New Jersey Geological and Water Survey
Open-File Report 15-1

Potable Water Supplied in 2011 by New Jersey's Highlands

New Jersey Department of Environmental Protection

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At the same time, it is crucial to understand how actions of this agency can impact the State's economic growth, to recognize the interconnection of the health of New Jersey's environment and its economy, and to appreciate that environmental stewardship and positive economic growth are not mutually exclusive goals: we will continue to protect the environment while playing a key role in positively impacting the ecomonic growth of the state.

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2015

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EXECUTIVE SUMMARY

The New Jersey Highlands are a vital source of potable water for the State. In 2011 the Highlands region supplied 136 billion gallons of water or approximately one-third of the total potable water used in New Jersey. Highlands water was distributed to 332 municipalities in 16 counties. These municipalities are home to 70% of the State's population. This is an increase from 1999 estimates, when 107 billion gallons of our potable water was estimated to have come from the Highlands and was used in 292 municipalities in 16 counties (Hoffman and Domber, 2004). For this analysis, potable water includes self-supplied residential uses and purveyor-supplied residential, commercial, and industrial uses. The current analysis uses an updated dataset and methodology than was used in a previous report on the potable water supplied by the Highlands in 1999. Self-supplied industrial and commercial, mining, agricultural, power generation, and irrigation water withdrawals, as well as withdrawals on the Delaware River downstream of the Highlands, but outside of New Jersey, are not considered in this analysis.

Potable water is supplied by the New Jersey Highlands in two ways. First, water is withdrawn from surface-water intakes and groundwater wells physically located in the Highlands. This water supplies communities in the Highlands itself as well as municipalities located outside of the Highlands. Second, runoff and groundwater discharge from the Highlands contributes to downstream surface-water supplies. The Highlands includes the headwaters of the Raritan, Passaic and Wallkill Rivers. It also contributes runoff and groundwater discharge to the Delaware River. There are nine major potable-supply surface-water intakes in New Jersey that are downstream of the Highlands and thus are partially supplied by Highlands water.

Once the water is withdrawn within or downstream of the Highlands, it can be used directly by the water purveyor who diverted it or transferred for use by a receiving purveyor. These transfers are sometimes referred to as a bulk transfers. In some cases there may be one or more purveyors involved in the distribution of water to the location of its final use.

The analysis in this report is based on water withdrawal and bulk transfer data collected by the Bureau of Water Allocation and Well Permitting and the Bureau of Safe Drinking Water. The data are compiled in the New Jersey Geological and Water Survey's NJ Water Tracking Data Model (NJWaTr). All three groups are within the Division of Water Supply and Geoscience of the New Jersey Department of Environmental Protection.

INTRODUCTION

The New Jersey Highlands region covers 17% of the State. Its diverse natural communities, including extensive forests, wetlands, rivers, and streams, are of statewide importance. The 2001 New Jersey Development and Redevelopment Plan declared it a "Special Resource Area" and describes the region as "an area or region with unique characteristics or resources of statewide importance which are essential to the sustained wellbeing and function of its own region and other regions or systems-environmental, economic, and social- and to the quality of life for future generations" (NJ State Planning Commission, 2001). This unique set of

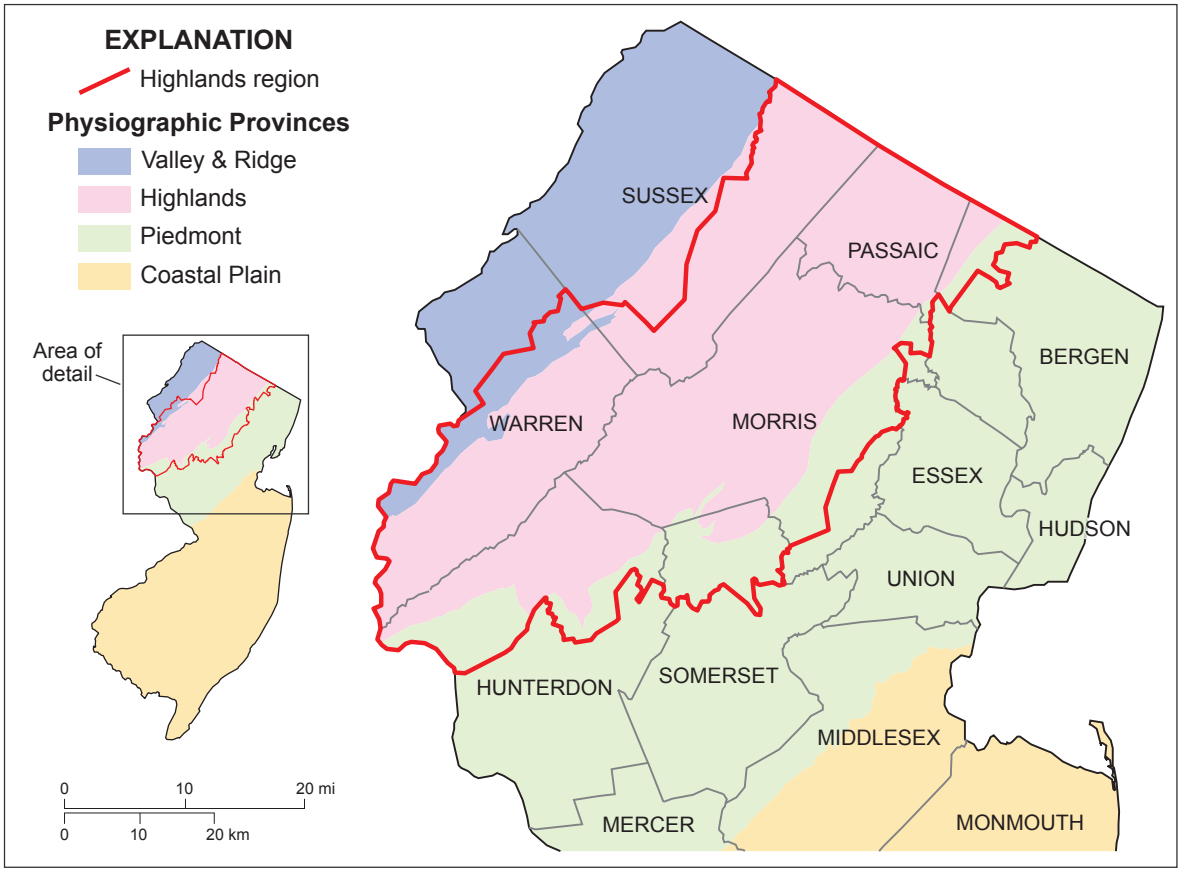

Figure 1. Physiographic provinces in Northern New Jersey with county and Highlands Region boundaries.

characteristics is what allows the Highlands to provide abundant, high quality water, including substantial amounts of potable water to the citizens of New Jersey. The Highlands region is the headwaters area for the Passaic, Raritan and Wallkill Rivers and provides runoff and groundwater discharge to the Delaware River.

