WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—The Trinity River Basin

In 1991, the U.S. Geological Survey (USGS) began to implement a full-scale National Water-Quality Assessment (NAWQA) program. The long-term goals of the NAWQA program are to describe the status and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources and to provide a sound, scientific understanding of the primary natural and human factors affecting the quality of these resources. In meeting these goals, the program will produce a wealth of water-quality information that will be useful to policy makers and managers at the national, State, and local levels.

A major design feature of the NAWQA program will enable water-quality information at different areal scales to be integrated. A major component of the program is study-unit investigations, which comprise the principal building blocks of the program on which national-level assessment activities will be based. The 60 study-unit investigations that make up the program are hydrologic systems that include parts of most major river basins and aquifer systems. These study units cover areas of 1,200 to more than 65,000 square miles and incorporate about 60 to 70 percent of the Nation's water use and population served by public water supply. In 1991, the Trinity River basin study was among the first 20 NAWQA study units selected for study under the full-scale implementation plan.

DESCRIPTION OF THE STUDY UNIT

The Trinity River basin drains about 18,000 square miles, all in Texas. In the northwest part of the basin at the headwaters, the land is at an altitude of 1,200 feet. The terrain varies from hills and valleys with timber, pastures, and small farms to prairies with grasslands and farms. In the central part, the land is hilly and usually covered with forests of oak and pine. In the extreme lower part, the basin is a plain with grasslands and farms. The Trinity River flows into Trinity Bay, whose waters then flow into Galveston Bay and finally into the Gulf of Mexico near Houston.

The geology of the bedrock and sediments in the Trinity River basin is composed of the Pennsylvanian, Cretaceous, Tertiary, and Quaternary Systems. Pennsylvanian rocks crop out in the northwest, dip regionally to the northwest, and include marine sand, shale, and limestone. Cretaceous rocks crop out in a north-south band, generally dip to the east, and are characterized by nearshore sand, shale, and limestone. The Trinity, Woodbine, and Nacatoch aquifers are present in this geologic unit. Tertiary and Quaternary rocks and sediments crop out in the southeastern two-thirds of the basin, dip to the southeast, and include beds of clay, shale, lignite, marl, sand, and gravel. The Carrizo-Wilcox, Queen City, and Sparta aquifers are present in the Tertiary System. The Gulf Coast aquifer is present in the Tertiary and Quaternary Systems. The Trinity, Carrizo-Wilcox, and Gulf Coast aquifers are major aquifers.

The average annual precipitation ranges from 27 inches in the northwest to 52 inches in the southeast. In the interior, the maximum monthly rainfall usually occurs in the spring, but is generally uniform throughout the year along the coast. The annual surface runoff ranges from about 2 inches in the northwest to 10 inches in the southeast and averages about 5 inches for the entire basin, including water released from reservoirs. The average maximum daily temperatures (in degrees Fahrenheit) in July are in the mid-90's and the average minimum temperatures in January range from the low 30's in the northwest to the mid-40's in the southeast.

About 4.2 million people live in the Trinity River basin, including about 3 million in the Dallas-Fort Worth metroplex. The economic base in the metroplex includes banking, insurance, transportation, tourism, grain storage, food processing, and manufacturing of apparel, building materials, aircraft, oil-field equipment, plastics, and military equipment. In the rural areas, agricultural products dominate the economic base and are about equally divided between ranching and farming. Beef and dairy cattle are the dominant livestock, whereas wheat, cotton, small grains, peanuts, vegetables, fruits, hay, and rice are the major farm products. Except for rice production, only a small percent of the farms are irrigated. Sand, gravel, and lignite are mined from surface pits. Almost all of the electricity is produced using lignite and natural gas.

The estimated water use in 1990 is 1,100 million gallons per day. Another 610 million gallons per day was exported from the lower part of the basin in 1990. Municipalities use about 75 percent and agriculture about 10 percent of the total water use. The sources of water include 730 million gallons per day from surface-water reservoirs and streams, about 280 million gallons per day imported from other basins, and about 90 million gallons per day from aquifers. Water shortages occur in the upper basin because the demands are great, the rainfall is moderate, and the watersheds are relatively small.

The surface-water hydrology in the Trinity River basin is dominated by reservoirs, diversions of water to municipalities, and wastewater effluent. The major reservoirs have a combined storage capacity of almost 7 million acre-feet. Their management is usually a compromise between lowering the water levels to the extent possible for storage of potential floods, keeping them as full as possible for water supplies during potential droughts, and maintaining a constant level for recreational interests. During base-flow conditions, the flow entering the Trinity River in the Dallas-Fort Worth area is about 100 cubic feet per second. At the same time, the flow immediately downstream from the metroplex is in the range of 500 to 700 cubic feet per second, and in the range of 1,000 to 4,000 cubic feet per second near the mouth of the Trinity River.

WATER-QUALITY ISSUES

Some of the major water-quality issues for the Trinity River basin are:

- Eutrophication of reservoirs. The sources of nutrients include nonpoint-source runoff from farms, ranches, and urban areas, and effluent from wastewater-treatment facilities and septic systems. In addition, accumulation of metals and toxic substances in the sediments is a concern. A prolific growth of vegetation is causing problems in some reservoirs.
- Urban stormwater runoff and wastewater effluent from the Dallas-Fort Worth metroplex. The volume of urban runoff is often large relative to flow in the Trinity River. The stream system's capacity to assimilate

or attenuate the constituents in stormwater and wastewater effluent is limited, and several fish kills have been attributed to stormwater runoff. There is also concern about accumulation of toxic substances in the sediments and fish tissue. The effect on a water-supply reservoir about 350 river miles downstream is unknown.

