WATER-RESOURCES OF WESTERN DOUGLAS COUNTY, OREGON

By D. A. Curtiss, C. A. Collins, and E. A. Oster

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WILLIAM P. CLARK, Secretary

GEOLOGICAL SURVEY

Dallas Peck, Director

For additional information write to:
U.S. Geological Survey
847 N.E. 19th Ave., Suite 300
Portland, Oregon 97232

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[Plate is in pocket]

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CONVERSION FACTORS FOR INCH-POUND SYSTEM AND INTERNATIONAL SYSTEM OF UNITS (SI)

For use by those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms used in this report are listed below.

To convert from	To	Multiply by
	Length	
inch (in.)	millimeter (mm)	25.4
foot (ft)	meter (m)	0.3048
mile (mi)	kilometer (km)	1.609
	Area	
acre	square meter (m^2)	4,047
acre	square hectometer (hm^2)	0.4047
square mile (mi^2)	square kilometer (km^2)	2.59
	Volume	
gallon (gal)	liter (L)	3.785
million gallons (Mgal)	cubic meter (m^3)	3,785
cubic foot (ft^3)	cubic meter (m^3)	0.02832
acre-foot (acre-ft)	cubic meter (m^3)	1,233
	Specific combinations	
cubic foot per second (ft^3/s)	cubic meter per second (m^3/s)	0.02832
foot per day (ft/d)	meter per day (m/d)	0.3048
foot squared per day (ft^2/s)	meter squared per day (m^2/d)	0.0929
gallon per minute (gal/min)	liter per second (L/s)	0.06309
gallon per minute per foot [(gal/min)/ft]	liter per second per meter [(L/s)/m]	0.2070
million gallons per day (Mgal/d)	cubic meter per day (m^3/d)	3,785
acre-foot per year (acre-ft/yr)	cubic meter per year (m^3/yr)	1,233
micromho per centimeter (umho/cm at 25°C)	microsiemens (uS/cm at 25°C)	1.00
	Temperature	
degree Fahrenheit (°F)	degree Celsius (°C)	5/9 after subtracting 32 from °F value

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ABSTRACT

In western Douglas County, Quaternary coastal dune sands and marine terrace deposits may have the best potential for ground-water development. Yields of 200 gallons per minute have been reported from wells completed in Quaternary fluvial deposits along the lower Umpqua River. The entire area is underlain by Tertiary marine sedimentary rocks that yield quantities of water barely adequate for domestic use.

On the basis of wells sampled and the constituents analyzed, ground-water quality was generally good, but the recommended maximum concentration of 300 micrograms per liter for iron in drinking water was exceeded in about one-third of the samples. Water from seven wells was analyzed for toxic trace metals and had concentrations less than the recommended criteria levels as determined by the U.S. Environmental Protection Agency.

The project area has a temperate marine climate, with an annual rainfall ranging from 70 to 100 inches, of which 80 percent falls from October to March. Average annual runoff from eight streams in western Douglas County was estimated to range from 2.4 cubic feet per second per square mile for Elk Creek to 6.8 cubic feet per second per square mile for Scholfield Creek. The estimated 7-day, 20-year low flow ranges from 0.01 cubic foot per second per square mile for Weatherly Creek to 3.6 cubic feet per second per square mile for the Smith River.

The dissolved-solids concentration in the Umpqua River is low and stable, with little seasonal and yearly variation. Likewise, the eight small streams in the project area have low dissolved-solids concentrations but have noticeably higher nitrite plus nitrate nitrogen concentrations than those of the Umpqua River. Also, during low flows of several small streams, dissolved-iron concentrations increased significantly. All the lakes in the project area have dissolved-solids concentrations of less than 100 milligrams per liter and, except for Loon Lake, have limited phosphorus available for algal production. Tahkenitch and Elbow Lakes are considered to be the most active in terms of biological productivity.

A survey in the Umpqua estuary during a high tide and low streamflow condition indicated that saltwater intrusion extends to river mile 20 in the Umpqua River, which limits the use of the river water downstream from that point.

INTRODUCTION

The rapid economic development and population expansion in western Douglas County, together with heavy tourism during most of the year, have necessitated the evaluation of the quantity, quality, and distribution of the water resources of the area. Although flow of smaller streams may be large during winter, it is small in summer when demand is greatest.

The purpose of this study is to assess the water resources of western Douglas County, including an evaluation of quantity, quality, and distribution of ground and surface waters in the study area.

This investigation is part of a continuing cooperative program between Douglas County and the U.S. Geological Survey to evaluate the water resources in Douglas County.

U.S. Forest Service and Bureau of Land Management personnel cooperated with and assisted the authors in the collection of field data. The helpful cooperation of these people, and especially of the well owners who permitted access to their wells to collect ground-water data, is gratefully acknowledged.

PREVIOUS INVESTIGATIONS

Rinella and others, (1980) evaluated the water resources in the Reedsport area. Many of the data collected for that study are included in this report. Four U.S. Geological Survey reports from earlier investigations in Douglas County deal with areal evaluations of ground-water availability and quality. The areas are: (1) Drain-Yoncalla (Robison and Collins, 1977), (2) Sutherlin (Robison, 1974), (3) Winston (Robison and Collins, 1978), and (4) Myrtle Creek-Glendale (Frank, 1979). Sediment yields in the Umpqua River basin were reported by Onions (1969) and Curtiss (1975). Chemical quality of streams in the Umpqua River basin was described in a report by Curtiss (1969) and the lakes of Douglas County were inventoried and reported by Rinella (1979). Hampton (1963) studied the ground water of the coastal dunes near Florence, 25 mi north of Reedsport. Ground-water resources of the coastal dunes north of Coos Bay, about 25 mi south of Reedsport, were studied by Brown and Newcomb (1963), and later by Robison (1973).

GEOGRAPHIC FEATURES

The western Douglas County area (fig. 1) covers about 700 mi^2 in southwestern Oregon. The area is drained by the Smith River, the lower Umpqua River and its tributaries, and a few small streams that drain directly into the Pacific Ocean. The area consists mostly of the rugged, heavily forested Coast Range, but includes a narrow strip of coastal beach and sand-dune land. The principal city along the Douglas County coast is Reedsport (population 4,970). Smaller coastal communities are Gardiner to the north and Winchester Bay to the south. Elkton (population 180) is the principal inland community in the study area.

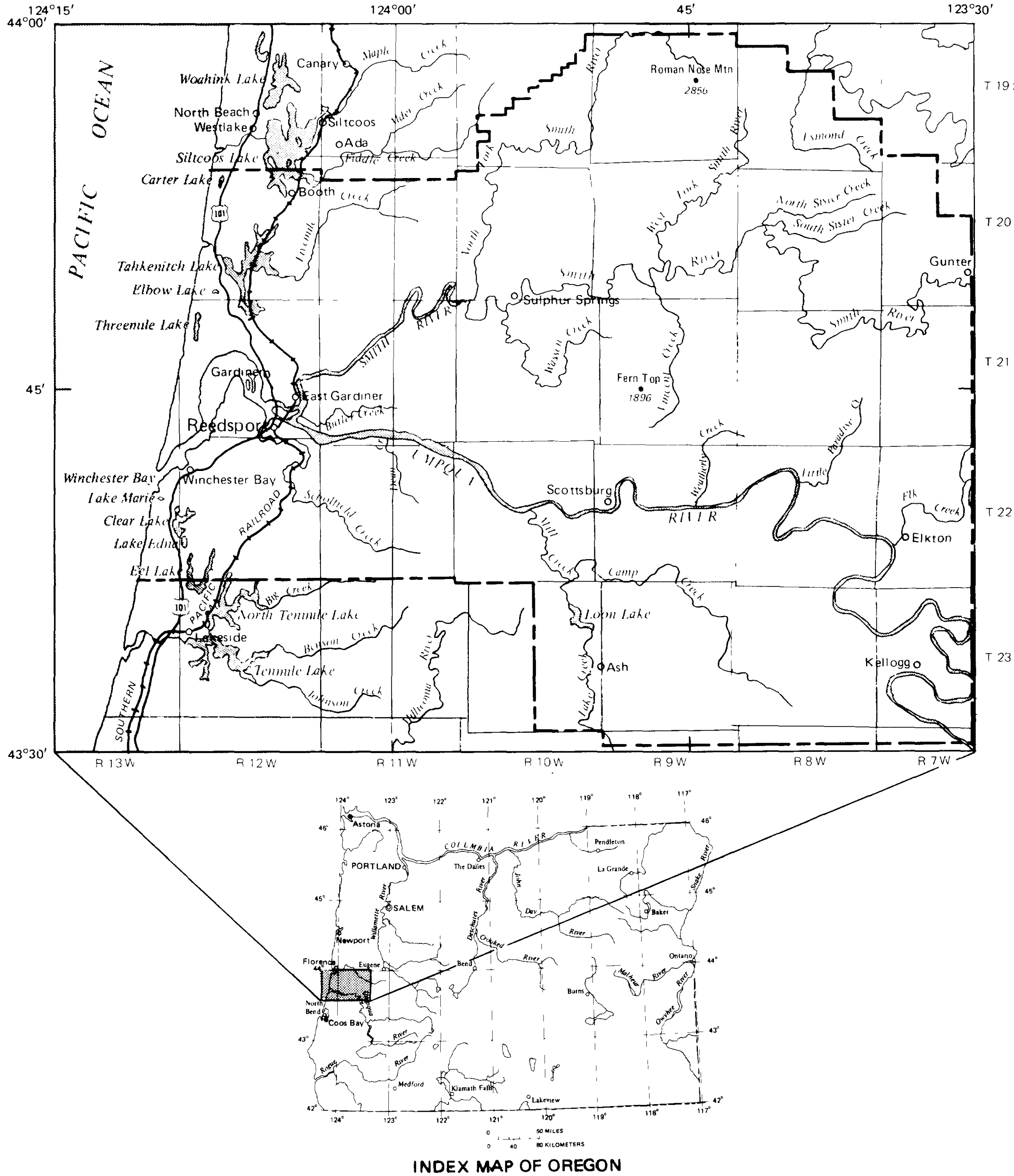


FIGURE 1. – Location of study area.

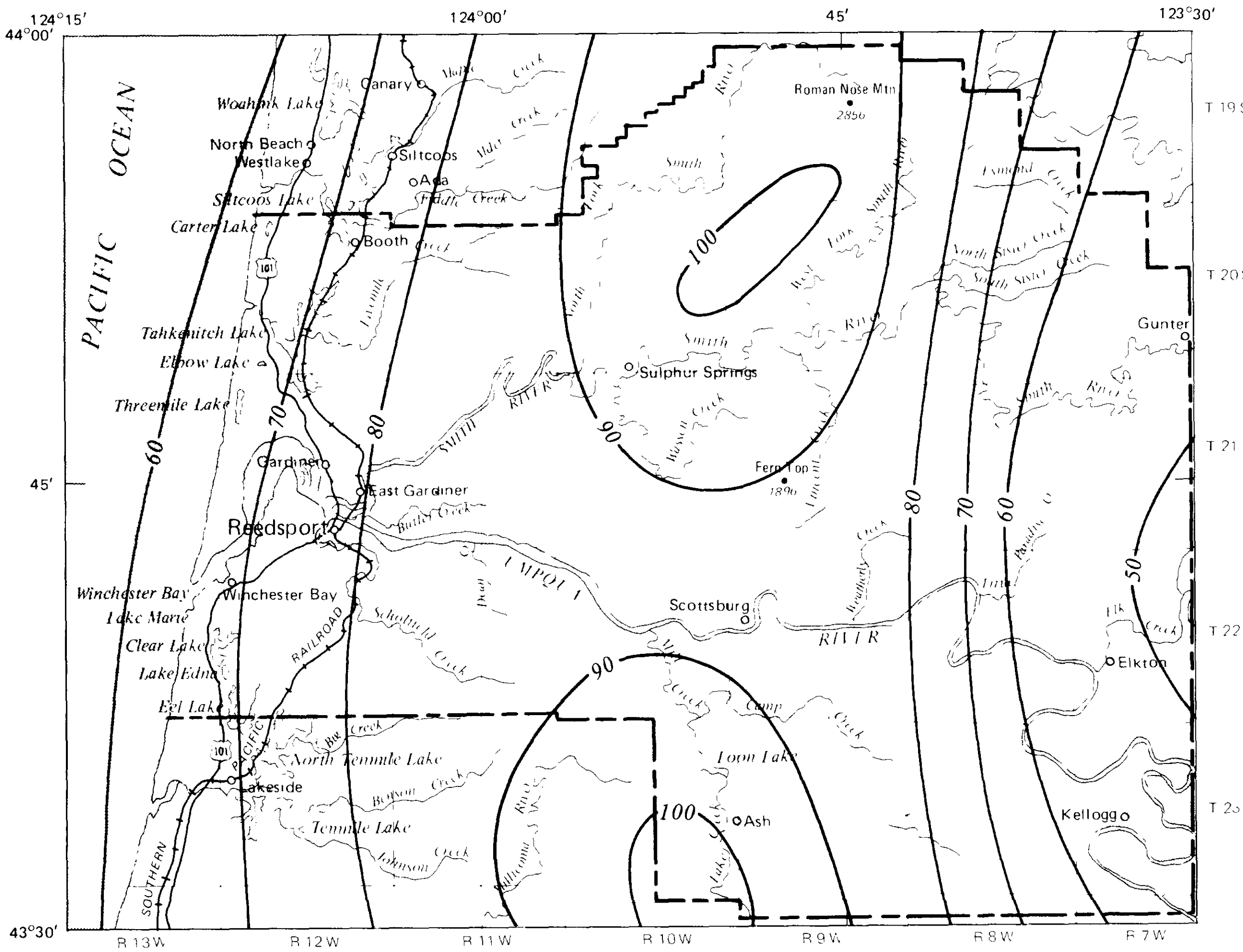


FIGURE 2. – Isohyetal map of the study area.

The rural residents generally live along lowlands of the Umpqua and Smith Rivers and along the coast. More than half the area is public lands managed by the U.S. Forest Service, the U.S. Bureau of Land Management, and the State of Oregon.

The major sources of income in the area are lumber and other forest products, tourism, and commercial and sport fishing.

The climate of western Douglas County, in common with western Oregon, is characterized by mild, wet winters and cool, dry summers. Annual precipitation in western Douglas County ranges from 70 in. near the coast to more than 100 in. at the summit of the Coast Range (fig. 2). About 80 percent of the annual precipitation falls in the 6-month period October to March.

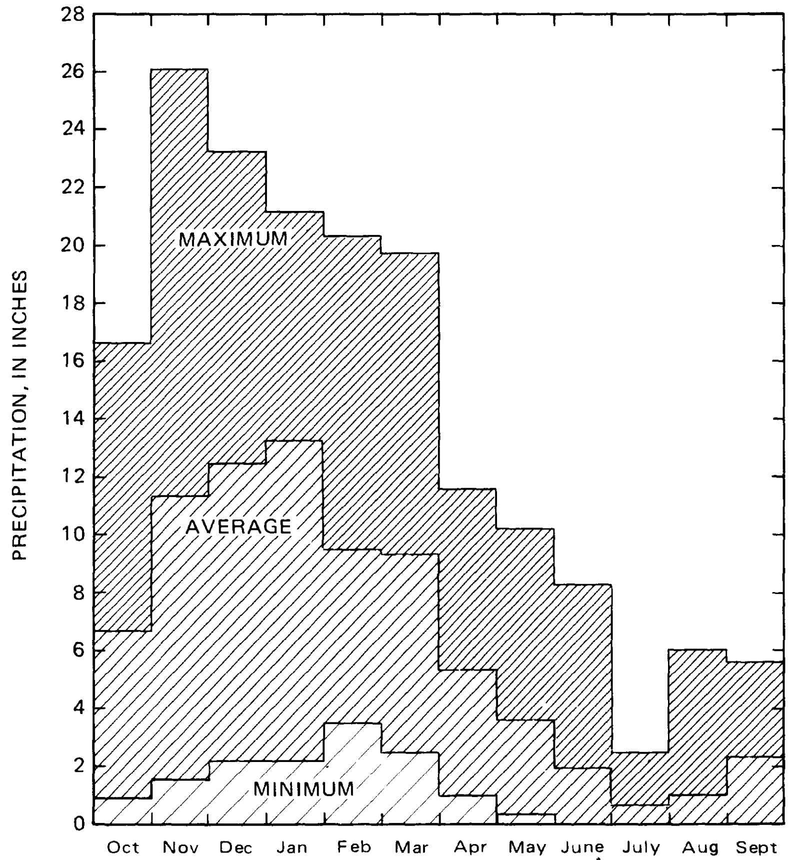


Figure 3.—Maximum, average, and minimum precipitation at Reedsport, 1938-79.

The average annual precipitation at Reedsport was 77 in.; the monthly precipitation at Reedsport has ranged from zero during the summer months to 26 in. in November, 1973 (fig. 3). Annual precipitation at Reedsport has ranged from 44 in. in 1976 to 100 in. in 1953. Figure 4 shows the cumulative departure from average precipitation at selected sites. The graphs for Reedsport and Gardiner are similar to the graph for Astoria (on the northern Oregon coast), which has precipitation records from 1854, thus indicating that precipitation trends at Reedsport are similiar to those at Astoria. From this comparison, it can be assumed that precipitation at Reedsport generally was above average from 1944 to 1955, generally below average from 1956 to 1967, above average from 1968 to 1975, and below average from 1976 to 1980.

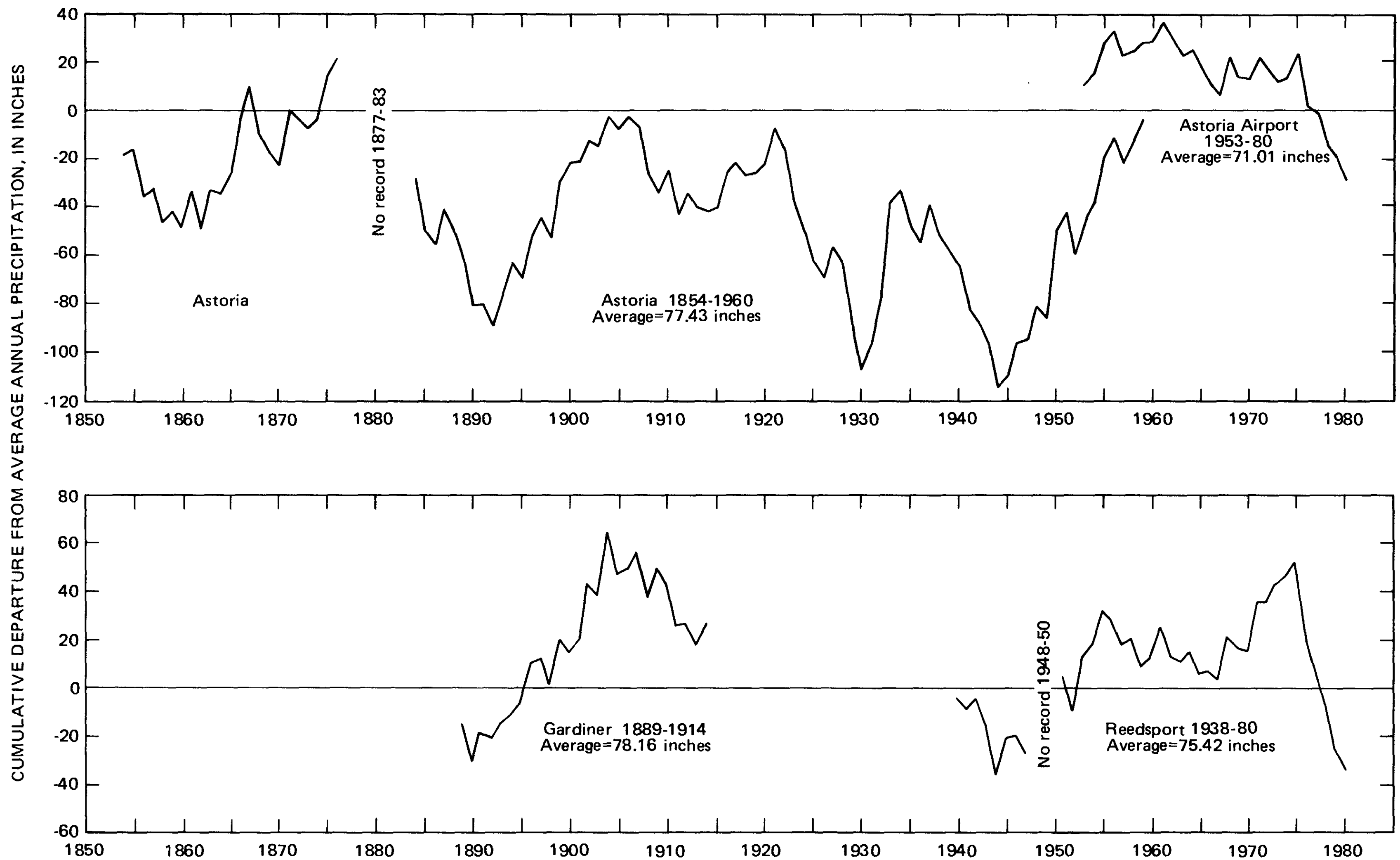


Figure 4.–Cumulative departure from average annual precipitation at Astoria, Gardiner, and Reedsport. A rising line (from left to right) indicates a period of above average precipitation; a falling line indicates a period of below average precipitation.

GEOLOGIC SETTING

Western Douglas County is in a large depositional basin of gently folded Tertiary marine sedimentary rocks that underlie the entire study area. Quaternary sediments overlie the Tertiary rocks along the coast and along major streams. The area is divided into three geohydrologic units--Tertiary marine sedimentary rocks, Quaternary coastal deposits, and Quaternary fluvial deposits (pl. 1).

Tertiary Marine Sedimentary Rocks

Tertiary marine sedimentary rocks are exposed over most of the study area and underlie the Quaternary deposits in the remainder of the area. The study area is near the southern edge of a structural basin, where sediments accumulated to thicknesses of as much as 9,000 ft. An oil and gas test well drilled in T. 20 S., R. 10 W., sec. 27, penetrated about 9,000 ft of sandstone, siltstone, and shale of Tertiary age. Tertiary marine sedimentary rocks extend beyond the boundaries of the project area in all directions. Uplift, local faulting, and folding have deformed the rocks into gentle north-trending folds. Erosion has removed large volumes of sediment and cut steep-walled canyons.

Fine- to medium-grained sandstone and siltstone are the major constituents of the Tertiary marine sedimentary rocks. Greenish to bluish-gray, well-cemented sandstone occurs in layers of a few inches to more that 10 ft in thickness. Quartz and feldspar are the most abundant minerals; other constituents are biotite and muscovite. Fossil-plant fragments are present along bedding planes. In drillers' logs (table 4), buff to dark-greenish siltstone is reported in layers ranging from less than an inch to a few feet in thickness. Mineral content of the siltstone is similar to that of the sandstone.

Drillers' logs of domestic water wells show clay as the uppermost sediment. The clay is formed from weathered Tertiary marine sedimentary rocks and ranges from 10 ft to as much as 60 ft in thickness. Drillers' logs generally describe the materials beneath the weathered sediments as sandstone or as alternating layers of sandstone and claystone.

Quaternary Sediments

In this report, Quaternary sediments refers to all Quaternary unconsolidated sedimentary deposits. Dune sand and marine terrace deposits form the coastal deposits; fluvial terrace deposits and alluvium along streams form the fluvial deposits. These sediments have similar hydrologic properties which differ significantly from the properties of the Tertiary marine sediments.

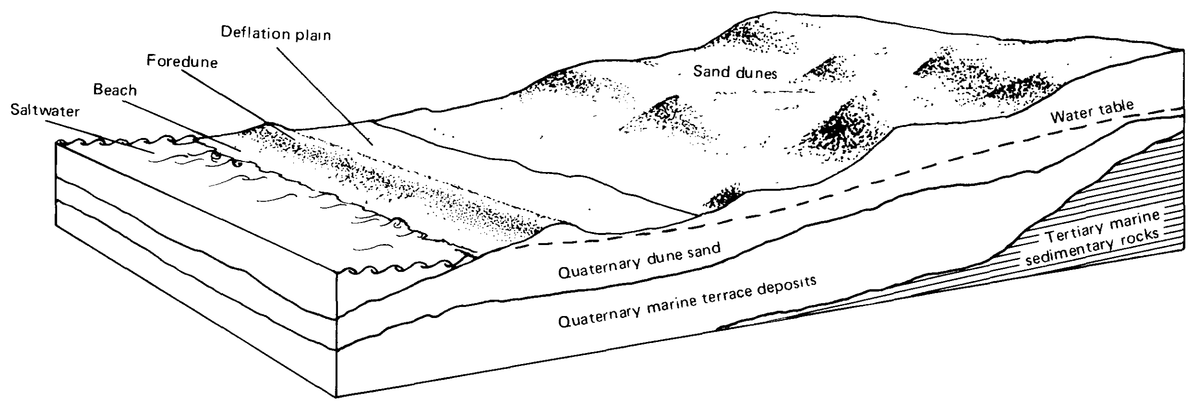


Figure 5.–Generalized block diagram of the coastal area.

Coastal Deposits

In this report, Holocene dune sand and Pleistocene marine terrace deposits are considered as one geohydrologic unit. The western part of study area is near the middle of a 50-mile-long strip of coastal deposits. Dune sand overlies the terrace deposits over much of the mapped area; terrace deposits are exposed near the eastern edge of the coastal deposits. A generalized block diagram of the coastal deposits, which overlie the Tertiary marine sedimentary rocks, is shown in figure 5.

Coastal deposits were derived from (1) sediment carried to the ocean by coastal rivers and (2) sediment eroded from coastal headlands of Tertiary sandstone. The greatest thickness of coastal deposits is generally near the mouths of coastal rivers. These materials have been transported, sorted, and deposited by ocean currents, wave action, and prevailing winds.

The coastal deposits are composed of fine to medium sand from 0.125 to 0.50 millimeter in size (Hampton, 1963; Brown and Newcomb, 1963). Quartz is the major constituent of the dune sand, with lesser amounts of feldspar, olivine, epidote, garnet, magnetite, chromite, and rock fragments. Thin layers of peat or limonite, which formed in swamps and marshes, are present in some areas.

Few data are available on the thickness of the coastal deposits in the study area. The city of Reedsport drilled four exploratory wells in the deflation plain south of the Umpqua River estuary (Rinella and others, 1980). These test wells ranged in depth from 72 to 92 ft, and may not have fully penetrated the coastal deposits (see table 4). Earlier investigations indicate that coastal deposits may be as thick as 200 ft in a similar depositional environment to the south of the study area (Robison, 1973).

Eastward-moving sand dunes have blocked many of the smaller coastal streams, creating a series of lakes at the eastern margin of the coastal deposits. New channels to the sea were formed as the old stream channels were buried. An example of this is Clear Creek which flows south out of Clear Lake (Cooper, 1958).

Fluvial Deposits

Fluvial deposits occur in most of the major stream valleys and upstream from the coastal and inland lakes (see pl. 1). These deposits consist mainly of sand and silt derived from erosion of the Tertiary sandstone. However, gravel is reported in drillers' logs of wells along the Umpqua and Smith River valleys. Alluvium probably is present beneath the river channels of both the Umpqua River downstream from Scottsburg and the Smith River downstream from Sulphur Springs. Bedrock is exposed at numerous rapids upstream from these points, which indicates that there is little or no alluvium in the river channel.

In western Douglas County, thickness of the fluvial deposits ranges from a few feet to more than one hundred feet. Well logs commonly report clay from the surface to depths of 15 to 30 ft, underlain by sand and gravel. Thickness of these gravel layers ranges from 3 to 45 ft near Elkton and from 60 to 80 ft near Brandy Bar (see wells 22S/10W-06CBA1 and -06CBB1, tables 4 and 5). See plate 1 for location of wells and explanation of well-numbering system. Sand-and-gravel layers as much as 40 ft in thickness are reported for well 21S/12W-33DBB1 west of Reedsport near Providence Creek. Width of exposed deposits ranges from less than 100 ft in the gorgelike section of the Umpqua between Scottsburg and Dean Creek to half a mile or more in the area near Elkton.

GROUND-WATER RESOURCES

Lohman and others (1972) define an aquifer as "*** a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs." The three geohydrologic units discussed in the previous sections are the major water-bearing units, or aquifers, of the study area. Areal extent of the three water-bearing units is generally the same as that of the geologic units shown on plate 1. As referred to in this report, these units are the (1) Tertiary aquifer, (2) fluvial aquifer, and (3) coastal aquifer.

