



# WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

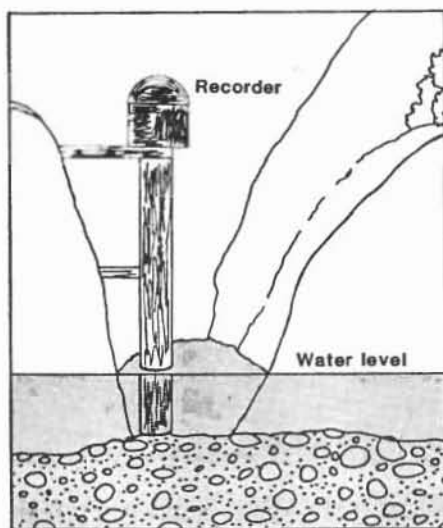
## THE U.S. GEOLOGICAL SURVEY STREAM-GAGING PROGRAM IN ALASKA

### INTRODUCTION

The U.S. Geological Survey (USGS) is the principal Federal agency that collects water data in the United States. These data are collected in cooperation with State and local governments and other Federal agencies. Water in rivers and lakes is called "surface water." One method of collecting data about surface water is to operate a stream-gaging program.

**What is a stream-gaging program?** It is a network of stream-gaging stations on rivers that provides data on surface-water resources. These data help planners make decisions on the use and management of these resources.

**What is a stream-gaging station?** It is a site on a stream where hydrologic data are collected on a systematic basis (see sketch below).



Typical gaging station installation

**What are surface-water records?** Surface-water records collected and published by the USGS consist primarily of listings or tables of *stage* and *discharge*. *Water-quality data* also are collected at many stream-gaging stations.

**Stage (gage height)** is the water-surface elevation above an arbitrary level or datum. Stage data can be collected manually by an observer, or can be recorded using either mechanical instruments or electronic-sensing and data-storage devices. Stream-gaging stations usually provide a continuous record of stage.

**Discharge (streamflow)** is the volume of water that passes a given point in a given period of time. At stations where water stage is recorded, a continuous record of

discharge can be calculated by using the relation between stage and discharge that is developed on the basis of actual measurements of discharge made over a range of stages. Discharge data for such stations are commonly reported for each day of the year. At partial-record stations, such as the network of "crest-stage" gages operated by the USGS in Alaska, data are not recorded, but are collected at regular intervals and only the peak discharge for the year is determined and reported.

**Water-quality data** might include the following types of water properties: physical (such as water temperature), biological (such as fecal coliform bacteria), and chemical (such as dissolved iron).

### USES OF DATA

The data collected at stream-gaging stations can be used for a variety of purposes. Examples of possible or potential uses are summarized below:

**Regional Hydrology:** Discharge data at a station where streamflow characteristics have not been altered by man can be used to develop relations between streamflow characteristics (stage, discharge) and basin characteristics (geographic traits, climatic conditions). These relations can be used to estimate streamflow characteristics at ungaged sites on streams within a region.

**Hydrologic Systems:** Data can be used to define current hydrologic conditions and to document changes in these conditions. For example, as an urban area becomes increasingly developed, stations can yield data that quantify changing streamflow characteristics.

**Planning and Design:** Data from gaging stations can be used to plan and design a specific project, such as a dam or bridge.

**Project Operation:** Data can be used to assist water managers in making operational decisions, such as reservoir releases at hydroelectric power plants and storage and release of water at flood-control projects.

**Hydrologic Forecasts:** Data provide information to various government agencies for flood forecasts.

**Water-Quality Monitoring:** Continued monitoring of streams can detect changes in physical, chemical, and biological quality of water. Some gaging stations in Alaska are part of a nationwide network designed to assess the water quality of major streams.

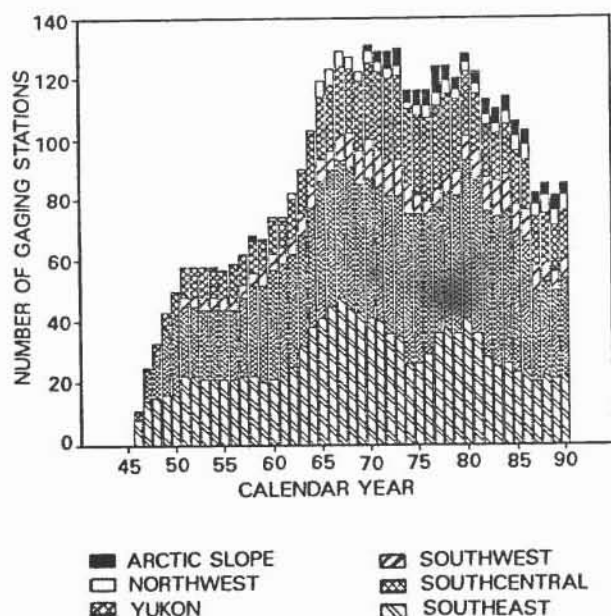
**Research:** Some gaging stations are operated for a particular research study or water investigation. An example is those stations operated to study the effects of the Redoubt Volcano eruptions on streamflow and stream channels.

