RESERVOIR EVAPORATION IN CENTRAL COLORADO

By Norman E. Spahr and Barbara C. Ruddy

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METRIC CONVERSION TABLE

Multiply inch-pound unit	*By*	*To obtain metric unit*
acre	4.047×10^{-1}	square kilometer
acre-foot (acre-ft)	1.233×10^{-3}	cubic hectometer
calories per square centimeter per day	29.06	watts per square meter
foot (ft)	0.3048	meter
inch	2.54	centimeter
mile (mi)	1.609	kilometer
mile per hour (mi/h)	4.470×10^{-1}	meter per second
millibars	1.000×10^{2}	newtons per square meter
square mile (mi^2)	2.590	square kilometer

To convert degrees Celsius (°C) to degrees Fahrenheit (°F) use the following formula: (°Cx9/5)+32=°F.

National Geodetic Vertical Datum of 1929 (NGVD of 1929): A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called mean sea level.

SYMBOLS

A Surface area of reservoir between consecutive thermal surveys
ATN Atmospheric net radiation
C Specific heat of water
E_{EB} Evaporation computed by the energy-budget method
E_{MT} Evaporation computed by the mass-transfer method
e_a Vapor pressure of the air
e_o Saturation vapor pressure of air at the water-surface temperature
L Latent heat of vaporization of water
N Mass-transfer coefficient
P Atmospheric pressure
Q_a Incoming long-wave radiation
Q_{ar} Reflected long-wave radiation
Q_{bs} Long-wave radiation from the water surface
Q_e Energy used for evaporation
Q_h Energy conducted from the water as sensible heat
Q_r Reflected solar radiation
Q_s Incoming solar radiation
Q_v Net energy advected into the reservoir
Q_w Energy advected by evaporating water
Q_x Increase in stored energy
R Bowen ratio
RH Relative humidity
T Mean temperature of reservoir during thermal survey
T_a Dry-bulb air temperature
T_b Reference of base temperature (0°Celsius) used in energy computations
T_d Temperature of water at a particular depth, d
T_e Temperature of evaporated water
T_o Water-surface temperature
T_w Wet-bulb air temperature
T_1 Mean temperature of water at beginning of energy-budget computation period
T_2 Mean temperature of water at end of energy-budget computation period
t Length of time between consecutive thermal surveys
U_z Windspeed at some height z above the water surface
V Volume of reservoir at time of thermal survey
V_1 Volume of water in reservoir at beginning of energy-budget computation period
V_2 Volume of water in reservoir at end of energy-budget computation period
z Maximum depth of reservoir during thermal survey
γ Coefficient in the formula used to compute Bowen ratio
ρ Density of water

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ABSTRACT

Evaporation losses from seven reservoirs operated by the Denver Water Department in central Colorado were determined during various periods from 1974 to 1980. The reservoirs studied were Ralston, Cheesman, Antero, Williams Fork, Elevenmile Canyon, Dillon, and Gross. The energy-budget and the mass-transfer methods were used to determine evaporation. Class-A pan-evaporation data also were collected at each reservoir.

The energy-budget method was the most accurate method and was used to calibrate the mass-transfer coefficients at Ralston, Cheesman, Antero, and Williams Fork Reservoirs. The mass-transfer coefficients were determined to be 0.00653, 0.00810, 0.00650, and 0.00863, respectively. Calibrated coefficients already were available for Elevenmile Canyon, Dillon, and Gross Reservoirs. Using the calibrated coefficients, seasonal record evaporation rates were determined at each reservoir. Record length varied from 92 to 242 days and rates from 0.19 to 0.55 centimeter per day.

Class-A pan data were used to determine seasonal pan coefficients for each reservoir. The coefficients varied seasonally and between reservoirs. The seasonal values ranged from 0.29 to 1.05.

INTRODUCTION

Colorado law, in recognizing the significance of evaporative losses from water-supply reservoirs, has provided for the release of water from onstream reservoirs to compensate for the evaporative loss. The statutes state:

> "Upon order of the state engineer there shall be released from the water in storage in each stream bed reservoir such quantities of water as, in the determination of the state engineer, are necessary to prevent evaporation from the surface of such reservoir from depleting the natural flow of the stream running through such reservoir which would otherwise be available for use by other appropriators. In determining the quantity of any evaporation release under this section, the state engineer shall compute the surface evaporation from the reservoir and deduct therefrom any accretions to the stream flow resulting from the existence of the reservoir and any natural depletions to the stream flow which would have resulted if the reservoir were not in existence."

Information on the quantity of evaporation from onstream reservoirs is required in order for the State Engineer to comply with this statute.

Purpose of Study and Report

This study is the result of an agreement between the Denver Water Department and the U.S. Geological Survey to investigate the evaporative losses from reservoirs which are a part of the Denver water-supply system. Interim results of the study were presented by Ficke and others (1977). The subject report is a continuation of results given by Ficke and others (1977).

Description of Reservoirs

Seven reservoirs (Ralston, Cheesman, Antero, Williams Fork, Elevenmile Canyon, Dillon, and Gross, fig. 1) were instrumented for the measurement of evaporation. Selected physical characteristics of these reservoirs are given in table 1. Surface area of the reservoirs ranged from 225 to 3,323 acres, mean depth ranged from 8.2 to 100.8 feet, and altitude ranged from 6,046 to 9,017 feet. These reservoirs, combined with transmountain-diversion tunnels, canals, and conduits, form the major part of the Denver metropolitan area water-supply system.

Acknowledgments

During 1974-78, the project operation was supervised by D. Briane Adams of the U.S. Geological Survey. Personnel of the Denver Water Department assisted in the collection, assembly, and processing of data for inclusion in this report.

METHODS AND INSTRUMENTATION

The energy-budget and the mass-transfer techniques were the two primary methods used for determining reservoir evaporation for this study. Class-A pan-evaporation data were also collected at each reservoir. Annual evaporation values were not determined for any reservoir, because the instruments were not operated during the entire open-water season. Measurements usually were begun a few weeks after the ice melted (late May or early June) and continued through October. Actual periods of evaporation determination are given with the corresponding data. Methods used and years for which data are available at each reservoir are shown in table 2. Data presented by Ficke and others (1977) are also shown in table 2.

The following sections describe techniques, instrumentation, and data-collection methods used for each evaporation determination made in this study.

Energy-Budget Method

The energy-budget method of computing reservoir evaporation is an accounting of the flow of energy into and out of a reservoir. Development and application of this technique are given by Anderson (1952) and Koberg (1958).