Ground water in the coastal and fluvial aquifers is generally unconfined; that is, the water is under atmospheric pressure. Ground water in the Tertiary aquifer in that part of the study area for which data are available is generally confined; that is, the water is under pressure significantly greater than atmospheric.

Recharge

Recharge to an aquifer depends on factors such as precipitation, vegetative cover, topography, and surface permeability. Although no direct measurements of recharge are available for this study, estimates were made for each of the aquifers based on similarities of hydrologic conditions in nearby study areas.

A previous study (Harris, 1977) based on annual rainfall and runoff suggests that little recharge enters the Tertiary aquifer. On the basis of the similarity of the present study area to the area described by Harris (1977), it is estimated that as little as 1 to 2 in. of rainfall per year becomes recharge to the Tertiary aquifer. Steep, heavily forested uplands of the study area are the intake areas for the Tertiary aquifer.

For the coastal aquifer the vegetative cover, topography, and surface permeability are markedly different from those of the Tertiary aquifer. Hampton (1963) and Brown and Newcomb (1963) estimated recharge to the coastal aquifer in their respective study areas to be 48 to 55 in. per year, probably due to the high permeability of the dune sand. Likewise, Robison (1973) estimated recharge to the coastal aquifer south of the study area to be about 50 in. per year. Therefore, based on these studies, a reasonable estimate of recharge for the coastal aquifer in the study area is about 50 in. per year.

The rate of recharge to the fluvial aquifer is lower than to the coastal aquifer primarily because of lower permeability of the deposits near the surface. Drillers report clay and silt layers near the surface of many wells drilled in the fluvial deposits. Recharge to the fluvial aquifer is unknown.

Movement

The direction of ground-water flow generally is from topographically high areas toward lowlands, where the water is discharged to streams, lakes, or directly to the ocean. The topography and geologic structure suggest that little ground water enters or leaves the northern, eastern, or southern boundaries of the study area as subsurface flow.

Ground water moves slowly downward and laterally through the Tertiary aquifer. Vertical movement of water is impeded by layers of low-permeability clay and silt, but may be faster through zones with fractures. Springs occur where downward-moving water is intercepted by low-permeability layers that intersect the land surface. Near the coast, water in the Tertiary aquifer probably moves upward into the coastal aquifer.

The high permeability of the coastal aquifer allows rapid movement of water through the dune sand and terrace deposits. Most of the water in the coastal aquifer moves westward toward the ocean.

Lower permeability of the fluvial aquifer probably causes a slower rate of movement of water than in the coastal aquifer. Direction of flow is downgradient, which generally is toward the nearest stream. Water may move upward into the fluvial aquifer from the underlying Tertiary aquifer, as seems to be the case in the coastal aquifer. In the lower Umpqua and Smith Rivers, thicker sections of alluvial material are believed to be in direct hydraulic connection with the stream. During higher river stages or periods of heavy pumping of wells near the river, a temporary reversal of ground-water flow could occur, with water moving from the river into the aquifer.

Discharge

Ground water is discharged from the aquifers to streams, lakes, and the ocean. It is also discharged from the aquifers through springs and wells, and through evapotranspiration.

Much of the water in the Tertiary aquifer is discharged to streams and lakes, and through evapotranspiration. Most of the study area has a dense vegetative cover that may transpire large amounts of ground water, estimated to be 15 to 20 in. per year (Harris, 1977). Although most of the wells in the study area are completed in the Tertiary aquifer, it is believed that ground-water discharge from these wells is a small percentage of the total aquifer discharge. An unknown but perhaps substantial amount of ground water discharges directly from this aquifer into the ocean.

Seeps along the beach and underflow to the ocean are the major types of ground-water discharge from the coastal aquifer. Robison (1973) estimated that about 33 Mgal/d discharges from a 20 sq. mi. coastal aquifer located about 20 mi south of the study area. He also estimated evapotranspiration to be 7 to 10 in. per year for that area. In western Douglas County, discharge from the coastal aquifer by evapotranspiration probably is about the same as that determined by Robison. Ground water also discharges to streams that cross the aquifer and to coastal lakes. Because only a few wells are completed in the coastal aquifer, a small amount of ground water discharges to wells.

The fluvial aquifer in the study area discharges ground water mainly to streams and to some lakes, such as Tahkenitch. The rate of evapotranspiration is unknown, but is believed to be less than that from the Tertiary aquifer. Locally, a significant percentage of ground water from the fluvial aquifer may discharge to wells in small areas that have a high density of domestic wells, such as in the Wells Creek area.

Water-Level Fluctuations

Water levels fluctuate primarily in response to seasonal variations in rainfall, but also may fluctuate locally because of pumping. Water levels are highest in winter or early spring and lowest in late summer or fall. Long-term trends of water levels are believed to correspond to long-term trends of precipitation (see fig. 4). Because long-term records of water levels are not available for wells in the study area, hydrographs of water-level measurements made in wells drilled in similar aquifers under similar hydrologic conditions outside the study area were used to show typical water-level fluctuations (fig. 6).

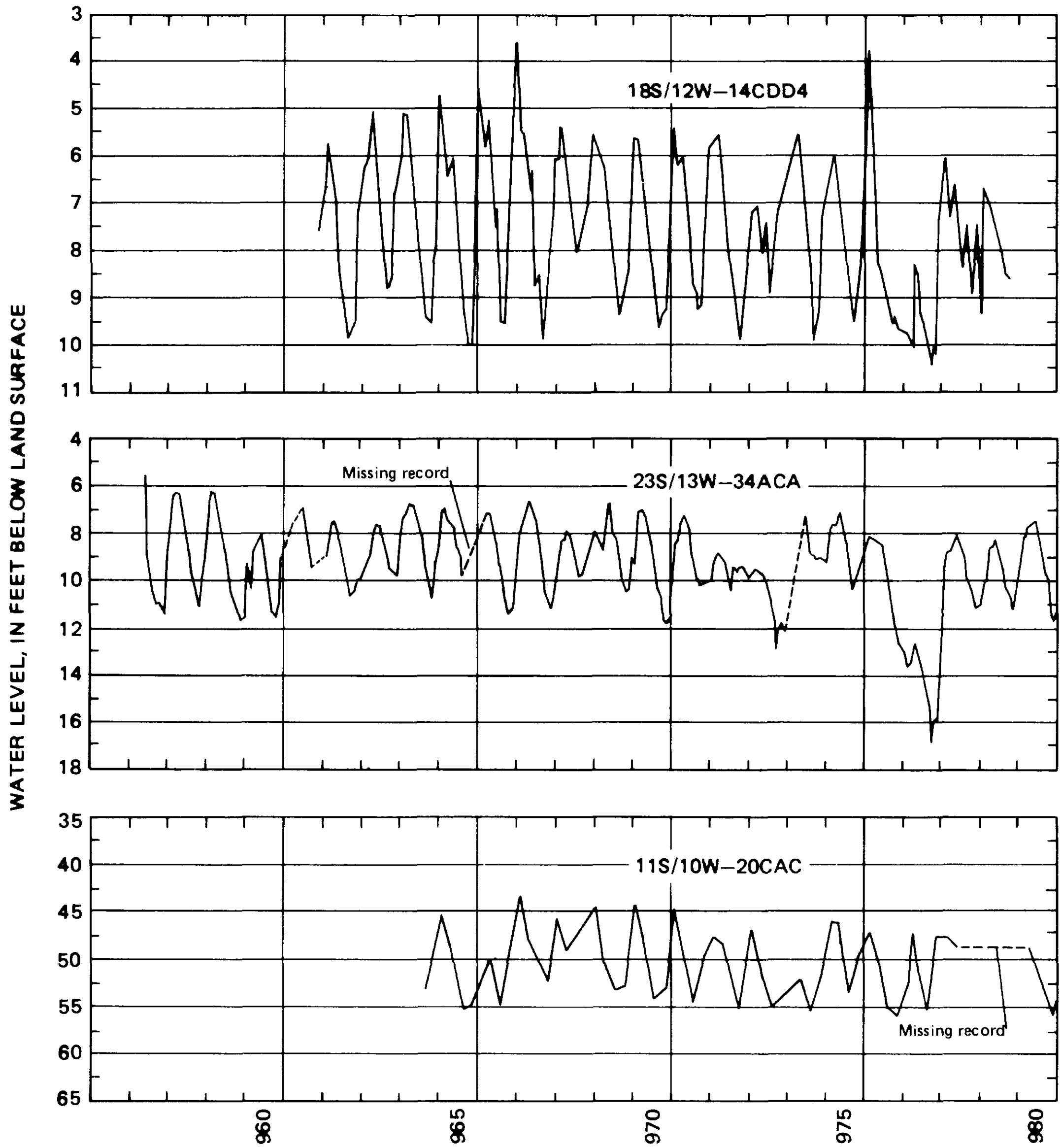
Well 11S/10W-20CAC (near Newport) is about 45 mi north of the study area and is completed in Tertiary marine sedimentary rocks similar to rocks of the Tertiary aquifer in the study area. Likewise, hydrographs of wells 18S/12W-14CDD4 and 23S/13W-34ACA (near Florence and Coos Bay, respectively) are assumed to be typical of water-level fluctuations in the coastal aquifer in the study area. Water levels in these wells fluctuated from 2 to 6 ft per year. Water levels in the Tertiary aquifer fluctuate seasonally as much as 10 ft per year. Well 22S/08W-22BBC1, near Elkton, which was completed in the fluvial aquifer, had water-level fluctuations of 8 ft in 1980. Fluctuations in other wells drilled in the fluvial aquifer could be expected to be similar. However, a greater range of water-level fluctuation may occur locally because of pumping in fluvial-aquifer wells.

Potential Well Yields

All three aquifers yield usable quantities of ground water. The Tertiary aquifer, which crops out over most of the study area and underlies the remainder, may be the most important aquifer for the development of a domestic water supply. The coastal aquifer, although limited to a narrow strip along the coast, may have the greatest potential for large-yield wells. The fluvial aquifer, which is of limited extent, yields water to a small number of wells along the Umpqua and Smith Rivers.

About 90 percent of the wells drilled in western Douglas County area are completed in the Tertiary aquifer. Yields of wells drilled in the Tertiary aquifer ranged from a few gallons per minute to about 20 gal/min. Well depths range from 32 to 560 ft, and water levels range from land surface to 535 ft. In the period 1955-80, 22 of 479 wells drilled in this aquifer were reported to be dry or to yield insufficient quantities of water for domestic use.

Nearly all the wells drilled in western Douglas County are for domestic use and are constructed in a similar manner. Typically a well is 6 inches in diameter, has a short section of casing (approximately 20 ft) at the top, and the remainder of the hole is uncased. Well performance is usualy tested for 1 hour and specific capacity data are comparable.



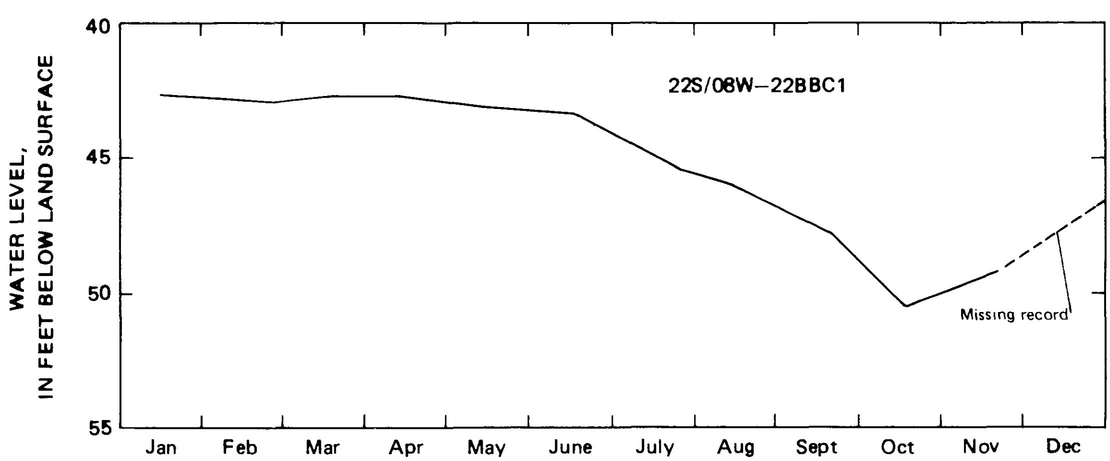


Figure 6.–Hydrographs of four wells.

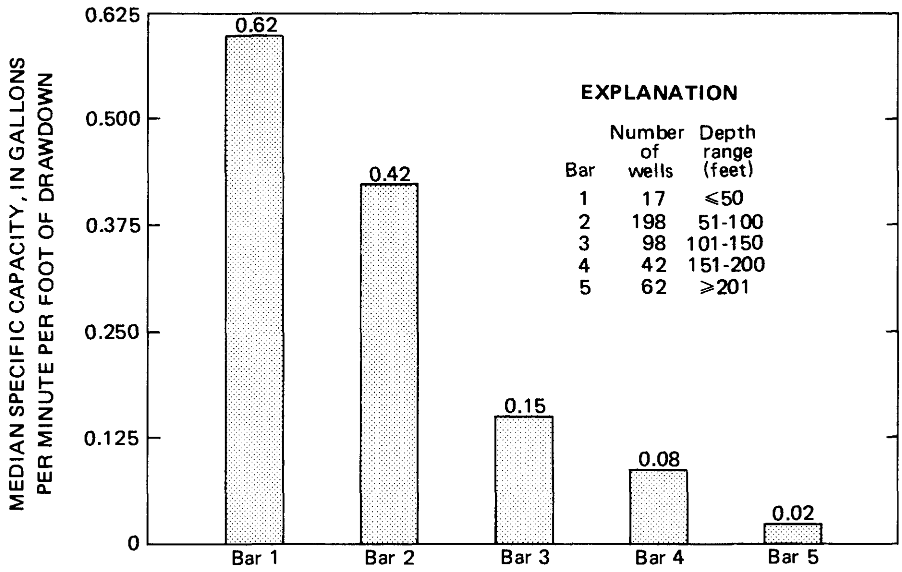


Figure 7.–Specific-capacity distribution for wells completed in the Tertiary aquifer.

Specific-capacity data were computed for 417 wells drilled in the Tertiary aquifer and grouped according to well depth. The median specific capacity was determined for each depth range (fig. 7). As shown in figure 7, the median specific-capacity value for wells 100 ft or less in depth was approximately three times greater than for wells more than 100 ft in depth.

Although few wells have been completed in the coastal and fluvial aquifers, these aquifers may have the greater potential for high-yielding wells. Forty-seven wells were drilled in the two aquifers from 1955 to 1980; twice as many wells were completed in the fluvial aquifer as in the coastal aquifer.

Well depths range from a 20-foot dug well to a 214-foot well drilled on Bolon Island in the Umpqua River. Yields of wells ranged from 4 to 200 gal/min. Specific-capacity data were computed for 42 wells completed in the coastal and fluvial aquifers and grouped according to well depth. The median specific capacity was determined for each depth range (see fig. 8).

Four exploratory wells drilled south of the Umpqua River estuary had specific capacities ranging from 4.1 to 9.0 (gal/min)/ft of drawdown. Tests on wells along Clear Creek in sands similar to those near the beach had specific capacities of as much as 20 (gal/min)/ft of drawdown. In the northwestern part of the study area, several wells drilled in dune sand had specific capacities of about 2.5 (gal/min)/ft of drawdown. Wells drilled in the fluvial deposits had specific capacities ranging from 0 to 200 (gal/min)/ft of drawdown.

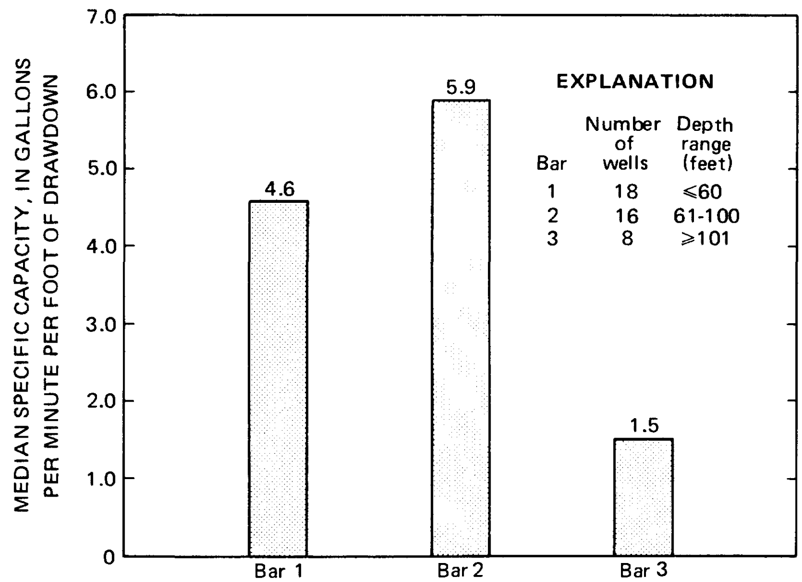


Figure 8.—Specific-capacity distribution for wells completed in the coastal and fluvial aquifers.

Water Quality

General Characteristics

Analyses of water samples from 45 wells in the study area indicate that the ground water is generally suitable for most uses. The ground water was evaluated using the quality criteria established by the U.S. Environmental Protection Agency (1976) for water used for drinking and other purposes. Samples were not analyzed for some of the constituents for which criteria are established, such as radionuclides and pesticides.

Chemical analyses show that in most of the water samples sodium and calcium are the dominant cations, and bicarbonate and chloride are the dominant anions (pl. 1). Large concentrations of chloride ion generally are indicative of water from (1) Tertiary marine sedimentary rocks that have retained saline water, or (2) alluvium in the lower river valleys containing brackish water that has been induced from the marine sediments by pumping. Water from four wells had chloride concentrations exceeding the recommended limit of 250 mg/L and dissolved-solids limit of 500 mg/L (table 6).

Dissolved-solids concentrations of the samples ranged from 40 to 3,240 mg/L. None of the water samples from wells in the study area exceeded the recommended limits for sulfate or nitrite plus nitrate expressed as nitrogen.

The recommended limit of 300 ug/L for iron and 50 ug/L for manganese was exceeded in about one-third of the water samples. Fluoride, with a concentration of 2.3 mg/L in one sample (from well 22S/08W-09DAB1) exceeded the recommended limit of 1.9 mg/L.

Boron in small amounts is essential to plant growth, but in larger amounts is toxic to many types of plants. Boron concentrations in two water samples exceeded the recommended limit of 1 mg/L, and another sample contained 0.9 mg/L.

The sodium-adsorption ratio (SAR) indicates the effect that irrigation water will have on soil-drainage characteristics. Water from several wells had high SAR values (17 to 34), which would make the water unsuitable for sustained irrigation use; however, few wells in the study area are used for irrigation.

Water from seven of the 45 wells sampled were analyzed for selected trace elements (table 7); none of the analyses showed concentrations greater than the recommended limits. Although all the water samples collected during 1980 were analyzed for arsenic, none contained excessive amounts; however, occurrences of arsenic-rich ground water have been reported in several areas of western Oregon. Goldblatt and others (1963) reported the occurrence of arsenic in ground water in southeastern Lane County.

Areal Variations

The chemical diagrams on plate 1 illustrate the areal variation of chemical quality of water from wells in the study area. Water from the Tertiary aquifer generally has a larger mineral concentration than water from the coastal or fluvial aquifers. Four of the water samples collected from wells drilled in the Tertiary aquifer had a dissolved-solids concentration considerably greater than samples from other wells. These wells are 22S/08W-09DAB1 and 23ACD-1, 22S/09W-08DCD1, and 23S/07W-27DBC1 (see pl. 1 and table 6). Many of the domestic wells drilled in the area derive their water from the Tertiary marine sedimentary rocks that produce water with the largest dissolved-solids concentration. In most instances, these wells are in the major river valleys near the streams.

Many well owners in the study area report the occurrence of "sulfur water." Such water contains the dissolved gas, hydrogen sulfide, which has a rotten-egg odor. Large concentrations of this gas are poisonous and explosive, but the concentrations found in water from most wells are not toxic and only make the water unpleasant to drink. The problem seems to exist throughout the entire project area. Normally, this water is weakly acidic and may be corrosive to metal plumbing.

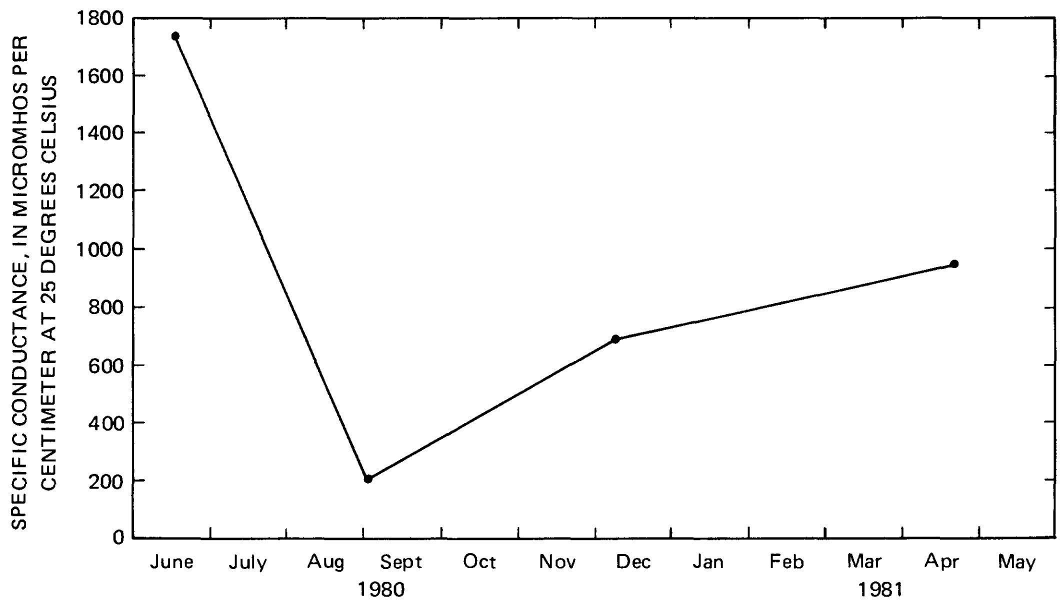


Figure 9.--Seasonal variation of specific conductance in well 22S/08W-23ACD1.

Concentrations of dissolved iron exceeding the recommended limit have been reported in water from numerous wells along the Umpqua River. By comparison, ground water along the Smith River and the coastal sand dunes generally has small concentrations of dissolved iron. Water from wells in the dune sand just south of the study area contained more than 40 mg/L of iron but the concentrations generally ranged from 1 to 5 mg/L. Water from wells in the dune area north of the study area, near Florence, had concentrations of iron as much as 2 mg/L but generally contained less than 0.5 mg/L (Hampton, 1963). The dune sand of the study area probably will yield water similar to that of the Florence area.

Numerous wells drilled along the major river valleys derive water from both the fluvial deposits and the underlying Tertiary marine sedimentary rocks. The quality of water from these wells may fluctuate in response to changes in hydraulic head in the aquifers including those caused by pumping. Analyses of four water samples collected from well 22S/08W-23ACD1 during 1980-81 show large changes in specific conductance of the water (fig. 9 and table 6) which reflects changes in the dissolved-solids concentration of the water. These changes may be due to the difference in the amount of water supplied to the well from each aquifer on the sampling date. Water from the Tertiary sediments generally contains larger mineral concentration than does water from the overlying fluvial deposits.

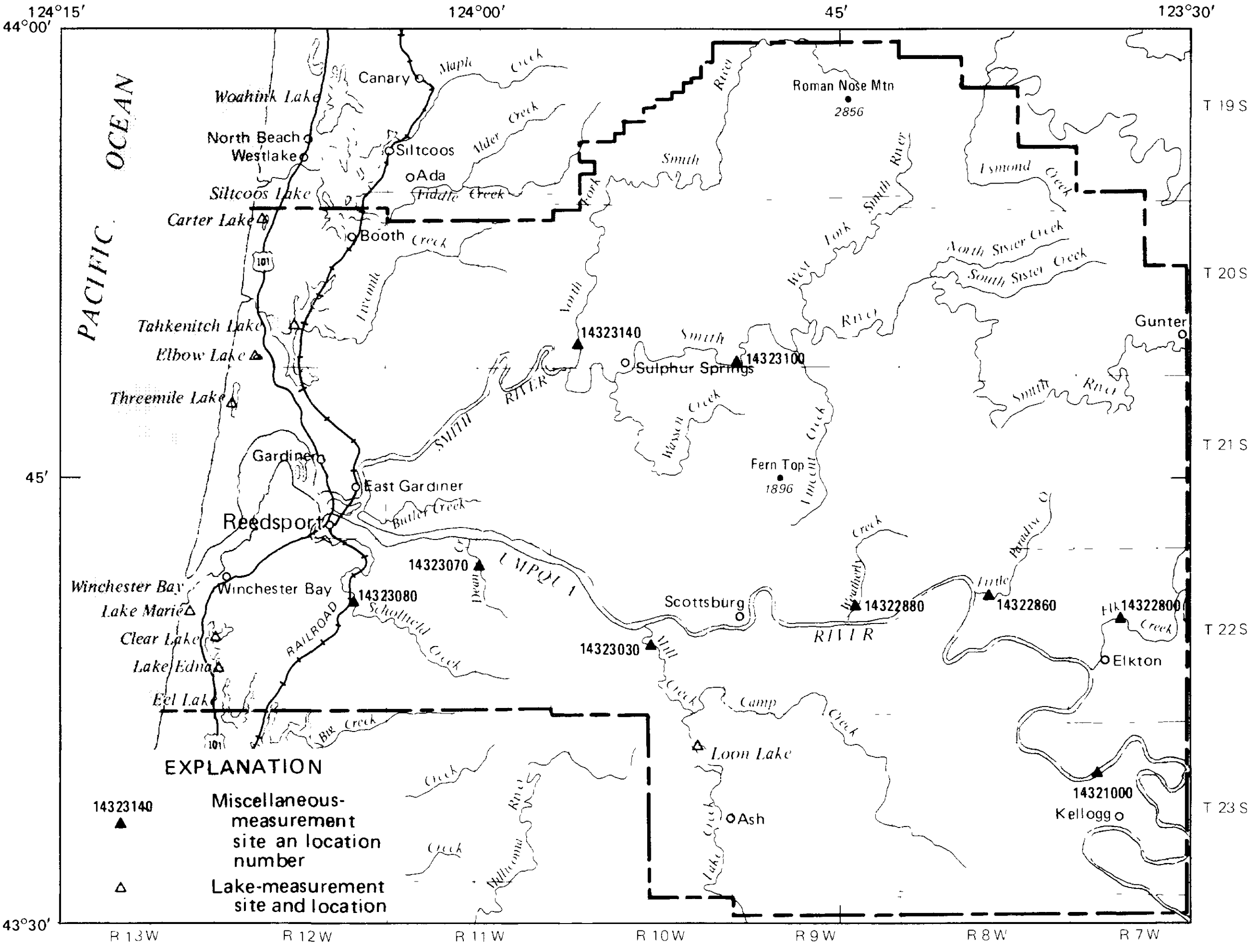


FIGURE 10. – Locations of miscellaneous measuring sites in the project area.

SURFACE WATER

Runoff from seven streams in western Douglas County (table 1 and fig. 10) was estimated by correlating monthly discharge measurements with the continuous streamflow record of West Fork Millicoma River near Allegany, in Coos County. Monthly measurements of discharge of Elk Creek at Elkton were correlated with the streamflow record of Elk Creek near Drain. Streamflow records for the Smith River from 1966 to 1973 were also correlated to West Fork Millicoma River to estimate the long-term mean. Discharges for the Smith River for 1979 were determined by applying the stage-discharge rating used in 1973 to observed gage heights. Because a complete set of measurements for Mill Creek could not be made during the 1979 water year, measurements were continued through the 1980 water year.

The ratio of monthly mean discharge to the daily discharge at West Fork Millicoma River was used to estimate the monthly mean discharge at the monthly measurement sites. The 1979 mean discharge was computed from the estimated monthly mean discharges. An annual mean discharge can be estimated to within 10 percent using this method (Riggs, 1969).

