

I. INTRODUCTION

Background

In 1996, segments of seven rivers within West Virginia's Potomac watershed (Lost River, South Branch of the Potomac, North Fork of the South Branch, South Fork of the South Branch, Mill Creek, Lunice Creek and Anderson Run) were placed on the 303(d) list of impaired water bodies due to fecal coliform bacteria. Out of concern that the listing of these waters was based on insufficient data, the West Virginia Department of Agriculture (WVDA) began a water quality initiative in 1998 intended to collect additional data that would more accurately establish the condition of these streams. The WVDA upgraded their water quality laboratory to allow research into the origin of pollutants and to study unanswered water quality questions that arose because of the expansion of agricultural activity in West Virginia's Potomac Basin. Through June 2004, the WVDA Water Quality Program collected and analyzed over 13,000 samples for temperature, pH, conductivity, fecal coliform, ammonia, nitrate, and total phosphorus. This comprehensive report discusses the findings of the WVDA Water Quality Program from July 1998 through June 2004.

Geography

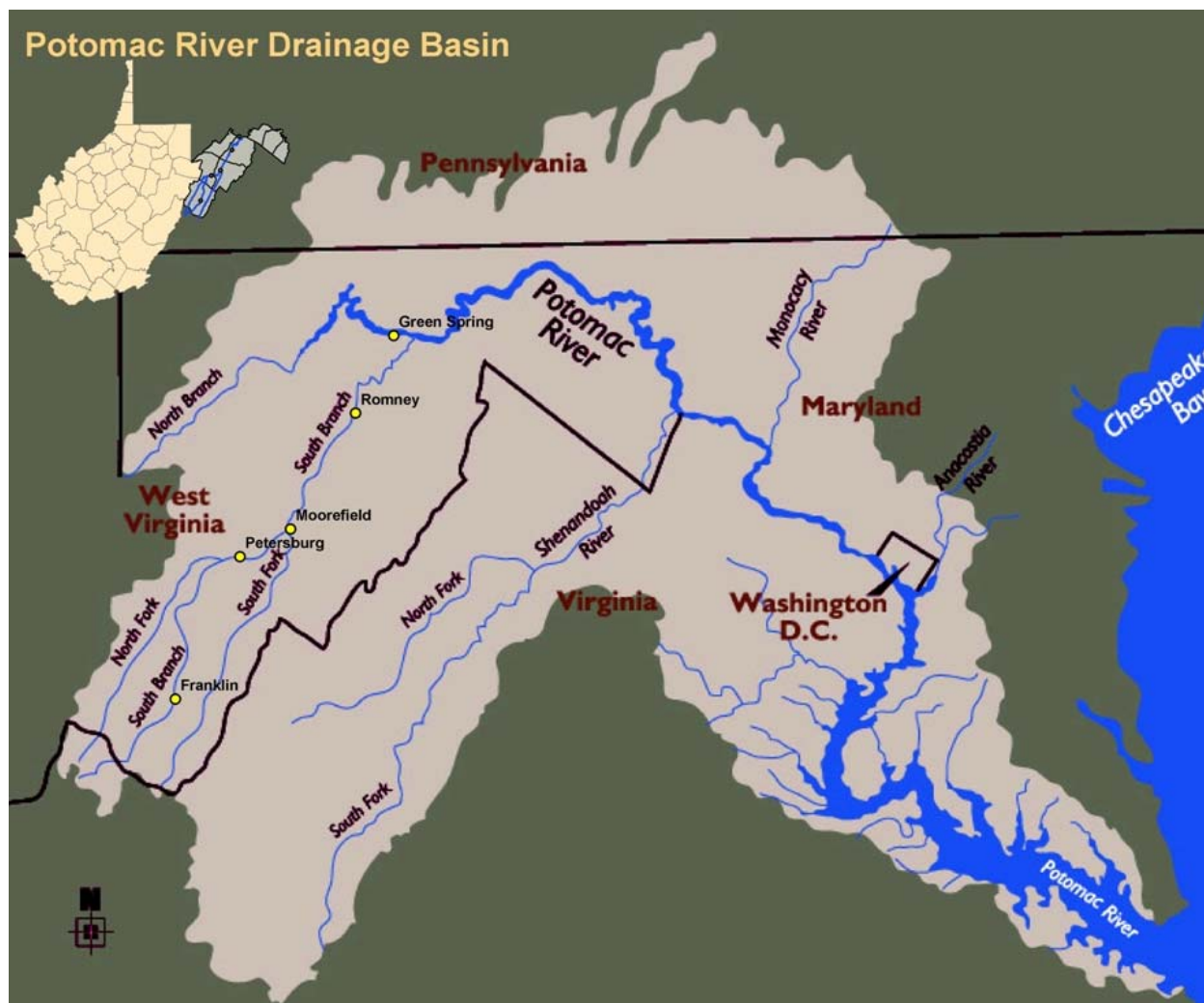


Figure 1. Potomac River Drainage Basin



West Virginia is a headwater state of the Potomac River, including drainage from the Appalachian Mountains lying east of the Eastern Continental Divide. The Potomac River's South Branch, the North Fork of the South Branch and the South Fork of the South Branch all have their beginnings in Highland County, Virginia, and Pendleton County, West Virginia. As depicted in Figure 1, the South Branch flows through the Pendleton County Seat, Franklin, West Virginia. The South Branch and the North Fork then flow through Grant County. These two streams converge at the Grant County Seat, Petersburg, West Virginia. The South Branch and the South Fork continue flowing north into Hardy County, and converge at the Hardy County Seat, Moorefield, West Virginia. The South Branch River then flows into Hampshire County passing close by Romney, West Virginia, the Hampshire County Seat. The river then flows through the western side of Hampshire County to Green Springs, West Virginia, where it joins with the North Branch to form the Potomac River. The Potomac River follows the West Virginia/Maryland state boundary to the eastern edge of the Eastern Panhandle of West Virginia. At Harpers Ferry, West Virginia, the Potomac River merges with the Shenandoah River, and then flows east/southeast to empty into the Chesapeake Bay.