On September 19, 2003, the Highlands Task Force was created through Executive Order No. 70 and was tasked with identifying opportunities to "preserve the natural resources of and enhance the quality of life within the Highlands region". In August 2004, the Highlands Water Protection and Planning Act was signed (N.J.A.C. 7:38). The Highlands Act defines the geographic boundary of the Highlands Region and establishes the Highlands Preservation Area and the Highlands Planning Area. The Act mandated the creation of a Highlands Water Protection and Planning Council, and development of a regional master plan (New Jersey Highlands Water Protection and Planning Council, 2008). It also tasked the New Jersey Department of Environmental Protection (NJDEP) to establish regulations in the Highlands Preservation Area.

Quantifying the importance of this region to the water supply of New Jersey is important to understanding the State's reliance on the Highlands. This report updates a previous report titled "Potable Water Supplied in 1999 by New Jersey Highlands" (Hoffman and Domber, 2004). At the time of publication, 2011 was the most recent year for which quality controlled data were available.

HIGHLANDS DEFINITION

Geologically, the Highlands are one of four different physiographic provinces defined in New Jersey based on relief, landforms, and geology (Salisbury, 1898). The New Jersey Highlands province extends from the Delaware River northeast to the New York border (fig. 1).

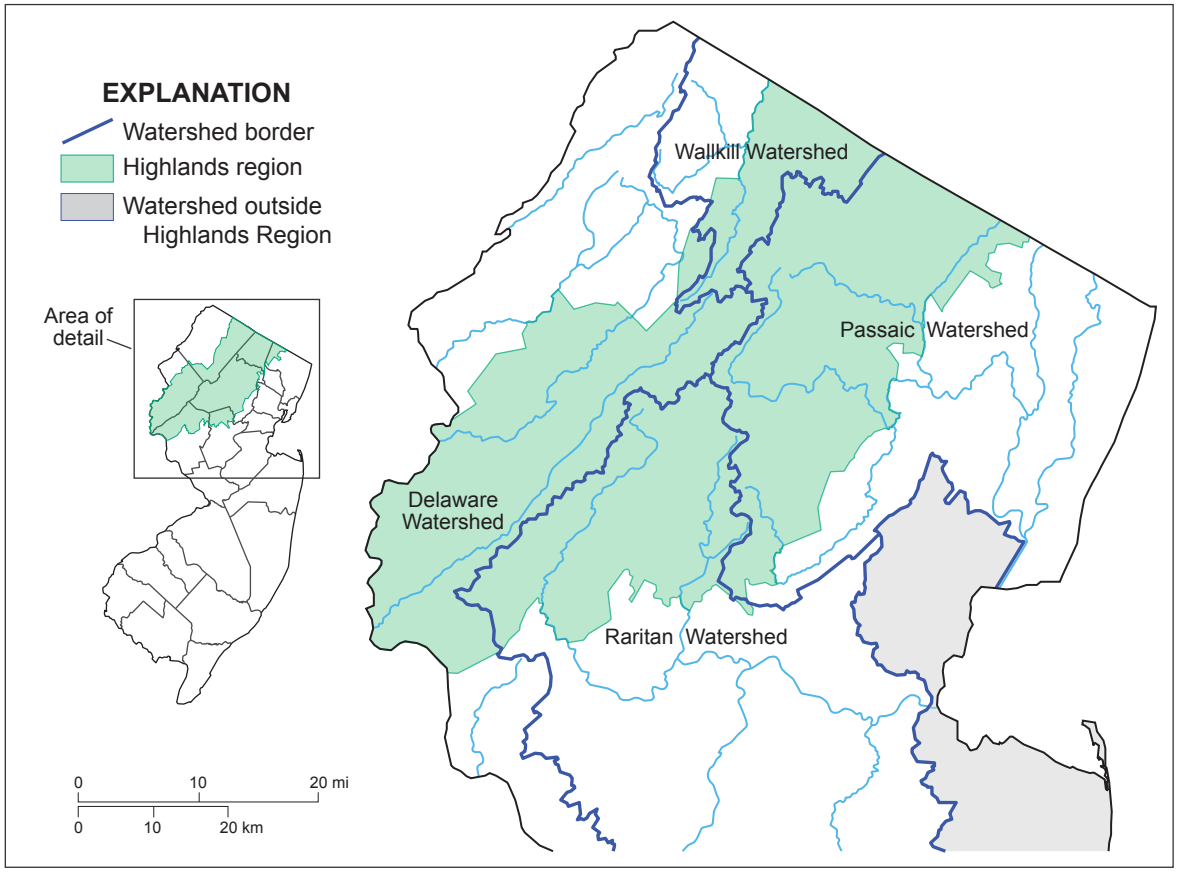

Figure 2. The major watersheds of the New Jersey Highlands Region.

BERGEN COUNTY	MORRIS COUNTY	MORRIS COUNTY	SOMERSET COUNTY	WARREN COUNTY
Mahwah Twp	Boonton Town	Mount Olive Twp	Bedminster Twp	Allamuchy Twp
Oakland Boro	Boonton Twp	Mountain Lakes Boro	Bernards Twp	Alpha Boro
	Butler Boro	Netcong Boro	Bernardsville Boro	Belvidere Town
HUNTERDON COUNTY	Chester Boro	Parsippany-Troy Hills	Far Hills Boro	Franklin Twp
	Chester Twp	Pequannock Twp	Peapack-Gladstone	Frelinghuysen Twp
Alexandria Twp	Denville Twp	Randolph Twp	Boro	Greenwich Twp
Bethlehem Twp	Dover Town	Riverdale Boro		Hackettstown Town
Bloomsbury Boro	Hanover Twp	Rockaway Boro		Harmony Twp
Califon Boro	Harding Twp	Rockaway Twp	**SUSSEX COUNTY**	Hope Twp
Clinton Town	Jefferson Twp	Roxbury Boro	Byram Twp	Independence Twp
Clinton Twp	Kinnelon Boro	Victory Gardens Boro	Franklin Boro	Liberty Twp
Glen Gardner Boro	Mendham Boro	Washington Twp	Green Twp	Lopatcong Twp
Hampton Boro	Mendham Twp	Wharton Boro	Hamburg Boro	Mansfield Twp
High Bridge Boro	Mine Hill Twp		Hardyston Twp	Oxford Twp
Holland Twp	Montville Twp	**PASSAIC COUNTY**	Hopatcong Boro	Phillipsburg Town
Lebanon Boro	Morris Twp	Bloomingdale Boro	Ogdensburg Boro	Pohatcong Twp
Lebanon Twp	Morris Plains Boro	Pompton Lakes Boro	Sparta Twp	Washington Boro
Milford Boro	Morristown Town	Ringwood Boro	Stanhope Boro	Washington Twp
Tewksbury Twp	Mt. Arlington Boro	Wanaque Boro	Vernon Twp	White Twp
Union Twp		West Milford Twp		

Table 1. New Jersey Highlands municipalities as defined by the 2004 Highlands Water Protection and Planning Act that comprise the Highlands region for this report.

