

The James and the Chesapeake Bay

The Chesapeake Bay is a body of water and like a human body, its health depends on what goes into it. But, as everyone knows, the Chesapeake is not as healthy as it once was. The problems stem, in part, from the declining quality of the rivers that feed the Bay. This fact sheet explains how the James River contributes to the Bay and outlines some ways to help keep the river clean.

THE HISTORIC JAMES

As it flows from near the western border of Virginia to the waters of the Chesapeake Bay, the 450-mile long James River carries with it a rich tradition of history, scenic beauty and abundant natural resources. The upper reaches of the James, part of which have been declared as the Upper James Scenic River by the Virginia General Assembly, reveal one of the premier warm-water stream fisheries and some of the most dramatic mountain vistas to be found anywhere in the Commonwealth.

The falls of the James occur in the heart of Richmond--over seven miles the river drops 105 feet in elevation. When Captain John Smith explored the river in May of 1607 he was stopped by the "great craggy stones in the midst of the river, where the water falleth so rudely, and with such a violence, as not any boat can pass" Settlers, quick to recognize the potential power of the falls for flour mills, paper mills, and iron works, built the nation's first industries. Richmond became a transportation center where goods were unloaded from oceangoing ships and taken farther inland by other means. Today's kayakers and white water enthusiasts relish the falls of the James as some of the finest white water on the East Coast and the only white water which cuts through the heart of an urban area. Virginia's General Assembly has included the falls in the state scenic river system.

Below the falls, where the tidal portion of the James begins, the river becomes wide and sluggish. More than a dozen colonial tobacco plantations still overlook this peaceful section of the James. Also along the lower James are the colonial capital at Williamsburg, the first permanent settlement of the British Empire at Jamestown, and 75 other registered historic landmarks. Given this wealth of the nation's past, it is no wonder that the portion of river flowing through Charles City, James City and Surry counties received Historic River designation from the General Assembly in 1988. Also along this section of river, on Powell's Creek in Prince George County, there is a major roosting area for bald eagles. As many as 125 eagles can be seen there and there are two known nesting sites. The Hampton Roads area, at the confluence of the James River and the Elizabeth River, is one of the world's greatest and busiest harbors as well as an important shipbuilding center.

In the midst of this great bustling harbor and just upriver are the major seed oyster beds for the Chesapeake Bay. In the past 50 years approximately 75% of the seed planted on private leases in Virginia came from the James River. Also this is where sooks, or female blue crabs, spawn from May to October and where they bury themselves in the mud for the winter.

POLLUTION PROBLEMS

Approximately two million people--nearly one-third of Virginia's population--live in the James watershed and use its waters. The number is projected to increase to 2.3 million by the year 2000. According to the Virginia State Water Control Board

(SWCB), there are now 21 significant municipal dischargers and 28 major industrial dischargers on the river. Most of this extensive urban development and industrial activity is concentrated at or below the fall line in Richmond, Petersburg, Hopewell and Hampton Roads.

Unfortunately, as the demands on the river increase, accommodating everyone's needs and maintaining the health of the river becomes more difficult. The James is now stressed by a combination of pollutants, including nutrients, toxics and bacteria. Landings of freshwater spawners, such as shad and striped bass, and commercial harvests of market oysters have declined dramatically over the years. Over 53,000 acres of once productive shellfish beds are now closed.

A growing concern in the James, particularly just below Richmond, is pollution by nutrients, such as phosphorous and nitrogen. The James receives the highest nutrient inputs of any river in Virginia, mostly from sewage treatment plants (STPs) and industrial discharges but also in lesser amounts from agricultural and urban runoff.

Nutrients can overenrich the water causing excessive algal growth, which in turn, decomposes and robs the water of life-giving oxygen. Oxygen levels sometimes fall below the state standards for aquatic life on the James. Ammonia, a form of nitrogen which can be toxic to marine life and can also deplete the water of oxygen through nitrification, sometimes reaches levels in the waters below Richmond that violate state criteria.

Ammonia violations and episodes of low dissolved oxygen indicate that the James River cannot receive ever-increasing levels of pollutants without ill effects. And nutrient inputs are still rising. At the current rate, by the year 2000, nitrogen loads are expected to increase by 23% above 1985 levels.

Fortunately, the state is taking significant steps to reduce the nutrient levels in the James. In signing the 1987 Chesapeake Bay Agreement, Virginia committed to reduce the amount of phosphorous and nitrogen entering the Bay by 40%. The ban on phosphate laundry detergents passed in 1987 helps by reducing the amount of phosphorous going into STPs. Early data shows very promising results-phosphorous concentrations in STP effluents have been reduced by as much as 50%. The state nutrient standard adopted by the SWCB in March of 1988 also calls for a limit of 2 mg/l phosphorous from large facilities discharging into waters which are overenriched with nutrients. Dischargers have three years to meet this limit once their permits are modified. According to state officials, 11 of 14 major STPs on the James east of the fall line will need to upgrade their facilities to meet the phosphorous limit.

The state nutrient standard is a step forward, but it does not require nitrogen removal. It does provide incentives for voluntary nitrogen removal and leaves open the option of requiring nitrogen removal in the future. Many authorities believe it will take removal of both phosphorous and nitrogen to clean up the James. New technologies that use biological, rather than chemical, means to remove nutrients may make nitrogen removal more feasible.

Meanwhile, in response to ammonia concerns in the upper James estuary, the SWCB has added ammonia limits to the permits of many STPs in this stretch of river.