Except for July, August, and September, the trend of the monthly mean discharge is similar to the trend of average monthly precipitation (based on figs. 3, 11). For these months, the discharge seems to lag behind the precipitation. This lag may be caused by the precipitation restoring depleted soil moisture.

Mean Annual Flow

Records from eight long-term gaging stations on streams draining the Coast Range were used to determine the relation of the 1979 mean discharge to the long-term average annual discharge (fig. 12). Discharge during the 1979 water year was less than the long-term average. The average annual discharge of Mill Creek was determined from 1980 water year data.

Peak Flows

For seven of the streams listed in table 1, the 100-year flood discharges were estimated from the equations presented by Harris and others (1979). These equations relate flood discharge to drainage area, precipitation intensity, and basin storage. The 100-year flood discharges for Scholfield and Elk Creeks are those used in the Flood Insurance Studies for Douglas County (U.S. Department of Housing and Urban Development, 1978) and for the city of Elkton (U.S. Department of Housing and Urban Development, 1979).

Table 1.--Selected streamflow data for western Douglas County

Site number	Stream	Drainage area (mi^2)	100-Year flood discharge (ft^3/s)	Annual discharge for 1979 water year (ft^3/s)	Average annual discharge (ft^3/s)	Average annual discharge (ft^3/mi^2)	Low flow 7-day, 20-year recurrence interval (ft^3/s)	Standard error, in percent
14322800	Elk Creek	290	67,700	466	690	2.38	1.2	48
14322860	Paradise Creek	19.5	6,200	46	68	3.49	.044	24
14322880	Weatherly Creek	12.6	3,800	29	43	3.41	.01	24
14323030	Mill Creek	133	21,100	1/ 466	540	4.06	2.6	48
14323070	Dean Creek	10.9	2,500	30	45	4.13	.2	39
14323080	Scholfield Creek	12.9	2,300	60	88	6.82	.3	38
14323100	Smith River	206	47,500	578	860	4.17	3.6	37
14323140	North Fork Smith River	59.9	13,400	263	390	6.51	3.3	16
14324500	West Fork Millicoma River	46.9	11,400	195	254	5.41	1.9	--

1/ 1980 water year.

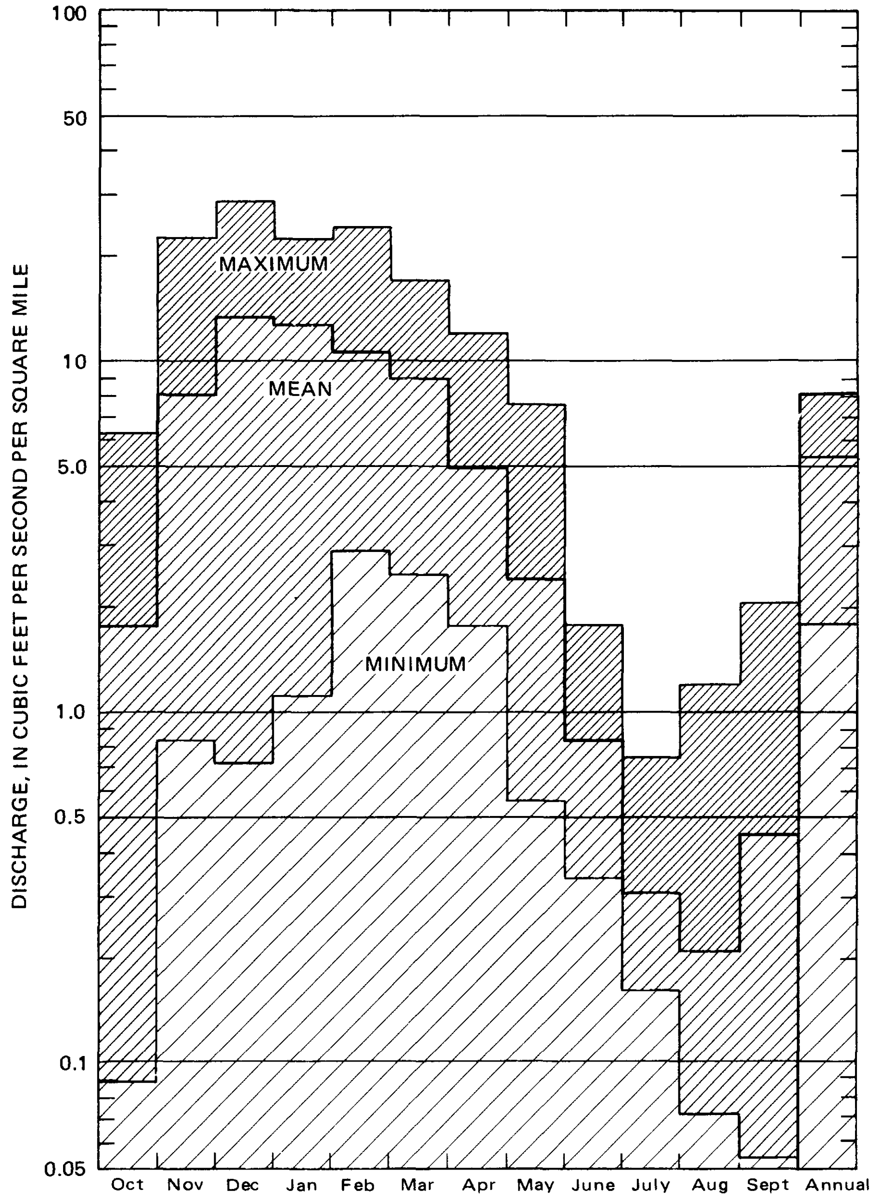


Figure 11.–Monthly and annual maximum, minimum, and mean discharge of West Fork Millicoma River near Allegany, 1955-79.

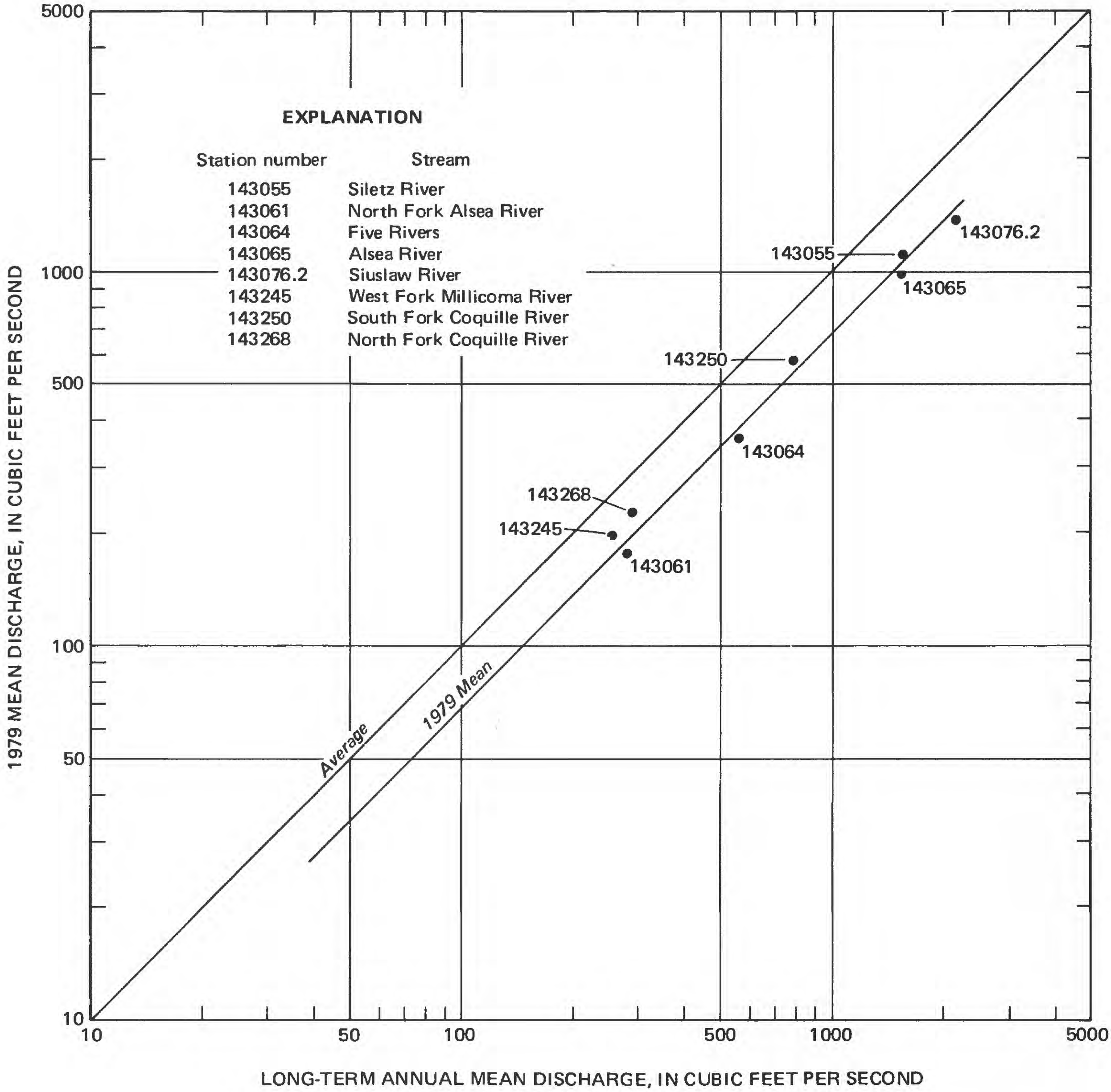


Figure 12.–Relation of 1979 mean discharge to long-term annual mean discharge.

Low Flows

The 7-day, 20-year recurrence interval was chosen as an index of low flows. The 1956-78 streamflow record for West Fork Millicoma River was analyzed using the log-Pearson Type-III method to determine the low-flow frequency. The measured discharges at the miscellaneous-measurement sites were correlated with the concurrent daily discharges of the West Fork Millicoma River. These correlations were extended to estimate 7-day, 20-year low flows at the measurement sites. The standard error of estimate ranged from 16 to 48 percent. Discharge data for the nine sites are shown in table 1.

Water Quality

Umpqua River near Elkton

Since 1966, under various national programs, the Geological Survey has been collecting water-quality samples from Umpqua River near Elkton (station 14321000). In October 1973, this station was included in the National Stream Quality Accounting Network (NASQAN) that is designed to systematically and continually determine the quality of the Nation's rivers and streams.

A statistical summary of selected water-quality constituents from Umpqua River near Elkton is presented in table 2. The statistical entries listed in the table are, for the most part, self-explanatory. The median values can be used as an index of groupings of observations. The difference between the 75 and 25 percentiles represents 50 percent of the observations, and using hardness as an example, the difference is 5.7 mg/L.

The small range of concentrations of hardness for half the observations, as indicated above, is characteristic of the Umpqua River. A plot of specific conductance versus discharge shows no significant variation with time, which indicates that (1) major ions and dissolved-solids concentrations have small seasonal and yearly variations, and (2) mean values can be used with confidence in describing chemical quality of the Umpqua River.

The stability of the Umpqua River, in terms of major ion concentrations and low dissolved-solids, is due to the influence of the North Umpqua River with its consistent flow during most of the year. During low-flow periods, the North Umpqua River contributes more than 80 percent of the discharge at the Elkton station (Curtiss, 1969).

Curtiss (1975) reported an estimated mean annual suspended-sediment discharge of 3.5 million tons transported by the Umpqua River near Elkton. Suspended-sediment data collected since 1973 under the NASQAN program were plotted on the correlation graph used by Curtiss; the data points fell within the normal distribution of the curve. No significant variations were noted for flows of more than 10,000 ft^3/s. This indicates that the estimated sediment-discharge values reported by Curtiss for the Umpqua River are reasonable; however, those values represent long-term averages and may differ greatly from year to year depending on hydrologic conditions.

Small Streams

Water samples were collected at the same eight ungaged streams (see fig. 10 and pl. 1) that were used for the streamflow evaluations. All samples were collected and analyzed using standard methods as outlined by Skougstad and others (1978), Greeson and others (1977), and Guy (1969). The streams were sampled during high-, medium-, and low-flow conditions, and the data are presented in table 8.

Table 2.--Statistical summary of water-quality data for Umpqua River near Elkton, Oreg., 1974-80

WATER QUALITY CONSTITUENT	SAMPLE SIZE	MAXIMUM	MINIMUM	MEAN	STANDARD DEVIATION	95	75	MEDIAN 50	25	5
	DESCRIPTIVE STATISTICS					PERCENT OF SAMPLES IN WHICH VALUES WERE LESS THAN OR EQUAL TO THOSE SHOWN				
SUMMARY OF DATA COLLECTED AT PERIODIC INTERVALS										
TEMPERATURE (DEG C)	71	27.50	2.00	13.33	6.42	25.32	18.70	12.50	7.50	4.76
STREAMFLOW, INSTANTANEOUS (CFS)	71	34200.00	761.00	5436.89	6015.85	16060.00	8400.00	3180.00	1330.00	966.00
SPECIFIC CONDUCTANCE (UMHOS)	71	138.00	42.00	78.61	13.91	100.80	86.00	79.00	70.00	59.60
OXYGEN, DISSOLVED (MG/L)	46	13.60	8.00	10.73	1.37	13.40	11.82	10.80	9.58	8.34
ALKALINITY FIELD (MG/L AS CACO3)	71	41.00	7.00	29.35	5.01	37.00	33.00	29.00	26.00	22.00
NITROGEN, TOTAL (MG/L AS N)	64	4.60	0.04	0.46	0.71	1.00	0.46	0.29	0.16	0.06
NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	13	0.17	0.00	0.06	0.06	0.17	0.11	0.03	0.01	0.00
PHOSPHORUS, TOTAL (MG/L AS P)	71	2.10	0.01	0.08	0.24	0.11	0.06	0.04	0.03	0.02
CARBON, ORGANIC TOTAL (MG/L AS C)	32	8.00	1.00	2.27	1.36	5.72	2.68	1.90	1.43	1.07
HARDNESS (MG/L AS CACO3)	71	41.06	10.45	28.91	4.74	37.93	31.83	28.85	26.10	21.98
CALCIUM DISSOLVED (MG/L AS CA)	71	11.00	2.70	7.22	1.39	9.94	8.00	7.00	6.50	5.06
MAGNESIUM, DISSOLVED (MG/L AS MG)	71	4.10	0.40	2.64	0.55	3.62	2.90	2.70	2.40	1.82
SODIUM, DISSOLVED (MG/L AS NA)	71	10.00	2.70	4.77	1.21	6.08	5.50	4.60	3.90	3.08
POTASSIUM, DISSOLVED (MG/L AS K)	71	1.60	0.40	0.85	0.27	1.30	1.10	0.80	0.60	0.50
CHLORIDE, DISSOLVED (MG/L AS CL)	71	7.20	0.20	3.30	1.21	5.82	3.80	3.30	2.50	1.76
SULFATE DISSOLVED (MG/L AS SO4)	71	10.00	0.10	3.48	1.86	6.84	4.70	3.10	2.10	1.00
FLUORIDE, DISSOLVED (MG/L AS F)	71	0.20	0.00	0.10	0.02	0.10	0.10	0.10	0.10	0.06
SILICA, DISSOLVED (MG/L AS SIO2)	70	23.00	12.00	16.90	1.98	20.45	18.00	17.00	16.00	13.00
ARSENIC DISSOLVED (UG/L AS AS)	23	2.00	0.00	0.96	0.47	2.00	1.00	1.00	1.00	0.00
ARSENIC TOTAL (UG/L AS AS)	23	2.00	1.00	1.09	0.29	2.00	1.00	1.00	1.00	1.00
CADMIUM DISSOLVED (UG/L AS CD)	22	60.00	0.00	4.18	12.50	51.45	2.00	2.00	0.75	0.00
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	23	20.00	0.00	11.17	9.44	20.00	20.00	20.00	2.00	0.00
CHROMIUM, DISSOLVED (UG/L AS CR)	23	20.00	0.00	2.48	5.98	20.00	0.00	0.00	0.00	0.00
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	23	20.00	0.00	6.83	9.19	20.00	20.00	0.00	0.00	0.00
COBALT, DISSOLVED (UG/L AS CO)	23	3.00	0.00	1.17	1.40	3.00	3.00	0.00	0.00	0.00
COBALT, TOTAL RECOVERABLE (UG/L AS CO)	23	100.00	0.00	52.57	50.67	100.00	100.00	100.00	0.00	0.00
COPPER, DISSOLVED (UG/L AS CU)	22	20.00	0.00	4.18	4.24	18.80	4.25	3.00	2.00	0.30
IRON, DISSOLVED (UG/L AS FE)	24	190.00	10.00	53.75	50.80	185.00	75.00	40.00	12.50	10.00
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	23	200.00	2.00	107.91	98.42	200.00	200.00	200.00	5.00	2.20
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	23	120.00	6.00	22.87	22.37	104.00	20.00	20.00	10.00	6.80
MANGANESE, DISSOLVED (UG/L AS MN)	23	20.00	2.00	8.74	3.86	18.00	10.00	10.00	8.00	2.00
ZINC, DISSOLVED (UG/L AS ZN)	23	50.00	0.00	13.74	13.62	48.00	20.00	9.00	3.00	0.00
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	23	360.00	0.00	54.70	87.84	336.00	40.00	20.00	20.00	1.60
SELENIUM, DISSOLVED (UG/L AS SE)	23	1.00	0.00	0.83	0.39	1.00	1.00	1.00	1.00	0.00
SELENIUM, TOTAL (UG/L AS SE)	23	1.00	0.00	0.83	0.39	1.00	1.00	1.00	1.00	0.00
SOLIDS, SUM OF CONSTITUENTS, DISS. (MG/L)	70	73.62	31.60	56.88	7.37	69.38	62.41	56.35	52.45	45.43
MERCURY DISSOLVED (UG/L AS HG)	19	0.50	0.10	0.33	0.20	0.50	0.50	0.50	0.10	0.10
MERCURY TOTAL RECOVERABLE (UG/L AS HG)	18	0.50	0.10	0.35	0.19	0.50	0.50	0.50	0.10	0.10
SEDIMENT, SUSPENDED (MG/L)	68	154.00	1.00	12.12	25.13	45.45	11.00	4.70	3.00	1.00
SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)	68	14200.00	2.70	524.89	2056.51	1968.99	172.25	38.50	11.25	4.41
SUMMARY OF DATA COLLECTED AT ONCE-DAILY OR MORE FREQUENT INTERVALS										
TEMPERATURE (DEG C)	8089	29.90	0.00	13.42	6.59	24.30	19.40	12.30	7.70	4.70
STREAMFLOW (FT^3/S)	28000	260000.00	663.00	7464.04	10920.00	14600.00	9200.00	3980.0	1380.00	940.00

The quality of water in streams of western Douglas County is typical of western Oregon coastal streams--small dissolved solids concentrations and generally large sediment concentrations during winter storm events.

Although the dissolved-solids concentrations in the streams tends to increase during low flow, they are still considered to be small (23 to 112 mg/L). Of the eight streams, Elk Creek had the greatest increase in dissolved solids, but the maximum dissolved-solids concentration did not coincide with the lowest flow sampled. Elk Creek flows through an area of greater agricultural activity than do the other seven streams. Therefore, irrigation return during summer in the Elk Creek basin is probably the cause of increased dissolved-solids concentration.

Nitrite plus nitrate nitrogen values of the eight small streams are noticeably larger than those of the Umpqua River. In particular, Scholfield and Dean Creeks had median values of 0.8 and 0.6 mg/L, respectively, compared with 0.02 mg/L for the Umpqua. The larger nitrogen values do not necessarily limit the use of the water; however, if a reservoir or impoundment were built on Scholfield Creek, for example, a potential problem could exist because the impounded water could be nutrient enriched and susceptible to undesirable algal productivity.

During low flows of several of the streams, dissolved-iron concentration increased significantly. In the spring and summer of 1979, iron concentrations of Scholfield Creek exceeded the recommended limit of 300 micrograms per liter for drinking water (U.S. Environmental Protection Agency, 1976). The larger iron concentrations and the general increase in dissolved solids may be attributed to the larger proportion of ground-water contributions to the streams during low-flow periods.

Curtiss (1975) estimated a mean annual suspended-sediment yield of 710 t/mi^2 for Elk Creek near Drain. Frank and Laenen (1977) estimated annual suspended-sediment yields ranging from 230 to 630 t/mi^2, excluding extremes, for 12 ungaged streams in Lincoln County. Because Lincoln County and western Douglas County are similar in topography, vegetative cover, and amount of precipitation received, streams in both counties, excluding Elk Creek, probably have a similar range in sediment yield.

Extent of Saltwater Intrusion in the Umpqua River Estuary

Upstream saltwater encroachment in the Umpqua River estuary limits the uses of water in the upper Umpqua tidal basin, and could affect the shallow wells in the alluvium along the river.

Hydrologic data for the Umpqua River estuary are scarce. For several days in 1955 and 1956, Burt (1956) measured temperature, salinity, and water currents in the estuary. Twice monthly from July through October 1972, Mullen (1973) measured temperature and salinity at 10 sites in the Umpqua River estuary from RM (river mile) 0.8 to 24.3.

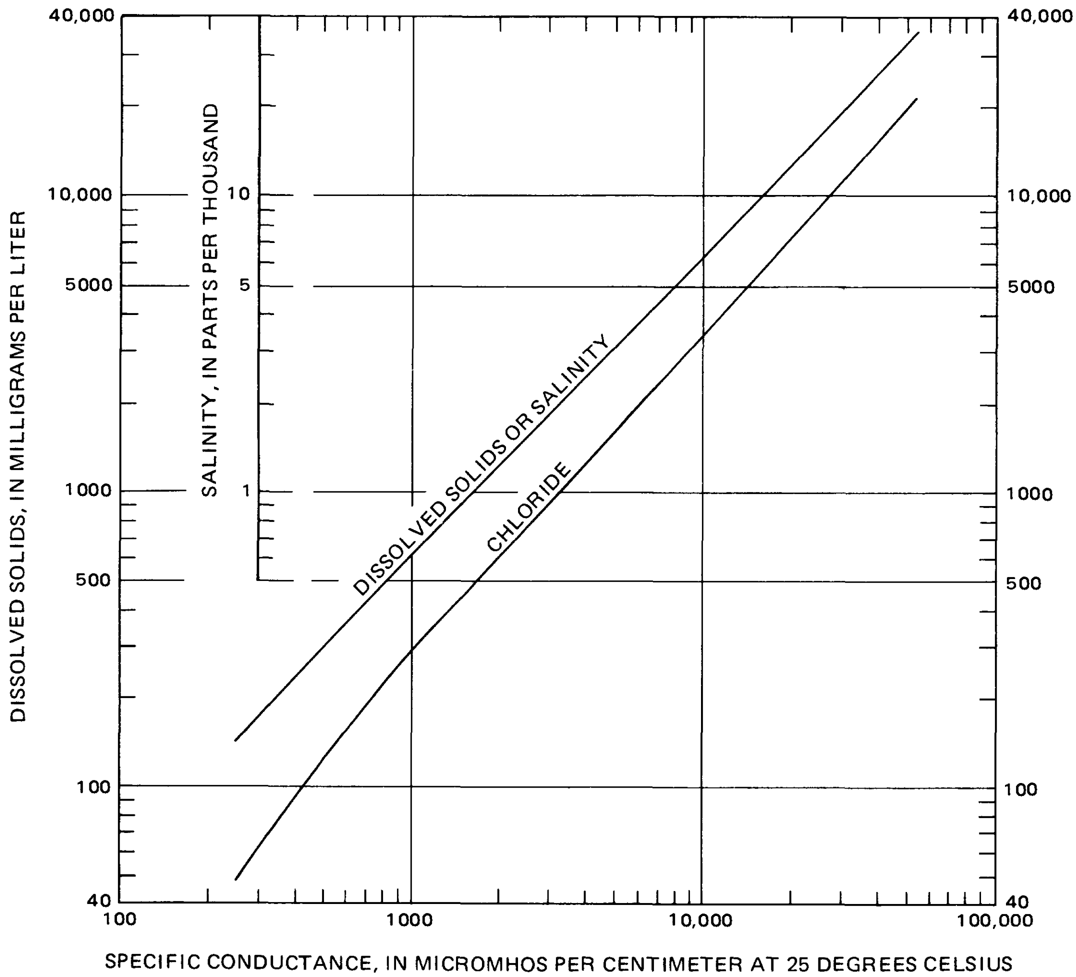


Figure 13.–Relation of specific conductance to chloride, dissolved solids, and salinity for freshwater-seawater mixture. (Webb and Heidel, 1970)

Salinity refers to the salt content of water, or more specifically, the concentration of dissolved solids of water expressed in thousands of milligrams per liter, or parts per thousand (Webb and Heidel, 1970). Because the ratio of any given major constituent to the dissolved solids is almost constant in seawater, and because specific conductance is a function of the dissolved solids, general correlations can be determined for seawater-freshwater mixtures, as shown in figure 13.

The amount of chloride often determines the suitability of estuarine water for public or agricultural use. The U.S. Environmental Protection Agency (1976) has established a recommended limit of 250 mg/L for chloride in drinking water. Water with 500 mg/L or more of chloride is unsuitable for most agricultural uses. Therefore, based on the relationship shown in figure 14, water with a specific conductance of 1,000 umhos/cm is unsuitable for public supplies and water with a specific conductance of 2,000 umhos/cm is unsuitable for most agricultural uses.

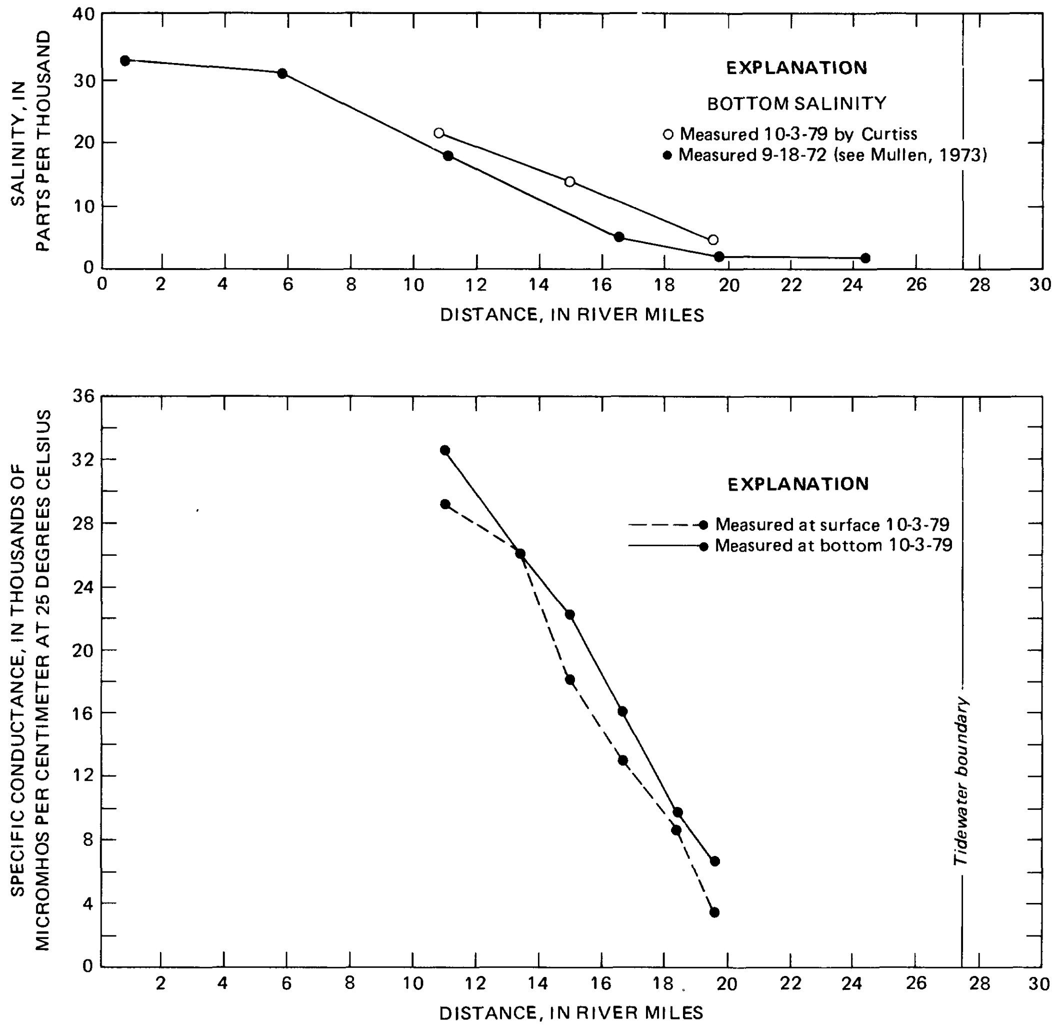


Figure 14.--Bottom salinity and specific conductance of the Umpqua River estuary.