Its "rugged topography consists of a series of discontinuous rounded ridges separated by deep narrow valleys" (Dalton, 2003). It is a region of mountains underlain by Precambrian crystalline bedrock with intermontane limestone and shale valleys. Its physical boundaries cut across many political boundaries.

The Highlands Water Protection and Planning Act (N.J.A.C. 7:38) defines 88 municipalities in 7 counties that together comprise the Preservation Area and the Planning Area of the Highlands Regions. These municipalities are listed in table 1. The Highlands municipalities cover 1,343 mi^2 or about 17% of New Jersey.

For the purposes of the water-supply analysis in this report, the New Jersey Highlands region is defined by the outer boundaries of the Highlands municipalities defined by the Highlands Water Protection and Planning Act (New Jersey Highlands Water Protection and Planning Council, 2008). The 88 Highlands municipalities fall within the boundary of the Highlands region depicted in figure 1. Andover Township and Lafayette Borough were included in the 1999 analysis (Hoffman and Domber, 2004) but are not included here. Bedminster Township was not included in the 1999 analysis, but is included here.

HIGHLANDS WATERSHEDS

The New Jersey Highlands region falls into four different watersheds: the Delaware, Passaic, Raritan and Wallkill (fig. 2). The Delaware and Passaic watersheds each cover a little more than a third of the region, the Raritan watershed covers 22%, and the Wallkill watershed covers the remaining 9% (table 2).

Watershed	Area (Square Miles)	Percentage of Total
Delaware	450	34%
Passaic	470	35%
Raritan	301	22%
Wallkill	122	9%
Total	1,343	100%

Table 2. Area of Highlands region in major watersheds.

DATA SOURCES AND METHODOLOGY

The volume of potable water supplied by the New Jersey Highlands region is calculated as the sum of two components: 1) potable withdrawals in the Highlands: and 2) potable withdrawals downstream of the Highlands prorated by the percentage of the intake's drainage area in the Highlands region. Estimation of that part of a municipality's total potable supply that originated in the Highlands is based on the NJ Water Tracking Data Model data (NJWaTr) (Tessler, 2003) and Bureau of Safe Drinking Water data obtained from NJDEP's DataMiner webpage. NJWaTr is a conveyance-based water withdrawal, transfer, and discharge database for NJ developed in part for water supply planning. DataMiner is a web application that allows querying of the Department's NJ Environmental Management System (NJEMS) data.

All surface-water and groundwater intakes located in the Highlands region were assumed to receive 100% of their water from the Highlands region. For permitted potable-supply surface-water intakes downstream from the Highlands region (fig. 3 and table 3), the percentage of water originating in the Highlands is based on total drainage area for the intake and drainage area within the Highlands. The total watershed area above each intake is estimated based on the watershed areas of nearby surface-water gages (Reed and others, 2000). The area of the watershed that is in the Highlands region was calculated using a geographical information system application. The resulting percentage was used to prorate the amount of the total diversion that originated in the Highlands.

In order to quantify the volume and percentage of Highlands region water used in each of NJ's 565 municipalities multiple interim data tables are needed. First, all Highlands-related potable withdrawal sites and their corresponding withdrawal volumes and percentage Highlands water were compiled in a table. Next a table of total water use by individual public water systems was generated through a series of queries in NJWaTr. The public water system identification code (PWSID) was used to identify each public water system in the analysis. These first two tables were combined

Permit number	Purveyor Name	Water Source	Percent of Watershed in Highlands
5094X	North Jersey District WSC./United Water NJ	Passaic /Pompton	59%
5094X	North Jersey District WSC./United Water NJ	Ramapo River	10%
4014PS	NJ Water Supply Authority-Raritan	Delaware & Raritan Canal	50%
5008X	NJ American Water-Passaic	Passaic River	50%
5020X	NJ American Water-Raritan	Raritan River	50%
5099X	Passaic Valley Water Commission	Passaic River	59%
5122	Burlington City Water Department	Delaware River	7%
5187	Trenton City Water Department	Delaware River	10%
5188X	NJ American Water-Western Division	Delaware River	7%

Table 3. New Jersey potable-supply surface-water intakes downstream of the Highlands region, with percent of each intake's watershed located in Highlands region.

to generate a third table which contained the total amount of water used and the amount from the Highlands region used by each unique PWSID. Bulk transfers between PWSIDs are included in this analysis and have the effect of identifying PWSIDs that don't have their own source related to the Highlands, but which purchase water from another PWSID that has a Highlands-related source.

Since multiple PWSIDs can serve one municipality or one PWSID can serve multiple municipalities, total water use for each PWSID had to be prorated by municipality. To do this, Bureau of Safe Drinking Water PWSID-municipal population served data (obtained through the "What municipalities are served by my water system" DataMiner query) were used to prorate total PWSID water use to individual municipalities within the water system's service area. For example, if PWSID 1 uses 50 million gallons per year (MGY) and serves 100 customers in town A and 900 customers in town B, 5 MGY or 10% of the total use is assumed to go to town A and the remaining 45 MGY or 90% to town B. If 10% of the total PWSID 1 water comes from Highlands related sources then 0.5 MGY of town A's use is from the Highlands and 4.5 MGY of town B's use is from the Highlands. In this example and in most cases the Highlands and non-Highlands water is assumed to mix uniformly throughout the PWSID's distribution system. In some large service areas where pressure zones or hydraulic gradients are substantial, adjustments were made to the data, especially if the information affected Highland vs. non-Highlands water use. This analysis resulted in a fourth table which listed municipalities served by PWSIDs and the corresponding prorated total and Highlands related water use.

After the PWSID-municipality water use data were calculated, self-supplied potable water use and private domestic well water use by municipality for all sources located in the Highlands region were appended to the fourth table referenced above. The addition of these Highlands-related withdrawals prevented overestimation of the significance of any water that was imported in to the Highlands. Private domestic well water use is estimated using 1980 US Census Bureau Survey data and from NJDEP's Bureau of Well Permitting well record data. This analysis assumes an 80 gallon per capita per day use rate and three people per well. Self-supplied potable water use data is from NJWaTr and based upon records submitted to NJDEP's Bureau of Water Allocation.

