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5-YEAR PLAN, 1985-1989

By

Alaska Division of
Geological and Geophysical Surveys
and
Water Resources Division
U.S. Geological Survey

June 1985

794 University Avenue, Basement
Fairbanks, Alaska 99701

ALASKA WATER RESOURCES EVALUATION

5-YEAR PLAN

1985-1989

Prepared jointly by

Division of Geological and Geophysical Surveys,
Department of Natural Resources, State of Alaska

and

Water Resources Division, U.S. Geological Survey,
Department of the Interior

June 1985

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

> "One could write the story of man's growth in terms of his epic concerns with water. Through the ages people have elected or been compelled to settle in regions where water was either deficient in amount, inferior in quality, or erratic in behavior.....(Yet) people have always preferred to meet their water troubles head on rather than quit their places of abode and industry, and.....applied their creative imagination and utilized their skills.....to find, develop, and maintain suitable water supplies.....We must pool our efforts if we expect to apply appropriate and durable prescriptions for our water ills."
>
> (excerpts from "The Story of Water as the Story of Man," by Bernard Frank in U.S. Dept of Agriculture Yearbook, 1955)

The Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys (DNR-DGGS), and the U.S. Geological Survey, Water Resources Division (USGS-WRD) have developed a statewide program for water-data collection and hydrologic studies called AWARE (Alaska Water Resources Evaluation). This document is a summary of the current and proposed future (through 1989) plan for hydrologic basic data collection and study activities in Alaska by these two agencies and will help define the Statewide Natural Resources Plan. Reference to related activities and programs of other agencies and institutions (Federal, State and Municipal) is also included.

It is emphasized that this is a plan, and that accomplishment of its goals and objectives (p. 6-7) will depend on the continued support and participation -- in terms of funding and available personnel -- of all agencies involved. These factors are, of course, subject to changing economic conditions, priorities, and policy decisions at all levels of government.

Water Resources Data

Although at first glance Alaska's rivers, lakes, snowfields, glaciers, and even muskeg and wet tundra areas seem to offer "water, water everywhere", a useable supply may not be available at a given time and place -- winter on the North Slope, for example. Too much water at the "wrong" time and place means flooding. Water may not be of suitable quality for its intended use or may be subject to contamination. Avoiding, or at least lessening the effect of such problems, even in the presence of abundant water, requires an understanding of the water resource -- its occurrence, movement, and availability -- as well as planning and management of its use. The basis for that understanding is an adequate bank or store of water resources data.

Water resources data are needed to effectively plan for and manage uses of water such as private, municipal, commercial, and industrial supply; recreational activities; hydroelectric power generation; irrigation; placer mining; and numerous other activities. Water data are analyzed to develop criteria for the protection of aquatic environments that support Alaska's all-important commercial and recrea-

tional fisheries and to predict the probable occurrence and severity of hydrologic hazards such as floods, erosion, and drought. Measurements and observations of hydrologic features and phenomena -- glaciers, icings, permafrost, ice-jam and glacier-outburst flooding -- unique to Arctic regions, and thus common in Alaska, are critical to the effective utilization of the State's water resources.

The U.S. Geological Survey first started systematic collection of hydrologic data in Alaska Territory in the late 1940's and the Water Resources Division of the USGS dominates Alaskan water data collection today. After statehood, the Division of Geological and Geophysical Surveys (DGGS) of the Alaska Department of Natural Resources became the Alaskan equivalent of the USGS and is the designated State agency responsible for water-resources data collection.

Agencies at all levels of government, universities and their associated institutes, many private enterprises, and individuals must have adequate information about water resources to conduct their activities. A primary user of water data is the Division of of Land and Water Management of DNR, the agency responsible for adjudication of water rights and management of water use in Alaska. Coordination of water-data collection and management has become a major concern. This plan is a response to that concern.

AWARE 5-Year Plan

The AWARE 5-year plan complements and defines the DNR Statewide Natural Resources [illegible] Water Resources Inventory and Water Management goals and objectives. A Memorandum of Agreement between USGS-WRD and DNR-DGGS states the need for a comprehensive program to provide for the coordination of water-data collection and water resources study activities in Alaska. The Memorandum specifies that a 5-year plan for such a program be prepared, reviewed and updated annually.

The plan was developed by DNR and WRD hydrologists and water managers during [illegible] with State and Federal agencies, particularly Park Divisions of DNR and Water Managers etc. The programs, needs, and future need for data collection and hydrologic studies in Alaska were primary considerations. State and Federal agencies directly involved in water-related activities or in need of or using water data have been contacted. Responses from these agencies, along with the results of the joint USGS-DGGS review of the AWARE program, have been incorporated in this revised 5-year plan. 1/

Unique aspects of Alaskan water resources have been included in the plan. Midwinter river overflow icing, ice-jam flooding during spring breakup, snow surveys over 20 degrees of latitude, the effect of glaciers and outburst flooding on [illegible] analysis of permafrost terrain and [illegible] and the [illegible] between glaciers and volcanoes are examples of hydrological subjects which are rarely found elsewhere in the United States. In

1/ Due to the schedule set for issuing this document, contributions and/or updates were received for all agencies. The Responsible Agency shown in the Related Programs sections should be contacted for further details on programs listed or for information on other ongoing or proposed projects.

the State of Washington considerable attention is paid to snow and glacier ice as important parts of the hydrological cycle. In Alaska we must focus even more on these aspects. (In April 1985, a "Workshop on Alaska Hydrology. Problems Related to Glacierized Basins," organized by the University of Alaska's Geophysical Institute, brought together scientists from Alaska and other states, Canada, and several European countries.) Future revisions of this plan will undoubtedly give increasing emphasis to unique Alaskan processes.

Plan Revision

A fundamental part of the AWARE program is the development and implementation of a plan to fulfill the data and information needs of all Alaska water users. In order to be successful, the program must include input from all groups or individuals who need or use water or water data. Participation in the continuing revision of and comments on this plan are welcomed by the DGGS and USGS. Suggestions for additions or other changes should be brought to the attention of:

Chief, Water Resources Section
DNR/DGGS
P.O. Box 772111
Eagle River, AK 99577

District Chief
USGS/WRD
4230 University Drive, Suite 201
Anchorage, AK 99508-4664

Acknowledgments

In addition to the ADNR-Division of Geological and Geophysical Surveys, Division of Land and Water Management, and the USGS-Water Resources Division, the following agencies are either involved in or provide funding for water resources study activities in Alaska. Their support of and participation in AWARE are critical to the success of the plan.

Federal

Bureau of Land Management (BLM)
U.S. Army, Corps of Engineers (USCE)
U.S. Environmental Protection Agency (USEPA)
U.S. Forest Service (USFS)
National Park Service (NPS)
National Weather Service (NWS)
Public Health Service (PBS)
Soil Conservation Service (SCS)
Cold Regions Research and Engineering Laboratory (CRREL)
U.S. Fish and Wildlife Service (USF&WS)
Alaska Cooperative Research Fisheries Unit (ACRFU)

State of Alaska

Department of Natural Resources (DNR)
Division of Agriculture (DA)
Division of Mining (DM)
Division of Forestry (DF)
Division of Parks (DP)
Department of Environmental Conservation (DEC)
Department of Fish and Game (DF&G)
Department of Transportation and Public Facilities (DOT&PF)
Department of Commerce and Economic Development (DC&ED)
Alaska Power Authority (APA)
Agricultural Action Council (AAC)

Industry

U.S Borax (USB)

Department of Community & Regional Affairs - Division of Municipal and Regional Assistance
Geophysical Institute, University of Alaska (GI)
Institute of Water Resources/ Engineering Experiment Station, University of Alaska (IWR/EES)
Arctic Environmental Information and Data Center, University of Alaska (AEIDC)

Local

Municipality of Anchorage (MOA)
El Fin Cove
Fairbanks North Star Borough (FNSB)
The City and Borough of Juneau (JCB)
Kenai Peninsula Borough (KPB)
Matanuska-Susitna Borough (MSB)
North Slope Borough (NSB)
City of Petersburg
City Of Sitka
City Of Wasilla

ALASKA'S WATER RESOURCES

Glacier ice covers 17,000 square miles in Alaska, about 5 percent of the total area of the State. However, seasonal snow forms a veneer on most of Alaska for one-half to three-quarters of the year, and the freezing and thawing of water affect virtually all of the State to some extent.

Surface Water

Surface waters of Alaska include many large rivers. The Yukon River ranks fifth in size in the United States, and six Alaskan rivers (Yukon, Copper, Stikine, Susitna, Kuskokwim, and Tanana) are among the 30 largest U.S. rivers. Glacial sources for most Alaskan rivers cause important hydrologic consequences in addition to the heavy loads of glacier-derived silt carried by the glacial streams. For example, even a small amount of glacier-covered area in a drainage basin can have a major effect on the amount and timing of runoff.

Alaskan lakes are so numerous that they are essentially uncounted. Lake Iliamna, Alaska's largest, has a surface area of 1,000 square miles. Springs occur throughout the State -- as innumerable small seeps and as warm or mineral waters that support recreational centers. On the North Slope, flow from large springs produces wide, broad icings in winter.

Ground Water

Ground water is an untested resource in most of Alaska, but in many areas potential development of the resource far exceeds current use. Ground-water conditions are highly variable: major aquifers are present in the alluvium of large river valleys (Yukon, Tanana, Kuskokwim, Susitna), in glacial outwash deposits under coastal basins (Cook Inlet) and valleys (Seward and Juneau), and in carbonate bedrock of the Brooks Range. In many areas, however, the fine-grained material of glacial and glacial-lake deposits and poorly permeable consolidated rocks offer a much less promising ground-water potential. In addition, the recharge, discharge, movement, and thus the availability of ground water over much of the interior, western, and northern parts of the State and on the flanks of the Alaska Range are restricted by permafrost -- permanently frozen ground.

Water Quality

The quality of Alaskan waters is generally acceptable for most uses. However, available data do indicate naturally occurring problems such as suspended sediment in glacier-fed streams, and salt-water intrusions and undesirable concentrations of iron or arsenic in ground water at various locations. A few instances of local, man-caused water pollution have been identified.

ALASKA WATER RESOURCES EVALUATION

5 -YEAR PLAN

1985 - 1989

LONG-RANGE GOAL

The AWARE goal is to provide water resource information and understanding needed by local, State, and Federal agencies, and by industry and the general public, for utilization and management of Alaska's water resources for the benefit of the people of Alaska through the conduct of water-resources investigations; and the collection and dissemination of these water resources data.

OBJECTIVES

This water resources evaluation program is comprised of three main elements. The first is to provide and improve the State-Federal Water Data and Information System, through collection, analysis, and dissemination of water data. The second element includes areal investigations, appraisals, and applied research related to defining and resolving specific water resource problems. The third element is to coordinate water data acquisition among State, Federal, and local agencies. The major objectives of each of these components follow:

A. State-Federal Water Data and Information System

Objectives:

1. To collect, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of Alaska's water resources.

2. To disseminate water data and results of investigations and research through reports, maps, computerized information services, and other forms of public release.

B. Water Resources Areal Investigations, Problem Appraisals, and Applied Research

Objectives:

1. To conduct analytical and interpretive water resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.

2. To provide scientific and technical assistance in hydrology to other State, Federal, and local agencies.

3. To conduct problem-oriented research in hydraulics, hydrology, and related fields of science, to improve the scientific basis for investigation and measurement techniques, and to understand hydrologic systems sufficiently well to predict their response to stress, either natural or man-made.

C. Coordinate Water Data Acquisition

Objective:

1. To coordinate the activities of State and Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground water. (The Division of Geological and Geophysical Surveys has statutory authority [AS 41.08] for coordination of water-data collection by State agencies. The U.S. Geological Survey has such responsibility regarding Federal agencies under the provisions of OMB Circular A-67.)

APPROACH

Individual data-collection activities and projects under the AWARE program, and their more specific purposes and objectives, reflect the translation of the overall goals and objectives listed above into a proposed implementation plan for the period 1985-1989. The projects are listed and described in the following pages.

For management purposes, Division of Land and Water Management divides Alaska into three regions (fig. 1): Northern, Southcentral, and Southeast. Data collection and study activities are described for each region and projects with more widespread application are described under the Statewide category.

