



Lower Merced River and Mustang Creek Watersheds Selected for a National Water-Quality Study

The U.S. Geological Survey (USGS) is studying five watersheds 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 watershed 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

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 watershed 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. The findings will provide information that will be useful for improving agricultural management locally and nationally, and will guide future studies in other watersheds.

water and water quality in a variety of agricultural settings

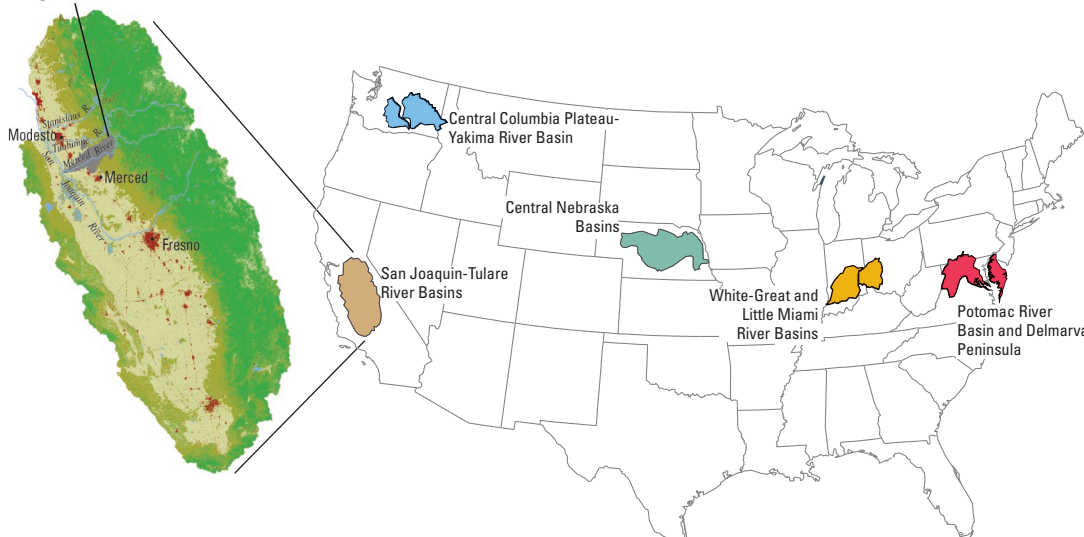
Why study these watersheds?

The lower Merced River and Mustang Creek watersheds, along with the other four watersheds, represent nationally important agricultural settings (chemical use, crops, and AMPs) and natural settings (climate, geology, topography, and soils). Mustang Creek is a small tributary to the Merced River, which drains into the San Joaquin River. AMPs are diverse throughout the lower Merced River watershed, which contains orchards, vineyards, row crops, dairies, and other animal operations typical of the San Joaquin Valley.

Other features of the watershed that are relevant to this study:

- **Use of agricultural chemicals:** Chemicals used include organic and inorganic fertilizers; herbicides; insecticides; and mixtures designed for orchards, row crops, or vineyards.
- **Distinct natural setting:** Land uses are variable, as are soil types and ground-water depths—from permeable sands with relatively shallow water tables to poorly drained soils with hardpans and relatively deep water tables that limit crops that can be grown.
- **Variety of agricultural management practices:** Fertilizer and pesticide use varies locally; conservation of available irrigation water is generally practiced.
- **Water-quality issues:** Winter rains transport a portion of insecticides (used as dormant sprays on orchards) to local creeks and to the Merced and San Joaquin rivers.

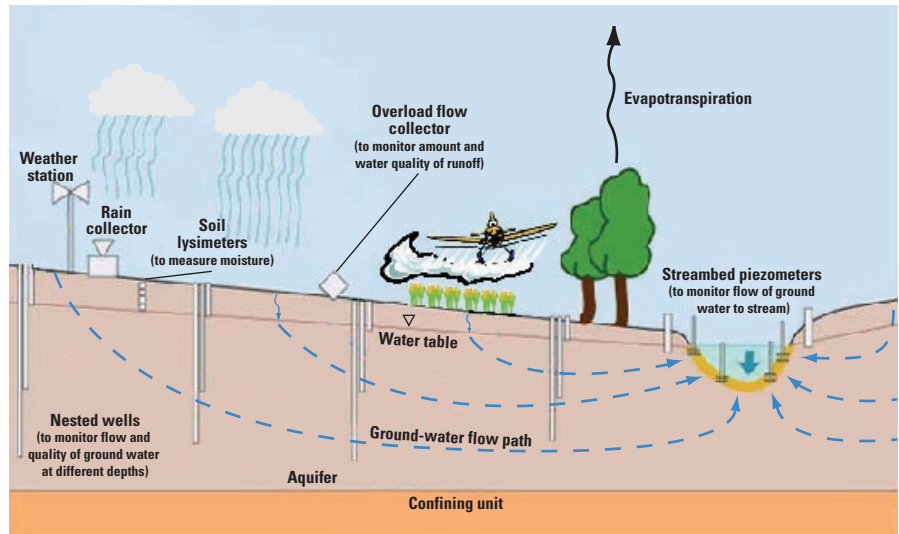
Lower Merced River and Mustang Creek watersheds



The lower Merced River and Mustang Creek watersheds and four other watersheds have been selected by the USGS National Water-Quality Assessment (NAWQA) Program for a special study of agricultural chemicals and water quality.

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 lower Merced River and Mustang Creek Watersheds, 2003–2004

What kind of data	Why the data are collected	How often
Meteorological data, including rainfall, wind speed, solar radiation, and air temperature. Soil temperature and moisture	To determine amount of precipitation and estimate amount that reaches the water table and how much is lost to evapotranspiration	Continuously for 2 years
Streamflow at 2 newly installed gaging stations within the Mustang Creek watershed. Streamflow on the Merced River measured by California Dept. of Water Resources.	To interpret water-quality data correctly (the amount of water in streams affects chemical concentrations)	Continuously
Quality of stream water, runoff water, rain 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

¹In 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

East Merced Resource Conservation District
 Merced River Stakeholders
 Turlock Irrigation District
 Merced County Dept. of Agriculture
 California Central Valley Regional Water Quality Control Board

For more information

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 NAWQA Program <http://water.usgs.gov/nawqa>
 San Joaquin-Tulare Basins NAWQA http://ca.water.usgs.gov/sanj_nawqa/

Publication

Dubrovsky, N.M., and others, 1998, Water Quality in the San Joaquin-Tulare Basins, California, 1992-95, U.S. Geological Survey Circular 1159.



The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy and mineral resources; and enhance and protect our quality of life.