What's new with . . .

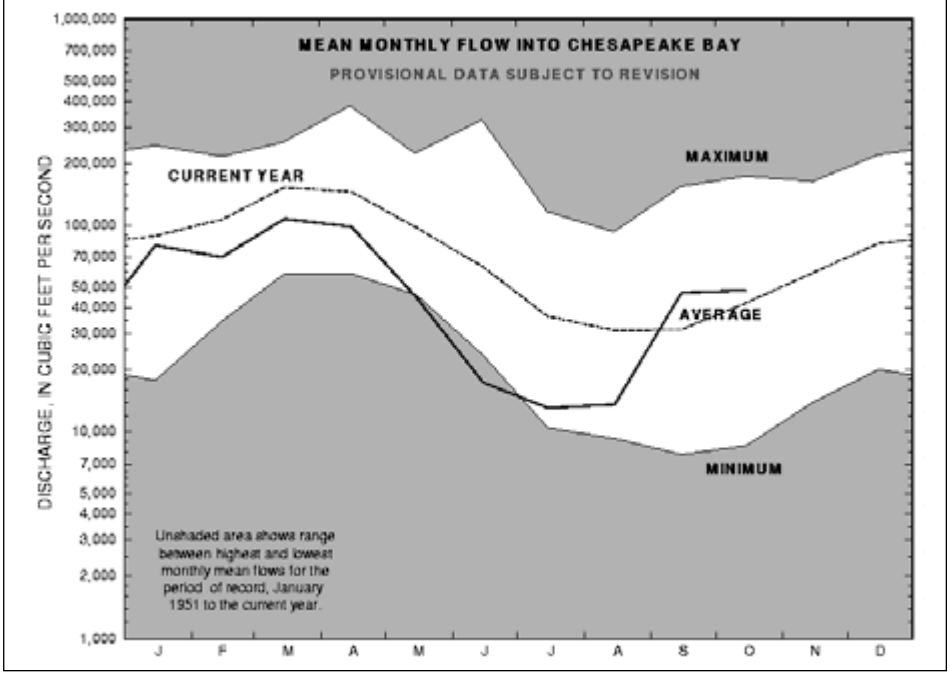
WATER QUALITY
IN THE CHESAPEAKE BAY REGION IN 1999

Extremes in Freshwater Flow Affect Bay

Water quality in 1999 was strongly influenced by the weather and, as in most years, the weather was not "normal." The most extreme weather lasted from the beginning of the year through mid-August as a severe drought persisted across most of the watershed. As a result, the cumulative freshwater flow from Bay tributaries was below normal from January through August and set new record lows in May and June.

The year would not end dry, however. Remnants of hurricanes Dennis and Floyd hit the Bay watershed in late August and mid-September, respectively. In some areas, especially close to the Bay, up to 15 inches of rain fell. In the wake of Floyd, some rivers, such as the Choptank, neared record flows. These rains were very helpful in relieving the drought condition. Cumulative flows to the Bay for September and October actually exceeded historical averages during these months when flows typically reach the annual minimum.

Freshwater Flow to the Bay



Drought Affects Salinity Levels Baywide

The drought caused significant seasonal shifts in the salinity of the Chesapeake Bay. Lower freshwater flow permitted saltwater from the ocean to move farther north into the Bay and its tributaries. During June and July, the low-salinity region at the north end of the Bay was 49% smaller than average for that time of year. The mid-salinity region was 27% smaller, and the high-salinity region near the mouth of the Bay was 38% larger. In many rivers, such as the Rappahannock, salinity moved farther up river than in any year since regular monitoring began in 1985.

Salinity is important because it defines habitat for many plants and animals. Creatures that survive in low-salinity water, such as yellow perch and largemouth bass and Bay grasses such as wild celery and sago pondweed, had less habitat in the summer of 1999. On the other hand, creatures that need high-salinity water for survival, such as hard clams and blue crab larvae and the Bay grass species widgeon grass and eel grass, had more habitat area. The stinging sea nettle, which requires high salinity, was more abundant than usual in the early summer. Oysters suffered this year because of a greater incidence of the diseases Dermo and MSX, which are favored in high salinity years.

