

# Water Use in West Virginia, 1990

This fact sheet describes the results of a water-use study for West Virginia that was conducted by the U.S. Geological Survey (USGS), in cooperation with the West Virginia Geological and Economic Survey (WVGES), as part of the National Water-Use Information Program of the USGS. The national program is based on Federal and State cooperative agreements to collect, store, and disseminate water-use information nationally and locally.

As the demand for freshwater increases, the stress placed on the surface-water and ground-water resources of West Virginia increases. Effective water-resource management depends, in part, on current and accurate water-use data. Such data are valuable for evaluating the effects of withdrawals on the State's water resources, identifying current water-use patterns, and estimating future water demands. Together, the WVGES and the USGS collect, compile, estimate, and store site-specific and aggregated water-use data that are useful for State water-resources management. The water uses discussed below include public supply, domestic, commercial, industrial, mining, thermoelectric power, and livestock.

West Virginia has a total land area of 24,232 square miles. The State is divided into 55 counties and includes 7 major river basins. According to the 1990 census, the total population is nearly 1.8 million (U.S. Department of Commerce, 1992). West Virginia has an abundant supply of fresh surface water and ground water. The State receives an annual average of about 51,000 million gallons per day (Mgal/d) from precipitation and about 28,000 Mgal/d as inflow from adjoining States. Of that quantity, 52,000 Mgal/d leaves the State as stream-flow, about 26,000 Mgal/d is returned to the atmosphere by evapotranspiration, and about 880 Mgal/d is accounted for by consumptive use (Hobba and Suder, 1990).

During 1990, about 5,354 Mgal/d of freshwater was withdrawn from rivers, lakes, and aquifers in West Virginia. In addition, about 32,707 Mgal/d was used "instream" (water used within and not removed from the stream) for hydroelectric power in the State. The largest use of water, excluding hydroelectric use, was for thermoelectric-power, which accounted for 3,708 Mgal/d. The largest total freshwater withdrawals were in

Kanawha, Mason, Grant, and Marshall Counties (fig. 1).

A water user can withdraw water from a surface- or ground-water source (self-supplied) or receive water from a public-supply system or both. The amount of water withdrawn and the amount delivered by public suppliers during 1990 is shown in figure 2 by water-use categories (values may not add to totals as a result of rounding). Industrial, mining, domestic, and commercial uses account for about 30 percent of total water withdrawn if water use by self- and public-supplied facilities are combined. Thermoelectric power-plants used 69 percent of the total water withdrawn for the State. Livestock use was less than 1 percent.

## Surface Water

During 1990, 4,732 Mgal/d (88 percent of the total) of freshwater was withdrawn from surface-water sources. The largest surface-water withdrawals were for thermoelectric-power (3,708 Mgal/d) and for public supply (118 Mgal/d). Many of West Virginia's population centers have developed along major rivers, and, as a result, the largest surface-water withdrawals for public supply and industrial use

### COUNTIES

- |                |                |             |
|----------------|----------------|-------------|
| 1. Barbour     | 31. Monongalia | 49. Upshur  |
| 2. Berkeley    | 32. Monroe     | 50. Wayne   |
| 3. Boone       | 33. Morgan     | 51. Webster |
| 4. Braxton     | 34. Nicholas   | 52. Wetzel  |
| 5. Brooke      | 35. Ohio       | 53. Wirt    |
| 6. Cabell      | 36. Pendleton  | 54. Wood    |
| 7. Calhoun     | 37. Pleasants  | 55. Wyoming |
| 8. Clay        | 38. Pocahontas |             |
| 9. Doddridge   | 39. Preston    |             |
| 10. Fayette    | 40. Putnam     |             |
| 11. Gilmer     | 41. Raleigh    |             |
| 12. Grant      | 42. Randolph   |             |
| 13. Greenbrier | 43. Ritchie    |             |
| 14. Hampshire  | 44. Roane      |             |
| 15. Hancock    | 45. Summers    |             |
| 16. Hardy      | 46. Taylor     |             |
| 17. Harrison   | 47. Tucker     |             |
| 18. Jackson    | 48. Tyler      |             |
| 19. Jefferson  |                |             |
| 20. Kanawha    |                |             |
| 21. Lewis      |                |             |
| 22. Lincoln    |                |             |
| 23. Logan      |                |             |
| 24. Marion     |                |             |
| 25. Marshall   |                |             |
| 26. Mason      |                |             |
| 27. McDowell   |                |             |
| 28. Mercer     |                |             |
| 29. Mineral    |                |             |
| 30. Mingo      |                |             |

