UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER QUALITY IN THE MERCED RIVER ABOVE AND BELOW THE EL PORTAL SEWAGE TREATMENT PLANT NEAR YOSEMITE NATIONAL PARK, CALIFORNIA, 1975-77

Open-File Report 79-679

Prepared in cooperation with
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By Ray J. Hoffman

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Menlo Park, California
May 1979

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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OPEN-FILE REPORT

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CONVERSION FACTORS

For readers who prefer to use inch-pound units rather than metric units (International System of Units), the conversion factors for the terms used in this report are listed below.

Metric (SI)	Multiply by:	Inch-pound
mm (millimeters)	0.0393	in (inches)
cm^2 (square centimeters)	0.1550	in^2 (square inches)
m (meters)	3.281	ft (feet)
m^2 (square meters)	10.76	ft^2 (square feet)
m^3/s (cubic meters per second)	35.31	ft^3/s (cubic feet per second)
km (kilometers)	0.6214	mi (miles)
km^2 (square kilometers)	0.3861	mi^2 (square miles)

Degrees Celsius are converted to degrees Fahrenheit by using the formula

$$\text{Temp } ^\circ\text{F} = 1.8 \text{ temp } ^\circ\text{C} + 32$$

Abbreviations used in this report:

g/m^2 (grams per square meter)
mg/L (milligrams per liter)

WATER QUALITY IN THE MERCED RIVER ABOVE AND BELOW THE EL PORTAL SEWAGE TREATMENT PLANT NEAR YOSEMITE NATIONAL PARK, CALIFORNIA, 1975-77

By Ray J. Hoffman

ABSTRACT

A study was made to evaluate the effects that treated sewage has on some characteristics of water quality in a reach of the Merced River near Yosemite National Park. Streamflow and water-quality data were collected from July through October 1975 and from July through November 1977 at five stations on the river and at an auxiliary station on the South Fork of the Merced River before and after a sewage treatment plant near El Portal began discharging treated effluent into the river in January 1977. Data collected in 1977 coincided with drought conditions in the Merced River drainage basin.

On-site measurements included streamflow, water temperature, specific conductance, pH, total alkalinity, and dissolved oxygen. Diel measurements were made at selected stations to determine the daily fluctuations of dissolved oxygen, temperature, alkalinity, pH, and specific conductance. Water samples were analyzed for nitrogen, phosphorus, and silica. Periphyton samples were collected from artificial substrates for taxonomic and biomass determinations.

Chemical analyses of water for plant nutrients indicated (1) an increase in the concentration of inorganic nitrogen immediately below the treated sewage effluent, (2) uniformly low phosphorus concentrations above and below the effluent, and (3) silica concentrations above and below the effluent greatly exceeding the minimum concentrations required for diatom growth and production. Diel measurements of dissolved oxygen in the reach below the effluent showed substantial sag during the night with supersaturation during the day, indicating considerable in-stream primary production. Measured and observed periphyton growth suggest that sufficient quantities of plant nutrients were available to support periphytic diatom blooms in the Merced River prior to the operation of the treatment plant during near-normal flow conditions. Nutrient availability was also sufficient to support both periphytic diatom and green-algal blooms above and below the treated sewage effluent during drought conditions. Greatest algal production was observed in early autumn.

INTRODUCTION

In 1971, the National Park Service notified the Central Valley Region of the California Regional Water Quality Control Board of its intent to construct and operate a sewage treatment plant on the Merced River 4.6 km outside the Yosemite National Park boundary near El Portal, Calif. (fig. 1). The El Portal plant is designed to provide primary treatment by settling and secondary treatment of waste influent by aeration followed by phosphate removal, chlorination, and filtration through sand and gravel before discharging the treated sewage into the Merced River. Upon completion of the El Portal plant, the treatment plant in Yosemite Valley near Yosemite Village (fig. 1) was to be terminated.

Although contamination of the river by treated sewage was not expected, the Regional Board had required the Park Service to insure that water-quality standards in the river were not violated. To evaluate possible changes, the collection and analysis of background water-quality data were needed prior to the operation of the treatment plant. In 1973 the Park Service requested that the U.S. Geological Survey make a study of a reach of the Merced River to determine background water-quality conditions. A report by Hoffman and others (1976) summarized the results of that study. In general, the study findings showed that the reach of the Merced River from Happy Isles Bridge to the Briceburg Station was of good quality with respect to nearly all the recommended criteria for most fresh-water organisms and for primary contact recreation. Specifically, however, water samples collected for nutrient analysis during the 1973-74 study showed that the river just downstream from the proposed sewage outfall at Rancheria Flat was high in nitrogen and phosphorus compared to other Merced River sampling sites. Recognizing the potential impact of additional nitrogen and phosphorus inputs on algal growth and productivity in the downstream direction, the Park Service requested in 1975 that the Geological Survey resume the investigation of water-quality conditions in the reach of the Merced River from Happy Isles Bridge to Briceburg (fig. 1).

Purpose and Approach

The purpose of this study was to examine and describe any differences in water chemistry and periphyton growth in the Merced River upstream and downstream from the treated sewage discharge at Rancheria Flat near El Portal.

The approach of this study included measuring selected physical, chemical, and biological characteristics and constituents at four sites on the Merced River and one site on the South Fork Merced River (fig. 1, table 1). Physical characteristics included streamflow, specific conductance, and water temperature. Chemical constituents and properties consisted of nitrogen, phosphorus, silica, dissolved oxygen, alkalinity, and pH, with emphasis placed on measuring plant nutrients. Biological constituents consisted of periphyton with emphasis placed on measuring their abundance.

TABLE 1.--Description of sampling stations on the Merced River and on South Fork Merced River

Station number	Station description	Drainage area (km^2)
Merced River:		
1	Merced River at Happy Isles Bridge near Yosemite	469
2	Merced River at Big Oak Flat near El Portal	894
3	Merced River at Rancheria Flat near El Portal	1,018
4	Merced River below South Fork Merced R. near Briceburg	1,709
5	Merced River near Briceburg	1,790
Tributary:		
6	South Fork Merced River near El Portal	624

Sampling was during the low-flow period of July-October 1975, before the El Portal plant began operating in January 1977, and of July-November 1977. Initially the plant was scheduled to begin operating in early summer 1976, but frequent construction problems delayed the start. Consequently, follow-up sampling was postponed until the late summer-autumn period of 1977. Diel (24-hour) measurements were made at three sites in September and October 1975 and at four sites in September and November 1977. Happy Isles Bridge (fig. 1) is a hydrologic benchmark station, where selected water-quality data are collected monthly. Pertinent data from that station were used in this study. The data-collection schedule is shown in table 2.

Description of Study Area

The area of study is in north central Mariposa County, Calif. It includes a reach of the Merced River extending about 65 km from Happy Isles Bridge downstream to the gaging station near Briceburg (fig. 1 and table 1). The Merced River originates on the western slope of the central Sierra Nevada at an altitude of 3,350 m above mean sea level. Flowing westward, the river drops to 1,220 m at Happy Isles Bridge at the eastern end of the Yosemite Valley. The valley is about 13 km long and 2 km wide, and is bounded by nearly vertical cliffs rising 900 to 1,200 m. From the west end of Yosemite Valley, the Merced River flows through a narrow steep-sided canyon and drops to about 370 m at Briceburg. The El Portal treatment plant is situated to the north of the Merced River on a naturally widened area of the flood plain in the narrow canyon. The four holding ponds from which the effluent seeps to the river are at an elevation of about 3 m above and about 30 m distant from the river during low flow, and are about 60 m upstream from the Rancheria Flat sampling site.

TABLE 2.--Data-collection schedule, Merced River and South Fork Merced River, July-October 1975 and July-November 1977

<table>
<thead>
<tr><th rowspan="2">Types of data</th><th rowspan="2">Constituents and properties</th><th colspan="6">Merced River stations[1]</th></tr>
<tr><th>1. Happy Isles Bridge</th><th>2. Big Oak Flat</th><th>3. Rancheria Flat</th><th>4. Below South Fork Merced River</th><th>5. Briceburg</th><th>6. South Fork Merced River</th></tr>
</thead>
<tbody>
<tr><td>Discharge</td><td></td><td>Continuous</td><td colspan="5">--------------------------Instantaneous-discharge measurements----------</td></tr>
<tr><td>Temperature</td><td></td><td>Continuous</td><td></td><td></td><td></td><td>Continuous</td><td>Continuous</td></tr>
<tr><td>Specific conductance</td><td></td><td></td><td></td><td></td><td></td><td>Continuous</td><td></td></tr>
<tr><td rowspan="2">Field measurements</td><td rowspan="2">Dissolved oxygen, pH, alkalinity, specific conductance, temperature</td><td rowspan="2">July 11, 1975
13, 18, 1977
Aug. 6, 1975
18, 1977
Oct. 9, 1975
20, 1977
Nov. 15, 1977</td><td colspan="5">-------July 23-24, Aug. 27-28, Sept. 24-25, Oct. 23-24, 1975----------</td></tr>
<tr><td colspan="5">-------July 13-14, 28, Sept. 8-9, 29-30, Nov. 30-Dec. 1, 1977---------</td></tr>
<tr><td rowspan="2">Diel (24-hour) measurements</td><td rowspan="2">Dissolved oxygen, pH, alkalinity, specific conductance, temperature</td><td rowspan="2"></td><td>Sept. 23-24, 1975
Oct. 20-23, 1975</td><td></td><td colspan="3">-------Sept. 23-24, Oct. 20-23, 1975-------</td></tr>
<tr><td colspan="5">----------------------Sept. 28-29, Nov. 29-30, 1977--------------------</td></tr>
<tr><td rowspan="2">Plant nutrients</td><td rowspan="2">Nitrogen, nitrite plus nitrate, ammonia, organic N, phosphorus, orthophosphate, and silica (silica collected in 1977 only)</td><td rowspan="2"></td><td colspan="5">-----------July 23-24, Aug. 27-28, Sept. 24-25, Oct. 23-24, 1975---------</td></tr>
<tr><td colspan="5">------------July 14, 28, Sept. 8-9, 29-30, Nov. 30-Dec. 1, 1977----------</td></tr>
<tr><td rowspan="2">Periphyton</td><td rowspan="2">Biomass and taxa</td><td rowspan="2"></td><td colspan="5">--------------------July 23-24 to Oct. 23-24, 1975---------------------</td></tr>
<tr><td colspan="5">------------------July 13-14 to Nov. 30-Dec. 1, 1977-------------------</td></tr>
</tbody>
</table>

[1]See figure 1 for location of sampling stations.

The climate of the area is characterized by marked wet and dry seasons with precipitation falling largely in the winter months, and normally in the form of snow above an altitude of 600 m. Above 1,200 m, snow covers the ground much of the time from November to April. Total precipitation recorded at Yosemite Village was 996 mm, 554 mm, and 292 mm in water years 1975, 1976, and 1977, respectively. Water year 1977 was one of the driest in California's recorded history, and water years 1976 and 1977, together, represented the only case on record of consecutive years of drought. Streamflow of the Merced River in 1977 was 66 percent of the flow in 1975; and based on 61 years of streamflow data, was 25 percent of the mean annual flow (fig. 2).

Daily mean streamflow at Happy Isles Bridge during the periods of this study is shown in figure 3. Streamflow from July through November 1977 was about 10 percent of the streamflow during a comparable period in 1975.

Methods

Measurements of streamflow were made by using the methods of Corbett and others (1943). Discharge data for the treated sewage effluent were provided by the National Park Service (Norman Turner, oral commun., May 1978). Continuous stage measurements (converted to discharge), were obtained by an automatic recorder (Buchanan and Somers, 1968). Continuous water temperature and continuous specific conductance measurements were obtained by using an automatic recorder with submerged probe. Periodic water-temperature readings were made with a calibrated hand-held thermometer, and periodic specific conductance and pH measurements were made with portable field meters. Total alkalinity (as $CaCO_3$) was determined immediately after sample collection by titrating with 0.01639N sulfuric acid to a pH of 4.5. Dissolved-oxygen concentration was measured by using both the modified Winkler method (Brown and others, 1970) and dissolved-oxygen meters field-calibrated by the Winkler method.

Water samples for determination of chemical constituents were collected at the estimated center of mass flow with a 5-liter plastic container. If the cross-channel specific conductance varied $\geq$5 percent at a particular site, the samples were collected with a DH-48 depth-integrating hand-held sampler using the equal-transit-rate method (Guy and Norman, 1970, p. 32). The individual samples taken at selected intervals across the stream channel by this method were subsequently composited. All samples for analyses of dissolved constituents were filtered through a prerinsed 0.45-micrometer filter immediately after collection and chilled to 4°C or lower until analyzed.

Determinations of chemical constituents were made by the Geological Survey Central Laboratory, Denver, Colo., using the methods described by Brown and others (1970).

Periphyton samples for taxonomic and biomass determinations were collected from artificial substrates (transparent plastic strips) placed at the head of a riffle just before the water surface began to break. The substrates were tied to rocks and placed on the streambed horizontal and parallel to streamflow. The artificial substrates were submerged during three sampling periods from July through October 1975 and July through November 1977. Following a 4-13 week period between visits, the substrates were removed and a 0.0025-square meter area was scraped from each for algal count and identification to species whenever possible. The algae were preserved with Lugol's solution (Slack and others, 1973) and counted as cells per unit area; for filamentous algae, the number of cells was determined by dividing the average filament length by the length of a component cell. The substrates were then placed in protective cardboard tubes to air-dry. After drying, three to ten 0.0025-square meter areas were scraped from each artificial substrate with a plastic scraper. Biomass determinations were made from the scraped material at the Geological Survey laboratory in Sacramento using the methods described by Slack and others (1973).

For qualitative comparison, periphyton samples were collected from natural substrates in the Merced River during the 1975 sampling period. Small stones, ranging from 25 to 50 mm in diameter, were randomly taken from each sampling site and thoroughly scrubbed into sample bottles. The periphyton samples were preserved with Lugol's solution and identified to generic level at the Geological Survey laboratory in Doraville, Ga.

DIEL MEASUREMENTS

Daily fluctuations of DO (dissolved oxygen) concentration are to be expected where there are appreciable numbers of aquatic plants. To determine daily changes in the concentration of DO, measurements were made over 24-hour periods in September and October 1975 at three sampling stations and in September and November 1977 at four sampling stations (table 2, figs. 4-10). Associated characteristics such as water temperature, total alkalinity, and pH were also determined.

Dissolved Oxygen

Measurements of DO in the Merced River (figs. 4-10) in general show a daily cyclic pattern with a diurnal increase and a nocturnal decrease. In September 1975, DO varied slightly within a 7.7 and 9.0 mg/L range at each station and saturation values remained at or above 88 percent. In October 1975 at each station, DO varied slightly about the 10 mg/L concentration and saturation values remained at or above 92 percent. The lowest DO concentration recorded during the 1975 diel measurements was 7.7 mg/L at 88 percent saturation at the Big Oak Flat Station in September. As for downstream trends, the September 1975 diel measurements of DO showed a gradual downstream increase, whereas the October measurements showed a gradual downstream decrease.

In 1977, DO showed considerable fluctuation in September, especially at Rancheria Flat and the station below the South Fork Merced River (figs. 8 and 9). Again, the lowest DO concentration (7.0 mg/L) and corresponding saturation value (73 percent) were recorded at Big Oak Flat upstream from the sewage outfall (fig. 7). At the other stations, DO concentrations were at or above 8.0 mg/L and saturation values remained at or above 80 percent (figs. 8-10). Supersaturation occurred during the afternoon at the three stations downstream from the sewage outfall, indicating highly active photosynthesis. The consistent undersaturated condition at Big Oak Flat is indicative of a biochemical demand for oxygen exceeding oxygen production by the aquatic plants. Downstream trends in DO during the 1977 diel measurements showed a large increase in concentration from Big Oak Flat to Rancheria Flat. Farther downstream there was a slight increase at the station below the South Fork Merced River and then virtually no increase at the Briceburg station. The higher DO concentration in October 1975 and November 1977 at all stations reflects the capacity of cooler water to hold more dissolved oxygen.

Water Temperature

Water temperature showed the usual daily warming and cooling cycle at all stations with maximum temperatures in the afternoon (1400 to 1800 hours) and minimum temperatures in the morning (0500 to 1000 hours) (figs. 4-10). In the downstream direction, from Big Oak Flat to Briceburg, the temperature increased about 5°C during the measurements in 1975 and increased about 10°C in 1977. With the onset of cooler weather and increased flow, the water temperature decreased 5°C at each sampling station in October 1975 when compared to September 1975 and decreased 10°C in November 1977 when compared to September 1977.

Monthly maximum and minimum water temperatures at the Happy Isles Bridge station indicate that the water temperatures recorded in 1977 at this station did not differ greatly from those of 1975 (fig. 11). In 1975 the highest recorded water temperature was in July, whereas in 1977 the highest recorded temperature was in August. Minimum temperatures were slightly higher during the summer of 1977 than in the summer of 1975.

Water temperatures at Briceburg (fig. 12) during the period of sampling in 1977 were considerably higher than those at Happy Isles Bridge (fig 11). Minimum temperatures at Briceburg were above 20°C in July and August, with maximum temperatures approaching 30°C. In September the temperature reached a maximum of 29°C and a minimum of about 14°C. This difference is caused in part by shallow water in the Merced River being affected by the daily fluctuations in air temperature. From July through September, temperatures at the Briceburg station were also affected by warm tributary inflow from the South Fork Merced River (fig. 12).

pH

The pH measurements during September and October 1975 indicated a slight downstream increase from Big Oak Flat to Briceburg (figs. 4-6). Little variation in pH occurred throughout the 24-hour period in September and virtually no variation occurred in October.

The pH measurements in September and November 1977 also showed a slight downstream increase (figs. 7-10). The values, however, were 1 to 2 units higher than the 1975 values at comparable stations. The pH varied the most at the station just below the South Fork Merced River in September 1977, with a maximum of 9.0 in the afternoon and a minimum of 7.3 in the early morning (fig. 9). Typically, pH increased during the period of active photosynthesis because of plant uptake of dissolved carbon dioxide and decreased during the hours of darkness because of community respiration.

Total Alkalinity

In addition to being a measure of the capacity of water to neutralize acids, alkalinity, in conjunction with pH, yields information on the availability of free carbon dioxide (CO_2) for photosynthetic activity. For example, once free CO_2 is depleted under high pH (≥ 8.5) conditions, blue-green algae, with their favorable uptake kinetics, can compete better than diatoms and green algae for bicarbonate CO_2 (King, 1970; Shapiro, 1973).

The Merced River was low in alkalinity, with values ranging from 10 to 23 mg/L during the diel measurements in 1975, and from 11 to 34 mg/L in 1977 (figs. 4-10). The data clearly show a downstream increase in alkalinity from Big Oak Flat to Briceburg in both years. The greatest daily fluctuation occurred at the Briceburg station in September 1975 and at the three stations downstream from the sewage outfall in September 1977 (figs. 6 and 8-10).

The low alkalinity values mean that the river could not withstand the addition of much acid without sustaining a change in the aquatic environment. Although alkalinity was low, the buffering capacity of the water was generally sufficient, especially during the critical periods of high primary productivity, to keep the daily variation in pH between 6 and 8. This pH range indicates that free CO_2 was not depleted by photosynthetic activity to the extent that much bicarbonate CO_2 was utilized. This condition, along with moderate water temperatures and nutrient levels in the Merced River, was favorable to the maintenance of diatom and green algae to the virtual exclusion of the blue-green algae.

Specific Conductance

Specific conductance (indicator of dissolved-solids concentration) varied slightly at most stations throughout the diel measurements (figs. 4-10). In general there was a slight increase around midnight. The greatest fluctuation in specific conductance over a 24-hour period occurred at the station below the South Fork Merced River during the September 1975 and November 1977 measurements (figs. 5 and 9). Specific conductance at Rancheria Flat, immediately below the sewage outfall, was about 20 micromhos higher than that at the upstream station at Big Oak Flat in September 1977 and about 10 micromhos higher in November 1977 (figs. 7 and 8).

In 1975, periodic measurements of specific conductance indicated a gradual increase in the downstream direction from Big Oak Flat to Briceburg (fig. 13). The lowest conductance was measured during moderately high flow in late July, and the highest was measured during low flow in late September. In contrast, the 1977 data indicated a gradual downstream increase only in July and November under high-flow conditions (figs. 3 and 13). In September, during extreme low-flow conditions, an abrupt increase in conductance was measured at Rancheria Flat just below the sewage outfall, and then at the station below the South Fork Merced River, which was influenced by tributary inflow. Specific conductance in the South Fork Merced River was 188 and 244 micromhos at 25°C on September 8 and 30, respectively, nearly a threefold increase when compared to Rancheria Flat on the Merced River.

Overall, the conductance values measured periodically in 1975 were lower than the values in 1977 because of dilution. Continuous specific conductance measurements recorded at the Briceburg station in 1977 when there was less water available for dilution, also indicated an increased concentration of dissolved solids (fig. 14). Because of equipment malfunction, continuous conductance data were not obtained in 1975; however, a partial record from June through September 1976 was obtained that showed a gradual increase in specific conductance from June through August and a decrease in September (fig. 14), responding inversely to streamflow.

PLANT NUTRIENTS

Of the essential elements required for plant growth and reproduction, nitrogen and phosphorus are considered the most important. Insufficient quantities of nitrogen and phosphorus can restrict plant growth; conversely, excessive plant productivity in surface water can occur in the presence of sufficient quantities of these two nutrients. The minimum requirements for algal growth range from a trace to 5.3 mg/L for nitrogen and from 0.002 to 0.09 mg/L for phosphorus (Greeson, 1971). In addition to nitrogen and phosphorus, dissolved silica is required by the diatoms, an important component of the algal population in most surface water. This requirement is absolute, and the minimum silica concentrations necessary for diatom growth and production range from 0.5 to 0.8 mg/L (Greeson, 1971). Analyses of dissolved silica were included in the 1977 study program when extreme low flows were forecast for the Merced River during the 1976-77 drought. The purpose was to determine if silica was a limiting nutrient during the critical summer low-flow period when increased aquatic plant production was expected.

Nitrogen

A comparison between the 1975 and 1977 nutrient data from a limited number of samples shows that the concentration of total nitrogen in the Merced River generally was lower during the 1977 study period (fig. 15). Exceptions were higher concentrations at the Rancheria Flat station just downstream from the sewage outfall in September 1977 and at the Briceburg station in late July 1977. The higher total-nitrogen values at these two stations consisted mainly of the inorganic fraction (fig. 15), primarily nitrate.

Concentrations of total nitrogen in the downstream direction were frequently highest at Big Oak Flat and Rancheria Flat in 1975 and at Rancheria Flat in 1977. Then farther downstream, at the station below the South Fork Merced River, the concentration decreased abruptly because of dilution by nitrogen-poor water.

Sewage-treatment facilities without nitrogen-removal capabilities may add large quantities of inorganic nitrogen, especially nitrate, to receiving water. For example, the mean total-nitrate (as N) concentration in five samples collected from the treatment-plant effluent near Yosemite Village in 1973-74 was 10 mg/L (Hoffman and others, 1976, p. 42). The amount of water available for dilution is, of course, important. A comparison of monthly mean discharge of the treated wastewater to that of the Merced River during the 1977 sampling period is shown in the following table.

	Monthly mean discharge (cubic meters per second)		
	Sewage effluent (A)	Merced River at Rancheria Flat (B)	Ratio [(B-A)/A]
July 1977	0.033	2.4	1:72
August	.034	.51	1:14
September	.027	.25	1:8.3
October	.027	.20	1:6.4
November	.018	.56	1:30

The values indicate that in September and October less river water was available for dilution. At the same time, the inorganic nitrogen concentration was highest at that station (fig. 15).

