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# HYDROLOGY AND HYDROCHEMISTRY FOR THE RICE CREEK WATERSHED OF THE WHITESHELL RESEARCH AREA 1986-90

# HYDROLOGIE ET HYDROCHIMIE DU BASSIN HYDROGRAPHIQUE DE RICE CREEK DE L'AIRE DE RECHERCHES DE WHITESHELL ENTRE 1986 ET 1990

G.A. Thorne, J.M. Laporte, D. Clarke

Applied Geoscience Branch
Whiteshell Laboratories

Service de Géoscience appliquée
Laboratoires de Whiteshell

Pinawa, Manitoba R0E 1L0

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# HYDROLOGY AND HYDROCHEMISTRY FOR THE RICE CREEK WATERSHED OF THE WHITESHELL RESEARCH AREA 1986-90

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## ABSTRACT

This report presents data and results of a hydrometeorological study carried out in the Rice Creek Watershed of the Whiteshell Research Area during 1986-90. Major water budget components, such as precipitation, runoff, groundwater, storage and evaporation, are evaluated and discussed. Mean annual precipitation was 544 mm, mean runoff was 101 mm, with evapotranspiration as the residual being 443 mm. The steady-state groundwater component of runoff is estimated to be less than 2 mm/unit area, or less than 2% of mean annual basin yield.

Water chemistry data for precipitation, surface waters and groundwaters are presented and the relative concentrations compared to provide information about sources of streamflow.

Data on a major storm event that provided precipitation with an estimated return period of over 100 a are presented. Also discussed are the effects of beaver dams on the hydrology of a major tributary of the Rice Creek watershed.

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## RÉSUMÉ

On présente dans ce rapport les résultats d'une étude hydrométéorologique effectuée dans le bassin hydrographique de Rice Creek de l'Aire de Recherche de Whiteshell entre 1986 et 1990. On a évalué et examiné les éléments importants du bilan d'eau comme, par exemple, les précipitations, le ruissellement, les eaux souterraines, la rétention et l'évaporation. Les précipitations annuelles moyennes ont été de 544 mm, le ruissellement moyen de 101 mm, l'évapotranspiration étant donc de 443 mm. L'élément eaux souterraines en régime stationnaire du ruissellement est évalué à moins de 2 mm/unité de surface ou moins de 2% du débit annuel moyen du bassin.

On présente des renseignements sur la chimie de l'eau pour la précipitation, les eaux superficielles et les eaux souterraines et on compare les concentrations relatives pour obtenir des renseignements au sujet des sources d'écoulement d'eaux superficielles d'alimentation de cours d'eau.

On présente aussi des renseignements au sujet d'un événement important sous la forme d'un orage entraînant de précipitations qui se produirait à nouveau dans plus de 100 a. En outre, on examine les effets des barrages construits par les castors sur l'hydrologie d'un affluent principal du bassin hydrographique de Rice Creek.

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Laboratoires de Whiteshell
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## 1. INTRODUCTION

Hydrometeorology monitoring studies have been established by AECL Research as part of the Canadian Nuclear Fuel Waste Management Program (CNFWMP) to gain a better understanding of surface and groundwater flow in Canadian Shield environments. Data are collected to quantify the various components of the hydrological budget and are used as input to geosphere models. Studies conducted since 1981 in the Whiteshell Research Area in southeastern Manitoba have been used to evaluate the interrelationship between precipitation, surface and shallow subsurface flow, evapotranspiration and shallow subsurface storage.

Initially, most of the meteorological and hydrological investigation was centred at the Underground Research Laboratory (URL), located about 15 km northeast of AECL's Whiteshell Laboratories. The site characterization program began in 1980 on the URL study area (4.8 km$^2$) with borehole drilling, geological mapping and hydrogeological investigations. Between 1984 and 1991, a shaft and underground research facility have been developed to carry out geotechnical studies on plutonic rock.

In 1986 the area of AECL's geotechnical study was expanded to cover a 750-km$^2$ area called the Whiteshell Research Area (WRA). A regional-scale groundwater flow system study has been ongoing in the WRA since 1986. In selected block areas, called permit areas, more detailed investigations of surface and groundwater flow have been undertaken. Figure 1 shows the extent of the WRA, the location of the Rice Creek watershed, and the various smaller study areas within the WRA.

The purpose of this report is to present hydrometeorological data collected in the Rice Creek watershed for the 1986-1990 period. Discussion and conclusions are provided on hydrological processes and the most important components of the hydrological budget for the watershed. Water chemistry data on precipitation, surface waters and groundwater are compared and provide baseline water chemistry parameters, which are useful for determining sources of streamflow.

## 2. THE RICE CREEK WATERSHED

The Rice Creek Watershed (150-km$^2$ gauged area) (Figure 2) is about 50% low-lying swamp and peat-covered soil and about 50% Precambrian outcrop. The outcrop forms topographic highs and bedrock ridges, the highest of which are drainage divides with adjacent catchments. Local relief can be as much as 20 m and the total relief is about 35 m within the watershed.

Depressions between outcrops are filled with predominantly clay or silt deposits of glacial or glaciolacustrine origin. Peat deposits overlie the unconsolidated materials of most of the low-lying areas. Drilling and field investigations have shown peat deposits to be up to 1.5 m thick, but at most locations the thickness is 0.5 m or less. In the topographic upland areas, shallow organic soils and sporadic peat accumulations occupy the shallow bedrock depressions.

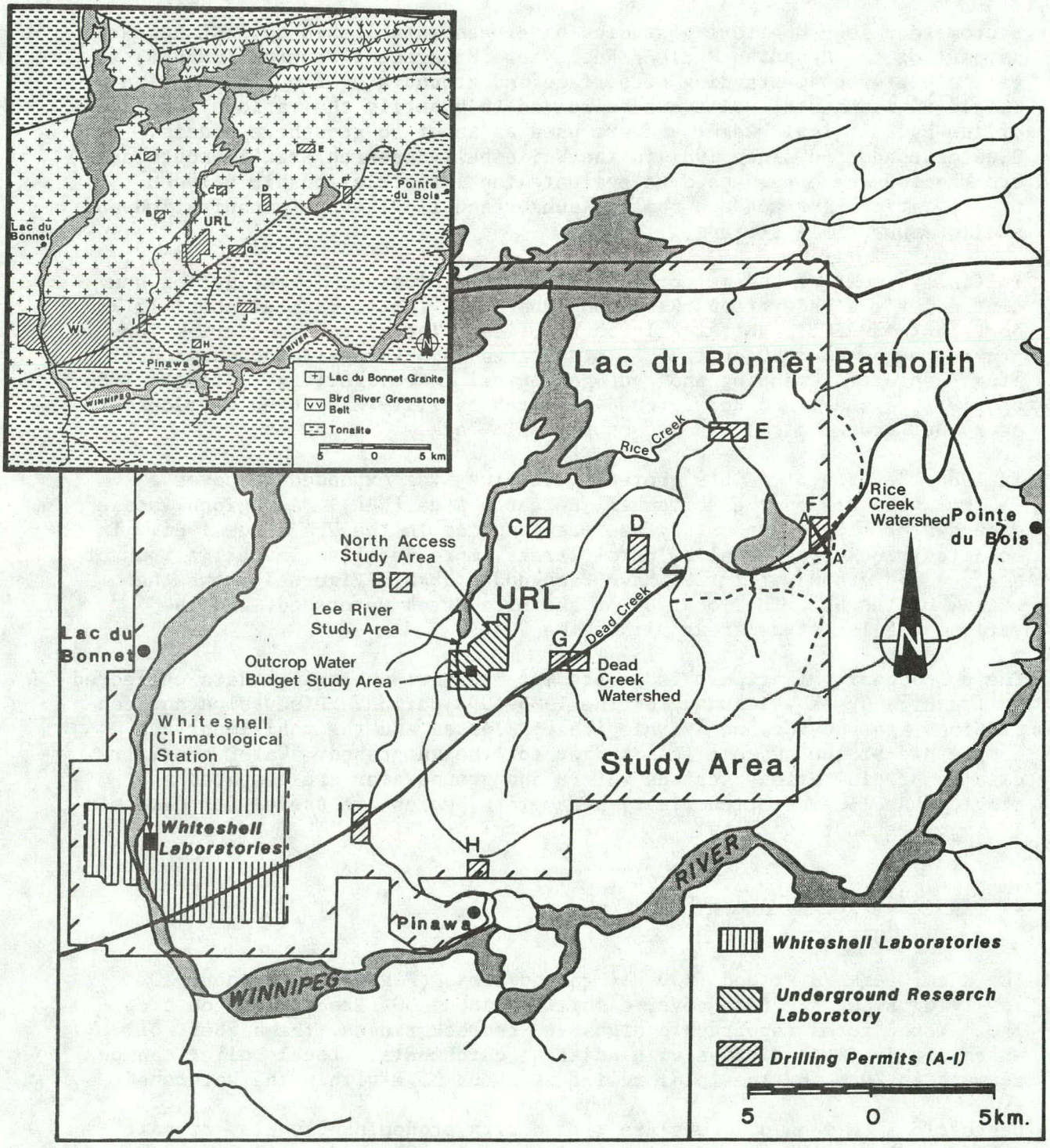



FIGURE 1: Geoscience Study Areas Within the Whiteshell Research Area

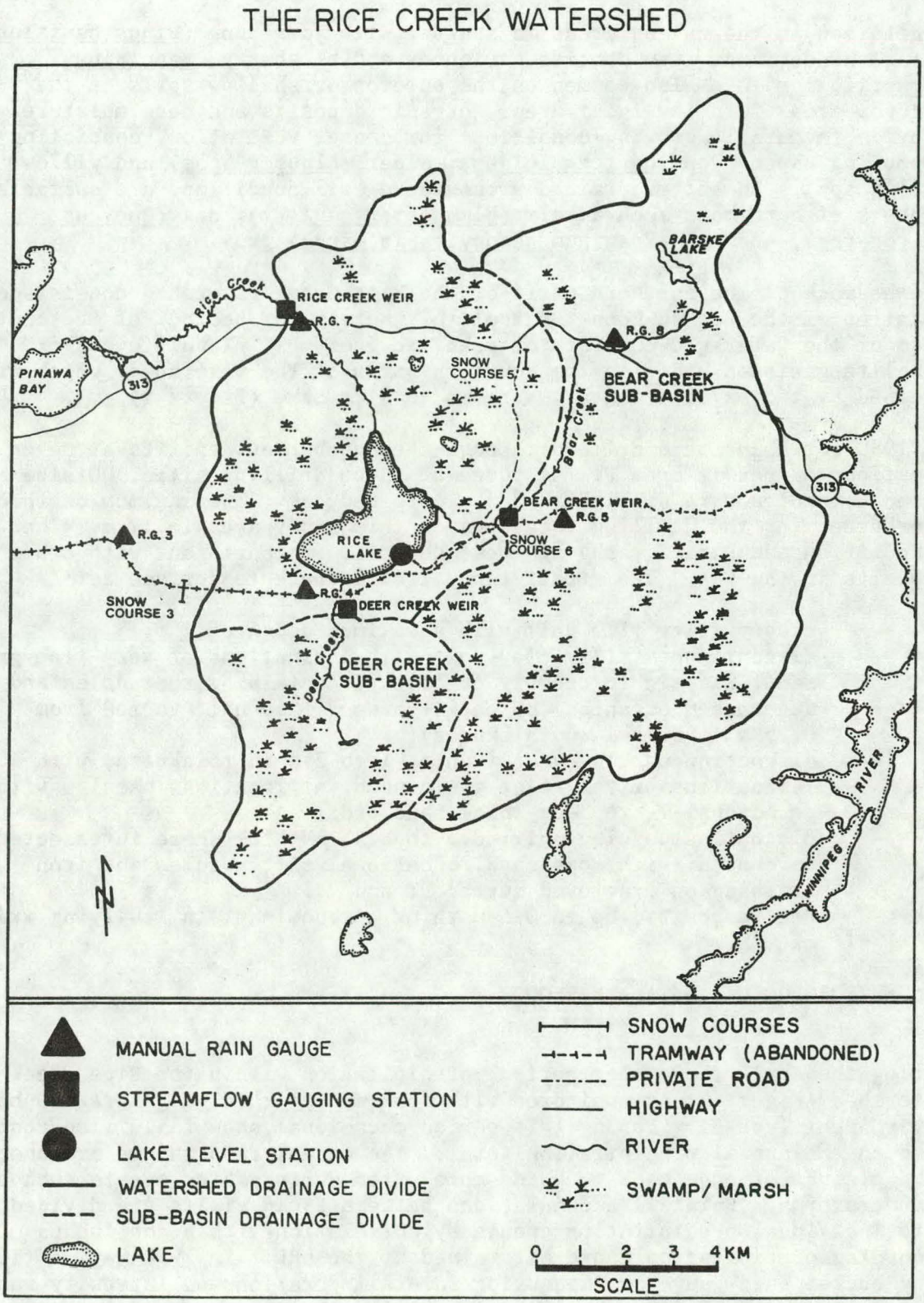



FIGURE 2: Instrumentation and Location of Rice Creek Watershed

Vegetation in the upland areas is sparse, with jack pine (Pinus banksiana) being the dominant tree species. Lichens and blueberry (Vaccinium augustifolium) are also common on the outcrop or shallow soils of the outcrop areas. In low-lying areas, organic deposits and more moisture provide favourable growing conditions for denser vegetation, consisting of trembling aspen (Populus tremuloides), alder (Alnus rugosa) and willow (Salix spp). In better drained areas where soil conditions are suitable, pockets of hardwoods such as elm (Ulmus americana L.), oak (Quercus macrocerpa), and ash (Franinus pennsylvania march) grow.

The bedrock of the northern parts of the Rice Creek watershed consists of granites of the Lac du Bonnet batholith, whereas the bedrock of the central area of the watershed consists of granitic gneisses. Tonalite and/or tonalite gneisses underlie the southern parts of the watershed, which are drained by two major tributary streams to Rice Lake (Figure 1).

In 1988 boreholes were drilled through the overburden deposits at seven locations on permit area F. At three of these drilling sites, NQ-size cored boreholes were drilled to 3-5 m into bedrock. The maximum depth of overburden for the drilling locations of this study area is 17 m. The composition and stratigraphy of these deposits is consistent with other deposits in the WRA. The stratigraphy from bedrock to surface is:

- clayey silty till unit with a maximum depth of 1 m;
- discontinuous silty clay unit with laminations of very fine grain sand, plastic to crumbly or blocky, containing root holes and decomposed organics (on permit area F this unit varied from 0.25 m to 6.75 m in thickness);
- discontinuous clayey silt unit, 1 to 2 m in thickness, with laminations of very fine grain sand, at locations massive with occasional 1- to 3-cm-thick sand beds;
- discontinuous clay unit, 0.5 to 3.25 m thick where intersected by boreholes, with some sand, occasional silt nodules and iron staining on fractured surfaces; and
- Peat deposits, up to 0.5 m thick, predominant in low-lying areas.

## 3. METEOROLOGICAL DATA - METHODS

During the April to October period, precipitation within the Rice Creek watershed (Figure 2) is monitored with four manual rain gauges (Atmospheric Environment Type B). During this period occasional snow falls also contribute to the annual precipitation total. The manual rain gauges are checked at a minimum of once each week and more often during major events such as thunderstorms. Rainfall accumulations between field visits are divided into individual precipitation events by correlation with a continuous recording precipitation gauge maintained at the URL. In 1990 May, a tipping bucket rain gauge for measuring rainfall duration and intensity was installed in the Bear Creek sub-basin. Prior to 1990, the nearest continuously recording precipitation gauge was located at the URL lease area.

Snowfall accumulation is measured prior to snowmelt at two or three snow courses within the watershed. The snow course locations were chosen to be representative of topographic and vegetation conditions and still be readily accessible. Snowpack water equivalent (SWE) is determined by collecting 10 snow cores at approximately 30-m intervals over a 300-m traverse. The individual depths and weights of the snow samples are recorded for each of the 10 sampling points to provide a mean snow water equivalent for the snow course. The snow water equivalent of the snowpack is taken as the mean of the results of all snow surveys taken within the watershed.

## 4. HYDROLOGICAL DATA - METHODS

In 1986 the area of geotechnical study (initially centred around the URL lease area and Dead Creek watershed) was expanded to cover regional-scale groundwater flow systems. At the same time hydrometeorological monitoring investigations, which prior to 1986 had been conducted in the Dead Creek watershed, were expanded into the Rice Creek watershed. A summary of hydrometeorological data for the 1982-89 period and conclusions about hydrological processes for the Dead Creek watershed have been provided by Thorne et al. (1991).

Initially, reconnaissance surveys were made within the Rice Creek watershed to evaluate geological and geomorphological conditions. Suitable meteorological and hydrometric gauging sites were chosen to allow collection of representative data. Based on field observations, past experience and estimates of high and low flows for catchment areas, three hydrometric gauging and one lake-stage monitoring site were selected (Figure 2).

At the outlet of Rice Creek, undesirable channel characteristics made it necessary to construct the main creek hydrometric monitoring station 5 km upstream. At this location, unfractured and flat-lying outcrop, along with stable channel banks, provided suitable conditions for constructing a 120° V-notch compound weir of concrete. Anchored to the concrete weir is a stilling well with stream stage recorded using a Stevens A-71 float-operated strip-chart recorder.

At the Bear Creek outlet into Rice Lake, a much smaller concrete weir than that at the outlet of Rice Creek was constructed. To accommodate a wide range of flows, a 90° V-notch and corrugated steel sheet bypass were incorporated into the weir design. A stilling well and instrument shelter housing a Stevens A-71 float-operated recorder are used to obtain a continuous stream-stage record for the open-water period.

Another weir was constructed from sheet metal near the outlet of Deer Creek. The low channel banks, minimal channel elevation decrease and swampy conditions made it necessary to construct a low-profile control. To prevent underflow at the weir a curtain constructed of sheet metal was installed in the stream bed at this location. Stream stage was continuously recorded during the open-water period with a Stevens A-71 float-operated recorder housed in an instrument shelter mounted on a stilling well.

Rice Lake stage was recorded using instrumentation similar to the three other hydrometric gauging stations in the Rice Creek watershed.

At all the hydrometric monitoring stations, a 1-m staff gauge fastened to the concrete weirs or iron rods were used to manually observe stream or lake-water levels.

### 4.1 WINTER MEASUREMENTS OF STREAMFLOW

Floats and water-level recorders are removed from the hydrometric gauging stations prior to freeze-up, which often starts in mid-November. They are serviced and replaced by mid-March before the spring melt begins. During the ice-cover period, stream discharge measurements are made with a current velocity meter and wading rod or by measuring the hydraulic head of flow through the V-notch weirs. These measurements are made at about weekly intervals. Hydrographs of daily mean discharge (Appendix B) are constructed from rating curves derived during open-water periods and by interpolation between flow measurements during winter periods.

### 4.2 HYDROCHEMISTRY SAMPLING

Water samples were collected on a regular basis at the Rice, Bear and Deer Creek hydrometric stations for the 1986-90 period. Also on a regular but less frequent interval, water samples were collected from Rice Lake at the stage monitoring station.

Groundwater samples were collected from the shallow bedrock and overburden boreholes of permit area F within the Rice Creek watershed in 1991 February. All samples were filtered and analyzed in the laboratory for concentrations of Na, K, Ca, Mg, Cl, $NO_3$, $SO_4$, $HCO_3$; their pH and conductivity were also measured. The chemistry data for these samples are provided in Appendix D.

## 5. RESULTS AND DISCUSSION

The following sections provide results and discussion of hydrometeorological processes and water budget components for the Rice Creek watershed. A section is included describing the water budget components for Rice Lake for 1986-87 during the open-water period.

Accounts of events such as an intense storm of 1988 June and the effects of beaver activity on hydrology provide insight into natural processes. Hydrochemical data for groundwater, stream and lake waters, and precipitation are summarized and used in developing an understanding of the movement and sources of streamflow within the Rice Creek watershed.

### 5.1 PRECIPITATION

The longest and most reliable climatological data record near the Rice Creek watershed is available from the WL climatological station, which has been in operation since 1964. The station is located about 20 km southwest of the westernmost Rice Creek drainage boundary. The long-term (1964-88)

mean annual precipitation recorded at the Whiteshell climatological station is 562 mm (Johnston 1989): about 430 mm falls as rain and 132 mm (water equivalent) as snowfall.

Since 1981, meteorological data, such as precipitation, temperature and relative humidity, have been collected at two locations on the URL lease area. A comparison of data for Whiteshell, the URL lease area and the Rice Creek watershed can be used to supplement and describe hydrometeorological conditions for the Rice Creek Watershed for the 1987-90 period. During 1987-90, annual precipitation at the Whiteshell climatological station ranged from 445 mm in 1987 to 576 mm in 1988. The mean annual precipitation for this four-year period was 516 mm, well below the long-term normal of 562 mm. For the same period, the precipitation recorded at the URL #1 precipitation gauge ranged from 392 mm in 1987 to 503 mm in 1988, with a four-year mean of 452 mm. Annual precipitation differences between these two locations are due mainly to summer rainstorm patterns; for example, in the month of 1990 June, 171 mm of precipitation was recorded at the Whiteshell meteorological station, whereas 136.5 mm of precipitation was recorded at the URL recording gauge. Similarly, for 1990 July, 89.6 mm of precipitation was recorded at Whiteshell and 57 mm at the URL.

During the summer period thunderstorm activity causes large variation in rainfall intensity and spatial distribution. Precipitation in the Rice Creek watershed was measured at four locations with manual rain gauges (Figure 3) for the 1987-90 April 1 to October 31 period. In addition, two rain gauges in the adjacent Dead Creek watershed provide supplementary precipitation data. During the remainder of the year, data from URL precipitation gauge 1 is taken as being representative for the Rice Creek watershed. By using the Thiessen polygon method for determining the amount of watershed rainfall and SWE from snow surveys, an annual watershed value is obtained for the Rice Creek watershed (Table 1). Yearly totals ranged from 387 mm in 1987 to 629 mm in 1988, with a four-year mean of 513 mm, very near the same four-year mean of 516 mm recorded at the Whiteshell meteorological station.

Snow surveys to determine SWE for the Rice Creek watershed were made at two snow courses each year for the 1987-90 period. In addition, two to three snow surveys were made in the adjacent Dead Creek watershed to provide supplementary data. At each snow-course location (Figure 2), snow cores are collected at approximately 30-m intervals for a 300-m traverse (10 samples). The individual sample depths and weight of snow cores are recorded for each of the ten sampling points to provide a mean SWE for the snow course. Snow water equivalents (Table 2) were 115.2 mm (1987), 51.8 mm (1988), 113.4 mm (1989) and 74.8 mm (1990). Snow surveys are made by early March of each year. The long-term normal annual snowfall recorded at the Whiteshell climatological station is 132 mm.

Subsequent to the snow surveys, any additional snowfall is recorded by a continuous recording precipitation gauge and is added to the annual snowfall accumulation values. For some years, late winter or early spring snowfall can add significant water equivalents to the annual snowfall accumulation. For example, in 1988 an additional 38.5 mm of SWE was recorded subsequent to the 51.8 mm measured by snow surveys on March 4, an

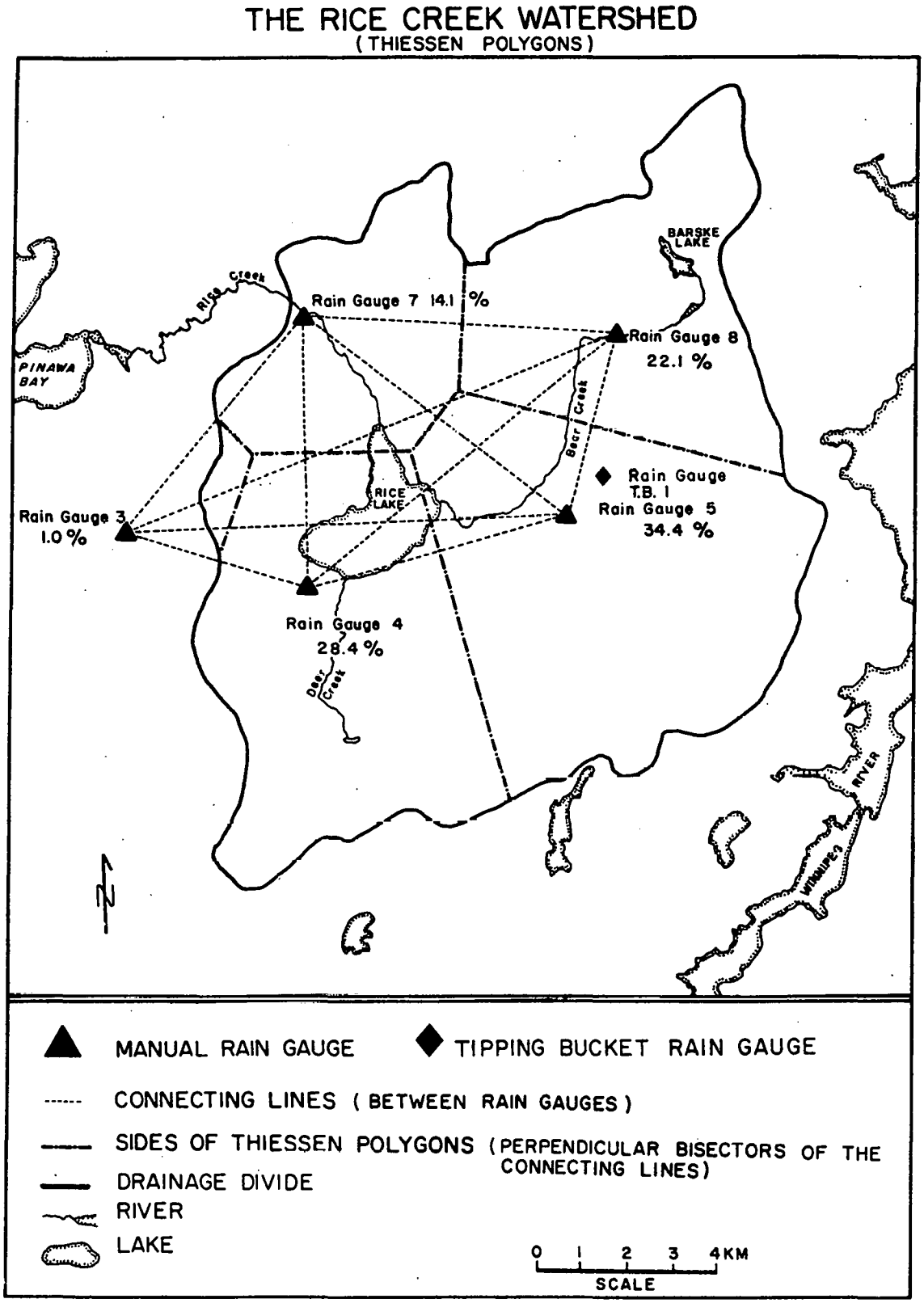



FIGURE 3: Rain Gauge Locations and Area of Catch, Rice Creek Watershed

## TABLE 1

## ANNUAL AND MONTHLY PRECIPITATION TOTALS FOR THE RICE CREEK WATERSHED

| Year | Jan. (mm) | Feb. (mm) | Mar. (mm) | Apr. (mm) | May (mm ) | June (mm) | July (mm) | Aug. (mm) | Sept. (mm) | Oct. (mm) | Nov. (mm) | Dec. (mm) | Yearly Total (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1987 | * 4.0 | *24.0 | *12.0 | 4.0 | 48.3 | 56.2 | 110.2 | 66.6 | 5.1 | 30.8 | * 7.0 | *19.0 | 387.2 |
| 1988 | *16.0 | *13.0 | *38.5 | + 7.6 | 41.4 | 163.4 | 116.2 | 60.2 | 71.3 | +43.2 | *31.5 | *27.0 | 629.4 |
| 1989 | *22.5 | * 7.0 | *20.5 | +18.0 | 78.6 | 110.9 | 116.6 | 65.4 | 19.4 | 41.3 | *14.5 | *18.0 | 532.7 |
| 1990 | *23.0 | *10.0 | *30.0 | 29.7 | 39.0 | 165.9 | 62.4 | 26.1 | 61.7 | 11.9 | *21.1 | *20.5 | 501.3 |
| Mean | 16.4 | 13.5 | 25.3 | 14.8 | 51.8 | 124.1 | 101.4 | 54.6 | 39.4 | 31.8 | 18.5 | 21.1 | 512.7 |
| Long-Term Normals | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* Data from recording rain gauge #1. Rain gauge #1 is used during the winter months when the manual rain gauges are not in operation.

\+ Data where part of the month has been monitored using rain gauge #1.

Note: 1) Values are the weighted means for manual rain gauges in the vicinity of the watershed. (Manual Rain Gauges #3, #4, #5, #7, #8)

2) Values are in millimetres water equivalent.

3) Long-term normals for precipitation are based on WL climatic normals 1964-1988.

TABLE 2

SNOW SURVEYS - RICE CREEK WATERSHED

| Location of Snow Survey | Date | Mean Depth (cm) | Average Density | Water Equivalent (mm) |
|---|---|---|---|---|
| Bear Creek - Williams Road at Tramway (Snow Course #6) | 04/03/87 | 52.9 | 0.215 | 113.9 |
| | 04/03/88 | 30.4 | 0.161 | 49.0 |
| | 01/03/89 | 53.1 | 0.206 | 109.4 |
| | 02/03/90 | 41.5 | 0.190 | 78.9 |
| Bear Creek - Williams Road at Hwy. #313 (Snow Course #5) | 04/03/88 | 30.9 | 0.163 | 50.5 |
| | 01/03/89 | 58.9 | 0.204 | 119.9 |
| | 05/03/90 | 36.1 | 0.204 | 73.8 |
| Rice Creek - at the Weir (Snow Course #7) | 04/03/87 | 52.2 | 0.223 | 116.5 |
| Ten-Mile Grid (Snow Course #3) | 01/03/88 | 33.6 | 0.166 | 55.8 |
| | 23/02/89 | 58.3 | 0.190 | 111.0 |
| | 05/03/90 | 35.1 | 0.205 | 71.8 |

increase of about 74%. For the four-year study period, the SWE added to the snowpack in March averaged 35% of the total winter period SWEs. Snow surveys in both the Rice Creek watershed and the adjacent Dead Creek watershed (Thorne et al. 1991) show that the snowpack accumulations are evenly distributed in both watersheds. Also it is evident that snowpack densities are nearly identical for the spatially separated snow courses at the time the snow surveys were made. Snowpack densities ranged from 0.161 in 1988 to 0.223 in 1987.

5.1.1 Storm of 1988 June 1

A storm of major proportions, with an estimated return period exceeding 100 a (Hogg and Carr 1985) occurred within the Rice Creek watershed during the evening of 1988 June 1. This storm provided a maximum recorded point rainfall of 128 mm during a 6-h period.

The most intense summer thunderstorms in this area occur along fast-moving, well-defined cold fronts, which displace warm, moist, tropical air masses. The uplifting of warm air by cold fronts commonly produces thunderstorm activity in a band of 10 to 100 km wide along the cold front. Normally cold fronts track northwest to southeast. These storms can occur at any time of the day, but they are larger and more common in the mid- afternoon to evening period. Storm cells formed along a cold front are commonly more numerous and closely packed than cells formed solely by convective instability in the lower atmosphere.

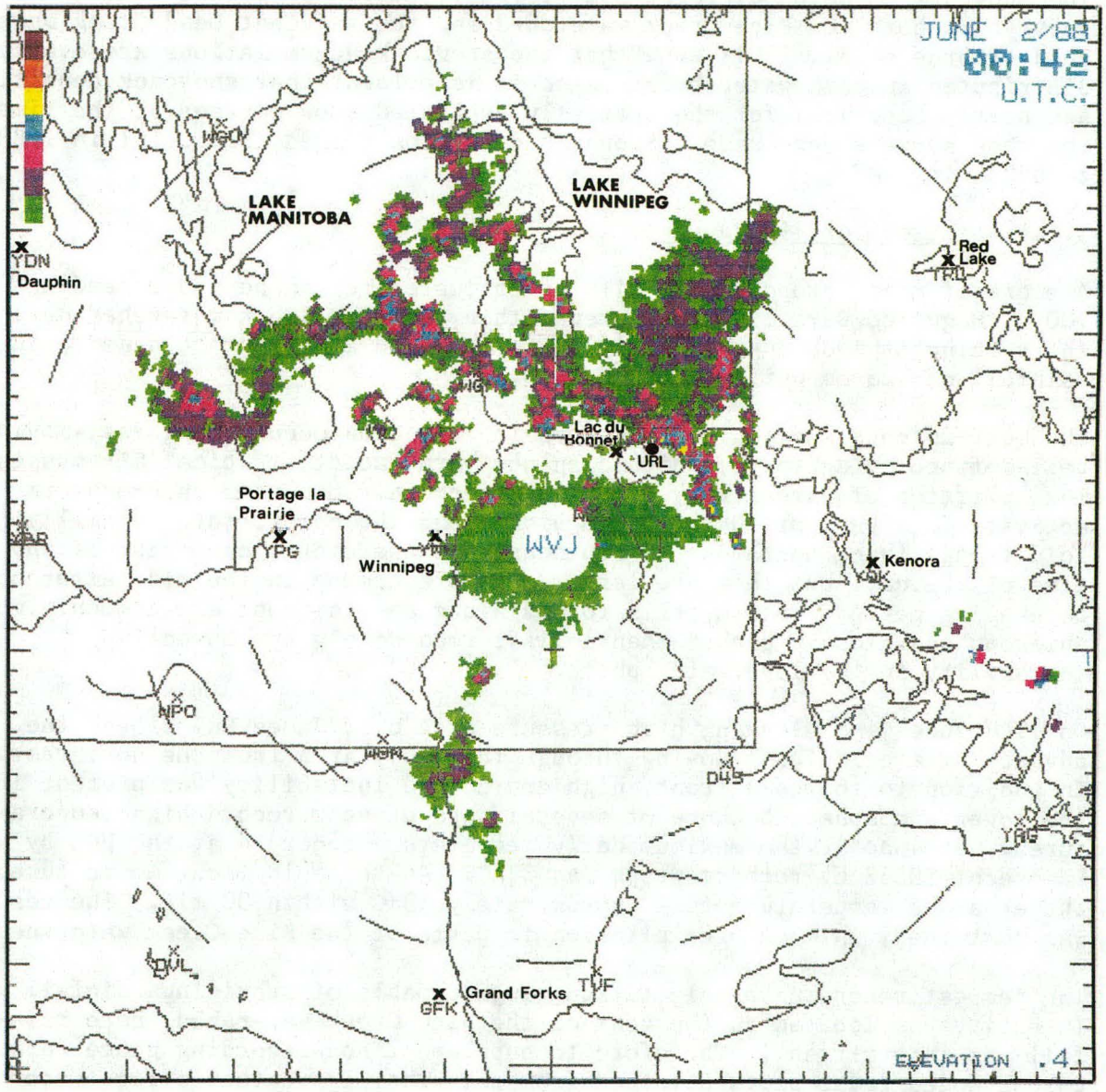
On 1988 June 1, a blocking high-pressure area over James Bay slowed the advance of a cold front moving through the study area from the northwest. In addition to the cold front, high convective instability was present in the lower atmosphere because of several days of near-record high temperatures. On June 1, the maximum daily temperature recorded at the URL by a Lambrecht TH252 hygrothermograph was 33°C. As the cold front moved through the area the temperature fell approximately 13°C within 30 min. The result was sustained, intense precipitation in parts of the Rice Creek watershed.

The nearest recording precipitation gauge capable of providing rainfall intensity was located to the west of the Rice Creek watershed, here rainfall was intermittent. Therefore to supplement non-recording gauge data, colour-coded radar plots obtained from the Winnipeg weather office were used to determine the period and intensity of the storm. The radar station of the Winnipeg weather office, located 75 km southwest of the study area, provided digitized plots from the radar scope at 15-min intervals. Radar plots show rain showers beginning over the study area at 4:30 p.m. By 6:00 p.m. isolated thunderstorms had formed with rainfall intensities of 14 to 39.9 mm/h (Figure 4). Maximum intensities over the basin occurred between 7:00 and 8:00 p.m., when cell tops exceeded 12 000 m, and rainfall intensities were estimated to exceed 70 mm/h for short durations. Radar plots showed clearing of the area by 10:30 p.m..

Four AES type B manual rain gauges were located in the Rice Creek watershed. In addition, rainfall data were obtained from the Provincial Government Natural Resources Office in Lac du Bonnet, Manitoba, the WL climate station and two private observers (Figure 5). The four manual rain gauges in the Rice Creek watershed recorded precipitation amounts ranging from 43

# WEATHER RADAR PLOT OF PRECIPITATION INTENSITY

SOUTHERN MANITOBA JUNE 1, 1988 19:42 CDT




LEGEND:

Precipitation Intensity mm/h

| |
|---|
| >100 |
| 40.0-99.9 |
| 14.0-39.9 |
| 5.0-13.9 |
| 1.5- 4.9 |
| 0.0- 1.4 |

0 50 100 150 km.

SCALE

SOURCE: Atmospheric Environment Service
Winnipeg Weather Office

FIGURE 4: Radar Plot of 1988 June 1 Storm

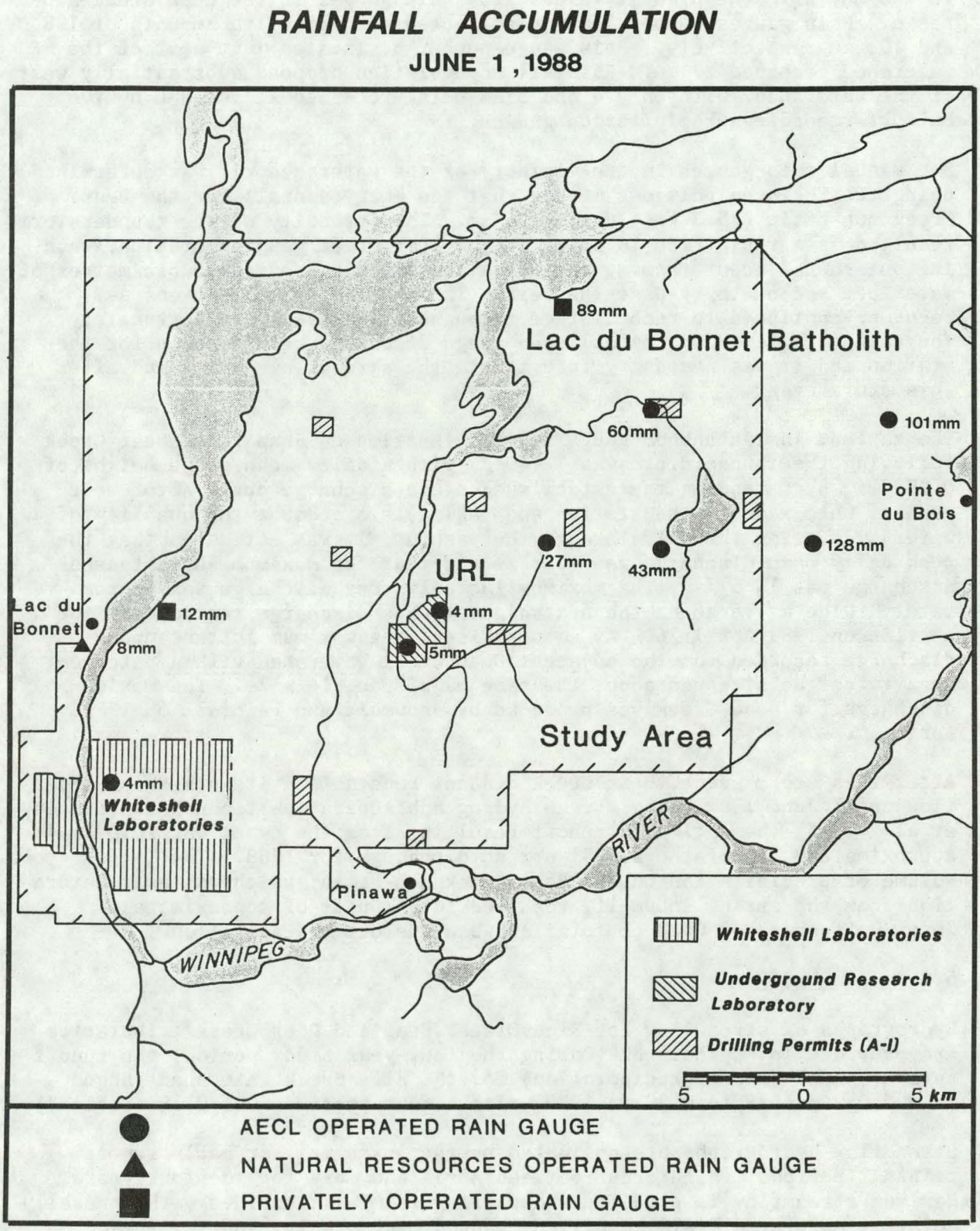



FIGURE 5: Rainfall Accumulations for 1988 June 1

to 128 mm, with the highest values from rain gauges in the Bear Creek sub-basin. Rain gauges number 5 and 8 collected precipitation amounts of 128 and 101 mm respectively. Rain gauge number 6, located just west of the watershed recorded 27 mm. Rainfall accumulation dropped substantially west of the watershed, with only 4 and 5 mm being recorded at the URL by two Belfort recording precipitation gauges.

For manual rain gauges in the vicinity of the watershed, it was determined using the Theissen polygons method that the mean rainfall for the Bear Creek sub-basin (75.3 $km^2$) was 114.6 mm. The intensity of the thunderstorm resulted in a rapid rise in stage at the Bear Creek gauging station, washing out the adjacent tramway road bank and allowing several cubic metres of water per second to by-pass the weir. The float-operated Stevens A-71 recorder continued to record stage throughout the event. Unfortunately, the washout altered the established stage discharge relationship for the station and it was necessary to estimate the streamflow during and after this storm event.

The maximum instantaneous gauge height elevation on June 2 for Bear Creek following the thunderstorm was 1.140 m, with a daily mean gauge height of 0.881 m. By extending the established stage-discharge curve after weir repairs were made at the station and taking into account the quantity of water by-passing the weir through the washout, it was estimated that the peak daily mean discharge was 10 $m^3/s$ and that the maximum instantaneous discharge was 14 $m^3/s$. The maximum instantaneous discharge was approximately twice as large as the next highest peak discharge recorded at the station on 1989 April 26. As a comparison, the maximum instantaneous discharge recorded for the adjacent Dead Creek watershed with a catchment area twice the size was about the same magnitude, 14 $m^3/s$. The maximum discharge for Dead Creek was produced by snowmelt and rainfall on 1986 April 30.

After this storm event, Bear Creek did not reestablish its pre-event base flow until June 13. Using stream hydrograph separation techniques (Linsley et al., 1975) the estimated runoff resulting from the event was 2010 $dam^3$; approximately 24% of the annual stream discharge for 1988. The large volume of precipitation on the Bear Creek sub-basin, which was near saturation from the spring snowmelt, resulted in a runoff of approximately 26 mm/unit area, or 0.23 of total sub-basin storm precipitation.

## 5.2 RUNOFF

Hydrographs of streamflow for Rice Creek, Bear and Deer Creek tributaries are provided in Appendix B. During the four-year study period, the runoff ratio (annual runoff/precipitation) for the Rice Creek watershed ranged from 0.08 in 1988 to 0.28 in 1989, with a four-year mean of 0.18 (Table 3).

Streamflow hydrographs are dominated by the springmelt or early summer rainfall periods, which occur between April and July for the four years. Maximum streamflow is produced when spring rainfall combines with generally moist or saturated field conditions caused by snowmelt. During these periods when evapotranspiration losses are small and surface storage is high, a larger percentage of incoming precipitation is available for

TABLE 3

RICE CREEK WATER BUDGET COMPONENTS

| Station | Year | Annual Flow ($dam^3$) | Drainage Area ($km^2$) | Runoff (mm/unit area) | Precipitation (mm) [1] | Evapotranspiration (mm) | Runoff Ratio |
|---|---|---|---|---|---|---|---|
| Bear Creek | 1987 | 4 250 | 75.3 | 56.4 | 456 | | 0.12 |
| | 1988 | 8 250 | 75.3 | 109.5 | 636 | | 0.17 |
| | 1989 | 11 700 | 75.3 | 154.8 | 595 | | 0.26 |
| | 1990 | 8 940 | 75.3 | 118.7 | 525 | | 0.23 |
| | Mean | 8 285 | | 109.9 | 553 | 443.1 | 0.20 |
| Deer Creek | 1987 | 1 670 | 24.4 | 68.7 | 457 | | 0.15 |
| | 1988 | 1 280 | 24.4 | 52.6 | 509 | | 0.10 |
| | 1989 | 2 650 | 24.4 | 108.8 | 604 | | 0.18 |
| | 1990 | 2 280 | 24.4 | 93.8 | 487 | | 0.19 |
| | Mean | 1 970 | | 81.0 | 514 | 433.0 | 0.16 |
| Rice Creek | 1987 | 9 590 | 154.4 | 62.1 | 461 | | 0.13 |
| | 1988 | 7 780 | 154.4 | 50.4 | 602 | | 0.08 |
| | 1989 | 25 600 | 154.4 | 165.6 | 596 | | 0.28 |
| | 1990 | 19 200 | 154.4 | 124.7 | 516 | | 0.24 |
| | Mean | 15 500 | | 100.7 | 544 | 443.3 | 0.18 |

[1] Precipitation is for the water budget year

runoff. For the four-year period, 72% (1990), 83% (1989), 92% (1988) and 96% (1987) of the total annual watershed yield occurred during a three-month spring period. For 1987, the only significant streamflow of the year was produced from mid-March to mid-June. Well below normal precipitation with an annual total of 461 mm for 1987, compared with long-term normals of 562 mm, were recorded and the dry conditions are reflected by a runoff ratio of 0.08, the lowest of the study period.

Comparison of Deer and Bear Creek hydrographs with the Rice Creek outlet show the regulating effects that lake storage has on streamflow from the watershed. Deer and Bear Creek tributaries discharge into Rice Lake and the Rice Creek hydrometric station is located downstream of Rice Lake. Rice Creek hydrographs have rising and falling limbs that are less steeply inclined than either the Deer or Bear Creek hydrographs, indicating the more sustained flow due to a larger catchment area and storage in Rice Lake. Even with the regulation and storage of Rice Lake, the streamflow hydrographs are dominated by low-flow periods for eight to nine months of the year. Subsequent to the spring melt period, high evapotranspiration during the summer period removes much of the summer rainfall, leaving little surplus for runoff. By late October or early November of most years, any additional precipitation begins to accumulate as snow or ice and does not contribute to runoff until the following spring.

Short periods of no flow were recorded for the watershed in late 1987 and the winter of 1988. Extended dry conditions in 1987 resulted in a depletion of surface water and Rice Lake stage was at its lowest level of the 1987-90 period. Coincident with no flow from the watershed were several months of no flow for the Deer and Bear Creek tributaries. Winter flows for the tributaries and the main outlet channel are dependent on lakes and swamps receiving sufficient fall precipitation to replenish summer evapotranspiration losses and provide a surplus to sustain streamflow during the winter. Without significant fall precipitation, periods of no flow are observed during winter periods for the tributaries or from the watershed.

In contrast to the more sustained flow shown by the Rice Creek hydrograph, the Deer and Bear Creek tributaries are more "flashy." The rising and falling limbs of the hydrograph are steeper, indicating quicker response to snowmelt and storm events. However, while surface water storage appears to have less effect on regulating or sustaining flow in the two tributaries than in Rice Creek, the swamp drainage does supply water for sustaining flow for most, if not all, of the four-year study period.

Surface water storage in both the Bear Creek and Deer Creek sub-basins is affected by beaver activity. Beaver dams have been constructed along the main channels and at the outlets of major swamp areas. Beaver dams constructed along the major streams act as nick points in the stream profile, retaining only small quantities of water in the channel above them. In contrast, large dams at the swamp outlets can retain relatively large volumes.

Beaver dams located in the Bear Creek sub-basin often result in the retention of large volumes of water in the swamps. Winnipeg Hydro has transmission power lines running from hydro-electric dams on the Winnipeg River

through the low-lying regions of the sub-basin, which are subject to flooding. To prevent the destabilizing effect the flooding has on the foundations on which the transmission towers are anchored, Hydro utility crews use explosives to break up major dams, helping to maintain low water levels. The removal of beaver dams and the subsequent release of large volumes of water result in rapid increases in the discharge at the gauging station downstream.

These "beaver peaks" are readily recognized on the annual hydrograph, especially since the beaver dams are most often removed in the period of mid-summer to late fall during natural low-flow conditions. In 1987 the removal of beaver dams on two occasions can be seen as peaks on the Bear Creek hydrograph (Figure 6).

The first of these two events occurred on October 28, and 47 h were required before the pre-event base flow was reestablished. Over this period, a total volume of 11 800 $m^3$ of discharge was measured at the weir, approximately 96%, or 11 280 $m^3$, of this discharge was the result of the dam's removal. The second event occurred on November 10, and 38 h were required before the pre-event discharge was reestablished. Over this period, a total of 34 600 $m^3$ of water discharged through the weir, approximately 34 100 $m^3$, or 99%, of this discharge was computed to have been from beaver dam pondage. Hydrographs of beaver pond water releases are provided in Appendix C.

Although the water released from behind a beaver dam contributes a large portion of the streamflow over a short period, it does not contribute significant volumes on an annual basis. Based on hydrograph analysis, 99% of the total streamflow during this event was water released from beaver dam storage over a 38-h period starting 1987 November 10. During November this release is significant, representing about 64% of the monthly streamflow; however, on an annual basis the quantity of water represents only 0.008% of the total annual streamflow. Because a very large portion of the annual stream discharge is accounted for during spring melt and early summer periods, the water stored and subsequently released from beaver pond storage constitutes only a small portion of the annual sub-basin yield. However, beaver dam pond storage and slow release from seepage over or through the beaver dam assist in sustaining streamflow during dry or winter periods.

## 5.3 GROUNDWATER CONTRIBUTION TO STREAMFLOW

The groundwater contribution to streamflow for the Rice Creek Watershed is of interest as it provides information on the storage and permeability of weathered or fractured bedrock and surficial deposits within the catchment area. In the Rice Creek watershed, hydrograph analysis, water chemistry, field observations and groundwater flow analysis for a piezometric cross-section have been used to evaluate groundwater seepage to stream channels.

The hydrographs show that, subsequent to the spring melt period, there are only occasional major runoff events caused by summer or fall rainstorms.

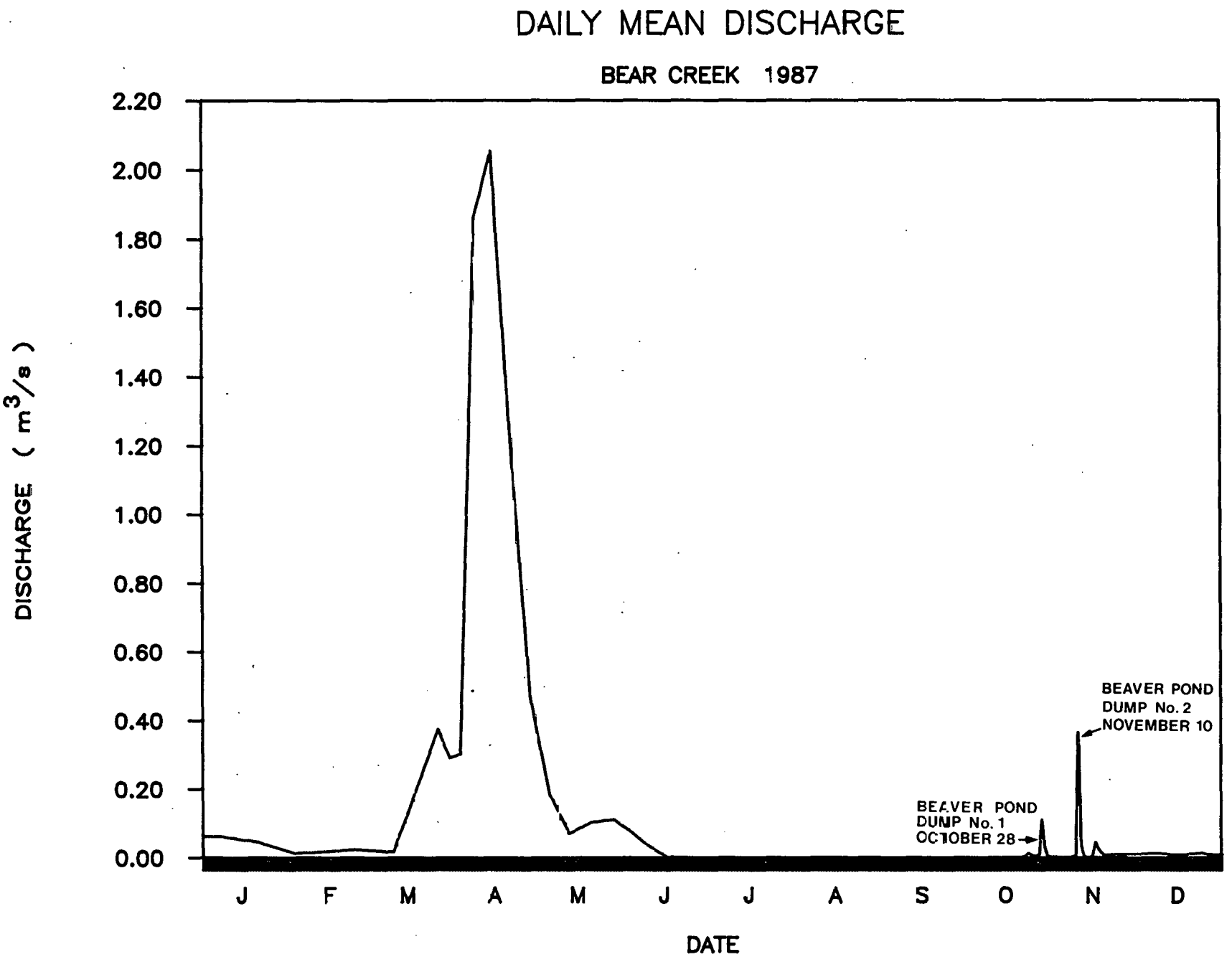



FIGURE 6: Bear Creek Hydrograph for 1987 Showing Beaver Peaks

The low-flow or even no-flow conditions are predominant for eight to nine months of the year. During the summer period, surface and shallow subsurface moisture is used to meet evapotranspiration demand. During this period, there is little excess water available for sustaining streamflow, and, as a consequence, very low or no-flow periods are prevalent within the watershed. Hydrographs of water levels from groundwater monitoring wells within the WRA show that piezometric levels recover to nearly the same elevations during successive years. Most groundwater levels rise in the spring in response to snowmelt and/or rainfall and again in the fall if sufficient precipitation is received prior to freeze-up. Therefore steady-state groundwater seepage from fractured bedrock or thicker overburden deposits should be relatively constant since the gradient, hydraulic head and hydraulic conductivity from recharge to discharge areas are maintained for most of the year. Discharge areas are often local depressions that lose water to evapotranspiration or are drained by intermittent streams. However, major streams serve as cutoffs for both surface drainage and shallow groundwaters (Thorne, 1990). Since streamflow is not sustained following dry periods during the fall, when evapotranspiration is negligible, or during winter periods, it is logical to conclude that seepage to the major channels of the Rice Creek watershed is not significant in comparison to other water budget components.

Additional evaluation of groundwater discharge to the major channels or lakes of the watershed can be made by examining groundwater flow characteristics along piezometric cross sections. Figure 7 is a cross section illustrating the predominate groundwater flow patterns near Rice Lake (location shown in Figure 2). The quantity of groundwater discharged into the lake or toward the water table can be estimated using Darcy's equation, $Q = KiA$, where K is hydraulic conductivity, i is gradient and A is cross-sectional area. The water-table gradient, hydraulic conductivity and cross-sectional area along a segment near Rice Lake have been determined from field investigations (Thorne 1990). The estimated groundwater discharge for a 12 000-$m^2$ segment normal to the piezometric cross section is less than 5 $m^3/a$.

Based on techniques such as hydrograph analysis, groundwater discharge estimates to streams along piezometric cross sections and hydrochemistry data an estimate of groundwater contribution to streamflow can be made. These calculations indicate that steady-state groundwater discharge constitutes less than 2% (2 mm/unit area) of the mean annual runoff from the watershed. Additional discussion on groundwater contribution to streamflow is provided in Section 6.4.

## 5.4 EVAPOTRANSPIRATION

Evapotranspiration is the largest component of the annual water budget for Canadian Shield watersheds of the WRA. Detailed energy balance and water budget techniques have been used to evaluate evapotranspiration for the small (0.42 $km^2$) north access catchment on the URL lease area for the 1986-90 period (Amiro and Thorne 1987, Thorne et al. 1990). These measurements showed that, for overburden-covered areas, a large soil moisture deficit (storage decrease) occurred prior to freeze-up for these years. Spring melt and early summer rainfalls were the dominant recharge events that could replenish depleted soil storage.

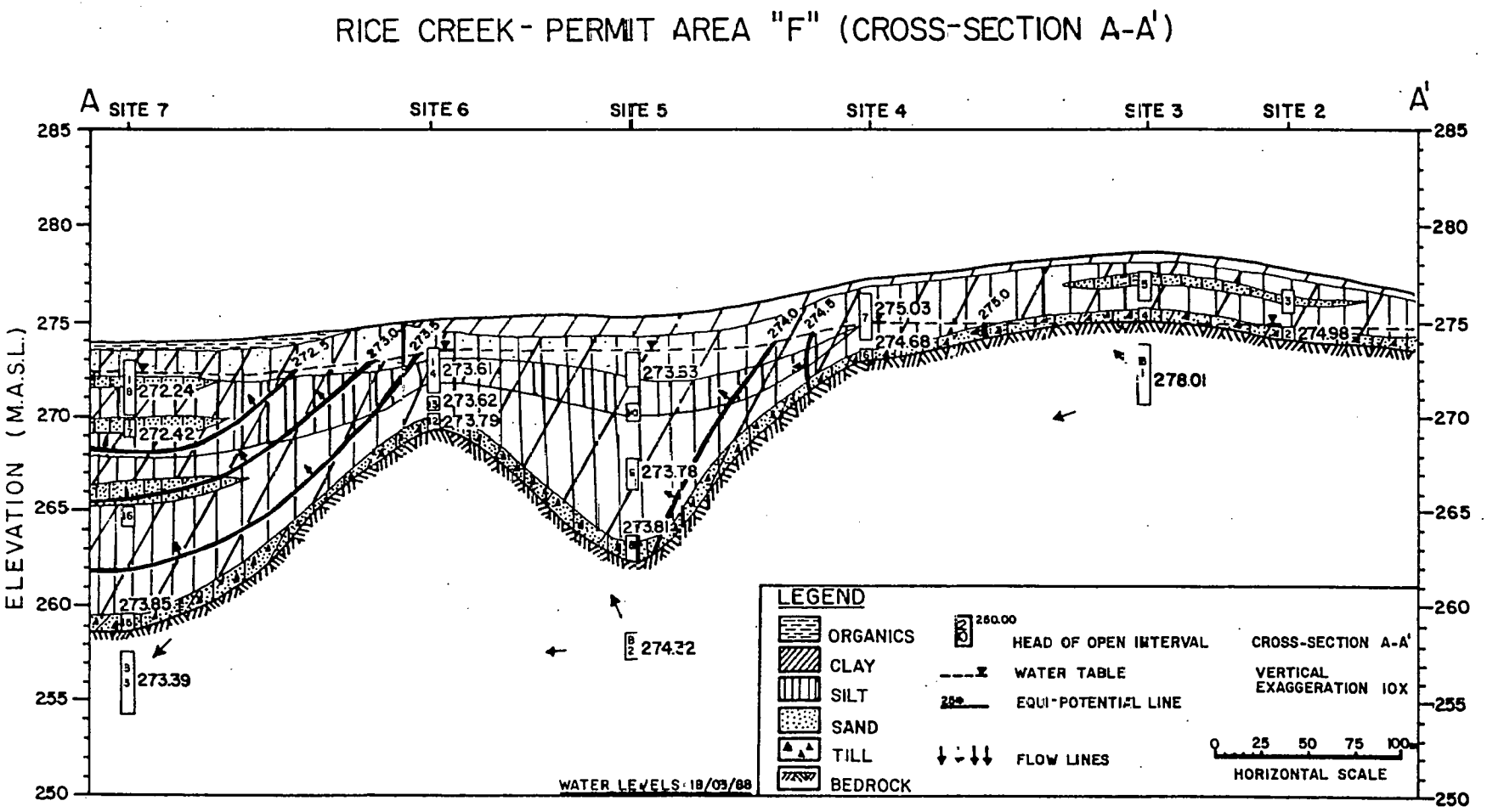



FIGURE 7: Stratigraphy and Groundwater Flow Patterns Along Section A-A', Permit Area F

For larger catchment areas, with a wide variety of storage conditions, geology, vegetation and other hydrologic characteristics, it is difficult to determine annual storage changes. Perhaps the best method for estimating average annual watershed evapotranspiration is to accurately measure, for several years, precipitation and runoff with evapotranspiration taken as the residual. Using these methods for the Rice Creek watershed the average annual evapotranspiration for the 1987-90 period was determined to be 443 mm (Table 3).

## 5.5 RICE LAKE WATER BUDGET - 1987

A monthly and annual water budget can be estimated for Rice Lake by applying measured quantities such as streamflow and precipitation and estimating values for components such as groundwater inflow/outflow and direct runoff. Monthly water budget components for Rice Lake have been evaluated and the largest unmeasureable component next to evaporation is direct runoff to Rice Lake from adjacent low-lying swamp areas. However, for the 1986 October 31 to 1987 October 31 water budget year inflows and outflows for the lake were small other than during the spring melt period. Therefore this period was chosen for estimating lake water budget components as the largest unknown, direct runoff, was small in comparison to components such as lake storage changes and precipitation.

The major components of the Rice Lake water budget are shown in Figure 8, with a description of measured or estimated values provided in Table 4.

### 5.5.1 Precipitation

Total precipitation for the one-year period was 454 mm, consisting of about 126 mm of snow and 328 mm of rain. Snowpack water equivalent was determined from two snow surveys taken 1987 March 4 and an additional 11 mm of SWE (URL precipitation gauge) recorded prior to March 31 was added to the SWE. A network of five rain gauges was installed within the Rice Creek watershed on April 1 and the total input to the watershed was 328 mm for the April-October period. Above-normal precipitation was received during July, when 110 mm of rain was recorded versus the long-term mean of 70 mm. April and September were very dry, with 3.0 and 7.0 mm of precipitation compared with long-term normals of 36.5 and 65.5 mm respectively. Daily precipitation values are provided in Appendix A.

### 5.5.2 Tributary Inflows and Watershed Outflow

The two major tributaries of the Rice Creek watershed are the Deer and Bear Creeks which combined account for 100 $km^2$ of the 150 $km^2$ Rice Creek watershed gauged area. For the 1986-87 lake water budget, the total measured input was 667.5 $dam^3$, with Bear Creek accounting for about 65% and Deer Creek 35% of the inflow. Of the total measured inflow, 531.8 $dam^3$ or 80%, of the total tributary input occurred in 1987 May and another 97.5 $dam^3$ in June, which for the two months accounts for about 94% of the 1986-87 tributary discharge into Rice Lake. The dry summer of 1987, combined with the high evapotranspiration losses of July to September, resulted in only small inflows to Rice Lake following the spring melt. Similarly, inflows and outflows during the winter of 1986 and 1987 were even smaller and are not included in the water budget.

