pickerel	51	0.12	1995
Wanaque Reservoir	Chain pickerel	47.5	0.18	1995
Wanaque Reservoir	Chain pickerel	50.5	0.37	1995
Wanaque Reservoir	Chain pickerel	47	0.41	1995
Wanaque Reservoir	Chain pickerel	50.6	0.43	1995
Wanaque Reservoir	Chain pickerel	56	0.73	1995
Wanaque Reservoir	Smallmouth bass	38.5	0.27	1995
Wanaque Reservoir	Smallmouth bass	29.6	0.29	1995
Wanaque Reservoir	Smallmouth bass	46.2	0.36	1995
Wanaque Reservoir	White catfish	41.5	0.12	1995
Wanaque Reservoir	White catfish	40.5	0.17	1995
Wanaque Reservoir	White catfish	37.1	0.17	1995
Wanaque Reservoir	White catfish	37.7	0.28	1995
Wanaque Reservoir	White catfish	42.9	0.33	1995
Wanaque Reservoir	White perch	27.2	0.35	1995
Wanaque Reservoir	White perch	30.7	0.63	1995

Wanaque Reservoir	White perch	36.8	0.65	1995
Wanaque Reservoir	White perch	32.1	0.75	1995
Wanaque Reservoir	White perch	33.9	1.18	1995
Wanaque Reservoir	Yellow bullhead	23.9	0.03	1995
Wanaque Reservoir	Largemouth bass	37.9	0.36	1995
Wanaque Reservoir	Largemouth bass	34.6	0.45	1995
Wanaque Reservoir	Largemouth bass	39.5	0.51	1995
Wanaque Reservoir	Largemouth bass	41.4	0.71	1995
Wanaque Reservoir	Largemouth bass	41.4	0.85	1995
Wilson Lake	Chain pickerel	29.5	0.66	1995
Wilson Lake	Chain pickerel	30.5	0.88	1995
Wilson Lake	Chain pickerel	25.7	0.91	1995
Wilson Lake	Chain pickerel	47	1.14	1995
Wilson Lake	Chain pickerel	47	1.30	1995
Boonton Reservoir	Brown Bullhead	30.5	0.01	1996
Boonton Reservoir	Brown Bullhead	32.8	0.02	1996
Boonton Reservoir	White Catfish	40	0.54	1996
Boonton Reservoir	Largemouth Bass	35	0.33	1996
Boonton Reservoir	Largemouth Bass	45.1	0.60	1996
Boonton Reservoir	Largemouth Bass	41.6	0.81	1996
Butterfly Bogs	Brown Bullhead	30.6	0.08	1996
Butterfly Bogs	Chain Pickerel	33.9	0.78	1996
Cedar Lake	Brown Bullhead	31.5	0.06	1996
Cedar Lake	Chain Pickerel	47.9	0.24	1996
Cedar Lake	Chain Pickerel	49.6	0.31	1996
Cedar Lake	Chain Pickerel	64.7	0.76	1996
Cedar Lake	Largemouth Bass	39	0.25	1996
Cedar Lake	Largemouth Bass	41.5	0.59	1996
Cedar Lake	Largemouth Bass	43.8	0.61	1996
Crater Lake	Brown Bullhead	30	0.39	1996
Crater Lake	Yellow Perch	21.6	0.29	1996
Crater Lake	Yellow Perch	19.9	0.43	1996
Crater Lake	Yellow Perch	27.9	0.58	1996
DeVoe Lake	Brown Bullhead	27	0.09	1996
DeVoe Lake	Chain Pickerel	41.5	0.14	1996
DeVoe Lake	Chain Pickerel	43	0.25	1996
DeVoe Lake	Chain Pickerel	48.5	0.27	1996
DeVoe Lake	Largemouth Bass	31.7	0.07	1996
DeVoe Lake	Largemouth Bass	34.1	0.21	1996
DeVoe Lake	Largemouth Bass	36.5	0.26	1996
Double Trouble Lake	Chain Pickerel	18.1	0.74	1996
Double Trouble Lake	Chain Pickerel	37.7	1.24	1996
Double Trouble Lake	Chain Pickerel	46.7	1.60	1996
Double Trouble Lake	Chain Pickerel	52.4	2.24	1996
Double Trouble Lake	Chain Pickerel	57.6	2.30	1996
Double Trouble Lake	Yellow Bullhead	26.1	0.82	1996
Double Trouble Lake	Yellow Bullhead	28.3	1.09	1996
Double Trouble Lake	Yellow Bullhead	26.6	1.18	1996
Echo Lake Reservoir	Largemouth Bass	30.4	0.12	1996

Echo Lake Reservoir	Largemouth Bass	34.4	0.15	1996
Echo Lake Reservoir	Largemouth Bass	29	0.16	1996
Echo Lake Reservoir	Largemouth Bass	35	0.17	1996
Green Turtle Lake	Chain Pickerel	28.1	0.11	1996
Green Turtle Lake	Chain Pickerel	44.7	0.14	1996
Green Turtle Lake	Chain Pickerel	44.6	0.15	1996
Green Turtle Lake	Yellow Perch	20.8	0.09	1996
Green Turtle Lake	Yellow Perch	24.6	0.10	1996
Green Turtle Lake	Largemouth Bass	23.6	0.17	1996
Green Turtle Lake	Largemouth Bass	26.1	0.22	1996
Green Turtle Lake	Largemouth Bass	34.7	0.32	1996
Greenwood Lake	White perch	18.3	0.00	1996
Greenwood Lake	White perch	19.2	0.02	1996
Greenwood Lake	Largemouth Bass	36.2	0.15	1996
Greenwood Lake	Largemouth Bass	34.3	0.18	1996
Greenwood Lake	Largemouth Bass	31.4	0.21	1996
Greenwood Lake	Largemouth Bass	36.3	0.24	1996
Greenwood Lake	Largemouth Bass	40	0.40	1996
Grovers Mill Pond	Brown Bullhead	33	0.08	1996
Grovers Mill Pond	Brown Bullhead	32.2	0.40	1996
Grovers Mill Pond	Chain Pickerel	35.3	0.12	1996
Grovers Mill Pond	Chain Pickerel	35.2	0.16	1996
Grovers Mill Pond	Chain Pickerel	37.2	0.16	1996
Grovers Mill Pond	Chain Pickerel	36.5	0.18	1996
Grovers Mill Pond	Largemouth Bass	31.3	0.25	1996
Grovers Mill Pond	Largemouth Bass	35.8	0.30	1996
Grovers Mill Pond	Largemouth Bass	35	0.36	1996
Grovers Mill Pond	Largemouth Bass	41.5	0.39	1996
Grovers Mill Pond	Largemouth Bass	28	0.47	1996
Hainesville Pond	Chain Pickerel	39.3	0.14	1996
Hainesville Pond	Chain Pickerel	36.6	0.14	1996
Hainesville Pond	Chain Pickerel	36.5	0.15	1996
Hainesville Pond	Largemouth Bass	30.3	0.13	1996
Hainesville Pond	Largemouth Bass	31.0	0.21	1996
Hainesville Pond	Largemouth Bass	31.3	0.23	1996
Malaga Lake	Chain Pickerel	32	0.73	1996
Malaga Lake	Chain Pickerel	29.3	0.88	1996
Malaga Lake	Chain Pickerel	36.2	0.97	1996
Malaga Lake	Chain Pickerel	31	0.99	1996
Malaga Lake	Chain Pickerel	34	1.38	1996
Malaga Lake	Largemouth Bass	32.4	0.95	1996
Passaic River at Hatfield Swamp	Pumpkinseed Sunfish	12.4	0.08	1996
Passaic River at Hatfield Swamp	Pumpkinseed Sunfish	12.6	0.09	1996
Passaic River at Hatfield Swamp	Black Crappie	18.1	0.30	1996
Passaic River at Hatfield Swamp	Black Crappie	18.9	0.32	1996
Passaic River at Hatfield Swamp	Bluegill Sunfish	18.9	0.19	1996
Passaic River at Hatfield Swamp	Black Crappie	20	0.21	1996

Passaic River at Hatfield Swamp	Black Crappie	20	0.22	1996
Passaic River at Hatfield Swamp	Yellow Bullhead	21.4	0.11	1996
Passaic River at Hatfield Swamp	Largemouth Bass	23	0.17	1996
Passaic River at Hatfield Swamp	Largemouth Bass	23.5	0.21	1996
Passaic River at Hatfield Swamp	Largemouth Bass	36	0.53	1996
Pompton River at Lincoln Park	Pike	27.8	0.17	1996
Pompton River at Lincoln Park	Pike	42	0.41	1996
Pompton River at Lincoln Park	Pike	66.6	0.59	1996
Pompton River at Lincoln Park	Yellow Perch	21	0.21	1996
Pompton River at Lincoln Park	Yellow Perch	24	0.26	1996
Pompton River at Lincoln Park	Largemouth Bass	35.4	0.50	1996
Pompton River at Lincoln Park	Largemouth Bass	35.5	0.68	1996
Raritan River at Millstone River	Brown Bullhead	25.4	0.06	1996
Raritan River at Millstone River	Brown Bullhead	27.5	0.07	1996
Raritan River at Millstone River	Channel Catfish	39.8	0.15	1996
Raritan River at Millstone River	Largemouth Bass	32.5	0.33	1996
Raritan River at Millstone River	Largemouth Bass	36.3	0.33	1996
Raritan River at Millstone River	Largemouth Bass	44.9	0.37	1996
Raritan River at Millstone River	Largemouth Bass	37	0.46	1996
Ridgeway Branch of Tom's River	Brown Bullhead	26.4	0.17	1996
Ridgeway Branch of Tom's River	Brown Bullhead	27	0.44	1996
Ridgeway Branch of Tom's River	Brown Bullhead	22.8	1.15	1996
Ridgeway Branch of Tom's River	Brown Bullhead	25.6	1.57	1996
Ridgeway Branch of Tom's River	Chain Pickerel	36	1.22	1996
Rockaway River near Whippany	Black Crappie	17.9	0.21	1996
Rockaway River near Whippany	Bluegill Sunfish	14.5	0.12	1996
Rockaway River near Whippany	Largemouth Bass	39.8	0.92	1996
South Branch Raritan River at Neshanic Station	Brown Bullhead	17.2	0.08	1996
South Branch Raritan River at Neshanic Station	Redbreast Sunfish	15.7	0.09	1996
South Branch Raritan River at Neshanic Station	Redbreast Sunfish	15.9	0.15	1996
South Branch Raritan River at Neshanic Station	Rock Bass	15	0.09	1996
South Branch Raritan River at Neshanic Station	Smallmouth Bass	20.7	0.18	1996
South Branch Raritan River at Neshanic Station	Largemouth Bass	18.2	0.11	1996
Speedwell Lake	Bluegill Sunfish	18.3	0.12	1996
Speedwell Lake	Bluegill Sunfish	19.7	0.13	1996
Speedwell Lake	Brown Bullhead	21	0.01	1996
Speedwell Lake	Largemouth Bass	27.5	0.10	1996
Speedwell Lake	Largemouth Bass	32.5	0.34	1996
Speedwell Lake	Largemouth Bass	36.1	0.38	1996
Steenykill Lake	Largemouth Bass	26.5	0.16	1996
Steenykill Lake	Largemouth Bass	27.5	0.19	1996
Steenykill Lake	Largemouth Bass	27.7	0.19	1996
Steenykill Lake	Largemouth Bass	27.8	0.15	1996
Steenykill Lake	Largemouth Bass	28.3	0.22	1996

Steenykill Lake	Largemouth Bass	29.6	0.15	1996
Sunset Lake	Bluegill Sunfish	11.2	0.05	1996
Sunset Lake	Chain Pickerel	30.7	0.09	1996
Sunset Lake	Largemouth Bass	22.5	0.10	1996
Sunset Lake	Largemouth Bass	33.8	0.17	1996
Sunset Lake	Largemouth Bass	38.2	0.21	1996
Sunset Lake	Largemouth Bass	38.5	0.35	1996
Sunset Lake	Largemouth Bass	53	0.69	1996
Wawayanda Lake	Chain Pickerel	35	0.25	1996
Wawayanda Lake	Chain Pickerel	39.5	0.28	1996
Wawayanda Lake	Chain Pickerel	40.5	0.29	1996
Wawayanda Lake	Chain Pickerel	37.9	0.31	1996
Wawayanda Lake	Chain Pickerel	42	0.34	1996
Wawayanda Lake	Chain Pickerel	42.4	0.44	1996
Oak Ridge Reservoir	Yellow Bullhead	24.5	0.25	1997
Oak Ridge Reservoir	Chain Pickerel	25	0.24	1997
Oak Ridge Reservoir	Chain Pickerel	28	0.29	1997
Oak Ridge Reservoir	Chain Pickerel	30.6	0.30	1997
Oak Ridge Reservoir	Brown Bullhead	33	0.02	1997
Oak Ridge Reservoir	Brown Bullhead	34.5	0.02	1997
Oak Ridge Reservoir	Smallmouth Bass	40.2	0.49	1997
Oak Ridge Reservoir	Chain Pickerel	58	0.30	1997
Oak Ridge Reservoir	Largemouth Bass	36.8	0.38	1997
Oak Ridge Reservoir	Largemouth Bass	42.5	0.64	1997
Oak Ridge Reservoir	Largemouth Bass	48	0.71	1997
Oak Ridge Reservoir	Largemouth Bass	48	0.89	1997
Pompton River at Pequannock River	Black Crappie	19.3	0.24	1997
Pompton River at Pequannock River	Pumpkinseed Sunfish	14.5	0.35	1997
Pompton River at Pequannock River	Pumpkinseed Sunfish	14.1	0.78	1997
Pompton River at Pequannock River	Redbreast Sunfish	13.7	0.32	1997
Pompton River at Pequannock River	Redbreast Sunfish	15.8	0.41	1997
Pompton River at Pequannock River	Rock Bass	19.2	0.54	1997
Pompton River at Pequannock River	Rock Bass	21.1	0.54	1997
Pompton River at Pequannock River	Rock Bass	22	0.68	1997
Pompton River at Pequannock River	Smallmouth Bass	29.6	0.57	1997
Pompton River at Pequannock River	Smallmouth Bass	36.8	1.02	1997
Pompton River at Pequannock River	Smallmouth Bass	25.4	1.10	1997
Pompton River at Pequannock River	Smallmouth Bass	27.8	1.14	1997
Pompton River at Pequannock River	Yellow Bullhead	26.2	0.80	1997
Pompton River at Pequannock River	Largemouth Bass	39	0.99	1997
Pompton River at Pequannock River	Largemouth Bass	39.8	1.36	1997
Whitesbog Pond	Chain Pickerel	23	0.43	1997
Whitesbog Pond	Chain Pickerel	31.5	0.58	1997
Whitesbog Pond	Chain Pickerel	34.3	0.74	1997
Whitesbog Pond	Chain Pickerel	32.5	0.76	1997
Whitesbog Pond	Chain Pickerel	39.6	1.02	1997
Willow Grove Lake	Brown Bullhead	33	0.23	1997