The Commonwealth is also working to reduce agricultural nutrient runoff into the James by paying farmers part of the cost of installing or adopting certain erosion and fertilizer management practices on their land. The state has also done some cost sharing to localities for implementing urban runoff control measures.

Overflows from combined sewers are another serious problem on the James. In modern systems, sewage is carried to treatment plants by one system of pipes, while another carries stormwater directly to the river. However, about 11,000 acres of Richmond's land area are served by combined sewer pipes, which use one pipe to convey both sewer and stormwater to STPs. When wet weather hits, the stormwater creates high flows that are too great in volume for the STP and excess flows go straight, untreated, into the river, carrying large quantities of raw sewage. In fact, during a large rainfall, Richmond's combined sewers contribute more fecal bacteria than all of the other sources on the river combined. As a result whenever there is a large rain event, the oyster beds in the lower estuary must be closed due to fecal contamination.

The City of Richmond has a plan to correct the combined sewer problem which would cost \$294 million to complete—much more than the city can afford. The city has committed to complete the first, five-year phase of the plan, which will route the sewer overflow further downstream, away from the recreational areas, and to seek federal and state financial aid to complete the remainder.

Finally, toxic chemical pollution represents a third threat to the James. In 1975, for example, large quantities of Kepone, an extremely potent pesticide, were discharged into the river at Hopewell. Concern over possible carcinogenic effects on people eating large quantities of Kepone contaminated fish led to a ban on commercial fishing in 98 miles of the James River from Richmond to the Hampton Roads Bridge Tunnel. The ban was finally lifted in 1989.

The Kepone is not gone. It has just become gradually buried by sediment, making it less accessible to fish and plant life. There is still some worry that a severe storm could stir up the sediments and the Kepone so the SWCB will continue measuring the Kepone levels in finfish and in the sediments.

Fish contamination is also a problem on the upper James and part of its headwaters on the Jackson River. The Virginia State Health Department recently issued a health advisory that fish in this area may contain levels of dioxin, a highly toxic by-product of paper production, and may be carcinogenic if eaten frequently. The SWCB has proposed the adoption of a water quality standard for dioxin.

In 1988, the SWCB adopted new toxics regulations which have resulted in over 100 discharge permits being issued in the James basin which require both biological and chemical toxics monitoring, as well as toxic management programs. Eighteen of these facilities have shown indications of toxicity and are now in various stages of toxicity identification and reduction studies. These studies are designed to pinpoint the sources of toxicity and to evaluate alternatives to eliminate the toxic effects.

WATCHING THE RIVER FLOW

The volume of water in the river as well as its quality is also a major concern on the James, which is occasionally subject to severe flooding. Hurricane Camille, in 1969, caused one of the worst floods, killing 151 people and causing \$161 million in property damage. A large floodwall is currently under construction in the City of

Richmond to protect the city's downtown area from further flooding.

The opposite problem-too little water-is also a possibility on the James. The James River Planning Area has been identified as the area in Virginia facing the most water supply problems by the year 2030. Some areas, including Chesterfield and Hanover Counties Newport News, Chesapeake and Virginia Beach, may face critical water shortages within 30 years which may limit population growth. Some of these localities are considering creating new reservoirs by impounding creeks. Others are proposing intrabasin transfers of water. Meanwhile other localities are rushing to secure future water supply projects in their area so water-short localities will not beat them to the water sources. Water is also being withdrawn for industrial and agricultural uses.

A coordinated statewide approach to water supply planning is clearly needed. The state's Virginia Water Supply Plan is a start. It assesses water supply conditions and demands across the state through the year 2030, data which localities need to make future water supply decisions. Still the document is only advisory in nature and localities-to a large extent-must continue to fend for themselves in obtaining water supplies.

Recent legislation has strengthened the state's ability to assure that enough water is left in rivers to protect water quality, aquatic life, wildlife habitat, recreation and aesthetics. These beneficial uses of instream water have been officially recognized and must be considered in related decision making. Additionally, the Surface Water Management Area Act gives the state the authority to regulate water use during droughts if an area has been specifically designated as having a low flow problem.

River flow is also a critical issue in one other respect. In the Richmond area, several dams along the James block the free flow of the river and prevent migratory fish, such as shad and striped bass, from reaching their historical spawning grounds further upstream. A commitment in the 1987 Chesapeake Bay Agreement calls for fish passages on dams. In response, the first two dams on the James have been breached and the others are earmarked for breaching in the future. This is an important first step if fisheries in the Chesapeake Bay are to be restored.

THE FUTURE

The future of the James River depends in part on how the rapid growth of its urban and industrial areas is handled. Efforts to reduce nutrients must keep pace with new STPs and industrial discharges. Eventually the costly question of nitrogen removal from STPs will have to be faced. Also as development occurs, erosion from construction and urban run-off will increase, so nonpoint control programs in the basin will need to increase accordingly.

The ammonia levels in the upper estuary need to be examined to see if the new permit limits will reduce ammonia to safe levels. Volunteer citizen monitors working with the Alliance for the Chesapeake Bay, which has been monitoring the James since 1986, are testing the ammonia levels in the upper estuary in cooperation with the Virginia State Water Control Board.

Local governments are getting involved in the cleanup as well. As a result of the Chesapeake Bay Preservation Act, all Tidewater localities are incorporating water quality protection into their planning.

Significant work has been done and money spent on improving the water quality of the James River. For the James to be clean in the future, it will take a continued effort by the Commonwealth, local governments and James River citizens.