

SUMMARY OF WATER-RESOURCES CONDITIONS

Precipitation

Precipitation amounts for the first quarter, October through December, of the 2002 water year were well below average across the State. Average precipitation amounts are mean monthly values based on data from 1971 through 2000, the 30-year base period used by the National Weather Service. Precipitation amounts varied from 6.02 (Asheville) and 6.63 (Charlotte) inches below average in the western part of the State, to 6.33 (Greensboro) and 4.82 (Raleigh) inches below average in the central part of the State, to 7.14 (Elizabeth City) and 7.54 (Wilmington) inches below average in the eastern part of the State. Rainfall data collected at six key National Weather Service stations (figs. 1 and 3) indicate that below-average rainfall amounts were recorded for all months, in all the Provinces of North Carolina, during the first quarter.

The second quarter of the 2002 water year, January through March, brought continued dry conditions to the State. However, above-average monthly mean rainfall occurred in a line from Charlotte to Elizabeth City as a result of a regional weather system that moved across the State in late January. Rainfall was below average at all index sites in February and above average at all index sites except Asheville and Greensboro in March. The most rainfall during the quarter was reported in Elizabeth City at 3.42 inches above average. Below average quarterly rainfall was recorded in Asheville (3.18 inches below average), Charlotte (1.24 inches below average), Greensboro (1.84 inches below average), Raleigh (0.10 inch below average), and Wilmington (2.98 inches below average).

The third quarter, April through June, again brought below-average amounts of rainfall across the State. Only Elizabeth City recorded 2 months of above-average precipitation. Quarterly precipitation amounts declined further below average during the third quarter at all the index sites across the State with the exception of Asheville, which was below average but not as severely as during the previous quarter. Raleigh and Wilmington were affected the most by lack of rain, recording 5.00 and 5.54 inches below average for the quarter. The remaining index sites also reported less severe conditions ranging from 1.01 to 4.18 inches below average for the quarter—Asheville (1.01 inches), Charlotte (4.18 inches), Greensboro (3.67 inches), and Elizabeth City (1.42 inches).

Rainfall conditions were close to the mean values in the central and eastern parts of the State during the fourth quarter, July through September. Index sites at Raleigh, Wilmington, and Elizabeth City all recorded above-average monthly rainfall for July and August. Index sites at Charlotte and Greensboro also reported above-average monthly rainfall in August. Above-average rainfalls were recorded for Wilmington (3.12 inches above the mean) and Elizabeth City (1.53 inches above the mean) for the entire quarter. The remaining index sites recorded below-average conditions ranging from 0.65 to 2.28 inches below average for the quarter—Asheville (1.76 inches), Charlotte (2.28 inches), Greensboro (1.01 inches), and Raleigh (0.65 inches).

In summary, drought conditions in North Carolina, which began in 1998, continued through 2002 with below-average annual rainfall at each of the six index sites. Mandatory and voluntary water restrictions were established in many regions of the State due to extremely low public-water supplies. The National Weather Service reported the following annual rainfall amounts for the 2002 water year at these selected stations: Asheville, 35.07 inches (11.97 inches below average); Charlotte, 29.18 inches (14.33 inches below average); Greensboro, 30.29 inches (12.85 inches below average); Raleigh, 33.78 inches (9.27 inches below average); Elizabeth City, 43.37 inches (3.61 inches below average); and Wilmington, 44.13 inches (12.94 inches below average).

Surface Water

Streamflow conditions in North Carolina are influenced greatly by precipitation. Rainfall can produce rapid responses in streamflow. Streamflow also declines following periods of low rainfall. The rate and magnitude of decline depend on basin size, the season, evapotranspiration, and the amount of ground water in storage at the onset of the dry period. The effects on streamflow of variable rainfall in North Carolina during the 2002 water year are illustrated in figures 3-8. Monthly conditions are depicted in maps (figs. 3 and 4) that show the regions of above-normal, normal, and below-normal streamflow.

Data for the period of record from 35 index gaging stations across the State were used to compute monthly flow statistics (figs. 3 and 4). These stations are located on streams that are free of significant regulations or diversions and range in size from about 30 to 1,400 square miles. The descriptors, "above normal," "normal," and "below normal," refer to flow in the upper quartile, the middle two quartiles, and the lower quartile, respectively.

Monthly mean flows recorded at index stations during the 2002 water year were generally below normal. Sites reporting below-normal streamflow were evident each month of the water year (figs. 3 and 4). In fact, below-normal streamflow conditions were noted at more than half of the 35 index stations for all months except January and September. All of the index stations recorded below-normal streamflow during the month of November (fig. 3).

Record low monthly mean discharges were established at one or more index sites for every month except January. Eighteen sites experienced new record low monthly mean discharges for June. New period of record low instantaneous discharges for the 2002 water year were also recorded at 11 of the 35 index sites (table 1).

Table 1.--Index stream-gaging stations recording new period of record minimum instantaneous discharges during the 2002 water year

Station name	USGS station number	Years of record	Drainage area (square miles)	Record low instantaneous discharge for period of record (cubic feet per second)
Little Fishing Creek near White Oak, N.C.	02082950	43	177	0.50
Flat River at Bahama, N.C.	02085500	78	149	0.15
Little River near Princeton, N.C.	02088500	73	232	0.00
Elk Creek at Elkville, N.C.	02111180	37	48.1	6.8
Fisher River near Copeland, N.C.	02113000	71	128	10
South Yadkin River near Mocksville, N.C.	02118000	64	306	2.8
Little River near Star, N.C.	02128000	49	106	0.00
Lumber River at Boardman, N.C.	02134500	73	1,228	40
Indian Creek near Laboratory, N.C.	02143500	52	69.2	0.25
First Broad River near Casar, N.C.	02152100	44	60.5	3.6
French Broad River at Asheville, N.C.	03451500	107	945	215

Responses of daily streamflow to basinwide weather patterns throughout the year at four long-term index stations across the State (fig. 1) are shown in figures 5-8. The daily mean discharge hydrograph for the 2002 water year is superimposed on the long-term median daily mean discharge hydrograph, for the 1971-2000 base period, for each of these index stations. Daily mean discharge fluctuated both above and below the median daily mean discharge at three of the four sites but was generally less than the median for most of the 2002 water year. The Lumber River at Boardman site was consistently below the median daily mean discharge throughout the water year.

In summary, below-average precipitation occurred during the 2002 water year throughout much of the State. Annual departure from normal precipitation totals for the six index weather stations were reported as follows: Asheville, 11.97 inches below average; Charlotte, 14.33 inches below average; Greensboro, 12.85 inches below average; Raleigh, 9.27 inches below average; Wilmington, 12.94 inches below average; Elizabeth City, 3.61 inches below average. Streamflow conditions reflected the rainfall pattern across the State, yielding below-normal streamflow conditions throughout much of the year.