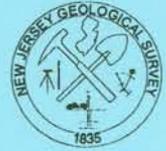




**New Jersey Geological Survey
Technical Memorandum 01-1**



**DEVELOPMENT OF NEW JERSEY
DROUGHT REGIONS**

STATE OF NEW JERSEY

Donald T. DiFrancesco, *Acting Governor*

Department of Environmental Protection

Robert C. Shinn, Jr., *Commissioner*

Policy and Planning

Leslie McGeorge, *Assistant Commissioner*

Division of Science, Research and Technology

Martin G. Rosen, *Acting Director*

Geological Survey

Karl Muessig, *State Geologist*

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

The mission of the New Jersey Department of Environmental Protection is to assist the residents of New Jersey in preserving, sustaining, protecting and enhancing the environment to ensure the integration of high environmental quality, public health and economic vitality.

NEW JERSEY GEOLOGICAL SURVEY

The mission of the New Jersey Geological Survey is to map, research, interpret and provide scientific information regarding the state's geology and ground-water resources. This information supports the regulatory and planning functions of DEP and other governmental agencies and provides the business community and public with information necessary to address environmental concerns and make economic decisions.

for more information contact:

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Division of Science, Research and Technology

Geological Survey

P.O. Box 427

Trenton, NJ 08625-0427

(609) 984-6587

<http://www.state.nj.us/dep/njgs>

Water Supply Administration

P.O. Box 426

Trenton, NJ 08625-0426

(609) 292-7219

New Jersey Geological Survey
Technical Memorandum 01-1

Development of New Jersey Drought Regions

by

Jeffrey L. Hoffman

**New Jersey Department of Environmental Protection
Division of Science, Research and Technology
Geological Survey
PO Box 427
Trenton, NJ 08625
2001
Printed on recycled paper**

New Jersey Geological Survey Technical Memorandums are brief reports prepared for timely response to issues of concern. They are published by the New Jersey Geological Survey, P.O. box 427, Trenton, NJ 08625-0427. This report may be reproduced in whole or part provided that suitable reference to the source of the copied material is provided.

Other Survey and Department maps and reports may be obtained from:

DEP Maps and Publication Sales Office
PO Box 438
Trenton, NJ 08625-0438

A price list is available on request.

More information is available on the New Jersey Geological Survey's web site:

<http://www.state.nj.us/dep/njgs/index.html>

CONTENTS

Abstract	1
Purpose	1
Development History	2
Limitations	6
Water Supply Considerations in Each Region	6
Summary and Conclusions	8
References	8

FIGURES

Figure 1. Water regions in New Jersey	4
2. Drought regions in New Jersey	5

TABLES

Table 1. Percent of each county in each drought region	3
2. Average sources of potable water withdrawn in each drought region, 1990-1999	7
3. Relative importance of different sources to potable water supply in each drought region.....	7

APPENDIX

Appendix 1. List of municipalities and assigned drought region	9
--	---

"Man can do little to modify the natural climatic phenomena that combine to cause droughts. He can, however, do much to lessen their impact on his activities through foresightedness in maintaining hold-over storage; in digging deeper wells or in lowering intakes to ground-water supplies; in adopting all practices known to conserve water; in limiting or adjusting economic development to assured sources of water supply; and in adopting a mode or scale of living in conformity with the dictates of nature."

"A drought situation is also created if, in the economic development of a region, man creates a demand for more water than is normally available."

Hoyt, 1942.

Development of New Jersey Drought Regions

Abstract

The Department of Environmental Protection (DEP) has divided New Jersey into six drought regions. This division will allow the DEP to impose different drought restrictions in each designated region, thereby permitting more effective response to water-supply shortages across New Jersey. The six areas are called the Northeast, Central, Coastal North, Coastal South, Northwest and Southwest drought regions.

The regions are roughly based on five water regions established by the DEP for its watershed-based management approach. An additional region (Coastal North) was added because of the water supply characteristics of the Monmouth County area. All borders were moved so as to match municipal boundaries in order to assist enforcement of mandated water cutbacks during drought emergencies.

The drought regions are intended to assist the DEP in making regulatory decisions during periods of drought or impending drought. If necessary, region boundaries will be changed as needed to increase their usefulness.

Purpose

New Jersey is not usually affected uniformly by droughts. Climate patterns, water-supply options and demographics typically cause different parts of New Jersey to experience different degrees of adversity during drought. If the State's drought response efforts (such as mandatory water restrictions) could target only the affected areas, hardship on water users in other areas would decrease.

New Jersey has had no systematic way of identifying different regions for application of different levels of drought response. Water restrictions have generally been imposed statewide, regardless of local water-supply conditions. The drought regions presented here will allow selective application of drought restrictions geographically. Drought indicators will be developed for each region to provide a more quantitative way of estimating the severity of droughts in each area using region-specific drought indicators.

The water-supply infrastructure of New Jersey crosses drought region boundaries. Water is normally transferred between regions. During droughts these transfers may become more important. Water shortages in one region may require transfers from another drought region and result in increased conservation measures in both.

During the 1998-1999 drought DEP established two internal groups to oversee drought-related work. The Drought Policy Committee is mostly DEP management, purveyors and federal experts and addresses policy issues. The Drought Technical Committee is largely composed of staff-level DEP employees who analyze basic data and make recommendations to the Drought Policy Committee. Both committees have reviewed and approved the drought regions presented here.

Development History

Drought regions were initially developed with several goals in mind: (1) they should be based roughly on New Jersey's watersheds, (2) boundaries must match municipality boundaries, and (3) water-supply characteristics in each region must be similar.

The Division of Watershed Management (Cohen, 1997) divides New Jersey into 5 water regions (fig. 1). The first version of New Jersey drought regions (which resulted in the Northeast, Central, Southeast, Northwest and Southwest drought regions) was based on modifying water region boundaries to account for local water supply conditions. These modifications are as follows.

A large portion of Cumberland County drains to the Delaware Bay. It comes under the jurisdiction of the Delaware River Basin Commission (DRBC). Thus it might be placed in the Southwest drought region. However, this area's water-supply characteristics are more similar to the Southeast drought region than the remainder of the Southwest. Additionally, since this region drains to below the salt-water line, the DRBC isn't as concerned about its effects on the Delaware River during droughts. For these reasons, the area draining to the Delaware Bay in Cumberland County was moved to the Southeast drought region.

