U.S. Department of the Interior
U.S. Geological Survey

Water-Quality Assessment in the Trinity River Basin, Texas—Pesticide Occurrence in Streams, Winter and Spring 1994

NAWQA
Fact Sheet

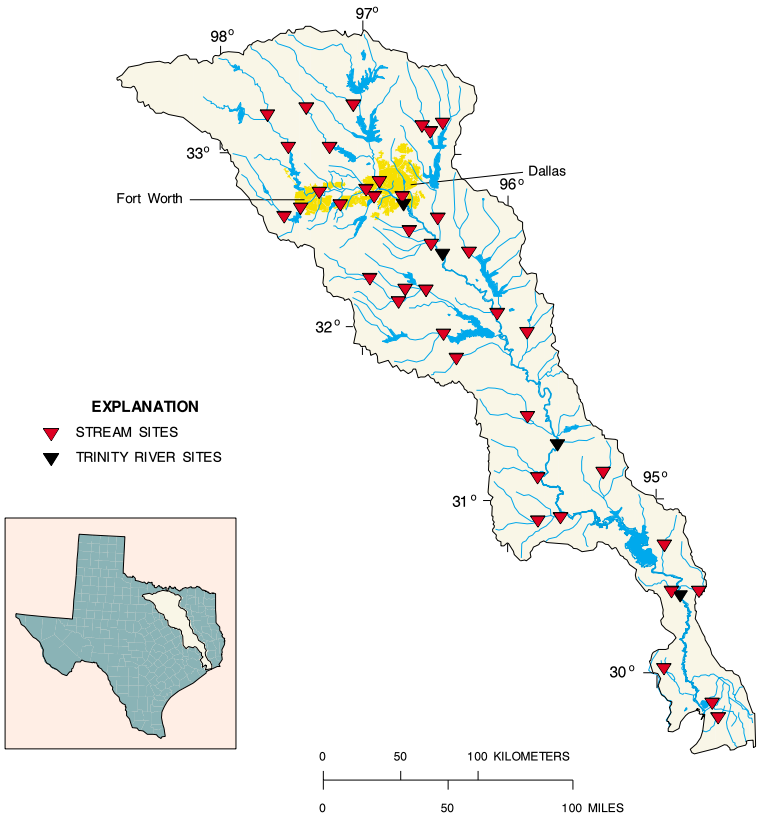
A consistent, basin-wide set of data for streams in the Trinity River Basin is necessary to provide a baseline for current conditions, to compare with historical data, and to provide a reference for future studies by the National Water-Quality Assessment (NAWQA) Program. In addition, the basin-wide surveys begin the process of addressing the cause-effect relation for water quality in the basin. Effects of land use, geology, vegetation, soils, and reservoirs on water quality were considered by site selection. Seasonal differences were addressed by conducting two surveys, the first during the winter low-flow period and the second during the late spring high-flow period.

Basin Description

The 48,096 square-kilometer basin includes all or part of 38 counties. In 1990, the basin had a population of about 4 million. The basin includes the Dallas-Fort Worth metropolitan area, with an estimated population of 3.5 million. According to the most recent land-use data (1970), about 57 percent of the basin is cropland or pasture; 25 percent forest or wetlands; 10 percent rangeland; and 5 percent urban. The remaining 3 percent is classified as either open water or barren land. Agriculture is a major economic activity in the basin. Livestock operations are predominant; however, a variety of crops are grown across the basin. The top nine crops grown in the basin are alfalfa or hay, corn, cotton, peanuts, pecans, rice, sorghum, soy beans, and wheat.

Pesticide Sampling

Water samples were collected from 43 sites within the basin. The sites are located on the main stem of the Trinity River and its major tributaries to provide broad spatial coverage of the basin. The chemical analyses include both herbicides and insecticides found in many chemicals used for urban and agricultural purposes. Samples were collected at each site along with data for streamflow, temperature, pH, dissolved oxygen, specific conductance, and suspended sediment. The samples were analyzed for major-ion, nutrient, organic carbon, and pesticide concentrations.



Surface-water synoptic sampling sites, Trinity River Basin, 1994.

The winter sampling occurred during the months of January, February, and March. The spring sampling occurred during the month of May.

Pesticide Occurrence

The pesticide analyses comprised 53 herbicides and 30 insecticides. The total number of pesticide detections in the basin was 170 for the winter sampling and 283 for the spring sampling. If every pesticide was detected at each site, there would have been 3,569 detections per season.

Of the 170 winter detections, 132 were herbicide detections and 38 were insecticide detections. The most commonly detected herbicides were atrazine (35), metolachlor (22), simazine (18), tebuthiuron (18), and prometon (16). The most commonly detected insecticides were diazinon (23) and chlorpyrifos (11).

Atrazine, commonly used on corn, hay and sorghum, was detected at more locations than any other pesticide during the winter sampling. The maximum atrazine concentration was 4.0 micrograms per liter (µg/L). Two samples contained 1.0 µg/L. The remaining 32 samples with detections contained less than 1.0 µg/L. No atrazine was detected at eight sites. The U.S. Environmental Protection Agency (USEPA) maximum contaminant level (MCL) for atrazine is 3.0 µg/L. The USEPA MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Diazinon commonly is applied to lawns in both urban and rural areas. The maximum concentration of diazinon was 0.064 µg/L. The USEPA drinking water health advisory level for diazinon is 0.6 µg/L. The USEPA drinking water health advisory level is the concentration in drinking

water that would result in no adverse human health effect for an adult lifetime exposure of 70 years.

Of the 283 spring detections, 219 were herbicide detections and 64 were insecticide detections. The most commonly detected herbicides were atrazine (37), desethyl atrazine (29), metolachlor (29), prometon (27), simazine (25), and tebuthiuron (19). The most commonly detected insecticides were diazinon (34) and chlorpyrifos (18).