Willow Grove Lake	Brown Bullhead	32.4	0.28	1997
Willow Grove Lake	Chain Pickerel	31	0.76	1997
Willow Grove Lake	Chain Pickerel	48.1	1.03	1997
Willow Grove Lake	Chain Pickerel	36.5	1.13	1997
Willow Grove Lake	Chain Pickerel	45.2	1.26	1997
Willow Grove Lake	Chain Pickerel	53	1.29	1997
Willow Grove Lake	White Catfish	43	0.17	1997
Willow Grove Lake	Yellow Bullhead	28	0.82	1997
Willow Grove Lake	Yellow Bullhead	30.5	0.91	1997
Willow Grove Lake	Largemouth Bass	33.2	1.68	1997
Mullica River @ Green Bank	American Eel	45.7	0.51	1999
Mullica River @ Green Bank	American Eel	69	0.49	1999
Mullica River @ New Gretna	American Eel	42.5	0.3	1999
Mullica River, below dam @ Batsto Village	American Eel	29.7	0.65	1999
Mullica River, below dam @ Batsto Village	American Eel	39.5	0.04	1999
Mullica River, below dam @ Batsto Village	American Eel	46.3	0.8	1999
Stewart Lake (Woodbury)	Bluegill	15.9	0.03	1999
Stewart Lake (Woodbury)	Bluegill	16.4	0.03	1999
Stewart Lake (Woodbury)	Black Crappie	18.3	0.1	1999
Stewart Lake (Woodbury)	Brown Bullhead	25.4	0.01	1999
Stewart Lake (Woodbury)	Brown Bullhead	27.3	0.01	1999
Stewart Lake (Woodbury)	Brown Bullhead	31.1	0.04	1999
Stewart Lake (Woodbury)	Common Carp	43.8	0.01	1999
Stewart Lake (Woodbury)	Common Carp	49.3	0.04	1999
Stewart Lake (Woodbury)	Common Carp	54.5	0.08	1999
Stewart Lake (Woodbury)	Common Carp	59.8	0.03	1999
Stewart Lake (Woodbury)	Common Carp	65.8	0.03	1999
Stewart Lake (Woodbury)	Largemouth Bass	35.9	0.2	1999
Stewart Lake (Woodbury)	Largemouth Bass	38.9	0.15	1999
Stewart Lake (Woodbury)	Largemouth Bass	43.5	0.19	1999
Boonton Reservoir	rock bass	20.7	0.13	2002
Boonton Reservoir	rock bass	22.2	0.27	2002
Boonton Reservoir	rock bass	22.3	0.22	2002
Boonton Reservoir	rock bass	22.3	0.26	2002
Boonton Reservoir	smallmouth bass	38.9	0.39	2002
Boonton Reservoir	smallmouth bass	41.0	0.39	2002
Boonton Reservoir	smallmouth bass	43.4	0.52	2002
Boonton Reservoir	smallmouth bass	48.4	0.75	2002
Boonton Reservoir	largemouth bass	41.6	0.36	2002
Boonton Reservoir	largemouth bass	45.0	0.59	2002
Boonton Reservoir	largemouth bass	48.3	1.08	2002
Boonton Reservoir	largemouth bass	48.7	0.73	2002
Boonton Reservoir	largemouth bass	52.2	0.80	2002
Branch Brook Park	bluegill	14.5	0.16	2002
Branch Brook Park	bluegill	15.3	0.15	2002
Branch Brook Park	bluegill	15.5	0.24	2002

Branch Brook Park	common carp	60.5	0.10	2002
Branch Brook Park	common carp	69.0	0.19	2002
Branch Brook Park	common carp	69.5	0.19	2002
Branch Brook Park	common carp	72.5	0.07	2002
Canistear Reservoir	bluegill	18.5	0.11	2002
Canistear Reservoir	yellow perch	20.5	0.29	2002
Canistear Reservoir	bluegill	21.0	0.10	2002
Canistear Reservoir	bluegill	21.8	0.11	2002
Canistear Reservoir	yellow bullhead	24.5	0.12	2002
Canistear Reservoir	yellow bullhead	25.1	0.17	2002
Canistear Reservoir	yellow perch	25.3	0.18	2002
Canistear Reservoir	yellow perch	27.5	0.22	2002
Canistear Reservoir	yellow bullhead	27.6	0.16	2002
Canistear Reservoir	yellow bullhead	28.6	0.19	2002
Canistear Reservoir	chain pickerel	41.5	0.19	2002
Canistear Reservoir	chain pickerel	41.8	0.25	2002
Canistear Reservoir	chain pickerel	44.0	0.14	2002
Canistear Reservoir	chain pickerel	47.2	0.16	2002
Canistear Reservoir	bluegill	21.2	0.23	2002
Canistear Reservoir	largemouth bass	41.7	0.38	2002
Canistear Reservoir	largemouth bass	43.8	0.29	2002
Canistear Reservoir	largemouth bass	44.5	0.51	2002
Canistear Reservoir	largemouth bass	51.4	0.67	2002
Clinton Reservoir	redbreast sunfish	12.7	0.25	2002
Clinton Reservoir	redbreast sunfish	13.2	0.19	2002
Clinton Reservoir	redbreast sunfish	13.8	0.16	2002
Clinton Reservoir	redbreast sunfish	14.1	0.16	2002
Clinton Reservoir	rock bass	15.8	0.18	2002
Clinton Reservoir	rock bass	15.9	0.19	2002
Clinton Reservoir	rock bass	18.2	0.65	2002
Clinton Reservoir	yellow bullhead	28.2	0.43	2002
Clinton Reservoir	yellow bullhead	28.3	0.74	2002
Clinton Reservoir	yellow bullhead	28.4	0.44	2002
Clinton Reservoir	yellow bullhead	29.7	0.45	2002
Clinton Reservoir	white sucker	44.5	0.25	2002
Clinton Reservoir	chain pickerel	45.2	0.61	2002
Clinton Reservoir	white sucker	45.5	0.19	2002
Clinton Reservoir	white sucker	46.8	0.24	2002
Clinton Reservoir	chain pickerel	53.0	0.43	2002
Echo Lake Reservoir	bluegill	16.4	0.10	2002
Echo Lake Reservoir	bluegill	17.9	0.06	2002
Echo Lake Reservoir	bluegill	18.5	0.11	2002
Echo Lake Reservoir	bluegill	19.0	0.11	2002
Echo Lake Reservoir	yellow bullhead	22.4	0.09	2002
Echo Lake Reservoir	yellow bullhead	22.9	0.14	2002
Echo Lake Reservoir	yellow bullhead	26.4	0.16	2002
Echo Lake Reservoir	yellow bullhead	28.6	0.07	2002
Echo Lake Reservoir	chain pickerel	43.5	0.20	2002
Echo Lake Reservoir	chain pickerel	45.6	0.27	2002

Echo Lake Reservoir	chain pickerel	62.8	0.37	2002
Echo Lake Reservoir	largemouth bass	45.6	0.43	2002
Echo Lake Reservoir	largemouth bass	48.1	0.61	2002
Echo Lake Reservoir	largemouth bass	49.4	0.72	2002
Echo Lake Reservoir	largemouth bass	50.5	0.79	2002
Green Turtle Lake	bluegill	17.7	0.07	2002
Green Turtle Lake	bluegill	17.9	0.09	2002
Green Turtle Lake	bluegill	18.6	0.14	2002
Green Turtle Lake	bluegill	19.9	0.58	2002
Green Turtle Lake	largemouth bass	31.7	0.20	2002
Green Turtle Lake	largemouth bass	32.5	0.26	2002
Green Turtle Lake	largemouth bass	38.9	0.32	2002
Green Turtle Lake	largemouth bass	40.0	0.36	2002
Green Turtle Lake	largemouth bass	49.4	0.74	2002
Greenwood Lake	bluegill	19.0	0.08	2002
Greenwood Lake	bluegill	19.1	0.13	2002
Greenwood Lake	bluegill	19.2	0.07	2002
Greenwood Lake	bluegill	20.1	0.09	2002
Greenwood Lake	yellow bullhead	21.4	0.06	2002
Greenwood Lake	yellow bullhead	23.6	0.09	2002
Greenwood Lake	yellow bullhead	23.7	0.07	2002
Greenwood Lake	yellow bullhead	23.8	0.11	2002
Greenwood Lake	walleye		0.18	2002
Greenwood Lake	walleye		0.28	2002
Greenwood Lake	walleye		0.28	2002
Greenwood Lake	walleye		0.30	2002
Greenwood Lake	walleye		0.47	2002
Greenwood Lake	largemouth bass	39.9	0.31	2002
Greenwood Lake	largemouth bass	42.0	0.31	2002
Greenwood Lake	largemouth bass	42.6	0.31	2002
Greenwood Lake	largemouth bass	42.7	0.21	2002
Greenwood Lake	largemouth bass	44.4	0.29	2002
Monksville reservoir	bluegill	17.8	0.11	2002
Monksville reservoir	bluegill	18.5	0.08	2002
Monksville reservoir	yellow bullhead	19.4	0.11	2002
Monksville reservoir	bluegill	19.8	0.17	2002
Monksville reservoir	bluegill	19.9	0.13	2002
Monksville reservoir	yellow bullhead	23.0	0.13	2002
Monksville reservoir	yellow perch	27.6	0.17	2002
Monksville reservoir	yellow perch	34.9	0.17	2002
Monksville reservoir	chain pickerel	35.5	0.15	2002
Monksville reservoir	chain pickerel	38.4	0.19	2002
Monksville reservoir	walleye	44.4	0.44	2002
Monksville reservoir	walleye	47.8	0.55	2002
Monksville reservoir	chain pickerel	51.1	0.31	2002
Monksville reservoir	walleye	51.6	0.42	2002
Monksville reservoir	walleye	54.0	0.35	2002
Monksville reservoir	walleye	59.8	0.78	2002
Monksville Reservoir	Largemouth bass	26.5	0.20	2002

Monksville Reservoir	Largemouth bass	28.0	0.18	2002
Monksville Reservoir	Largemouth bass	31.5	0.13	2002
Monksville Reservoir	Largemouth bass	36.9	0.32	2002
Monksville Reservoir	Largemouth bass	44.0	0.39	2002
Oak Ridge Reservoir	bluegill	17.5	0.15	2002
Oak Ridge Reservoir	bluegill	18.1	0.11	2002
Oak Ridge Reservoir	bluegill	19.9	0.24	2002
Oak Ridge Reservoir	bluegill	20.0	0.28	2002
Oak Ridge Reservoir	yellow bullhead	23.8	0.10	2002
Oak Ridge Reservoir	yellow bullhead	28.5	0.23	2002
Oak Ridge Reservoir	largemouth bass	41.3	0.90	2002
Oak Ridge Reservoir	largemouth bass	41.6	0.65	2002
Oak Ridge Reservoir	largemouth bass	42.2	0.81	2002
Oak Ridge Reservoir	largemouth bass	45.1	0.82	2002
Pompton River at Lincoln Park	black crappie	17.5	0.19	2002
Pompton River at Lincoln Park	black crappie	20.3	0.29	2002
Pompton River at Lincoln Park	rock bass	20.8	0.64	2002
Pompton River at Lincoln Park	black crappie	21.4	0.15	2002
Pompton River at Lincoln Park	rock bass	21.5	0.60	2002
Pompton River at Lincoln Park	rock bass	23.7	0.83	2002
Pompton River at Lincoln Park	common carp	49.5	0.22	2002
Pompton River at Lincoln Park	common carp	49.9	0.47	2002
Pompton River at Lincoln Park	common carp	57.5	0.28	2002
Pompton River at Lincoln Park	common carp	58.7	0.39	2002
Pompton River at Lincoln Park	largemouth bass	34.6	0.35	2002
Pompton River at Lincoln Park	largemouth bass	35.2	0.50	2002
Pompton River at Lincoln Park	largemouth bass	39.2	0.74	2002
Rockaway River at Powerville	bluegill	15.8	0.11	2002
Rockaway River at Powerville	bluegill	16.0	0.11	2002
Rockaway River at Powerville	bluegill	16.1	0.13	2002
Rockaway River at Powerville	yellow bullhead	16.6	0.10	2002
Rockaway River at Powerville	yellow bullhead	22.5	0.28	2002
Rockaway River at Powerville	rock bass	23.3	0.29	2002
Rockaway River at Powerville	yellow bullhead	23.5	0.14	2002
Rockaway River at Powerville	rock bass	23.9	0.41	2002
Rockaway River at Powerville	rock bass	24.1	0.34	2002
Rockaway River at Powerville	rock bass	24.5	0.32	2002
Shepherds lake	redbreast sunfish	14.6	0.19	2002
Shepherds lake	rock bass	15.3	0.20	2002
Shepherds lake	redbreast sunfish	15.6	0.18	2002
Shepherds lake	redbreast sunfish	15.9	0.20	2002
Shepherds lake	rock bass	20.9	0.15	2002
Shepherds lake	brown bullhead	28.9	0.06	2002
Shepherds lake	brown bullhead	29.5	0.13	2002
Shepherds lake	brown bullhead	36.1	0.07	2002
Shepherds lake	largemouth bass	39.0	0.76	2002
Shepherds Lake	largemouth bass	39.2	0.71	2002
Shepherds Lake	largemouth bass	39.7	0.56	2002
Shepherds Lake	largemouth bass	40.4	0.67	2002