Another reassigned area is in Monmouth County. This county has several reservoirs and is less dependent on ground water than the rest of the southeast region. For this reason, it was initially placed in the Central drought region.

These boundaries were initially based on watersheds. To assist with the potential enforcement of water restrictions during an emergency, drought regions must match municipal boundaries. Any municipality that was split between drought regions was examined individually. Generally, if more than 75% of a municipality was in a drought region, it was assigned entirely to that region. The water-supply characteristics of the remaining split municipalities were examined and each was assigned to the drought region it most closely resembled in terms of water supply.

This initial version of New Jersey drought regions was distributed to interested parties in the DEP. The Drought Policy Committee approved it in December 1999. After this approval comments from water purveyors resulted in 2 changes. This led to the May 2000 version of the drought regions (fig. 2).

The primary comment from the New Jersey Water Supply Authority on the December 1999 version of the drought regions was that during the water shortages of 1999, water supply concerns in Monmouth and northern Ocean Counties were different from either the Central and Southeast drought regions. This justified creating a new drought region. Thus Monmouth County and northern Ocean County were put into a separate drought region called the Coastal North drought region. The remainder of the Southeast drought region was renamed the Coastal South drought region.

A second change reassigned those municipalities in Mercer County originally in the Northwest drought region to the Southwest drought region. This was done because much of the water supply for this area is surface water withdrawn from the Delaware River near Trenton. This reassignment is not exact given that the water supply for Pennington and Hopewell Boroughs more closely resembles the water supply of the western portion of the Central drought region. But because Pennington and Hopewell are in the Delaware River Basin it seems best to keep them in a drought region draining to the Delaware River. This also helps the DEP's drought efforts remain in alignment with the Delaware River Basin Commission's drought-management efforts.

Table 1 shows the percent of each county in each drought region for the May 2000 version. Appendix A is a list of municipalities, sorted by county, with assigned drought region.

Table 1. Percent of each county in each drought region

County	Drought Region					
	Northwest	Central	Northeast	Southwest	Coastal North	Coastal South
Atlantic	-	-	-	-	-	100%
Bergen	-	-	100%	-	-	-
Burlington	-	-	-	55%	-	45%
Camden	-	-	-	56%	-	44%
Cape May	-	-	-	-	-	100%
Cumberland	-	-	-	-	-	100%
Essex	-	-	100%	-	-	-
Gloucester	-	-	-	58%	-	42%
Hudson	-	-	100%	-	-	-
Hunterdon	45%	55%	-	-	-	-
Mercer	-	27%	-	73%	-	-
Middlesex	-	100%	-	-	-	-
Monmouth	-	-	-	10%	90%	-
Morris	-	22%	78%	-	-	-
Ocean	-	-	-	-	53%	47%
Passaic	-	-	100%	-	-	-
Salem	-	-	-	75%	-	25%
Somerset	-	100%	-	-	-	-
Sussex	100%	-	-	-	-	-
Union	-	100%	-	-	-	-
Warren	100%	-	-	-	-	-

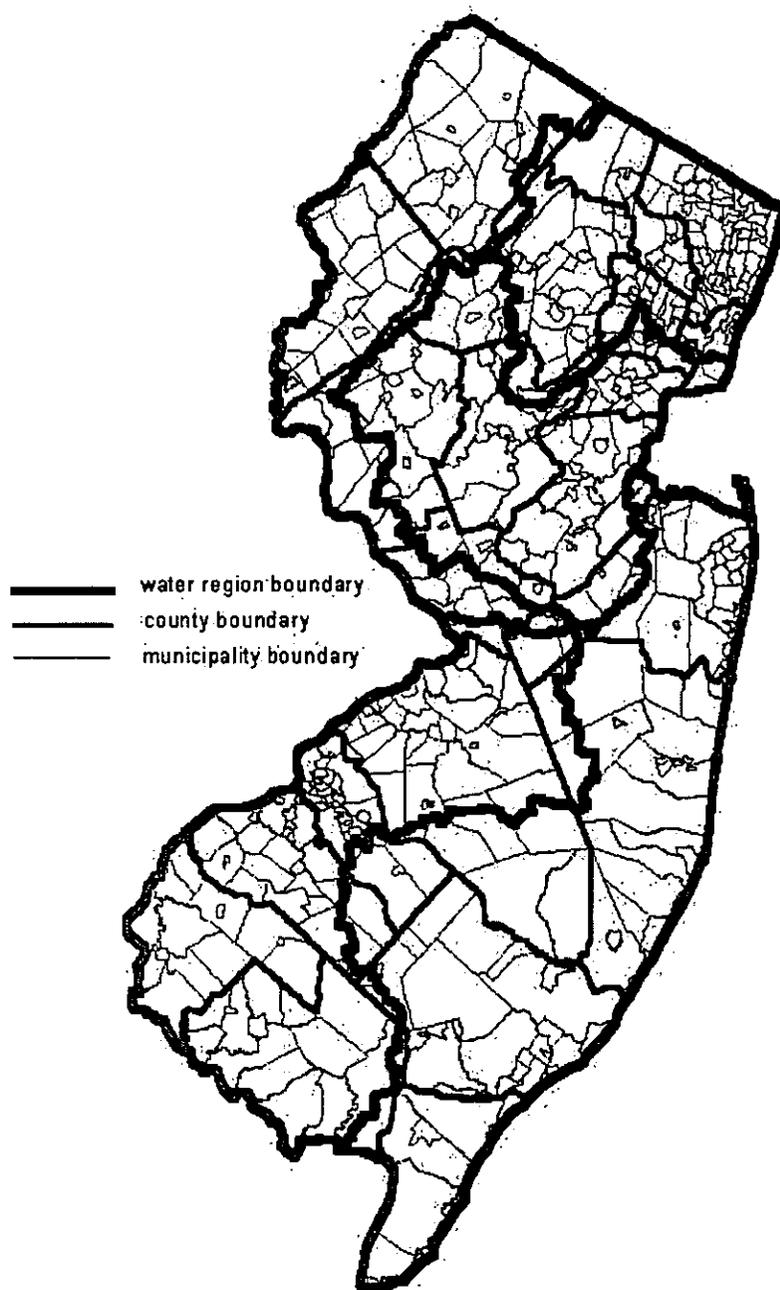


Figure 1. Water region in New Jersey (after Cohen, 1997)