Atrazine was detected at more sites than any other pesticide during the spring sampling. The maximum atrazine concentration was 4.2 µ g/L. Five samples contained atrazine concentrations between 1.5 and 3.8 µ g/L. The remaining 31 samples with atrazine detections contained less than 0.87 µ g/L. Atrazine was not detected at six sites.

The maximum concentration of diazinon was 0.42 µ g/L. Diazinon was not detected at nine sites.

The highest concentration of a herbicide in the basin was molinate, commonly used on rice. The maximum concentration was 20.0 µ g/L. No USEPA standard or guideline has been reported for molinate.

— Allison A. Shipp

In 1991, the U.S. Geological Survey, U.S. Department of the Interior, began a National Water-Quality Assessment (NAWQA) Program. The long-term goals of the NAWQA Program are to describe the status of and trends in the quality of a large representative part of the Nation's surface- and ground-water resources and to identify the major factors that affect the quality of these resources. In addressing these goals, NAWQA will produce water-quality information that is useful to policymakers and managers at Federal, State and local levels.

Studies of 60 hydrologic systems that include parts of most major river basins and aquifer systems are the building blocks of the national assessment. The 60 study units range in size from less than 1,000 to more than 60,000 square miles and represent 60 to 70 percent of the Nation's water use and population served by public water supplies. Twenty investigation began in 1991, 15 investigations began in 1994, and 20 are scheduled to begin in 1997.

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Information on technical reports and hydrologic data related to the NAWQA Program can be obtained from:

Project Chief—Trinity River Basin
NAWQA Study
U.S. Geological Survey
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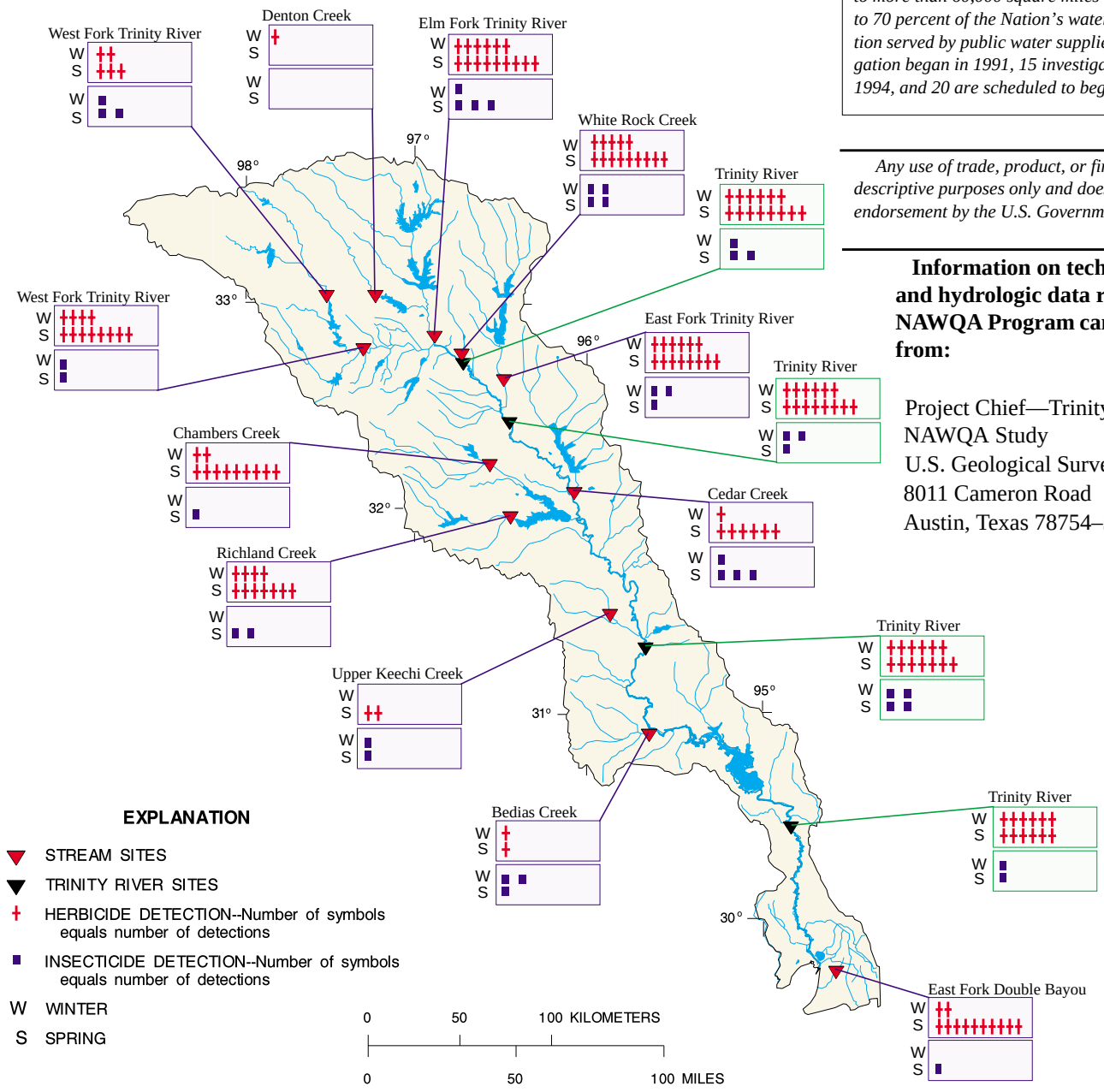
Austin, Texas 78754–3898



Pesticide detections at selected surface-water synoptic sampling sites, Trinity River Basin, 1994