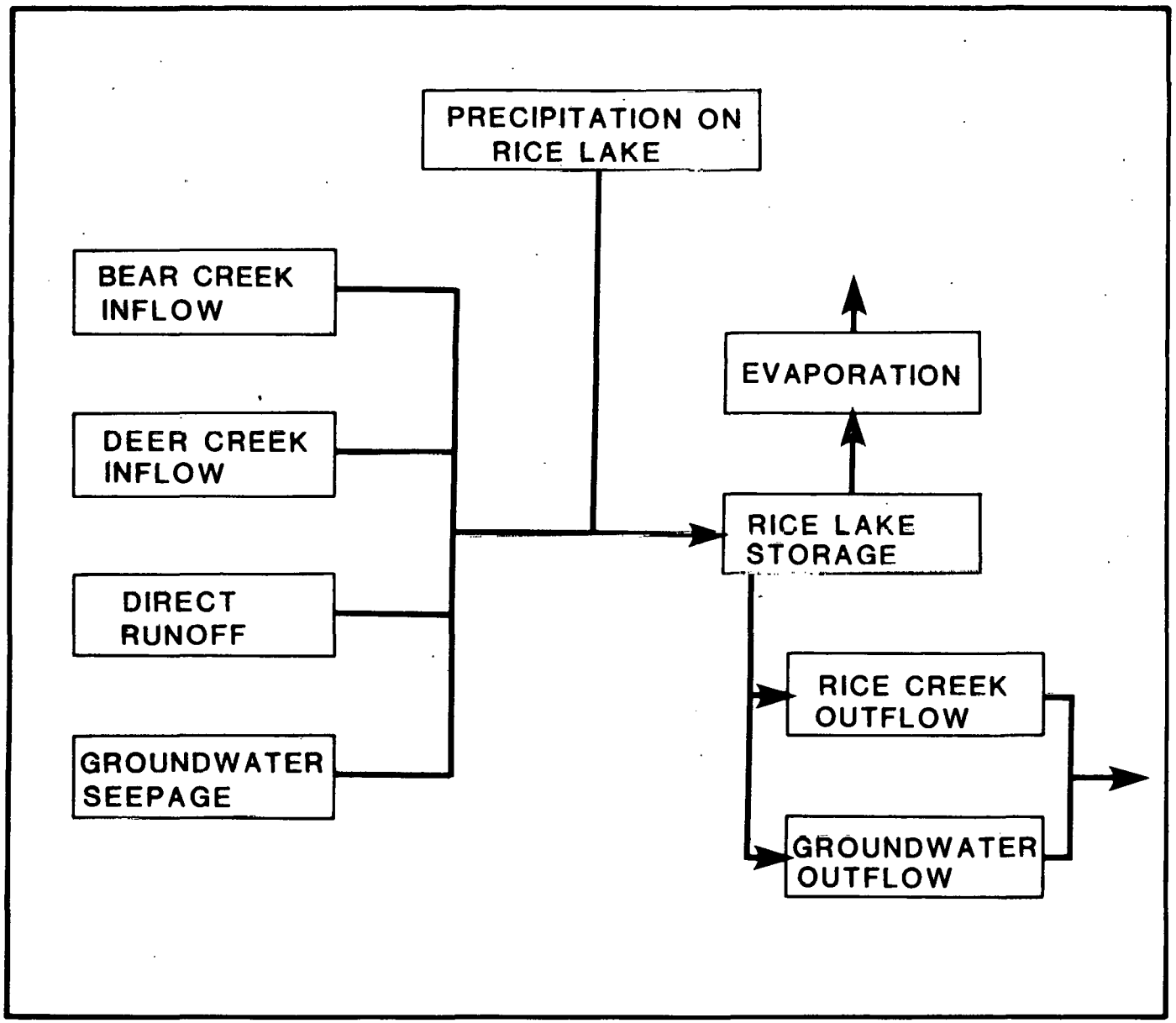



FIGURE 8: Components of the Rice Lake Water Budget

TABLE 4

MONTHLY RICE LAKE WATER BUDGET COMPONENTS

| Month | Inputs | | | | Outputs | | |
|---|---|---|---|---|---|---|---|
| | Change in Surface Storage[1] ($dam^3$) | Precipitation[2] ($dam^3$) | Runoff Inflow[3] ($dam^3$) | Direct Inflow[4] ($dam^3$) | Runoff[5] ($dam^3$) | Evapotranspiration[6] ($dam^3$) | (mm) |
| April | +3386.6 | - | - | - | - | | - |
| May | -1935.2 | 285.0 | 531.8 | 367.8 | 2732.7 | 387.0 | 64.5 |
| June | -678.5 | 331.6 | 97.5 | 79.4 | 274.7 | 912.6 | 152.1 |
| July | -88.5 | 650.2 | 8.1 | 16.0 | 14.1 | 748.8 | 124.8 |
| August | -206.5 | 392.9 | 6.4 | 10.8 | 8.8 | 619.8 | 103.3 |
| September | -377.6 | 30.1 | 2.4 | 4.8 | 1.2 | 414.0 | 69.0 |
| October | +11.8 | 181.7 | 21.3 | 6.6 | 1.8 | 192.2 | 32.7 |
| Total | +112.1 | 1871.5 | 667.5 | 485.4 | 3033.3 | 3278.4 | 544.4 |

(1) Storage for Rice Lake (6.0 $km^2$)
(2) Monthly precipitation on Rice Lake
(3) Total runoff inflow to Rice Lake from Deer and Bear Creek tributaries
(4) Direct inflow is for ungauged area contribution to Rice Lake and Rice Creek
(5) Runoff is outflow at watershed outlet
(6) Evapotranspiration is the residual of the water budget equation ($dam^3$ or mm/unit lake area)

### 5.5.3 Direct Runoff

Direct runoff is the ungauged runoff contribution to Rice Lake that occurs as overland flow, transient groundwater flow through organic deposits or in small channels that drain poorly drained areas. In the Rice Creek watershed above the lake outlet, this contributing area is about 25 $km^2$. Another 25 $km^2$, which is ungaugeable, lies below the lake outlet and does not contribute runoff to Rice Lake. However, direct runoff for ungauged areas can be estimated from adjacent gauged streams, which have catchment areas with similar geomorphological and hydrological characteristics (WMO-1983).

Deer Creek inflows were assumed representative of direct inflows for ungauged areas and a proportional discharge/area volume of 485.4 $dam^3$ were estimated as total direct inflow to Rice Lake and the area downstream of the lake outlet for the 1986-87 water budget year.

### 5.5.4 Groundwater Inflow and Outflow

Hydrogeological study of unconsolidated deposits and shallow bedrock on permit area F of the Rice Creek watershed (Thorne 1990) show that groundwater flow into and out of Rice Lake is probably a very small component of the Rice Lake budget. Low gradients and low permeabilities adjacent to the lake indicate that "steady-state" groundwater inflow or outflow are insignificant when compared with other water budget components.

### 5.5.5 Storage

Probably the best indicator of the quantity of surface storage in the Rice Lake watershed is the stage of Rice Lake. This shallow lake is by far the dominant storage area (6.0 $km^2$) of the catchment, with two major tributaries contributing inflow and Rice Creek the outflow channel. For 1986 October to 1987 October, the annual lake stage range was from a low in each October of 272.93 m a.m.s.l. to highs of 273.68 m a.m.s.l. in 1987 April. The highest levels corresponding to the snowmelt period and the lows to extended dry autumn periods. Lake-stage hydrographs are provided in Appendix B. Since the lake stage at the beginning and end of the water budget year was nearly identical, the lake storage change was negligible. Similarly storage gains or losses in other parts of the watershed were probably small.

### 5.5.6 Evapotranspiration

Inflows and outflows for Rice Lake were small for much of the high-evapotranspiration period of June-September. Therefore during this period precipitation into the lake was the main input and storage loss to evapotranspiration the principle output. Evapotranspiration is the residual term of the monthly water budget for Rice Lake. For 1987, the May to October lake evapotranspiration based on these water budget measurements was 544 mm. This value is in good agreement with mean annual lake evaporation estimates of about 600 mm for this area as provided by Fisheries and Environment Canada (1978).

# 6. WATER CHEMISTRY

## 6.1 PRECIPITATION WATER CHEMISTRY

Table 5 is a summary of hydrochemical analysis and ion balance data of precipitation samples collected by the Province of Manitoba at Pointe du Bois, Manitoba, during 1987 January to December period. The unpublished data were collected as part of a federally sponsored Canadian network for the sampling of precipitation (CANSAP). The precipitation collection station was located about 2 km east of the Bear Creek drainage boundary and would therefore provide a representative sampling of precipitation chemistry for the Rice Creek watershed. In 1987, 51 precipitation events, including both snow and rainfall events, that met the volumetric requirements were analyzed for major chemical constituents.

The mean concentrations of the 51 precipitation samples analyzed for major ions are generally very low. Mean concentrations are highest for sulphate at 1.09 mg/L to a low of 0.085 mg/L for magnesium. For 1987 the order of dominance is $SO_4$ > Ca > Cl > $NH_3$ > K > Na > $NO_3$ > Mg. Some anomalous high concentrations are evident for some of the precipitation samples. For example, the sample of 1987 October 5 has concentrations for major cations and anions of up to 20 times greater than samples collected a few days earlier or later. This may be due to atmospheric suspension of particulate from cultivated farm fields, which is removed by the subsequent precipitation event. Very strong winds with gusts up to 80 km/h were recorded on 1987 October 1 by the Winnipeg Weather Office. Similarly, the Whiteshell meteorological station recorded winds that averaged 63 km/h on this day. Visibility was also reduced because of smoke from farm stubble fires and blowing dust. However, the two anomalous concentrations do not significantly affect the mean values and for comparison of water chemistry from different sources, i.e., atmosphere, surface waters and groundwaters, the mean precipitation concentrations are much lower and are representative of precipitation chemical constituents.

## 6.2 GROUNDWATER CHEMISTRY

Table 6 summarizes results of major ion analyses and lists the charge balance of groundwaters collected in 1991 February at Permit Area F within the Rice Creed watershed. Two samples RCB-2-1 and RCB-3-1 are from monitoring intervals within the bedrock and the remainder are groundwaters collected from the various stratigraphic units of this study area. The shallow bedrock groundwater is bicarbonate-rich with concentrations of about 265 mg/L. Sodium and Ca are the dominant cations, with average concentrations of 60 mg/L and 30 mg/L respectively. The TDS for the bedrock samples are near 400 mg/L, which is higher than three of the samples collected from the overburden. While somewhat more dilute than some overburden samples, the similar compositions and concentrations indicate that the shallow bedrock is an integral part of the shallow groundwater flow system.

The overburden groundwaters are also bicarbonate-rich, with $HCO_3^-$ concentrations of 208 to 870 mg/L. The mean $HCO_3^-$ concentration for the two bedrock and eleven overburden samples is 371 mg/L. Next to bicarbonate,

## TABLE 5

## PRECIPITATION HYDROCHEMICAL DATA FOR POINTE DU BOIS - 1987

| Collection Date | Na (mg/L) | K (mg/L) | Ca (mg/L) | Mg (mg/L) | Cl (mg/L) | $NO_3$ (mg/L) | $SO_4$ (mg/L) | Alka. (mg/L) | pH | Cond. (µS/m) | Ammonia | H+ | Ion Bal. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 Jan | 0.05 | 0.02 | 0.49 | 0.030 | 0.10 | 0.51 | 1.10 | * | 5.46 | 9.28 | 0.405 | 3.44 | 0.05 |
| 16 Feb | 0.02 | 0.02 | 0.32 | 0.025 | 0.05 | 0.21 | 0.20 | * | 5.50 | 4.28 | 0.034 | 3.14 | 9.73 |
| 25 Feb | 0.08 | 0.07 | 0.57 | 0.070 | 0.15 | 0.42 | 0.20 | <1.00 | 6.05 | 10.40 | 0.345 | 0.88 | -16.86 |
| 27 Feb | 0.08 | 0.08 | 0.46 | 0.045 | 0.15 | 0.82 | 2.50 | * | 4.71 | 22.80 | 0.990 | 19.34 | 3.21 |
| 01 Mar | 0.02 | 0.01 | 0.16 | 0.015 | 0.10 | 0.10 | <0.20 | * | 5.40 | 2.92 | 0.024 | 3.95 | -14.19 |
| 27 Mar | 0.07 | 0.05 | 0.49 | 0.025 | 0.10 | 0.66 | 4.00 | * | 4.51 | 28.10 | 0.970 | 30.66 | 1.90 |
| 28 Mar | 0.08 | 0.05 | 0.51 | 0.030 | <0.10 | 0.31 | 1.40 | * | 4.76 | 13.70 | 0.140 | 17.24 | 5.16 |
| 01 Apr | 0.05 | 0.05 | 0.27 | 0.030 | <0.10 | 0.15 | 0.30 | * | 5.72 | 4.68 | 0.125 | 1.89 | 20.94 |
| 13 Apr | 0.07 | 0.06 | 1.15 | 0.330 | 0.10 | 0.73 | 3.05 | * | 6.56 | 21.30 | 1.000 | 0.27 | 15.25 |
| 17 Apr | 0.07 | 0.08 | 0.73 | 0.100 | <0.10 | 0.16 | 0.70 | * | 6.64 | 7.57 | 0.385 | 0.23 | * |
| 26 Apr | 0.41 | 0.43 | 2.78 | 0.500 | 0.55 | 1.58 | 4.80 | * | * | 50.50 | 2.380 | * | * |
| 13 May | 0.15 | 0.17 | 0.61 | 0.120 | <0.10 | 0.17 | 0.90 | 2.00 | 6.45 | 8.51 | 0.305 | 0.35 | -0.75 |
| 17 May | 0.03 | 0.04 | 0.46 | 0.060 | <0.10 | 0.13 | 0.20 | 1.00 | 6.10 | 4.29 | 0.028 | 0.79 | 2.70 |
| 21 May | 0.04 | 0.02 | 0.12 | 0.015 | <0.10 | 0.08 | 0.20 | * | 5.31 | 3.77 | 0.085 | 4.86 | 28.83 |
| 02 Jun | * | * | * | * | 0.20 | 0.21 | 0.60 | * | 6.58 | 12.20 | 0.420 | 0.26 | * |
| 03 Jun | 0.16 | 0.12 | 0.61 | 0.075 | 0.25 | 0.05 | 0.50 | 2.00 | 6.45 | 5.90 | 0.054 | 0.35 | 9.08 |
| 04 Jun | * | * | 1.53 | 0.265 | 0.30 | 0.36 | 1.10 | * | 6.67 | 15.40 | 0.260 | 0.21 | * |
| 06 Jun | 0.26 | 0.26 | 1.25 | 0.345 | 0.55 | 0.85 | 1.90 | 2.67 | 6.55 | 24.10 | 0.930 | 0.28 | -1.91 |
| 11 Jun | 0.04 | 0.05 | 0.13 | 0.020 | 0.10 | 0.06 | 0.50 | * | 5.42 | 3.15 | 0.025 | 3.77 | 2.30 |
| 22 Jun | 0.03 | 0.04 | 0.12 | 0.015 | <0.10 | 0.16 | 1.40 | * | 4.70 | 11.10 | 0.215 | 19.79 | 3.20 |
| 25 Jun | * | 2.80 | * | * | * | 0.52 | * | * | 7.49 | 78.00 | 1.250 | 0.03 | * |
| 26 Jun | * | 1.50 | 0.92 | 0.100 | * | 0.08 | * | 4.00 | 6.85 | 21.60 | 0.585 | 0.14 | * |
| 02 Jul | 0.05 | 0.06 | 0.20 | 0.030 | 0.10 | 0.17 | 0.80 | 1.33 | 5.75 | 6.34 | 0.365 | 1.76 | 13.96 |
| 06 Jul | * | * | * | * | 1.50 | 0.24 | 0.50 | * | 6.39 | 14.10 | 0.260 | 0.40 | * |
| 07 Jul | 0.07 | 0.05 | 0.17 | 0.030 | 0.10 | 0.14 | 0.50 | * | 5.53 | 4.70 | 0.195 | 2.93 | 16.16 |
| 10 Jul | 1.33 | 0.57 | 0.45 | 0.070 | * | 0.24 | 0.80 | 2.67 | 6.50 | 10.30 | 0.285 | 0.31 | 16.46 |
| 12 Jul | 0.08 | 0.05 | 0.12 | 0.005 | 0.10 | 0.03 | 0.20 | 1.33 | 5.70 | 2.34 | 0.008 | 1.98 | 44.66 |
| 14 Jul | 0.17 | 0.26 | 0.37 | 0.025 | 0.25 | 0.02 | 0.40 | * | 6.67 | 8.92 | 0.610 | 0.21 | 64.71 |
| 19 Jul | 0.58 | 0.71 | 0.43 | 0.045 | 0.80 | 0.13 | 0.50 | 1.33 | 6.38 | 11.50 | 0.225 | 0.41 | 10.47 |
| 20 Jul | 0.08 | 0.09 | 0.15 | 0.010 | 0.15 | 0.07 | 0.30 | * | 5.65 | 3.72 | 0.105 | 2.22 | 21.28 |
| 22 Jul | 0.06 | 0.04 | 0.13 | 0.015 | 0.10 | 0.17 | 0.85 | * | 4.80 | 8.90 | 0.165 | 15.72 | 8.74 |
| 01 Aug | 0.08 | 0.09 | 0.26 | 0.035 | 0.20 | 0.26 | 0.85 | 1.33 | 5.75 | 6.50 | 0.345 | 1.76 | 6.90 |
| 06 Aug | 0.12 | 0.20 | 0.60 | 0.135 | 0.30 | 0.28 | 1.10 | 2.67 | 6.45 | 11.20 | 0.590 | 0.35 | 5.36 |
| 11 Aug | 0.02 | 0.06 | 0.47 | 0.100 | 0.10 | 0.14 | 0.50 | 1.33 | 6.25 | 4.99 | 0.115 | 0.54 | 8.08 |
| 12 Aug | 0.02 | 0.04 | 0.29 | 0.035 | 0.10 | 0.31 | 0.80 | <1.00 | 6.10 | 7.44 | 0.465 | 0.79 | 2.67 |
| 13 Aug | 0.04 | 0.04 | 0.37 | 0.020 | 0.10 | 0.02 | 0.70 | * | 6.40 | 3.60 | 0.030 | 3.95 | 21.27 |
| 17 Aug | 0.46 | 0.37 | 0.45 | 0.075 | 0.70 | 0.08 | 0.35 | 2.66 | 6.45 | 8.91 | 0.285 | 0.35 | 4.34 |
| 19 Aug | 0.03 | 0.03 | 0.45 | 0.040 | 0.10 | 0.06 | 0.50 | * | * | 4.26 | 0.062 | * | * |
| 23 Aug | 0.16 | 0.13 | 0.53 | 0.120 | 0.25 | 0.15 | 0.80 | <1.00 | 6.25 | 7.08 | 0.145 | 0.56 | 24.09 |
| 31 Aug | 0.47 | 0.26 | 0.34 | 0.030 | 0.65 | 0.03 | 0.40 | * | * | 5.66 | 0.006 | * | * |
| 13 Sep | 0.08 | 0.07 | 0.22 | 0.010 | 0.15 | 0.02 | <0.20 | 1.33 | 5.80 | 2.33 | 0.002 | 1.57 | 33.54 |
| 01 Oct | 1.90 | 1.70 | 1.05 | 0.120 | 2.85 | 0.31 | 0.80 | * | 6.77 | 24.90 | 0.245 | 0.17 | 26.75 |
| 02 Oct | 0.55 | 0.56 | 0.87 | 0.285 | 0.85 | <0.01 | 1.30 | * | 6.60 | 11.90 | 0.003 | 0.25 | 34.24 |
| 05 Oct | 3.95 | 2.70 | 1.53 | 0.260 | 5.55 | 0.31 | 4.00 | * | 6.77 | 47.60 | 0.435 | 0.12 | 17.12 |
| 07 Oct | 0.18 | 0.07 | 0.39 | 0.025 | * | 0.02 | * | * | 5.96 | 4.50 | 0.009 | 1.09 | 0.00 |
| 09 Oct | 0.05 | 0.04 | 0.41 | 0.085 | 0.15 | 0.22 | 0.85 | 1.33 | 6.25 | 7.51 | 0.375 | 0.56 | 5.63 |
| 18 Oct | 0.14 | 0.17 | 0.61 | 0.110 | 0.25 | 0.51 | 2.20 | 4.00 | 6.50 | 19.00 | 1.500 | 0.31 | 23.59 |
| 23 Oct | 0.07 | 0.04 | 0.42 | 0.030 | * | 0.17 | 0.60 | * | 6.27 | 6.30 | * | 0.58 | 6.51 |
| 16 Nov | 0.09 | 0.12 | 0.23 | 0.020 | 0.15 | 0.68 | 2.35 | * | 4.56 | 22.30 | 0.850 | 27.32 | 3.15 |
| 09 Dec | 0.76 | 0.48 | 0.67 | 0.065 | 1.10 | 0.76 | 2.40 | * | 5.93 | 19.90 | 0.775 | 1.17 | 2.02 |
| 11 Dec | 0.30 | 0.15 | 0.34 | 0.045 | 0.30 | 0.23 | 1.10 | <1.00 | 5.85 | 6.96 | 0.180 | 1.40 | 6.76 |
| Minimum | 0.02 | 0.01 | 0.12 | 0.005 | 0.05 | 0.01 | 0.20 | 1.00 | 4.51 | 2.33 | 0.002 | 0.03 | |
| Maximum | 3.85 | 2.80 | 2.78 | 0.500 | 5.55 | 1.58 | 4.80 | 4.00 | 7.49 | 73.00 | 2.380 | 30.66 | |
| Mean | 0.29 | 0.31 | 0.55 | 0.085 | 0.44 | 0.27 | 1.09 | 1.85 | 5.98 | 12.98 | 0.392 | 3.76 | |
| Wl.Mean | 0.15 | 0.14 | 0.37 | 0.062 | 0.28 | 0.23 | 0.92 | 1.67 | 5.71 | 9.43 | 0.320 | 5.29 | |
| S.D. | 0.64 | 0.61 | 0.47 | 0.103 | 0.89 | 0.29 | 1.06 | 0.93 | 0.67 | 13.14 | 0.450 | 7.14 | |

## TABLE 6

## GROUNDWATER CHEMISTRY FOR SHALLOW BEDROCK AND OVERBURDEN AT PERMIT AREA F

| Sample Name | Date | Time | Na (mg/L) | K (mg/L) | Ca (mg/L) | Mg (mg/L) | Cl (mg/L) | $NO_3$ (mg/L) | $SO_4$ (mg/L) | $HCO_3$ (mg/L) | pH | TDS (mg/L) | Charge Balance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RCB-2-1 | 20-Feb-91 | 13:00 | 57.30 | 5.00 | 36.20 | 8.92 | 9.98 | <0.05 | 16.0 | 260.0 | 7.80 | 393.49 | 2.85% |
| RCB-3-1 | 20-Feb-91 | 14:00 | 63.90 | 7.70 | 23.10 | 10.70 | 2.18 | <0.01 | 23.0 | 267.0 | 7.74 | 397.65 | 0.94% |
| RC-6-1 | 20-Feb-91 | 16:00 | 41.20 | 6.40 | 58.00 | < 0.01 | 1.87 | <0.01 | 23.0 | 870.0 | 7.47 | 1000.47 | -50.63% |
| RC-8-1 | 20-Feb-91 | 11:30 | 113.70 | 2.57 | 49.00 | 13.30 | 2.15 | <0.01 | 85.2 | 392.0 | 7.51 | 657.89 | 1.72% |
| RC-9-1 | 20-Feb-91 | 11:00 | 79.10 | 9.03 | 65.00 | 21.10 | 8.56 | 0.09 | 90.0 | 392.0 | 7.58 | 664.80 | 0.63% |
| RC-10-1 | 20-Feb-91 | 12:00 | 25.30 | 3.36 | 52.00 | 13.40 | 2.38 | 0.12 | 13.4 | 278.0 | 7.68 | 387.86 | -0.20% |
| RC-11-1 | 20-Feb-91 | 11:45 | 132.20 | 3.23 | 41.00 | 14.80 | 2.50 | - | 63.9 | 380.0 | 7.92 | 637.59 | 8.76% |
| RC-12-1 | 20-Feb-91 | 13:15 | 17.80 | 2.34 | 63.00 | 16.90 | 1.59 | <0.05 | 5.0 | 208.0 | 7.76 | 315.94 | 20.71% |
| RC-13-1 | 20-Feb-91 | 13:45 | 87.50 | 10.44 | 47.00 | 14.40 | 10.16 | 0.06 | 132.0 | 315.0 | 7.89 | 617.22 | -3.62% |
| RC-14-1 | 20-Feb-91 | 13:30 | 17.60 | 1.35 | 52.00 | 17.90 | 1.48 | <0.02 | 30.8 | 267.0 | 7.71 | 391.06 | -0.87% |
| RC-15-1 | 20-Feb-91 | 14:50 | 63.50 | 7.36 | 76.00 | 21.60 | 7.82 | <0.05 | 20.8 | 378.0 | 8.45 | 575.10 | 10.86% |
| RC-16-1 | 20-Feb-91 | 15:10 | 67.10 | 3.14 | 131.00 | 36.10 | 3.11 | 0.16 | 75.6 | 402.0 | 7.57 | 718.15 | 20.50% |
| RC-17-1 | 20-Feb-91 | 15:00 | 59.90 | 7.41 | 115.00 | 38.10 | 5.85 | <0.02 | 69.3 | 412.0 | 7.69 | 713.36 | 17.36% |
| RC-18-1 | 20-Feb-91 | 15:30 | 62.10 | 3.23 | 181.00 | 64.70 | 2.30 | <0.01 | 316.0 | - | 7.28 | 632.58 | 44.38% |
| Minimum | | | 17.60 | 1.35 | 23.10 | <0.01 | 1.48 | - | 5.0 | 208.0 | 7.28 | 315.94 | - |
| Maximum | | | 132.20 | 10.44 | 181.00 | 64.70 | 10.16 | - | 316.0 | 870.0 | 8.45 | 1000.47 | - |
| Mean | | | 63.44 | 5.18 | 70.66 | 20.85 | 4.42 | - | 68.9 | 370.8 | 7.72 | 578.80 | - |
| S.D. | | | 31.93 | 2.73 | 41.50 | 15.47 | 3.18 | - | 77.3 | 158.1 | 0.26 | 178.24 | - |

the groundwaters are Ca-, $SO_4$-, Na- and Mg-rich in order of importance. In terms of mean concentrations for 14 samples, the Ca, $SO_4$ and Na concentrations are relatively equal with some switching of the dominant ions.

The predominantly $HCO_3^-$- and $SO_4$-rich groundwaters of this study area are consistent with groundwater from sediments of the URL lease area. However, the URL lease area groundwaters have higher TDS concentrations than the samples collected from Permit Area F. $SO_4$ concentrations are as high as 4500 mg/L for some samples collected from URL lease area clays and the TDS concentrations are as high as 7060 mg/L (Betcher 1983).

## 6.3 SURFACE WATER CHEMISTRY

Table 7 is a summary of hydrochemical data for surface water samples collected at the Deer, Bear, and Rice Creek gauging stations and the Rice Lake stage monitoring location for the 1987-90 period. Total number of samples collected and analyzed ranged from 78 for Rice Lake to 162 for Bear Creek. The mean ion charge balance for these surface water samples are 42% for Bear Creek, 37% for Deer and Rice Lake and 35% for Rice Creek. The ion charge balance is an indicator of the accuracy of the water analysis data (Freeze and Cherry, 1979). Generally the ion balance error of the surface water is much larger than for groundwaters (Table 6) and can be attributed to analytical error and the presence of ion species that are not included in the analysis (e.g. metals sorbed on organic molecules). However, despite the poor charge balances for the most dilute waters, the water chemistry data are useful for comparison purposes because of the large differences in ion concentration between precipitation, surface waters and groundwaters. A complete listing of hydrochemistry data is provided in Appendix D.

### 6.3.1 Deer Creek

The dominant anion is bicarbonate, with a mean concentration of 33.2 mg/L and minimum and maximum values of 4.0 mg/L and 101 mg/L respectively. Laboratory-measured pHs ranged from 5.8 to 7.7 with a mean of 6.8. Conductivity, also measured in the laboratory, ranged from 2.4 to 21.9 mS/m with a mean of 3.5 mS/m. Compared with $HCO_3$ content, the $SO_4$, Cl and $NO_3$ are present in relatively minor concentration of about 1 mg/L. The bicarbonate-rich groundwater is consistent with the carbonate silt nodules, carbonate fragments, and carbonate coating of fractures evident in core samples of unconsolidated sediments from boreholes of permit area F.

The Cl concentration is low but generally stable, with most samples having concentrations of between 0.50 and 2.50 mg/L. Of the major anions, $NO_3$ is least abundant with concentrations most often less than 0.20 mg/L.

For the cations, Ca is predominant, with a mean concentration of 12.2 mg/L and a range from 3.30 to 23.1 mg/L. The mean concentrations of other cations for 126-128 samples collected at the Deer Creek gauging station are Mg (5.63), Na (2.76) and K (1.65) mg/L.

TABLE 7

SUMMARY OF HYDROCHEMICAL DATA FOR SURFACE WATERS AT RICE CREEK WATERSHED

| Chemical Analysis | | Na (mg/L) | K (mg/L) | Ca (mg/L) | Mg (mg/L) | Cl (mg/L) | $NO_3$ (mg/L) | $SO_4$ (mg/L) | Alka. (mg/L) | pH | Cond. (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Deep Creek | Minimum | 0.91 | 0.34 | 3.30 | 1.75 | 0.24 | <0.16 | <0.10 | 4.0 | 5.8 | 2.4 |
| | Maximum | 6.48 | 6.00 | 28.10 | 12.10 | 10.50 | 1.86 | 4.86 | 101.0 | 7.7 | 21.9 |
| | Mean | 2.76 | 1.65 | 12.24 | 5.63 | 1.20 | 0.27 | 1.27 | 33.2 | 6.8 | 8.7 |
| | S.D. | 1.18 | 1.06 | 5.05 | 2.31 | 1.07 | 0.30 | 1.06 | 20.8 | 0.4 | 3.5 |
| | Samples | 126 | 126 | 128 | 127 | 126 | 126 | 126 | 125 | 126 | 125 |
| Bear Creek | Minimum | 0.52 | 0.16 | 1.24 | 0.44 | 0.32 | <0.16 | <0.10 | 3.5 | 5.4 | 1.0 |
| | Maximum | 4.63 | 4.68 | 36.00 | 9.00 | 14.50 | 3.23 | 3.69 | 60.0 | 7.4 | 14.9 |
| | Mean | 2.18 | 1.27 | 7.36 | 3.27 | 1.84 | 0.28 | 1.03 | 15.9 | 6.4 | 5.8 |
| | S.D. | 0.70 | 0.75 | 3.56 | 1.36 | 1.58 | 0.32 | 0.78 | 10.9 | 0.5 | 2.8 |
| | Samples | 161 | 161 | 161 | 161 | 162 | 162 | 162 | 161 | 162 | 162 |
| Rice Creek | Minimum | 0.68 | 0.38 | 2.94 | 1.13 | 0.29 | <0.16 | 0.31 | 7.0 | 5.7 | 2.1 |
| | Maximum | 7.92 | 5.63 | 33.00 | 15.80 | 38.00 | 2.81 | 7.34 | 130.0 | 7.6 | 30.3 |
| | Mean | 2.72 | 1.59 | 11.40 | 5.44 | 2.55 | 0.35 | 1.55 | 31.3 | 6.8 | 9.0 |
| | S.D. | 1.32 | 0.84 | 6.03 | 2.76 | 3.63 | 0.40 | 1.13 | 28.1 | 0.4 | 5.3 |
| | Samples | 154 | 154 | 154 | 154 | 152 | 152 | 152 | 151 | 152 | 152 |
| Rice Lake | Minimum | 1.01 | 0.21 | 3.60 | 1.56 | 0.43 | <0.16 | 0.21 | 9.0 | 6.0 | 3.2 |
| | Maximum | 5.97 | 4.91 | 21.10 | 8.90 | 4.20 | 2.38 | 3.53 | 68.8 | 7.4 | 16.0 |
| | Mean | 2.37 | 1.41 | 7.81 | 3.61 | 1.21 | 0.21 | 1.33 | 19.6 | 6.7 | 6.2 |
| | S.D. | 0.95 | 0.81 | 2.65 | 1.25 | 0.61 | 0.26 | 0.51 | 9.6 | 0.3 | 2.0 |
| | Samples | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 75 | 78 | 78 |

### 6.3.2 Bear Creek

As with Deer Creek, the dominant anion for Bear Creek is bicarbonate, with a mean concentration of 15.9 mg/L and a range from 3.5 to 60 mg/L. Laboratory values of pH ranged from 5.4 to 7.4 with a mean of 6.4. Conductivity ranged from 1.0 to 14.9 mS/m with a mean of 5.8 mS/m.

The mean bicarbonate concentration of samples collected for Bear Creek is about one-half of the concentration of samples from the adjacent Deer Creek tributary. Of the other anions, the order of dominance and mean concentrations are Cl (1.84), $SO_4$ (1.03), and $NO_3$ (0.28) mg/L for 162 surface water samples collected at the Bear Creek hydrometric station.

For the cations, Ca is dominant with a mean concentration of 7.36 mg/L with a minimum sample value of 1.24 mg/L and a maximum of 36.0 mg/L. The order of predominance and mean concentration of other cations are Mg (3.27), Na (2.18) and K (1.27) mg/L.

### 6.3.3 Rice Creek

The hydrochemistry samples for Rice Creek were collected at the Rice Creek hydrometric gauging station, which represents a composite of waters from the tributaries, direct overland inflow, groundwater seepage and precipitation on the lake. The dominant anion is bicarbonate, with a mean concentration of 31.3 mg/L. For the 151 samples collected, bicarbonate concentrations ranged from 7.0 mg/L to 130 mg/L. Laboratory values of pH ranged from 5.7 to 7.6 with a mean of 6.8. Maximum conductivity values of 30.3 mS/m, a minimum of 2.1 and a mean of 9.0 mS/m were determined for samples from laboratory measurements. Of the remaining anions, the order of dominance and mean concentration of 152 samples are Cl (2.55), $SO_4$ (1.55) and $NO_3$ (0.35) mg/L.

Ca is the dominant cation with a mean concentration of 11.4 mg/L and minimum and maximum values of 2.94 and 33.0 mg/L respectively. The mean concentrations of other cations are Mg (5.44), Na (2.72) and K (1.59) mg/L. These values were obtained from analysis of 154 samples collected during the 1986-90 period.

### 6.3.4 Rice Lake

Hydrochemistry samples for Rice Lake are a mix of tributary inflows, direct surface inflow, groundwater seepage and precipitation that falls on the lake. Bicarbonate is the dominant anion with a mean concentration of 19.6 mg/L and minimum and maximum values of 9.0 and 68.8 mg/L respectively. Laboratory values of pH ranged from 6.0 to 7.4, with a mean of 6.7. Conductivity values (mS/m) ranged from 3.2 to 16.0, with a mean of 6.2. Other anions and their concentrations (mg/L) are, in order of importance, $SO_4$ (1.33), Cl (1.21) and $NO_3$ (0.21).

Calcium is the dominant cation, with a mean concentration of 7.81 mg/L and minimum and maximum values of 3.6 and 21.1 mg/L respectively. Other cation concentrations (mg/L) are Mg (3.61), Na (2.37) and K (1.41). Except for the bicarbonate data, which had 75 samples completed, the chemistry data are based on analysis of 78 water samples.

## 6.4 DISCUSSION OF HYDROCHEMISTRY

A comparison of the mean concentrations of water samples of precipitation, groundwater and surface waters show that groundwaters have the highest and precipitation the lowest ionic concentration. Sulphate is the dominant anion of precipitation with a mean concentration of 1.09 mg/L. For stream and lake waters, bicarbonate is the dominate anion with mean concentrations of 15.9 mg/L for Bear Creek, 19.6 mg/L for Rice Lake, 31.3 mg/L for Rice Creek and 33.2 mg/L for Deer Creek. Calcium is the dominant cation with mean concentrations of 7.4 mg/L for Bear Creek, 7.8 mg/L for Rice Lake, 11.40 mg/L for Rice Creek and 12.2 mg/L for Deer Creek. Shallow bedrock and overburden groundwater are bicarbonate-rich with mean concentrations of 265 mg/L for 2 bedrock samples and 390 mg/L for 11 overburden samples. Sodium and calcium are the dominant cations of shallow groundwater of Permit Area F, with mean concentrations of 63.4 and 70.7 mg/L respectively.

A comparison of the concentrations of the three sources of water show that at least an order of magnitude separates the precipitation and stream/lake water concentrations and similarly the stream/lake waters from groundwaters. Total ionic concentrations of stream and lake water vary significantly, depending upon streamflow volumetric discharges and season. The highest ionic concentrations are observed during winter periods, because of limited dilution from incoming precipitation and a larger streamflow component derived from groundwater seepage and surface waters that have had a longer residence time within the watershed. Longer residence time provides the opportunity for surface waters to dissolve more minerals of soils and bedrock and therefore the stream waters have a higher total ionic concentration. During most winters, streamflow is sustained predominantly by ponded swamp waters and seepage through beaver dams.

The most dilute streamflows are generally coincident with the spring melt period, when maximum annual streamflows are most often recorded. The relationship between Deer, Bear and Rice Creek streamflow discharge and major ion concentrations, pH and conductivity are shown in Appendix D. The dissolved chemical concentrations and dilution trends of streamflow in the Rice Creek watershed are similar to water chemistry variations observed for the adjacent Dead Creek watershed (Thorne 1986). For both watersheds, the generally dilute streamflows, even during periods of very low flow, indicate that the groundwater contribution can account for only a small component of streamflow. During the fall and winter period, however, streamflow ionic concentrations increase as less dilution from precipitation is available. The increased concentrations provide evidence that during these low-flow periods, a larger component of streamflow is derived from groundwater seepage or from waters that have been in storage within the watershed for a longer time period. Despite the increased groundwater component of streamflow during the fall and winter period, the total annual groundwater contribution to streamflow is estimated to be very small in comparison to other water budget components. Only a small percentage of annual basin yield is recorded during the low-flow periods, when a larger component of streamflow is derived from groundwater seepage. Periods of no stream discharge have been recorded at the three gauging stations for varying time periods within the Rice Creek during the four-year study period, also indicative that sustaining groundwater seepage into major channels is a very small quantity.

ACKNOWLEDGEMENTS

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# APPENDIX A

## PRECIPITATION SUMMARY 1987-90

### CONTENTS

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PRECIPITATION DATA FOR MANUAL RAIN GAUGE #3
DEAD CREEK AT THE TRAMWAY 1987

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 1.0 | | | | | 23.0 | 5.8 | | 1.0 | | | |
| 2 | | 1.0 | | | | 1.0 | 2.0 | | | | | | |
| 3 | | | 1.0 | | 0.1 | 1.0 | | | | | 4.0 | | |
| 4 | | | | | | 4.0 | | | | 3.0 | | | |
| 5 | | | | | | | 2.7 | 35.0 | | 1.0 | | | |
| 6 | | | | | | 11.6 | 5.0 | 8.0 | | | | | |
| 7 | | | 1.0 | | | | | | | 1.0 | | | |
| 8 | | | | | | | | | | 9.0 | 1.0 | | |
| 9 | | | | | | | 1.0 | | | 2.4 | 1.0 | 2.5 | |
| 10 | | | | | | 12.0 | 7.0 | 5.2 | | | 1.0 | | |
| 11 | | | | | | | 2.0 | 4.0 | | | | 4.0 | |
| 12 | | | | 1.2 | | | 5.4 | 1.0 | 2.0 | | | 7.0 | |
| 13 | | | | | 8.8 | | 2.0 | | | | | 2.5 | |
| 14 | | | | | | | 3.0 | | | | | 1.0 | |
| 15 | | | | | 0.8 | | | | | | | | |
| 16 | | 1.0 | | 1.8 | 4.0 | | | 1.0 | | | | 0.5 | |
| 17 | 1.0 | 1.0 | | | | | | | | 2.0 | | | |
| 18 | | | | | | | | 3.4 | 1.7 | | | | |
| 19 | 3.0 | | | | | | 5.0 | | | 1.9 | | | |
| 20 | | | | | 12.0 | | 14.0 | | | | | | |
| 21 | | | | | 8.0 | 26.1 | | | | 1.0 | | 0.5 | |
| 22 | | | | | | 1.0 | 10.0 | | | | | | |
| 23 | | | 2.0 | | | 1.0 | 5.4 | 1.0 | | 3.0 | | | |
| 24 | | 3.0 | | | 1.0 | 1.2 | | 1.6 | | | | | |
| 25 | | 3.0 | 1.0 | 0.4 | 1.0 | | | | | 1.0 | | 1.0 | |
| 26 | | 5.0 | 3.0 | | 6.0 | | | | | | | | |
| 27 | | | | | 5.0 | | | | | | | | |
| 28 | | 9.0 | | | | | | 2.0 | | | | | |
| 29 | | | | | | | | 3.0 | | | | | |
| 30 | | | | | | | | 4.0 | 1.0 | | | | YEARLY |
| 31 | | | 4.0 | | | | 12.0 | | | | | | TOTALS |
| MONTHLY TOTALS | 4.0 | 24.0 | 12.0 | 3.4 | 46.7 | 58.9 | 99.5 | 75.0 | 4.7 | 26.3 | 7.0 | 19.0 | 380.5 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

*INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #3
DEAD CREEK AT THE TRAMWAY 1988

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | 23.8 | | | | | | | |
| 2 | 2.0 | | | | | | | | 1.5 | 3.1 | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | 29.2 | | | | 2.0 | | |
| 5 | | | 7.0 | | | | 15.7 | | | | | 3.0 | |
| 6 | | 2.0 | 2.0 | | 4.6 | | 22.3 | | 4.5 | | | | |
| 7 | | | 6.0 | | 0.4 | | 27.6 | | | | 3.0 | 1.0 | |
| 8 | | | | | | 2.4 | | | | | | 7.0 | |
| 9 | 2.0 | | | | | | | 1.5 | 12.5 | | | 2.0 | |
| 10 | | | 1.0 | | | | | | | | | 0.5 | |
| 11 | | | | | | | | 2.4 | 23.4 | | 3.0 | | |
| 12 | | | | | 3.5 | 31.4 | 2.0 | | | | | 2.5 | |
| 13 | 1.5 | 2.0 | | | | 5.6 | 14.1 | | | | 2.0 | 1.5 | |
| 14 | 0.5 | 1.0 | | | | | 14.1 | | | | 1.0 | 0.5 | |
| 15 | | 1.0 | | | 3.7 | 1.0 | | | 1.3 | 5.6 | 17.0 | 0.5 | |
| 16 | | | | | | | | | 9.0 | 5.6 | 1.0 | | |
| 17 | | | | | | 5.1 | | | | | 0.5 | 2.0 | |
| 18 | 3.0 | | | | 15.3 | | | | 12.6 | 1.2 | | | |
| 19 | | 4.0 | | | 9.5 | | 10.6 | | 2.2 | | | 1.0 | |
| 20 | | 1.0 | | | | 0.8 | | | | | | | |
| 21 | | 2.0 | 2.0 | | | | | 7.1 | | | | | |
| 22 | | | | 0.6 | 1.3 | 5.6 | | | | *7.0 | | 1.0 | |
| 23 | 1.0 | | | 2.0 | | | | 5.9 | | *3.0 | | | |
| 24 | 1.0 | | 6.0 | | | | | | 0.5 | *1.5 | | 1.5 | |
| 25 | 2.0 | | 9.0 | | | | | | 0.5 | *2.5 | 2.0 | | |
| 26 | | | 0.5 | | | | | 6.3 | 0.6 | | | 1.0 | |
| 27 | | | 1.0 | | | 23.6 | | 9.7 | | *13.0 | | | |
| 28 | | | 2.0 | | | | | 8.0 | | | | 0.5 | |
| 29 | | | 2.0 | | | | 13.1 | | | | | | |
| 30 | 2.0 | | | | | | | | | *1.0 | | | YEARLY |
| 31 | | | | | | | | | | | | 1.5 | TOTALS |
| MONTHLY TOTALS | 16.0 | 13.0 | 38.5 | 2.6 | 38.3 | 99.3 | 148.7 | 40.9 | 68.6 | 43.5 | 31.5 | 27.0 | 567.9 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #3
DEAD CREEK AT THE TRAMWAY 1989

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1.0 | | | 4.0 | | | 1.0 | | 1.0 | |
| 2 | 2.0 | | | | | | | 23.9 | | | 2.0 | | |
| 3 | | | | | 8.4 | | | | 3.0 | 4.0 | | | |
| 4 | 1.0 | | | | | | | | | 10.0 | 2.0 | | |
| 5 | 1.0 | 1.5 | | | | | 18.0 | | | 3.2 | | | |
| 6 | 1.0 | 1.0 | | | | 3.3 | | | | | | | |
| 7 | 4.0 | | 6.0 | 1.5 | | 30.1 | | | | | 4.0 | 1.0 | |
| 8 | | 1.0 | | 3.0 | | | | | 2.0 | | 1.0 | | |
| 9 | | | | 1.0 | | | 3.1 | | | | | 10.0 | |
| 10 | | | 1.5 | | | | | | 8.7 | | | | |
| 11 | 1.0 | | | | | 27.0 | | | | | | | |
| 12 | | 1.0 | 3.0 | | | 11.5 | 25.2 | | | | 1.0 | | |
| 13 | | | | | | | | | | | | | |
| 14 | 2.0 | | | | | | | | | | 1.0 | 1.0 | |
| 15 | | | | | 1.5 | | | | 0.3 | 23.0 | | | |
| 16 | 1.0 | | | 1.5 | 1.7 | | | | | | | 1.0 | |
| 17 | 1.0 | | | | | 6.6 | | | | | | | |
| 18 | 1.0 | | | | 9.3 | | 6.7 | | | | | | |
| 19 | 1.0 | | 2.0 | | | | | 33.0 | | | 0.5 | | |
| 20 | | | | | | 12.6 | | 0.9 | | | | | |
| 21 | | | | | | 2.8 | | | | | | | |
| 22 | | | | | 1.5 | 1.8 | | | | | | | |
| 23 | | | | | 1.5 | | | | | | | | |
| 24 | | 1.5 | | 10.6 | 23.0 | 1.2 | | | 5.4 | | 2.0 | | |
| 25 | 1.5 | 1.0 | 2.0 | | 24.4 | | 10.0 | | | | | 2.0 | |
| 26 | | | | | | | | 4.0 | | | | | |
| 27 | | | | | 2.1 | 12.3 | | | | 3.4 | | | |
| 28 | | | | | | | | 6.0 | | | 1.0 | 2.0 | |
| 29 | | | 6.0 | | | | 35.0 | 1.0 | | | | | |
| 30 | 5.0 | | | | | | | | 0.4 | | | | YEARLY TOTALS |
| 31 | | | | | | | 1.3 | | | | | | |
| MONTHLY TOTALS | 22.5 | 7.0 | 20.5 | 18.6 | 73.4 | 109.2 | 103.3 | 68.8 | 19.8 | 44.6 | 14.5 | 18.0 | 520.2 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #3
DEAD CREEK AT THE TRAMWAY 1990

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 25.0 | | | 20.0 | | | | |
| 2 | | | | | | 32.0 | | | 1.4 | | | | |
| 3 | 3.0 | | | | | | 24.0 | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | 1.0 | | 2.0 | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | 0.6 | 3.0 | 2.0 | 20.0 | | | | | | |
| 8 | 3.0 | | | | 0.9 | 18.0 | 1.7 | 2.0 | | 0.5 | 2.0 | | |
| 9 | | 1.0 | | | | | | | | | | | |
| 10 | 4.0 | | | | | | | | | | | | |
| 11 | 5.0 | | | | | 18.0 | | | | | 2.0 | 4.0 | |
| 12 | | 1.0 | 8.0 | | | | | | | | | 2.0 | |
| 13 | | | | | | | | 3.8 | | 6.4 | | | |
| 14 | | | 4.0 | | | 3.7 | | | | | | | |
| 15 | | | 10.0 | 4.0 | 10.0 | | | | | | | | |
| 16 | | | 3.0 | | 5.6 | | | | | | | | |
| 17 | | 4.0 | | | | | 5.0 | | 2.5 | | | | |
| 18 | | | | | | 0.7 | | | | | | | |
| 19 | | | | | | 30.0 | | | 20.0 | | | 3.0 | |
| 20 | | | | | | 49.3 | 5.3 | 8.5 | 8.4 | | 1.5 | 2.0 | |
| 21 | 2.0 | 1.0 | 3.0 | | | | | | | 0.4 | 7.5 | 2.0 | |
| 22 | 2.0 | 1.0 | 2.0 | 8.4 | | 1.2 | | | | | 1.3 | 2.0 | |
| 23 | 1.0 | 1.0 | | 4.7 | 11.1 | | | | | | 3.8 | | |
| 24 | | | | | | | | | | | 2.0 | 0.5 | |
| 25 | 1.0 | | | | | | | | | | | | |
| 26 | | 1.0 | | 9.0 | | | | | | | 1.0 | | |
| 27 | | | | 1.8 | | | 2.0 | 3.5 | | | | 1.0 | |
| 28 | | | | | | | 3.3 | | | | | 2.0 | |
| 29 | 1.0 | | | | 2.5 | | | | | 5.0 | | 1.0 | |
| 30 | | | | 2.0 | | | | | 3.7 | | | 1.0 | YEARLY |
| 31 | 1.0 | | | | | | | 7.2 | | | | | TOTALS |
| MONTHLY TOTALS | 23.0 | 10.0 | 30.0 | 31.5 | 33.1 | 181.9 | 61.3 | 25.0 | 56.0 | 12.3 | 21.1 | 20.5 | 505.7 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #4
DEER CREEK 1987

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 1.0 | | | | | | 4.0 | | 1.0 | | | |
| 2 | | 1.0 | | | | 1.0 | 23.0 | | | | | | |
| 3 | | | 1.0 | | 0.2 | 1.0 | 2.0 | | | | 4.0 | | |
| 4 | | | | | | 4.0 | | | | 4.0 | | | |
| 5 | | | | | | | 3.0 | 30.0 | | 1.0 | | | |
| 6 | | | | | | 12.0 | 5.0 | 6.0 | | | | | |
| 7 | | | 1.0 | | | | | | | 1.0 | | | |
| 8 | | | | | | | | | | 12.0 | 1.0 | | |
| 9 | | | | | | | 1.0 | | | 2.0 | 1.0 | 2.5 | |
| 10 | | | | | | 14.2 | 8.0 | 4.6 | | | 1.0 | | |
| 11 | | | | | | | 2.0 | 3.0 | | | | 4.0 | |
| 12 | | | | 1.5 | | | 5.2 | 1.0 | 2.0 | | | 7.0 | |
| 13 | | | | | 8.0 | | 2.0 | | | | | 2.5 | |
| 14 | | | | | | | 3.0 | | | | | 1.0 | |
| 15 | | | | | 1.0 | | | | | | | | |
| 16 | | 1.0 | | 2.1 | 4.6 | | | 1.0 | | | | 0.5 | |
| 17 | 1.0 | 1.0 | | | | | | | | 2.4 | | | |
| 18 | | | | | | | 6.4 | 1.4 | 1.6 | | | | |
| 19 | 3.0 | | | | | | 14.0 | | | 2.0 | | | |
| 20 | | | | | 12.0 | | | | | | | | |
| 21 | | | | | 8.0 | 23.6 | 11.0 | | | 1.0 | | 0.5 | |
| 22 | | | | | | 1.0 | 6.0 | 3.0 | | | | | |
| 23 | | | 2.0 | | 1.2 | 1.0 | | 4.0 | | 3.5 | | | |
| 24 | | 3.0 | | | 1.0 | 0.8 | | | | | | | |
| 25 | | 3.0 | 1.0 | 0.6 | | | | | | 1.0 | | 1.0 | |
| 26 | | 5.0 | 3.0 | | 6.0 | | | | | 1.2 | | | |
| 27 | | | | | 5.0 | | | | | | | | |
| 28 | | 9.0 | | | | | | 1.0 | 1.6 | | | | |
| 29 | | | | | | | | 2.0 | | | | | |
| 30 | | | | | | | | 4.4 | 1.0 | | | | YEARLY |
| 31 | | | 4.0 | | | | 12.6 | | | | | | TOTALS |
| MONTHLY TOTALS | 4.0 | 24.0 | 12.0 | 4.2 | 47.0 | 58.6 | 104.2 | 65.4 | 6.2 | 32.1 | 7.0 | 19.0 | 383.7 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

*INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #4
DEER CREEK 1988

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | 39.4 | | | | | | | |
| 2 | 2.0 | | | | | | | | | 3.0 | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | 21.3 | | | | 2.0 | | |
| 5 | | | 7.0 | | | | 11.4 | | | | | 3.0 | |
| 6 | | 2.0 | 2.0 | | 7.2 | | 19.9 | | 2.0 | | | | |
| 7 | | | 6.0 | | 0.6 | 4.0 | | | | | 3.0 | 1.0 | |
| 8 | | | | | | | | 0.4 | | | | 7.0 | |
| 9 | 2.0 | | | | | | | | 13.0 | | | 2.0 | |
| 10 | | | 1.0 | | | | | | | | | 0.5 | |
| 11 | | | | | | | 2.1 | 3.3 | 24.3 | | 3.0 | | |
| 12 | | | | | 3.6 | | | | | | | 2.5 | |
| 13 | 1.5 | 2.0 | | | | 0.1 | 14.9 | | | | 2.0 | 1.5 | |
| 14 | 0.5 | 1.0 | | | | 39.2 | 14.8 | | | | 1.0 | 0.5 | |
| 15 | | 1.0 | | | 3.9 | | | | 1.4 | 6.1 | 17.0 | 0.5 | |
| 16 | | | | | | | | | 9.4 | 6.1 | 1.0 | | |
| 17 | | | | | | | | | | | 0.5 | 2.0 | |
| 18 | 3.0 | | | | 11.5 | | | | 13.1 | 1.4 | | | |
| 19 | | 4.0 | | | 7.1 | 7.8 | 11.2 | | 2.3 | | | 1.0 | |
| 20 | | 1.0 | | | | 0.7 | | | | | | | |
| 21 | | 2.0 | 2.0 | | | | | 5.0 | | | | | |
| 22 | | | | 0.6 | 1.0 | 5.0 | | | | *7.0 | | 1.0 | |
| 23 | 1.0 | | | | | | | 5.0 | | *3.0 | | | |
| 24 | 1.0 | | 6.0 | | | | | | | *1.5 | | 1.5 | |
| 25 | 2.0 | | 9.0 | | | | | | | *2.5 | 2.0 | | |
| 26 | | | 0.5 | 5.6 | | | 0.9 | 8.0 | 0.3 | | | 1.0 | |
| 27 | | | 1.0 | | | 24.3 | | 8.0 | 0.3 | *13.0 | | | |
| 28 | | | 2.0 | | 2.8 | | | 8.0 | 0.4 | | | 0.5 | |
| 29 | | | 2.0 | | | | | | | | | | |
| 30 | 2.0 | | | | | | | | | *1.0 | | | YEARLY |
| 31 | | | | | | | | | | | | 1.5 | TOTALS |
| MONTHLY TOTALS | 16.0 | 13.0 | 38.5 | 6.2 | 37.7 | 120.5 | 96.5 | 37.7 | 66.5 | 46.6 | 31.5 | 27.0 | 537.7 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #4
DEER CREEK 1989

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1.0 | | | 5.4 | 19.0 | | 1.5 | | 1.0 | |
| 2 | 2.0 | | | | | | | 4.3 | 6.4 | | 2.0 | | |
| 3 | | | | | 11.8 | | | | | | | | |
| 4 | 1.0 | | | | | | 18.0 | | | 3.0 | 2.0 | | |
| 5 | 1.0 | 1.5 | | | | | | | | 10.0 | | | |
| 6 | 1.0 | 1.0 | | | | 3.3 | | | | 2.2 | | | |
| 7 | 4.0 | | 6.0 | 1.5 | | 29.9 | | | | | 4.0 | 1.0 | |
| 8 | | 1.0 | | 3.0 | | | | | | | 1.0 | | |
| 9 | | | | 1.0 | | | 3.2 | | 2.0 | | | 10.0 | |
| 10 | | | 1.5 | | | | | | | | | | |
| 11 | 1.0 | | | | | | | | 4.2 | | | | |
| 12 | | 1.0 | 3.0 | | | 28.0 | 39.8 | | | | 1.0 | | |
| 13 | | | | | | 12.0 | | | | | | | |
| 14 | 2.0 | | | | | | | | | | 1.0 | 1.0 | |
| 15 | | | | | 1.6 | | | | | 22.0 | | | |
| 16 | 1.0 | | | 1.5 | 1.7 | | | | 0.4 | | | 1.0 | |
| 17 | 1.0 | | | | | 5.5 | | | | | | | |
| 18 | 1.0 | | | | 9.3 | | 6.0 | | | | | | |
| 19 | 1.0 | | 2.0 | | | | | 32.0 | | | 0.5 | | |
| 20 | | | | | | 13.6 | | 1.1 | | | | | |
| 21 | | | | | 1.5 | 3.0 | | | | | | | |
| 22 | | | | | 1.5 | 2.0 | | | 4.9 | 0.2 | | | |
| 23 | | | | | | | | | | | | | |
| 24 | | 1.5 | | 13.1 | 25.0 | 1.3 | | | | | 2.0 | | |
| 25 | 1.5 | 1.0 | 2.0 | | 26.3 | | 14.6 | | | | | 2.0 | |
| 26 | | | | | | | | 4.0 | | | | | |
| 27 | | | | | 2.1 | 13.2 | | | | 2.0 | | | |
| 28 | | | | | | | | 5.0 | | | 1.0 | 2.0 | |
| 29 | | | 6.0 | | | | 30.0 | 1.0 | | | | | |
| 30 | 5.0 | | | | | | | | 1.0 | | | | YEARLY TOTALS |
| 31 | | | | | | | 1.3 | | | | | | |
| MONTHLY TOTALS | 22.5 | 7.0 | 20.5 | 21.1 | 80.8 | 111.8 | 118.3 | 66.4 | 18.9 | 40.9 | 14.5 | 18.0 | 540.7 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #4
DEER CREEK 1990

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 20.0 | | | | | | | |
| 2 | | | | | | 29.7 | | | 20.0 | | | | |
| 3 | 3.0 | | | | | | 21.1 | | 2.0 | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | 0.4 | | 2.0 | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | 0.3 | 5.0 | 2.0 | 22.0 | | | | | | |
| 8 | 3.0 | | | | | 18.0 | 2.8 | 1.8 | | 0.5 | 2.0 | | |
| 9 | | 1.0 | | | | | | | | | | | |
| 10 | 4.0 | | | | | | | | | | | | |
| 11 | 5.0 | | | | | 18.0 | | | | | 2.0 | 4.0 | |
| 12 | | 1.0 | 8.0 | | | | | | | | | 2.0 | |
| 13 | | | | | | | | 4.2 | | 6.0 | | | |
| 14 | | | 4.0 | | | 2.0 | | | | | | | |
| 15 | | | 10.0 | 3.4 | | | | | | | | | |
| 16 | | | 3.0 | | | | | | | | | | |
| 17 | | 4.0 | | | 10.0 | | 5.0 | | 2.9 | | | | |
| 18 | | | | | 7.2 | | | | | | | | |
| 19 | | | | | | 25.0 | | | 25.0 | | | 3.0 | |
| 20 | | | | | | 38.0 | 4.7 | 9.1 | 6.0 | | 1.5 | 2.0 | |
| 21 | 2.0 | 1.0 | 3.0 | | | | | | | 0.4 | 7.5 | 2.0 | |
| 22 | 2.0 | 1.0 | 2.0 | 5.0 | | 2.6 | | | | | 1.3 | 2.0 | |
| 23 | 1.0 | 1.0 | | 2.4 | 13.9 | | | | | | 3.8 | | |
| 24 | | | | | | | | | | | 2.0 | 0.5 | |
| 25 | 1.0 | | | | | | | | | | | | |
| 26 | | 1.0 | | 9.0 | | | | | | | 1.0 | | |
| 27 | | | | 2.2 | | | 1.0 | 3.6 | | | | 1.0 | |
| 28 | | | | | | | 2.4 | | | | | 2.0 | |
| 29 | 1.0 | | | | | | | | | | | 1.0 | |
| 30 | | | | | | | | | 4.3 | 3.8 | | 1.0 | YEARLY TOTALS |
| 31 | 1.0 | | | | | | | 5.8 | | | | | |
| MONTHLY TOTALS | 23.0 | 10.0 | 30.0 | 22.7 | 36.1 | 157.3 | 59.0 | 24.5 | 60.2 | 10.7 | 21.1 | 20.5 | 475.1 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #5
BEAR CREEK AT THE WEIR 1987

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 1.0 | | | | | 25.0 | 5.6 | 0.4 | 1.0 | | | |
| 2 | | 1.0 | | | | 2.0 | 3.0 | | | | | | |
| 3 | | | 1.0 | | 0.2 | 2.0 | | | | | 4.0 | | |
| 4 | | | | | | 5.0 | 2.4 | | | 4.0 | | | |
| 5 | | | | | | | 6.0 | 30.0 | | 1.0 | | | |
| 6 | | | | | | 9.0 | | 6.0 | | 11.2 | | | |
| 7 | | | 1.0 | | | | | | | 1.0 | | | |
| 8 | | | | | | | | | | | 1.0 | | |
| 9 | | | | | | | 1.0 | | | 2.0 | 1.0 | 2.5 | |
| 10 | | | | | | 12.8 | 10.0 | 4.4 | | | 1.0 | | |
| 11 | | | | | | | 3.0 | 3.0 | | | | 4.0 | |
| 12 | | | | 2.1 | | | 6.0 | 2.0 | 1.0 | | | 7.0 | |
| 13 | | | | | 6.0 | | 2.2 | | | | | 2.5 | |
| 14 | | | | | | | 5.0 | | | | | 1.0 | |
| 15 | | | | | 1.6 | | | | | | | | |
| 16 | | 1.0 | | 1.2 | 6.0 | | | 1.0 | | | | 0.5 | |
| 17 | 1.0 | 1.0 | | | | | | | | 2.0 | | | |
| 18 | | | | | | | 4.6 | 9.6 | 1.0 | | | | |
| 19 | 3.0 | | | | | | 10.0 | | | 1.4 | | | |
| 20 | | | | | 12.0 | | | | | | | | |
| 21 | | | | | 8.0 | 18.0 | | | | 1.0 | | 0.5 | |
| 22 | | | | | | | 9.0 | | | | | | |
| 23 | | | 2.0 | | | | 7.0 | 1.0 | | 3.0 | | | |
| 24 | | 3.0 | | | 2.0 | | | 2.0 | | | | | |
| 25 | | 3.0 | 1.0 | 0.8 | 1.4 | | | | | 0.2 | | 1.0 | |
| 26 | | 5.0 | 3.0 | | 6.0 | | | | | 1.0 | | | |
| 27 | | | | | 6.0 | | | | | | | | |
| 28 | | 9.0 | | | | | | 1.0 | 1.3 | | | | |
| 29 | | | | | | 1.0 | | 2.0 | | | | | |
| 30 | | | | | | | | 3.2 | 1.0 | | | | YEARLY |
| 31 | | | 4.0 | | | | 15.0 | | | | | | TOTALS |
| MONTHLY TOTALS | 4.0 | 24.0 | 12.0 | 4.1 | 49.2 | 49.8 | 109.2 | 70.8 | 4.7 | 28.8 | 7.0 | 19.0 | 382.6 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

*INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #5
BEAR CREEK AT THE WEIR 1988

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | 112.3 | | 12.1 | 1.7 | | | | |
| 2 | 2.0 | | | | | | | | | 3.2 | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | 25.4 | | | | 2.0 | | |
| 5 | | | 7.0 | | | | 13.7 | | | | | 3.0 | |
| 6 | | 2.0 | 2.0 | | 8.6 | | 19.4 | | 4.9 | | | | |
| 7 | | | 6.0 | | 1.4 | 15.3 | | | | | 3.0 | 1.0 | |
| 8 | | | | | | | | 2.1 | | | | 7.0 | |
| 9 | 2.0 | | | | | | | | 13.5 | | | 2.0 | |
| 10 | | | 1.0 | | | | | | | | | 0.5 | |
| 11 | | | | | | | | | 25.2 | | 3.0 | | |
| 12 | | | | | 3.8 | | 35.5 | | | | | 2.5 | |
| 13 | 1.5 | 2.0 | | | | 0.5 | 13.4 | 5.5 | | | 2.0 | 1.5 | |
| 14 | 0.5 | 1.0 | | | | 42.6 | | | | | 1.0 | 0.5 | |
| 15 | | 1.0 | | | 4.1 | | | | 1.4 | 5.5 | 17.0 | 0.5 | |
| 16 | | | | | | 7.1 | | | 9.6 | 5.6 | 1.0 | | |
| 17 | | | | | | | | | | | 0.5 | 2.0 | |
| 18 | 3.0 | | | | 9.7 | | | | 13.5 | 1.1 | | | |
| 19 | | 4.0 | | | 5.9 | | 3.6 | | 2.4 | | | 1.0 | |
| 20 | | 1.0 | | | | 0.9 | 11.8 | | | | | | |
| 21 | | 2.0 | 2.0 | | | | | 38.1 | | | | | |
| 22 | | | | 0.2 | 0.9 | 5.0 | | | | *7.0 | | 1.0 | |
| 23 | 1.0 | | | 1.2 | | | | | | *3.0 | | | |
| 24 | 1.0 | | 6.0 | 6.4 | | | | | 0.5 | *1.5 | | 1.5 | |
| 25 | 2.0 | | 9.0 | | 4.5 | | | | 0.5 | *2.5 | 2.0 | | |
| 26 | | | 0.5 | | 3.8 | | 0.5 | 4.8 | 0.4 | | | 1.0 | |
| 27 | | | 1.0 | | | 21.2 | | 8.0 | | *13.0 | | | |
| 28 | | | 2.0 | | | | | 6.4 | | | | 0.5 | |
| 29 | | | 2.0 | | | | | | | | | | |
| 30 | 2.0 | | | | | | | | | *1.0 | | | YEARLY |
| 31 | | | | | | | | | | | | 1.5 | TOTALS |
| MONTHLY TOTALS | 16.0 | 13.0 | 38.5 | 7.8 | 42.7 | 204.9 | 123.3 | 77.0 | 73.6 | 43.4 | 31.5 | 27.0 | 698.7 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #5
BEAR CREEK AT THE WEIR 1989