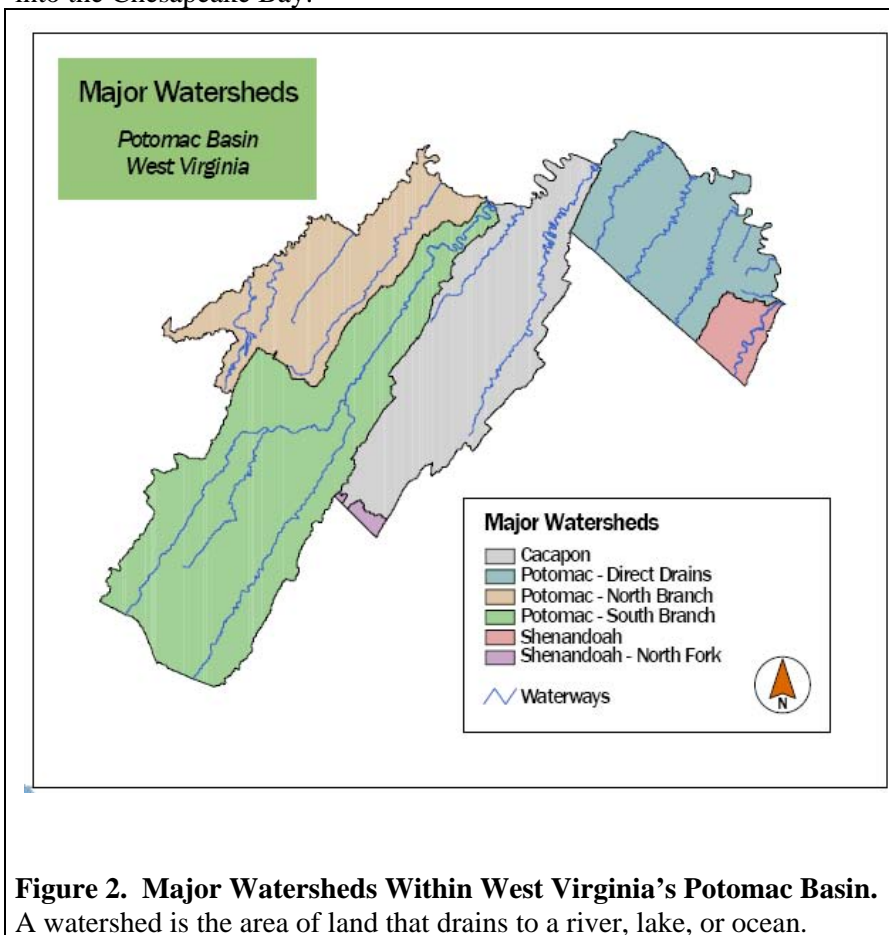


Figure 2. Major Watersheds Within West Virginia's Potomac Basin.
A watershed is the area of land that drains to a river, lake, or ocean.

West Virginia's Potomac Basin includes six major watersheds: the South Branch of the Potomac, the North Branch of the Potomac, the Cacapon, a group of relatively small waters known as the Potomac Direct Drains, the Shenandoah mainstem, and a small piece of the North Fork of the Shenandoah. These watersheds are depicted in Figure 2.

Economics

The economy in West Virginia's Potomac Basin is primarily agriculture based, supplemented with timber harvesting, manufacturing, construction, utilities and tourism. High quality limestone deposits are mined within the watershed. Six active/inactive limestone/dolomite operations are presently

under permit in Grant, Hampshire and Pendleton Counties.

The agricultural industry is diverse, with the majority of production being poultry and cattle. Most corn acreage is used to feed local livestock with the remainder being sold to the cash grain market. Pasture, hay, soybeans, wheat and barley are also major crops in this region of the state. The area also supports an orchard industry, primarily apples and peaches.