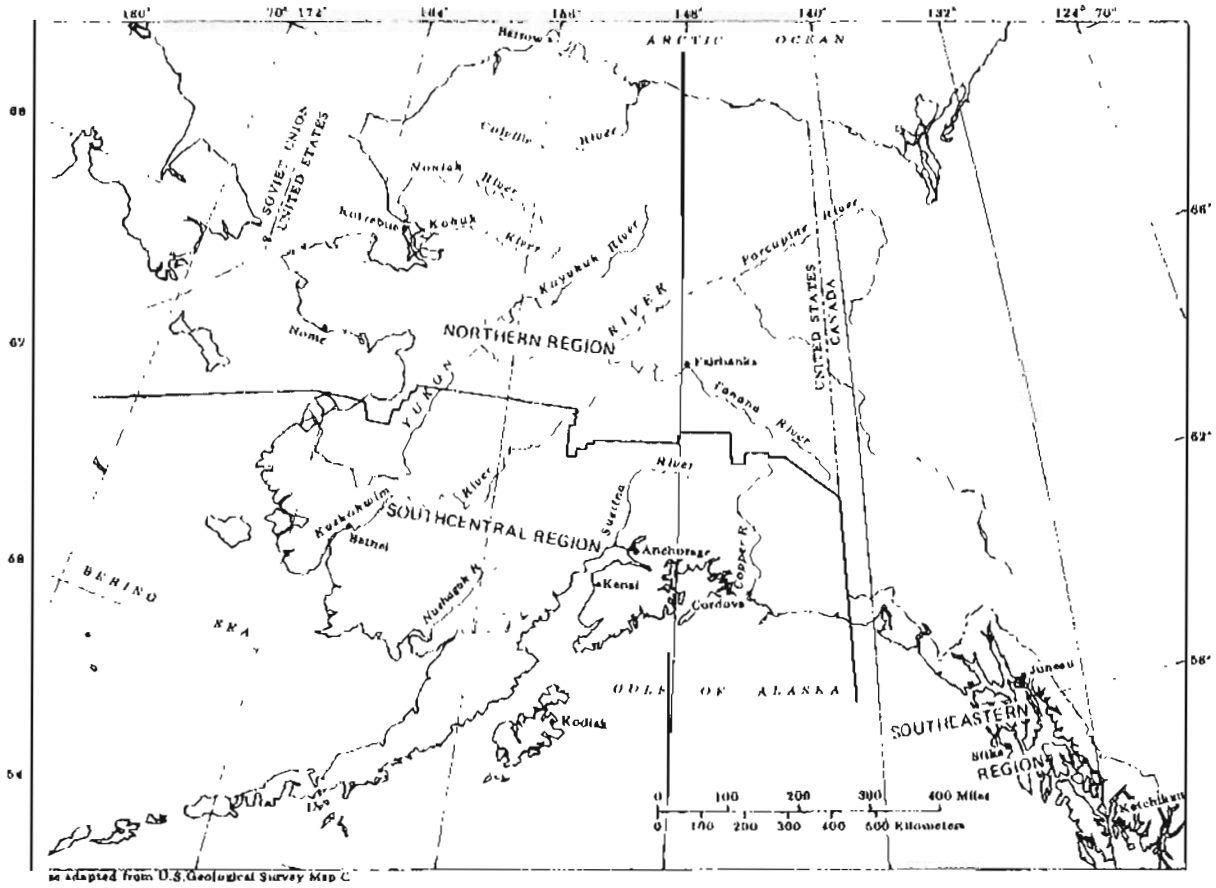


Figure 1. -- Index to land and water management regions.

STATEWIDE PROGRAMS

Statewide programs are primarily those activities aimed at achieving the objectives of the first major element of the AWARE program -- the collection, analysis, and dissemination of water data. The needs for such data may extend beyond the boundaries of a single region or may not be met within the scope, areal extent, and time constraints of one or more specific studies or resource appraisals. The selection of sites or areas to be included within a particular data-collection network is guided by the following criteria:

a. Need - of an individual, group or agency for a specific type of data at a particular time or place, or for a specific application.

b. Areal coverage - geologic and climatic differences in Alaska create a wide range and variety of hydrologic conditions and phenomena.

c. Representativeness - data-collection sites should be the hydrologically most representative within the area or environment sampled. Data should have a maximum transfer value to other, hydrologically similar sites or areas.

A. Statewide DNR/USGS Projects

Program Element	'85	'86	'87	'88	89	Responsible agency(s)	Co-op agency(s)
1. Surface-Water Stations	F	F	F	F	F	USGS	Many agencies
2. Ground-Water Stations	F	F	F	F	F	USGS	DGGS
3. Water-Quality Stations	F		F	F	F	USGS	USFS/DF&G/ DGGS/DEC
4. Sediment Stations	F	F	F	F	F	USGS	APA/USCE/ DGGS/DEC
5. Alaska Water-Use Data System	F	F	F	F	F	DLWM	USGS
6. River Navigability Surveys	F	F	F	F	F	DLWM	DGGS
7. Water Rights Advisory	F	F	F	F	F	DLWM	DGGS
8. Water Resources Data System	F	F	F	F	F	DGGS/DLWM/ USGS	
9. Land Disposal Review	F	F	F	F	F	DLWM	DGGS

A. Statewide DNR/USGS Projects--Continued

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
10. Basinwide Adjudication Technical Support	P	P	P	P	P	DLWM	DGGS
11. Dam Safety	F	F	F	F	F	DLWM	DGGS
12. Instream Flow Analysis	F	F	F	F	F	DLWM	DGGS
13. Community Assistance	P	P	P	P	P	DGGS	DLWM

F - funded at present; funding anticipated
P - proposed, funds needed
C - completed

1. SURFACE-WATER STATIONS

A network of 104 continuous gaging stations (see table 1, p. 10 to 14) and 65 crest stage stations (figs. 2 and 3) equipped with water stage recorders, peak stage indicators, as well as periodically observed water-level indicators (staff plates) provides information on lake levels and on streamflow, including flood heights and discharges. Recorded or observed values of stream stage (water level) are used in conjunction with periodic field measurements of discharge to compute flow on a daily basis. Data collected as part of the AWARE plan augment the USGS Collection of Basic Records (CBR) program. These data are used in planning, designing and operating water-supply systems and hydroelectric facilities, designing stream crossings (pipelines, bridges, culverts), and assessing environmental impacts of such structures or facilities. On a real-time basis, these data are used to provide flood warnings, current river conditions (navigation safety), and forecasts for commercial and recreational activities.

2. GROUND-WATER STATIONS

A network of observation wells (fig. 4) provides data on ground-water level fluctuations. Water-level data indicate the status of ground water in storage, changes in storage due to development (pumping), effects of land-use changes (clearing and artificial drainage), and probable base flow of hydraulically connected streams nearby. Continued operation of the network will provide long-term records for regional studies that, in turn, serve as a basis for correlation of short-term hydrologic data collected for specific purposes.

3. WATER-QUALITY STATIONS

Analyses of data collected at these stations (which generally are also surface-water data stations) allow for characterization of the chemical, physical, and biological properties of surface waters of the State to (1) serve as a base from which many changes can be measured, and (2) permit evaluation of the suitability of

Table 1.--Selected hydrologic data for stations in the Alaska surface-water program.

Index no.	Station no.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
		SOUTHEAST ALASKA			
1	15022000	Harding River near Wrangell	67.4	1951-	732
2	15024750	Goat Creek near Wrangell	17.3	1976-	192
3	15024800	Stikine River near Wrangell	19,320	1976-	56,674
4	15028300	Farragut River near Petersburg	151	1977-	1,574
5	15049900	Gold Creek near Juneau	8.41	1984-	
6	15051008	Salmon Creek above Diversion near Juneau	9.77	1982-	
7	15052009	Lemon Creek near Mouth near Juneau	22.9	1982-	---
8	15052500	Mendenhall River near Auke Bay	85.1	1965-	1,129
9	15052800	Montana Creek near Auke Bay	15.5	1965-1975, 1983	105
0	15056100	Skagway River at Skagway	45	1963-	568
11	15056560	Klehini River near Klukwan	445	1981-	---
12	15067900	Upper Mahoney Lake outlet near Ketchikan	2.03	1977-	40
13	15072000	Fish Creek near Ketchikan	32.1	1915-36, 1938-	421
14	15081580	Black Bear Lake outlet near Klawock	1.32	1980-	---
15	15081995	Reynolds Creek below Lake Mellen near Hydaburg	5.20	1982-	---
16	15083500	Perkins Creek near Metlakatla	3.38	1976-	34
17	15085100	Old Tom Creek near Kasaan	5.90	1949-	38.8
18	15087545	Municipal Watershed Creek near Petersburg	2.20	1978-	22.9
19	15087570	Hamilton Creek near Kake	65.0	1972-73a, 1975-76a, 1976-	326
20	15087590	Rocky Pass Creek near Point Baker	2.72	1976-	11
21	15087690	Indian River near Sitka	10.1	1980-	---
22	15101500	Greens Creek near Juneau	22.8	1978-	60.2
23	15106920	Kadashan River above Hook Creek near Tenakee	10.2	1968-78, 1980-	63.1
24	15106980	Tonalite Creek near Tenakee	14.5	1968-	96.4

See footnotes at end of table.

Table 1. --Continued

Index no.	Station no.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
		SOUTH-CENTRAL ALASKA			
25	15212000	Copper River near Chitina	20,600	1950b, 1952b, 1955-	37,670
26	15216000	Power Creek near Cordova	2c.5	1913c, 1947-	250
27	15238648	Upper Nuka River near Homer	d	1984-	---
28	15238653	Nuka River near tidewater near Homer	d	1984-	---
29	15238820	Barbara Creek near Seldovia	20.7	1972-	105
30	15238990	Upper Bradley River near Homer	10d	1979-	---
31	15239000	Bradley River near Homer	54d	1955b, 1957-	434
32	15239050	Bradley River tributary near Homer	9.25	1979-	
33	15239070	Bradley River near tidewater near Homer	82	1983-	
34	15239900	Anchor River near Anchor Point	137	1964-73, 1974a, 1978-	201
35	15241600	Ninilchik River at Ninilchik	131	1963-	107
36	15258000	Kenai River at Cooper Landing	694	1947-	2,824e
37	15266300	Kenai River at Soldotna	2,010	965-	5,907
38	15267900	Resurrection Creek near Hope	149	1967-	281
39	15271000	Sixmile Creek near Hope	234	1979-	---
40	15273050	Rabbit Creek at Anchorage	15	1979-80, 1984-	
41	15273095	Little Rabbit Creek above Goldenview Drive at Anchorage	5.06	1980-	
42	15273105	Rabbit Creek at New Seward Highway at Anchorage	f	1984-	
43	15274300	North Fork Campbell Creek near Anchorage	13.4	1967-74a, 19[illegible]	18.2
44	15274600	Campbell Creek near Spenard	69.7	1966-	45.5
45	15274798	South Branch South Fork Chester Creek near 20th Avenue at Anchorage	9.39	1980-	---
46	15275100	Chester Creek at Arctic Boulevard at Anchorage	27.2	1966-	18.1
47	15276000	Ship Creek near Anchorage	90.5	1946-	163g

See footnotes at end of table.

Table 1 --Continued

Index no.	Station no.	Station name	Drainage area (mi²)	Period of record	Mean annual flow (ft³/s)
		SOUTH-CENTRAL ALASKA--Continued			
48	15281000	Knik River near Palmer	1,130	1959h	6,955
49	15290000	Little Susitna River near Palmer	61.9	1948-	208
50	15291000	Susitna River near Denali	950	1957-66, 1967j 1968-	2,759
51	15291200	Maclaren River near Paxson	230	1958-	979
52	15291500	Susitna River near Cantwell	4,180	1961-72, 1980-	6,404
53	15292000	Susitna River at Gold Creek	6,160	1949-	9,724
54	15292400	Chulitna River near Talkeetna	1,870	1958-72, 1973-77a, 1979a, 1980-	8,798
55	15292700	Talkeetna River near Talkeetna	1,030	1964-	4,055
56	15292780	Susitna River at Sunshine	11,100	1981-	---
57	15294005	Willow Creek near Willow	206	1978-	417
58	15294010	Deception Creek near Willow	48.0	1978-	69.1
59	15294100	Deshka River near Willow	592	1978-	941
60	15294345	Yentna River near Susitna Station	6,180	1380-	---
61	15294350	Susitna River at Susitna Station	19,400	1974-	49,940
62	15294410	Capps Creek below North Capps Creek near Tyonek	10.6	1979-	
63	15294450	Chuitna River near Tyonek	131	1975-	369
64	15294900	Paint River near Kamishak	205	1983-	---
65	15295600	Terror River near Kodiak	15.0k	1962-68, 1978-	142k
66	15295700	Terror River at mouth near Kodiak	45.7k	1964-68, 1981-	294k
67	15297200	Myrtle Creek near Kodiak	4.74	1963-	46.2
68	15297485	Kizhuyak River near Port Lions	27.5k	1980-	---

See footnotes at end of table.

