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Granger Drain Subbasin Selected for a National Water-Quality Study

The U.S. Geological Survey (USGS) is studying five areas across the Nation to better understand how natural factors and agricultural management practices (AMPs) affect the transport of water and chemicals. Natural factors include climate and landscape (soil type, topography, geology), and AMPs include practices related to tillage, irrigation, and chemical application. The study approach is similar in each area so that we can compare and contrast the results and more accurately predict conditions in other agricultural settings.

Study objectives

- Understand the links between the sources of water and agricultural chemicals (nutrients and pesticides) and their behavior and transport through the environment
- Predict the behavior and transport of water and agricultural chemicals in other agricultural areas not being studied
- Evaluate what the study results mean for management of water and water quality in a variety of agricultural settings

We appreciate your help

We are working with local growers and land owners to gain access to study sites. We also need information about the study area and about current as well as historical agricultural management practices—past practices also affect concentrations of agricultural chemicals in ground and surface water.

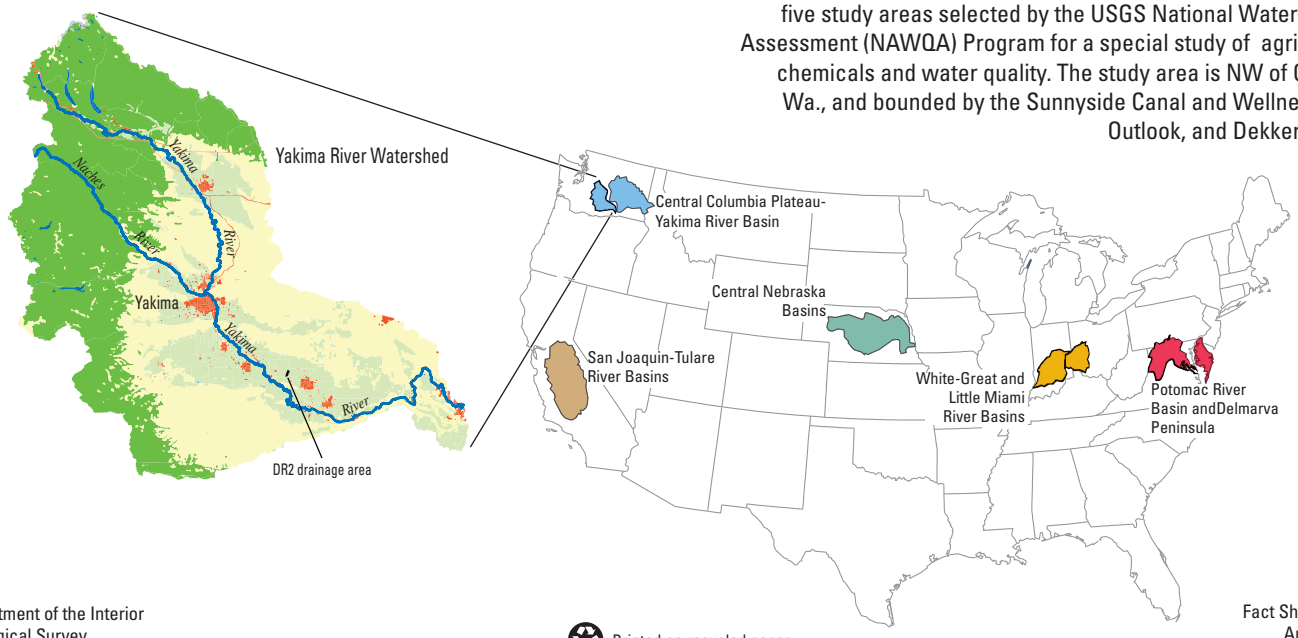
We will report the findings of the study in public meetings and in publications. These findings will provide information that will be useful for improving agricultural management locally and nationally, and will guide future studies in other watersheds.

Why study the DR2 drainage area?

The DR2 drainage and the other four study areas represent nationally important agricultural settings (chemical use, crops, and AMPs) and natural settings (climate, geology, topography, and soils). The DR2 study area, which is part of the Yakima River watershed, is representative of the complex, multi-crop systems found in irrigated agricultural settings of the arid western United States.

Other features that are relevant to this study:

- **Use of agricultural chemicals:** Chemicals used include herbicides such as atrazine, simazine, trifluralin; insecticides such as azinphos-methyl, carbaryl, chlorpyrifos; and fertilizers, both organic and inorganic.
- **Distinct natural setting:** The climate is arid, so irrigation is necessary for agriculture; soils are fine-grained and often require artificial drainage.
- **Variety of agricultural management practices:** AMPs include construction of retention ponds and an extensive artificial network of water delivery and drainage channels; use of rill, sprinkler, and drip irrigation and of polyacrylamide (PAM).
- **Water-quality issues:** Pesticides and elevated concentrations of nutrients have been frequently detected in streams and drains in the Yakima River Basin. Water temperature and sediment loads in streams are of concern.



