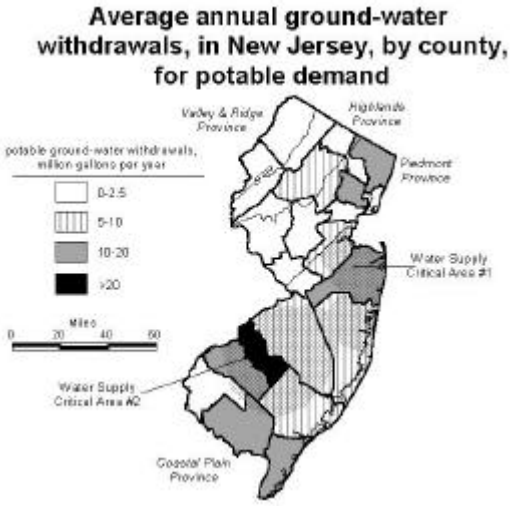
NEW JERSEY GROUND WATER CONDITIONS

Importance of Ground Water: Ground water is an extremely important resource for the people of New Jersey. It provides base flow to streams, is intimately associated with the ecology of the State's wetlands, and supplies approximately 40 percent of the State's potable water. About 2.2 million people (out of 8.0 million total populations) rely on ground water from about 2,500 public supply wells. Additionally, an estimated 1.1 million people throughout the State depend on water from private domestic wells.

Total ground water withdrawals averaged 239 billion gallons annually over the period 1990-1997. Of this volume, 179 billion gallons, or about 75 percent, was for potable supply. These withdrawals, however, were not evenly distributed across the State.

Availability and Use*:* New Jersey is divided into four physiographic provinces (fig. 1). They are, from northwest to southeast: Valley & Ridge (primarily sandstone, shale and limestone); Highlands (granite, gneiss and marble); Piedmont (sandstone, siltstone, mudstone, shale, conglomerate, basalt and diabase); and Coastal Plain (unconsolidated sand, silt and clay). Average total ground water withdrawals from these four provinces for the period 1990-1996 were, in billions of gallons, 17.5, 24.5, 52.0 and 144.5, respectively. Southern New Jersey has the greatest total volume of ground water withdrawals (fig. 1). This is due to the presence of more productive Coastal Plain aquifers in southern New Jersey and a greater reliance on surface water reservoirs in Northern New Jersey where the topographic setting better accommodates their construction. The Potomac-Raritan-Magothy aquifer in southern New Jersey had the greatest reported volume of annual withdrawals for public supply, an average of 71.8 billion gallons. Surface water resources are less developed in southern New Jersey and the population is more dependent on ground water for their potable supply (fig. 2).

The high volume of withdrawals in southern New Jersey has created extensive cones of depression that may increase salt-water



intrusion. In response to this, two water supply critical areas were instituted (fig. 1) by NJDEP. State-ordered pumping reductions, instituted in conjunction with the development of surface water supplies, have resulted in significant rises in ground water levels, thus lessening the threat to the resource.

Ground Water Protection*:* New Jersey has an active ground water quality monitoring network program. Between 1984 and 1998, 387 wells

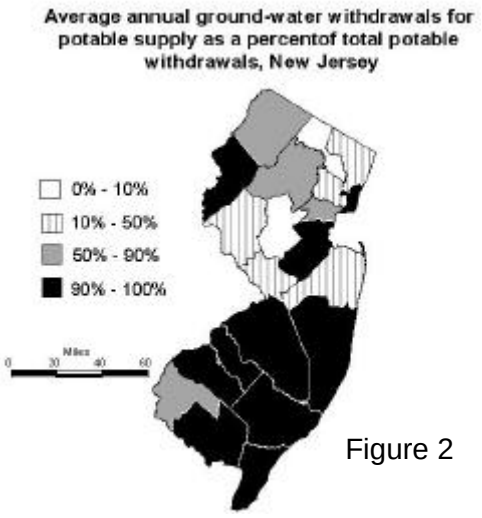


Figure 1

Figure 2

have been sampled for a variety of constituents. Original goals of the network focused on characterizing the ground water quality in the major aquifers of the State. New network goals

involve characterizing shallow ground water quality as a function of land use.

Ground water quality in the State of New Jersey is generally good for most purposes. Treatment for some undesirable naturally occurring contaminants and characteristics is needed in some areas, however, due to the physical and chemical nature of the geologic materials of the aquifer. The most widespread contaminant problems involve exceedances of the mainly aesthetic Secondary Drinking Water Standards. These include iron, total dissolved solids, sulfate, hardness, manganese, and pH. Health based Primary Drinking Water Standards for radionuclides are also exceeded in some areas due to natural sources. For example, in some parts of the Piedmont Province in New Jersey radium concentrations and gross alpha particle activity, associated with natural occurrences of radium and uranium in the aquifer, exceed the primary standards. In the Coastal Plain of New Jersey, radium concentrations can also exceed the primary standard. Although the radium there is natural in origin, it is believed to be mobilized by the application of certain agri-chemicals and lawn care products. Elevated arsenic concentrations from wells sampled in part of the Piedmont Province may also be natural in origin.

Point and non-point pollution resulting from anthropogenic activities also affects ground water quality in the State. Point source pollution from leaking underground storage tanks, spills, improper disposal of hazardous waste and other sources can occur anywhere, but concentrate in highly populated and industrialized areas. Non-point sources of pollution related to agricultural and urban/suburban land use activities impact shallow ground water quality throughout the State. In those areas surface water quality can also be impacted by ground water base flow. Mercury contamination in the major water-table aquifer in the Coastal Plain is believed to be related to past non-point source pollution. Over pumping of some aquifers near coastal areas has resulted in the movement of more saline water into the aquifer.