Table 1.--Continued

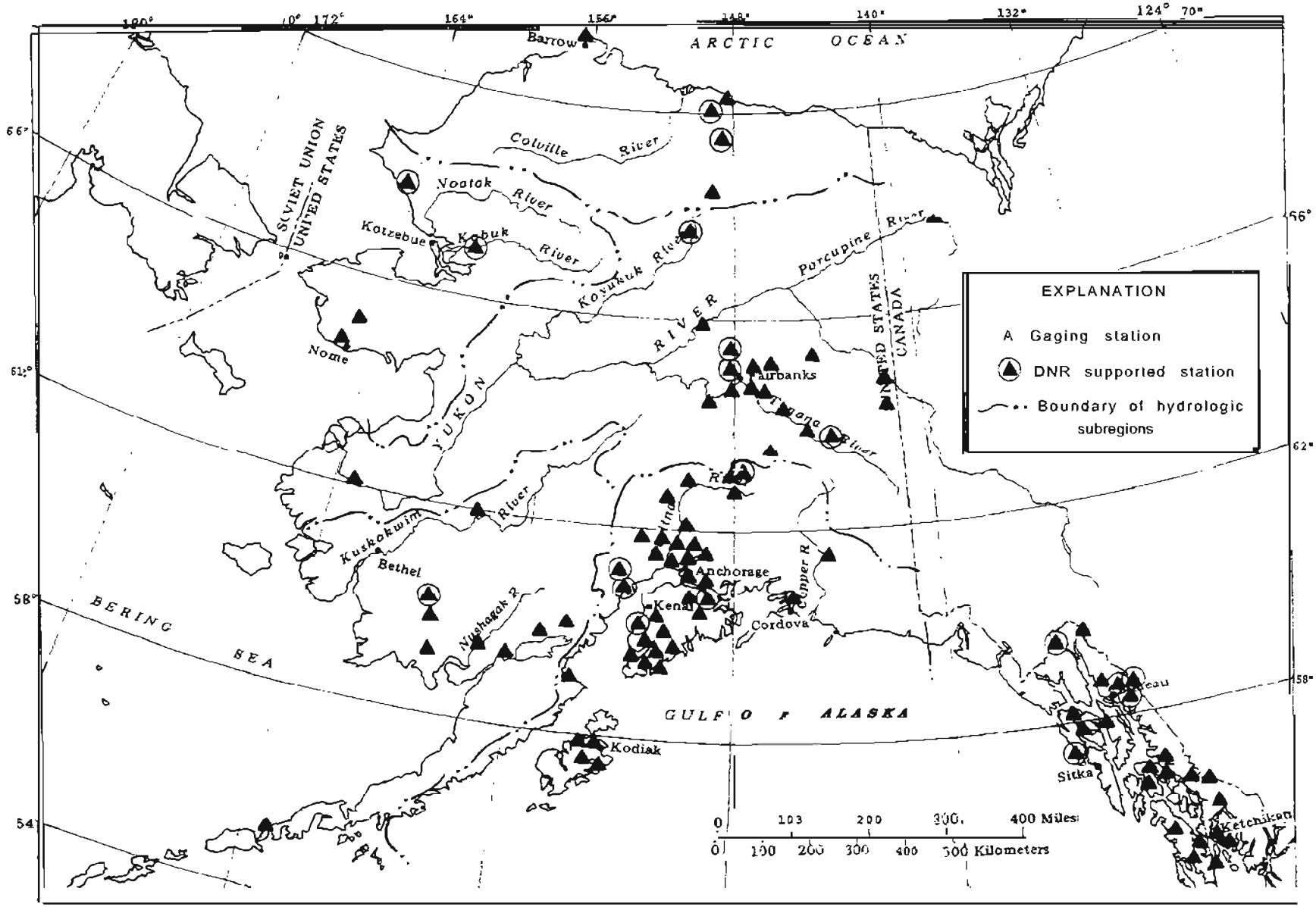
Index no.	Station no.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
		SOUTHWEST ALASKA			
69	15297610	Russell Creek near Cold Bay	25	1981-	---
70	15303010	Silver Salmon Creek near Aleknagik	4.46	1965-67a, 1969-83a, 1984-1973-76, 1977-	---
71	15299900	Tazimina River near Nondalton	327	1981-	---
72	15300000	Newhalen River near Iliamna	3,478	1951-67, 1968-77a, 1982-	9,226
73	15300500	Kvichak River at Igiugig	6,500	196?-	18,060
74	15302000	Nuyakuk River near Dillingham	1,490	1953-	6,156
75	15302500	Nushagak River at Ekwok	9,850	1977-	23,840
76	15304000	Kuskokwim River at Crooked Creek	31,100	1951-	41,220
77	15304200	Kisaralik River near Akiak	270	1979-	---
		YUKON ALASKA			
78	15344000	King Creek near Dome Creek	5.99	1975-82a, 1983-	---
79	15356000	Yukon River at Eagle	113,500	1911-13, 1950-	82,660
80	15388950	Porcupine River at Old Crow, Yukon Territory	21,400	1961-68, 1969-	m
81	15439800	Boulder Creek near Central	31.3	1964-65a, 1966-82, 1983a, 1984-	11.6
82	15453500	Yukon River near Stevens Village	196,300	1976-	119,200
83	15457800	Hess Creek near Livengood	662	1970-78, 1982-	227
84	15476000	Tanana River near Tanacross	8,550	1953-	7,943
85	15478040	Phelan Creek near Paxson	12.2	1966-78, 1983-	69.7
86	15484000	Salcha River near Salchaket	2,170	1909-10b, 1948-	1,640
87	15485500	Tanana River at Fairbanks	n	1973-	19,060
88	15493000	Chena River near Two Rivers	941	1967-	644
89	15493700	Chena River below Moose Creek Dam	1,430	1979-	---
90	15511000	Little Chena River near Fairbanks	372	1966-	203
91	15514000	Chena River at Fairbanks	1,980	1947-48b, 1948-	1,384
92	15515500	Tanana River at Nenana	25,600	1952-	23,550

See footnotes at end of table.

Table 1.--Continued

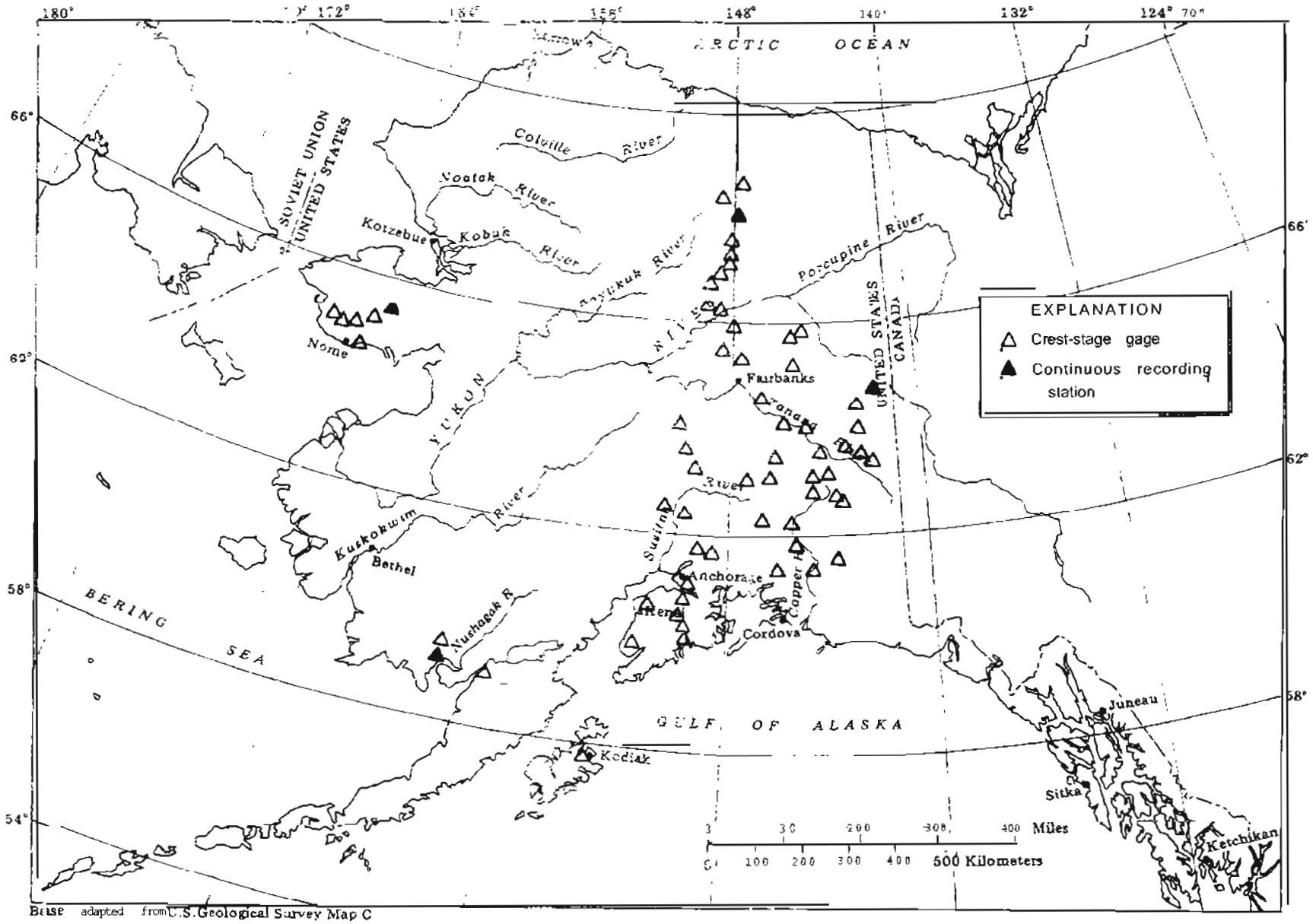
Index no.	Station no.	Station name	Drainage area (mi^2)	Period of record	Mean annual flow (ft^3/s)
		YUKON ALASKA-Continued			
93	15535000	Caribou Creek near Chatanika	9.19	1969-	5.09
94	15564875	Middle Fork Koyukuk River near Wiseman	1,200	1970-78, 1984-	709
95	15565447	Yukon River at Pilot Station	321,300	1975-	219,600
		NORTHWEST ALASKA			
96	15621000	Snake River near Nome	83.7	1965-81, 1982-	183
97	15668200	Crater Creek near Nome	21.9	1964-65a, 1967-75a, 1975-	54.6
98	15744500	Kobuk River near Kiana	9,520	1976-	15,270
99	15747000	Wulik River below Tutak Creek near Kivalina	705	1984-	---
		ARCTIC SLOPE ALASKA			
100	15798700	Nunavak Creek near Barrow	2.79	1971-	0.84
101	15896000	Kuparuk River near Deadhorse	3,130	1971-	1,367
102	15896700	Putuligayuk River near Deadhorse	176	1970-79, 1981-	42.2
103	15904900	Atigun River tributary near Pump Station 4	32.6	1976-	29.9
104	15908000	Sagavanirktok River near Pump Station 3	1,860	1982-	---

a Operated as a crest-stage gage.
b Seasonal summer record only.
c Fragmentary record.
d Drainage area not determinable to greater precision because it varies due to changes in route of meltwater stream from glacier at head of basin.
e Adjusted to exclude diversion from Cooper Lake.
f Not yet determined because drainage area depends on storm sewer network.
g Adjusted to include diver-ion for water supply.
h Flood peaks due to outbreak of glacier-dammed Lake George for 1948-62 and 1964-65 available.
j Only flood peak available.
k Affected by construction of Terror Lake Hydroelectric Power Project
m Average not determined, Canadian record.
n Drainage area undefined as part of river flows through Salchaket Slough and is ungaged.



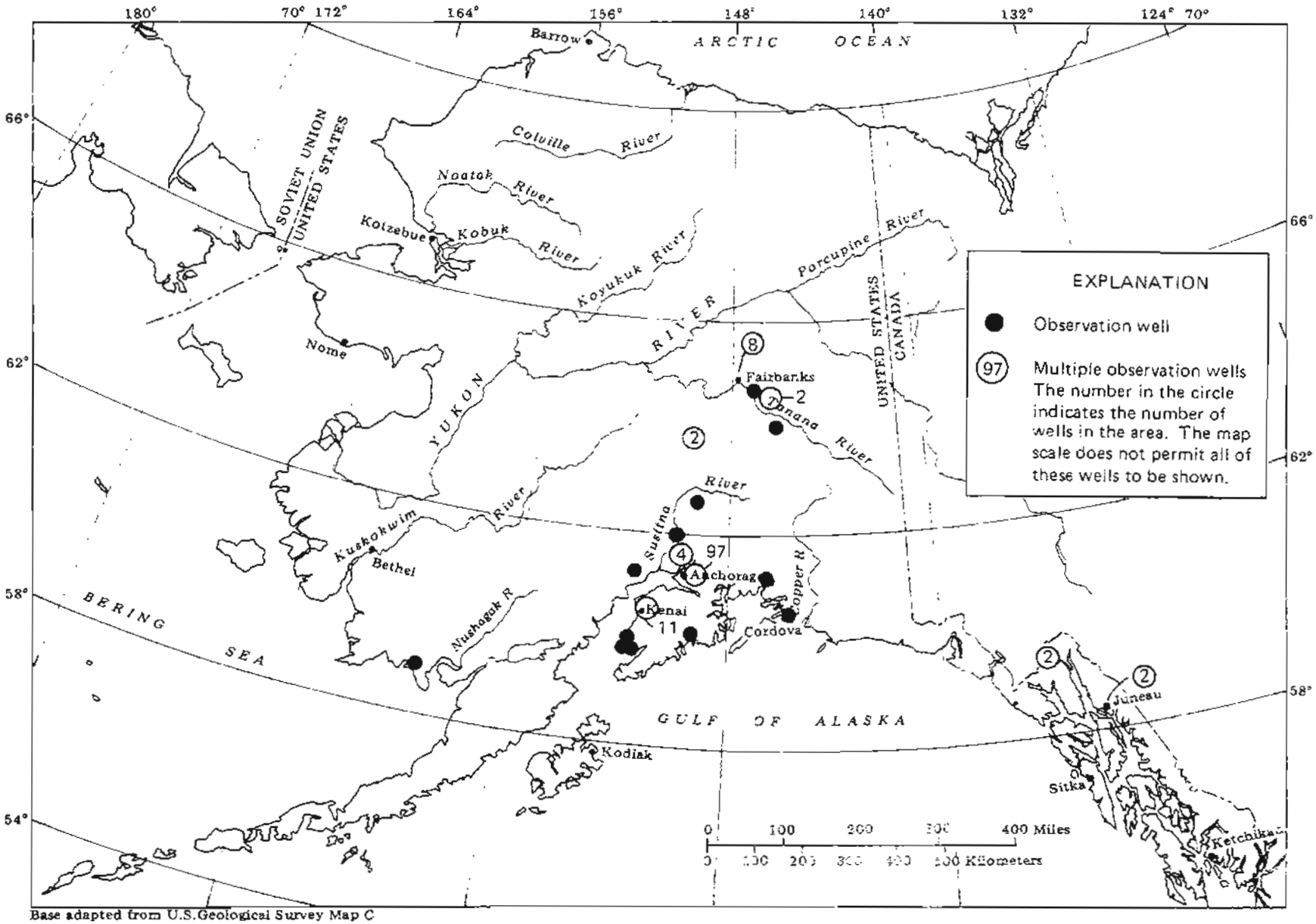
Base adapted from U.S.Geological Survey Map

Figure 2.--Distribution of stream-gaging stations (diagrammatic -- 104 continous-record stations operating in 1985).