Low Oxygen Leads to Fish Kills

Probably the most severe and obvious effect of the drought was the prevalence of summer fish kills due to low oxygen conditions in creeks, often in combination with elevated water temperatures. The low flow conditions reduced flushing in the upper parts of many Bay tributaries, allowing algae to proliferate in these shallow, nutrient-enriched environments. Normal flows would have flushed nutrients and algae farther downstream where blooms may not have grown as large or caused the same degree of oxygen depletion. As these algal blooms

→

decomposed, or consumed oxygen during the night, oxygen concentrations dropped to lethal levels in several areas, such as creeks draining to Baltimore Harbor, the Magothy River and the Pocomoke River. Higher salinity levels added to the problem by forcing many of the freshwater species, such as yellow perch, up into creeks in search of suitable, low-salinity habitats. Unfortunately, these small remaining low-salinity habitats were the same ones experiencing the loss of oxygen and higher water temperatures.

Low Flow May Help Bay Grasses in Some Areas

Preliminary data from the 1999 underwater Bay grasses survey indicate that Bay grass acreage in some areas expanded and that these improvements may have been related to the low freshwater flow this year. Low freshwater flow and precipitation meant that lesser amounts of sediments and nutrients were washed into the Bay from land-based and atmospheric sources in 1999. Both of these pollutants reduce the amount of light available for Bay grasses to grow. One of the areas that has shown an improvement is Tangier Sound, which has experienced marked declines in recent years.

Potomac River Improves

The give and take of biological communities living at the boundary between freshwater and saltwater was evident in the tidal Potomac River during the 1999 summer drought. As record low river flows in May, June, July and August allowed saltier water to move upriver, freshwater organisms were contained in smaller areas of the river while traditional saltwater species—such as blue crab, bluefish, speckled trout and flounder— roamed farther upriver. Drought conditions benefitted some species and hurt others.

Underwater Bay grass beds in parts of the Potomac expanded their coverage and increased their diversity in response to the abundant sunlight, low flows and good water clarity in parts of the river. These same conditions also spur the growth of large algal blooms. A brilliant bluegreen (cyanobacteria) algal bloom formed below the District of Columbia in July and August, and a red tide (dinoflagellate) bloom developed in the middle of the river. Watermen have reported heavy oyster mortality in the lower Potomac. The prolonged drought could have intensified Dermo disease and possibly caused an outbreak of MSX disease in this area. Dermo and MSX are caused by oyster parasites that are not harmful to humans. Offspring of the recovering American shad population, which needs low salinity nursery grounds, did poorly in the Potomac. In contrast, numbers of juvenile striped bass were above their long-term average, possibly because striped bass adults are now so abundant.

One of the major questions concerning the Potomac is how have nutrient reductions in the past three decades improved habitat in the tidal portion of this river? A group of scientists and managers believes they have—up to a point. In a recent report, a team of state, federal and university analysts evaluated long-term Potomac monitoring data and found signs of recovery.

- Summer dissolved oxygen near the District of Columbia no longer drops below five milligrams per liter, the minimum concentration considered acceptable for aquatic life. The exception to this is in slow-flowing, heavily enriched tributaries, such as the Anacostia River.
- Ammonium, a form of nitrogen abundant in poorly treated sewage, rarely reaches concentrations stressful to animals.
- Underwater Bay grasses are returning and continue to thrive despite less-than-ideal water clarity in the tidal portion.
- The diversity of plankton and bottom-dwelling species is increasing in the middle, or low-salinity, portion of the tidal river.
- Algal blooms do not have the intensity, or the magnitude, they once had in the 1970s and 1980s, chiefly because concentrations of phosphorus have been reduced 24% to 95% along the length of the tidal river since 1965.
- Recently implemented Biological Nutrient Removal (BNR) at the Blue Plains Sewage Treatment Plant is expected to reduce nitrogen, the other overabundant nutrient, and further improve water quality.

These signs of improvement are somewhat offset by the recognition that further efforts are needed to restore a vigorous Potomac ecosystem. Those efforts must include reducing sediments suspended in the water, reducing toxics and restoring and protecting healthy oyster, fish and wildlife populations. However, the Potomac is continuing on the path toward recovery.