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1.0 | | | 12.3 | | | 2.0 | | 1.0 | |
| 2 | 2.0 | | | | | | | 18.0 | | | 2.0 | | |
| 3 | | | | | | | | 1.0 | 4.0 | 2.0 | | | |
| 4 | 1.0 | | | | 12.8 | | | | | 9.0 | 2.0 | | |
| 5 | 1.0 | 1.5 | | | | | 16.0 | | | 2.0 | | | |
| 6 | 1.0 | 1.0 | | | | 3.0 | | | | | | | |
| 7 | 4.0 | | 6.0 | 1.5 | | 30.0 | | | | | 4.0 | 1.0 | |
| 8 | | 1.0 | | 3.0 | | | | | | | 1.0 | | |
| 9 | | | | 1.0 | | | | | | | | 10.0 | |
| 10 | | | 1.5 | | | | 0.7 | | 2.0 | | | | |
| 11 | 1.0 | | | | | 31.5 | | | | | | | |
| 12 | | 1.0 | 3.0 | | | 13.5 | 30.0 | | 6.2 | | 1.0 | | |
| 13 | | | | | | | | | | | | | |
| 14 | 2.0 | | | | | | | | | | 1.0 | 1.0 | |
| 15 | | | | | | | | | | | | | |
| 16 | 1.0 | | | 1.5 | 1.6 | | | | | | | 1.0 | |
| 17 | 1.0 | | | | 1.7 | 4.1 | | | | 27.0 | | | |
| 18 | 1.0 | | | | | | 6.0 | | | | | | |
| 19 | 1.0 | | 2.0 | | 8.4 | | | 31.0 | | | 0.5 | | |
| 20 | | | | | | 12.9 | | 1.2 | | | | | |
| 21 | | | | | 1.3 | 2.8 | | | | | | | |
| 22 | | | | | 1.5 | 1.9 | | | | | | | |
| 23 | | | | | | | | | | | | | |
| 24 | | 1.5 | | 10.9 | 26.0 | 1.3 | | | | | 2.0 | | |
| 25 | 1.5 | 1.0 | 2.0 | | 26.4 | | 30.2 | 3.1 | 5.0 | | | 2.0 | |
| 26 | | | | | | | | | | | | | |
| 27 | | | | | 2.3 | 12.6 | | 12.0 | | 1.6 | | | |
| 28 | | | | | | | | | | | 1.0 | 2.0 | |
| 29 | | | 6.0 | | | | 23.0 | 1.0 | | | | | |
| 30 | 5.0 | | | | | | | | | | | | YEARLY TOTALS |
| 31 | | | | | | | 0.8 | | 1.0 | | | | |
| MONTHLY TOTALS | 22.5 | 7.0 | 20.5 | 18.9 | 82.0 | 113.6 | 119.0 | 67.3 | 18.2 | 43.6 | 14.5 | 18.0 | 545.1 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANLAL RAIN GAUGE #5
BEAR CREEK AT THE WEIR 1990

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 20.0 | | | 25.0 | | | | |
| 2 | | | | | | 29.6 | | | 0.8 | | | | |
| 3 | 3.0 | | | | | | 18.6 | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | 1.0 | | 2.0 | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | 0.4 | 5.6 | 2.0 | 23.0 | | | | | | |
| 8 | 3.0 | | | | | 17.1 | 2.2 | 1.0 | | 0.5 | 2.0 | | |
| 9 | | 1.0 | | | | | | | | | | | |
| 10 | 4.0 | | | | | 16.0 | | | | | | | |
| 11 | 5.0 | | | | | 2.3 | | | | | 2.0 | 4.0 | |
| 12 | | 1.0 | 8.0 | | | | | | | | | 2.0 | |
| 13 | | | | | | | | 2.9 | | 7.0 | | | |
| 14 | | | 4.0 | | | 2.0 | | | | | | | |
| 15 | | | 10.0 | 2.3 | | | | | | | | | |
| 16 | | | 3.0 | | 12.0 | | | | | | | | |
| 17 | | 4.0 | | | 5.1 | | 10.0 | | 2.7 | | | | |
| 18 | | | | | | | | | | | | | |
| 19 | | | | | | 20.0 | | | 20.0 | | | 3.0 | |
| 20 | | | | | | 36.4 | 10.1 | 8.2 | 9.6 | | 1.5 | 2.0 | |
| 21 | 2.0 | 1.0 | 3.0 | | | | | | | 0.3 | 7.5 | 2.0 | |
| 22 | 2.0 | 1.0 | 2.0 | 10.0 | 17.1 | 3.8 | | | | | 1.3 | 2.0 | |
| 23 | 1.0 | 1.0 | | 6.0 | | | | | | | 3.8 | | |
| 24 | | | | | | | | | | | 2.0 | 0.5 | |
| 25 | 1.0 | | | | | | | | | | | | |
| 26 | | 1.0 | | 10.0 | | | | | | | 1.0 | | |
| 27 | | | | 2.2 | | | 2.0 | | | | | 1.0 | |
| 28 | | | | | 0.6 | | 3.0 | 2.6 | | | | 2.0 | |
| 29 | 1.0 | | | | | | | | | 4.3 | | 1.0 | |
| 30 | | | | 2.0 | | | | | 4.3 | | | 1.0 | YEARLY TOTALS |
| 31 | 1.0 | | | | | | | 10.4 | | | | | |
| MONTHLY TOTALS | 23.0 | 10.0 | 30.0 | 33.9 | 40.4 | 151.2 | 68.9 | 25.1 | 62.4 | 12.1 | 21.1 | 20.5 | 498.6 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #7
RICE CREEK AT THE WEIR 1987

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 1.0 | | | | | 29.4 | 5.0 | | 1.0 | | | |
| 2 | | 1.0 | | | | 1.0 | 3.0 | | | | | | |
| 3 | | | 1.0 | | 0.1 | 2.0 | | 1.0 | | | 4.0 | | |
| 4 | | | | | | 5.0 | | | | 3.0 | | | |
| 5 | | | | | | | 4.0 | 30.0 | | 1.0 | | | |
| 6 | | | | | | 10.0 | 7.0 | 6.0 | | | | | |
| 7 | | | 1.0 | | | | | | | 1.0 | | | |
| 8 | | | | | | | | | | 8.8 | 1.0 | | |
| 9 | | | | | | | 1.0 | | | 1.0 | 1.0 | 2.5 | |
| 10 | | | | | | 13.2 | 10.0 | 4.2 | | | 1.0 | | |
| 11 | | | | | | | 2.0 | 2.0 | | | | 4.0 | |
| 12 | | | | 1.0 | | | 6.0 | 1.0 | 2.0 | | | 7.0 | |
| 13 | | | | | 5.0 | | 2.6 | | | | | 2.5 | |
| 14 | | | | | | | 5.0 | | | | | 1.0 | |
| 15 | | | | | 1.2 | | | | | | | | |
| 16 | | 1.0 | | 1.4 | 5.0 | | | 2.0 | | | | 0.5 | |
| 17 | 1.0 | 1.0 | | | | | | | | 3.2 | | | |
| 18 | | | | | | | 4.4 | 2.0 | 1.0 | | | | |
| 19 | 3.0 | | | | | | 10.0 | | | 2.0 | | | |
| 20 | | | | | | | | | | | | | |
| 21 | | | | | 12.0 | 46.0 | 11.0 | | | 2.0 | | 0.5 | |
| 22 | | | | | 8.0 | | 5.4 | 6.0 | | | | | |
| 23 | | | 2.0 | | | 5.0 | | 5.4 | | 4.5 | | | |
| 24 | | 3.0 | | | 1.8 | 0.4 | | | | | | | |
| 25 | | 3.0 | 1.0 | 0.4 | 1.0 | | | | | 1.5 | | 1.0 | |
| 26 | | 5.0 | 3.0 | | 5.0 | | | | | 2.5 | | | |
| 27 | | | | | 6.0 | | | | | | | | |
| 28 | | 9.0 | | | | | | 1.0 | | | | | |
| 29 | | | | | | | | 1.8 | | | | | |
| 30 | | | | | | | | 2.0 | 1.0 | | | | YEARLY |
| 31 | | | 4.0 | | | | 13.0 | | | | | | TOTALS |
| MONTHLY TOTALS | 4.0 | 24.0 | 12.0 | 2.8 | 45.1 | 82.6 | 113.8 | 69.4 | 4.0 | 31.5 | 7.0 | 19.0 | 415.2 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

*INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL



TR-570
COG-92-131

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #7
RICE CREEK AT THE WEIR 1988

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | 17.6 | | | 2.1 | | | | |
| 2 | 2.0 | | | | | | | | | 3.7 | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | 37.2 | | | | 2.0 | | |
| 5 | | | 7.0 | | | | 20.0 | | 2.1 | | | 3.0 | |
| 6 | | 2.0 | 2.0 | | 7.1 | | 28.4 | | 5.1 | | | | |
| 7 | | | 6.0 | | 1.2 | | | | | | 3.0 | 1.0 | |
| 8 | | | | | | 2.4 | | | | | | 7.0 | |
| 9 | 2.0 | | | | | | | 1.0 | 14.3 | | | 2.0 | |
| 10 | | | 1.0 | | | | | | | | | 0.5 | |
| 11 | | | | | | | | | 26.6 | | 3.0 | | |
| 12 | | | | | 4.5 | 33.6 | 27.7 | 1.6 | | | | 2.5 | |
| 13 | 1.5 | 2.0 | | | | 6.0 | 16.6 | | | | 2.0 | 1.5 | |
| 14 | 0.5 | 1.0 | | | | | | | | | 1.0 | 0.5 | |
| 15 | | 1.0 | | | 4.7 | 44.4 | | | 1.5 | 4.7 | 17.0 | 0.5 | |
| 16 | | | | | | | | | 10.5 | 4.7 | 1.0 | | |
| 17 | | | | | | 14.1 | | | | | 0.5 | 2.0 | |
| 18 | 3.0 | | | | 13.4 | | | | 14.3 | 1.0 | | | |
| 19 | | 4.0 | | | 8.3 | | 4.4 | | 2.5 | | | 1.0 | |
| 20 | | 1.0 | | | | 2.2 | | | | | | | |
| 21 | | 2.0 | 2.0 | | | | | 26.8 | | | | | |
| 22 | | | | 0.3 | 1.1 | 4.3 | | | | *7.0 | | 1.0 | |
| 23 | 1.0 | | | 1.2 | | | | 6.8 | | *3.0 | | | |
| 24 | 1.0 | | 6.0 | 6.2 | | | | | 0.5 | *1.5 | | 1.5 | |
| 25 | 2.0 | | 9.0 | | | | 4.5 | | 0.6 | *2.5 | 2.0 | | |
| 26 | | | 0.5 | | 6.3 | | | 6.5 | 0.7 | | | 1.0 | |
| 27 | | | 1.0 | | | 18.3 | | 13.1 | | *13.0 | | | |
| 28 | | | 2.0 | | | | | 2.6 | | | | 0.5 | |
| 29 | | | 2.0 | | | | 11.8 | | | | | | |
| 30 | 2.0 | | | | | | | | | *1.0 | | | YEARLY |
| 31 | | | | | | | | | | | | 1.5 | TOTALS |
| MONTHLY TOTALS | 16.0 | 13.0 | 38.5 | 7.7 | 46.6 | 142.9 | 150.6 | 58.4 | 80.8 | 42.1 | 31.5 | 27.0 | 655.1 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #7
RICE CREEK AT THE WEIR 1989

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1.0 | | | 6.8 | | | 2.6 | | 1.0 | |
| 2 | 2.0 | | | | | | | 20.0 | | 1.0 | 2.0 | | |
| 3 | | | | | 8.2 | | | 3.8 | 6.0 | 3.0 | | | |
| 4 | 1.0 | | | | | | | | | 1.0 | 2.0 | | |
| 5 | 1.0 | 1.5 | | | | | 11.0 | | | | | | |
| 6 | 1.0 | 1.0 | | | | 3.2 | | | | | | | |
| 7 | 4.0 | | 6.0 | 1.5 | | 29.9 | | | | | 4.0 | 1.0 | |
| 8 | | 1.0 | | 3.0 | | | | | 1.8 | | 1.0 | | |
| 9 | | | | 1.0 | | | 1.3 | | | | | 10.0 | |
| 10 | | | 1.5 | | | | | | 2.0 | | | | |
| 11 | 1.0 | | | | | 30.5 | | | | | | | |
| 12 | | 1.0 | 3.0 | | | 10.2 | 48.5 | | 2.0 | | 1.0 | | |
| 13 | | | | | | | | 0.4 | 1.0 | | | | |
| 14 | 2.0 | | | | | | | | | | 1.0 | 1.0 | |
| 15 | | | | | 1.4 | | | | | | | | |
| 16 | 1.0 | | | 1.5 | 2.0 | | | | | 26.0 | | 1.0 | |
| 17 | 1.0 | | | | | 5.8 | | | | | | | |
| 18 | 1.0 | | | | 8.3 | | 6.6 | | 7.4 | | | | |
| 19 | 1.0 | | 2.0 | | | | | 29.0 | | | 0.5 | | |
| 20 | | | | | | 10.2 | | 1.1 | 1.0 | | | | |
| 21 | | | | | 1.4 | 2.2 | | | | | | | |
| 22 | | | | | 0.7 | | | | | | | | |
| 23 | | | | | | | | | | | | | |
| 24 | | 1.5 | | 6.1 | 23.0 | 1.0 | | | | | 2.0 | | |
| 25 | 1.5 | 1.0 | 2.0 | | 27.8 | | 10.0 | 3.2 | | | | 2.0 | |
| 26 | | | | | | | | | | | | | |
| 27 | | | | | 2.3 | 10.9 | | 8.0 | | 1.2 | | | |
| 28 | | | | | | | | | | | 1.0 | 2.0 | |
| 29 | | | 6.0 | | | | 36.0 | 1.0 | | | | | |
| 30 | 5.0 | | | | | | | | | | | | YEARLY TOTALS |
| 31 | | | | | | | 3.3 | | | | | | |
| MONTHLY TOTALS | 22.5 | 7.0 | 20.5 | 14.1 | 75.1 | 103.9 | 123.5 | 66.5 | 21.2 | 34.8 | 14.5 | 18.0 | 521.6 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #7
RICE CREEK AT THE WEIR 1990

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 25.0 | | | | | | | |
| 2 | | | | | | 29.4 | | | 56.4 | | | | |
| 3 | 3.0 | | | | | | 22.6 | | 1.0 | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | 1.0 | | 2.0 | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | 0.8 | 3.7 | 2.0 | 18.0 | 2.0 | | | | | |
| 8 | 3.0 | | | | | 21.2 | 1.0 | | | 0.5 | 2.0 | | |
| 9 | | 1.0 | | | | | | | | | | | |
| 10 | 4.0 | | | | | | | | | | | | |
| 11 | 5.0 | | | | | 22.2 | | | | | 2.0 | 4.0 | |
| 12 | | 1.0 | 8.0 | | | 1.0 | | | | 7.4 | | 2.0 | |
| 13 | | | | | | | | | | | | | |
| 14 | | | 4.0 | | | 2.8 | | 4.1 | | | | | |
| 15 | | | 10.0 | 3.6 | | | | 3.0 | | | | | |
| 16 | | | 3.0 | | 12.0 | | | 2.2 | | | | | |
| 17 | | 4.0 | | | 6.7 | | 5.0 | | 3.1 | | | | |
| 18 | | | | | | | | | | | | | |
| 19 | | | | | | 20.0 | | | 20.0 | | | 3.0 | |
| 20 | | | | | | 48.3 | 5.7 | | 7.3 | | 1.5 | 2.0 | |
| 21 | 2.0 | 1.0 | 3.0 | | 2.4 | | | | | 0.4 | 7.5 | 2.0 | |
| 22 | 2.0 | 1.0 | 2.0 | 10.0 | 2.4 | 5.3 | | | | | 1.3 | 2.0 | |
| 23 | 1.0 | 1.0 | | 6.9 | | | | | | | 3.8 | | |
| 24 | | | | | | | | | | | 2.0 | 0.5 | |
| 25 | 1.0 | | | | | | | | | | | | |
| 26 | | 1.0 | | 7.0 | | | | | | | 1.0 | | |
| 27 | | | | 2.2 | | | 5.0 | 3.2 | | | | 1.0 | |
| 28 | | | | | 0.2 | | 5.9 | | | | | 2.0 | |
| 29 | 1.0 | | | | | | | | | 4.5 | | 1.0 | |
| 30 | | | | 2.0 | | | | | 3.9 | | | 1.0 | YEARLY TOTALS |
| 31 | 1.0 | | | | | | | | | | | | |
| MONTHLY TOTALS | 23.0 | 10.0 | 30.0 | 33.5 | 27.4 | 179.2 | 63.2 | 14.5 | 91.7 | 12.6 | 21.1 | 20.5 | 526.9 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #8
BARSKI CREEK OUTLET AT 313 1987

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 1.0 | | | | | 27.8 | 5.9 | 0.2 | 1.0 | | | |
| 2 | | 1.0 | | | | 1.0 | 2.0 | | | | | | |
| 3 | | | 1.0 | | 0.2 | 1.5 | | 1.0 | | | 4.0 | | |
| 4 | | | | | | 4.0 | | | | 4.0 | | | |
| 5 | | | | | | | 4.0 | 25.0 | | 1.0 | | | |
| 6 | | | | | | 9.0 | 6.0 | 5.0 | | | | | |
| 7 | | | 1.0 | | | | | | | 1.0 | | | |
| 8 | | | | | | | | | | 12.2 | 1.0 | | |
| 9 | | | | | | | 1.0 | | | 2.0 | 1.0 | 2.5 | |
| 10 | | | | | | 13.8 | 12.0 | 4.0 | | | 1.0 | | |
| 11 | | | | | | | 2.2 | 3.0 | | | | 4.0 | |
| 12 | | | | 2.0 | | | 9.0 | 1.0 | 2.0 | | | 7.0 | |
| 13 | | | | | 6.0 | | 3.0 | | | | | 2.5 | |
| 14 | | | | | | | 5.0 | | | | | 1.0 | |
| 15 | | | | | 1.8 | | | | | | | | |
| 16 | | 1.0 | | 1.5 | 6.0 | | | 2.0 | | | | 0.5 | |
| 17 | 1.0 | 1.0 | | | | | | | | 3.0 | | | |
| 18 | | | | | | | 4.6 | 2.2 | 1.4 | | | | |
| 19 | 3.0 | | | | | | 10.0 | | | 2.0 | | | |
| 20 | | | | | 12.0 | | | | | | | | |
| 21 | | | | | 8.0 | 13.8 | 9.0 | | | 1.4 | | 0.5 | |
| 22 | | | | | | | 7.0 | 1.0 | | | | | |
| 23 | | | 2.0 | | | 1.8 | | 2.0 | | 3.0 | | | |
| 24 | | 3.0 | | | 2.0 | 1.0 | | | | | | | |
| 25 | | 3.0 | 1.0 | 0.8 | 1.2 | | | | | 0.5 | | 1.0 | |
| 26 | | 5.0 | 3.0 | | 6.0 | | | | | 1.0 | | | |
| 27 | | | | | 6.0 | | | | | | | | |
| 28 | | 9.0 | | | | | | 1.0 | 0.6 | | | | |
| 29 | | | | | | | | 2.4 | | | | | |
| 30 | | | | | | | | 4.0 | 1.0 | | | | YEARLY |
| 31 | | | 4.0 | | | | 15.0 | | | | | | TOTALS |
| MONTHLY TOTALS | 4.0 | 24.0 | 12.0 | 4.3 | 49.2 | 45.9 | 117.6 | 59.5 | 5.2 | 32.1 | 7.0 | 19.0 | 379.8 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

*INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #3
BARSKI CREEK OUTLET AT 313 1988

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | | | | | 88.7 | | 12.9 | 1.2 | | | | |
| 2 | 2.0 | | | | | | | | | 3.7 | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | 23.9 | | | | 2.0 | | |
| 5 | | | 7.0 | | | | 12.9 | | | | | 3.0 | |
| 6 | | 2.0 | 2.0 | | 6.2 | | 18.2 | | 4.5 | | | | |
| 7 | | | 6.0 | | 1.0 | | | | | | 3.0 | 1.0 | |
| 8 | | | | | | 12.1 | | | | | | 7.0 | |
| 9 | 2.0 | | | | | | | 1.4 | 12.5 | | | 2.0 | |
| 10 | | | 1.0 | | | | | | | | | 0.5 | |
| 11 | | | | | | | | | 23.3 | | 3.0 | | |
| 12 | | | | | 4.3 | 0.4 | 27.2 | | | | | 2.5 | |
| 13 | 1.5 | 2.0 | | | | | 15.5 | 2.4 | | | 2.0 | 1.5 | |
| 14 | 0.5 | 1.0 | | | | | | | | | 1.0 | 0.5 | |
| 15 | | 1.0 | | | 5.2 | 37.8 | | | 1.3 | 4.6 | 17.0 | 0.5 | |
| 16 | | | | | | | | | 8.9 | 4.6 | 1.0 | | |
| 17 | | | | | | 5.0 | | | | | 0.5 | 2.0 | |
| 18 | 3.0 | | | | 9.4 | | | | 12.5 | 1.0 | | | |
| 19 | | 4.0 | | | 5.3 | | 4.1 | | 2.2 | | | 1.0 | |
| 20 | | 1.0 | | | | 0.6 | | | | | | | |
| 21 | | 2.0 | 2.0 | | | | | 38.5 | | | | | |
| 22 | | | | 0.2 | 0.8 | 4.8 | | | | *7.0 | | 1.0 | |
| 23 | 1.0 | | | 1.0 | | | | | | *3.0 | | | |
| 24 | 1.0 | | 6.0 | 6.0 | | | | | 0.5 | *1.5 | | 1.5 | |
| 25 | 2.0 | | 9.0 | | 4.4 | | 5.2 | | 0.5 | *2.5 | 2.0 | | |
| 26 | | | 0.5 | | 3.4 | | | 2.9 | 0.5 | | | 1.0 | |
| 27 | | | 1.0 | | | 20.4 | | 5.8 | | *13.0 | | | |
| 28 | | | 2.0 | | | | | 1.2 | | | | 0.5 | |
| 29 | | | 2.0 | | | | | | | | | | |
| 30 | 2.0 | | | | | | | | | *1.0 | | | YEARLY |
| 31 | | | | | | | | | | | | 1.5 | TOTALS |
| MONTHLY TOTALS | 16.0 | 13.0 | 38.5 | 7.2 | 41.1 | 169.8 | 107.0 | 65.1 | 67.9 | 44.4 | 31.5 | 27.0 | 628.5 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #8
BARSKI CREEK OUTLET AT 313 - 1989

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 1.0 | | | 15.2 | | | 1.5 | | 1.0 | |
| 2 | 2.0 | | | | | | | 19.0 | | | 2.0 | | |
| 3 | | | | | 11.8 | | | 3.0 | 4.4 | 2.0 | | | |
| 4 | 1.0 | | | | | | | | | 12.0 | 2.0 | | |
| 5 | 1.0 | 1.5 | | | | 3.3 | 14.4 | | | 1.3 | | | |
| 6 | 1.0 | 1.0 | | | | 30.1 | | | | | | | |
| 7 | 4.0 | | 6.0 | 1.5 | | | | | | | 4.0 | 1.0 | |
| 8 | | 1.0 | | 3.0 | | | | | | | 1.0 | | |
| 9 | | | | 1.0 | | | | | 1.0 | | | 10.0 | |
| 10 | | | 1.5 | | | | | | | | | | |
| 11 | 1.0 | | | | | 33.5 | | | 3.4 | | | | |
| 12 | | 1.0 | 3.0 | | | 11.2 | 22.8 | | | | 1.0 | | |
| 13 | | | | | | | | | | | | | |
| 14 | 2.0 | | | | | | | | | | 1.0 | 1.0 | |
| 15 | | | | | 1.4 | | | | | | | | |
| 16 | 1.0 | | | 1.5 | 2.0 | | | | | 24.0 | | 1.0 | |
| 17 | 1.0 | | | | | 3.2 | | | 8.4 | | | | |
| 18 | 1.0 | | | | 8.3 | | 7.2 | | | | | | |
| 19 | 1.0 | | 2.0 | | | | | 30.0 | | | 0.5 | | |
| 20 | | | | | | 11.8 | | 1.2 | | | | | |
| 21 | | | | | | 2.6 | | | 3.0 | | | | |
| 22 | | | | | 1.4 | 1.7 | | | | | | | |
| 23 | | | | | 0.7 | | | | | | | | |
| 24 | | 1.5 | | 7.2 | | | | | | | 2.0 | | |
| 25 | 1.5 | 1.0 | 2.0 | | 23.0 | | 22.0 | 2.0 | | | | 2.0 | |
| 26 | | | | | 21.7 | | | | | | | | |
| 27 | | | | | | 12.7 | | 4.0 | | 1.4 | | | |
| 28 | | | | | 2.6 | | | | | | 1.0 | 2.0 | |
| 29 | | | 6.0 | | | | 25.0 | 0.9 | | | | | |
| 30 | 5.0 | | | | | | | | 0.5 | | | | YEARLY TOTALS |
| 31 | | | | | | | 0.5 | | | | | | |
| MONTHLY TOTALS | 22.5 | 7.0 | 20.5 | 15.2 | 72.9 | 110.1 | 107.1 | 60.1 | 20.7 | 42.2 | 14.5 | 18.0 | 510.8 |
| LONGTERM AVERAGE | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE AT URL

PRECIPITATION DATA FOR MANUAL RAIN GAUGE #8
BARSKI CREEK OUTLET AT 313 1990

| DAY | *JAN | *FEB | *MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | *NOV | *DEC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | 23.3 | | | | | | | |
| 2 | | | | | | 38.0 | | | 20.0 | | | | |
| 3 | 3.0 | | | | | | 18.2 | | 0.4 | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | 0.4 | | 2.0 | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | 0.3 | 2.8 | 2.0 | 20.0 | | | | | | |
| 8 | 3.0 | | | | | 22.1 | 1.4 | | | 0.5 | 2.0 | | |
| 9 | | 1.0 | | | | | | | | | | | |
| 10 | 4.0 | | | | | | | | | | | | |
| 11 | 5.0 | | | | | 23.1 | | | | | 2.0 | 4.0 | |
| 12 | | 1.0 | 8.0 | | | 1.0 | | | | | | 2.0 | |
| 13 | | | | | | | | | | 7.6 | | | |
| 14 | | | 4.0 | | | | | 4.0 | | | | | |
| 15 | | | 10.0 | 2.3 | | | | 4.0 | | | | | |
| 16 | | | 3.0 | | 10.0 | | | 4.1 | | | | | |
| 17 | | 4.0 | | | 5.6 | | 7.0 | | 2.3 | | | | |
| 18 | | | | | | | | | | | | | |
| 19 | | | | | | 30.0 | | | 25.0 | | | 3.0 | |
| 20 | | | | | | 42.6 | 7.7 | | 8.4 | | 1.5 | 2.0 | |
| 21 | 2.0 | 1.0 | 3.0 | | | | | | | 0.2 | 7.5 | 2.0 | |
| 22 | 2.0 | 1.0 | 2.0 | 8.0 | | 4.4 | | | | | 1.3 | 2.0 | |
| 23 | 1.0 | 1.0 | | 3.2 | 29.4 | | | | | | 3.8 | | |
| 24 | | | | | | | | | | | 2.0 | 0.5 | |
| 25 | 1.0 | | | | | | | | | | | | |
| 26 | | 1.0 | | 10.0 | | | | | | | 1.0 | | |
| 27 | | | | 3.4 | | | | | | | | 1.0 | |
| 28 | | | | | 0.4 | | 2.1 | 2.4 | | 4.2 | | 2.0 | |
| 29 | 1.0 | | | | | | | | 4.4 | | | 1.0 | |
| 30 | | | | 2.0 | | | | 22.4 | | | | 1.0 | YEARLY TOTALS |
| 31 | 1.0 | | | | | | | | | | | | |
| MONTHLY TOTALS | 23.0 | 10.0 | 30.0 | 29.6 | 48.2 | 188.5 | 56.4 | 36.9 | 60.5 | 12.5 | 21.1 | 20.5 | 537.2 |
| LONGTERM AVERAGES | 24.1 | 17.0 | 28.2 | 36.5 | 59.9 | 91.0 | 69.7 | 72.5 | 65.5 | 44.1 | 27.8 | 25.2 | 561.5 |

* INDICATES PRECIPITATION FOR PRECIPITATION GAUGE 1 AT URL

# APPENDIX B

## STREAMFLOW SUMMARIES AND HYDROGRAPHS

## CONTENTS

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

BEAR CREEK DISCHARGE 1987

DRAINAGE AREA 75.3 Km$^2$

| DAY | DISCHARGE (m$^3$/s) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0620 B | 0.0170 B | 0.0210 B | 0.2970 E | 0.3490 E | 0.0870 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0009 | 0.0107 B | 1 |
| 2 | 0.0620 B | 0.0140 B | 0.0210 B | 0.3000 E | 0.3070 E | 0.0800 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0007 | 0.0107 B | 2 |
| 3 | 0.0620 B | 0.0120 B | 0.0200 B | 0.3030 A | 0.2660 E | 0.0740 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0005 | 0.0109 B | 3 |
| 4 | 0.0630 B | 0.0130 B | 0.0190 B | 0.5930 E | 0.2250 E | 0.0680 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0005 | 0.0112 B | 4 |
| 5 | 0.0630 B | 0.0130 B | 0.0190 B | 0.8840 E | 0.1840 A | 0.0610 E | 0.0000 E | 0.0002 E | 0.0000 | 0.0000 | 0.0011 | 0.0114 B | 5 |
| 6 | 0.0630 B | 0.0140 B | 0.0180 B | 1.1740 A | 0.1680 E | 0.0550 E | 0.0000 E | 0.0003 E | 0.0000 | 0.0000 | 0.0017 | 0.0117 B | 6 |
| 7 | 0.0620 B | 0.0140 B | 0.0170 B | 1.5180 E | 0.1510 E | 0.0490 E | 0.0000 E | 0.0004 E | 0.0000 | 0.0000 | 0.0017 | 0.0119 B | 7 |
| 8 | 0.0610 B | 0.0150 B | 0.0170 B | 1.8610 A | 0.1350 E | 0.0420 E | 0.0000 E | 0.0004 E | 0.0000 | 0.0000 | 0.0032 | 0.0122 B | 8 |
| 9 | 0.0590 B | 0.0150 B | 0.0170 B | 1.8930 E | 0.1180 E | 0.0360 A | 0.0000 E | 0.0005 E | 0.0000 | 0.0017 | 0.0046 | 0.0117 B | 9 |
| 10 | 0.0580 B | 0.0160 B | 0.0160 A | 1.9250 E | 0.1020 E | 0.0310 E | 0.0000 E | 0.0006 E | 0.0000 | 0.0010 | 0.3676 | 0.0112 B | 10 |
| 11 | 0.0570 B | 0.0170 B | 0.0380 E | 1.9580 E | 0.0850 E | 0.0260 E | 0.0000 E | 0.0007 E | 0.0000 | 0.0021 | 0.0333 | 0.0107 B | 11 |
| 12 | 0.0560 B | 0.0170 B | 0.0610 E | 1.9900 E | 0.0690 A | 0.0210 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0009 | 0.0036 | 0.0098 B | 12 |
| 13 | 0.0550 B | 0.0180 B | 0.0830 E | 2.0220 E | 0.0730 E | 0.0160 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0008 | 0.0011 | 0.0089 B | 13 |
| 14 | 0.0530 B | 0.0180 B | 0.1060 E | 2.0540 A | 0.0770 E | 0.0110 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0006 | 0.0011 | 0.0083 B | 14 |
| 15 | 0.0520 B | 0.0190 B | 0.1280 E | 1.9350 E | 0.0820 E | 0.0060 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0006 | 0.0056 | 0.0090 B | 15 |
| 16 | 0.0510 B | 0.0190 B | 0.1510 E | 1.8170 E | 0.0860 E | 0.0007 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0006 | 0.0460 | 0.0090 B | 16 |
| 17 | 0.0500 B | 0.0200 B | 0.1730 E | 1.6980 E | 0.0900 E | 0.0007 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0006 | 0.0252 B | 0.0100 B | 17 |
| 18 | 0.0480 B | 0.0210 B | 0.1960 E | 1.5790 E | 0.0950 E | 0.0006 E | 0.0000 E | 0.0008 E | 0.0000 | 0.0013 | 0.0146 B | 0.0100 B | 18 |
| 19 | 0.0470 B | 0.0210 B | 0.2180 E | 1.4600 E | 0.0990 E | 0.0006 E | 0.0000 E | 0.0007 E | 0.0000 | 0.0011 | 0.0077 B | 0.0110 B | 19 |
| 20 | 0.0460 B | 0.0220 B | 0.2400 E | 1.3420 E | 0.1030 A | 0.0006 E | 0.0001 E | 0.0006 E | 0.0000 | 0.0013 | 0.0076 B | 0.0110 B | 20 |
| 21 | 0.0440 B | 0.0220 B | 0.2630 E | 1.2230 A | 0.1040 E | 0.0006 E | 0.0001 E | 0.0005 E | 0.0000 | 0.0025 | 0.0081 B | 0.0110 B | 21 |
| 22 | 0.0410 B | 0.0230 B | 0.2850 E | 1.1160 E | 0.1050 E | 0.0005 E | 0.0001 E | 0.0004 E | 0.0000 | 0.0042 | 0.0087 B | 0.0120 B | 22 |
| 23 | 0.0390 B | 0.0230 B | 0.3080 E | 1.0080 E | 0.1060 E | 0.0005 E | 0.0001 E | 0.0003 E | 0.0000 | 0.0132 | 0.0094 B | 0.0120 B | 23 |
| 24 | 0.0360 B | 0.0240 A | 0.3300 E | 0.9010 E | 0.1080 E | 0.0004 E | 0.0001 E | 0.0002 E | 0.0000 | 0.0089 | 0.0096 B | 0.0140 B | 24 |
| 25 | 0.0340 B | 0.0230 E | 0.3530 E | 0.7940 E | 0.1090 E | 0.0003 E | 0.0001 E | 0.0001 E | 0.0000 | 0.0046 | 0.0096 B | 0.0110 B | 25 |
| 26 | 0.0310 B | 0.0230 E | 0.3750 A | 0.6870 E | 0.1100 E | 0.0003 E | 0.0001 E | 0.0001 E | 0.0000 | 0.0053 | 0.0098 B | 0.0100 B | 26 |
| 27 | 0.0290 B | 0.0220 E | 0.3540 E | 0.5790 E | 0.1110 E | 0.0002 E | 0.0001 E | 0.0000 | 0.0000 | 0.0092 | 0.0100 B | 0.0100 B | 27 |
| 28 | 0.0270 B | 0.0220 E | 0.3330 E | 0.4720 A | 0.1120 A | 0.0001 E | 0.0001 E | 0.0000 | 0.0000 | 0.1120 | 0.0103 B | 0.0090 B | 28 |
| 29 | 0.0240 B | | 0.3120 E | 0.4310 E | 0.1060 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0302 | 0.0105 B | 0.0090 B | 29 |
| 30 | 0.0220 B | | 0.2910 A | 0.3900 E | 0.0990 E | 0.0000 E | 0.0001 E | 0.0000 | 0.0000 | 0.0037 | 0.0107 B | 0.0080 B | 30 |
| 31 | 0.0190 B | | 0.2940 E | | 0.0930 E | | 0.0001 E | 0.0000 | | 0.0018 | | 0.0080 B | 31 |
| TOTAL | 1.4760 | 0.5170 | 5.0770 | 36.2040 | 4.0270 | 0.6691 | 0.0015 | 0.0119 | 0.0000 | 0.2082 | 0.6251 | 0.3254 | |
| MEAN | 0.0476 | 0.0185 | 0.1638 | 1.2068 | 0.1299 | 0.0223 | 0.0000 | 0.0004 | 0.0000 | 0.0067 | 0.0208 | 0.0105 | |
| dam$^3$ | 127.5 | 44.7 | 438.7 | 3128.0 | 347.9 | 57.8 | 0.1 | 1.0 | 0.0 | 18.0 | 54.0 | 28.1 | |
| MAX | 0.0630 | 0.0240 | 0.3750 | 2.0540 | 0.3490 | 0.0870 | 0.0001 | 0.0008 | 0.0000 | 0.1120 | 0.3676 | 0.0140 | |
| MIN | 0.0190 | 0.0120 | 0.0160 | 0.2970 | 0.0690 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 | 0.0080 | |
| mm/unit area | 1.7 | 0.6 | 5.8 | 41.5 | 4.6 | 0.8 | 0.0 | 0.0 | 0.0 | 0.2 | 0.7 | 0.4 | |

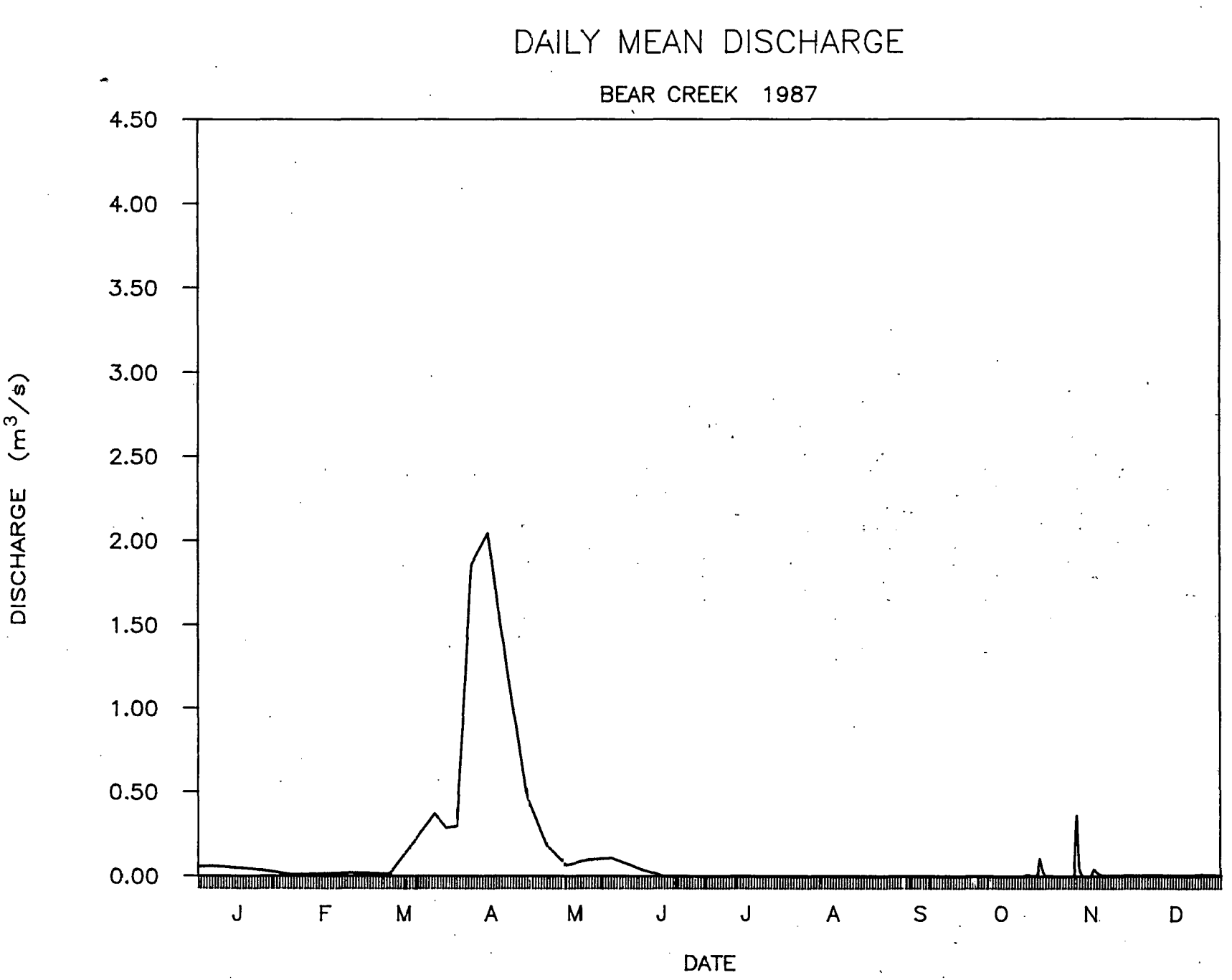
TOTAL DISCHARGE 4250 dam$^3$
56.4 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


DAILY MEAN DISCHARGE
BEAR CREEK 1987
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
DISCHARGE (m3/s)
J
F
M
A
M
J
J
A
S
O
N
D
DATE

BEAR CREEK DISCHARGE 1988

DRAINAGE AREA 75.3 Km$^2$

| DAY | DISCHARGE ($m^3/s$) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0070 B | 0.0060 B | 0.0070 B | 0.0190 B | 0.0520 | 0.2360 E | 0.1600 E | 0.3040 E | 0.6416 E | 0.0455 | 0.1158 A | 0.1082 E | 1 |
| 2 | 0.0070 B | 0.0060 B | 0.0080 B | 0.0310 B | 0.0780 | 10.0000 E | 0.1420 E | 0.2400 E | 0.5002 E | 0.0427 | 0.1472 E | 0.1064 E | 2 |
| 3 | 0.0060 B | 0.0060 B | 0.0080 B | 0.0470 B | 0.0700 | 4.4000 E | 0.1320 E | 0.1500 E | 0.0640 | 0.2071 E | 0.1634 E | 0.1045 E | 3 |
| 4 | 0.0060 B | 0.0060 B | 0.0080 B | 0.0670 B | 0.0440 | 2.6200 E | 0.1260 E | 0.0250 | 0.0212 | 0.0477 | 0.1373 E | 0.1018 E | 4 |
| 5 | 0.0050 B | 0.0060 B | 0.0080 B | 0.0910 B | 0.0450 | 1.6800 E | 0.1420 EE | 0.0130 | 0.0072 | 0.1238 E | 0.1384 E | 0.0991 E | 5 |
| 6 | 0.0050 B | 0.0060 B | 0.0080 B | 0.1330 B | 0.1280 | 1.2800 E | 0.3780 A | 0.0090 | 0.0038 | 0.0412 | 0.1495 E | 0.0974 B | 6 |
| 7 | 0.0050 B | 0.0060 B | 0.0080 B | 0.1180 B | 0.1850 | 0.9800 E | 1.2800 E | 0.0090 | 0.0028 | 0.0268 | 0.1634 A | 0.0864 B | 7 |
| 8 | 0.0050 B | 0.0060 B | 0.0080 B | 0.1030 B | 0.1550 | 0.8800 E | 1.5000 E | 0.0060 | 0.0020 | 0.0302 | 0.1634 E | 0.0762 B | 8 |
| 9 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0890 B | 0.1760 | 0.6380 E | 2.0000 E | 0.0060 | 0.0016 | 0.0396 | 0.1646 E | 0.0674 B | 9 |
| 10 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0770 B | 0.0810 | 0.5270 E | 4.3200 E | 0.0050 | 0.0046 | 0.0281 | 0.1658 E | 0.0587 B | 10 |
| 11 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0660 B | 0.0440 | 0.4170 E | 4.0800 E | 0.0040 | 0.0293 | 0.0536 | 0.1658 E | 0.0506 B | 11 |
| 12 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0550 | 0.0460 | 0.3150 E | 3.3600 E | 0.0040 | 0.0619 | 0.0542 | 0.1670 E | 0.0471 B | 12 |
| 13 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0070 | 0.0560 | 0.3060 A | 3.8000 E | 0.0040 | 0.0593 | 0.0237 | 0.1670 E | 0.0438 B | 13 |
| 14 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0330 | 0.0490 | 0.3800 E | 3.0000 E | 0.0030 | 0.0256 | 0.0109 | 0.1683 E | 0.0438 B | 14 |
| 15 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0720 | 0.0570 | 0.7600 A | 2.7000 E | 0.0030 | 0.0347 E | 0.0132 | 0.1683 E | 0.0444 B | 15 |
| 16 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0920 | 0.1000 | 0.6950 E | 2.7400 E | 0.0020 | 0.0455 E | 0.0276 | 0.1683 E | 0.0444 B | 16 |
| 17 | 0.0050 B | 0.0070 B | 0.0080 B | 0.0590 | 0.0820 | 0.6600 E | 2.5600 E | 0.0055 | 0.0580 E | 0.0302 | 0.1695 E | 0.0449 B | 17 |
| 18 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0720 | 0.2490 | 0.5520 E | 1.7400 E | 0.0019 | 0.0717 E | 0.0449 | 0.1707 A | 0.0449 B | 18 |
| 19 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0880 | 0.8100 E | 0.3480 E | 1.4240 E | 0.0060 | 0.0897 E | 0.0477 | 0.1695 E | 0.0455 B | 19 |
| 20 | 0.0060 B | 0.0070 B | 0.0080 B | 0.1620 | 1.2200 E | 0.3000 E | 0.9540 E | 0.0342 | 0.1091 E | 0.0477 | 0.1683 E | 0.0455 B | 20 |
| 21 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0550 | 0.8500 E | 0.2900 A | 1.0560 E | 0.0169 | 0.1331 E | 0.0466 | 0.1670 E | 0.0460 B | 21 |
| 22 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0240 | 0.4370 E | 0.2640 E | 0.9200 E | 0.0739 | 0.1227 E | 0.0905 E | 0.1634 E | 0.0466 B | 22 |
| 23 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0200 | 0.4010 E | 0.2420 E | 0.8480 E | 0.0172 | 0.0391 | 0.0991 E | 0.1611 E | 0.0471 B | 23 |
| 24 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0670 | 0.1830 E | 0.2600 E | 0.6240 E | 0.0081 | 0.0438 | 0.0897 E | 0.1587 E | 0.0477 B | 24 |
| 25 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0860 | 0.1190 E | 0.2000 E | 0.6550 E | 0.0124 | 0.0306 | 0.0913 E | 0.1564 A | 0.0483 B | 25 |
| 26 | 0.0060 B | 0.0070 B | 0.0080 B | 0.0320 | 0.0570 E | 0.1760 E | 0.5420 E | 0.0052 | 0.0310 | 0.0939 E | 0.1483 E | 0.0489 B | 26 |
| 27 | 0.0060 B | 0.0070 B | 0.0090 B | 0.1190 | 0.0260 A | 0.1760 E | 0.4240 E | 0.0047 | 0.0466 | 0.1018 E | 0.1384 E | 0.0494 B | 27 |
| 28 | 0.0060 B | 0.0070 B | 0.0090 B | 0.0720 | 0.0780 A | 0.2160 A | 0.3960 E | 0.0182 | 0.0606 | 0.1101 E | 0.1331 E | 0.0500 B | 28 |
| 29 | 0.0060 B | 0.0070 B | 0.0100 B | 0.0400 | 0.0440 A | 0.2000 E | 1.5000 E | 0.0222 | 0.0703 | 0.1188 E | 0.1248 E | 0.0506 B | 29 |
| 30 | 0.0060 B | | 0.0100 B | 0.1170 | 0.0470 A | 0.1700 E | 0.3780 E | 0.0237 | 0.0769 | 0.1289 E | 0.1178 A | 0.0512 B | 30 |
| 31 | 0.0060 B | | 0.0110 B | | 0.0760 A | | 0.3550 E | 0.0982 E | | 0.1395 E | | 0.0512 B | 31 |
| TOTAL | 0.1750 | 0.1950 | 0.2560 | 2.1130 | 6.0450 | 30.1680 | 44.2360 | 1.1354 | 2.4886 | 2.0966 | 4.6604 | 1.8979 | |
| MEAN | 0.0056 | 0.0067 | 0.0083 | 0.0704 | 0.1950 | 1.0056 | 1.4270 | 0.0366 | 0.0830 | 0.0676 | 0.1553 | 0.0612 | |
| dam$^3$ | 15.1 | 16.8 | 22.1 | 182.6 | 522.3 | 2606.5 | 3822.0 | 98.1 | 215.0 | 181.1 | 402.7 | 164.0 | |
| MAX | 0.0070 | 0.0070 | 0.0110 | 0.1620 | 1.2200 | 10.0000 | 4.3200 | 0.3040 | 0.6416 | 0.2071 | 0.1707 | 0.1082 | |
| MIN | 0.0050 | 0.0060 | 0.0070 | 0.0070 | 0.0260 | 0.1700 | 0.1260 | 0.0019 | 0.0016 | 0.0109 | 0.1158 | 0.0438 | |
| mm/unit area | 0.2 | 0.2 | 0.3 | 2.4 | 6.9 | 34.6 | 50.8 | 1.3 | 2.9 | 2.4 | 5.3 | 2.2 | |

TOTAL DISCHARGE 8250 dam$^3$
109.5 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

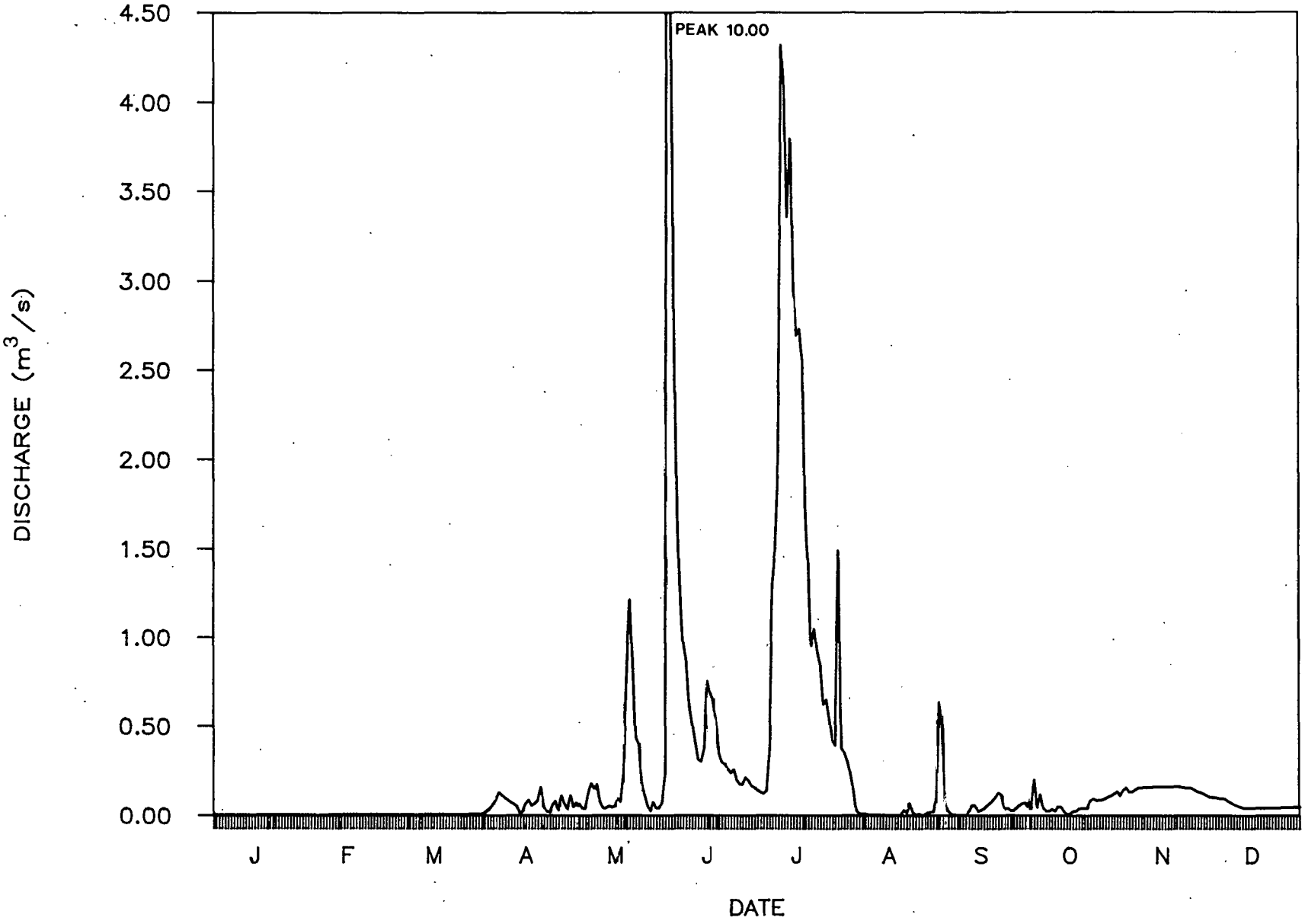
TYPE OF GAUGE - RECORDING



TR-570
COG-92-131

# DAILY MEAN DISCHARGE

BEAR CREEK 1988






TR-570
COG-92-131

BEAR CREEK DISCHARGE 1989

DRAINAGE AREA 75.3 Km$^2$

| DAY | DISCHARGE ($m^3/s$) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0512 B | 0.0401 B | 0.0178 B | 0.0324 B | 2.9240 | 1.2606 | 0.3961 | 0.0653 | 0.0031 | 0.0001 | 0.0056 B | 0.0092 B | 1 |
| 2 | 0.0518 B | 0.0376 B | 0.0188 B | 0.0422 B | 2.6540 | 0.8668 | 0.3645 | 0.0536 | 0.0013 | 0.0001 | 0.0092 B | 0.0083 B | 2 |
| 3 | 0.0524 B | 0.0352 B | 0.0195 B | 0.0542 B | 2.2888 | 0.7508 | 0.3317 | 0.0646 | 0.0004 | 0.0001 | 0.0140 B | 0.0076 B | 3 |
| 4 | 0.0530 B | 0.0324 B | 0.0205 B | 0.0660 B | 2.3018 | 0.5799 | 0.2511 | 0.2183 | 0.0001 E | 0.0008 E | 0.0195 B | 0.0068 B | 4 |
| 5 | 0.0536 B | 0.0297 B | 0.0212 B | 0.0681 B | 2.4847 | 0.6005 | 0.3317 | 0.2699 | 0.0001 E | 0.0010 E | 0.0268 B | 0.0061 B | 5 |
| 6 | 0.0542 B | 0.0276 B | 0.0222 B | 0.0710 B | 2.3500 | 0.7914 | 0.3167 | 0.0148 | 0.0001 | 0.0013 E | 0.0352 B | 0.0052 B | 6 |
| 7 | 0.0536 B | 0.0256 B | 0.0230 B | 0.0732 B | 2.1200 | 1.1298 | 0.2194 | 0.0050 | 0.0001 E | 0.0021 E | 0.0427 B | 0.0046 B | 7 |
| 8 | 0.0530 B | 0.0252 B | 0.0230 B | 0.0681 B | 1.7393 | 1.4891 | 0.1988 | 0.0056 | 0.0001 E | 0.0026 | 0.0356 B | 0.0046 B | 8 |
| 9 | 0.0524 B | 0.0249 B | 0.0233 B | 0.0626 B | 1.6430 | 1.1324 | 0.1900 | 0.0052 | 0.0001 E | 0.0028 | 0.0356 B | 0.0046 B | 9 |
| 10 | 0.0524 B | 0.0245 B | 0.0233 B | 0.0580 B | 1.5030 | 0.9482 | 0.1827 | 0.0070 | 0.0001 E | 0.0028 | 0.0356 B | 0.0046 B | 10 |
| 11 | 0.0518 B | 0.0241 B | 0.0237 B | 0.0530 B | 1.4844 | 0.7972 | 0.1300 | 0.0079 | 0.0002 E | 0.0028 | 0.0356 B | 0.0046 B | 11 |
| 12 | 0.0512 B | 0.0237 B | 0.0237 B | 0.0660 B | 1.1324 | 0.9385 | 0.2163 | 0.0055 | 0.0004 E | 0.0028 | 0.0356 B | 0.0046 B | 12 |
| 13 | 0.0506 B | 0.0233 B | 0.0241 B | 0.0808 B | 0.8552 | 2.4455 | 0.2147 | 0.0031 | 0.0005 E | 0.0022 | 0.0356 B | 0.0046 B | 13 |
| 14 | 0.0500 B | 0.0236 B | 0.0241 B | 0.1853 B | 0.7244 | 2.0413 | 0.1866 | 0.0249 E | 0.0010 | 0.0011 | 0.0356 B | 0.0046 B | 14 |
| 15 | 0.0494 B | 0.0226 B | 0.0237 B | 0.2459 B | 0.6074 | 1.5160 | 0.1880 | 0.0477 E | 0.0005 | 0.0026 E | 0.0347 B | 0.0046 B | 15 |
| 16 | 0.0489 B | 0.0222 B | 0.0233 B | 0.3276 B | 0.5714 | 1.1396 | 0.0824 | 0.0324 E | 0.0003 | 0.0052 E | 0.0338 B | 0.0045 B | 16 |
| 17 | 0.0483 B | 0.0219 B | 0.0230 B | 0.4210 B | 0.5699 | 1.0840 | 0.0856 | 0.0105 | 0.0002 | 0.0085 E | 0.0319 B | 0.0043 B | 17 |
| 18 | 0.0477 B | 0.0215 B | 0.0226 B | 0.4127 B | 0.5868 | 0.9967 | 0.2615 | 0.0188 | 0.0002 | 0.0103 A | 0.0302 B | 0.0031 B | 18 |
| 19 | 0.0471 B | 0.0212 B | 0.0222 B | 0.4072 B | 0.7798 | 0.7740 | 0.2050 | 0.0406 | 0.0001 | 0.0100 E | 0.0285 B | 0.0021 B | 19 |
| 20 | 0.0466 B | 0.0208 B | 0.0219 B | 0.6762 B | 2.1017 | 0.6300 | 0.0905 | 0.0241 | 0.0001 | 0.0098 E | 0.0272 B | 0.0013 B | 20 |
| 21 | 0.0466 B | 0.0201 B | 0.0215 B | 1.3008 B | 1.1668 | 0.8610 | 0.0777 | 0.0166 | 0.0001 | 0.0096 | 0.0256 B | 0.0015 B | 21 |
| 22 | 0.0460 B | 0.0201 B | 0.0212 B | 2.1440 B | 0.7106 | 0.9288 | 0.0646 | 0.0085 | 0.0001 | 0.0094 | 0.0230 B | 0.0016 B | 22 |
| 23 | 0.0460 B | 0.0198 B | 0.0212 B | 3.0540 B | 0.3126 | 2.2480 | 0.0530 | 0.0824 | 0.0001 | 0.0092 E | 0.0205 B | 0.0018 B | 23 |
| 24 | 0.0455 B | 0.0195 B | 0.0212 B | 4.0390 B | 0.2000 | 1.3544 | 0.0567 | 0.0633 | 0.0001 | 0.0089 E | 0.0182 B | 0.0019 B | 24 |
| 25 | 0.0455 B | 0.0191 B | 0.0208 B | 6.6980 B | 0.8320 E | 0.7624 | 0.0587 | 0.0293 | 0.0001 | 0.0063 | 0.0160 B | 0.0021 B | 25 |
| 26 | 0.0449 B | 0.0188 B | 0.0208 B | 6.8210 B | 1.8752 E | 0.5936 | 0.0633 | 0.0276 | 0.0008 | 0.0105 | 0.0140 B | 0.0023 B | 26 |
| 27 | 0.0449 B | 0.0185 B | 0.0208 B | 6.0060 | 2.1017 | 0.6968 | 0.0438 | 0.0226 | 0.0001 | 0.0052 | 0.0122 B | 0.0025 B | 27 |
| 28 | 0.0444 B | 0.0182 B | 0.0205 B | 4.9225 | 1.8903 | 0.5654 | 0.0319 | 0.0178 | 0.0001 | 0.0076 | 0.0112 B | 0.0027 B | 28 |
| 29 | 0.0444 B | | 0.0212 B | 4.0910 | 2.9240 | 0.5380 | 0.0352 | 0.0117 | 0.0001 | 0.0135 | 0.0107 B | 0.0029 B | 29 |
| 30 | 0.0438 B | | 0.0222 B | 3.4895 | 2.7220 | 0.4543 | 0.0703 | 0.0074 | 0.0001 | 0.0043 | 0.0100 B | 0.0031 B | 30 |
| 31 | 0.0433 B | | 0.0230 B | | 1.6279 | | 0.0703 | 0.0056 | | 0.0031 B | | 0.0033 B | 31 |
| TOTAL | 1.5146 | 0.6816 | 0.6792 | 46.0374 | 47.7851 | 30.9150 | 5.0687 | 1.2179 | 0.0109 | 0.1564 | 0.7501 | 0.1255 | |
| MEAN | 0.0489 | 0.0243 | 0.0219 | 1.5346 | 1.5415 | 1.0305 | 0.1635 | 0.0393 | 0.0004 | 0.0050 | 0.0250 | 0.0040 | |
| dam$^3$ | 130.9 | 58.9 | 58.7 | 3977.6 | 4128.6 | 2671.1 | 437.9 | 105.2 | 0.9 | 13.5 | 64.8 | 10.8 | |
| MAX | 0.0542 | 0.0401 | 0.0241 | 6.8210 | 2.9240 | 2.4455 | 0.3961 | 0.2699 | 0.0031 | 0.0135 | 0.0427 | 0.0092 | |
| MIN | 0.0433 | 0.0182 | 0.0178 | 0.0324 | 0.2000 | 0.4543 | 0.0319 | 0.0031 | 0.0001 | 0.0001 | 0.0056 | 0.0013 | |
| mm/unit area | 1.7 | 0.8 | 0.8 | 52.8 | 54.8 | 35.5 | 5.8 | 1.4 | 0.0 | 0.2 | 0.9 | 0.1 | |

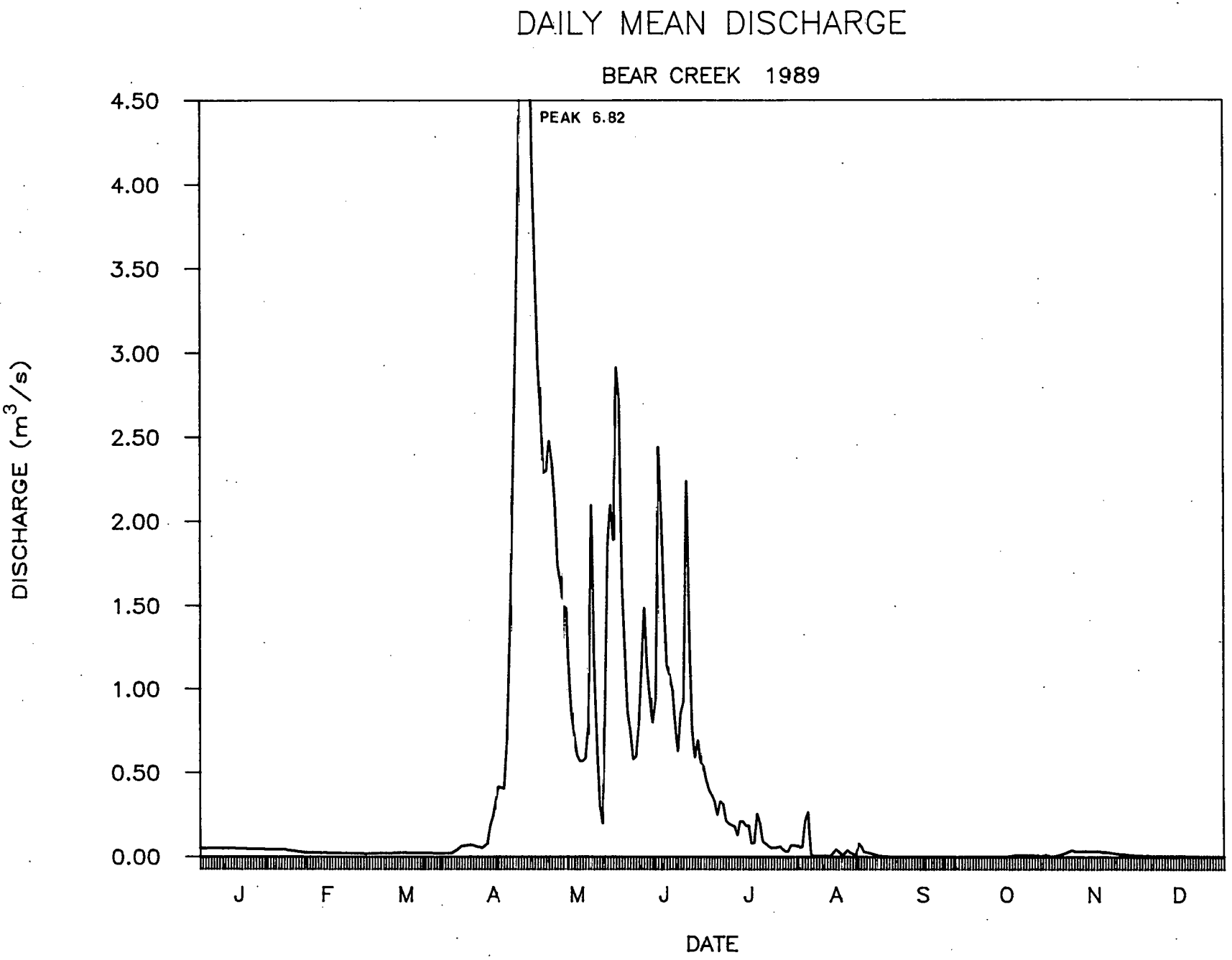
TOTAL DISCHARGE 11700 dam$^3$
154.8 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131