Base adapted from U.S. Geological Survey Map C

Figure 3.--Location of data-collection sites in small-streams (drainage area = .00 square miles or less) flood study network.



Base adapted from U.S.Geological Survey Map C

Figure 4.--Location of ground-water observation wells.

a water source for domestic, municipal, and industrial use. Water-quality stations operated as part of the AWARE plan augment the CHR program in development of the bank of data useful in broad State and Federal planning and action programs and in the management of international (Alaska-Canada) waters.

4. SEDIMENT STATIONS

Suspended-sediment concentration (actually a physical property of water) and sediment transport and discharge data collected at these stations are important for evaluating: effects of construction, bridges, culverts, pipeline crossings, and hydroelectric dams; effects of activities such as placer mining and sand-and-gravel removal; and effects of sediment on operation of hydroelectric facilities. Data from these stations also contribute to accomplishing the objectives of the USGS CHR program.

5. ALASKA WATER-USE DATA SYSTEM

The objectives of this program are to develop among agencies a coordinated and efficient system to collect, store, and disseminate data on water use in Alaska. The data are critical to planning the development and management of the State's water resources. Efforts within this program will contribute to the National Water-Use Data System (NWUDS) and support decisions in the appropriation of water rights in Alaska. DLWM collects the data and is a primary user of the data.

6. RIVER NAVIGABILITY SURVEYS

By Federal law, the State is entitled to the beds of all navigable water bodies, including the natural resources on and under the beds of those water bodies. DLWM needs criteria for determining "navigability" to argue Alaska's case in Federal courts in order to address anticipated disputes between various agencies, groups, and individuals. DGGS has the responsibility to describe the physical characteristics (such as width, depth, and velocity of flow) of selected water bodies throughout the State. Through 1983, surveys have been completed on the Matanuska, Alagnak, Gakona, Nenana, and Eagle Rivers; and Big Lake (Brooks Range), Hudson, Alexey and Northway Lakes. Regional reports on water bodies in the Koyukuk, Bristol Bay, and Arctic areas are near completion. Surveys are planned for other areas of the State, though specific streams and lakes have not been selected.

7. WATER RIGHTS ADVISORY

Increasing conflicting uses of water statewide has led the DLWM to frequently require detailed technical analyses and interpretations of various hydrologic conditions. Services provided by the Water Resources Section of DGGS include data acquisition and the needed analyses and interpretations. Water managers of DLWM use this information in decisions on appropriations.

8. WATER RESOURCES DATA SYSTEMS (WATSTORE)

Data collected on the quantity and quality of ground, surface, and coastal waters through various State and Federal programs are entered into several computer systems. The USGS and DGGS have long enjoyed a unique and successful cooperative

agreement where Alaskan data entered into national systems such as NAWDEX and WATSTORE are readily available for project research and distribution to all users. Compatibility between the above-mentioned Federal data systems and DGGS' geoprocessor and Well Log Tracking System (WELTS) enables users to utilize the most recent and reliable data on water resources in Alaska.

9. LAND DISPOSAL REVIEW

Land disposals of many forms are a major activity for DLWM. Each land disposal action is reviewed by DGGS for hydrological implications and factors such as flooding, water supply, erosion, and water-quality effects.

10. BASINWIDE ADJUDICATION TECHNICAL SUPPORT

Due to unquantified Federal Reserve Water Rights and unknown streamflow values, several high-density, competitively used water bodies have been subject to overappropriation. In the event of water shortages or drought, Ship Creek in Anchorage, and possibly Indian River at Sitka would be primary examples of situations where the right to use water may exceed the water available for use. Basinwide Adjudications designed to quantify all uses, either private, State, or Federal, will assure orderly, effective management scenarios for high-use areas. In such cases, DLWM would request that DGGS designate drainage basin boundaries, collect and evaluate hydrologic data, and provide other technical assistance needed for basin-wide adjudication.

11. DAM SAFETY

The Water Management Section of DLWM is charged with permitting the construction or modification of dams 10 feet or more in height or storing 50 acre-feet or more of water. Detailed hydrologic data on affected drainage basins, spillway capacities, and flooding potentials downstream are occasionally directed to DGGS for review of adequacy.

12. INSTREAM FLOW ANALYSIS (RESERVATION)

All surface and subsurface waters of Alaska are reserved to the people for common use, and are subject to appropriations. One form of nonconsumptive use of water is the instream flow reservation. A person may apply to reserve sufficient water to maintain a critical level of water at a specified point on a stream or water body or in a specified stream reach for certain periods of time. The four types of instream flow uses are fish and wildlife, navigation and transportation, parks and recreation, and sanitary and water quality. DLWM, with technical assistance from DGGS, reviews, issues, and manages these appropriations.

13. COMMUNITY ASSISTANCE

Within the limits of funds available, DGGS will provide assistance, on an as-requested basis, to communities that have water-related problems.

DGGS hydrologists provide technological advice and even site-specific investigation for hydrologic problems arising in Alaskan communities. Water supply location,

erosion evaluation, gravel supplies, and pollution evaluation are typical kinds of problems hydrologists address for Alaskan communities.

B. Related Programs — Responsible Agency

1. River information, forecast, and flood warning program. — National Weather Service (NWS)

   a. River Gage Network -- A network of 28 river gage sites, located along the major rivers and in flood-prone locations, is operated by the NWS (fig. 5). Either staff or wire-weight gages are used at most sites. All of the observations are transmitted to the NWS River Forecast Center in Anchorage on a daily basis. The data from the network are used in the NWS river information, forecast and flood warning programs and are supplemental to the USGS network.

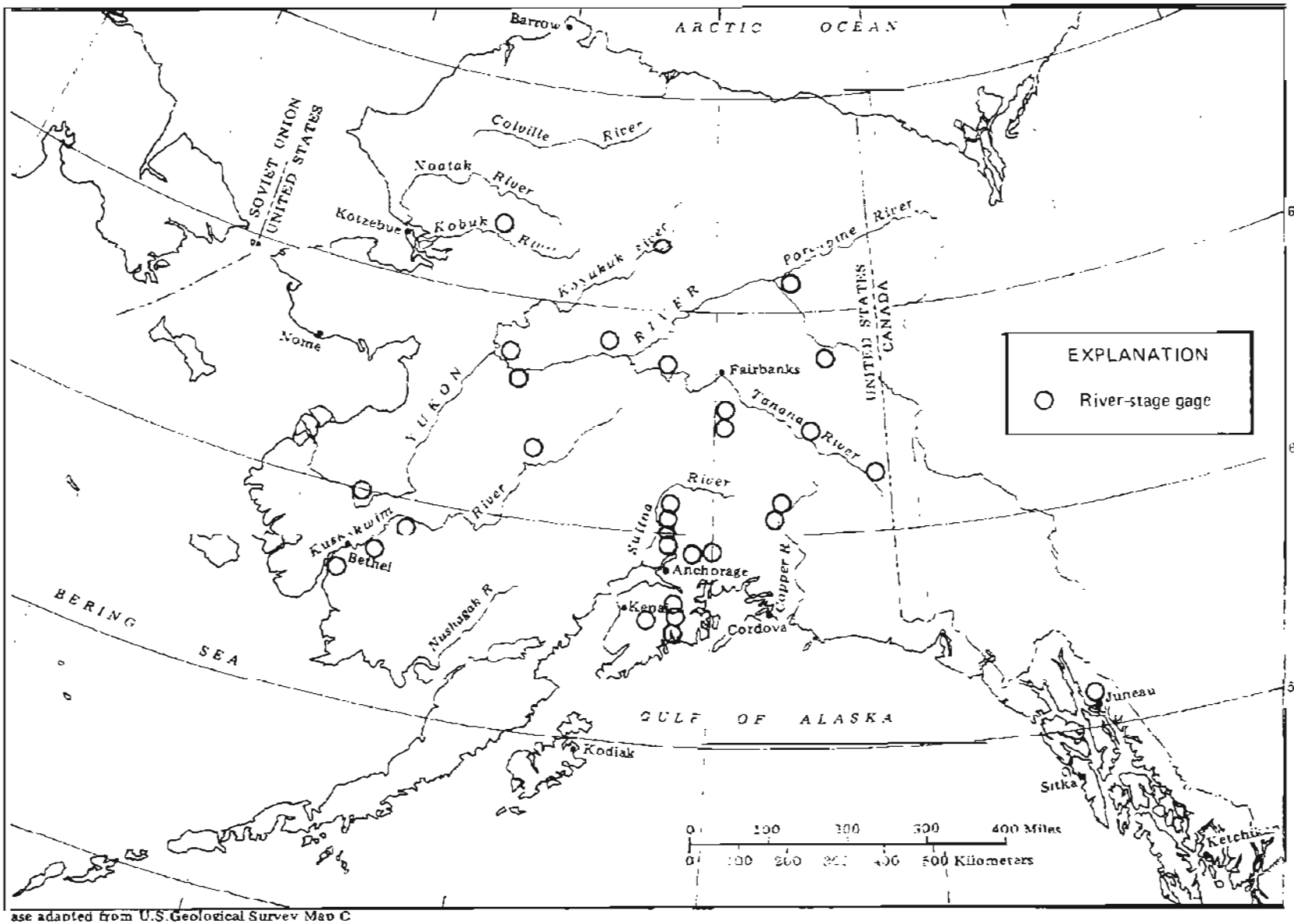
   b. Ice Measurement -- The NWS operates 10 river and lake-ice observation sites (fig. 6). Observations are made twice per month and consist of drilling a hole in the ice and measuring its thickness. The data are used for estimating spring breakup ice-jam flood potential.

   c. Precipitation Data Monitoring and Archives -- A precipitation data monitoring and archiving program is in the process of being developed. The monitoring portion of the project is well developed and is a primary tool used in the NWS flood warning program. The archival portion is under development and will archive all of the precipitation data received by the River Forecast Center from telemetry systems operated by Federal and State agencies.

   d. River Information -- River stage/discharge information for the recent past (last 60 days), present and future, is on file for many of the USGS and the Corps of Engineers sites as well as the NWS network. The data are available seven days per week through the NWS offices in Anchorage, Fairbanks, and Juneau.

   e. Streamflow Modeling -- Developed for various types of watersheds to illustrate some measures to mitigate or counteract flood damages.

2. Evaluation of capability of fish passage through roadway drainage structures (culverts). Complementary studies will address fish passage as it is affected by streamflow characteristics (seasonal variation, flow frequency and duration) and provide methods to determine those characteristics. — Institute of Water Resources, Engr. Experiment Station (IWR/EES) [Co-op with ADOT&PF]



ase adapted from U.S.Geological Survey Map C

Figure 5.–Location of the National Weather Service river gages.

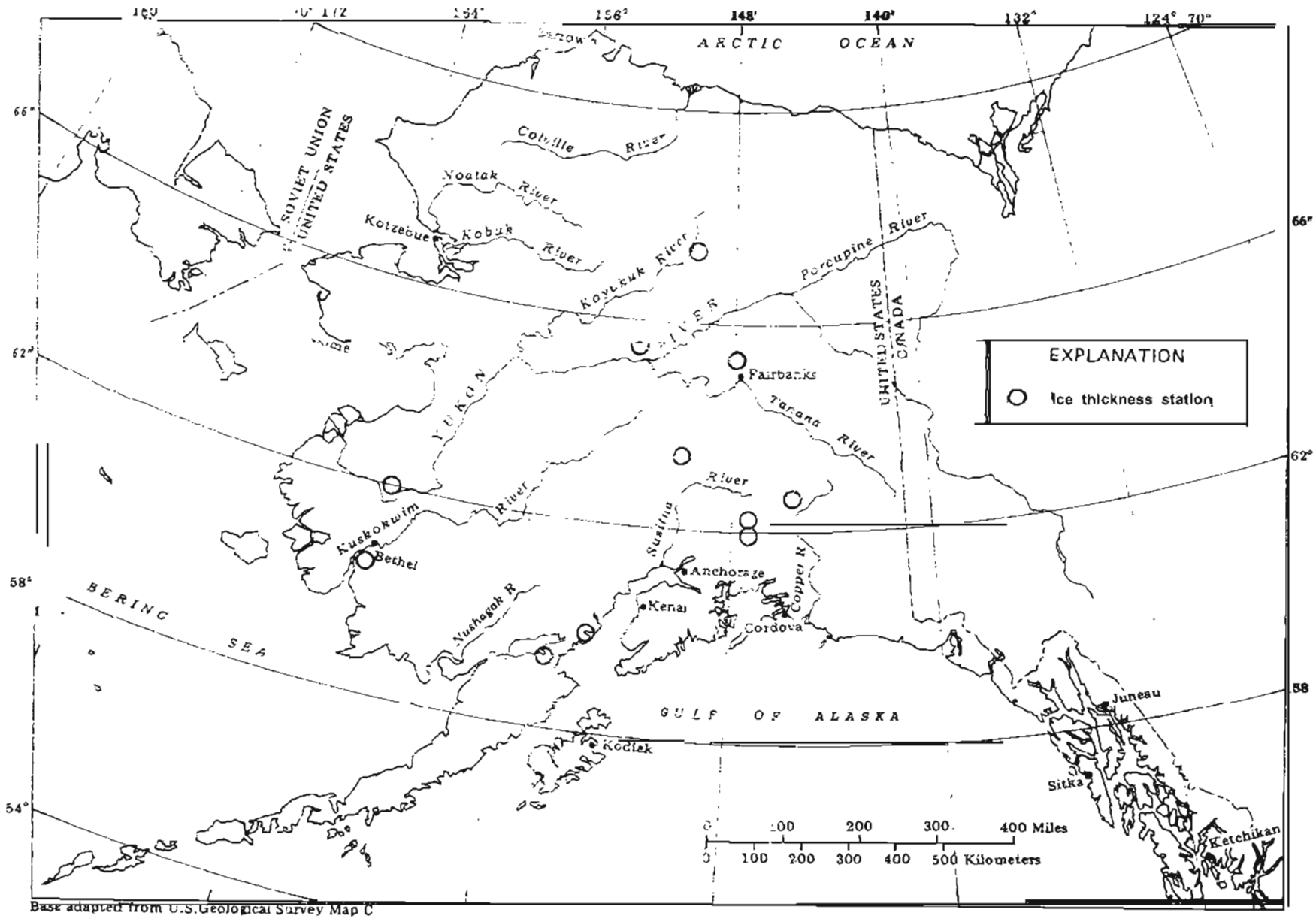


Figure 6.–Location of the National Weather Service ice observation sites.