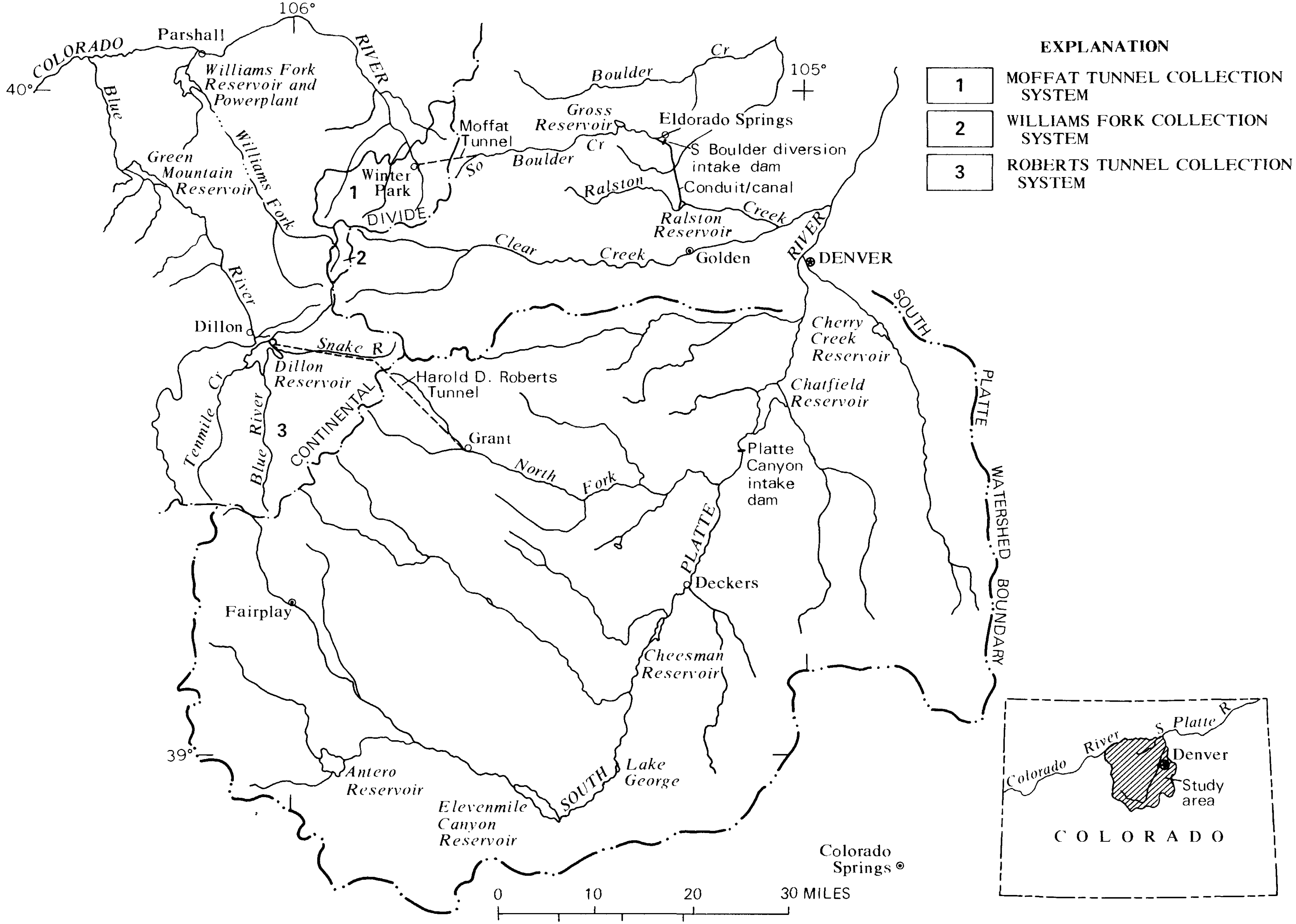

Figure 1.--Water-supply system operated by the Denver Water Department (modified from Ficke and others, 1977).

Table 1.--*Characteristics of reservoirs at which evaporation data were collected*

[From Ficke and others (1977). mi^2, square miles; ft, feet; acre-ft, acre-feet]

Reservoir	Stream impounded	Year completed	Drainage area (mi^2)	Spillway altitude[1] (ft)	Storage capacity (acre-ft)	Surface area (acres)	Maximum depth (ft)	Mean depth (ft)
Ralston--------	Ralston Creek--	1937	46	6,046	11,218	225	151	49.9
Cheesman-------	South Platte River.	1905	1,752	6,842	79,064	871	212	90.8
Antero---------	South Platte River.	1909	337	8,978	15,878	1,931	16	8.2
Williams Fork--	Williams Fork--	1959	230	7,803	96,822	1,618	169	59.8
Elevenmile Canyon.	South Platte River.	1932	880	8,597	97,779	3,323	117	29.4
Dillon---------	Blue River and tributaries.	1963	335	9,017	254,036	3,222	188	78.8
Gross----------	South Boulder Creek.	1954	93	7,282	41,811	415	207	100.8

[1]National Geodetic Vertical Datum of 1929.

Table 2.--*Reservoirs, methods used, and years for which evaporation data are available*

Reservoir	Energy budget	Mass transfer	Class-A pan
Ralston------------	1975-76	[1]1972-80	[1]1972-80
Cheesman-----------	1977-78	[1]1967-80	[1]1967-80
Antero-------------	1977-78	[1]1967-71 1977-80	[1]1967-71 1977-80
Williams Fork------	1979-80	[1]1969-80	[1]1969-80
Elevenmile Canyon--	-------	1974-80	1974-80
Dillon-------------	-------	1974-80	1974-80
Gross--------------	-------	1974-80	1974-80
	Data presented by Ficke and others (1977)		
Ralston------------	-------	1972-73	1972-73
Cheesman-----------	-------	1967-73	1967-73
Antero-------------	-------	1967-71	1967-71
Williams Fork------	-------	1969-73	1969-73
Elevenmile Canyon--	1967-70	1967-73	1967-73
Dillon-------------	1969-71	1969-73	1969-73
Gross--------------	1972-73	1972-73	1972-73

[1]Data prior to 1974 from Ficke and others (1977). Updated values of the mass-transfer coefficient are given in the subject report.

The basic energy-budget equation for a reservoir is:

$$Q_s - Q_r + Q_a - Q_{ar} - Q_{bs} + Q_v - Q_e - Q_h - Q_w = Q_x \tag{1}$$

where Q_s=incoming solar radiation,

Q_r=reflected solar radiation,

Q_a=incoming long-wave radiation,

Q_{ar}=reflected long-wave radiation,

Q_{bs}=long-wave radiation from the water surface,

Q_v=net energy advected into the reservoir,

Q_e=energy used for evaporation,

Q_h=energy conducted from the water as sensible heat,

Q_w=energy advected by evaporating water, and

Q_x=increase in stored energy.

Units for the above terms usually are expressed as calories per square centimeter per day.

Equation 1 can be rearranged to take the form:

$$Q_e+Q_h+Q_w=Q_s-Q_r+Q_a-Q_{ar}-Q_{bs}+Q_v-Q_x. \tag{2}$$

The energy used for evaporation, Q_e, can be described as:

$$Q_e=\rho E_{EB}L \tag{3}$$

where ρ=density of water evaporated, in grams;
E_{EB}=volume of water evaporated as determined by the energy-budget method, in grams per square centimeter per day; and
L=latent heat of vaporization, in calories per gram.

For the temperature range and accuracy of the data available in this study, density, ρ, is considered to be unity. Latent heat of vaporization, L, is determined as a function of temperature.

The energy conducted from the water as sensible heat (Q_h) can be estimated as a function of Q_e and the Bowen ratio (Bowen, 1926) by

$$Q_h=Q_eR \tag{4}$$

where R=Bowen ratio. The Bowen ratio is computed as:

$$R=\frac{\gamma(T_o-T_a)P}{(e_o-e_a)1000} \tag{5}$$

where γ=0.61;
T_o=water-surface temperature, in degrees Celsius;
T_a=dry-bulb air temperature, in degrees Celsius;
e_o=saturation vapor pressure of air at the water-surface temperature, in millibars;
e_a=vapor pressure of the air, in millibars; and
P=atmospheric pressure, in millibars.