TR-570
COG-92-131

BEAR CREEK DISCHARGE 1990

DRAINAGE AREA 75.3 Km$^2$

| DAY | DISCHARGE (m$^3$/s) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0036 B | 0.0038 B | 0.0053 B | 0.1873 B | 0.9288 | 0.6005 | 0.6418 | 0.2178 | 0.0008 | 0.0003 | 0.0005 | 0.0119 B | 1 |
| 2 | 0.0038 B | 0.0034 B | 0.0053 B | 0.1988 B | 1.2204 | 1.7695 | 0.5456 | 0.1840 | 0.0006 | 0.0160 | 0.0004 | 0.0114 B | 2 |
| 3 | 0.0042 B | 0.0031 B | 0.0053 B | 0.1887 B | 1.1034 | 3.5749 | 0.5578 | 0.0703 | 0.0009 | 0.0208 | 0.0004 | 0.0109 B | 3 |
| 4 | 0.0046 B | 0.0028 B | 0.0053 B | 0.0880 B | 0.7450 | 2.8980 | 0.6556 | 0.0175 | 0.0182 | 0.0100 | 0.0003 | 0.0105 B | 4 |
| 5 | 0.0050 B | 0.0026 B | 0.0053 B | 0.0777 B | 0.6349 | 2.4586 | 0.5714 | 0.0045 | 0.0049 | 0.0092 | 0.0003 | 0.0100 B | 5 |
| 6 | 0.0055 B | 0.0024 B | 0.0061 B | 0.0688 B | 0.5669 | 2.2160 | 0.5532 | 0.0025 | 0.0151 | 0.0072 | 0.0002 | 0.0096 B | 6 |
| 7 | 0.0060 B | 0.0026 B | 0.0070 B | 0.0606 B | 0.5730 | 1.8752 | 0.6968 | 0.0009 | 0.0079 | 0.0041 | 0.0002 | 0.0092 B | 7 |
| 8 | 0.0065 B | 0.0028 B | 0.0079 B | 0.0536 B | 0.5868 | 1.8903 | 0.7381 | 0.0124 | 0.0039 | 0.0019 | 0.0003 | 0.0087 B | 8 |
| 9 | 0.0070 B | 0.0030 B | 0.0089 B | 0.0466 B | 0.6349 | 2.3671 | 0.5639 | 0.0241 | 0.0023 | 0.0013 | 0.0001 | 0.0085 B | 9 |
| 10 | 0.0076 B | 0.0032 B | 0.0100 B | 0.0455 B | 0.5730 | 2.1680 | 0.4961 | 0.0103 | 0.0001 | 0.0011 | 0.0000 | 0.0081 B | 10 |
| 11 | 0.0081 B | 0.0033 B | 0.0114 B | 0.0444 B | 0.6831 | 2.1200 | 0.4293 | 0.0011 | 0.0000 | 0.0010 | 0.0201 B | 0.0077 B | 11 |
| 12 | 0.0087 B | 0.0034 B | 0.0129 B | 0.0438 B | 0.8030 | 2.4455 | 0.3645 | 0.0003 | 0.0006 | 0.0009 | 0.0175 B | 0.0076 B | 12 |
| 13 | 0.0092 B | 0.0034 B | 0.0215 B | 0.0412 B | 0.6143 | 2.1600 | 0.3296 | 0.0001 | 0.0024 | 0.0008 | 0.0160 B | 0.0072 B | 13 |
| 14 | 0.0096 B | 0.0034 B | 0.0328 B | 0.0391 B | 0.5684 | 1.7695 | 0.3064 | 0.0002 | 0.0021 | 0.0008 | 0.0146 B | 0.0068 B | 14 |
| 15 | 0.0100 B | 0.0034 B | 0.1927 B | 0.0366 B | 0.5380 | 1.5030 | 0.2563 | 0.0002 | 0.0014 | 0.0007 | 0.0132 B | 0.0065 B | 15 |
| 16 | 0.0105 B | 0.0034 B | 0.2046 B | 0.0347 B | 0.5244 | 1.3678 | 0.2209 | 0.0001 | 0.0013 | 0.0007 | 0.0119 B | 0.0063 B | 16 |
| 17 | 0.0098 B | 0.0034 B | 0.2170 B | 0.0555 B | 0.5699 | 1.1395 | 0.2178 | 0.0146 | 0.0012 | 0.0007 | 0.0107 B | 0.0061 B | 17 |
| 18 | 0.0089 B | 0.0034 B | 0.0754 B | 0.0824 B | 0.7037 | 1.0743 | 0.2132 | 0.0695 | 0.0008 | 0.0006 | 0.0096 B | 0.0061 B | 18 |
| 19 | 0.0081 B | 0.0034 B | 0.0324 B | 0.1893 B | 0.7508 | 0.9579 | 0.1927 | 0.0117 | 0.0007 | 0.0006 | 0.0072 B | 0.0061 B | 19 |
| 20 | 0.0074 B | 0.0034 B | 0.0315 B | 0.0856 | 0.7175 | 1.8903 | 0.0832 | 0.0007 | 0.0007 | 0.0005 | 0.0076 B | 0.0061 B | 20 |
| 21 | 0.0066 B | 0.0037 B | 0.0310 B | 0.0856 | 0.7037 | 3.4407 | 0.0824 | 0.0006 | 0.0007 | 0.0005 | 0.0096 B | 0.0063 B | 21 |
| 22 | 0.0060 B | 0.0039 B | 0.0276 B | 0.3700 | 0.7244 | 3.2222 | 0.0777 | 0.0006 | 0.0006 | 0.0005 | 0.0146 B | 0.0063 B | 22 |
| 23 | 0.0053 B | 0.0042 B | 0.0245 B | 0.5799 | 1.5077 | 2.8060 | 0.0777 | 0.0008 | 0.0005 | 0.0004 | 0.0208 B | 0.0063 B | 23 |
| 24 | 0.0053 B | 0.0045 B | 0.0215 B | 0.5517 | 1.4616 | 2.2757 | 0.0695 | 0.0182 | 0.0005 | 0.0004 | 0.0328 B | 0.0063 B | 24 |
| 25 | 0.0053 B | 0.0047 B | 0.0188 B | 0.7740 | 1.1395 | 1.9205 | 0.0619 | 0.0065 | 0.0004 | 0.0004 | 0.0245 B | 0.0063 B | 25 |
| 26 | 0.0052 B | 0.0050 B | 0.0163 B | 0.8997 | 1.0064 | 1.5520 | 0.0710 | 0.0032 | 0.0003 | 0.0004 | 0.0201 B | 0.0065 B | 26 |
| 27 | 0.0052 B | 0.0053 B | 0.0140 B | 0.8088 | 0.8436 | 1.3142 | 0.0606 | 0.0061 | 0.0003 | 0.0005 | 0.0175 B | 0.0065 B | 27 |
| 28 | 0.0050 B | 0.0053 B | 0.0122 B | 0.8030 | 0.7106 | 1.1286 | 0.0587 | 0.0160 | 0.0003 | 0.0005 | 0.0151 B | 0.0065 B | 28 |
| 29 | 0.0050 B | | 0.0260 B | 0.9482 | 0.5639 | 0.9482 | 0.0444 | 0.0063 | 0.0003 | 0.0005 | 0.0135 B | 0.0065 B | 29 |
| 30 | 0.0046 B | | 0.0471 B | 0.8900 | 0.7740 | 0.7914 | 0.0347 | 0.0041 | 0.0003 | 0.0005 | 0.0124 B | 0.0065 B | 30 |
| 31 | 0.0042 B | | 0.0856 B | | 1.4937 | | 0.2163 | 0.0016 | | 0.0005 | | 0.0066 B | 31 |
| TOTAL | 0.2019 | 0.1006 | 1.2237 | 8.3789 | 24.9693 | 57.6454 | 9.4890 | 0.7066 | 0.0701 | 0.0845 | 0.3120 | 0.2361 | |
| MEAN | 0.0065 | 0.0036 | 0.0395 | 0.2793 | 0.8055 | 1.9215 | 0.3061 | 0.0228 | 0.0023 | 0.0027 | 0.0104 | 0.0076 | |
| dam^3 | 17.4 | 8.7 | 105.7 | 723.9 | 2157.3 | 4980.6 | 819.8 | 61.0 | 6.1 | 7.3 | 27.0 | 20.4 | |
| MAX | 0.0105 | 0.0053 | 0.2170 | 0.9482 | 1.5077 | 3.5749 | 0.7381 | 0.2178 | 0.0182 | 0.0208 | 0.0328 | 0.0119 | |
| MIN | 0.0036 | 0.0024 | 0.0053 | 0.0347 | 0.5244 | 0.6005 | 0.0347 | 0.0001 | 0.0000 | 0.0003 | 0.0000 | 0.0061 | |
| mm/unit area | 0.2 | 0.1 | 1.4 | 9.6 | 28.7 | 66.1 | 10.9 | 0.8 | 0.1 | 0.1 | 0.4 | 0.3 | |

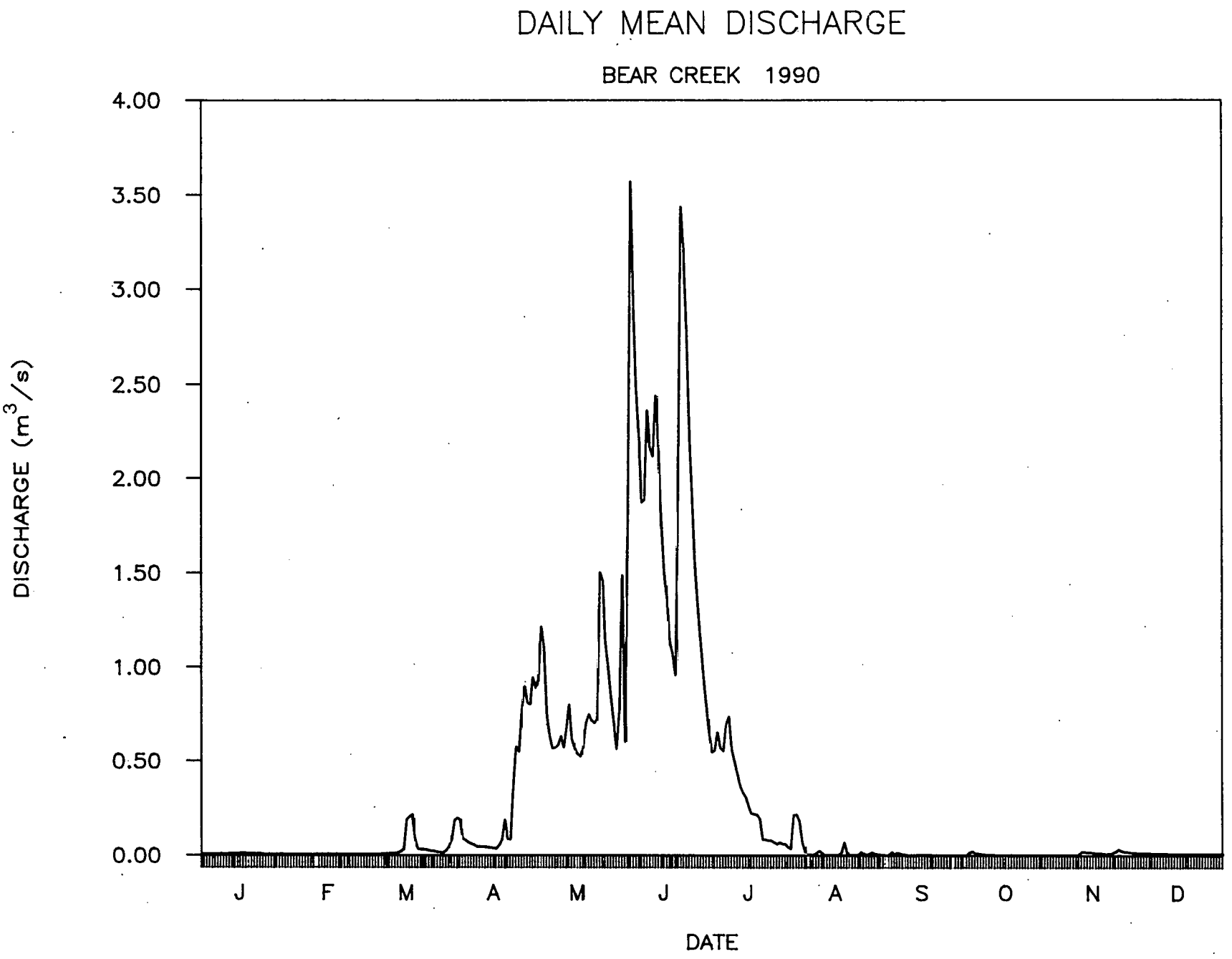
TOTAL DISCHARGE 8940 dam$^3$
118.7 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


DAILY MEAN DISCHARGE
BEAR CREEK 1990
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
DISCHARGE ($m^3/s$)
J
F
M
A
M
J
J
A
S
O
N
D
DATE

DEER CREEK DISCHARGE 1987

DRAINAGE AREA 24.36 Km$^2$

| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DISCHARGE (m$^3$/s) | | | | | | DISCHARGE (m$^3$/s) | | | | | | |
| 1 | 0.0098 B | 0.0039 B | 0.0027 B | 0.2740 B | 0.1770 E | 0.0550 E | 0.0012 E | 0.0030 | 0.0010 A | 0.0000 | 0.0020 E | 0.0030 B | 1 |
| 2 | 0.0094 B | 0.0037 B | 0.0022 B | 0.2990 B | 0.1630 E | 0.0510 E | 0.0012 E | 0.0020 | 0.0010 | 0.0000 | 0.0020 E | 0.0030 B | 2 |
| 3 | 0.0089 B | 0.0035 B | 0.0018 B | 0.3230 B | 0.1490 E | 0.0480 E | 0.0013 E | 0.0020 | 0.0010 | 0.0000 | 0.0030 A | 0.0030 B | 3 |
| 4 | 0.0085 B | 0.0035 B | 0.0015 B | 0.3480 B | 0.1340 E | 0.0450 E | 0.0013 E | 0.0020 | 0.0010 | 0.0000 | 0.0030 E | 0.0030 B | 4 |
| 5 | 0.0080 B | 0.0036 B | 0.0011 B | 0.3720 B | 0.1200 A | 0.0410 E | 0.0014 E | 0.0020 | 0.0020 | 0.0000 | 0.0030 E | 0.0040 B | 5 |
| 6 | 0.0076 B | 0.0036 B | 0.0007 B | 0.3970 B | 0.1090 E | 0.0370 E | 0.0014 E | 0.0070 | 0.0020 | 0.0000 | 0.0030 E | 0.0040 B | 6 |
| 7 | 0.0075 B | 0.0037 B | 0.0004 B | 0.5490 E | 0.0980 E | 0.0340 E | 0.0015 E | 0.0040 | 0.0020 E | 0.0000 | 0.0030 E | 0.0040 B | 7 |
| 8 | 0.0075 B | 0.0037 B | 0.0001 B | 0.7010 A | 0.0870 E | 0.0300 E | 0.0019 E | 0.0030 | 0.0010 A | 0.0000 | 0.0040 B | 0.0040 B | 8 |
| 9 | 0.0074 B | 0.0038 B | 0.0000 | 0.8900 E | 0.0760 E | 0.0260 E | 0.0023 E | 0.0020 | 0.0010 | 0.0000 | 0.0040 B | 0.0040 B | 9 |
| 10 | 0.0073 B | 0.0038 B | 0.0000 | 1.0780 A | 0.0650 E | 0.0230 E | 0.0027 | 0.0020 | 0.0010 | 0.0000 | 0.0040 B | 0.0030 B | 10 |
| 11 | 0.0072 B | 0.0038 B | 0.0000 | 0.9420 E | 0.0540 E | 0.0190 E | 0.0031 | 0.0020 | 0.0010 | 0.0000 | 0.0040 B | 0.0030 B | 11 |
| 12 | 0.0072 B | 0.0039 B | 0.0007 B | 0.8070 E | 0.0430 A | 0.0150 E | 0.0042 | 0.0020 A | 0.0010 | 0.0020 E | 0.0030 B | 0.0030 B | 12 |
| 13 | 0.0071 B | 0.0039 B | 0.0014 B | 0.6710 E | 0.0410 E | 0.0110 E | 0.0034 A | 0.0020 | 0.0020 | 0.0030 A | 0.0030 B | 0.0040 B | 13 |
| 14 | 0.0070 B | 0.0040 B | 0.0021 B | 0.5350 | 0.0390 E | 0.0080 E | 0.0021 | 0.0020 | 0.0010 | 0.0030 E | 0.0030 B | 0.0040 B | 14 |
| 15 | 0.0070 B | 0.0040 B | 0.0027 B | 0.5260 E | 0.0360 E | 0.0040 E | 0.0020 | 0.0020 | 0.0010 | 0.0030 E | 0.0030 B | 0.0040 B | 15 |
| 16 | 0.0069 B | 0.0041 B | 0.0034 B | 0.5160 E | 0.0340 E | 0.0008 E | 0.0017 | 0.0020 | 0.0010 | 0.0020 E | 0.0030 B | 0.0040 B | 16 |
| 17 | 0.0068 B | 0.0041 B | 0.0041 B | 0.5070 E | 0.0320 E | 0.0008 E | 0.0016 | 0.0010 | 0.0010 | 0.0010 E | 0.0030 B | 0.0040 B | 17 |
| 18 | 0.0067 B | 0.0041 B | 0.0048 B | 0.4970 E | 0.0300 E | 0.0008 E | 0.0016 | 0.0010 | 0.0010 | 0.0010 E | 0.0030 B | 0.0040 B | 18 |
| 19 | 0.0067 B | 0.0042 B | 0.0055 B | 0.4880 E | 0.0270 E | 0.0008 E | 0.0050 | 0.0010 | 0.0010 | 0.0010 E | 0.0030 B | 0.0040 B | 19 |
| 20 | 0.0066 B | 0.0042 B | 0.0314 B | 0.4780 E | 0.0250 A | 0.0007 E | 0.0040 | 0.0010 | 0.0010 | 0.0010 A | 0.0030 B | 0.0040 B | 20 |
| 21 | 0.0064 B | 0.0043 B | 0.0574 B | 0.4690 A | 0.0310 E | 0.0007 E | 0.0020 | 0.0030 | 0.0010 | 0.0010 E | 0.0030 B | 0.0040 B | 21 |
| 22 | 0.0062 B | 0.0043 B | 0.0833 B | 0.4330 E | 0.0360 E | 0.0007 E | 0.0080 | 0.0040 | 0.0010 A | 0.0010 E | 0.0030 B | 0.0040 B | 22 |
| 23 | 0.0059 B | 0.0044 B | 0.1093 B | 0.3980 E | 0.0420 E | 0.0007 E | 0.0060 | 0.0020 | 0.0010 | 0.0010 E | 0.0030 B | 0.0040 B | 23 |
| 24 | 0.0057 B | 0.0044 B | 0.1352 B | 0.3620 E | 0.0480 E | 0.0008 E | 0.0040 | 0.0013 | 0.0002 A | 0.0010 E | 0.0030 B | 0.0040 B | 24 |
| 25 | 0.0055 B | 0.0040 B | 0.1311 B | 0.3270 E | 0.0530 E | 0.0008 E | 0.0030 | 0.0010 | 0.0002 E | 0.0020 E | 0.0030 B | 0.0030 B | 25 |
| 26 | 0.0053 B | 0.0036 B | 0.1270 B | 0.2910 E | 0.0580 E | 0.0009 E | 0.0050 | 0.0010 E | 0.0001 E | 0.0030 E | 0.0030 B | 0.0020 B | 26 |
| 27 | 0.0051 B | 0.0033 B | 0.1520 B | 0.2560 E | 0.0640 E | 0.0009 E | 0.0050 | 0.0010 E | 0.0001 E | 0.0030 A | 0.0030 B | 0.0010 B | 27 |
| 28 | 0.0048 B | 0.0029 B | 0.1760 B | 0.2200 E | 0.0700 A | 0.0010 E | 0.0050 | 0.0010 E | 0.0000 | 0.0030 E | 0.0030 B | 0.0008 B | 28 |
| 29 | 0.0046 B | | 0.2000 B | 0.2060 E | 0.0660 E | 0.0010 E | 0.0040 | 0.0010 E | 0.0000 | 0.0020 E | 0.0030 B | 0.0004 B | 29 |
| 30 | 0.0044 B | | 0.2250 B | 0.1910 E | 0.0630 E | 0.0011 E | 0.0030 | 0.0010 E | 0.0000 | 0.0020 E | 0.0030 B | 0.0002 B | 30 |
| 31 | 0.0042 B | | 0.2500 B | | 0.0590 E | | 0.0030 | 0.0010 E | | 0.0020 E | | 0.0002 B | 31 |
| TOTAL | 0.2092 | 0.1083 | 1.7129 | 14.3510 | 2.1290 | 0.4595 | 0.0929 | 0.0623 | 0.0276 | 0.0380 | 0.0920 | 0.0966 | |
| MEAN | 0.0067 | 0.0039 | 0.0553 | 0.4784 | 0.0687 | 0.0153 | 0.0030 | 0.0020 | 0.0009 | 0.0012 | 0.0031 | 0.0031 | |
| dam$^3$ | 18.1 | 9.4 | 148.0 | 1239.9 | 183.9 | 39.7 | 8.0 | 5.4 | 2.4 | 3.3 | 7.9 | 8.3 | |
| MAX | 0.0098 | 0.0044 | 0.2500 | 1.0780 | 0.1770 | 0.0550 | 0.0080 | 0.0070 | 0.0020 | 0.0030 | 0.0040 | 0.0040 | |
| MIN | 0.0042 | 0.0029 | 0.0000 | 0.1910 | 0.0250 | 0.0007 | 0.0012 | 0.0010 | 0.0000 | 0.0000 | 0.0020 | 0.0002 | |
| mm/unit area | 0.7 | 0.4 | 6.1 | 50.9 | 7.6 | 1.6 | 0.3 | 0.2 | 0.1 | 0.1 | 0.3 | 0.3 | |

TOTAL DISCHARGE 1670 dam$^3$
68.7 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

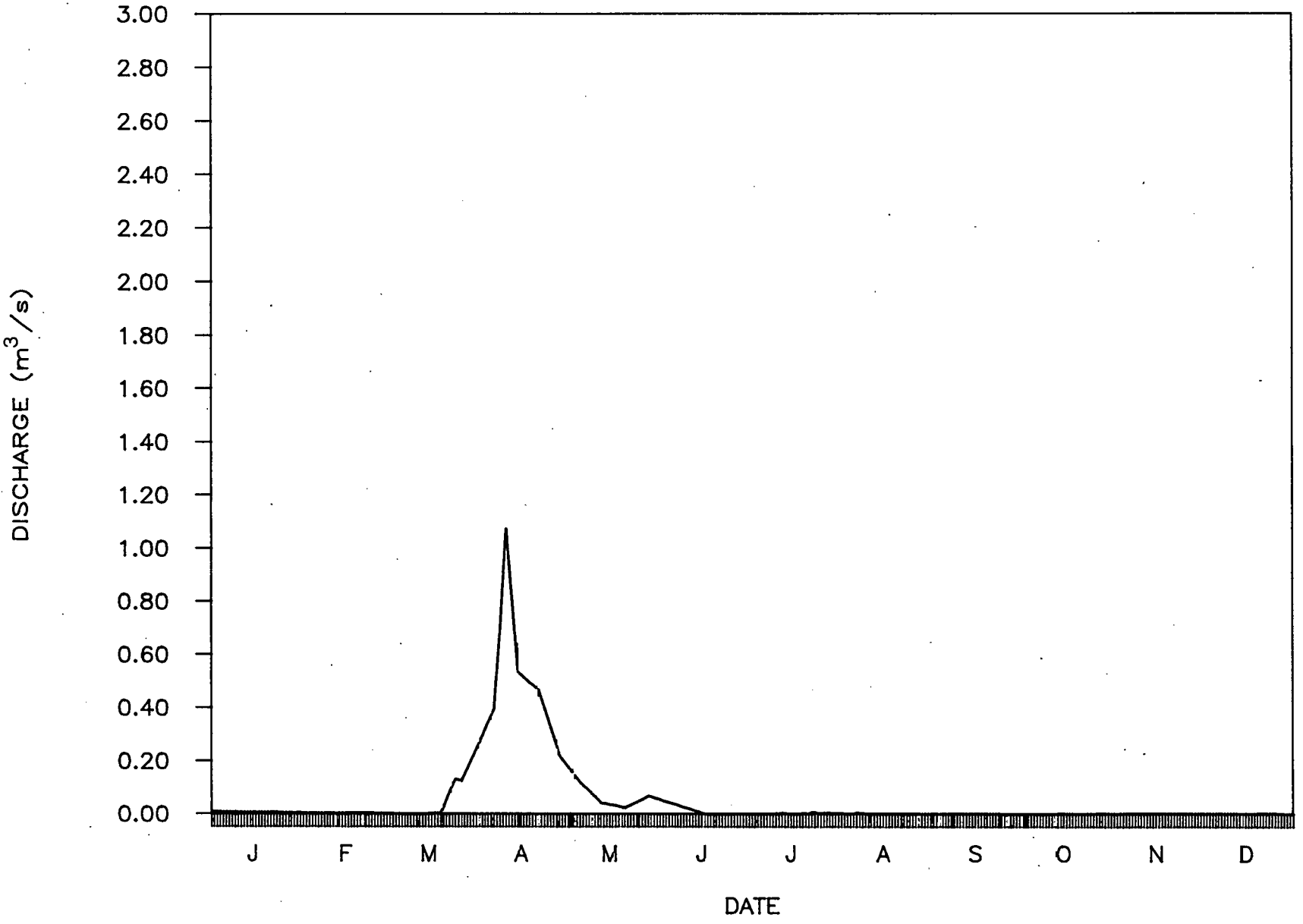
TYPE OF GAUGE - RECORDING



TR-570
COG-92-131

# DAILY MEAN DISCHARGE

DEER CREEK 1987






TR-570
COG-92-131

DEER CREEK DISCHARGE 1988

DRAINAGE AREA 24.36 Km$^2$

DISCHARGE ($m^3/s$)

| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0002 B | 0.0000 | 0.0000 | 0.0008 E | 0.0246 E | 0.1758 E | 0.0580 E | 0.0179 E | 0.0001 E | 0.0046 E | 0.0262 B | 0.0292 B | 1 |
| 2 | 0.0002 B | 0.0000 | 0.0000 | 0.0072 E | 0.0238 E | 0.8229 E | 0.0400 E | 0.0168 E | 0.0001 E | 0.0043 E | 0.0259 B | 0.0279 B | 2 |
| 3 | 0.0001 B | 0.0000 | 0.0000 | 0.0229 E | 0.0231 E | 0.7539 E | 0.0320 E | 0.0160 E | 0.0001 E | 0.0041 E | 0.0259 B | 0.0262 B | 3 |
| 4 | 0.0001 B | 0.0000 | 0.0000 | 0.0471 E | 0.0223 E | 0.6849 E | 0.0145 E | 0.0147 E | 0.0001 E | 0.0039 E | 0.0256 B | 0.0250 B | 4 |
| 5 | 0.0000 | 0.0000 | 0.0000 | 0.0843 A | 0.0215 A | 0.6159 E | 0.2060 E | 0.0137 E | 0.0001 E | 0.0046 | 0.0256 B | 0.0238 B | 5 |
| 6 | 0.0000 | 0.0000 | 0.0000 | 0.1457 E | 0.0246 E | 0.5469 E | 0.3085 E | 0.0126 E | 0.0001 E | 0.0052 | 0.0253 B | 0.0226 B | 6 |
| 7 | 0.0000 | 0.0000 | 0.0000 | 0.2282 A | 0.0475 E | 0.4760 E | 0.2500 A | 0.0115 E | 0.0001 E | 0.0054 | 0.0253 B | 0.0200 B | 7 |
| 8 | 0.0000 | 0.0000 | 0.0000 | 0.2098 E | 0.0418 E | 0.4070 A | 0.2242 E | 0.0105 E | 0.0002 E | 0.0053 | 0.0256 B | 0.0174 B | 8 |
| 9 | 0.0000 | 0.0000 | 0.0000 | 0.1914 E | 0.0391 E | 0.3450 E | 0.1986 E | 0.0094 A | 0.0003 E | 0.0046 | 0.0259 B | 0.0153 B | 9 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.1730 E | 0.0371 A | 0.2830 E | 0.1730 E | 0.0079 E | 0.0003 E | 0.0034 | 0.0259 B | 0.0130 B | 10 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.1546 E | 0.0367 E | 0.2210 E | 0.1472 E | 0.0109 E | 0.0072 E | 0.0030 | 0.0262 B | 0.0112 B | 11 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.1362 E | 0.0363 E | 0.1590 E | 0.1217 A | 0.0079 E | 0.0321 E | 0.0027 | 0.0266 B | 0.0096 B | 12 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.1178 E | 0.0390 E | 0.0970 E | 0.2147 E | 0.0044 E | 0.0285 E | 0.0027 | 0.0266 B | 0.0079 B | 13 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0994 E | 0.0386 E | 0.0348 E | 0.3077 E | 0.0019 E | 0.0259 E | 0.0026 | 0.0269 B | 0.0075 B | 14 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0811 E | 0.0392 E | 0.2063 A | 0.2500 E | 0.0005 E | 0.0238 E | 0.0027 | 0.0269 B | 0.0072 B | 15 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0628 E | 0.0368 E | 0.1500 E | 0.1937 E | 0.0003 E | 0.0264 E | 0.0059 | 0.0272 B | 0.0067 B | 16 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0445 E | 0.0344 A | 0.0800 E | 0.1767 E | 0.0003 E | 0.0292 E | 0.0075 | 0.0272 B | 0.0063 B | 17 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0262 E | 0.0341 E | 0.0500 E | 0.1597 E | 0.0003 E | 0.0272 E | 0.0075 | 0.0275 B | 0.0061 B | 18 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0079 A | 0.0537 E | 0.1440 E | 0.1420 E | 0.0003 E | 0.0248 E | 0.0081 | 0.0309 B | 0.0057 B | 19 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0059 E | 0.0437 E | 0.0907 E | 0.1250 E | 0.0003 E | 0.0224 E | 0.0084 | 0.0346 B | 0.0053 B | 20 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0049 E | 0.0339 E | 0.0661 A | 0.1090 E | 0.0002 E | 0.0200 E | 0.0069 | 0.0385 B | 0.0053 B | 21 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0039 E | 0.0325 E | 0.0568 E | 0.0917 E | 0.0002 E | 0.0176 E | 0.0065 | 0.0422 B | 0.0052 B | 22 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0029 E | 0.0321 E | 0.0474 E | 0.0740 E | 0.0002 E | 0.0152 E | 0.0063 E | 0.0466 B | 0.0050 B | 23 |
| 24 | 0.0000 | 0.0000 | 0.0000 | 0.0019 E | 0.0317 E | 0.0381 E | 0.0570 E | 0.0002 E | 0.0128 E | 0.0084 E | 0.0508 B | 0.0049 B | 24 |
| 25 | 0.0000 | 0.0000 | 0.0000 | 0.0188 E | 0.0313 E | 0.0287 E | 0.0400 E | 0.0002 E | 0.0104 E | 0.0109 E | 0.0557 B | 0.0049 B | 25 |
| 26 | 0.0000 | 0.0000 | 0.0000 | 0.0206 E | 0.0309 E | 0.0193 E | 0.0242 A | 0.0001 E | 0.0080 E | 0.0137 E | 0.0498 B | 0.0048 B | 26 |
| 27 | 0.0000 | 0.0000 | 0.0000 | 0.0320 E | 0.0305 E | 0.0100 E | 0.0232 E | 0.0001 E | 0.0058 A | 0.0167 | 0.0444 B | 0.0047 B | 27 |
| 28 | 0.0000 | 0.0000 | 0.0000 | 0.0282 E | 0.0311 E | 0.0917 A | 0.0221 E | 0.0001 E | 0.0055 E | 0.0235 B | 0.0393 B | 0.0046 B | 28 |
| 29 | 0.0000 | 0.0000 | 0.0000 | 0.0261 A | 0.0307 E | 0.0800 E | 0.0210 E | 0.0001 E | 0.0052 E | 0.0235 B | 0.0346 B | 0.0046 B | 29 |
| 30 | 0.0000 | | 0.0000 | 0.0253 E | 0.0293 E | 0.0700 E | 0.0200 E | 0.0001 E | 0.0049 E | 0.0238 B | 0.0306 B | 0.0045 B | 30 |
| 31 | 0.0000 | | 0.0001 E | | 0.0288 A | E | 0.0189 E | 0.0001 E | | 0.0241 B | | 0.0044 B | 31 |
| TOTAL | 0.0006 | 0.0000 | 0.0001 | 2.0114 | 0.0246 | 6.8522 | 3.8443 | 0.1597 | 0.3544 | 0.2608 | 0.9703 | 0.3468 | |
| MEAN | 0.0000 | 0.0000 | 0.0000 | 0.0670 | 0.0336 | 0.2284 | 0.1240 | 0.0052 | 0.0118 | 0.0084 | 0.0323 | 0.0112 | |
| dam^3 | 0.1 | 0.0 | 0.0 | 173.8 | 2.1 | 592.0 | 332.1 | 13.8 | 30.6 | 22.5 | 83.8 | 30.0 | |
| MAX | 0.0002 | 0.0000 | 0.0001 | 0.2282 | 0.0537 | 0.8229 | 0.3085 | 0.0179 | 0.0321 | 0.0241 | 0.0557 | 0.0292 | |
| MIN | 0.0000 | 0.0000 | 0.0000 | 0.0008 | 0.0215 | 0.0100 | 0.0145 | 0.0001 | 0.0001 | 0.0026 | 0.0253 | 0.0044 | |
| mm/unit area | 0.0 | 0.0 | 0.0 | 7.1 | 0.1 | 24.3 | 13.6 | 0.6 | 1.3 | 0.9 | 3.4 | 1.2 | |

TOTAL DISCHARGE 1280 $dam^3$

52.6 mm/unit area

A - MANUAL GAUGE

E - ESTIMATE

B - ICE CONDITIONS

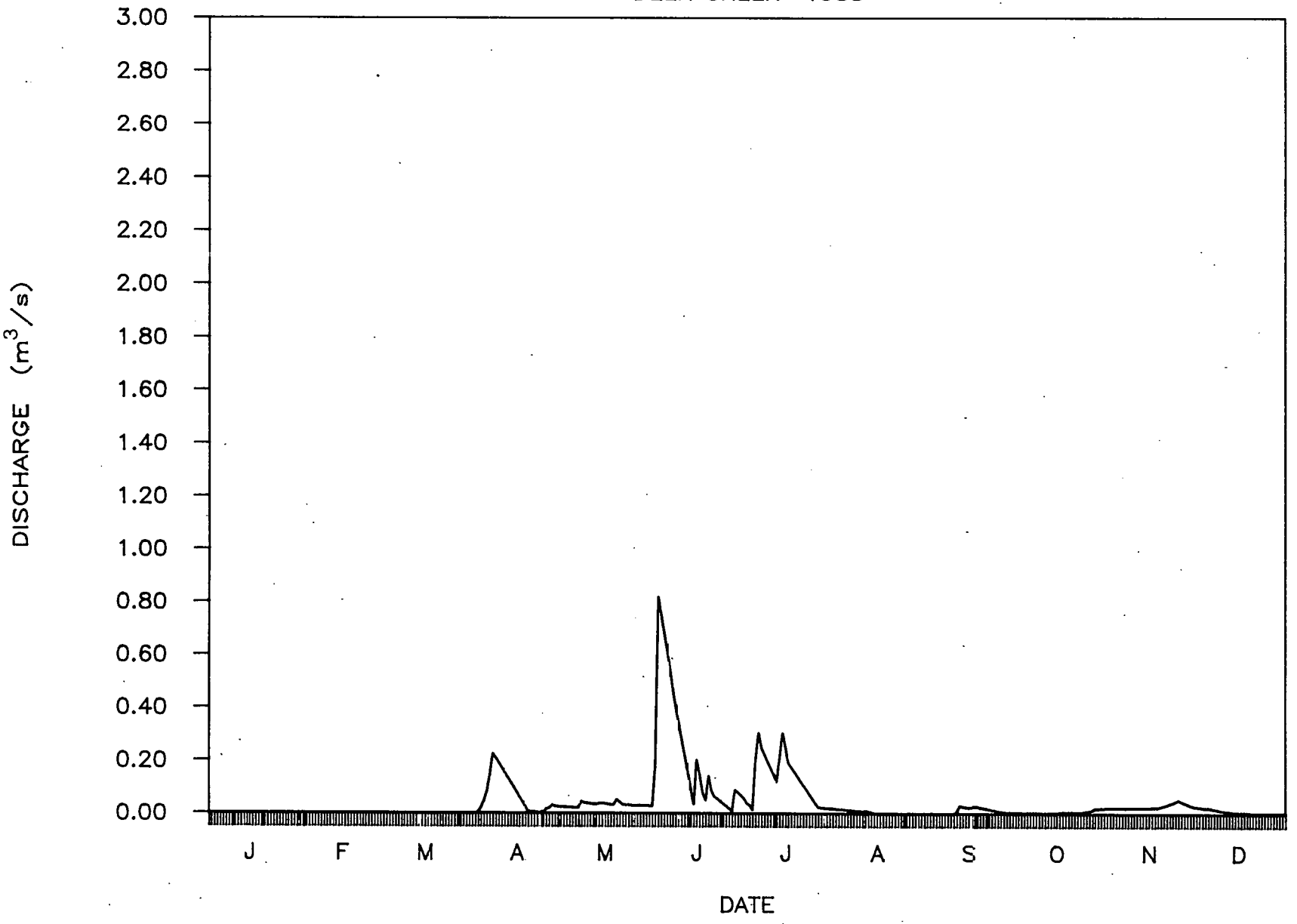
TYPE OF GAUGE - RECORDING



TR-570
COG-92-131

# DAILY MEAN DISCHARGE

DEER CREEK 1988






TR-570
COG-92-131

DEER CREEK DISCHARGE 1989

DRAINAGE AREA 24.36 Km$^2$

| DAY | DISCHARGE ($m^3/s$) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0047 B | 0.0037 B | 0.0000 | 0.0003 E | 1.0120 E | 0.4510 E | 0.1140 E | 0.1000 E | 0.0130 E | 0.0002 E | 0.0080 E | 0.0026 B | 1 |
| 2 | 0.0046 B | 0.0040 B | 0.0000 | 0.0019 E | 0.9440 E | 0.4430 E | 0.1030 E | 0.0360 E | 0.0120 E | 0.0004 E | 0.0100 E | 0.0025 B | 2 |
| 3 | 0.0046 B | 0.0043 B | 0.0000 | 0.0052 E | 0.8380 E | 0.3900 E | 0.0680 E | 0.0610 E | 0.0140 E | 0.0005 E | 0.0120 E | 0.0024 B | 3 |
| 4 | 0.0044 B | 0.0046 B | 0.0000 | 0.0105 A | 0.8420 E | 0.2870 E | 0.0770 E | 0.0650 E | 0.0170 E | 0.0005 E | 0.0140 E | 0.0023 B | 4 |
| 5 | 0.0044 B | 0.0049 B | 0.0000 | 0.0190 E | 0.8460 E | 0.2460 E | 0.0490 E | 0.0600 E | 0.0150 E | 0.0008 E | 0.0160 E | 0.0022 B | 5 |
| 6 | 0.0040 B | 0.0052 B | 0.0000 | 0.0170 E | 0.7850 E | 0.1950 A | 0.0320 E | 0.0560 E | 0.0120 E | 0.0010 E | 0.0180 E | 0.0021 B | 6 |
| 7 | 0.0040 B | 0.0055 B | 0.0000 | 0.0100 E | 0.7350 E | 0.4720 E | 0.0510 E | 0.0510 E | 0.0100 E | 0.0008 E | 0.0210 E | 0.0020 B | 7 |
| 8 | 0.0037 B | 0.0037 B | 0.0000 | 0.0060 E | 0.7050 E | 0.4060 A | 0.0810 E | 0.0470 E | 0.0080 E | 0.0006 E | 0.0230 E | 0.0015 B | 8 |
| 9 | 0.0034 B | 0.0034 B | 0.0000 | 0.0040 E | 0.6870 E | 0.4060 E | 0.0730 E | 0.0420 E | 0.0060 E | 0.0004 E | 0.0240 E | 0.0013 B | 9 |
| 10 | 0.0032 B | 0.0032 B | 0.0000 | 0.0020 E | 0.5890 E | 0.3400 E | 0.0790 E | 0.0360 E | 0.0040 E | 0.0003 E | 0.0260 E | 0.0010 B | 10 |
| 11 | 0.0029 B | 0.0015 B | 0.0000 | 0.0007 A | 0.5360 E | 0.3630 E | 0.0610 E | 0.0310 E | 0.0020 E | 0.0003 E | 0.0280 E | 0.0009 B | 11 |
| 12 | 0.0027 B | 0.0010 B | 0.0000 | 0.0020 E | 0.4900 E | 0.4270 E | 0.1350 E | 0.0250 E | 0.0040 E | 0.0002 E | 0.0290 E | 0.0007 B | 12 |
| 13 | 0.0023 B | 0.0006 B | 0.0000 | 0.0070 E | 0.4410 E | 0.5660 E | 0.1500 E | 0.0210 E | 0.0020 E | 0.0002 E | 0.0310 E | 0.0005 B | 13 |
| 14 | 0.0021 B | 0.0003 B | 0.0000 | 0.0160 A | 0.3960 E | 0.5610 E | 0.1120 E | 0.0170 E | 0.0010 E | 0.0001 E | 0.0320 B | 0.0004 B | 14 |
| 15 | 0.0019 B | 0.0001 B | 0.0000 | 0.0830 A | 0.3590 E | 0.5220 E | 0.1010 E | 0.0150 E | 0.0010 E | 0.0040 E | 0.0300 B | 0.0002 B | 15 |
| 16 | 0.0017 B | 0.0000 | 0.0000 | 0.1200 E | 0.3320 E | 0.4370 E | 0.0920 E | 0.0120 E | 0.0010 E | 0.0080 E | 0.0280 B | 0.0001 B | 16 |
| 17 | 0.0015 B | 0.0000 | 0.0000 | 0.1670 A | 0.4230 E | 0.3770 E | 0.1280 E | 0.0120 E | 0.0010 E | 0.0060 E | 0.0260 B | 0.0001 B | 17 |
| 18 | 0.0014 B | 0.0000 | 0.0000 | 0.1480 E | 0.4240 E | 0.3240 E | 0.1280 E | 0.0100 E | 0.0008 E | 0.0060 A | 0.0250 B | 0.0000 | 18 |
| 19 | 0.0012 B | 0.0000 | 0.0000 | 0.1350 A | 0.3590 E | 0.2840 A | 0.1240 E | 0.0250 E | 0.0006 E | 0.0060 E | 0.0230 B | 0.0000 | 19 |
| 20 | 0.0014 B | 0.0000 | 0.0000 | 0.1620 E | 0.4260 E | 0.2620 E | 0.1160 E | 0.0200 E | 0.0006 E | 0.0060 E | 0.0210 B | 0.0000 | 20 |
| 21 | 0.0015 B | 0.0000 | 0.0000 | 0.1920 E | 0.3830 E | 0.2980 E | 0.0890 E | 0.0150 E | 0.0005 E | 0.0070 E | 0.0200 B | 0.0000 | 21 |
| 22 | 0.0015 B | 0.0000 | 0.0000 | 0.7960 E | 0.3690 E | 0.2900 E | 0.0690 E | 0.0120 E | 0.0005 E | 0.0070 E | 0.0180 B | 0.0000 | 22 |
| 23 | 0.0019 B | 0.0000 | 0.0000 | 0.9470 E | 0.2720 E | 0.2770 E | 0.0730 E | 0.0110 E | 0.0004 E | 0.0080 E | 0.0150 B | 0.0000 | 23 |
| 24 | 0.0020 B | 0.0000 | 0.0000 | 1.3740 E | 0.3430 E | 0.2360 E | 0.0700 E | 0.0100 E | 0.0003 E | 0.0080 E | 0.0120 B | 0.0000 | 24 |
| 25 | 0.0022 B | 0.0000 | 0.0000 | 2.2920 E | 0.4310 E | 0.2260 E | 0.0500 E | 0.0090 E | 0.0003 E | 0.0080 E | 0.0100 B | 0.0000 | 25 |
| 26 | 0.0023 B | 0.0000 | 0.0000 | 2.5920 E | 0.8300 E | 0.2110 E | 0.0350 E | 0.0080 E | 0.0003 E | 0.0070 E | 0.0070 B | 0.0000 | 26 |
| 27 | 0.0026 B | 0.0000 | 0.0000 | 2.0540 E | 0.6930 E | 0.2010 E | 0.0060 E | 0.0080 E | 0.0002 E | 0.0070 E | 0.0050 B | 0.0000 | 27 |
| 28 | 0.0028 B | 0.0000 | 0.0000 | 1.7370 E | 0.6490 E | 0.1730 E | 0.0040 E | 0.0090 E | 0.0002 E | 0.0060 E | 0.0040 B | 0.0000 | 28 |
| 29 | 0.0030 B | | 0.0000 | 1.3220 E | 0.5561 A | 0.1600 E | 0.0080 E | 0.0100 E | 0.0001 E | 0.0060 E | 0.0030 B | 0.0000 | 29 |
| 30 | 0.0033 B | | 0.0000 | 1.1400 E | 0.5230 E | 0.1320 E | 0.0500 E | 0.0120 E | 0.0001 E | 0.0060 E | 0.0028 B | 0.0000 | 30 |
| 31 | 0.0035 B | | 0.0000 | | 0.4860 E | | 0.2000 E | 0.0150 E | | 0.0060 E | | 0.0000 | 31 |
| TOTAL | 0.0867 | 0.0460 | 0.0000 | 15.3626 | 1.0120 | 9.9630 | 2.5280 | 0.8610 | 0.1279 | 0.1183 | 0.5418 | 0.0228 | |
| MEAN | 0.0028 | 0.0016 | 0.0000 | 0.5121 | 0.5709 | 0.3321 | 0.0815 | 0.0278 | 0.0043 | 0.0038 | 0.0181 | 0.0007 | |
| dam^3 | 7.5 | 4.0 | 0.0 | 1327.3 | 87.4 | 860.8 | 218.4 | 74.4 | 11.1 | 10.2 | 46.8 | 2.0 | |
| MAX | 0.0047 | 0.0055 | 0.0000 | 2.5920 | 1.0120 | 0.5660 | 0.2000 | 0.1000 | 0.0170 | 0.0080 | 0.0320 | 0.0026 | |
| MIN | 0.0012 | 0.0000 | 0.0000 | 0.0003 | 0.2720 | 0.1320 | 0.0040 | 0.0080 | 0.0001 | 0.0001 | 0.0028 | 0.0000 | |
| mm/unit area | 0.3 | 0.2 | 0.0 | 54.5 | 3.6 | 35.3 | 9.0 | 3.1 | 0.5 | 0.4 | 1.9 | 0.1 | |

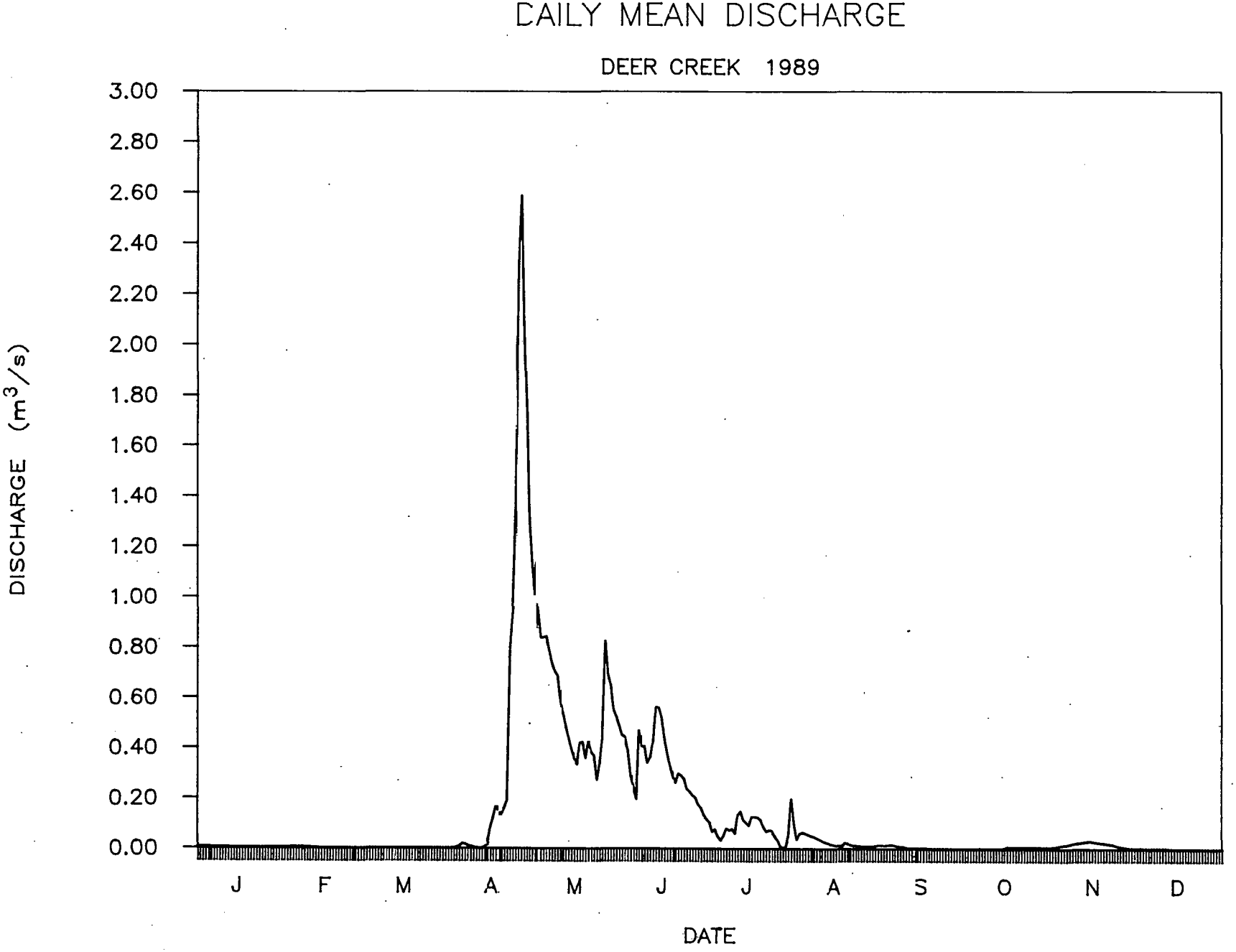
TOTAL DISCHARGE 2650 $dam^3$
108.8 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


DAILY MEAN DISCHARGE
DEER CREEK 1989
DISCHARGE (m3/s)
3.00
2.80
2.60
2.40
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
J
F
M
A
M
J
J
A
S
O
N
D
DATE

DEER CREEK DISCHARGE 1990

DRAINAGE AREA 24.36 Km$^2$

| DAY | DISCHARGE ($m^3/s$) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | DISCHARGE ($m^3/s$) JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0615 E | 0.2760 | 0.1040 | 0.1452 | 0.0025 E | 0.0000 E | 0.0000 E | 0.0002 E | 0.0010 B | 1 |
| 2 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0483 A | 0.2835 | 0.2244 | 0.1320 | 0.0020 E | 0.0000 E | 0.0000 E | 0.0001 E | 0.0010 B | 2 |
| 3 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0200 E | 0.2585 | 0.5530 | 0.1480 | 0.0017 E | 0.0000 E | 0.0000 E | 0.0001 E | 0.0010 B | 3 |
| 4 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0110 A | 0.1810 | 0.4750 | 0.1683 | 0.0014 E | 0.0000 A | 0.0000 E | 0.0001 E | 0.0010 B | 4 |
| 5 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0070 E | 0.1920 | 0.5490 | 0.1980 | 0.0010 E | 0.0000 E | 0.0000 E | 0.0001 B | 0.0009 B | 5 |
| 6 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0050 A | 0.1750 | 0.3828 | 0.2277 | 0.0007 E | 0.0000 E | 0.0000 E | 0.0000 B | 0.0008 B | 6 |
| 7 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0060 E | 0.2015 | 0.2871 | 0.2895 | 0.0004 E | 0.0000 E | 0.0000 E | 0.0000 B | 0.0007 B | 7 |
| 8 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0070 E | 0.2285 | 0.4300 | 0.3290 | 0.0003 A | 0.0000 E | 0.0000 E | 0.0000 B | 0.0006 B | 8 |
| 9 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0100 E | 0.2110 | 0.5883 | 0.3650 | 0.0002 E | 0.0000 E | 0.0000 A | 0.0000 B | 0.0006 B | 9 |
| 10 | 0.0000 B | 0.0000 B | 0.0000 B | 0.0120 E | 0.2170 | 0.5500 | 0.1848 | 0.0002 E | 0.0000 A | 0.0000 E | 0.0000 B | 0.0006 B | 10 |
| 11 | 0.0000 B | 0.0000 B | 0.0000 A | 0.0140 E | 0.1860 | 0.6996 | 0.1333 | 0.0002 A | 0.0000 E | 0.0000 E | 0.0000 B | 0.0006 B | 11 |
| 12 | 0.0000 B | 0.0000 B | 0.0090 A | 0.0150 E | 0.1490 | 0.7524 | 0.1287 | 0.0002 E | 0.0000 E | 0.0000 E | 0.0000 B | 0.0005 B | 12 |
| 13 | 0.0000 B | 0.0000 B | 0.0180 A | 0.0160 E | 0.1475 | 0.7010 | 0.1056 | 0.0002 E | 0.0000 E | 0.0001 E | 0.0000 B | 0.0005 B | 13 |
| 14 | 0.0000 B | 0.0000 B | 0.0360 E | 0.0170 E | 0.1565 | 0.5676 | 0.0907 | 0.0002 A | 0.0000 E | 0.0001 E | 0.0000 B | 0.0005 B | 14 |
| 15 | 0.0000 B | 0.0000 B | 0.0763 A | 0.0180 E | 0.1375 | 0.4650 | 0.0800 | 0.0002 E | 0.0000 E | 0.0001 E | 0.0000 B | 0.0005 B | 15 |
| 16 | 0.0000 B | 0.0000 B | 0.0753 E | 0.0200 E | 0.1665 | 0.4026 | 0.0759 | 0.0002 E | 0.0000 E | 0.0001 E | 0.0000 B | 0.0005 B | 16 |
| 17 | 0.0000 B | 0.0000 B | 0.0743 A | 0.0200 A | 0.2330 | 0.3630 | 0.0779 | 0.0002 A | 0.0000 E | 0.0001 E | 0.0000 B | 0.0005 B | 17 |
| 18 | 0.0000 B | 0.0000 B | 0.0441 E | 0.0500 E | 0.2485 | 0.3069 | 0.0710 | 0.0001 E | 0.0000 E | 0.0001 E | 0.0000 B | 0.0004 B | 18 |
| 19 | 0.0000 B | 0.0000 B | 0.0138 A | 0.0460 | 0.2330 | 0.3399 | 0.0676 | 0.0001 E | 0.0000 E | 0.0001 A | 0.0000 B | 0.0004 B | 19 |
| 20 | 0.0000 B | 0.0000 B | 0.0108 E | 0.1210 | 0.2010 | 0.6501 | 0.0842 | 0.0001 A | 0.0000 E | 0.0002 E | 0.0000 B | 0.0004 B | 20 |
| 21 | 0.0000 B | 0.0000 B | 0.0078 E | 0.0645 | 0.1890 | 0.9405 | 0.0779 | 0.0001 E | 0.0000 E | 0.0002 E | 0.0001 B | 0.0004 B | 21 |
| 22 | 0.0000 B | 0.0000 B | 0.0048 E | 0.1030 | 0.2345 | 0.7821 | 0.0690 | 0.0000 E | 0.0000 E | 0.0002 E | 0.0002 B | 0.0004 B | 22 |
| 23 | 0.0000 B | 0.0000 B | 0.0020 A | 0.1570 | 0.2200 | 0.5930 | 0.0577 | 0.0000 E | 0.0000 E | 0.0001 E | 0.0004 B | 0.0003 B | 23 |
| 24 | 0.0000 B | 0.0000 B | 0.0015 E | 0.1655 | 0.2225 | 0.4305 | 0.0495 | 0.0000 E | 0.0000 E | 0.0000 A | 0.0006 B | 0.0003 B | 24 |
| 25 | 0.0000 B | 0.0000 B | 0.0015 E | 0.2075 | 0.2305 | 0.3850 | 0.0413 | 0.0000 E | 0.0000 E | 0.0000 E | 0.0008 B | 0.0003 B | 25 |
| 26 | 0.0000 B | 0.0000 B | 0.0005 A | 0.2480 | 0.1720 | 0.3555 | 0.0410 | 0.0000 E | 0.0000 E | 0.0000 E | 0.0010 B | 0.0003 B | 26 |
| 27 | 0.0000 B | 0.0000 B | 0.0007 E | 0.2490 | 0.1610 | 0.3069 | 0.0148 | 0.0000 E | 0.0000 E | 0.0000 E | 0.0010 B | 0.0002 B | 27 |
| 28 | 0.0000 B | 0.0000 B | 0.0010 A | 0.2510 | 0.1335 | 0.2970 | 0.0092 | 0.0000 A | 0.0000 E | 0.0001 A | 0.0010 B | 0.0002 B | 28 |
| 29 | 0.0000 B | 0.0000 B | 0.0252 E | 0.2705 | 0.1023 | 0.2310 | 0.0030 | 0.0000 E | 0.0000 E | 0.0002 E | 0.0010 B | 0.0002 B | 29 |
| 30 | 0.0000 B | 0.0000 B | 0.0494 A | 0.2835 | 0.1071 | 0.2046 | 0.0027 | 0.0000 E | 0.0000 E | 0.0002 E | 0.0010 B | 0.0001 B | 30 |
| 31 | 0.0000 B | 0.0000 B | 0.0747 A | | 0.1060 | | 0.0025 | 0.0000 E | 0.0000 E | 0.0002 E | | 0.0001 B | 31 |
| TOTAL | 0.0000 | 0.0000 | 0.5267 | 2.5243 | 5.9609 | 13.9178 | 3.4710 | 0.0122 | 0.0000 | 0.0021 | 0.0077 | 0.0158 | |
| MEAN | 0.0000 | 0.0000 | 0.0170 | 0.0841 | 0.1923 | 0.4639 | 0.1120 | 0.0004 | 0.0000 | 0.0001 | 0.0003 | 0.0005 | |
| dam^3 | 0.0000 | 0.0000 | 45.5 | 218.1 | 515.0 | 1202.5 | 299.9 | 1.1 | 0.0 | 0.2 | 0.7 | 1.4 | |
| MAX | 0.0000 | 0.0000 | 0.0763 | 0.2835 | 0.2835 | 0.9405 | 0.3650 | 0.0025 | 0.0000 | 0.0002 | 0.0010 | 0.0010 | |
| MIN | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 0.1023 | 0.1040 | 0.0025 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0001 | |
| mm/unit area | 0.0 | 0.0 | 1.9 | 9.0 | 21.1 | 49.4 | 12.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | |

TOTAL DISCHARGE 2280 dam$^3$

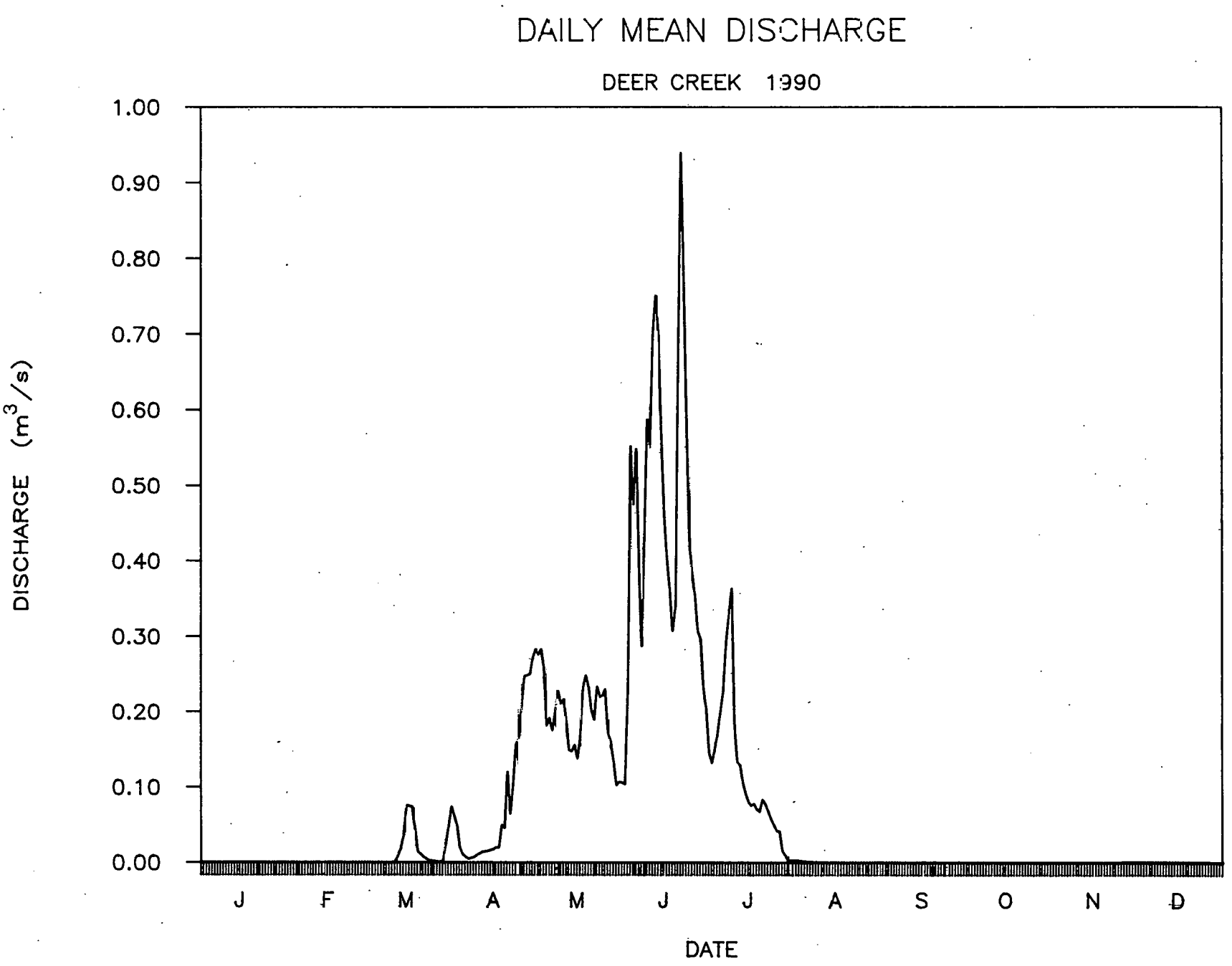
93.8 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


DAILY MEAN DISCHARGE
DEER CREEK 1990
DISCHARGE (m3/s)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
J
F
M
A
M
J
J
A
S
O
N
D
DATE