Shepherds Lake	largemouth bass	41.1	0.60	2002
Speedwell Lake	bluegill	15.4	0.10	2002
Speedwell Lake	bluegill	15.8	0.10	2002
Speedwell Lake	bluegill	18.6	0.13	2002
Speedwell Lake	bluegill	20.5	0.16	2002
Speedwell Lake	chain pickerel	25.9	0.09	2002
Speedwell Lake	chain pickerel	31.8	0.11	2002
Speedwell Lake	common carp	57.7	0.13	2002
Speedwell Lake	chain pickerel	59.6	0.26	2002
Speedwell Lake	common carp	61.7	0.10	2002
Speedwell Lake	common carp	62.5	0.14	2002
Speedwell Lake	common carp	63.6	0.05	2002
Split Rock Reservoir	bluegill	21.2	0.13	2002
Split Rock Reservoir	bluegill	21.4	0.21	2002
Split Rock Reservoir	bluegill	22.0	0.10	2002
Split Rock Reservoir	bluegill	22.6	0.12	2002
Split Rock Reservoir	yellow perch	26.2	0.10	2002
Split Rock Reservoir	yellow perch	29.5	0.15	2002
Split Rock Reservoir	yellow perch	30.0	0.13	2002
Split Rock Reservoir	yellow perch	30.0	0.34	2002
Split Rock Reservoir	brown bullhead	30.7	0.04	2002
Split Rock Reservoir	brown bullhead	39.0	0.04	2002
Split Rock Reservoir	chain pickerel	46.8	0.30	2002
Split Rock Reservoir	chain pickerel	49.0	0.32	2002
Split Rock Reservoir	chain pickerel	54.5	0.30	2002
Split Rock Reservoir	chain pickerel	57.0	0.32	2002
Split Rock Reservoir	chain pickerel	61.0	0.26	2002
Split Rock Reservoir	largemouth bass	35.5	0.32	2002
Split Rock Reservoir	largemouth bass	35.9	0.38	2002
Split Rock Reservoir	largemouth bass	38.0	0.32	2002
Split Rock Reservoir	largemouth bass	39.4	0.48	2002
Split Rock Reservoir	largemouth bass	40.5	0.52	2002
Wanaque Reservoir	yellow bullhead	18.8	0.10	2002
Wanaque Reservoir	yellow bullhead	19.9	0.08	2002
Wanaque Reservoir	bluegill	20.2	0.22	2002
Wanaque Reservoir	bluegill	20.4	0.23	2002
Wanaque Reservoir	bluegill	20.6	0.27	2002
Wanaque Reservoir	bluegill	21.2	0.41	2002
Wanaque Reservoir	yellow bullhead	22.2	0.16	2002
Wanaque Reservoir	yellow bullhead	22.9	0.17	2002
Wanaque Reservoir	largemouth bass	30.7	0.28	2002
Wanaque Reservoir	largemouth bass	34.2	0.23	2002
Wanaque Reservoir	largemouth bass	45.2	1.03	2002
Wanaque Reservoir	largemouth bass	48.0	1.47	2002
Wawayanda Lake	bluegill	17.9	0.14	2002
Wawayanda Lake	bluegill	18.2	0.21	2002
Wawayanda Lake	bluegill	18.3	0.21	2002
Wawayanda Lake	chain pickerel	26.4	0.23	2002
Wawayanda Lake	chain pickerel	27.1	0.23	2002
Wawayanda Lake	yellow bullhead	27.1	0.30	2002

Wawayanda Lake	chain pickerel	28.0	0.23	2002
Wawayanda Lake	yellow bullhead	28.3	0.45	2002
Wawayanda Lake	yellow bullhead	29.9	0.36	2002
Wawayanda Lake	chain pickerel	33.9	0.50	2002
Wawayanda Lake	chain pickerel	44.5	0.44	2002
Wawayanda Lake	largemouth bass	33.0	0.29	2002
Wawayanda Lake	largemouth bass	33.4	0.33	2002
Wawayanda Lake	largemouth bass	42.9	0.78	2002
Wawayanda Lake	largemouth bass	44.1	0.66	2002
Wawayanda Lake	largemouth bass	45.3	0.73	2002
Weequachic Lake	bluegill	16.4	0.12	2002
Weequachic Lake	bluegill	17.3	0.15	2002
Weequachic Lake	bluegill	17.4	0.09	2002
Weequachic Lake	white perch	17.7	0.10	2002
Weequachic Lake	white perch	17.9	0.08	2002
Weequachic Lake	white perch	18.0	0.09	2002
Weequachic Lake	brown bullhead	27.2	0.03	2002
Weequachic Lake	brown bullhead	30.0	0.03	2002
Weequachic Lake	brown bullhead	31.0	0.03	2002
Weequachic Lake	common carp	50.5	0.04	2002
Weequachic Lake	common carp	56.2	0.08	2002
Weequachic Lake	common carp	71.0	0.10	2002
Weequachic Lake	largemouth bass	34.0	0.21	2002
Weequachic Lake	largemouth bass	35.1	0.20	2002
Weequachic Lake	largemouth bass	45.9	0.31	2002
Weequachic Lake	largemouth bass	47.5	0.39	2002
Mullica River	American Eel	49.5	0.29	2004
Mullica River	American Eel	63.5	0.33	2004
Mullica River	American Eel	64.9	0.18	2004
Mullica River	American Eel	73.2	0.2	2004
Mullica River	American Eel	77	0.2	2004
Below New Market Pond Dam	American eel	68.2	0.08673	2006
Below New Market Pond Dam	American eel	69.9	0.11418	2006
Bound Brook @ Shepard Rd.	American eel	51.3	0.08569	2006
Bound Brook @ Shepard Rd.	American eel	54.3	0.08921	2006
Bound Brook @ Shepard Rd.	American eel	61.3	0.20208	2006
Budd Lake	bluegill	17.8	0.09949	2006
Budd Lake	bluegill	18.2	0.1561	2006
Budd Lake	bluegill	18.8	0.12716	2006
Budd Lake	brown bullhead	25.6	0.02337	2006
Budd Lake	brown bullhead	27.2	0.0193	2006
Budd Lake	brown bullhead	31.5	0.01034	2006
Budd Lake	white catfish	34.3	0.18067	2006
Budd Lake	white catfish	35.6	0.21846	2006
Budd Lake	white catfish	42.1	0.27947	2006
Budd Lake	northern pike	74.1	0.30651	2006
Budd Lake	northern pike	78.4	0.45883	2006
Budd Lake	northern pike	81	0.19917	2006
Budd Lake	largemouth bass	35.7	0.16964	2006
Budd Lake	largemouth bass	36.4	0.43134	2006

Budd Lake	largemouth bass	36.9	0.53606	2006
Budd Lake	largemouth bass	43.1	0.48615	2006
Budd Lake	largemouth bass	47.6	0.41803	2006
Carnegie Lake	Bluegill sunfish	16.7	0.06306	2006
Carnegie Lake	Bluegill sunfish	17.9	0.05655	2006
Carnegie Lake	Bluegill sunfish	19	0.10097	2006
Carnegie Lake	white perch	20.8	0.23403	2006
Carnegie Lake	white perch	20.8	0.14171	2006
Carnegie Lake	white perch	21	0.16152	2006
Carnegie Lake	largemouth bass	34.3	0.15636	2006
Carnegie Lake	largemouth bass	38.3	0.11614	2006
Carnegie Lake	largemouth bass	43.3	0.40243	2006
Carnegie Lake	largemouth bass	44.3	0.36529	2006
Carnegie Lake	largemouth bass	49.6	0.51996	2006
Davidson Mill Pond	bluegill	18.1	0.18292	2006
Davidson Mill Pond	bluegill	19	0.0504	2006
Davidson Mill Pond	bluegill	20.3	0.14941	2006
Davidson Mill Pond	chain pickerel	43.5	0.27161	2006
Davidson Mill Pond	chain pickerel	43.9	0.24405	2006
Davidson Mill Pond	chain pickerel	48.3	0.35285	2006
Davidson Mill Pond	American eel	75.2	0.20145	2006
Davidson Mill Pond	American eel	79	0.20049	2006
Davidson Mill Pond	largemouth bass	37.7	0.5091	2006
Davidson Mill Pond	largemouth bass	40.4	0.50194	2006
Davidson Mill Pond	largemouth bass	41.3	0.56886	2006
DeVoe Lake	brown bullhead	30.9	0.07703	2006
DeVoe Lake	brown bullhead	32.5	0.12689	2006
DeVoe Lake	brown bullhead	35.7	0.16058	2006
DeVoe Lake	chain pickerel	45.8	0.26277	2006
DeVoe Lake	chain pickerel	50	0.38873	2006
DeVoe Lake	chain pickerel	50.5	0.50737	2006
Duhernal Lake	bluegill	18.4	0.04042	2006
Duhernal Lake	bluegill	20.2	0.07774	2006
Duhernal Lake	bluegill	22.3	0.16006	2006
Duhernal Lake	brown bullhead	31.6	0.03663	2006
Duhernal Lake	brown bullhead	33.5	0.02588	2006
Duhernal Lake	brown bullhead	34.5	0.05482	2006
Duhernal Lake	largemouth bass	36.4	0.19646	2006
Duhernal Lake	largemouth bass	36.5	0.1712	2006
Duhernal Lake	largemouth bass	39.2	0.2798	2006
Farrington Lake	bluegill	17.2	0.09828	2006
Farrington Lake	bluegill	17.8	0.1512	2006
Farrington Lake	bluegill	18.7	0.11982	2006
Farrington Lake	yellow perch	20.6	0.17985	2006
Farrington Lake	yellow perch	20.7	0.22166	2006
Farrington Lake	yellow perch	25.7	0.41141	2006
Farrington Lake	brown bullhead	29.8	0.03402	2006
Farrington Lake	brown bullhead	34.7	0.04048	2006
Farrington Lake	brown bullhead	36.5	0.01656	2006
Farrington Lake	chain pickerel	43.2	0.19105	2006

Farrington Lake	chain pickerel	45.8	0.20378	2006
Farrington Lake	chain pickerel	48.8	0.48139	2006
Farrington Lake	largemouth bass	39.8	0.51737	2006
Farrington Lake	largemouth bass	41	0.50762	2006
Farrington Lake	largemouth bass	42.3	0.93764	2006
Farrington Lake	largemouth bass	46.3	1.41272	2006
Farrington Lake	largemouth bass	49	0.97277	2006
Lamington River @ Lamington	redbreast sunfish	15.8	0.12666	2006
Lamington River @ Lamington	redbreast sunfish	16.1	0.16744	2006
Lamington River @ Lamington	redbreast sunfish	16.6	0.14858	2006
Lamington River @ Lamington	smallmouth bass	18.6	0.13566	2006
Lamington River @ Lamington	smallmouth bass	20.6	0.18452	2006
Lamington River @ Lamington	smallmouth bass	22	0.12535	2006
Lamington River @ Lamington	brown trout	23.7	0.07503	2006
Lamington River @ Lamington	brown trout	26.1	0.08884	2006
Lamington River @ Lamington	American eel	53.7	0.18808	2006
Lamington River @ Lamington	American eel	60.2	0.39376	2006
Lamington River @ Lamington	American eel	63.2	0.24738	2006
Manalapan Lake	bluegill	18.4	0.04791	2006
Manalapan Lake	bluegill	18.4	0.07113	2006
Manalapan Lake	bluegill	18.6	0.04947	2006
Manalapan Lake	black crappie	21	0.09823	2006
Manalapan Lake	black crappie	21.4	0.10733	2006
Manalapan Lake	black crappie	22.8	0.14389	2006
Manalapan Lake	American eel	49.5	0.07662	2006
Manalapan Lake	American eel	53.4	0.12536	2006
Manalapan Lake	American eel	59.7	0.17554	2006
Manalapan Lake	largemouth bass	38	0.23315	2006
Manalapan Lake	largemouth bass	39.1	0.32996	2006
Manalapan Lake	largemouth bass	40.8	0.40945	2006
New Market Pond	bluegill	16.5	0.06683	2006
New Market Pond	bluegill	17	0.06511	2006
New Market Pond	bluegill	17.3	0.0888	2006
New Market Pond	black crappie	20.6	0.05647	2006
New Market Pond	black crappie	22.5	0.08984	2006
New Market Pond	black crappie	24.1	0.05213	2006
New Market Pond	brown bullhead	33.3	0.02354	2006
New Market Pond	brown bullhead	33.5	0.00063	2006
New Market Pond	American eel	34	0.02819	2006
New Market Pond	brown bullhead	34.5	0.00419	2006
New Market Pond	American eel	46.6	0.04004	2006
New Market Pond	American eel	48.5	0.10651	2006
New Market Pond	common carp	50.7	0.04819	2006
New Market Pond	common carp	52.7	0.05352	2006
New Market Pond	common carp	53	0.03293	2006
New Market Pond	largemouth bass	35.9	0.13736	2006
New Market Pond	largemouth bass	36.8	0.10944	2006
New Market Pond	largemouth bass	41.4	0.26315	2006
Raritan River @ Millstone River	redbreast sunfish	18.2	0.13396	2006
Raritan River @ Millstone River	redbreast sunfish	18.2	0.16323	2006