The energy advected by the evaporating water, Q_w, is described as:

$$Q_w=c\rho E_{EB}(T_e-T_b) \tag{6}$$

where ρ and E_{EB} are as defined in equation 3;
c=specific heat of water, in calories per gram;
T_e=temperature of evaporated water, in degrees Celsius; and
T_b=reference base temperature, in degrees Celsius.

Specific heat, c, is assumed to be 1.0, T_e is taken to be equal to the water-surface temperature, T_o, and T_b is taken to be 0°C.

Substituting equations 3, 4, and 6 into equation 2 yields:

$$E_{EB}L+Q_eR+c\rho E_{EB}\ T_o=Q_s-Q_r+Q_a-Q_{ar}-Q_{bs}+Q_v-Q_x. \tag{7}$$

Solving for E_{EB} in equation 7 and using the indicated assumptions for equations 3 and 6 yields:

$$E_{EB} = \frac{Q_s-Q_r+Q_a-Q_{ar}-Q_{bs}+Q_v-Q_x}{L(1+R)+T_o}. \tag{8}$$

Equation 8 is the energy-budget evaporation equation used in this study.

Energy-Budget Instrumentation and Data Collection

Instruments and data-collection procedures used to determine values for the terms in equation 8 are described in the following sections. The sketch in figure 2 shows the typical data-collection equipment necessary for an energy-budget determination of evaporation.

Solar radiation.--Incoming solar radiation, Q_s, was measured using an Eppley[1] pyranometer. Instruments generally were calibrated before each season. Short periods of missing data were estimated as a function of cloud cover and tabulated values of clear-sky radiation.

Reflected solar radiation, Q_r, was determined as a function of Q_s, using relationships developed by Koberg (1964, fig. 36).

Long-wave radiation.--Incoming long-wave radiation, Q_a, was determined by two different methods. The first method used a ventilated unshielded total hemispherical radiometer to measure the total incoming radiation. Values for Q_a were calculated as the difference between the total incoming radiation and the solar radiation as measured by the pyranometer. The second method used an Eppley pyrgeometer to measure Q_a directly.

Reflected long-wave radiation, Q_{ar}, was estimated to be 3.0 percent of Q_a (Anderson, 1952). Atmospheric net radiation, *ATN*, is sometimes used to represent the difference Q_a-Q_{ar}.

Air temperature and vapor pressure.--Air temperature, T_a, and vapor pressure, e_a are needed for calculation of the Bowen ratio. Values of air temperature and wet-bulb temperature, T_w, were measured using a thermocouple psychrometer. The psychrometer was of a design presented by Anderson and others (1950). At Williams Fork Reservoir, air temperature was measured using a thermistor sensor, and relative humidity, *RH*, was measured using a thin-film capacitive sensor. Both sensors were manufactured by Weathertronics.

[1]The use of brand names in this report is for identification only and does not constitute endorsement by the U.S. Geological Survey.

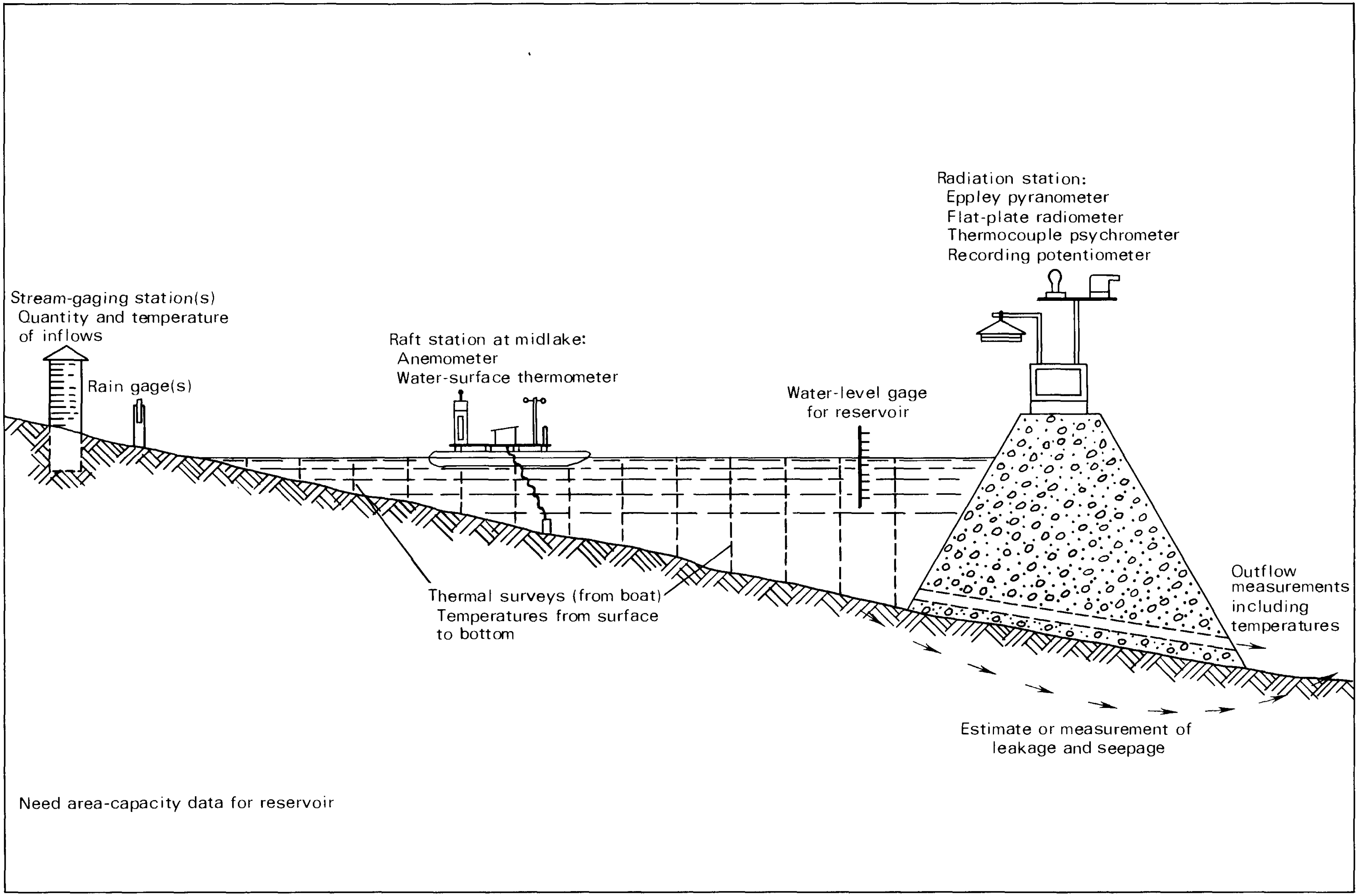

Figure 2.--Equipment used to collect data for computing evaporation by the energy-budget method (modified from Ficke and others, 1977).

Using values of T_a and T_w, or T_a and RH, the vapor pressure of the air was computed. The instruments were checked on a weekly basis using a ventilated psychrometer. Adjustments were then made when necessary during data reduction. The effect of freezing on the thermocouple psychrometer is difficult to determine. Therefore, during periods of below-freezing temperatures, vapor-pressure records were determined from hygrothermograph data at the reservoirs.

Recorders.--Two different recorders were used during the study. At all sites except Williams Fork Reservoir, signals from the radiometers and psychrometers were recorded on an eight-channel, millivolt-recording potentiometer. A mechanical integrating device was used with the recorder which would sum the millivolt signals. The integrators were then read daily by personnel of the Denver Water Department.

