

GROUND WATER

OCCURRENCE AND AVAILABILITY. — Geologic factors exert the major control on the occurrence and availability of ground water. The intrusive, volcanic and metamorphic sedimentary rocks that underlie most of the Kodiak-Sheklikof subregion are dense and nearly impermeable. The occurrence of ground water in such rocks is irregular and unpredictable, and water is generally obtained only from secondary openings. Ground water is more readily available from unconsolidated materials such as alluvial sand and gravel.

Very little ground-water exploration has been done in the area. Data are available only for Kodiak, along the road south of the city, and at other small scattered coastal communities. Selected water-well data are presented in the table at right.

Well yields that will meet individual household demands can almost always be obtained from bedrock (Fred and Sharon Ogden, J. & S. Drilling, oral commun., 1976). Estimated well yields range from 1 to 15 gal/min and average 5 gal/min for 26 wells completed in bedrock in the area northeast of Kodiak. Well depths range from 34 to 240 ft, and depth to bedrock ranges from 0 to 17 ft. Drillers' logs indicate that these wells produce water from fractures or "fractured quartz" within the bedrock. Data for wells 26011, 26044 and 26049 are typical for this area. A few recent attempts to obtain larger yields from bedrock on Kodiak Island have been successful (wells 26045 at Gibson Cove, 26021 at Bella Flats, and 26049 at Lary Bay). Reported yields of these wells suggest that previous estimates of the availability of ground water in bedrock were low (Joint Federal-State Land Planning Commission for Alaska, 1973; Selkregg, 1974). A well at Chignik (26015) on the Alaska Peninsula yields a reported 208 gal/min from a formation of shale, sandstone, and conglomerate at depths between 330 and 410 ft (Dol Monte Corp., written commun., 1974). Water from this well is saline.

Ground-water development is generally more favorable in unconsolidated or alluvial deposits than in bedrock. Unconsolidated deposits in the Kodiak-Sheklikof subregion are found in coastal areas or stream valleys. The largest reported yields are from wells completed in shallow alluvial gravel (well 26026) or in unconsolidated coastal and marine deposits that are apparently in hydraulic connection with surface waters (wells 26044 and 26048). A well at Chignik (well 26013) yielded 125 gal/min of freshwater from sands and gravels above the freshwater-saltwater interface. In some areas, such as Basin River Valley and Bella Flats, unconsolidated deposits are too thin to yield significant quantities of ground water.

Several communities and seafood canneries report the use of springs or spring-fed streams for water supplies (Selkregg, 1974, fig. 111). A few spring locations are shown on the generalized geologic map, but other data on springs are not included in this report.

ADDITIONAL DATA NEEDED. — The current ground-water data base for Kodiak and the adjacent road system probably represents fairly well the hydrologic conditions of the area; this base could be expanded by an additional inventory of existing wells. Most of the ground-water data available for areas elsewhere in the sparsely settled Kodiak-Sheklikof subregion has been considered in this study. A more comprehensive regional evaluation of the ground-water resources would require subsurface exploration such as test drilling to determine the thickness of unconsolidated deposits in various areas. More quantitative information such as that from aquifer tests and borehole geophysical logs should be obtained to determine aquifer characteristics and possible yields where future ground-water demands are anticipated.

SELECTED DATA FROM WELLS IN THE KODIAK-SHEKLIKOF SUBREGION.

(Small water production from some wells; test the water)

Well No.	Location	Depth (ft)	Water to surface (ft)	Yield (gal/min)	Water description
26011	Chignik	330-410	10-15	208	Saline
26013	Chignik	330-410	10-15	125	Freshwater
26015	Chignik	330-410	10-15	208	Saline
26021	Bella Flats	34	0	125	Freshwater
26026	Chignik	34	0	125	Freshwater
26044	Gibson Cove	34	0	125	Freshwater
26048	Bella Flats	34	0	125	Freshwater
26049	Lary Bay	34	0	125	Freshwater
26045	Gibson Cove	34	0	125	Freshwater
26020	Chignik	34	0	125	Freshwater
26022	Chignik	34	0	125	Freshwater
26023	Chignik	34	0	125	Freshwater
26024	Chignik	34	0	125	Freshwater
26025	Chignik	34	0	125	Freshwater
26027	Chignik	34	0	125	Freshwater
26028	Chignik	34	0	125	Freshwater
26029	Chignik	34	0	125	Freshwater
26030	Chignik	34	0	125	Freshwater
26031	Chignik	34	0	125	Freshwater
26032	Chignik	34	0	125	Freshwater
26033	Chignik	34	0	125	Freshwater
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26035	Chignik	34	0	125	Freshwater
26036	Chignik	34	0	125	Freshwater
26037	Chignik	34	0	125	Freshwater
26038	Chignik	34	0	125	Freshwater
26039	Chignik	34	0	125	Freshwater
26040	Chignik	34	0	125	Freshwater
26041	Chignik	34	0	125	Freshwater
26042	Chignik	34	0	125	Freshwater
26043	Chignik	34	0	125	Freshwater
26046	Chignik	34	0	125	Freshwater
26047	Chignik	34	0	125	Freshwater
26048	Chignik	34	0	125	Freshwater
26049	Chignik	34	0	125	Freshwater