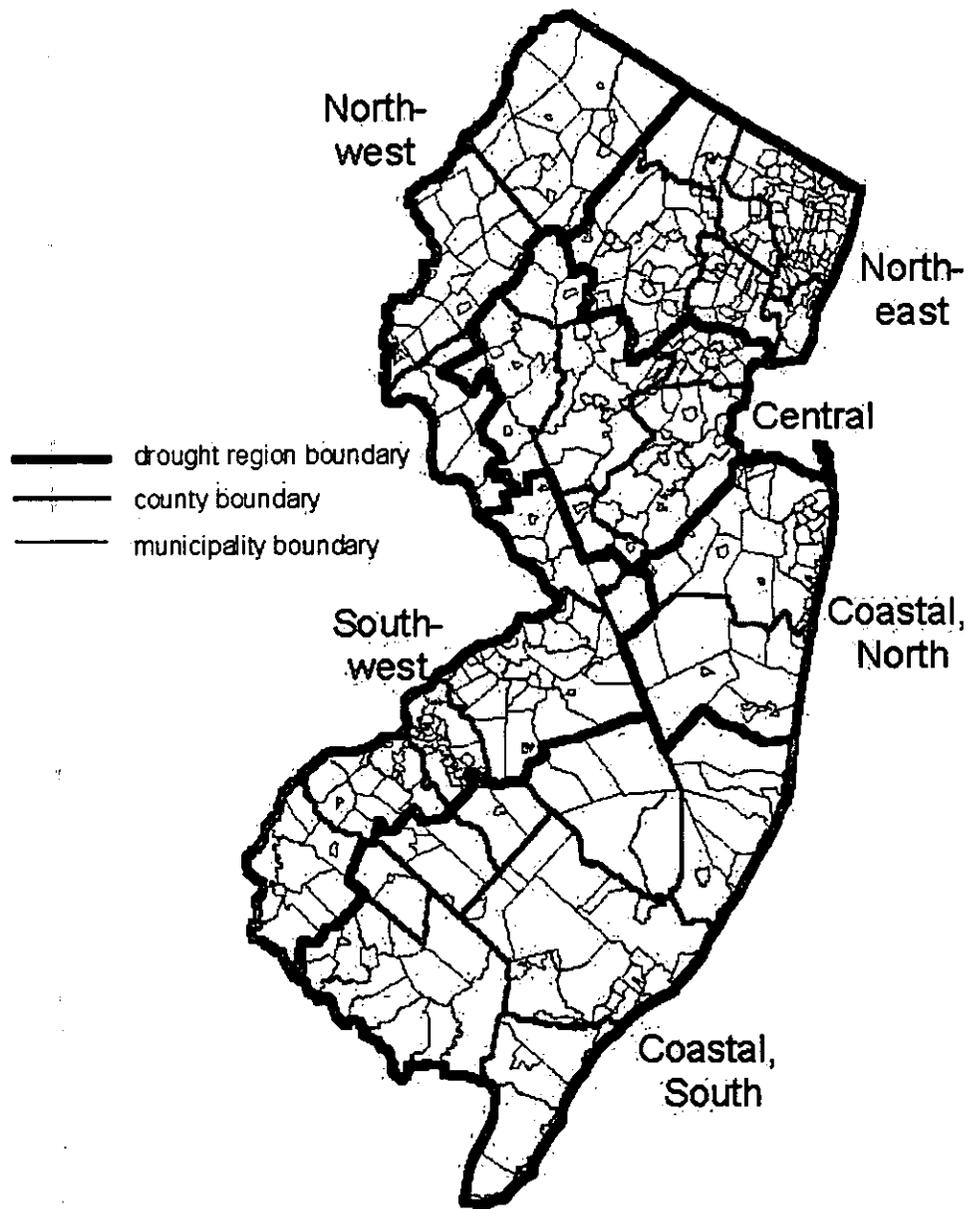


Figure 2. Drought regions in New Jersey.

Limitations

The division of New Jersey into six drought regions is based on matching watershed boundaries and areas of similar water-supply characteristics to municipal boundaries. However, this division is not without complication. For example, along the border of the Central and Northeast drought regions numerous interconnections between water suppliers move water across the border. During droughts there may be significant water movements across the border and, in fact, part of the DEP's water-supply policy is to move water from areas less affected by drought to areas with shortages.

Watersheds do not match municipal boundaries. The requirement that drought region boundaries match municipal boundaries results in numerous mismatches. But for administrative purposes this is necessary. Thus there are numerous cases where the headwaters of a stream is found in one drought region, while most of the stream's watershed is in a different one.

Water Supply Considerations in Each Region

Since drought restrictions result from concern about water supplies, the drought regions reflect differing water-supply sources and distribution patterns. The primary division is between ground and surface water but an additional distinction exists between surface water withdrawn from reservoirs versus water directly withdrawn from rivers.

Table 2 shows average annual withdrawals for potable use, by source, for the six drought regions in New Jersey (fig. 2) for the period 1990-99. This demonstrates the relative importance of surface and ground water for supply in these regions. The available data do not distinguish water withdrawn from reservoirs from river withdrawals. These two components are combined under surface-water withdrawals.

Table 3 is an evaluation of the relative importance of ground water, reservoir and river withdrawals to each drought regions. For example, reservoirs are a major source of water in the Northeast drought region but are not a significant source in the Coastal South region. The rankings are relative to each drought region.

Table 2. Average sources of potable water withdrawn in each drought region, 1990-1999.

Water Region	Potable Withdrawals by Source				Average potable withdrawals (million gallons/year)
	surface-water withdrawals		ground-water withdrawals		
	Million gallons/year	percent of region average	million gallons/year	percent of region average	
Northwest	120,359	93%	8,769	7%	129,129
Central	120,359	79%	31,880	21%	152,240
Northeast	47,980	53%	42,850	47%	90,830
Southwest	64,519	58%	46,734	42%	111,254
Coastal, north	19,498	46%	23,110	54%	42,608
Coastal, south	49,994	62%	31,272	38%	81,266

Notes:

- Data are from Hoffman and Lieberman, 2000 and files of the NJ Geological Survey. They do not break out surface-water withdrawals as to whether source was a reservoir or stream.
- Data show withdrawals by region, not where water is actually consumed. The Delaware and Raritan Canal withdrawals a significant volume of water from the Northwest drought region (up to 100 million gallons per day under normal operation) for eventual consumption in the Central drought region.
- Drought regions are shown on figure 2.