At Williams Fork Reservoir, a Campbell data logger was used to integrate readings from the radiometers and temperature and relative-humidity probes. Values were stored by the data logger on a cassette tape. The cassette tape was then read through an interpreting device to yield digital output. Computer programs were used to compute daily average values from the potentiometer and data-logger output.

Water-Surface Temperature.--Average daily water-surface temperatures were measured near the center of each reservoir using a liquid-filled recording thermometer mounted on an anchored raft. Every week the recording thermometer clocks were wound and the recorder charts changed. Temperature readings were checked during servicing using an independent thermometer and adjustments were made during record processing when necessary.

Long-wave radiation emitted from the reservoir surface, Q_{bs}, was calculated using the water-surface temperature, the Stephan-Boltzman Law, and an emissivity of 0.97. Water-surface temperatures also were used to determine the saturation vapor pressure at the water-surface temperature, e_o.

Advected energy.--Advected energy, Q_v, is that energy advected to or from a reservoir directly by inflow, outflow, and precipitation. Temperatures of the inflow and outflow were measured at about weekly intervals. Records of inflow and outflow volume were provided by personnel of the Denver Water Department. Quantities of precipitation were obtained from gages near each reservoir. The temperature of precipitation was assumed to be equal to the wet-bulb temperature recorded at the psychrometer.

Changes in stored energy.--Changes in stored energy, Q_x, were determined by changes in reservoir water temperature between consecutive thermal surveys. Thermal surveys were conducted at intervals of 7 to 14 days. During a thermal survey, temperatures were measured from the surface to the bottom of the reservoir at selected depths and at about 15 measurement points evenly spaced across the reservoir surface in both shallow and deep areas. Temperatures were measured using a resistance-type Whitney underwater thermometer. The underwater thermometer was calibrated with a precision mercury-in-glass thermometer throughout the range of measured values.

All temperatures at each selected depth during a thermal survey were averaged to determine an average temperature profile for the reservoir. Using this average profile, a mean temperature for the thermal survey was computed as:

$$T=\frac{1}{V}\sum_{d=o}^{z} T_d dV \tag{9}$$

where T=mean temperature of reservoir during thermal survey, in degrees Celsius;

V=volume of reservoir at time of thermal survey, in cubic centimeters;

T_d=temperature of water at depth, d, having volume, dV, in degrees Celsius; and

z=maximum depth of reservoir during thermal survey, in centimeters.

Volumes of water were determined from capacity tables supplied for each reservoir by the Denver Water Department.

The mean temperature combined with the volume of water and the average surface area between thermal surveys allow the determination of Q_x by:

$$Q_x=c\rho\frac{V_2(T_2-T_b)-V_1(T_1-T_b)}{At}; \tag{10}$$

where Q_x, c, and ρ are as defined previously;

V_1 and V_2=volume of water at beginning and end of energy-budget computation period, in cubic centimeters;

T_1 and T_2=mean water temperature at beginning and end of energy-budget computation period, in degrees Celsius;

T_b=reference temperature, in degrees Celsius;

A=average surface area of reservoir between consecutive thermal surveys, in square centimeters; and

t=length of time between consecutive thermal surveys, in days.

With c equal to 1.0 calorie per gram, ρ equal to 1.0 gram per cubic centimeter, and T_b taken to be 0.0° Celsius, equation 10 reduces to:

$$Q_x=\frac{V_2T_2\ V_1T_1}{At}. \tag{11}$$

Equation 11 shows that values of Q_x can be determined only between two accurate measurements of average lake temperature. Consequently, the period between thermal surveys becomes the computation period for the energy-budget determination of evaporation.

Mass-Transfer Method

The mass-transfer technique used in this study is that presented by Harbeck (1962). The equation takes the form:

$$E_{MT}=NU_{2.0}(e_o-e_a). \tag{12}$$

where E_{MT}=evaporation, in centimeters per day;

N=mass-transfer coefficient;

$U_{2.0}$=average wind speed at 2 meters above the water surface, in miles per hour;

e_o=saturation-vapor pressure of air at the water-surface temperature, in millibars; and

e_a=vapor pressure of the air, in millibars.

The coefficient, N, incorporates several factors such as terrain effects, wind and vapor-pressure profiles, and surface shape. Because of all the influencing factors, N preferably needs to be determined by calibration against an independent measurement of evaporation. Ficke and others (1977) determined a value for N from a linear relation between the energy-budget evaporation, E_{EB}, and the mass-transfer product, $U_{2.0}(e_o-e_a)$ for Elevenmile Canyon, Dillon, and Gross Reservoirs. In this report, N values were determined from similar relations for Ralston, Cheesman, Antero, and Williams Fork Reservoirs. An alternative method to determine a value for N using reservoir surface area was developed by Harbeck (1962). This relation is:

$$N=0.00859/A^{0.05} \tag{13}$$

where A=reservoir surface area, in acres.

The value of N usually is considered to be constant for a reservoir, unless an updated determination based upon more accurate evaporation values becomes available. Values of N used by Ficke and others (1977) for Ralston, Cheesman, Antero, and Williams Fork Reservoirs were based on equation 13. Energy-budget relations are now available; therefore, mass-transfer evaporation rates for the above reservoirs presented by Ficke and others (1977) were recalculated and are given in subsequent sections of this report.

Mass-Transfer Instrumentation and Data Collection

The typical data-collection equipment needed for mass-transfer determinations of evaporation is shown in figure 3. The mass-transfer technique does not require the extensive data collection necessary for the energy budget and as such, is much less expensive. The following sections describe the instruments and methods of data collection used for the mass-transfer studies.