Raritan River @ Millstone River	redbreast sunfish	19.3	0.10685	2006
Raritan River @ Millstone River	smallmouth bass	30.9	0.29331	2006
Raritan River @ Millstone River	smallmouth bass	31	0.33445	2006
Raritan River @ Millstone River	white catfish	32.6	0.20333	2006
Raritan River @ Millstone River	white catfish	35.7	0.21395	2006
Raritan River @ Millstone River	smallmouth bass	37.3	0.26906	2006
Raritan River @ Millstone River	white catfish	40.1	0.23869	2006
Raritan River @ Millstone River	channel catfish	48.7	0.35862	2006
Raritan River @ Millstone River	channel catfish	53	0.17138	2006
Raritan River @ Millstone River	American eel	57.6	0.10876	2006
Raritan River @ Millstone River	common carp	57.9	0.12682	2006
Raritan River @ Millstone River	common carp	59.7	0.15017	2006
Raritan River @ Millstone River	channel catfish	63.7	0.16402	2006
Raritan River @ Millstone River	common carp	65.9	0.00431	2006
Raritan River @ Millstone River	American eel	70.6	0.24336	2006
Raritan River @ Millstone River	American eel	71	0.29174	2006
Raritan River at Millstone River	largemouth bass	32.4	0.25569	2006
Raritan River at Millstone River	largemouth bass	37.2	0.32619	2006
Raritan River at Millstone River	largemouth bass	43	0.6896	2006
Rosedale Lake in Pennington	bluegill	18.4	0.05062	2006
Rosedale Lake in Pennington	bluegill	18.7	0.06377	2006
Rosedale Lake in Pennington	bluegill	20.2	0.10783	2006
Rosedale Lake in Pennington	black crappie	24.1	0.10195	2006
Rosedale Lake in Pennington	black crappie	25.7	0.11855	2006
Rosedale Lake in Pennington	black crappie	30.8	0.12335	2006
Rosedale Lake in Pennington	common carp	62.2	0.11683	2006
Rosedale Lake in Pennington	common carp	64.1	0.10668	2006
Rosedale Lake in Pennington	common carp	66.8	0.10278	2006
Rosedale Lake in Pennington	largemouth bass	40	0.22114	2006
Rosedale Lake in Pennington	largemouth bass	47.6	0.22991	2006
Rosedale Lake in Pennington	largemouth bass	47.7	0.3298	2006
Round Valley Reservoir	bluegill	21.5	0.11044	2006
Round Valley Reservoir	bluegill	21.9	0.11996	2006
Round Valley Reservoir	bluegill	22	0.09508	2006
Round Valley Reservoir	white catfish	36.8	0.08206	2006
Round Valley Reservoir	white catfish	40	0.0991	2006
Round Valley Reservoir	lake trout	43.9	0.08773	2006
Round Valley Reservoir	channel catfish	50.2	0.11492	2006
Round Valley Reservoir	lake trout	52.2	0.10409	2006
Round Valley Reservoir	lake trout	53.7	0.2057	2006
Round Valley Reservoir	lake trout	54.9	0.12745	2006
Round Valley Reservoir	channel catfish	58.7	0.4599	2006
Round Valley Reservoir	channel catfish	61.8	0.06823	2006
Round Valley Reservoir	lake trout	66.5	0.18896	2006
Round Valley Reservoir	largemouth bass	30.6	0.19463	2006
Round Valley Reservoir	largemouth bass	41.8	0.2981	2006
Round Valley Reservoir	largemouth bass	45.1	0.38514	2006
South Branch Raritan River at Neshanic Station	redbreast sunfish	16.9	0.10381	2006

South Branch Raritan River at Neshanic Station	redbreast sunfish	17.7	0.09302	2006
South Branch Raritan River at Neshanic Station	redbreast sunfish	17.9	0.12138	2006
South Branch Raritan River at Neshanic Station	rock bass	20.4	0.24498	2006
South Branch Raritan River at Neshanic Station	rock bass	20.6	0.16647	2006
South Branch Raritan River at Neshanic Station	rock bass	21.1	0.2056	2006
South Branch Raritan River at Neshanic Station	smallmouth bass	34.9	0.31523	2006
South Branch Raritan River at Neshanic Station	common carp	37.2	0.05298	2006
South Branch Raritan River at Neshanic Station	smallmouth bass	41.1	0.38035	2006
South Branch Raritan River at Neshanic Station	common carp	42.7	0.05706	2006
South Branch Raritan River at Neshanic Station	common carp	46.1	0.04491	2006
South Branch Raritan River at Neshanic Station	smallmouth bass	49.9	0.39461	2006
South Branch Raritan River at Neshanic Station	American eel	63	0.29096	2006
South Branch Raritan River at Neshanic Station	American eel	69.9	0.22739	2006
South Branch Raritan River at Neshanic Station	American eel	72.5	0.25548	2006
South Branch Raritan River at Neshanic Station	largemouth bass	20	0.18969	2006
South Branch Raritan River at Neshanic Station	largemouth bass	21.3	0.17653	2006
South Branch Raritan River at Neshanic Station	largemouth bass	26.9	0.1382	2006
Spring Lake	common carp	48.3	0.04448	2006
Spring Lake	common carp	54.5	0.00202	2006
Spring Lake	common carp	64.6	0.0799	2006
Spruce Run Reservoir	channel catfish	41	0.06091	2006
Spruce Run Reservoir	striped x white bass hybrid	42.4	0.14346	2006
Spruce Run Reservoir	striped x white bass hybrid	48	0.18523	2006
Spruce Run Reservoir	striped x white bass hybrid	49.2	0.22875	2006
Spruce Run Reservoir	striped x white bass hybrid	53.6	0.39913	2006
Spruce Run Reservoir	striped x white bass hybrid	54.3	0.51704	2006
Spruce Run Reservoir	channel catfish	55.6	0.22611	2006
Spruce Run Reservoir	channel catfish	56.3	0.32477	2006
Spruce Run Reservoir	common carp	57.8	0.12598	2006
Spruce Run Reservoir	common carp	58.1	0.12418	2006
Spruce Run Reservoir	common carp	58.3	0.13401	2006
Spruce Run Reservoir	northern pike	65.5	0.31375	2006

Spruce Run Reservoir	northern pike	68.5	0.24939	2006
Spruce Run Reservoir	northern pike	76.8	0.20958	2006
Spruce Run Reservoir	largemouth bass	28.7	0.17957	2006
Spruce Run Reservoir	largemouth bass	35.8	0.17422	2006
Spruce Run Reservoir	largemouth bass	39.8	0.43026	2006
Spruce Run Reservoir	largemouth bass	42.9	0.44294	2006
Spruce Run Reservoir	largemouth bass	47.3	0.60489	2006
Weston Mill Pond	bluegill	17.7	0.06793	2006
Weston Mill Pond	bluegill	18.6	0.11264	2006
Weston Mill Pond	bluegill	18.9	0.2196	2006
Weston Mill Pond	yellow perch	25.3	0.27386	2006
Weston Mill Pond	black crappie	25.8	0.19928	2006
Weston Mill Pond	yellow perch	26.3	0.14497	2006
Weston Mill Pond	black crappie	26.9	0.28312	2006
Weston Mill Pond	black crappie	26.9	0.22769	2006
Weston Mill Pond	brown bullhead	27.1	0.01612	2006
Weston Mill Pond	brown bullhead	28.2	0.05252	2006
Weston Mill Pond	yellow perch	29.3	0.39874	2006
Weston Mill Pond	brown bullhead	35.7	0.0256	2006
Weston Mill Pond	chain pickerel	38.9	0.16182	2006
Weston Mill Pond	chain pickerel	45.9	0.28877	2006
Weston Mill Pond	chain pickerel	48	0.48049	2006
Weston Mill Pond	American eel	49.8	0.10278	2006
Weston Mill Pond	American eel	50.2	0.11332	2006
Weston Mill Pond	American eel	55.1	0.13674	2006
Weston Mill Pond	largemouth bass	38	0.52104	2006
Weston Mill Pond	largemouth bass	38.1	0.41189	2006
Weston Mill Pond	largemouth bass	39.5	0.46808	2006
Atsion Lake	American eel	31.2	0.33	2007
Atsion Lake	American eel	32.1	0.27	2007
Atsion Lake	American eel	51.7	0.52	2007
Atsion Lake	chain pickerel	33.2	0.47	2007
Atsion Lake	chain pickerel	39.6	0.69	2007
Atsion Lake	chain pickerel	44.7	0.82	2007
Batsto Lake	brown bullhead	32.9	0.29	2007
Batsto Lake	brown bullhead	33.4	0.22	2007
Batsto Lake	brown bullhead	36.18	0.16	2007
Batsto Lake	chain pickerel	23.7	0.30	2007
Batsto Lake	chain pickerel	35	0.78	2007
Batsto Lake	chain pickerel	35.5	0.85	2007
Batsto Lake	chain pickerel	35.9	0.44	2007
Batsto Lake	largemouth bass	35.5	1.25	2007
Batsto Lake	largemouth bass	35.6	1.07	2007
Batsto Lake	largemouth bass	36.7	0.85	2007
Batsto Lake	largemouth bass	37.2	0.10	2007
Cedar Lake	American eel	48.7	0.16	2007
Cedar Lake	American eel	54.2	0.18	2007
Cedar Lake	American eel	63.9	0.22	2007
Cedar Lake	largemouth bass	32.8	0.18	2007
Cedar Lake	largemouth bass	38.8	0.31	2007

Cedar Lake	largemouth bass	47	1.63	2007
Cedar Lake	white perch	30.7	0.33	2007
Cedar Lake	white perch	31.8	0.22	2007
Cedar Lake	white perch	37.4	0.51	2007
Cedarville Ponds	chain pickerel	30.6	0.65	2007
Cedarville Ponds	chain pickerel	32.5	0.46	2007
Cedarville Ponds	chain pickerel	34.4	0.53	2007
Cedarville Ponds	chain pickerel	35.4	0.54	2007
Cedarville Ponds	chain pickerel	43.1	0.69	2007
Cedarville Ponds	yellow perch	28	0.31	2007
Cedarville Ponds	yellow perch	28.8	0.33	2007
Cedarville Ponds	yellow perch	29.8	0.35	2007
Deal Lake	American eel	31	0.30	2007
Deal Lake	American eel	60	0.05	2007
Deal Lake	largemouth bass	38	0.09	2007
Deal Lake	largemouth bass	39.8	0.12	2007
Deal Lake	largemouth bass	40.2	0.14	2007
Deal Lake	white perch	16.3	0.02	2007
Deal Lake	white perch	18.1	0.04	2007
Deal Lake	white perch	20.2	0.18	2007
East Creek Lake	American eel	43.2	1.05	2007
East Creek Lake	American eel	51.8	1.02	2007
East Creek Lake	American eel	53.9	1.24	2007
East Creek Lake	chain pickerel	33.6	1.14	2007
East Creek Lake	chain pickerel	41.1	1.46	2007
East Creek Lake	chain pickerel	42.9	1.05	2007
East Creek Lake	largemouth bass	30.5	1.05	2007
East Creek Lake	largemouth bass	39.4	1.40	2007
East Creek Lake	largemouth bass	44.6	1.37	2007
Harrisville Lake	American eel	27.4	0.47	2007
Harrisville Lake	American eel	40.5	0.58	2007
Harrisville Lake	American eel	54.1	0.73	2007
Harrisville Lake	chain pickerel	27.6	1.05	2007
Harrisville Lake	chain pickerel	29.4	0.61	2007
Harrisville Lake	chain pickerel	30.4	0.91	2007
Harrisville Lake	chain pickerel	31.3	1.05	2007
Lake Absegami	American eel	31.6	0.36	2007
Lake Absegami	American eel	32.7	0.29	2007
Lake Absegami	American eel	47.5	0.80	2007
Lake Absegami	chain pickerel	35.3	1.32	2007
Lake Absegami	chain pickerel	35.4	1.26	2007
Lake Absegami	chain pickerel	43.5	1.24	2007
Lake Absegami	chain pickerel	47.6	1.62	2007
Lake Absegami	chain pickerel	58.7	1.39	2007
Lake Manahawkin	American eel	46.3	1.50	2007
Lake Manahawkin	American eel	56.1	1.43	2007
Lake Manahawkin	American eel	79.6	1.89	2007
Lake Manahawkin	largemouth bass	33.6	1.08	2007
Lake Manahawkin	largemouth bass	35.2	0.93	2007

Lake Manahawkin	largemouth bass	45.1	1.76	2007
Lake Nummy	yellow bullhead	29.2	0.44	2007
Lake Nummy	yellow bullhead	29.7	0.26	2007
Lake Nummy	yellow bullhead	33.4	0.79	2007
Lake Nummy	chain pickerel	46.2	1.07	2007
Lake Nummy	chain pickerel	56	2.56	2007
Lake Oswego	American eel	49.6	0.70	2007
Lake Oswego	American eel	60.5	0.46	2007
Lake Oswego	chain pickerel	26.6	0.82	2007
Lake Oswego	chain pickerel	27.7	0.76	2007
Lake Oswego	chain pickerel	42.1	0.42	2007
Lake Oswego	chain pickerel	46.8	2.05	2007
Lefferts Lake	brown bullhead	27.8	0.07	2007
Lefferts Lake	brown bullhead	28.8	0.10	2007
Lefferts Lake	brown bullhead	29.1	0.10	2007
Lefferts Lake	chain pickerel	43.9	0.11	2007
Lefferts Lake	chain pickerel	44.7	0.19	2007
Lefferts Lake	chain pickerel	46.7	0.21	2007
Lefferts Lake	yellow perch	23.8	0.10	2007
Lefferts Lake	yellow perch	24.4	0.12	2007
Lefferts Lake	yellow perch	25.3	0.09	2007
Lenape Lake	American eel	53	0.42	2007
Lenape Lake	American eel	58.7	1.06	2007
Lenape Lake	American eel	62.4	0.89	2007
Lenape Lake	largemouth bass	40	1.60	2007
Lenape Lake	largemouth bass	44.6	1.04	2007
Lenape Lake	largemouth bass	45.9	1.61	2007
Manasquan Reservoir	American eel	54.2	0.08	2007
Manasquan Reservoir	American eel	58	0.05	2007
Manasquan Reservoir	American eel	82.4	0.17	2007
Manasquan Reservoir	largemouth bass	40.1	0.10	2007
Manasquan Reservoir	largemouth bass	44.5	0.21	2007
Manasquan Reservoir	largemouth bass	49.2	0.40	2007
Maple Lake	American eel	44.1	0.81	2007
Maple Lake	American eel	48.6	0.81	2007
Maple Lake	American eel	53.6	1.02	2007
Maple Lake	largemouth bass	33.1	0.43	2007
Maple Lake	largemouth bass	33.7	0.84	2007
Maple Lake	largemouth bass	34.7	0.86	2007
Maple Lake	largemouth bass	38	1.48	2007
Marlu Lake	common carp	64.4	0.04	2007
Marlu Lake	common carp	66.6	0.04	2007
Marlu Lake	common carp	67.9	0.04	2007
Marlu Lake	largemouth bass	34.5	0.08	2007
Marlu Lake	largemouth bass	41.4	0.09	2007
Marlu Lake	largemouth bass	44.2	0.14	2007
Parvin Lake	American eel	63.1	0.12	2007
Parvin Lake	American eel	64.9	0.12	2007
Parvin Lake	chain pickerel	45.7	0.24	2007
Parvin Lake	chain pickerel	47.7	0.21	2007