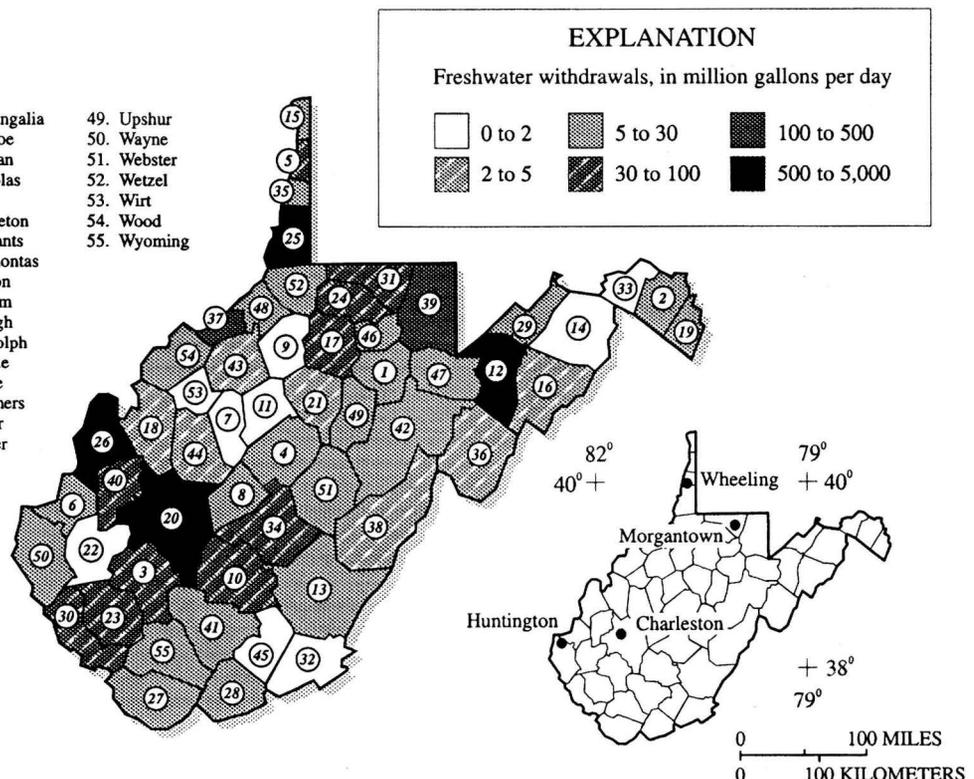


Figure 1. Freshwater withdrawals by county in West Virginia, 1990.

are located near the major urban areas, including Charleston, Huntington, Morgantown, and Wheeling.

## Ground Water

Of the total freshwater withdrawals in 1990, 12 percent was from ground-water sources. The largest withdrawals were for mining (503 Mgal/d), domestic use (48 Mgal/d), and public supply (42 Mgal/d). Together these categories represent 593 Mgal/d or 96 percent of total ground-water withdrawals. About 83 percent of total ground-water withdrawals were from the Pennsylvanian Appalachian Plateau aquifers.

## Water Use, By Category

### Public Supply

About 615 public water-supply systems in the State provide water to about 1.2 million people (67 percent of the State's population). Total withdrawals for public supply during 1990 were 160 Mgal/d, of which 118 Mgal/d was from surface-water sources and 42 Mgal/d was from ground-water sources. Of the population served by public-supply systems, 75 percent was supplied by surface water. The largest user of surface water for public supply is the Charleston metropolitan area. During 1990, 26 Mgal/d was withdrawn for use. Of the total ground water withdrawn and delivered by public suppliers (42 Mgal/d), about 11 percent (5 Mgal/d) is derived from coal mines. Most of these mines are in the low-sulfur coal fields of Fayette, Logan, McDowell, and Raleigh Counties in southern West Virginia.

### Domestic and Commercial

Domestic and commercial users receive freshwater from public-supply and self-supplied systems. Combined total water use during 1990 was 160 Mgal/d. Domestic water use was about 136 Mgal/d, of which 87 Mgal/d was from public-supply systems. About 33 percent of the population used a total of 48 Mgal/d of water from private wells or springs. Commercial water use during 1990 was about 24 Mgal/d; only about 3 Mgal/d was provided by self-supplied systems.