FACTORS FOR CONVERTING ENGLISH UNITS TO METRIC UNITS

Multiply U.S. customary units by:

inches (in)	25.4	millimeters (mm)
feet (ft)	304.8	centimeters (cm)
miles (mi)	1,609	kilometers (km)
gallons per minute (gal/min)	.00379	liters per second (L/s)
cubic feet per second (ft ³ /s)	.02832	cubic meters per second (m ³ /s)
degrees Fahrenheit (°F)	.5556	degrees Celsius (°C)
degrees Fahrenheit (°F)	5/9(F-32)	degrees Celsius (°C)

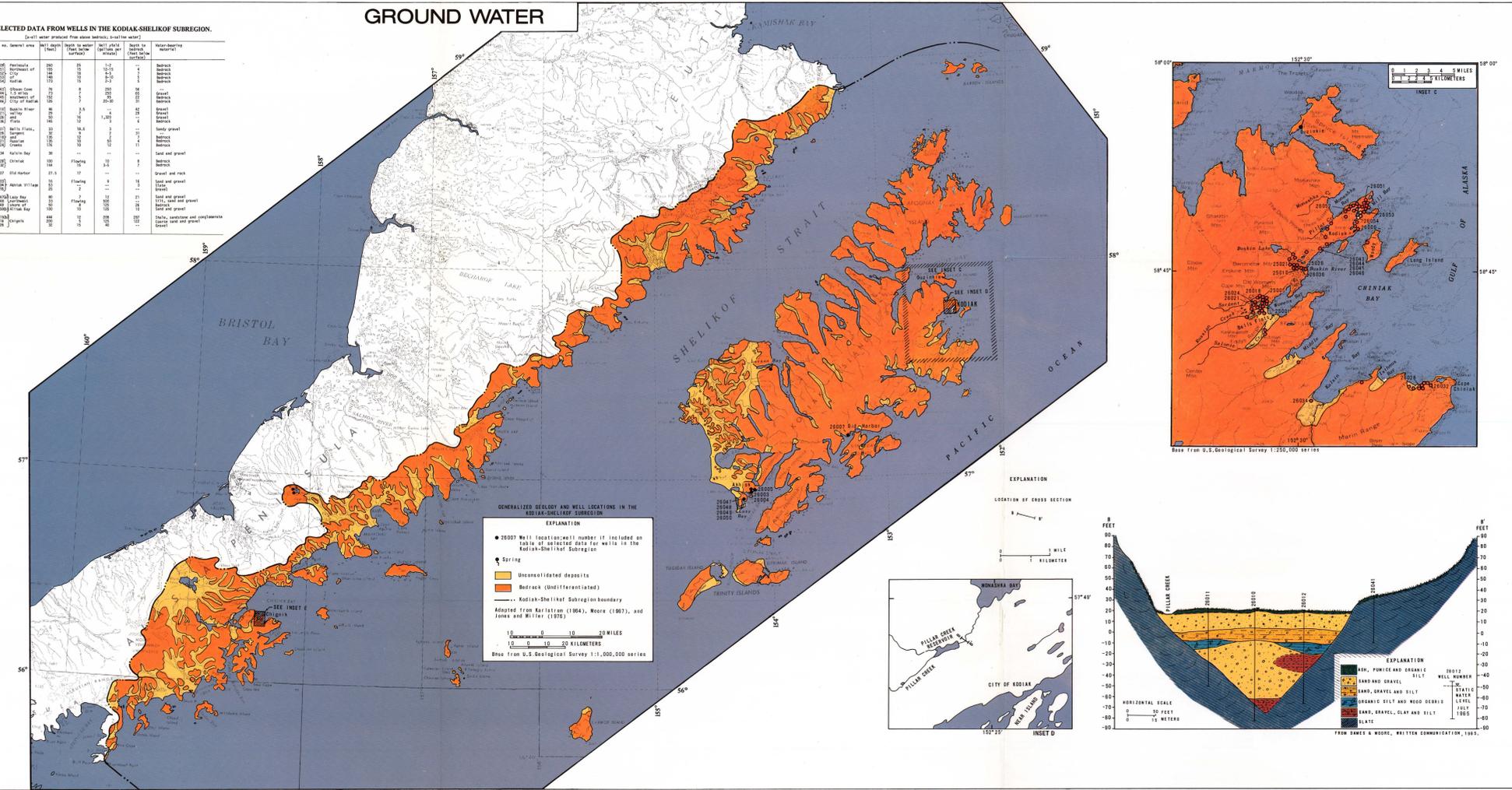
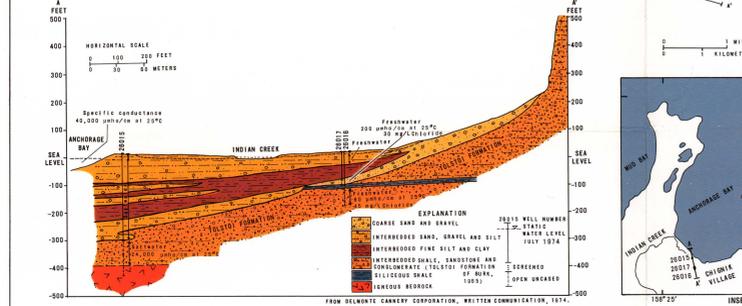
ACKNOWLEDGMENTS