Parvin Lake	chain pickerel	51.4	0.19	2007
Parvin Lake	largemouth bass	35.9	0.16	2007
Parvin Lake	largemouth bass	39.5	0.21	2007
Parvin Lake	largemouth bass	43.3	0.26	2007
Parvin Lake	largemouth bass	44.6	0.19	2007
Parvin Lake	largemouth bass	49	0.27	2007
Pohatcong Lake	American eel	44.3	0.44	2007
Pohatcong Lake	American eel	45.3	0.95	2007
Pohatcong Lake	American eel	66.2	0.72	2007
Pohatcong Lake	largemouth bass	41.7	0.78	2007
Pohatcong Lake	largemouth bass	41.7	0.69	2007
Pohatcong Lake	largemouth bass	42.7	0.61	2007
Pohatcong Lake	largemouth bass	43	0.64	2007
Pohatcong Lake	yellow perch	26.5	0.14	2007
Pohatcong Lake	yellow perch	31.2	0.36	2007
Pohatcong Lake	yellow perch	34.6	0.83	2007
Shenandoah Lake	American eel	46.8	0.42	2007
Shenandoah Lake	American eel	47.9	0.24	2007
Shenandoah Lake	American eel	75.5	0.42	2007
Shenandoah Lake	chain pickerel	35.3	0.34	2007
Shenandoah Lake	chain pickerel	41.2	0.23	2007
Shenandoah Lake	chain pickerel	41.4	0.32	2007
Shenandoah Lake	largemouth bass	40.5	0.37	2007
Shenandoah Lake	largemouth bass	41.6	0.46	2007
Shenandoah Lake	largemouth bass	43.2	0.65	2007
Swimming River Reservoir	American eel	42.2	0.04	2007
Swimming River Reservoir	American eel	66.1	0.07	2007
Swimming River Reservoir	American eel	68.9	0.08	2007
Swimming River Reservoir	largemouth bass	40	0.09	2007
Swimming River Reservoir	largemouth bass	42.7	0.09	2007
Swimming River Reservoir	largemouth bass	50.1	0.15	2007
Wading River	chain pickerel	36.3	2.60	2007
Wading River	chain pickerel	37.5	2.63	2007
Wading River	chain pickerel	40.7	2.03	2007
Wilson Lake	chain pickerel	34.7	1.58	2007
Wilson Lake	chain pickerel	37	1.36	2007
Wilson Lake	chain pickerel	54.7	2.02	2007
Wilson Lake	largemouth bass	35.4	1.53	2007
Wilson Lake	largemouth bass	38.9	1.63	2007
Wilson Lake	largemouth bass	40.9	3.27	2007
Wilson Lake	yellow perch	28	1.25	2007
Wilson Lake	yellow perch	28	1.46	2007
Wilson Lake	yellow perch	30	0.87	2007

Appendix C

Non-Tidal Surface Water NJPDES Facility List to Quantify Potential Hg Load

NJPDES Permit Number	Facility Name	Permitted Flow	Description
NJ0000876	HERCULES INC - KENVIL	0.7	Industrial
NJ0020036	DEPT OF VETERANS AFFAIRS	0.08	Municipal minor
NJ0020184	NEWTOWN WASTEWATER TREATMENT PLANT	1.4	Municipal major
NJ0020206	ALLENTOWN BORO WWTP	0.238	Municipal minor
NJ0020281	CHATHAM HILL STP	0.03	Municipal minor
NJ0020290	CHATHAM TWP MAIN STP	1	Municipal minor
NJ0020354	BRANCHBURG NESHANIC STP	0.055	Municipal minor
NJ0020389	CLINTON TOWN WWTP	2.03	Municipal major
NJ0020419	LONG POND SCHOOL WTP	0.01	Municipal minor
NJ0020427	CALDWELL WASTEWATER TREATMENT PLANT	4.5	Municipal major
NJ0020532	HARRISON TOWNSHIP TREATMENT PLANT	0.8	Municipal minor
NJ0020605	ALLAMUCHY SEWERAGE TREATMENT PLANT	0.6	Municipal minor
NJ0020711	WARREN CO TECHNICAL SCHOOL STP	0.012	Municipal minor
NJ0021083	VETERANS AFFAIRS NJ HEALTH CARE SYSTEM-LYONS	0.4	Municipal minor
NJ0021091	JEFFERSON TWP HIGH-MIDDLE SCHOOL	0.0275	Municipal minor
NJ0021105	ARTHUR STANLICK SCHOOL	0.013	Municipal minor
NJ0021113	WASHINGTON BORO WWTP	1.5	Municipal major
NJ0021253	INDIAN HILLS HIGH SCHOOL	0.0336	Municipal minor
NJ0021326	MEDFORD LAKES BOROUGH STP	0.55	Municipal minor
NJ0021334	MENDHAM BORO	0.45	Municipal minor
NJ0021342	SKYVIEW/HIBROOK WTP	0.023	Municipal minor
NJ0021369	HACKETTSTOWN MUA	3.48	Municipal major
NJ0021571	SPRINGFIELD TWP ELEM SCH STP	0.0075	Municipal minor
NJ0021636	NEW PROVIDENCE WWTP	1.5	Municipal major
NJ0021717	BUENA BOROUGH MUA	0.4	Municipal major
NJ0021865	FIDDLER'S ELBOW CTRY CLUB WWTP	0.03	Municipal minor
NJ0021890	MILFORD SEWER UTILITY	0.4	Municipal minor
NJ0021954	CLOVERHILL STP	0.5	Municipal minor
NJ0022047	RARITAN TOWNSHIP MUA STP	3.8	Municipal major
NJ0022063	SUSSEX COUNTY HOMESTEAD WTP	0.05	Municipal minor
NJ0022101	BLAIR ACADEMY	0.05	Municipal minor
NJ0022110	EDUCATIONAL TESTING SERVICE	0.08	Municipal minor
NJ0022144	HAGEDORN PSYCHIATRIC HOSPITAL	0.052	Municipal minor
NJ0022250	WOODSTOWN WASTEWATER TREATMENT PLANT	0.53	Municipal minor
NJ0022276	STONYBROOK SCHOOL	0.01	Municipal minor
NJ0022349	ROCKAWAY VALLEY REG SA	12	Municipal major
NJ0022381	NORTHERN BURLINGTON COUNTY	0.0135	Municipal minor
NJ0022390	NPDC SEWAGE TREATMENT PLANT	0.5	Municipal minor
NJ0022438	HELEN A FORT MIDDLE SCHOOL	0.05	Municipal minor

NJ0022489	WARREN TWP SEWERAGE AUTH STAGE I-II STP	0.47	Municipal minor
NJ0022497	WARREN STAGE IV STP	0.8	Municipal minor
NJ0022586	MARLBORO PSYCHIATRIC HOSP STP	1	Municipal major
NJ0022675	ROXBURY TOWNSHIP	2	Municipal major
NJ0022764	RIVER ROAD STP	0.1172	Municipal minor
NJ0022781	POTTERSVILLE STP	0.048	Municipal minor
NJ0022845	HARRISON BROOK STP	2.5	Municipal major
NJ0022918	ROOSEVELT BORO WTP	0.25	Municipal minor
NJ0022985	WRIGHTSTOWN BOROUGH STP	0.337	Municipal minor
NJ0023001	SALVATION ARMY CAMP TECUMSEH	0.018	Municipal minor
NJ0023124	MONTGOMERY HIGH SCHOOL STP	0.035	Municipal minor
NJ0023175	ROUND VALLEY MIDDLE SCHOOL	0.009	Municipal minor
NJ0023311	KINGWOOD TWP SCHOOL	0.0048	Municipal minor
NJ0023493	WASHINGTON TOWNSHIP MUA WTP	0.5	Municipal minor
NJ0023540	NAVAL WEAPONS STATION EARLE	0.37	Municipal minor
NJ0023663	CARRIER FOUNDATION WTP	0.04	Municipal minor
NJ0023698	POMPTON LAKES BORO MUA	1.2	Municipal major
NJ0023728	PINE BROOK STP	8.8	Municipal major
NJ0023736	PINELANDS WASTEWATER COMPANY	0.5	Municipal minor
NJ0023787	EAST WINDSOR WATER POLLUTION CONTROL PLANT	4.5	Municipal major
NJ0023841	LOUNSBERRY HOLLOW MIDDLE SCH STP	0.032	Municipal minor
NJ0023949	LEGENDS RESORT & COUNTRY CLUB	0.35	Municipal minor
NJ0024031	ELMWOOD WTP	2.978	Municipal major
NJ0024040	WOODSTREAM STP	1.7	Municipal major
NJ0024091	UNION TWP ELEMENTARY SCHOOL	0.011	Municipal minor
NJ0024104	UNITED WATER PRINCETON MEADOWS	1.64	Municipal major
NJ0024163	BIG `N` SHOPPING CENTER STP	0.02	Municipal minor
NJ0024414	WEST MILFORD SHOPPING CENTER STP	0.02	Municipal minor
NJ0024457	OUR LADY OF THE MAGNIFICAT	0.0012	Municipal minor
NJ0024465	LONG HILL TOWNSHIP OF STP	0.9	Municipal minor
NJ0024490	VERONA TWP WTP	4.1	Municipal major
NJ0024511	LIVINGSTON WATER POLLUTION CONTROL FACILITY	4.6	Municipal major
NJ0024716	PHILLIPSBURG TOWN STP	3.5	Municipal major
NJ0024759	EWING-LAWRENCE SA WTP	16	Municipal major
NJ0024791	RIDGEWOOD VILLAGE WPC FACILITY	5	Municipal major
NJ0024813	NORTHWEST BERGEN CNTY UA	16.8	Municipal major
NJ0024821	PEMBERTON TOWNSHIP MUA STP	2.5	Municipal major
NJ0024864	SOMERSET RARITAN VALLEY SA	21.3	Municipal major
NJ0024902	HANOVER SEWERAGE AUTHORITY	4.61	Municipal major
NJ0024911	BUTTERWORTH WATER POLLUTION CONTROL UTILITY	3.3	Municipal major
NJ0024929	WOODLAND WATER POLLUTION CONTROL UTILITY(WPCU	2	Municipal major
NJ0024937	MOLITOR WATER POLLUTION CONTROL FACILITY	5	Municipal major
NJ0024970	PARSIPPANY TROY HILLS	16	Municipal major
NJ0025160	HAMMONTON WTPF	1.6	Municipal major
NJ0025330	CEDAR GROVE STP	2	Municipal major