Table 3. Relative importance of different sources to potable water supply in each drought region.

Drought Region	Water Source		
	Reservoir Withdrawals	River withdrawals	Ground-water withdrawals
Northwest	Minor	Major	Major
Central	Major	Major	Minor
Northeast	Major	Major	Minor
Southwest	None	Major	Major
Coastal, north	Minor	Minor	Major
Coastal, south	Minor	Minor	Major

Notes:

- Rankings are relative. A minor source of water to one drought region may represent a larger quantity of water than a major source of water in another.
- Some reservoir releases are to surface water for downstream intakes.
- Drought regions are shown on figure 2.
- Data from Paul Schorr, DEP, Water Supply Administration, personal communication, 2000.

Summary and Conclusions

New Jersey has been divided into six drought regions based on hydrology, water-supply infrastructure, and municipal boundaries. These regions are the Northeast, Central, Coastal North, Coastal South, Northwest and Southwest drought regions. The regions are roughly based on New Jersey's 5 water regions (devised for watershed-based management) with an additional drought region added to account for specific water-supply issues in Monmouth and northern Ocean Counties. Some areas were assigned to a neighboring drought region if specific water-supply patterns in the areas better matched the neighbor's.

These drought regions will be the basis for declaring region-specific water drought restrictions during water shortages. All drought region boundaries match municipal boundaries in order to assist enforcement of mandated conservation measures during drought emergencies.

The water-supply infrastructure of New Jersey moves water across the defined drought boundaries. During droughts it may be necessary to transfer water from areas not in difficulty to areas that are in water shortage. This may result in requiring water conservation measures in all of the drought regions concerned.

References

- Cohen, Sandra, 1997, Draft statewide watershed management framework document for the State of New Jersey: N.J. Department of Environmental Protection, Office of Environmental Planning, Trenton, N.J., 78p.
- Hoffman, J.L. and Lieberman, S.E., 2000, New Jersey water withdrawals 1990-1996: N.J. Geological Survey, Trenton, N.J., 121p.
- Hoyt, W.G., 1942, Droughts, *in* Meinzer, O.E., editor, Hydrology, New York, McGraw-Hill Book Co., Inc., p. 579-591.