With the exception of the unexplained high value (1.7 mg/L) at the Briceburg station in 1977, the concentration of total inorganic nitrogen in the downstream direction (fig. 15) was generally highest at the Big Oak Flat station in 1975 and at the Rancheria Flat station in 1977. The inorganic nitrogen contribution from the South Fork Merced River to the Merced River was minimal.

Two water samples for total nitrite-plus-nitrate analysis collected immediately upstream from the sewage effluent on September 9, 1977, had a concentration of 0.05 mg/L each, compared to 0.19 mg/L downstream from the effluent. On September 30, 1977, the concentration of nitrite plus nitrate immediately upstream from the effluent was again 0.05 mg/L, compared to 0.36 mg/L downstream. This downstream increase suggests that the treated effluent was adding nitrate to the river. The downstream values, however, were similar to background concentrations of dissolved nitrite-plus-nitrate detected in water samples in September 1973 and in September 1974.

The fraction of nitrite in the nitrite-plus-nitrate analyses in this study was considered nil. Previous analyses (Hoffman and others, 1976, p. 12-16 and 42) indicated that the concentrations of nitrite in the Merced River and in the treated sewage effluent were negligible.

Phosphorus

Dissolved-orthophosphate and total-phosphorus concentrations were, for the most part, consistently lower during 1977 than during 1975 (fig. 16). With the exception of October, dissolved orthophosphate decreased gradually in concentration in the downstream direction in 1975. In October, concentrations of orthophosphate were similar at all Merced River stations. Maximum concentrations in water samples were found at the Big Oak Flat station (0.18 mg/L) in late August 1975 and at the Rancheria Flat station (0.12 mg/L) in late September 1975. In 1977, orthophosphate showed no obvious downstream trends.

Total phosphorus measurements for 1975 indicated virtually the same downstream trend as dissolved orthophosphate (fig. 16). Total-phosphorus concentrations recorded at all Merced River stations in 1977 were either below or slightly above analytical detection limits.

Although there was considerably less water for dilution in 1977 than in 1975, the generally lower nitrogen and phosphorus concentrations recorded in 1977 suggest a greater uptake of the nutrients by aquatic plants. Phosphorus, in particular, is often rapidly extracted and stored by algae in amounts that may exceed 10 times their immediate needs if the supply so allows (Ruttner, 1971, p. 90).

Silica

Dissolved-silica concentrations were well above the minimum concentrations (0.5 to 0.8 mg/L) required for diatom growth and production (fig. 15). With the exception of the South Fork Merced River and the station just below the South Fork Merced River, the concentration of silica tended to vary inversely with streamflow, a common relationship under most flow conditions in most river systems. In the South Fork Merced River the concentration of silica tended to vary directly with streamflow. High diatom productivity in relationship to the low volume of water in the South Fork Merced River may have caused measurable extraction of silica from the water; the lowest silica concentration (6.0 mg/L) recorded on September 8, 1977, was also the time of lowest discharge (0.034 m^3/s) and high algal productivity (figs. 15 and 16). The similar silica concentrations recorded at the sampling station just below the confluence of the South Fork Merced River (fig. 15) probably reflect simple dilution.

PERIPHYTON

Periphyton is the assemblage of algae and associated micro-organisms usually found attached to underwater substrates. Periphytic algae are good indicators of water quality; their presence or absence and their relative abundance often reflect the condition of the water in which they live.

Total Taxa and Percentage Composition

The number of taxa and percentage composition of the major algal groups found on the artificial substrates are shown in table 3. A comparison between 1975 and 1977 data shows that the number of taxa was generally greater in 1977. The data do not show any obvious downstream trend in the number of taxa in either sampling year. The number of taxa found on natural substrates in 1975 (table 4), although two to seven times greater than that found on the artificial substrates (table 3), also showed no downstream trend. Periphyton samples were not collected from natural substrates in 1977. The small number of taxa found on artificial substrates during this study is consistent with the small number found in 1974 (Hoffman and others, 1976, p. 54).

TABLE 3.--Total taxa found on artificial substrates and percentage composition of the major algal groups, 1975 and 1977

Station	Sampling period	Total taxa	Percentage composition: Green algae	Diatoms	Blue-green algae	Miscellaneous flagellates
	1975					
Merced River:						
Big Oak Flat	July 23-Aug. 28		Sample vial broken			
	Aug. 28-Sept. 24	2	0	50	0	50
	Sept. 24-Oct. 23	7	29	71	0	0
Rancheria Flat	July 24-Aug. 28	4	0	50	0	50
	Aug. 28-Sept. 25	7	14	71	0	14
	Sept. 25-Oct. 24	14	36	64	0	0
Below South Fork Merced River	July 24-Aug. 27		Substrates lost			
	Aug. 27-Sept. 25	2	0	50	0	50
	Sept. 25-Oct. 24	8	25	75	0	0
Near Briceburg	July 24-Aug. 27	3	0	67	0	33
	Aug. 27-Sept. 25	5	0	80	0	20
	Sept. 25-Oct. 24	6	0	83	0	17
Tributary:						
South Fork Merced River	July 24-Aug. 27	8	12	62	12	12
	Aug. 27-Sept. 25	7	0	86	0	14
	Sept. 25-Oct. 23		Substrates lost			
	1977					
Merced River:						
Big Oak Flat	July 13-Sept. 9	7	0	100	0	0
	Sept. 9-Sept. 29	16	38	62	0	0
	Sept. 29-Nov. 30	21	33	67	0	0
Rancheria Flat	July 14-Sept. 9	5	0	100	0	0
	Sept. 9-Sept. 30	11	18	82	0	0
	Sept. 30-Dec. 1	13	15	85	0	0
Below South Fork Merced River	July 13-Sept. 8	6	0	100	0	0
	Sept. 8-Sept. 30	20	50	50	0	0
	Sept. 30-Dec. 1	14	0	93	0	7
Near Briceburg	July 13-Sept. 8	8	25	75	0	0
	Sept. 8-Sept. 30	20	35	50	10	5
	Sept. 30-Dec. 1	21	33	62	5	0
Tributary:						
South Fork Merced River	July 14-Sept. 9	13	62	23	15	0
	Sept. 9-Sept. 29	10	40	50	10	0
	Sept. 29-Nov. 30	10	10	90	0	0

TABLE 4.--Frequency of occurrence of periphytic algae on natural substrates in the Merced River, July-October 1975

[x indicates occurrence. xl indicates the dominant (≥15 percent) genera]

	Merced River stations											
	Big Oak Flat			Rancheria Flat			Below South Fork			Near Briceburg		
Taxa	July-Aug.	Aug.-Sept.	Sept.-Oct.	July-Aug.	Aug.-Sept.	Sept.-Oct.	July-Aug.	Aug.-Sept.	Sept.-Oct.	July-Aug.	Aug.-Sept.	Sept.-Oct.
CHRYSOPHYTA												
Bacillariophyceae (diatoms--genera)												
Achnanthes	x	x	xl	x	x	xl	xl	x	x	x	xl	x
Amphora	x	x	x	-	-	-	-	-	-	x	-	x
Cocconeis	xl	xl	x	x	x	x	x	xl	x	xl	xl	x
Cymbella	xl	-	xl	xl	xl	xl	xl	xl	xl	xl	x	xl
Diatoma	-	-	x	-	-	-	-	-	-	-	-	x
Epithema	-	-	-	-	-	-	-	-	-	-	-	x
Eunotia	x	-	x	-	-	-	-	-	-	-	-	-
Fragilaria	x	x	xl	x	x	x	x	-	x	x	x	x
Gomphonema	x	x	x	x	x	x	xl	x	x	xl	x	xl
Hannea	-	-	x	-	-	-	-	-	-	x	-	-
Melosira	x	x	x	x	x	x	-	-	x	-	x	xl
Navicula	x	x	x	x	x	x	x	x	x	x	x	x
Nitzschia	x	x	x	x	x	x	-	x	-	x	-	x
Pinnularia	x	x	x	-	x	x	x	-	-	x	x	x
Rhoiocosphenia	-	-	-	-	-	-	-	-	-	-	-	-
Rhopalodia	-	-	x	-	x	x	-	-	x	-	-	x
Stauroneis	x	-	x	-	-	-	-	-	-	-	-	-
Surirella	-	-	-	-	-	-	x	-	-	-	-	x
Synedra	x	x	x	x	x	x	x	x	x	x	x	x
Tabellaria	x	-	x	x	-	-	x	-	-	-	-	x
CHLOROPHYTA												
Chlorophyceae (green algae--genera)												
Ankistrodesmus	x	-	-	-	-	x	x	-	-	-	x	-
Cladophora	-	-	-	-	-	-	x	xl	x	-	xl	x
Closterium	-	x	x	-	-	-	-	-	-	-	-	x
Cosmarium	-	-	x	-	-	x	-	-	-	-	-	x
Kerchneriella	-	-	-	-	-	-	-	-	-	-	-	x
Mougeotia	x	x	x	-	-	x	-	-	-	-	-	x
Oedogonium	-	-	-	-	-	-	-	-	-	-	-	-
Pediastrum	-	-	-	-	-	-	-	-	-	-	x	-
Pteromonas	-	-	-	-	-	-	-	-	-	-	-	-
Scenedesmus	x	-	x	x	-	x	x	x	x	x	x	x
Selenastrum	-	x	x	x	-	-	-	-	-	-	-	x
Spirogyra	x	x	-	-	-	x	-	x	x	-	-	-
Staurastrum	-	-	-	-	-	-	-	-	-	-	-	x
Stigeoclonium	-	-	-	x	-	-	-	-	-	-	-	-
Ulothrix	x	-	x	-	-	-	-	-	-	-	-	-
TOTAL GENERA	19	14	23	13	11	16	13	10	12	11	13	24

Of the major algal groups, the diatoms composed the greatest percentage of the taxa found on artificial substrates at all but one Merced River station during both study years. The exception was the station below the South Fork Merced River where 50 percent of the taxa were green algae and 50 percent diatoms. In general, the second greatest percentage of taxa were represented by the miscellaneous flagellates in 1975 and by the green algae in 1977. The miscellaneous flagellates comprise a variety of extremely small unicellular algae having flagella, and precise identification of these organisms is difficult with conventional microscopic techniques. The blue-green algae were absent from the artificial substrates at all Merced River stations in 1975, and made an appearance only at the Briceburg station in late 1977.

Because of the variability in percentage composition of the major algal groups within the three artificial-substrate sampling periods, no downstream trend concerning the algal groups was detected.

Dominant Algae

Ten dominant algal species belonging to eight genera, seven of which were in the diatom group, were identified during both study years (table 5). Of the eight genera, *Cymbella* (a diatom) was detected in 34 percent of the samples, *Cocconeis* (a diatom) in 31 percent, and the remaining six genera in 35 percent. Downstream trends during the first sampling period in 1977 indicate *Cymbella cistula* dominant at the Big Oak Flat and Rancheria Flat stations and *Cocconeis placentula* dominant at the two downstream stations on the Merced River. During the second sampling period of 1977 the dominant algae at each station (table 5) were different at the generic taxonomic level from those at the preceding station. During the third sampling period of 1977, *Melosira varians* was dominant at the Big Oak Flat station and *Achnanthes minutissima* at the three downstream stations on the Merced River.

The genera *Cymbella*, *Cocconeis*, *Melosira*, and *Achnanthes* frequently occur together in the periphyton and are typically associated with a clean-water environment. Specifically, however, *Cymbella cistula*, *Cocconeis placentula*, and *Melosira varians* are characterized as filter-clogging algae.

TABLE 5.--Dominant (>15 percent) periphytic algae on artificial substrates during each of the three sampling periods, 1975 and 1977

[Number in parentheses indicates percentage of total cells]

	1975: July-August 1977: July-September	August-September September	September-October September-November
Merced River stations:			
Big Oak Flat			
1975	(Sample vial broken)	*Cocconeis placentula* (94)	*Cocconeis placentula* (80)
1977	*Cymbella cistula*(68)	*Melosira varians* (52)	*Melosira varians* (58)
Rancheria Flat			
1975	*Cocconeis placentula* (88)	*Navicula cryptocephala* (33) *Cymbella ventricosa* (29) *Cymbella cistula* (18)	*Cymbella cistula* (74)
1977	*Cymbella cistula* (79)	*Cymbella cistula* (90)	*Achnanthes minutissima* (46) *Cymbella cistula* (22)
Below S. Fork Merced R.			
1975	(Substrates lost)	*Cocconeis placentula* (94)	*Cymbella cistula* (54) *Cymbella ventricosa* (38)
1977	*Cocconeis placentula* (80)	*Fragilaria crotonensis* (74)	*Achnanthes minutissima* (87)
Near Briceburg			
1975	*Cocconeis placentula* (94)	*Cocconeis placentula* (86)	*Cocconeis placentula* (78)
1977	*Cocconeis placentula* (80)	*Bulbocheate* sp.(18)	*Achnanthes minutissima* (26) *Epithemia sorex* (20) *Fragilaria crotonensis* (19)
Tributary:			
S. Fork Merced R.			
1975	Misc. flagellates (62)	*Cocconeis placentula* (45) *Cymbella cistula* (15)	(Substrates lost)
1977	*Cocconeis placentula* (45) *Cymbella microcephala* (41)	*Achnanthes minutissima* (37) *Cymbella microcephala* (21)	*Achnanthes minutissima* (81)

Biomass

Periphyton biomass determinations are shown graphically in figure 16. Biomass includes only the organic weight of the attached organisms; the silica frustules of the diatoms, for example, are excluded. Periphyton growth on the artificial substrates placed in the Merced River was overwhelmingly plant life; few aquatic insects were seen on the substrates. Numerous blackfly larvae (*Simulium* spp.), however, were attached to the artificial substrates in the South Fork Merced River during the September 29 to November 30, 1977, sampling period.

Downstream trends in biomass (fig. 16) in 1975 before the treatment plant went into operation show a dramatic increase and fluctuation at the Rancheria Flat station, followed by an overall gradual reduction in biomass at the two downstream stations on the Merced River. Downstream trends in 1977 after the treatment plant went into operation and during drought conditions, show a substantial increase at Rancheria Flat only in late September when compared to the upstream station. Many of the higher biomass values in the Merced River were recorded at the two stations farther downstream.

The biomass values recorded in this study are low when compared to other California streams (Britton and Averett, 1974; Fuller, 1975; Iwatsubo and others, 1976). Naturally many ecological factors must be considered when making detailed biological comparisons between rivers.

Visual Observations

In 1975 the periphyton that was observed on submerged rocks at all sampling stations was mainly the thin coating of diatom growth that commonly causes rocks to feel slippery and casts a yellowish-brown hue. But on October 24 a massive growth of the periphytic diatom *Cymbella cistula* was seen thickly covering the streambed at the station just below the South Fork Merced River. These algal cells form slimy, gelatinous tubes that intertwine to form extensive brown-colored mats. As previously mentioned, this species is recognized as a filter-clogging alga. Production of this nature was not seen at this station during the previous months, nor at any of the other stations during the July-October 1975 sampling period. A year later on November 10, 1976, during a sampling visit not directly related to this study, the same kind of massive growth was seen covering about a 60-m reach of the river at the Big Oak Flat station and at the station below the South Fork Merced River, but to a slightly lesser degree.

In 1977 the usual thin, yellowish-brown coating of diatoms that was seen covering nearly all submerged rocks in July was succeeded by a periphytic diatom bloom similar in appearance to *Cymbella cistula* at all stations by early September. These growths were generally restricted to faster flowing water immediately downstream from a pool. From late September, the period of lowest flow (fig. 3), through November dense blooms of periphytic green algae (*Spirogyra* spp.) were seen in nearly every pool in the Merced River from about 2 km upstream from the Big Oak Flat station downstream to Briceburg.

These visual observations of periphyton growth on natural substrates in the Merced River indicate that the input of plant nutrients to the river was sufficient to support diatom blooms at the Big Oak Flat station and at the station below the South Fork Merced River before the operation of the treatment plant. The input was also sufficient to support both diatom and green-algal blooms along the entire reach from Big Oak Flat downstream to Briceburg after the treatment plant was operational.

SUMMARY

Water samples for plant-nutrient analyses and periphyton samples from artificial substrates for taxonomic and biomass determinations were collected from four stations on the Merced River. An auxiliary sampling station was located on the South Fork Merced River. Data were collected from July through October 1975 before the treatment plant began operating in January 1977 and from July through November 1977. Sampling in 1977 coincided with severe drought conditions in the Merced River drainage basin.

Total nitrogen concentrations in the mainstem of the Merced River were generally lower in 1977 than in 1975. Downstream trends showed that the concentrations were frequently highest at Big Oak Flat and Rancheria Flat in 1975 and at Rancheria Flat in 1977. Then farther downstream, the concentration decreased because of dilution by nitrogen-poor water.

With the exception of the Rancheria Flat and Briceburg stations, the inorganic-nitrogen values recorded in 1977 were lower than those in 1975. The higher values at Rancheria Flat in 1977 indicate an input of inorganic nitrogen to the river from the treated sewage effluent. In 1975, before the treatment plant became operational, the concentration of inorganic nitrogen decreased substantially in the downstream direction from Big Oak Flat to Rancheria Flat during low-flow conditions in August and September. But after the plant became operational, a substantial increase in concentration was recorded at Rancheria Flat, especially during minimum flows in September 1977. The concentrations at Rancheria Flat, however, were similar to background concentrations recorded in September 1973 and in September 1974.

Phosphorus concentrations in the Merced River were clearly lower in 1977 relative to 1975. In 1975 there appeared to be a slight decrease in concentration in the downstream direction from Big Oak Flat to Briceburg. In 1977, however, no obvious downstream trends were noted. The lower nitrogen and phosphorus values in 1977, than in 1975, were probably the result of increased plant uptake of these nutrients because of the increased algal production.

Silica concentrations were well above the minimum required for diatom growth and production, and thus they were not a limiting factor.

Diel measurements of dissolved oxygen varied the most in September 1977 at the three Merced River stations downstream from the effluent, with supersaturation occurring at the two stations farthest downstream--indicating high aquatic-plant productivity.

In general, the diatoms composed the greatest percentage of taxa and were the dominant or codominant algae on artificial substrates at all Merced River stations during both study years. Because of the variability of the data, a downstream trend was not evident concerning the number of taxa and the percentage composition of the major algal groups.

Periphyton biomass collected from artificial substrates in 1975 showed a substantial increase at Rancheria Flat followed by a general overall reduction farther downstream. In 1977 a substantial increase at Rancheria Flat was noted only in late September. Many of the higher biomass values were recorded at the two Merced River stations farthest downstream. The biomass values measured in this study, however, were low when compared to several California streams.

In the autumn of 1975 and 1976 before the El Portal treatment plant became operational, periphytic diatom blooms were seen at the Big Oak Flat station and at the station below the South Fork Merced River. In the autumn of 1977 after the treatment plant was operational, green-algal blooms were seen in nearly every pool and periphytic diatom blooms in nearly every riffle from Big Oak Flat downstream to Briceburg.

Overall, the data collected during this study indicate that sufficient quantities of plant nutrients were available to support periphytic diatom blooms in the Merced River prior to the operation of the El Portal treatment plant during near-normal flow conditions. Nutrient availability was also sufficient to support both periphytic diatom and green-algal blooms above and below the treated-sewage effluent during drought conditions. In addition, the limited nutrient data suggest that the effluent from the treatment plant may be adding measurable quantities of inorganic nitrogen to the Merced River. Visual observations indicated that September and October are the critical months in which excessive algal production may occur.

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ILLUSTRATIONS

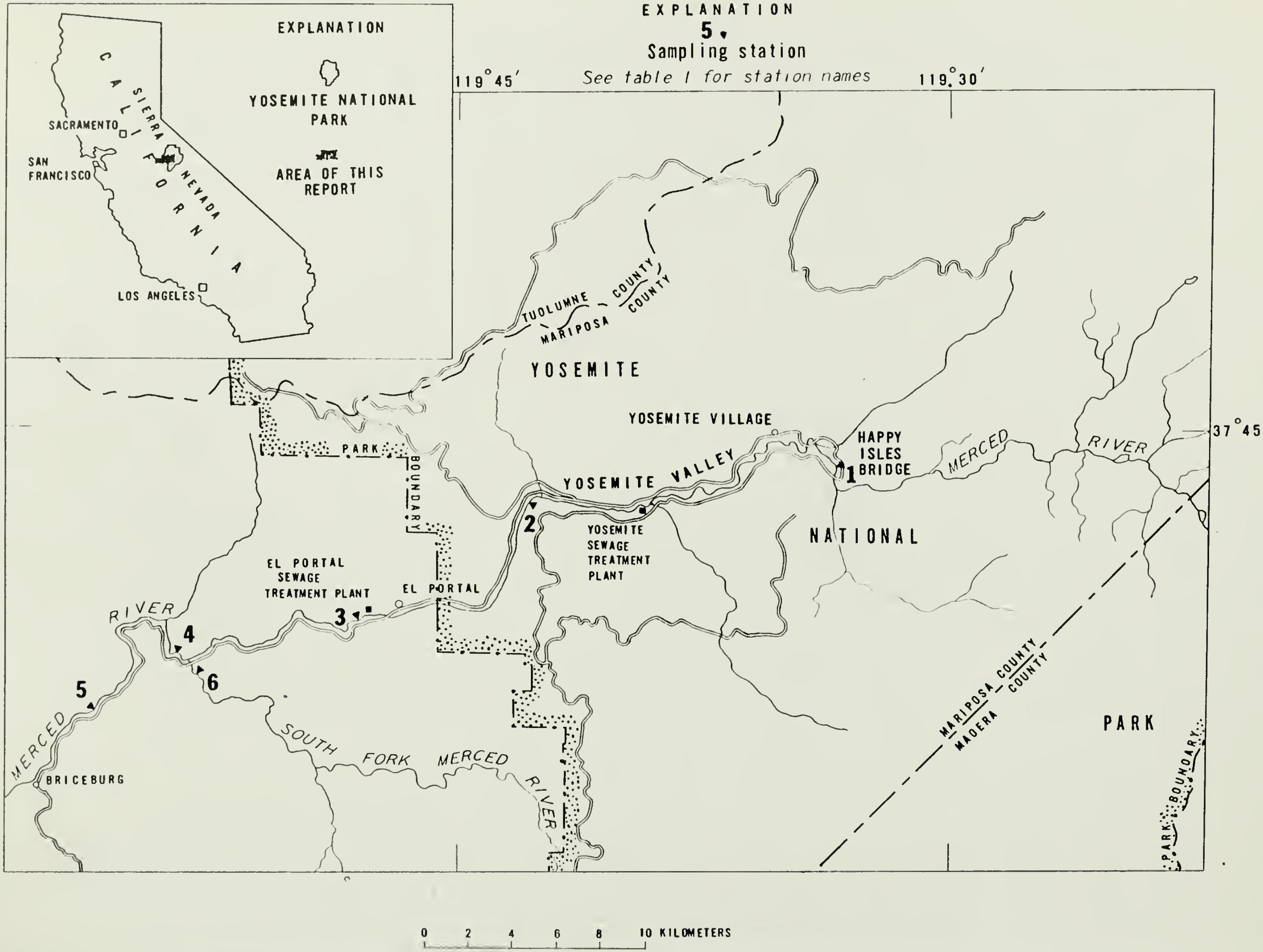

FIGURE 1.--Location of sampling stations.