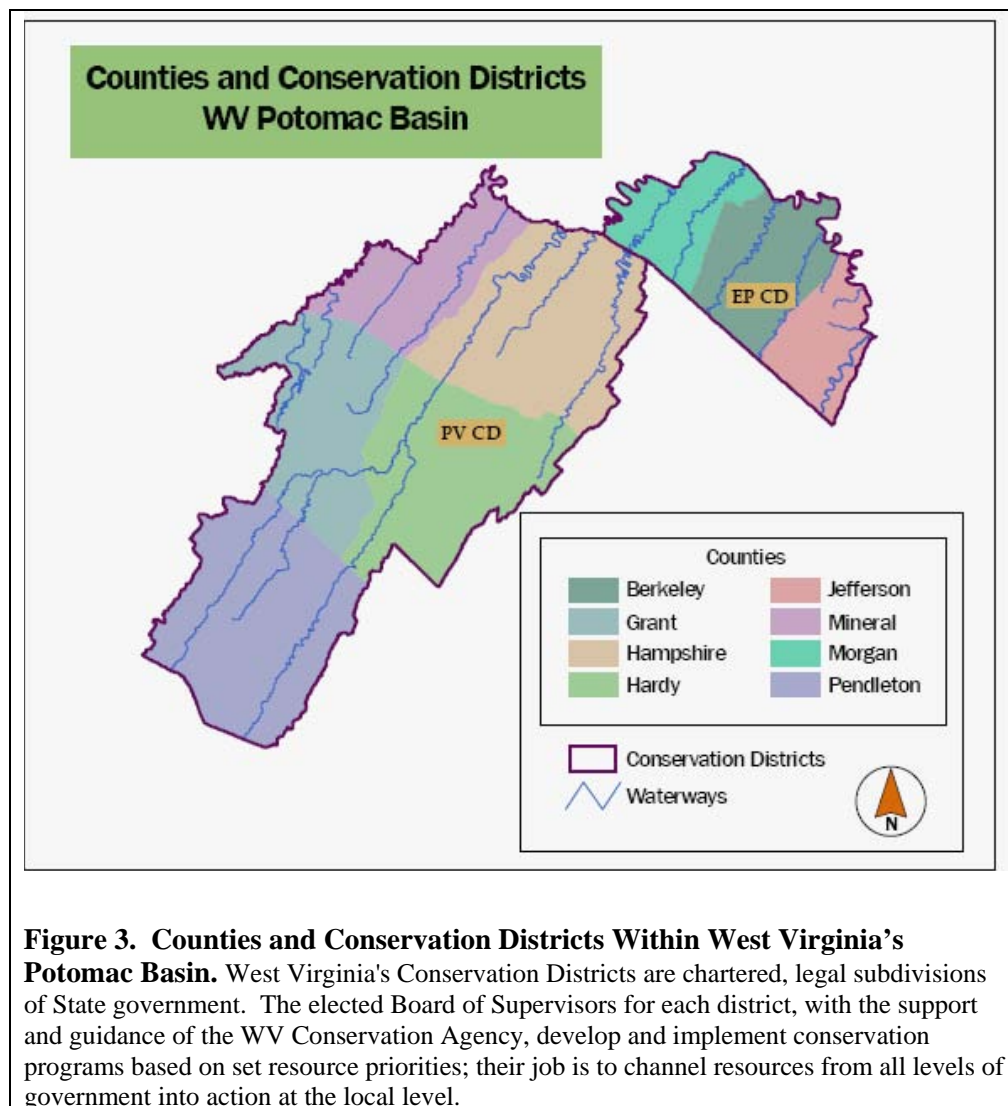


Figure 3. Counties and Conservation Districts Within West Virginia's Potomac Basin. West Virginia's Conservation Districts are chartered, legal subdivisions of State government. The elected Board of Supervisors for each district, with the support and guidance of the WV Conservation Agency, develop and implement conservation programs based on set resource priorities; their job is to channel resources from all levels of government into action at the local level.

West Virginia's Potomac Basin includes eight counties: Pendleton, Grant, Hardy, Mineral, Hampshire, Morgan, Berkeley, and Jefferson (Figure 3). Morgan, Berkeley, and Jefferson counties are located in the 763 square mile Eastern Panhandle Conservation District (EPCD). To the west, the five-county area of Pendleton, Grant, Hardy, Mineral, and Hampshire, counties comprise the 2,722 square miles Potomac Valley Conservation District (PVCD).

The EPCD has a large apple and peach industry,

and many farms are dependent upon crop sales. In 2002, the agriculture census crop sales accounted for 66%, 41%, and 54% of the market value in Berkeley County, Jefferson County and Morgan County, respectively. The EPCD is the fastest growing region in the state. Many farms are being developed and this region is rapidly being transformed into a bedroom community of the Washington-Baltimore Metropolitan Area. The 2002 agriculture census, showed a slight decrease in farm acreage in Jefferson and Berkeley Counties and a slight increase in farm acreage in Morgan County from 1987-2002. Since 2002 significant farmland has been taken out of production for the building of houses and businesses due to increased population from surrounding urban areas. This phenomenon is especially evident in Berkeley and Jefferson Counties.

The PVCD is West Virginia's most significant agricultural region, dominated by large-scale poultry production and processing facilities, as well as a robust beef cattle market. Over 56% of West Virginia's sales of agricultural products come from this region, according to the 2002 agricultural census. Pilgrims Pride, a poultry integrator located in Moorefield, is the thirteenth largest employer in the state of West Virginia and is the largest single employer in Hardy County as of March 2004 (WVBEP, 2004a; WVBEP, 2004b). In the early 1990's, the local poultry industry increased when WLR Foods (now Pilgrims Pride) expanded the processing plant in Hardy County. The area has approximately 870 poultry houses and the poultry and poultry products produced from these farms account for 54.6% of all animal



agriculture products sold in the state in 2002. Cattle production is the second largest agricultural industry in the PVCD with many local farms raising both beef and poultry. Seventy percent of open agricultural land in the PVCD is pasture and hay land.

The timber and wood products industry is another major contributor to the economy with approximately 70 percent of the land covered by forest. Recreation and tourism are extensive in West Virginia's Potomac Basin, including hunting, fishing, swimming, canoeing and hiking. One of the most popular attractions, Seneca Rocks National Recreation Area, is located in Pendleton County along the North Fork. Within this region are portions of the George Washington and the Monongahela National Forests.