Appendix 1. List of municipalities and assigned drought region

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Atlantic County						
Absecon City	-	-	-	-	-	•
Atlantic City	-	-	-	-	-	•
Brigantine City	-	-	-	-	-	•
Buena Boro	-	-	-	-	-	•
Buena Vista Twp	-	-	-	-	-	•
Corbin City	-	-	-	-	-	•
Egg Harbor Twp	-	-	-	-	-	•
Egg Harbor City	-	-	-	-	-	•
Estell Manor City	-	-	-	-	-	•
Folsom Boro	-	-	-	-	-	•
Galloway Twp	-	-	-	-	-	•
Hamilton Twp	-	-	-	-	-	•
Hammonton Town	-	-	-	-	-	•
Linwood City	-	-	-	-	-	•
Longport Boro	-	-	-	-	-	•
Margate City	-	-	-	-	-	•
Mullica Twp	-	-	-	-	-	•
Northfield City	-	-	-	-	-	•
Pleasantville City	-	-	-	-	-	•
Port Republic City	-	-	-	-	-	•
Somers Point City	-	-	-	-	-	•
Ventnor City	-	-	-	-	-	•
Weymouth Twp	-	-	-	-	-	•
Bergen County						
Allendale Boro	-	-	•	-	-	-
Alpine Boro	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Bergenfield Boro	-	-	•	-	-	-
Bogota Boro	-	-	•	-	-	-
Carlstadt Boro	-	-	•	-	-	-
Cliffside Park Boro	-	-	•	-	-	-
Closter Boro	-	-	•	-	-	-
Cresskill Boro	-	-	•	-	-	-
Demarest Boro	-	-	•	-	-	-
Dumont Boro	-	-	•	-	-	-
East Rutherford Boro	-	-	•	-	-	-
Edgewater Boro	-	-	•	-	-	-
Elmwood Park Boro	-	-	•	-	-	-
Emerson Boro	-	-	•	-	-	-
Englewood City	-	-	•	-	-	-
Englewood Cliffs Boro	-	-	•	-	-	-
Fair Lawn Boro	-	-	•	-	-	-
Fairview Boro	-	-	•	-	-	-
Fort Lee Boro	-	-	•	-	-	-
Franklin Lakes Boro	-	-	•	-	-	-
Garfield City	-	-	•	-	-	-
Glen Rock Boro	-	-	•	-	-	-
Hackensack City	-	-	•	-	-	-
Harrington Park Boro	-	-	•	-	-	-
Hasbrouck Heights Boro	-	-	•	-	-	-
Haworth Boro	-	-	•	-	-	-
Hillsdale Boro	-	-	•	-	-	-
Hohokus Boro	-	-	•	-	-	-
Leonida Boro	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Little Ferry Boro	-	-	•	-	-	-
Lodi Boro	-	-	•	-	-	-
Lyndhurst Twp	-	-	•	-	-	-
Mahwah Twp	-	-	•	-	-	-
Maywood Boro	-	-	•	-	-	-
Midland Park Boro	-	-	•	-	-	-
Montvale Boro	-	-	•	-	-	-
Moonachie Boro	-	-	•	-	-	-
New Milford Boro	-	-	•	-	-	-
North Arlington Boro	-	-	•	-	-	-
Northvale Boro	-	-	•	-	-	-
Norwood Boro	-	-	•	-	-	-
Oakland Boro	-	-	•	-	-	-
Old Tappan Boro	-	-	•	-	-	-
Oradell Boro	-	-	•	-	-	-
Palisades Park Boro	-	-	•	-	-	-
Paramus Boro	-	-	•	-	-	-
Park Ridge Boro	-	-	•	-	-	-
Ramsey Boro	-	-	•	-	-	-
Ridgefield Boro	-	-	•	-	-	-
Ridgefield Park Village	-	-	•	-	-	-
Ridgewood Village	-	-	•	-	-	-
River Edge Boro	-	-	•	-	-	-
River Vale Twp	-	-	•	-	-	-
Rochelle Park Twp	-	-	•	-	-	-
Rockleigh Boro	-	-	•	-	-	-
Rutherford Boro	-	-	•	-	-	-
Saddle Brook Twp	-	-	•	-	-	-
Saddle River Boro	-	-	•	-	-	-
South Hackensack Twp	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Teaneck Twp	-	-	•	-	-	-
Tenafly Boro	-	-	•	-	-	-
Teterboro Boro	-	-	•	-	-	-
Upper Saddle River Boro	-	-	•	-	-	-
Waldwick Boro	-	-	•	-	-	-
Wallington Boro	-	-	•	-	-	-
Washington Twp	-	-	•	-	-	-
Westwood Boro	-	-	•	-	-	-
Woodcliff Lake Boro	-	-	•	-	-	-
Wood-Ridge Boro	-	-	•	-	-	-
Wyckoff Twp	-	-	•	-	-	-
Burlington County						
Bass River Twp	-	-	-	-	-	•
Beverly City	-	-	-	•	-	-
Bordentown City	-	-	-	•	-	-
Bordentown Twp	-	-	-	•	-	-
Burlington City	-	-	-	•	-	-
Burlington Twp	-	-	-	•	-	-
Chesterfield Twp	-	-	-	•	-	-
Cinnaminson Twp	-	-	-	•	-	-
Delanco Twp	-	-	-	•	-	-
Delran Twp	-	-	-	•	-	-
Eastampton Twp	-	-	-	•	-	-
Edgewater Park Twp	-	-	-	•	-	-
Evesham Twp	-	-	-	•	-	-
Fieldsboro Boro	-	-	-	•	-	-
Florence Twp	-	-	-	•	-	-
Hainesport Twp	-	-	-	•	-	-
Lumberton Twp	-	-	-	•	-	-
Mansfield Twp	-	-	-	•	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Maple Shade Twp	-	-	-	•	-	-
Medford Twp	-	-	-	•	-	-
Medford Lakes Boro	-	-	-	•	-	-
Moorestown Twp	-	-	-	•	-	-
Mount Holly Twp	-	-	-	•	-	-
Mount Laurel Twp	-	-	-	•	-	-
New Hanover Twp	-	-	-	•	-	-
North Hanover Twp	-	-	-	•	-	-
Palmyra Boro	-	-	-	•	-	-
Pemberton Boro	-	-	-	•	-	-
Pemberton Twp	-	-	-	•	-	-
Riverside Twp	-	-	-	•	-	-
Riverton Boro	-	-	-	•	-	-
Shamong Twp	-	-	-	-	-	•
Southampton Twp	-	-	-	•	-	-
Springfield Twp	-	-	-	•	-	-
Tabernacle Twp	-	-	-	-	-	•
Washington Twp	-	-	-	-	-	•
Westampton Twp	-	-	-	•	-	-
Willingboro Twp	-	-	-	•	-	-
Woodland Twp	-	-	-	-	-	•
Wrightstown Boro	-	-	-	•	-	-
Camden County						
Audubon Boro	-	-	-	•	-	-
Audubon Park Boro	-	-	-	•	-	-
Barrington Boro	-	-	-	•	-	-
Bellmawr Boro	-	-	-	•	-	-
Berlin Boro	-	-	-	-	-	•
Berlin Twp	-	-	-	•	-	-
Brooklawn Boro	-	-	-	•	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Camden City	-	-	-	•	-	-
Cherry Hill Twp	-	-	-	•	-	-
Chesilhurst Boro	-	-	-	-	-	•
Clementon Boro	-	-	-	•	-	-
Collingswood Boro	-	-	-	•	-	-
Gibbsboro Boro	-	-	-	•	-	-
Gloucester Twp	-	-	-	•	-	-
Gloucester City	-	-	-	•	-	-
Haddon Twp (East)	-	-	-	•	-	-
Haddonfield Boro	-	-	-	•	-	-
Haddon Heights Boro	-	-	-	•	-	-
Hi-Nella Boro	-	-	-	•	-	-
Laurel Springs Boro	-	-	-	•	-	-
Lawnside Boro	-	-	-	•	-	-
Lindenwold Boro	-	-	-	•	-	-
Magnolia Boro	-	-	-	•	-	-
Merchantville Boro	-	-	-	•	-	-
Mount Ephraim Boro	-	-	-	•	-	-
Oaklyn Boro	-	-	-	•	-	-
Pennsauken Twp	-	-	-	•	-	-
Pine Hill Boro	-	-	-	•	-	-
Pine Valley Boro	-	-	-	•	-	-
Runnemede Boro	-	-	-	•	-	-
Somerdale Boro	-	-	-	•	-	-
Stratford Boro	-	-	-	•	-	-
Tavistock Boro	-	-	-	•	-	-
Voorhees Twp	-	-	-	•	-	-
Waterford Twp	-	-	-	-	-	•
Winslow Twp	-	-	-	-	-	•
Woodlynne Boro	-	-	-	•	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Cape May County						
Avalon Boro	-	-	-	-	-	•
Cape May City	-	-	-	-	-	•
Cape May Point Boro	-	-	-	-	-	•
Dennis Twp	-	-	-	-	-	•
Lower Twp	-	-	-	-	-	•
Middle Twp	-	-	-	-	-	•
North Wildwood City	-	-	-	-	-	•
Ocean City	-	-	-	-	-	•
Sea Isle City	-	-	-	-	-	•
Stone Harbor Boro	-	-	-	-	-	•
Upper Twp	-	-	-	-	-	•
West Cape May Boro	-	-	-	-	-	•
West Wildwood Boro	-	-	-	-	-	•
Wildwood City	-	-	-	-	-	•
Wildwood Crest Boro	-	-	-	-	-	•
Woodbine Boro	-	-	-	-	-	•
Cumberland County						
Bridgeton City	-	-	-	-	-	•
Commercial Twp	-	-	-	-	-	•
Deerfield Twp	-	-	-	-	-	•
Downe Twp	-	-	-	-	-	•
Fairfield Twp	-	-	-	-	-	•
Greenwich Twp	-	-	-	-	-	•
Hopewell Twp	-	-	-	-	-	•
Lawrence Twp	-	-	-	-	-	•
Maurice River Twp	-	-	-	-	-	•
Millville City	-	-	-	-	-	•
Shiloh Boro	-	-	-	-	-	•
Stow Creek Twp	-	-	-	-	-	•