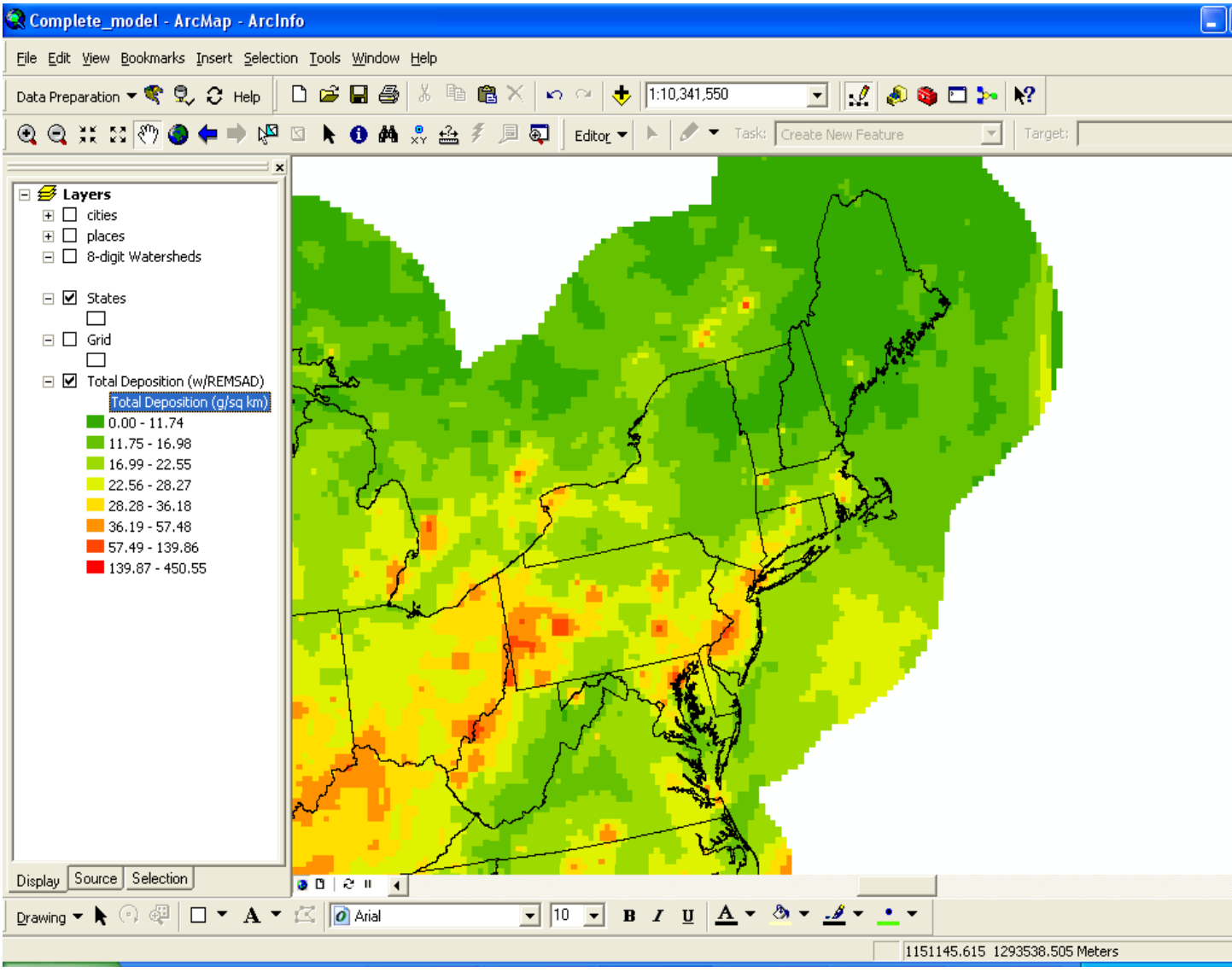
NJ0025496	MORRISTOWN SEWER UTILITY	6.3	Municipal major
NJ0025518	FLORHAM PARK SEWERAGE AUTH	1.4	Municipal major
NJ0026174	CRESCENT PARK STP	0.064	Municipal minor
NJ0026387	BERNARDSVILLE STP	0.8	Municipal minor
NJ0026689	GREYSTONE PARK PSYCH HOSPITAL	0.4	Municipal minor
NJ0026697	READINGTON TWP PUBLIC SCHOOL	0.017	Municipal minor
NJ0026719	ALBERT C WAGNER YOUTH CORRECTIONAL FACILITY	1.3	Municipal minor
NJ0026727	COLORADO CAFE WTP	0.0175	Municipal minor
NJ0026824	CHESTER SHOPPING CENTER	0.011	Municipal minor
NJ0026832	MEDFORD TWP WASTEWATER TREATMENT PLANT	1.75	Municipal major
NJ0026867	WHITE ROCK STP	0.1295	Municipal minor
NJ0026891	BURNT HILL TREATMENT PLANT #1	0.0153	Municipal minor
NJ0026905	STAGE II TREATMENT PLANT	0.48	Municipal minor
NJ0027006	RINGWOOD ACRES TREATMENT PLANT	0.036	Municipal minor
NJ0027031	HOLMDEL BD OF ED VILLAGE SCHOOL STP	0.01	Municipal minor
NJ0027049	POPE JOHN XXIII HIGH SCH WTP	0.022	Municipal minor
NJ0027057	SPARTA PLAZA WTP	0.05	Municipal minor
NJ0027065	SPARTA ALPINE SCHOOL	0.025	Municipal minor
NJ0027227	TRUMP NATIONAL GOLF COURSE	0.0005	Municipal minor
NJ0027464	HANOVER MOBILE VILLAGE ASSOC	0.02	Municipal minor
NJ0027511	CALIFORNIA VILLAGE SEWER PLANT	0.032	Municipal minor
NJ0027529	CAREONE @HOLMDEL	0.025	Municipal minor
NJ0027553	LESTER D. WILSON ELEM SCHOOL	0.0075	Municipal minor
NJ0027561	DELAWARE TOWNSHIP MUA	0.065	Municipal minor
NJ0027596	SPARTAN VILLAGE MOBILE HOME PK	0.038	Municipal minor
NJ0027669	AWOSTING STP	0.045	Municipal minor
NJ0027677	OLDE MILFORD ESTATES STP	0.172	Municipal minor
NJ0027685	HIGHVIEW ACRES STP	0.2	Municipal minor
NJ0027715	MERCER CO CORRECTION CTR STP	0.09	Municipal minor
NJ0027731	PRINCETON HEALTHCARE SYSTEM	0.296	Industrial
NJ0027774	OAKWOOD KNOLLS WWTP	0.035	Municipal minor
NJ0027821	MUSCONETCONG SEWERAGE AUTHORITY	5.79	Municipal major
NJ0027961	BERKELEY HEIGHTS WPCF	3.1	Municipal major
NJ0028002	MOUNTAIN VIEW STP	13.5	Municipal major
NJ0028304	QUALITY INN OF LEDGEWOOD	0.04	Municipal minor
NJ0028436	RARITAN TWP MUA-FLEMINGTON	2.35	Municipal major
NJ0028479	NJ TRAINING SCHOOL FOR BOYS	0.15	Municipal minor
NJ0028487	MOUNTAINVIEW CORRECTIONAL INSTITUTION	0.26	Municipal minor
NJ0028541	BIRCH HILL PARK STP	0.02	Municipal minor
NJ0028665	MOBILE ESTATES OF SOUTHAMPTON INC	0.06	Municipal minor
NJ0028894	KITTATINNY REG HS BD OF ED	0.045	Municipal minor
NJ0029041	REGENCY @ SUSSEX APT	0.08	Municipal minor
NJ0029386	TWO BRIDGES WASTEWATER TREATMENT PLANT	10	Municipal major
NJ0029432	ROBERT ERSKINE SCHOOL STP	0.008	Municipal minor
NJ0029475	HIGHTSTOWN BORO AWWTP	1	Municipal major

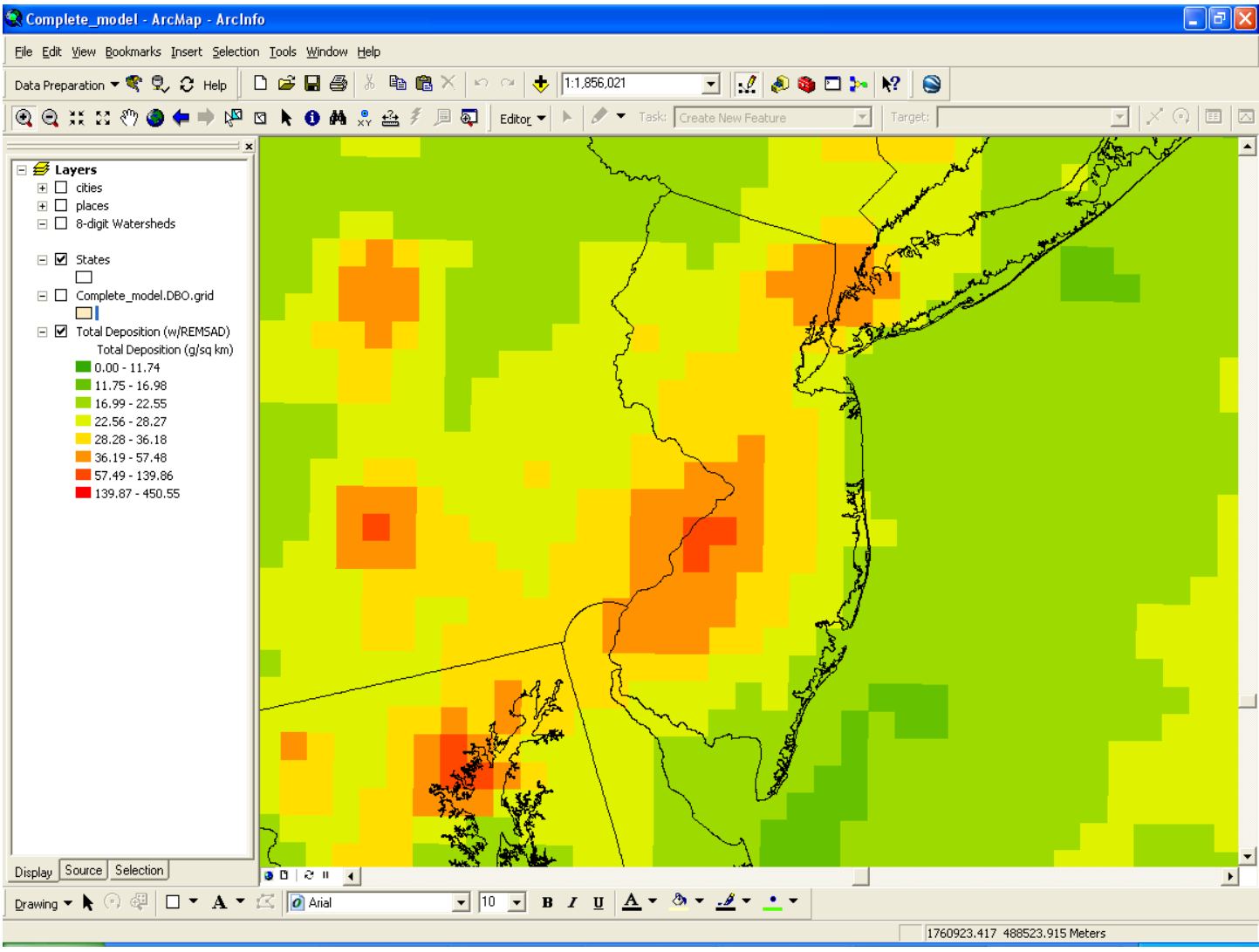
NJ0029831	FRENCHTOWN WASTEWATER TREATMENT PLANT	0.15	Municipal minor
NJ0029858	OAKLAND CARE CENTER INC	0.03	Municipal minor
NJ0031046	NORTH WARREN REG SCH DIST WTF	0.02	Municipal minor
NJ0031119	STONY BROOK RSA- RIVER ROAD STP	13.06	Municipal major
NJ0031585	HIGH POINT REGIONAL HS	0.03	Municipal minor
NJ0031615	CAMDEN COUNTY VOC & TECH SCHOOL	0.058	Municipal minor
NJ0031674	REMINGTON'S RESTAURANT	0.028	Municipal minor
NJ0031771	COLTS NECK INN HOTEL	0.006	Municipal minor
NJ0032395	RINGWOOD PLAZA STP	0.01168	Municipal minor
NJ0033995	ENVIRONMENTAL DISPOSAL CORP	2.1	Municipal major
NJ0035084	EXXONMOBIL RESEARCH & ENGINEERING CO	0.22	Industrial
NJ0035114	BELVIDERE AREA WWTF	0.5	Municipal minor
NJ0035301	STONY BROOK RGNL SEWERAGE AUTH	0.3	Municipal minor
NJ0035319	STONY BROOK RSA	0.3	Municipal minor
NJ0035483	OXFORD AREA WTF	0.5	Municipal minor
NJ0035670	ALEXANDRIA MIDDLE SCHOOL	0.011	Municipal minor
NJ0035718	HOLMDEL WASTEWATER TREATMENT FACILITY	0.04	Municipal minor
NJ0050130	RIVERSIDE FARMS STP	0.145	Municipal minor
NJ0050369	WARREN STAGE V STP	0.38	Municipal minor
NJ0050580	HAMPTON COMMONS WASTEWATER FACILITY	0.05	Municipal minor
NJ0052256	CHATHAM GLEN STP	0.155	Municipal minor
NJ0053112	CHAPEL HILL ESTATES STP	0.01	Municipal minor
NJ0053350	SUSSEX CNTY MUA UPPER WALLKILL FACILITY	3	Municipal major
NJ0053759	WANAQUE VALLEY REGIONAL SEWERAGE AUTHORITY	1.25	Municipal major
NJ0055395	BURLINGTON CNTY RESOURCE RECOVERY COMPLEX	2.075	Industrial
NJ0060038	PIKE BROOK STP	0.67	Municipal minor
NJ0067733	OXBRIDGE WASTEWATER TREATMENT PLANT	0.16	Municipal minor
NJ0069523	CHERRY VALLEY STP	0.286	Municipal minor
NJ0080811	RAMAPO RIVER RESERVE WWTP	0.1137	Municipal minor
NJ0098663	HOMESTEAD TREATMENT UTILITY	0.25	Municipal minor
NJ0098922	READINGTON-LEBANON SA	0.8	Municipal minor
NJ0100528	GLEN MEADOWS/TWIN OAKS STP	0.025	Municipal minor
NJ0102270	EVOINK DEGUSSA CORP	0.015	Industrial
NJ0102563	ROUTE 78 OFFICE AREA WWTF	0.09653	Municipal minor
NJ0109061	LONG VALLEY VILLAGE WTP	0.244	Municipal minor
NJ0136603	MORRIS LAKE WTP	0.2	Municipal minor
NJG0005134	HERCULES GROUNDWATER TREATMT AT GEO SPEC CHEM	0.432	Industrial

Footnote: TMDL Section 4.0 - Source Assessment describes list construction.

Appendix D

Mercury Air Deposition Load for New Jersey (provided by Mr. Dwight Atkinson of EPA)