B. Related Programs--Continued	Responsible Agency
3. Evaluate potential for production of acid and/or dissolution of metals from coal and other mine spoils.	IWR/EES
4. Assist in development of stipulations for operation and abandonment of coal and other mines by studying impacts of mining on riparian ecosystems.	IWR/EES
5. Developmental research program for on-site wastewater and sewage disposal methods in Alaska.	IWR/EES
6. Potential impacts on water quality from activities such as seafood processing, agricultural practices, and development of timber, petroleum and mineral resources. Potential effects of placer mining are of particular concern in various areas of Alaska.	Alaska Department of Environmental Conservation (DEC)
7. Quality of public-drinking supplies.	DEC
8 Snow Surveys Program -- Snow survey data are useful or critical to water-resources and water-related research, assessment, planning, forecasting and management activities. At end of the 1984 winter, the network consisted of 196 snow measurement sites, 17 of which are precipitation gages equipped with Wyoming windshields. Manually measured data are published monthly from February through June. Recording and/or radio telemetry equipment is installed at about 40 of the measurement sites (table 2). Most of the climatological data collected at these sites have not been published, but can be obtained from the Snow Survey Unit of SCS.	U.S. Soil Conservation Service (SCS) [Co-op with many Federal & State agencies]
9. Hydropower studies -- various surveys, assessments, and investigations related to the feasibility, design and operation of hydroelectric power generating facilities.	Alaska Power Authority
10. Glacial hydrology, water supply -- to assess the role of glaciers in the regulation and quality of Alaska's water supply.	Geophysical Institute, Univ. of Alaska (GI)
11. Glacial hydrology, hazards -- to assess the hazards from glacier-dammed lakes, glacier-covered volcanoes and surging glaciers.	GI
12. Glacier-melt modeling -- development of subroutine for the NWS/RFC's operational river forecast model to make the model more applicable to basins that contain large areas of glaciers.	Arctic Environ. Info. and Data Center [Coop. with NWS]

Table 2.--Snow survey network sites with daily records
(Soil Conservation Service, February 1985)

Data site	Region/Drainage	Elevation	Latitude	Longitude	Begin daily record	Snow water-content	Precip.	Air temp.
Anchor River Divide	Cook Inlet	1,600	59°52'N	151°19'W	10/80	X	X	
Atigun Cirque	Yukon River	4,750	68°08'N	149°29'W	07/79	X		
Atigun Pass	Yukon River	4,350	68°08'N	149°28'W	09/93		X	
Barter Island	North Slope	30	70°07'N	143°39'W	08/84		X	
Bettles Field	Koyukuk River	640	66°55'N	151°32'W	10/80	X	X	
Botts Creek	Cook inlet	1,500	61°13'N	151°38'W	11/81		X	
Caribou Snow Pillow	Tanana River	300	65°09'N	147°33'W	10/69	X		
Chuitna Plateau	Cook inlet	1,540	61°13'N	151°38'W	12/82	X		X
Colorado Creek	Tanana River	700	64°54'N	146°37'W	10/65	X	(Discontinued 5/77)	
Congahbuna Lake	Cook Inlet	500	61°04'N	151°26'W	10/82	X	X	
Cooper Lake	Kenai River	1,200	60°29'N	149°41'W	10/81	X	X	
Cottonwood Camp	Seward Peninsula	100	65°07'N	164°43'W	08/82		X	
Fairbanks Test Site	Tanana River	450	64°51'N	147°48'W	10/82	X	X	X
Falls Creek	Kodiak Island	1,980	57°38'N	152°58'W	12/82		X	x
Grandview	Kenai Peninsula	1,100	60°36'N	149°04'W	10/84		X	
Indian Pass	Cook Inlet	2,350	61°04'N	149°29'W	10/79	X	X	X
Kenai Moose Pens	Kenai River	300	60°44'N	150°28'W	09/80	X	X	
Kizhuyak Valley	Kodiak Island	20	57°42'N	152°53'W	12/82		X	X
Little Chena Ridge	Tanana River	2,000	65°07'N	146°44'W	06/79	X	X	X
Monahan Flat	Susitna River	2,710	63°13'N	147°39'W	10/83		X	
Monument Creek	Tanana River	1,850	65°04'N	145°52'W	06/79	X	X	X
Mt. Alyeska	Cook inlet	1,540	61°58'N	149°05'W	10/72	X	X	
Mt. Ryan	Tanana River	3,800	65°15'N	146°09'W	01/82	X	X	X
Munson Ridge	Tanana River	3,050	64°51'N	146°12'W	06/79	X	X	X
Nome 20-Mile	Seward Peninsula	250	64°44'N	165°14'W	08/84		X	
Point MacKenzie	Cook Inlet	200	61°23'N	150°04'W	01/81	X	X	
Ptarmigan Hills	Kenai Peninsula	1,200	59°43'N	150°42'W	10/79		X	
Ramsdyke Creek	Susitna River	2,220	62°37'N	150°48'W	10/79	X		
Rhoads Creek	Tanana River	1,225	63°56'N	145°22'W	12/80		X	
Sagwon	North Slope	1,000	69°26'N	148°41'W	07/83		X	
Ship Creek	Cook Inlet	1,750	61°08'N	149°27'W	10/72	X		
Terror Lake	Kodiak Island	1,450	57°36'N	153°02'W	12/82		X	X
Teuchet Creek	Tanana River	1,640	64°57'N	145°31'W	06/81	X	X	X
Toolik River	North Slope	3,050	69°38'N	149°18'W	07/83		X	
Totchaket	Tanana River	350	64°45'N	149°25'W	10/80	X	X	X
Turnagain Pass	Kenai Peninsula	1,880	60°46'N	149°13'W	12/82	X	X	X
Upper Chena Pillow	Tanana River	3,440	65°06'N	144°56'W	05/81	X	X	X
Upper Long Lake	Southeast	1,000	58°11'N	133°53'W	10/67		(Discontinued 6/75)	

Related Programs--Continued	Responsible Agency
13 Statewide assistance to local governments, lenders, and citizens regarding the National Flood Insurance Program (NFIP); technical assistance to improve community flood-plain management programs.	Dept. of Community & Regional Affairs/ Municipal & Regional Assistance Div.
14 Statewide coastal wind and wave data-collection sites located at Akutan, Atka, Chignik, Homer, Kake, King Cove, Kodiak, Nome, Saxman, Seward, and Whittier.	U.S. Army Corps of Engineers (USCE)
15. Statewide small hydropower projects - sites collecting data on temperature, precipitation, and streamflow at Bear Creek near Hope, Falls Creek near Gustavus, Indian Creek near Chignik, Kings River near Chickaloon, Pyramid Creek near Unalaska, Shaishnikof River near Unalaska, unnamed creek at Scammon Bay, and Windy River near Seldovia.	USCE

REGJ ONAL PROGRAMS

NORTHERN REG I ON

Arctic Area

The occurrence, movement, and availability of water in this region are strongly controlled by condit-ions created by its climate -- permafrost (permanently frozen ground), and rivers and lakes that are ice covered (or frozen solid) except during a short summer season. Prior to investigations conducted within the past 10 to 15 years along the Alaska Pipel ine and other proposed transportation corridors, hydrologic data were collected at only a few, widely scattered sites. More recently , data collection activities have been expanded t.o fulfi) l requirements of the Alaska National. Interests Land Conservation Act (ANTLCA) of 1980. The potential future water needs of industry are great, hut the paucity of water-resources data in the Arctic Region h i n d e r s a ful l understand i ng of' hydro l ogic processes and the efficient development and use of the resource.

Seward Peninsula Area

The western part of the region includes extensive uplands and isolated groups of rugged, glaciated mountains of the Seward Peninsula, and alluvium-filled flats and lowlands of the Koyukuk, upper Kuskokwim, and lower Yukon basins. The Brooks Range (Baird Mountains) and Kuskokwim Mountains are dominant highland areas.

Surface-water data for the Seward Peninsula-Kotzebue Sound area have been collected for both long and short periods, or on an intermittent or one-time basis at several sites, and ground-water conditions are known locally at several communities. Yet the character of and the potential for development of water resources in this remote part of Alaska are probably the least studied of any area in the State.

Future requirements for hydrologic data and information probably will be related to development of known mineral reserves on the Seward Peninsula, extension and/or connection of now isolated, local road systems, and development and protection of the quality of community water supplies at the larger communities in the region (Nome, Unalakleet, Golovin, etc.). Hydrologic reconnaissance surveys, similar to those conducted in the Kobok and Noatak basins, provide valuable, preliminary information for regional-scale resource assessment and planning. Establishment of one or more index stations on representative streams in large basins and a few crest gages in small basins provide a basis for interpreting additional reconnaissance-level observations and measurements at widely scattered sites in ungaged basins.

Interior Area

Interior Alaska is dominated by the valleys of the Yukon and Tanana Rivers, where alluvial deposits may be as thick as 2,000 feet. Permafrost is absent or thawed to a considerable depth beneath major streams, and rarely extends all the way to bedrock. Ground water is generally available in these thawed areas and in unfrozen zones within or beneath the permafrost. The melting of glacier ice (Alaska Range) and of perennial and seasonal snow affects the timing and amount of runoff to

streams draining the upland areas. Surface-water bodies are ice covered for at least half of each year, and most large streams carry heavy loads of glacier-derived sediment during summer months.

Ground water is the source of nearly all public and most private supplies in the region. Well yields as great as 1,000 gal/min have been developed from alluvial deposits of the Tanana Valley at Fairbanks, Eielson AFB and at Big Delta, but yields of wells drilled in bedrock north of Fairbanks are generally adequate only for individual household use. Two hydrologic "problems" have been identified in studies in the Fairbanks uplands: (1) anomalous concentrations of arsenic in the ground water and (2) a 10-year decline in water levels (although precipitation totals have been stable and base flow of streams seems to be increasing during the same period).

Demands for water are most intense in the Fairbanks area, where the population increased during and after construction of the Alaska oil pipeline. Future needs for water in this region will probably continue to be concentrated at Fairbanks, but anticipated development of the Nenana and Big Delta agricultural areas, and potential impacts of placer and hardrock mining on water quality are also important concerns.

A. Northern Region USGS/DNR Projects

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
1. Streamflow Data	F	F	F	F	F	USGS/DGGS	DGGS/DLWM
2. Stream Basin Reconnaissance Surveys	F	F	F	F	F	DGGS	
3. Placer Mining Stream Basin Research	F	F	F	F	F	DGGS/USGS	DEC/DF&G/USFWS
4. Fairbanks Ground-Water Monitoring	F	F	F	F	F	DGGS/DLWM	USGS
5. Nenana Agricultural Area Hydrologic Resources	F	F	F	F	F	DGGS/SCS	DLWM
6. Delta Agricultural Area	F	F	F	F	F	DGGS/DF	DLWM/DA/ AAC
7. Hydrology of the North Star Borough	F	F	F	F	F	USGS	FNSB
8. Ground-Water Levels in Chena-Tanana Flood Plain	F	P	P	P		USGS	FNSB

F - funded at present; funding anticipated
P - proposed, funds needed
C - completed

1. STREAMFLOW DATA

A total of 22 continuous gaging stations provide streamflow data for the Northern Region. Operation of long-term, continuous recording gaging stations ("index stations") and selective discharge measurements provide data necessary for predicting streamflow and runoff characteristics in other basins. A stream-gaging site on the Sagavanirktok River (near Alaska Pipeline Pump Station 3) and a site on the Putuligayuk River (near Deadhorse) for which 10 years of streamflow data are available serve as index stations for large, northward flowing streams.

Additional index stations on the Colville and Canning Rivers are being considered, but costs are very high. Special emphasis should be directed to the Arctic National Wildlife Refuge. Continuation of stream discharge measurements at selected sites and times, and operation of partial-record and seasonal (summer) stations are planned. Partial record stations are planned for selected streams in the Seward Peninsula, and on placer mining streams, including the Chatanika River.