RICE CREEK DISCHARGE 1987

DRAINAGE AREA 154.4 $Km^2$

| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DISCHARGE ($m^3/s$) | | | | | | DISCHARGE ($m^3/s$) | | | | | | |
| 1 | 0.0300 B | 0.0050 B | 0.0075 B | 0.8620 E | 2.0670 E | 0.3470 E | 0.0020 E | 0.0053 | 0.0007 | 0.0004 | 0.0008 | 0.0003 B | 1 |
| 2 | 0.0290 B | 0.0050 B | 0.0080 B | 0.9610 E | 1.9890 E | 0.3260 E | 0.0024 E | 0.0041 | 0.0006 | 0.0004 | 0.0009 | 0.0003 B | 2 |
| 3 | 0.0290 B | 0.0050 B | 0.0085 B | 1.0610 E | 1.9110 E | 0.3050 E | 0.0027 E | 0.0039 | 0.0004 | 0.0004 | 0.0008 | 0.0003 B | 3 |
| 4 | 0.0290 B | 0.0050 B | 0.0090 B | 1.1610 E | 1.8320 E | 0.2840 E | 0.0030 E | 0.0036 | 0.0003 | 0.0004 | 0.0008 | 0.0002 B | 4 |
| 5 | 0.0290 B | 0.0050 B | 0.0095 B | 1.2610 E | 1.7540 E | 0.2630 E | 0.0033 E | 0.0038 | 0.0005 | 0.0006 | 0.0008 | 0.0002 B | 5 |
| 6 | 0.0280 B | 0.0050 B | 0.0100 B | 1.3600 E | 1.6760 E | 0.2420 E | 0.0036 E | 0.0127 | 0.0008 | 0.0006 | 0.0008 | 0.0002 B | 6 |
| 7 | 0.0280 B | 0.0050 B | 0.0105 B | 1.4600 A | 1.5980 E | 0.2210 E | 0.0040 E | 0.0074 | 0.0008 | 0.0006 | 0.0008 | 0.0001 B | 7 |
| 8 | 0.0260 B | 0.0050 B | 0.0110 B | 1.9510 E | 1.5190 E | 0.2000 E | 0.0043 E | 0.0045 | 0.0006 | 0.0007 | 0.0008 | 0.0001 B | 8 |
| 9 | 0.0240 B | 0.0050 B | 0.0115 B | 2.4430 E | 1.4410 E | 0.1790 E | 0.0046 E | 0.0034 | 0.0005 | 0.0008 | 0.0008 | 0.0000 | 9 |
| 10 | 0.0230 B | 0.0050 B | 0.0120 B | 2.9340 A | 1.3630 E | 0.1580 A | 0.0046 | 0.0033 | 0.0004 | 0.0005 | 0.0008 | 0.0000 | 10 |
| 11 | 0.0210 B | 0.0050 B | 0.0114 B | 2.9720 E | 1.2840 E | 0.1310 E | 0.0055 | 0.0039 | 0.0003 | 0.0004 | 0.0008 | 0.0000 | 11 |
| 12 | 0.0190 B | 0.0050 B | 0.0109 B | 3.0100 E | 1.2060 E | 0.1040 E | 0.0072 | 0.0041 | 0.0004 | 0.0004 | 0.0008 | 0.0000 | 12 |
| 13 | 0.0170 B | 0.0050 B | 0.0103 B | 3.0480 E | 1.1280 E | 0.0770 E | 0.0060 | 0.0034 | 0.0005 | 0.0004 | 0.0006 | 0.0001 B | 13 |
| 14 | 0.0160 B | 0.0050 B | 0.0098 B | 3.0860 E | 1.0500 E | 0.0500 E | 0.0036 | 0.0028 | 0.0004 | 0.0004 | 0.0004 | 0.0008 B | 14 |
| 15 | 0.0140 B | 0.0050 B | 0.0092 B | 3.1240 E | 0.9710 E | 0.0230 A | 0.0034 | 0.0026 | 0.0004 | 0.0004 | 0.0004 | 0.0006 B | 15 |
| 16 | 0.0120 B | 0.0050 B | 0.0087 B | 3.1560 A | 0.8930 E | 0.0233 E | 0.0030 | 0.0026 | 0.0004 | 0.0004 | 0.0003 | 0.0004 B | 16 |
| 17 | 0.0100 B | 0.0050 B | 0.0081 B | 3.1230 E | 0.8150 E | 0.0237 E | 0.0028 | 0.0022 | 0.0004 | 0.0003 | 0.0003 B | 0.0004 B | 17 |
| 18 | 0.0090 B | 0.0050 B | 0.0076 B | 3.0830 E | 0.7370 E | 0.0241 E | 0.0028 | 0.0022 | 0.0003 | 0.0005 | 0.0003 B | 0.0003 B | 18 |
| 19 | 0.0050 B | 0.0050 B | 0.0070 E | 3.0440 E | 0.6580 E | 0.0245 E | 0.0087 | 0.0021 | 0.0004 | 0.0004 | 0.0002 B | 0.0002 B | 19 |
| 20 | 0.0050 B | 0.0050 B | 0.0320 E | 3.0040 E | 0.5810 A | 0.0249 E | 0.0068 | 0.0020 | 0.0004 | 0.0004 | 0.0002 B | 0.0002 B | 20 |
| 21 | 0.0050 B | 0.0050 B | 0.0570 E | 2.9660 A | 0.5620 E | 0.0253 E | 0.0042 | 0.0043 | 0.0004 | 0.0004 | 0.0001 B | 0.0001 B | 21 |
| 22 | 0.0050 B | 0.0050 B | 0.0820 E | 2.8700 E | 0.5440 E | 0.0256 E | 0.0132 | 0.0068 | 0.0004 | 0.0005 | 0.0001 B | 0.0001 B | 22 |
| 23 | 0.0050 B | 0.0050 B | 0.0730 E | 2.7760 E | 0.5270 E | 0.0260 A | 0.0110 | 0.0039 | 0.0004 | 0.0013 | 0.0001 B | 0.0001 B | 23 |
| 24 | 0.0050 B | 0.0050 B | 0.0640 E | 2.6810 E | 0.5090 E | 0.0219 E | 0.0061 | 0.0023 | 0.0004 | 0.0010 | 0.0001 B | 0.0001 B | 24 |
| 25 | 0.0050 B | 0.0055 B | 0.1640 E | 2.5860 E | 0.4910 E | 0.0178 E | 0.0047 | 0.0018 | 0.0004 | 0.0010 | 0.0001 B | 0.0000 B | 25 |
| 26 | 0.0050 B | 0.0060 B | 0.2630 E | 2.4910 E | 0.4730 A | 0.0137 E | 0.0079 | 0.0004 | 0.0004 | 0.0020 | 0.0001 B | 0.0000 B | 26 |
| 27 | 0.0050 B | 0.0065 B | 0.3630 E | 2.3970 E | 0.4520 E | 0.0096 E | 0.0083 | 0.0005 | 0.0004 | 0.0010 | 0.0002 B | 0.0000 B | 27 |
| 28 | 0.0050 B | 0.0070 B | 0.4630 E | 2.3020 A | 0.4310 E | 0.0055 E | 0.0079 | 0.0005 | 0.0004 | 0.0010 | 0.0002 B | 0.0000 B | 28 |
| 29 | 0.0050 B | | 0.5620 E | 2.2240 E | 0.4100 E | 0.0014 A | 0.0061 | 0.0001 | 0.0005 | 0.0010 | 0.0003 B | 0.0000 B | 29 |
| 30 | 0.0050 B | | 0.6620 E | 2.1450 E | 0.3890 E | 0.0017 E | 0.0043 | 0.0009 | 0.0005 | 0.0010 | 0.0003 B | 0.0000 B | 30 |
| 31 | 0.0050 B | | 0.7620 E | | 0.3680 E | | 0.0050 | 0.0007 | | 0.0009 | | 0.0000 | 31 |
| TOTAL | 0.4580 | 0.1450 | 3.7275 | 71.5420 | 31.6290 | 3.1790 | 0.1630 | 0.1021 | 0.0137 | 0.0205 | 0.0139 | 0.0051 | |
| MEAN | 0.0148 | 0.0052 | 0.1202 | 2.3847 | 1.0203 | 0.1060 | 0.0053 | 0.0033 | 0.0005 | 0.0007 | 0.0005 | 0.0002 | |
| $dam^3$ | 39.6 | 12.5 | 322.1 | 6181.2 | 2732.7 | 274.7 | 14.1 | 8.8 | 1.2 | 1.8 | 1.2 | 0.4 | |
| MAX | 0.0300 | 0.0070 | 0.7620 | 3.1560 | 2.0670 | 0.3470 | 0.0132 | 0.0127 | 0.0008 | 0.0020 | 0.0009 | 0.0008 | |
| MIN | 0.0050 | 0.0050 | 0.0070 | 0.8620 | 0.3680 | 0.0014 | 0.0020 | 0.0001 | 0.0003 | 0.0003 | 0.0001 | 0.0000 | |
| mm/unit area | 0.3 | 0.1 | 2.1 | 40.0 | 17.7 | 1.8 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |

TOTAL DISCHARGE 9590 $dam^3$

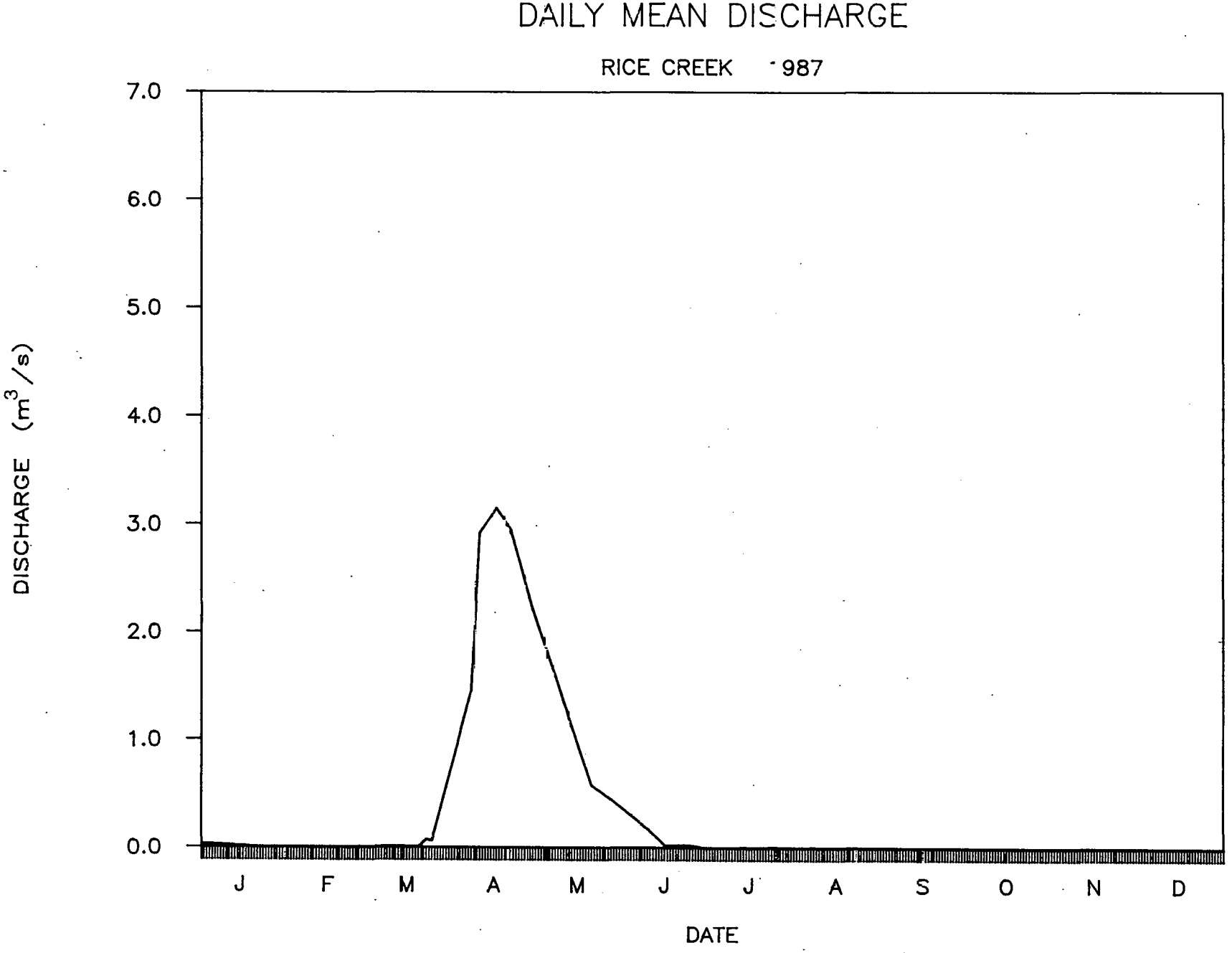
62.1 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131






TR-570
COG-92-131

RICE CREEK DISCHARGE 1988

DRAINAGE AREA 154.4 Km$^2$

| DAY | DISCHARGE (m$^3$/s) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0110 | 0.0260 | 0.7520 | 0.3830 | 0.0041 | 0.0163 | 0.0031 | 0.1101 B | 1 |
| 2 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0090 | 0.4950 | 0.7490 | 0.5940 | 0.0038 | 0.0185 | 0.0031 | 0.1082 B | 2 |
| 3 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.7800 E | 0.6120 | 0.4120 | 0.0037 | 0.0205 | 0.0031 | 0.1064 B | 3 |
| 4 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0030 | 3.2500 E | 0.5470 | 0.2720 | 0.0036 | 0.0222 | 0.0032 | 0.1054 B | 4 |
| 5 | 0.0000 | 0.0000 | 0.0000 | 0.0040 | 0.0030 | 3.1000 E | 0.5770 | 0.1540 | 0.0034 | 0.0188 | 0.0032 | 0.1045 B | 5 |
| 6 | 0.0000 | 0.0000 | 0.0000 | 0.0220 | 0.0030 | 2.9500 E | 0.8420 | 0.0913 | 0.0036 | 0.0157 | 0.0032 | 0.1036 B | 6 |
| 7 | 0.0000 | 0.0000 | 0.0000 | 0.0230 | 0.0090 | 2.8000 E | 1.1700 | 0.0518 | 0.0036 | 0.0129 | 0.0032 | 0.1036 B | 7 |
| 8 | 0.0000 | 0.0000 | 0.0000 | 0.0370 | 0.0000 | 2.7230 E | 1.2600 | 0.0160 | 0.0030 | 0.0105 | 0.0042 | 0.1054 B | 8 |
| 9 | 0.0000 | 0.0000 | 0.0000 | 0.1490 | 0.0050 | 2.4720 E | 1.9540 | 0.0096 | 0.0034 | 0.0083 | 0.0052 | 0.1082 B | 9 |
| 10 | 0.0000 | 0.0000 | 0.0000 | 0.0990 | 0.0040 | 2.2230 | 1.7450 | 0.0045 | 0.0041 | 0.0065 | 0.0065 | 0.1101 B | 10 |
| 11 | 0.0000 | 0.0000 | 0.0000 | 0.0950 | 0.0030 | 2.0350 | 1.1650 | 0.0034 | 0.0046 | 0.0049 | 0.0079 | 0.1129 B | 11 |
| 12 | 0.0000 | 0.0000 | 0.0000 | 0.1050 | 0.0040 | 1.7640 | 1.5240 | 0.0032 | 0.0053 | 0.0041 | 0.0094 B | 0.1158 B | 12 |
| 13 | 0.0000 | 0.0000 | 0.0000 | 0.0940 | 0.0040 | 1.5960 A | 1.5680 | 0.0038 | 0.0060 | 0.0033 | 0.0112 B | 0.1198 B | 13 |
| 14 | 0.0000 | 0.0000 | 0.0000 | 0.0820 | 0.0060 | 1.5950 | 1.4160 | 0.0041 | 0.0068 | 0.0033 | 0.0132 B | 0.1198 B | 14 |
| 15 | 0.0000 | 0.0000 | 0.0000 | 0.0700 | 0.0060 | 2.0250 | 1.3230 | 0.0041 | 0.0074 | 0.0033 | 0.0151 B | 0.1198 B | 15 |
| 16 | 0.0000 | 0.0000 | 0.0000 | 0.0660 | 0.0070 | 2.0820 | 1.2340 | 0.0037 | 0.0083 | 0.0033 | 0.0175 B | 0.1198 B | 16 |
| 17 | 0.0000 | 0.0000 | 0.0000 | 0.0570 | 0.0070 | 1.9730 | 1.1760 | 0.0036 | 0.0103 | 0.0034 | 0.0198 B | 0.1198 B | 17 |
| 18 | 0.0000 | 0.0000 | 0.0000 | 0.0480 | 0.0100 | 1.9540 | 1.0240 | 0.0037 | 0.0114 | 0.0034 | 0.0226 B | 0.1198 B | 18 |
| 19 | 0.0000 | 0.0000 | 0.0000 | 0.0350 | 0.0140 | 1.7640 | 1.0800 | 0.0038 | 0.0124 | 0.0036 | 0.0306 B | 0.1198 B | 19 |
| 20 | 0.0000 | 0.0000 | 0.0000 | 0.0280 | 0.0280 | 1.6090 | 1.1100 | 0.0038 | 0.0124 | 0.0036 | 0.0396 B | 0.1198 B | 20 |
| 21 | 0.0000 | 0.0000 | 0.0000 | 0.0190 | 0.0600 | 1.3750 | 1.0420 | 0.0033 | 0.0122 | 0.0036 | 0.0506 B | 0.1198 B | 21 |
| 22 | 0.0000 | 0.0000 | 0.0000 | 0.0110 | 0.0750 | 1.1940 | 0.9600 | 0.0033 | 0.0114 | 0.0038 | 0.0626 B | 0.1217 B | 22 |
| 23 | 0.0000 | 0.0000 | 0.0000 | 0.0090 | 0.0720 | 1.2340 | 0.8880 | 0.0041 | 0.0109 | 0.0041 | 0.0769 B | 0.1248 B | 23 |
| 24 | 0.0000 | 0.0000 | 0.0000 | 0.0100 | 0.0960 | 1.0880 | 0.8540 | 0.0049 | 0.0107 | 0.0043 | 0.0922 B | 0.1268 B | 24 |
| 25 | 0.0000 | 0.0000 | 0.0000 | 0.0070 | 0.1070 | 0.9530 | 0.7730 | 0.0050 | 0.0105 | 0.0042 | 0.1101 B | 0.1289 B | 25 |
| 26 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 0.0520 | 0.9250 | 0.7010 | 0.0052 | 0.0100 | 0.0041 | 0.1101 B | 0.1320 B | 26 |
| 27 | 0.0000 | 0.0000 | 0.0000 | 0.0040 | 0.0500 | 0.9000 | 0.6430 | 0.0052 | 0.0098 | 0.0038 | 0.1101 B | 0.1341 B | 27 |
| 28 | 0.0000 | 0.0000 | 0.0000 | 0.0040 | 0.0430 | 0.9250 A | 0.5910 | 0.0050 | 0.0107 | 0.0037 | 0.1101 B | 0.1362 B | 28 |
| 29 | 0.0000 | 0.0000 | 0.0000 | 0.0040 | 0.0350 | 0.8500 | 0.5620 | 0.0049 | 0.0119 | 0.0034 | 0.1101 B | 0.1384 B | 29 |
| 30 | 0.0000 | | 0.0000 | 0.0090 | 0.0250 | 0.7800 | 0.5230 | 0.0049 | 0.0140 | 0.0033 | 0.1101 B | 0.1417 B | 30 |
| 31 | 0.0000 | | 0.0000 | | 0.0150 | | 0.5080 | 0.0046 | | 0.0032 | | 0.1439 B | 31 |
| TOTAL | 0.0000 | 0.0000 | 0.0000 | 1.0960 | 0.7710 | 51.4400 | 30.8730 | 0.5940 | 0.2333 | 0.2279 | 1.1678 | 3.7006 | |
| MEAN | 0.0000 | 0.0000 | 0.0000 | 0.0365 | 0.0249 | 1.7147 | 0.9959 | 0.0670 | 0.0078 | 0.0074 | 0.0389 | 0.1194 | |
| dam$^3$ | 0.0 | 0.0 | 0.0 | 94.7 | 66.6 | 4444.4 | 2667.4 | 51.3 | 20.2 | 19.7 | 100.9 | 319.7 | |
| MAX | 0.0000 | 0.0000 | 0.0000 | 0.1490 | 0.1070 | 3.2500 | 1.9540 | 0.5940 | 0.0140 | 0.0222 | 0.1101 | 0.1439 | |
| MIN | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0260 | 0.5080 | 0.0032 | 0.0030 | 0.0032 | 0.0031 | 0.1036 | |
| mm/unit area | 0.0 | 0.0 | 0.0 | 0.6 | 0.4 | 28.8 | 17.3 | 0.3 | 0.1 | 0.1 | 0.7 | 2.1 | |

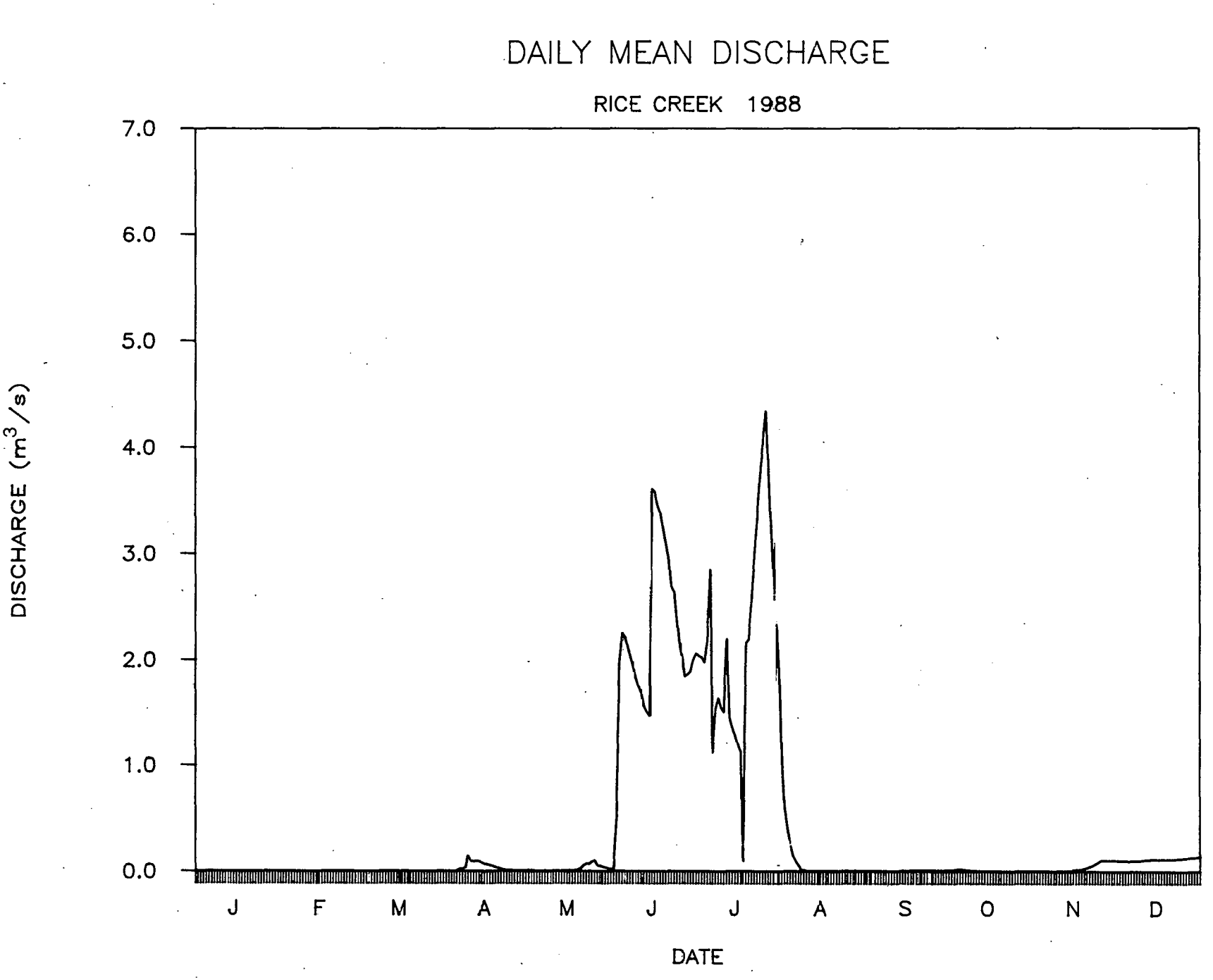
TOTAL DISCHARGE 7790 dam$^3$
50.4 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131






TR-570
COG-92-131

RICE CREEK DISCHARGE 1989

DRAINAGE AREA 154.4 Km$^2$

| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DISCHARGE (M$^3$/s) | | | | | | DISCHARGE (M$^3$/s) | | | | | | |
| 1 | 0.1406 B | 0.1278 B | 0.0839 B | 0.0555 B | 5.9987 | 3.4296 | 1.8744 | 0.4768 | 0.0356 | 0.0146 | 0.0154 | 0.0060 B | 1 |
| 2 | 0.1417 B | 0.1248 B | 0.0824 B | 0.0606 B | 5.8382 | 3.2184 | 1.8120 | 0.3927 | 0.0310 | 0.0146 | 0.0154 | 0.0055 B | 2 |
| 3 | 0.1439 B | 0.1227 B | 0.0816 B | 0.0660 B | 5.7098 | 3.0355 | 1.6748 | 0.3392 | 0.0268 | 0.0143 | 0.0208 | 0.0052 B | 3 |
| 4 | 0.1472 B | 0.1198 B | 0.0808 B | 0.0710 B | 5.5787 | 2.8974 | 1.5303 | 0.3466 | 0.0230 | 0.0143 | 0.0688 | 0.0047 B | 4 |
| 5 | 0.1472 B | 0.1178 B | 0.0800 B | 0.0864 B | 5.3407 | 2.7388 | 1.5370 | 0.3355 | 0.0198 | 0.0146 | 0.0587 | 0.0045 B | 5 |
| 6 | 0.1495 B | 0.1149 B | 0.0792 B | 0.1018 B | 5.4087 | 2.6464 | 1.4767 | 0.3580 | 0.0154 | 0.0148 | 0.0230 | 0.0041 B | 6 |
| 7 | 0.1472 B | 0.1129 B | 0.0785 B | 0.1178 B | 5.3067 | 2.8184 | 1.4397 | 0.3542 | 0.0127 | 0.0151 | 0.0037 B | 0.0037 B | 7 |
| 8 | 0.1461 B | 0.1129 B | 0.0785 B | 0.1120 B | 5.1707 | 2.7868 | 1.3358 | 0.3618 | 0.0103 | 0.0157 | 0.0034 B | 0.0036 B | 8 |
| 9 | 0.1439 B | 0.1129 B | 0.0816 B | 0.1073 B | 4.9667 | 2.7542 | 1.2687 | 0.3103 | 0.0103 | 0.0160 | 0.0031 B | 0.0034 B | 9 |
| 10 | 0.1417 B | 0.1129 B | 0.0832 B | 0.1018 B | 4.8307 | 2.6464 | 1.2150 | 0.2914 | 0.0103 | 0.0160 | 0.0033 B | 0.0033 B | 10 |
| 11 | 0.1406 B | 0.1129 B | 0.0848 B | 0.0965 B | 4.5247 | 2.5540 | 1.1479 | 0.2830 | 0.0103 | 0.0160 | 0.0036 B | 0.0033 B | 11 |
| 12 | 0.1384 B | 0.1129 B | 0.0864 B | 0.0956 B | 4.2187 | 2.7234 | 1.1747 | 0.2603 | 0.0103 | 0.0163 | 0.0037 B | 0.0032 B | 12 |
| 13 | 0.1384 B | 0.1129 B | 0.0880 B | 0.0956 B | 3.9554 | 2.9607 | 1.1613 | 0.2226 | 0.0103 | 0.0163 | 0.0041 B | 0.0030 B | 13 |
| 14 | 0.1384 B | 0.1129 B | 0.0905 B | 0.0948 B | 3.7444 | 3.2568 | 1.0875 | 0.1950 | 0.0119 | 0.0163 | 0.0043 B | 0.0029 B | 14 |
| 15 | 0.1384 B | 0.1120 B | 0.0856 B | 0.1732 B | 3.4488 | 3.1800 | 1.0674 | 0.1732 | 0.0135 | 0.0166 | 0.0043 B | 0.0029 B | 15 |
| 16 | 0.1384 B | 0.1101 B | 0.0800 B | 0.1529 B | 3.2760 | 3.0355 | 1.0137 | 0.1331 | 0.0154 | 0.0166 | 0.0043 B | 0.0029 B | 16 |
| 17 | 0.1384 B | 0.1091 B | 0.0754 B | 0.1331 B | 3.1800 | 2.9823 | 0.9533 | 0.1268 | 0.0154 | 0.0169 | 0.0045 B | 0.0029 B | 17 |
| 18 | 0.1373 B | 0.1073 B | 0.0703 B | 0.1461 B | 2.9981 | 2.8658 | 0.9399 | 0.1634 | 0.0154 | 0.0169 | 0.0045 B | 0.0029 B | 18 |
| 19 | 0.1373 B | 0.1064 B | 0.0660 B | 0.1587 B | 2.8500 | 2.7388 | 0.9063 | 0.1976 | 0.0154 | 0.0172 | 0.0045 B | 0.0029 B | 19 |
| 20 | 0.1362 B | 0.1045 B | 0.0613 B | 0.2731 E | 2.8342 | 2.5694 | 0.8425 | 0.1622 | 0.0154 | 0.0172 | 0.0046 B | 0.0029 B | 20 |
| 21 | 0.1362 B | 0.1036 B | 0.0574 B | 0.4230 A | 2.7868 | 2.7080 | 0.7933 | 0.1552 | 0.0154 | 0.0169 | 0.0046 B | 0.0029 B | 21 |
| 22 | 0.1352 B | 0.1009 B | 0.0561 B | 1.2016 | 2.5848 | 2.5848 | 0.7711 | 0.1278 | 0.0154 | 0.0169 | 0.0046 B | 0.0030 B | 22 |
| 23 | 0.1352 B | 0.0982 B | 0.0549 B | 1.5703 | 2.4154 | 2.5078 | 0.6999 | 0.0808 | 0.0154 | 0.0166 | 0.0049 B | 0.0030 B | 23 |
| 24 | 0.1341 B | 0.0965 B | 0.0536 B | 2.4616 | 2.2886 | 2.4924 | 0.6465 | 0.0580 | 0.0154 | 0.0166 | 0.0052 B | 0.0031 B | 24 |
| 25 | 0.1331 B | 0.0939 B | 0.0530 B | 4.2527 | 2.6464 | 2.4308 | 0.6071 | 0.0555 | 0.0154 | 0.0163 | 0.0055 B | 0.0031 B | 25 |
| 26 | 0.1331 B | 0.0913 B | 0.0524 B | 5.4427 | 3.1800 | 2.2886 | 0.5215 | 0.0536 | 0.0154 | 0.0163 | 0.0058 B | 0.0032 B | 26 |
| 27 | 0.1320 B | 0.0888 B | 0.0518 B | 5.8703 | 3.7022 | 2.2728 | 0.4197 | 0.0506 | 0.0154 | 0.0160 | 0.0061 B | 0.0033 B | 27 |
| 28 | 0.1320 B | 0.0872 B | 0.0512 B | 6.0629 | 3.7655 | 2.1464 | 0.4236 | 0.0489 | 0.0151 | 0.0160 | 0.0065 B | 0.0034 B | 28 |
| 29 | 0.1310 B | | 0.0524 B | 6.0511 | 3.7655 | 2.0674 | 0.4506 | 0.0466 | 0.0148 | 0.0157 | 0.0068 B | 0.0036 B | 29 |
| 30 | 0.1310 B | | 0.0536 B | 6.0308 | 3.8921 | 1.9472 | 0.5317 | 0.0460 | 0.0148 | 0.0154 | 0.0065 B | 0.0037 B | 30 |
| 31 | 0.1299 B | | 0.0549 B | | 3.6811 | | 0.5661 | 0.0396 | | 0.0154 | | 0.0038 B | 31 |
| TOTAL | 4.2934 | 3.0411 | 2.1890 | 41.6666 | 123.8883 | 81.2848 | 31.8900 | 6.2463 | 0.4811 | 0.4943 | 0.3145 | 0.1097 | |
| MEAN | 0.1385 | 0.1085 | 0.0706 | 1.3889 | 3.9964 | 2.7095 | 1.0287 | 0.2015 | 0.0160 | 0.0159 | 0.0105 | 0.0035 | |
| dam$^3$ | 371.0 | 262.7 | 189.1 | 3600.0 | 10703.9 | 7023.0 | 2755.3 | 539.7 | 41.6 | 42.7 | 27.2 | 9.5 | |
| MAX | 0.1495 | 0.1278 | 0.0905 | 6.0629 | 5.9987 | 3.4296 | 1.8744 | 0.4768 | 0.0356 | 0.0172 | 0.0688 | 0.0060 | |
| MIN | 0.1299 | 0.0872 | 0.0512 | 0.0555 | 2.2886 | 1.9472 | 0.4197 | 0.0396 | 0.0103 | 0.0143 | 0.0031 | 0.0029 | |
| mm/unit area | 2.4 | 1.7 | 1.2 | 23.3 | 69.3 | 45.5 | 17.8 | 3.5 | 0.3 | 0.3 | 0.2 | 0.1 | |

TOTAL DISCHARGE 25600 dam$^3$

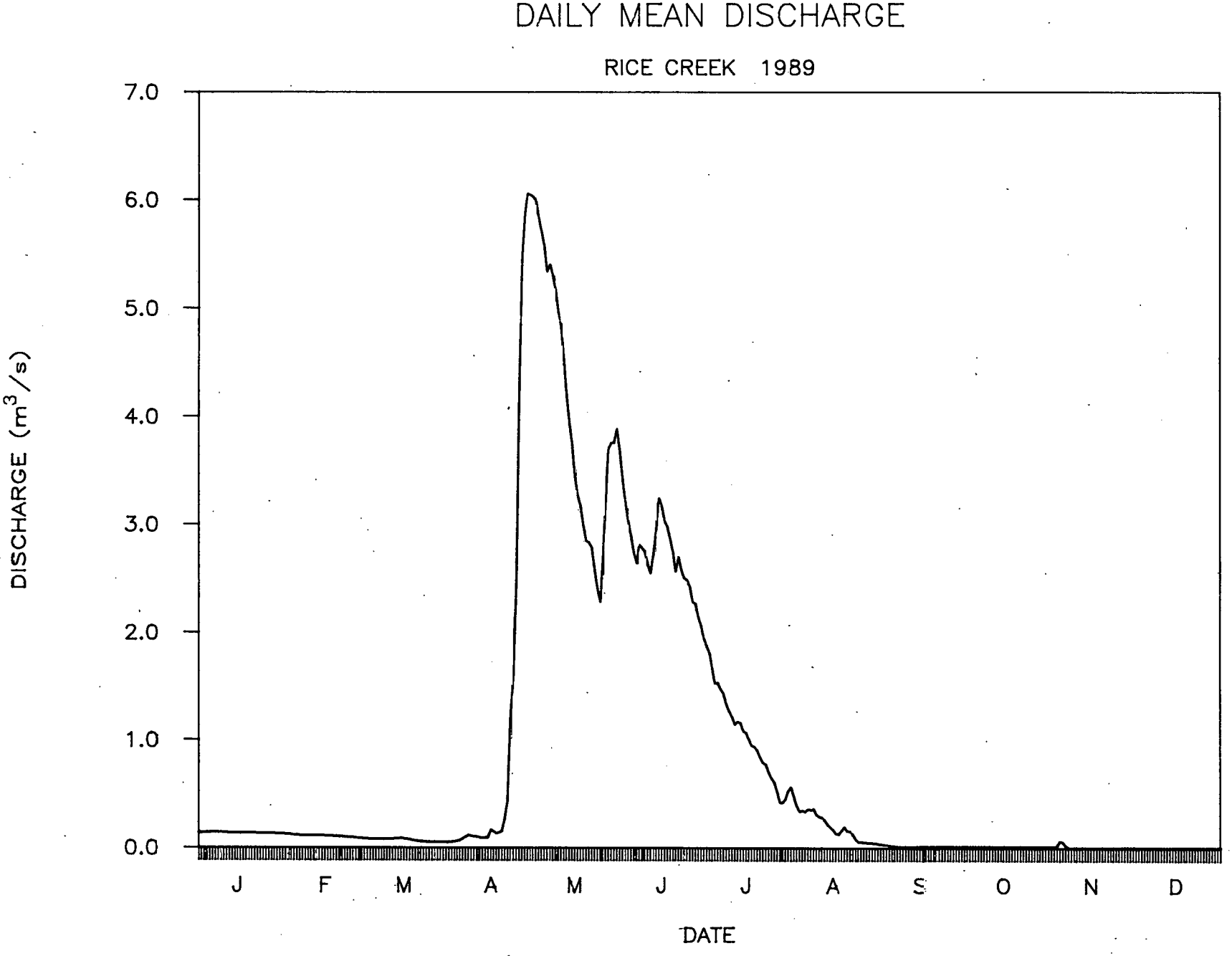
165.6 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


DAILY MEAN DISCHARGE
RICE CREEK 1989
DISCHARGE ($m^3/s$)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
J
F
M
A
M
J
J
A
S
O
N
D
DATE

RICE CREEK DISCHARGE 1990

DRAINAGE AREA 154.4 Km$^2$

| DAY | DISCHARGE (m$^3$/s) JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0039 B | 0.0027 B | 0.0031 B | 0.0848 B | 0.8200 | 1.2150 | 3.6408 E | 0.5489 | 0.0030 | 0.0011 E | 0.0007 | 0.0148 B | 1 |
| 2 | 0.0041 B | 0.0027 B | 0.0030 B | 0.1158 | 0.8719 | 1.4397 | 3.4104 E | 0.4872 | 0.0079 | 0.0011 E | 0.0006 | 0.0208 B | 2 |
| 3 | 0.0042 B | 0.0026 B | 0.0030 B | 0.1299 | 0.9734 | 2.1148 | 3.1800 E | 0.3355 | 0.0143 | 0.0011 E | 0.0005 | 0.0281 B | 3 |
| 4 | 0.0043 B | 0.0025 B | 0.0029 B | 0.1439 | 0.9868 | 2.7234 | 3.1145 E | 0.2127 | 0.0129 | 0.0011 E | 0.0005 | 0.0272 B | 4 |
| 5 | 0.0043 B | 0.0024 B | 0.0029 B | 0.1472 B | 0.9734 | 3.0197 | 3.0829 | 0.0888 | 0.0021 | 0.0011 E | 0.0005 | 0.0264 B | 5 |
| 6 | 0.0043 B | 0.0023 B | 0.0031 B | 0.1506 B | 0.9935 | 3.1145 | 2.9449 | 0.0342 | 0.0015 | 0.0011 E | 0.0005 | 0.0260 B | 6 |
| 7 | 0.0043 B | 0.0025 B | 0.0033 B | 0.1540 B | 0.9667 | 3.2760 | 2.9133 | 0.0205 | 0.0013 | 0.0010 E | 0.0005 | 0.0252 B | 7 |
| 8 | 0.0043 B | 0.0027 B | 0.0036 B | 0.1575 B | 0.9935 | 3.3336 | 2.8658 | 0.0068 | 0.0013 | 0.0010 E | 0.0005 | 0.0249 B | 8 |
| 9 | 0.0042 B | 0.0029 B | 0.0038 B | 0.1611 B | 0.9600 | 3.3912 | 2.7080 | 0.0037 | 0.0013 | 0.0010 A | 0.0005 | 0.0241 B | 9 |
| 10 | 0.0042 B | 0.0031 B | 0.0042 B | 0.1634 B | 1.0070 | 3.3720 | 2.5540 | 0.0034 | 0.0013 | 0.0010 E | 0.0005 | 0.0233 B | 10 |
| 11 | 0.0042 B | 0.0034 B | 0.0046 B | 0.1658 B | 0.9868 | 3.4872 | 2.4154 | 0.0065 | 0.0013 | 0.0009 A | 0.0005 | 0.0230 B | 11 |
| 12 | 0.0042 B | 0.0038 B | 0.0052 B | 0.1683 B | 0.9801 | 3.6024 | 2.3044 | 0.0089 | 0.0011 | 0.0008 | 0.0004 B | 0.0222 B | 12 |
| 13 | 0.0042 B | 0.0038 B | 0.0129 B | 0.1707 B | 0.9868 | 3.5832 | 2.1622 | 0.0103 | 0.0011 | 0.0008 E | 0.0004 B | 0.0219 B | 13 |
| 14 | 0.0041 B | 0.0039 B | 0.0252 B | 0.1732 B | 0.9667 | 3.5064 | 1.9888 | 0.0077 | 0.0010 | 0.0007 E | 0.0003 B | 0.0215 B | 14 |
| 15 | 0.0041 B | 0.0039 B | 0.0460 B | 0.1756 B | 1.1009 | 3.4488 | 1.8640 | 0.0022 | 0.0010 E | 0.0007 E | 0.0003 B | 0.0208 B | 15 |
| 16 | 0.0041 B | 0.0041 B | 0.0561 B | 0.1781 B | 1.1143 | 3.3144 | 1.7508 | 0.0020 | 0.0010 E | 0.0007 E | 0.0003 B | 0.0205 B | 16 |
| 17 | 0.0041 B | 0.0041 B | 0.0674 B | 0.1807 B | 1.0674 | 3.1800 | 1.6653 | 0.0019 | 0.0011 E | 0.0007 | 0.0003 B | 0.0201 B | 17 |
| 18 | 0.0039 B | 0.0042 B | 0.0542 B | 0.1845 | 1.1277 | 3.0513 | 1.5703 | 0.0015 | 0.0011 E | 0.0006 | 0.0003 B | 0.0169 B | 18 |
| 19 | 0.0039 B | 0.0042 B | 0.0427 B | 0.1976 | 1.2016 | 2.9449 | 1.5035 | 0.0015 | 0.0012 E | 0.0007 | 0.0003 B | 0.0140 B | 19 |
| 20 | 0.0038 B | 0.0043 B | 0.0386 B | 0.2085 | 1.1948 | 3.7866 | 1.4364 | 0.0015 | 0.0012 | 0.0010 | 0.0003 B | 0.0114 B | 20 |
| 21 | 0.0037 B | 0.0042 B | 0.0347 B | 0.1963 | 1.1881 | 7.2600 | 1.3693 | 0.0014 | 0.0018 | 0.0009 | 0.0003 B | 0.0107 B | 21 |
| 22 | 0.0036 B | 0.0041 B | 0.0401 B | 0.2127 | 1.2083 | 7.6400 | 1.2619 | 0.0015 | 0.0026 | 0.0007 | 0.0003 B | 0.0100 B | 22 |
| 23 | 0.0034 B | 0.0039 B | 0.0455 B | 0.2764 | 1.2351 | 7.0200 | 1.1613 | 0.0016 | 0.0025 | 0.0006 | 0.0004 B | 0.0094 B | 23 |
| 24 | 0.0033 B | 0.0038 B | 0.0361 B | 0.3016 | 1.3089 | 6.1600 | 1.0674 E | 0.0017 | 0.0015 | 0.0006 | 0.0004 B | 0.0087 B | 24 |
| 25 | 0.0032 B | 0.0037 B | 0.0281 B | 0.3410 E | 1.3492 | 5.9024 | 0.9734 E | 0.0023 | 0.0012 | 0.0010 | 0.0005 B | 0.0081 B | 25 |
| 26 | 0.0031 B | 0.0036 B | 0.0212 B | 0.3966 E | 1.3827 | 5.4087 | 0.8788 E | 0.0047 | 0.0012 E | 0.0013 | 0.0006 B | 0.0076 B | 26 |
| 27 | 0.0030 B | 0.0033 B | 0.0195 B | 0.4803 E | 1.4901 | 5.1027 | 0.8111 E | 0.0032 | 0.0012 E | 0.0009 | 0.0017 B | 0.0070 B | 27 |
| 28 | 0.0029 B | 0.0032 B | 0.0178 B | 0.5557 E | 1.4029 | 4.7287 E | 0.7488 E | 0.0021 | 0.0012 E | 0.0007 | 0.0036 B | 0.0065 B | 28 |
| 29 | 0.0029 B | | 0.0178 B | 0.6312 E | 1.2418 | 4.2867 E | 0.6865 E | 0.0018 | 0.0011 E | 0.0007 | 0.0063 B | 0.0060 B | 29 |
| 30 | 0.0028 B | | 0.0175 B | 0.7266 E | 1.1747 | 3.8921 E | 0.6277 E | 0.0016 | 0.0011 E | 0.0006 | 0.0100 B | 0.0055 B | 30 |
| 31 | 0.0028 B | | 0.0587 B | | 1.2284 | | 0.5763 A | 0.0021 | | 0.0006 | | 0.0050 B | 31 |
| TOTAL | 0.1173 | 0.0957 | 0.7228 | 7.3297 | 34.4835 | 118.3064 | 59.2382 | 1.8099 | 0.0735 | 0.0267 | 0.0330 | 0.5178 | |
| MEAN | 0.0038 | 0.0034 | 0.0233 | 0.2443 | 1.1124 | 3.9435 | 1.9109 | 0.0584 | 0.0025 | 0.0009 | 0.0011 | 0.0167 | |
| dam$^3$ | 10.1 | 8.3 | 62.5 | 633.3 | 2979.4 | 10221.7 | 5118.2 | 156.4 | 6.4 | 2.3 | 2.9 | 44.7 | |
| MAX | 0.0043 | 0.0043 | 0.0674 | 0.7266 | 1.4901 | 7.6400 | 3.6408 | 0.5489 | 0.0143 | 0.0013 | 0.0100 | 0.0281 | |
| MIN | 0.0028 | 0.0023 | 0.0029 | 0.0848 | 0.8200 | 1.2150 | 0.5763 | 0.0014 | 0.0010 | 0.0006 | 0.0003 | 0.0050 | |
| mm/unit area | 0.1 | 0.1 | 0.4 | 4.1 | 19.3 | 66.2 | 33.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.3 | |

TOTAL DISCHARGE 19200 dam$^3$
124.7 mm/unit area

A - MANUAL GAUGE
E - ESTIMATE
B - ICE CONDITIONS

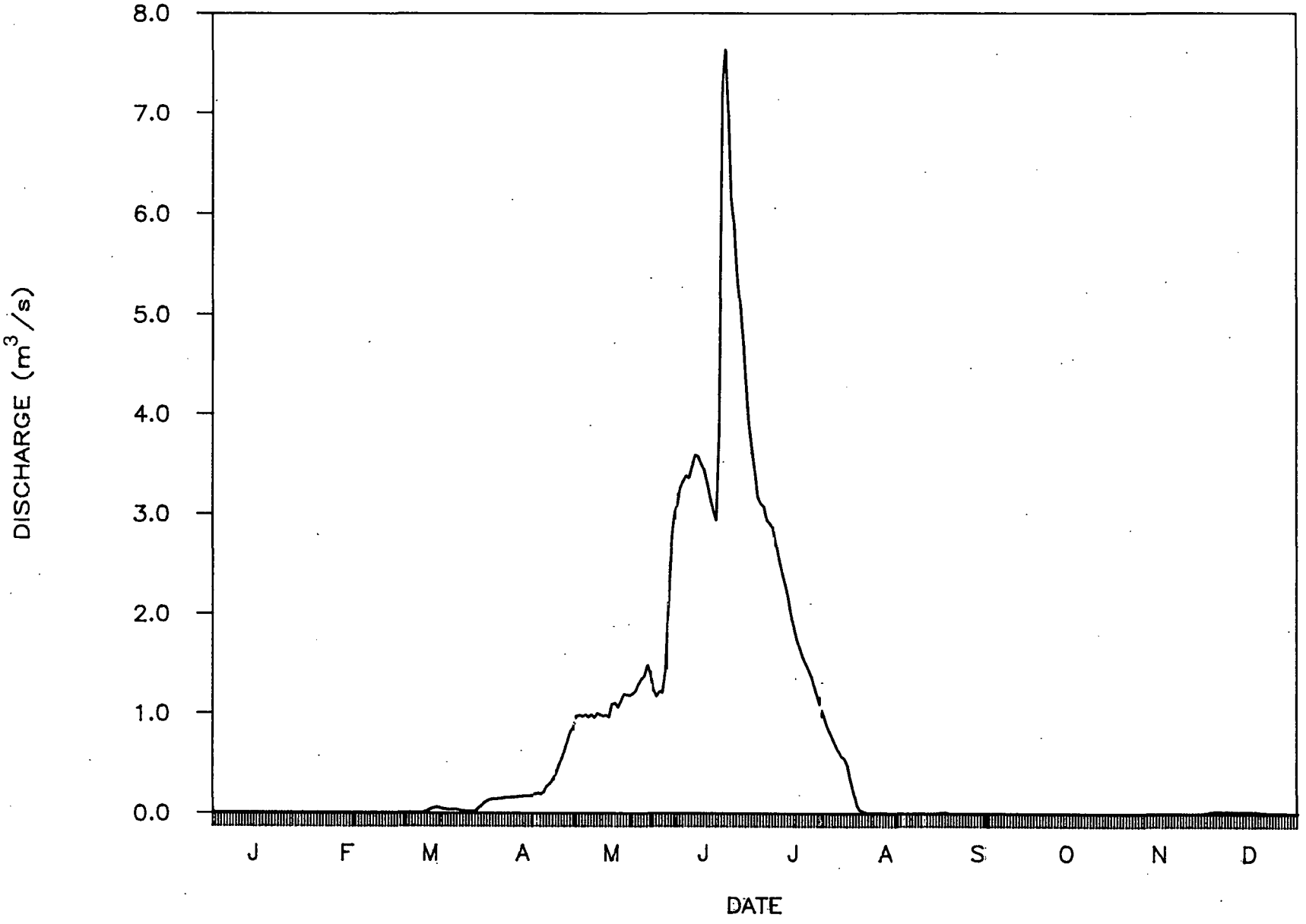
TYPE OF GAUGE - RECORDING



TR-570
COG-92-131

# DAILY MEAN DISCHARGE

RICE CREEK 1990






TR-570
COG-92-131

RICE LAKE WATER LEVELS 1987

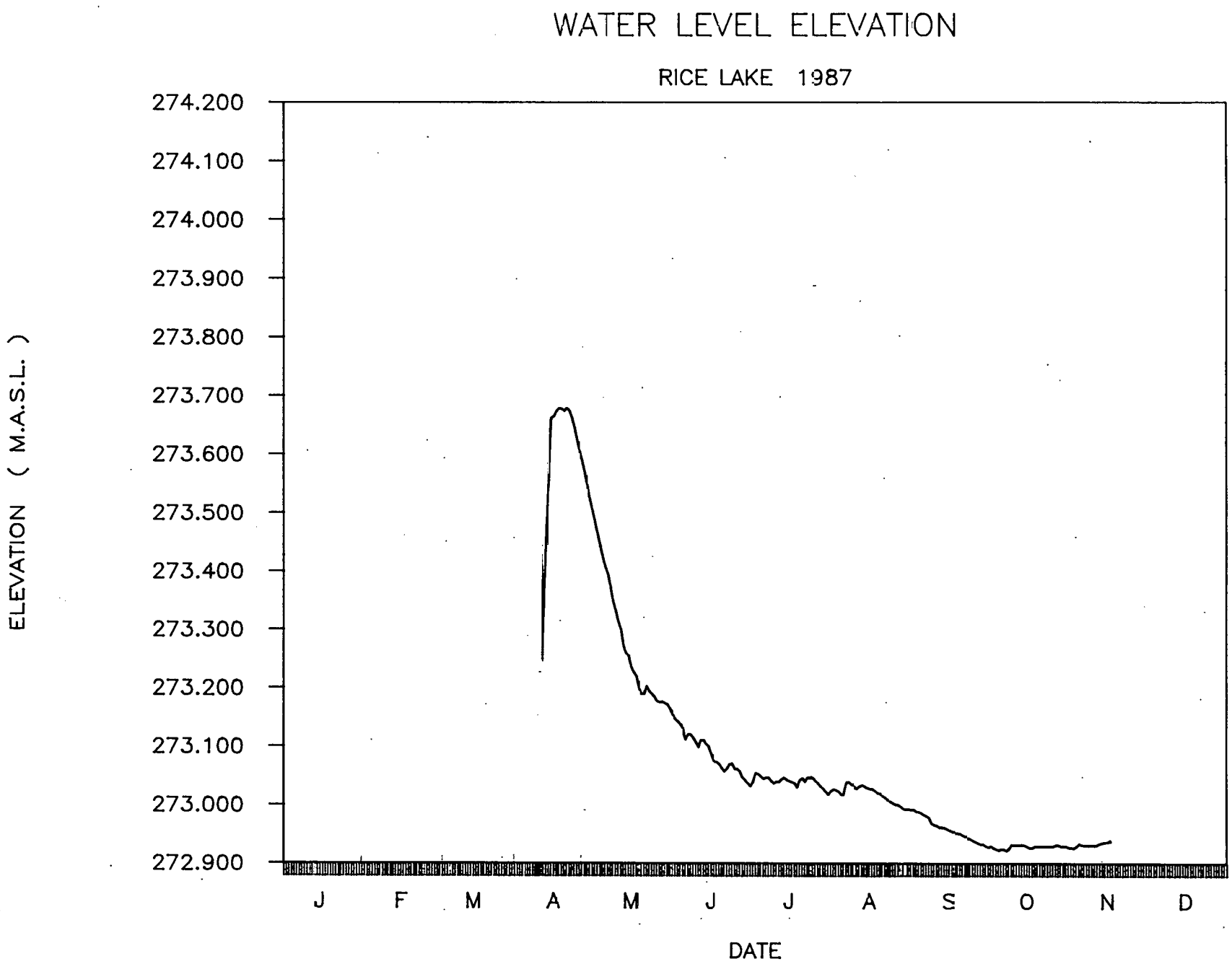
| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WATER LEVELS IN METERS ABOVE GEODETIC DATUM | | | | | | | | | | | | |
| 1 | | | | | 273.484 | 273.147 | 273.039 | 273.027 | 272.992 | 272.930 | 272.927 | | 1 |
| 2 | | | | | 273.465 | 273.143 | 273.055 | 273.026 | 272.989 | 272.926 | 272.926 | | 2 |
| 3 | | | | | 273.443 | 273.139 | 273.053 | 273.023 | 272.988 | 272.924 | 272.929 | | 3 |
| 4 | | | | | 273.423 | 273.131 | 273.049 | 273.018 A | 272.986 | 272.923 | 272.934 | | 4 |
| 5 | | | | | 273.408 A | 273.112 | 273.045 | 273.018 | 272.983 | 272.925 | 272.932 | | 5 |
| 6 | | | | | 273.394 | 273.121 | 273.047 | 273.040 | 272.981 | 272.924 | 272.931 | | 6 |
| 7 | | | | | 273.373 | 273.120 | 273.047 | 273.039 | 272.978 | 272.922 | 272.931 | | 7 |
| 8 | | | | | 273.350 | 273.115 | 273.041 | 273.036 | 272.968 A | 272.925 | 272.931 | | 8 |
| 9 | | | | | 273.332 | 273.107 A | 273.037 | 273.032 | 272.966 | 272.933 | 272.931 | | 9 |
| 10 | | | | 273.227 | 273.314 | 273.099 | 273.040 | 273.028 | 272.965 | 272.932 | 272.931 | | 10 |
| 11 | | | | 273.338 | 273.299 | 273.112 | 273.040 | 273.032 | 272.962 | 272.932 | 272.933 | | 11 |
| 12 | | | | 273.446 | 273.272 | 273.111 | 273.044 | 273.034 A | 272.962 | 272.932 | 272.935 | | 12 |
| 13 | | | | 273.555 | 273.260 | 273.104 | 273.047 | 273.032 | 272.961 | 272.933 A | 272.936 | | 13 |
| 14 | | | | 273.663 | 273.255 | 273.100 | 273.043 | 273.029 | 272.959 | 272.931 | 272.937 | | 14 |
| 15 | | | | 273.666 | 273.236 | 273.086 | 273.041 | 273.028 | 272.957 | 272.929 | 272.938 | | 15 |
| 16 | | | | 273.674 | 273.227 | 273.074 | 273.039 | 273.027 | 272.955 | 272.927 | 272.939 | | 16 |
| 17 | | | | 273.679 | 273.220 | 273.073 | 273.037 | 273.024 | 272.953 | 272.927 | | | 17 |
| 18 | | | | 273.678 | 273.200 | 273.070 | 273.030 | 273.021 | 272.952 | 272.930 | | | 18 |
| 19 | | | | 273.674 | 273.190 | 273.063 | 273.043 | 273.019 | 272.951 | 272.930 | | | 19 |
| 20 | | | | 273.679 | 273.190 | 273.057 | 273.046 | 273.016 | 272.948 | 272.930 | | | 20 |
| 21 | | | | 273.674 | 273.203 | 273.062 | 273.040 | 273.013 | 272.946 | 272.930 | | | 21 |
| 22 | | | | 273.662 | 273.195 | 273.070 | 273.047 | 273.009 | 272.944 | 272.930 | | | 22 |
| 23 | | | | 273.646 | 273.190 | 273.071 | 273.049 | 273.006 | 272.942 | 272.930 | | | 23 |
| 24 | | | | 273.624 | 273.185 | 273.061 | 273.046 | 273.003 | 272.939 | 272.930 | | | 24 |
| 25 | | | | 273.605 | 273.178 | 273.061 | 273.042 | 273.001 A | 272.937 | 272.930 | | | 25 |
| 26 | | | | 273.589 | 273.176 | 273.057 | 273.037 | 273.000 | 272.935 | 272.932 | | | 26 |
| 27 | | | | 273.568 | 273.177 | 273.046 | 273.032 | 272.997 | 272.933 | 272.932 | | | 27 |
| 28 | | | | 273.546 | 273.175 | 273.042 | 273.028 | 272.994 | 272.933 | 272.930 | | | 28 |
| 29 | | | | 273.524 | 273.172 | 273.037 | 273.023 | 272.992 | 272.930 | 272.930 | | | 29 |
| 30 | | | | 273.502 | 273.166 | 273.032 | 273.018 | 272.993 | 272.928 | 272.930 | | | 30 |
| 31 | | | | | 273.156 | | 273.024 | 272.992 | | 272.928 | | | 31 |
| MEAN | | | | | 273.268 | 273.087 | 273.040 | 273.017 | 272.957 | 272.929 | | | |
| MAX | | | | | 273.484 | 273.147 | 273.055 | 273.040 | 272.992 | 272.933 | | | |
| MIN | | | | | 273.156 | 273.032 | 273.018 | 272.992 | 272.928 | 272.922 | | | |

A - MANUAL GAUGE
E - ESTIMATE

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131

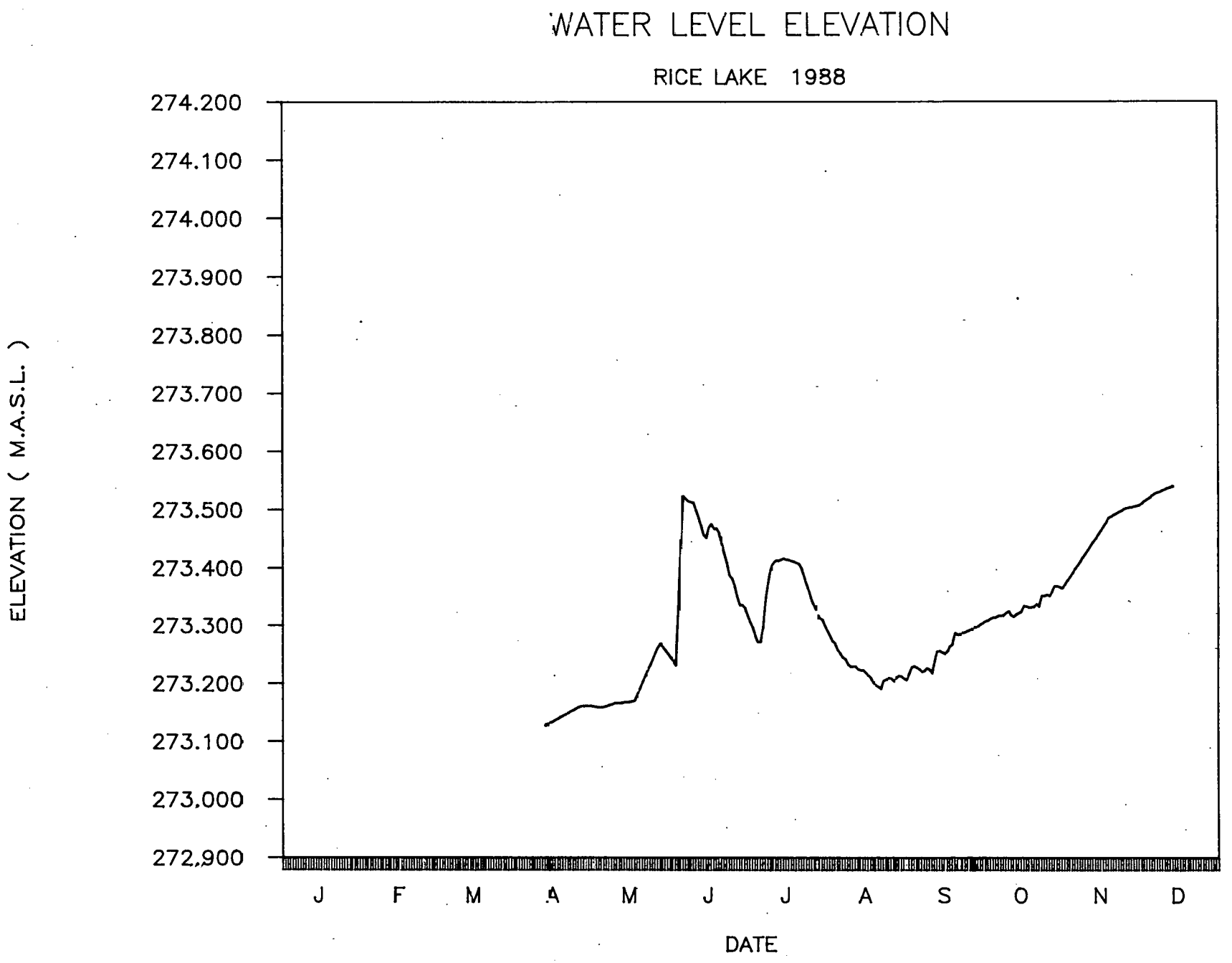

WATER LEVEL ELEVATION
RICE LAKE 1987
274.200
274.100
274.000
273.900
273.800
273.700
273.600
273.500
273.400
273.300
273.200
273.100
273.000
272.900
ELEVATION ( M.A.S.L. )
J
F
M
A
M
J
J
A
S
O
N
D
DATE

RICE LAKE WATER LEVELS 1988

| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WATER LEVELS IN METERS ABOVE GEODETIC DATUM | | | | | | | | | | | | |
| 1 | | | | | 273.161 E | 273.240 E | 273.308 | 273.283 | 273.219 | 273.309 E | 273.373 E | 273.513 E | 1 |
| 2 | | | | | 273.160 E | 273.232 E | 273.297 | 273.274 | 273.230 | 273.311 E | 273.380 E | 273.517 E | 2 |
| 3 | | | | | 273.159 E | 273.329 E | 273.282 | 273.270 | 273.232 | 273.314 E | 273.386 E | 273.520 E | 3 |
| 4 | | | | | 273.159 A | 273.427 E | 273.272 | 273.258 | 273.229 | 273.316 | 273.393 E | 273.523 E | 4 |
| 5 | | | | | 273.161 E | 273.525 E | 273.272 | 273.253 | 273.226 | 273.316 | 273.400 E | 273.527 E | 5 |
| 6 | | | | | 273.162 E | 273.520 E | 273.298 A | 273.246 | 273.222 A | 273.319 | 273.406 E | 273.530 A | 6 |
| 7 | | | | | 273.164 E | 273.516 E | 273.343 | 273.243 | 273.223 | 273.320 | 273.413 E | 273.532 E | 7 |
| 8 | | | | | 273.165 E | 273.514 | 273.377 | 273.235 | 273.228 | 273.320 | 273.420 E | 273.534 E | 8 |
| 9 | | | | | 273.167 E | 273.513 | 273.399 | 273.230 A | 273.225 | 273.324 | 273.426 E | 273.536 E | 9 |
| 10 | | | | | 273.168 A | 273.501 | 273.410 | 273.231 | 273.219 | 273.327 | 273.433 E | 273.538 E | 10 |
| 11 | | | | | 273.168 E | 273.486 | 273.414 | 273.230 | 273.240 | 273.320 | 273.440 E | 273.540 E | 11 |
| 12 | | | | 273.128 A | 273.168 E | 273.473 | 273.414 A | 273.225 | 273.257 | 273.317 | 273.446 E | 273.541 E | 12 |
| 13 | | | | 273.130 E | 273.169 E | 273.458 A | 273.416 E | 273.224 | 273.258 | 273.322 A | 273.453 E | 273.543 A | 13 |
| 14 | | | | 273.133 E | 273.169 E | 273.453 | 273.418 E | 273.224 | 273.255 | 273.324 | 273.460 E | | 14 |
| 15 | | | | 273.135 E | 273.170 E | 273.471 | 273.416 E | 273.220 | 273.253 | 273.326 | 273.466 E | | 15 |
| 16 | | | | 273.138 E | 273.171 E | 273.477 | 273.415 E | 273.215 | 273.257 | 273.336 | 273.473 E | | 16 |
| 17 | | | | 273.140 E | 273.172 A | 273.468 | 273.413 E | 273.210 | 273.266 | 273.335 | 273.480 E | | 17 |
| 18 | | | | 273.143 E | 273.182 E | 273.469 | 273.412 E | 273.202 | 273.269 | 273.333 A | 273.488 A | | 18 |
| 19 | | | | 273.145 E | 273.192 E | 273.462 | 273.410 E | 273.198 | 273.289 | 273.334 | 273.490 E | | 19 |
| 20 | | | | 273.148 E | 273.203 E | 273.442 | 273.408 E | 273.195 | 273.285 A | 273.335 | 273.493 E | | 20 |
| 21 | | | | 273.150 E | 273.213 E | 273.426 A | 273.400 | 273.191 | 273.287 E | 273.339 | 273.495 E | | 21 |
| 22 | | | | 273.153 E | 273.223 E | 273.410 | 273.386 | 273.206 | 273.289 E | 273.335 | 273.498 E | | 22 |
| 23 | | | | 273.155 E | 273.233 E | 273.387 | 273.370 | 273.208 | 273.291 E | 273.354 | 273.500 E | | 23 |
| 24 | | | | 273.158 E | 273.243 E | 273.382 | 273.358 | 273.211 | 273.293 E | 273.354 | 273.503 E | | 24 |
| 25 | | | | 273.160 E | 273.254 E | 273.370 | 273.343 | 273.210 | 273.295 E | 273.355 | 273.505 A | | 25 |
| 26 | | | | 273.162 A | 273.264 A | 273.351 | 273.333 A | 273.205 | 273.297 E | 273.353 A | 273.506 E | | 26 |
| 27 | | | | 273.162 E | 273.270 E | 273.336 | 273.325 | 273.212 | 273.299 A | 273.360 E | 273.507 E | | 27 |
| 28 | | | | 273.162 E | 273.264 E | 273.337 A | 273.314 | 273.215 | 273.301 E | 273.370 E | 273.508 E | | 28 |
| 29 | | | | 273.162 A | 273.258 E | 273.331 | 273.311 | 273.213 | 273.304 E | 273.370 E | 273.509 E | | 29 |
| 30 | | | | 273.162 E | 273.252 E | 273.319 | 273.301 | 273.209 A | 273.306 E | 273.368 E | 273.510 A | | 30 |
| 31 | | | | | 273.246 A | | 273.292 | 273.207 | | 273.366 E | | | 31 |
| MEAN | | | | | 273.197 | 273.420 | 273.358 | 273.224 | 273.261 | 273.334 | 273.458 | | |
| MAX | | | | | 273.270 | 273.525 | 273.418 | 273.283 | 273.306 | 273.370 | 273.510 | | |
| MIN | | | | | 273.159 | 273.232 | 273.272 | 273.191 | 273.219 | 273.310 | 273.373 | | |