On October 3, 1979, temperature, specific conductance, and salinity were measured in the Umpqua estuary during high tide and low inflow. Seven sites were sampled between Highway 101 bridge (RM 11.5) at Reedsport and a site about 3 mi upstream from Dean Creek (RM 19.5). These data, and the data collected by Mullen (1973) under similar hydrologic conditions, are shown in figure 14. The larger salinity values obtained during this study, as compared to Mullen's data, are due principally to a higher tide, smaller inflow condition.

Because the data collected during this study show that saltwater encroaches as far upstream as RM 20, at least for short periods, use of the water in the Umpqua River estuary is limited. Data collected by Mullen (1973) show (1) maximum upstream encroachment at the confluence of the Umpqua River and Mill Creek (RM 24.2) and (2) that from July to October 1972 the estuarine water downstream from Dean Creek (RM 16.5) was too salty for domestic or most agricultral uses.

Selected Lakes

The freshwater lakes are an important water resource in western Douglas County. Clear Lake provides the public-water supply for Reedsport and surrounding communities. Several other lakes are heavily used for recreation and sport fishing.

In 1980, water from several lakes in the project area was sampled and analyzed for selected chemical constituents and biological features. With the exception of Loon Lake, which is about 25 mi inland, all the lakes are near the coast (see fig. 10). Five of the lakes (Elbow, Marie, Threemile, Carter, and Edna) were sampled only once during the spring. Two lakes, Loon and Tahkenitch, were sampled three times during the year to compare seasonal variations. Bathymetric maps with the sampling-site locations (Rinella, 1979) are presented in figure 17. Data for Clear Lake were collected in 1978-79 by Rinella and others (1980).

Chemical and biological data for the lakes are shown in table 3. The water in the lakes is soft and contains small dissolved-solids concentrations. The seven coastal-lake waters have predictably dominant ions of sodium and chloride. Loon Lake water, being farther inland, has dominant calcium and bicarbonate ions.

Many elements and compounds are nutrients that supply food for growth of aquatic plants, including phytoplankton. Dissolved inorganic nitrogen (nitrite, nitrate, and ammonia), orthophosphate phosphorus, and carbon are the major nutrients that are often exhausted by phytoplankton, thus limiting growth of all aquatic plants (Britton and others, 1975). Critical minimum concentrations of nitrogen and phosphorus necessary to support nuisance plant growths in Wisconsin lakes have been found to be 0.30 mg/L for inorganic nitrogen and 0.01 mg/L for inorganic phosphorus. These critical concentrations were determined in the springtime, when nutrient concentrations commonly are at a maximum at the start of a growing season (National Academy of Sciences and National Academy of Engineering, 1972). The nutrient concentrations of lakes sampled in western Douglas County were generally less than the concentrations for Wisconsin lakes, although the inorganic nitrogen for Elbow and Tahkenitch Lakes (February 5, 1980) exceeded 0.30 mg/L. Both lakes had a limiting concentration of 0.000 mg/L of orthophosphate.

Biological features are good indicators of the productivity of lakes, and those for lakes of western Douglas County are included in table 3. Concentrations of suspended algae were measured directly by cell count per unit volume and by chlorophyll a. Algal growth potential (AGP) in lakes was estimated by bioassays in which the growth of a selected test alga was observed in filtered lake water under laboratory conditions.

Table 3.--Water-quality data for miscellaneous lakes

Date of col-lection	Time (2400 hours)	Milligrams per liter: Dissolved constituents: Depth of col-lection (feet)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (as $CaCO_3$)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrite + ni-trate (as N)	Organic nitro-gen (as N)	Ammonia nitro-gen (as N)	Orthophosphate (as P)	Dissolved sol-ids residue at 180°C	Hardness (as $CaCO_3$)	Total constituents: Kjeldahl nitro-gen (as N)	Phosphorus (as P)	Total organic carbon (TOC)	Specific conduct-ance (micro-mhos/cm at 25°C)	pH (units)	Biological parameters: Algal growth poten-tial	Chloro-phyll a (ug/L)	Algal count (cells/mL)
Lake Marie																									
5-13-80	1215	13.1	9.6	4.3	4.1	16	1.1	12	12	21	0.0	0.08	0.34	0.06	0.009	96	28	0.60	0.01	2.5	156	7.2	0.3	0.81	350
Threemile Lake (south)																									
5-14-80	1115	13.1	6.9	2.5	2.5	17	1.0	7	5.4	25	.0	.20	.29	.08	.000	73	17	.63	.01	3.4	138	7.0	.4	2.26	397
Elbow Lake																									
5-14-80	1500	6.6	12	3.3	2.5	13	.9	13	7.6	22	.1	.35	.35	.10	.000	69	19	.68	.01	4.6	117	6.3	.4	6.27	911
Carter Lake																									
5-13-80	1645	9.8	10	2.3	2.2	15	.9	12	4.0	20	.1	.05	.41	.15	.001	60	15	.52	.01	4.7	120	7.0	.4	.00	78
Lake Edna																									
5-13-80	1020	20	7.6	2.0	1.7	9.4	.9	8	.1	13	.1	.09	.42	.17	.000	42	12	.86	.01	2.0	84	7.4	.4	.82	304
Loon Lake																									
2- 5-80	1400	9.8	11	3.2	1.1	3.8	.8	12	3.0	3.4	.0	.21	.04	.00	.000	34	13	.13	.03	2.6	46	6.7	1.8	.00	26
5-12-80	1615	20	10	3.4	1.3	3.2	.8	12	2.9	2.9	.1	.08	.45	.04	.000	32	14	.51	.01	2.2	44	6.2	.8	.00	58
8-26-80	1515	9.8	8.7	4.6	1.9	4.7	.9	25	1.8	3.5	.1	.00	.52	.06	.000	46	19	.59	.03	2.2	60	7.0	.8	.53	109
Tahkenitch Lake																									
2- 5-80	1000	9.8	8.4	2.7	1.1	6.9	.9	11	2.2	12	.0	.58	.10	.00	.000	40	11	.33	.02	3.4	62	7.3	--	4.53	746
5-13-80	1500	9.8	3.2	2.6	1.3	5.9	.7	11	1.2	7.9	.1	.08	1.1	.08	.000	31	12	--	.02	2.9	61	7.2	.4	9.14	486
8-27-80	1000	8.2	2.9	3.0	1.4	7.0	.8	18	.1	9.6	.0	.00	.46	.04	.005	44	13	.51	.01	4.4	64	7.0	.7	.91	2,625
Clear Lake																									
9- 7-78	1325	98	8.8	3.8	2.0	15	1.0	12	6.0	15	.0	.27	--	--	.00	60	18	.22	.01	1.7	81	6.8	1/.4	1/.13	1/450
11-28-78	1145	10	7.7	2.5	2.0	12	1.1	13	4.3	16	.3	.10	--	--	.01	54	14	.29	.01	2.3	87	6.9	.5	.00	63
5- 2-79	0915	7	7.0	2.8	1.9	10	.9	13	3.6	12	.1	.19	--	--	.00	60	15	.14	.01	2.5	84	6.7	.3	.00	77

1/ Samples collected at 16-foot depth.

Productivity is defined as the total amount of living matter produced in an area per unit of time regardless of the fate of the living matter (Greeson and others, 1977). Because a lake undergoes very complex and rapid changes in productivity, such as algal blooms and die-off, the algal count and chlorophyll a data can be used only to describe the condition of a lake at the time of sampling.

The chlorophyll a concentrations range from very small to moderate in terms of productivity of chlorophyll-bearing phytoplankton (National Academy of Science and National Academy of Engineering, 1974). The number of algae, based on cell count, was considered to be small for all lakes except Tahkenitch, but five of the lakes were sampled only once in the spring and the algae generally increase later in the summer depending on nutrient availability. Of the five lakes sampled only once, Elbow Lake had the largest springtime cell count and has the potential of a large cell count later in the summer. Loon, Tahkenitch, and Clear Lakes, which were sampled seasonally, showed increases in algal population during summer. Tahkenitch Lake had a large cell count of 2,625 cells/mL in August 1980 due to an abundance of Ancystis sp., a blue-green alga that generally is characteristic of productive waters. Counts of particular phytoplankton species in each sample are listed in table 9.

The AGP of lakes was determined by bioassays for which the growth of the test alga, Selenastrum capricornutum, was monitored in filtered lake water. The growth of this alga may not be identical to that of indigenous species of algae in the lakes, but the growth trends are probably similar (Miller and others, 1978). With the exception of the February sample from Loon Lake, the AGP values were moderate for all other lakes, indicating moderate productivity (Miller and others, 1974). The larger AGP value in February for Loon Lake, although difficult to explain, probably was due to all the nutrients being available in the water column after fall turnover of the lake.

In addition to the standard AGP tests, selected samples from Loon, Tahkenitch, and Clear Lakes were spiked with 1.0 mg/L of nitrogen (as N) and 0.05 mg/L of inorganic phosphorus (as P) to ascertain if one of these nutrients limited algal productivity. Results of the spike test are shown below:

		Algal growth potential		
Lake	Date	Regular	Nitrogen spike	Phosphorus spike
Loon	8-26-80	0.8	0.7	1.8
Tahkenitch	5-13-80	.4	.4	4.0
Clear	5-02-79	.3	.4	6.0

The nitrogen spike did little to enhance AGP, whereas the phosphorus spike significantly increased AGP values for Tahkenitch and Clear Lakes, indicating that these two lakes may be phosphorus limited.

Because neither the nitrogen nor phosphorus spike enhanced algal growth in the Loon Lake sample, one or more of the following conditions probably exists: (1) Loon Lake is both nitrogen and phosphorus limited; (2) one or more of the minor nutrients, such as iron, manganese, cobalt, or boron, is not present in the water; and (3) an unknown toxicity is present that retards productivity. A more detailed study would be required to determine to what extent the conditions exist and their causes.

Figure 15 shows temperature and dissolved-oxygen (DO) profiles of seven lakes measured May 13-15, 1980, at which time four of the lakes--Loon, Elbow, Marie, and Edna--had begun thermal stratification. Profiles for the four lakes indicate an oxygen deficit in the lower part of the water column (hypolimnion), with Loon Lake showing the least deficit. Deficits at the lower depths are probably due to oxidation of organic matter, which is characteristic of nutrient-enriched or productive lakes.

Figure 16 shows profiles of seasonal variations of temperature and DO for Loon, Tahkenitch, and Clear Lakes. All three lakes show the effects of turnover in late fall and early winter, when the water becomes well mixed and is not stratified. In early spring, Clear Lake begins to show thermal stratification, with no oxygen demand in the water column except at the bottom. By late summer, the lake shows a sharp temperature transition in the metalimnion, a layer of water that rapidly decreases in temperature with depth, and an oxygen deficit in the lower cold layer, the hypolimnion. The seasonal pattern is typical of lakes of this size in the North Temperate Zone (Smith and Bella, 1973).

Tahkenitch Lake shows no stratification throughout the year, nor does it show any oxygen deficit except at the mud-water interface at the bottom. The overall shallow depth, large surface area, ample light penetration, and circulation patterns aided by wind seem to keep the water well mixed and prevent stratification.

Loon Lake is unusual in its seasonal profiles. Temperature in the hypolimnion changes very little during the year, but a very sharp temperature transition takes place in the metalimnion by mid-August. The upper warm-water zone (epilimnion) in Loon Lake is shallow compared to that of Clear Lake. DO profiles for Loon Lake are different from those for other lakes in that a small oxygen deficit exists in the metalimnion throughout the year and becomes quite pronounced in late summer. The reason for this pattern is not known, but there is a definite oxygen demand, either chemical or biological, in the metalimnion. As is characteristic of productive lakes, the lower, cold-water zone has an oxygen deficit, beginning in the spring and increasing during the summer.

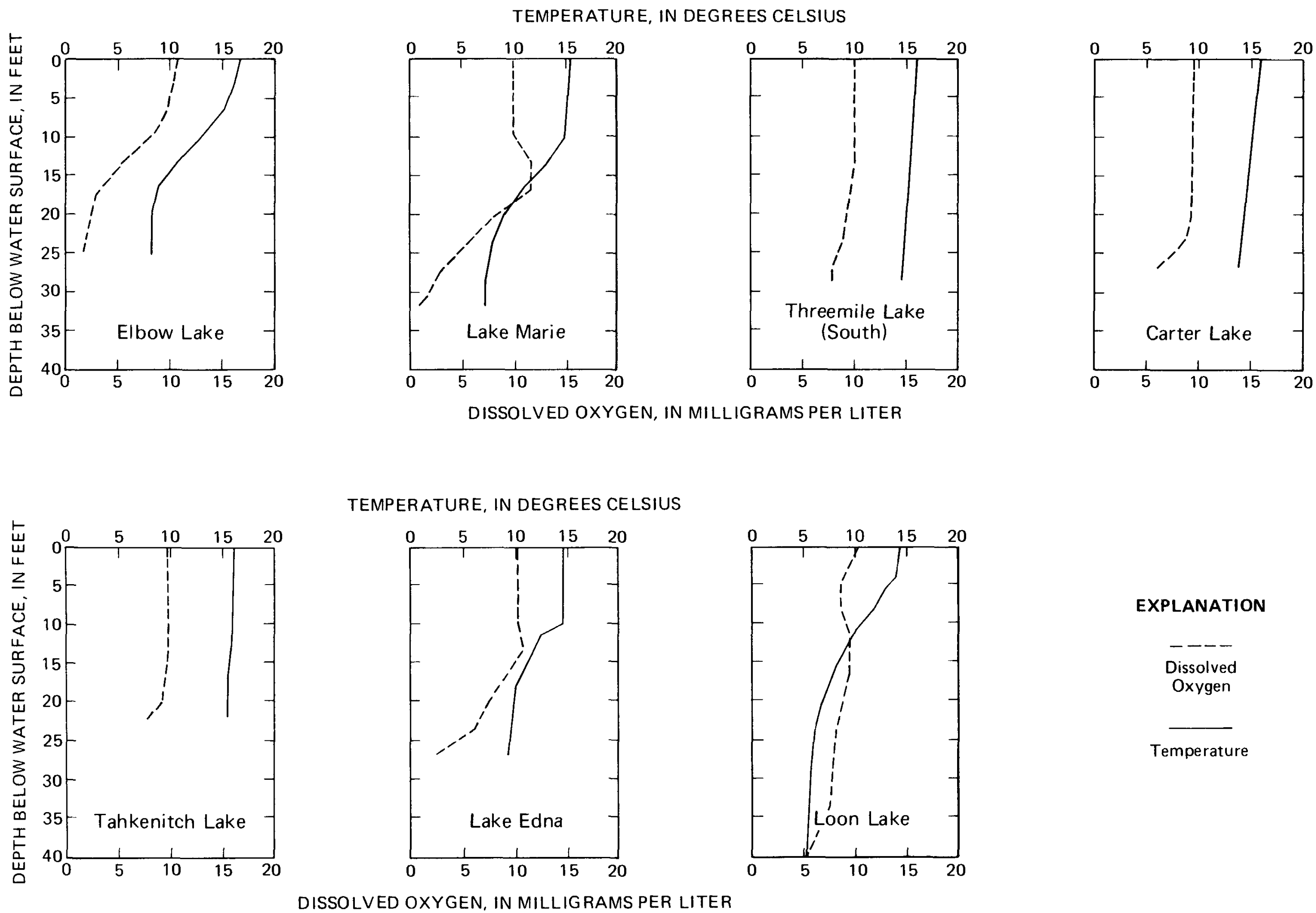


Figure 15.–Profiles of temperature and oxygen for miscellaneous lakes in western Douglas County, May 13-15, 1980.

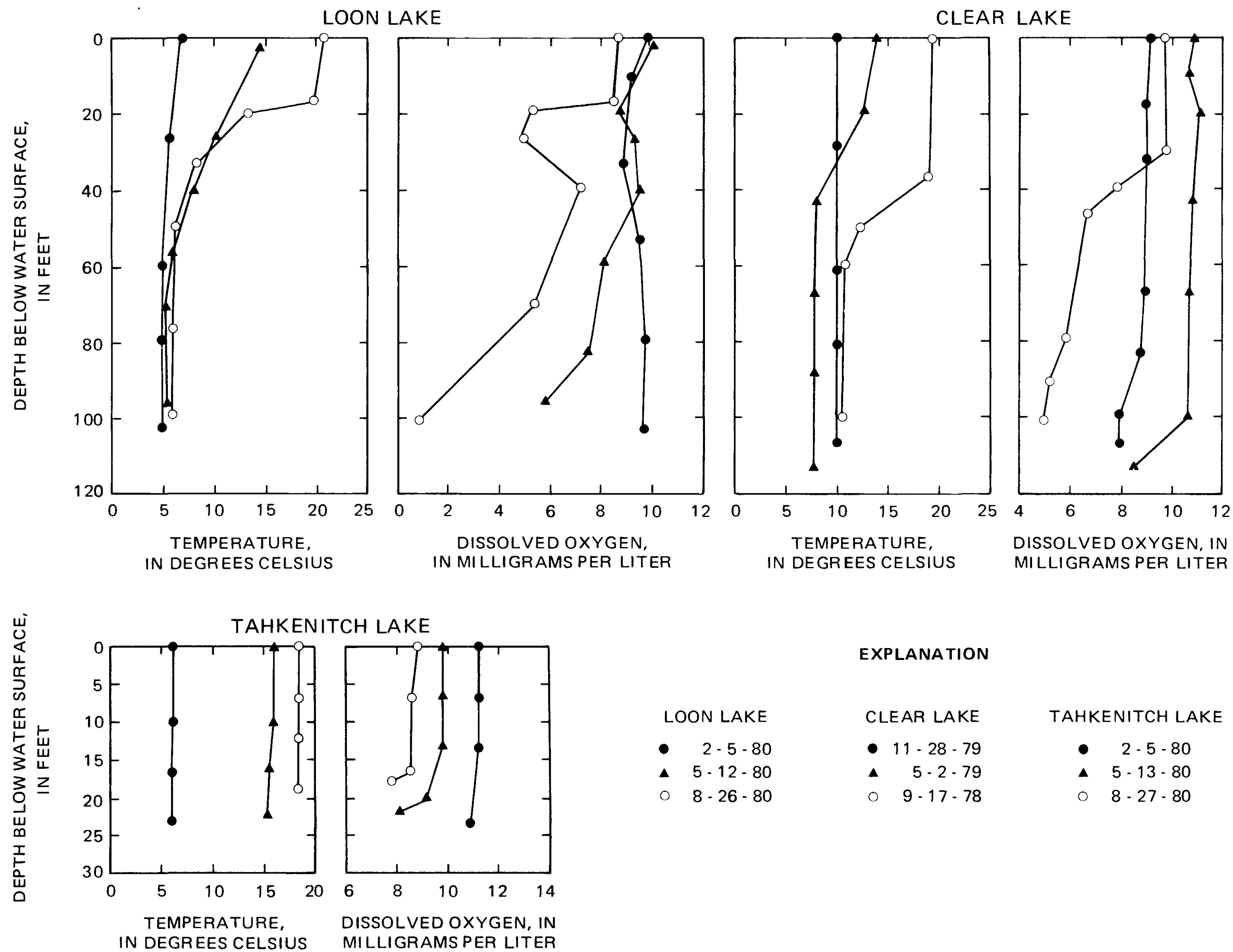


Figure 16.–Seasonal profiles of temperature and oxygen for Loon, Clear, and Tahkenitch Lakes.

Nutrients are characteristically depleted during the summer growing season, particularly nitrite plus nitrate for Tahkenitch and Loon Lakes. Throughout most of the year, orthophosphate in Tahkenitch, Loon, and Clear Lakes is less than the detection limit. Tahkenitch Lake shows a marked decrease in silica concentration during the year, whereas Clear and Loon Lakes show no change. The decrease in silica in Tahkenitch Lake is due to consumption by diatoms.

The aquatic-weed problem in Tahkenitch and Elbow Lakes is well documented (Saltzman, 1964). The macrophytes are so dense in summer and early fall that use of Tahkenitch and Elbow Lakes is restricted, particularly for boating, fishing, and swimming.

SUMMARY OF WATER-RESOURCES CONDITIONS

About 80 percent of the average annual precipitation of 77 in. at Reedsport falls from October to March. Most of the precipitation in the project area results in surface-water runoff, with as little as 1 to 2 in. of recharge to the Tertiary aquifer. However, as much as 50 in. of the precipitation that falls on the coastal deposits of dune sand recharges that aquifer. The amount of recharge to the fluvial aquifer is unknown but believed to be less than that to the coastal aquifer.

Western Douglas County is in a large depositional basin of Tertiary marine sedimentary rocks. These sediments, which may be as thick as 9,000 ft, are the main aquifer of the study area. Most of the wells drilled in this aquifer produce quantities of water barely adequate for domestic use. Of about 450 wells completed in the Tertiary sedimentary rocks, 22 were reported to be dry, and several domestic wells are more than 500 ft deep. Poor-quality water has been reported from several wells in the Smith and Umpqua River Valleys.

Of the overlying Quaternary deposits, the coastal deposits of dune sand and marine terrace deposits may have the best potential for future ground-water development. Assuming coastal deposits are similar in thickness and lithology to those north and south of the study area, moderate to large quantities of water could be withdrawn from this aquifer. Additional ground-water information is needed before development is proposed.

Wells drilled in the fluvial deposits along the major streams produce moderate to large quantities of water. These deposits, consisting of sand and silt with occasional layers of gravel, are of limited thickness in the eastern part of the study area, but may be more than 100 ft thick near Reedsport. A well drilled near Brandy Bar (22S/10W-06CBA2) adjacent to the Umpqua River at about River Mile 20, was reported to produce 200 gal/min.

In the project area, quality of ground water was generally satisfactory in wells sampled; however, saline water was reported in several wells drilled in the river valleys near the streams. About one-third of the wells sampled had hard to very hard water and iron concentrations exceeding the recommended criteria. Four wells had concentrations of chloride greater than 250 mg/l, and many well owners report "sulfur water."

The trend of monthly mean discharges of the small streams in the project area follows closely the trend of monthly precipitation. Weatherly Creek had the lowest dependable low flow (7-day, 20-year recurrence interval) of 0.01 ft^3/s, and Smith River had the highest low flow of 3.6 ft^3/s.

On the basis of the chemical constituents analyzed, water quality of eight small streams is generally good, with dissolved-solid concentrations generally less than 100 mg/L. During medium- and low-flow conditions, Scholfield Creek had iron concentrations exceeding the recommended limits for domestic supplies. Paradise and Weatherly Creeks also showed an increase in iron concentration during low-flow conditions. The small streams also had noticeably larger nitrite plus nitrate concentrations than did the Umpqua River.

Saltwater intrusion extends up the Umpqua River as far as River Mile 20, at least for short durations, during low flow-high tide conditions.

Water in the lakes in western Douglas County is soft and contains small concentrations of dissolved solids. Loon Lake, unlike other lakes in the area, has an abnormal oxygen demand in the metalimnion, and does not seem to be dependent entirely on the phosphorus nutrient to increase its algal production. Because of fairly abundant algal growth during the summer months and the abundance of aquatic weeds, Tahkenitch Lake is the most active in terms of biological productivity. Elbow Lake is considered to be similar to Tahkenitch Lake based on the one spring sampling and the reported abundance of aquatic weeds.

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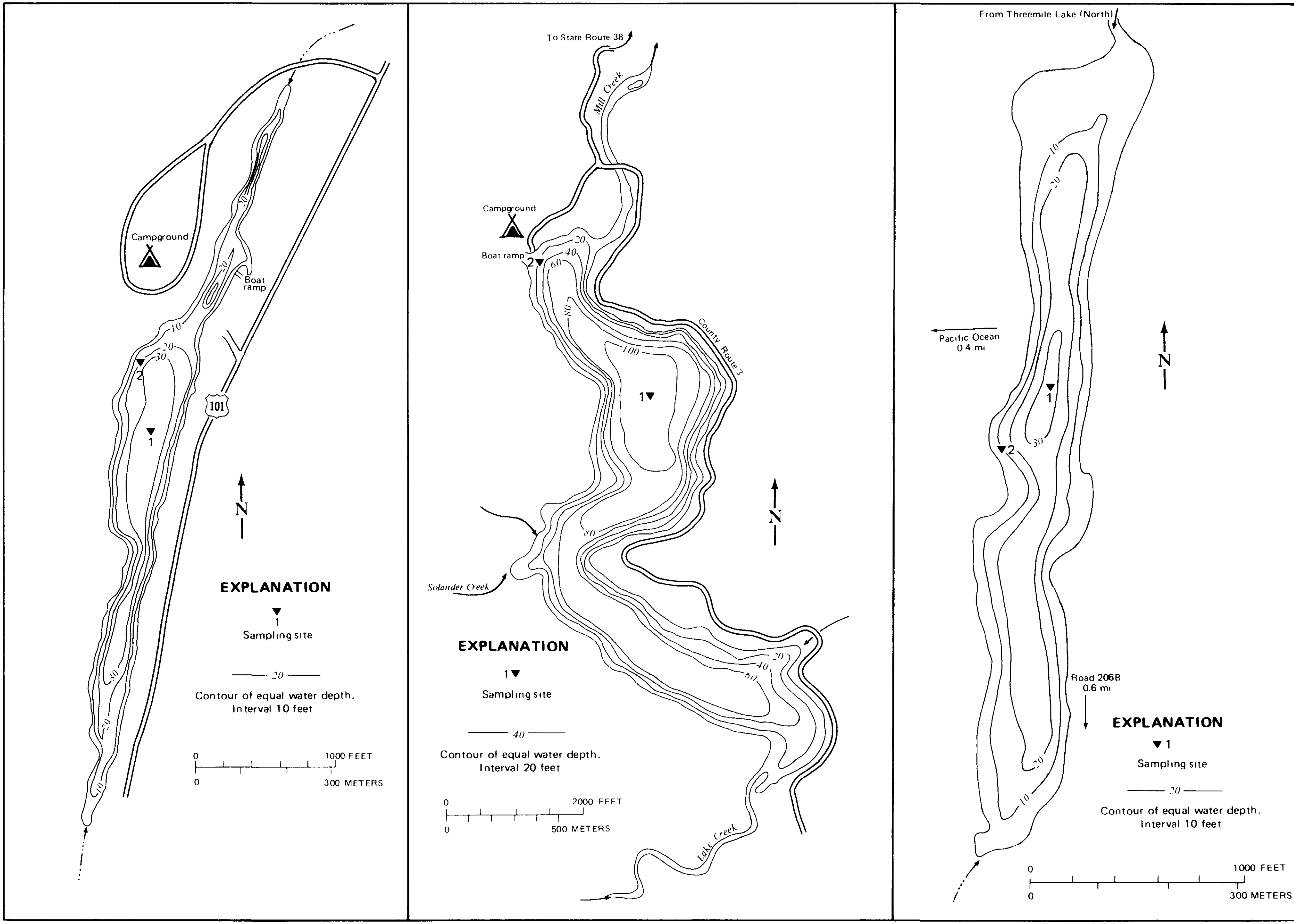
SUPPLEMENTAL DATA

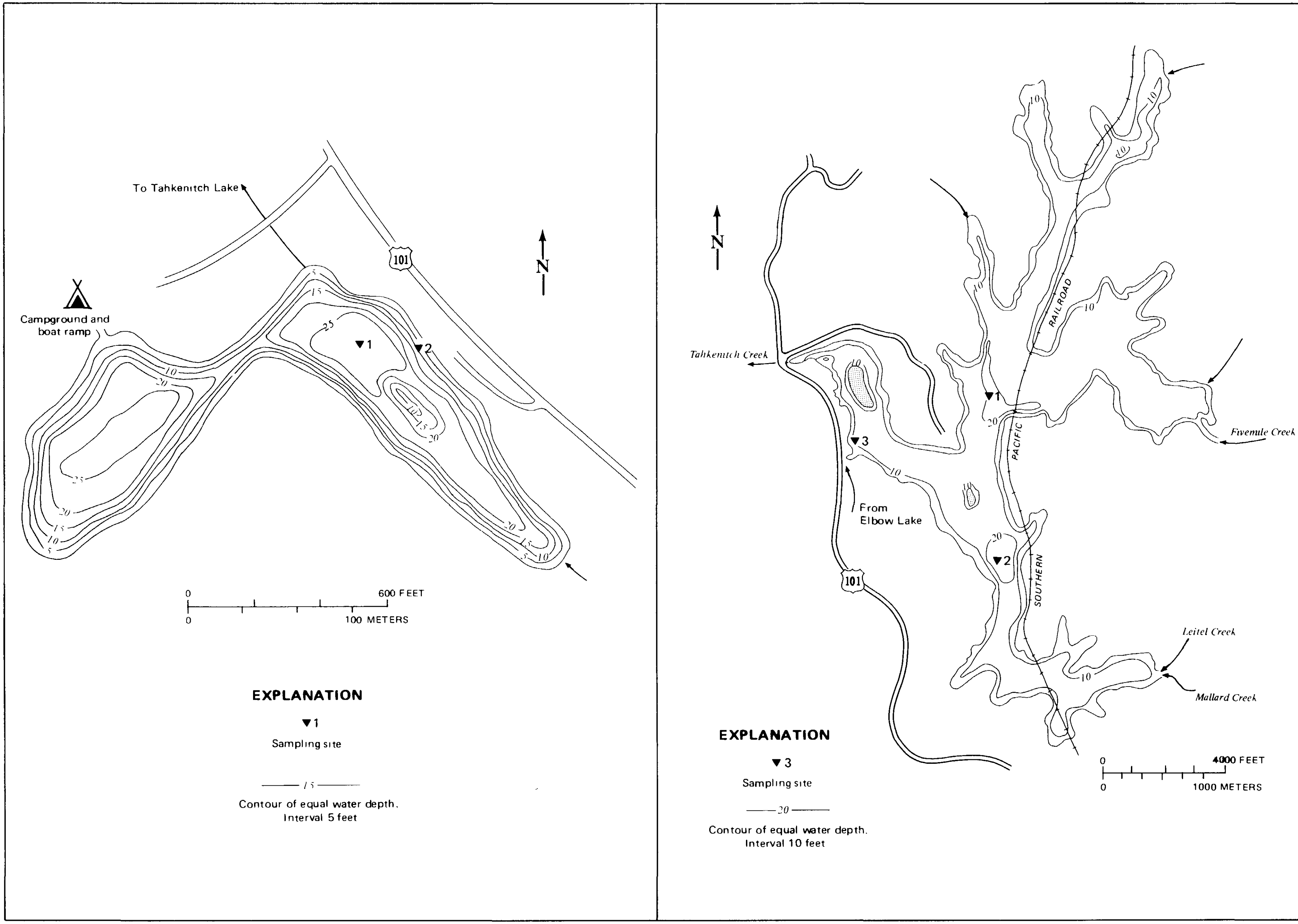


CARTER LAKE

LOON LAKE

THREEMILE LAKE (SOUTH)

FIGURE 17. – Bathymetric maps showing sampling-site locations.



