National Water-Quality Assessment Program Activities in the Potomac River Basin

Selected Results from the Great Valley Carbonate Region

> Linda M Debrewer U.S. Geological Survey

Outline

- Review of the Scope and Objectives of the NAWQA Program
- Summary of activities and findings in the Potomac Watershed from Cycle I (1991 through 2000)
- Summary of activities and findings in the Potomac Watershed from Cycle II (start 2001)

National Water Quality Assessment Program

Purpose

To provide water-quality information to policy makers and resource managers at the Federal, state, and local level so they can better prioritize and manage water resources in diverse hydrologic and land-use settings

Scope

- More than 60 major river basins and aquifer systems
- Over 2/3 of the population served by public waters systems
- Over 2/3 of the Nation's freshwater use

1991 to 2001



- What is the quality of the Nation's water?
- Is water quality getting better or worse?
- Have water-quality programs in the past resulted in significant water-quality improvements?

NAWQA Objectives

STATUS: Describe the quality of the Nation's water resources in a Nationally consistent manner

TRENDS: Assess long-term trends and changes in water quality

UNDERSTANDING: Identify, describe, and explain factors that govern water quality

AWQA in the Potomac Watershed

Cycle I

Physiographic Provinces and Subprovinces Potomac River Basin



Great Valley Carbonate Region





Cycle I Temporal Sampling



11 "fixed" monitoring sites – routine nutrients, major ions, sediment, and pesticides
18-24 months, 1993-95
3 sites [5 (Ag),10 (F), 11 (Ur)] continued through 2001

Cycle I Spatial Sampling



In small streams, late-summer base flow synoptic sampling, 1993-95



Nutrient occurrence 1993 to 1995



NITRATE, IN MILLIGRAMS PER LITER AS NITROGEN

Stream concentrations below MCL even during high flows

Most nitrate in streams comes from ground-water contributions to stream flow



OCTOBER, 1993 - SEPTEMBER, 1995

Nutrient occurrence 1993 to 1995



Nitrate concentrations in Great Valley among the highest in the Potomac River Basin

Pesticide Occurrence



Highest concentrations typically in Great Valley Carbonate 85% ground-water samples contained detectable pesticides



Detected in small streams at low flow

Pesticide occurrence 1993 to 1995



EXPLANATION

County agricultural land planted in corn, barley, oats, wheat, sorghum, or soybeans, in percent



Less than or equal to 20

Atrazine concentrations at selected sites in agricultural areas, in micrograms per liter

Ground water

Less than 0.001

• 0.001 - 0.009

• 0.01 - 0.099

• Greater than or equal to 0.1

Streams, low flow

▲ Less than 0.001

▲ 0.001 - 0.009

▲ 0.01 - 0.099

▲ Greater than or equal to 0.1

Pesticide concentrations highest in areas of intense agriculture

Atrazine expected more in crop areas than pasture

Summary of Cycle 1 Results in the Potomac Watershed

Nutrient and pesticide concentrations in streams and ground water are related to land use and geology (specifically row crop agriculture and carbonate bedrock)

Higher concentrations of most pesticides occur in streams during spring and early summer, coincident with application

Higher concentrations of agricultural chemicals found in Great Valley streams - carbonate bedrock permits relatively rapid movement of chemicals through ground water to streams

NAWQA in the Potomac River Basin and Delmarya Peninsula

Cycle II (2001-2007)

NAWQA Cycle II

Surface Water: Continuation of five trends sites, including Muddy Creek in the Great Valley Carbonate Region Ground Water: Re-sample Great Valley Carbonate wells (24/29) New Urban Land use study in Piedmont New Study Unit Survey in Coastal Plain near Fall Line Topical Studies: Explanation Transport and transformation of agricultural chemicals from fields to streams (upper Delmarva Peninsula) Effects of varying levels of nutrient enrichment on stream ecology (Coastal and Plain)

Nitrate occurrence 1993 to 2003



Seasonal trend: Nitrate higher in winter when uptake is minimal Dilute nitrate concentrations with flooding

Nitrate in Ground Water 1993 and 2002



No significant change in nitrate concentrations



Pesticide occurrence 1993 to 1995

Muddy Creek at Mount Clinton, VA (01621050) 1993-2003



Atrazine detected all year

Concentrations generally below $0.1 \ \mu g/L$

Concentrations increase after application

Muddy Creek at Mount Clinton, VA (01621050) 1993-2003

Concentrations increase with stream flow due to runoff after application

Concentrations not affected by stream flow rest of year



Pesticides in Ground Water 1993 and 2002



Atrazine and simazine used and behave similarly No significant change in the triazines

FYI...

Summary of NAWQA findings in Potomac Watershed, Cycle I <u>http://md.water.usgs.gov/publications/circ1166/</u>

Cycle I data from the Potomac Watershed http://md.usgs.gov/pnawqa/datarpt/

USGS Water Data (including more recent NAWQA data) http://water.usgs.gov/nwis/

USGS Water Information

http://water.usgs.gov/