A - MANUAL GAUGE
E - ESTIMATE

TYPE OF GAUGE - RECORDING


WATER LEVEL ELEVATION
RICE LAKE 1988
ELEVATION ( M.A.S.L. )
274.200
274.100
274.000
273.900
273.800
273.700
273.600
273.500
273.400
273.300
273.200
273.100
273.000
272.900
J
F
M
A
M
J
J
A
S
O
N
D
DATE

RICE LAKE WATER LEVELS 1989

WATER LEVELS IN METERS ABOVE GEODETIC DATUM

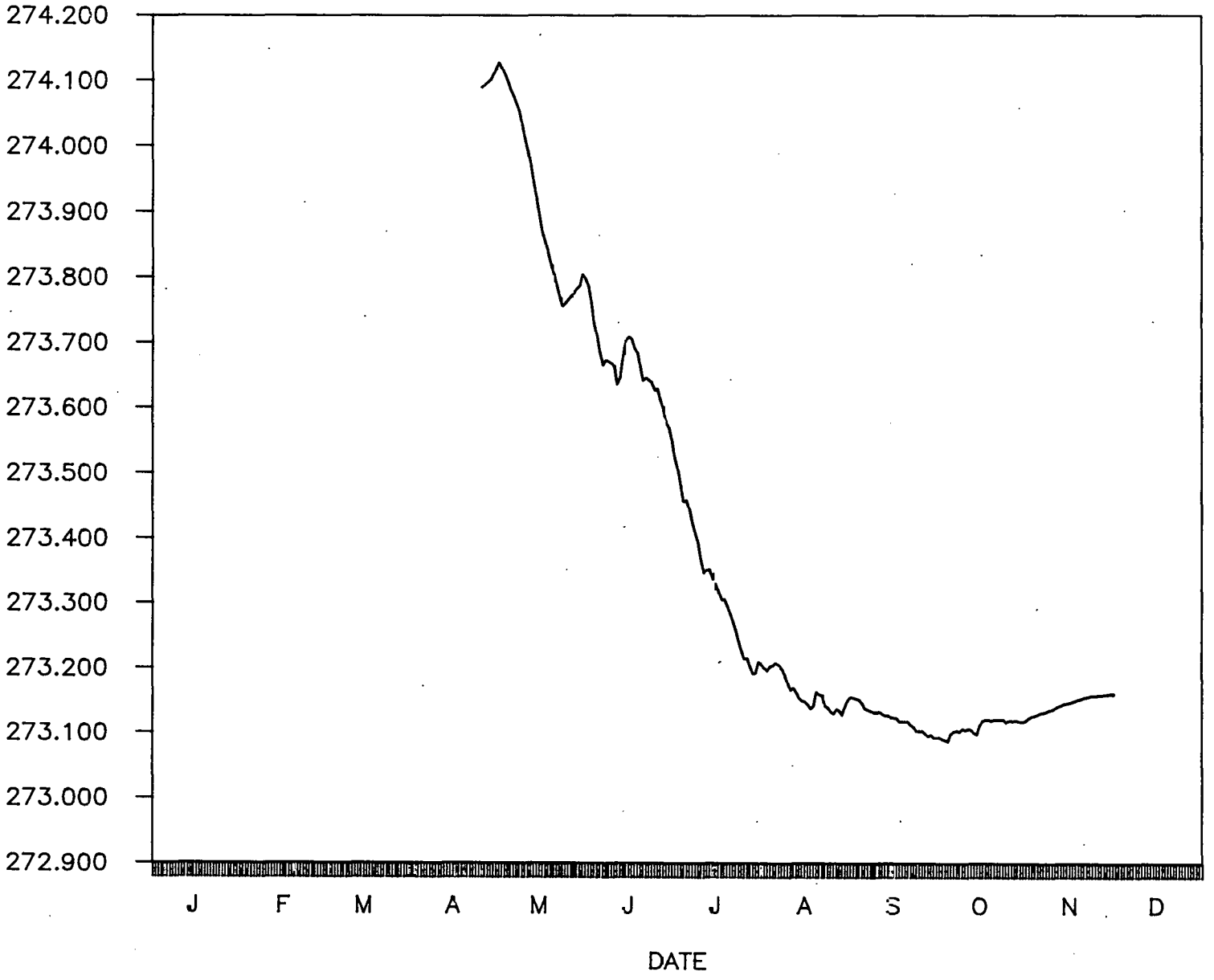
| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 274.128 A | 273.788 A | 273.524 | 273.201 | 273.156 | 273.094 | 273.125 | | 1 |
| 2 | | | | | 274.120 E | 273.764 | 273.506 | 273.198 | 273.154 | 273.092 | 273.127 | | 2 |
| 3 | | | | | 274.110 A | 273.733 | 273.482 | 273.205 | 273.153 | 273.090 | 273.129 | | 3 |
| 4 | | | | | 274.099 E | 273.710 | 273.458 A | 273.206 | 273.147 | 273.088 | 273.131 | | 4 |
| 5 | | | | | 274.088 E | 273.687 | 273.460 | 273.210 | 273.139 | 273.100 | 273.133 | | 5 |
| 6 | | | | | 274.077 E | 273.667 | 273.445 | 273.206 | 273.137 | 273.104 | 273.134 | | 6 |
| 7 | | | | | 274.066 E | 273.675 | 273.424 | 273.201 | 273.135 | 273.105 | 273.135 A | | 7 |
| 8 | | | | | 274.055 A | 273.673 | 273.407 | 273.193 A | 273.134 | 273.103 | 273.137 E | | 8 |
| 9 | | | | | 274.034 E | 273.670 | 273.394 | 273.178 | 273.130 | 273.108 | 273.139 E | | 9 |
| 10 | | | | | 274.013 E | 273.665 | 273.368 | 273.168 | 273.134 | 273.106 | 273.141 E | | 10 |
| 11 | | | | | 273.992 E | 273.637 | 273.349 | 273.171 | 273.130 | 273.108 | 273.143 E | | 11 |
| 12 | | | | | 273.970 A | 273.648 | 273.353 | 273.163 | 273.128 | 273.106 | 273.145 E | | 12 |
| 13 | | | | | 273.945 | 273.682 | 273.354 | 273.155 | 273.127 | 273.101 | 273.147 E | | 13 |
| 14 | | | | | 273.920 | 273.706 | 273.340 | 273.151 | 273.126 A | 273.099 | 273.148 A | | 14 |
| 15 | | | | | 273.895 | 273.711 | 273.332 | 273.149 | 273.124 | 273.113 | 273.149 E | | 15 |
| 16 | | | | | 273.871 | 273.707 | 273.321 | 273.145 | 273.124 | 273.120 | 273.151 E | | 16 |
| 17 | | | | | 273.854 | 273.694 | 273.306 | 273.139 | 273.118 | 273.122 | 273.152 E | | 17 |
| 18 | | | | | 273.837 | 273.686 | 273.308 | 273.143 | 273.118 | 273.122 | 273.154 E | | 18 |
| 19 | | | | | 273.821 | 273.665 | 273.298 | 273.165 | 273.118 | 273.120 | 273.155 E | | 19 |
| 20 | | | | | 273.805 | 273.643 | 273.286 | 273.161 | 273.118 | 273.122 | 273.157 E | | 20 |
| 21 | | | | | 273.789 | 273.647 | 273.274 | 273.159 | 273.113 | 273.122 | 273.158 A | | 21 |
| 22 | | | | | 273.772 | 273.644 | 273.260 | 273.143 A | 273.110 | 273.122 | 273.159 E | | 22 |
| 23 | | | | | 273.756 A | 273.640 | 273.242 | 273.140 | 273.104 | 273.122 | 273.160 E | | 23 |
| 24 | | | | | 273.761 | 273.628 | 273.228 | 273.134 | 273.104 | 273.118 | 273.160 E | | 24 |
| 25 | | | | 274.091 A | 273.767 | 273.630 | 273.216 | 273.131 | 273.104 | 273.120 | 273.161 E | | 25 |
| 26 | | | | 274.095 E | 273.772 | 273.614 | 273.216 | 273.138 | 273.100 | 273.120 | 273.161 E | | 26 |
| 27 | | | | 274.099 E | 273.777 | 273.601 | 273.205 | 273.136 | 273.096 | 273.120 | 273.162 E | | 27 |
| 28 | | | | 274.103 A | 273.784 | 273.578 | 273.193 | 273.129 | 273.098 | 273.120 | 273.162 E | | 28 |
| 29 | | | | 274.111 E | 273.788 A | 273.570 | 273.194 | 273.143 | 273.094 | 273.119 | 273.163 A | | 29 |
| 30 | | | | 274.120 E | 273.806 | 273.548 | 273.212 | 273.153 | 273.094 | 273.119 | 273.163 E | | 30 |
| 31 | | | | | 273.800 | | 273.206 | 273.157 | | 273.121 | | | 31 |
| MEAN | | | | | 273.912 | 273.663 | 273.327 | 273.163 | 273.122 | 273.111 | 273.148 | | |
| MAX | | | | | 274.128 | 273.788 | 273.524 | 273.210 | 273.156 | 273.122 | 273.164 | | |
| MIN | | | | | 273.756 | 273.548 | 273.193 | 273.129 | 273.094 | 273.088 | 273.125 | | |

A - MANUAL GAUGE
E - ESTIMATE

TYPE OF GAUGE - RECORDING

# WATER LEVEL ELEVATIONS

RICE LAKE 1989



RICE LAKE WATER LEVELS 1990

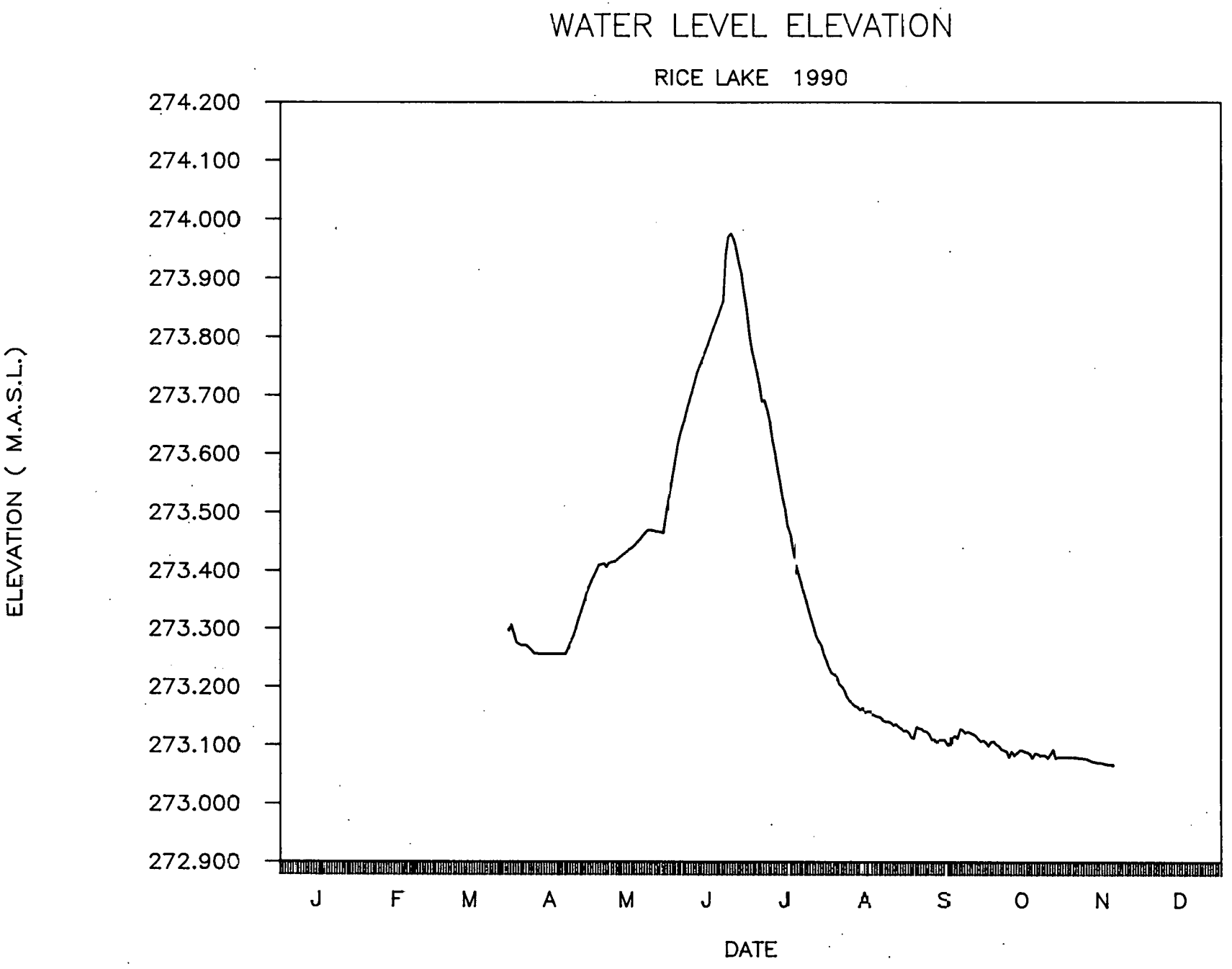
| DAY | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | DAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | WATER LEVELS IN METERS ABOVE GEODETIC DATUM | | | | | | | | | | | | |
| 1 | | | | 273.293 E | 273.383 E | 273.547 E | 273.812 | 273.234 | 273.123 | 273.107 | 273.082 | | 1 |
| 2 | | | | 273.278 A | 273.392 E | 273.574 E | 273.781 | 273.226 | 273.115 | 273.100 | 273.081 | | 2 |
| 3 | | | | 273.275 E | 273.402 E | 273.600 E | 273.762 | 273.223 | 273.113 | 273.108 | 273.081 | | 3 |
| 4 | | | | 273.273 A | 273.412 A | 273.627 A | 273.743 | 273.219 | 273.134 | 273.109 | 273.081 | | 4 |
| 5 | | | | 273.273 E | 273.413 A | 273.643 E | 273.719 | 273.206 | 273.131 | 273.103 | 273.081 | | 5 |
| 6 | | | | 273.273 A | 273.414 A | 273.659 E | 273.692 | 273.202 | 273.130 | 273.100 | 273.080 | | 6 |
| 7 | | | | 273.268 E | 273.408 A | 273.676 E | 273.694 | 273.195 | 273.126 | 273.095 | 273.080 | | 7 |
| 8 | | | | 273.264 E | 273.415 E | 273.692 E | 273.678 | 273.184 | 273.125 | 273.093 | 273.079 | | 8 |
| 9 | | | | 273.259 A | 273.417 A | 273.708 E | 273.658 | 273.177 | 273.121 | 273.091 | 273.078 | | 9 |
| 10 | | | | 273.259 E | 273.418 A | 273.725 E | 273.628 | 273.173 | 273.112 | 273.081 | 273.076 | | 10 |
| 11 | | | | 273.258 E | 273.421 E | 273.741 A | 273.604 | 273.169 | 273.112 | 273.091 | 273.074 | | 11 |
| 12 | | | | 273.258 A | 273.425 E | 273.753 E | 273.577 | 273.167 | 273.107 | 273.084 | 273.073 A | | 12 |
| 13 | | | | 273.258 E | 273.428 E | 273.764 E | 273.554 | 273.162 | 273.112 | 273.089 | 273.072 E | | 13 |
| 14 | | | | 273.258 E | 273.432 E | 273.776 A | 273.526 | 273.166 | 273.111 | 273.093 | 273.072 E | | 14 |
| 15 | | | | 273.258 E | 273.435 E | 273.788 E | 273.507 | 273.158 | 273.112 | 273.093 | 273.071 E | | 15 |
| 16 | | | | 273.258 A | 273.439 E | 273.801 E | 273.479 | 273.160 | 273.103 | 273.091 | 273.070 E | | 16 |
| 17 | | | | 273.258 E | 273.442 E | 273.813 E | 273.465 | 273.160 | 273.098 | 273.090 | 273.069 E | | 17 |
| 18 | | | | 273.258 E | 273.446 A | 273.826 E | 273.440 | 273.154 | 273.115 | 273.087 | 273.069 E | | 18 |
| 19 | | | | 273.258 A | 273.451 E | 273.838 E | 273.417 | 273.152 | 273.118 | 273.080 | 273.068 A | | 19 |
| 20 | | | | 273.258 E | 273.456 E | 273.850 E | 273.397 | 273.151 | 273.114 | 273.088 | | | 20 |
| 21 | | | | 273.258 E | 273.462 E | 273.863 A | 273.382 | 273.149 | 273.130 | 273.087 | | | 21 |
| 22 | | | | 273.268 E | 273.467 E | 273.941 | 273.367 | 273.144 | 273.128 | 273.084 | | | 22 |
| 23 | | | | 273.279 E | 273.472 A | 273.973 | 273.351 | 273.142 | 273.123 | 273.085 | | | 23 |
| 24 | | | | 273.289 A | 273.472 E | 273.978 | 273.335 | 273.142 | 273.125 | 273.084 | | | 24 |
| 25 | | | | 273.303 E | 273.471 E | 273.969 | 273.320 | 273.140 | 273.123 | 273.080 | | | 25 |
| 26 | | | | 273.317 E | 273.470 E | 273.953 | 273.304 | 273.136 | 273.121 | 273.087 | | | 26 |
| 27 | | | | 273.331 E | 273.469 E | 273.928 | 273.289 | 273.138 | 273.118 | 273.095 | | | 27 |
| 28 | | | | 273.345 E | 273.468 E | 273.910 | 273.280 | 273.134 | 273.113 | 273.080 | | | 28 |
| 29 | | | | 273.359 E | 273.467 A | 273.879 | 273.273 | 273.130 | 273.109 | 273.082 | | | 29 |
| 30 | | | 273.299 A | 273.373 A | 273.494 E | 273.850 | 273.257 | 273.126 | 273.110 | 273.082 | | | 30 |
| 31 | | | 273.308 A | | 273.520 E | | 273.246 | 273.127 | | 273.082 | | | 31 |
| MEAN | | | | 273.280 | 273.441 | 273.788 | 273.501 | 273.166 | 273.117 | 273.090 | | | |
| MAX | | | | 273.373 | 273.520 | 273.978 | 273.812 | 273.234 | 273.134 | 273.109 | | | |
| MIN | | | | 273.258 | 273.383 | 273.547 | 273.246 | 273.126 | 273.098 | 273.080 | | | |

A - MANUAL GAUGE
E - ESTIMATE

TYPE OF GAUGE - RECORDING



TR-570
COG-92-131


WATER LEVEL ELEVATION
RICE LAKE 1990
ELEVATION ( M.A.S.L.)
274.200
274.100
274.000
273.900
273.800
273.700
273.600
273.500
273.400
273.300
273.200
273.100
273.000
272.900
J
F
M
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D
DATE

# APPENDIX C

## HYDROGRAPHS FOR BEAVER POND DUMPS

1987 October 28, November 10

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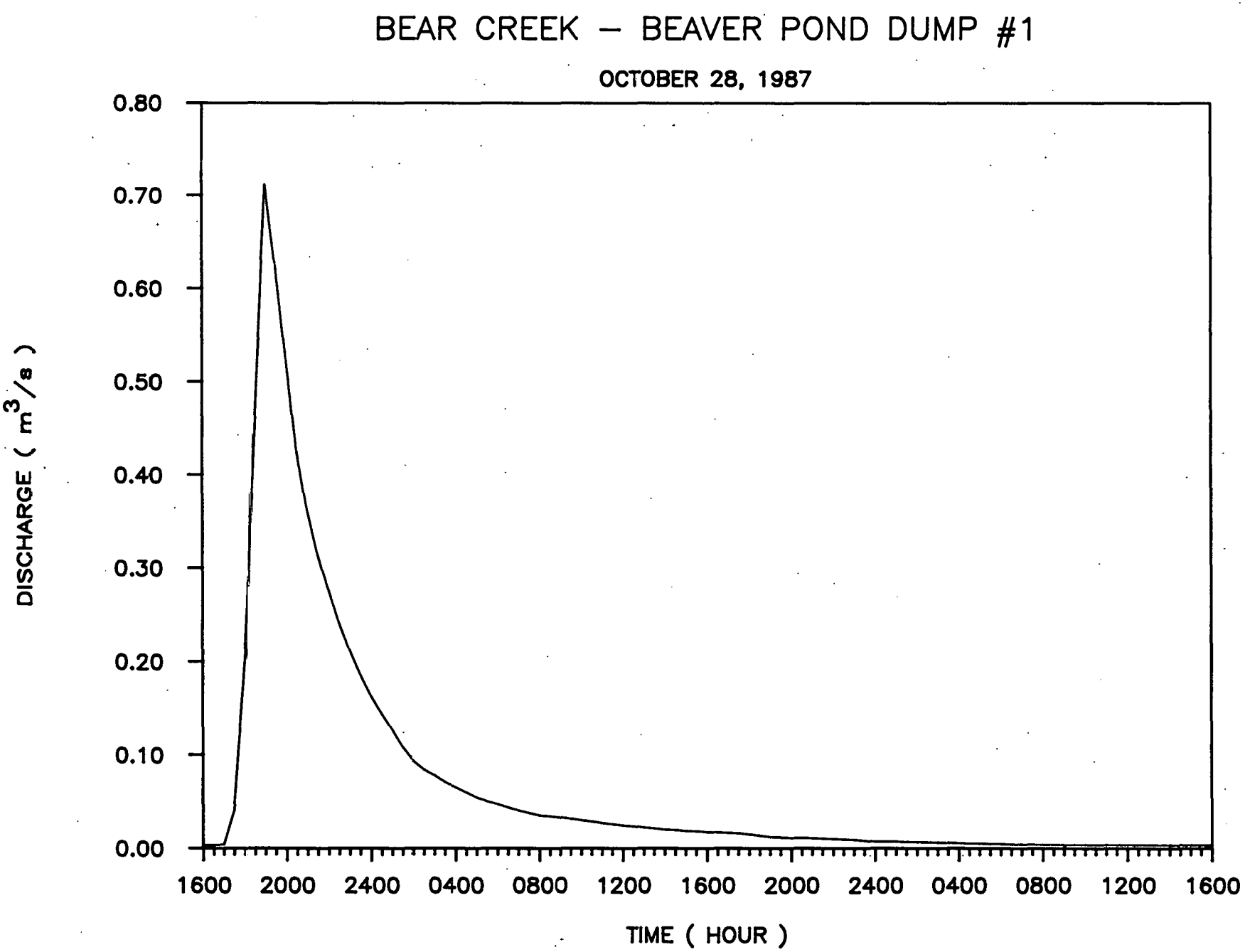
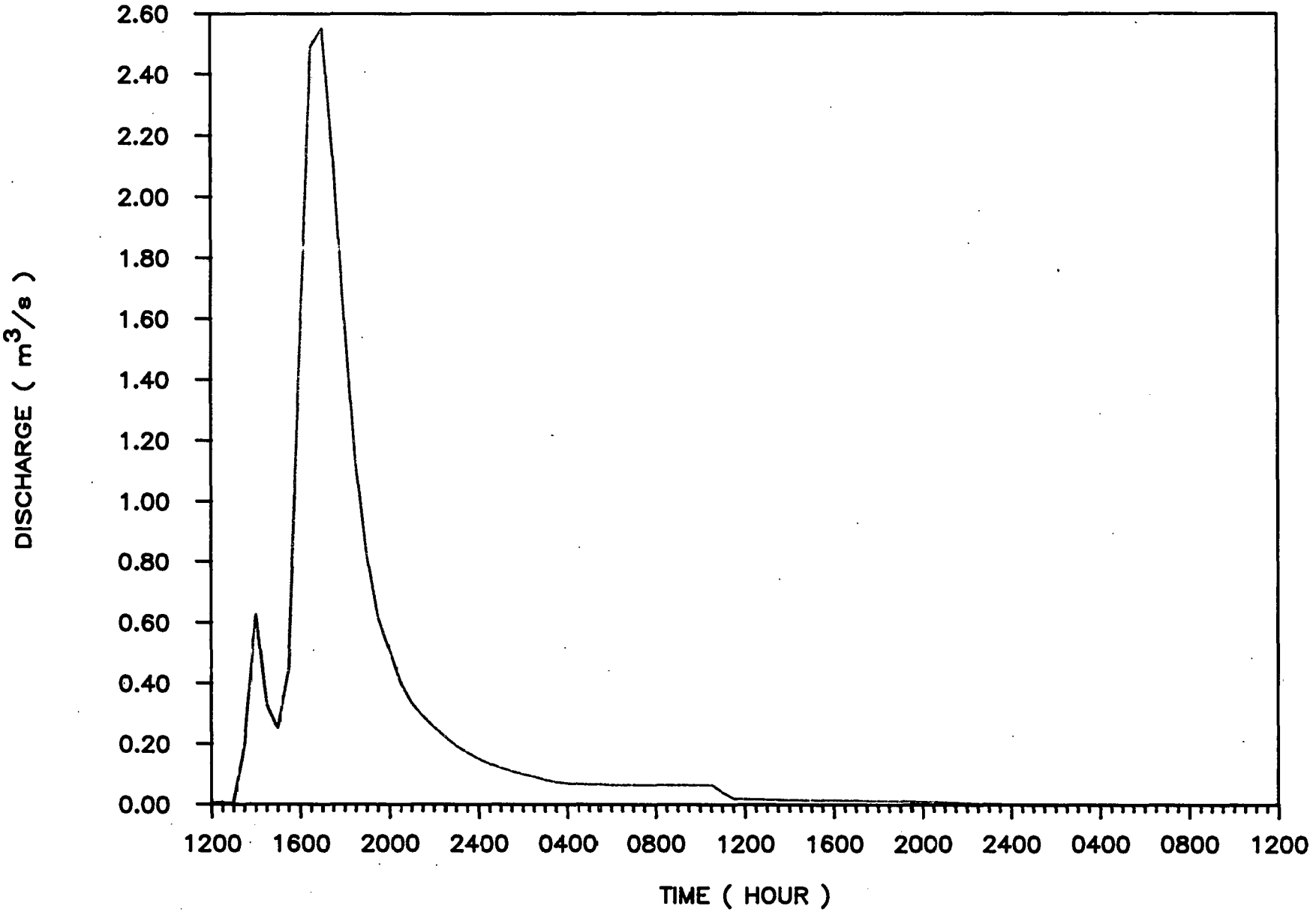

BEAR CREEK – BEAVER POND DUMP #1
OCTOBER 28, 1987
DISCHARGE ( m3/s )
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1600
2000
2400
0400
0800
1200
1600
2000
2400
0400
0800
1200
1600
TIME ( HOUR )

# BEAR CREEK – BEAVER POND DUMP #2

NOVEMBER 10, 1987






TR-570
COG-92-131

# APPENDIX D

## SURFACE WATER CHEMISTRY

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BEAR CREEK CHEMISTRY

1986 Samples 01 .. 18
1987 Samples 19 .. 36
1988 Samples 37 .. 72
1989 Samples 73 .. 117
1990 Samples 118 .. 162

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 08/04/86 | 1.23 | 2.04 | 3.54 | 3.50 | 0.72 | < 0.20 | 0.62 | 11.0 | 6.8 | 5.1 |
| 2 | 22/04/86 | 1.09 | 0.66 | 3.43 | 1.47 | 0.64 | < 0.20 | 1.21 | 4.0 | 5.5 | 3.7 |
| 3 | 29/04/86 | 1.11 | 0.69 | 3.43 | 1.41 | 0.74 | < 0.20 | 1.61 | 4.0 | 5.8 | 3.7 |
| 4 | 06/05/86 | 1.10 | 0.52 | 3.04 | 1.30 | 0.44 | < 0.20 | 1.45 | 6.0 | 5.7 | 2.6 |
| 5 | 13/05/86 | 1.17 | 0.47 | 3.75 | 1.38 | 0.53 | < 0.20 | 1.06 | 6.0 | 5.8 | 2.7 |
| 6 | 20/05/86 | 1.14 | 0.38 | 3.40 | 1.55 | 0.38 | < 0.20 | 0.65 | 6.0 | 5.6 | 2.7 |
| 7 | 03/06/86 | 1.26 | 0.44 | 4.09 | 1.96 | 0.40 | < 0.20 | 0.34 | 7.0 | 5.8 | 3.1 |
| 8 | 10/06/86 | 1.31 | 0.41 | 4.31 | 2.19 | 0.43 | < 0.20 | 0.39 | 8.0 | 6.0 | 3.3 |
| 9 | 17/06/86 | 1.89 | 0.52 | 5.30 | 2.70 | 0.90 | < 0.20 | 0.55 | 9.0 | 6.5 | 4.0 |
| 10 | 24/06/86 | 2.20 | 0.66 | 5.80 | 3.10 | 1.31 | 0.46 | 0.72 | 10.0 | 6.6 | 4.7 |
| 11 | 02/07/86 | 2.58 | 0.77 | 7.70 | 3.40 | 1.77 | < 0.20 | 0.78 | 12.0 | 6.8 | 6.3 |
| 12 | 08/07/86 | 1.83 | 0.77 | 7.40 | 3.40 | 0.96 | < 0.20 | 0.55 | 12.0 | 7.0 | 5.5 |
| 13 | 15/07/86 | 2.40 | 0.85 | 7.90 | 4.00 | 1.37 | < 0.20 | 1.10 | 13.0 | 7.0 | 6.0 |
| 14 | 22/07/86 | 2.06 | 1.13 | 7.90 | 4.10 | 1.02 | < 0.20 | 0.77 | 13.0 | 7.1 | 5.8 |
| 15 | 29/07/86 | 3.00 | 1.12 | 8.90 | 4.30 | 2.18 | < 0.20 | 1.62 | 14.0 | 7.1 | 7.0 |
| 16 | 05/08/86 | 3.70 | 0.98 | 9.60 | 4.80 | 3.09 | 0.46 | 1.99 | 16.0 | 7.2 | 8.8 |
| 17 | 26/11/86 | 1.47 | 0.58 | 5.00 | 2.10 | 1.39 | 0.26 | 1.31 | 13.0 | 6.5 | 4.4 |
| 18 | 09/12/86 | 1.53 | 0.54 | 5.00 | 2.10 | 1.43 | 0.26 | 1.71 | 10.0 | 6.4 | 4.5 |
| 19 | 06/01/87 | 1.63 | 0.57 | 5.30 | 2.30 | 1.31 | < 0.20 | 1.31 | 10.0 | 6.3 | 4.3 |
| 20 | 03/02/87 | 2.10 | 0.70 | 7.60 | 3.30 | 1.50 | 0.20 | 1.45 | 12.0 | 6.4 | 5.5 |
| 21 | 10/03/87 | 1.90 | 0.80 | 7.40 | 3.30 | 1.81 | < 0.20 | 1.54 | 16.0 | 6.6 | 6.8 |
| 22 | 24/03/87 | 1.80 | 0.90 | 5.70 | 2.40 | 1.22 | < 0.20 | 1.19 | 5.0 | 5.7 | 4.4 |
| 23 | 21/04/87 | 1.30 | 0.56 | 3.40 | 1.40 | 0.80 | < 0.20 | 1.35 | 6.0 | 6.1 | 4.1 |
| 24 | 05/05/87 | 1.40 | 0.51 | 4.40 | 1.90 | 0.72 | < 0.20 | 1.04 | 5.0 | 6.0 | 4.3 |
| 25 | 20/05/87 | 1.70 | 0.55 | 6.00 | 2.40 | 1.20 | < 0.20 | 1.19 | 11.0 | 6.3 | 5.5 |
| 26 | 09/06/87 | 1.73 | 0.67 | 6.60 | 2.90 | 1.04 | < 0.16 | 0.91 | 16.0 | 7.0 | 5.7 |
| 27 | 23/06/87 | 2.17 | 1.22 | 11.00 | 4.30 | 1.66 | 0.66 | 1.32 | 36.0 | 7.1 | 8.8 |
| 28 | 14/07/87 | 2.27 | 1.08 | 12.00 | 5.20 | 2.01 | < 0.16 | 0.80 | 49.0 | 7.3 | 10.2 |
| 29 | 18/08/87 | 1.98 | 2.46 | 13.00 | 6.10 | 1.54 | < 0.16 | 0.66 | 54.0 | 7.4 | 11.2 |
| 30 | 13/10/87 | 3.60 | 2.40 | 17.70 | 9.00 | 3.50 | < 0.20 | 1.69 | 60.0 | 7.2 | 14.9 |
| 31 | 12/11/87 | 2.00 | 2.60 | 10.70 | 5.00 | 1.82 | < 0.20 | 1.86 | 31.0 | 7.1 | 9.5 |
| 32 | 19/11/87 | 2.30 | 2.40 | 11.10 | 6.00 | 1.84 | 0.64 | 1.83 | 32.0 | 6.9 | 10.0 |
| 33 | 24/11/87 | 2.50 | 2.40 | 11.70 | 6.00 | 3.80 | 0.20 | 1.67 | 34.0 | 7.1 | 11.8 |
| 34 | 01/12/87 | 2.90 | 2.20 | 11.00 | 8.00 | 3.34 | 0.32 | 1.99 | 31.0 | 7.1 | 10.0 |
| 35 | 08/12/87 | 2.60 | 2.30 | 10.20 | 5.00 | 2.13 | 0.39 | 1.59 | 20.0 | 6.7 | 9.0 |
| 36 | 23/12/87 | 2.10 | 1.60 | 8.10 | 3.60 | 1.25 | < 0.20 | 0.50 | 17.0 | 6.4 | 6.8 |
| 37 | 06/01/88 | 0.91 | 1.26 | 3.90 | 1.65 | 0.77 | 1.17 | 0.40 | 6.0 | 6.4 | 3.5 |
| 38 | 29/01/88 | 2.60 | 2.10 | 9.10 | 4.40 | 1.82 | < 0.20 | 0.60 | 19.0 | 6.4 | 8.0 |
| 39 | 04/03/88 | 2.50 | 2.50 | 10.40 | 4.60 | 1.73 | 0.30 | 1.00 | 19.0 | 6.2 | 8.5 |
| 40 | 24/03/88 | 2.79 | 2.81 | 8.60 | 3.80 | 1.61 | 0.25 | 0.80 | 16.0 | 6.2 | 7.1 |
| 41 | 31/03/88 | 2.46 | 2.40 | 7.80 | 3.60 | 1.49 | 0.67 | 1.00 | 14.0 | 6.2 | 6.8 |
| 42 | 05/04/88 | 1.60 | 2.00 | 4.90 | 2.21 | 1.05 | 0.58 | 1.50 | 11.0 | 6.4 | 5.5 |
| 43 | 12/04/88 | 1.76 | 4.68 | 3.80 | 1.69 | 2.63 | 3.23 | 3.26 | 6.0 | 6.1 | 5.0 |
| 44 | 15/04/88 | 2.00 | 2.50 | 3.90 | 1.71 | 3.00 | 1.08 | 3.00 | 9.0 | 6.1 | 5.3 |
| 45 | 19/04/88 | 1.90 | 2.50 | 4.30 | 1.90 | 3.67 | 1.18 | 3.52 | 8.0 | 6.3 | 5.5 |
| 46 | 22/04/88 | 2.00 | 2.60 | 4.70 | 2.07 | 3.62 | 1.21 | 3.69 | 9.0 | 6.4 | 5.6 |
| 47 | 26/04/88 | 1.90 | 2.40 | 4.90 | 2.18 | 3.66 | 0.50 | 3.48 | 9.0 | 6.3 | 5.6 |
| 48 | 29/04/88 | 2.20 | 2.20 | 5.00 | 2.20 | 3.57 | 0.29 | 2.90 | 10.0 | 6.3 | 5.6 |
| 49 | 04/05/88 | 1.28 | 1.10 | 2.94 | 1.22 | 1.81 | < 0.20 | 1.40 | 5.0 | 6.3 | 3.4 |
| 50 | 10/05/88 | 2.40 | 2.10 | 5.90 | 2.44 | 3.52 | < 0.20 | 3.53 | 12.0 | 6.6 | 6.1 |
| 51 | 17/05/88 | 2.20 | 2.10 | 5.10 | 2.29 | 2.31 | < 0.20 | 1.90 | 11.0 | 6.3 | 5.4 |
| 52 | 31/05/88 | 2.78 | 3.26 | 7.80 | 3.40 | 3.55 | 0.26 | 2.94 | 16.0 | 6.5 | 6.2 |
| 53 | 08/06/88 | 1.64 | 2.75 | 5.70 | 2.48 | 1.18 | < 0.20 | 1.35 | 4.0 | 5.4 | 4.9 |
| 54 | 13/06/88 | 1.81 | 2.34 | 6.10 | 2.67 | 1.22 | < 0.20 | 1.19 | 5.0 | 5.4 | 5.0 |
| 55 | 15/06/88 | 2.10 | 2.39 | 6.30 | 2.69 | 1.66 | < 0.20 | 1.38 | 6.0 | 5.6 | 5.3 |

BEAR CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 21/06/88 | 1.90 | 0.91 | 5.87 | 2.23 | 1.76 | 0.43 | 0.52 | 4.0 | 5.5 | 4.7 |
| 57 | 28/06/88 | 1.60 | 0.92 | 6.21 | 2.80 | 1.10 | < 0.20 | 0.42 | 6.0 | 5.6 | 4.9 |
| 58 | 06/07/88 | 1.80 | 1.05 | 6.66 | 3.05 | 0.91 | 0.22 | 0.55 | 9.0 | 5.9 | 5.3 |
| 58A | 12/07/88 | 1.70 | 0.88 | 5.86 | 2.42 | 1.56 | < 0.20 | 0.51 | 6.0 | 5.7 | 4.8 |
| 59 | 26/07/88 | 1.90 | 0.74 | 6.65 | 2.73 | 1.84 | 0.23 | 0.40 | 9.0 | 6.0 | 5.1 |
| 60 | 03/08/88 | 2.62 | 2.00 | 7.60 | 3.60 | 0.96 | < 0.16 | 0.34 | 10.0 | 5.9 | 5.8 |
| 61 | 15/08/88 | 1.90 | 0.95 | 8.07 | 3.65 | 1.57 | 0.31 | 0.74 | 16.0 | 6.2 | 6.3 |
| 61A | 24/08/88 | 2.56 | 2.00 | 8.30 | 4.00 | 0.71 | 0.27 | 0.32 | 15.0 | 6.1 | 6.5 |
| 62 | 30/08/88 | 1.70 | 1.16 | 8.40 | 3.91 | 1.07 | < 0.20 | 1.07 | 16.0 | 6.3 | 6.3 |
| 63 | 06/09/88 | 2.09 | 2.00 | 7.30 | 3.40 | 0.57 | < 0.16 | 0.24 | 8.0 | 5.7 | 5.4 |
| 64 | 21/09/88 | 2.48 | 2.00 | 7.90 | 3.70 | 1.04 | < 0.16 | 0.37 | 15.0 | 6.2 | 6.3 |
| 65 | 04/10/88 | 3.20 | 2.00 | 7.30 | 3.30 | 2.90 | 0.26 | 0.90 | 17.0 | 6.5 | 6.8 |
| 66 | 13/10/88 | 2.48 | 2.00 | 6.98 | 3.17 | 1.27 | < 0.16 | 0.32 | 10.0 | 6.2 | 5.3 |
| 67 | 26/10/88 | 2.59 | 2.00 | 6.00 | 2.76 | 1.87 | < 0.16 | 0.43 | 9.0 | 6.1 | 5.3 |
| 68 | 07/11/88 | 2.48 | 2.00 | 6.00 | 2.66 | 2.34 | < 0.16 | 0.62 | 8.0 | 6.1 | 5.3 |
| 69 | 18/11/88 | 2.01 | 2.00 | 5.30 | 2.41 | 1.82 | < 0.16 | 0.94 | 6.0 | 5.9 | 4.8 |
| 70 | 30/11/88 | 2.10 | 0.60 | 6.07 | 2.66 | 1.85 | 0.34 | 1.00 | 7.0 | 6.0 | 5.0 |
| 71 | 06/12/88 | 2.40 | 2.00 | 5.80 | 2.66 | 1.82 | < 0.16 | 0.94 | 7.0 | 5.9 | 5.0 |
| 72 | 20/12/88 | 2.31 | 0.71 | 7.20 | 3.20 | 1.94 | 0.24 | 0.96 | 11.0 | 6.4 | 5.6 |
| 73 | 19/01/89 | LOST SAMPLE | | | | | | | | | |
| 74 | 31/01/89 | 2.10 | 0.70 | 7.00 | 3.10 | 1.35 | 0.21 | 0.45 | 10.0 | 5.8 | 5.5 |
| 75 | 07/02/89 | 2.17 | 0.72 | 7.20 | 3.20 | 1.39 | 0.23 | 0.45 | 10.0 | 5.9 | 5.6 |
| 76 | 21/02/89 | 2.10 | 0.75 | 7.10 | 3.30 | 1.18 | 0.22 | 0.34 | 10.0 | 6.2 | 5.5 |
| 77 | 01/03/89 | 1.96 | 0.75 | 7.20 | 3.20 | 1.09 | < 0.20 | < 0.10 | 8.0 | 5.6 | 5.5 |
| 78 | 14/03/89 | 2.27 | 0.87 | 6.80 | 3.40 | 1.36 | < 0.20 | 0.29 | 11.0 | 5.9 | 5.9 |
| 79 | 28/03/89 | 2.33 | 0.91 | 8.20 | 3.70 | 1.39 | 0.23 | 0.30 | 15.0 | 6.1 | 6.7 |
| 80 | 04/04/89 | 2.43 | 1.01 | 8.80 | 4.00 | 1.60 | 0.28 | 0.56 | 17.0 | 6.3 | 9.1 |
| 81 | 11/04/89 | 3.40 | 1.15 | 8.40 | 3.80 | 4.70 | < 0.16 | 2.40 | 16.8 | 6.4 | 6.4 |
| 82 | 17/04/89 | 2.88 | 1.57 | 6.50 | 2.86 | 1.11 | < 0.16 | 1.86 | 14.3 | 6.5 | 3.6 |
| 83 | 25/04/89 | 1.29 | 1.36 | 3.60 | 1.52 | 0.75 | < 0.16 | 1.83 | 6.4 | 6.1 | 4.7 |
| 84 | 01/05/89 | 1.30 | 1.14 | 5.60 | 2.47 | 0.76 | < 0.16 | 1.69 | 13.4 | 6.6 | 3.3 |
| 85 | 08/05/89 | 1.38 | 1.02 | 3.30 | 1.44 | 0.65 | < 0.16 | 0.74 | 3.5 | 5.7 | 3.5 |
| 86 | 15/05/89 | 1.49 | 1.03 | 4.00 | 1.68 | 0.85 | < 0.16 | 0.52 | 5.0 | 5.9 | 4.0 |
| 87 | 23/05/89 | 1.69 | 1.00 | 4.90 | 2.03 | 0.81 | < 0.16 | 0.70 | 6.1 | 5.9 | 3.5 |
| 88 | 28/05/89 | 1.56 | 0.55 | 4.30 | 1.71 | 1.06 | < 0.16 | 0.49 | 5.3 | 5.8 | 3.7 |
| 89 | 06/06/89 | 1.67 | 0.39 | 4.80 | 1.92 | 1.47 | < 0.16 | 0.95 | 5.9 | 5.9 | 3.8 |
| 90 | 13/06/89 | 1.81 | 0.53 | 4.70 | 1.91 | 0.65 | < 0.16 | < 0.10 | 7.4 | 6.2 | 3.5 |
| 91 | 19/06/89 | 1.44 | 0.33 | 4.50 | 1.90 | 0.67 | < 0.16 | < 0.10 | 5.0 | 5.8 | 3.7 |
| 92 | 26/06/89 | 1.54 | 0.37 | 5.00 | 2.07 | 1.33 | < 0.16 | < 0.10 | 5.5 | 5.8 | 4.0 |
| 93 | 04/07/89 | 1.55 | 0.33 | 5.50 | 2.20 | 0.57 | < 0.16 | < 0.10 | 5.7 | 5.7 | 4.5 |
| 94 | 10/07/89 | 1.54 | 0.44 | 6.40 | 2.50 | 0.73 | < 0.16 | < 0.10 | 8.7 | 5.9 | 4.7 |
| 95 | 17/07/89 | 1.46 | 0.46 | 6.30 | 2.54 | 0.70 | 0.30 | < 0.10 | 9.6 | 5.9 | 4.7 |
| 96 | 26/07/89 | 1.33 | 0.56 | 6.40 | 2.68 | 0.49 | < 0.16 | < 0.10 | 9.4 | 5.9 | 4.9 |
| 97 | 02/08/89 | 1.80 | 0.65 | 6.00 | 2.56 | 0.78 | < 0.16 | < 0.10 | 9.1 | 5.9 | 4.8 |
| 98 | 08/08/89 | 1.42 | 0.52 | 6.80 | 2.89 | 0.57 | < 0.16 | 0.45 | 9.1 | 5.8 | 5.2 |
| 99 | 15/08/89 | 1.90 | 0.62 | 7.80 | 3.30 | 1.07 | < 0.16 | 0.38 | 15.3 | 6.3 | 5.7 |
| 100 | 22/08/89 | 1.54 | 0.63 | 6.40 | 2.72 | 0.82 | < 0.16 | 0.40 | 10.4 | 6.1 | 5.1 |
| 101 | 29/08/89 | 1.68 | 0.75 | 7.30 | 3.40 | 0.86 | < 0.16 | 0.54 | 16.4 | 6.6 | 4.3 |
| 102 | 05/09/89 | 1.84 | 0.89 | 7.80 | 3.60 | 0.70 | < 0.16 | 0.43 | 17.9 | 7.0 | 4.5 |
| 103 | 14/09/89 | 2.33 | 1.02 | 36.00 | 3.50 | 1.60 | < 0.16 | 0.41 | 17.8 | 6.7 | 1.3 |
| 104 | 19/09/89 | 2.11 | 1.01 | 8.40 | 4.00 | 0.97 | < 0.16 | 0.45 | 21.2 | 7.1 | 4.7 |
| 105 | 26/09/89 | 2.17 | 1.12 | 10.30 | 4.60 | 1.26 | < 0.16 | 0.40 | 29.7 | 7.2 | 6.0 |
| 106 | 03/10/89 | 2.01 | 1.04 | 8.40 | 4.00 | 1.12 | < 0.16 | 0.41 | 23.5 | 7.3 | 5.0 |
| 107 | 10/10/89 | 1.49 | 0.88 | 5.30 | 2.56 | 0.72 | 0.72 | 0.95 | 6.7 | 6.3 | 3.2 |
| 108 | 18/10/89 | 1.65 | 0.92 | 6.20 | 3.00 | 1.01 | 0.63 | 1.24 | 11.8 | 6.5 | 4.0 |
| 109 | 24/10/89 | 1.88 | 0.95 | 7.10 | 3.40 | 1.29 | < 0.16 | 1.14 | 17.5 | 6.7 | 4.5 |
| 110 | 31/10/89 | 1.91 | 0.97 | 6.50 | 3.10 | 1.25 | < 0.16 | 1.17 | 18.3 | 6.9 | 4.3 |

BEAR CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 111 | 07/11/89 | 1.31 | 0.46 | 4.60 | 2.19 | 0.96 | 0.56 | 0.51 | 5.7 | 6.2 | 2.8 |
| 112 | 14/11/89 | 2.15 | 0.80 | 7.00 | 3.40 | 1.61 | < 0.16 | 0.66 | 16.7 | 6.7 | 5.6 |
| 113 | 21/11/89 | 1.80 | 0.64 | 6.10 | 2.86 | 1.63 | < 0.16 | 0.45 | 13.3 | 6.9 | 3.6 |
| 114 | 29/11/89 | 2.38 | 0.89 | 8.70 | 4.10 | 2.35 | < 0.16 | 0.56 | 20.0 | 6.5 | 5.5 |
| 115 | 07/12/89 | 2.70 | 1.01 | 10.10 | 4.70 | 2.86 | < 0.16 | 0.58 | 25.2 | 6.6 | 6.5 |
| 116 | 16/12/89 | 2.95 | 1.11 | 11.40 | 5.30 | 3.20 | < 0.16 | 0.61 | 29.7 | 7.2 | 6.7 |
| 117 | 20/12/89 | 3.25 | 1.22 | 12.60 | 5.80 | 3.64 | < 0.16 | 0.62 | 34.1 | 7.1 | 8.7 |
| 118 | 05/01/90 | 3.62 | 1.27 | 13.60 | 6.30 | 3.70 | < 0.16 | 0.53 | 38.3 | 6.5 | 11.7 |
| 119 | 16/01/90 | 2.83 | 0.97 | 10.70 | 4.60 | 3.06 | < 0.16 | 0.37 | 31.8 | 6.3 | 9.4 |
| 120 | 23/01/90 | 3.82 | 1.35 | 13.90 | 6.30 | 4.40 | < 0.16 | 0.38 | 41.0 | 6.3 | 11.9 |
| 121 | 29/01/90 | 3.68 | 1.19 | 12.50 | 5.70 | 3.70 | < 0.16 | 0.44 | 37.1 | 6.4 | 10.8 |
| 122 | 06/02/90 | 3.61 | 1.23 | 13.00 | 6.00 | 3.80 | < 0.16 | 0.43 | 39.0 | 6.8 | 10.9 |
| 123 | 12/02/90 | 3.61 | 1.20 | 12.90 | 5.90 | 3.40 | < 0.16 | 0.49 | 39.0 | 6.5 | 10.9 |
| 124 | 20/02/90 | 3.52 | 1.14 | 12.60 | 5.80 | 3.30 | < 0.16 | 0.51 | 36.8 | 6.9 | 10.6 |
| 125 | 27/02/90 | 3.47 | 1.15 | 12.70 | 5.80 | 3.08 | < 0.16 | 0.48 | 39.0 | 6.5 | 10.8 |
| 126 | 05/03/90 | 3.69 | 1.20 | 13.40 | 6.10 | 3.50 | < 0.16 | 0.45 | 42.0 | 6.5 | 11.3 |
| 127 | 14/03/90 | 3.21 | 1.28 | 11.70 | 5.30 | 3.13 | 0.37 | 0.70 | 36.6 | 6.4 | 10.3 |
| 128 | 19/03/90 | 4.63 | 3.08 | 7.30 | 3.20 | 14.50 | 0.72 | 2.29 | 20.2 | 6.4 | 10.9 |
| 129 | 26/03/90 | - | - | - | - | 9.50 | 0.53 | 2.61 | 23.0 | 6.8 | 8.7 |
| 130 | 02/04/90 | 3.24 | 2.93 | 5.10 | 2.19 | 6.40 | 0.52 | 2.10 | 14.4 | 7.4 | 6.0 |
| 131 | 09/04/90 | 2.68 | 2.53 | 5.00 | 2.16 | 4.70 | 1.58 | 2.30 | 10.5 | 6.4 | 5.4 |
| 132 | 16/04/90 | 2.25 | 1.96 | 4.70 | 2.09 | 2.97 | 0.64 | 2.04 | 15.5 | 6.7 | 5.5 |
| 133 | 24/04/90 | 1.91 | 1.82 | 4.00 | 1.80 | 2.65 | 0.55 | 2.59 | 15.6 | 6.7 | 5.2 |
| 134 | 04/05/90 | LOST | SAMPLE | | | | | | | | |
| 135 | 10/05/90 | 2.18 | 1.71 | 4.10 | 1.78 | 2.73 | < 0.16 | 2.28 | 9.2 | 6.1 | 3.8 |
| 136 | 18/05/90 | 1.74 | 1.40 | 3.80 | 1.69 | 1.58 | < 0.16 | 1.96 | 10.0 | 6.3 | 4.2 |
| 137 | 23/05/90 | 2.01 | 1.33 | 4.10 | 1.75 | 2.24 | < 0.16 | 2.06 | 10.1 | 6.4 | 4.4 |
| 138 | 28/05/90 | 1.82 | 1.32 | 4.10 | 1.77 | 1.51 | < 0.16 | 1.29 | 10.2 | 6.3 | 4.2 |
| 139 | 11/06/90 | 0.52 | 0.16 | 1.24 | 0.44 | 0.32 | < 0.16 | 1.49 | 8.9 | 5.9 | 1.0 |
| 140 | 21/06/90 | 1.85 | 0.68 | 4.60 | 1.87 | 1.09 | < 0.16 | 0.80 | 9.3 | 6.3 | 3.5 |
| 141 | 26/06/90 | 1.56 | 0.35 | 4.40 | 1.83 | 0.77 | < 0.16 | 0.51 | 9.3 | 6.0 | 3.3 |
| 142 | 10/07/90 | 1.72 | 0.41 | 5.70 | 2.16 | 1.05 | < 0.16 | 0.38 | 9.5 | 5.8 | 3.6 |
| 143 | 16/07/90 | 1.86 | 0.62 | 5.30 | 2.27 | 1.18 | < 0.16 | < 0.10 | 9.5 | 5.8 | 3.9 |
| 144 | 23/07/90 | 1.86 | 0.70 | 6.50 | 2.55 | 0.85 | < 0.16 | < 0.10 | 9.9 | 6.0 | 4.2 |
| 145 | 31/07/90 | 2.01 | 0.86 | 7.00 | 2.86 | 1.10 | 0.53 | 0.74 | 11.5 | 6.4 | 4.8 |
| 146 | 08/08/90 | 2.11 | 0.86 | 8.50 | 3.70 | 0.77 | < 0.16 | 0.46 | 20.3 | 6.6 | 5.6 |
| 147 | 14/08/90 | 2.34 | 2.08 | 8.70 | 4.10 | 0.69 | < 0.16 | 0.50 | 23.4 | 6.9 | 5.8 |
| 148 | 20/08/90 | 1.72 | 0.69 | 5.60 | 2.69 | 0.49 | 0.29 | 0.59 | - | 6.3 | 3.5 |
| 149 | 28/08/90 | 2.98 | 0.83 | 7.90 | 3.80 | 1.58 | < 0.16 | 1.17 | 12.9 | 6.5 | 5.0 |
| 150 | 04/09/90 | 2.32 | 0.91 | 8.20 | 3.70 | 1.09 | 0.19 | 0.76 | 20.8 | 6.6 | 5.3 |
| 151 | 10/09/90 | 2.49 | 0.98 | 8.40 | 3.80 | 1.26 | 0.18 | 0.98 | 21.1 | 7.0 | 5.1 |
| 152 | 17/09/90 | 2.59 | 1.10 | 8.80 | 3.80 | 1.37 | < 0.16 | 0.93 | 25.1 | 6.9 | 5.5 |
| 153 | 24/09/90 | 2.62 | 1.05 | 8.70 | 3.80 | 1.45 | 0.19 | 0.88 | 23.2 | 6.9 | 5.8 |
| 154 | 01/10/90 | 3.37 | 1.02 | 8.10 | 3.70 | 2.43 | < 0.16 | 0.99 | 24.3 | 7.0 | 5.5 |
| 155 | 09/10/90 | 2.12 | 1.67 | 8.40 | 4.00 | 0.92 | 0.41 | 2.12 | 21.9 | 6.7 | 4.8 |
| 156 | 15/10/90 | 2.47 | 1.46 | 8.80 | 4.20 | 1.12 | 0.25 | 1.36 | 21.2 | 6.8 | 5.2 |
| 157 | 22/10/90 | 3.06 | 1.50 | 10.20 | 4.80 | 1.67 | < 0.16 | 1.39 | 32.2 | 6.9 | 6.0 |
| 158 | 29/10/90 | 3.37 | 1.16 | 10.30 | 5.00 | 2.19 | < 0.16 | 1.34 | 32.9 | 7.0 | 6.5 |
| 159 | 05/11/90 | 3.22 | 1.16 | 9.30 | 4.40 | 1.87 | < 0.16 | 1.07 | 29.2 | 6.8 | 5.9 |
| 160 | 12/11/90 | 2.99 | 1.04 | 9.50 | 4.60 | 1.72 | < 0.16 | 0.69 | 27.7 | 7.0 | 5.8 |
| 161 | 03/12/90 | 3.02 | 1.25 | 9.70 | 4.30 | 2.61 | 0.18 | 0.64 | 27.4 | 6.9 | 8.1 |
| 162 | 17/12/90 | 3.20 | 1.24 | 11.20 | 5.00 | 2.81 | 0.21 | 0.68 | 32.8 | 6.8 | 9.0 |
| | MINIMUM | 0.52 | 0.16 | 1.24 | 0.44 | 0.32 | < 0.16 | < 0.10 | 3.5 | 5.4 | 1.0 |
| | MAXIMUM | 4.63 | 4.68 | 36.00 | 9.00 | 14.50 | 3.23 | 3.69 | 60.0 | 7.4 | 14.9 |
| | MEAN | 2.18 | 1.27 | 7.36 | 3.27 | 1.84 | 0.28 | 1.03 | 15.9 | 6.4 | 5.8 |
| | S.D. | 0.70 | 0.75 | 3.56 | 1.36 | 1.58 | 0.32 | 0.78 | 10.9 | 0.5 | 2.3 |
| | SAMPLES | 161 | 161 | 161 | 161 | 162 | 162 | 162 | 161 | 162 | 162 |

RICE CREEK CHEMISTRY

1986 Samples 01 .. 22
1987 Samples 23 .. 36
1988 Samples 37 .. 64
1989 Samples 65 .. 110
1990 Samples 111 .. 157

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 09/04/86 | 1.56 | 1.57 | 4.90 | 2.90 | 1.47 | < 0.20 | 1.94 | 15.0 | 7.3 | 5.7 |
| 2 | 22/04/86 | 1.35 | 1.05 | 5.00 | 2.70 | 0.93 | < 0.20 | 1.67 | 9.0 | 6.7 | 4.9 |
| 3 | 29/04/86 | 1.48 | 1.62 | 5.60 | 3.50 | 0.96 | < 0.20 | 2.54 | 13.0 | 6.7 | 5.5 |
| 4 | 06/05/86 | 1.32 | 0.94 | 4.41 | 2.61 | 0.64 | < 0.20 | 1.94 | 8.0 | 6.6 | 3.9 |
| 5 | 13/05/86 | 1.44 | 1.00 | 4.81 | 2.74 | 0.69 | < 0.20 | 1.94 | 9.0 | 6.6 | 4.2 |
| 6 | 20/05/86 | 1.45 | 0.95 | 4.70 | 2.69 | 0.48 | < 0.20 | 1.69 | 9.0 | 6.6 | 4.2 |
| 7 | 03/06/86 | 1.52 | 0.95 | 5.00 | 2.90 | 0.43 | < 0.20 | 1.53 | 10.0 | 6.7 | 4.4 |
| 8 | 10/06/86 | 1.49 | 0.91 | 5.20 | 3.01 | 0.42 | < 0.20 | 1.59 | 10.0 | 6.6 | 4.6 |
| 9 | 17/06/86 | 1.53 | 0.96 | 5.30 | 3.30 | 0.39 | < 0.16 | 1.75 | 20.0 | 6.8 | 4.5 |
| 10 | 24/06/86 | 1.80 | 0.98 | 6.60 | 3.70 | 0.50 | 0.31 | 1.73 | 11.0 | 6.7 | 5.3 |
| 11 | 02/07/86 | 1.54 | 1.01 | 7.30 | 3.90 | 0.66 | 0.28 | 1.61 | 7.0 | 7.0 | 5.6 |
| 12 | 08/07/86 | 1.50 | 0.92 | 7.50 | 4.00 | 0.58 | 0.38 | 1.63 | 12.0 | 7.0 | 6.0 |
| 13 | 15/07/86 | 1.54 | 0.75 | 7.80 | 4.10 | 0.43 | < 0.20 | 1.47 | 13.0 | 7.2 | 6.0 |
| 14 | 23/07/86 | 1.60 | 0.80 | 8.20 | 4.40 | 0.42 | < 0.20 | 1.51 | 14.0 | 7.3 | 6.5 |
| 15 | 29/07/86 | 1.63 | 0.87 | 8.80 | 4.70 | 0.43 | < 0.20 | 1.37 | 15.0 | 7.2 | 7.0 |
| 16 | 05/08/86 | 1.92 | 0.85 | 10.40 | 6.30 | 0.41 | < 0.20 | 0.92 | 19.0 | 7.6 | 9.3 |
| 17 | 19/08/86 | 1.95 | 0.88 | 10.70 | 6.70 | 0.45 | < 0.20 | 1.26 | 18.0 | 7.2 | 9.0 |
| 18 | 09/09/86 | 2.02 | 0.97 | 10.40 | 6.90 | 0.44 | < 0.20 | 0.98 | 19.0 | 7.5 | 9.5 |
| 19 | 22/09/86 | 1.71 | 0.91 | 9.90 | 6.50 | 0.48 | < 0.20 | 1.47 | 50.0 | 7.2 | 6.0 |
| 20 | 06/10/86 | 1.90 | 0.93 | 10.30 | 6.60 | 1.13 | < 0.20 | 1.63 | 56.0 | 7.6 | 9.8 |
| 21 | 26/11/86 | 3.10 | 1.46 | 11.80 | 6.40 | 3.77 | 0.34 | 1.63 | 48.0 | 7.1 | 10.8 |
| 22 | 09/12/86 | 3.00 | 1.19 | 11.90 | 6.50 | 1.78 | 0.29 | 1.55 | 49.0 | 7.1 | 10.0 |
| 23 | 07/01/87 | 3.10 | 0.93 | 14.30 | 7.40 | 1.33 | 1.32 | 0.99 | 62.0 | 7.2 | 11.8 |
| 24 | 24/02/87 | 3.20 | 1.04 | 20.10 | 9.60 | - | - | - | - | - | - |
| 25 | 10/03/87 | 3.80 | 1.20 | 20.30 | 9.30 | 2.77 | < 0.20 | 1.78 | 74.0 | 7.1 | 20.0 |
| 26 | 24/03/87 | 4.30 | 1.50 | 14.50 | 6.80 | 6.83 | 2.81 | 4.92 | 48.0 | 7.1 | 17.0 |
| 27 | 21/04/87 | 1.50 | 0.90 | 5.10 | 2.10 | 1.13 | 0.24 | 2.04 | 10.0 | 6.4 | 5.3 |
| 28 | 05/05/87 | 1.70 | 1.00 | 6.00 | 2.70 | 0.82 | < 0.20 | 2.17 | 14.0 | 6.5 | 6.0 |
| 29 | 20/05/87 | 1.80 | 0.90 | 6.00 | 2.90 | 0.76 | < 0.20 | 1.95 | 14.0 | 6.6 | 6.0 |
| 30 | 10/06/87 | 1.81 | 0.88 | 6.10 | 3.40 | 0.80 | 0.62 | 2.01 | 18.0 | 7.3 | 6.0 |
| 31 | 23/06/87 | 2.03 | 0.85 | 6.80 | 3.70 | 1.66 | 1.01 | 2.32 | 20.0 | 7.1 | 7.0 |
| 32 | 14/07/87 | 2.12 | 0.86 | 8.40 | 4.50 | 2.55 | 0.57 | 2.02 | 28.0 | 7.4 | 8.1 |
| 33 | 18/08/87 | 2.53 | 0.81 | 10.00 | 6.00 | 3.42 | < 0.16 | 1.50 | 46.0 | 7.3 | 10.3 |
| 34 | 13/10/87 | 4.30 | 2.20 | 24.30 | 8.00 | 6.92 | < 0.20 | 2.63 | 46.0 | 7.1 | 14.0 |
| 35 | 12/11/87 | 4.50 | 2.40 | 15.10 | 9.00 | 6.03 | < 0.20 | 3.00 | 51.0 | 7.3 | 14.8 |
| 36 | 23/12/87 | 6.20 | 2.40 | 23.20 | 11.90 | 7.30 | 0.20 | 2.40 | 87.0 | 7.2 | 22.0 |
| 37 | 05/04/88 | 7.40 | 2.90 | 19.90 | 8.80 | 9.90 | 1.31 | 2.30 | 67.0 | 7.1 | 2.1 |
| 38 | 12/04/88 | 3.20 | 3.70 | 7.10 | 3.20 | 5.70 | 1.54 | 3.98 | 23.0 | 6.9 | 9.0 |
| 39 | 15/04/88 | 0.83 | 1.70 | 3.40 | 1.13 | 1.29 | 1.39 | 1.42 | 8.0 | 6.5 | 3.4 |
| 40 | 19/04/88 | 2.90 | 3.40 | 9.20 | 4.30 | 4.68 | 0.53 | 4.17 | 30.0 | 6.7 | 10.0 |
| 41 | 22/04/88 | 2.70 | 3.20 | 9.30 | 4.40 | 4.00 | 0.47 | 4.34 | 30.0 | 6.8 | 9.8 |
| 42 | 29/04/88 | 2.80 | 3.00 | 10.10 | 4.80 | 3.87 | < 0.20 | 4.77 | 32.0 | 7.1 | 10.0 |
| 43 | 04/05/88 | 3.33 | 4.78 | 10.70 | 5.00 | 4.03 | < 0.20 | 5.33 | 31.0 | 7.0 | 10.5 |
| 44 | 10/05/88 | 3.20 | 3.30 | 11.70 | 5.40 | 4.81 | 0.26 | 6.65 | 32.0 | 7.1 | 11.2 |
| 45 | 17/05/88 | 3.40 | 2.90 | 10.90 | 5.00 | 4.15 | < 0.20 | 5.90 | 28.0 | 6.6 | 10.4 |
| 46 | 31/05/88 | 7.92 | 4.49 | 20.50 | 10.10 | 16.90 | 0.44 | 7.34 | 55.0 | 6.9 | 21.0 |
| 47 | 08/06/88 | 3.10 | < 2.00 | 8.70 | 4.30 | 1.84 | 0.91 | 2.03 | 21.0 | 6.5 | 7.8 |
| 48 | 13/06/88 | 2.43 | 3.61 | 7.90 | 3.80 | 1.69 | < 0.20 | 1.96 | 19.0 | 6.3 | 7.0 |
| 49 | 21/06/88 | 3.00 | < 2.00 | 7.20 | 3.70 | 1.41 | 0.48 | 1.46 | 17.0 | 6.4 | 6.4 |
| 50 | 28/06/88 | 2.30 | 1.67 | 7.70 | 3.72 | 1.24 | 0.94 | 1.81 | 16.0 | 6.6 | 6.5 |
| 51 | 06/07/88 | 3.00 | < 2.00 | 7.90 | 4.00 | 1.56 | 0.66 | 1.87 | 15.0 | 6.2 | 6.7 |
| 52 | 26/07/88 | 2.20 | 1.25 | 7.06 | 3.67 | 1.40 | 0.20 | 1.20 | 16.0 | 6.5 | 6.2 |
| 53 | 24/08/88 | 2.85 | < 2.00 | 8.90 | 4.70 | 1.12 | 0.23 | 0.86 | 22.0 | 6.7 | 7.4 |
| 54 | 30/08/88 | 2.76 | < 2.00 | 9.00 | 4.80 | 1.09 | < 0.16 | 0.80 | 23.0 | 6.7 | 7.5 |
| 55 | 06/09/88 | 2.75 | < 2.00 | 9.90 | 5.20 | 1.14 | < 0.16 | 0.69 | 26.0 | 6.8 | 8.0 |