For any non-Highlands municipality identified in the PWSID-municipality analysis described above (fourth table), all other potable water use, including domestic wells and self-supplied potable sources, was appended. The addition of non-Highlands related water use decreased the percentage reliance on the Highlands to accurately reflect the true volume of Highlands-region water utilized. This fourth table was then reformatted to create a fifth and final table which summarized total potable, Highlands potable and percentage water use derived from the Highlands region for 2011 by

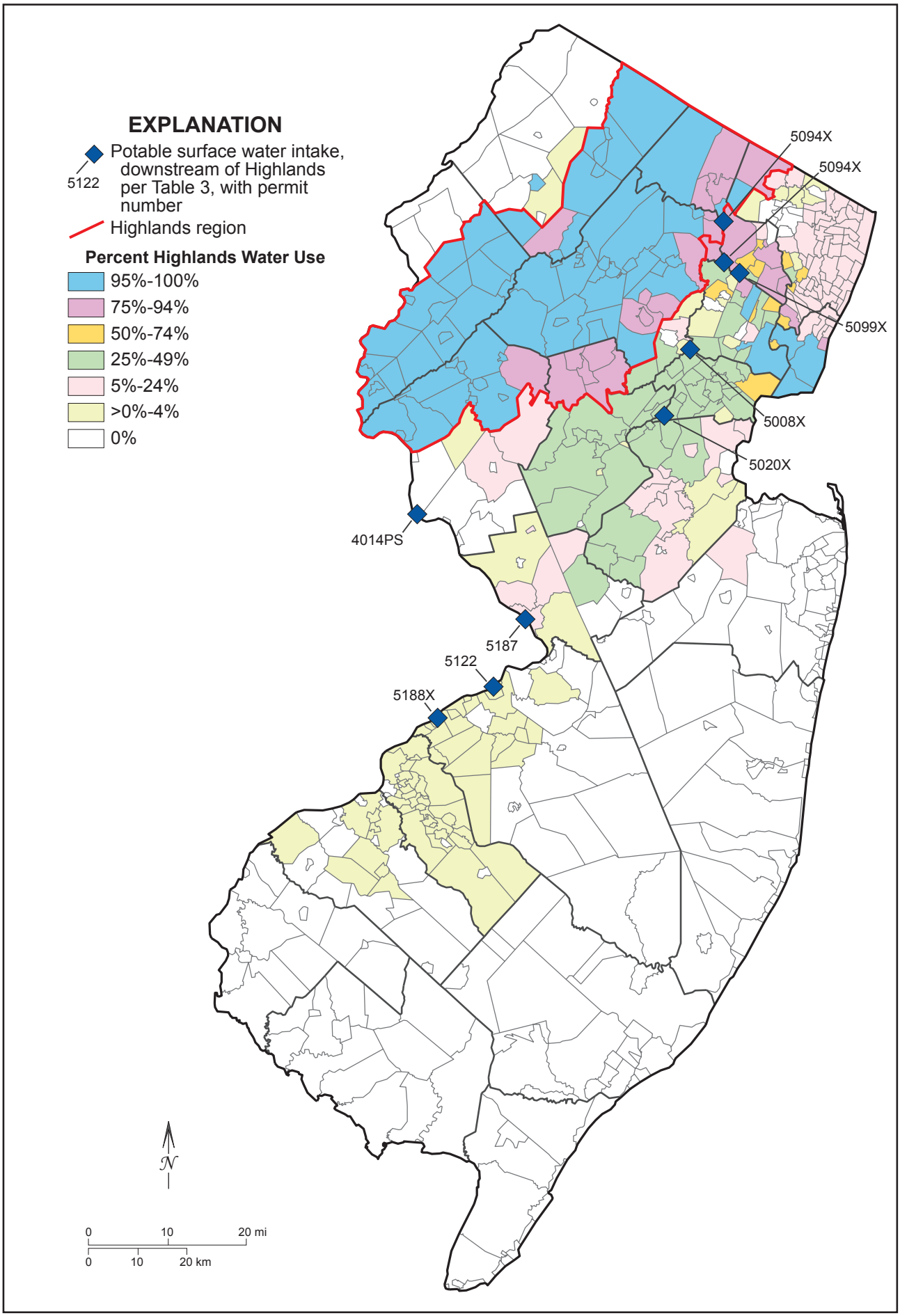

Figure 3. Percentage of potable water supplied to New Jersey municipalities by the New Jersey Highlands in 2011.

New Jersey municipalities. Full results are in the Appendix.

There are a number of assumptions built into this analysis. The primary ones are:

- Water purveyor potable water use includes residential, commercial, and industrial uses. The exact percentage of each varies substantially by water system. For this analysis all water delivered through a potable water system is defined as potable use.

- Water that is supplied to a purveyor service area is uniformly distributed across the service area. With some exceptions as discussed above, this analysis does not account for different pressure zones within a purveyor's service area.

- Purveyor supplied data on population served by individual water system are correct.

- Purveyor-supplied reports on volumes of water withdrawn are accurate.

- The percentage of water withdrawn from a subwatershed above an intake is directly proportional to the percentage of the subwatershed's area to the total area of the intake's watershed

POTABLE WATER SUPPLIED BY NEW JERSEY'S HIGHLANDS IN 2011

Potable water is supplied to New Jersey municipalities via a complex assemblage of private domestic wells, self-supplied potable water for industrial and commercial users, and public water systems. Transmission pipelines and interconnections within and between purveyors further complicate water distribution. Despite this complex network, it is possible to quantify the movement of water from a source area to a use area using the New Jersey Water Tracking Data Model (Tessler, 2003) and Bureau of Safe Drinking Water data. By analyzing data for the municipalities served, the source of water, and bulk transfers, it is possible to estimate the percentage of Highlands potable water delivered to each of New Jersey's municipalities.

The total volume of potable water that originated from the New Jersey Highlands region in 2011 is estimated to be 136 billion gallons, or 373 million gallons per day on average. This represents 33% of the total statewide potable use in 2011. Highlands water was used in 332 municipalities located in 16 counties. Within the Highlands 608 potable groundwater sites withdrew 21.2 billion gallons, 15 potable surface water intakes withdrew 67.2 billion gallons, and private domestic wells withdrew an additional 8.2 billion gallons of groundwater, for a total of 96.6 billion gallons. The remaining 39.2 billion gallons is from prorated potable surface-water withdrawals downstream of the Highlands. This information is presented by municipality in figure 3 and the appendix.