### Industrial and Mining

During 1990, freshwater use by industries and mining operations was about 1,438 Mgal/d, of which 99 percent was self-supplied and 1 percent was from pub-

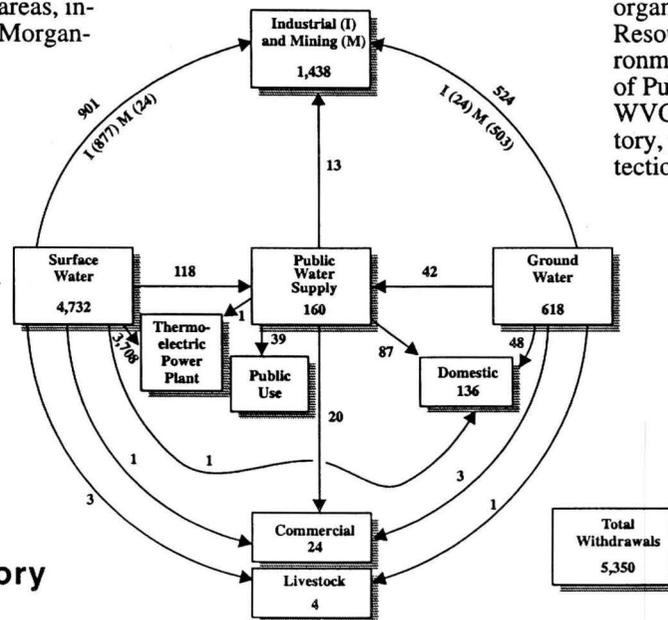


Figure 2. Estimated freshwater use, in million gallons per day, in West Virginia, 1990.

lic-supply systems. About 877 Mgal/d of surface water and 21 Mgal/d of ground water were self-supplied by industries. Public suppliers provided 13 Mgal/d to industrial users. Self-supplied coal- and limestone-mining operations withdrew 24 Mgal/d of surface water and 503 Mgal/d of ground water.

### Thermoelectric Power

During 1990, thermoelectric powerplants used 3,708 Mgal/d of water or 69 percent of total freshwater withdrawals for cooling purposes; all water was from surface-water sources. Most of the water was returned to streams from which it was withdrawn. About 3 percent (99 Mgal/d) of the water used for cooling was consumed.

### Livestock

Water for livestock accounted for less than 1 percent of total freshwater withdrawals. During 1990, 4 Mgal/d was withdrawn for livestock watering, of which 3 Mgal/d was from surface-water sources and 1 Mgal/d was from ground-water sources.

## Water-Resources Management

Laws that affect water management in West Virginia are based on a modification of the riparian doctrine which states that land ownership containing or bordering a water body is the basis for the right to reasonable use of the water. State

organizations, such as the Water Resources Board, the Division of Environmental Protection (DEP), the Bureau of Public Health (BPH), and the WVGES, implement most of the regulatory, planning, and research for water protection and management as follows:

- The DEP administers and enforces all laws that relate to the conservation, development, protection, and use of water resources in the State.
- The BPH regulates public-supply systems, which include installations and adherence to water-quality standards. The BPH also issues well drilling permits.
- In cooperation with the WVGES, the DEP, and other agencies, the USGS maintains a statewide data-collection network and is responsible for investigating the State's water resources. The research, data collection, and analysis provided by this cooperative program form an information base upon which water-management decisions are made.

- Judith C. Wheeler

## References

Hobba, W.A., Jr., and Suder, K.E., 1990, *West Virginia water supply and use*, in *U.S. Geological Survey national water summary 1987—Hydrologic events and water supply and use*: U.S. Geological Survey Water-Supply Paper 2350, p. 523-530.

U.S. Department of Commerce, 1990, *1990 census of population and housing—Summary population and housing characteristics—West Virginia, 1990* CPH-1-50, 102 p.

**Additional information on water use in West Virginia can be obtained from:**

District Chief  
U.S. Geological Survey  
11 Dunbar Street  
Charleston, WV 25301  
(304) 347-5130

Director, West Virginia Geological and Economic Survey  
P.O. Box 879  
Morgantown, WV 26507-0879  
(304) 594-2333