



## Near Record Nutrient and Sediment Loads in the Major Rivers Entering Chesapeake Bay in 2003

*Prepared by the U.S. Geological Survey (5/18/2004); updated 8/23/2004*

In 2003, nutrient and sediment loads entering the tidal watershed of the Chesapeake Bay from its principle rivers, were the second highest since 1990, according to the U.S. Geological Survey (USGS). The loads were influenced by near-record river flow to the Bay in 2003. The increased nutrient and sediment loads resulted in less light in the Bay waters, which contributed to a decline of submerged aquatic vegetation (SAV). The increased nutrient loads also contributed to large areas of low dissolved oxygen levels in the Bay during the summer of 2003.

The USGS, in cooperation with the Maryland Department of Natural Resources and the Virginia Department of Environmental Quality, collects water-quality samples from the nine principle rivers that enter the Chesapeake Bay to estimate the amount, or load, and trends of nutrients and sediment. The sampling sites are located near the head of tide on each major river, and all sites collectively represent 78 percent of the area in the Bay watershed (see map below). The principle rivers that are sampled include the Susquehanna, Potomac, James, Rappahannock, Appomattox, Pamunkey, Mattaponi, Patuxent, and Choptank Rivers. Sampling of some of the rivers began in 1979, with sampling for all rivers implemented by 1990. More data for the River-Input Monitoring Project can be found at <http://va.water.usgs.gov/chesbay/RIMP/index.html>.

In 2003, the loads at the nine river-input sites were 353.6 million pounds (Mlbs.) of nitrogen, 30 Mlbs of phosphorus, and 18,169.9 Mlbs of sediment (see graph and table below). The loads at the River-Input sites represent about 60 percent of the total load that enter the tidal waters of the Bay watershed.

Table of Nutrient and Sediment Loads from Nine Principle Rivers entering Chesapeake Bay

Period	TN (Mlbs)	TP (Mlbs)	Sediment (Mlbs)	Flow (billion gallons per day)
2002	130.5	6.0	1,644.1	37.7
2003	353.6	30.0	18,169.9	86.7
Long-term avg.	207.0	12.2	7,875.7	50.1
1996	364.6	30.9	28,659.2	87.5

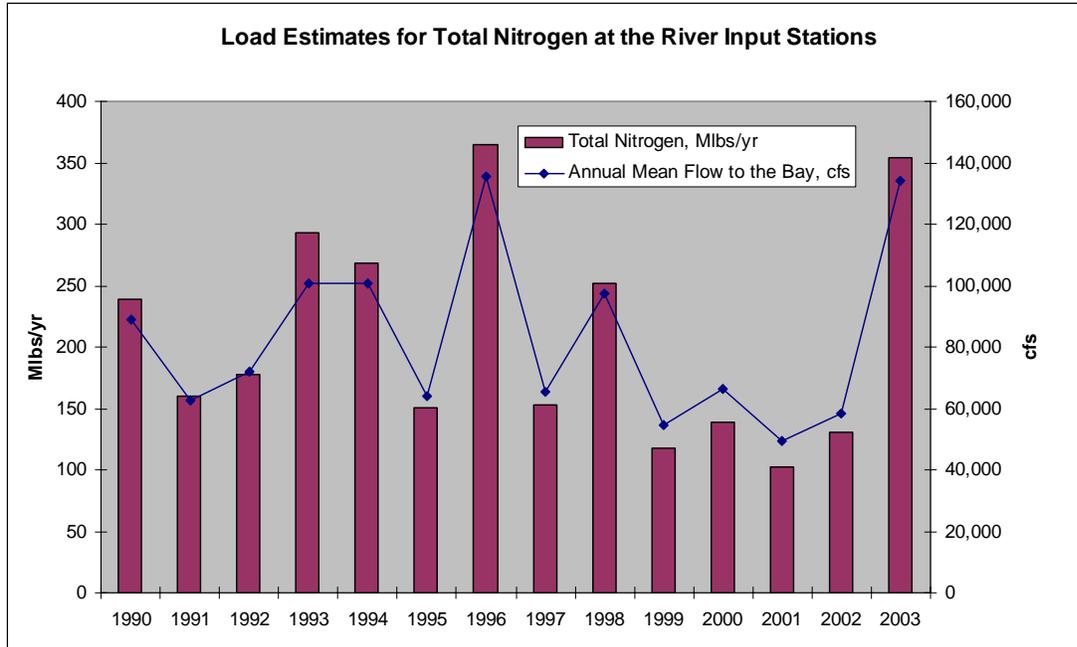


Figure: Load Computations for Total Nitrogen at the River Input Stations

The nutrient and sediment loads in 2003 were influenced by near-record river flow to the Bay. In 2003, more than twice the amount river flow (86.7 billion gallons per day) entered the Bay than in 2002 (37.7 billion gallons per day). This was the third highest amount since 1937, when the USGS began keeping records to compute estimates of the total flow to the Bay.

In 2003, the loads from the nine major rivers entering the Bay were much higher than in 2002, and contained about 3 times the amount of nitrogen, 5 times the amount of phosphorous, and 11 times the amount of sediment. The loads were higher due to both the near-record river flow and an increase in nutrient and sediment concentrations in the rivers. The increased nitrogen concentrations were a result of higher amounts of nitrogen being flushed from the land and ground water. Increased sediment and phosphorus concentrations were caused by the substantial erosion of sediment from the land and streams. So far in 2004, flow to the Bay has been near average (<http://md.water.usgs.gov/monthly/bay.html>) therefore sediment and nutrient loads could be less than in 2003.

The USGS has developed statistical techniques to compensate for the natural changes in river flow, so we can better understand progress related to management actions. Using these techniques, preliminary results of trends through 2003 from the nine River-Input sites show improvements in nitrogen and phosphorus concentrations at about half of the sites. There were declines in total nitrogen concentrations at 4 rivers stations, including the Susquehanna, Potomac, and James Rivers, which comprise about 90 percent of the river flow that enters the Bay. Total phosphorus concentrations also declined at four sites, including the Susquehanna and James rivers.

More information about USGS activities related to Chesapeake Bay can be found at <http://chesapeake.usgs.gov> or by contacting Scott Phillips (swphilli@usgs.gov)