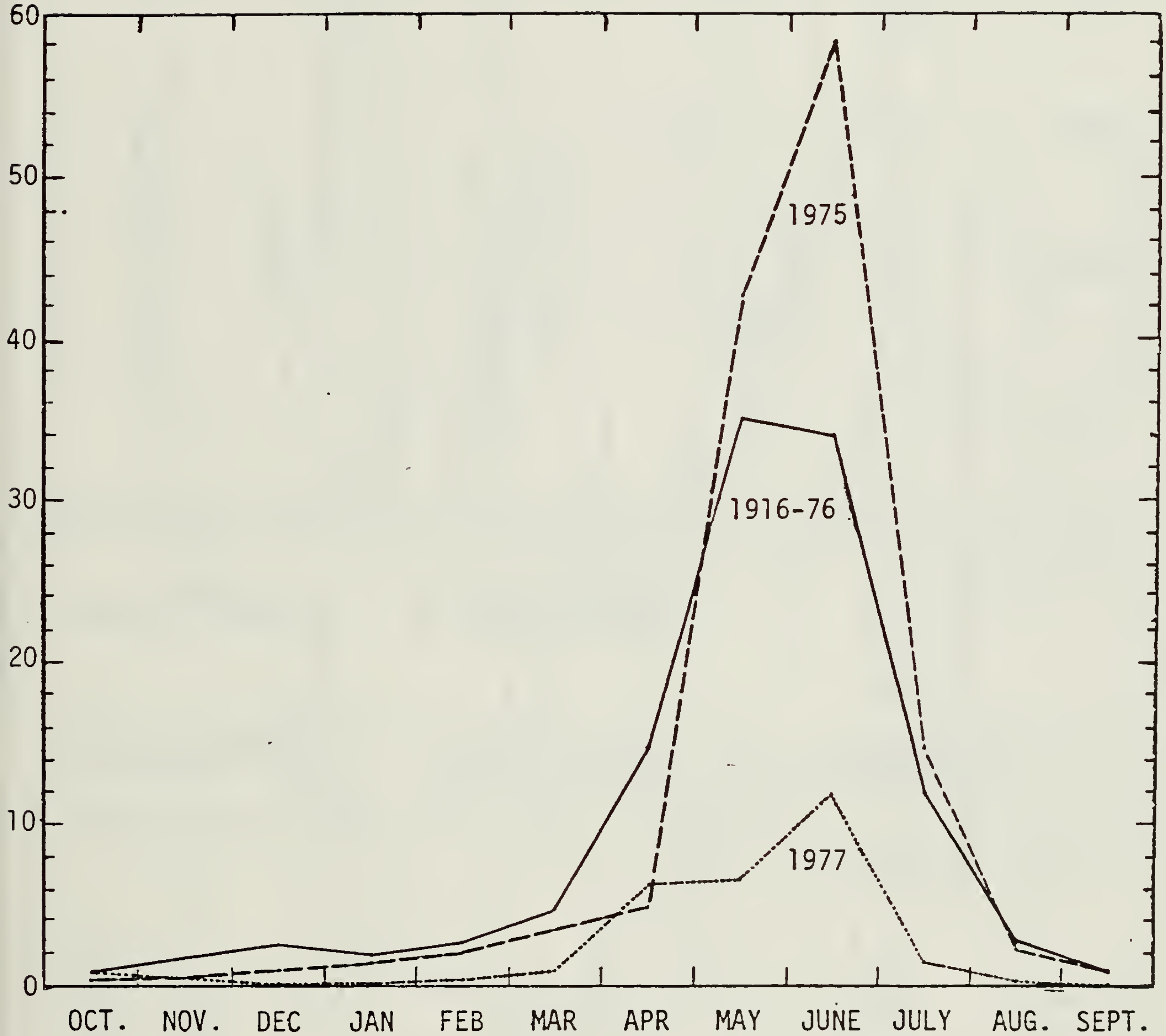

FIGURE 2.--Mean monthly streamflow of the Merced River at Happy Isles Bridge for water years 1975 and 1977 and mean monthly flow for 1916-76.

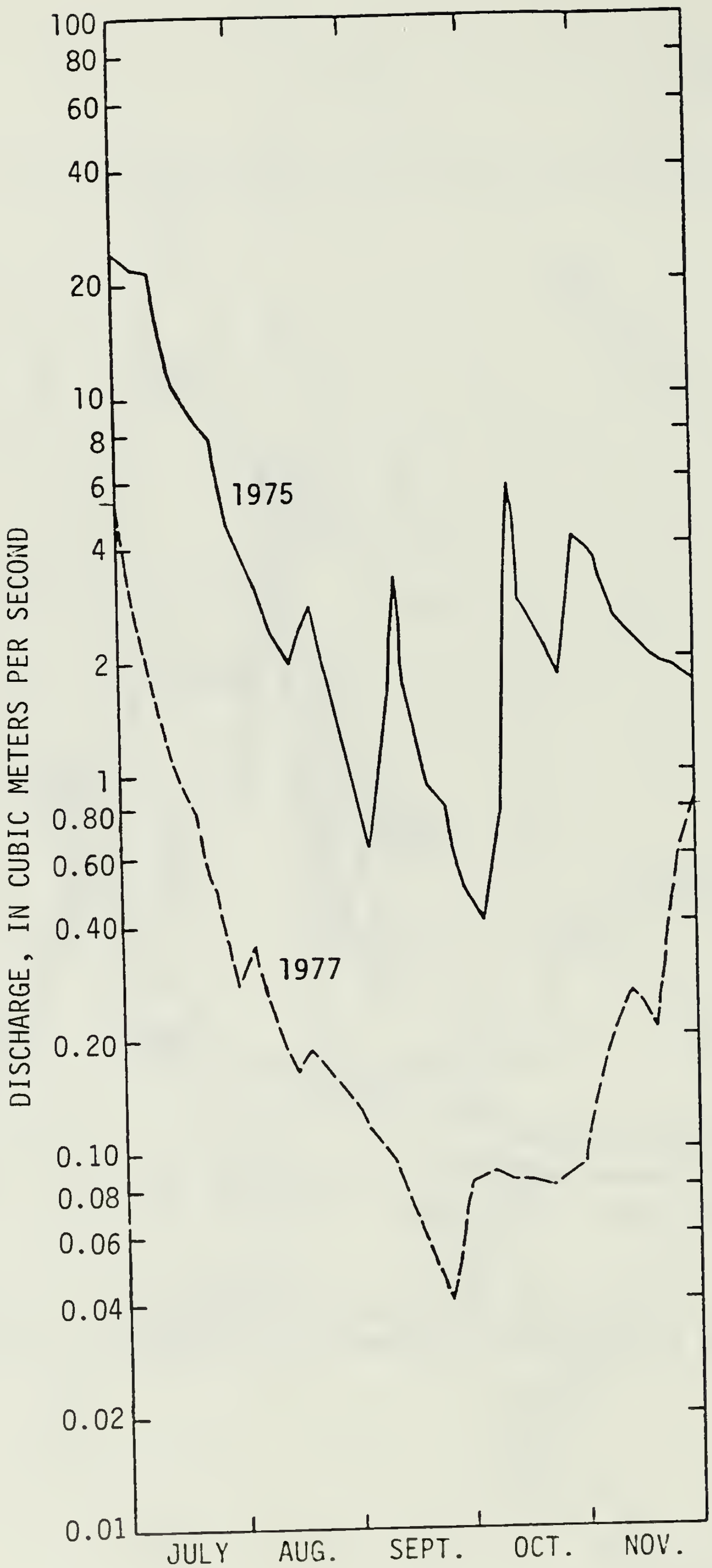

FIGURE 3.--Daily mean streamflow of the Merced River at Happy Isles Bridge, July-November 1975 and 1977.

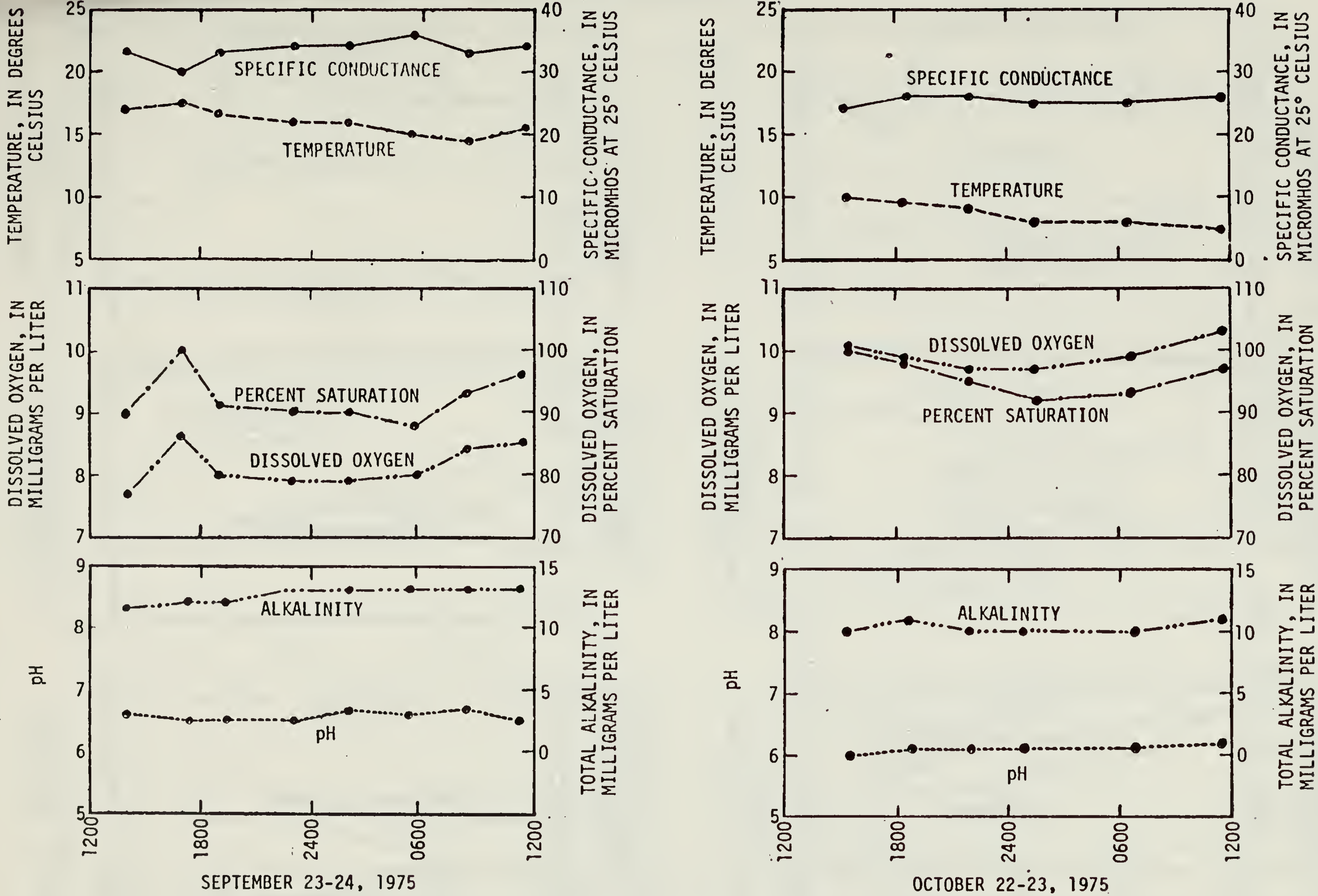

FIGURE 4.--Results of diel measurements in the Merced River at Big Oak Flat (Station 2), September 23-24 and October 22-23, 1975.

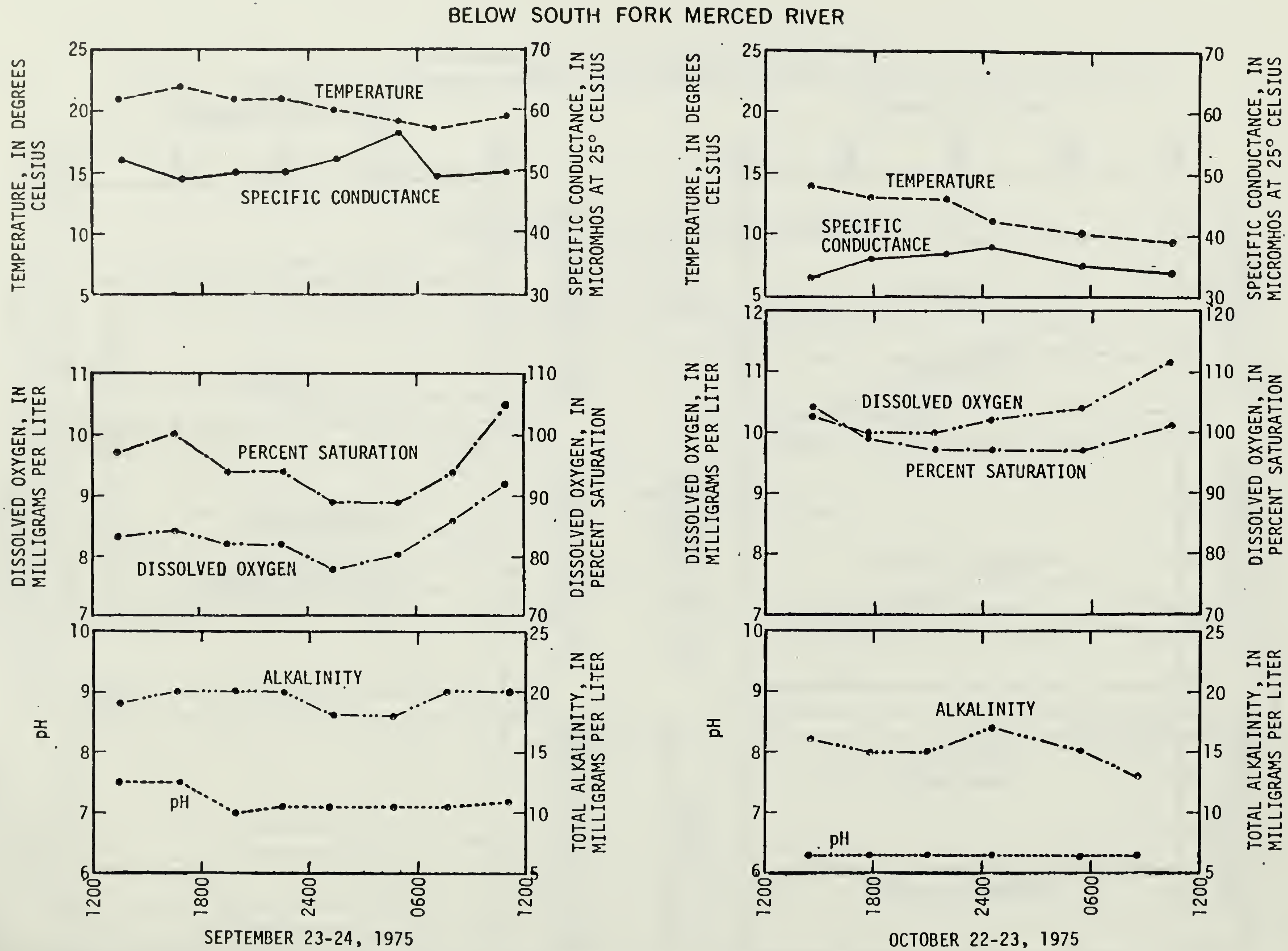

FIGURE 5.--Results of diel measurements in the Merced River below South Fork Merced River (Station 4), September 23-24 and October 22-23, 1975.

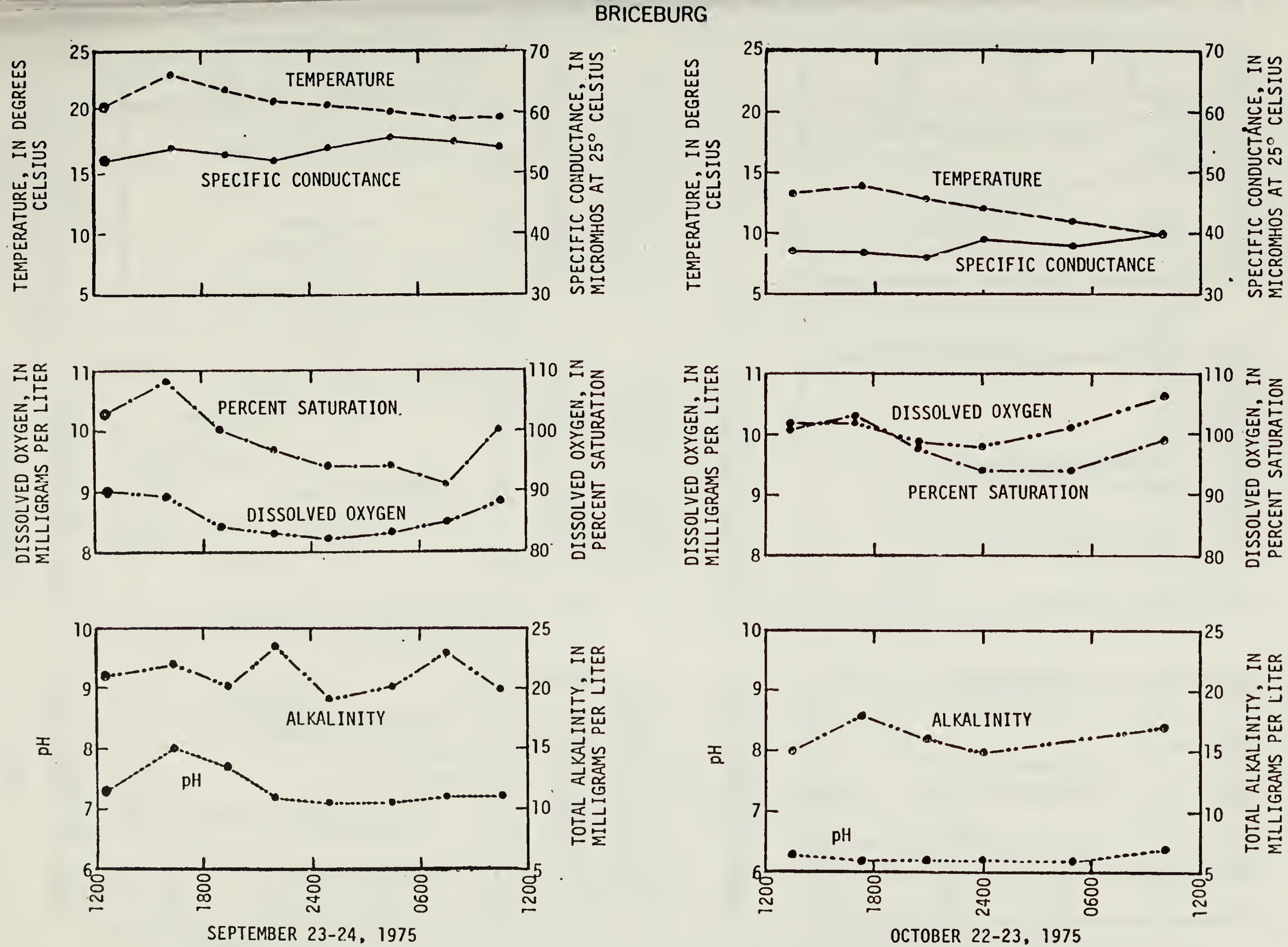

FIGURE 6.--Results of diel measurements in the Merced River near Briceburg (Station 5), September 22-23 and October 22-23, 1975.

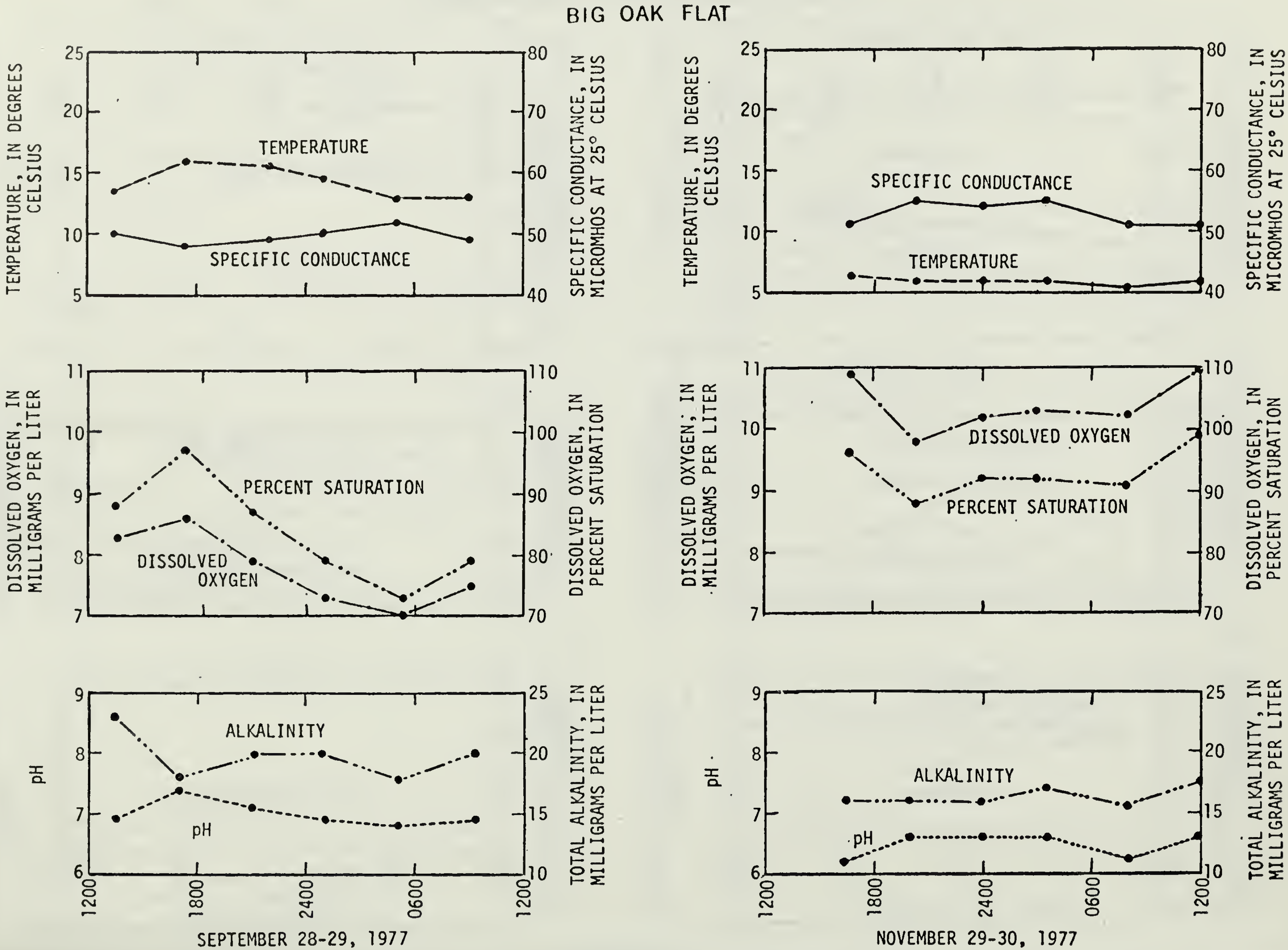

FIGURE 7.--Results of diel measurements in the Merced River at Big Oak Flat (Station 2), September 28-29 and November 29-30, 1977.