The results show a broad range of reliance on Highlands region water. In some municipalities, especially those in southwestern New Jersey, the percentage of Highlands water is very small. In contrast, in some municipalities in northern New Jersey outside of the Highlands a large percentage of the potable water is from the Highlands. In Jersey City, Hudson County, 100% of the potable water comes from the Highlands even though it is located 20 miles from the Highlands Region. Some municipalities obtain less than 100% of their potable water from Highlands sources even though they are entirely within the Highlands region. Byram Township (Sussex), Harding Township (Morris), Tewksbury Township (Hunterdon), Peapack-Gladstone Borough (Somerset), Mahwah Township (Bergen), Ringwood Borough (Passaic) and Bloomingdale Borough (Passaic) divert or purchase water from sources outside and/or downstream of the Highlands and import it back into the Highlands. Many of these municipalities have small water systems that have wells just outside the Highlands and a small part of their service area just within the Highlands.

As existing Highlands-dependent public water systems are expanded or new ones added, communities may receive a higher percentage of their water from the Highlands. This would

be especially true in the Camden/Gloucester area where new water mains are projected to receive water from the regional Tri-County pipeline. This pipeline delivers potable water withdrawn from the Delaware River and thus carries a small part of Highlands water.

On a daily or monthly basis the percentage of a municipality's water use originating from the Highlands may differ from the annual average due to fluctuations in demand, seasonal patterns of water use or drought operations. However, the annual average is a reasonable parameter by which to compare the relative importance of Highlands water to a municipality.

SUMMARY

The New Jersey Highlands supplied about one-third of the State's potable water in 2011 or 136 billion gallons. Highlands water was distributed to 332 municipalities in 16 counties in northern, central and southwestern New Jersey. These municipalities contain about 70% of New Jersey's population. It is important to note that in some of these municipalities the percentage of Highlands water is very small; in other municipalities all the potable water comes from the Highlands.

This analysis considers direct withdrawal of water in the Highlands as well as downstream surface-water intakes. The Highlands are the headwaters of the Passaic, Wallkill and Raritan Rivers. The Highlands also contribute water to the Delaware River.

This analysis was done using the New Jersey Water Tracking Data Model and Bureau of Safe Drinking Water data. There are a number of assumptions built into the analysis. As new data are added and errors are corrected the results may be adjusted.

The Highlands region is an important source of potable water for New Jersey. Proper management of this natural resource is critical so that it continues to be a safe and reliable source of water for future generations.

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Tessler, Steven, 2003, Data model and relational database design for the New Jersey water-transfer data system (NJWaTr): U.S. Geological Survey Open-File Report OFR-03-197.

INTERNET RESOURCES

New Jersey Department of Environmental Protection, DataMiner webpage:
datamine2.state.nj.us/DEP_OPRA/OpraMain/categories?category=Safe+Drinking+Water

New Jersey Department of Environmental Protection, GIS data with GNIS number
www.nj.gov/dep/gis/statshp.html#NJMUN

New Jersey Department of Environmental Protection, GIS page
www.state.nj.us/dep/gis/

New Jersey Geological and Water Survey
www.njgeology.org/

New Jersey Highlands Council
www.highlands.state.nj.us/njhighlands/

New Jersey State Development and Redevelopment Plan
www.nj.gov/state/planning/spc-state-plan.html

APPENDIX. Volume and percent of Highlands potable-water used by New Jersey municipalities in 2011

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Bergen	Allendale Boro	885135	No	6	2%				X
Bergen	Alpine Boro	885139	No	13	13%		X		
Bergen	Bergenfield Boro	885157	No	181	14%		X		
Bergen	Bogota Boro	885163	No	55	14%		X		
Bergen	Carlstadt Boro	885180	No	42	14%		X		
Bergen	Cliffside Park Boro	885187	No	160	13%		X		
Bergen	Closter Boro	885190	No	57	13%		X		
Bergen	Cresskill Boro	885193	No	58	13%		X		
Bergen	Demarest Boro	885195	No	33	13%		X		
Bergen	Dumont Boro	885197	No	118	13%		X		
Bergen	East Rutherford Boro	885201	No	60	13%		X		
Bergen	Edgewater Boro	885203	No	78	14%		X		
Bergen	Elmwood Park Boro	885207	No	298	59%				X
Bergen	Emerson Boro	885208	No	50	13%		X		
Bergen	Englewood City	885209	No	184	12%		X		
Bergen	Englewood Cliffs Boro	885210	No	36	14%		X		
Bergen	Fair Lawn Boro	885214	No	304	21%				X
Bergen	Fairview Boro	885215	No	94	14%		X		
Bergen	Fort Lee Boro	885223	No	239	14%		X		
Bergen	Franklin Lakes Boro	885225	No	21	3%				X
Bergen	Garfield City	885228	No	275	26%				X
Bergen	Hackensack City	885236	No	291	13%		X		
Bergen	Harrington Park Boro	885244	No	32	13%		X		
Bergen	Hasbrouck Heights Boro	885247	No	80	13%		X		
Bergen	Haworth Boro	885248	No	23	13%		X		
Bergen	Hillsdale Boro	885255	No	69	6%		X		
Bergen	Leonia Boro	885276	No	61	14%		X		
Bergen	Little Ferry Boro	885281	No	72	14%		X		
Bergen	Lodi Boro	885284	No	200	57%				X
Bergen	Lyndhurst Twp	882225	No	15	89%			X	
Bergen	Mahwah Twp	882312	Yes	852	90%	X			
Bergen	Maywood Boro	885294	No	65	14%		X		
Bergen	Montvale Boro	885306	No	49	4%		X		
Bergen	Moonachie Boro	885307	No	18	13%		X		