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Target:
Layers
cities
places
8-digit Watersheds
States
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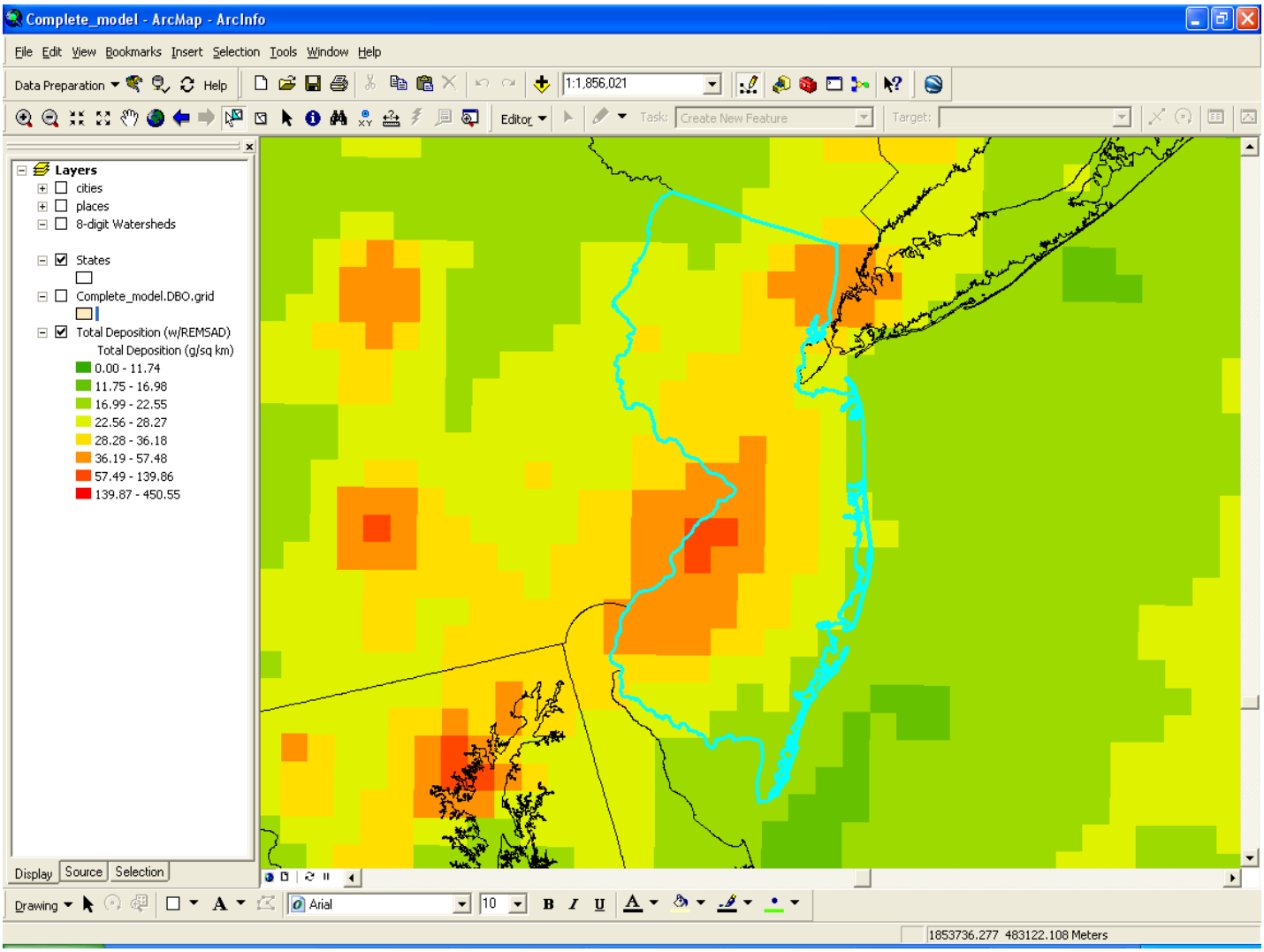
Total Deposition (w/REMSAD)
Total Deposition (g/sq km)
0.00 - 11.74
11.75 - 16.98
16.99 - 22.55
22.56 - 28.27
28.28 - 36.18
36.19 - 57.48
57.49 - 139.86
139.87 - 450.55
Display
Source
Selection
Drawing
Arial
10
1760923.417 488523.915 Meters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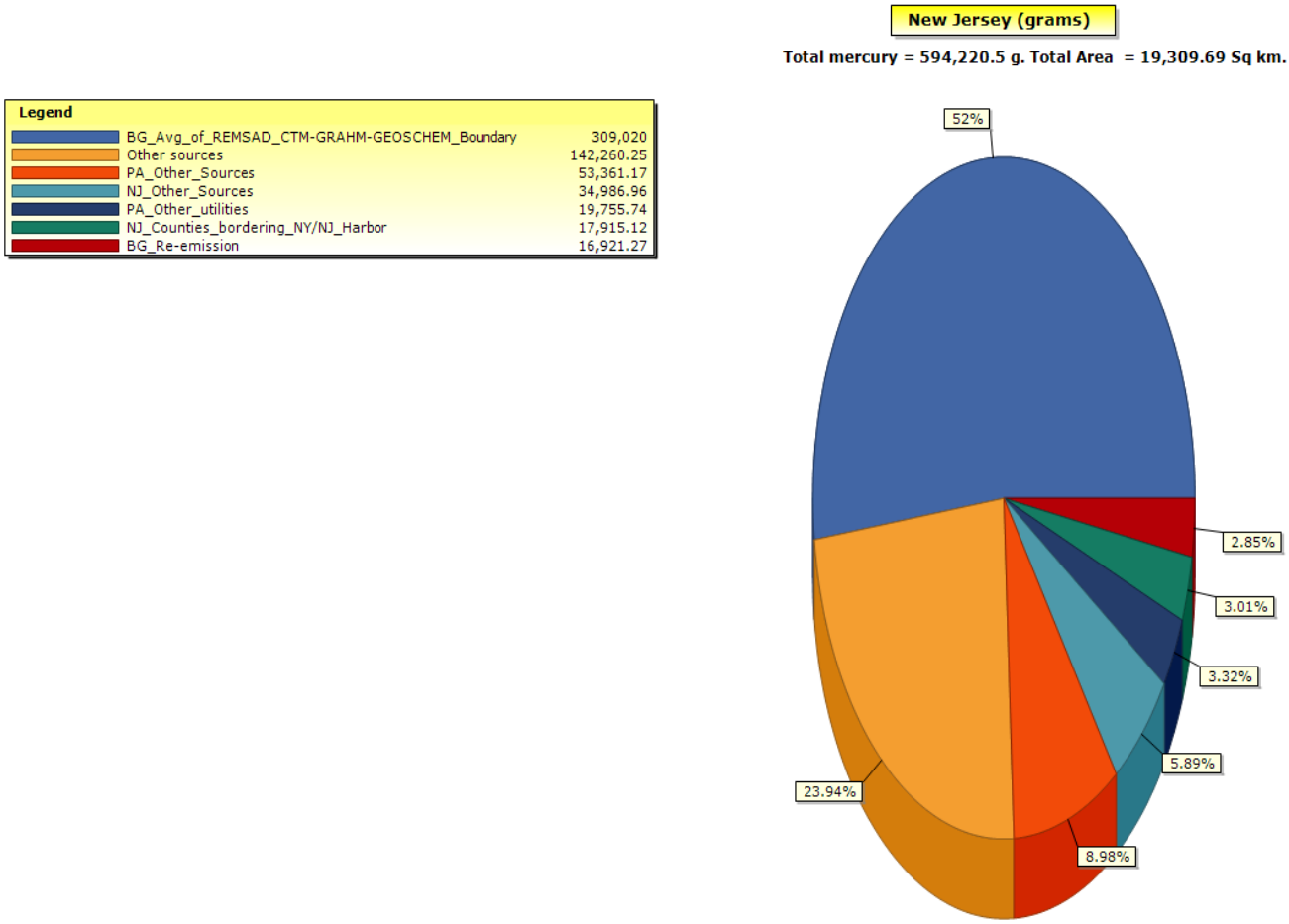
Task:
Create New Feature
Target:
Layers
cities
places
8-digit Watersheds
States
Complete_model.DBO.grid
Total Deposition (w/REMSAD)
Total Deposition (g/sq km)
0.00 - 11.74
11.75 - 16.98
16.99 - 22.55
22.56 - 28.27
28.28 - 36.18
36.19 - 57.48
57.49 - 139.86
139.87 - 450.55
Display
Source
Selection
Drawing
Arial
10
1853736.277 483122.108 Meters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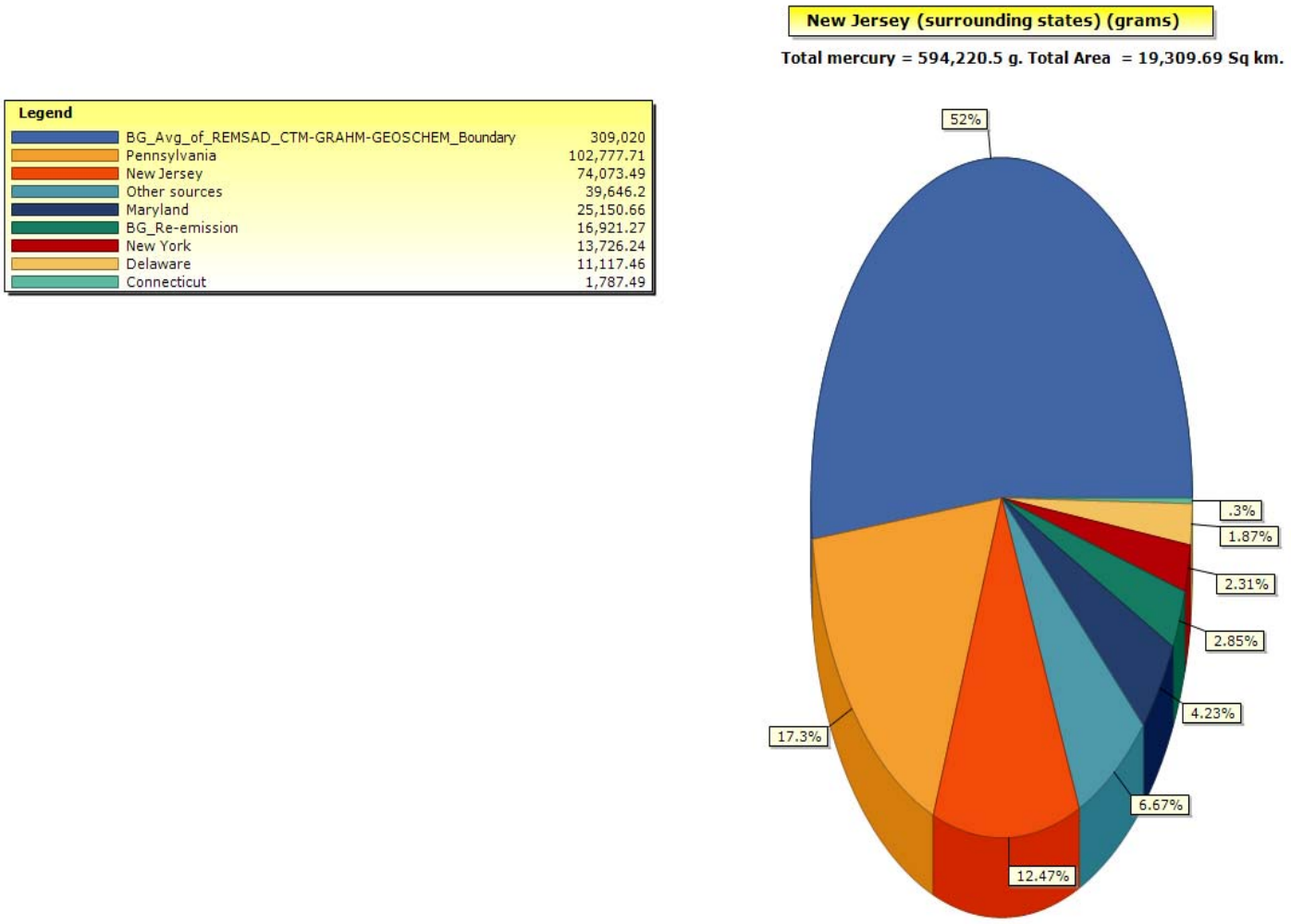
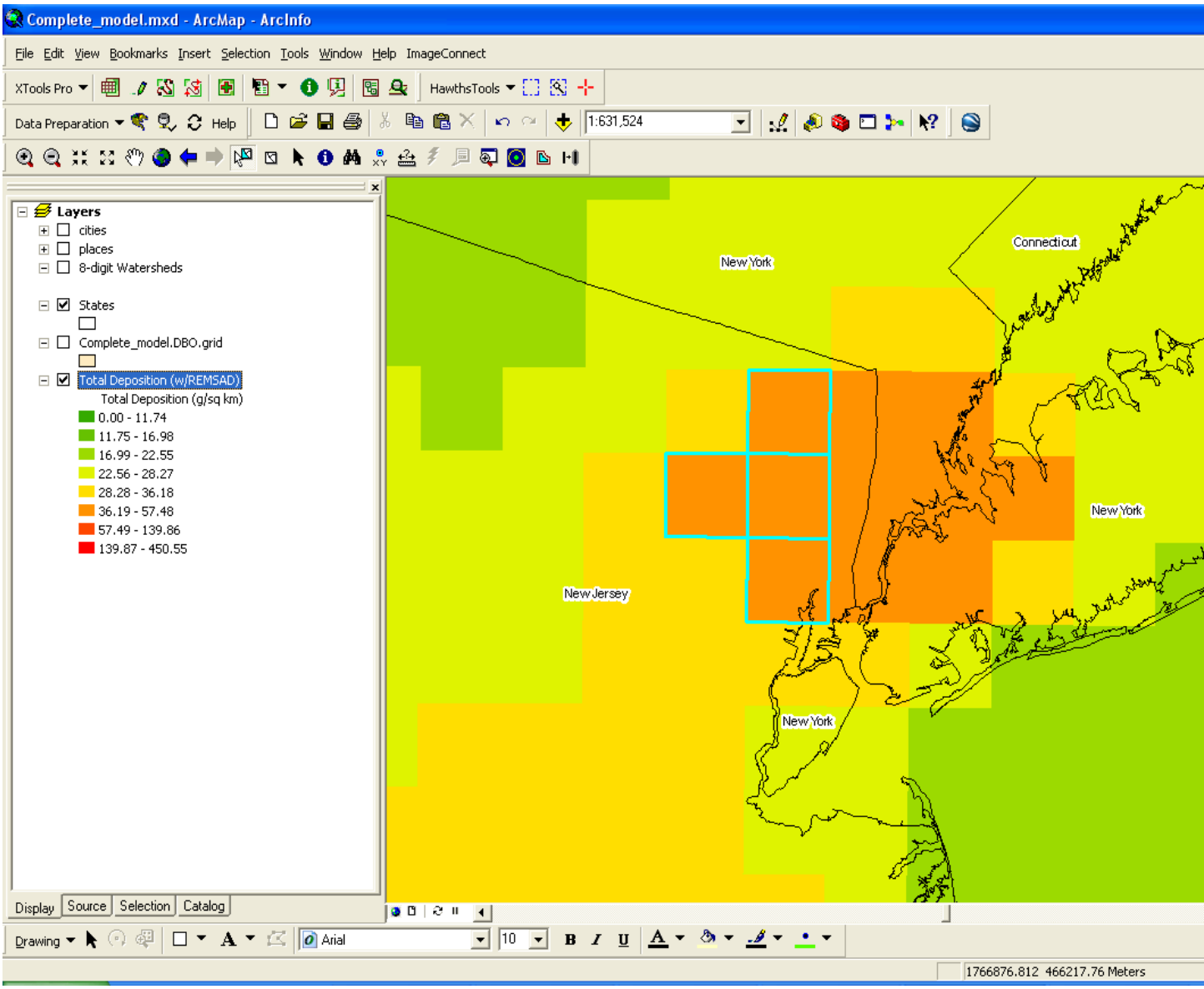
Other sources 142,260.25
PA_Other_Sources 53,361.17
NJ_Other_Sources 34,986.96
PA_Other_utilities 19,755.74
NJ_Counties_bordering_NY/NJ_Harbor 17,915.12
BG_Re-emission 16,921.27
New Jersey (grams)
Total mercury = 594,220.5 g. Total Area = 19,309.69 Sq km.
52%
2.85%
3.01%
3.32%
5.89%
23.94%
8.98%