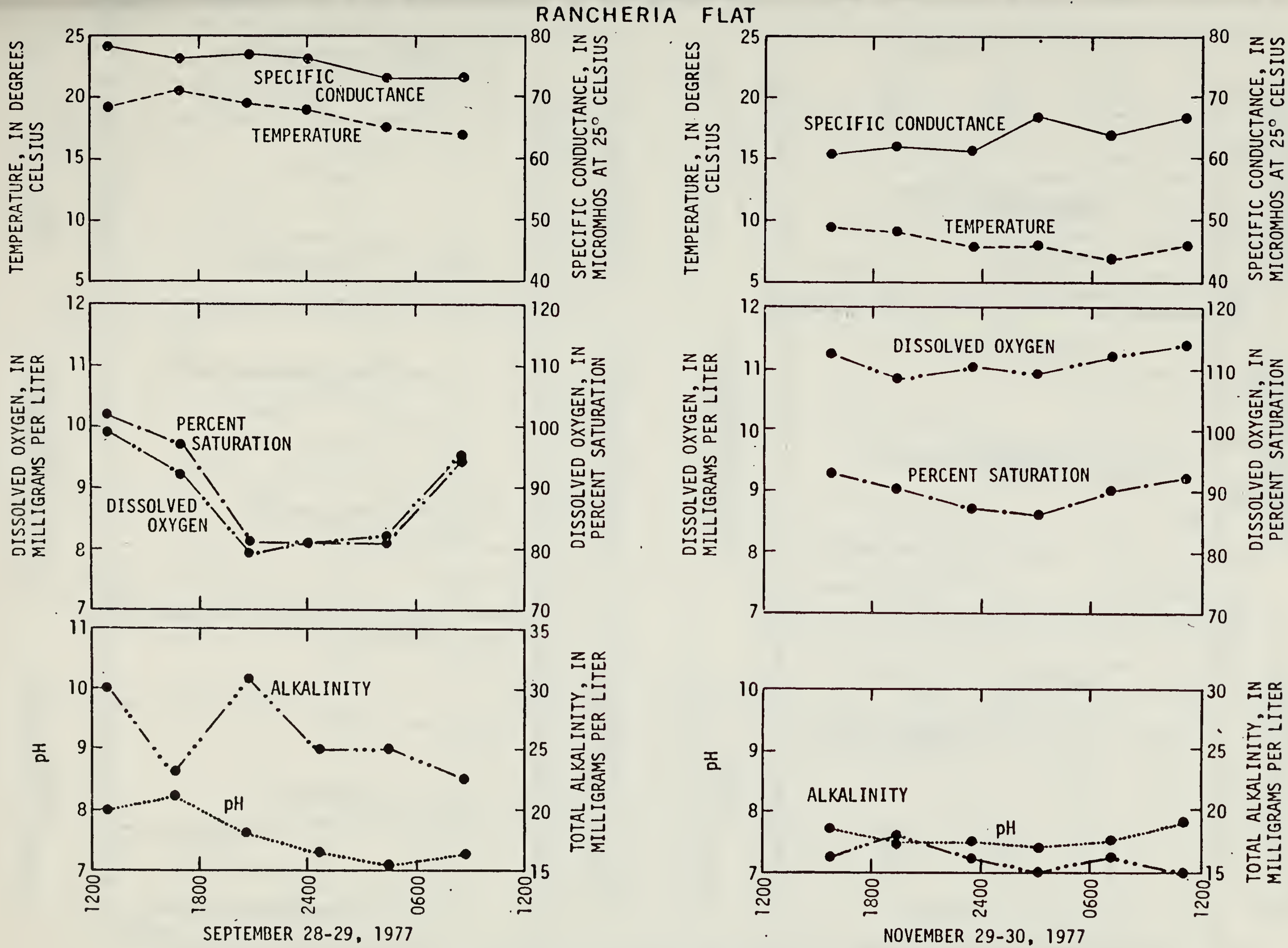

FIGURE 8.--Results of diel measurements in the Merced River at Rancheria Flat (Station 3), September 28-29 and November 29-30, 1977.

BELOW SOUTH FORK MERCED RIVER

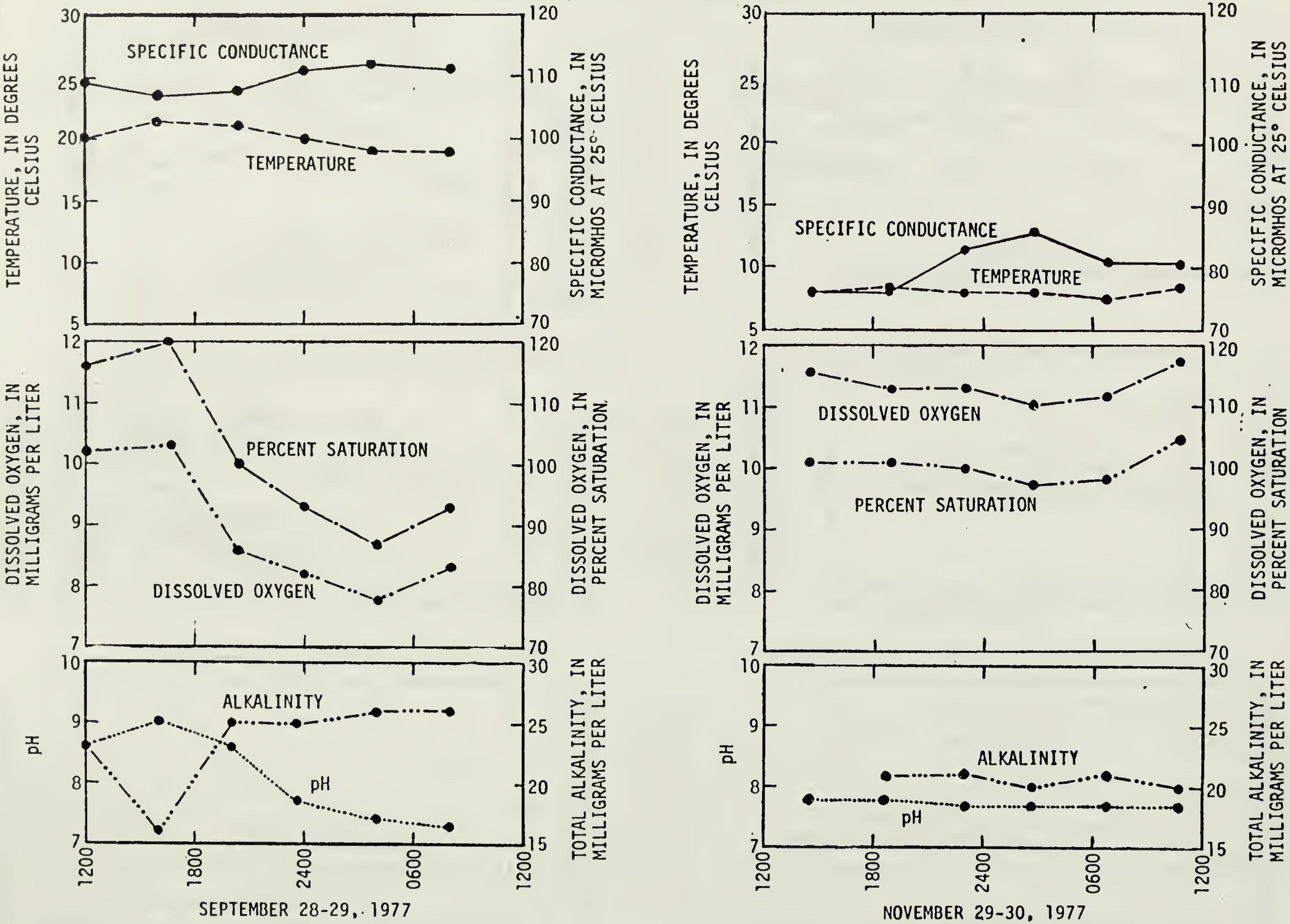

FIGURE 9.--Results of diel measurements in the Merced River below South Fork Merced River (Station 4) September 28-29 and November 29-30, 1977.

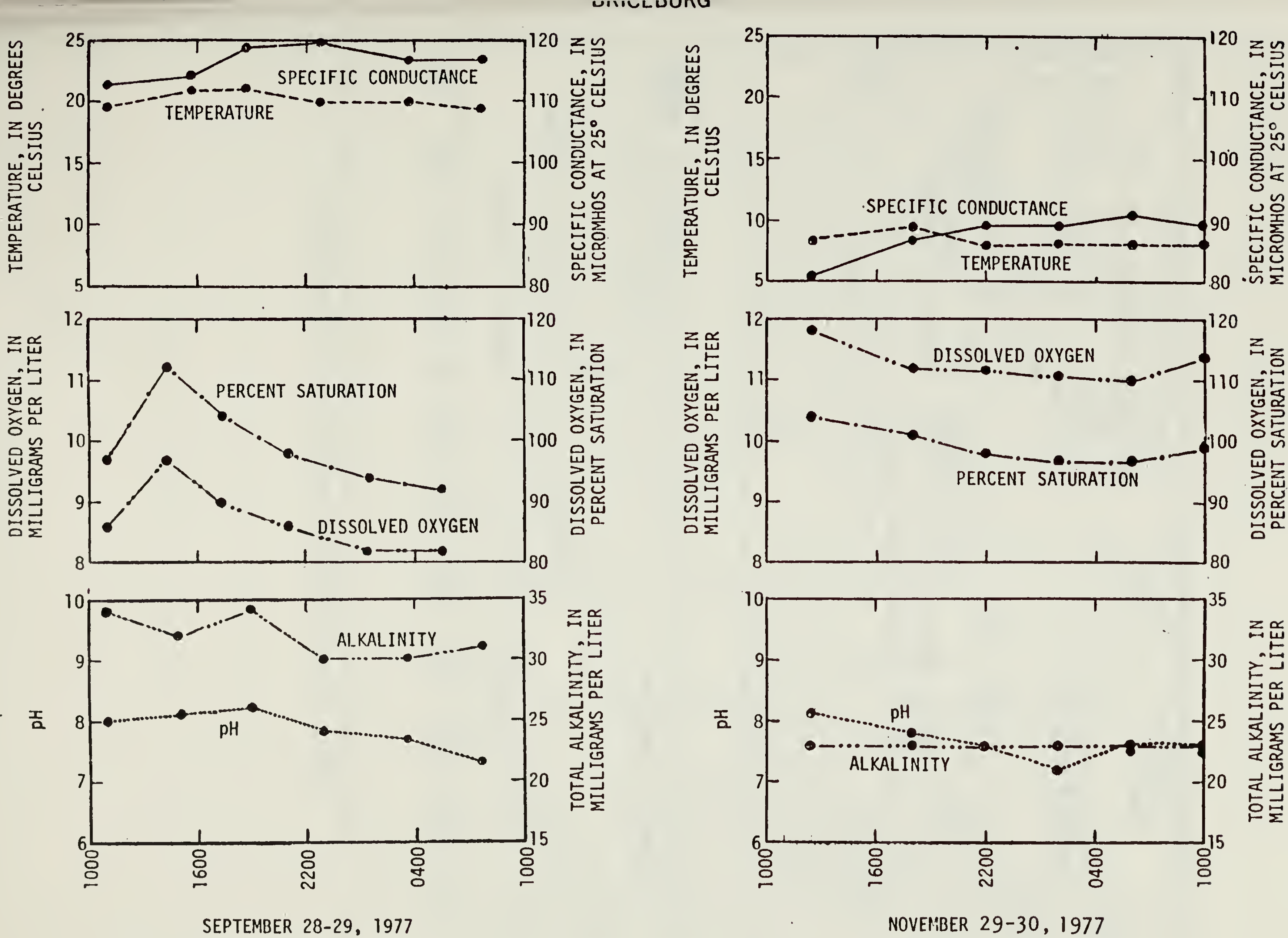

FIGURE 10.--Results of diel measurements in the Merced River near Briceburg (Station 5), September 28-29 and November 29-30, 1977.

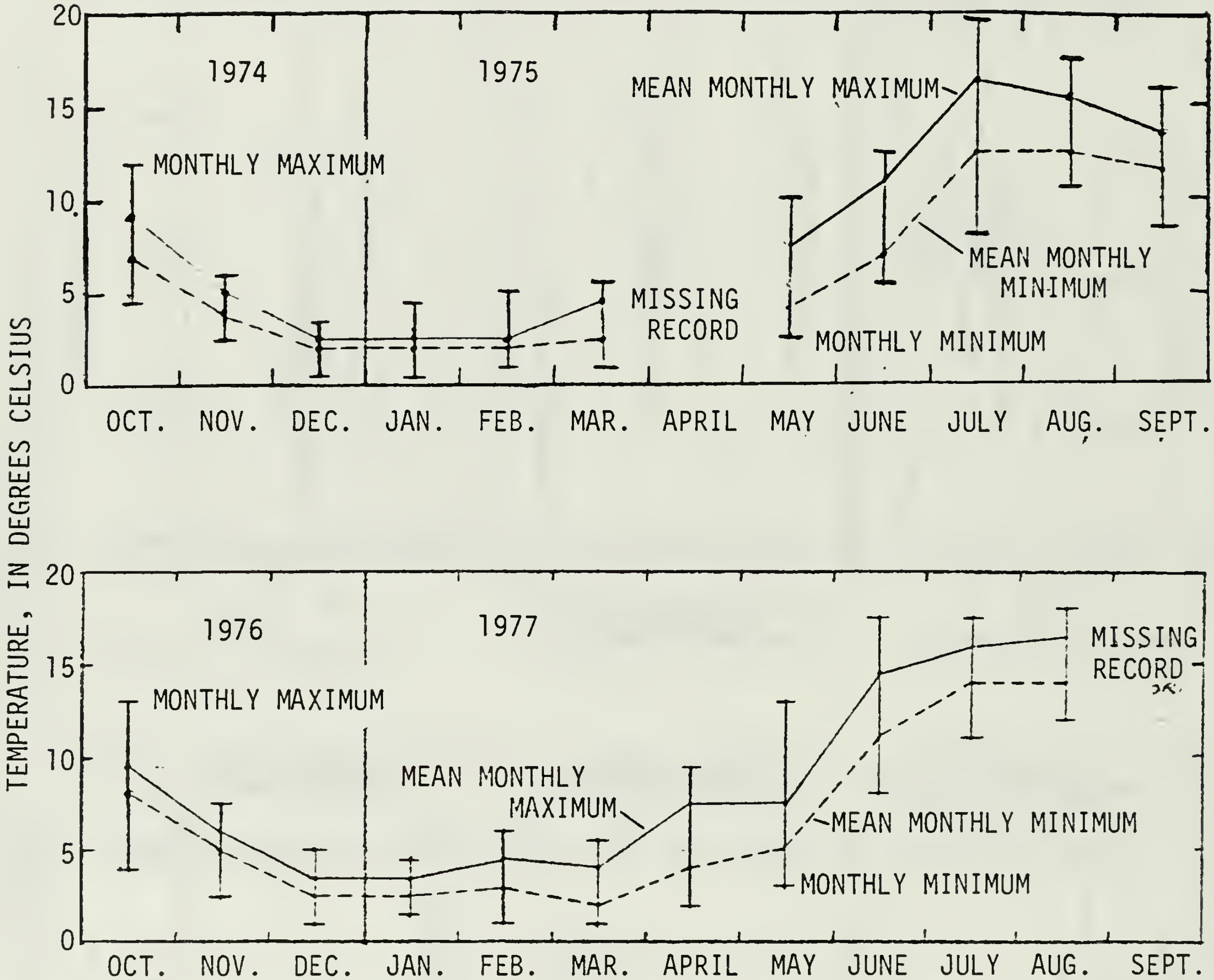

FIGURE 11.--Monthly maximum and minimum water temperatures of the Merced River at Happy Isles Bridge for water years 1975 and 1977.

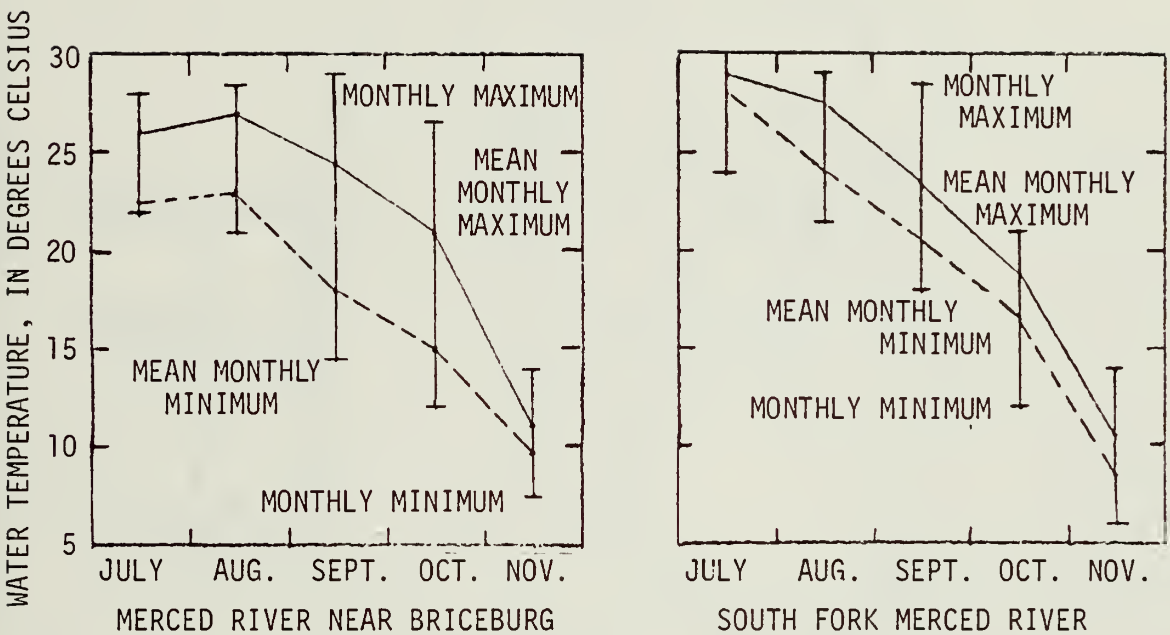

FIGURE 12.--Monthly maximum and minimum water temperatures of the Merced River near Briceburg and the South Fork Merced River near El Portal, July-November 1977.

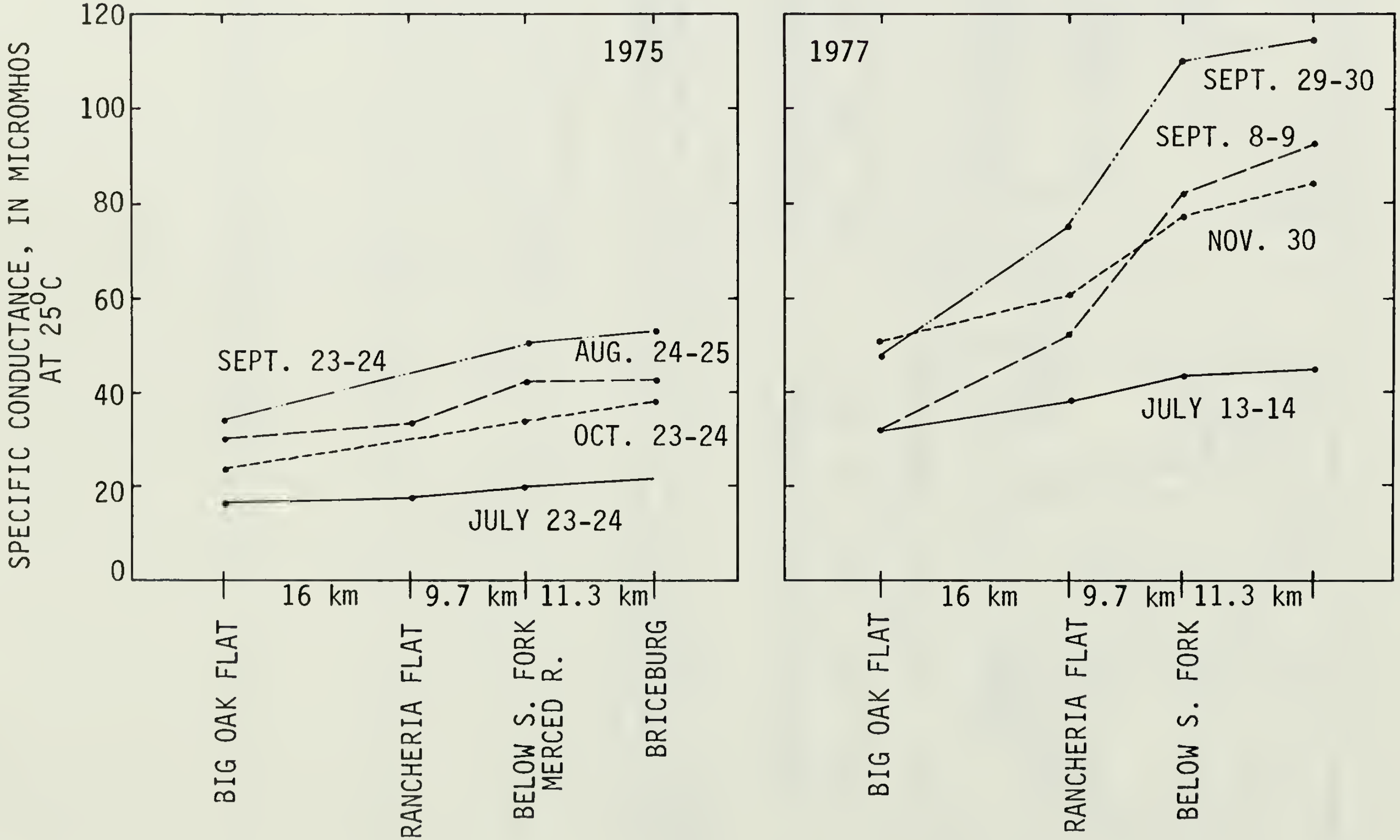

FIGURE 13.--Specific conductance of the Merced River from Big Oak Flat to Briceburg, 1975 and 1977.

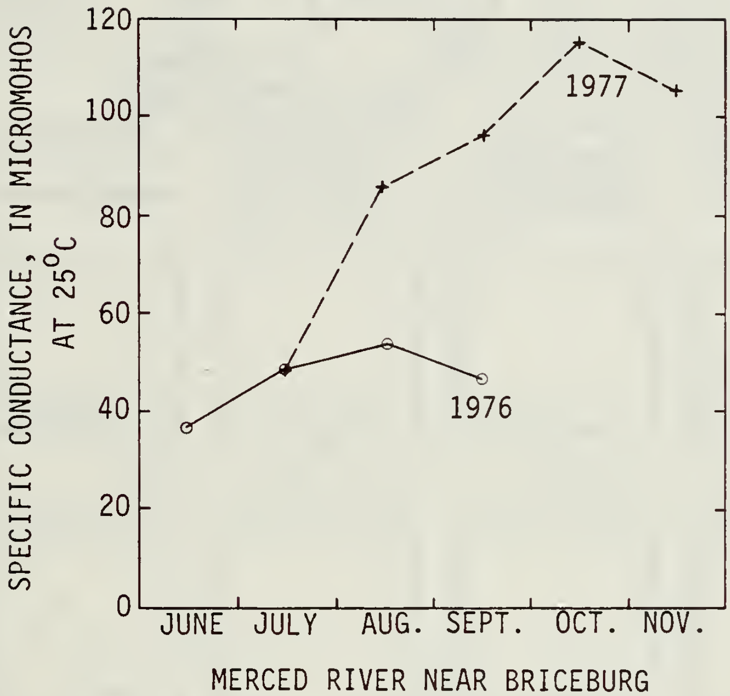

FIGURE 14.--Monthly mean values of specific conductance of the Merced River near Briceburg, 1976 and 1977.