The South Branch of the Potomac and Lost River watersheds contain a great diversity of fish and wildlife resources. This diversity is largely due to the remoteness of the watersheds as well as the good water quality of the streams. An abundance of public lands, the stocking of hatchery-raised trout and the presence of native trout and wildlife create excellent opportunities for recreational hunting and fishing.

A variety of game and non-game birds, mammals, and fish inhabit these watersheds. White-tailed deer, black bear, turkey, Canada Geese, rabbit, grouse, gray and fox squirrels are present in significant populations. These areas consistently rank among the best in West Virginia for harvesting deer and turkey. Migratory bird species and numerous non-game species such as small mammals, birds of prey, songbirds, reptiles, amphibians, and invertebrates attract visitors to the watersheds for non-game wildlife uses such as bird watching.

Purpose and Scope

Beginning in mid 1990s, the agricultural industry more than tripled in the Potomac Headwaters of West Virginia. Most of this increase was in the Potomac Valley Conservation District's region, which received economic and societal benefits from strong growth in the poultry industry.

The Potomac Headwaters Interagency Water Quality Office (PHIWQO) was formed in response to concerns over water quality related to an expanding agricultural presence. The PHIWQO was charged with protecting the waters of the Potomac while maintaining a strong agricultural industry. It actively promoted government cost share projects focused on accelerated development of nutrient management plans and installation of agriculture waste storage structures, mortality composters and livestock confinement areas. Eighty-five percent of poultry growers in the five county area of the Potomac Valley Conservation District are currently participating.

As part of the PHIWQO effort, the USDA-Natural Resources Conservation Service contracted with the U.S. Geological Survey (USGS) to conduct a surveillance level water quality study in 1994 and 1995 to assess the condition of the Potomac Headwater region's rivers (PHIWQO, 1996). Sites in the South Branch of the Potomac drainage and the Lost River drainage were sampled monthly for varying periods of time (Mathes, 1996). All water quality parameters, other than fecal coliform bacteria, were found to be in accordance with West Virginia's existing water quality standards. However, as a result of the USGS study, segments of the Lost River, South Branch of the Potomac, North Fork of the South Branch, South Fork of the South Branch, Mill Creek, Lunice Creek and Anderson Run were placed on West Virginia's 303(d) list of impaired water bodies due to fecal coliform bacteria. Out of concern that the listing of these waters was based on insufficient data, the West Virginia Department of Agriculture (WVDA) began a water quality initiative in 1998 intended to collect additional data that would more accurately establish the condition of these streams.

In 1998 with funding provided by the West Virginia Legislature, a water testing laboratory was built as an addition to the original office and laboratory building in Moorefield, West Virginia. Previous to the 1998 addition, the Moorefield Department of Agriculture building had undergone a transformation in 1993 from an animal health lab to a facility for the determination of nutrients in poultry litter and other animal manures. With the 1998 addition, the laboratory now housed sophisticated equipment to analyze



nutrient and bacteria levels in water samples and to aid in researching the origin of pollutants. For instance, contributors to bacteria levels might include wastewater treatment facilities, failing septic systems, recreation activities and vacationers with inadequate or no sewage treatment facilities at campsites and cabins along the river, wildlife populations and animal agriculture.

Since 1998, the WVDA has continued this comprehensive water quality monitoring program within West Virginia’s Potomac Basin to monitor the seven impaired streams and investigate potential sources of fecal coliform bacteria. This water quality project has undergone several changes during the six years that it has been in operation. Changes in site locations, numbers of sites sampled within a watershed, testing parameters, improved lab facilities and up-graded sampling/testing equipment are some examples of the changes. The addition of a DNA bacterial source tracking program and affiliation with the Chesapeake Bay Program contributed to the continuing expansion of the WVDA water quality efforts. Throughout the entire WVDA Water Quality Program, over 13,000 samples have been collected and analyzed for temperature, pH, conductivity, fecal coliform bacteria, ammonia-nitrogen, nitrate-nitrogen, and total phosphorus.

This comprehensive report focuses primarily on findings of the WVDA Water Quality Program within the South Branch of the Potomac and part of the Cacapon watersheds from July 1998 through June 2004 (Figure 4). Additional information will also be presented for what are termed the Outer Run watersheds. The Outer Run sites were added to develop water quality information needed by the Chesapeake Bay Program to improve the accuracy of its water quality modeling and forecasting.