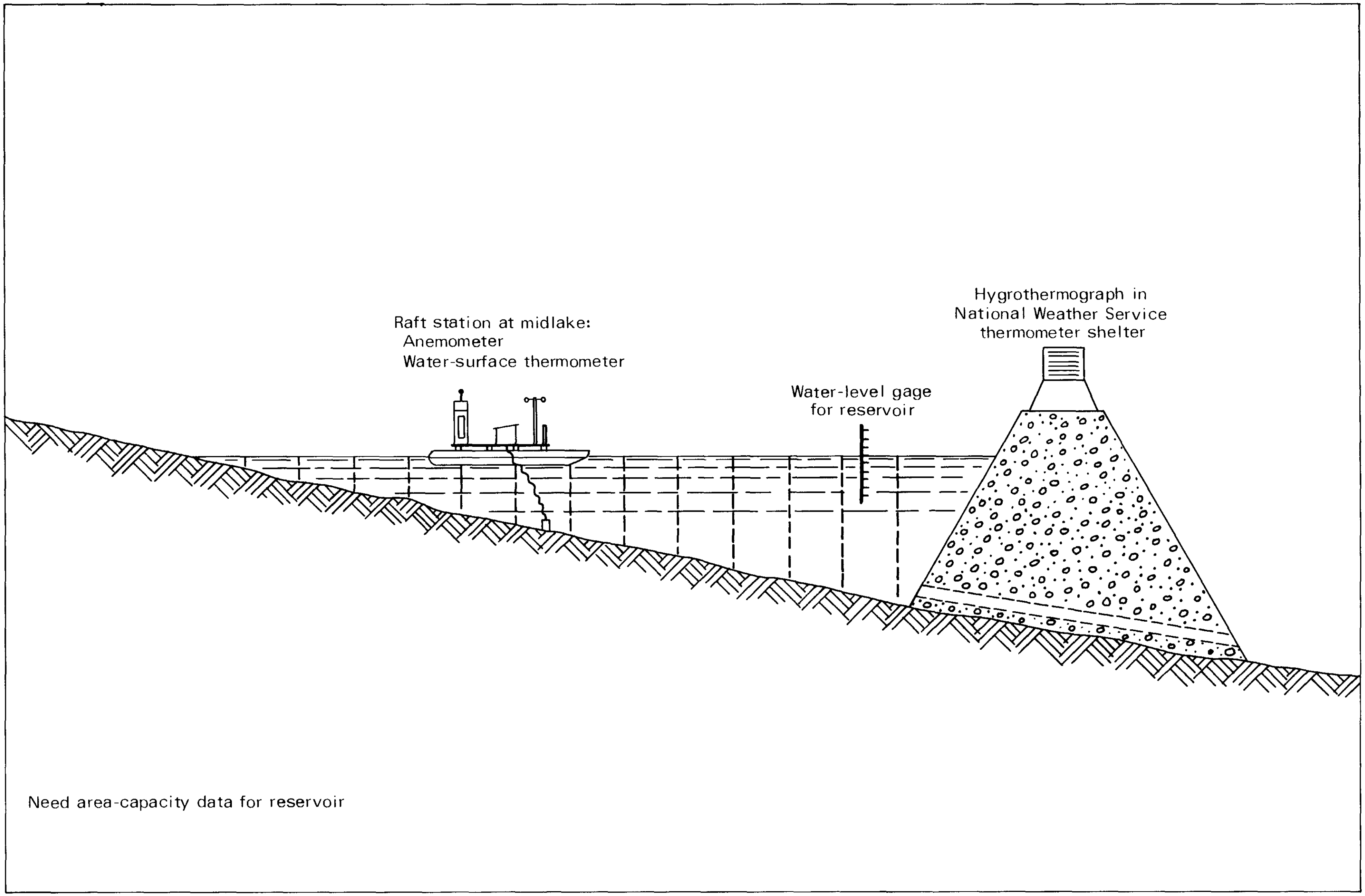

Figure 3.--Equipment used to collect data for computing evaporation by the mass-transfer method (modified from Ficke and others, 1977).

Wind speed.--Wind speed, $U_{2.0}$, was measured using a three-cup totalizing anemometer mounted 2.0 meters above the water surface on a raft anchored near the center of each reservoir. The totalizing dials of the anemometers were read at approximately 7-day intervals. The difference in consecutive readings was used to compute average wind speed during the time between readings. This time interval became the computation period for the mass-transfer equation.

Saturation-vapor pressure at water-surface temperature.--Water-surface temperatures were measured with liquid-filled recording thermographs in the same manner as was done for the energy budget. Values of saturation-vapor pressure at the water-surface temperature, e_o, were determined from tables of the saturation vapor pressure of water as functions of daily average water-surface temperature.

Vapor pressure of air.--Values of vapor pressure of the air, e_a, were computed from hygrothermograph measurements at each reservoir. The hygrothermographs were calibrated in a laboratory with carefully controlled humidity prior to each season. Calibration also was checked during the season with a ventilated psychrometer. During energy-budget studies at the reservoirs, hygrothermograph measurements were complemented by measurements from the psychrometer at the radiation station. Adjustments to the hygrothermograph records were made using field checks and post season calibration. During short periods of missing record, humidity data were estimated using wet- and dry-bulb temperatures collected with a sling psychrometer by personnel of the Denver Water Department.

Surface area.--Surface area of each reservoir was determined from storage-capacity versus reservoir-elevation tables and reservoir-elevation readings provided by the Denver Water Department.

Pan Evaporation

Standard U.S. Class-A evaporation pans were operated at all reservoirs. The operational procedure for the collection of pan-evaporation data followed the standard practice described by the National Weather Service (1972). Each pan was mounted on a wood frame on the ground. A three-cup totalizing anemometer was positioned 6 inches above the rim of each pan. Maximum and minimum pan-water temperatures also were measured.

EVAPORATION FROM RALSTON RESERVOIR

Ralston Reservoir is on Ralston Creek, about 10 miles northwest of Denver, Colo. The reservoir has a storage capacity of 11,218 acre-feet, a surface area of 225 acres, and a mean depth of 49.9 feet. At full pool the water surface is at an altitude of 6,046 feet. Drainage area above the reservoir is 46 square miles, but the major inflow to Ralston Reservoir is the South Boulder Canal, which diverts water released from Gross Reservoir into South Boulder Creek.

Energy Budget

Energy-budget data were collected at Ralston Reservoir during 1975 and 1976. Radiation and psychrometric data were collected at a station atop the dam. Total daily solar radiation, Q_s, and vapor pressures, e_o and e_a, measured during 1975 at Ralston Reservoir, are shown in figures 4 and 5.

Thermal surveys were conducted approximately once every 2 weeks. Inflow temperatures were measured using a thermograph mounted in the South Boulder Canal. Outflow temperatures were measured at weekly intervals below the dam. Advected energy minus changes in stored energy for Ralston Reservoir during 1975 is shown in figure 6. Water-surface temperatures measured at the raft during 1975 are shown in figure 7.

Values for the terms of equation 8 for 1975 and 1976 energy-budget evaporation from Ralston Reservoir are shown in table 3. Hydrographs of the energy-budget evaporation rates are shown in figure 8. Evaporation rates ranged from 0.03 to 0.83 centimeter per day. The average evaporation rate for 1975 was less than the average rate for 1976. Direct comparisons are possible because of the similar periods of record for each year.

Mass Transfer

Determination of the mass-transfer coefficient, N.--The energy-budget and mass-transfer data for 1975 and 1976 were used to determine a value of N for Ralston Reservoir. The evaporation rate from the energy budget, E_{EB}, is plotted against the mass-transfer product, $U_{2.0}(e_o-e_a)$ in figure 9. Different methods were used to determine a value of N from data shown in figure 9. A summary of these methods is shown in figure 10.

The results shown in figure 10 were used to select an N value of 0.00653 for Ralston Reservoir. The annual variation of N shown in figures 9 and 10 is slight. The value of N presented by Ficke and others (1977) for Ralston Reservoir using Harbeck's relation (equation 13 of this report) was 0.00667. The values based on the energy-budget calibration are well within the range of expected variation of Harbeck's relation. The mass-transfer data collected and presented by Ficke and others (1977) is presented in this report using an updated N value of 0.00653 to determine the evaporation rates.

Data.--Mass-transfer data were collected at Ralston Reservoir from 1974 to 1980. Hygrothermograph data were collected at a station near the caretaker's house, 500 feet downstream from the dam. Water-surface temperatures and wind speed were collected as described earlier.

Wind-speed data collected at the raft during 1975 are shown in figure 11. A summary of mass-transfer terms and pan evaporation for the 1972-80 seasons for Ralston Reservoir is shown in table 4. Data for 1972 and 1973 are from Ficke and others (1977), using the updated value of N. Hydrographs of mass-transfer evaporation rates for 1972-74 and 1977-80 are shown in figure 12; 1975-76 mass-transfer evaporation rates are shown in figure 8.