Alaska Department of Fish and Game personnel on Kodiak Island provided lake data. Kodiak municipal officials offered data on water use, the many well drillers in the study area provided drilling information, and well owners assisted with much information on their wells. All this has been of benefit to the report.

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WATER QUALITY

WATER-QUALITY DATA. — Water-quality data for the Kodiak-Sheklikof subregion consists chiefly of analyses for major dissolved inorganic constituents in samples collected intermittently since 1951 from other streams and lakes on Kodiak Island. Only three other sites in the subregion have been sampled: two on Afognak Island and one near Chignik. Trace-element concentrations have been determined for about 20 streams and lakes. Suspended-sediment samples have been collected from six streams on Kodiak Island, but data which represent most of the range of discharges are available only for a few samples from the vicinity of the city of Kodiak.

WATER-QUALITY PROBLEMS. — Water users should be aware of potential water-quality problems when locating or developing water supply.

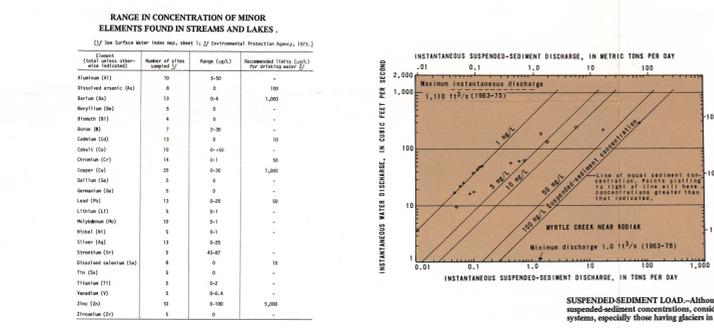
Where bedrock is at or close to the land surface and individual wells and water-waste disposal units (septic tanks) are used, there is potential for pollution of shallow ground-water and nearby surface-water bodies. Pollution by septic tank effluent of Indian Lake near the city of Kodiak has been reported (C. Sorenson, Alaska Department of Environmental Conservation, oral commun., 1976). There have been reports, but little documentation, of water-well pollution in this area. However, future pollution prevention will require careful planning and design of water and waste-disposal systems. Nitrate concentrations indicative of contamination were found in the water from well 26029 near Kodiak (5.1 mg/L as N) and well 26005 at Abikok (3.0 mg/L as N).

Ground-water development in low coastal areas should be designed, controlled, and monitored to avoid a reversal of the natural hydraulic gradient and consequent saltwater intrusion into the freshwater aquifer. Drillers' reports of saltwater being pumped from originally freshwater wells 26049 and 26048 near Kodiak suggest that saltwater intrusion may have occurred; hydrologic data are inadequate to verify this. Wells reported to produce saline water at Chignik (26015) and Lary Bay (26049) were apparently drilled into a wedge of seepage that extends shoreward under a thin, coastal layer of freshwater. Water with high iron concentration, exceeding the recommended limits for public water supplies, may be present in some surface water and especially in ground water. Accurate data on soluble iron concentrations are not presently available, and the occurrence or distribution of high iron concentration in surface and ground waters is not well known.