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Upper Deerfield Twp	-	-	-	-	-	•
Vineland City	-	-	-	-	-	•
Essex County						
Belleville Town	-	-	•	-	-	-
Bloomfield Town	-	-	•	-	-	-
Caldwell Boro	-	-	•	-	-	-
Cedar Grove Twp	-	-	•	-	-	-
East Orange City	-	-	•	-	-	-
Essex Fells Boro	-	-	•	-	-	-
Fairfield Boro	-	-	•	-	-	-
Glen Ridge Boro	-	-	•	-	-	-
Irvington Town	-	-	•	-	-	-
Livingston Twp	-	-	•	-	-	-
Maplewood Twp	-	-	•	-	-	-
Millburn Twp	-	-	•	-	-	-
Montclair Town	-	-	•	-	-	-
Newark City	-	-	•	-	-	-
North Caldwell Boro	-	-	•	-	-	-
Nutley Town	-	-	•	-	-	-
Orange City	-	-	•	-	-	-
Roseland Boro	-	-	•	-	-	-
South Orange Village	-	-	•	-	-	-
Verona Boro	-	-	•	-	-	-
West Caldwell Boro	-	-	•	-	-	-
West Orange Town	-	-	•	-	-	-
Gloucester County						
Clayton Boro	-	-	-	-	-	•
Deptford Twp	-	-	-	•	-	-
East Greenwich Twp	-	-	-	•	-	-
Elk Twp	-	-	-	-	-	•