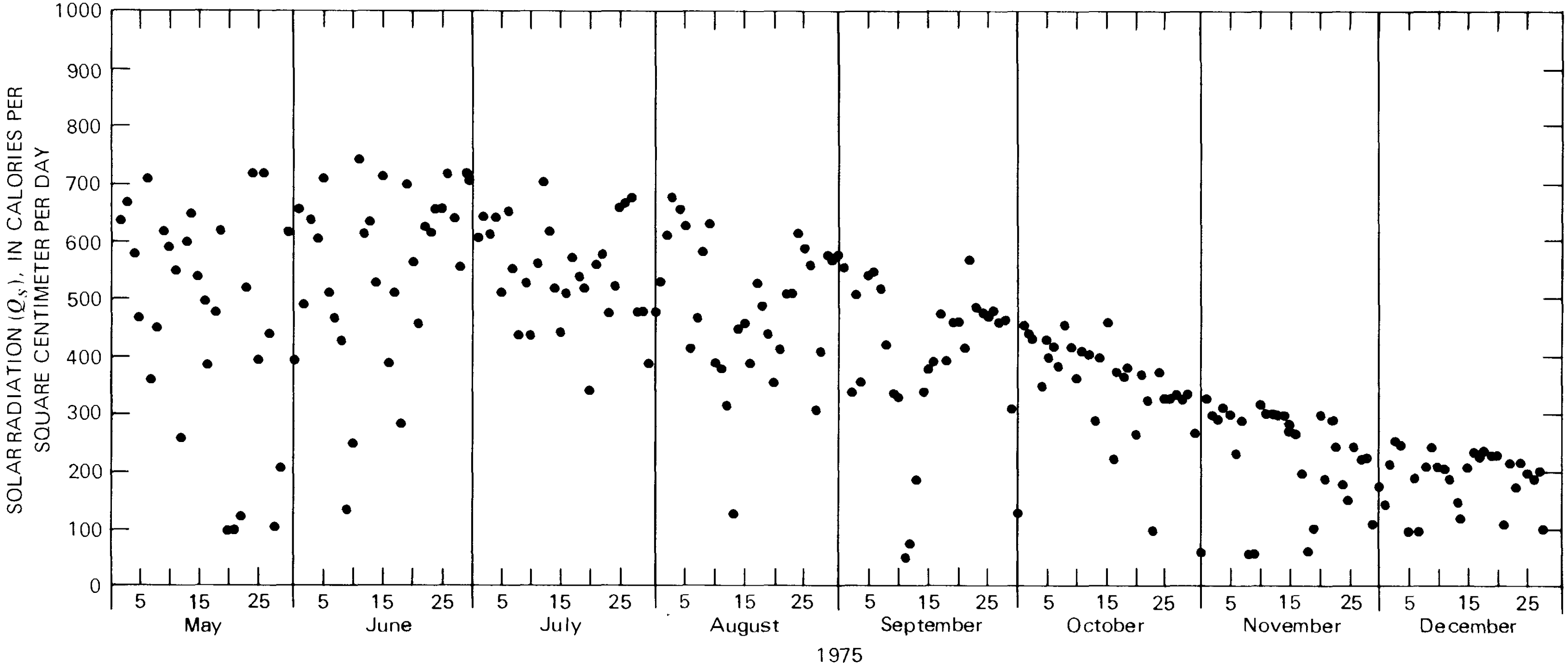

Figure 4.-- Total daily solar radiation, Q_S, at Ralston Reservoir, May-December 1975.

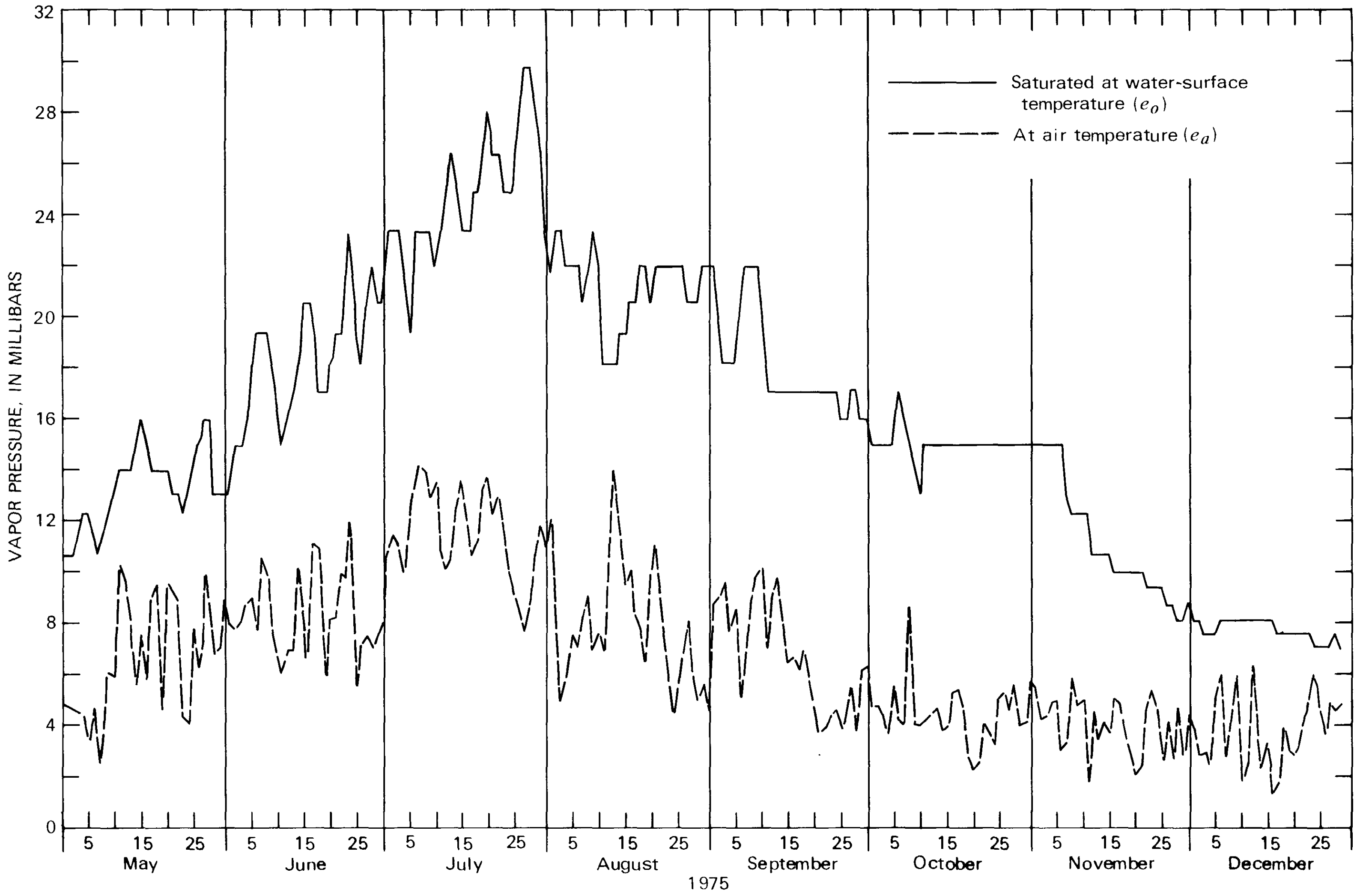

Figure 5.--Daily vapor pressures, e_o and e_a, at Ralston Reservoir, May-December 1975.