New Jersey (surrounding states) (grams)
Total mercury = 594,220.5 g. Total Area = 19,309.69 Sq km.
Legend
BG_Avg_of_REMSAD_CTM-GRAHM-GEOSCHEM_Boundary 309,020
Pennsylvania 102,777.71
New Jersey 74,073.49
Other sources 39,646.2
Maryland 25,150.66
BG_Re-emission 16,921.27
New York 13,726.24
Delaware 11,117.46
Connecticut 1,787.49
52%
.3%
1.87%
2.31%
2.85%
4.23%
6.67%
12.47%
17.3%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States
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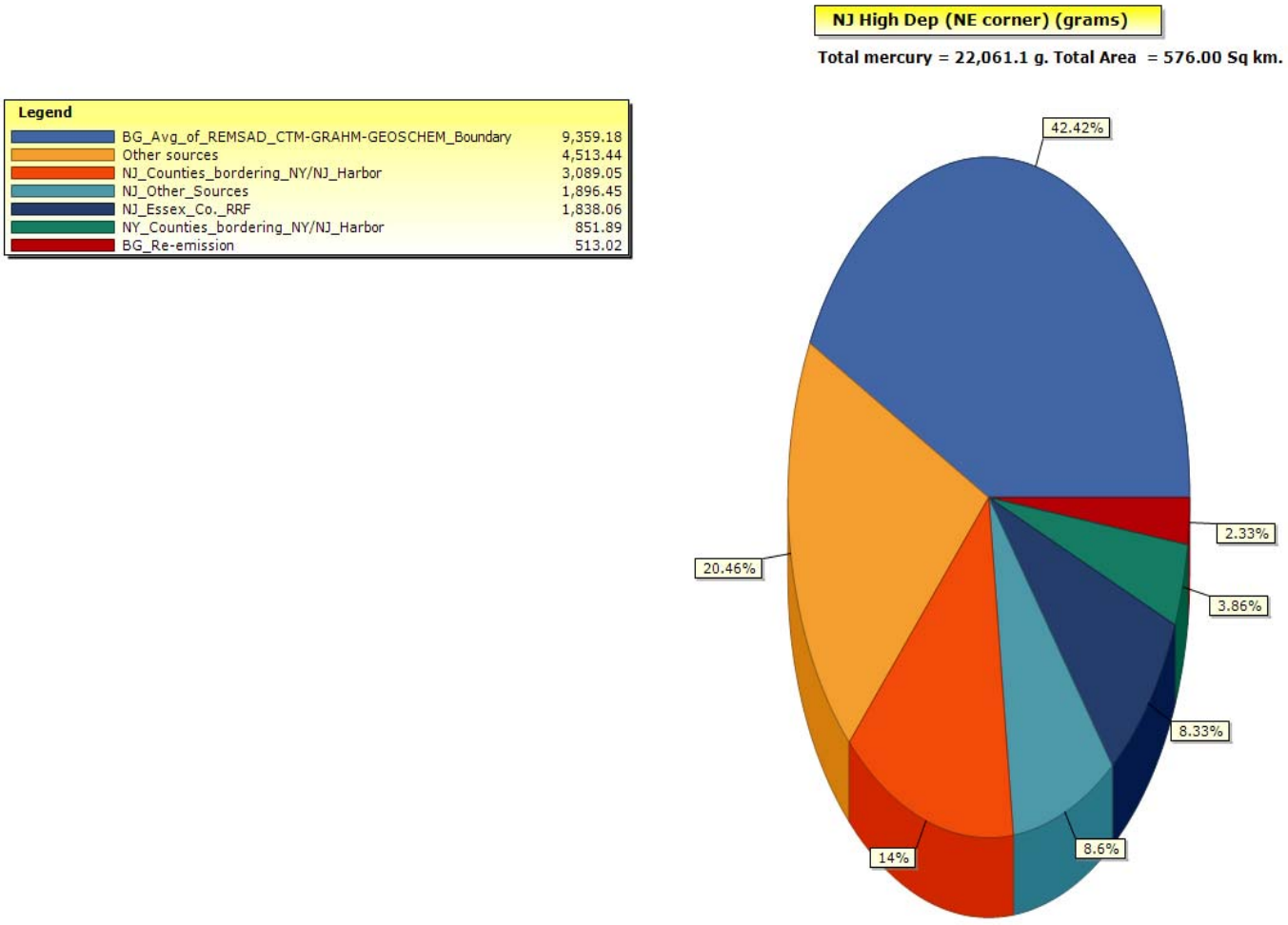
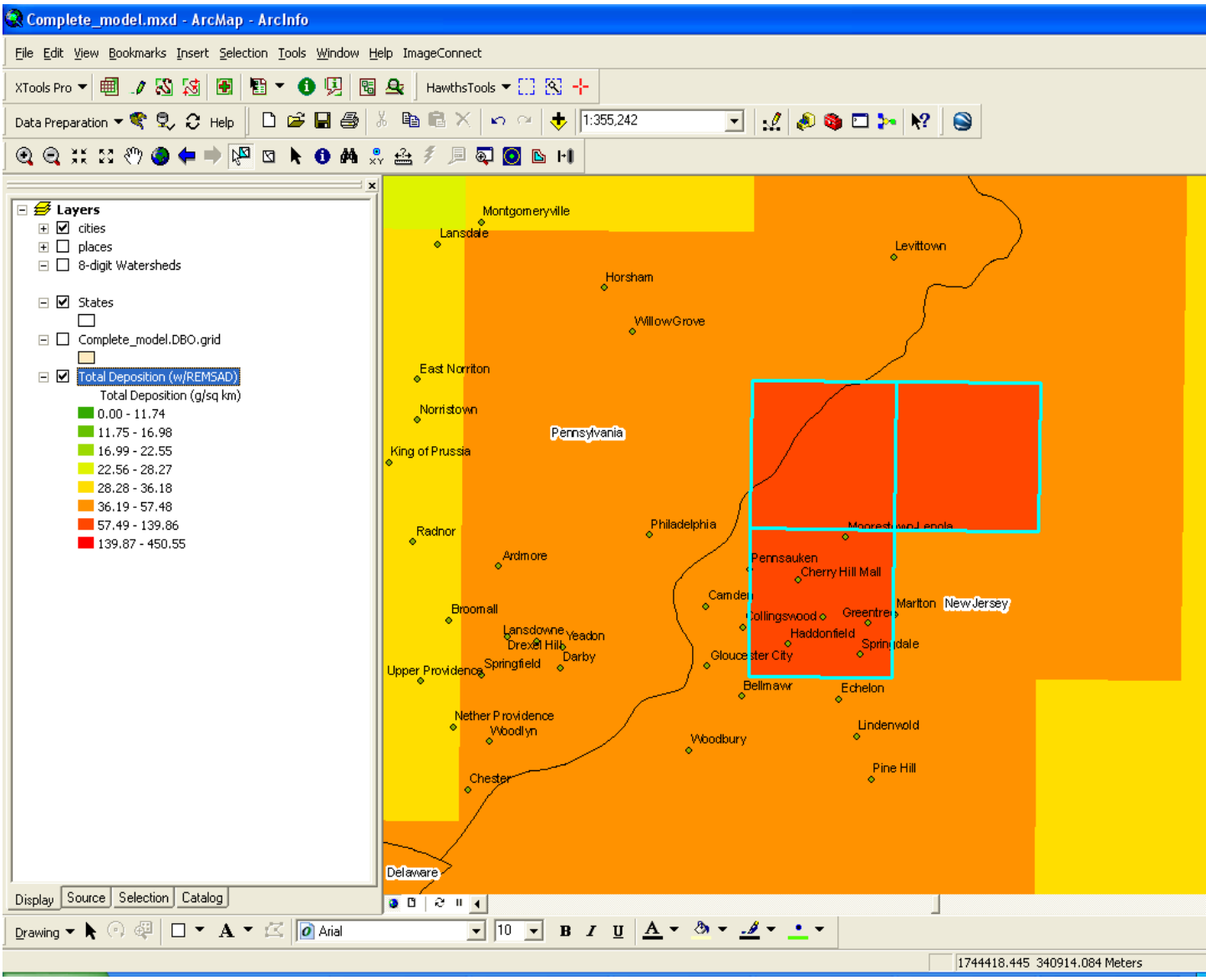
Total Deposition (w/REMSAD)
Total Deposition (g/sq km)
0.00 - 11.74
11.75 - 16.98
16.99 - 22.55
22.56 - 28.27
28.28 - 36.18
36.19 - 57.48
57.49 - 139.86
139.87 - 450.55
New York
Connecticut
New York
New Jersey
New York
Display
Source
Selection
Catalog
Drawing
Arial
10
1766876.812 466217.76 Meters


NJ High Dep (NE corner) (grams)
Total mercury = 22,061.1 g. Total Area = 576.00 Sq km.
Legend
BG_Avg_of_REMSAD_CTM-GRAHM-GEOSCHEM_Boundary 9,359.18
Other sources 4,513.44
NJ_Counties_bordering_NY/NJ_Harbor 3,089.05
NJ_Other_Sources 1,896.45
NJ_Essex_Co._RRF 1,838.06
NY_Counties_bordering_NY/NJ_Harbor 851.89
BG_Re-emission 513.02
42.42%
2.33%
3.86%
8.33%
8.6%
14%
20.46%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Data Preparation
Help
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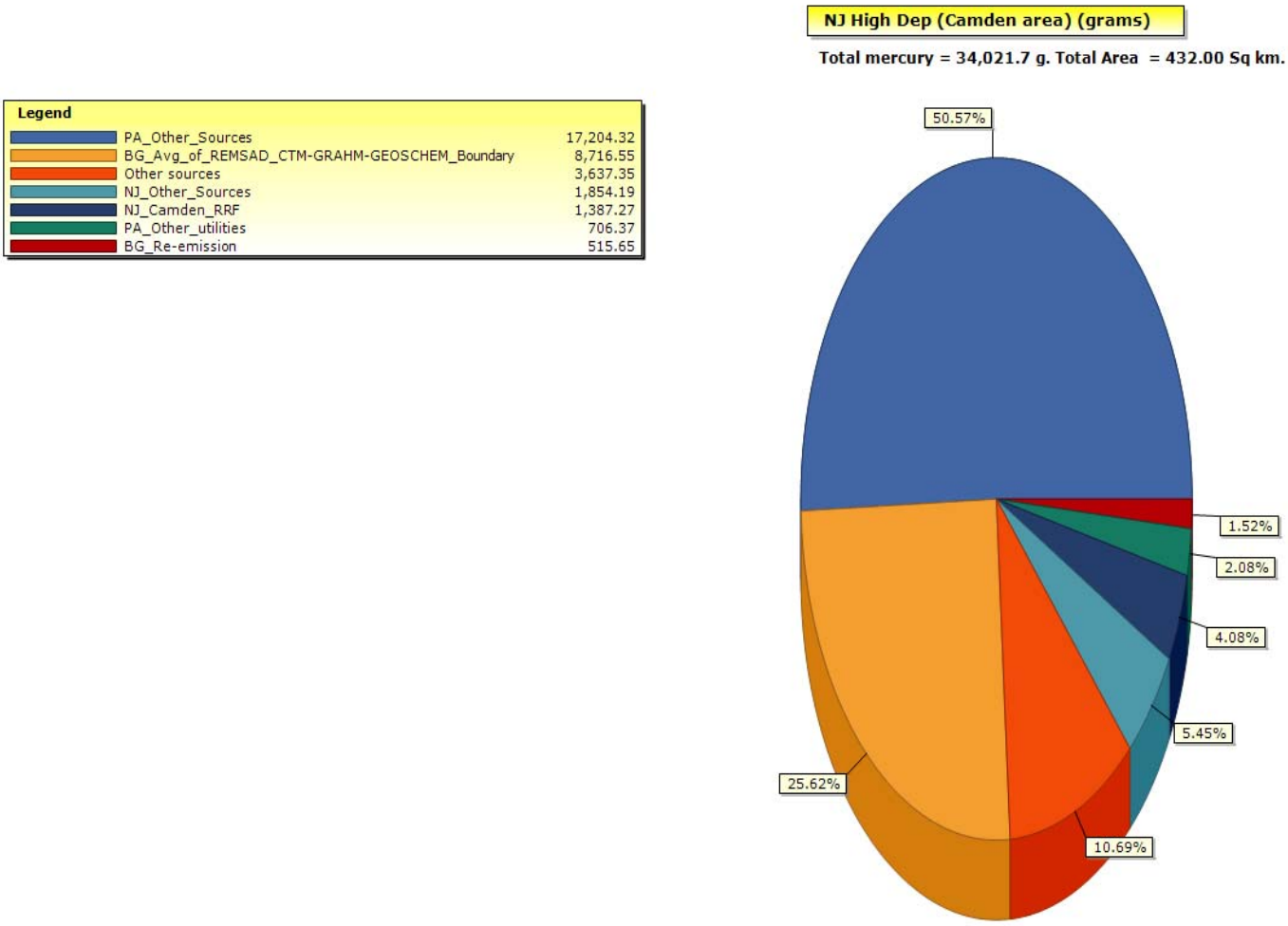
Layers
cities
places
8-digit Watersheds
States
Complete_model.DBO.grid
Total Deposition (w/REMSAD)
Total Deposition (g/sq km)
0.00 - 11.74
11.75 - 16.98
16.99 - 22.55
22.56 - 28.27
28.28 - 36.18
36.19 - 57.48
57.49 - 139.86
139.87 - 450.55
Display
Source
Selection
Catalog
Drawing
Arial
10
Montgomeryville
Lansdale
Levittown
Horsham
WillowGrove
East Norriton
Norristown
Pennsylvania
King of Prussia
Philadelphia
Radnor
Ardmore
Pennsauken
Cherry Hill Mall
Broomall
Lansdowne
Yeadon
Drexel Hill
Darby
Springfield
Upper Providence
Haddonfield
Gloucester City
Marlton
New Jersey
Bellmawr
Echelon
Nether Providence
Woodlyn
Woodbury
Lindenwold
Pine Hill
Chester
Delaware
1744418.445 340914.084 Meters


NJ High Dep (Camden area) (grams)
Total mercury = 34,021.7 g. Total Area = 432.00 Sq km.
Legend
PA_Other_Sources 17,204.32
BG_Avg_of_REMSAD_CTM-GRAHM-GEOSCHEM_Boundary 8,716.55
Other sources 3,637.35
NJ_Other_Sources 1,854.19
NJ_Camden_RRF 1,387.27
PA_Other_utilities 706.37
BG_Re-emission 515.65
50.57%
1.52%
2.08%
4.08%
5.45%
25.62%
10.69%