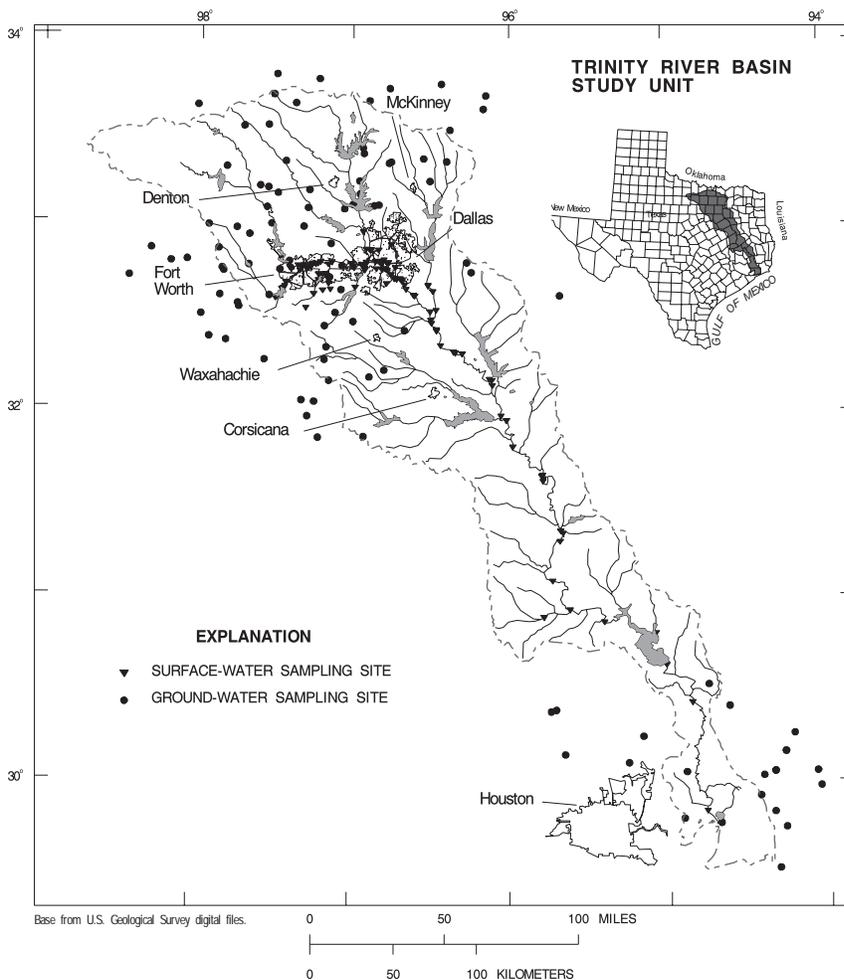


The Trinity River Basin National Water Quality Assessment (NAWQA) study-unit staff began assessment activities in 1991, and in 1992, undertook a retrospective review of existing data on pesticides. The main purpose of this review was to aid in the design of a pesticide-sampling network for the study unit. The review consisted of the compilation, screening, and analysis of available pesticide-sample information. In addition, important environmental factors, which influence the occurrence and distribution of pesticides in the study unit, were identified and compiled. A report of this review and analysis will be released in 1995 (Ulery and Brown, in press). This fact sheet provides a brief overview of significant findings.

Study-Unit Facts

The 18,570 square-mile study unit includes about 7 percent of the area of the State of Texas, and all or part of 38 Texas counties. In 1990, the study unit had a population of about 4.5 million. The cities of Corsicana, Denton, McKinney, and Waxahachie, and the Dallas-Fort Worth metropolitan area are within the study-unit, and the city of Houston is located nearby. According to 1970 land-use data, about 57 percent of the study unit was cropland or pasture; 25 percent; forest or wetlands; 10 percent, rangeland; and 5 percent, urban. Agriculture is one of the most important industries in the study unit. The temperate climate, long growing season, and rich soils provide an environment in which a diverse agricultural economy has prospered. Range and dry cropland are prevalent in the drier northwest section of the study unit, and cattle ranches and rice farms in the more humid southeast.

Agriculture accounts for the major use of pesticides in the study unit, however, the use of pesticides on lawns and gardens, along roads and other rights-of way, and around buildings or other structures, is appreciable.



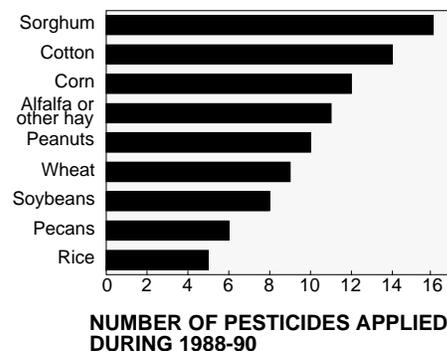
Pesticide Applications

Pesticide-application data for the study unit, for the early period of this review, was not readily available. National-application estimates (for 1976) indicate that about 65 percent of pesticide use in the United States occurred in agricultural areas. Organochlorine-class pesticides, commonly used during the early period covered by this report are no longer in use, having been replaced by organophosphate-, triazine-, chlorophenoxy-, and carbamate-class pesticides.