ELBOW LAKE

TAHKENITCH LAKE

FIGURE 17. – Bathymetric maps showing sampling-site locations -- continued.

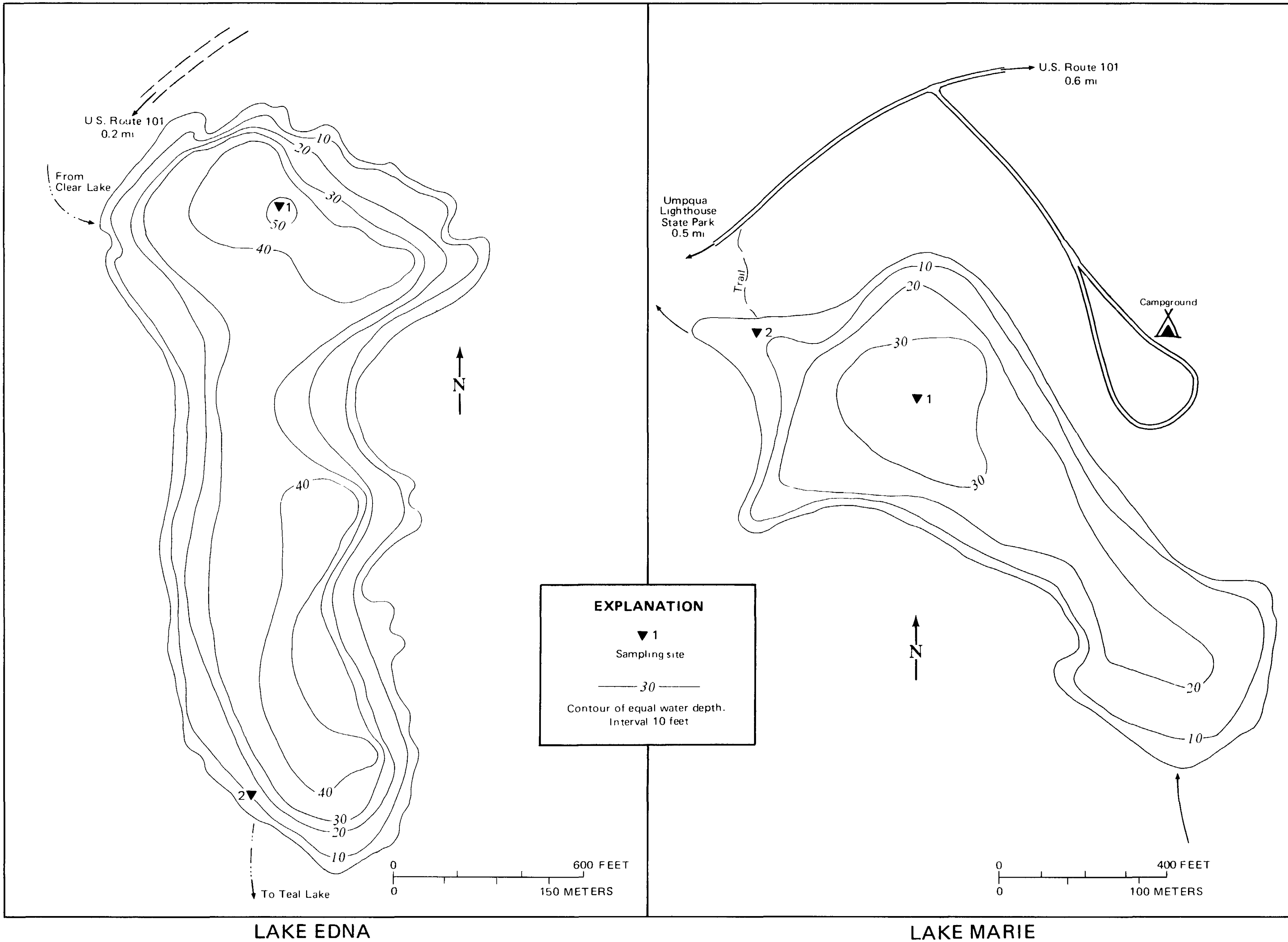
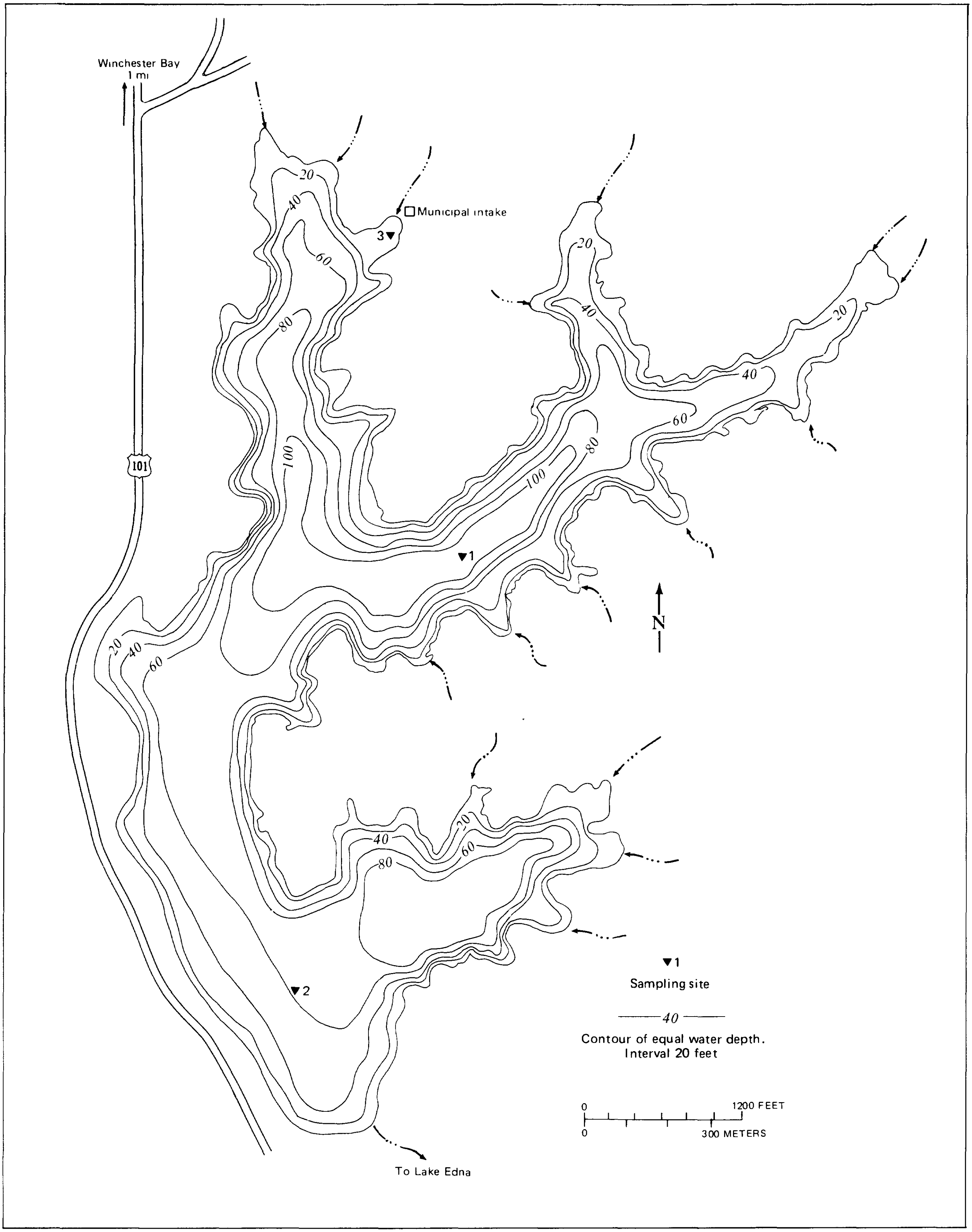


FIGURE 17. – Bathymetric maps showing sampling-site locations -- continued.



CLEAR LAKE

FIGURE 17. – Bathymetric map showing sampling-site locations -- continued.

Table 4.--Records of selected wells and springs in western Douglas County

Well number: See plate 1 for description of well-numbering system.
Type of well: C. cable tool; A, air rotary.
Finish: O, open end; P, perforated; S, screened; X, open hole.
Altitude: Altitude of land surface at well, in feet above sea level.
Water level: Depth to water given in feet and decimal fractions were measured; those given in whole feet were reported by well driller or owner. Water levels above land surface preceded by +.
Specific conductance: Field or laboratory measurements by U.S. Geological Survey personnel; micromhos per centimeter at 25°C.
Temperature: Field measurement by U.S. Geological Survey personnel.

Well performance: Yield, in gallons per minute, and drawdown, in feet, generally reported by driller, owner, or pump company for period indicated under "Remarks."
Use: H, domestic; I, irrigation; N, industrial; P, public supply; R, recreational; S, stock; U, unused; Z, abandoned.
Remarks: C, chemical analysis reported in table 6 ; T, chemical analysis for trace metals reported in table 7 ; L, driller's log in table 5; P, pumped; B, bailed; or A, air lift, for indicated time to determine yield under "Well performance"; H, hydrograph in report.

Well or spring number	Owner	Type of well	Year completed	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Altitude (feet)	Water level: Feet below datum	Water level: Date	Specific conductance of water	Temperature (°C)	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Use	Remarks
								T. 19 S., R. 12 W.									
34BBC1	U.S. Forest Service	A	1978	98	6	90	S, 85-90, P, 85-90	Sand	28	6.98	03-18-80	480	14.0	8	50	U	A 4 hr, L.
34BBC2	do.	C	1978	54	6 5	50 44-48	S, 48-53	do.	25	12.0	07-29-78	184	12.2	30	12	R	P 8 hr, L.
								T. 20 S., R. 10 W.									
31ADD1	Gladys Standley	C	1973	422	8	26	X	Sandstone	150	65.0	10-02-73	--	--	15	64	H	P 2 hr.
31BCC1	K. K. Kenagy	C	1970	117	6	25.5	X	Sand and clay	50	12.80	05-11-79	77	13.0	20	30	H	B 0.5 hr, C, L.
32CBD1	Everett Weist	C	1968	103	6	60.5	X	do.	80	34.30	do.	--	--	12	20	U	B 2 hr.
32CCA1	Colman Borders	C	1976	300	6	130	X	Sandstone	150	111	09-08-76	--	--	16	171	H	B 1 hr.
								T. 20 S., R. 11 W.									
35DBC1	Ray Harris	C	1973	90.5	6	38.50	X	Sandstone	50	24	10-17-73	--	--	10	15	H	P 2 hr.
36BDA1	S. C. Smith	C	1967	234	6	34.0	X	Sandstone and shale	50	36	10-30-67	--	--	8	150	U	P 2 hr, L.
								T. 20 S., R. 12 W.									
01ACA1	Ada Resort	--	--	--	--	--	--	--	220	--	--	75	12.8	--	--	H	Spring.
01CAC	Will Sparrow	C	1979	64	6	37.0	P, 26.50-37.0	Clay and shale	25	8	02-13-71	--	--	15	9	H	P 1 hr.
04ABB1	U.S. Forest Service	A	1978	65	6	60.0	S, 60-65	Sand	100	5	06-06-78	245.0	12.2	40	0	R	A 4 hr, C, T, L.
04ABB2	do.	A	1978	204	6	110	X	do.	160	86.5	07-22-80	320	13.0	.5	90	U	A 4 hr, L.
04BDC1	Charles Robinson	C	1972	215	6	20	X	Sandstone	160	18.25	03-18-80	--	--	1.33	215	U	B 1 hr.
04CBA1	do.	C	1976	135	6	19	X	do.	170	26.15	do.	310	--	7	102	H	Do.
05DDD1	U.S. Forest Service	C	1961	54	6	50	O	Sand	50	--	--	122	11.7	33	14	R	P 2 hr.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year com-pleted	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Alti-tude (feet)	Water level: Feet below datum	Water level: Date	Specific conduct-ance of water	Temper-ature (°C)	Well performance: Yield (gal/min)	Well performance: Draw-down (feet)	Use	Remarks
T. 20 S., R. 12 W.--Continued																	
29DAC1	U.S. Forest Service	A	1978	200	6	50	X	Sand	35	Dry	--	--	--	--	--	U	L.
32ABA1	do.	C	1963	31.5	6	26	S, 26-31.5	Sandstone and clay	20	10.4	05-08-79	110	10.8	12	5	R	P 5.5 hr, C, T, L.
T. 21 S., R. 10 W.																	
04BAA1	Mast	--	--	--	--	--	--	--	40	--	--	268	13.6	--	--	U	Spring.
T. 21 S., R. 11 W.																	
02DBB1	Lyle Lyster	C	1972	307.5	6	37.83	X	Sandstone and shale	20	1	07-10-72	--	--	5	287	H	P 0.75 hr.
03ABD1	Lawrence Noel	C	1956	111	6	32.5	X	Hard rock	5	43.3	03-20-80	310	10.6	1	111	H	B, C.
03CAD1	Lyle Earle	C	1973	90.5	6	78.0	X	Clay, shale	10	1.25	do.	--	--	32	36	U	B 1.25 hr.
08DAC1	W. F. Muffet	C	1969	142	6	75.0	P, 65-75	Clay	10	4.15	do.	800	14.0	10	31	U	P 1 hr.
08DAD1	do.	C	1969	78	6	35.0	X	Sandstone	5	10	09-22-69	58	9.6	15	62	H	P 1.5 hr, C, L.
09DAD1	L. F. Peterson	C	1957	105	6	25.0	X	do.	50	38	06-03-57	--	--	10	62	H	B 0.5 hr.
16ABB1	Rod Brandon	C	1973	60	6	46.0	X	do.	50	40	09-21-73	53	11.2	5	60	H	B 1 hr, C.
21DCC1	Bill Hardy	C	1973	33	6	20.67	X	do.	60	8	10-03-73	54	9.8	7	33	H	B 1.5 hr.
28BAB1	Bruce Harris	C	1976	38	6	26.50	X	do.	30	10	05-11-76	--	--	45	0	H	B 2 hr.
T. 21 S., R. 12 W.																	
22ABA1	U.S. Forest Service	C	1967	282	8	40.5	X	Sandstone and shale	20	+.65	05-09-79	--	--	6	252	U	B 6 hr, C, L.
23DAC1	M. E. Andrews	C	1971	55	6	47.6	X	Sandstone	30	9.0	do.	159	14.4	8	55	H	B 1 hr, C.
23DAC2	do.	C	1971	284	6	20.0	X	do.	35	19.4	07-24-80	1,750	8.3	.17	284	U	B 3 hr.
24BAB1	Mary Mendiaz	C	1973	70	6	20.0	X	do.	20	11	10-15-73	240	--	6	70	H	B 1 hr.
24BBA1	F. C. Morey	C	1963	96	6	87.5	X	do.	75	36.0	07-18-63	--	--	15	45	H	Do.
24BDD1	B. E. Bliss	C	1974	305	6	48.0	P, 30-45 X, 48-305	do.	30	28.25	04-08-80	133	12.2	2	278	H	B 1 hr, C.
24CAA1	C. M. Dawson	--	--	--	--	--	--	--	200	--	--	124	--	--	--	H	Spring.
26CCD1	Bohemia, Inc.	C	1979	115	8	22.0	X	Sandstone	12	4.72	05-09-79	--	--	3	110	U	B 1 hr, L.
26DAA1	Ray Gardner	C	1971	57	6	38.0	X	Clay and sandstone	30	17.24	04-09-80	225	10.5	15	57	H	B 1 hr.
27CCD1	Ray Holladay	--	--	--	--	--	--	--	70	--	--	110	13.0	--	--	U	Spring.
28DDD1	do.	C	1956	208	6	200	P, 195-200 X, 200-208	Sand and silt	40	19.64	08-03-78	580	12.0	66	--	H	P 1 hr, C.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year com-pleted	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Alti-tude (feet)	Water level: Feet below datum	Water level: Date	Specific conduct-ance of water	Temper-ature (°C)	Well performance: Yield (gal/min)	Well performance: Draw-down (feet)	Use	Remarks
								T. 21 S., R. 12 W.--Continued									
33DBB1	J. K. Hubbard	C	1966	127.5	6	124	X	Sand and gravel	40	16	07-22-66	120	13.0	30	20	H	B 5 hr, L.
33DCB1	do.	C	1966	142	--	--	--	Clay and sand	60	38	08-04-66	--	--	30	20	Z	Do.
								T. 22 S., R. 7 W.									
15DCD1	Douglas Forest Protec-tive Assoc.	A	1975	130	6	40.0	X	Marine basalt (medium hard)	140	25.70	09-02-80	610	13.8	50	107	H	P 1 hr, C. L.
22CBB1	Francis Mack	C	1967	85	6	67.50	X	Sandstone	190	10.80	09-25-79	2,310	18.0	25	15	I	B 1 hr, C.
29BBD1	F. D. Hawkinson	C	1962	109	6	25.0	X	do.	170	63.70	06-05-79	348	15.3	40	8	H	Do.
29BBD2	Sidney Gates	C	1966	178	6	24.0	X	Basalt	180	83.60	06-06-79	282	13.6	20	40	H	B 0.5 hr.
30DAA1	F. W. Mode	C	1979	97	6	35.0	X	Sandstone	100	34.10	do.	296	14.5	25	35	H	B 1 hr.
30DAD1	Frank Madison	C	1979	68	6	32.5	X	do.	120	23.4	do.	438	15.3	15	35	I	B 2 hr.
30DDB1	do.	C	1979	70	6	35.0	X	do.	230	37.20	do.	695	15.0	12	22	H	B 1 hr.
31ABB1	Bennie Knypstta	A	1973	250	6	36.0	X	Marine basalt	250	38.0	04-16-73	--	--	25	150	U	B 1 hr. Saltwater reported.
31CDD1	L. A. Montgomery	A	1973	120	6	30.0	X	Claystone	330	13.4	06-12-79	153	13.4	19	84	H	A 1 hr.
31DCD1	do.	C	1971	59.5	6	19.50	X	Sandstone	300	20.0	08-20-71	276	--	10	50	H	B 1 hr.
32CAC1	H. L. Perry	A	1974	200	6	45.0	X	Claystone	260	34.2	06-05-79	372	--	20	120	H	A 1 hr.
32CDC1	B. L. Clark	A	1975	360	6	44.0	X	Sandstone	340	102.8	do.	274	15.5	2.50	240	H	Do.
32DCD1	Ken Kolar	A	1979	330	6	65.0	X	do.	480	74.30	do.	292	21.3	37.0	80	H	Do.
								T. 22 S., R. 8 W.									
05DCB1	Erik Albro	A	1975	125	6	41.0	X	Marine basalt	150	37.0	07-23-79	192	14.3	12	30	H	A 1 hr.
07CDA1	C. A. Martin	C	1962	80	6	35.0	X	Sandstone and claystone	60	27.90	do.	168	15.4	10	35	H	B 1 hr, C. L.
07CDA2	do.	C	1962	134	6	38.0	X	do.	60	54	09-14-62	--	--	4	66	Z	B 1 hr. Saltwater reported.
09DAB1	Homer Smith	C	1970	128	6	36.0	X	Claystone	70	41.50	09-17-79	3,350	12.5	4	65	H	B 1 hr, T, C, L.
09DBA1	A. J. Smith	C	1970	105	6	27.0	X	Limestone	70	43.10	do.	314	13.0	15	50	H	B 1 hr, C.
90DBA2	do.	C	1970	108	6	40.0	X	do.	70	--	--	--	--	0	--	U	
10BAB1	Merrill	--	--	--	--	--	--	--	870	--	--	91	12.4	--	--	H	Spring.
10CAD1	Vant Zet	A	1968	200	6	20.0	X	Sandstone	100	51.90	07-26-79	515	14.5	15	135	H	B 1 hr.
16CBB1	Fenn	C	1964	76	6	30.0	X	do.	130	20.50	09-19-79	1,040	14.4	5	--	H	B, C.
17DDD1	F. H. Barnthouse	C	1966	75	6	49.60	X	do.	140	31.90	07-24-79	216	15.0	6	20.0	H	B 1 hr.
20AAB1	Raymond Monner	C	1959	44	6	40.0	X	do.	140	21	--	213	--	24	0	H	B.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year completed	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character	Altitude (feet)	Water level: Feet below datum	Water level: Date	Specific conductance of water	Temperature (°C)	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Use	Remarks
								T. 22 S., R. 8 W.--Continued									
21CCC1	Conrad Godding	C	1964	100	6	40.0	X	Claystone	100	38	02-26-66	328	13.2	40	25	H	B 0.5 hr.
21DCA1	Craig Royce	A	1977	345	6	40.0	X	Sandstone	250	15	09-19-79	2,170	14.9	10	28	H	A 1 hr, C.
22BBC1	Kenneth Gossel	C	1961	85	6	22.0	X	Clay	90	47.70	09-27-79	--	--	5	15	U	B 1 hr, H, L.
23ACD1	George Fenn	A	1974	270	6	43.0	X	Sandstone	160	133.90	09-19-79	7,060	13.4	60	58	I	A 1 hr, C, T, H, L.
23BAA1	Ray Bishop	A	1973	110	6	39.0	X	do.	100	32.2	09-18-79	368	14.0	20	80	H	A 1 hr.
23BAB1	C. A. Shafer	A	1974	155	6	50.0	X	do.	100	36.8	do.	480	17.9	20	90	H	Do.
24CAC1	Eugene Mitchell	C	1965	116	6	20.0	X	Sandstone and claystone	260	12	06-24-65	2,240	15.6	7	97	H	B 1 hr, C.
28BCB1	B. F. Mohler	A	1974	170	6	47.0	X	Claystone	250	48.40	09-25-79	1/167	2/13.3	30	85	H	A 1 hr.
29ADC1	Bob Waldren	A	1977	295	6	31.0	X	Marine basalt	170	290.0	07-25-79	585	15.7	25	272	H	Do.
29DBA1	George Bowman	C	1967	100	6	60.0	X	Siltstone	200	40	08-15-67	2,900	16.2	12	40	H	B 1 hr, C.
29DBB1	Bowman	--	1970	120	--	--	X	--	215	68.1	09-28-79	2,330	13.9	--	--	I	
33DBD1	Boyd Garrison	C	1967	130	6	18.0	X	Sandstone	600	50.40	06-11-79	494	14.4	3.0	85	H	B 1 hr.
34CDA1	Wilbur Garrison	C	1956	56	6	28.0	X	Claystone and shale	240	7.0	09-20-56	490	13.8	60	7	H	B.
34DDB1	Garrison	C	1961	79	6	73.0	P, 66-73	Sandstone and claystone	260	22.0	06-11-79	--	--	20	23	U	B 1 hr.
36CCD1	Norman Compton	C	1959	110	6	24.5	X	Sandstone	150	17	09-15-59	508	--	15	74	H	B 2 hr.
36CCD2	do.	A	1973	170	6	20.0	X	do.	150	26.20	06-12-79	424	12.7	6	0	H	A 1 hr.
								T. 22 S., R. 9 W.									
08ABC1	Everett Hendrickson	C	1963	76	6	56.0	X	Claystone	30	18.7	07-21-80	--	--	30	32	U	B 1 hr.
08ABD1	McCoy	C	1970	120	6	55.5	X	do.	80	44.1	07-16-80	550	--	12	84	H	Do.
08ADC1	Wayne Stauffer	C	1978	80	6	42.5	X	do.	80	33.3	do.	364	14.6	35	20	H	Do.
08DAB1	L. C. Gates	C	1976	80	6	33.0	P, 33-80	do.	60	28.20	do.	378	14.8	20	22	H	Do.
08DCD1	William Mechelke	C	1974	105	6	48.0	X	do.	35	42.3	07-23-80	9,900	14.4	1	103	U	B 1 hr, C, L.
08DCD2	Pat Rooney	C	1976	105	6	44.0	X	--	35	32.0	06-08-76	--	--	2	105	U	B 1 hr. Saltwater reported.
08DDA1	E. G. Wright	C	1972	104	6	49.5	X	Clay and gravel	140	31.4	07-21-80	49	13.0	15	20	H	P 2.5 hr.
08DDC1	A. W. Lewis	C	1974	80	6	43.0	X	Claystone	50	4.30	05-11-79	382	14.7	10	60	H	B 1 hr, C, L.

