



ABSTRACT

Ground-water recharge in the Rancocas Creek, Pennsauken Creek, and Cooper River watersheds in southwestern New Jersey was calculated using a method developed by the New Jersey Geological Survey. This method is based on soil type, land use, climate, and evapotranspiration. Basin calibration is a required step in verifying the model. The results are applicable to land parcels as small as five acres. In the study area annual recharge rates range from 0 to 17 inches/year. A value of 0 applies to impervious areas. The highest rates are associated with sandy soils in the eastern part of the study area. Recharge is omitted for wetlands, hydric soils and surface-water bodies.

The map also shows land owned by the Federal and State governments. Selected minor parcels of privately owned open-space land are also included. The purpose of this map is to show the extent to which land areas contribute to ground-water recharge and those areas protected from development.

INTRODUCTION

The New Jersey Department of Environmental Protection has a goal of protecting 1 million additional acres of open space by the year 2008 (New Jersey Department of Environmental

Protection, 1999). Ground-water recharge is one factor which can be used to help evaluate potential land purchases for open-space preservation. Land-use changes which reduce recharge decrease the volume of water available to nearby water-supply wells and may decrease base flow in nearby streams. Preservation of open space can help prevent these reductions.

METHOD OF INVESTIGATION

Ground-water recharge shown on the map ranges from 0 to 17 inches/year. This calculation is based on a method developed by Charles and others (1993). It is based on soil type, land use/land cover and climate. The results are applicable to land parcels as small as five acres. Recharge is omitted for wetlands, hydric soils and surface-water bodies. French (1996) gives a more detailed description of how this method applies to New Jersey.

This map was created using a geographical information system (GIS). A digital copy of the recharge coverage is available from the N.J. Geological Survey in Trenton.

As originally developed the method recommended a basin-calibration factor of 1.3 (Charles and others: 1993). Further investigation has shown that a basin calibration factor of 1.0 results in a net ground-water-recharge volume that generally

more accurately matches stream base flow (Hoffman, 1999). The recharge map above uses this corrected basin-calibration factor.

MAP LIMITATIONS

The ground-water-recharge calculations are based on several assumptions. This imposes some limitations on the results. See Charles and others (1993) for a thorough description of the assumptions made and the resulting limitations. A brief description of the major ones follows.

For this analysis all recharge rates were rounded to the nearest inch. Thus recharge rates are displayed on the map as whole numbers.

Ground-water recharge in western Camden County has not been calculated because up-to-date soil maps are unavailable. This is due to the highly urban character of this area.

Ground-water recharge to and from surface-water bodies and wetlands cannot be determined using the method because these areas may be discharge or recharge areas, or neither. Site-specific studies are needed to determine the recharge potential of individual wetlands. Hydric soils are excluded for the same reason.

This map does not show land owned by the counties or municipalities because a GIS coverage was unavailable. Open space is from an internal GIS coverage developed by the New Jersey Department of Environmental Protection, Office of Green Acres.

The map shows ground-water recharge. This is water which has migrated downward to below the root zone. The map does not indicate the distribution, thickness or productivity of aquifers. French (1996) shows in detail how to produce a map of aquifer recharge potential.

EXCLUDED AREAS

The following areas are not shown because they are too small.

| Name | Location | Acres in study area |
|-----------------------|---------------------------------|---------------------|
| Hawk Island | Delanco Twp, Burlington Co. | 1.2 |
| Lawrence House | Burlington City, Burlington Co. | 0.8 |
| Walt Whitman House | Camden City, Camden Co. | 0.7 |
| Indian King Tavern | Haddonfield Boro, Camden Co. | 0.6 |
| Wharton State Forest* | Medford Twp, Burlington Co. | 11.8 |
| Board of Proprietors | Manchester Twp., Ocean Co. | 0.9 |

*The Wharton State Forest is much larger but primarily outside of the study area.

REFERENCES

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, 95p.

French, M.A., 1996. Ground-water recharge and aquifer recharge potential for Middlesex County, New Jersey: N.J. Geological Survey Open-File Map OFM 21, 1 sheet, scale 1:100,000.

Hoffman, J.L., 1999. Basin factor calibration for ground-water recharge estimation: N.J. Geological Survey Technical Memorandum TM99-1, 2 p.

New Jersey Department of Environmental Protection, 1999. NJDEP Strategic Plan 1998-2001: Office of the Commissioner, Trenton, 36p.

The New Jersey Geological Survey is at PO Box 427, Trenton, NJ, 08625 or <http://www.state.nj.us/dep/njgs/>

GLOSSARY

aquifer - a geologic formation, part of a formation or group of formations that can supply economic quantities of water to wells.

Geographic Information System (GIS) - a computer-based, integrated spatial and tabular data base used for spatial analysis, data storage and query, and computer-assisted mapping.

evapotranspiration - loss of water from a land area through transpiration from plants and evaporation from the soil.

ground water - the part of the subsurface water that is in the saturated zone.

ground-water recharge - the process of addition of water to the saturated zone.

hydric soils - a soil which developed under primarily wet conditions.

land use/land cover - a description of what is at the land surface.

open space - undeveloped land.

root zone - the zone from the land surface to the maximum depth penetrated by plant roots.

watershed - the tract of land that gathers water originating as precipitation and contributes it to a particular stream channel or system of channels.

wetland - areas with a high water table and/or marked by a distinct plant population.

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Area of Detail