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Bergen	New Milford Boro	885320	No	111	13%		X		
Bergen	North Arlington Boro	885323	No	124	60%				X
Bergen	Northvale Boro	885327	No	31	14%		X		
Bergen	Norwood Boro	885329	No	39	12%		X		
Bergen	Oakland Boro	885330	Yes	491	100%	X			
Bergen	Old Tappan Boro	885336	No	39	12%		X		
Bergen	Oradell Boro	885337	No	54	14%		X		
Bergen	Palisades Park Boro	885338	No	133	13%		X		
Bergen	Paramus Boro	885340	No	178	13%		X		
Bergen	Ramsey Boro	885364	No	94	15%	X			
Bergen	Ridgefield Boro	885367	No	75	14%		X		
Bergen	Ridgefield Park Village	885368	No	86	14%		X		
Bergen	River Edge Boro	885372	No	77	13%		X		
Bergen	River Vale Twp	882310	No	65	13%		X		
Bergen	Rochelle Park Twp	882307	No	37	14%		X		
Bergen	Rockleigh Boro	885375	No	4	10%		X		
Bergen	Rutherford Boro	885383	No	122	13%		X		
Bergen	Saddle Brook Twp	882308	No	23	4%				X
Bergen	Saddle River Boro	885384	No	2	1%				X
Bergen	South Hackensack Twp	882226	No	16	14%		X		
Bergen	Teaneck Twp	882227	No	270	13%		X		
Bergen	Tenafly Boro	885417	No	98	13%		X		
Bergen	Teterboro Boro	885418	No	0.5	13%		X		
Bergen	Upper Saddle River Boro	885425	No	56	7%		X		
Bergen	Wallington Boro	885430	No	254	58%				X
Bergen	Washington Twp	882311	No	62	13%		X		
Bergen	Westwood Boro	885442	No	74	13%		X		
Bergen	Woodcliff Lake Boro	885449	No	2	<1%		X		
Bergen	Wood-Ridge Boro	885451	No	52	13%		X		
Burlington	Beverly City	885160	No	6	5%		X		
Burlington	Burlington City	885174	No	29	2%		X		
Burlington	Burlington Twp	882102	No	1	2%		X		
Burlington	Cinnaminson Twp	882096	No	34	5%		X		
Burlington	Delanco Twp	882100	No	7	5%		X		
Burlington	Delran Twp	882097	No	29	5%		X		

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Burlington	Eastampton Twp	882105	No	1	1%				X
Burlington	Edgewater Park Twp	882101	No	10	5%		X		
Burlington	Evesham Twp	882082	No	18	1%				X
Burlington	Hainesport Twp	882092	No	1	1%				X
Burlington	Lumberton Twp	882091	No	2	1%				X
Burlington	Mansfield Twp	882108	No	1.3	<1%				X
Burlington	Maple Shade Twp	882094	No	3	1%				X
Burlington	Moorestown Twp	882095	No	14	1%				X
Burlington	Mount Holly Twp	882104	No	2	1%				X
Burlington	Mount Laurel Twp	882093	No	28	1%		X		
Burlington	Palmyra Boro	885339	No	12	5%		X		
Burlington	Riverside Twp	882098	No	14	5%		X		
Burlington	Riverton Boro	885373	No	5	5%		X		
Burlington	Westampton Twp	882103	No	1	1%				X
Camden	Audubon Boro	885144	No	16	5%		X		
Camden	Audubon Park Boro	885145	No	<1	4%		X		
Camden	Barrington Boro	885149	No	10	5%		X		
Camden	Bellmawr Boro	885154	No	6	5%		X		
Camden	Berlin Boro	885158	No	6	2%				X
Camden	Berlin Twp	882152	No	4	2%				X
Camden	Camden City	885177	No	42	4%		X		
Camden	Cherry Hill Twp	882155	No	114	4%		X		
Camden	Clementon Boro	885186	No	<1	<1%		X		
Camden	Collingswood Boro	885191	No	5	<1%				X
Camden	Gibbsboro Boro	885230	No	5	4%		X		
Camden	Gloucester Twp	882154	No	39	2%		X		
Camden	Haddon Heights Boro	885239	No	14	5%		X		
Camden	Haddon Twp	882156	No	2	5%		X		
Camden	Haddonfield Boro	885238	No	6	1%				X
Camden	Hi-Nella Boro	885256	No	1	5%		X		
Camden	Laurel Springs Boro	885272	No	4	5%		X		
Camden	Lawnside Boro	885274	No	5	4%		X		
Camden	Lindenwold Boro	885279	No	16	4%		X		
Camden	Magnolia Boro	885288	No	8	5%		X		
Camden	Merchantville Boro	885297	No	<1	<1%				X

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Camden	Mount Ephraim Boro	885313	No	9	5%		X		
Camden	Oaklyn Boro	885331	No	7	5%		X		
Camden	Pennsauken Twp	882157	No	6	<1%		X		
Camden	Pine Hill Boro	885352	No	3	1%				X
Camden	Runnemede Boro	885382	No	14	5%		X		
Camden	Somerdale Boro	885396	No	9	5%		X		
Camden	Stratford Boro	885411	No	12	5%		X		
Camden	Voorhees Twp	882153	No	41	5%		X		
Camden	Waterford Twp	882151	No	<1	<1%				X
Camden	Winslow Twp	882150	No	28	2%				X
Essex	Belleville Twp	1729713	No	1,011	45%			X	
Essex	Bloomfield Twp	1729714	No	2,344	45%			X	
Essex	Cedar Grove Twp	882222	No	463	94%			X	
Essex	East Orange City	885200	No	518	18%			X	
Essex	Essex Fells Boro	2390558	No	<1	<1%				X
Essex	Fairfield Twp	1729722	No	308	50%				X
Essex	Glen Ridge Boro	2390559	No	185	59%				X
Essex	Irvington Twp	877363	No	649	39%		X		
Essex	Livingston Twp	882219	No	69	5%				X
Essex	Maplewood Twp	882220	No	492	40%		X		
Essex	Millburn Twp	882221	No	455	39%		X		
Essex	Montclair Twp	1729720	No	2,033	100%			X	
Essex	Newark City	885317	No	20,644	98%	X			
Essex	North Caldwell Boro	878839	No	9	1%				X
Essex	Nutley Twp	1729715	No	584	59%				X
Essex	South Orange Village Twp	880741	No	8	1%		X		
Essex	Verona Twp	1729716	No	192	35%				X
Essex	West Caldwell Twp	1729717	No	226	57%				X
Essex	West Orange Twp	1729718	No	870	39%		X		
Gloucester	Deptford Twp	882149	No	36	3%				X
Gloucester	Glassboro Boro	885231	No	19	3%				X
Gloucester	Harrison Twp	882146	No	10	2%				X
Gloucester	Logan Twp	882143	No	9	1%				X
Gloucester	Mantua Twp	882147	No	6	1%				X
Gloucester	Pitman Boro	885354	No	3	1%				X