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Franklin Twp	-	-	-	-	-	•
Glassboro Boro	-	-	-	-	-	•
Greenwich Twp	-	-	-	•	-	-
Harrison Twp	-	-	-	•	-	-
Logan Twp	-	-	-	•	-	-
Mantua Twp	-	-	-	•	-	-
Monroe Twp	-	-	-	-	-	•
National Park Boro	-	-	-	•	-	-
Newfield Boro	-	-	-	-	-	•
Paulsboro Boro	-	-	-	•	-	-
Pitman Boro	-	-	-	•	-	-
South Harrison Twp	-	-	-	•	-	-
Swedesboro Boro	-	-	-	•	-	-
Washington Twp	-	-	-	•	-	-
Wenonah Boro	-	-	-	•	-	-
West Deptford Twp	-	-	-	•	-	-
Westville Boro	-	-	-	•	-	-
Woodbury City	-	-	-	•	-	-
Woodbury Heights Boro	-	-	-	•	-	-
Woolwich Twp	-	-	-	•	-	-
Hudson County						
Bayonne City	-	-	•	-	-	-
East Newark Boro	-	-	•	-	-	-
Guttenberg Town	-	-	•	-	-	-
Harrison Town	-	-	•	-	-	-
Hoboken City	-	-	•	-	-	-
Jersey City	-	-	•	-	-	-
Kearny Town	-	-	•	-	-	-
North Bergen Twp	-	-	•	-	-	-
Secaucus Town	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Union City	-	-	•	-	-	-
Weehawken Twp	-	-	•	-	-	-
West New York Town	-	-	•	-	-	-
Hunterdon County						
Alexandria Twp	•	-	-	-	-	-
Bethlehem Twp	•	-	-	-	-	-
Bloomsbury Boro	•	-	-	-	-	-
Califon Boro	-	•	-	-	-	-
Clinton Town	-	•	-	-	-	-
Clinton Twp	-	•	-	-	-	-
Delaware Twp	•	-	-	-	-	-
East Amwell Twp	-	•	-	-	-	-
Flemington Boro	-	•	-	-	-	-
Franklin Twp	•	-	-	-	-	-
Frenchtown Boro	•	-	-	-	-	-
Glen Gardner Boro	-	•	-	-	-	-
Hampton Boro	•	-	-	-	-	-
High Bridge Boro	-	•	-	-	-	-
Holland Twp	•	-	-	-	-	-
Kingwood Twp	•	-	-	-	-	-
Lambertville City	•	-	-	-	-	-
Lebanon Boro	-	•	-	-	-	-
Lebanon Twp	-	•	-	-	-	-
Milford Boro	•	-	-	-	-	-
Raritan Twp	-	•	-	-	-	-
Readington Twp	-	•	-	-	-	-
Stockton Boro	•	-	-	-	-	-
Tewksbury Twp	-	•	-	-	-	-
Union Twp	-	•	-	-	-	-
West Amwell Twp	•	-	-	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Mercer County						
East Windsor Twp	-	•	-	-	-	-
Ewing Twp	-	-	-	•	-	-
Hamilton Twp	-	-	-	•	-	-
Hightstown Boro	-	•	-	-	-	-
Hopewell Boro	-	-	-	•	-	-
Hopewell Twp	-	-	-	•	-	-
Lawrence Twp	-	-	-	•	-	-
Pennington Boro	-	-	-	•	-	-
Princeton Boro	-	•	-	-	-	-
Princeton Twp	-	•	-	-	-	-
Trenton City	-	-	-	•	-	-
Washington Twp	-	-	-	•	-	-
West Windsor Twp	-	•	-	-	-	-
Middlesex County						
Carteret Boro	-	•	-	-	-	-
Cranbury Twp	-	•	-	-	-	-
Dunellen Boro	-	•	-	-	-	-
East Brunswick Twp	-	•	-	-	-	-
Edison Twp	-	•	-	-	-	-
Helmetta Boro	-	•	-	-	-	-
Highland Park Boro	-	•	-	-	-	-
Jamesburg Boro	-	•	-	-	-	-
Metuchen Boro	-	•	-	-	-	-
Middlesex Boro	-	•	-	-	-	-
Milltown Boro	-	•	-	-	-	-
Monroe Twp	-	•	-	-	-	-
New Brunswick City	-	•	-	-	-	-
North Brunswick Twp	-	•	-	-	-	-
Old Bridge Twp	-	•	-	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Perth Amboy City	-	•	-	-	-	-
Piscataway Twp	-	•	-	-	-	-
Plainsboro Twp	-	•	-	-	-	-
Sayreville Boro	-	•	-	-	-	-
South Amboy City	-	•	-	-	-	-
South Brunswick Twp	-	•	-	-	-	-
South Plainfield Boro	-	•	-	-	-	-
South River Boro	-	•	-	-	-	-
Spotswood Boro	-	•	-	-	-	-
Woodbridge Twp	-	•	-	-	-	-
Monmouth County						
Aberdeen Twp	-	-	-	-	•	-
Allenhurst Boro	-	-	-	-	•	-
Allentown Boro	-	-	-	•	-	-
Asbury Park City	-	-	-	-	•	-
Atlantic Highlands Boro	-	-	-	-	•	-
Avon By The Sea Boro	-	-	-	-	•	-
Belmar Boro	-	-	-	-	•	-
Bradley Beach Boro	-	-	-	-	•	-
Brielle Boro	-	-	-	-	•	-
Colts Neck Twp	-	-	-	-	•	-
Deal Boro	-	-	-	-	•	-
Eatontown Boro	-	-	-	-	•	-
Englishtown Boro	-	-	-	-	•	-
Fair Haven Boro	-	-	-	-	•	-
Farmingdale Boro	-	-	-	-	•	-
Freehold Boro	-	-	-	-	•	-
Freehold Twp	-	-	-	-	•	-
Gateway Nat'l Rec Area	-	-	-	-	•	-
Hazlet Twp	-	-	-	-	•	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Highlands Boro	-	-	-	-	•	-
Holmdel Twp	-	-	-	-	•	-
Howell Twp	-	-	-	-	•	-
Interlaken Boro	-	-	-	-	•	-
Keansburg Boro	-	-	-	-	•	-
Keyport Boro	-	-	-	-	•	-
Little Silver Boro	-	-	-	-	•	-
Loch Arbour Village	-	-	-	-	•	-
Long Branch City	-	-	-	-	•	-
Manalapan Twp	-	-	-	-	•	-
Manasquan Boro	-	-	-	-	•	-
Marlboro Twp	-	-	-	-	•	-
Matawan Boro	-	-	-	-	•	-
Middletown Twp	-	-	-	-	•	-
Millstone Twp	-	-	-	-	•	-
Monmouth Beach Boro	-	-	-	-	•	-
Neptune Twp	-	-	-	-	•	-
Neptune City Boro	-	-	-	-	•	-
Ocean Twp	-	-	-	-	•	-
Oceanport Boro	-	-	-	-	•	-
Red Bank Boro	-	-	-	-	•	-
Roosevelt Boro	-	-	-	-	•	-
Rumson Boro	-	-	-	-	•	-
Sea Bright Boro	-	-	-	-	•	-
Sea Girt Boro	-	-	-	-	•	-
Shrewsbury Boro	-	-	-	-	•	-
Shrewsbury Twp	-	-	-	-	•	-
South Belmar Boro	-	-	-	-	•	-
Spring Lake Boro	-	-	-	-	•	-
Spring Lake Heights Boro	-	-	-	-	•	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Tinton Falls Boro	-	-	-	-	•	-
Union Beach Boro	-	-	-	-	•	-
Upper Freehold Twp	-	-	-	•	-	-
Wall Twp	-	-	-	-	•	-
West Long Branch Boro	-	-	-	-	•	-
Morris County						
Boonton Town	-	-	•	-	-	-
Boonton Twp	-	-	•	-	-	-
Butler Boro	-	-	•	-	-	-
Chatham Boro	-	-	•	-	-	-
Chatham Twp	-	-	•	-	-	-
Chester Boro	-	•	-	-	-	-
Chester Twp	-	•	-	-	-	-
Denville Twp	-	-	•	-	-	-
Dover Town	-	-	•	-	-	-
East Hanover Twp	-	-	•	-	-	-
Florham Park Boro	-	-	•	-	-	-
Hanover Twp	-	-	•	-	-	-
Harding Twp	-	-	•	-	-	-
Jefferson Twp	-	-	•	-	-	-
Kinnelon Boro	-	-	•	-	-	-
Lincoln Park Boro	-	-	•	-	-	-
Madison Boro	-	-	•	-	-	-
Mendham Boro	-	-	•	-	-	-
Mendham Twp	-	-	•	-	-	-
Mine Hill Twp	-	-	•	-	-	-
Montville Twp	-	-	•	-	-	-
Morris Twp	-	-	•	-	-	-
Morris Plains Boro	-	-	•	-	-	-
Morristown Town	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Mountain Lakes Boro	-	-	•	-	-	-
Mount Arlington Boro	-	-	•	-	-	-
Mount Olive Twp	-	•	-	-	-	-
Netcong Boro	-	-	•	-	-	-
Parsippany-Troy Hills Twp	-	-	•	-	-	-
Long Hill Twp	-	-	•	-	-	-
Pequannock Twp	-	-	•	-	-	-
Randolph Twp	-	-	•	-	-	-
Riverdale Boro	-	-	•	-	-	-
Rockaway Boro	-	-	•	-	-	-
Rockaway Twp	-	-	•	-	-	-
Roxbury Twp	-	-	•	-	-	-
Victory Gardens Boro	-	-	•	-	-	-
Washington Twp	-	•	-	-	-	-
Wharton Boro	-	-	•	-	-	-
Ocean County						
Barnegat Twp	-	-	-	-	-	•
Barnegat Light Boro	-	-	-	-	-	•
Bay Head Boro	-	-	-	-	•	-
Beach Haven Boro	-	-	-	-	-	•
Beachwood Boro	-	-	-	-	•	-
Berkeley Twp	-	-	-	-	•	-
Brick Twp	-	-	-	-	•	-
Dover Twp	-	-	-	-	•	-
Eagleswood Twp	-	-	-	-	-	•
Harvey Cedars Boro	-	-	-	-	-	•
Island Heights Boro	-	-	-	-	•	-
Jackson Twp	-	-	-	-	•	-
Lacey Twp	-	-	-	-	-	•
Lakehurst Boro	-	-	-	-	•	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Lakewood Twp	-	-	-	-	•	-
Lavallette Boro	-	-	-	-	•	-
Little Egg Harbor Twp	-	-	-	-	-	•
Long Beach Twp	-	-	-	-	-	•
Manchester Twp	-	-	-	-	•	-
Mantoloking Boro	-	-	-	-	•	-
Ocean Twp	-	-	-	-	-	•
Ocean Gate Boro	-	-	-	-	•	-
Pine Beach Boro	-	-	-	-	•	-
Plumsted Twp	-	-	-	-	•	-
Point Pleasant Boro	-	-	-	-	•	-
Point Pleasant Beach Boro	-	-	-	-	•	-
Seaside Heights Boro	-	-	-	-	•	-
Seaside Park Boro	-	-	-	-	•	-
Ship Bottom Boro	-	-	-	-	-	•
South Toms River Boro	-	-	-	-	•	-
Stafford Twp	-	-	-	-	-	•
Surf City Boro	-	-	-	-	-	•
Tuckerton Boro	-	-	-	-	-	•
Passaic County						
Bloomington Boro	-	-	•	-	-	-
Clifton City	-	-	•	-	-	-
Haledon Boro	-	-	•	-	-	-
Hawthorne Boro	-	-	•	-	-	-
Little Falls Twp	-	-	•	-	-	-
North Haledon Boro	-	-	•	-	-	-
Passaic City	-	-	•	-	-	-
Paterson City	-	-	•	-	-	-
Pompton Lakes Boro	-	-	•	-	-	-
Prospect Park Boro	-	-	•	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Ringwood Boro	-	-	•	-	-	-
Totowa Boro	-	-	•	-	-	-
Wanaque Boro	-	-	•	-	-	-
Wayne Twp	-	-	•	-	-	-
West Milford Twp	-	-	•	-	-	-
West Paterson Boro	-	-	•	-	-	-
Salem County						
Alloway Twp	-	-	-	•	-	-
Carneys Point Twp	-	-	-	•	-	-
Elmer Boro	-	-	-	-	-	•
Elsinboro Twp	-	-	-	•	-	-
Lower Alloways Creek Twp	-	-	-	•	-	-
Mannington Twp	-	-	-	•	-	-
Oldmans Twp	-	-	-	•	-	-
Penns Grove Boro	-	-	-	•	-	-
Pennsville Twp	-	-	-	•	-	-
Pilesgrove Twp	-	-	-	•	-	-
Pittsgrove Twp	-	-	-	-	-	•
Quinton Twp	-	-	-	•	-	-
Salem City	-	-	-	•	-	-
Upper Pittsgrove Twp	-	-	-	-	-	•
Woodstown Boro	-	-	-	•	-	-
Somerset County						
Bedminster Twp	-	•	-	-	-	-
Bernards Twp	-	•	-	-	-	-
Bernardsville Boro	-	•	-	-	-	-
Bound Brook Boro	-	•	-	-	-	-
Branchburg Twp	-	•	-	-	-	-
Bridgewater Twp	-	•	-	-	-	-
Far Hills Boro	-	•	-	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Franklin Twp	-	•	-	-	-	-
Green Brook Twp	-	•	-	-	-	-
Hillsborough Twp	-	•	-	-	-	-
Manville Boro	-	•	-	-	-	-
Millstone Boro	-	•	-	-	-	-
Montgomery Twp	-	•	-	-	-	-
North Plainfield Boro	-	•	-	-	-	-
Peapack Gladstone Boro	-	•	-	-	-	-
Raritan Boro	-	•	-	-	-	-
Rocky Hill Boro	-	•	-	-	-	-
Somerville Boro	-	•	-	-	-	-
South Bound Brook Boro	-	•	-	-	-	-
Warren Twp	-	•	-	-	-	-
Watchung Boro	-	•	-	-	-	-
Sussex County						
Andover Boro	•	-	-	-	-	-
Andover Twp	•	-	-	-	-	-
Branchville Boro	•	-	-	-	-	-
Byram Twp	•	-	-	-	-	-
Frankford Twp	•	-	-	-	-	-
Franklin Boro	•	-	-	-	-	-
Fredon Twp	•	-	-	-	-	-
Green Twp	•	-	-	-	-	-
Hamburg Boro	•	-	-	-	-	-
Hampton Twp	•	-	-	-	-	-
Hardyston Twp	•	-	-	-	-	-
Hopatcong Boro	•	-	-	-	-	-
Lafayette Twp	•	-	-	-	-	-
Montague Twp	•	-	-	-	-	-
Newton Town	•	-	-	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Ogdensburg Boro	•	-	-	-	-	-
Sandyston Twp	•	-	-	-	-	-
Sparta Twp	•	-	-	-	-	-
Stanhope Boro	•	-	-	-	-	-
Stillwater Twp	•	-	-	-	-	-
Sussex Boro	•	-	-	-	-	-
Vernon Twp	•	-	-	-	-	-
Walpack Twp	•	-	-	-	-	-
Wantage Twp	•	-	-	-	-	-
Union County						
Berkeley Heights Twp	-	•	-	-	-	-
Clark Twp	-	•	-	-	-	-
Cranford Twp	-	•	-	-	-	-
Elizabeth City	-	•	-	-	-	-
Fanwood Boro	-	•	-	-	-	-
Garwood Boro	-	•	-	-	-	-
Hillside Twp	-	•	-	-	-	-
Kenilworth Boro	-	•	-	-	-	-
Linden City	-	•	-	-	-	-
Mountainside Boro	-	•	-	-	-	-
New Providence Boro	-	•	-	-	-	-
Plainfield City	-	•	-	-	-	-
Rahway City	-	•	-	-	-	-
Roselle Boro	-	•	-	-	-	-
Roselle Park Boro	-	•	-	-	-	-
Scotch Plains Twp	-	•	-	-	-	-
Springfield Twp	-	•	-	-	-	-
Summit City	-	•	-	-	-	-