2. STREAM BASIN RECONNAISSANCE SURVEYS

Reconnaissance surveys of representative ungaged river basins are planned to provide data on channel and valley characteristics from which reasonable estimates of streamflow and flood levels can be made. Such surveys provide a sound basis for streamflow estimates in lieu of continuous gaging. Surveys have been completed for the Togiak, Kobuk, and Noatak basins (results published) and the Wulik and Unalakleet basins, and a survey of the Sheenjek River basin is being considered for 1985 and 1986.

3. PLACER MINING STREAM BASIN RESEARCH PROJECT

Placer mining activities significantly disrupt streams and stream valleys. Streamflow and stream water-quality data are needed by miners and agency managers. This 5-agency cooperative project monitors flows, turbidities, water quality, and valley morphological changes in a variety of ways at 20 to 30 sites in the Birch Creek basin. Special emphasis is given to specific data needed for habitat studies as well as general hydrologic studies to determine volumes and times of flows for efficient mining and water-quality monitoring above and below placer operations.

4. FAIRBANKS GROUND-WATER MONITORING

Ground-water levels near school sites and other locations in the Fairbanks area are being monitored in order to evaluate impacts of the large producing well on local aquifers and general aquifer variation. Also, well data reports are being processed for entry into the USGS WATSTORE computer system (see Statewide Projects) by DNR/DOG. A report on Fairbanks ground water based on existing data is being prepared by USGS.

5. NENANA AGRICULTURAL AREA HYDROLOGIC RESOURCES

The objectives of this study are: to determine the availability of water from lakes, small streams, and ground water; to identify flood plains of large streams; to collect meteorological data for hydrologic cycle interpretation and wind analysis for erosion protection; and to assess potential for contamination of the

water resources by anticipated agricultural development. One monitoring well and two meteorological stations operated during 1984. Expanded surface-water studies are proposed for 1985.

6. DELTA AGRICULTURAL AREA

Hydrologic, meteorological, and ground cover baseline data for interagency plans for the Delta agricultural development areas have been reported. A data collection system monitors water level and wind of the Delta area. Five wind stations, several precipitation stations (rain and snow), as well as water-quality sampling sites provide data necessary for evaluating waters and winds of the area. Flood evaluation, erosion control design, windbreak design, and ground-water recharge evaluation require data provided by the project.

7. HYDROLOGY OF NORTH STAR BOROUGH

This continuing study will provide basic hydrologic data useful for: (1) determining the availability of water from surface- and ground-water systems; (2) describing the "operation" of the hydrologic system in upland bedrock area and evaluating possible causes of the continuing water-level declines; (3) defining water quality with special attention to high nitrate and arsenic concentrations in ground water; and (4) assisting residents, officials, and consultants concerning hydrologic problems.

A research effort just being completed at the Fairbanks landfill was directed at explaining geochemical processes (production and movement of leachate) in subarctic areas. Potential effect of any leachate movement on Fairbanks municipal and domestic water-supply systems downgradient will be evaluated.

8. GROUND-WATER LEVELS IN CHENA-TANANA FLOOD PLAIN

Changes in stage of the Chena and Tanana Rivers are the principal controls on water-table fluctuations in the adjacent alluvial aquifers. Various ground-water modeling techniques will be used to simulate arid attempt prediction of trends and ranges of water-table changes in response to changing river levels. Of particular concern are increases in ground-water levels that would result from any extended releases of water from flood-control dams above Fairbanks.

B. Related Programs	Responsible Agency
1. Determination of energy sources supporting arctic freshwater fauna (in anticipation of rapid increases in demand for generally scarce freshwater sources in arctic Alaska).	Institute of Water Resources/Engr. Exp. Sta. (IWR/EES)
2. Evaluation of impact of drilling-mud disposal on wetlands (Prudhoe Bay area).	Alaska Department of of Environmental Conservation (DEC)

B. Related Programs--Continued	Responsible Agency
3. Study of hydrologic system in Ester Dome area west of Fairbanks: results will be applicable to management of quantity and quality of ground water where potential conflicts exist over its use.	IWR/EES
4. Flood-hydrograph modeling, Chena Lakes Flood Control Project -- models developed from data collected at streamflow and meteorological stations. Near real-time data transmittal facilities provide flood prediction capabilities.	U.S. Army, Corps of Engineers (USCE)
5. Hydrologic and other natural resources of Tanana River Basin -- broad-based planning and management applications.	U. S. Soil Conservation Service (SCS)
6. Evaluation of Tanana River Basin flood hazards, particularly as they apply to flood-plain management in the Fairbanks area.	SCS
7. Water-quality impacts from chemical spills, abandoned landfills and "dump" sites, and military operations (Fairbanks area).	DEC
8. Effects of urban development on surface waters (Fairbanks).	DEC
9. Effects of use of fertilizers, other agricultural chemicals on water quality.	DEC
10. Impacts of placer mining on mainstem streams.	DEC
11. Water quality impacts of the Atqasuk Dredging Program -- will provide data on environmental impacts of dredging on the chemical and physical aspects of village water supplies, and ancillary information related to impact on anadromous and resident fish populations.	IWR/EES
12. Snowmelt infiltration into frozen ground -- will examine the role that moisture content within the seasonally frozen layers plays in controlling the infiltration and movement of snowmelt water.	IWR/EES
13. Geochemistry of saline lakes in northeastern Yukon Flats -- will determine the conditions leading to the formation of evaporite lakes in the Yukon Flats.	IWR/EES
14. Mineralogy of soils following forest fires (interior Alaska) and subsequent effect on ground-water quality.	IWR/EES
15. Consequences of removal of riparian vegetations on physical, chemical and biological characteristics of a headwaters, first-order tributary stream.	IWR/EES

B. Related Programs--Continued	Responsible Agency
16. Effects of placer mining on stream channel morphology, water quality, and aquatic organisms at sites in Denali National Park and Preserve. Continue water-quality studies and collection of baseline hydrologic data of DNP&P.	National Park Service (NPS)
17. Initiate baseline hydrologic-data collection and studies at Kohuk Valley National Park, Gates of the Arctic NP&P, Cape Krusenstern National Monument, and Noatak and Yukon-Charley Rivers National Preserves. Begin study of mining effects on water resources at Yukon-Charley Rivers National Preserve.	NPS

SOUTHCENTRAL REGION

Terrain, climate, and development are diverse within this large area. Physiographically, the Cook Inlet/Copper River basin is characterized by broad lowlands surrounded by rugged, glacier-clad mountains. The occurrence and potential for development of ground water are controlled by the wide range and complex distribution of underlying materials. Mixed glacier deposits, stream-sorted sand and gravel, wind-blown sand and silt, and lake-deposited silt and clay underlie the Matanuska and Susitna valleys, Anchorage Bowl area, Kenai Peninsula Lowlands, and the Copper River basin. Sedimentary and metasedimentary rocks form the Kenai and Chugach Ranges, and the Talkeetna and Wrangell Mountains are made up primarily of igneous rocks. Ground water has been developed from glacial outwash for public supplies at Kenai, Anchorage, and the Palmer-Wasilla area. Wells in either unconsolidated materials or bedrock also supply most individual, private water systems in the region. Frozen, fine-grained glacial-lake deposits in much of the Copper River basin restrict the occurrence and availability of ground water in that area.

The large, glacier-fed rivers of the region -- Copper-Chitina system, Susitna, Matanuska, Knik, and Kenai -- carry a high concentration of suspended sediment (glacier flour) during the summer melt periods, but many nonglacier-fed tributaries and other streams contain clear water. Ship Creek is an important source of supply at Anchorage, and the municipality proposes to pipe water, treated to remove the suspended sediment, from glacier-fed Eklutna Lake to the Anchorage Bowl area.

The water resources of the region as a whole are perhaps the most studied, documented, and developed in the State. Yet the rapid industrial and commercial development and accompanying population increases in Southcentral Alaska, where half the people of the State now live, are already stressing currently developed supplies in some areas (particularly Anchorage) and pose the potential for degradation of water quality (urban and residential runoff, untreated industrial and household wastewater). Anticipated future growth and development (coal resources in the Beluga area, agricultural activities at Pt. MacKenzie) will inevitably lead to additional demands for water supplies and concerns about protection of water quality. The timely and economical solution of these problems will require the continued expansion of the hydrologic information and data base.

The compound delta of the Yukon-Kuskokwim Rivers, the Bristol Bay-Nushagak Lowland, the intervening Ahklun/Kuskokwim Mountains, the Alaska Peninsula (Aleutian Range), and the volcanic Aleutian Island are separated and isolated by mountains, distance, and weather from developments in Cook Inlet and interior Alaska.

Ground-water conditions in the Bristol Bay-Nushagak Lowland are probably similar to those in other thick alluvial sequences, except that here the availability of water is increased (reduced) by a layer of permafrost as thick as 175 feet. Potential for development of ground water in the Yukon-Kuskokwim Delta is limited by predominantly fine-grained sediment, permafrost, and shallow depth to the freshwater-saltwater interface near the coast. Ground-water conditions are probably highly variable in the volcanic rocks of the Alaska Peninsula and Aleutian Islands.

Man's use of and impact on the water resources of southwestern part of Alaska have so far been minor, and our knowledge of those resources correspondingly limited.

Immediate needs for water data and information will most likely remain those at settled communities, military installations, and seasonal recreational and commercial fishery facilities. However, an understanding of the hydrologic environment is necessary to plan the orderly development of agricultural, hydropower, geothermal, and likely offshore mineral potentials in part of the regiou. Thus, significant increases in hydrologic data collection and in the current scope of study efforts are required.

A. Southcentral Region USGS/DNR Projects

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
1. Streamflow Data	F	F	F	F	F	DGGS/USGS	
2. Beluga Coalfields Projects							
a. Beluga Water Quality Monitoring	F	F	c			DGGS	DEC
b. Beluga Snow/Precipitation Survey	F	F	F	F	F	DGGS	SCS
3. Matanuska-Susitna Valley Projects							
a. Peak Flow, Low Flow & Lake Level Monitoring	F	F	F	F	F	USGS	DGGS/DF&G
b. Matanuska River Basin Survey	F	F	c			DGGS	DLWM
c. Knik Glacier Monitoring	F	F	P	F	F	USGS	DGGS
d. Pt, MacKenzie Ag Area Meteorological Data	C					DGGS	DA
e. Matanuska Aquifer Study	F	F	F	F	F	DGGS	DLWM
f. Mat-Su Large Lakes Study	C					USGS/DGGS	
g. Mat-Su Small Lake Study	C					USGS/DGGS/ DF&G	
h. Lake Eutrophication	F	F	F	F	C	USGS	DGGS
i. Hatcher Pass Snow Surveys	F	F	F	F	F	DGGS	SCS/DLWM
j. Susitna River Sediment Transport	F	F	C			USGS	APA
k. Knik River Gravel Survey	P	P	P			DGGS	DLWM
l. Matanuska Valley Moose Range Hydrology	F	F	F	F	F	DGGS	DLWM
4. Anchorage Area Projects							
a. Geohydrology of the Anchorage Area	F	F	F	F	F	USGS	MOA
b. Eagle River Ground Water Availability	F	C				DGGS	DLWM
c. Potter Marsh/Rabbit Creek Hydrological Evaluation	F	F	C			USGS	MOA/DLWM
d. South Anchorage Water Supply & Lake Levels	P	P	P	P	P	DGGS	DLWM
e. Hillside Area Ground Water Study	F	F	c			DGGS	

A. Southcentral Region USGS/DNR Projects--Cent i nued

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
f. Eklutna Lake	F	F	F	C		USGS	MOA
5. Kenai Peninsula Projects							
a. North Kenai Ground Water Model		P	P	P		USGS	DGGS /DLWM
h. Lake Level & Ground Water Monitoring	F	F	F	F	F	USGS	DGGS
c. Water Resources of the Kenai Peninsula Borough	F	F	F	F	F	USGS	KPB
d. Kenai River Management Data		P	P	P	P	DGGS/DP	KPB
6. Kuskokwirn Basin Reconnai ssance Survey	F	F	C			DGGS	
7. Copper River Basin Projects							
a. Kenney Lake/Copper Center Water Supplies	P	P	P	P	P	DGGS	DLWM
b. Copper River Gaging Station		P				USGS	ADOT&PF
8. Alaska Peninsula/Aleutian Islands Projects							
a Aleutian Island Stream-flow Data	F	F	F	F	F	DGGS	DLWM
b. Bristol Bay Water Supply Study	P	P	P	P	P	DGGS	DLWM

F = Funded at present; funding anticipated
P = proposed, funds needed
C = Completed

I. SOUTHCENTRAL STREAMFLOW CHARACTERISTICS

Streamflow data are basic to management of the water of Southcentral Alaska. Continuous recording gages are established, maintained, and data collected and published by USGS/DGGS cooperative, jointly funded contract.

Continuous streamflow recording gages are located on Anchor River, Kenai River, Capps Creek, Chuitna River, Willow Creek, Deception Creek, and Deshka River.

Peak flow and lake levels are maintained on 23 other streams and several lakes. Some stations are part of the GOES satellite real time system for which the receiving station is located in Anchorage.

l. Matanuska Valley Moose Range Hydrology - Streamflow, lake level, ground-water levels, water quality, wind and precipitation data needed to prepare a management plan for the newly created Matanuska Valley Moose Range will be provided to DLWM planners. Monitoring sites will provide data for ongoing management of the range.