1/ Conductivity taken 07-15-81. 2/ Temperature taken 07-15-80.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year com-pleted	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character	Alti-tude (feet)	Water level: Feet below datum	Water level: Date	Specific conduct-ance of water	Temper-ature (°C)	Well performance: Yield (gal/min)	Well performance: Draw-down (feet)	Use	Remarks
T. 22 S., R. 9 W.--Continued																	
13AAD1	Ainor Soderback	A	1965	110	6	42.0	X	Sandstone	60	55.0	07-23-79	297	14.8	25	110	H	B 1 hr.
13AAD2	do.	C	1965	130	6	--	--	do.	60	60.0	10-16-57	--	--	4	--	H	B.
13ACA1	Kenneth Abraham	A	1978	45	6	41.0	X	Sand and gravel	60	15.7	09-26-79	3,260	15.3	15	20	H	A 1 hr, C, L.
13ACB1	Ron Abraham	A	1978	175	6	41.0	X	Sandstone	60	34.0	do.	2,760	15.4	30	135	H	A 1 hr, C.
15DBD1	William Love	A	1978	74	6	37.0	X	do.	70	--	--	3,090	17.6	26	--	H	A, C.
16BBB1	R. B. Cornelius	C	1975	125.0	6	63.0	X	do.	160	80	11-12-75	3/745	4/12.8	8	125	H	B 1 hr.
16BBB2	Richard Koehstar	C	1972	110	6	63.0	X	do.	300	84.1	07-16-80	214	12.8	4	40	H	Do.
18ABA1	Robert Parsons	C	1963	66	6	33.0	X	Basalt	80	--	--	212	15.0	30	16	I	Do.
18CAC1	Scottsburg Community Church	C	1964	80.5	6	40.0	X	Sandstone and shale	40	44.6	07-17-80	216	16.8	12	0	H	B 8 hr.
18CBD1	D. D. Murphy	C	1975	50	6	31.0	X	Sandstone	40	34.8	do.	204	12.2	5	18	H	B 1 hr.
18CDA1	do.	C	1967	61	6	35.5	X	Siltstone	30	33.9	do.	135	13.0	10	31.0	H	Do.
18DBD1	Henry Jackson	C	1972	55	6	35.0	X	Claystone	50	25.9	do.	182	--	12	15.0	H	Do.
T. 22 S., R. 10 W.																	
06CDA1	Brandy Bar Limited	A	1979	60	6	59.0	P, 49-59 X. 59-60	Sand and gravel	20	17.4	07-24-80	550	14.4	200	0	P	A 1 hr, L.
06CDA2	do.	A	1979	60	6	59.0	P, 49-59	do.	20	17.2	do.	510	--	200	0	P	A 1 hr, C, T.
06CDA3	do.	A	1979	60	6	59.0	P, 49-59	do.	20	17.7	do.	460	12.7	180	0	P	A 1 hr.
06CDB1	do.	A	1979	80	6	79.0	P, 69-79 X, 79-80	Sand and gravel	20	13.7	do.	--	--	109	0	U	A 1 hr, L. Saltwater reported.
13CAD1	Kelly	C	1966	78	6	44.0	X	Claystone	50	37.7	07-22-80	675	--	4	78	H	B 1 hr, L.
13CCD1	Neideigh	A	1974	415	6	42.0	X	Sandstone	50	47	12-02-74	187	13.4	2	--	H	A, L.
13CDC1	Ralph Bacon	A	1979	245	6	39	X	do.	40	15.9	07-24-80	86	15.4	1/5	206	H	A 1 hr.
13DCC1	Douglas County Park Dept.	C	1965	77	8	31.0	X	Claystone	30	23.0	07-18-80	163	--	25.0	15	H	B 2 hr, C.
14CBB1	Weber	C	1975	63	6	40	X	Sandstone	40	30	06-16-75	73	11.0	60	0	H	B 1 hr.
14DBA1	Russel	C	1965	91	6	41	X	do.	30	20	06-05-75	154	13.0	9	56	H	B 2 hr.

3/ Conductivity taken 07-16-80. 4/ Temperature taken 07-16-80.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year completed	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Altitude (feet)	Water level: Feet below datum	Water level: Date	Specific conductance of water	Temperature (°C)	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Use	Remarks
								T. 22 S., R. 10 W.--Continued									
14DBD1	Stearns	C	1961	71	6	46	X	Sandstone	40	24.8	07-22-80	112	13.8	30	12	H	B 1 hr, C.
35DAC1	Bureau of Land Management	C	1963	53	6	27	X	do.	120	--	--	243	--	15	20	H	B 1 hr, L.
								T. 22 S., R. 11 W.									
03BAD1	G. M. Leach	C	1964	150	6	28	X	Sandstone	20	12	08-19-64	--	--	1.33	138	U	B 1 hr.
03BAD2	do.	C	1962	75.5	6	26	X	Claystone	20	1	07-16-62	--	--	6	74	U	Do.
04DCA1	Farr	C	1972	100	10	55	P, 35-45	Sandstone	60	9.63	09-04-80	--	--	15	30	U	B 2.5 hr, L.
05AAC1	P. J. Washburn	--	--	--	--	--	--	--	240	--	--	100	13.0	--	--	H	Spring.
05BDA1	W. B. Warren	--	--	--	--	--	--	--	160	--	--	110	15.0	--	--	H	Do.
07AAA1	R. K. Stevens	C	1972	77	6	55.2	X	Sandstone and shale	60	10	12-05-72	68	17.4	15	8	H	B 2 hr.
07ACA1	R. Hakki	C	1973	78	6	41.6	X	Sandstone	80	20.5	07-18-80	770	--	4.5	78	H	B 1 hr.
08BAB1	Harry Wilkes	C	1972	95	6	26.75	X	do.	160	16	07-31-72	210	11.1	2.5	95	H	B 1 hr, C.
18ACD1	Bert Bartow	A	1979	200	6	61.0	X	do.	20	8.5	07-21-80	--	--	1	165	U	B 4 hr.
18DBB1	do.	C	1963	88	6	24.5	X	do.	60	32	06-21-63	422	17.3	5	56	H	B 1 hr, C.
								T. 22 S., R. 12 W.									
03ACA1	John Waggoner	C	1971	136	6	49.5	P, 29.5-49.5	Clay and gravel	80	27.64	08-31-78	127	13.0	16	135	H	B 0.5 hr.
03ACB1	do.	C	1957	107	6	90.0	X	Sandstone	70	23	06-08-57	--	--	40	10	U	B.
04DAC1	Leonard Larson	C	1963	250	6	20.0	X	do.	200	68.0	11-29-63	--	--	4	182	U	B 1 hr.
08CBB1	M. D. Andruss	C	1973	113	6	94.0	X	Sand and clay	10	80	09-19-73	7,000	--	.17	113	U	B 2 hr, L. Saltwater reported.
08CCB1	do.	C	1973	158	6	118.5	X	do.	20	60.0	09-15-73	--	--	.17	158	U	B 6 hr. Saltwater reported.
11DBA1	G. L. Grenz	C	1974	150	6	43.0	X	Sandstone	80	30.6	04-09-80	145	9.6	5	107	H	B 1 hr, C.
14ACD1	Jerry Graber	C	1980	120	6	49.0	X	do.	120	65.8	do.	170	11.3	3.5	120	H	B 2.5 hr, L.
14DAA1	Bob Billings	C	1976	218	6	42.0	X	do.	155	165	11-15-76	--	--	7	43.0	H	B 1 hr.
14DAB1	Barbara Mills	C	1976	113	6	30.0	X	do.	80	41.5	03-26-76	--	--	8	18	H	P 4 hr.
14DCA1	R. E. Dietrick	C	1976	190	6	18.5	X	do.	80	--	11-30-76	--	--	0	--	H	
31BCA1	Forrest Warren	C	1971	133	6	49.5	X	Claystone	320	59.2	05-14-80	365	--	15	60	H	B 1 hr, C.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year com-pleted	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Alti-tude (feet)	Water level: Feet below datum	Water level: Date	Specific conduct-ance of water	Temper-ature (°C)	Well performance: Yield (gal/min)	Well performance: Draw-down (feet)	Use	Remarks
								T. 22 S., R. 12 W.--Continued									
31BCA2	Forrest Warren	C	1978	159	6	59.0	X	Sandstone	320	88.0	05-14-80	--	--	5.5	38	H	P 4 hr, C, L.
31BCA3	do.	C	1971	233	6	39.0	X	do.	320	105.0	06-15-71	--	--	1	127	H	B 1 hr.
31BCA4	E. L. Pearson	C	1974	105	6	28.0	X	do.	320	60.0	03-12-74	--	--	20	15	H	Do.
31BCA5	J. J. Grabow	C	1963	148	6	39.5	X	do.	320	59.0	06-28-63	--	--	13.3	0	H	Do.
31BCB1	A. V. Jelinski	C	1966	50	6	50.0	P, 30-50	do.	270	17	08-17-66	180	11.2	16.7	33	H	Do.
31BCB2	T. E. Ogle	C	1966	39	6	33.0	S, 33-39	Sand	270	12.6	05-15-80	175	12.2	20	20	H	Do.
31BCB3	Roy Willingham	C	1969	72	6	70.0	S, 28-48	Sand and clay	270	12.1	do.	148	11.6	15	1	H	P 4 hr, C, L.
31BCC1	Glenn Briggs	C	1970	134	6	53.5	X	Claystone	340	70.2	05-12-80	650	10.8	11	36	H	P 1.5 hr, C.
31BCC2	Paul Chudy	C	1965	80	6	21.0	X	Sandstone	270	22.95	05-13-80	495	11.6	9	30.0	H	B 1 hr, C.
31CBD1	J. L. Blumberg	C	1960	105	6	76.5	P, 40-76.5	Clay and shale	320	29.8	05-14-80	--	--	3.3	105	U	B 0.75 hr.
31CBD2	J. E. Wilson	C	1958	55	6	55	P, 45-55	Shale	360	43	07-19-58	--	--	5	10	H	B 3 hr.
33ABD1	H. E. Smith	--	--	--	--	--	--	--	80	--	--	110	13.2	--	--	H	Spring.
								T. 22 S., R. 13 W.									
14DDA1	City of Reedsport	A	1978	72	6	72.0	O	Sand	15	23.98	10-03-78	--	--	--	--	U	C, L.
25DAD1	do.	A	1978	119	6	109.5	S, 109.5-119	do.	260	34.5	10-05-78	95	12.0	46	6.8	U	A 3 hr, C, L.
26DBD1	do.	A	1978	83	6	73.0	S, 73-83	do.	18	7.0	09-29-78	67	12.0	46	5.1	U	A 1.5 hr, C.
35ACA1	do.	A	1978	76	6	66.0	S, 66-76	do.	17	6.2	09-27-78	75	11.0	46	6.8	U	Do.
35DCC1	do.	A	1978	65	6	57.5	S, 54-64	do.	22	4.4	09-23-78	85	16.0	46	11.06	U	A 1.3 hr, C, L.
36AAA1	D. R. St. Claire	C	1962	49	6	44.0	S, 44-49	do.	230	33.9	08-10-78	95	14.0	40	2	H	B 1 hr.
36AAA2	Frank Hunter	C	1961	69	6	64.5	S, 64.5-69	do.	235	28.15	do.	151	15.0	4	12	H	B 2 hr.
36AAA3	Donald Whelpley	C	1978	100	6	60.0	P, 60-100	do.	240	38	02-15-78	152	14.0	12	23	H	P 4 hr.
36DAC1	E. J. Honn	C	1965	65	6	40.0	X	Claystone	160	11	06-03-65	--	--	10	10	H	B 1 hr.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year completed	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Altitude (feet)	Water level: Feet below datum	Water level: Date	Specific conductance of water	Temperature (°C)	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Use	Remarks
								T. 23 S., R. 7 W.									
07CAB1	Comfort	C	1961	120	--	--	--	Claystone	150	--	--	--	--	--	--	Z	Abandoned because of excess iron content.
07CBA1	do.	C	1961	106	6	19.00	X	do.	150	41.9	06-07-79	420	14.5	2.0	97	H	B 1 hr, L.
07CBB1	do.	C	1963	32	6	23.0	X	do.	150	6.2	do.	--	--	10	5	I	B 1 hr.
08BBC1	Whipple	C	1979	80	6	38.0	X	Shale	200	42.6	do.	214	--	30	30	H	B 2 hr.
17DDC1	Ray Shepherd	A	1977	295	6	30.0	X	Marine basalt	700	93.1	07-15-80	580	15.2	12	258	H	A 1 hr.
19ACB1	Mike Madison	A	1975	560	6	30.0	X	Sandstone	560	78	05-30-75	--	--	1	482	H	Do.
19ACB2	do.	C	1975	90	6	40.0	X	Claystone	560	30	07-17-75	--	--	2	50	H	B 1 hr.
20ACB1	Tim Shepard	C	1970	53	6	28.0	X	do.	280	13.0	07-15-80	424	15.3	10	25	H	Do.
20BDD1	C. M. Minter	C	1961	74	6	28.0	X	do.	260	25.8	06-07-79	279	--	15	40	H	B 1 hr, C.
20DCA1	Perry George	C	1970	100	6	20.0	X	Sandstone	240	45.0	06-19-79	--	--	4	50	H	B 1 hr.
20DDB1	J. M. Burke	C	1979	82	6	20.0	X	Claystone	200	24.3	do.	302	14.1	25	50	H	B.
21CDB1	J. A. Curzon	C	1965	71	6	36.0	X	Sandstone	160	45	10-15-65	--	--	20	10	H	B 1.5 hr.
22CAD1	C. Allison	C	1966	67	6	22.0	X	do.	220	40.9	06-20-79	348	12.7	30	3	H	B 1 hr.
22CBA1	R. Wilson	C	1979	85	6	39.0	X	do.	180	43.1	do.	339	13.2	6	45	H	Do.
22DAC1	Robert Bauer	C	1979	162	6	23.0	X	do.	220	36.0	do.	--	--	25	109	U	B 0.7 hr.
27DAB1	Eugene Holcomb	A	1980	147	6	20.0	X	Claystone	190	37.2	07-15-80	308	--	9	--	H	A.
27DBC1	George Cruikshank	A	1971	120	6	40.0	X	Sandstone	180	35.8	06-20-79	--	--	12	80	H	A 1 hr, C, L.
31BBC1	Don Mode	A	1979	160	6	20.0	X	Marine basalt	320	24.4	06-13-79	490	--	9	128	H	A 1 hr.
32BDD1	Douglas County Park Dept.	C	1961	76	6	39.0	X	Claystone	180	42	09-26-61	--	--	7	20	H	B 2 hr.
								T. 23 S., R. 8 W.									
01CBC1	Oregon Forest Nursery	A	1974	105	8	39.0	X	Claystone	130	7.40	06-12-79	635	--	25	55	H	A 4 hr, C, L.
12BBB1	do.	A	1978	100	8	43.0	X	Sand and gravel	140	39.5	07-24-79	750	15.4	13.5	62	U	A 1 hr.
25DDA1	Don Mode	A	1974	500	6	42.0	X	Sandstone	400	63	09-04-74	327	--	4	422	H	A 1 hr, L.

Table 4.--Records of selected wells and springs in western Douglas County--Continued

Well or spring number	Owner	Type of well	Year completed	Depth of well (feet)	Diameter of well (inches)	Depth of casing (feet)	Finish	Character of material	Altitude (feet)	Water level: Feet below datum	Water level: Date	Specific conductance of water	Temperature (°C)	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Use	Remarks
T. 23 S., R. 10 W.																	
02ACC1	Bureau of Land Management	C	1962	48	6	20.0	X	Sandstone	480	17	02-00-62	165	12.5	150.0	25	R	A 6 hr, C. T.
02BDA1	do.	C	1962	78	6	60.0	X	do.	520	56.6	03-21-80	--	--	2.5	15	U	P 1 hr.
12ACB1	R. T. Harder	C	1973	199	6	105.75	X	Claystone	420	82.6	09-20-79	1,120	14.4	3.5	199	H	B 3.5 hr, C, T, L.
24ACD1	Ash Valley School	C	1964	120	6	80.0	P, 53-80	Clay and sand	760	22	02-12-64	--	--	10	54	H	B 4 hr.
24DCD1	Sarah Buus	C	1965	65	6	55	X	Sandstone	400	15	02-02-65	--	--	13	40	H	B 1 hr.
25ABA1	do.	C	1973	125	6	108	X	Claystone	400	17	10-10-73	--	--	8	125	H	B 1 hr, L.

Table 5.--Drillers' logs of representative wells

Materials	Thickness (feet)	Depth (feet)
19S/12W-34BBC1. U.S. Forest Service. Altitude 28 ft. Drilled by Schoen Electric & Pump, 1978. Casing: 6-in. diam to 90 ft; perforated 85-90 ft, screened 85-90 ft		
Sand, "beach"	48	48
Sand, black, fine	48	96
Claystone, gray	2	98
19S/12W-34BBC2. U.S. Forest Service. Altitude 25 ft. Drilled by M & H Well Drilling, Inc., 1978. Casing: 6-in. diam to 50 ft, 5-in. diam 44-48 ft; screened 48-53 ft		
Sand, brown, fine	23	23
Sand, gray, fine	13	36
Sand and clay, gray	1	37
Sand, gray, fine	5	42
Sand, gray, with seashells	7	49
Sand, gray, fine	5	54
20S/10W-31BCC1. K. K. Kenagy. Altitude 50 ft. Drilled by Charles Panschow, 1970. Casing: 6-in. diam to 25⅓ ft; unperforated		
Clay, brown, and sand, mixed	8	8
Clay, yellow, and sand, mixed	11½	19½
Sandstone, gray, and clay and some shale	17½	37
Sandstone, gray, and shale	2	39
Sandstone, gray, and clay and some shale	4	43
Shale and some sandstone	2	45
Sandstone, gray, and clay	2	47
Shale	2	49
Sandstone, gray, and clay and some shale	21½	70½
Shale	½	71
Sandstone, gray, and clay and some shale	3½	74½
Shale	½	75
Sandstone, gray, and clay and some shale	8	83
Shale, gray, and some clay; water-bearing	34	117
20S/11W-36BDA1. S. C. Smith. Altitude 50 ft. Drilled by Charles Panschow, 1967. Casing: 6-in. diam to 34 ft; unperforated		
Clay, brown, and sand and chunks of sandstone	27½	27½
Clay, gray, and sandstone and some shale	½	28
Sandstone, gray, and some shale	85	113
Shale, gray, heavy	3	116
Sandstone, gray, and clay	3	119
Shale, gray, and some sandstone	6	125
Sandstone, gray, and clay and some shale	13	138
Shale, gray	2	140
Sandstone, gray, and some shale and clay	15	155
Shale, gray, and some sandstone	16	171
Clay, dark-gray, and shale	8	179
Sandstone, gray	1½	180½
Sandstone, gray, and shale	25½	206
Sand and shale, gray	8	214
Shale, gray, and some sandstone	10	224
Sandstone, gray, and shale	10	234
20S/12W-04ABB1. U.S. Forest Service. Altitude 100 ft. Drilled by Schoen Electric & Pump, 1978. Casing: 6-in. diam to 65 ft; unperforated, screened 60-65 ft		
Sand, "beach"	4	4
Sand, coarse	46	50
Sand, fine	15	65
20S/12W-04ABB2. U.S. Forest Service. Altitude 160 ft. Drilled by Schoen Electric & Pump, 1978. Casing: 6-in. diam to 110 ft; unperforated		
Sand, yellow-brown, cemented	3	3
Sand, yellow-brown	74	77
Clay, dark-brown, sandy	2	79
Sandstone, yellowish-brown	4	83
Sand, brown, cemented	23	106
Clay, blue-green, sandy	11	117
Claystone, gray, soft	11	128
Sandstone, gray, soft	10	138
Sandstone, gray	1	139
Claystone, gray, sandy	6	145

Materials	Thickness (feet)	Depth (feet)
20S/12W-04ABB2.--Continued		
Claystone, gray, soft	3	148
Sandstone, gray	40	188
Claystone, gray	4	192
Sandstone, gray	12	204
20S/12W-29DAC1. U.S. Forest Service. Altitude 35 ft. Drilled by Schoen Electric & Pump, 1978. Casing: 6-in. diam to 50 ft; unperforated		
Sand, "beach"	50	50
Sandstone, coarse	150	200
20S/12W-32ABA1. U.S. Forest Service. Altitude 20 ft. Drilled by Charles Panschow, 1963. Casing: 6-in. diam to 25 ft 8 in.; unperforated, screened 25 ft 8 in. to 31½ ft		
Sand	10	10
Sand and clay; water-bearing	24	34
Sand, wood, and dark clay	8	42
Clay, silty, dark-brown	4	46
Clay, gray, and wood	4	50
Clay and sandstone, light brown, and gray clay, mixed	21	71
Sandstone, blue, and clay	73	144
Shale, brown	1	145
Sandstone and clay; mixed	80	225
Sandstone	34	259
21S/11W-08DAD1. W. F. Muffet. Altitude 5 ft. Drilled by Charles Panschow, 1969. Casing: 6-in. diam to 35 ft; unperforated		
Soil, brown, and gravel	28	28
Clay, yellow, hard	2	30
Sandstone; with some water	18	48
Sandstone, hard	10	58
Slate and shale, hard	1½	59½
Rock, dark-gray, hard	2	61½
Slate, shale, and sandstone, mixed; water-bearing	13½	75
Slate, shale, and sandstone	3	78
21S/12W-22ABA1. U.S. Forest Service. Altitude 20 ft. Drilled by Charles Panschow, 1967. Casing: 8-in. to 40½ ft; unperforated		
Clay, gray, and wood	10	10
Clay, gray, and sand and wood	10	20
Sand, gray, and wood	10	30
Clay, gray, and sandstone	8½	38½
Sandstone, gray, and shale	68½	107
Clay, gray, and some sandstone and shale	3	110
Sandstone, gray	9	119
Sandstone, gray, and shale	16	135
Sandstone, gray, and some shale	10	145
Sandstone, gray	10	155
Shale, gray, and sandstone; mixed	10	165
Shale, gray	9	174
Sandstone, gray, and clay, mixed	1	175
Sandstone, gray	5	180
Shale and clay, light-gray; mixed	1	181
Sandstone, gray, fine	19½	200½
Shale, dark-gray	½	201
Sandstone, gray, fine	8½	209½
Sandstone and shale, dark-gray, fine, mixed	1½	211
Sandstone, gray	9	220
Shale and clay, gray, mixed	1	221
Sandstone, gray, and some shale	20	241
Sandstone, gray, with light clay and some shale	10	251
Sandstone, gray, and shale	7	258
Shale, gray, and clay; water-bearing	2	260
Sandstone and shale	1	261
Sandstone, gray, and some clay and shale; water-bearing	21	282

21S/12W-26CCD1. Bohemia Lumber Co. Altitude 12 ft. Drilled by Barrington Well Drilling, 1973. Casing: 8-in. diam to 22 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, brown, sandy	14	14
Claystone, brown, hard	11	25
Sandstone, blue	2	27
Sandstone, brown	13	40
Sandstone, gray	75	115

21S/12W-33DBB1. J. K. Hubbard. Altitude 40 ft. Drilled by Charles Panschow, 1966. Casing: 6-in. diam to 124 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, yellow	28	28
Clay, gray, and sand	70	98
Clay, brown and gray; mixed	8	106
Clay, gray	11	117
Sand, gray, and gravel; water-bearing	10½	127½

21S/12W-33DCB1. J. K. Hubbard. Altitude 60 ft. Drilled by Charles Panschow, 1966. Casing: 6-in. diam to 139 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, yellow	25	25
Clay, dark-yellow	25	50
Clay, dark-yellow, and sand; water-bearing	12	62
Clay, dark-yellow	18	80
Clay, blue	15	95
Clay, blue, and sand; mixed	41	136
Sand, brown, and clay and gravel; water-bearing	6	142

22S/07W-15DCD1. Douglas Forest Protective Assoc. Altitude 140 ft. Drilled by Mohr Well Drilling, Inc., 1975. Casing: 6-in. diam to 40 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Soil, brown	4	4
Clay, sandy	19	23
Clay, gravel, sandy	4	27
"Marine basalt," fractured	7	34
"Marine basalt," hard	49	83
"Marine basalt," medium-hard	29	112
"Marine basalt," hard	18	130

22S/08W-07CDA1. C. A. Martin. Altitude 60 ft. Drilled by Steiber's Well Drilling, 1962. Casing: 6-in. diam to 35 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Soil, brown, sandy	10	10
Clay, brown, compact	20	30
Claystone, blue	5	35
Sandstone, gray, medium	2	37
Claystone, blue	3	40
Sandstone, gray, medium; water-bearing (4 gal/min)	5	45
Sandstone, gray, medium, and blue claystone; water-bearing (6 gal/min)	35	80

22S/08W-09DAB1. Homer Smith. Altitude 70 ft. Drilled by John T. Beck, 1970. Casing: 6-in. diam to 36 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Soil, black	3	3
Clay, red	9	12
Claystone and rocks, mixed	5½	17½
Hardpan, clay	16½	34
Claystone, gray	56	90
Limestone	24	114
Claystone, blue	14	128

22S/08W-22BBC1. Kenneth Gossel. Altitude 90 ft. Drilled by Floyd Walton, 1961. Casing: 10-in. diam to 22 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, red	17	17
Gravel	2	19
Clay, blue, hard	19	38
Rock, blue, hard	5	43
Clay, blue	35	78
Sand, black, coarse	1	79
Clay, blue	6	85

22S/08W-23ACD1. George Fenn. Altitude 160 ft. Drilled by Casey Jones Well Drilling Co., Inc., 1974. Casing: 6-in. diam to 43 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Soil, brown	1	1
Clay, brown	24	25
Clay, light-brown, sandy	10	35
Clay, brown, and gravel	2	37
Sandstone, blue	22	59
Sandstone, gray	35	94
Claystone, gray	38	132
Sandstone, gray	106	238
Sandstone, dark-gray	10	248
Sandstone, light-gray	22	270

22S/09W-08DCD1. William Mechelke. Altitude 35 ft. Drilled by Barrington Well Drilling, 1974. Casing: 6-in. diam to 48 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, dark-brown	14	14
Clay, light-brown	8	22
Clay, brown, sandy	20	42
Claystone, blue, hard	63	105

22S/09W-08DDC1. A. W. Lewis. Altitude 50 ft. Drilled by Barrington Well Drilling, 1974. Casing: 6-in. diam to 43 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Clay, dark-brown	4	4
Clay, light-brown	10	14
Claystone, blue	11	25
Gravel, small	12	37
Claystone, gray	43	80

22S/09W-13ACA1. Kenneth Abraham. Altitude 60 ft. Drilled by Casey Jones Well Drilling Co., Inc., 1978. Casing: 6-in. diam to 41 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Soil	2	2
Clay, brown	20	22
Clay, gray	13	35
Sand and gravel	10	45

22S/10W-06CDA1. Brandy Bar Limited. Altitude 20 ft. Drilled by G. L. Meyer Well Drilling, 1979. Casing: 6-in. diam to 59 ft; perforated 49-59 ft

Materials	Thickness (feet)	Depth (feet)
Loam, sandy	18	18
Sand and gravel	42	60

22S/10W-06CDB1. Brandy Bar Limited. Altitude 20 ft. Drilled by G. L. Meyer Well Drilling, 1979. Casing: 6-in. diam to 79 ft; perforated 69-79 ft

Materials	Thickness (feet)	Depth (feet)
Loam, sandy	18	18
Sand and gravel	62	80

22S/10W-13CAD1. Kelly. Altitude 50 ft. Drilled by George R. Miller, 1966. Casing: 6-in. diam to 44 ft; unperforated

Materials	Thickness (feet)	Depth (feet)
Boulders and clay (slide area)	10	10
Clay, tan	26	36
Clay, tan, and gravel	4	40
Claystone, blue	3	43
Sandstone, hard, fine-grained	35	78