**Other:** Some stations are operated to collect data for legal obligations or for the adjudication of water rights.

## THE STREAM-GAGING PROGRAM IN ALASKA

The USGS began its streamflow-data collection in summer 1906 near Nome, in connection with gold placer mining. During the next few years, data collection expanded on the Seward Peninsula and into the Yukon and Tanana River basins. In 1913, emphasis shifted to reconnaissance of potential water-power sites in the lower Copper River basin, in the Prince William Sound area, and, eventually, in southeast Alaska. Although the USGS discontinued data collection in Alaska in 1921, private companies and other Federal agencies continued to collect some data in southeast Alaska until 1946.

In 1946, the Alaska District of the USGS was established and the stream-gaging program was started with 16 stations. By 1951, 58 gaging stations were operating. The graph below shows the status of the network since 1946. The greatest number of stream-gaging stations operating concurrently was 131 in 1970.



### History of stream gaging by areas in Alaska

During 1990, water-discharge data were collected at 81 gaging stations; water-quality data were collected at 24 of these. Data were also collected at 67 crest-stage partial-record stations. The map shows the locations of the continuous-record gaging stations.

Although surface-water records have been compiled in Alaska since the early years of the century, the State is so large that data are sparse for many areas. Northern and western areas of the State, in particular, have few stream gages (see map). More streamflow data are needed in response to the increasing water-resource development within the State.

## DATA COMPILATIONS AND REPORTS

The USGS publishes surface-water records obtained at gaging stations. From 1957 to 1971, water-resources data for Alaska were published annually by the USGS in Water-Supply Papers. In 1972, a series of Water-Data Reports was started, into which all water-resources data were merged (see U.S. Geological Survey reference below). All sites in Alaska that had surface-water records up to 1988 are listed in the report by Still and Cosby (1989) referenced below. In addition to the reports, most of the surface-water data are available through computerized data-retrieval programs. Additional reports on Alaska's water resources that may be of interest are also listed below.

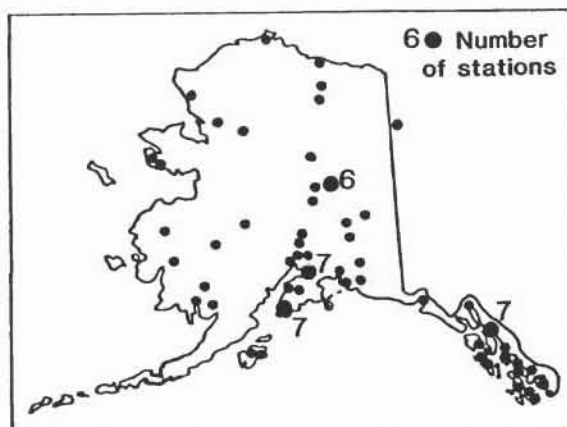
- Feulner, A.J., and Reed, K.M., 1977, Bibliography of reports by members of the U.S. Geological Survey on the water resources of Alaska, 1870 through 1976: U.S. Geological Survey Open-File Report 77-687, 112 p.
- Lamke, R.D., 1984, Cost-effectiveness of the stream-gaging program in Alaska: U.S. Geological Survey Water-Resources Investigations Report 84-4096, 100 p.
- Parks, Bruce, and Madison, R.J., 1985, Estimation of selected flow and water-quality characteristics of Alaskan streams: U.S. Geological Survey Water-Resources Investigations Report 84-4247, 64 p.
- Snyder, E.F., 1990, Activities of the Alaska District, Water Resources Division, U.S. Geological Survey, 1990: U.S. Geological Survey Open-File Report 90-157, 21 p.
- , 1991, Location maps and list of U.S. Geological Survey reports on water resources in Alaska, 1950 to 1990: U.S. Geological Survey Open-File Report 91-60, 44 p.
- Still, P.J., and Cosby, J.M., 1989, Alaska index: Streamflow, lake levels, and water-quality records to September 30, 1988: U.S. Geological Survey Open-File Report 89-269, 189 p.
- U.S. Geological Survey, 1976-91, Water resources data for Alaska, water years 1975-90: U.S. Geological Survey Water-Data Reports AK-75-1 to AK-90-1 (published annually).

For further information on reports or data bases write to:

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Open-File Report 92-106

E.F. Snyder, 1992



Locations of continuous record stream-gaging stations in 1990