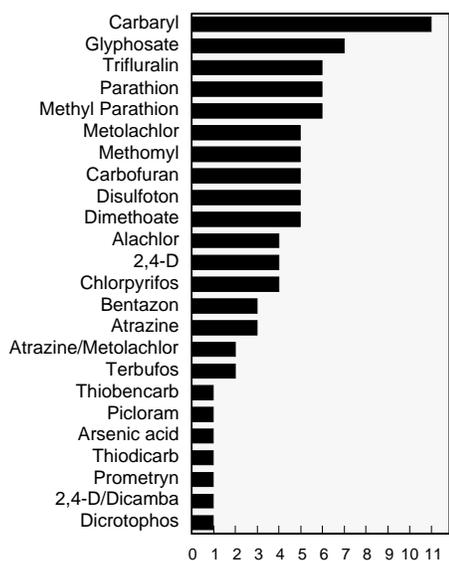
The pesticides 2,4-D, diazinon, malathion, and methyl parathion, which are commonly used in both agricultural and urban areas, were used during the early period covered by this report, and

continue in use today. In this review, agricultural pesticide-application data for the period 1988-90 were analyzed. Selected highlights of this analysis are:

- Dimethoate, an organophosphate insecticide, was the most heavily-applied pesticide.



- 105 individual pesticides were applied on 17 crop types. Nine crop types were treated with 5 or more pesticides.
- Grain sorghum, used for animal feed, was treated by the largest number of individual pesticides.
- Wheat (541,250 acres), cotton (519,870 acres), and rice (265,430 acres) accounted for the largest acreages treated.
- 24 pesticides accounted for 75 percent of use.
- Carbaryl, a carbamate insecticide, was applied to the largest number of individual crop types.



NUMBER OF CROP TYPES TREATED WITH 24 MOST-USED PESTICIDES, DURING 1989-90

Pesticide Sampling

During 1968–91, eight agencies collected more than 2,000 pesticide samples at 155 surface- and 140 ground-water sites. The samples were collected for many different purposes, from routine monitoring to specialized studies covering only small segments of the mainstem Trinity River. The media sampled included water, bed sediment, and tissue of aquatic animals, but the type of sample varied by sampling agency. In most instances, quality-control and detection-level information was available. Those agencies that provided pesticide sample data were:

- City of Arlington, Texas
- Dallas Water Utilities
- Texas Parks and Wildlife Department
- Texas Water Commission

University of North Texas
 University of Texas at Arlington
 U.S. Fish and Wildlife Service
 U.S. Geological Survey

One conclusion reached during the review of sample data was that no ongoing, comprehensive sampling program for pesticides exists in the study unit, although there is ongoing, substantial use of a variety of pesticides.

Pesticide Detections

An analysis of surface-water sample detections, from all agencies, of the major classes of pesticides in water, bed sediment, and tissue of aquatic animals, yielded the following information:

- Organochlorines were detected in 20 percent of 2,909 analyses of surface water, 13 percent of 5,060 analyses of bed sediment, and 31 percent of 981 tissue analyses.
- Organophosphates were detected in 24 percent of 1,119 surface-water analyses, and 2 percent of 818 bed-sediment analyses. No tissue analyses were available.
- Chlorophenoxy pesticides were detected in 56 percent of the 769 surface-water analyses and 35 percent of 252 bed-sediment analyses.

• The highest number of samples with pesticides detected were from upstream reaches of the river, in or near urban areas. The number of detections decrease as the distance downstream from urban areas increases.

• Detections of organochlorine pesticides (chlordan, for example), correlated with the percentage of urban land in the watershed above the respective sites. This finding is consistent with the fact that these pesticides were mainly used in urban areas.

• Review of ground-water analyses indicated no detections of any pesticide. Samples were collected from only a few agricultural areas in or adjacent to the study unit. Of the 140 ground-water sites, only 19 wells were sampled for a broad range of pesticides.

References

Hirsch, R.M., Alley, W.M., and Wilber, W.G., 1988, Concepts for a national water quality assessment program: U.S. Geological Survey Circular 1021, 42 p.

Ulery, R.L., and Brown, M.F., in press, Water-Quality Assessment of the Trinity River Basin, Texas--Review and Analysis of Available Pesticide Information, 1968-91: U.S. Geological Survey Water Resources Investigation 94-4218, 115 p.



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, the NAWQA Program 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 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 investigations were begun in 1991, 20 investigations began in 1994, and 20 are scheduled to begin in 1997.

—R.L. Ulery

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
 8011 Cameron Road, Bldg. B.