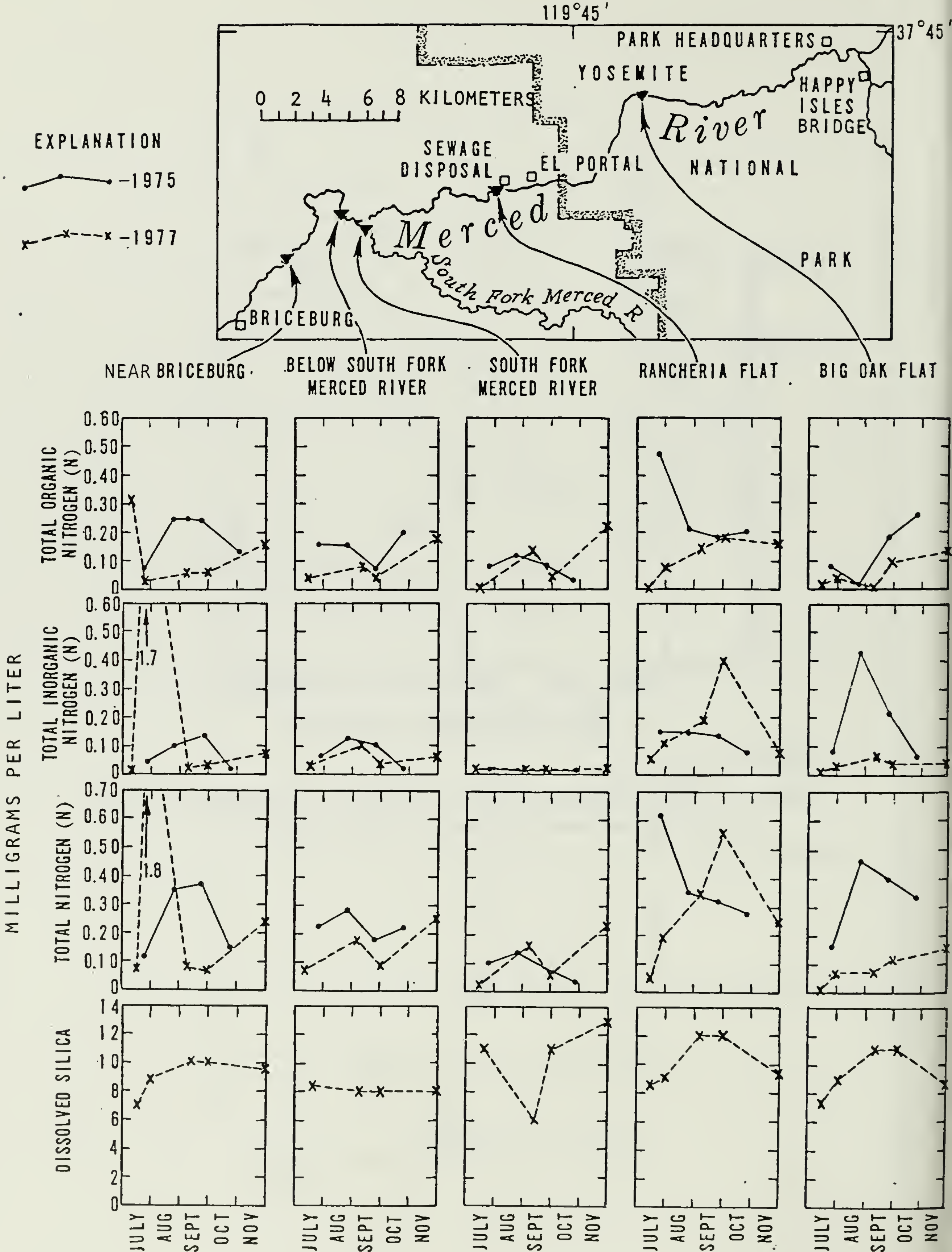

FIGURE 15.--Total organic nitrogen, total inorganic nitrogen, total nitrogen, and dissolved silica in the Merced River from Big Oak Flat to Briceburg, 1975 and 1977.

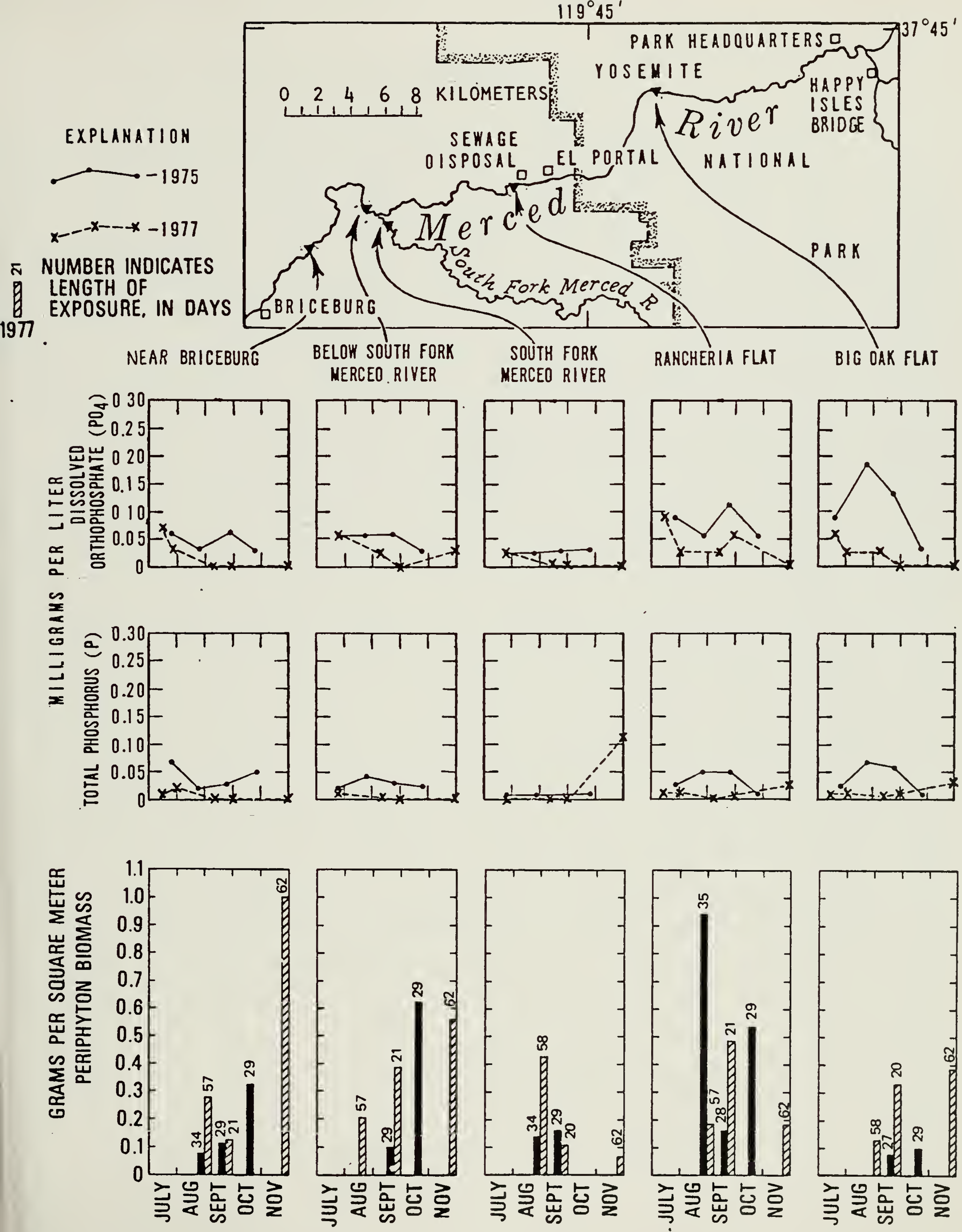

FIGURE 16.--Dissolved orthophosphate, total phosphorus, and periphyton biomass in the Merced River from Big Oak Flat to Briceburg, 1975 and 1977.

DATA

FIELD MEASUREMENTS, PLANT NUTRIENTS, AND BIOMASS DATA, 1975

DATE	TIME	DIS-CHARGE (M^3/S)	INSTAN-TANEOUS DIS-CHARGE (M^3/S)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)
11264500 - MERCED R AT HAPPY ISLES BRIDGE NR YOSEMITE CALIF (LAT 37 43 54 LONG 119 33 28)										
JUL , 1975										
11...	0900	24	27	12	7.3	14.0	9.1	4	3.4	.05
AUG										
25...	1100	1.6	1.6	23	6.3	13.5	9.5	10	5.3	.03
OCT										
09...	0800	.87	.85	38	6.6	8.0	10.8	9	5.8	.01
11266750 - MERCED R AT BIG OAK FLAT NR EL PORTAL CAA (LAT 37 43 18 LONG 119 42 45)										
JUL , 1975										
23...	1500	E12	--	17	6.4	19.0	8.2	--	--	.08
AUG										
28...	0930	2.5	--	30	6.9	15.5	8.6	14	--	.44
SEP										
24...	1130	1.7	--	34	6.5	15.5	8.5	13	--	.22
OCT										
23...	1130	--	3.8	26	6.2	7.5	10.3	11	--	.03
11267050 - MERCED RIVER AT RANCHERIA FLAT NR EL PORTAL CA (LAT 37 40 10 LONG 119 48 25)										
JUL , 1975										
23...	1130	--	12	17	6.9	20.5	9.0	--	--	.15
AUG										
28...	1300	--	2.5	34	7.6	20.5	8.7	16	--	.15
SEP										
25...	1315	--	1.8	--	7.8	19.0	--	--	--	.14
OCT										
24...	0800	--	E4.0	--	6.6	7.5	--	--	--	.05
11268000 - SOUTH FORK MERCED RIVER NEAR EL PORTAL, CALIF. (LAT 37 39 05 LONG 119 53 04)										
JUL , 1975										
24...	0950	3.1	--	35	6.9	21.0	7.6	--	--	.02
AUG										
27...	1800	.90	--	66	7.2	24.0	7.4	32	--	.01
SEP										
25...	1100	.48	--	--	7.3	20.0	--	--	--	.01
OCT										
24...	0930	--	1.4	--	7.4	9.0	--	--	--	.01
11268100 - MERCED R BELOW SOUTH FORK NR BRICEBURG CA (LAT 37 39 25 LONG 119 53 29)										
JUL , 1975										
24...	1145	--	E17	20	6.9	21.0	8.2	--	--	.06
AUG										
27...	1600	--	E3.6	42	7.4	22.5	7.2	21	--	.13
SEP										
25...	0930	--	E2.3	--	7.1	19.0	--	--	--	.11
OCT										
24...	1030	--	5.5	--	6.5	8.5	--	--	--	.02
11268200 - MERCED RIVER NEAR BRICEBURG, CALIF. (LAT 37 38 09 LONG 119 55 56)										
JUL , 1975										
24...	0815	--	E17	22	6.9	19.5	8.0	--	--	.04
AUG										
27...	1300	--	E3.8	42	7.2	22.0	7.8	22	--	.11
SEP										
25...	0800	--	2.4	--	7.2	19.0	--	--	--	.14
OCT										
24...	1200	--	5.4	--	6.5	9.0	--	--	--	.01

E=Estimated

FIELD MEASUREMENTS, PLANT NUTRIENTS, AND BIOMASS DATA, 1975--Continued

DATE	DIS-SOLVED NITRITE PLUS NITPATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	LENGTH OF EXPOSURE (DAYS)
11264500 - MERCED R AT HAPPY ISLES BRIDGE NR YOSEMITE CALIF (LAT 37 43 54 LONG 119 33 28)										
JUL , 1975										
11...	--	--	--	--	--	.00	--	--	--	
AUG										
25...	--	--	--	--	--	.00	--	--	--	
OCT										
09...	--	--	--	--	--	.01	--	--	--	
11266750 - MERCED R AT BIG OAK FLAT NR EL PORTAL CAA (LAT 37 43 18 LONG 119 42 45)										
JUL , 1975										
23...	.08	.00	.08	.08	.16	.03	.03	--	--	
AUG										
28...	.42	.00	.02	.02	.46	.07	.06	--	--	
SEP										
24...	.22	.00	.18	.18	.40	.06	.05	.120	.200	27
OCT										
23...	.03	.04	.26	.30	.33	.01	.01	.040	.140	29
11267050 - MERCED RIVER AT RANCHERIA FLAT NR EL PORTAL CA (LAT 37 40 10 LONG 119 48 25)										
JUL , 1975										
23...	.08	.00	.47	.47	.62	.03	.03	--	--	
AUG										
28...	.15	.00	.21	.21	.36	.02	.02	.970	1.90	35
SEP										
25...	.14	.00	.18	.18	.32	.05	.04	.080	.240	28
OCT										
24...	.05	.02	.20	.22	.27	.00	.02	.420	.950	29
11268000 - SOUTH FORK MERCED RIVER NEAR EL PORTAL, CALIF. (LAT 37 39 05 LONG 119 53 04)										
JUL , 1975										
24...	.01	.00	.08	.08	.10	.01	.01	--	--	
AUG										
27...	.01	.00	.12	.12	.13	.01	.01	.040	.160	34
SEP										
25...	.01	.00	.08	.08	.09	.00	.01	.070	.240	29
OCT										
24...	.01	.00	.03	.03	.04	.01	.01	--	--	
11268100 - MERCED R BELOW SOUTH FORK NR BRICEBURG CA (LAT 37 39 25 LONG 119 53 29)										
JUL , 1975										
24...	.06	.00	.16	.16	.22	.02	.02	--	--	
AUG										
27...	.13	.00	.16	.16	.28	.04	.02	--	--	
SEP										
25...	.11	.00	.07	.07	.18	.03	.02	.040	.100	29
OCT										
24...	.02	.00	.20	.20	.22	.02	.01	.680	1.30	29
11268200 - MERCED RIVER NEAR BRICEBURG, CALIF. (LAT 37 38 09 LONG 119 55 56)										
JUL , 1975										
24...	.04	.00	.08	.08	.12	.07	.02	--	--	
AUG										
27...	.11	.00	.25	.25	.36	.02	.01	.010	.100	34
SEP										
25...	.14	.00	.23	.23	.37	.03	.02	.030	.140	29
OCT										
24...	.01	.00	.14	.14	.15	.05	.01	.520	.850	29

FIELD MEASUREMENTS, PLANT NUTRIENTS, AND BIOMASS DATA, 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (M^3/S)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)
11264500 - MERCED R AT HAPPY ISLES BRIDGE NR YOSEMITE CALIF (LAT 37 43 54 LONG 119 33 28)										
JUL , 1977										
13...	1030	1.0	24	7.2	12.4	11.1	5	3.9	.04	--
28...	1130	.40	31	7.0	14.0	9.2	6	5.6	.02	.07
AUG										
18...	1000	.16	40	6.6	14.0	8.6	6	5.5	.09	--
OCT										
20...	1030	.06	57	6.0	9.0	--	7	11	.05	--
NOV										
15...	1100	.16	46	6.8	4.5	--	7	6.6	.02	--
11266750 - MERCED R AT BIG OAK FLAT NR EL PORTAL CAA (LAT 37 43 18 LONG 119 42 45)										
JUL , 1977										
14...	1230	1.7	32	7.4	19.5	8.0	16	7.5	.01	.03
28...	1000	.79	32	7.0	19.0	7.4	12	8.8	.02	.03
SEP										
09...	1130	.28	47	7.1	15.0	6.9	26	11	.07	.09
29...	1600	.20	48	7.0	14.0	--	--	11	.03	.05
NOV										
30...	1200	.93	51	7.5	6.0	11.0	13	8.5	.04	.00
11267050 - MERCED RIVER AT RANCHERIA FLAT NR EL PORTAL CA (LAT 37 40 10 LONG 119 48 25)										
JUL , 1977										
14...	1030	1.5	38	7.6	20.5	9.0	17	8.5	.05	.08
28...	0800	.99	52	7.8	19.0	9.0	16	8.8	.11	.12
SEP										
09...	0930	[1]E.25	74	8.0	20.5	9.0	25	12	.19	.22
30...	1230	.34	75	8.0	18.0	10.1	--	12	.36	.35
DEC										
01...	1400	1.3	61	7.7	9.0	11.6	15	9.6	.08	.09
11268000 - SOUTH FORK MERCED RIVER NEAR EL PORTAL, CALIF. (LAT 37 39 05 LONG 119 53 04)										
JUL , 1977										
14...	0830	1.9	81	--	24.0	7.6	25	11	.01	.02
SEP										
08...	1700	.03	188	8.7	28.5	9.3	--	6.0	.01	.04
30...	1130	.10	244	7.9	19.5	9.9	--	11	.01	.01
DEC										
01...	1200	.48	110	7.7	8.0	11.6	26	13	.01	.01
11268100 - MERCED R BELOW SOUTH FORK NR BRICEBURG CA (LAT 37 39 25 LONG 119 53 29)										
JUL , 1977										
13...	1430	1.8	44	7.9	25.0	8.2	26	8.5	.03	.04
SEP										
08...	1430	.37	83	9.1	26.0	9.0	26	10	.09	.10
30...	1000	.45	110	7.8	17.5	9.9	--	10	.04	.05
DEC										
01...	1100	1.8	77	7.8	8.0	11.9	20	10	.06	.11
11268200 - MERCED RIVER NEAR BRICEBURG, CALIF. (LAT 37 38 09 LONG 119 55 56)										
JUL , 1977										
13...	1100	2.1	45	7.6	23.0	8.5	20	7.2	.02	.03
27...	1600	1.0	61	8.4	26.0	8.6	19	8.7	1.7	.01
SEP										
08...	1230	.37	92	8.1	24.0	8.7	32	10	.01	.04
30...	0830	.37	115	7.8	18.0	8.6	--	9.9	.01	.00
DEC										
01...	0900	1.9	84	7.7	8.5	11.4	21	9.7	.07	.04

[1]E=Estimated

DATE	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	PERI-PHYTON BIOMASS ASH WEIGHT (G/SQ M)	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT (G/SQ M)	LENGTH OF EXPO-SURE (DAYS)
11264500 - MERCED R AT HAPPY ISLES BRIDGE NR YOSEMITE CALIF (LAT 37 43 54 LONG 119 33 28									
JUL , 1977									
13...	--	--	--	--	.01	--	--	--	--
28...	.00	.03	.03	.05	.00	.01	--	--	--
AUG									
18...	--	--	--	--	.01	--	--	--	--
OCT									
20...	--	--	--	--	.04	--	--	--	--
NOV									
15...	--	--	--	--	.00	--	--	--	--
11266750 - MERCED R AT BIG OAK FLAT NR EL PORTAL CAA (LAT 37 43 18 LONG 119 42 45)									
JUL , 1977									
14...	.00	.00	.00	.01	.01	.02	--	--	--
28...	.01	.04	.05	.07	.01	.01	--	--	--
SEP									
09...	.00	.00	.00	.07	.00	.01	.530	.660	58
29...	.00	.10	.10	.13	.01	.00	.610	.94	20
NOV									
30...	.00	.12	.12	.16	.03	.00	.950	1.33	62
11267050 - MERCED RIVER AT RANCHERIA FLAT NR EL PORTAL CA (LAT 37 40 10 LONG 119 48 25									
JUL , 1977									
14...	.00	.00	.00	.05	.01	.03	--	--	--
28...	.01	.07	.08	.19	.01	.01	--	--	--
SEP									
09...	.01	.14	.15	.34	.00	.01	.320	.500	57
30...	.01	.18	.19	.55	.01	.02	.390	.890	21
DEC									
01...	.00	.16	.16	.24	.03	.00	.160	.340	62
11268000 - SOUTH FORK MERCED RIVER NEAR EL PORTAL, CALIF. (LAT 37 39 05 LONG 119 53 04									
JUL , 1977									
14...	.00	.00	.00	.01	.00	.01	--	--	--
SEP									
08...	.01	.14	.15	.16	.00	.00	.300	.720	58
30...	.00	.05	.05	.06	.00	.00	.060	.160	20
DEC									
01...	.00	.21	.21	.22	.12	.00	.060	.130	62
11268100 - MERCED R BELOW SOUTH FORK NR BRICEBURG CA (LAT 37 39 25 LONG 119 53 29)									
JUL , 1977									
13...	.00	.04	.04	.07	.01	.02	--	--	--
SEP									
08...	.01	.08	--	.18	.00	.01	.220	.420	57
30...	.00	.04	.04	.08	.00	.00	.280	.670	21
DEC									
01...	.00	.18	.18	.24	.00	.01	.900	1.46	62
11268200 - MERCED RIVER NEAR BRICEBURG, CALIF. (LAT 37 38 09 LONG 119 55 56)									
JUL , 1977									
13...	.01	.04	.05	.07	.01	.02	--	--	--
27...	.06	.03	.09	1.8	.02	.01	--	--	--
SEP									
08...	.00	.06	.06	.07	.00	.00	.160	.440	57
30...	.00	.05	.05	.06	.00	.00	.120	.240	21
DEC									
01...	.00	.16	.16	.23	.00	.00	1.72	2.75	62

DISCHARGE OF MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE, 1973-77

DISCHARGE, IN CUBIC METERS PER SECOND, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.22	1.30	3.6	5.3	4.3	4.9	8.5	27	63	24.0	17.0	1.10
2	.21	1.30	4.1	4.3	3.9	6.6	8.7	33	55	22.0	11.0	1.00
3	.20	1.10	4.8	5.0	3.9	5.1	8.1	37	54	18.0	8.0	.92
4	.20	.81	4.3	4.7	3.8	5.1	7.8	36	59	18.0	9.9	.87
5	.19	.81	4.1	4.0	3.7	5.3	8.9	38	62	17.0	12.0	.84
6	.19	1.00	4.0	3.9	3.5	5.4	9.0	46	76	15.0	11.0	.84
7	.23	2.20	4.1	4.3	3.5	5.3	9.4	57	77	14.0	7.8	.84
8	.64	2.50	4.0	4.1	3.4	5.2	10.0	65	68	12.0	6.2	.81
9	.50	2.10	4.1	3.8	3.4	5.0	9.5	68	62	12.0	5.1	.81
10	.42	12.00	4.3	3.7	3.4	5.1	8.4	66	63	15.0	4.4	.78
11	.39	48.00	4.3	3.5	3.3	4.9	8.3	64	64	11.0	4.0	.73
12	.39	45.00	4.0	3.8	3.3	5.2	9.6	67	65	8.2	3.7	.70
13	.42	15.00	4.3	3.7	3.2	5.4	11.0	61	60	7.5	3.3	.67
14	.45	10.00	4.1	3.6	3.1	6.2	14.0	57	58	7.8	3.0	.64
15	.50	7.80	3.9	4.3	3.0	7.4	16.0	59	52	8.1	2.7	.62
16	.53	7.10	3.7	5.9	3.0	7.6	17.0	51	46	8.5	2.4	.53
17	.53	7.30	3.8	7.5	2.7	7.4	19.0	41	38	8.5	2.2	.50
18	.50	7.70	3.5	8.1	2.9	7.0	20.0	30	31	8.0	2.0	.45
19	.48	6.60	3.4	11.0	3.0	7.4	15.0	24	29	7.6	1.9	.42
20	.48	6.40	3.3	9.3	2.8	7.8	14.0	21	25	7.5	1.8	.42
21	.45	5.60	3.3	7.6	2.9	8.2	15.0	21	28	7.7	1.7	.36
22	.50	5.00	3.4	6.6	2.8	8.2	19.0	23	32	8.1	1.6	.34
23	1.80	4.50	3.4	6.5	2.7	8.4	19.0	29	33	8.4	1.5	.34
24	1.40	4.50	3.4	6.1	2.8	9.0	16.0	34	28	8.0	1.4	.31
25	1.60	4.10	3.3	5.9	2.9	9.5	13.0	54	23	11.0	1.4	.31
26	1.50	4.00	3.2	5.5	3.0	8.5	12.0	70	22	13.0	1.4	.34
27	1.40	3.90	3.8	5.0	2.9	8.1	10.0	79	21	8.9	1.3	.34
28	1.40	3.90	5.2	5.0	2.9	8.6	11.0	81	21	7.4	1.3	.34
29	1.40	4.00	8.4	4.8	---	8.5	14.0	75	22	7.1	1.3	.34
30	1.30	3.90	7.4	4.5	---	9.0	19.0	64	24	7.0	1.2	.31
31	1.30	---	6.0	4.4	---	8.1	---	63	---	17.0	1.2	---
TOTAL	21.72	229.42	130.5	165.7	90.0	213.6	380.2	1541	1361	353.3	134.7	17.82
MEAN	.70	7.65	4.21	5.35	3.21	6.89	12.7	49.7	45.4	11.4	4.35	.59
MAX	1.8	48	8.4	11	4.3	9.5	20	81	77	24	17	1.1
MIN	.19	.81	3.2	3.5	2.7	4.9	7.8	21	21	7.0	1.2	.31