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						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Gloucester	West Deptford Twp	882148	No	22	2%				X
Gloucester	Woodbury City	885447	No	3	1%				X
Gloucester	Woodbury Heights Boro	885448	No	2	1%				X
Hudson	Bayonne City	885151	No	2,253	98%			X	
Hudson	East Newark Boro	885199	No	69	59%				X
Hudson	Guttenberg Town	885235	No	76	14%		X		
Hudson	Harrison Town	885245	No	121	59%				X
Hudson	Hoboken City	885257	No	234	95%			X	
Hudson	Jersey City	885264	No	11,892	100%	X			
Hudson	Kearny Town	885266	No	2,196	100%			X	
Hudson	North Bergen Twp	882223	No	412	13%		X		
Hudson	Secaucus Town	885392	No	110	14%		X		
Hudson	Union City	885424	No	450	13%		X		
Hudson	Weehawken Twp	882224	No	85	13%		X		
Hudson	West New York Town	885438	No	337	13%		X		
Hunterdon	Alexandria Twp	882186	Yes	166	100%	X			
Hunterdon	Bethlehem Twp	882189	Yes	130	100%	X			
Hunterdon	Bloomsbury Boro	885162	Yes	56	100%	X			
Hunterdon	Califon Boro	885176	Yes	35	100%	X			
Hunterdon	Clinton Town	885189	Yes	171	100%	X			
Hunterdon	Clinton Twp	882177	Yes	782	100%	X			
Hunterdon	Franklin Twp	882184	No	1.9	<1%	X			
Hunterdon	Frenchtown Boro	885227	No	37	32%		X		
Hunterdon	Glen Gardner Boro	885232	Yes	50	100%	X			
Hunterdon	Hampton Boro	885243	Yes	59	100%	X			
Hunterdon	High Bridge Boro	885251	Yes	132	100%	X			
Hunterdon	Holland Twp	882185	Yes	186	100%	X			
Hunterdon	Lebanon Boro	885275	Yes	28	100%	X			
Hunterdon	Lebanon Twp	882191	Yes	235	100%	X			
Hunterdon	Milford Boro	885301	Yes	39	100%	X			
Hunterdon	Raritan Twp	882179	No	264	25%		X		
Hunterdon	Readington Twp	882178	No	89	14%		X		
Hunterdon	Tewksbury Twp	882190	Yes	213	94%	X			
Hunterdon	Union Twp	882188	Yes	310	100%	X			
Mercer	Ewing Twp	882128	No	102	6%		X		

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						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Mercer	Hamilton Twp	882127	No	160	5%		X		
Mercer	Hopewell Boro	885260	No	12	17%				X
Mercer	Hopewell Twp	882129	No	15	2%		X		
Mercer	Lawrence Twp	882126	No	331	23%		X		
Mercer	Princeton	2743608	No	606	20%		X		
Mercer	Trenton City	885421	No	223	7%		X		
Mercer	West Windsor Twp	882124	No	532	42%		X		
Middlesex	Carteret Boro	885181	No	116	12%		X		
Middlesex	Cranbury Twp	882160	No	73	36%		X		
Middlesex	Dunellen Boro	885198	No	175	44%		X		
Middlesex	East Brunswick Twp	882163	No	156	8%		X		
Middlesex	Edison Twp	882166	No	1,196	27%				X
Middlesex	Helmetta Boro	885250	No	6	9%				X
Middlesex	Highland Park Boro	885252	No	36	7%				X
Middlesex	Jamesburg Boro	885263	No	69	42%				X
Middlesex	Metuchen Boro	885298	No	103	12%		X		
Middlesex	Middlesex Boro	885299	No	358	39%		X		
Middlesex	Milltown Boro	885303	No	14	7%				X
Middlesex	Monroe Twp	882159	No	85	6%				X
Middlesex	New Brunswick City	885318	No	274	7%		X		
Middlesex	North Brunswick Twp	882164	No	165	9%		X		
Middlesex	Old Bridge Twp	882158	No	70	2%				X
Middlesex	Piscataway Twp	882167	No	956	42%		X		
Middlesex	Plainsboro Twp	882161	No	307	43%		X		
Middlesex	Sayreville Boro	885386	No	49	3%				X
Middlesex	South Amboy City	885399	No	55	12%		X		
Middlesex	South Brunswick Twp	882162	No	629	31%				X
Middlesex	South Plainfield Boro	885402	No	418	29%		X		
Middlesex	South River Boro	885403	No	25	6%				X
Middlesex	Spotswood Boro	885405	No	7	3%				X
Middlesex	Woodbridge Twp	882165	No	532	11%		X		
Monmouth	Marlboro Twp	882118	No	83	7%				X
Morris	Boonton Town	885164	Yes	274	99%	X			
Morris	Boonton Twp	882205	Yes	126	100%	X			
Morris	Butler Boro	885175	Yes	364	100%	X			

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Morris	Chatham Boro	885182	No	2	1%	X			
Morris	Chatham Twp	882194	No	100	35%		X		
Morris	Chester Boro	885184	Yes	236	100%	X			
Morris	Chester Twp	882199	Yes	265	100%	X			
Morris	Denville Twp	882204	Yes	650	100%	X			
Morris	Dover Town	885196	Yes	781	99%	X			
Morris	East Hanover Twp	882192	No	5	1%				X
Morris	Florham Park Boro	885221	No	8	12%		X		
Morris	Hanover Twp	882187	Yes	656	93%	X			
Morris	Harding Twp	882195	Yes	183	95%	X			
Morris	Jefferson Twp	882210	Yes	668	100%	X			
Morris	Kinnelon Boro	885269	Yes	309	100%	X			
Morris	Lincoln Park Boro	885277	No	826	83%	X			
Morris	Long Hill Twp	882196	No	218	38%		X		
Morris	Mendham Boro	885296	Yes	142	100%		X		
Morris	Mendham Twp	882200	Yes	167	100%	X			
Morris	Mine Hill Twp	882202	Yes	184	100%	X			
Morris	Montville Twp	882207	Yes	913	93%	X			
Morris	Morris Plains Boro	885308	Yes	317	92%	X			
Morris	Morris Twp	882193	Yes	1,042	91%	X			
Morris	Morristown Town	885309	Yes	866	93%	X			
Morris	Mount Arlington Boro	885312	Yes	300	100%	X			
Morris	Mount Olive Twp	882197	Yes	924	97%	X			
Morris	Mountain Lakes Boro	885310	Yes	204	100%	X			
Morris	Netcong Boro	885316	Yes	103	100%	X			
Morris	Parsippany-Troy Hills Twp	882206	Yes	2,215	100%	X			
Morris	Pequannock Twp	882208	Yes	82	90%	X			
Morris	Randolph Twp	882201	Yes	1,065	100%			X	
Morris	Riverdale Boro	885371	Yes	95	90%	X			
Morris	Rockaway Boro	885374	Yes	342	99%	X			
Morris	Rockaway Twp	882209	Yes	1,188	100%	X			
Morris	Roxbury Boro	882203	Yes	728	100%	X			
Morris	Victory Gardens Boro	885427	Yes	55	100%	X			
Morris	Washington Twp	882198	Yes	618	100%	X			
Morris	Wharton Boro	885443	Yes	519	100%	X			