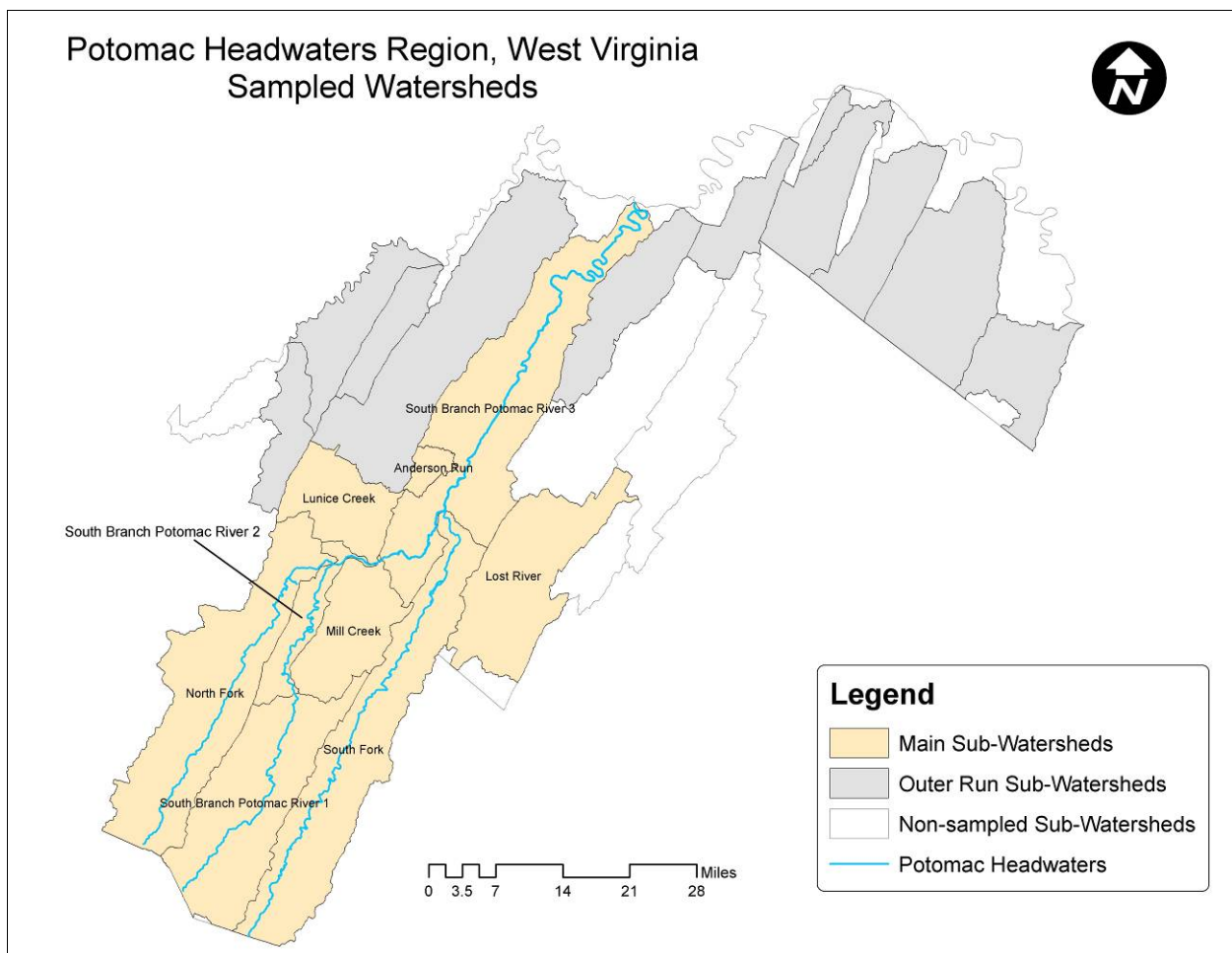


Figure 4. Sampled Watersheds Within West Virginia’s Potomac Basin

