

# WATER FACT SHEET



U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

## NATIONAL WATER-QUALITY ASSESSMENT PROGRAM -- Puget Sound Basin, Washington

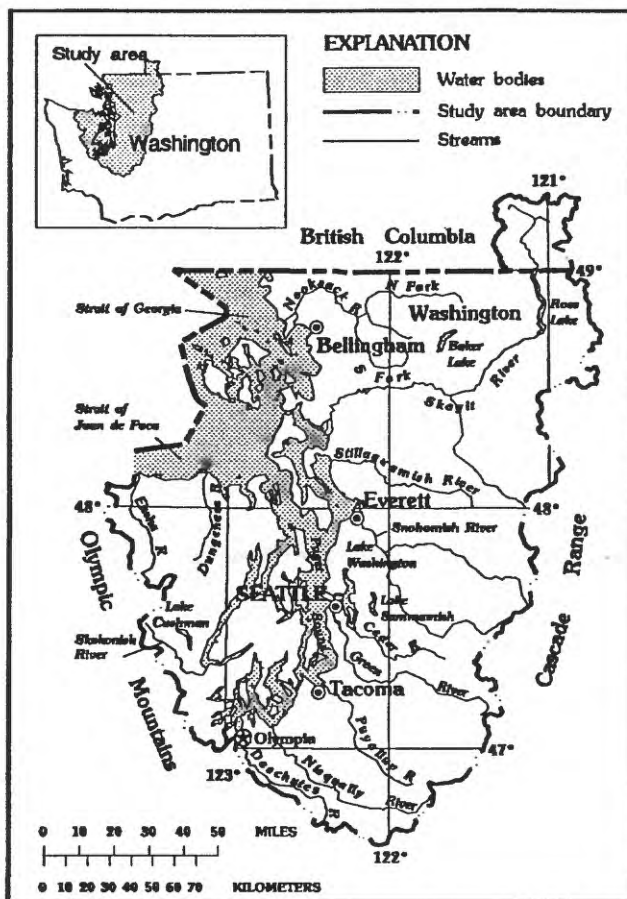
### BACKGROUND

In 1991, the U.S. Geological Survey (USGS) 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 natural and human factors that affect the quality of these resources. In addressing these goals, the program will produce water-quality information that will be useful to policy makers and managers at the National, State, and local levels.

Sixty study units constitute the principal building blocks of the NAWQA program and provide the basis for national- and regional-level assessments. Study units range in size from less than 1,000 mi<sup>2</sup> (square miles) to more than 60,000 mi<sup>2</sup> and represent 60 to 70 percent of the Nation's water use and population served by public water supplies. Twenty study unit investigations started in 1991, 20 (including the Puget Sound Basin) are starting in 1994, and 20 more are planned to start in 1997.

The NAWQA program emphasis is on national- and regional-scale water-quality problems. The first priority of the Puget Sound Basin study unit is to meet the national program goals by collecting water-quality data that are directly comparable and easily incorporated with data from other study units to allow synthesis and analyses on regional and national scales. The NAWQA program is not designed to replace or diminish the need for existing smaller-scale studies and monitoring by Federal, State, and local agencies. The NAWQA program is designed to compliment existing water-quality programs by incorporating the data collected in these programs into an analyses of regional and national issues and by providing additional, high-quality data that local agencies can use to address water-quality issues of local concern.

The NAWQA program is designed to take a long-term view of water-quality issues, and the study unit assessments are therefore designed as long-term, multiphase investigations. The first phase of the Puget Sound Basin study unit assessment is designed to be carried out over a 6-year period during which time water-quality issues will be identified and prioritized, existing water-quality data will be accumulated and evaluated, surface- and ground-water quality data will be collected, and associated aquatic ecological surveys will be conducted. Data analyses and report writing will be completed in 1999-2000 at which time the assessment will shift into a low-intensity phase of limited data collection, the purpose of which is to track long-term trends and identify emerging water-quality issues before beginning a second high-intensity phase in the year 2005.



### STUDY UNIT DESCRIPTION

The Puget Sound Basin study unit encompasses the 13,600-mi<sup>2</sup> area that drains to the Puget Sound and its adjacent waters, including lands that drain to the Strait of Georgia below the Canadian border and to the eastern part of the Strait of Juan de Fuca. The study unit includes the islands but not the marine waters, of Puget Sound. It encompasses all or part of 12 counties in western Washington, as well as the headwaters of the Skagit River and the recharge area of the Abbotsford/Sumas aquifer in British Columbia. About 3.4 million people, or 70 percent of the population of Washington State, live in the Puget Sound area, mainly in the metropolitan areas of Seattle, Tacoma, Everett, Bellingham, and Olympia. From 1980 to 1990 the population increased by 620,000 (23 percent) with population forecasts of an additional 1.1 million by 2010.

