Metadata for N.J. Geological Survey Digital Geodata Series DGS 02-4

Additional Climate Factors for the New Jersey Geological Survey's Ground-Water Recharge Methodology

By

M.A. French and J.L. Hoffman

New Jersey Geological Survey  
Land Use Management  
New Jersey Department of Environmental Protection

1. IDENTIFICATION INFORMATION

1.1 CITATION

Additional Climate Factors for the New Jersey Geological Survey's Ground-Water Recharge Methodology

Mark A. French and Jeffrey L. Hoffman, 2002

N.J. Geological Survey Digital Geodata Series DGS02-4

Trenton, N.J.

1.2 DESCRIPTION

1.2.1 ABSTRACT

DGS02-4 is an Excel workbook that lists climate factors designed to be used in conjunction with the New Jersey Geological Survey's ground-water recharge methodology (Charles and others, 1993). As originally published, climate factors were available by municpality. This publication supplies additional climate factors for watershed management areas as well as HUC8, HUC11 and HUC14 watersheds. The original GSR-32 approach (Charles and others, 1993) calculated climate factors at 32 locations. Each station's climate factor was assumed to be relevant throughout the Theissen polygon centered on that station. Any municipality entirely within a polygon was assigned that polygon's climate factor. Municipalties which were split between two or more polygons were assigned an area-weighted average climate factor. This procedure was repeated here to yield climate factors for watershed management areas, HUC8, HUC11, and HUC14 watersheds. The additional climate factors are listed in this publication in separate worksheets.

The new watershed-based climate factors are not more precise than the municipality-based ones. Rather, this approach yields estimated climate factors for different geographical units.

An Excel workbook which implements the GSR-32 methodology for municipality and HUC14 geographic units is available as the NJGS Digital Geodata Series 99-2 (Hoffman, 1999).

1.2.2. LIST OF FILES AND BRIEF DESCRIPTION

climate factors.xls - a Microsoft Excel (97 SR-2) workbook (354 KB)

1.2.3. LIST OF KEYWORDS

New Jersey, ground-water recharge, climate factors, GSR-32, municipalities, watershed management areas, watersheds

1.3. GEOGRAPHIC EXTENT

State of New Jersey

1.4. CONTACT INFORMATION

Mark A. French or Jeffrey L. Hoffman

N.J. Dept. Environmental Protection

Land Use Regulation

NJ Geological Survey

PO Box 427 Trenton, NJ

08625

phone: (609) 984-6587

email: Mark.French@dep.nj.gov

           Jeffrey.L.Hoffman@dep.nj.gov

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

2. DATA QUALITY INFORMATION

2.1 NAME OF DATA

climate factors.xls

2.2 DESCRIPTION OF THE TYPE OF DATA

The MS Excel Workbook consists of nine worksheets:

Climate Stations - List of the 32 stations used in the original GSR-32 methodology, with locational information, average annual precipitation, average annual potential evapotranspiration, and climate factor.

Figure 1. - A figure showing the 32 precipitation stations, generated theissen polygons and New Jersey counties.

Figure 2. A figure showing watershed management areas and HUC8, HUC11 and HUC14 boundaries in New Jersey.

Municipal CF - Climate factors for each municipality in New Jersey.These were reported in the original GSR-32 report (Charles and others, 1993).

WMA CF - Climate factors for each watershed management area in New Jersey.

HUC8 CF - Climate factors for each HUC8 watershed in New Jersey.

HUC11 CF - Climate factors for each HUC11 watershed in New Jersey.

HUC14 CF - Climate factors for each HUC14 watershed in New Jersey.

Metadata - This metadata file.

2.3. DATA SOURCES

Locations of the precipitation gages were taken from a data CD of meterological information (Hydrosphere, Inc., 1992).

Coverages of watershed management areas and HUC watersheds are available on the GIS downloads website of the NJDEP: http://www.state.nj.us/dep/gis/ The coverage depwmas shows the watershed management areas. The coverage dephuc14 holds the HUC14 watersheds. The HUC8 and HUC11 watersheds are built up from the HUC14 watersheds. This coverage also assigns all HUC14 watersheds to the appropriate HUC8 and HUC11 watershed.

Climate factors for each of the 32 precipitation stations were calculated during the development of GSR-32 (Charles and others, 1993). A more thorough description of them is found in that publication.

2.4. DEVELOPMENT OF CLIMATE FACTORS

All processing was done in an Arc/Info environment. The THEISSEN command was used to generate theissen polygons centered on the 32 precipitation stations. The INTERSECT command was then used five times to join the theissen polygon coverage with coverages of municipalities, watershed management areas, HUC8s, HUC11s, and HUC14s. The resulting .dbf files were exported into an Excel workbook. The area of each geographical extent in each theissen polygon was calculated using the pivot table abilities of Excel. A climate factor for each geographical areas was then calculated based on the relative area of each geographical extent in each theissen polygon and the climate factor assigned to that polygon.

2.5 DATA ORGANIZERS

Mark A. French and Jeffrey L. Hoffman

2.6 DATA OF COMPILATION

June, 2002

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

3. DISTRIBUTION INFORMATION

This report may be redistributed if it is not modified and appropriate reference is made.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

4. METADATA REFERENCE INFORMATION

4.1 PUBLICATION DATE

September, 2002

4.2 AUTHORS

Mark A. French and Jeffrey L. Hoffman

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

5. REFRENCES

Charles, E.G., Behroozi, Cyrus, Schooley, Jack, and Hoffman, J.L., 1993, A method for evaluating ground-water-recharge areas in New Jersey: N.J. Geological Survey Report GSR-32, Trenton, 95p.

Hoffman, J.L., 1999, Ground-water recharge calculations for New Jersey, spreadsheet: N.J. Geological Survey Digital Geodata Series DGS 99-2, revised 2002, Trenton.

Hoyt, W.G., 1942, Droughts, in Meinzer, O.E., editor, Hydrology, New York, McGraw-Hill Book Co., Inc., p. 579-591.

Hydrosphere Inc., 1992, CLIMATEDATA™ NCDC Summary of the Day, vol.4.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

6. AUTHOR NOTES

The climate factor is how the NJGS ground-water recharge methodology incorporates average annual precipitation and evapotranspiration into one factor. This was calculated for 32 precipitation stations across New Jersey and applied to municipalities in the original report (Charles and others, 1993). Recasting the climate factors by watershed management area or watershed does not increase the precision of the original climate factor calculations.

A point in New Jersey may have different climate factors depending  on its municipality, watershed management area, or watershed. Thus it may have different estimated average annual ground-water recharge values. This is a result of having to project precipitation and evapotranspiration data from the 32 meterological stations. Different methods of projection will produce different results. In general, one should use climate factors for the smallest geographic unit practicable for the project at hand. However, the same geographic base should be used for the entire project; one should not mix municipal climate factors and HUC14 climate factors in the same project.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

7. EPIGRAM

"Nature supplies the earth with water largely in the form of rain and snow. Nature, however, has the first demands upon this precipitation, and there is left as stream flow or ground water only such water as escapes the demands of evaporation and transpiration."

- Hoyt, 1942

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*