RICE CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 20/09/88 | 2.10 | 1.37 | 9.87 | 4.85 | - | - | - | - | - | - |
| 57 | 04/10/88 | 3.40 | < 2.00 | 12.20 | 6.00 | 0.29 | 1.00 | 1.64 | 25.0 | 6.7 | 9.3 |
| 58 | 13/10/88 | 2.60 | 1.12 | 11.80 | 5.40 | 2.22 | 0.24 | 1.19 | 25.0 | 6.6 | 8.6 |
| 59 | 26/10/88 | 3.10 | < 2.00 | 10.50 | 5.10 | 1.88 | 0.19 | 1.28 | 22.0 | 6.7 | 8.0 |
| 60 | 07/11/88 | 2.81 | < 2.00 | 9.90 | 4.80 | 1.93 | 0.29 | 0.31 | 18.0 | 6.4 | 7.5 |
| 61 | 18/11/88 | 2.95 | < 2.00 | 9.00 | 4.60 | 2.37 | 0.56 | 1.17 | 19.0 | 6.7 | 7.4 |
| 62 | 30/11/88 | 2.50 | 0.98 | 10.40 | 5.30 | 1.97 | < 0.16 | 0.68 | 18.0 | 6.4 | 7.6 |
| 63 | 06/12/88 | 4.00 | < 2.00 | 12.40 | 6.50 | 2.41 | < 0.16 | 1.09 | 28.0 | 6.8 | 9.8 |
| 64 | 20/12/88 | 3.81 | 2.14 | 14.90 | 7.00 | 2.60 | < 0.20 | 1.19 | 40.0 | 7.1 | 11.6 |
| 65 | 12/01/89 | 3.34 | 1.83 | 12.30 | 5.60 | 2.19 | < 0.20 | 1.05 | 35.0 | 6.7 | 10.5 |
| 66 | 17/01/89 | 3.34 | 1.86 | 12.90 | 5.80 | 2.11 | 0.98 | 1.08 | 37.0 | 6.7 | 11.0 |
| 67 | 31/01/89 | 3.17 | 1.79 | 13.00 | 5.80 | 1.99 | 0.65 | 0.88 | 38.0 | 6.8 | 11.0 |
| 68 | 07/02/89 | 3.10 | 1.73 | 13.10 | 5.70 | 1.92 | 0.30 | 0.70 | 38.0 | 6.8 | 10.9 |
| 69 | 21/02/89 | 3.47 | 1.99 | 13.00 | 5.70 | 2.17 | < 0.20 | 0.73 | 43.0 | 7.0 | 12.0 |
| 70 | 01/03/89 | 4.04 | 2.25 | 15.90 | 7.00 | 2.41 | < 0.20 | 0.75 | 51.0 | 7.0 | 13.5 |
| 71 | 14/03/89 | 3.90 | 2.25 | 14.10 | 6.80 | 2.19 | < 0.20 | 0.56 | 49.0 | 7.0 | 13.4 |
| 72 | 28/03/89 | 4.54 | 2.52 | 19.60 | 8.50 | 2.79 | < 0.20 | 0.75 | 62.0 | 7.0 | 16.0 |
| 73 | 04/04/89 | 4.21 | 2.35 | 19.20 | 8.30 | 2.67 | < 0.20 | 0.73 | 62.0 | 6.6 | 15.5 |
| 74 | 11/04/89 | 4.93 | 2.25 | 16.70 | 7.40 | 5.40 | < 0.16 | 1.43 | 48.0 | 6.8 | 16.0 |
| 75 | 17/04/89 | 5.48 | 2.08 | 14.90 | 6.60 | 9.00 | 1.67 | 2.56 | 39.7 | 6.8 | 15.5 |
| 76 | 25/04/89 | 1.47 | 1.63 | 4.10 | 2.09 | 1.48 | < 0.16 | 2.22 | 8.6 | 6.2 | 5.4 |
| 77 | 01/05/89 | 1.53 | 1.34 | 4.60 | 2.15 | 1.16 | < 0.16 | 1.87 | 9.5 | 6.3 | 5.1 |
| 78 | 08/05/89 | 1.64 | 1.44 | 5.30 | 2.47 | 0.90 | < 0.16 | 1.91 | 11.3 | 6.3 | 5.3 |
| 79 | 15/05/89 | 1.63 | 1.45 | 5.50 | 2.48 | 0.80 | < 0.16 | 1.77 | 10.8 | 6.4 | 5.2 |
| 80 | 23/05/89 | 1.67 | 1.40 | 5.90 | 2.67 | 0.83 | < 0.16 | 1.62 | 11.0 | 6.4 | 6.2 |
| 81 | 28/05/89 | 1.76 | 1.19 | 6.10 | 2.87 | 0.86 | < 0.16 | 1.86 | 10.8 | 6.3 | 5.5 |
| 82 | 06/06/89 | 1.76 | 1.24 | 6.10 | 2.86 | 0.85 | < 0.16 | 1.53 | 11.0 | 6.3 | 5.3 |
| 83 | 13/06/89 | 2.06 | 1.02 | 6.80 | 3.30 | 1.32 | < 0.16 | 2.06 | 11.4 | 6.3 | 5.7 |
| 84 | 19/06/89 | 1.74 | 0.93 | 6.10 | 2.96 | 0.70 | < 0.16 | 1.30 | 10.8 | 6.4 | 5.0 |
| 85 | 26/06/89 | 1.75 | 0.83 | 6.30 | 3.10 | 0.78 | < 0.16 | 1.27 | 10.7 | 6.3 | 5.2 |
| 86 | 04/07/89 | 1.82 | 0.80 | 6.80 | 3.10 | 0.73 | < 0.16 | 1.26 | 12.6 | 6.3 | 5.3 |
| 87 | 10/07/89 | 1.80 | 0.74 | 7.20 | 3.30 | 0.66 | < 0.16 | 1.19 | 12.8 | 6.3 | 5.6 |
| 88 | 17/07/89 | 1.82 | 0.67 | 7.40 | 3.40 | 0.67 | < 0.16 | 1.11 | 12.5 | 6.1 | 5.7 |
| 89 | 26/07/89 | 1.79 | 0.57 | 7.80 | 3.60 | 0.67 | < 0.16 | 1.16 | 14.4 | 6.2 | 5.9 |
| 90 | 02/08/89 | 1.70 | 0.45 | 8.30 | 3.80 | 0.75 | < 0.16 | 1.08 | 13.7 | 6.3 | 6.6 |
| 91 | 08/08/89 | 1.55 | 0.39 | 8.10 | 3.80 | 0.61 | < 0.16 | 1.21 | 16.0 | 6.2 | 6.3 |
| 92 | 15/08/89 | 1.58 | 0.38 | 9.10 | 4.00 | 0.67 | < 0.16 | 0.82 | 16.0 | 6.3 | 6.6 |
| 93 | 22/08/89 | 1.45 | 0.65 | 9.50 | 4.50 | 0.91 | < 0.16 | 0.96 | 12.2 | 5.9 | 6.7 |
| 94 | 29/08/89 | 1.46 | 0.71 | 10.00 | 4.90 | 0.93 | < 0.16 | 0.94 | 18.4 | 6.6 | 5.7 |
| 95 | 05/09/89 | 1.54 | 0.83 | 11.20 | 5.20 | 0.97 | < 0.16 | 0.85 | 24.0 | 6.9 | 8.0 |
| 96 | 14/09/89 | 1.93 | 1.10 | 12.20 | 5.50 | 1.45 | < 0.16 | 0.93 | 27.7 | 6.9 | 6.6 |
| 97 | 19/09/89 | 1.88 | 1.10 | 13.10 | 5.90 | 1.58 | 0.65 | 0.90 | 28.3 | 6.9 | 6.6 |
| 98 | 26/09/89 | 2.07 | 1.22 | 12.90 | 6.00 | 1.63 | < 0.16 | 0.89 | 27.9 | 7.1 | 6.3 |
| 99 | 03/10/89 | 2.18 | 1.28 | 14.90 | 6.60 | 1.86 | < 0.16 | 0.88 | 31.8 | 7.0 | 7.5 |
| 100 | 10/10/89 | 2.23 | 1.37 | 14.70 | 6.60 | 2.10 | 0.59 | 0.98 | 32.3 | 7.0 | 7.3 |
| 101 | 18/10/89 | 2.26 | 1.49 | 14.90 | 6.60 | 2.09 | 1.06 | 1.32 | 32.6 | 7.0 | 8.0 |
| 102 | 24/10/89 | 2.35 | 1.64 | 15.80 | 7.00 | 2.17 | 0.62 | 1.39 | 36.1 | 7.0 | 7.7 |
| 103 | 31/10/89 | 2.44 | 1.73 | 16.20 | 7.10 | 2.49 | < 0.16 | 1.15 | 37.2 | 7.1 | 8.2 |
| 104 | 07/11/89 | 2.29 | 1.36 | 11.20 | 5.10 | 2.24 | < 0.16 | 1.02 | 23.8 | 7.2 | 6.0 |
| 105 | 14/11/89 | 3.17 | 1.87 | 18.60 | 8.20 | 4.30 | < 0.16 | 0.90 | 45.1 | 6.9 | 9.8 |
| 106 | 21/11/89 | 3.63 | 1.48 | 13.80 | 7.20 | 4.50 | < 0.16 | 0.80 | 39.5 | 7.4 | 8.3 |
| 107 | 29/11/89 | 2.47 | 1.49 | 14.50 | 5.90 | 2.46 | < 0.16 | 0.48 | 30.0 | 7.0 | 7.2 |
| 108 | 07/12/89 | 3.59 | 2.02 | 19.10 | 8.90 | 3.41 | < 0.16 | 0.53 | 40.7 | 6.7 | 9.8 |
| 109 | 16/12/89 | 3.73 | 2.00 | 20.40 | 9.20 | 3.82 | < 0.16 | 0.54 | 46.4 | 6.7 | 10.5 |
| 110 | 20/12/89 | 3.95 | 2.09 | 21.40 | 9.70 | 4.00 | < 0.16 | 0.50 | 49.9 | 6.8 | 10.7 |
| 111 | 05/01/90 | 3.93 | 1.91 | 20.20 | 9.50 | 3.60 | < 0.16 | 0.36 | 53.0 | 6.5 | 16.2 |
| 112 | 16/01/90 | 3.18 | 1.50 | 16.20 | 7.50 | 2.90 | < 0.16 | 0.38 | 49.0 | 6.6 | 14.2 |

RICE CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 113 | 23/01/90 | 4.40 | 2.02 | 22.80 | 10.80 | 4.50 | < 0.16 | 0.37 | 69.0 | 6.4 | 19.4 |
| 114 | 29/01/90 | 4.65 | 2.03 | 24.00 | 11.10 | 4.10 | < 0.16 | 0.38 | 77.0 | 6.9 | 19.3 |
| 115 | 06/02/90 | 5.10 | 2.14 | 25.20 | 11.60 | 4.50 | < 0.16 | 0.35 | 81.0 | 6.6 | 20.7 |
| 116 | 12/02/90 | 5.03 | 2.16 | 25.60 | 11.90 | 4.30 | < 0.16 | 0.39 | 84.0 | 6.8 | 21.1 |
| 117 | 20/02/90 | 6.20 | 2.32 | 33.00 | 15.80 | 5.90 | < 0.16 | 1.08 | 130.0 | 7.2 | 30.3 |
| 118 | 27/02/90 | 6.38 | 2.23 | 32.00 | 15.40 | 5.50 | < 0.16 | 0.72 | 119.0 | 6.8 | 27.8 |
| 119 | 05/03/90 | 6.49 | 2.27 | 32.00 | 14.90 | 5.90 | < 0.16 | 0.57 | 118.0 | 6.8 | 27.8 |
| 120 | 12/03/90 | 6.85 | 2.30 | 30.00 | 13.90 | 6.70 | < 0.16 | 0.73 | 115.0 | 6.8 | 26.9 |
| 121 | 19/03/90 | 2.01 | 5.63 | 12.40 | 5.60 | 38.00 | 2.12 | 3.49 | 38.0 | 6.7 | 23.9 |
| 122 | 26/03/90 | 0.92 | 0.61 | 2.94 | 1.13 | 1.23 | < 0.16 | 0.46 | 9.4 | 6.6 | 2.6 |
| 123 | 02/04/90 | 4.46 | 4.50 | 10.20 | 4.90 | 7.00 | 0.53 | 2.22 | 40.0 | 7.4 | 11.4 |
| 124 | 09/04/90 | 0.68 | 0.59 | 4.30 | 1.29 | 0.69 | < 0.16 | 0.41 | 9.9 | 7.0 | 2.9 |
| 125 | 16/04/90 | 2.03 | 1.56 | 8.40 | 3.50 | 2.11 | < 0.16 | 0.78 | 27.9 | 6.5 | 6.4 |
| 126 | 24/04/90 | 4.04 | 1.94 | 7.90 | 3.30 | 7.20 | 1.26 | 2.19 | 23.8 | 7.0 | 7.5 |
| 127 | 04/05/90 | 1.75 | 1.71 | 5.40 | 2.52 | 1.67 | < 0.16 | 1.32 | 17.3 | 7.2 | 5.4 |
| 128 | 10/05/90 | 1.79 | 1.63 | 5.70 | 2.60 | 1.74 | < 0.16 | 1.47 | 12.8 | 7.1 | 5.6 |
| 129 | 18/05/90 | 2.07 | 1.88 | 7.00 | 3.30 | 2.49 | 0.62 | 1.73 | 22.2 | 6.7 | 6.6 |
| 130 | 23/05/90 | 1.87 | 1.69 | 6.20 | 2.92 | 2.00 | < 0.16 | 1.51 | 15.0 | 6.8 | 5.8 |
| 131 | 28/05/90 | LOST SAMPLE | | | | | | | | | |
| 132 | 04/06/90 | 2.09 | 1.45 | 6.70 | 3.30 | 1.88 | 0.64 | 2.14 | 15.2 | 6.8 | 6.1 |
| 133 | 11/06/90 | 1.96 | 1.40 | 6.10 | 2.93 | 1.59 | < 0.16 | 1.61 | 15.1 | 6.7 | 5.5 |
| 134 | 21/06/90 | 1.56 | 1.17 | 4.80 | 2.16 | 0.72 | 0.50 | 1.59 | 9.5 | 5.7 | 3.6 |
| 135 | 26/06/90 | 1.77 | 1.18 | 6.60 | 3.20 | 1.08 | < 0.16 | 1.28 | 10.6 | 6.2 | 4.9 |
| 136 | 04/07/90 | LOST SAMPLE | | | | | | | | | |
| 137 | 10/07/90 | 1.97 | 1.04 | 6.80 | 3.20 | 1.05 | < 0.16 | 1.01 | 11.0 | 6.4 | 5.0 |
| 138 | 16/07/90 | 2.08 | 1.08 | 7.00 | 3.20 | 1.08 | < 0.16 | 0.88 | 23.2 | 6.9 | 5.0 |
| 139 | 23/07/90 | 2.09 | 1.05 | 6.90 | 3.30 | 1.09 | < 0.16 | 0.75 | 11.3 | 6.2 | 5.2 |
| 140 | 31/07/90 | 1.92 | 0.89 | 7.20 | 3.40 | 0.88 | 0.19 | 0.93 | - | 6.8 | 4.5 |
| 141 | 08/08/90 | 2.33 | 1.16 | 8.80 | 4.10 | 0.91 | < 0.16 | 0.86 | 22.4 | 6.6 | 6.3 |
| 142 | 14/08/90 | 2.34 | 1.08 | 9.00 | 4.20 | 1.07 | < 0.16 | 0.82 | 25.1 | 6.9 | 6.1 |
| 143 | 20/08/90 | LOST SAMPLE | | | | | | | | | |
| 144 | 28/08/90 | 2.23 | 1.16 | 10.10 | 4.70 | 1.00 | < 0.16 | 0.73 | 27.9 | 7.3 | 6.2 |
| 145 | 04/09/90 | 2.04 | 1.15 | 10.30 | 4.70 | 0.96 | 1.50 | 1.98 | 25.4 | 7.2 | 6.1 |
| 146 | 10/09/90 | 2.12 | 1.19 | 10.20 | 4.80 | 1.00 | < 0.16 | 2.12 | 30.5 | 7.3 | 6.5 |
| 147 | 17/09/90 | 2.15 | 1.18 | 10.80 | 5.00 | 1.10 | 0.19 | 1.52 | 30.3 | 7.3 | 6.3 |
| 148 | 24/09/90 | 2.15 | 1.09 | 9.80 | 4.60 | 1.13 | 0.30 | 1.33 | 31.2 | 7.1 | 6.5 |
| 149 | 01/10/90 | 2.20 | 1.09 | 11.00 | 5.10 | 1.47 | < 0.16 | 1.25 | 31.1 | 7.1 | 6.7 |
| 150 | 09/10/90 | 2.41 | 1.17 | 11.40 | 5.30 | 1.54 | < 0.16 | 1.14 | 34.7 | 7.2 | 6.5 |
| 151 | 15/10/90 | 2.42 | 1.21 | 11.90 | 5.40 | 1.56 | < 0.16 | 1.07 | 33.4 | 7.2 | 6.8 |
| 152 | 22/10/90 | 2.46 | 1.24 | 12.30 | 5.60 | 1.57 | < 0.16 | 1.05 | 35.5 | 7.2 | 7.2 |
| 153 | 29/10/90 | 2.56 | 1.26 | 12.90 | 5.90 | 1.67 | < 0.16 | 1.06 | 34.4 | 7.2 | 7.4 |
| 154 | 05/11/90 | 2.68 | 1.32 | 13.60 | 6.20 | 1.80 | < 0.16 | 1.04 | 42.9 | 7.3 | 8.1 |
| 155 | 12/11/90 | 3.07 | 1.51 | 16.00 | 7.20 | 2.09 | < 0.16 | 1.15 | 46.2 | 7.2 | 9.2 |
| 156 | 03/12/90 | 3.62 | 1.38 | 17.80 | 8.50 | 3.39 | < 0.16 | 0.83 | 58.0 | 7.0 | 14.7 |
| 157 | 17/12/90 | 4.27 | 2.09 | 20.90 | 9.90 | 3.45 | 0.51 | 1.27 | 65.0 | 7.4 | 16.8 |
| | MINIMUM | 0.68 | 0.38 | 2.94 | 1.13 | 0.29 | < 0.16 | 0.31 | 7.0 | 5.7 | 2.1 |
| | MAXIMUM | 7.92 | 5.63 | 33.00 | 15.80 | 38.00 | 2.81 | 7.34 | 130.0 | 7.6 | 30.3 |
| | MEAN | 2.72 | 1.59 | 11.40 | 5.44 | 2.55 | 0.35 | 1.55 | 31.3 | 6.8 | 9.0 |
| | S.D. | 1.32 | 0.84 | 6.03 | 2.76 | 3.63 | 0.40 | 1.13 | 23.1 | 0.4 | 5.3 |
| | SAMPLES | 154 | 154 | 154 | 154 | 152 | 152 | 152 | 151 | 152 | 152 |

DEER CREEK CHEMISTRY

1986 Samples 01 .. 18
1987 Samples 19 .. 34
1988 Samples 35 .. 61
1989 Samples 62 .. 99
1990 Samples 100 .. 128

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 08/04/86 | 1.11 | 1.33 | 4.17 | 1.79 | 0.34 | < 0.20 | 0.74 | 4.0 | 6.5 | 2.4 |
| 2 | 22/04/86 | 1.38 | 0.99 | 4.80 | 2.60 | 0.47 | < 0.20 | 1.63 | 7.0 | 5.8 | 5.0 |
| 3 | 29/04/86 | 1.35 | 1.07 | 5.00 | 2.40 | 0.39 | < 0.20 | 2.14 | 6.0 | 6.4 | 4.9 |
| 4 | 06/05/86 | 1.37 | 0.79 | 4.50 | 2.48 | 0.30 | < 0.20 | 1.49 | 8.0 | 6.5 | 3.7 |
| 5 | 13/05/86 | 1.52 | 0.75 | 5.10 | 2.90 | 0.31 | < 0.20 | 1.19 | 9.0 | 6.7 | 3.9 |
| 6 | 20/05/86 | 1.52 | 0.46 | 5.20 | 2.99 | 0.24 | < 0.20 | 0.49 | 9.0 | 6.6 | 3.9 |
| 7 | 01/06/86 | 1.69 | 0.35 | 8.00 | 4.36 | 0.54 | 1.34 | 0.40 | 11.0 | 6.6 | 5.5 |
| 8 | 10/06/86 | 1.66 | 0.34 | 8.20 | 4.43 | 0.43 | < 0.20 | 0.41 | 13.0 | 6.9 | 5.8 |
| 9 | 17/06/86 | 1.78 | 0.61 | 10.70 | 4.00 | 0.48 | < 0.20 | 0.35 | 15.0 | 6.8 | 7.0 |
| 10 | 24/06/86 | 1.98 | 0.46 | 11.50 | 4.60 | 0.84 | < 0.20 | 0.54 | 17.0 | 6.9 | 7.5 |
| 11 | 02/07/86 | 1.83 | 0.62 | 12.70 | 4.90 | 1.05 | < 0.20 | 0.38 | 17.0 | 6.9 | 8.3 |
| 12 | 08/07/86 | 1.99 | 0.77 | 13.50 | 5.30 | 1.14 | < 0.20 | 0.56 | 19.0 | 6.8 | 9.3 |
| 13 | 15/07/86 | 2.04 | 0.65 | 14.00 | 6.20 | 0.91 | < 0.10 | 0.59 | 19.0 | 7.4 | 8.5 |
| 14 | 22/07/86 | 1.87 | 0.48 | 14.20 | 6.20 | 0.63 | < 0.20 | 0.83 | 19.0 | 7.3 | 8.5 |
| 15 | 29/07/86 | 2.09 | 0.69 | 14.20 | 6.00 | 1.07 | < 0.20 | 0.76 | 19.0 | 7.3 | 9.0 |
| 16 | 05/08/86 | 2.30 | 0.49 | 14.10 | 7.00 | 1.11 | < 0.20 | 0.80 | 20.0 | 7.1 | 10.0 |
| 17 | 25/11/86 | 1.91 | 0.60 | 8.10 | 4.30 | 0.61 | < 0.20 | 1.63 | 32.0 | 6.9 | 6.8 |
| 18 | 09/12/86 | 1.86 | 0.52 | 8.30 | 4.10 | 0.59 | < 0.20 | 1.31 | 32.0 | 7.1 | 6.3 |
| 19 | 06/01/87 | 1.98 | 0.58 | 9.40 | 4.60 | 0.71 | < 0.20 | 1.31 | 33.0 | 6.5 | 7.3 |
| 20 | 03/02/87 | 2.20 | 0.75 | 10.80 | 5.30 | 1.67 | 0.52 | 2.42 | 43.0 | 7.1 | 13.0 |
| 21 | 10/03/87 | 2.70 | 1.10 | 12.90 | 6.30 | - | - | - | - | - | - |
| 22 | 24/03/87 | 1.90 | 1.70 | 7.00 | 3.60 | 0.55 | 0.67 | 1.81 | 7.0 | 6.4 | 8.3 |
| 23 | 21/04/87 | 1.70 | 0.80 | 6.20 | 2.80 | 0.54 | < 0.20 | 0.98 | 4.0 | 6.2 | 5.5 |
| 24 | 05/05/87 | 1.80 | 0.54 | 8.00 | 3.50 | 0.47 | < 0.20 | 1.04 | 15.0 | 6.9 | 6.0 |
| 25 | 20/05/87 | 2.00 | 0.36 | 10.60 | 4.60 | 0.87 | < 0.20 | 1.12 | 23.0 | 7.2 | 8.0 |
| 26 | 09/06/87 | 2.12 | 0.51 | 16.00 | 7.20 | 1.20 | 0.45 | 1.24 | 46.0 | 7.4 | 10.9 |
| 27 | 23/06/87 | 1.84 | 0.65 | 15.00 | 7.20 | 1.36 | < 0.16 | 1.32 | 51.0 | 7.3 | 11.3 |
| 28 | 14/07/87 | 2.22 | 0.51 | 15.00 | 7.40 | 2.18 | < 0.16 | 1.56 | 53.0 | 7.3 | 12.0 |
| 29 | 18/08/87 | 2.03 | 0.47 | 15.00 | 7.40 | 1.57 | < 0.16 | 1.21 | 58.0 | 7.5 | 12.0 |
| 30 | 13/10/87 | 4.80 | 6.00 | 21.10 | 10.00 | 10.50 | < 0.20 | 4.86 | 63.0 | 7.2 | 20.0 |
| 31 | 12/11/87 | 3.60 | 2.00 | 14.80 | 7.00 | 3.04 | < 0.20 | 3.21 | 43.0 | 6.7 | 12.5 |
| 32 | 19/11/87 | 3.60 | 2.40 | 15.10 | 8.00 | 3.56 | < 0.20 | 3.29 | 44.0 | 7.0 | 13.0 |
| 33 | 11/12/87 | 3.30 | 2.00 | 15.30 | 8.00 | 3.39 | < 0.20 | 2.03 | 45.0 | 6.9 | 13.0 |
| 34 | 23/12/87 | 4.60 | 2.50 | 16.00 | 8.70 | 2.58 | 0.26 | 1.50 | 54.0 | 7.1 | 14.5 |
| 35 | 05/04/88 | 0.91 | 5.70 | 3.30 | 1.75 | 1.66 | 1.76 | 3.15 | 14.0 | 6.4 | 5.5 |
| 36 | 12/04/88 | 1.31 | 4.34 | 4.50 | 2.05 | 1.37 | 1.86 | 3.83 | 12.0 | 6.5 | 5.3 |
| 37 | 15/04/88 | 1.82 | 2.90 | 5.70 | 2.63 | 1.59 | 1.31 | 4.70 | 15.0 | 6.6 | 6.3 |
| 38 | 19/04/88 | 1.70 | 2.40 | 4.30 | 2.05 | 1.39 | 0.78 | 3.30 | 10.0 | 6.3 | 5.1 |
| 39 | 22/04/88 | 1.90 | 2.60 | 5.50 | 2.60 | 1.42 | 0.54 | 4.00 | 13.0 | 6.4 | 5.8 |
| 40 | 26/04/88 | 1.90 | 2.60 | 6.50 | 3.10 | 1.78 | 0.49 | 4.69 | 16.0 | 6.4 | 6.8 |
| 41 | 04/05/88 | 2.20 | 2.70 | 7.70 | 3.50 | 1.83 | < 0.20 | 4.35 | 19.0 | 6.6 | 7.5 |
| 42 | 10/05/88 | 2.50 | 2.80 | 7.90 | 3.70 | 2.35 | 0.25 | 4.32 | 19.0 | 6.6 | 7.8 |
| 43 | 17/05/88 | 2.50 | 2.30 | 7.60 | 3.60 | 1.38 | < 0.20 | 3.20 | 17.0 | 6.5 | 7.2 |
| 44 | 31/05/88 | 3.08 | 3.74 | 10.60 | 5.10 | 1.03 | < 0.20 | 1.81 | 28.0 | 6.5 | 8.8 |
| 45 | 08/06/88 | 2.64 | 4.19 | 11.20 | 5.10 | 0.75 | < 0.20 | 1.47 | 27.0 | 6.7 | 8.6 |
| 46 | 15/06/88 | 2.69 | 2.00 | 10.40 | 5.00 | 0.76 | < 0.16 | 1.24 | 25.0 | 6.6 | 8.4 |
| 47 | 21/06/88 | 3.67 | 2.67 | 14.30 | 6.40 | 0.67 | < 0.20 | 0.90 | 33.0 | 6.6 | 9.8 |
| 48 | 28/06/88 | 3.21 | 1.88 | 13.90 | 6.20 | 0.59 | 1.32 | 1.09 | 31.0 | 6.3 | 9.5 |
| 49 | 26/07/88 | 3.00 | 2.00 | 15.60 | 7.10 | 0.62 | < 0.16 | 0.42 | 32.0 | 6.4 | 10.3 |
| 50 | 03/08/88 | 2.70 | 1.07 | 16.10 | 6.88 | 1.00 | 0.53 | 0.52 | - | 6.7 | - |
| 51 | 15/08/88 | 4.20 | 2.00 | 20.90 | 9.00 | 1.56 | 0.25 | 0.91 | 50.0 | 6.7 | 14.0 |
| 52 | 30/08/88 | 5.50 | 2.00 | 18.40 | 8.80 | 2.13 | < 0.16 | 2.18 | 54.0 | 6.9 | 14.6 |
| 53 | 20/09/88 | 3.50 | 3.33 | 20.20 | 8.50 | 2.69 | < 0.20 | 2.52 | 65.0 | 7.0 | 16.0 |
| 54 | 04/10/88 | 3.30 | 2.00 | 15.70 | 6.50 | 1.42 | < 0.16 | 1.71 | 41.0 | 6.8 | 11.9 |
| 55 | 13/10/88 | 4.00 | 2.00 | 15.70 | 6.70 | 1.36 | < 0.16 | 2.37 | 41.0 | 6.9 | 12.0 |

DEER CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | 26/10/88 | 3.10 | 2.12 | 13.30 | 5.64 | 1.38 | < 0.16 | 1.12 | 34.0 | 6.9 | 10.0 |
| 57 | 07/11/88 | 3.10 | 2.00 | 10.00 | 4.80 | 1.37 | < 0.16 | 1.40 | 24.0 | 6.6 | 8.4 |
| 58 | 18/11/88 | 2.95 | 2.00 | 9.80 | 4.60 | 0.99 | < 0.16 | 0.77 | 24.0 | 6.7 | 8.0 |
| 59 | 30/11/88 | - | - | 9.40 | - | - | - | - | - | - | - |
| 60 | 06/12/88 | 3.40 | 2.00 | 9.70 | 4.70 | 1.00 | < 0.16 | 1.02 | 22.0 | 6.4 | 7.9 |
| 61 | 20/12/88 | 3.00 | 0.98 | 11.30 | 5.10 | 0.97 | < 0.20 | 0.87 | 29.0 | 6.9 | 6.8 |
| 62 | 19/01/89 | 2.02 | 0.65 | 8.70 | 3.90 | 0.79 | < 0.20 | 0.52 | 22.0 | 6.8 | 10.2 |
| 63 | 07/02/89 | 3.15 | 1.10 | 13.20 | 5.90 | 1.01 | < 0.20 | 0.63 | 36.0 | 6.8 | 12.5 |
| 64 | 04/04/89 | 3.33 | 1.62 | 15.40 | 6.80 | 1.28 | 0.24 | 0.84 | 48.0 | 6.7 | 3.0 |
| 65 | 11/04/89 | 2.70 | 1.77 | 12.10 | 5.60 | 1.23 | < 0.16 | 1.73 | 42.0 | 6.7 | 9.6 |
| 66 | 17/04/89 | 2.05 | 2.86 | 7.80 | 3.70 | 1.16 | < 0.16 | 2.03 | 25.4 | 6.6 | 7.2 |
| 67 | 25/04/89 | 1.41 | 2.76 | 4.90 | 2.22 | 0.73 | < 0.16 | 2.26 | 11.0 | 6.3 | 4.6 |
| 68 | 01/05/89 | 1.83 | 1.77 | 5.50 | 2.59 | 0.78 | < 0.16 | 2.63 | 9.3 | 6.3 | 4.8 |
| 69 | 08/05/89 | 1.85 | 1.36 | 6.40 | 2.92 | 0.52 | < 0.16 | 2.79 | 10.4 | 6.2 | 5.2 |
| 70 | 15/05/89 | 2.18 | 1.48 | 9.50 | 3.90 | 0.41 | < 0.16 | 1.71 | 16.9 | 6.4 | 6.2 |
| 71 | 23/05/89 | 2.29 | 1.21 | 9.90 | 4.20 | 0.39 | < 0.16 | 1.07 | 17.5 | 6.4 | 6.4 |
| 72 | 28/05/89 | 2.25 | 0.88 | 9.00 | 4.00 | 0.44 | < 0.16 | 1.70 | 14.4 | 6.4 | 6.0 |
| 73 | 06/06/89 | 2.07 | 0.57 | 9.60 | 4.20 | 0.27 | < 0.16 | 0.45 | 14.9 | 6.3 | 6.0 |
| 74 | 13/06/89 | 2.31 | 0.73 | 10.10 | 4.30 | 0.58 | < 0.16 | 1.01 | 20.1 | 6.6 | 6.5 |
| 75 | 19/06/89 | 1.98 | 0.52 | 9.70 | 4.20 | 0.26 | < 0.16 | 0.42 | 16.4 | 6.3 | 6.1 |
| 76 | 26/06/89 | 2.07 | 0.67 | 11.40 | 5.00 | 0.34 | < 0.16 | 0.44 | 19.7 | 6.3 | 7.0 |
| 77 | 04/07/89 | 2.23 | 0.75 | 15.10 | 6.30 | 0.38 | < 0.16 | 0.49 | 27.9 | 6.5 | 8.9 |
| 78 | 10/07/89 | 2.28 | 0.83 | 14.90 | 6.10 | 0.46 | < 0.16 | 0.43 | 27.3 | 6.4 | 8.8 |
| 79 | 17/07/89 | 1.99 | 0.81 | 13.50 | 5.60 | 0.69 | < 0.16 | 0.47 | 23.1 | 6.1 | 8.2 |
| 80 | 26/07/89 | 2.35 | 0.96 | 14.60 | 6.10 | 0.62 | < 0.16 | 0.42 | 27.3 | 6.2 | 9.0 |
| 81 | 02/08/89 | 2.38 | 1.03 | 13.10 | 5.40 | 0.72 | < 0.16 | 0.33 | 24.3 | 6.3 | 8.2 |
| 82 | 08/08/89 | 2.20 | 1.05 | 13.40 | 5.50 | 0.49 | < 0.16 | 0.37 | 25.5 | 6.3 | 8.3 |
| 83 | 15/08/89 | 2.65 | 0.97 | 14.10 | 5.80 | 0.60 | < 0.16 | 0.40 | 29.0 | 6.3 | 9.3 |
| 84 | 22/08/89 | 2.69 | 1.27 | 13.70 | 5.70 | 0.88 | < 0.16 | 0.10 | 28.7 | 6.4 | 9.1 |
| 85 | 29/08/89 | 2.72 | 1.31 | 15.50 | 6.80 | 0.92 | < 0.16 | 0.47 | 37.9 | 6.8 | 8.2 |
| 86 | 05/09/89 | 3.08 | 1.27 | 15.70 | 7.00 | 0.96 | 1.27 | 0.46 | 39.2 | 6.8 | 8.2 |
| 87 | 14/09/89 | 3.44 | 1.41 | 16.10 | 7.40 | 1.00 | < 0.16 | 0.53 | 45.4 | 6.9 | 8.7 |
| 88 | 19/09/89 | 3.71 | 2.22 | 14.20 | 7.40 | 1.19 | < 0.16 | 0.74 | 41.9 | 7.7 | 7.5 |
| 89 | 26/09/89 | 3.49 | 1.72 | 15.80 | 7.40 | 1.05 | < 0.16 | 0.60 | 48.7 | 7.5 | 10.3 |
| 90 | 03/10/89 | 3.98 | 1.67 | 17.30 | 8.00 | 1.25 | < 0.16 | 0.72 | 53.6 | 7.1 | 9.7 |
| 91 | 10/10/89 | 4.39 | 1.76 | 16.80 | 7.90 | 1.68 | < 0.16 | 0.91 | 53.2 | 7.3 | 9.3 |
| 92 | 18/10/89 | - | - | 12.80 | 6.00 | 1.15 | < 0.16 | 1.06 | 32.9 | 7.0 | 6.8 |
| 93 | 24/10/89 | 3.13 | 1.75 | 12.30 | 5.90 | 1.27 | < 0.16 | 1.31 | 32.6 | 7.6 | 6.2 |
| 94 | 31/10/89 | 3.37 | 1.94 | 14.80 | 6.80 | 1.40 | < 0.16 | 0.91 | 42.8 | 7.2 | 8.3 |
| 95 | 07/11/89 | 3.42 | 1.13 | 15.40 | 7.10 | 1.36 | < 0.16 | 0.93 | 45.6 | 7.2 | 8.7 |
| 96 | 14/11/89 | 2.80 | 2.14 | 12.70 | 5.90 | 1.33 | < 0.16 | 0.65 | 36.5 | 7.0 | 7.3 |
| 97 | 21/11/89 | 2.58 | 2.02 | 11.40 | 5.40 | 1.34 | < 0.16 | 0.55 | 30.7 | 7.5 | 6.7 |
| 98 | 29/11/89 | 3.64 | 2.46 | 16.10 | 7.30 | 1.97 | < 0.16 | 0.87 | 40.0 | 6.9 | 9.0 |
| 99 | 07/12/89 | 3.66 | 2.18 | 17.40 | 7.90 | 1.89 | < 0.16 | 0.67 | 54.1 | 7.0 | 11.5 |
| 100 | 19/03/90 | 1.86 | 5.46 | 7.60 | 3.90 | 1.92 | 0.71 | 1.93 | 29.2 | 6.2 | 8.9 |
| 101 | 02/04/90 | 1.35 | 2.98 | 7.20 | 3.10 | 1.10 | < 0.16 | 0.84 | 28.0 | 7.5 | 6.0 |
| 102 | 16/04/90 | 1.30 | 2.23 | 5.70 | 2.68 | 0.93 | < 0.16 | 0.90 | 21.0 | 6.7 | 6.3 |
| 103 | 24/04/90 | 1.35 | 2.17 | 4.70 | 2.20 | 1.29 | < 0.16 | 1.11 | 22.6 | 6.7 | 5.3 |
| 104 | 10/05/90 | 1.80 | 2.24 | 5.40 | 2.47 | 1.10 | < 0.16 | 1.34 | 15.9 | 6.6 | 5.3 |
| 105 | 18/05/90 | 1.97 | 2.15 | 5.80 | 2.65 | 0.89 | < 0.16 | 1.19 | 19.2 | 6.7 | 5.5 |
| 106 | 23/05/90 | 2.06 | 2.04 | 6.20 | 2.80 | 1.13 | < 0.16 | 1.23 | 19.4 | 6.6 | 5.8 |
| 107 | 28/05/90 | 2.12 | 1.93 | 7.50 | 3.40 | 0.81 | < 0.16 | 0.97 | 23.2 | 6.7 | 6.3 |
| 108 | 04/06/90 | 2.12 | 1.85 | 7.30 | 3.30 | 0.92 | < 0.16 | 1.28 | 22.7 | 6.6 | 6.3 |
| 109 | 21/06/90 | 2.27 | 1.18 | 9.30 | 4.20 | 0.50 | < 0.16 | 1.02 | 20.4 | 6.5 | 5.6 |
| 110 | 26/06/90 | 2.01 | 0.73 | 8.80 | 4.10 | 0.47 | 0.41 | 0.46 | 14.5 | 6.2 | 5.1 |
| 111 | 10/07/90 | 2.09 | 0.85 | 10.10 | 4.80 | 0.44 | < 0.16 | <0.10 | 24.6 | 6.8 | 5.5 |
| 112 | 16/07/90 | 2.39 | 0.83 | 11.00 | 5.10 | 0.68 | < 0.16 | 0.36 | 24.0 | 6.4 | 6.2 |

DEER CREEK CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND (mS/m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 113 | 23/07/90 | 2.63 | 0.96 | 12.50 | 5.70 | 0.51 | < 0.16 | <0.10 | 31.1 | 6.6 | 7.1 |
| 114 | 31/07/90 | 3.39 | 0.95 | 14.40 | 6.50 | 0.76 | < 0.16 | <0.10 | 43.2 | 6.6 | 8.8 |
| 115 | 08/08/90 | 3.86 | 0.78 | 15.80 | 7.30 | 0.86 | < 0.16 | <0.10 | 47.5 | 6.9 | 10.0 |
| 116 | 14/08/90 | 3.84 | 0.90 | 16.30 | 7.60 | 0.81 | < 0.16 | <0.10 | 54.1 | 7.0 | 10.3 |
| 117 | 20/08/90 | 4.22 | 1.04 | 17.60 | 8.20 | 0.73 | < 0.16 | 0.26 | 60.0 | 7.5 | 10.0 |
| 118 | 28/08/90 | 4.14 | 1.21 | 17.40 | 8.20 | 0.63 | 0.18 | 0.27 | 61.0 | 7.6 | 10.5 |
| 119 | 04/09/90 | 4.01 | 1.75 | 18.40 | 8.60 | 0.74 | 0.19 | 0.47 | 64.0 | 7.6 | 11.0 |
| 120 | 10/09/90 | 4.08 | 1.60 | 20.80 | 9.50 | 0.86 | 0.18 | 0.49 | 82.0 | 5.9 | 13.0 |
| 121 | 24/09/90 | 4.99 | 2.43 | 20.90 | 10.00 | 1.48 | < 0.16 | 0.60 | 81.0 | 7.4 | 14.3 |
| 122 | 09/10/90 | 5.22 | 2.34 | 25.20 | 11.80 | 1.57 | < 0.16 | 0.29 | 96.0 | 7.2 | 15.8 |
| 123 | 15/10/90 | 6.36 | 1.94 | 20.40 | 10.00 | 2.12 | < 0.16 | 0.57 | 80.0 | 7.3 | 13.8 |
| 124 | 22/10/90 | 6.48 | 1.92 | 20.20 | 10.00 | 2.30 | < 0.16 | 1.31 | 75.0 | 7.3 | 13.9 |
| 125 | 29/10/90 | 6.21 | 2.00 | 20.40 | 9.90 | 2.33 | 0.18 | 1.36 | 77.0 | 7.2 | 13.7 |
| 126 | 05/11/90 | 6.15 | 1.94 | 20.90 | 10.10 | 2.29 | < 0.16 | 1.93 | 79.0 | 7.2 | 14.0 |
| 127 | 03/12/90 | 5.53 | 2.92 | 27.30 | 11.70 | 2.65 | < 0.16 | 0.68 | 97.0 | 7.4 | 21.7 |
| 128 | 17/12/90 | 5.32 | 3.07 | 28.10 | 12.10 | 2.52 | < 0.16 | 0.62 | 101.0 | 6.9 | 21.9 |
| | MINIMUM | 0.91 | 0.34 | 3.30 | 1.75 | 0.24 | < 0.16 | <0.10 | 4.0 | 5.8 | 2.4 |
| | MAXIMUM | 6.48 | 6.00 | 28.10 | 12.10 | 10.50 | 1.86 | 4.86 | 101.0 | 7.7 | 21.9 |
| | MEAN | 2.76 | 1.65 | 12.24 | 5.63 | 1.20 | 0.27 | 1.27 | 33.2 | 6.8 | 8.7 |
| | S.D. | 1.18 | 1.06 | 5.05 | 2.31 | 1.07 | 0.30 | 1.06 | 20.8 | 0.4 | 3.5 |
| | SAMPLES | 126 | 126 | 128 | 127 | 126 | 126 | 126 | 125 | 126 | 125 |

RICE LAKE CHEMISTRY

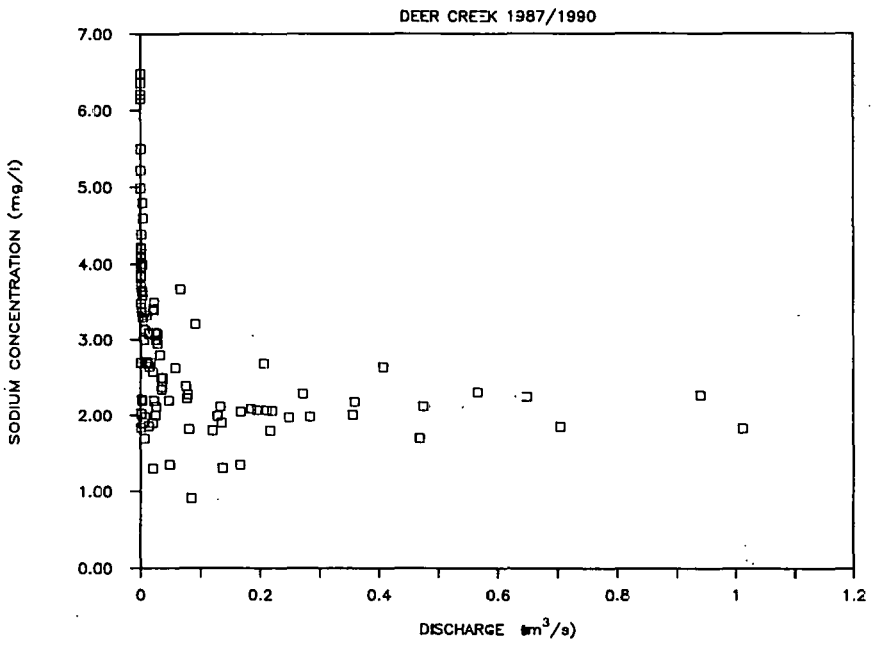
1988 Samples 01 .. 16
1989 Samples 17 .. 47
1990 Samples 48 .. 77

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 06/04/88 | 1.67 | 1.90 | 5.00 | 1.99 | 0.92 | < 0.20 | 1.90 | 9.0 | 6.0 | 5.5 |
| 2 | 29/04/88 | 4.00 | 3.10 | 7.30 | 3.10 | 2.20 | < 0.20 | 2.30 | 30.0 | 6.6 | 8.8 |
| 3 | 04/05/88 | 3.10 | 4.91 | 5.80 | 2.66 | 1.61 | 0.25 | 1.59 | 22.0 | 6.3 | 7.0 |
| 4 | 17/05/88 | 3.80 | 2.80 | 6.00 | 2.86 | 2.52 | < 0.16 | 1.00 | 22.0 | 6.6 | 7.5 |
| 5 | 08/06/88 | 2.53 | 3.77 | 8.30 | 3.50 | 1.53 | < 0.20 | 2.40 | 18.0 | 6.4 | 7.0 |
| 6 | 28/06/88 | 2.20 | 1.73 | 6.50 | 3.10 | 1.19 | < 0.20 | 1.17 | 16.0 | 6.4 | 6.1 |
| 7 | 06/07/88 | 2.30 | 1.34 | 6.66 | 3.29 | 1.09 | < 0.16 | 0.67 | 15.0 | 6.4 | 6.4 |
| 8 | 03/08/88 | 3.20 | < 2.00 | 7.00 | 3.60 | 1.24 | < 0.16 | 0.44 | 15.0 | 6.5 | 6.2 |
| 9 | 30/08/88 | 3.40 | < 2.00 | 7.10 | 3.80 | 0.79 | < 0.16 | 0.31 | 20.0 | 6.7 | 6.5 |
| 10 | 06/09/88 | 4.80 | < 2.00 | 7.60 | 4.20 | 1.00 | < 0.16 | 0.21 | 22.0 | 6.7 | 6.9 |
| 11 | 20/09/88 | 2.10 | 0.84 | 7.29 | 3.69 | 0.59 | < 0.16 | 1.00 | 20.0 | 6.8 | 6.5 |
| 12 | 04/10/88 | 2.30 | 1.34 | 8.10 | 3.91 | 1.03 | < 0.20 | 1.33 | 18.0 | 6.7 | 6.7 |
| 13 | 13/10/88 | 3.60 | < 2.00 | 7.60 | 4.00 | 1.34 | < 0.16 | 1.29 | 20.0 | 6.8 | 7.0 |
| 14 | 26/10/88 | 3.70 | < 2.00 | 7.90 | 4.00 | 1.31 | 0.35 | 1.44 | 21.0 | 6.8 | 7.4 |
| 14A | 18/11/88 | 4.20 | < 2.00 | 10.20 | 5.30 | 1.88 | < 0.16 | 1.78 | 32.0 | 6.9 | 9.8 |
| 15 | 30/11/88 | 4.40 | 2.92 | 13.40 | 6.31 | 2.99 | 0.26 | 2.27 | 39.0 | 6.9 | 12.0 |
| 16 | 06/12/88 | 5.20 | < 2.00 | 12.90 | 6.20 | 2.70 | < 0.16 | 1.33 | 38.0 | 6.9 | 12.0 |
| 17 | 01/05/89 | 1.34 | 1.40 | 4.20 | 1.77 | 1.00 | < 0.16 | 1.77 | 9.6 | 6.4 | 4.5 |
| 18 | 08/05/89 | 1.64 | 1.49 | 4.60 | 1.98 | 1.08 | < 0.16 | 2.16 | 9.0 | 6.4 | 4.6 |
| 19 | 16/05/89 | 1.61 | 1.48 | 5.30 | 2.36 | 0.92 | < 0.16 | 2.00 | 11.6 | 6.5 | 5.0 |
| 20 | 23/05/89 | 1.73 | 1.52 | 5.90 | 2.65 | 0.88 | < 0.16 | 1.86 | 11.9 | 6.5 | 5.4 |
| 21 | 28/05/89 | 2.04 | 1.53 | 6.50 | 2.97 | 0.96 | < 0.16 | 2.10 | 12.8 | 6.5 | 5.8 |
| 22 | 06/06/89 | 1.84 | 1.33 | 6.10 | 2.74 | 0.86 | < 0.16 | 1.83 | 12.9 | 6.6 | 5.5 |
| 23 | 13/06/89 | 2.09 | 0.86 | 6.60 | 2.91 | 0.72 | < 0.16 | 1.52 | 10.5 | 6.1 | 5.3 |
| 24 | 19/06/89 | 1.96 | 0.86 | 6.80 | 3.00 | 0.68 | < 0.16 | 1.49 | 12.5 | 6.2 | 5.4 |
| 25 | 26/06/89 | 1.92 | 0.99 | 6.80 | 3.10 | 0.71 | < 0.16 | 1.33 | 13.9 | 6.4 | 5.3 |
| 26 | 04/07/89 | 1.55 | 0.82 | 6.90 | 2.91 | 0.77 | < 0.16 | 1.03 | 13.5 | 6.3 | 5.4 |
| 27 | 10/07/89 | 1.50 | 0.79 | 7.50 | 3.20 | 0.66 | < 0.16 | 1.19 | 14.3 | 6.4 | 5.9 |
| 28 | 17/07/89 | 1.62 | 0.83 | 8.30 | 3.50 | 0.59 | < 0.16 | 1.25 | 17.5 | 6.6 | 6.2 |
| 29 | 26/07/89 | 1.70 | 0.55 | 7.80 | 3.40 | 0.54 | < 0.16 | 0.93 | 16.5 | 6.4 | 6.0 |
| 30 | 02/08/89 | 2.26 | 1.01 | 8.00 | 3.40 | 1.82 | < 0.16 | 1.08 | 19.0 | 6.7 | 6.6 |
| 31 | 08/08/89 | 1.51 | 0.43 | 7.10 | 3.20 | 0.55 | < 0.16 | 0.94 | 15.3 | 6.5 | 5.8 |
| 32 | 15/08/89 | 1.72 | 0.37 | 8.20 | 3.50 | 0.45 | < 0.16 | 0.76 | 17.4 | 6.4 | 6.1 |
| 33 | 22/08/89 | 1.49 | 0.32 | 7.30 | 3.20 | 0.44 | < 0.16 | 0.77 | 16.2 | 6.4 | 6.2 |
| 34 | 29/08/89 | 1.32 | 0.29 | 7.20 | 3.40 | 0.59 | < 0.16 | 0.53 | 15.8 | 6.8 | 4.5 |
| 35 | 05/09/89 | 1.33 | 0.28 | 7.10 | 3.40 | 0.57 | < 0.16 | 0.63 | 16.4 | 6.6 | 4.3 |
| 36 | 14/09/89 | 1.01 | 0.21 | 6.50 | 3.20 | 0.43 | < 0.16 | 0.80 | 12.3 | 6.6 | 4.3 |
| 37 | 19/09/89 | 1.31 | 0.30 | 7.70 | 3.50 | 0.47 | < 0.16 | 0.75 | 13.9 | 7.2 | 4.3 |
| 38 | 26/09/89 | 1.60 | 0.51 | 7.20 | 3.50 | 0.62 | < 0.16 | 1.17 | 14.7 | 7.0 | 4.5 |
| 39 | 03/10/89 | 1.89 | 0.64 | 7.80 | 3.70 | 0.72 | < 0.16 | 1.20 | 16.8 | 7.1 | 5.2 |
| 40 | 10/10/89 | 1.90 | 0.82 | 8.90 | 3.90 | 0.85 | < 0.16 | 1.06 | 19.4 | 7.0 | 6.0 |
| 41 | 18/10/89 | 2.30 | 1.41 | 9.10 | 4.30 | 1.38 | < 0.16 | 1.25 | 23.4 | 6.9 | 6.0 |
| 42 | 24/10/89 | 2.19 | 1.18 | 8.50 | 3.90 | 1.24 | < 0.16 | 1.08 | 22.1 | 6.9 | 5.7 |
| 43 | 31/10/89 | 2.14 | 1.08 | 8.90 | 4.10 | 1.10 | < 0.16 | 1.09 | 22.4 | 7.1 | 5.7 |
| 44 | 07/11/89 | 1.79 | 1.43 | 8.10 | 3.60 | 1.32 | 0.66 | 1.55 | 26.6 | 7.0 | 6.3 |
| 45 | 14/11/89 | 2.49 | 1.54 | 10.80 | 4.80 | 1.52 | < 0.16 | 1.02 | 31.0 | 7.0 | 7.3 |
| 46 | 21/11/89 | 2.43 | 1.75 | 11.20 | 4.60 | 1.61 | < 0.16 | 0.95 | 31.9 | 7.4 | 7.3 |
| 47 | 29/11/89 | 5.97 | 3.86 | 21.10 | 8.90 | 4.20 | < 0.16 | 1.48 | 68.8 | 7.1 | 16.0 |
| 48 | 16/04/90 | 1.98 | 1.32 | 5.70 | 2.14 | 1.42 | 0.48 | 1.51 | 26.9 | 7.0 | 6.2 |
| 49 | 24/04/90 | 1.56 | 0.99 | 6.60 | 2.19 | 1.14 | 2.38 | 1.09 | 13.6 | 6.4 | 4.9 |
| 50 | 04/05/90 | 1.83 | 1.75 | 6.00 | 2.60 | 1.68 | 0.40 | 1.08 | 23.9 | 6.9 | 5.8 |
| 51 | 10/05/90 | 1.18 | 1.01 | 3.60 | 1.56 | 1.11 | < 0.16 | 0.98 | 9.5 | 6.6 | 3.5 |
| 52 | 18/05/90 | 1.79 | 1.59 | 5.50 | 2.45 | 1.74 | < 0.16 | 1.54 | 16.3 | 6.8 | 5.3 |
| 53 | 23/05/90 | 1.86 | 1.59 | 5.80 | 2.54 | 1.69 | < 0.16 | 1.57 | 17.0 | 6.8 | 5.5 |
| 54 | 28/05/90 | 2.05 | 1.80 | 6.10 | 2.73 | 1.71 | < 0.16 | 1.38 | 18.5 | 6.8 | 5.6 |

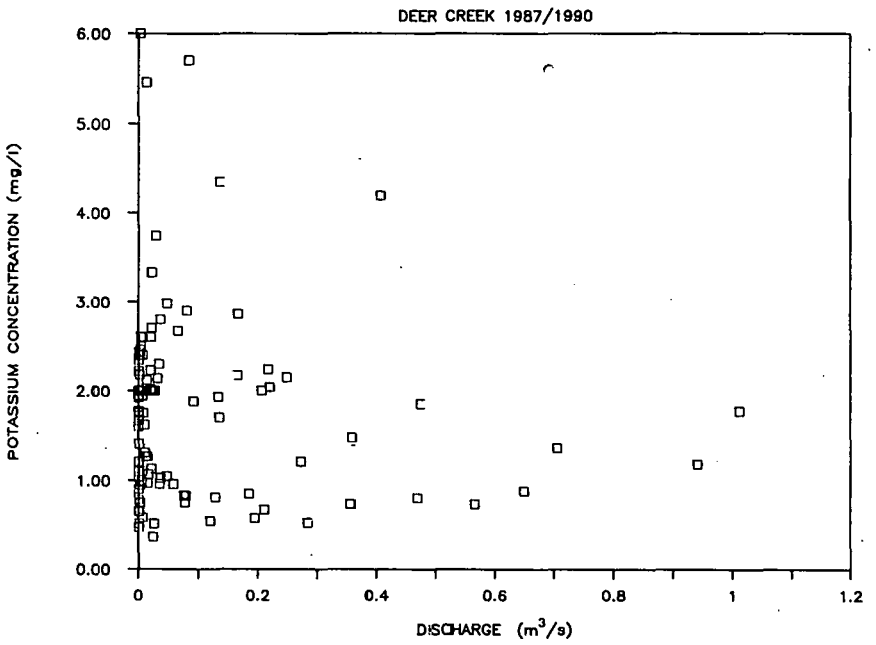
RICE LAKE CHEMISTRY (CONTINUED)

| SAMPLE NO. | DATE | Na mg/l | K mg/l | Ca mg/l | Mg mg/l | Cl mg/l | NO3 mg/l | SO4 mg/l | ALKA-LINITY | pH | COND |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | 04/06/90 | 1.99 | 1.69 | 5.40 | 2.46 | 1.77 | < 0.16 | 1.60 | 15.6 | 6.8 | 5.4 |
| 56 | 11/06/90 | 1.76 | 1.45 | 5.50 | 2.45 | 1.50 | < 0.16 | 1.51 | 15.0 | 6.7 | 5.2 |
| 57 | 21/06/90 | 1.89 | 1.17 | 5.70 | 2.54 | 1.03 | < 0.16 | 1.29 | 11.6 | 6.6 | 4.8 |
| 58 | 26/06/90 | 1.97 | 1.22 | 6.10 | 2.71 | 1.12 | < 0.16 | 1.17 | 12.3 | 6.3 | 5.2 |
| 59 | 10/07/90 | 2.09 | 1.21 | 7.30 | 3.30 | 0.94 | < 0.16 | 1.00 | 14.5 | 6.4 | 5.8 |
| 60 | 16/07/90 | 2.22 | 1.26 | 7.20 | 3.20 | 1.02 | < 0.16 | 1.06 | 11.8 | 6.6 | 5.6 |
| 61 | 23/07/90 | 2.01 | 1.10 | 7.00 | 3.30 | 1.00 | < 0.16 | 1.09 | - | 6.9 | 4.9 |
| 62 | 31/07/90 | 2.24 | 1.14 | 7.40 | 3.40 | 1.09 | < 0.16 | 1.07 | 11.3 | 6.7 | 6.1 |
| 63 | 08/08/90 | 3.21 | 0.94 | 18.70 | 8.60 | 0.82 | < 0.16 | 3.53 | 57.8 | 7.1 | 13.0 |
| 64 | 14/08/90 | 2.40 | 1.09 | 7.80 | 3.70 | 0.97 | < 0.16 | 1.12 | 10.5 | 6.8 | 6.0 |
| 65 | 20/08/90 | 2.58 | 1.16 | 8.30 | 4.10 | 1.40 | < 0.16 | 1.66 | - | 7.2 | 5.2 |
| 66 | 28/08/90 | 2.35 | 1.06 | 8.20 | 4.10 | 1.08 | 0.18 | 1.44 | 21.0 | 7.0 | 5.5 |
| 67 | 04/09/90 | 2.35 | 1.03 | 8.50 | 4.20 | 1.07 | 0.20 | 1.51 | 20.7 | 6.9 | 5.4 |
| 68 | 10/09/90 | 2.46 | 1.09 | 8.40 | 4.20 | 1.14 | < 0.16 | 1.50 | 23.0 | 6.9 | 5.6 |
| 69 | 17/09/90 | 2.50 | 1.14 | 9.30 | 4.50 | 1.17 | 0.18 | 1.17 | 21.7 | 7.1 | 5.7 |
| 70 | 24/09/90 | 2.58 | 1.29 | 8.00 | 4.10 | 1.19 | 0.19 | 1.57 | 20.8 | 7.0 | 5.5 |
| 71 | 01/10/90 | 2.64 | 1.39 | 8.70 | 4.40 | 1.22 | 0.18 | 1.55 | 21.4 | 7.1 | 5.7 |
| 72 | 09/10/90 | 1.45 | 0.68 | 4.80 | 2.02 | 0.69 | < 0.16 | 0.77 | - | 6.9 | 3.2 |
| 73 | 15/10/90 | 2.86 | 1.52 | 8.90 | 4.40 | 1.34 | 0.19 | 1.54 | 21.0 | 7.0 | 5.9 |
| 74 | 22/10/90 | 2.85 | 1.47 | 9.00 | 4.40 | 1.26 | 0.22 | 1.52 | 20.8 | 7.1 | 5.7 |
| 75 | 29/10/90 | 3.03 | 1.59 | 9.20 | 4.60 | 1.41 | 0.20 | 1.54 | 22.4 | 7.1 | 6.2 |
| 76 | 05/11/90 | 3.09 | 1.64 | 9.40 | 4.60 | 1.43 | 0.19 | 1.61 | 25.2 | 7.2 | 6.4 |
| 77 | 12/11/90 | 4.13 | 2.42 | 12.30 | 5.90 | 2.07 | 0.19 | 1.79 | 21.1 | 7.2 | 8.5 |
| | MINIMUM | 1.01 | 0.21 | 3.60 | 1.56 | 0.43 | < 0.16 | 0.21 | 9.0 | 6.0 | 3.2 |
| | MAXIMUM | 5.97 | 4.91 | 21.10 | 8.90 | 4.20 | 2.38 | 3.53 | 68.8 | 7.4 | 16.0 |
| | MEAN | 2.37 | 1.41 | 7.81 | 3.61 | 1.21 | 0.21 | 1.33 | 19.6 | 6.7 | 6.2 |
| | S.D. | 0.95 | 0.81 | 2.65 | 1.25 | 0.61 | 0.26 | 0.51 | 9.6 | 0.3 | 2.0 |
| | SAMPLES | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 75 | 78 | 78 |