Most of the population lives near the shores of Puget Sound and in the alluvial valleys of major rivers. Eighty percent of the Puget Sound Basin remains forested, three-

quarters of which is available for commercial harvesting. Six percent of the basin is farmed, and 9 percent is urban or rural. The balance is covered by lakes, reservoirs, glaciers, and shorelands.

The Puget Sound is bounded on the east by the Cascade Range and on the west by the Olympic Mountains of the Coastal Range, both composed of volcanic and marine sedimentary rock. Between the mountain ranges is the Puget Sound lowland, a structural basin filled with alluvial, glacial, and interglacial unconsolidated sediments. The coarse-grained unconsolidated deposits and alluvium of the Puget Sound lowlands constitute the aquifer units of the Puget Sound aquifer system. The USGS Puget Sound Regional Aquifer Study (RASAS) identified eight major alluvial valley aquifers and two discontinuous regional aquifers (Fraser and Puget aquifers). The alluvial aquifers and the Fraser aquifer are generally found at or near land surface and commonly serve domestic and municipal uses. The Puget aquifer is generally found at depths greater than 150 ft (feet) and is used less commonly as a water supply due to the availability of water in the overlying aquifers.

The Puget Sound has a Pacific Coast marine climate that is characterized by cool, wet winters and warm, dry summers. Precipitation varies from about 16 to 53 in/yr (inches per year) in the lowlands, and from 60 to 200 in/yr in the mountains.

Twelve major and numerous minor tributaries drain to Puget Sound and adjoining waters. The major tributaries, with their headwaters in the Olympic Mountains and Cascade Range, account for more than 85 percent of the 45,000 ft<sup>3</sup>/s (cubic feet per second) mean annual surface-water runoff to the Puget Sound.

Water use in the study unit is estimated as 810 Mgal/d (million gallons per day), of which about 56 percent is supplied by surface water and 44 percent is supplied by ground water. Nearly half of the water (411 Mgal/d) is used for domestic purposes; the rest is used for irrigation (163 Mgal/d), industry (131 Mgal/d), commerce (97 Mgal/d), and livestock (8 Mgal/d).

## WATER-QUALITY ISSUES

The Puget Sound Basin contains surface- and ground-water resources of significant economic and ecological importance. These resources provide water for a large and expanding population, hydroelectric power, recreational opportunities for residents and visitors, and an ecosystem that supports an economically important fishery. Surface and ground waters also carry significant nutrient and contaminant loads to the Puget Sound. The importance of maintaining the quality of the basin's fresh water resources has been recognized for many years and important steps have been taken to preserve and improve the quality of these waters. However, several water-quality issues remain unresolved, and with continued development in the watersheds, these issues will gain in importance. Water-quality issues identified by Federal, State, and local water-resources managers as current priorities are listed below.

### Surface water

- Loss of aquatic habitat through destruction of riparian vegetation, sediment deposition, and channel scour caused by

forestry, agricultural, and land development practices.

- Bacterial contamination of Puget Sound shellfish beds from sewage treatment plant discharges, failed septic systems, and washoff of livestock manure.
- Contamination of streams and marine sediments by point source discharges and by storm washoff of metals, pesticides, and petroleum products from urban and suburban areas.
- Nutrient enrichment of lakes and embayments of Puget Sound from sources such as failed septic systems, manure washoff, and lawn and agricultural fertilizers.

### Ground water

- Contamination of ground water by pesticides in agricultural and urban areas, by synthetic organic chemicals in urban and industrial areas, and by elevated nitrate concentrations in rural and agricultural areas.
- Intrusion of salt water into island and near coastal aquifers from overpumping of fresh ground-water supplies.
- Protection of ground-water quality to support current beneficial uses and to provide a drinking water supply for future residents.

Assessments conducted by the Puget Sound Basin NAWQA will assist local water management agencies in addressing these issues by providing information on the occurrence and distribution of contaminants in surface and ground water, loadings of contaminants discharged from watersheds with different land use, and the relative health of associated aquatic ecosystems. This information will help water-resources agencies to better focus management decisions and track the effectiveness of their actions.

## COMMUNICATION AND COORDINATION

Communication and coordination between the USGS and water-management or related scientific organizations are critical components of the NAWQA program. Study-unit liaison committees have proven highly effective in this process and consist of representatives from Federal, State, and local agencies, universities, and the private sector who have water-resources responsibilities. Specific activities of each liaison committee include exchange of information on and prioritization of water-quality issues of regional and local interest; identification of sources of water-quality data and other information; assistance in design and scope of project elements; identification of potential interfaces with local water-quality programs; and review of project planning activities, findings, and interpretations, including reports. The liaison committee for the Puget Sound Basin study unit held its first meeting on March 31, 1994.

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

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