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Passaic	Bloomingdale Boro	885161	Yes	159	90%				X
Passaic	Clifton City	885188	No	4,303	85%		X		
Passaic	Haledon Boro	885240	No	186	57%				X
Passaic	Little Falls Twp	882313	No	224	49%				X
Passaic	North Haledon Boro	885325	No	70	18%				X
Passaic	Passaic City	885342	No	3,704	85%		X		
Passaic	Paterson City	885343	No	8,127	85%		X		
Passaic	Pompton Lakes Boro	885359	Yes	343	100%	X			
Passaic	Prospect Park Boro	885362	No	365	82%		X		
Passaic	Ringwood Boro	885370	Yes	413	90%	X			
Passaic	Totowa Boro	885420	No	353	58%				X
Passaic	Wanaque Boro	885431	Yes	414	95%	X			
Passaic	Wayne Twp	882314	No	2,514	92%			X	
Passaic	West Milford Twp	882315	Yes	896	100%	X			
Passaic	Woodland Park Boro	885439	No	903	73%		X		
Somerset	Bedminster Twp	882176	Yes	246	90%	X			
Somerset	Bernards Twp	882174	Yes	592	90%	X			
Somerset	Bernardsville Boro	885159	Yes	216	90%	X			
Somerset	Bound Brook Boro	885166	No	224	40%		X		
Somerset	Branchburg Twp	882175	No	270	34%		X		
Somerset	Bridgewater Twp	882171	No	951	38%		X		
Somerset	Far Hills Boro	885217	Yes	36	90%	X			
Somerset	Franklin Twp	882170	No	858	25%				X
Somerset	Green Brook Twp	882172	No	177	42%		X		
Somerset	Hillsborough Twp	882169	No	722	38%		X		
Somerset	Manville Boro	885291	No	296	44%		X		
Somerset	Millstone Boro	885302	No	7	20%		X		
Somerset	Montgomery Twp	882168	No	353	36%		X		
Somerset	North Plainfield Boro	885326	No	394	44%		X		
Somerset	Peapack-Gladstone Boro	885345	Yes	80	90%	X			
Somerset	Raritan Boro	885365	No	180	42%		X		
Somerset	Somerville Boro	885398	No	275	44%		X		
Somerset	South Bound Brook Boro	885401	No	97	39%		X		
Somerset	Warren Twp	882173	No	284	35%		X		
Somerset	Watchung Boro	885433	No	122	31%		X		

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						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Sussex	Andover Twp	882266	No	5	1%	X			
Sussex	Byram Twp	882263	Yes	210	88%	X			
Sussex	Franklin Boro	885224	Yes	154	100%	X			
Sussex	Green Twp	882264	Yes	117	100%	X			
Sussex	Hamburg Boro	885241	Yes	113	100%	X			
Sussex	Hardyston Twp	882269	Yes	279	98%	X			
Sussex	Hopatcong Boro	885259	Yes	543	100%	X			
Sussex	Lafayette Twp	882260	No	8	4%	X			
Sussex	Newton Town	885322	No	328	98%	X			
Sussex	Ogdensburg Boro	885335	Yes	60	98%	X			
Sussex	Sparta Twp	882265	Yes	734	100%	X			
Sussex	Stanhope Boro	885408	Yes	111	100%	X			
Sussex	Vernon Twp	882258	Yes	895	100%	X			
Union	Berkeley Heights Twp	882218	No	339	38%		X		
Union	Clark Twp	882216	No	395	44%		X		
Union	Cranford Twp	882214	No	605	45%		X		
Union	Elizabeth City	885205	No	3,235	66%			X	
Union	Fanwood Boro	885216	No	202	45%		X		
Union	Garwood Boro	885229	No	122	45%		X		
Union	Hillside Twp	882211	No	476	45%		X		
Union	Kenilworth Boro	885267	No	245	45%		X		
Union	Linden City	885278	No	922	44%		X		
Union	Mountainside Boro	885311	No	200	44%		X		
Union	New Providence Boro	885321	No	277	39%		X		
Union	Plainfield City	885355	No	818	44%		X		
Union	Rahway City	885363	No	20	1%				X
Union	Roselle Boro	885379	No	423	44%		X		
Union	Roselle Park Boro	885380	No	273	45%		X		
Union	Scotch Plains Twp	882217	No	594	44%		X		
Union	Springfield Twp	882213	No	296	40%		X		
Union	Summit City	885412	No	431	39%		X		
Union	Union Twp	882212	No	1,355	45%		X		
Union	Westfield Town	885436	No	780	44%		X		
Union	Winfield Twp	882215	No	19	44%				X
Warren	Allamuchy Twp	882243	Yes	211	100%	X			

County Name	Municipality Name	GNIS Number *	Highlands Municipality	Potable Use From Highlands (MGY)	Percentage Highlands Water Use	Direct Sources ++		Bulk Purchases ++	
						Inside Highlands	Downstream of Highlands	Inside Highlands	Downstream of Highlands
Warren	Alpha Boro	885138	Yes	142	99%	X			
Warren	Belvidere Town	885156	Yes	84	100%	X			
Warren	Franklin Twp	882251	Yes	96	100%	X			
Warren	Frelinghuysen Twp	882240	Yes	82	100%	X			
Warren	Greenwich Twp	882253	Yes	67	100%	X			
Warren	Hackettstown Town	885237	Yes	625	99%	X			
Warren	Harmony Twp	882248	Yes	170	100%	X			
Warren	Hope Twp	882242	Yes	74	100%	X			
Warren	Independence Twp	882244	Yes	114	100%	X			
Warren	Liberty Twp	882245	Yes	107	100%	X			
Warren	Lopatcong Twp	882252	Yes	37	100%	X			
Warren	Mansfield Twp	882249	Yes	186	100%	X			
Warren	Oxford Twp	882247	Yes	99	100%	X			
Warren	Phillipsburg Town	885350	Yes	1,104	100%	X			
Warren	Pohatcong Twp	882254	Yes	55	100%	X			
Warren	Washington Boro	885432	Yes	277	99%	X			
Warren	Washington Twp	882250	Yes	358	100%	X			
Warren	White Twp	882246	Yes	1,355	100%	X			

* GNIS Number: Geographic Names Information System unique identification number which refers to one of NJ's 565 municipalities.

To view GIS data with GNIS Number, click here.

++ Direct Sources and Bulk Purchases categories marked are the municipality's primary source of water. Other sources may also provide some water to the municipality.