WTR YR 1974 TOTAL 4638.96 MEAN 12.7 MAX 81 MIN .19

DISCHARGE OF MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE, 1973-77--Continued

DISCHARGE, IN CUBIC METERS PER SECOND, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.27	.73	.45	.59	1.4	4.1	4.7	8.5	102	24.0	3.9	.92
2	.28	.64	.45	.56	1.3	3.9	4.2	9.8	102	22.0	3.5	.87
3	.36	.59	.81	.62	1.7	3.6	4.3	12.0	86	20.0	3.3	.76
4	.36	.53	1.40	.62	1.9	3.8	3.9	11.0	82	18.0	3.3	.70
5	.34	.50	.95	.59	1.9	3.7	3.8	8.6	87	23.0	3.3	.67
6	.31	.50	.95	.90	1.9	3.6	3.8	7.7	91	27.0	3.2	.64
7	.31	.50	1.00	1.00	1.9	3.6	3.9	8.9	87	26.0	3.0	.64
8	.34	.53	1.00	1.20	1.9	3.6	3.7	13.0	80	22.0	2.7	.67
9	.34	.50	1.10	1.10	2.2	3.5	3.3	16.0	80	22.0	2.5	1.10
10	.36	.50	1.00	1.30	2.1	3.3	3.3	21.0	80	22.0	2.4	1.40
11	.36	.50	1.00	1.30	2.0	3.1	3.2	25.0	79	24.0	2.4	2.90
12	.34	.48	1.00	1.30	2.1	2.9	3.4	31.0	72	21.0	2.3	3.30
13	.31	.45	1.00	1.30	2.1	3.0	4.0	42.0	69	20.0	2.4	2.70
14	.28	.45	.95	1.40	2.0	3.0	4.9	51.0	75	15.0	2.2	2.10
15	.27	.45	.92	1.50	1.9	2.9	4.5	54.0	77	12.0	2.0	1.70
16	.26	.45	.95	1.40	1.8	2.9	3.9	54.0	66	9.8	1.9	1.40
17	.25	.45	.95	1.50	1.7	2.7	3.5	60.0	55	9.4	1.8	1.20
18	.24	.45	.90	1.60	1.7	2.7	3.5	69.0	38	11.0	1.8	1.10
19	.23	.45	.84	1.70	1.8	2.9	3.8	76.0	27	11.0	2.2	1.00
20	.22	.42	.81	1.80	1.8	2.9	4.8	60.0	23	9.6	2.7	.95
21	.21	.53	.78	1.80	1.6	2.9	6.2	36.0	25	9.1	2.9	1.00
22	.21	.67	.73	1.90	1.6	2.9	6.8	32.0	32	8.6	2.7	1.00
23	.21	.62	.53	2.00	1.8	2.9	7.2	37.0	36	8.3	2.2	1.00
24	.20	.64	.59	2.10	2.1	3.2	7.5	55.0	31	8.2	1.8	.92
25	.20	.67	.64	2.20	2.4	5.2	7.0	68.0	21	7.7	1.6	.84
26	.20	.62	.64	2.30	2.7	4.3	5.6	72.0	21	7.2	1.5	.76
27	.20	.59	.62	2.00	3.0	3.9	5.2	71.0	25	6.9	1.4	.67
28	.62	.53	.64	1.50	3.5	3.6	6.0	72.0	25	7.4	1.4	.64
29	.64	.50	.62	1.60	---	3.5	7.3	71.0	27	6.5	1.2	.59
30	.50	.48	.62	1.30	---	4.1	8.6	74.0	26	5.7	1.1	.53
31	.64	---	.59	1.20	---	5.4	---	86.0	---	4.7	1.0	---
TOTAL	9.86	15.92	25.43	43.18	55.8	107.8	145.8	1312.5	1727	449.1	71.6	34.67
MEAN	.32	.53	.82	1.39	1.99	3.48	4.86	42.3	57.6	14.5	2.31	1.16
MAX	.64	.73	1.4	2.3	3.5	5.4	8.6	86	102	27	3.9	3.3
MIN	.20	.42	.45	.56	1.3	2.7	3.2	7.7	21	4.7	1.0	.53

CAL YR 1974 TOTAL 4308.53 MEAN 11.8 MAX 81 MIN .20
WTR YR 1975 TOTAL 3998.66 MEAN 11.0 MAX 102 MIN .20

DISCHARGE OF MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE, 1973-77--Continued

DISCHARGE, IN CUBIC METERS PER SECOND, WATER YEAR OCTOBER 1975 TO SEPTEMBER 1976
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.50	4.5	1.50	.53	.53	1.3	3.7	19.0	8.7	2.10	3.10	.48
2	.48	4.8	1.70	.50	.53	1.4	3.6	21.0	8.5	1.90	2.80	.42
3	.48	4.7	1.70	.62	.53	1.4	3.9	21.0	7.6	1.70	2.20	.39
4	.45	4.4	1.70	.62	.53	1.3	3.6	21.0	6.7	1.60	1.70	.39
5	.42	3.8	1.60	.73	.53	1.4	3.2	21.0	6.1	1.60	1.40	.45
6	.45	3.3	1.50	.62	.64	1.3	3.1	16.0	5.7	1.60	1.20	.53
7	1.10	2.9	1.40	.64	.73	1.4	3.3	13.0	5.4	1.50	1.00	.78
8	.90	3.1	1.40	.64	.81	1.5	4.3	15.0	5.0	1.40	.90	.87
9	.87	2.6	1.40	.67	.95	1.6	3.8	21.0	4.6	1.30	.81	.87
10	1.40	2.7	1.30	.67	.92	1.7	3.9	21.0	4.1	1.20	.76	.90
11	6.10	2.5	1.30	.73	.92	1.8	3.6	22.0	4.0	1.20	.70	10.00
12	4.30	2.6	1.30	.70	.92	1.8	3.3	28.0	3.7	1.10	.67	16.00
13	3.30	2.6	1.20	.67	.98	1.8	3.2	33.0	3.5	1.10	.64	6.80
14	3.10	2.6	.84	.67	1.10	1.9	3.3	35.0	4.1	.92	.62	4.20
15	3.10	2.3	1.10	.67	1.10	2.1	3.4	31.0	5.2	.84	.67	3.10
16	3.20	2.3	1.10	.67	1.00	2.4	3.0	27.0	5.9	1.40	.90	2.50
17	3.30	2.2	.98	.67	1.10	3.0	2.8	26.0	6.0	3.10	1.20	2.10
18	3.10	1.7	.95	.67	1.10	3.4	3.0	22.0	5.8	2.30	1.20	1.80
19	2.70	1.6	.92	.59	1.10	3.0	3.4	18.0	5.9	1.60	1.10	1.50
20	2.40	1.8	.90	.56	1.00	2.7	5.5	17.0	5.6	1.40	1.30	1.50
21	2.30	1.6	.90	.53	1.10	2.8	8.2	16.0	4.9	1.30	1.30	1.40
22	2.30	1.5	.95	.53	1.10	3.3	9.4	13.0	4.1	1.20	1.20	1.50
23	2.20	1.4	.87	.50	1.00	3.3	10.0	13.0	3.2	1.10	1.00	1.40
24	2.00	1.4	.98	.53	.98	3.4	13.0	13.0	2.7	1.20	.95	1.20
25	1.80	1.4	.95	.50	.98	3.7	15.0	14.0	2.7	1.20	.84	1.10
26	12.00	1.4	.92	.50	.98	3.3	12.0	15.0	2.8	1.20	.73	.95
27	17.00	1.4	.92	.50	1.00	3.1	9.0	15.0	2.7	1.20	.64	.90
28	7.80	1.4	.95	.50	1.20	2.8	7.3	14.0	2.6	1.20	.59	.84
29	5.00	1.1	1.00	.53	1.30	2.7	7.9	11.0	2.4	4.20	.56	.76
30	4.20	1.3	.95	.53	---	3.0	12.0	9.6	2.3	3.80	.53	.67
31	4.20	---	.64	.50	---	3.8	---	9.0	---	2.80	.48	---
TOTAL	102.45	72.9	35.82	18.49	26.66	73.4	174.7	590.6	142.5	51.26	33.69	66.30
MEAN	3.30	2.43	1.16	.60	.92	2.37	5.82	19.1	4.75	1.65	1.09	2.21
MAX	17	4.8	1.7	.73	1.3	3.8	15	35	8.7	4.2	3.1	16
MIN	.42	1.1	.64	.50	.53	1.3	2.8	9.0	2.3	.84	.48	.39

CAL YR 1975 TOTAL 4158.62 MEAN 11.4 MAX 102 MIN .42
WTR YR 1976 TOTAL 1388.77 MEAN 3.79 MAX 35 MIN .39

DISCHARGE OF MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE, 1973-77--Continued

DISCHARGE, IN CUBIC METERS PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.92	.28	.19	.10	.23	.53	.90	7.0	20.0	5.40	.27	.14
2	1.90	.28	.19	.13	.23	.48	.84	6.1	20.0	4.80	.31	.14
3	2.40	.28	.18	.15	.22	.50	.78	5.6	17.0	4.00	.45	.13
4	2.60	.24	.18	.13	.22	.45	.95	4.4	16.0	3.50	.45	.12
5	2.00	.23	.18	.15	.21	.45	1.80	4.2	16.0	3.00	.36	.12
6	1.70	.22	.17	.15	.21	.48	3.20	3.6	14.0	2.60	.34	.11
7	1.40	.22	.17	.15	.21	.48	4.80	3.1	14.0	2.20	.28	.10
8	1.20	.21	.17	.14	.22	.50	6.40	3.3	13.0	2.00	.25	.10
9	1.10	.21	.17	.14	.22	.56	6.00	3.7	31.0	1.70	.24	.10
10	.92	.20	.16	.15	.21	.59	4.90	3.9	30.0	1.60	.23	.09
11	.84	.20	.15	.15	.21	.62	4.70	4.0	19.0	1.40	.22	.09
12	.76	.20	.15	.15	.22	.62	5.00	3.9	12.0	1.30	.21	.09
13	.67	.20	.15	.16	.23	.62	6.10	4.1	9.7	1.20	.20	.09
14	.59	.28	.15	.16	.23	.59	5.10	4.7	7.6	1.20	.19	.08
15	.53	.36	.12	.16	.26	.59	6.30	6.6	6.8	1.00	.17	.08
16	.50	.31	.11	.17	.28	.56	10.00	6.6	6.9	.95	.16	.08
17	.48	.36	.10	.18	.31	.56	13.00	5.5	6.9	.90	.15	.10
18	.45	.36	.10	.20	.34	.56	11.00	4.9	6.1	.87	.15	.09
19	.45	.39	.10	.22	.36	.56	7.40	4.5	5.4	.84	.16	.10
20	.42	.36	.09	.23	.36	.59	6.30	5.5	5.5	.81	.19	.10
21	.42	.36	.09	.24	1.00	.64	6.40	8.8	5.8	.81	.20	.09
22	.42	.36	.08	.24	.95	.84	6.80	12.0	5.5	.76	.20	.08
23	.39	.36	.09	.25	.78	1.20	6.60	10.0	5.5	.64	.14	.07
24	.39	.34	.09	.24	.67	1.20	7.90	9.1	5.4	.59	.15	.06
25	.39	.28	.08	.24	.59	1.10	7.50	8.0	7.1	.53	.16	.04
26	.36	.24	.09	.24	.56	.95	8.40	6.8	9.2	.48	.17	.04
27	.36	.21	.08	.24	.53	1.00	8.50	5.6	7.5	.39	.17	.04
28	.34	.20	.08	.24	.53	1.20	8.90	6.7	12.0	.39	.17	.05
29	.31	.20	.08	.24	---	1.00	8.60	9.1	9.6	.34	.15	.07
30	.31	.19	.09	.24	---	.95	7.50	12.0	6.9	.31	.15	.09
31	.31	---	.10	.23	---	.90	---	17.0	---	.28	.14	---
TOTAL	25.83	8.13	3.93	5.81	10.59	21.87	182.57	200.3	351.4	46.79	6.78	2.68
MEAN	.83	.27	.13	.19	.38	.71	6.09	6.46	11.7	1.51	.22	.089
MAX	2.6	.39	.19	.25	1.0	1.2	13	17	31	5.4	.45	.14
MIN	.31	.19	.08	.10	.21	.45	.78	3.1	5.4	.28	.14	.04

CAL YR 1976 TOTAL 1215.49 MEAN 3.32 MAX 35 MIN .08
WTR YR 1977 TOTAL 866.68 MEAN 2.37 MAX 31 MIN .04

WATER TEMPERATURE (°C)

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE

	1974						1975					
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	12.0	10.5	6.0	5.5	3.0	2.5	1.5	0.5	1.0	1.0	4.5	3.5
2	12.0	11.0	5.5	4.5	3.5	3.0	1.0	0.5	1.5	1.0	4.5	3.0
3	11.0	9.0	5.0	4.5	3.5	3.0	1.5	1.0	1.5	1.5	4.5	2.0
4	9.5	9.0	5.0	4.5	3.5	3.0	1.5	1.0	1.5	1.5	4.5	3.0
5	9.5	9.0	5.0	4.5	3.0	2.0	2.0	1.5	2.0	1.5	4.5	4.0
6	---	---	5.0	4.5	2.5	2.0	2.0	2.0	2.0	2.0	4.5	3.5
7	---	---	5.5	4.5	2.5	2.0	2.0	1.5	2.5	2.0	4.5	3.5
8	10.5	9.5	5.0	4.5	2.5	2.0	2.0	1.5	3.5	2.5	4.5	3.5
9	10.5	9.0	5.0	4.0	2.0	2.0	1.5	1.0	3.5	3.0	4.5	3.5
10	10.0	9.0	5.0	4.0	2.0	2.0	1.5	1.0	3.0	2.5	3.5	3.0
11	10.0	9.0	5.0	4.5	2.0	1.5	2.5	1.5	2.5	2.0	4.0	2.5
12	9.5	8.0	5.5	4.5	2.5	2.0	3.5	2.5	3.0	2.0	4.0	1.5
13	9.5	8.0	5.5	5.0	2.5	2.0	3.5	1.5	3.0	2.5	3.5	2.0
14	9.5	8.0	6.0	5.0	2.5	2.0	2.5	1.5	2.5	2.0	2.0	1.5
15	10.0	8.5	6.0	5.0	3.0	2.5	3.0	2.0	2.0	1.5	2.0	1.5
16	10.0	6.5	6.0	5.5	3.0	2.5	2.5	2.0	1.5	1.0	2.0	1.5
17	10.0	8.5	6.0	5.0	3.0	2.0	3.5	2.5	1.0	1.0	2.0	1.0
18	10.0	8.5	6.0	5.0	2.0	1.5	3.5	2.5	1.5	1.0	5.0	2.0
19	10.0	8.5	5.5	5.0	2.0	1.5	3.5	2.5	2.0	1.5	5.5	3.5
20	10.0	9.0	5.5	5.0	3.0	2.0	3.5	2.5	2.5	2.0	5.5	4.5
21	10.0	8.5	6.0	5.5	3.0	2.5	3.5	2.5	2.5	2.0	4.5	1.5
22	9.5	8.0	5.5	3.5	2.5	1.5	3.5	3.0	2.5	2.0	2.0	1.5
23	9.0	8.0	4.0	3.0	2.0	1.5	4.0	3.0	3.0	2.0	2.5	1.5
24	9.0	7.5	4.0	3.5	2.0	1.5	4.5	3.5	3.0	2.5	5.5	2.5
25	9.0	7.5	3.5	3.0	2.0	1.5	4.5	3.5	3.5	2.5	5.5	2.0
26	9.0	7.5	3.5	3.0	2.0	1.5	3.5	2.5	3.5	2.5	---	---
27	9.5	8.0	3.5	3.0	2.5	2.0	3.0	1.0	4.5	3.0	---	---
28	8.0	5.0	3.0	2.5	2.0	2.0	1.5	1.0	5.0	3.0	---	---
29	5.5	5.0	3.0	2.5	2.0	1.5	1.0	1.0	---	---	---	---
30	5.5	4.5	3.0	2.5	2.0	1.5	1.0	1.0	---	---	---	---
31	6.0	5.5	---	---	1.5	0.5	1.0	1.0	---	---	---	---
MONTH	12.0	4.5	6.0	2.5	3.5	0.5	4.5	0.5	5.0	1.0	5.5	1.0

WATER TEMPERATURE (°C)--Continued

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE--Continued

DAY	1975 APRIL MAX	MIN	MAY MAX	MIN	JUNE MAX	MIN	JULY MAX	MIN	AUGUST MAX	MIN	1975 SEPTEMBER MAX	MIN
1			---	---	10.0	7.0	12.0	8.5	16.0	12.0	13.0	11.0
2			---	---	9.5	6.0	12.5	8.0	16.5	13.0	13.0	11.5
3			---	---	10.0	6.0	13.0	8.0	17.0	13.0	13.0	11.0
4			---	---	10.0	5.5	14.0	9.0	16.5	13.5	14.0	12.0
5			---	---	10.5	7.0	15.0	10.0	17.5	14.0	14.5	12.5
6			---	---	10.5	6.0	15.0	11.0	16.5	14.0	15.0	12.5
7			6.0	3.0	10.0	6.0	15.0	10.5	15.5	11.5	14.5	13.0
8			6.0	3.0	11.0	6.5	16.0	11.0	17.5	13.5	14.5	13.5
9			6.5	3.0	11.0	7.0	15.5	12.0	16.5	12.5	14.5	12.5
10			6.5	3.0	11.5	7.5	16.5	13.5	16.5	14.0	14.5	12.0
11			7.0	2.5	11.0	7.5	17.0	13.5	16.5	13.5	14.5	11.0
12			7.0	2.5	10.5	7.5	17.0	13.0	17.0	13.5	15.0	12.0
13			6.5	2.5	11.5	8.0	17.0	12.5	16.0	13.5	14.5	12.0
14			6.5	2.5	12.5	8.5	16.5	12.0	15.5	13.0	14.0	11.0
15			6.0	2.5	11.0	8.5	14.5	11.5	15.5	12.5	13.5	11.5
16			7.0	3.5	11.5	8.0	16.5	12.5	15.0	12.0	14.0	11.5
17			7.0	3.5	9.5	7.5	17.0	14.0	15.0	12.0	15.0	13.5
18			7.5	3.5	9.0	7.5	17.5	15.0	14.0	12.5	16.0	14.0
19			6.0	4.0	8.0	7.0	18.0	14.0	14.0	12.0	15.0	13.0
20			---	---	10.5	7.5	17.5	14.0	13.0	11.0	14.5	12.5
21			---	---	12.0	7.5	17.5	14.0	13.5	10.5	14.0	12.0
22			---	---	12.5	8.5	18.5	14.5	15.0	11.5	13.0	11.5
23			9.5	6.0	11.0	8.5	18.5	14.5	15.0	12.0	12.5	10.5
24			9.5	5.0	9.0	7.5	19.0	14.5	15.0	12.0	12.5	10.5
25			9.0	5.0	10.5	6.5	19.5	14.0	16.0	13.0	12.0	10.5
26			8.5	5.0	11.5	7.5	18.5	15.0	15.5	14.0	11.0	10.0
27			9.0	5.0	11.5	7.0	19.0	16.0	14.5	12.0	11.0	10.0
28			9.0	5.5	12.0	8.0	18.5	16.0	14.0	11.5	10.5	9.5
29			9.0	5.5	12.0	9.0	17.0	14.5	13.5	10.5	10.5	9.0
30			9.5	5.0	12.0	8.5	15.5	13.0	14.5	11.5	10.0	8.5
31			10.0	6.0	---	---	15.0	10.0	13.5	11.0	---	---
MONTH			---	---	12.5	5.5	19.5	8.0	17.5	10.5	16.0	8.5
YEAR	19.5	0.5										

WATER TEMPERATURE (°C)--Continued

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE--Continued

	1975 OCTOBER		NOVEMBER		DECEMBER		1976 JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	10.0	9.0	5.0	4.5			---	---	3.0	2.0	1.0	0.0
2	10.0	9.0	5.5	5.0			---	---	2.5	2.0	0.5	0.0
3	10.5	9.5	6.0	5.5			---	---	2.5	2.0	0.0	0.0
4	10.0	9.0	6.0	6.0			---	---	2.0	0.5	0.0	0.0
5	10.0	9.0	6.0	6.0			---	---	1.0	0.0	0.0	0.0
6	10.0	9.0	6.0	5.5			---	---	0.5	0.5	0.0	0.0
7	---	---	7.0	5.5			---	---	1.0	0.5	0.5	0.0
8	---	---	7.0	6.0			---	---	1.5	1.0	1.0	0.0
9	---	---	6.0	4.5			---	---	2.0	1.0	1.0	0.0
10	7.5	6.0	4.5	4.0			---	---	1.5	1.0	2.0	0.5
11	7.5	6.0	4.0	3.5			---	---	1.5	0.5	3.0	1.5
12	6.0	5.5	3.5	3.5			---	---	1.5	0.5	3.0	0.5
13	5.5	5.0	4.0	3.5			---	---	2.0	1.0	4.0	1.0
14	6.0	5.5	4.5	4.0			---	---	2.5	1.5	3.5	1.0
15	7.5	6.0	4.5	4.5			---	---	1.5	0.5	4.5	1.5
16	7.5	6.5	4.5	4.5			---	---	1.0	0.5	5.5	2.5
17	7.5	6.5	4.5	4.0			---	---	2.0	1.0	5.5	3.0
18	7.5	6.5	4.0	3.5			---	---	2.0	1.0	4.0	2.5
19	7.5	6.0	3.5	3.0			---	---	2.0	0.5	3.0	0.5
20	7.5	6.0	---	---			---	---	1.0	0.0	4.5	1.0
21	7.5	6.0	---	---			---	---	1.0	0.5	5.5	2.5
22	7.5	6.5	---	---			1.0	0.5	1.5	0.5	5.5	2.5
23	6.5	4.5	---	---			1.5	0.5	1.5	0.5	5.5	2.5
24	4.5	3.5	---	---			1.5	1.0	1.5	0.5	6.0	3.0
25	4.0	3.5	---	---			1.0	0.5	1.5	0.5	5.0	2.5
26	6.5	4.5	---	---			1.5	0.5	2.0	1.0	4.5	1.5
27	6.5	6.5	---	---			2.0	1.0	3.0	1.0	4.0	2.0
28	6.5	5.5	---	---			2.0	1.5	4.0	2.5	4.5	1.5
29	5.5	5.5	---	---			2.5	1.5	3.5	0.5	6.0	2.0
30	5.5	5.0	---	---			2.5	2.0	---	---	6.5	2.5
31	5.0	4.5	---	---			2.5	2.0	---	---	6.0	3.0
MONTH	10.5	3.5	---	---			---	---	4.0	0.0	6.5	0.0