Materials	Thickness (feet)	Depth (feet)
22S/10W-13CCD1. Neideigh. Altitude 50 ft. Drilled by Mohr Well Drilling, 1974. Casing: 6-in. diam to 42 ft; unperforated		
Soil, black, sandy	3	3
Clay, yellow, sandy	11	14
Clay, gray, sandy	17	31
Sandstone, broken	4	35
Sandstone, medium-hard	155	190
Sandstone, hard	80	270
Sandstone, medium-hard; water bearing at 390 ft	120	390
Sandstone, hard	25	415
22S/10W-35DAC1. Bureau of Land Management. Altitude 120 ft. Drilled by Casey Jones Well Drilling Co., 1963. Casing: 6-in. diam to 27 ft; unperforated		
Gravel	3	3
Soil, brown	20	23
Sandstone, blue	10	33
Granite, blue	20	53
22S/11W-04DCA1. Farr. Altitude 60 ft. Drilled by Charles Panschow, 1972. Casing: 10-in. diam to 55 ft; perforated 35-45 ft		
Gravel and blue clay	29	29
Clay, blue, and sand and gravel	15	44
Clay, gray	2½	46½
Clay, yellow, and sand and gravel, mixed	1½	48
Sandstone, gray	22	70
Shale, brown	3	73
Sandstone, gray	17	90
Shale, brown	6	96
Sandstone, gray, hard	4	100
22S/12W-08CBB1. M. D. Andruss. Altitude 10 ft. Drilled by George R. Miller & Son Well Drilling, 1973. Casing: 6-in. diam to 94 ft; unperforated		
Clay fill, brown	3	3
Clay, black	2	5
Peat	19	24
Clay, dark-gray, with wood and shell	46	70
Sand, dark-gray, muddy, with wood and shell	5	75
Clay, dark-gray	14	89
Sandstone, gray	24	113
22S/12W-14ACD1. Jerry Graber. Altitude 120 ft. Drilled by Bill Miller Well Drilling, 1977. Casing: 6-in. diam to 49 ft; unperforated		
Soil, dark-brown, clayey	4	4
Clay, brown, sandy	26	30
Sandstone, brown	19	49
Sandstone, gray, with claystone lenses	71	120
22S/12W-31BCA2. Forrest Warren. Altitude 320 ft. Drilled by Bill Miller Well Drilling, 1978. Casing: 6-in. diam to 59 ft; unperforated		
Soil, dark-brown, clayey	1	1
Claystone, brown, soft	19	20
Claystone, brown, soft, fractured	5	25
Claystone, brown, soft, fine	15	40
Claystone, dark-gray	5	45
Sandstone, brown, fine	14	59
Sandstone, blue, very hard	2	61
Sandstone, brown, fine	11	72
Sandstone, gray, soft	10	82
Sandstone, brown, fine	20	102
Sandstone, gray, fine	25	127
Sandstone, gray, coarse	18	145
Claystone, dark-brown, with coal	1	146
Siltstone, gray	13	159
22S/12W-31BCB3. Roy Willingham. Altitude 270 ft. Drilled by Barrington Well Drilling, 1969. Casing: 6-in. diam to 24 ft, 4-in. diam to 70 ft; unperforated		
Sand and clay, brown	28	28
Sand, brown, with wood	20	48
Clay, brown	3	51
Claystone, gray, soft	21	72
22S/13W-14DDA1. City of Reedsport. Altitude 15 ft. Drilled by Aqua-Tech Well Construction Co., Inc., 1978. Casing: 6-in. diam to 72 ft; unperforated		
Sand, brown, medium-fine	38	38
Sand, brown, medium-fine, tightly packed	34	72
22S/13W-25DAD1. City of Reedsport. Altitude 260 ft. Drilled by Aqua-Tech Well Construction Co., Inc., 1978. Casing: 6-in. diam to 109½ ft; screened 109½ to 119 ft		
Sand, light brown, medium-fine	38	38
Sand, brown, medium-fine, with streaks of silty clay	81	119
22S/13W-35DCC1. City of Reedsport. Altitude 22 ft. Drilled by Aqua-Tech Well Construction Co., Inc., 1978. Casing: 6-in. diam to 57½ ft; screened 54 to 64 ft		
Sand, brown, medium-fine	66	66
Sandstone, green, decomposed	4	70
23S/07W-07CBA1. Comfort. Altitude 150 ft. Drilled by Steibers Well Drilling, 1961. Casing: 6-in. diam to 19 ft; unperforated		
Soil with clay, brown	2	2
Clay, brown, with medium-sized sand	5	7
Gravel, medium, with coarse brown sand; loose	9	16
Sandstone, brown, coarse	6	22
Claystone, blue, water-bearing (2 gal/min)	38	60
Claystone, dark-gray	23	83
Claystone, soft, cavey	1	84
Claystone, dark-gray	22	106

Materials	Thickness (feet)	Depth (feet)
23S/07W-27DBC1. George Cruikshank. Altitude 180 ft. Drilled by Flannery Well Drilling, 1971. Casing: 6-in. diam to 40 ft; unperforated		
Clay, brown	18	18
Sand and gravel	17	35
Basalt	40	75
Crevice, water-bearing (3 gal/min)	1	76
Bluestone, medium-hard	29	105
Crevice, water-bearing (12 gal/min)	1	106
Bluestone	14	120
23S/08W-01CBC1. Oregon Forest Nursery. Altitude 130 ft. Drilled by Mohr Well Drilling, Inc., 1974. Casing: 8-in. diam to 39 ft; unperforated		
Soil, brown, sandy	3	3
Sand, brown, medium	22	25
Gravel and medium-sized boulders	9	34
Claystone, light-gray, medium-hard; water bearing at 72 ft	71	105
23S/08W-25DDA1. Don Mode. Altitude 400 ft. Drilled by Mohr Well Drilling, Inc., 1974. Casing: 6-in. diam to 42 ft; unperforated		
Soil, dark-brown	1	1
Clay, yellow	26	27
Sandstone, broken	9	36
Sandstone, medium-hard	157	193
23S/08W-25DDA1.--Continued		
Sandstone, hard; water bearing at 485 ft	292	485
Sandstone, very hard	15	500
23S/10W-12ACB1. R. T. Harder. Altitude 420 ft. Drilled by George R. Miller & Son Well Drilling, 1973. Casing: 6-in. diam to 105.75 ft; unperforated		
Clay and boulders, brown	60	60
Claystone, brown, fractured	44	104
Claystone, gray, hard	36	140
Sandstone, gray, fine-grained	15	155
Claystone, gray, hard	15	170
Sandstone, blue	15	185
Claystone, gray	10	195
Sandstone, gray	4	199
23S/10W-25ABA1. Sarah Buus. Altitude 400 ft. Drilled by George R. Miller & Son Well Drilling, 1973. Casing: 6-in. diam to 108 ft; unperforated		
Soil, brown	1	1
Clay, tan	9	10
Clay, blue	25	35
Silt, gray, with wood	25	60
Clay, blue	12	72
Clay, brown	6	78
Clay, blue, sandy	25	103
Claystone, gray-brown, hard, brittle	14	117
Claystone, gray, hard, brittle	8	125

Table 6.--Water-quality data for wells and springs in western Douglas County

LOCAL IDENT-I-FIER	DATE OF SAMPLE	TIME	SAM-PLING DEPTH (FEET)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	BORON, DIS-SOLVED (UG/L AS B)	ARSENIC TOTAL (UG/L AS AS)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (STAND-ARD UNITS)	TEMPER-ATURE (DEG C)
20S/10W-31BCC1	80-06-19	1015	117	21	30	5	7.9	2.4	7.7	1.0	29	9.5	4.3	.10	1.8	10	2	71	30	1	.6	106	5.9	11.0
20S/12W-04ABB1	80-06-20	1000	65	11	70	20	3.0	2.7	16	.9	10	5.0	25	.10	.22	30	1	70	19	9	1.6	118	5.5	11.2
20S/12W-32ABA1	80-06-20	0930	259	9.9	50	10	1.5	2.2	16	.7	.0	3.3	30	.00	.50	10	1	64	13	13	2.0	127	5.4	11.2
21S/11W-03ABD1	80-06-19	1100	111	16	40	<3	.3	<.0	61	.1	86	6.9	33	1.8	.00	1600	2	--	--	--	--	290	8.8	--
21S/11W-08DAD1	80-06-19	1130	78	13	20	<3	3.0	1.1	12	.6	35	1.8	5.6	.10	.73	140	1	58	12	0	1.6	83	6.1	11.6
21S/11W-16ABB1	80-06-19	1300	60	17	30	7	2.2	1.1	4.6	.9	17	.9	2.7	.00	.38	20	1	40	10	0	.7	52	5.5	13.4
21S/12W-22ABD1	67-05-17	1200	--	25	0	0	1.4	.3	136	.8	240	.6	41	1.1	--	--	--	389	5	0	28	575	9.3	25.2
21S/12W-24BDD1	80-06-19	1340	305	24	30	<3	5.5	1.6	24	1.2	37	8.6	15	.20	1.0	150	2	102	20	0	2.4	172	6.2	12.6
21S/12W-28DDD1	78-10-25	1600	--	32	130	--	8.2	3.6	120	2.3	--	2.9	98	.60	--	530	--	--	35	0	9.1	607	7.8	12.0
22S/07W-15DCD1	80-09-02	1415	130	24	310	170	35	1.8	84	.5	100	3.1	120	.50	.00	480	1	330	95	0	3.9	610	7.0	13.8
22S/07W-22CBB1	80-06-16	1445	85	13	580	0	30	2.7	54	1.1	170	.8	23	1.3	.01	530	3	229	86	0	2.7	418	7.9	15.6
22S/07W-29BBD1	71-05-04	1230	--	38	140	0	32	5.0	15	.6	95	34	2.3	.20	--	--	--	184	101	6	.7	256	7.4	12.7
	80-06-16	1515	109	32	<10	40	43	6.3	19	.6	100	100	2.0	.30	.03	30	1	263	133	34	.7	340	8.0	14.6
22S/08W-07CDA1	80-06-18	1000	80	34	70	20	15	4.2	11	.6	69	10	2.5	.20	.23	9	1	119	55	0	.7	163	6.6	13.2
22S/08W-09DAB1	80-06-18	0930	128	13	460	150	560	2.5	640	1.4	32	.1	2000	2.3	.01	2000	1	3240	1409	1379	7.8	5800	7.2	13.0
22S/08W-16CBB1	80-06-17	1400	76	24	50	70	8.8	1.8	22	.6	72	4.3	2.0	.80	.01	410	6	108	29	0	1.8	144	7.8	15.6
22S/08W-21DCA1	80-06-17	1550	345	37	1500	260	19	4.4	16	1.4	90	10	3.5	.20	.00	6	1	147	66	0	.9	215	7.3	13.0
22S/08W-23ACD1	80-06-17	1315	270	12	<10	20	6.7	1.0	340	1.1	220	.9	390	1.5	.01	900	2	886	21	0	34	1730	9.3	14.2
	80-09-02	1530	270	27	20	10	3.5	1.1	38	.7	76	16	4.2	.30	.53	70	2	136	13	0	4.7	200	7.9	14.2
	80-12-09	1015	270	15	20	5	3.8	7.0	160	.7	--	15	100	1.3	--	660	3	418	38	0	11	705	9.6	13.2
	81-04-20	1100	270	15	30	20	7.5	1.5	210	.9	--	13	180	1.3	--	700	2	556	25	0	19	950	9.2	14.0
22S/08W-24CAC1	80-06-17	1615	116	21	<10	6	7.9	2.1	67	.6	170	12	2.9	.40	.12	180	1	216	28	0	5.7	310	8.8	14.2
22S/08W-29DBA1	80-06-17	1545	120	29	510	240	25	5.7	31	1.5	150	1.2	2.1	.20	.02	120	6	187	86	0	1.5	302	7.6	13.8
22S/09W-08DCD1	80-09-03	1700	--	13	590	300	280	22	490	3.3	68	17	1400	.30	.00	450	1	2270	790	723	7.9	4100	7.2	13.6
22S/09W-08DDC1	80-06-18	1240	80	21	230	20	20	1.7	53	.9	150	.2	20	.40	.02	270	2	208	57	0	3.2	342	7.9	13.2
22S/09W-13ACA1	80-06-18	1045	45	36	850	2	37	14	23	1.9	180	6.3	3.6	.40	.15	20	19	231	150	0	.8	390	7.4	14.4
22S/09W-13ACB1	80-06-18	1115	175	27	50	8	4.3	.0	98	.6	160	3.9	16	.40	.32	110	2	246	11	0	14	385	8.4	14.0
22S/09W-15DBD1	80-06-18	1410	74	37	860	780	32	9.7	18	1.3	150	.8	3.5	.30	.03	20	15	194	120	0	.7	305	7.2	12.6
22S/10W-06CDA2	80-09-03	1045	60	46	6300	650	13	24	45	8.6	150	1.9	60	.10	.02	120	6	296	131	0	1.7	510	7.1	--
22S/10W-13DCC1	80-09-03	1430	77	23	170	110	15	1.5	16	.2	68	2.8	8.1	.30	.00	100	1	108	44	0	1.1	160	6.7	11.4
22S/10W-14DBD1	80-09-03	1530	71	24	60	8	9.5	2.7	8.3	.4	35	2.2	5.5	.20	.67	20	0	74	35	0	.6	115	5.5	11.6
22S/11W-08BAB1	80-09-04	1200	95	15	20	20	20	4.7	15	.8	76	8.7	11	.20	.02	50	1	121	69	0	.8	225	7.1	11.1
22S/11W-18DBB1	80-09-04	1015	88	24	570	50	10	1.5	40	.4	43	6.2	52	.70	.00	330	0	162	31	0	3.3	260	6.9	13.8
22S/12W-11DBA1	80-09-04	1115	150	35	100	3	.3	.0	40	.1	60	17	14	.30	.24	250	1	143	1	0	21	180	6.9	--
22S/12W-31BCA1	80-06-19	1645	133	28	<10	160	36	11	19	3.0	130	16	23	.10	.07	30	2	214	135	5	.7	355	7.6	--
22S/12W-31BCA2	80-06-19	1630	159	43	130	160	18	7.2	19	1.6	81	22	14	.20	.03	20	3	174	75	0	1.0	242	7.0	12.5
22S/12W-31BCB3	80-06-19	1530	72	15	2100	60	3.7	2.9	15	1.3	30	9.0	16	.10	.41	30	3	83	21	0	1.5	142	5.4	12.6
22S/12W-31BCC1	80-06-19	1440	134	21	<10	<3	1.6	.1	120	1.3	210	27	16	.20	.15	650	7	314	4	0	26	550	8.6	12.0
22S/12W-31BCC2	80-06-19	1500	80	30	80	160	19	5.9	72	2.9	160	46	19	.10	.13	240	1	291	72	0	3.8	460	7.7	11.6
22S/13W-14DDA1	78-10-03	1450	25	--	50	--	--	--	--	--	7.0	--	32	--	--	--	--	--	--	--	--	100	--	--
22S/13W-25DAD1	78-10-24	0955	109	17	140	--	7.9	3.3	9.8	1.1	21	5.7	22	<.10	3.1	30	--	80	33	12	.8	130	7.0	12.0
22S/13W-26DBD1	78-09-28	1500	12	--	110	--	--	--	--	--	9.0	--	32	--	--	--	--	--	--	--	--	130	6.3	16.0
	78-10-25	0106	83	18	60	--	2.4	1.3	8.7	.9	11	4.8	9.5	<.10	.26	<20	--	52	11	0	1.2	70	7.0	12.0
22S/13W-35ACA1	78-09-26	1400	14	--	80	--	--	--	--	--	7.0	--	22	--	--	--	--	--	--	--	--	100	6.3	15.0
	78-10-25	0945	76	18	210	--	3.7	2.0	8.9	1.4	16	3.6	12	<.10	.05	30	--	59	17	1	1.0	70	7.0	11.5
22S/13W-35DCC1	78-09-21	1335	10	--	40	--	--	--	--	--	7.0	--	11	--	--	--	--	--	--	--	--	66	6.4	--
	78-10-24	0230	64	20	490	--	11	1.9	10	1.1	18	3.1	23	<.10	.08	40	--	81	35	17	.8	80	7.0	12.0
23S/07W-20BDD1	80-06-17	1015	14	20	30	70	30	5.0	55	1.1	160	57	2.8	.40	.03	120	1	267	96	0	2.6	415	7.8	14.4
23S/07W-27DBC1	80-06-17	1145	120	18	130	130	280	16	170	1.6	110	5.4	750	.50	.06	270	1	1310	765	656	2.8	2450	7.5	13.2
23S/08W-01CBC1	80-06-16	1610	105	37	230	60	3.5	1.5	150	.9	260	3.6	43	.60	.01	150	7	396	15	0	17	590	8.9	14.6
23S/10W-02ACC1	80-09-03	1300	--	26	4700	250	15	3.8	6.6	.7	60	2.9	5.9	.10	.00	5	1	102	53	0	.4	165	5.8	12.5
23S/10W-12ACB1	80-06-18	1540	199	19	20	40	13	3.2	8.9	1.5	37	8.0	5.4	.10	5.0	30	1	81	46	9	.6	152	6.1	13.2

Table 7.--Chemical analyses of trace elements for selected wells

LOCAL IDENT-I-FIER	DATE OF SAMPLE	TIME	SAM-PLING DEPTH (FEET)	ARSENIC TOTAL (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BORON, DIS-SOLVED (UG/L AS B)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SELE-NIUM, TOTAL (UG/L AS SE)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
20S/12W-04ABB1	80-06-20	1000	65	1	0	30	0	2	8	0	0	.0
20S/12W-32ABA1	80-06-20	0930	259	1	0	10	0	3	4	0	0	.0
22S/08W-09DAB1	80-06-18	0930	128	1	400	2000	0	6	2	0	0	.2
22S/08W-23ACD1	80-06-17	1315	270	2	100	900	0	5	3	0	0	.0
	80-09-02	1530	270	2	--	70	--	--	--	--	--	--
22S/10W-06CDA2	80-09-03	1045	60	6	0	120	4	3	--	0	0	.0
23S/10W-02ACC1	80-09-03	1300	--	1	0	5	4	2	--	0	0	.1
23S/10W-12ACB1	80-06-18	1540	199	1	0	30	0	0	3	0	0	.0

Table 8.--Water-quality data for miscellaneous streams in western Douglas County

14322800 ELK CREEK NEAR ELKTON, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
14...	1400	2640	8.0	7.5	11.9	64	15	80	5.1
MAY									
15...	1345	393	16.0	7.4	10.9	84	14	20	8.4
SEP									
18...	1400	7.8	18.4	7.9	9.4	202	6.0	60	18
FEB , 1980									
27...	0915	700	9.8	6.8	11.0	79	15	--	6.6
MAR									
14...	0915	--	8.4	7.2	11.8	55	13	--	5.1
AUG									
25...	1000	--	17.2	7.9	--	140	.4	--	9.8

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
14...	1.6	4.1	.7	18	5.1	4.1	<.1	.28	--
MAY									
15...	2.3	5.4	1.1	21	5.0	5.5	.1	.28	.80
SEP									
18...	5.6	13	1.8	32	11	37	.1	<.10	.47
FEB , 1980									
27...	2.5	4.7	.6	26	1.9	5.3	.1	.19	.32
MAR									
14...	1.9	3.9	.9	16	1.3	3.5	.0	.25	1.30
AUG									
25...	3.7	9.9	.9	34	.1	18	.1	.00	.55

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
14...	--	.050	--	19	0	47	332	46	328
MAY									
15...	--	.010	1.6	30	0	54	57.4	--	--
SEP									
18...	<.010	<.010	3.5	68	36	112	2.4	--	--
FEB , 1980									
27...	.010	.060	1.9	27	1	52	112	15	28
MAR									
14...	.010	.300	17	21	5	39	--	434	--
AUG									
25...	.010	.030	4.3	40	6	63	--	--	--

14322860 PARADISE CREEK NEAR ELKTON, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
14...	1550	202	8.0	7.4	11.9	48	8.1	60	3.2
MAY									
15...	1515	38	13.9	7.1	10.6	54	12	30	4.0
SEP									
18...	1520	.88	17.6	7.2	8.8	90	11	250	7.3
FEB , 1980									
27...	1130	42	9.7	6.7	11.6	53	13	--	3.8
MAR									
14...	1040	750	8.5	7.0	11.6	43	12	--	3.4
AUG									
25...	1105	1.1	18.4	7.6	--	108	6.4	--	8.2

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
14...	1.1	3.2	.6	13	4.0	2.3	<.1	.18	--
MAY									
15...	1.3	4.2	1.0	15	4.7	3.3	.1	.13	.51
SEP									
18...	2.7	6.7	2.3	23	12	4.7	.1	.12	.50
FEB , 1980									
27...	1.6	4.2	.7	18	1.0	3.2	.0	.15	.25
MAR									
14...	1.2	3.5	.9	11	.2	3.0	.0	.39	1.30
AUG									
25...	2.9	6.9	2.2	43	2.4	6.2	.1	.26	.69

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
14...	--	.030	--	13	0	30	16.6	21	11
MAY									
15...	--	.010	1.4	15	0	39	4.1	--	--
SEP									
18...	.040	.050	4.8	29	6	61	.14	--	--
FEB , 1980									
27...	.000	.010	1.7	16	0	38	3.9	4	.45
MAR									
14...	.010	.130	6.4	13	2	31	93.1	134	271
AUG									
25...	.040	.120	6.2	32	0	61	.21	--	--

Table 8.--Water-quality data for miscellaneous streams in western Douglas County--Continued

14322880 WEATHERLY CREEK NEAR SCOTTSBURG, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
16...	1020	99	7.0	7.5	12.0	50	11	40	3.4
MAY									
15...	1630	25	12.8	7.0	10.4	58	11	30	7.2
SEP									
18...	1615	.40	16.0	6.7	7.5	88	12	200	6.9
FEB , 1980									
27...	1220	80	9.9	6.4	11.4	54	11	--	3.6
MAR									
14...	1115	640	8.5	6.9	11.5	42	10	--	3.2
AUG									
25...	1148	--	13.3	7.2	--	94	11	--	6.4

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
16...	1.1	4.2	.6	14	6.9	4.0	<.1	.35	--
MAY									
15...	1.2	4.4	.8	16	2.6	3.7	.1	.16	.14
SEP									
18...	2.2	8.0	1.7	18	12	6.2	.1	<.10	.45
FEB , 1980									
27...	1.3	4.6	.7	15	1.8	3.5	.0	.23	.31
MAR									
14...	1.2	4.0	.8	10	.6	3.5	.0	.43	.62
AUG									
25...	2.0	7.3	1.3	34	1.8	6.5	.1	.06	.66

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
16...	--	.020	--	13	0	40	10.6	15	4.0
MAY									
15...	--	.010	1.6	23	0	41	2.8	--	--
SEP									
18...	.010	.010	4.4	26	8	60	.06	--	--
FEB , 1980									
27...	.010	.010	2.3	14	0	36	6.3	4	.86
MAR									
14...	.010	.130	6.3	13	3	29	74.3	--	--
AUG									
25...	.030	.050	3.4	24	0	57	--	--	--

Table 8.--Water-quality data for miscellaneous streams in western Douglas County--Continued

14323030 MILL CREEK NEAR SCOTTSBURG, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
16...	0845	--	7.0	7.5	12.0	43	10	60	3.0
MAY									
16...	1345	346	14.0	7.2	10.6	55	--	70	5.0
SEP									
19...	1500	14	19.0	7.1	9.4	69	8.0	90	5.1
FEB , 1980									
27...	1310	680	9.6	6.5	11.7	44	10	--	3.1
MAR									
14...	1210	5050	8.8	7.1	11.7	44	9.5	--	3.1
AUG									
25...	1230	9.0	18.0	7.1	--	72	7.5	--	6.0

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
16...	1.1	3.5	.7	9.0	6.7	3.8	<.1	.34	--
MAY									
16...	1.3	3.9	1.0	8.0	8.9	4.1	.1	.13	.26
SEP									
19...	1.8	5.6	1.0	16	12	3.8	.1	<.10	.43
FEB , 1980									
27...	1.2	4.9	.7	12	2.1	3.6	.0	.34	.20
MAR									
14...	1.2	4.1	1.1	12	2.9	3.9	.0	.34	.79
AUG									
25...	2.1	5.6	1.1	25	1.4	4.3	.1	.00	.55

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
16...	--	.020	--	12	0	34	--	23	--
MAY									
16...	--	.010	1.9	18	10	39	36.4	--	--
SEP									
19...	<.010	<.010	2.1	20	4	47	1.8	--	--
FEB , 1980									
27...	.000	.020	1.5	13	1	33	45.9	--	--
MAR									
14...	.000	.110	4.1	13	1	33	600	98	1340
AUG									
25...	.000	.030	2.7	24	0	43	.80	--	--

14323070 DEAN CREEK NEAR REEDSPORT, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
15...	1530	81	7.5	6.8	11.3	49	9.7	70	5.2
MAY									
16...	1230	13	12.5	6.6	10.0	55	9.0	80	3.5
SEP									
19...	1400	2.4	18.0	6.2	9.4	63	11	160	4.0
FEB , 1980									
27...	1340	--	10.5	6.5	11.0	48	9.3	--	3.0
MAR									
14...	1245	900	8.4	6.9	11.3	40	9.0	--	2.9
AUG									
25...	1340	1.6	19.9	6.4	--	59	11	--	3.5

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
15...	1.0	5.1	.5	7.0	5.6	5.1	<.1	.86	--
MAY									
16...	1.0	5.0	.8	10	4.7	4.6	.1	.53	.51
SEP									
19...	1.4	6.4	.8	11	11	5.6	.1	.29	.44
FEB , 1980									
27...	1.1	4.9	.5	10	.6	4.6	.0	.58	.37
MAR									
14...	1.0	4.7	.6	5.0	.7	4.5	.0	1.5	.58
AUG									
25...	1.2	5.5	.7	18	3.8	5.9	.1	.00	.30

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
15...	--	.010	--	17	0	37	8.0	22	4.8
MAY									
16...	--	<.010	2.7	13	0	35	1.2	--	--
SEP									
19...	<.010	<.010	1.2	16	5	47	.31	--	--
FEB , 1980									
27...	.000	.000	--	12	2	30	--	11	--
MAR									
14...	.010	.070	5.1	11	6	26	97.2	210	510
AUG									
25...	.000	.030	2.4	14	0	43	.16	--	--

14323080 SCHOLFIELD CREEK NEAR REEDSPORT, OREGON

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	TEMPERATURE (DEG C)	PH (STANDARD UNITS)	OXYGEN, DISSOLVED (MG/L)	SPECIFIC CONDUCTANCE (UMHOS)	SILICA, DISSOLVED (MG/L AS SIO2)	IRON, DISSOLVED (UG/L AS FE)	CALCIUM DISSOLVED (MG/L AS CA)
FEB , 1979									
15...	1300	154	6.0	6.7	11.0	67	13	60	3.8
MAY									
16...	1115	19	11.9	6.6	9.4	68	12	320	4.7
SEP									
19...	1240	2.3	16.0	6.5	6.7	92	14	470	7.2
FEB , 1980									
27...	1430	72	10.3	6.4	10.3	73	13	--	3.5
MAR									
14...	1200	--	--	--	--	--	--	--	--
14...	1320	365	9.4	6.8	10.3	51	11	--	3.1
AUG									
25...	1430	7.2	15.2	6.1	--	95	13	--	6.4

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
15...	1.2	5.6	.6	10	5.8	7.6	<.1	1.7	--
MAY									
16...	1.4	6.2	1.0	13	5.6	5.7	.1	1.0	.47
SEP									
19...	2.1	8.0	1.2	19	11	6.9	.1	.25	.48
FEB , 1980									
27...	1.4	6.0	.6	11	.6	5.5	.0	1.3	.44
MAR									
14...	1.3	5.4	1.0	8.0	2.7	5.0	.0	.67	.64
AUG									
25...	2.2	7.5	1.3	34	.2	8.3	.1	.09	.69

DATE	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
FEB , 1979									
15...	--	.010	--	14	0	44	18.1	12	5.0
MAY									
16...	--	.010	3.9	18	0	45	2.3	--	--
SEP									
19...	<.010	.010	4.5	27	8	62	.39	--	--
FEB , 1980									
27...	.000	.010	3.8	15	4	37	6.6	8	1.6
MAR									
14...	.000	.050	4.7	13	5	34	51.2	1	1.0
AUG									
25...	.000	.060	5.5	25	0	59	1.3	--	--

14323100 SMITH RIVER NEAR GARDINER, OREGON

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	TEMPERATURE (DEG C)	PH (STANDARD UNITS)	OXYGEN, DISSOLVED (MG/L)	SPECIFIC CONDUCTANCE (UMHOS)	SILICA, DISSOLVED (MG/L AS SIO2)	IRON, DISSOLVED (UG/L AS FE)	CALCIUM DISSOLVED (MG/L AS CA)
FEB , 1979									
15...	0830	1860	6.0	6.6	12.4	71	16	40	6.3
MAY									
17...	1100	362	15.0	7.2	10.7	47	9.8	60	3.0
SEP									
19...	1030	14	17.2	6.9	9.2	67	7.8	90	4.5
FEB , 1980									
27...	1720	840	10.0	6.6	11.3	35	11	--	2.8
MAR									
14...	1605	5900	8.5	6.9	11.7	37	10	--	2.9
AUG									
25...	1630	1.0	22.2	7.8	--	64	6.2	--	3.9

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	ALKALINITY FIELD (MG/L AS CACO3)	SULFATE DISSOLVED (MG/L AS SO4)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
15...	2.8	3.3	.5	25	7.1	3.1	<.1	.16	--
MAY									
17...	.9	4.0	1.1	10	4.4	3.4	.1	.13	.35
SEP									
19...	1.7	5.7	1.3	10	10	6.9	.1	.01	.54
FEB , 1980									
27...	.8	5.2	.7	12	1.0	3.4	.0	.24	.36
MAR									
14...	1.0	3.4	.8	9.0	.4	2.8	.0	.41	.93
AUG									
25...	1.5	5.4	1.1	24	.1	7.1	.1	.00	.68