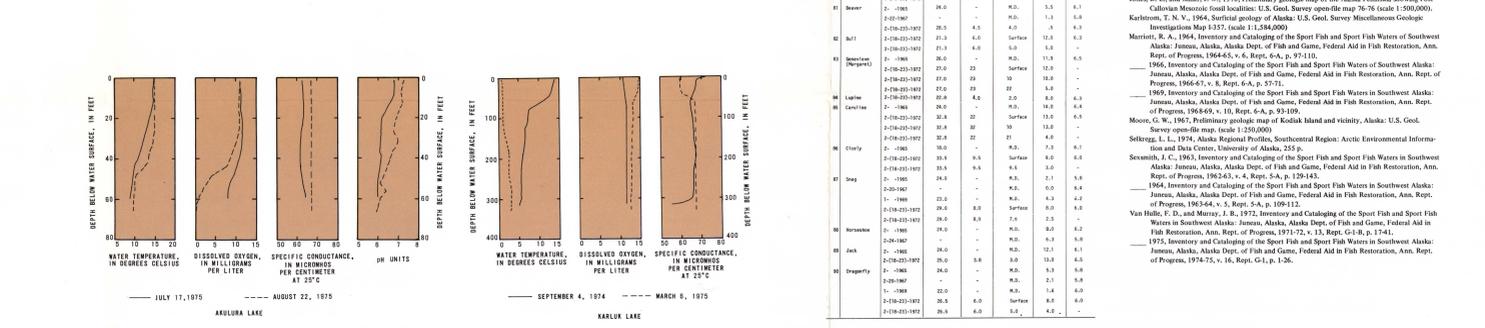
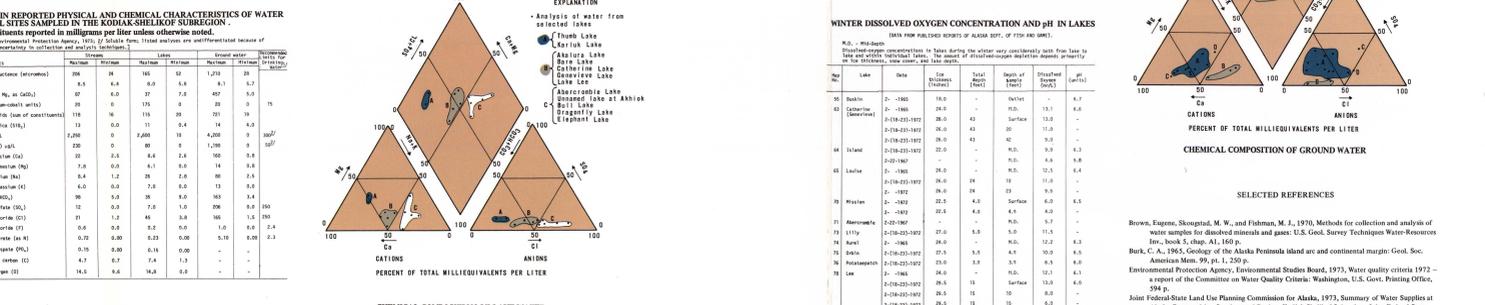
ADDITIONAL DATA NEEDED. — Isotopic water-quality data are adequate in areal coverage and time to show the expected range of concentrations of major dissolved constituents in surface waters of Kodiak Island. Additional data collection should be directed either toward long-term monitoring at specific sites to show changes from environmental stress or toward explaining specific problems. Practically any information on water quality is available for the rest of the subregion, particularly on the Alaska Peninsula. Additional data are required to provide a general understanding of water-quality characteristics.

Available data do not adequately define base-line sediment characteristics. More data are needed to define the expected range of sediment concentration for representative streams. Measurements made during storm periods or high flows over a period of several years would provide a minimum data base to show probable maximum sediment concentrations.

Additional information is needed to define the chemical character and variability in quality of ground water and to delineate potential problem areas. Related geologic and hydrologic information must also be obtained to ensure that the data are representative of the sampled ground-water environment.



WATER QUALITY OF STREAMS AND LAKES. — Water in streams and lakes generally has a dissolved-solids concentration less than 60 mg/L. Of the 38 streams and 13 lakes for which water-quality information is available, only one stream and one lake showed concentrations of more than 100 mg/L. Stream water is predominantly the calcium bicarbonate type. The chemical composition of lakes ranges from the calcium bicarbonate to the sodium chloride type. Sodium chloride type lakes are generally those in areas of high precipitation (south side of Afognak) or near the coast. All the surface waters sampled appear to be of acceptable quality for anticipated uses.



WINTER DISSOLVED OXYGEN CONCENTRATION AND pH IN LAKES

(Data from water-well records at Kodiak, Alaska)

Well No.	Location	Date	Depth (ft)	Dissolved Oxygen (mg/L)	pH
63	Basin	2-1965	10.0	10.0	8.1
63	Chignik	2-1965	20.0	10.0	8.6
63	Chignik	2-1965	30.0	10.0	8.1
63	Chignik	2-1965	40.0	10.0	8.1
63	Chignik	2-1965	50.0	10.0	8.1
63	Chignik	2-1965	60.0	10.0	8.1
63	Chignik	2-1965	70.0	10.0	8.1
63	Chignik	2-1965	80.0	10.0	8.1
63	Chignik	2-1965	90.0	10.0	8.1
63	Chignik	2-1965	100.0	10.0	8.1