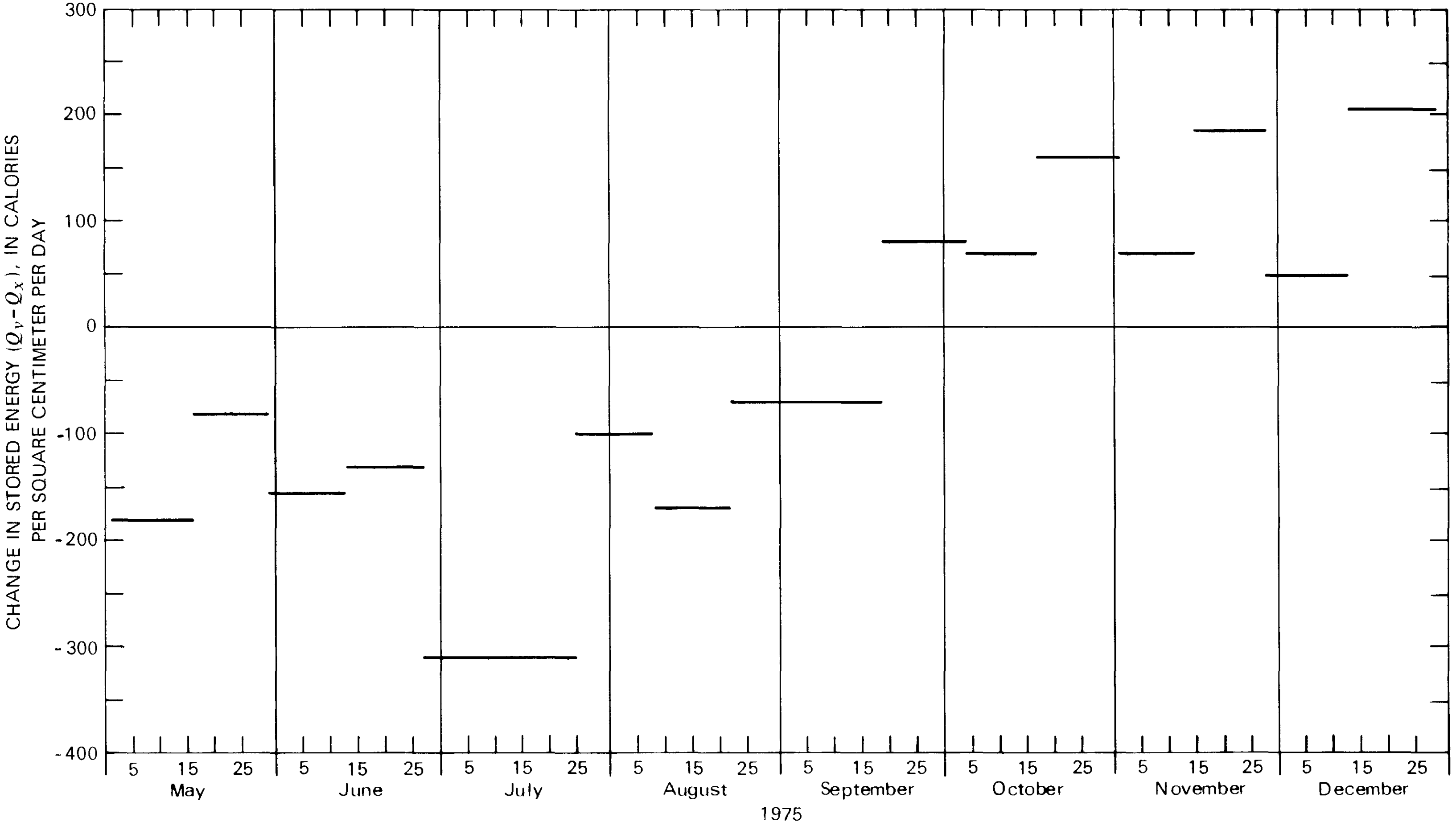

Figure 6.-- Advected energy minus changes in stored energy, Q_v-Q_x, for Ralston Reservoir, May-December 1975.

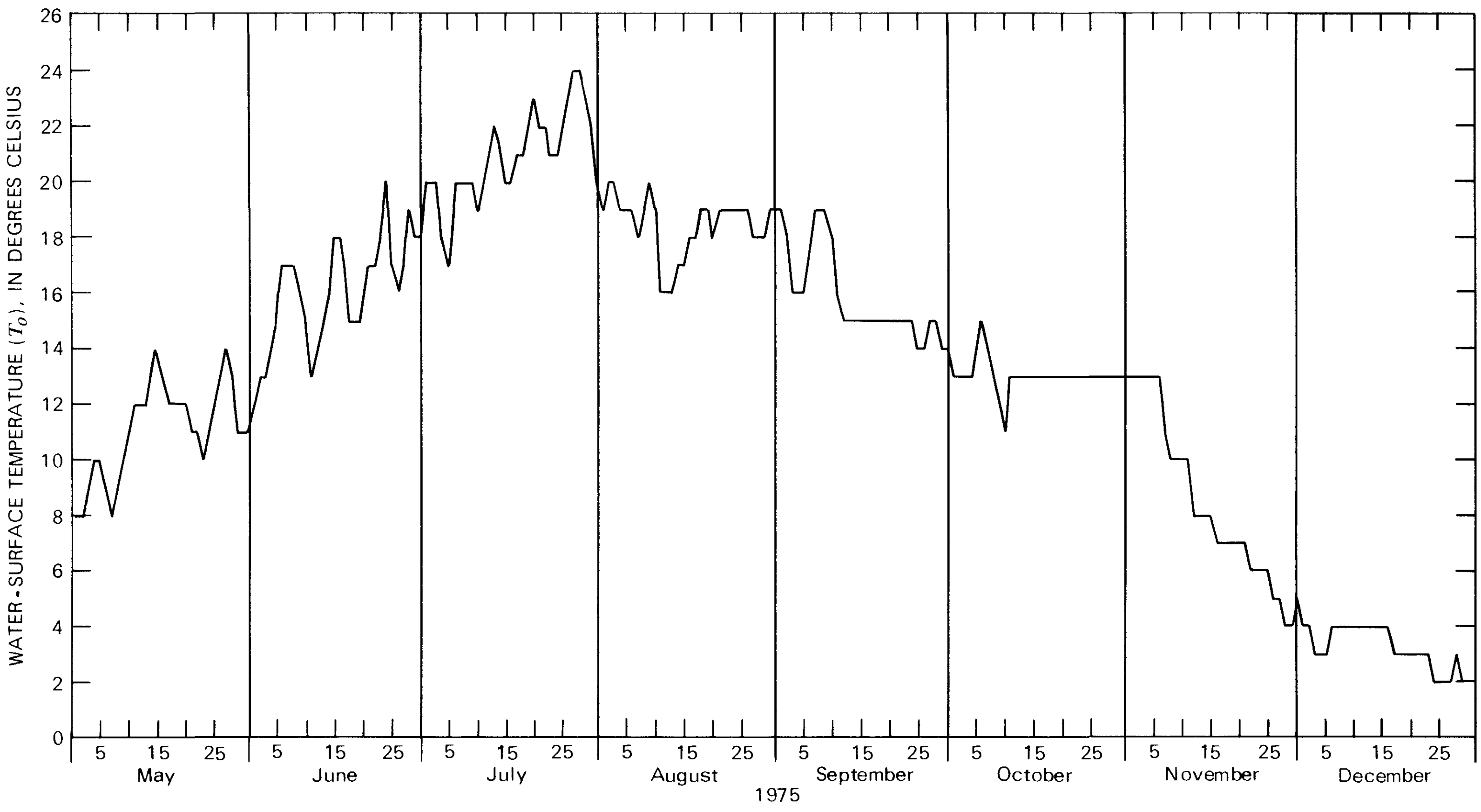

Figure 7.-- Daily water-surface temperature, T_o, of Ralston Reservoir, May-December 1975.