The DR2 drainage area of the Granger Drain subbasin is one of five study areas selected by the USGS National Water-Quality Assessment (NAWQA) Program for a special study of agricultural chemicals and water quality. The study area is NW of Outlook, Wa., and bounded by the Sunnyside Canal and Wellner, North Outlook, and Dekker Roads.

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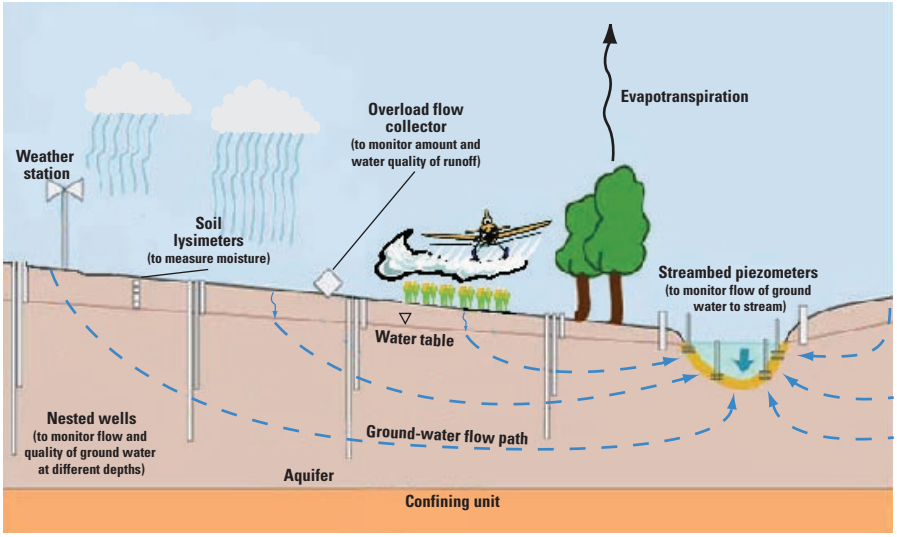
At a typical study site, several methods are used to collect water and chemical samples from the air, soil, surface water, and ground water.

After being applied to the land surface, agricultural chemicals can move upward into the atmosphere, downward through the soil to shallow ground water and underlying aquifers, eventually discharging to streams, or run off across the land into streams, eventually moving downstream to reservoirs and coastal waters. This process can take days, weeks, or even decades if water moves underground through the ground-water system.



Data Collection in the DR2 Study Area, 2003–2004

What kind of data	Why the data are collected	How often
Meteorological data (including wind speed, solar radiation, and air temperature), soil temperature and soil moisture	To estimate the amount of irrigation water that reaches the water table, and how much is lost to evapotranspiration	Continuously for 2 years
Amount of streamflow at DR2 at Yakima Valley Highway gaging station	To interpret water-quality data correctly (the amount of water in streams affects chemical concentrations)	Continuously for 2 years (data available at http://waterdata.usgs.gov/wa/nwis/nwisman/?site_no=462023120075200&agency_cd=USGS)
Quality of stream and runoff water[1]	To quantify the transport and behavior of natural and agricultural chemicals	Several times a year (>14 samples) for 2 years, with intensive sampling during application season
Ground-water levels in wells	To determine direction of ground-water flow, which affects transport of chemicals	At least quarterly in some wells, continuously in others for at least 1 year
Quality of ground water, soil water, and shallow water in and around streambed/riparian zone[1]	To quantify the transport and behavior of natural and agricultural chemicals	At least quarterly for 1 year
Quality of sediment in streambed and soils in agricultural fields[1]	To quantify the storage, behavior, and transport of water and chemicals in the soils and sediment	At least once during study

[1]In this study, water-quality and sediment-quality data include concentrations of nutrients (nitrogen and phosphorous), pesticides and pesticide breakdown products, and natural constituents and properties, including major ions (calcium, magnesium, chloride, etc.), organic carbon, dissolved oxygen, and temperature.

We would like to thank

Roza-Sunnyside Board of Joint Control

Sunnyside Valley Irrigation District

Roza Irrigation District

South Yakima Conservation District

Prosser Irrigated Agriculture Research & Extension Center

For more information

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NAWQA Program http://water.usgs.gov/nawqa

Publication

Morace, J.L., Fuhrer, G.J., Rinella, J.F., McKenzie, S.W., and others, 1999, Surface Water-Quality Assessment of the Yakima River Basin, Washington, USGS Water-Resources Investigations Report 98-4113.