Municipality	Drought Region					
	North-west	Central	Northeast	South-west	Coastal North	Coastal South
Union Twp	-	•	-	-	-	-
Westfield Town	-	•	-	-	-	-
Winfield Twp	-	•	-	-	-	-
Warren County						
Allamuchy Twp	•	-	-	-	-	-
Alpha Boro	•	-	-	-	-	-
Belvidere Town	•	-	-	-	-	-
Blairstown Twp	•	-	-	-	-	-
Franklin Twp	•	-	-	-	-	-
Frelinghuysen Twp	•	-	-	-	-	-
Greenwich Twp	•	-	-	-	-	-
Hackettstown Town	•	-	-	-	-	-
Hardwick Twp	•	-	-	-	-	-
Harmony Twp	•	-	-	-	-	-
Hope Twp	•	-	-	-	-	-
Independence Twp	•	-	-	-	-	-
Knowlton Twp	•	-	-	-	-	-
Liberty Twp	•	-	-	-	-	-
Lopatcong Twp	•	-	-	-	-	-
Mansfield Twp	•	-	-	-	-	-
Oxford Twp	•	-	-	-	-	-
Phillipsburg Town	•	-	-	-	-	-
Pohatcong Twp	•	-	-	-	-	-
Washington Boro	•	-	-	-	-	-
Washington Twp	•	-	-	-	-	-
White Twp	•	-	-	-	-	-

