



Nutrient and Sediment Loads of Major Rivers Entering Chesapeake Bay in 2003

Prepared by the U.S. Geological Survey (5/18/2004)

In 2003, nutrient and sediment loads to the Chesapeake Bay from its major 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 the low dissolved oxygen levels in the Bay during the summer of 2003.

In 2003, the nine major rivers entering the Bay delivered 353.6 million pounds (Mlbs.) of nitrogen, 30 Mlbs of phosphorus, and 18,169.9 Mlbs of sediment. The highest nutrient and sediment loads were recorded in 1996 (see table below). The major rivers that are sampled to determine loads 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.

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, therefore sediment and nutrient loads could be less than in 2003.

Overall, the concentrations of nutrients and sediment in most of the major rivers entering the Bay have shown a very slow decline since 1990 as actions are taken to reduce nutrient and sediment sources to the Bay. However, yearly fluctuations in rainfall and streamflow can cause temporary increases of nutrient and sediment concentrations.

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 major 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. More data for the River-Input Monitoring Project can be found at <http://www-va.usgs.gov/chesbay/RIMP/>

Table of Nutrient and Sediment Loads from Nine Major 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

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), Mick Senus (mpsenus@usgs.gov), and Doug Moyer (dlmoyer@usgs.gov).



