WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN HAWAII

GROUND-WATER ISSUES

Water demands in Hawaii are approximately 1,700 million gallons per day (Mgal/d). Ground-water sources supply about 41 percent (710 Mgal/d) of this demand. Of the total quantity of ground water used, 53 percent is for irrigation, 25 percent for public supply, 21 percent for livestock and industry, and about 1 percent for rural domestic supplies. Public systems provide ground water to about 920,000 people, or 95 percent of the population. The major issues related to ground water in Hawaii are:

- Competing uses for available supplies,
- Contamination by organic compounds and seawater intrusion, and
- Effects of land use on ground-water quality and recharge.

U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate scientific information on the Nation's water resources. The activities of the Water Resources Division in Hawaii are conducted by scientists, technicians, and support staff in offices in Honolulu, Oahu; Lihue, Kauai; Kahului, Maui; and Hilo, Hawaii.

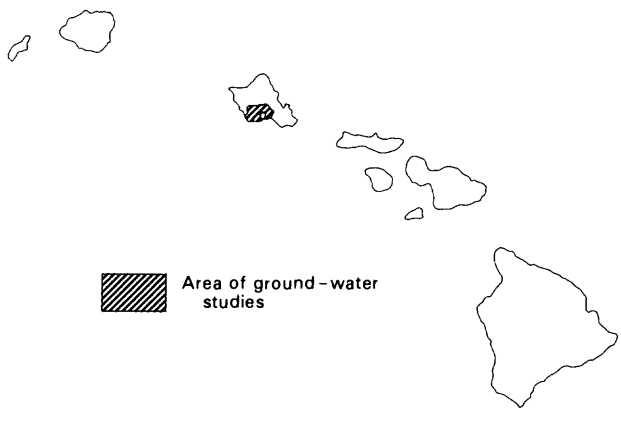
Hydrologic-data stations are maintained at selected locations throughout Hawaii to record data on stream discharge and stage, reservoir and lake storage, ground-water levels, well and spring discharge, and the quality of surface and ground water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water planners and others involved in decisions that affect Hawaii's water resources.

During 1987, the USGS maintained a network of 202 observation wells in Hawaii to monitor fluctuations in water levels and ground-water quality, particularly the concentration of chloride, which is an index to contamination of the fresh ground water by seawater. Water-level and water-quality data obtained from observation wells are used to monitor ground-water trends; however, they need to be integrated with other observations and ground-water investigations to be most relevant and useful.

The USGS has conducted more than 120 hydrologic investigations in Hawaii. During fiscal year 1987, the USGS entered into agreements with nine Federal, State, and local agencies involving 10 hydrologic investigations in Hawaii; four of the investigations included studies of ground-water quantity and quality. These investigations provide information needed to answer hydrologic questions that are specific to the State's principal ground-water issues. Three examples of ground-water studies by the USGS that address specific ground-water issues in Hawaii are discussed in the following sections.

Potential Contamination of Pearl Harbor Aquifer

The Pearl Harbor aquifer of southern Oahu is the most important and most productive aquifer in the State. Since 1979, primarily owing to improved analytical techniques, trace amounts of several organic compounds have been detected in water pumped from the Pearl Harbor aquifer. Concern of State and county agencies and the general public, which once centered on the quantity of water pumped from the aquifer, has now focused on water-quality problems. An investigation was initiated, under the U.S. Air Force (USAF) Installation Restoration Program, to determine if the fuel storage and distribution system at the Hickam Air Force Base could contaminate the Pearl Harbor aquifer. As part of this investigation, the USGS, in cooperation with the USAF, conducted a study of the fuel storage and transmission system during 1986-87. The study identified new potential problem sites; defined the geohydrologic setting of the general area in which the fuel storage and transmission system is located; defined the ground-water quality of the study area; and prepared a specific program for drilling, sampling of soil and water, and collecting detailed soil moisture and geologic data in the system. The results of this investigation provide the



information needed to design future studies that will determine the existence, concentration, location, and mobility of potential contaminants. The USAF will use the results of these studies to develop methods to prevent contamination of the Pearl Harbor aquifer.

Applied Research in Southern Oahu

A research project, which began in 1987 and is now in its second phase, is to relate information on the movement and quantity of water in an aquifer, at a small scale, to predictions of aquifer behavior at a larger scale. The study included the drilling, by use of a new technique, and instrumentation of eight test holes in the Pearl Harbor aquifer of southern Oahu. Instruments placed at several levels in each test hole and connected to recording devices monitored aquifer response during aquifer tests. Additional aquifer tests will be conducted to determine ground-water flow rates and preferred flow paths. The Hawaii Department of Land and Natural Resources and the Honolulu Board of Water Supply have cooperated with the USGS on this project. The results of this study will benefit the State by the introduction of a new drilling method; development of more accurate models to predict ground-water supply; explanation of the movement of contaminants and seawater intrusion; and evaluation of aquifer-test analyses not previously applied in Hawaii.

Salinity Problems in U.S. Navy Water Tunnel, Oahu

The salinity of the water supply for the Barbers Point Naval Air Station has increased markedly since 1983. About 3 million gallons per day of potable water is obtained from a water tunnel located in the southeastern flank of the Waianae Mountains in southwestern Oahu. Owing to the deterioration of the water quality obtained from the Barbers Point tunnel, the USGS, in cooperation with the U.S. Navy (USN), is studying the cause of increased salinity. The physical processes of concern are the upconing of the underlying saltwater and return flow of irrigation water that contains increasing concentrations of dissolved minerals. The USGS compiled and analyzed available data, defined the regional hydrology, investigated past and present irrigation practices, and used a computer model to estimate the hydrologic processes near the USN water tunnel. The results of this study are being used by the USN to operate the water tunnel and to plan future action to correct the salinity problem.

GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management in Hawaii are the Department of Land and Natural Resources, Commission on Water Resources Management (CWRM), and the Hawaii Department of Health (DH). The CWRM is responsible for the administration of the State Water Code, and the DH is responsible for the administration of Hawaii's Water Quality Control Program. Both agencies use ground-water data and the results of ground-water studies provided by the USGS. During 1987–88, the following Federal, State, and local agencies entered into interagency or cooperative cost-sharing agreements with the USGS to conduct ground-water investigations in Hawaii:

Department of Land and Natural Resources
Honolulu Board of Water Supply
U.S. Air Force
U.S. Navy

SELECTED REFERENCES

Eyre, P.R., 1987, Sources of salt in the Waianae part of the Pearl Harbor aquifer near Barbers Point water tunnel, Oahu, Hawaii: U.S. Geological Survey Water-Resources Investigation Report 87-4732, 56 p.

U.S. Geological Survey, 1984, National water summary 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.

———1985, National water summary 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.

Information on technical reports and data related to ground water in Hawaii can be obtained from:

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