WATER TEMPERATURE (°C)--Continued

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE--Continued

	1976 APRIL		MAY		JUNE		JULY		AUGUST		1976 SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	5.5	3.0	9.5	5.5	12.5	9.0	13.5	10.0	16.0	13.0	15.5	12.5
2	6.0	2.5	9.0	5.5	12.5	8.5	13.5	10.5	15.0	12.0	16.0	13.0
3	5.0	2.5	9.0	5.5	12.0	8.0	15.0	11.0	14.5	12.5	16.0	13.0
4	3.5	3.0	9.0	5.5	11.5	8.0	16.0	12.5	13.5	10.0	15.5	13.5
5	4.0	3.0	8.0	6.0	11.5	7.5	16.0	12.5	13.5	11.0	15.0	14.0
6	6.0	3.0	7.0	6.0	11.5	8.0	16.5	13.0	13.5	11.0	15.0	13.5
7	7.0	2.5	9.5	5.5	12.0	8.5	15.5	12.0	13.0	10.0	14.5	13.0
8	5.0	2.0	9.5	7.0	11.0	9.0	16.0	12.5	---	---	14.5	13.0
9	5.0	0.5	8.5	6.5	11.0	9.5	16.0	12.0	---	---	14.5	13.0
10	4.5	2.5	9.5	6.0	10.0	8.5	16.5	13.5	---	---	15.0	14.0
11	4.0	3.0	11.0	6.5	11.5	8.0	16.5	13.5	---	---	15.0	13.5
12	3.0	2.0	11.5	7.0	13.0	9.0	16.5	13.0	---	---	15.0	12.0
13	3.0	2.0	11.5	8.0	14.5	10.5	17.0	13.5	---	---	14.5	11.0
14	5.0	2.0	11.0	8.0	15.5	11.0	17.0	14.0	---	---	14.5	12.0
15	4.5	1.0	11.0	6.5	15.5	12.5	17.0	14.5	---	---	13.0	11.0
16	1.5	0.0	11.0	7.5	15.5	12.0	18.0	15.5	---	---	11.5	9.0
17	4.5	0.5	11.5	8.0	16.0	11.5	17.0	14.5	12.0	10.5	12.0	9.5
18	7.0	3.5	10.5	7.0	16.5	13.0	16.0	13.0	12.0	11.0	13.0	10.0
19	8.5	3.0	10.5	6.5	16.5	13.0	17.0	14.0	13.0	11.5	12.5	10.5
20	9.0	4.5	10.5	7.5	16.0	12.5	16.0	13.0	15.0	11.5	12.5	11.0
21	8.0	3.5	11.0	8.5	14.5	12.0	15.5	12.5	16.0	13.0	12.5	10.5
22	7.5	3.5	11.5	7.5	14.5	10.0	15.5	12.5	16.0	13.5	13.0	11.0
23	8.5	3.5	11.0	8.0	15.0	11.0	16.0	14.0	13.5	11.0	12.5	10.0
24	8.5	4.5	12.0	7.5	15.0	11.0	17.0	14.0	14.5	12.0	12.5	10.5
25	7.0	4.5	13.0	8.5	15.5	12.5	18.0	15.0	14.0	12.5	12.5	11.0
26	5.5	3.0	13.0	9.5	15.0	11.5	18.0	15.0	14.0	12.0	12.5	10.5
27	5.5	2.5	13.0	9.5	15.5	12.0	17.0	15.0	14.5	12.0	12.5	11.0
28	7.0	2.5	11.5	8.5	16.5	13.0	18.0	16.0	15.0	13.0	12.0	10.5
29	8.5	3.0	11.5	7.5	15.5	13.0	18.5	16.0	15.5	13.0	11.0	10.5
30	9.5	5.0	12.5	8.0	14.5	11.5	17.5	15.0	15.5	12.5	11.0	10.5
31	---	---	13.0	9.0	---	---	16.0	15.0	16.0	13.0	---	---
MONTH	9.5	0.0	13.0	5.5	16.5	7.5	18.5	10.0	---	---	16.0	9.0
YEAR	18.5	0.0										

WATER TEMPERATURE (°C)--Continued

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE--Continued

	1977 OCTOBER		NOVEMBER		DECEMBER		1977 JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	11.0	10.0	6.0	5.0	4.0	2.5	4.5	3.0	4.0	2.5	2.5	1.5
2	10.5	10.0	6.5	5.5	4.0	3.0	4.5	3.0	3.5	2.5	4.0	1.0
3	11.0	8.0	7.0	6.0	4.0	3.0	3.0	2.0	4.0	2.5	4.0	1.5
4	11.5	8.5	7.0	6.0	4.0	3.0	3.0	1.5	4.0	2.5	4.5	1.5
5	12.5	9.5	7.0	6.0	4.0	3.0	2.5	1.5	4.5	2.5	4.0	2.0
6	12.5	10.0	7.5	6.0	4.0	2.5	2.5	1.5	4.5	3.0	4.0	2.5
7	12.5	11.5	7.0	6.0	3.5	2.5	2.5	1.5	5.0	3.5	4.0	2.5
8	13.0	11.0	7.0	6.0	4.0	3.0	2.5	1.5	5.0	4.0	4.0	2.5
9	12.5	11.0	7.0	6.0	3.5	3.0	2.5	2.0	5.0	3.5	3.5	2.0
10	12.5	10.5	6.5	5.5	3.5	2.5	3.0	2.0	5.0	3.0	3.5	1.5
11	11.5	9.5	6.5	5.5	3.5	2.5	3.0	2.0	5.0	3.0	4.0	1.5
12	10.5	8.5	6.5	6.0	4.0	3.0	3.5	2.5	5.0	3.5	4.0	2.5
13	9.5	8.0	6.5	5.5	3.5	3.0	3.5	2.0	5.5	4.0	2.5	1.5
14	9.0	8.5	6.0	5.5	3.5	3.0	3.0	2.0	5.5	4.0	3.0	1.0
15	9.0	8.5	6.0	5.0	3.5	3.0	3.0	2.5	6.0	4.5	3.0	1.0
16	9.0	8.5	6.5	5.5	3.5	3.0	3.0	2.5	6.0	4.5	2.5	2.0
17	8.5	8.0	6.5	6.0	3.5	2.5	3.5	2.5	6.0	4.5	4.0	1.5
18	8.5	8.0	7.0	6.0	3.0	2.5	3.5	3.0	5.5	4.0	4.0	1.5
19	8.5	7.5	6.5	5.5	3.5	2.5	3.5	3.0	5.5	4.0	4.0	2.0
20	8.5	8.0	6.5	6.0	3.5	2.5	4.0	3.0	5.0	4.0	4.5	2.5
21	8.5	8.0	6.0	5.5	3.0	1.0	4.5	4.0	5.0	2.5	5.0	3.0
22	8.5	8.0	6.0	5.5	4.0	2.5	4.5	3.5	3.0	2.0	5.5	3.5
23	8.0	7.5	5.5	5.0	4.0	2.0	4.0	3.5	2.5	2.0	5.0	3.5
24	8.0	7.0	5.5	5.0	3.5	2.5	3.5	3.0	3.0	1.5	3.5	2.5
25	7.0	6.5	5.5	4.5	3.5	2.5	4.0	3.0	3.0	1.0	3.5	2.0
26	7.0	5.5	5.0	4.0	4.0	3.0	4.0	3.0	3.5	1.5	4.0	2.0
27	5.5	4.5	4.0	2.5	3.5	2.5	4.0	3.0	3.5	2.0	5.5	3.5
28	5.5	4.0	3.0	2.5	4.0	2.5	4.0	2.5	4.0	2.5	5.0	3.0
29	6.0	4.5	3.5	2.5	4.5	3.0	3.5	2.5	---	---	3.5	1.5
30	6.0	5.0	3.5	2.5	5.0	3.5	3.5	2.5	---	---	2.0	1.5
31	6.0	4.5	---	---	5.0	3.5	4.5	2.5	---	---	3.0	1.0
MONTH	13.0	4.0	7.5	2.5	5.0	1.0	4.5	1.5	6.0	1.0	5.5	1.0

WATER TEMPERATURE (°C)--Continued

11264500--MERCED RIVER AT HAPPY ISLES BRIDGE NEAR YOSEMITE--Continued

	1977 APRIL		MAY		JUNE		JULY		AUGUST		1977 SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	3.5	2.0	7.0	5.0	12.5	9.5	16.5	14.0	18.0	14.5	16.0	12.5
2	4.5	2.5	8.5	5.0	12.5	9.0	16.5	14.0	17.5	15.0	16.0	12.0
3	5.0	3.0	7.0	5.0	12.5	9.0	16.0	13.5	18.0	15.5	16.0	12.5
4	6.5	4.5	8.5	4.0	14.0	10.0	14.5	13.0	16.0	15.0	16.0	12.5
5	8.0	5.0	7.0	3.5	14.0	11.0	14.5	11.0	16.5	14.0	16.5	12.5
6	8.0	4.5	3.5	2.5	13.5	11.5	14.5	11.0	15.5	13.5	16.5	12.5
7	8.0	4.5	4.0	1.5	13.5	11.5	15.0	11.0	16.0	13.0	16.5	12.5
8	6.5	4.0	5.0	4.0	13.0	11.5	15.0	11.5	16.0	12.0	16.5	12.5
9	6.0	3.5	4.5	3.0	12.0	10.0	15.0	11.5	16.5	12.5	17.0	12.5
10	7.0	3.0	6.0	4.0	12.0	9.5	14.5	11.5	16.5	12.5	16.0	12.0
11	7.5	3.5	5.5	4.0	12.5	8.5	16.0	12.5	17.0	13.0	16.0	12.0
12	7.5	4.0	6.0	4.0	13.0	8.5	16.0	13.0	17.0	13.5	15.5	12.0
13	6.5	4.5	7.0	5.0	13.0	10.0	15.5	12.5	17.5	14.0	12.5	11.5
14	8.0	3.5	9.5	6.5	13.0	8.0	15.5	12.5	17.5	13.5	---	---
15	8.5	4.5	7.5	6.0	14.0	10.0	16.0	13.0	16.5	12.5	---	---
16	9.0	5.5	6.0	3.5	14.5	11.0	16.5	13.5	15.5	12.5	---	---
17	8.5	5.0	4.5	2.0	14.0	11.0	17.5	14.5	14.5	13.5	---	---
18	7.0	3.0	5.5	2.0	13.0	10.5	17.0	14.5	17.5	13.5	---	---
19	7.0	3.0	8.5	4.0	13.0	10.5	16.5	14.0	17.5	14.5	---	---
20	7.5	3.5	10.5	6.0	14.5	11.0	16.5	13.5	18.0	14.5	---	---
21	7.5	4.0	11.0	7.0	16.5	12.0	17.0	14.0	17.5	14.0	---	---
22	8.0	5.0	9.0	7.0	17.0	13.0	17.0	14.5	17.5	14.0	---	---
23	9.0	5.0	7.0	6.5	17.0	13.5	16.0	13.0	17.5	14.0	---	---
24	8.5	6.0	7.5	5.5	17.0	14.0	16.0	13.0	16.5	13.5	---	---
25	9.0	6.0	7.5	5.0	16.5	14.5	15.5	13.0	15.0	13.0	---	---
26	9.0	5.5	7.5	5.5	17.5	14.0	15.0	12.0	16.0	12.5	---	---
27	9.5	6.5	9.5	5.0	17.0	13.5	16.0	12.5	15.5	12.0	---	---
28	9.5	6.0	10.0	5.5	17.0	15.0	16.5	13.0	16.0	12.0	---	---
29	9.5	6.0	11.0	6.5	15.5	13.5	16.5	12.5	16.5	13.0	---	---
30	8.0	6.0	12.0	7.5	17.0	13.5	17.0	13.5	16.5	12.5	---	---
31	---	---	13.0	9.0	---	---	17.0	14.0	16.5	13.0	---	---
MONTH	9.5	2.0	13.0	1.5	17.5	8.0	17.5	11.0	18.0	12.0	---	---
YEAR	18.0	1.0										

WATER TEMPERATURE (°C)--Continued

11268000--SOUTH FORK MERCED RIVER NEAR EL PORTAL

	1977 JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		1977 DECEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MI
1	---	---	30.0	29.5	29.0	25.5	26.0	22.5	21.0	18.5	14.0	11.5	9.0	6.
2	---	---	30.0	30.0	29.0	26.0	26.0	23.5	20.5	18.5	14.0	11.5	9.0	6.
3	---	---	30.0	29.5	29.0	25.5	26.5	22.5	20.5	17.5	13.5	11.5	8.0	5.
4	---	---	30.0	29.5	27.5	25.5	27.0	22.5	20.5	17.0	13.0	11.5	7.0	5.
5	---	---	29.5	29.5	28.5	24.0	26.5	22.0	21.0	18.0	14.0	11.5	7.5	5.
6	---	---	29.5	29.5	28.0	24.0	26.5	23.0	21.0	19.0	12.5	10.5	7.0	5.
7	---	---	29.5	29.5	27.5	23.5	27.0	23.0	20.5	17.5	12.0	9.0	7.0	4.
8	---	---	29.5	29.0	27.5	22.5	27.0	22.0	20.0	17.5	12.0	9.0	7.0	5.
9	---	---	29.5	29.0	27.0	24.0	28.5	23.0	19.5	17.0	10.5	8.5	6.0	4.
10	---	---	29.5	29.0	27.0	23.5	27.5	23.5	20.0	17.0	11.0	8.5	5.5	4.
11	---	---	29.0	29.0	27.0	23.0	25.5	22.0	20.0	17.0	11.0	9.0	6.0	3.
12	---	---	29.0	29.0	27.5	23.5	25.0	22.0	19.5	17.0	11.0	8.5	7.0	5.
13	---	---	29.0	29.0	28.0	24.5	25.0	21.0	20.0	17.0	10.5	8.5	7.0	4.
14	---	---	29.0	29.0	27.5	24.0	25.5	21.5	20.5	17.0	10.0	8.0	7.5	5.
15	---	---	29.0	29.0	29.0	24.0	23.5	20.5	19.5	17.0	10.0	8.0	9.0	--
16	---	---	29.0	28.5	27.5	24.0	21.5	19.0	19.5	17.5	9.5	8.0	8.5	--
17	---	---	29.0	28.5	26.5	25.0	21.0	19.0	19.5	17.0	10.0	8.0	9.0	6.
18	---	---	29.0	28.5	28.0	24.5	21.5	18.0	19.5	17.0	10.0	8.5	8.5	--
19	---	---	29.0	28.5	28.0	24.5	20.0	19.0	19.5	17.0	10.5	8.0	6.5	--
20	---	---	28.5	28.5	28.5	24.5	21.5	19.0	19.0	16.5	8.0	6.0	4.5	--
21	---	---	28.5	28.5	28.5	24.5	22.0	18.5	18.0	16.0	7.5	6.0	5.0	--
22	---	---	28.5	28.5	28.5	24.0	21.5	18.5	18.0	15.5	9.5	7.0	---	--
23	33.0	29.0	28.5	28.0	28.0	24.5	21.0	19.0	17.5	15.5	9.0	6.5	---	--
24	32.5	29.0	28.5	28.5	27.0	24.5	20.5	18.0	18.0	15.5	8.5	6.5	---	--
25	31.0	29.5	28.5	28.0	26.5	23.5	20.5	18.0	18.0	15.5	8.5	6.5	---	--
26	31.0	30.5	28.0	28.0	26.0	23.5	21.5	19.0	18.0	15.5	8.5	6.5	---	--
27	30.5	30.5	27.5	24.0	26.0	22.0	21.0	19.0	17.5	15.5	9.0	6.5	---	--
28	30.5	30.0	28.0	24.0	27.0	21.5	21.5	19.0	16.0	13.0	9.0	7.0	---	--
29	30.0	30.0	28.0	24.5	27.0	23.0	21.0	19.5	15.0	12.5	9.0	6.5	---	--
30	30.0	30.0	28.5	25.0	27.0	23.5	21.0	19.0	15.0	12.0	9.0	6.5	---	--
31	---	---	28.5	25.0	26.0	24.0	---	---	14.0	12.0	---	---	---	--
MONTH	---	---	30.0	24.0	29.0	21.5	28.5	18.0	21.0	12.0	14.0	6.0	---	--

WATER TEMPERATURE (°C)--Continued

11268200--MERCED RIVER NEAR BRICEBURG

DAY	1976 JUNE MAX	MIN	JULY MAX	MIN	AUGUST MAX	MIN	1976 SEPTEMBER MAX	MIN
1	---	---	23.0	19.5	23.5	20.5	25.5	21.5
2	---	---	23.0	19.5	23.0	21.0	26.0	22.0
3	---	---	24.5	20.0	22.5	21.0	26.0	22.5
4	17.0	15.5	25.0	21.0	23.0	19.5	25.5	22.5
5	17.0	13.5	26.0	21.5	23.5	19.5	25.5	23.0
6	17.0	14.0	26.0	22.0	23.0	20.0	25.5	23.0
7	17.0	14.0	26.0	22.0	23.0	19.5	25.5	22.0
8	17.0	14.0	26.0	22.0	24.0	20.0	25.5	21.5
9	17.0	14.5	27.0	22.5	25.0	20.5	24.5	22.0
10	15.5	13.5	27.0	23.0	25.0	21.5	24.0	23.0
11	16.5	13.0	27.0	23.0	25.5	21.5	22.5	21.0
12	17.5	14.0	27.0	23.0	25.5	21.5	21.0	17.0
13	19.0	15.5	27.0	23.0	24.5	21.5	19.5	17.0
14	20.0	17.0	27.5	23.5	22.5	20.5	20.0	18.0
15	20.5	17.5	27.5	23.5	21.0	19.5	20.0	18.5
16	21.0	17.5	27.5	24.5	22.0	19.5	19.5	18.0
17	21.0	17.5	26.0	24.0	19.5	19.0	19.5	17.0
18	22.0	18.0	24.5	22.0	20.0	18.0	20.5	17.5
19	22.5	19.5	25.5	22.5	19.5	18.5	20.5	18.0
20	22.5	19.5	26.0	22.5	23.0	18.5	21.5	18.0
21	22.0	19.0	26.5	22.0	24.5	21.0	21.5	18.5
22	21.0	16.0	26.0	22.0	23.5	22.0	21.5	19.0
23	21.5	18.5	25.5	24.0	24.0	20.0	21.5	18.0
24	22.5	19.5	27.0	23.0	24.5	20.5	21.0	18.5
25	23.0	20.5	28.0	24.0	24.0	21.0	21.0	18.5
26	23.5	20.0	28.0	24.5	24.5	20.5	21.0	18.5
27	24.0	20.5	27.5	24.5	25.0	20.5	21.0	19.0
28	24.5	21.0	28.5	25.0	25.5	21.0	20.5	19.0
29	24.5	21.5	28.0	24.5	25.5	21.0	20.0	19.0
30	23.5	20.5	25.5	22.5	25.5	21.0	20.5	18.0
31	---	---	23.5	21.0	26.0	21.5	---	---
MONTH	24.5	13.0	28.5	19.5	26.0	18.0	26.0	17.0

WATER TEMPERATURE (°C)--Continued

11268200--MERCED RIVER NEAR BRICEBURG--Continued

DAY	1977 JULY MAX	MIN	AUGUST MAX	MIN	SEPTEMBER MAX	MIN	OCTOBER MAX	MIN	1977 NOVEMBER MAX	MIN
1	21.0	21.0	27.5	19.0	25.5	22.0	24.0	16.5	14.0	12.5
2	23.5	21.5	28.0	24.5	27.0	22.0	24.0	15.5	14.0	12.5
3	21.5	20.5	28.5	24.0	27.0	21.5	25.0	14.5	14.0	12.5
4	23.0	20.0	26.0	24.5	28.0	20.5	24.0	14.0	13.5	12.5
5	22.5	20.0	26.5	23.5	28.5	21.0	23.5	16.5	13.5	12.5
6	23.5	20.5	25.5	23.0	28.5	21.0	24.0	15.5	13.0	11.5
7	24.5	20.5	26.0	22.5	28.0	21.0	24.0	15.5	12.5	10.5
8	25.0	21.5	26.5	22.0	29.0	21.0	25.0	15.5	12.0	10.5
9	25.0	21.0	26.0	22.5	26.0	19.5	25.0	13.5	12.0	10.0
10	26.0	21.5	26.0	22.5	27.5	18.5	26.0	13.0	11.5	10.0
11	26.5	22.5	26.0	22.5	28.0	17.5	23.5	16.0	11.5	10.5
12	26.0	22.5	27.5	23.0	27.0	16.5	22.0	15.5	11.0	9.5
13	---	---	27.5	23.5	29.0	16.5	24.0	13.0	10.5	9.5
14	26.5	22.0	27.5	23.5	27.0	15.0	27.0	12.0	10.5	9.5
15	27.0	22.5	27.5	22.5	22.0	14.5	26.0	13.5	10.5	9.0
16	27.0	23.5	27.0	23.0	17.5	15.0	26.0	13.5	10.5	9.0
17	28.0	24.5	26.0	24.5	24.0	14.5	25.5	13.0	10.5	9.5
18	28.0	24.5	28.0	23.5	21.5	17.0	13.0	13.0	10.5	10.0
19	27.0	24.0	28.0	23.0	19.5	18.0	19.5	16.0	10.5	8.5
20	27.5	23.5	28.0	23.5	22.5	18.0	19.0	16.0	8.5	7.5
21	27.5	23.5	28.5	23.0	22.5	18.0	18.0	15.0	8.0	8.0
22	27.5	23.5	28.0	23.0	22.5	18.0	18.0	14.5	10.0	8.5
23	27.5	23.0	28.0	23.5	22.0	17.5	17.5	15.0	9.5	8.5
24	26.5	23.0	27.5	22.5	21.5	17.5	18.0	15.0	10.0	8.5
25	26.5	22.5	27.5	23.0	22.5	17.5	18.0	15.0	10.0	8.5
26	26.5	22.0	26.5	22.0	25.5	17.5	18.0	15.5	10.0	8.5
27	26.5	22.0	26.5	21.5	25.0	17.5	17.0	15.0	10.0	8.5
28	26.5	22.5	26.5	21.0	22.0	17.5	15.0	13.5	10.5	9.0
29	26.5	22.5	27.0	22.5	21.0	17.0	14.5	13.0	10.0	9.0
30	27.5	23.0	27.0	22.5	20.0	16.5	14.0	13.0	10.0	8.5
31	27.0	24.0	26.5	22.0	---	---	14.0	12.5	---	---
MONTH	28.0	20.0	28.5	19.0	29.0	14.5	27.0	12.0	14.0	7.5

MEAN DAILY SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)

11268200--MERCED RIVER NEAR BRICEBURG

DAY	1976 JUN	JUL	AUG	SEP	1976 OCT	1977 JUN	JUL	AUG	SEP	OCT	1977 NOV
1	---	44	33	61	52	---	31	67	87	111	127
2	---	45	32	62	52	---	33	68	86	112	126
3	---	46	34	63	53	---	35	73	88	115	125
4	25	48	36	63	50	---	37	74	88	115	123
5	27	49	40	64	44	---	24	75	88	115	123
6	30	51	43	64	39	---	27	74	89	120	121
7	31	51	46	64	38	---	30	71	89	120	120
8	33	50	49	65	39	---	34	70	90	119	127
9	34	50	51	64	---	---	37	70	91	117	123
10	36	51	53	63	---	---	40	80	92	114	114
11	38	52	54	60	---	---	43	72	92	110	109
12	39	53	57	---	---	---	47	73	93	110	109
13	41	54	59	19	---	---	47	75	90	112	110
14	41	54	60	21	---	---	50	76	94	113	109
15	41	55	61	24	---	---	51	78	96	110	106
16	40	55	60	28	---	---	52	91	98	115	103
17	40	52	70	30	---	---	53	92	93	115	101
18	37	40	65	32	---	---	54	93	91	118	101
19	34	41	63	35	---	---	56	95	91	113	103
20	35	45	64	37	---	---	57	95	91	113	104
21	35	48	60	39	---	---	57	96	91	113	105
22	36	49	58	40	---	31	58	97	98	113	98
23	37	50	57	42	---	32	58	97	104	112	102
24	39	51	55	41	---	33	59	98	107	113	74
25	41	53	56	42	---	33	60	101	110	113	76
26	42	53	55	42	---	30	61	102	110	114	80
27	43	54	56	44	---	30	62	102	110	116	81
28	43	54	57	47	---	28	63	101	111	119	82
29	43	52	58	50	---	27	64	101	111	118	84
30	44	33	59	51	---	29	65	102	111	117	84
31	---	29	60	---	---	---	67	102	---	128	---
MONTH	37	49	54	47	---	---	49	86	96	115	105