4. ANCHORAGE AREA PROJECTS

a. Geohydrology of Anchorage Area - The objectives of this project are to: (1) operate a data-collection network for streamflow, lake levels, and ground-water levels; (2) maintain a "state-of-the-art" digital computer model of the confined aquifer system to simulate the hydrologic effects of ground-water development; (3) describe hydrologic characteristics of selected areas in Anchorage where information is required to guide land-use planning decisions; (4) determine current conditions and changes in streamflow characteristics and stream water quality due to urbanization of Campbell and Chester Creek basins; and (5) evaluate availability and quality of potential new public water supplies at Girdwood.

b. Eagle River Ground Water Availability - Eagle River community has had a history of ground-water supply problems. A study of the area's ground-water system, begun in 1982 at the request of DLWM, will result in the definition and understanding of Eagle River aquifers necessary for prudent management of the community's water resources.

c. Potter Marsh/Rabbit Creek Hydrological Evaluation - Potter Marsh is the focal point of a prime coastal waterfowl natural area which is potentially threatened by Anchorage subdivision development. Many agencies, organizations, and citizens have requested that steps be taken to preserve the natural qualities of the estuarine environment.

This project will provide data and analyses that will provide a basis for determining the potential of future development to alter the present hydrological balance of the marsh.

d. South Anchorage Water Supply and Lake Levels - Ground-water data (both quantity and quality) from bedrock aquifers and other aquifers are necessary for improved water management of water resources of South Anchorage. Saltwater intrusion poses a threat to wells near the inlet. Lake levels and quality have been jeopardized by continuing land development so that evaluation of the hydrological changes is needed by water managers and residents.

e. Hillside Area Ground-Water Study - Detailed data compilation and computer analysis will yield data for models which will provide a method for monitoring and interpreting hillside area ground-water systems. The model will be used to attempt to predict effects of potential withdrawals from the system. These data and interpretations are needed to manage water applications in this growing Anchorage suburb.

f. Eklutna Lake - Construction has begun on a pipeline that will eventually carry water from Eklutna Lake to communities along the Glenn Highway and to the Anchorage Bowl area. This study will investigate aspects of the water source, including (1) runoff characteristics of snow- and glacier-fed Eklutna lake, and (2) sedimentation rates in and processes of transport of suspended sediment through the lake.

5. KENAI PENINSULA PROJECTS

a. North Kenai Ground Water Model - Continued monitoring of local ground water will allow development of a digital model of the lower confined aquifer, in order to simulate the extent of, and predict, probable changes in, the intrusion of salt water from Cook Inlet into the aquifer due to anticipated increases in pumping of large-yield industrial wells, as well as effects on lakes and other hydrologic expressions of the area.

b. Lake Level and Ground Water Monitoring - This continuing program, begun as part of earlier USGS interpretive studies in the North Kenai area, further defines the relationships between ground-water use and fluctuations in lake levels.

c. Water Resources of the Kenai Peninsula Borough - The objectives are to monitor hydrologic conditions in parts of the Borough outside the specific study areas addressed in a and b above, and to evaluate needs for detailed studies.

d. Kenai River Management Data - Division of Parks needs all Kenai River hydrologic data available in order to prepare a management plan for the river. This project will summarize and evaluate existing data as well as define and initiate a data collection system adequate for managing the Kenai River in order to maintain the fisheries and recreational values of that system.

6. KUSKOKWIM BASIN RECONNAISSANCE SURVEY

Flow and flood data are developed from reconnaissance surveys of the Kuskokwim River tributaries. Surveys of valley and channel profiles as well as water surface slope and discharge allow reasonably accurate calculations for streamflow and flood characteristics for these major, hydrologically unknown interior Alaskan rivers which are tributary to the largest totally Alaskan river. The hydrologic data and interpretations are needed for knowledge, planning, and management of the Kuskokwim River system as well as the state lands through which the rivers flow.

7. COPPER RIVER BASIN PROJECTS

a. Kenney Lake/Copper Center Water Supply Evaluation - Residents and DNR water managers request data and evaluation of water supply sources for this Copper Basin population center particularly for domestic and agricultural water supplies.

b. Copper River Gaging Station - The streamgaging station on the Copper River near Chitina, operated by USGS, should be augmented or replaced by a station at the Million Dollar Bridge near Cordova. The new station would monitor runoff of the entire basin (which is not provided by the present gage) as well as obtain streamflow data needed for planning and design of proposed highway structures on the lower Copper River.

8. ALASKA PENINSULA/ALEUTIAN ISLAND PROJECTS

a. Aleutian Islands Streamflow Data - Small cooperator operated stations are located at Nikolski and Unalaska to provide streamflow data for small streams in the Aleutian Islands. Data are used to appraise the local water resource potential

2. BELUGA COALFIELD PROJECTS

a. Beluga Water Quality Monitoring - Water quality of the streams of the Beluga Coalfields will be threatened by coal mining. Baseline data are needed as well as water quality monitoring of the streams in order to adequately manage the water quality. This program provides data to DEC as well as DNR. This project involves a systematic sampling and analysis of water from designated sites in the Beluga Coal Mine area. The data are provided to management agencies.

b. Beluga Snow/Precipitation Survey - Precipitation and snow accumulation are an important part of monitoring and managing surface waters of the Beluga Coalfields area. This project is part of the statewide snow survey system coordinated by the U.S. Soil Conservation Service, which maintains five snow survey and precipitation sites in the Beluga Coalfields. Data are collected throughout the winter snow accumulation season.

3. MATANUSKA-SUSITNA VALLEY PROJECTS

a. Peak Flow, Low Flow, and Lake Level Monitoring - Peak-stage indicators (crest-stage gages) at several sites document flood events. Stream discharge measurements are made at other selected sites during low-flow conditions. Water levels are measured semiannually at 12 lakes. These streamflow and lake data (3 years of record now available) provide background information for other ongoing and planned areal and research studies.

b. Matanuska River Basin Survey - The Matanuska River system has good access and is one of the major river systems of the Matanuska-Susitna area. Very few data exist for the tributaries of the Matanuska River and no gaging stations presently monitor any part of the system. Data are needed to interpret water and sediment transport by the river. Gravel extraction, water quality, flooding, and erosion near Palmer are being monitored. This project will support preliminary streamflow measurement of the Matanuska River tributaries and sediment transport characteristics of the river system.

c. Knik Glacier Monitoring - The outburst of glacier-dammed Lake George once produced large floods on the Knik River. Although the lake has not formed since 1966, the potential exists for future formation and resumption of annual flooding. Such floods could affect existing and proposed future development along the Knik River. The activity of Knik Glacier is monitored in an attempt to predict the likelihood of the formation of a "new" Lake George.

d. Pt. MacKenzie Ag Area Meteorological Data - A meteorological station installed in 1981 records wind velocity and direction data needed for development of agricultural plans. The University of Alaska Agricultural Extension Service is planning to assume maintenance and monitoring of the station.

e. Matanuska Valley Aquifer Study - Demands for ground water in the Matanuska Valley are increasing rapidly as the population and associated development grow. Ground-water systems of the area need to be defined and evaluated in order to manage the area's water demands wisely. This project will analyze existing data and collect new information necessary to understand and describe ground-water systems of the Matanuska-Susitna area.

f. Matanuska-Susitna Large Lake Study - Big Lake in the Matanuska-Susitna Valley is an important area of development for recreation and fishing. The waters of the lake can produce necessary nutrients for the aquatic life there, but should not be polluted. Careful investigation of the nutrient condition of the lake will allow decisions for management of lake development and use to be based on fundamental biological principles and characteristics of the lake.

This project will define the physical and biological character of the waters of Big Lake and will document the distribution and variety of organic matter, the ability of the lake to support fish, and the potential for pollution of the waters. Principles learned through this study will be applicable to other lakes in subarctic areas of Alaska.

g. Matanuska-Susitna Small Lake Study - Smaller, heavily used lakes of the Matanuska-Susitna Valley support important fish population. Limnological investigations provide a scientific basis for management of the water of these recreational lakes.

h. Lake Eutrophication - An extension of earlier limnological studies in the Matanuska-Susitna Valley, this project will provide criteria for lake management by identifying those factors/conditions in shallow, subarctic lakes that make them most susceptible to cultural eutrophication.

i. Hatcher Pass Snow Surveys

Snow survey courses to monitor snow depth and water content will be established at selected locations to provide needed snow-cover data for managing these recreational areas for skiing, and other winter sports. Data will also be useful for stream runoff and flood prediction.

j. Susitna River Sediment Transport Study - Alaska Power Authority has contracted with [illegible] to conduct an in-depth investigation of the characteristics of sediment production, concentration, and yield of a glacier-fed stream. The data will be used for planning, design, and operation of proposed hydroelectric dams and power generation facilities. This study on the Susitna River (below the Devils Canyon dam site) will address the following aspects:

(a) Suspended-sediment transport rate as a function of discharge.
(b) Size distribution of suspended sediment as a function of transport rate.
(c) Bedload sediment-transport rate as a function of discharge.
(d) Size distribution of bedload sediment as a function of transport rate.
(e) Spatial distribution of total sediment transport.
(f) Stream vertical-velocity distributions as a function of discharge.
(g) Stream water-surface gradient as a function of discharge.
(h) Bed material particle-size distribution.

k. Knik River Gravel Survey - The project will evaluate the amount of gravel available for extraction from the bed of the Knik River, the effects of gravel mining and the potential gravel "recharge" of the river in response to demand for aggregate resources. DNR land managers have requested this study.

for domestic and industrial water supply, hydroelectric potential, and fish habitat. Also the data can be used for improving ungaged streamflows in a hydrologically unsampled corner of Alaska.

b. Bristol Bay Water Supply Study - The study would evaluate available data and install new data collection stations in order to develop information needed to improve water supplies for Bristol Bay communities and seafood industrial plants at Naknek, King Salmon, Dillingham, or other villages as demand requires. Some work has already been done in Dillingham.

B. Related Programs	Responsible Agency
1. Chugach National Forest -- Establish and maintain a current water-resources data index for CNF; inventory and update current water rights permits on forest lands; transfer USGS gaging station from Resurrection Creek to Portage Creek and identify potential sites on Montague Island for streamflow data collection.	U.S Forest Service (USFS)
2. Fisheries ground-water studies -- assess potential for developing spawning and rearing areas in stream channel gravels fed by ground water (Turnagain Pass, Portage Valley and other areas).	USFS [Co-op with DF&G]
3. Potential for degradation of water quality: (a) Anchorage - urban runoff. (b) Kenai - disposal and storage of drilling muds in wetland areas.	Alaska Department Of Environmental Conservation (DEC)
4. Collection of baseline hydrologic data in anticipation of coal mining (Beluga area).	DEC/DNR Co-op Study
5. Sterling Special Waste Site Evaluation.	DEC
6. Impacts of disposal of seafood processing wastes on receiving marine waters -- studies at Kodiak, Akutan, and at Cordova.	DEC
7. Geochemistry of Copper River Basin ground water - will provide a multivariate statistical analysis of the area's geochemistry.	Institute of Water Resources (IWR) [Co-op with DGGS]
8. Initiate water resources baseline studies at Lake Clark and Wrangell-St. Elias National Park and Preserve (NP&P); study of mining effects on water resources at Wrangell-St. Elias NP&P; study of salmon nutrient re-cycling at Katmai NP&P.	National Park Service (NPS)

B. Related Programs--Continued	Res Agency le
9. Monitoring of aquatic habitat and fish populations of the Tuluksak River with respect to placer-gold dredging operations at Nyac.	Alaska Department of Fish & Game
10. Stream-temperature modelling -- Evaluate potential effects of proposed two-dam Susitna hydroelectric project on downstream water temperature. Model will simulate natural and "with-project" instream temperatures under a range of meteorologic and hydrologic conditions and various reservoir operating procedures. Associated with this project are investigations of thermal effects on fish and effects of an altered ice regime on physical and biologic system of the river.	Arctic Environ. Info. and Data Center [Coop. w/APA, USF&WS]
11. Identification of flood hazard areas along selected streams or reaches of those streams for use in flood-plain management studies. Tentative list of streams includes Kuskokwim, Copper, Matanuska, Kenai, Anchor, Kasilof, and Ninilchik Rivers, and Deep Creek	Soil Conservation Service
12. Strandline Lake/Beluga River outburst flood analysis -- Strandline Lake is a glacially dammed lake which outbursts nearly every year causing flooding of the Beluga River. Power transmission lines, bridges, and fishermen are endangered by this flood. Detailed analysis of the processes responsible for the flooding will allow interpretation and possible prediction of the outburst flood. This project will support the field surveys and analyses and the preparation of the study report.	Geophysical Institute(GI)[co-op; with DGGS]
13. Mt. Redoubt/Drift River flood evaluation -- Drift River outburst floods occur when the North Glacier on Mt. Redoubt surges and dams the Drift River. Developments in the Drift River valley are threatened by such a flood. Recent investigation indicates the North Glacier is in the process of surging. Monitoring the surging glacier will allow forecast of flooding of the Drift River. This project will support continued surveillance and surveying of the North Glacier on Mt. Redoubt and collection of data necessary to make glacial terminus advance prediction.	GI [Co-op with DGGS]

SOUTHEAST REGION

Water is abundant in relatively mild (for Alaska) and very wet climate of Alaska's coastal "panhandle". The high precipitation (more than 200 inches per year measured at Little Port Walter; probably much greater at higher altitudes) on glaciers and on steeply sloping glacially scoured bedrock produces the highest mean annual and peak runoff rates in the State. Several large rivers originating in Canada flow through Southeast Alaska: the Taku (Drainage Area = 6,000 mi^2), the Alsek (D.A. = 11,000 mi^2) and the Stikine (D.A. = 20,000 mi^2). These glacier-fed rivers carry large amounts of suspended sediment. Most of the smaller streams in the region are free of glacial debris. Ground water can be obtained readily from alluvium of the larger stream valleys, although these deposits are not as extensive as in other parts of Alaska. Most of the water used in Southeast Alaska -- for hydroelectric power generation, sea food processing, and pulp mill operations -- is from surface sources, but ground water provides the principal public supply at Juneau, Sitka, Yakutat, Ketchikan, and at other large communities.