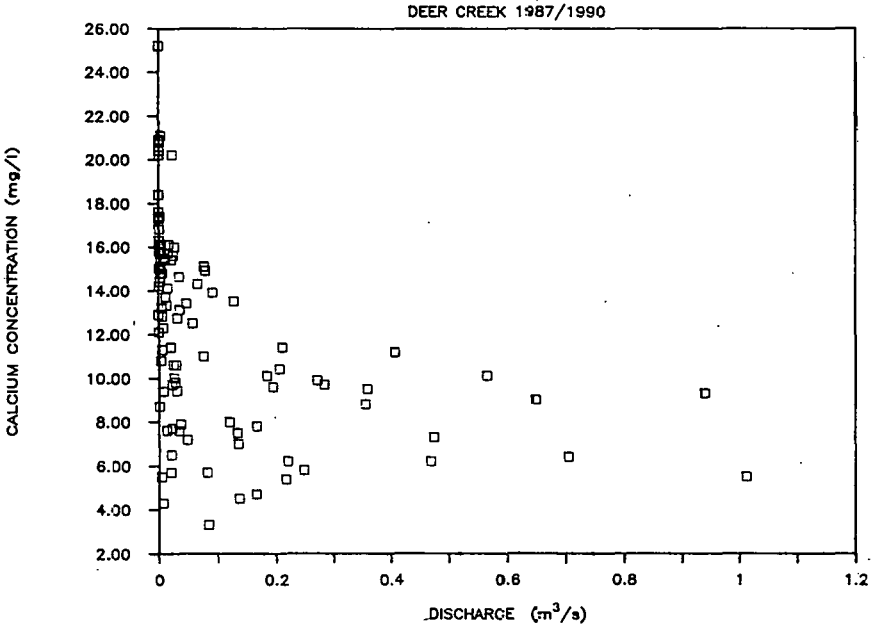
SODIUM CONCENTRATION vs. DISCHARGE



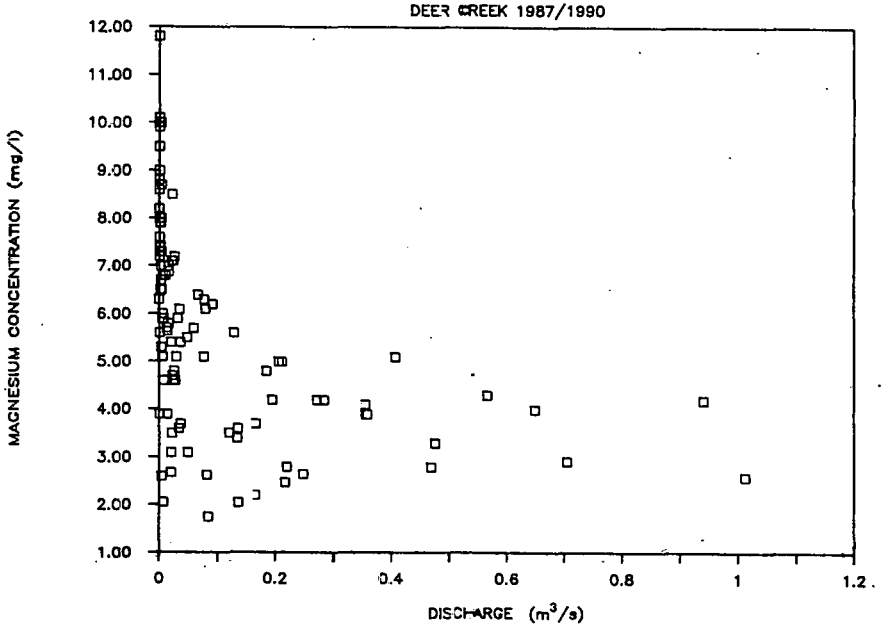

POTASSIUM CONCENTRATION vs. DISCHARGE




CALCIUM CONCENTRATION vs. DISCHARGE

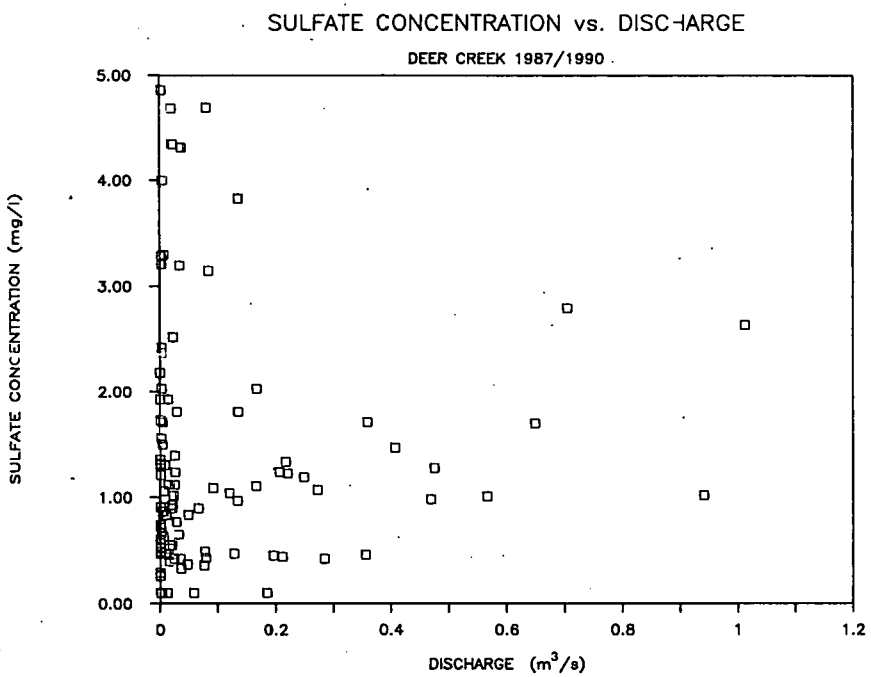


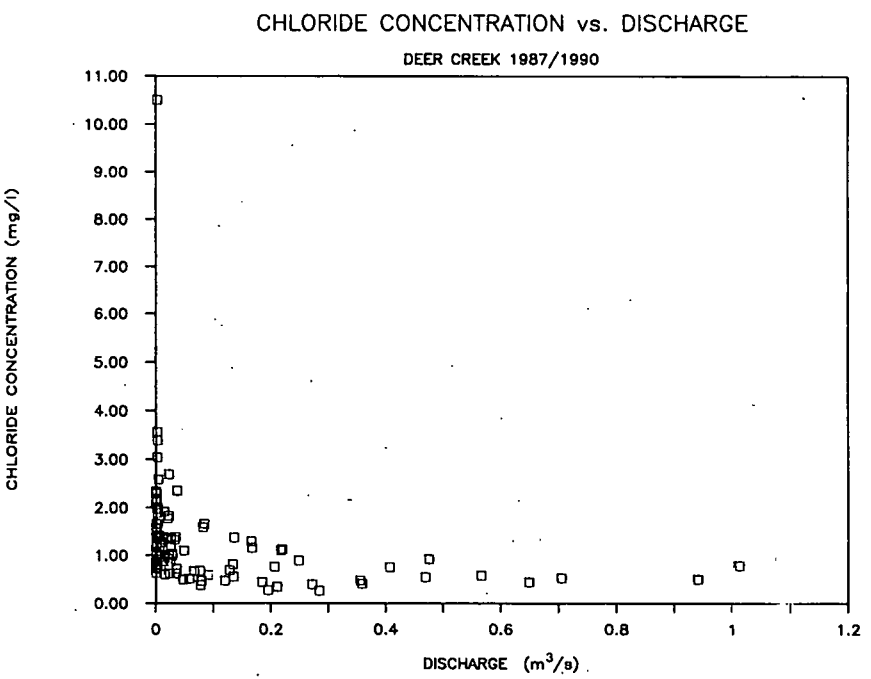

MAGNESIUM CONCENTRATION vs. DISCHARGE



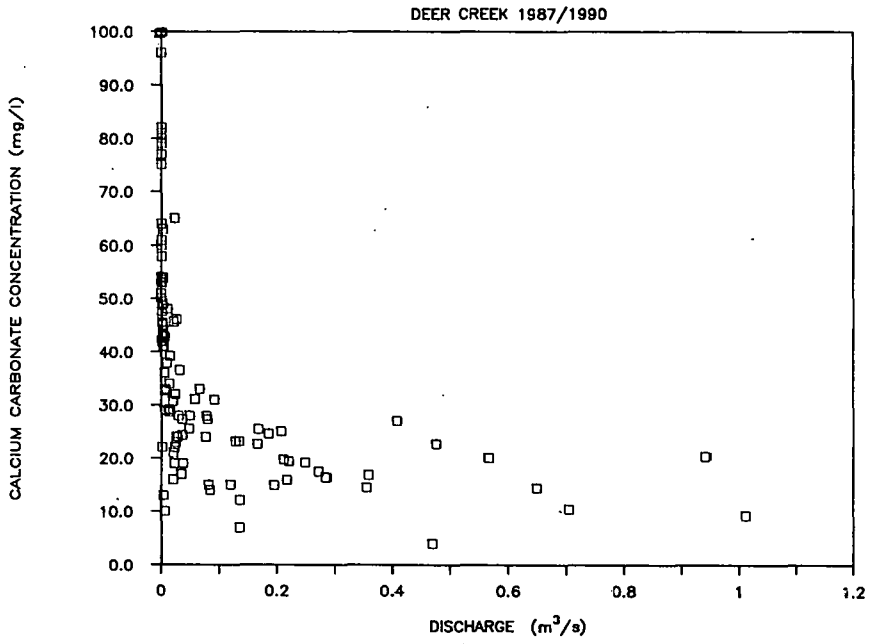



TR-570
COG-92-131

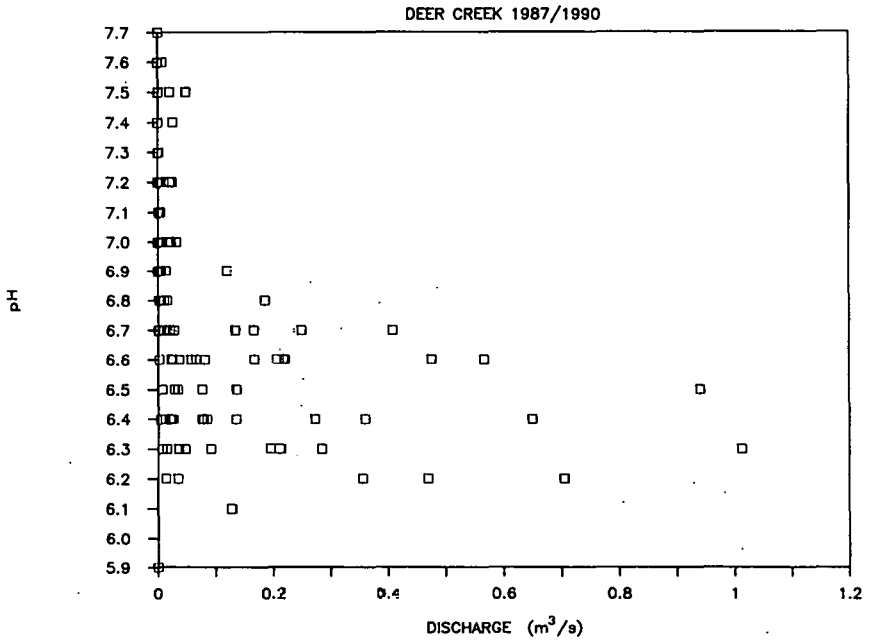

SULFATE CONCENTRATION vs. DISCHARGE
DEER CREEK 1987/1990
SULFATE CONCENTRATION (mg/l)
5.00
4.00
3.00
2.00
1.00
0.00
0
0.2
0.4
0.6
0.8
1
1.2
DISCHARGE (m3/s)


CHLORIDE CONCENTRATION vs. DISCHARGE
DEER CREEK 1987/1990
CHLORIDE CONCENTRATION (mg/l)
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
0.2
0.4
0.6
0.8
1
1.2
DISCHARGE (m3/s)

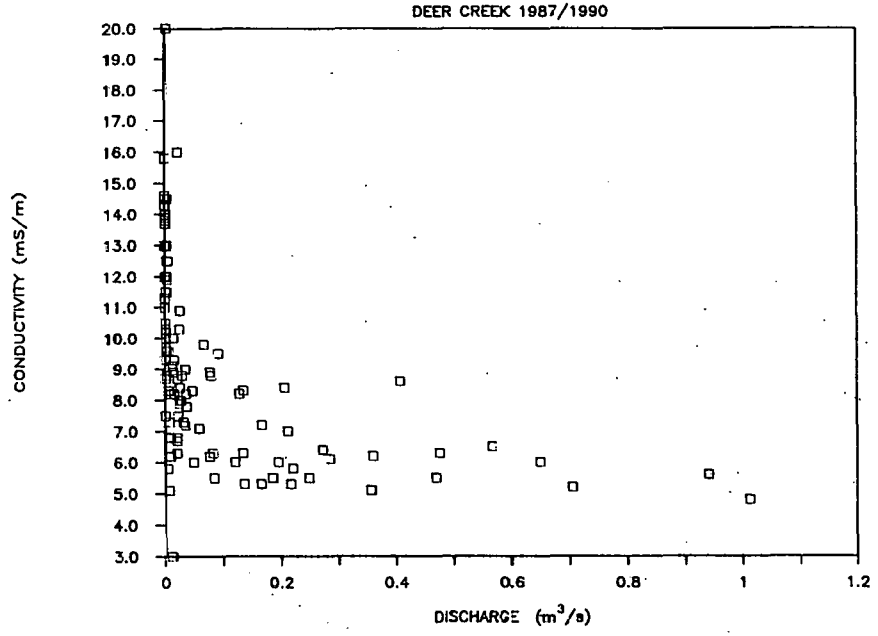
ALKALINITY vs. DISCHARGE



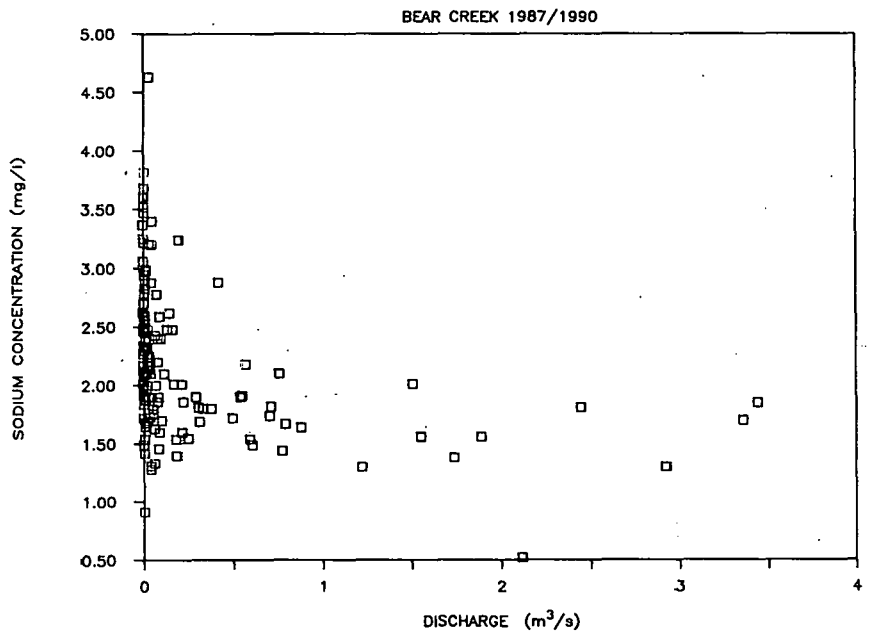

pH vs. DISCHARGE



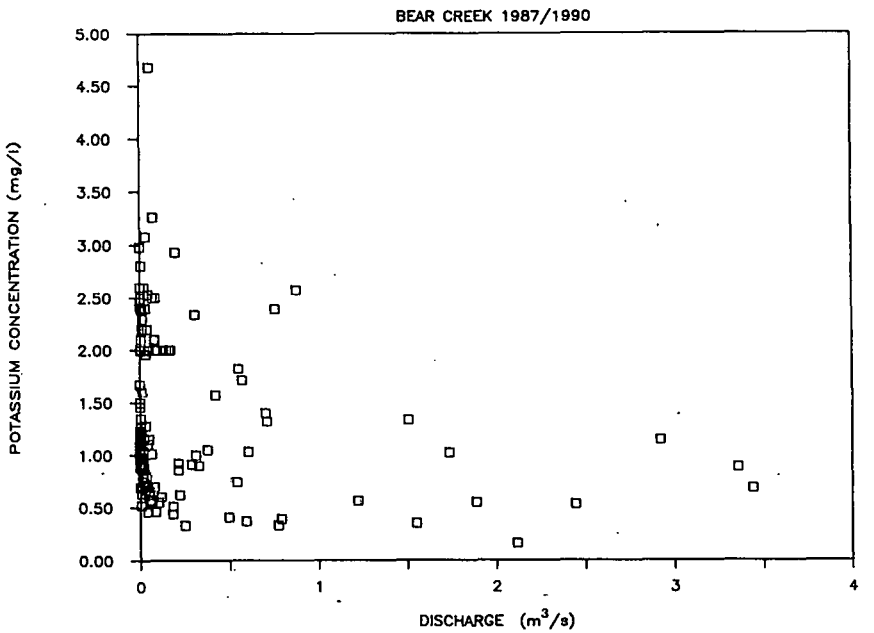

CONDUCTIVITY vs. DISCHARGE



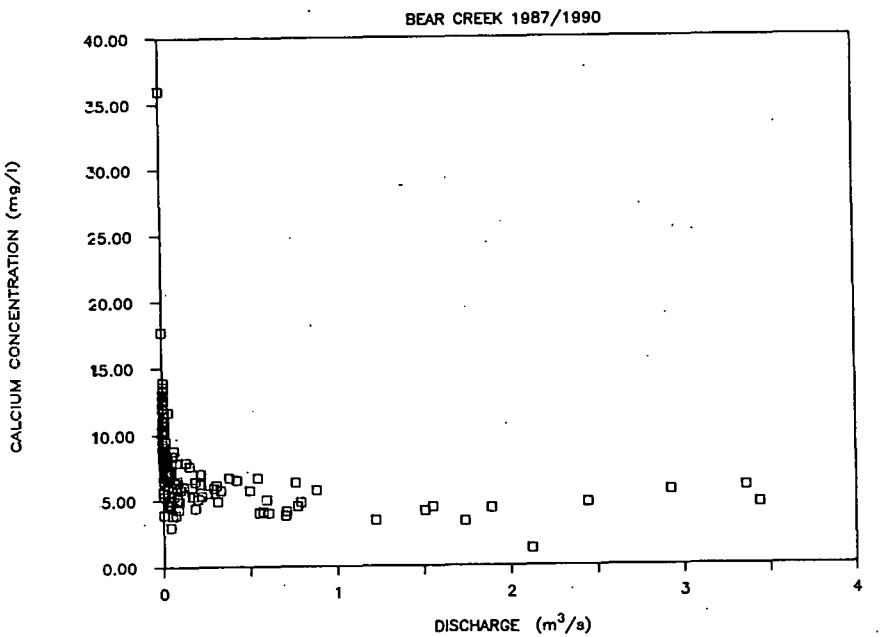
SODIUM CONCENTRATION vs. DISCHARGE



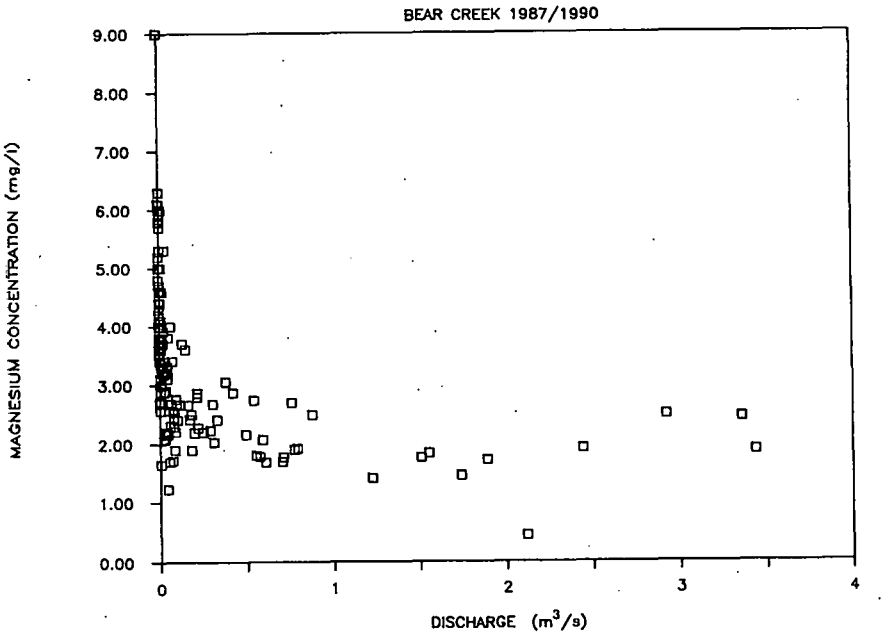

POTASSIUM CONCENTRATION vs. DISCHARGE

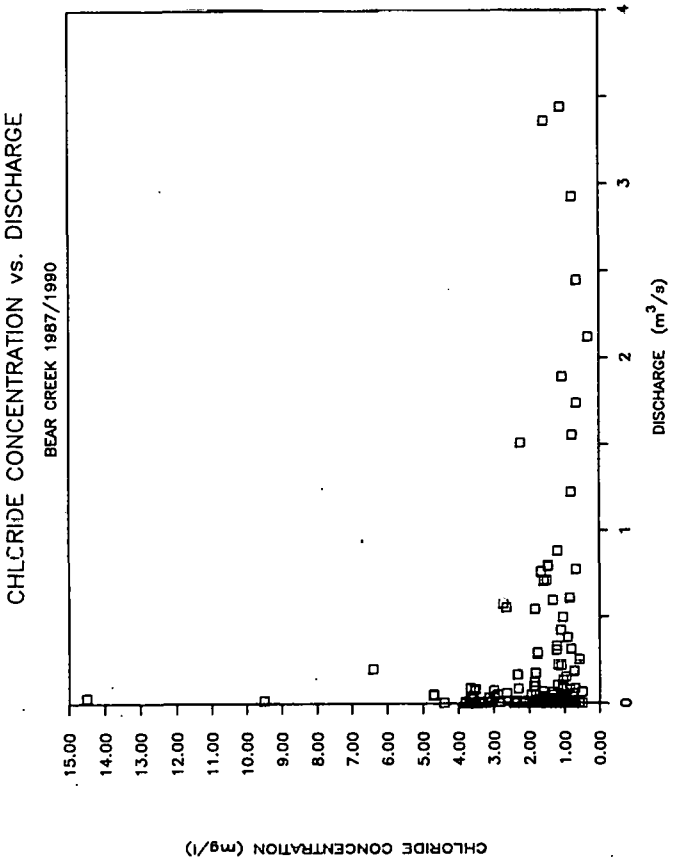


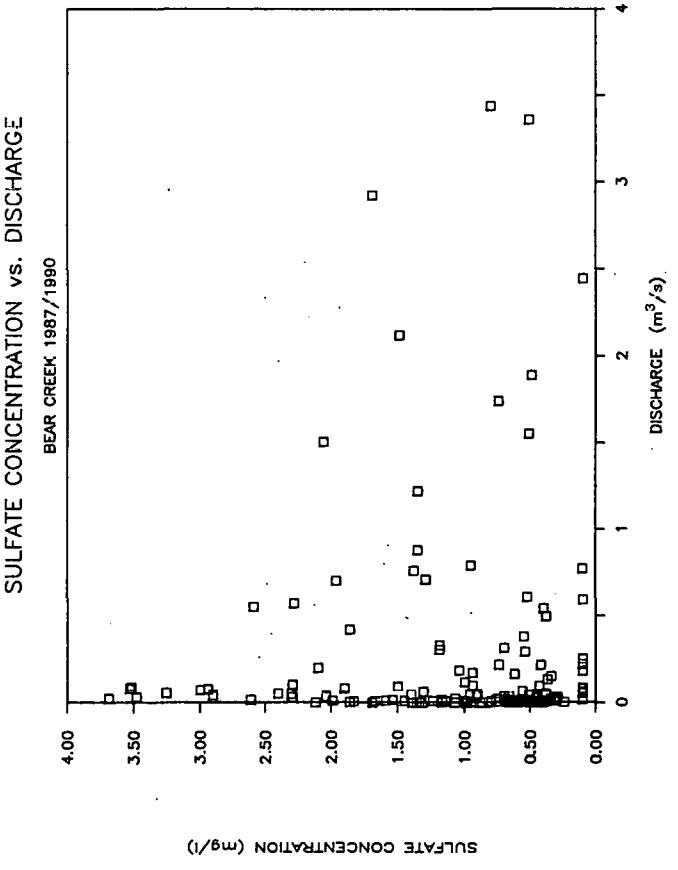

CALCIUM CONCENTRATION vs. DISCHARGE

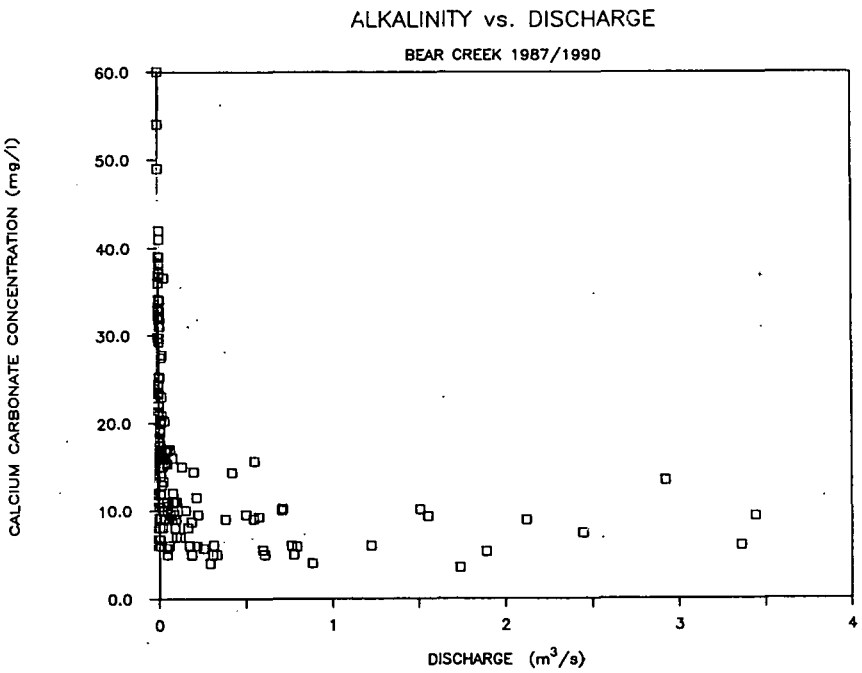


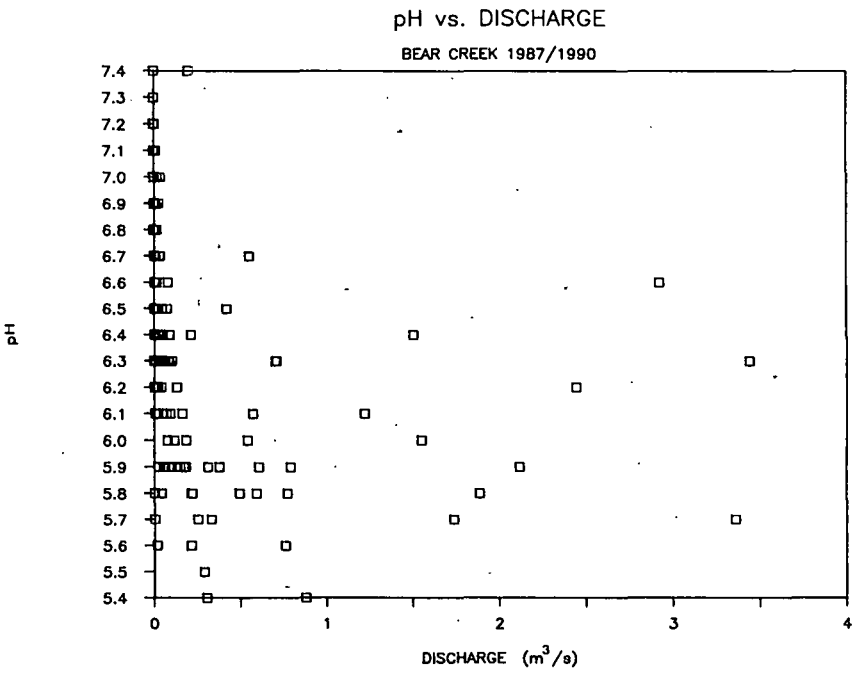

MAGNESIUM CONCENTRATION vs. DISCHARGE

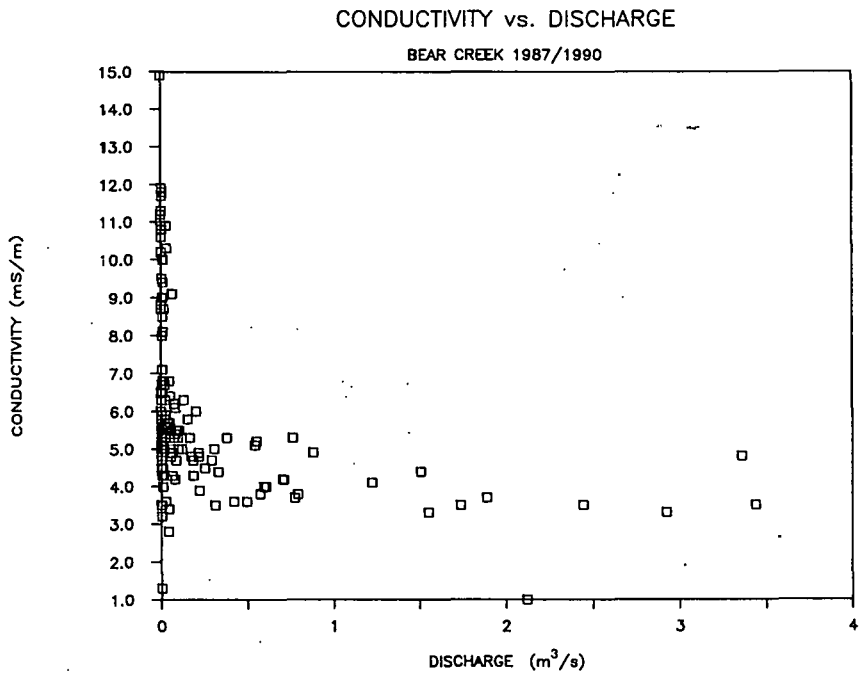


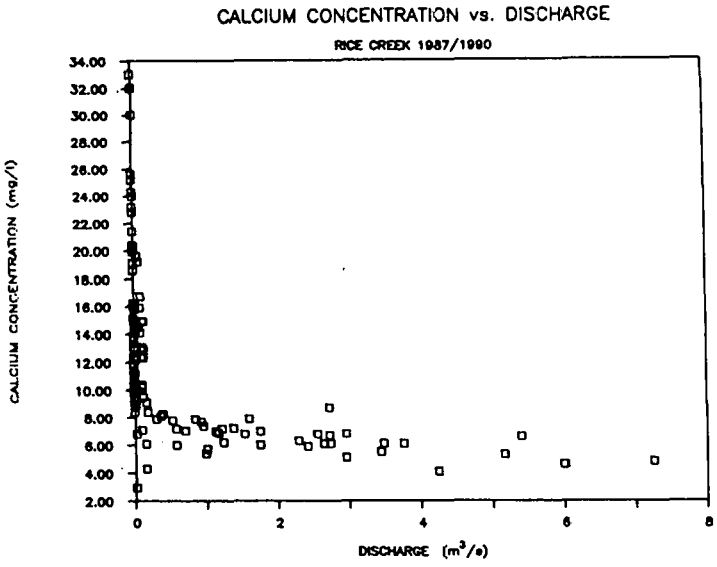

CHLORIDE CONCENTRATION vs. DISCHARGE
BEAR CREEK 1987/1990
CHLORIDE CONCENTRATION (mg/l)
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
DISCHARGE (m3/s)
0
1
2
3
4

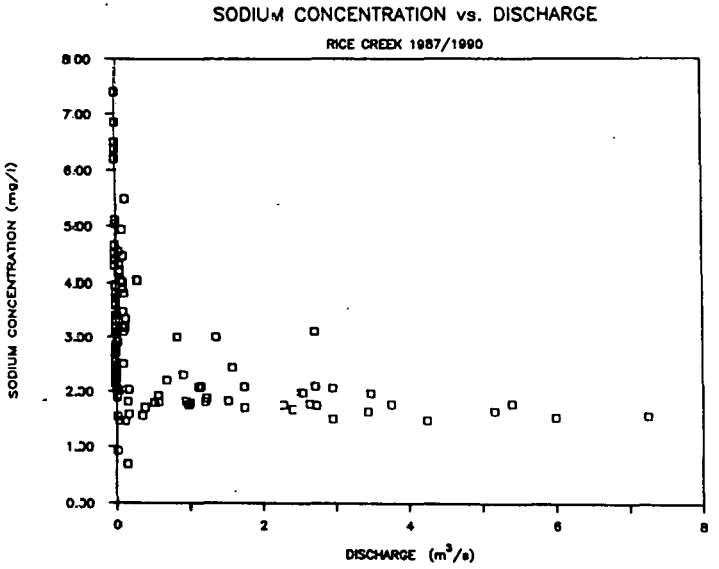

SULFATE CONCENTRATION vs. DISCHARGE
BEAR CREEK 1987/1990
SULFATE CONCENTRATION (mg/l)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
DISCHARGE (m3/s)
0
1
2
3
4

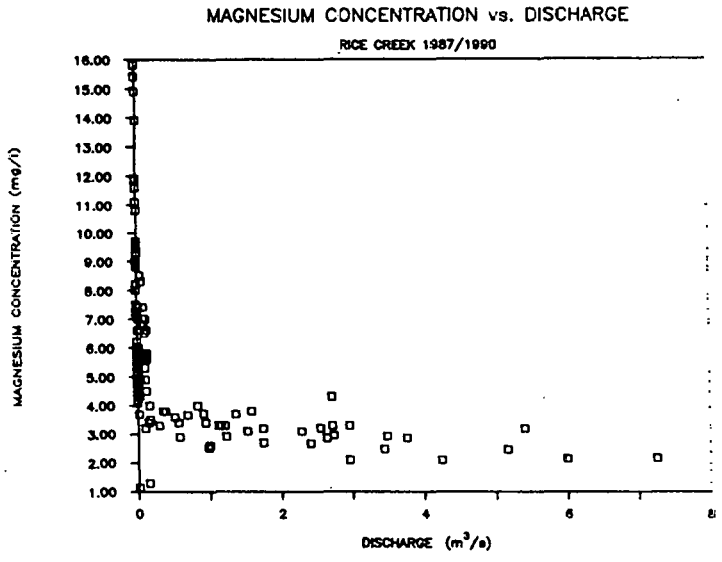

ALKALINITY vs. DISCHARGE
BEAR CREEK 1987/1990
CALCIUM CARBONATE CONCENTRATION (mg/l)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
1
2
3
4
DISCHARGE (m3/s)

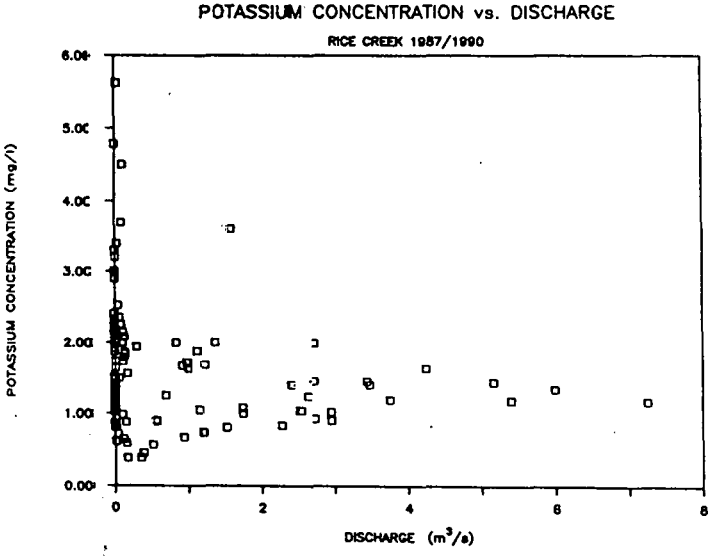

pH vs. DISCHARGE
BEAR CREEK 1987/1990
pH
7.4
7.3
7.2
7.1
7.0
6.9
6.8
6.7
6.6
6.5
6.4
6.3
6.2
6.1
6.0
5.9
5.8
5.7
5.6
5.5
5.4
0
1
2
3
4
DISCHARGE (m3/s)


CONDUCTIVITY vs. DISCHARGE
BEAR CREEK 1987/1990
CONDUCTIVITY (mS/m)
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0
1
2
3
4
DISCHARGE (m3/s)

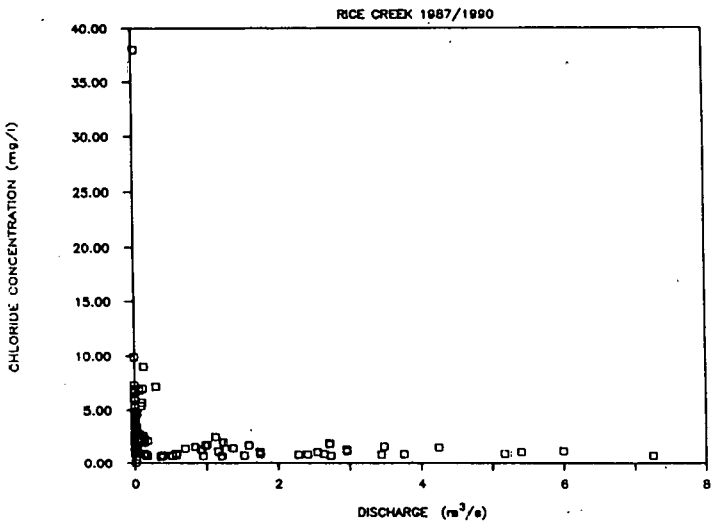

CALCIUM CONCENTRATION vs. DISCHARGE
RICE CREEK 1987/1990
CALCIUM CONCENTRATION (mg/l)
DISCHARGE (m³/s)


SODIUM CONCENTRATION vs. DISCHARGE
RICE CREEK 1987/1990
SODIUM CONCENTRATION (mg/l)
DISCHARGE (m³/s)

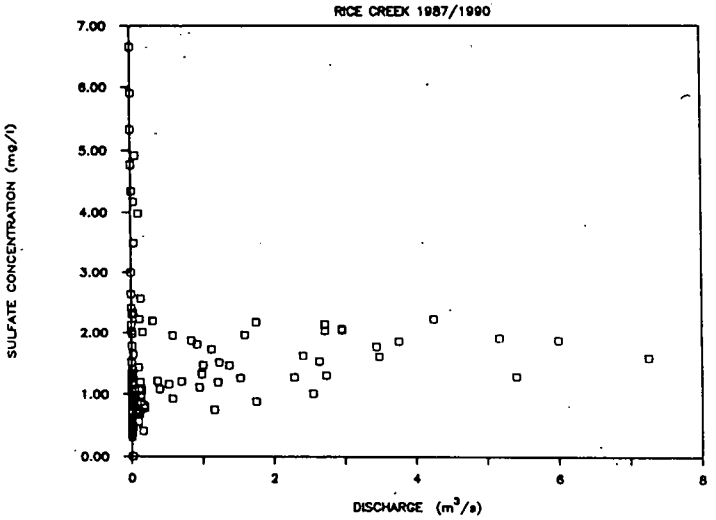

MAGNESIUM CONCENTRATION vs. DISCHARGE
RICE CREEK 1987/1990
MAGNESIUM CONCENTRATION (mg/l)
DISCHARGE (m³/s)


POTASSIUM CONCENTRATION vs. DISCHARGE
RICE CREEK 1987/1990
POTASSIUM CONCENTRATION (mg/l)
DISCHARGE (m³/s)

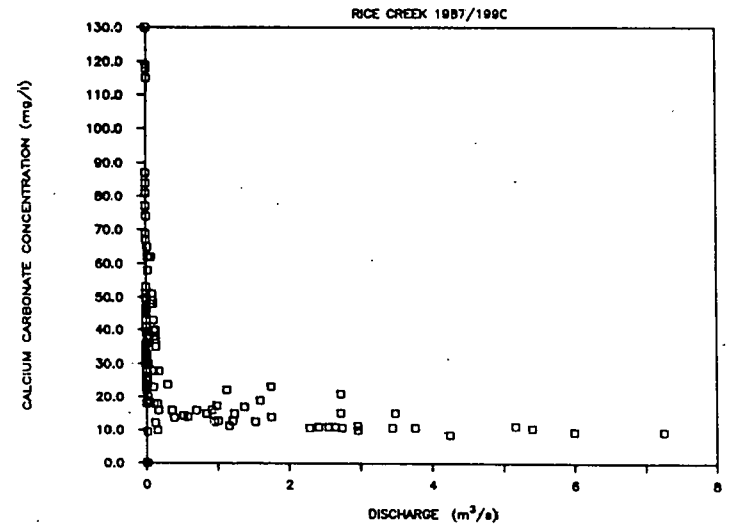
CHLORIDE CONCENTRATION vs. DISCHARGE



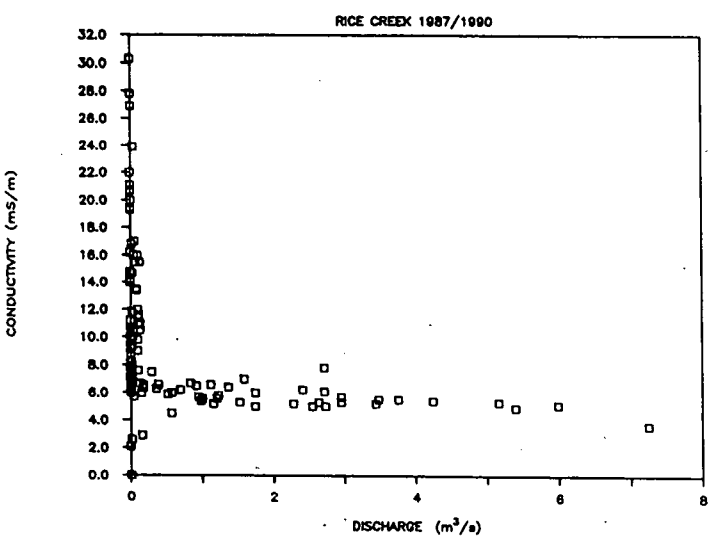

SULFATE CONCENTRATION vs. DISCHARGE



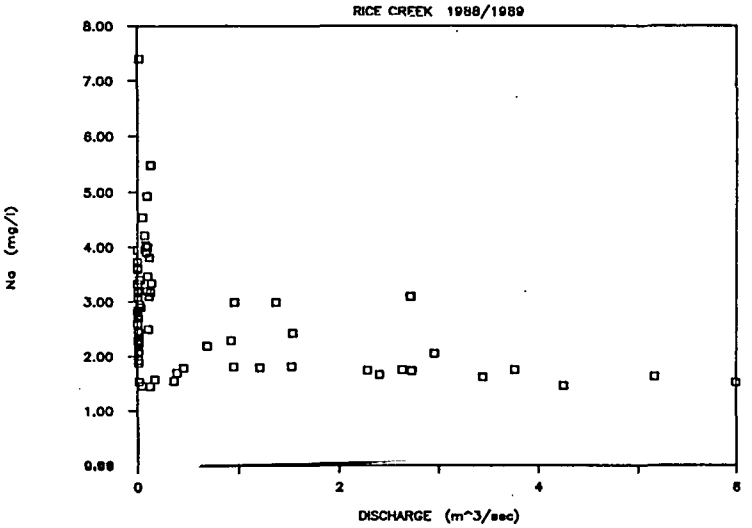

ALKALINITY vs. DISCHARGE



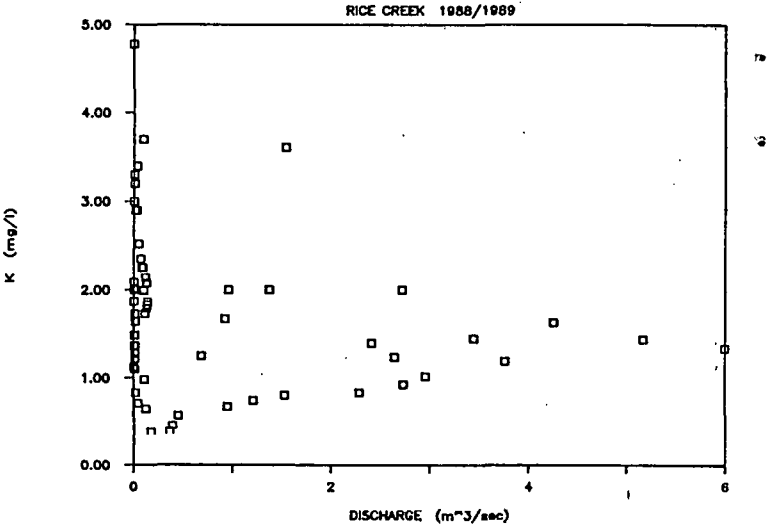

CONDUCTIVITY vs. DISCHARGE



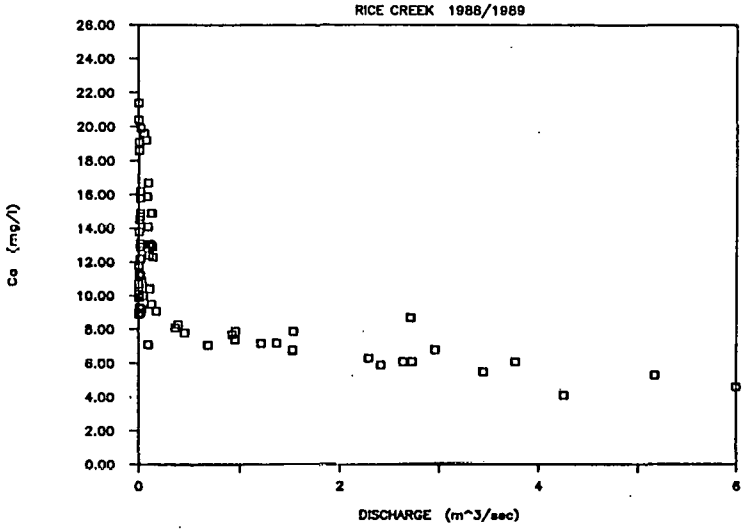
SODIUM CONCENTRATION vs. DISCHARGE



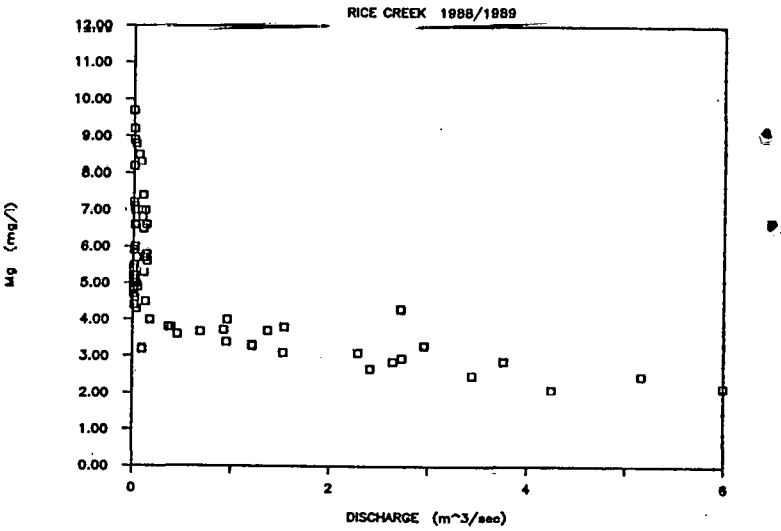

POTASSIUM CONCENTRATION vs. DISCHARGE



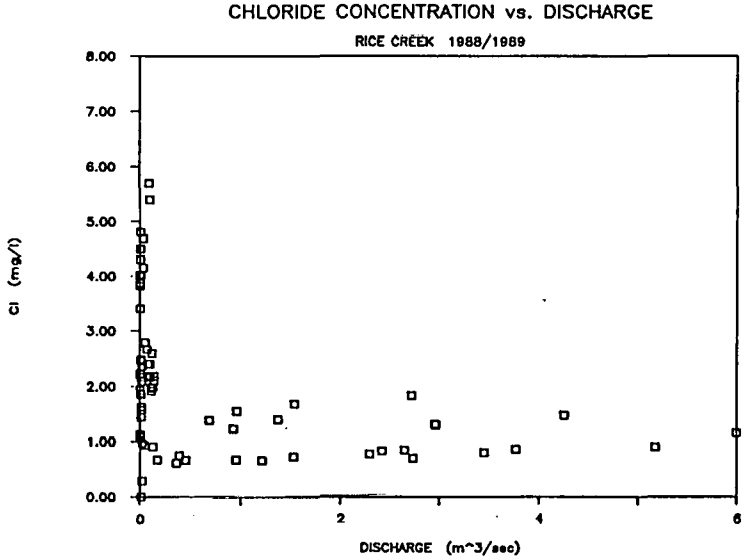

CALCIUM CONCENTRATION vs. DISCHARGE



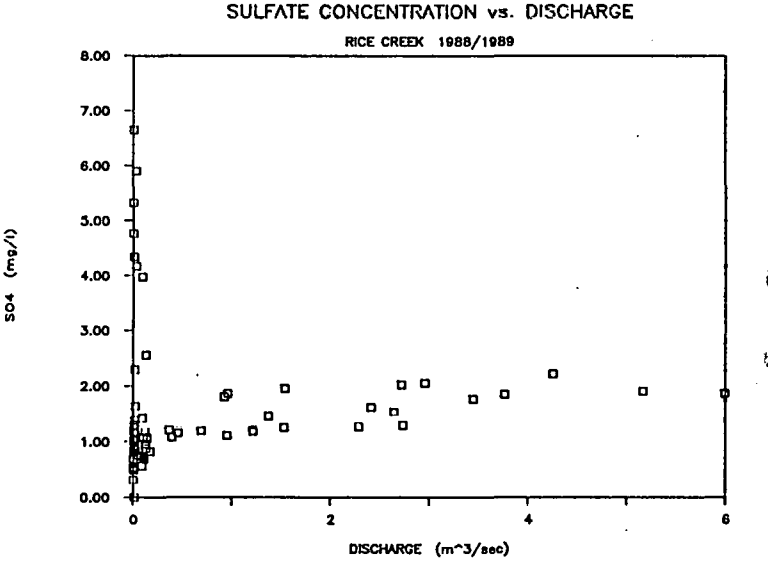

MAGNESIUM CONCENTRATION vs. DISCHARGE



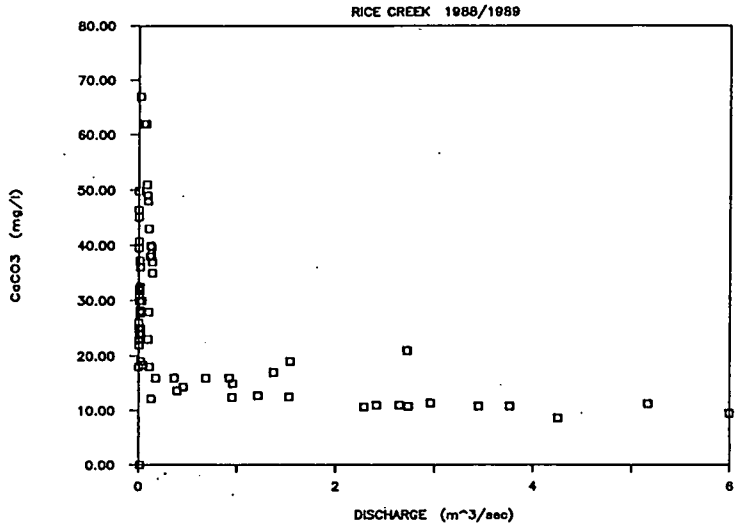

CHLORIDE CONCENTRATION vs. DISCHARGE



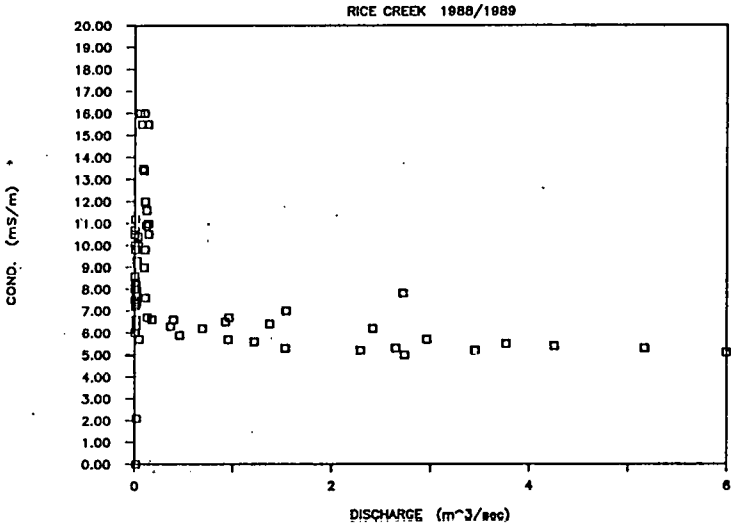

SULFATE CONCENTRATION vs. DISCHARGE



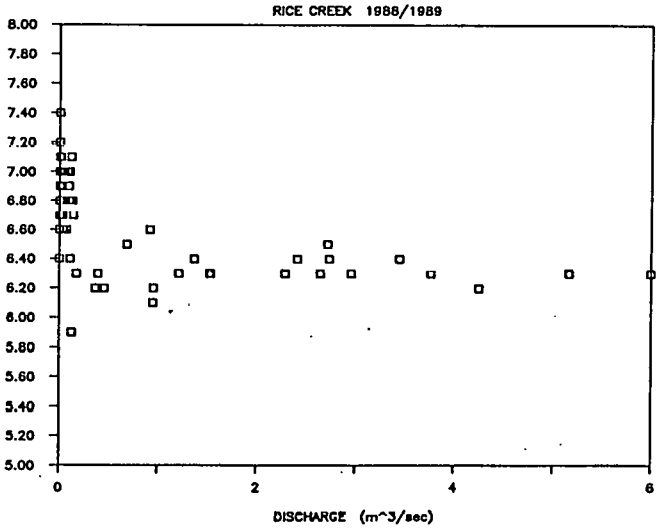
ALKALINITY (CaCO3) vs. DISCHARGE



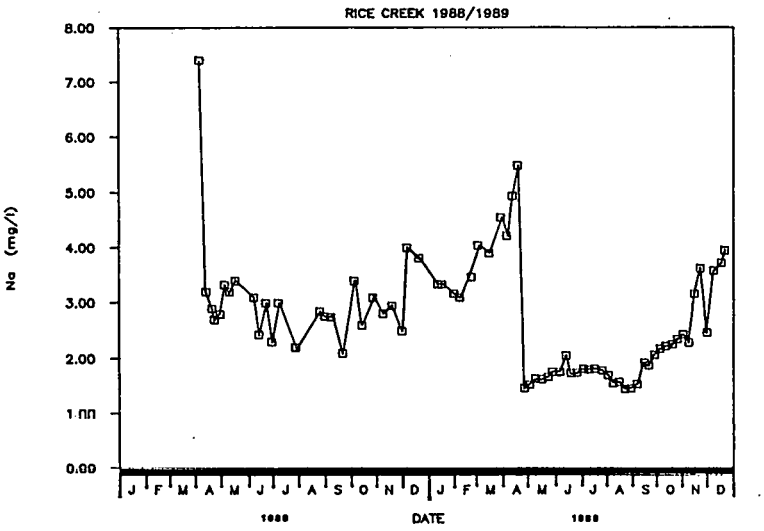

CONDUCTIVITY vs. DISCHARGE



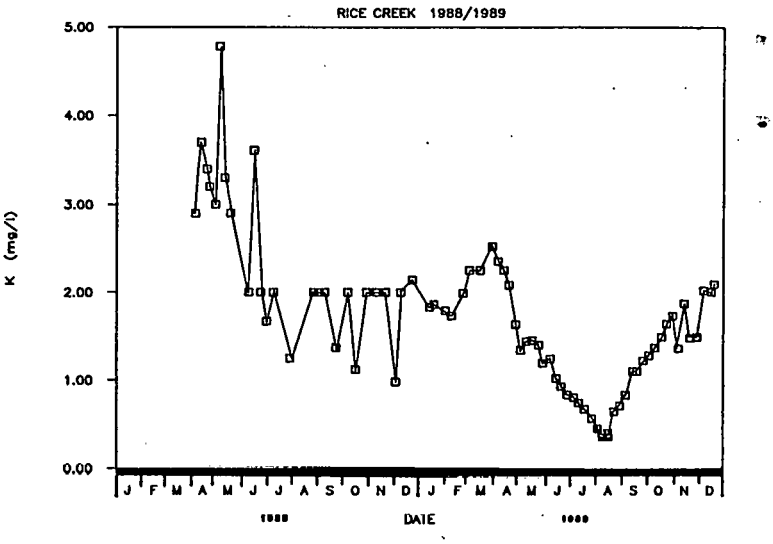

pH vs. DISCHARGE



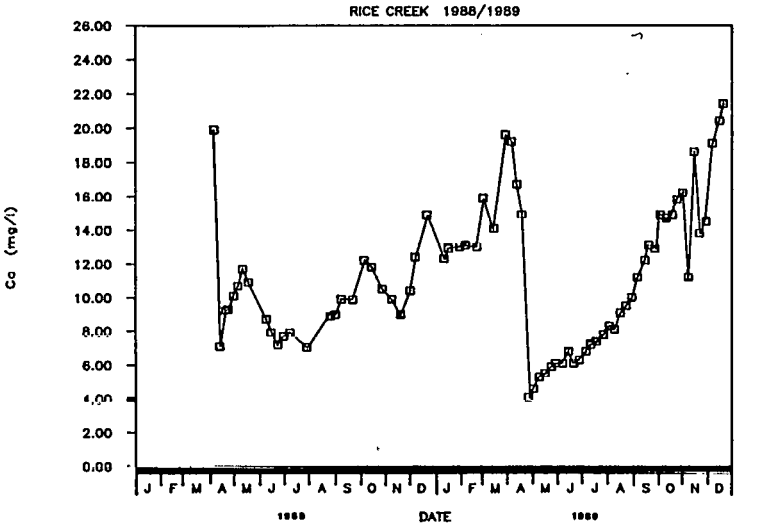
SODIUM CONCENTRATION



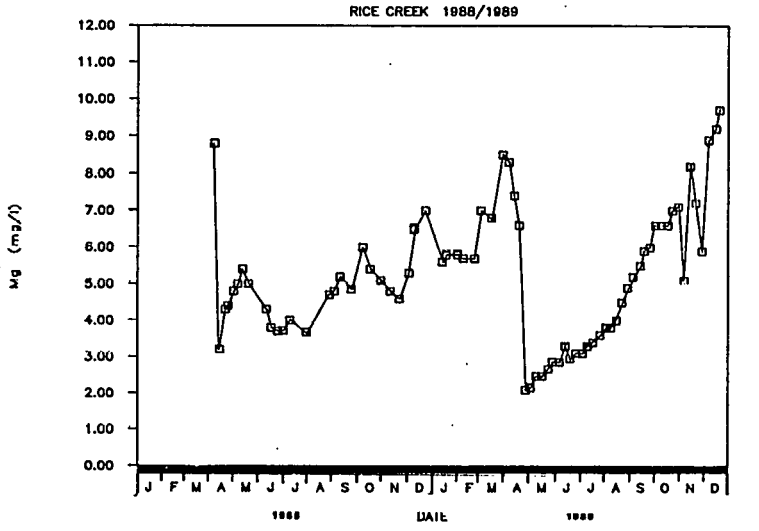

POTASSIUM CONCENTRATION



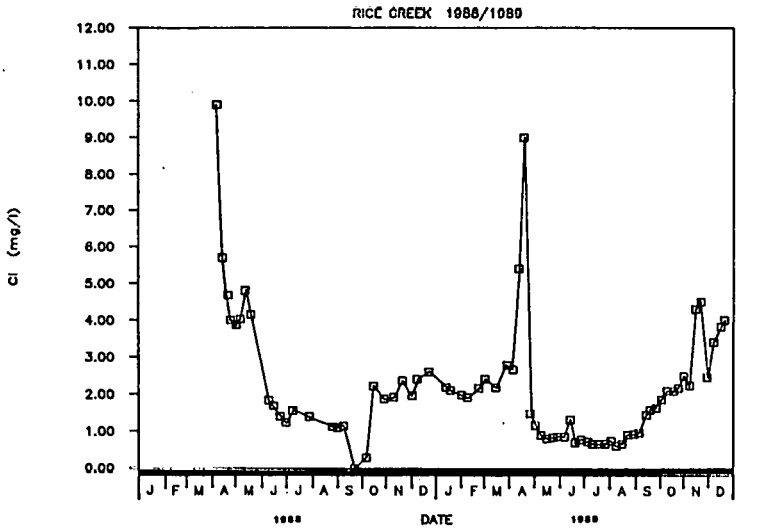

CALCIUM CONCENTRATION



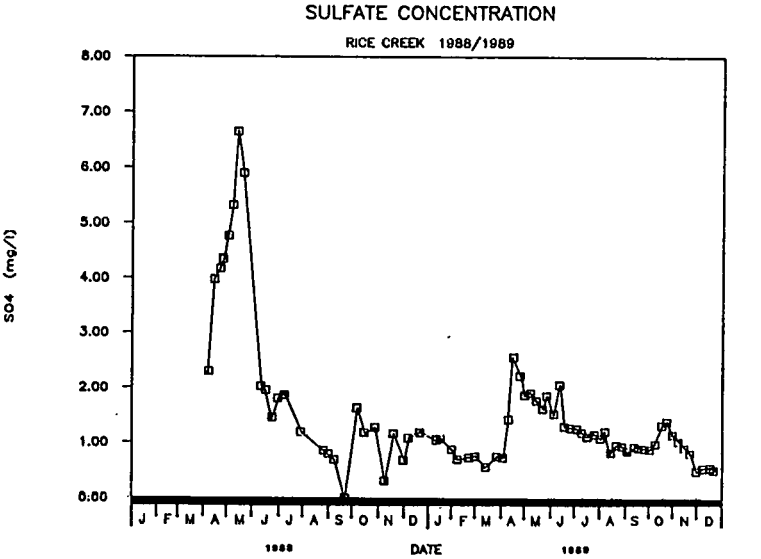

MAGNESIUM CONCENTRATION



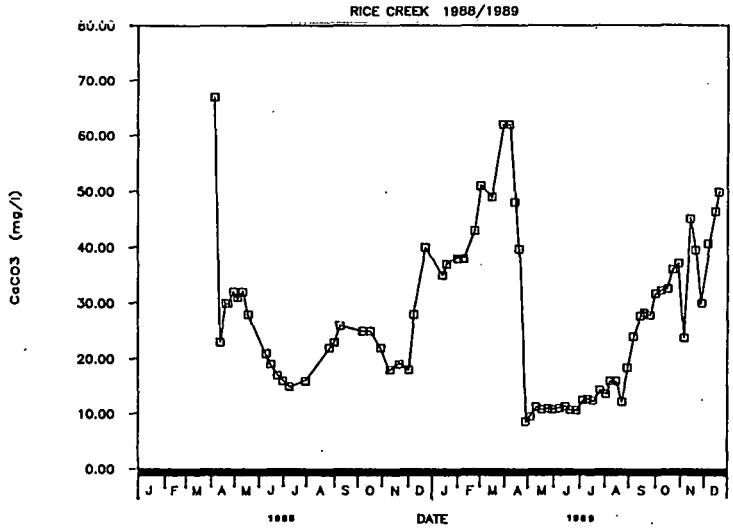

CHLORIDE CONCENTRATION



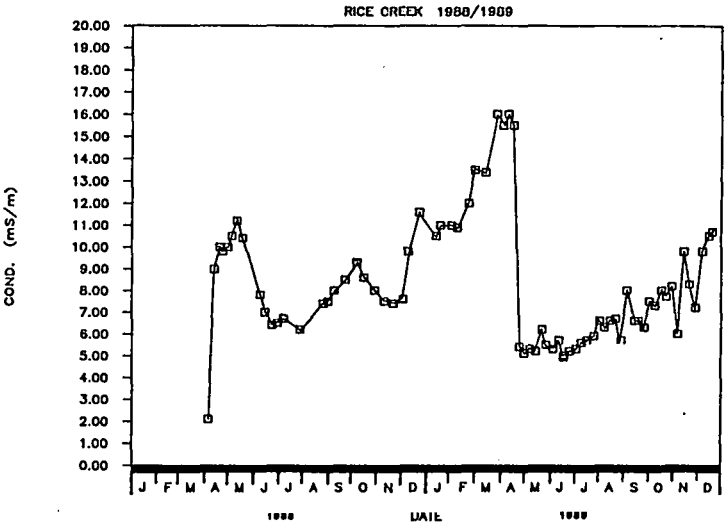

SULFATE CONCENTRATION



CaCO3 CONCENTRATION




CONDUCTIVITY

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