- Nutrient and freshwater inflow into Galveston Bay. One of the issues of interest to officials of the Galveston Bay National Estuary program is the relation of nutrient and freshwater inflows from the Trinity River to chemical and biological conditions in the bay.
- Landfills in the vicinity of major streams. In the Dallas-Fort Worth metroplex especially, there are many active and closed solid-waste-disposal sites near streams. The amount of leakage of contaminants to streams and aquifers is largely unknown.
- Nutrients and pesticides from agricultural activities. There is considerable surface runoff of animal waste from feedlots and pastures and of fertilizers and pesticides from farms. These substances contaminate aquifers and streams in the study unit.
- Oil-field effluents. Large volumes of brine are a by-product of oil and gas production. In spite of sound practices and regulation, some of these brines enter streams and aquifers.
- Erosion. Intensive farming and ranching practices in the rural areas and construction activities in the urban areas readily contribute to the runoff of sediment into streams and reservoirs.

COMMUNICATION AND COORDINATION

Communication and coordination between USGS personnel and other interested scientists and water-management organizations are critical components of the NAWQA program. The Trinity River basin NAWQA study will have a local liaison committee consisting of representatives who have water-resources responsibilities from Federal, State, and local agencies, universities, and the private sector. Specific activities of the liaison committee will include the exchange of information about water-quality issues of regional and local interest; the identification of sources of data and information; assistance in the design and scope of project products; and the review of project planning documents and reports. A liaison committee for the Trinity River basin study unit will be formed in 1991.

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

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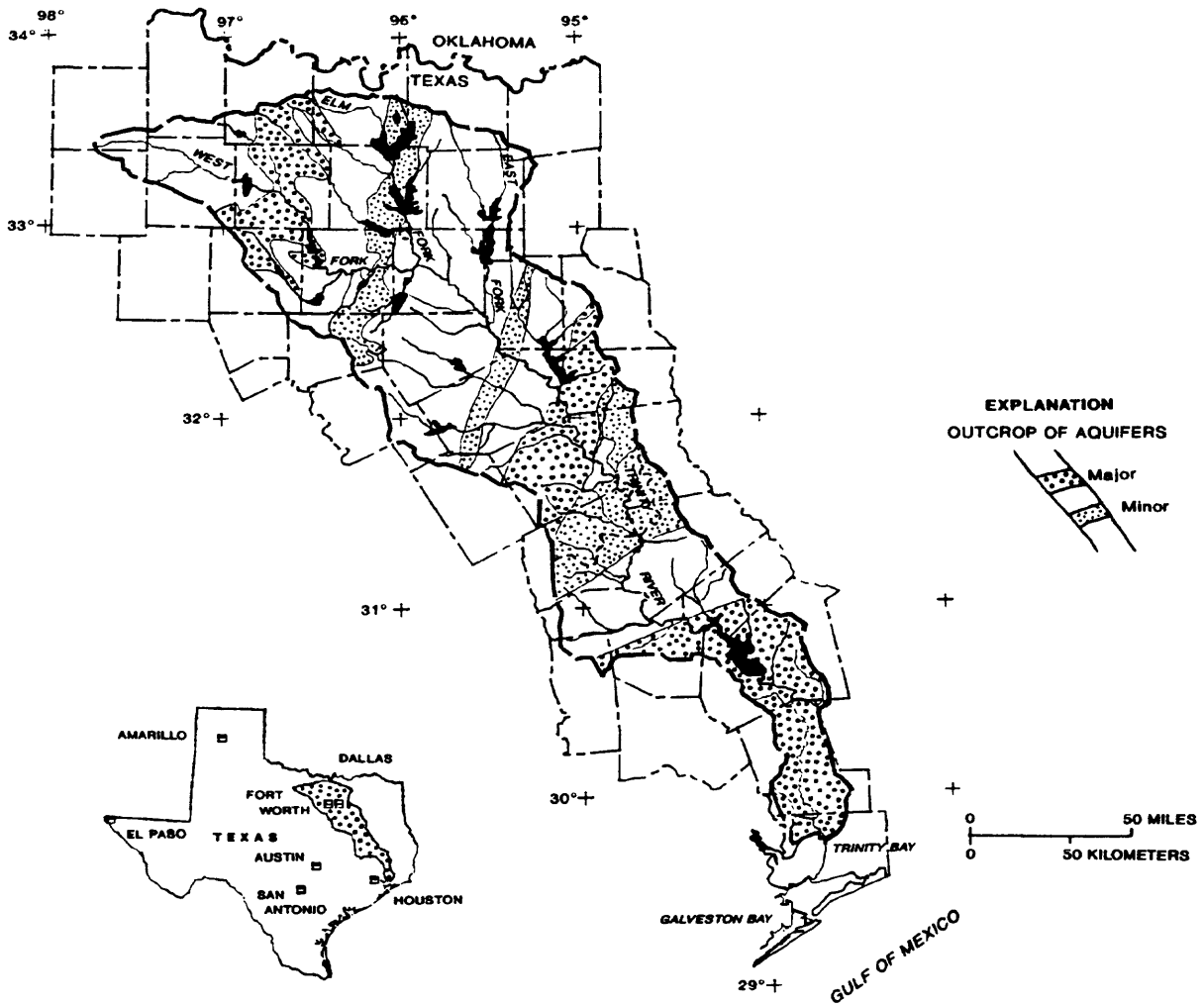

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