The following potential problems and needs exist in the Southeast Region: (1) Effects of past and ongoing logging practices as well as proposed mining operations (at Quartz Hill near Ketchikan and Greens Creek on Admiralty Island) pose potentially significant impacts on quality of surface water. Avalanches and landslides may occur naturally on steep, saturated slopes in areas being disturbed by man's activities; separation of "causes" may be difficult. (2) Potential hazards from glaciers (outburst floods) and heavy, wet snowfall on steep mountain slopes (avalanches) have been identified locally. A compilation of data and a coordinated action plan in case of emergency are needed. (3) Water-supply needs in the Juneau area (Mendenhall Valley and Douglas Island) and other communities require extension of information on ground-water systems -- complex hydrology (and local water-quality problems) of glacio-fluvial deposits and alluvial fans. Salt-water intrusion may occur naturally or be caused by pumping from coastal valleys. (4) Conduct of hydrologic-data collection and research activities on Native- or corporate-owned lands by government agencies (at least Federal) may be restricted by legal "considerations." (Federal government cannot accept funds for studies from such entities. This situation not unique to SE Alaska.)

A. Southeast Region USGS/DNR Projects

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
1. Streamflow Characteristics							
a. Gaging Stations (see Statewide Programs)	F	F	F	F	F	USGS	USFS/USB/ DGGS/DLWM*
b. River Basin Surveys		P	P	P	P	DGGS	DLWM
2. Mendenhall Valley Hydrological Study	F	C				USGS	JCB/DLWM

*Also cities of Sitka and Petersburg

A. *Southeast Region USGS/DNR Projects--Continued*

Program Element	'85	'86	'87	'88	'89	Responsible agency(s)	Co-op agency(s)
3. Auke Bay Water Supply Study	F	F	C			DGGS	DLWM
4. Indian River Basinwide Adjudication	P	P	P	P	P	DLWM/DGGS	
5. Quartz Hill Water Monitoring	P	P	P	P	P	USGS	USB/DGGS
6. Greens Creek Water Monitoring	F	F	F	F	F	USFS/USGS	
7. Land Disposal Water Availability Studies	P	P	P	P	P	DGGS/DLWM	

F - funded at present; funding anticipated
P - proposed, funds needed
C - completed

1. STREAMFLOW CHARACTERISTICS

a. Gaging Stations (Linked with Statewide Programs). In southeast Alaska, long-term records from several active and discontinued gaging stations probably provide a more complete and representative picture of the regional variation and range of streamflow than for any other large area of the State. Although a relatively extensive regional data base collection effort continues, new developments, activities in problem areas require additional and/or more detailed data at specific sites. Stations are only established to provide such information include Indian River near Sitka (water rights adjudication), Mendenhall River near Auke Bay, and Keehan River near Klukwan (surface-water/ground-water relations).

A reconnaissance of runoff characteristics in the Alsek River basin is planned for FY85-86. This large river drainage area (11,000 mi^2) is fed primarily by glacial meltwaters.

b. River Basin Surveys. Reconnaissance surveys of ungaged stream systems to produce streamflow and flood predictions have been planned for the Alsek and Taku River basins as well as other streams which DNR water managers identify for which data are needed. (Nonfunded projects.)

2. MENDENHALL VALLEY HYDROLOGIC STUDY

The Borough and City of Juneau as well as residents and DNR water managers have expressed an interest in investigation and evaluation of the water supplies of the Mendenhall Valley area. A USGS-WRD study nearing completion will provide necessary data and interpretation for determining quantities of available water and effects on the quantity and quality of the water from salt water intrusion and sewage resulting from increasing demands from the system.

3. AUKE BAY WATER SUPPLY STUDY

The study will provide more complete data and interpretation of ground water and other water supplies of the Auke Bay area in order to more accurately define salt water intrusion and provide a technical basis for more effective management policies for this developing area. The study was requested by Region water managers.

4. INDIAN RIVER BASINWIDE ADJUDICATION

Appropriations of water from Indian River in Sitka may be greater than the amount of water in the river during low flows. Users and water rights holders include Alaska Department of Fish and Game, City of Sitka, National Park Service, Sheldon Jackson College, and private parties. DLWM water managers are planning to adjudicate Indian River's waters on a basinwide basis and will require good, basic data as well as analyses and interpretation of those data for meaningful adjudication of this over-appropriated stream system.

5. QUARTZ HILL WATER MONITORING

This project will provide baseline data to characterize present hydrologic conditions in an area of known potential for molybdenum development near Ketchikan. Two gage sites provide quantity and seasonal distribution of stream discharge and seasonal and areal variations in surface-water quality

6. GREENS CREEK WATER MONITORING

Information similar to that collected at Quartz Hill will document surface-water conditions in this proposed mining development in the Hawk Inlet-Young Bay area in the northern part of Admiralty Island. The ongoing work is conducted by U.S. Forest Service hydrologists.

7. LAND DISPOSAL WATER AVAILABILITY STUDIES

Technical hydrological evaluations of water supply, flooding, erosion, recreation, and habitat will be provided as requested and needed by DNR planners and managers in order to conduct land disposals.

B Related Programs	Responsible Agency
1. Impacts of forestry practices on water quality.	Alaska Department of Environmental Conservation (DEC)
2. Water quality and sediment analysis of Swan Lake, Sitka	DEC
3. Evaluate usefulness of the mussel Mytilus as a bio-accumulator and thus an index of metals added to streams by mining operations (Greens Creek and Hawk Inlet at Admiralty Island).	DEC

B. Related Programs--Continued	Responsible Agency
4. Impact of ore spillage on water quality (Skagway harbor)	DEC
5. Receiving water quality in the vicinity of Petersburg seafood processors.	DEC
6. Juneau area water-quality studies: a. Water quality investigations of North Twin Lake. b. Aurora Basin and Gastineau Channel -- circulation and water exchange. c. Effects of small boat moorage -- Auke Bay, Aurora Basin, Tee Harbor.	DEC
7. Forest Practices Advisory -- determine effects of forest practices on hydrologic system and monitor effectiveness of "Best Management Practices."	U.S. Forest Service (USFS)
8. Fishway investigations -- to provide hydraulic and hydrologic data to fisheries management agencies.	USFS
9. Kadashan Barometer Watershed -- intensive effort to monitor effects of roads and timber harvesting practices on water quality and streamflow regime.	USFS [Co-op with USGS]
10. Water resource inventory of the Chatham Area (Tongass National Forest) -- relation of stream channel morphology to suitability and sensitivity of aquatic habitats for anadromous and resident fish.	USFS
11. Snow surveys and precipitation stations -- data significant in evaluation of runoff and water availability in areas of small or virtually nonexistent ground-water supplies.	U.S. Soil Conservation Service [Co-op with DGGS]
12. Instream flow study of Indian River, Sitka National Historical Park.	National Park Service (NPS)
13. Water-resources baseline study, Glacier Bay National Park and Preserve.	NPS
14. Streamflow data in support of potential hydroelectric power studies -- Favorite Creek near Angoon and small stream near Klukwan (north of Haines).	Alaska Power Authority (APA)
15. Monitoring effects of operation of Tyee hydroelectric project on fish-spawning channel developed in tailrace of the plant.	Arctic Environmental Info. & Data Center [Co-op. w/APA]

HYDROLOGICAL ACTIVITIES IN YUKON TERRITORY, 1985-1989

The great Yukon River system heads in the Yukon Territory and British Columbia, where our neighbors to the east must deal with water resources issues and problems similar to those we face in Alaska. We are thus pleased to include in this AWARE Plan the following statements provided by J.R. (Hic) Janowicz, Regional Hydrologist for Yukon Territory, with the Water Resources Division, Indian and Northern Affairs, Canada:

During the 1985/86 fiscal year a five-year plan will be implemented to expand the hydrometric network operated by Water Survey of Canada in Yukon Territory as part of the Water Survey of Canada/Department of Indian and Northern Development (WSC/DIAND) cooperative cost sharing agreement. The proposed plan, consisting primarily of baseline stations, will expand the existing network of 72 stations by 15 stations.

Water Survey of Canada intends to begin the installation of Data Collection Platforms at all remote hydrometric stations with five Yukon stations being instrumented during 1985. These five stations have ports available for the installation of additional sensors. Cooperation between WSC and Atmospheric Environmental Service, as well as other government agencies is anticipated with the inclusion of various meteorological instruments at WSC hydrometric sites.

The hydrometric network operated by DIAND during 1985/86 will consist of 24 stations of which 11 are baseline stations and 13 site specific stations. The future plan for the network is to transfer the 11 baseline stations to WSC (as outlined in the WSC/DIAND 5 year plan). The site specific stations, which represent primarily mining and transportation concerns, will be maintained only as long as a need exists. It is expected that other site specific stations will be added to the network. A historic.21 summary of the data was published in 1984. It is expected that an update will be published every two years.

The snow course network operated by DIAND with thr cooperation of the Atmospheric Environmental Service presently consists of 41 stations throughout the Territory. These will be sampled for snow depth and snow water equivalent-. on February 1, March 1, April 1, May 1 and Play 15; a snow survey bulletin with runoff forecasts will be published after each sample. A historical snow survey summary is planned for 1985.

DIAND hopes to establish a snow pillow station in the Mackenzie Mountains to provide information on a real time basis for spring flood forecasting.

The Vancouver office of the National Water Research Institute is conducting a multiyear research project to develop a better understanding of freeze-up and break-up processes on the Yukon River in the Whitehorse area. Five river stage and ice front progression observation stations have been established in the reach. This particular river reach is traditionally a problem area with respect to freeze-up ice jam Flooding on an almost annual frequency and the study will (hopefully provide the basis for mitigative measures.

A joint study between DIAND and the Department of Civil Engineering, University of Alberta in Edmonton, is planned to study freeze-up and break-up processes on the

Yukon River in the reach between Fort. Selkirk at the confluence of the Pelly River, and Eagle-, Alaska. Emphasis will be placed on the Dawson area which is susceptible to ice jam flooding on a relatively frequent basis. The over-all objective of the study is to obtain a solution to the flooding problem.

Negotiations between the Inland Water Directorate, Department of Environment, DIAND and Yukon Territory leading to the implementation of the Flood Damage Reduction Program (FDRP) in Yukon are planned to commence during 1985 with an agreement. hopefully in place in the foreseeable future. The FDRP is a cooperative program to discourage future flood vulnerable developments in areas designated as flood prone. The Program is made up of a two stage process consisting of the floodplain mapping followed by designation. Nationally approximately 200 communities in the Northwest Territories, New Brunswick, Quebec, Ontario, Manitoba and Saskatchewan have been mapped and designated.

A general hydrology study of northern Canada (Northwest and Yukon Territories) is planned for 1986. The study to be funded by DIAND will consist of an inventory of hydrologic parameters, an estimation of these parameters for gauged areas followed by the transfer to ungauged areas. Recommendation for future hydrometeorologic data needs will be assessed on this basis. A similar study was carried out for NWT in 1982 with the 1986 publication representing a four-year update encompassing both Territories.

Primary work will continue to study the surface hydrology of Haeckel Creek near Whitehorse. The experimental watershed established in 1984 is a 17.4 square kilometer basin which is characteristic of Coast Mountain drainages. The basin will be used primarily for development and calibration of hydrologic models, the results of which will be transferred to ungauged areas.

A Canada-wide flood guide being prepared by the National Research Council, Associated Subcommittee on Hydrology will contain examples extracted from Yukon Territory. The guide is expected to be released during 1985.

The Mackenzie River Basin Study is at the implementation stage of several recommendations which include the establishment of an integrated monitoring network in the Liard and Peel River sub-basins of Yukon Territory and spring flood studies on the Liard. The proposed integrated monitoring network, which will consist of Hydrometric, Meteorologic, Snow Course, Water Quality arid Sediment stations is anticipated to go ahead during 1986/87 through existing agreements where available.

The Canadian Climate Program is expected to be active in northern Canada through various subcommittees. The overall objective of the program is to better define the requirements for climate information for northern planning and development, and to provide insight into the ways which climate information can be acquired and used in responding to northern issues.

YUKON RIVER BASIN STUDY

The Yukon River Basin Study was a joint ($2.2 million dollar Canadian) study by Canada, British Columbia and Yukon of the water and related resources of the Yukon River Basin in Canada. The study was carried out between 1980 and 1984. The final

report of the Yukon River Basin Committee is expected to be released in the spring of 1985.

During the course of the study, projects were completed in eight program areas: hydrology, water quality, wildlife, tourism, parks and recreation, fisheries, energy, placer mining and socio-economics. In addition, a program to exchange information between the governments and with the public was developed.

A computer model of the basin and a model of the basin's economy have been developed which will be of particular use to planners in the basin.

For further information on the study contact:

Dr. S. A. D'Aquino
Head, Planning Division
Water Planning and Management Branch
Inland Waters Directorate
Room 502 - 1001 West Pender St
Vancouver, B.C. V6E 2M9 CANADA