DATE	PHOSPHORUS, ORTHO, DISSOLVED (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY)
FEB , 1979									
15...	--	.040	--	27	0	54	273	16	80
MAY									
17...	--	<.010	2.0	11	0	33	31.9	--	--
SEP									
19...	<.010	<.010	3.2	18	8	44	1.7	--	--
FEB , 1980									
27...	.020	.020	--	10	0	32	68.0	4	9.1
MAR									
14...	.000	.130	9.3	11	2	27	573	332	5290
AUG									
25...	.000	.030	3.4	16	0	40	.11	--	--

14323140 NORTH FORK SMITH RIVER NEAR GARDINER, OREGON

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	PH (STAND-ARD UNITS)	OXYGEN, DIS-SOLVED (MG/L)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	SILICA, DIS-SOLVED (MG/L AS SIO2)	IRON, DIS-SOLVED (UG/L AS FE)	CALCIUM DIS-SOLVED (MG/L AS CA)
FEB , 1979									
15...	1030	--	6.0	7.3	12.0	40	9.1	20	2.3
MAY									
17...	0945	121	12.4	6.6	9.6	42	7.7	60	2.4
SEP									
19...	0900	14	17.2	6.9	9.2	67	6.7	130	3.2
FEB , 1980									
27...	1630	90	10.1	6.6	11.3	57	8.6	--	2.4
MAR									
14...	1505	--	8.0	6.9	11.8	33	7.6	--	2.2
AUG									
25...	1530	28	19.6	7.1	--	52	6.5	--	3.1

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY FIELD (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)
FEB , 1979									
15...	.8	3.8	.4	6.0	4.9	4.1	<.1	.54	--
MAY									
17...	.8	3.7	1.0	7.0	3.8	3.7	.1	.30	.66
SEP									
19...	1.1	5.0	.8	10	10	4.4	.1	.13	.42
FEB , 1980									
27...	1.0	5.0	.5	8.0	.8	4.0	.0	.50	.40
MAR									
14...	.8	3.1	.6	2.0	.9	3.8	.0	.58	.57
AUG									
25...	1.0	4.8	.8	16	.1	5.2	.1	.00	.64

DATE	PHOS-PHORUS, ORTHO, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
FEB , 1979									
15...	--	.010	--	9	0	29	--	24	--
MAY									
17...	--	.010	1.1	9	0	28	9.0	--	--
SEP									
19...	<.010	<.010	2.1	13	3	37	1.4	--	--
FEB , 1980									
27...	.000	.010	1.2	10	2	27	5.6	6	1.5
MAR									
14...	.000	.080	4.8	9	7	20	--	150	--
AUG									
25...	.000	.030	2.1	12	0	31	2.6	--	--

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County

LOON LAKE

DATE	80/02/05		80/05/12		80/08/26	
SPECIES						
DIVERSITY	2.90		2.86		1.99	
DIVISION						
-CLASS						
--ORDER						
---FAMILY						
----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	26.		58.		109.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CHLOROPHYTA GREEN ALGAE						
-CHLOROPHYCEAE						
--VOLVOCALES						
---CHLAMYDOMONADACEAE						
----CHLAMYDOMONAS-LIKE	--	---	--	---	1	1.0
--CHLOROCOCCALES						
---OOCYSTACEAE						
----ANKISTRODESMUS FALCATUS	--	---	--	---	1	1.0
----OOCYSTIS PUSILLA	--	---	--	---	2	2.0
MISCELLANEOUS GREEN ALGAE	--	---	--	---	2	2.0
EUGLENOPHYTA EUGLENOIDS						
-EUGLENOPHYCEAE						
--EUGLENALES						
---EUGLENACEAE						
----TRACHELOMONAS SPP.	--	---	1	1.2	1	1.0
PYRRHOPHYTA						
-DINOPHYCEAE DINOFLAGELLATES						
--DINOKONTAE						
---PERIDINIACEAE						
----PERIDINIUM CINCTUM	--	---	--	---	19	17.0
---CERATIACEAE						
----CERATIUM HIRUNDINIELLA	--	---	--	---	1	1.0
CRYPTOPHYTA						
-CRYPTOPHYCEAE						
--CRYPTOMONADALES						
---CRYPTOCHRYSIDACEAE						
----RHODOMONAS MINUTA	--	---	--	---	2	2.0
CHRYSOPHYTA YELLOW-BROWN ALGAE						
-CHRYSOPHYCEAE						
--CHRYSOMONADALES						
---DINOBRYACEAE						
----DINOBRYON SERTULARIA	--	---	3	6.0	--	---
---SYNURACEAE						
----MALLOMONAS ALPINA	--	---	1	1.2	--	---
-BACILLARIOPHYCEAE DIATOMS						
--CENTRALES CENTRIC DIATIOMS						
---COSCINODISCACEAE						
----CYCLOTELLA STELLIGERA	2	6.0	--	---	50	46.0
----MELOSIRA AMBIGUA	--	---	--	---	--	---
----MELOSIRA DISTANS	--	---	--	---	--	---
--PENNALES PENNATE DIATOMS						
---FRAGILARIACEAE						
----ASTERIONELLA FORMOSA	--	---	--	---	--	---
----FRAGILARIA CONSTRUENS	1	3.6	1	1.2	--	---
----FRAGILARIA CROTONENSIS	--	---	1	2.4	--	---
----FRAGILARIA VAUCHERIAE	1	4.8	2	3.6	1	1.0
----SYNEDRA MINUSCULA	--	---	6	10.7	--	---
----SYNEDRA ULNA	--	---	1	2.4	--	---
---EUNOTIACEAE						
----EUNOTIA VANHEURCKII	--	---	2	3.6	--	---
----EUNOTIA SPP.	1	2.4	--	---	--	---
---ACHNANTHACEAE	--	---	1	1.2	--	---
----ACHNANTHES LANCEOLATA	3	9.6	1	2.4	--	---
----ACHNANTHES LINEARIS	3	10.8	10	17.9	3	3.0
----ACHNANTHES LEWISIANA	--	---	1	1.2	--	---
----ACHNANTHES MINUTISSIMA	4	14.5	6	10.7	--	---
----COCCONEIS PLANCENTULA ENGLYPTA	--	---	--	---	1	1.0
----COCCONEIS PLACENTULA LINEATA	--	---	--	---	3	3.0
---NAVICULACEAE						
----NAVICULA SPP.	--	---	--	---	1	1.0
----NAVICULA CRYPTOCEPHALA	--	---	1	1.2	--	---
----NAVICULA CRYPTOCEPHALA VENETA	--	---	--	---	--	---
----NAVICULA GREGARIA	1	4.8	3	4.8	--	---
---GOMPHONEMACEAE						
----GOMPHONEMA ANGUSTATUM	2	7.2	3	4.8	1	1.0

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

LOON LAKE

DATE	80/02/05		80/05/12		80/08/26	
SPECIES DIVERSITY	2.90		2.86		1.99	
DIVISION -CLASS --ORDER ---FAMILY ----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	26.		58.		109.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CHRYSOPHYTA YELLOW-BROWN ALGAE						
-BACILLARIOPHYCEAE DIATOMS						
--PENNALES PENNATE DIATOMS						
---GOMPHONEMACEAE						
----GOMPHONEMA CLEVEI	1	3.6	--	---	--	---
----GOMPHONEMA TENELLUM	--	---	2	3.6	--	---
---CYMBELLACEAE						
----CYMBELLA MICROCEPHALA	1	2.4	--	---	--	---
----CYMBELLA MINUTA	1	2.4	3	6.0	--	---
---NITZSCHIACEAE						
----NITZSCHIA SPP.	1	2.4	1	1.2	--	---
----NITZSCHIA ACICULARIS	--	---	3	4.8	--	---
----NITZSCHIA DISSIPATA	1	2.4	1	1.2	--	---
----NITZSCHIA FILIFORMIS	--	---	--	---	1	1.0
----NITZSCHIA FRUSTULUM	--	---	--	---	1	1.0
----NITZSCHIA GRACILIS	--	---	--	---	1	1.0
----NITZSCHIA INNOMINATA	--	---	1	2.4	--	---
----NITZSCHIA MICROCEPHALA	--	---	--	---	1	1.0
----NITZSCHIA PALEACEA	2	7.2	1	1.2	--	---
----NITZSCHIA PALEA	--	---	--	---	--	---
--MISCELLANEOUS PENNATE DIATOMS	1	4.8	2	3.6	--	---
CYANOPHYTA BLUE-GREEN ALGAE						
-MYXOPHYCEAE						
--CHROOCOCCALES						
---CHROOCOCCACEAE						
----CHROOCOCCUS LIMNETICUS	--	---	--	---	11	10.0
--NOSTOCACALES						
---NOSTOCACEAE						
----ANABAENA SPP.	--	---	--	---	3	3.0

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

CLEAR LAKE

DATE	78/09/07		78/11/28		79/05/02	
SPECIES DIVERSITY	0.00		0.00		0.00	
DIVISION -CLASS --ORDER ---FAMILY ----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	0.		0.		0.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CHLOROPHYTA GREEN ALGAE						
-CHLOROPHYCEAE						
--VOLVOCALES						
---CHLAMYDOMONADACEAE						
----CHLAMYDOMONAS-LIKE	23	5.0	2	3.2	6	4.7
--CHLOROCOCCALES						
---COELASTRACEAE						
----COELASTRUM MICROPORUM	--	---	1	1.6	--	---
---OOCYSTACEAE						
----ANKISTRODESMUS FALCATUS	--	---	--	---	2	1.6
----OOCYSTIS SPP.	13	2.9	--	---	7	5.5
---SCENEDESMACEAE						
----CRUCIGENIA QUADRATA	--	---	3	4.7	--	---
--ZYGNEMATALES						
---DESMIDIACEAE DESMIDS						
----STAURASTRUM SP.	3	0.7	--	---	--	---
MISCELLANEOUS GREEN ALGAE	40	8.4	4	6.4	--	---
EUGLENOPHYTA EUGLENOIDS						
-EUGLENOPHYCEAE						
--EUGLENALES						
---EUGLENACEAE						
----TRACHELOMONAS SPP.	--	---	--	---	2	1.6
PYRRHOPHYTA						
-DINOPHYCEAE DINOFLAGELLATES						
--DINOKONTAE						
---CERATIACEAE						
----CERATIUM HIRUNDINIELLA	3	0.7	--	---	--	---
CRYPTOPHYTA						
-CRYPTOPHYCEAE						
--CRYPTOMONADALES						
---CRYPTOMONADACEAE						
----CRYPTOMONAS SPP.	19	4.3	--	---	--	---
----CRYPTOMONAS EROSA	36	7.9	--	---	--	---
CHRYSOPHYTA YELLOW-BROWN ALGAE						
-CHRYSOPHYCEAE						
--CHRYSOMONADALES						
---DINOBRYACEAE						
----DINOBRYON DIVERGENS	--	---	4	6.3	--	---
----DINOBRYON SERTULARIA	--	---	--	---	4	3.1
-BACILLARIOPHYCEAE DIATOMS						
--CENTRALES CENTRIC DIATIOMS						
---COSCINODISCACEAE						
----CYCLOTELLA MENEGHINIANA	110	24.4	19	30.1	30	23.6
----CYCLOTELLA STELLIGERA	--	---	1	1.6	--	---
----MELOSIRA DISTANS	--	---	--	---	3	2.4
--PENNALES PENNATE DIATOMS						
---FRAGILARIACEAE						
----FRAGILARIA CONSTRUENS	--	---	1	1.6	--	---
----SYNEDRA RUMPENS	--	---	--	---	1	0.8
----TABELLARIA FENESTRATA	--	---	1	1.6	1	0.8
---ACHNANTHACEAE						
----ACHNANTHES LINEARIS	10	2.1	2	3.2	--	---
----ACHNANTHES MICROCEPHALA	--	---	--	---	2	1.6
----ACHNANTHES MINUTISSIMA	16	3.6	2	3.2	3	2.4
----ACHNANTHES STEWARTII	--	---	--	---	1	0.8
---NAVICULACEAE						
----ANOMOEONEIS VITREA	6	1.4	1	1.6	8	6.3
----FRUSTULIA RHOMBOIDES	--	---	1	1.6	--	---
----GYROSIGMA SPP.	--	---	1	1.6	1	0.8
----NAVICULA CRYPTOCEPHALA	--	---	--	---	5	3.9
----NAVICULA MINIMA	--	---	1	1.6	--	---
----NAVICULA PSEUDOREINHARDTII	--	---	1	1.6	--	---
---CYMBELLACEAE						
----CYMBELLA ANGUSTATA	--	---	--	---	1	0.8
----CYMBELLA CESATII	--	---	--	---	3	2.4

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

CLEAR LAKE

DATE	78/09/07		78/11/28		79/05/02	
SPECIES DIVERSITY	0.00		0.00		0.00	
DIVISION -CLASS --ORDER ---FAMILY ----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	0.		0.		0.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CHRYSOPHYTA YELLOW-BROWN ALGAE						
-BACILLARIOPHYCEAE DIATOMS						
--PENNALES PENNATE DIATOMS						
---NITZSCHIACEAE						
----NITZSCHIA PALEA	--	---	--	---	1	0.8
--MISCELLANEOUS PENNATE DIATOMS	--	---	--	---	4	3.1
CYANOPHYTA BLUE-GREEN ALGAE						
-MYXOPHYCEAE						
--CHROOCOCCALES						
---CHROOCOCCACEAE						
----ANACYSTIS SPP.	129	28.6	18	28.5	42	33.0
----CHROOCOCCUS SPP.	16	3.6	--	---	--	---
MISCELLANEOUS BLUE-GREEN ALGAE	29	6.4	--	---	--	---

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

TAHKENITCH LAKE

DATE	80/02/05		80/05/13		80/08/27	
SPECIES DIVERSITY	1.25		1.97		1.14	
DIVISION -CLASS --ORDER ---FAMILY ----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	746.		486.		2625.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CHLOROPHYTA GREEN ALGAE						
-CHLOROPHYCEAE						
--VOLVOCALES						
---CHLAMYDOMONADACEAE						
----CHLAMYDOMONAS-LIKE	--	---	14	2.9	--	---
--CHLOROCOCCALES						
---CHLOROCOCCACEAE						
----SPHAEROCYSTIS SCHROETERI	--	---	6	1.2	--	---
---OOCYSTACEAE						
----ANKISTRODESMUS FALCATUS	37	5.0	31	6.4	--	---
---SCENEDESMACEAE						
----CRUCIGENIA QUADRATA	--	---	11	2.3	--	---
----SCENEDESMUS DENTICULATUS	--	---	8	1.7	--	---
----TETRASTRUM STAUROGENIAFORME	2	0.3	--	---	--	---
MISCELLANEOUS GREEN ALGAE	4	0.6	3	0.6	--	---
EUGLENOPHYTA EUGLENOIDS						
-EUGLENOPHYCEAE						
--EUGLENALES						
---EUGLENACEAE						
----TRACHELOMONAS SPP.	--	---	3	0.6	8	0.3
CHRYSOPHYTA YELLOW-BROWN ALGAE						
-CHRYSOPHYCEAE						
--CHRYSOMONADALES						
---DINOBRYACEAE						
----DINOBRYON SERTULARIA	--	---	3	0.6	31	1.2
---SYNURACEAE						
----MALLOMONAS ALPINA	8	1.1	--	---	--	---
-BACILLARIOPHYCEAE DIATOMS						
--CENTRALES CENTRIC DIATIOMS						
---COSCINODISCACEAE						
----CYCLOTELLA MENEGHINIANA	--	---	3	0.6	--	---
----CYCLOTELLA STELLIGERA	--	---	70	14.5	15	0.6
----MELOSIRA AMBIGUA	4	0.6	--	---	811	30.9
----MELOSIRA DISTANS	345	46.1	6	1.2	38	1.5
----MELOSIRA SPP.	--	---	--	---	8	0.3
---RHIZOSOLENIACEAE						
----ATTHEYA ZACHARIASI	--	---	--	---	38	1.5
----RHIZOSOLENIA ERIENSIS	4	0.6	--	---	--	---
--MISCELLANEOUS CENTRIC DIATOMS	4	0.6	--	---	--	---
--PENNALES PENNATE DIATOMS						
---FRAGILARIACEAE						
----ASTERIONELLA FORMOSA	312	41.7	--	---	23	0.9
----FRAGILARIA CROTONENSIS	--	---	124	25.6	--	---
----SYNEDRA DELICATISSIMA	4	0.6	--	---	--	---
----SYNEDRA MINUSCULA	--	---	6	1.2	--	---
----SYNEDRA RADIANS	4	0.6	--	---	--	---
---ACHNANTHACEAE						
----ACHNANTHES LEWISIANA	2	0.3	--	---	--	---
----ACHNANTHES MINUTISSIMA	2	0.3	14	2.9	--	---
----COCCONEIS PLANCENTULA ENGLYPTA	2	0.3	--	---	--	---
---NAVICULACEAE						
----NAVICULA CAPITATA	2	0.3	--	---	--	---
---NITZSCHIACEAE						
----NITZSCHIA SPP.	--	---	--	---	8	0.3
----NITZSCHIA DISSIPATA	2	0.3	--	---	--	---
----NITZSCHIA FILIFORMIS	--	---	6	1.2	--	---
----NITZSCHIA PALEACEA	2	0.3	--	---	--	---
----NITZSCHIA PALEA	2	0.3	--	---	--	---
--MISCELLANEOUS PENNATE DIATOMS	4	0.6	--	---	--	---
CYANOPHYTA BLUE-GREEN ALGAE						
-MYXOPHYCEAE						
--CHROOCOCCALES						
---CHROOCOCCACEAE						
----ANACYSTIS SPP.	--	---	--	---	1531	58.3
----CHROOCOCCUS LIMNETICUS	--	---	6	1.2	46	1.7

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

TAHKENITCH LAKE

DATE	80/02/05		80/05/13		80/08/27	
SPECIES DIVERSITY	1.25		1.97		1.14	
DIVISION -CLASS --ORDER ---FAMILY ----GENUS SPECIES						
TOTAL COUNT (CELLS/ML)	746.		486.		2625.	
	COUNT	PCT	COUNT	PCT	COUNT	PCT
CYANOPHYTA BLUE-GREEN ALGAE						
-MYXOPHYCEAE						
--CHROOCOCCALES						
---CHROOCOCCACEAE						
----GOMPHOSPHAERIA WICHURAE	--	---	6	1.2	--	---
--NOSTOCACALES						
---NOSTOCACEAE						
----ANABAENA SPP.	--	---	166	34.3	69	2.6

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

THREEMILE LAKE

DATE	80/05/14
SPECIES	
DIVERSITY	1.48
DIVISION	
-CLASS	
--ORDER	
---FAMILY	
----GENUS SPECIES	
TOTAL COUNT (CELLS/ML)	397.

	COUNT	PCT
CHLOROPHYTA GREEN ALGAE		
-CHLOROPHYCEAE		
--VOLVOCALES		
---CHLAMYDOMONADACEAE		
----CHLAMYDOMONAS-LIKE	2	0.5
MISCELLANEOUS GREEN ALGAE	2	0.5
PYRRHOPHYTA		
-DINOPHYCEAE DINOFLAGELLATES		
--DINOKONTAE		
---GLENODINIACEAE		
----GLENODINIUM SPP.	238	60.1
CRYPTOPHYTA		
-CRYPTOPHYCEAE		
--CRYPTOMONADALES		
---CRYPTOCHRYSIDACEAE		
----RHODOMONAS MINUTA	58	14.8
CHRYSOPHYTA YELLOW-BROWN ALGAE		
-BACILLARIOPHYCEAE DIATOMS		
--PENNALES PENNATE DIATOMS		
---FRAGILARIACEAE		
----FRAGILARIA CONSTRUENS	6	1.5
---EUNOTIACEAE		
----EUNOTIA SPP.	4	1.0
---ACHNANTHACEAE		
----ACHNANTHES LINEARIS	12	3.0
----ACHNANTHES MINUTISSIMA	33	8.4
---NAVICULACEAE		
----NAVICULA CRYPTOCEPHALA	2	0.5
----NAVICULA MINIMA	4	1.0
---CYMBELLACEAE		
----CYMBELLA CESATII	2	0.5
----CYMBELLA LUNATA	2	0.5
----CYMBELLA MICROCEPHALA	16	3.9
---NITZSCHIACEAE		
----NITZSCHIA GRACILIS	2	0.5
--MISCELLANEOUS PENNATE DIATOMS	6	1.5
CYANOPHYTA BLUE-GREEN ALGAE		
-MYXOPHYCEAE		
--CHROOCOCCALES		
---CHROOCOCCACEAE		
----ANACYSTIS SPP.	8	2.0

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

CARTER LAKE

DATE	80/05/13
SPECIES	
DIVERSITY	1.24
DIVISION	
-CLASS	
--ORDER	
---FAMILY	
----GENUS SPECIES	
TOTAL COUNT (CELLS/ML)	78.

	COUNT	PCT
CHLOROPHYTA GREEN ALGAE		
-CHLOROPHYCEAE		
--VOLVOCALES		
---CHLAMYDOMONADACEAE		
----CHLAMYDOMONAS-LIKE	1	0.7
CRYPTOPHYTA		
-CRYPTOPHYCEAE		
--CRYPTOMONADALES		
---CRYPTOCHRYSIDACEAE		
----RHODOMONAS MINUTA	2	2.9
CHRYSOPHYTA YELLOW-BROWN ALGAE		
-CHRYSOPHYCEAE		
--CHROMULINALES		
---CHROMULINACEAE		
----KEPHYRION SPP.	1	0.7
--CHRYSOMONADALES		
---DINOBRYACEAE		
----DINOBRYON SERTULARIA	1	1.5
-BACILLARIOPHYCEAE DIATOMS		
--CENTRALES CENTRIC DIATIOMS		
---COSCINODISCACEAE		
----CYCLOTELLA STELLIGERA	23	30.7
--PENNALES PENNATE DIATOMS		
---FRAGILARIACEAE		
----ASTERIONELLA FORMOSA	42	54.7
----FRAGILARIA CONSTRUENS	1	0.7
---EUNOTIACEAE		
----EUNOTIA SPP.	1	0.7
---ACHNANTHACEAE		
----ACHNANTHES MINUTISSIMA	4	5.8
---NAVICULACEAE		
----NAVICULA ANGLICA	1	0.7
---NITZSCHIACEAE		
----NITZSCHIA PALEA	1	0.7

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

ELBOW LAKE

DATE	80/05/14
SPECIES	
DIVERSITY	1.58
DIVISION	
-CLASS	
--ORDER	
---FAMILY	
----GENUS SPECIES	
TOTAL COUNT (CELLS/ML)	912.

	COUNT	PCT
CHLOROPHYTA GREEN ALGAE		
-CHLOROPHYCEAE		
--VOLVOCALES		
---CHLAMYDOMONADACEAE		
----CHLAMYDOMONAS-LIKE	6	0.7
--CHLOROCOCCALES		
---PALMELLACEAE		
----SPHAEROCYSTIS SCHROETERI	6	0.7
---OOCYSTACEAE		
----OOCYSTIS PUSILLA	24	2.6
---SCENEDESMACEAE		
----SCENEDESMUS DENTICULATUS	6	0.7
MISCELLANEOUS GREEN ALGAE	24	2.6
PYRRHOPHYTA		
-DINOPHYCEAE DINOFLAGELLATES		
--DINOKONTAE		
---PERIDINIACEAE		
----PERIDINIUM CINCTUM	6	0.7
CHRYSOPHYTA YELLOW-BROWN ALGAE		
-CHRYSOPHYCEAE		
--CHROMULINALES		
---CHROMULINACEAE		
----KEPHYRION SPP.	42	4.6
----KEPHYRION LITTORALE	71	7.8
----KEPHYRION SPIRALE	399	43.8
--CHRYSOMONADALES		
---DINOBRYACEAE		
----DINOBRYON SERTULARIA	292	32.0
-BACILLARIOPHYCEAE DIATOMS		
--PENNALES PENNATE DIATOMS		
---FRAGILARIACEAE		
----SYNEDRA MINUSCULA	6	0.7
---ACHNANTHACEAE		
----ACHNANTHES MINUTISSIMA	6	0.7
---NITZSCHIACEAE		
----NITZSCHIA ACICULARIS	12	1.3
CYANOPHYTA BLUE-GREEN ALGAE		
-MYXOPHYCEAE		
--CHROOCOCCALES		
---CHROOCOCCACEAE		
----CHROOCOCCUS LIMNETICUS	6	0.7
MISCELLANEOUS BLUE-GREEN ALGAE	6	0.7

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

LAKE MARIE

DATE	80/05/13
SPECIES	
DIVERSITY	0.94
DIVISION	
-CLASS	
--ORDER	
---FAMILY	
----GENUS SPECIES	
TOTAL COUNT (CELLS/ML)	350.

	COUNT	PCT
CHLOROPHYTA GREEN ALGAE		
-CHLOROPHYCEAE		
--VOLVOCALES		
---CHLAMYDOMONADACEAE		
----CHLAMYDOMONAS-LIKE	5	1.4
PYRRHOPHYTA		
-DINOPHYCEAE DINOFLAGELLATES		
--DINOKONTAE		
---PERIDINIACEAE		
----PERIDINIUM CINCTUM	5	1.4
CHRYSOPHYTA YELLOW-BROWN ALGAE		
-CHRYSOPHYCEAE		
--CHROMULINALES		
---CHROMULINACEAE		
----KEPHYRION SPP.	2	0.7
--CHRYSOMONADALES		
---DINOBRYACEAE		
----DINOBRYON SERTULARIA	10	2.8
-BACILLARIOPHYCEAE DIATOMS		
--CENTRALES CENTRIC DIATIOMS		
---COSCINODISCACEAE		
----CYCLOTELLA STELLIGERA	268	76.4
----MELOSIRA DISTANS	41	11.8
--PENNALES PENNATE DIATOMS		
---FRAGILARIACEAE		
----FRAGILARIA CONSTRUENS	5	1.4
---ACHNANTHACEAE		
----ACHNANTHES LINEARIS	5	1.4
---NAVICULACEAE		
----ANOMOEONEIS VITREA	2	0.7
----NAVICULA CRYPTOCEPHALA	7	2.1

Table 9.--Taxa and cell count of phytoplankton for selected lakes in western Douglas County - Continued

LAKE EDNA

DATE	80/05/13
SPECIES	
DIVERSITY	0.86
DIVISION	
-CLASS	
--ORDER	
---FAMILY	
----GENUS SPECIES	
TOTAL COUNT (CELLS/ML)	304.

	COUNT	PCT
CHLOROPHYTA GREEN ALGAE		
-CHLOROPHYCEAE		
--CHLOROCOCCALES		
---OOCYSTACEAE		
----ANKISTRODESMUS FALCATUS	10	3.1
----OOCYSTIS PUSILLA	8	2.1
CRYPTOPHYTA		
-CRYPTOPHYCEAE		
--CRYPTOMONADALES		
---CRYPTOCHRYSIDACEAE		
----RHODOMONAS MINUTA	2	0.8
CHRYSOPHYTA YELLOW-BROWN ALGAE		
-CHRYSOPHYCEAE		
--CHRYSOMONADALES		
---DINOBRYACEAE		
----DINOBRYON SERTULARIA	8	2.7
-BACILLARIOPHYCEAE DIATOMS		
--CENTRALES CENTRIC DIATIOMS		
---COSCINODISCACEAE		
----CYCLOTELLA STELLIGERA	255	83.3
--PENNALES PENNATE DIATOMS		
---EUNOTIACEAE		
----EUNOTIA PECTINALIS	1	0.4
---ACHNANTHACEAE		
----ACHNANTHES LINEARIS	1	0.4
----ACHNANTHES MINUTISSIMA	1	0.4
---NAVICULACEAE		
----ANOMOEONEIS	4	1.2
----NAVICULA MINIMA	1	0.4
----STAURONEIS KRIEGERI	1	0.4
---CYMBELLACEAE		
----CYMBELLA CESATII	1	0.4
----CYMBELLA MICROCEPHALA	2	0.8
---SURIRELLACEAE		
----SURIRELLA OVATA	1	0.4
--MISCELLANEOUS PENNATE DIATOMS	1	0.4
CYANOPHYTA BLUE-GREEN ALGAE		
-MYXOPHYCEAE		
--CHROOCOCCALES		
---CHROOCOCCACEAE		
----ANACYSTIS SPP.	1	0.4
----CHROOCOCCUS SPP.	1	0.4
--NOSTOCACALES		
---NOSTOCACEAE		
----ANABAENA SPP.	5	1.6

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