PERIPHYTON DATA, 1975

Algae	Merced River stations: July 23-Aug. 28 Big Oak Flat		July 23-Aug. 27 Rancheria Flat		July 24-Aug. 27 Below South Fork Merced River		July 24-Aug. 27 Briceburg		July 24-Aug. 27 South Fork Merced River	
	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent
CHLOROPHYTA (green algae)	Artificial substrates lost				Sample vial broken					
Ankistrodesmus falcatus										
Closterium sp.										
Cosmarium sp.										
Mougeotia sp.										
Pediastrum tetras										
Scenedesmus dimorphus			-	-			-	-	20	0.1
CHRYSOPHYTA										
Bacillariophyceae (diatoms)										
Achnanthes lanceolata										
A. minutissima			-	-			-	-	1,000	4
Cocconeis placentula			36,400	88			107,000	94	600	3
Cymbella cistula			-	-			-	-	90	.4
C. tumida										
C. ventricosa			2,100	5			900	1	-	-
Fragilaria sp.										
Gomphonema angustatum			-	-			-	-	6,600	28
G. sp.										
Navicula cryptocephala										
N. exigua										
Nitzschia amphibia										
Rhopalodia gibba										
Synedra ulna			-	-			-	-	150	.6
S. sp.										
CYANOPHYTA (blue-green algae)										
Amphithrix janthima			-	-			-	-	600	3
Miscellaneous filaments			1,500	4			5,900	5	-	-
Miscellaneous flagellates			1,400	3			-	-	14,600	62
TOTAL			41,400				113,800		23,700	

Algae	Merced River stations: Aug. 27-Sept. 24 Big Oak Flat		Aug. 28-Sept. 25 Rancheria Flat		Aug. 27-Sept. 25 Below South Fork Merced River		Aug. 27-Sept. 25 Briceburg		Aug. 27-Sept. 25 South Fork Merced River	
	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent
CHLOROPHYTA (green algae)										
Ankistrodesmus falcatus										
Closterium sp.										
Cosmarium sp.										
Mougeotia sp.										
Pediastrum tetras										
Scenedesmus dimorphus	-	-	1,100	1	-	-	-	-	-	-
CHRYSOPHYTA										
Bacillariophyceae (diatoms)										
Achnanthes lanceolata										
A. minutissima	-	-	-	-	-	-	-	-	2,600	7
Cocconeis placentula	36,900	94	-	-	10,300	94	28,200	86	17,600	45
Cymbella cistula	-	-	16,900	18	-	-	-	-	5,900	15
C. tumida	-	-	800	.9	-	-	50	.2	-	-
C. ventricosa	300	.8	26,400	29	-	-	50	.2	400	1
Fragilaria sp.										
Gomphonema angustatum	-	-	-	-	-	-	-	-	4,900	12
G. sp.										
Navicula cryptocephala	-	-	30,500	33	-	-	100	.3	-	-
N. exigua	-	-	12,500	14	-	-	-	-	-	-
Nitzschia amphibia										
Rhopalodia gibba										
Synedra ulna	200	.5	-	-	-	-	-	-	5,400	14
S. sp.										
CYANOPHYTA (blue-green algae)										
Amphithrix janthima										
Miscellaneous filaments	1,900	5	3,300	4	600	6	4,500	14	-	-
Miscellaneous flagellates	-	-	-	-	-	-	-	-	2,500	6
TOTAL	39,300		91,500		10,900		32,900		39,300	

	Merced River stations									
	Sept. 24-Oct. 23 Big Oak Flat		Sept. 25-Oct. 24 Rancheria Flat		Sept. 25-Oct. 24 Below South Fork Merced River		Sept. 25-Oct. 24 Briceburg		Sept. 25-Oct. 24 South Fork Merced River	
gae	Cells/cm²	Percent	Cells/cm²	Percent	Cells/cm²	Percent	Cells/cm²	Percent	Cells/cm²	Percent
LOROPHYTA (green algae)										
Ankistrodesmus falcatus	-	-	900	1	500	0.1	-	-	Artificial substrates lost	
Closterium sp.	-	-	100	.1	-	-	-	-		
Cosmarium sp.	-	-	100	.1	-	-	-	-		
Mougectia sp.	100	0.4	-	-	-	-	-	-		
Pediastrum tetras	-	-	100	.1	-	-	-	-		
Scenedesmus dimorphus	-	-	900	1	11,100	3	-	-		
RYSOPHYTA										
acillariophyceae (diatoms)										
Achnanthes lanceolata	100	.4	-	-	-	-	-	-		
A. minutissima	-	-	-	-	9,100	2	2,100	7		
Cocconeis placentula	22,800	80	-	-	-	-	22,100	78		
Cymbella cistula	100	.4	63,100	74	212,000	54	700	2		
C. tumida	-	-	300	.4	-	-	-	-		
C. ventricosa	4,900	17	8,300	10	149,000	38	30	.1		
Fragilaria sp.	-	-	7,700	9	-	-	-	-		
Gomphonema angustatum	100	.4	-	-	-	-	-	-		
G. sp.	-	-	100	.1	3,800	1	150	.5		
Navicula cryptocephala										
N. exiqua	-	-	2,100	2	-	-	-	-		
Nitzschia amphibia	-	-	900	1	-	-	-	-		
N. sp.	-	-	-	-	3,300	.8	-	-		
Rhopalodia gibba										
Synedra ulna	-	-	100	.1	3,500	.9	-	-		
S. sp.	-	-	400	.5	-	-	-	-		
ANOPHYTA (blue-green algae)										
Amphithrix janthina										
scellaneous filaments	300	1	-	-	-	-	3,200	11		
scellaneous flagellates										
TOTAL	28,400		85,100		392,300		28,300			

PERIPHYTON DATA, 1977

Algae	Merced River stations: July 13-Sept. 9 Big Oak Flat, Cells/cm²	Percent	July 14-Sept. 9 Rancheria Flat, Cells/cm²	Percent	July 13-Sept. 8 Below South Fork Merced River, Cells/cm²	Percent	July 13-Sept. 8 Briceburg, Cells/cm²	Percent	July 14-Sept. 8 South Fork Merced River, Cells/cm²	Percent
CHLOROPHYTA (green algae)										
Ankistrodesmus falcatus										
Apiocystis brauniana										
Askenasyella chlamydopus										
Bulbocheate sp.	-	-	-	-	-	-	-	-	150	1
Characium rostratum										
Closterium sp.										
Coelastrum microsporum										
C. reticulatum	-	-	-	-	-	-	-	-	25	.2
Cosmarium sp.	-	-	-	-	-	-	-	-	50	.3
Gloeocystis sp.										
Mougeotia sp.	-	-	-	-	-	-	600	2	1,100	7
Oedogonium sp.										
Pediastrum tetras	-	-	-	-	-	-	-	-	25	.2
Scenedesmus dimorphus										
S. sp.										
Spirogyra sp.										
Staurastrum sp.	-	-	-	-	-	-	-	-	50	.3
Stigeoclonium sp.	-	-	-	-	-	-	1,400	5	-	-
Tetraedron minimum	-	-	-	-	-	-	-	-	25	.2
Tetraspora lacustris										
Zygnema sp.	-	-	-	-	-	-	-	-	125	.8
CHRYSOPHYTA										
Bacillariophyceae (diatoms)										
Achnanthes lanceolata										
A. minutissima	-	-	-	-	30	.2	-	-	6,800	45
Cocconeis placentula	4,600	11	2,700	3	12,100	80	24,900	86	-	-
Cymbella cistula	29,400	68	72,800	79	400	3	130	.5	-	-
C. lunata										
C. microcephala	-	-	-	-	-	-	-	-	6,200	41
C. minuta	600	1	2,100	2	200	1	-	-	-	-
Diatoma hiemale										
Eunotia sp.										
Epithemia sorex	-	-	-	-	-	-	60	.2	-	-
E. zebra										
Fragilaria crotonensis										
F. vaucheriae										
Gomphocymbella sp.										
Gomphoneis herculeana										
Gomphonema angustatum	1,900	4	12,800	14	-	-	-	-	-	-
G. augur	-	-	-	-	-	-	200	.7	-	-
G. sphaerophorum	-	-	-	-	-	-	300	1	-	-
G. truncatum	-	-	-	-	-	-	1,200	4	-	-
Melosira varians	6,700	15	-	-	400	3	-	-	-	-
Navicula cryptocephala	-	-	-	-	2,100	14	-	-	-	-
N. exiqua										
N. sp.										
Nitzschia acicularis										
N. kutzinghiana										
N. sublinearis										
Pinnularia sp.										
Rhopalodia gibba	100	.2	-	-	-	-	-	-	-	-
Synedra sp.										
S. ulna	100	.2	1,900	2	-	-	-	-	25	.2
Tabellaria flocculosa										
CYANOPHYTA (blue-green algae)										
Aphanocapsa sp.	-	-	-	-	-	-	-	-	600	4
Oscillatoria sp.	-	-	-	-	-	-	-	-	125	.8
Miscellaneous flagellates										
TOTAL	43,400		92,300		15,200		28,800		15,200	

PERIPHYTON DATA, 1977--Continued

	Merced River stations									
	Sept. 9-29 Big Oak Flat		Sept. 9-30 Rancheria Flat		Sept. 8-30 Below South Fork Merced River		Sept. 8-30 Briceburg		Sept. 8-30 South Fork Merced River	
Algae	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent	Cells/cm^2	Percent
CHLOROPHYTA (green algae)										
Ankistrodesmus falcatus	600	0.9	2,200	0.6	-	-	300	4	1,200	2
Apiocystis brauniana	-	-	-	-	100	0.1	200	3	-	-
Askenasyella chlamydopus										
Bulbocheate sp.	-	-	-	-	-	-	1,400	18	3,800	7
Characium rostratum										
Closterium sp.	100	.1	-	-	-	-	-	-	-	-
Coelastrum microsporum	-	-	-	-	300	.2	-	-	-	-
C. reticulatum	-	-	-	-	800	.5	200	3	-	-
Cosmarium sp.	-	-	-	-	-	-	-	-	100	
Gloeocystis sp.										
Mougeotia sp.	1,400	2	-	-	-	-	-	-	2,700	5
Oedogonium sp.	-	-	-	-	100	.1	300	4	-	-
Pediastrum tetras	100	.1	-	-	-	-	-	-	-	-
Scenedesmus dimorphus	-	-	4,100	1	300	.2	-	-	-	-
S. sp.	300	.4	-	-	-	-	-	-	-	-
Spirogyra sp.	200	.3	-	-	900	.5	500	7	-	-
Staurastrum sp.	-	-	-	-	100	.1	100	1	-	-
Stigeoclonium sp.	-	-	-	-	2,900	2	-	-	-	-
Tetraedron minimum										
Tetraspora lacustris	-	-	-	-	100	.1	-	-	-	-
Zygnema sp.	-	-	-	-	100	.1	-	-	-	-
CHRYSOPHYTA										
Bacillariophyceae (diatoms)										
Achnanthes lanceolata										
A. minutissima	-	-	2,700	.7	9,600	6	-	-	19,700	37
Cocconeis placentula	1,200	2	3,800	1	2,800	2	-	-	-	-
Cymbella cistula	7,200	10	326,000	90	4,600	3	-	-	100	
C. lunata										
C. microcephala	-	-	-	-	-	-	-	-	11,300	21
C. minuta	2,400	3	9,100	3	4,800	3	-	-	-	-
Diatoma hiemale										
Eunotia sp.										
Epithemia sorex	-	-	-	-	-	-	400	5	-	-
E. zebra										
Fragilaria crotonensis	-	-	-	-	122,400	74	1,100	14	7,000	13
F. vaucheriae	14,500	21	-	-	-	-	-	-	-	-
Gomphocymbella sp.	-	-	7,400	2	-	-	-	-	-	-
Gomphoneis herculeana										
Gomphonema angustatum	300	.4	39,000	11	-	-	-	-	-	-
G. augur	-	-	-	-	200	.1	700	9	-	-
G. sphaerophorum	-	-	-	-	-	-	200	3	-	-
G. truncatum										
Melosira varians	35,400	52	-	-	3,100	2	-	-	-	-
Navicula cryptocephala	4,400	6	-	-	9,100	6	300	4	-	-
N. exiqua	200	.3	-	-	-	-	-	-	-	-
N. sp.	200	.3	1,000	.3	-	-	-	-	-	-
Nitzschia acicularis	-	-	-	-	-	-	700	9	-	-
N. kulzinghiana	-	-	900	.2	600	.4	300	4	-	-
N. sublinearis										
Pinnularia sp.	-	-	-	-	-	-	50	.7	-	-
Rhopalodia gibba	-	-	-	-	-	-	150	2	-	-
Synedra sp.										
S. ulna	200	.3	1,400	.4	1,100	.7	30	.4	6,700	13
Tabellaria flocculosa										
CYANOPHYTA (blue-green algae)										
Aphanocapsa sp.	-	-	-	-	-	-	100	1	-	-
Oscillatoria sp.	-	-	-	-	-	-	300	4	100	
Miscellaneous flagellates	-	-	-	-	-	-	200	3	-	-
TOTAL	68,700		362,500		164,000		7,600		52,700	

PERIPHYTON DATA, 1977--Continued

Algae	Merced River stations: Sept. 29-Nov. 30 Big Oak Flat Cells/cm²	Percent	Sept. 30-Dec. 1 Rancheria Flat Cells/cm²	Percent	Sept. 30-Dec. 1 Below South Fork Merced River Cells/cm²	Percent	Sept. 30-Dec. 1 Briceburg Cells/cm²	Percent	Sept. 30-Dec. 1 South Fork Merced River Cells/cm²	Percen
CHLOROPHYTA (green algae)										
Ankistrodesmus falcatus	-	-	-	-	-	-	300	0.5	-	-
Apiocystis brauniana										
Askenasyella chlamydopus	-	-	2,300	0.9	-	-	-	-	-	-
Bulbocheate sp.										
Characium rostratum	-	-	-	-	-	-	300	.5	-	-
Closterium sp.										
Coelastrum microsporum										
C. reticulatum	-	-	-	-	-	-	400	.6	-	-
Cosmarium sp.	800	0.3	-	-	-	-	-	-	-	-
Gloeocystis sp.	-	-	600	.2	-	-	-	-	-	-
Mougeotia sp.	4,200	2	-	-	-	-	100	.2	40	.
Oedogonium sp.	300	.1	-	-	-	-	200	.3	-	-
Pediastrum tetras										
Scenedesmus dimorphus	800	.3	-	-	-	-	200	.3	-	-
S. sp.	1,600	.7	-	-	-	-	500	.8	-	-
Spirogyra sp.	300	.1	-	-	-	-	-	-	-	-
Staurastrum sp.										
Stigeoclonium sp.	2,900	1	-	-	-	-	-	-	-	-
Tetraedron minimum										
Tetraspora lacustris										
Zygnema sp.										
CHRYSOPHYTA										
Bacillariophyceae (diatoms)										
Achnanthes lanceolata	7,400	3	-	-	-	-	-	-	-	-
A. minutissima	2,100	.9	120,000	46	495,000	87	16,300	26	14,900	81
Cocconeis placentula	7,900	3	12,200	5	14,900	3	5,400	7	100	.
Cymbella cistula	25,800	11	56,400	22	26,000	5	500	.8	100	.
C. lunata	-	-	-	-	1,400	.2	-	-	-	-
C. microcephala	-	-	-	-	-	-	-	-	400	2
C. minuta	800	.3	400	.2	300	.05	-	-	-	-
Diatoma hiemale										
Eunotia sp.										
Epithemia sorex	-	-	-	-	-	-	12,300	20	-	-
E. zebra	-	-	-	-	-	-	1,100	2	-	-
Fragilaria crotonensis	-	-	-	-	-	-	11,700	19	1,200	7
F. vaucheriae	37,000	15	-	-	4,500	.8	5,100	8	-	-
Gomphocymbella sp.	-	-	3,500	1	-	-	-	-	-	-
Gomphoneis herculeana	-	-	600	.2	-	-	-	-	-	-
Gomphonema angustatum	2,600	1	51,700	20	1,000	.2	-	-	400	2
G. augur										
G. sphaerophorum	-	-	1,400	.5	-	-	100	.2	-	-
G. truncatum	1,600	.7	-	-	-	-	1,100	2	-	-
Melosira varians	141,600	58	-	-	1,000	.2	1,500	2	-	-
Navicula cryptocephala	-	-	500	.2	1,300	2	2,300	4	-	-
N. exiqua										
N. sp.	1,000	.4	-	-	-	-	-	-	-	-
Nitzschia acicularis	-	-	100	.04	400	.07	-	-	-	-
N. kulzinghiana										
N. sublinearis	300	.1	-	-	-	-	-	-	-	-
Pinnularia sp.	500	.2	-	-	-	-	-	-	-	-
Rhopalodia gibba	300	.1	-	-	100	.02	1,000	2	40	.
Synedra sp.	-	-	-	-	-	-	-	-	460	2
S. ulna	3,700	2	500	.2	3,600	.6	1,700	3	760	4
Tabellaria flocculosa	-	-	-	-	300	.05	-	-	-	-
CYANOPHYTA (blue-green algae)										
Aphanocapsa sp.	-	-	-	-	-	-	100	.2	-	-
Oscillatoria sp.										
Miscellaneous flagellates	-	-	12,500	5	17,200	3	-	-	-	-
TOTAL	242,000		262,300		567,000		62,200		18,400	

1975 DIEL DATA

DATE	TIME	TEMPERATURE (DEG C)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	ALKALINITY AS CACO3 (MG/L)
11267500--MERCED RIVER AT BIG OAK FLAT NEAR EL PORTAL							
SEP , 1975							
23...	1400	17.0	33	6.6	7.7	90	12
23...	1700	17.5	30	6.5	8.6	100	12
23...	1900	16.5	33	6.5	8.0	91	12
23...	2300	16.0	34	6.5	7.9	90	13
24...	0200	16.0	34	6.7	7.9	90	13
24...	0530	15.0	36	6.6	8.0	88	13
24...	0830	14.5	33	6.7	8.4	93	13
24...	1130	15.5	34	6.5	8.5	96	13
OCT							
22...	1530	10.0	24	6.0	10.1	100	10
22...	1830	9.5	26	6.1	9.0	98	--
22...	2200	9.0	26	6.1	9.7	95	10
23...	0130	8.0	25	6.1	9.7	92	10
23...	0630	8.0	25	6.1	9.9	93	10
23...	1130	7.5	26	6.2	10.3	97	11
11268100--MERCED RIVER BELOW SOUTH FORK NEAR BRICEBURG							
SEP , 1975							
23...	1330	21.0	52	7.5	8.3	97	19
23...	1630	22.0	49	7.5	8.4	100	20
23...	1930	21.0	50	7.0	8.2	94	20
23...	2230	21.0	50	7.1	8.2	94	21
24...	0130	20.0	52	7.1	8.3	89	18
24...	0500	19.0	56	7.1	8.0	89	18
24...	0800	18.5	49	7.1	8.6	94	21
24...	1100	19.5	50	7.2	9.2	105	20
OCT							
22...	1430	14.0	33	6.3	10.3	104	16
22...	1730	13.0	36	6.3	10.0	99	15
22...	2100	12.0	37	6.3	10.0	98	15
23...	0030	11.0	38	6.3	10.2	97	17
23...	0530	10.0	35	6.3	10.4	97	15
23...	1030	9.5	34	6.3	11.1	101	13
11268200--MERCED RIVER NEAR BRICEBURG							
SEP , 1975							
23...	1230	20.5	52	7.3	9.0	103	21
23...	1600	23.0	54	8.0	8.9	108	21
23...	1900	22.0	53	7.7	8.4	100	21
23...	2200	21.0	52	7.2	8.2	97	23
24...	0100	20.5	54	7.1	8.2	94	18
24...	0430	20.0	56	7.1	8.3	94	21
24...	0730	19.5	55	7.2	8.5	91	23
24...	1030	19.5	54	7.2	8.8	100	21
OCT							
22...	1330	13.5	37	6.3	10.2	101	15
22...	1700	14.0	37	6.2	10.2	103	18
22...	2030	13.0	36	6.2	9.9	98	16
22...	2400	12.0	39	6.2	9.8	94	15
23...	0500	11.0	38	6.2	10.1	94	--
23...	1000	10.0	40	6.4	10.6	99	17

1977 DIEL DATA

11266750--MERCED RIVER AT BIG OAK FLAT NEAR EL PORTAL

DATE	TIME	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	ALKA-LINITY AS CACO3 (MG/L)
SEP , 1977							
28...	1330	13.5	50	6.9	8.3	88	23
28...	1700	16.0	48	7.4	8.6	97	18
28...	2100	15.5	49	7.1	7.9	87	20
29...	0100	15.0	50	6.9	7.3	79	20
29...	0500	13.0	52	6.8	7.0	73	18
29...	0900	13.0	49	6.9	7.5	79	20
NOV							
29...	1630	6.5	51	7.2	10.9	96	11
29...	2000	6.0	55	7.2	9.8	88	13
29...	2400	6.0	54	7.2	10.2	92	13
30...	0330	6.0	55	7.4	9.2	92	13
30...	0800	5.5	51	7.1	10.2	91	11
30...	1200	6.0	51	7.5	11.0	99	13

11267050--MERCED RIVER AT RANCHERIA FLAT NEAR EL PORTAL

DATE	TIME	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	ALKA-LINITY AS CACO3 (MG/L)
SEP , 1977							
28...	1300	19.0	78	8.0	9.9	112	30
28...	1630	20.5	76	8.3	9.2	107	23
28...	2030	19.5	77	7.6	7.9	91	31
29...	0030	19.0	76	7.3	8.1	91	25
29...	0430	17.5	73	7.1	8.2	91	25
29...	0830	17.0	73	7.3	9.5	104	23
30...	1230	18.0	75	8.0	10.1	--	--
NOV							
29...	1530	9.5	61	7.7	11.2	103	16
29...	1900	9.0	62	7.5	10.8	100	18
29...	2330	8.0	61	7.5	11.0	97	16
30...	0300	8.0	67	7.4	10.9	96	15
30...	0700	7.5	64	7.5	11.2	100	16
30...	1100	8.0	67	7.8	11.4	102	15

11268100--MERCED RIVER BELOW SOUTH FORK NEAR BRICEBURG

DATE	TIME	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	ALKA-LINITY AS CACO3 (MG/L)
SEP , 1977							
28...	1200	20.0	109	8.6	10.2	116	23
28...	1600	21.5	107	9.0	10.3	120	16
28...	1945	21.0	108	8.6	8.6	100	25
28...	2400	20.0	111	7.7	8.2	93	25
29...	0400	19.0	112	7.4	7.8	87	26
29...	0800	19.0	111	7.3	8.3	93	26
NOV							
29...	1430	8.0	76	7.8	11.6	101	--
29...	1830	8.5	76	7.8	11.3	101	21
29...	2300	8.0	83	7.7	11.3	100	21
30...	0245	8.0	86	7.7	11.0	97	20
30...	0645	7.5	81	7.7	11.2	98	21
30...	1045	8.5	81	7.7	11.8	105	20

11268200--MERCED RIVER NEAR BRICEBURG

DATE	TIME	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	ALKA-LINITY AS CACO3 (MG/L)
SEP , 1977							
28...	1100	19.5	113	8.0	8.6	97	34
28...	1500	21.0	114	8.1	9.7	112	32
28...	1900	21.0	119	8.2	9.0	104	34
28...	2300	20.0	120	7.8	8.6	98	30
29...	0330	20.0	117	7.0	8.2	94	30
29...	0730	19.5	117	7.3	8.2	92	31
NOV							
29...	1230	8.5	81	8.1	11.0	104	23
29...	1800	9.5	87	7.8	11.2	101	23
29...	2200	9.0	89	7.6	11.2	98	23
30...	0200	8.0	89	7.6	11.1	97	21
30...	0600	8.0	91	7.5	11.0	97	23
30...	1000	9.0	89	7.5	11.4	99	23