Table 3.--*Summary of energy-budget terms and evaporation for Ralston Reservoir*

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1975	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
1	14.8	MAY 1- MAY 16	535	36	646	733	75	254	255	-27	5	-.105	.43	6.39
2	14.1	MAY 16- MAY 30	394	28	611	749	-3	77	135	9	3	.068	.23	3.21
3	14.0	MAY 30- JUNE 13	518	34	683	774	66	222	241	-9	6	-.039	.41	5.70
4	14.2	JUNE 13- JUNE 27	595	37	726	802	5	137	358	-17	10	-.049	.61	8.64
5	13.8	JUNE 27- JULY 11	571	37	808	827	-175	136	229	-32	7	-.142	.39	5.39
6	14.1	JULY 11- JULY 25	540	35	780	851	-268	40	121	-1	4	-.010	.21	2.90
7	14.0	JULY 25- AUG. 8	555	37	763	847	-67	32	344	-22	12	-.063	.59	8.19
8	14.0	AUG. 8- AUG. 22	430	31	732	814	-125	43	158	-15	5	-.096	.27	3.78
9	15.0	AUG. 22-SEPT. 6	499	36	727	816	-2	69	316	-24	10	-.075	.54	8.05
10	13.3	SEPT. 6-SEPT. 19	364	27	712	797	-130	-61	168	9	5	.052	.29	3.82
11	14.8	SEPT. 19- OCT. 4	425	33	604	774	23	-60	284	14	7	.050	.48	7.12
12	13.2	OCT. 4- OCT. 17	391	31	572	761	-287	-358	243	-8	5	-.031	.41	5.44
13	14.8	OCT. 17- NOV. 1	295	29	540	760	-431	-590	167	33	4	.197	.28	4.19
14	14.0	NOV. 1- NOV. 15	266	25	485	738	-216	-289	53	7	1	.130	.09	1.26
15	13.0	NOV. 15- NOV. 28	206	20	460	692	-76	-259	84	50	1	.601	.14	1.83
16	14.9	NOV. 28- DEC. 13	183	19	472	668	130	81	20	-4	0	-.175	.03	.51
17	16.0	DEC. 13- DEC. 29	194	20	442	659	-17	-224	112	51	1	.454	.19	3.01
RECORD SEASON	242.0	MAY 1- DEC. 29											0.33	79.43

Table 3.--*Summary of energy-budget terms and evaporation for Ralston Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1976	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
18	14.0	MAY 7- MAY 21	453	30	681	744	115	444	32	-2	1	-.076	.05	.75
19	14.0	MAY 21- JUNE 4	442	29	703	756	120	256	238	-20	5	-.085	.40	5.66
20	13.9	JUNE 4- JUNE 18	524	34	712	775	67	28	491	-37	12	-.074	.83	11.57
21	13.9	JUNE 18- JULY 2	578	37	755	793	-81	84	361	-34	10	-.093	.61	8.52
22	13.9	JULY 2- JULY 16	523	34	792	823	-142	241	86	-14	3	-.158	.15	2.04
23	14.0	JULY 16- JULY 30	476	33	779	824	-148	-56	322	-28	10	-.086	.55	7.69
24	14.0	JULY 30- AUG. 13	458	32	761	832	-4	30	317	-8	11	-.025	.54	7.58
25	14.0	AUG. 13- AUG. 27	430	31	770	816	133	187	335	-47	10	-.139	.57	7.98
26	14.1	AUG. 27-SEPT. 10	442	32	701	811	51	-6	363	-18	11	-.049	.62	8.69
27	14.0	SEPT. 10-SEPT. 24	303	25	687	802	12	-11	175	6	5	.037	.30	4.16
28	14.0	SEPT. 24- OCT. 8	301	25	607	784	42	-153	237	51	6	.215	.40	5.63
29	14.0	OCT. 8- OCT. 22	368	30	566	755	-38	-218	269	54	6	.200	.45	6.39
30	14.1	OCT. 22- NOV. 5	284	25	547	739	-41	-278	233	68	4	.291	.39	5.55
31	13.9	NOV. 5- NOV. 19	192	18	521	718	65	-177	172	44	3	.257	.29	4.03
32	14.1	NOV. 19- DEC. 3	209	21	461	705	-25	-415	215	115	3	.533	.36	5.14
33	14.0	DEC. 3- DEC. 17	199	19	464	680	-40	-189	83	28	1	.336	.14	1.94
RECORD SEASON	223.9	MAY 7- DEC. 17											0.42	93.32

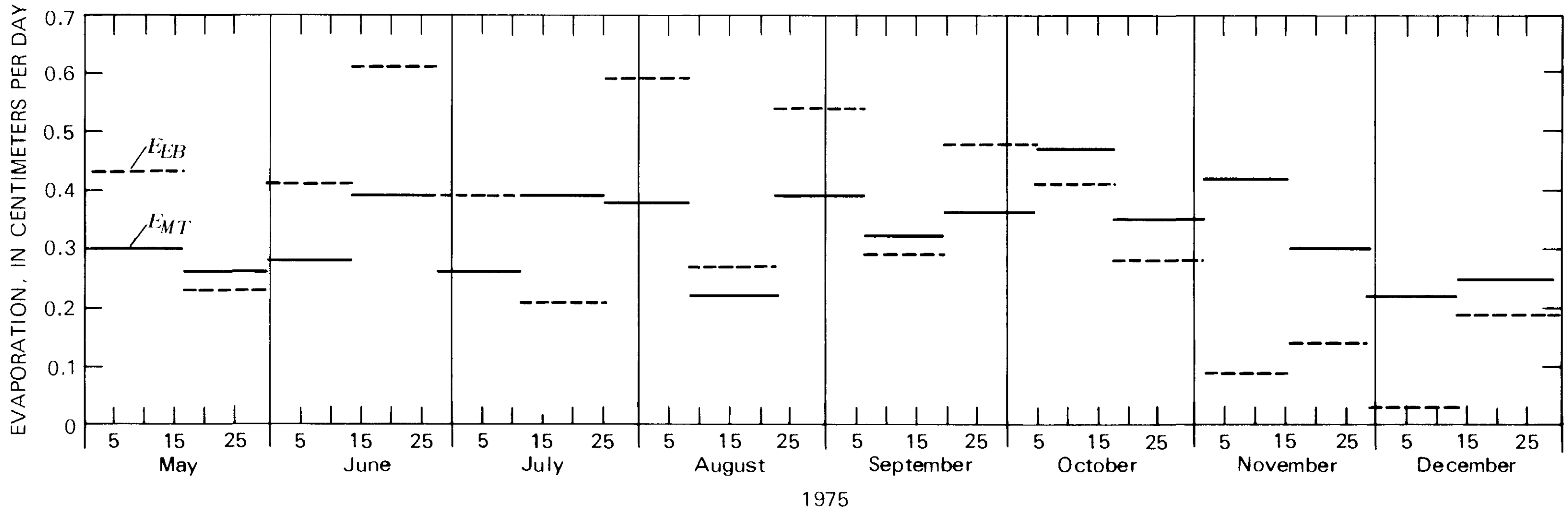

Figure 8.--Rates of energy-budget, E_{EB}, and mass-transfer, E_{MT}, evaporation from Ralston Reservoir for the 1975-76 record seasons.

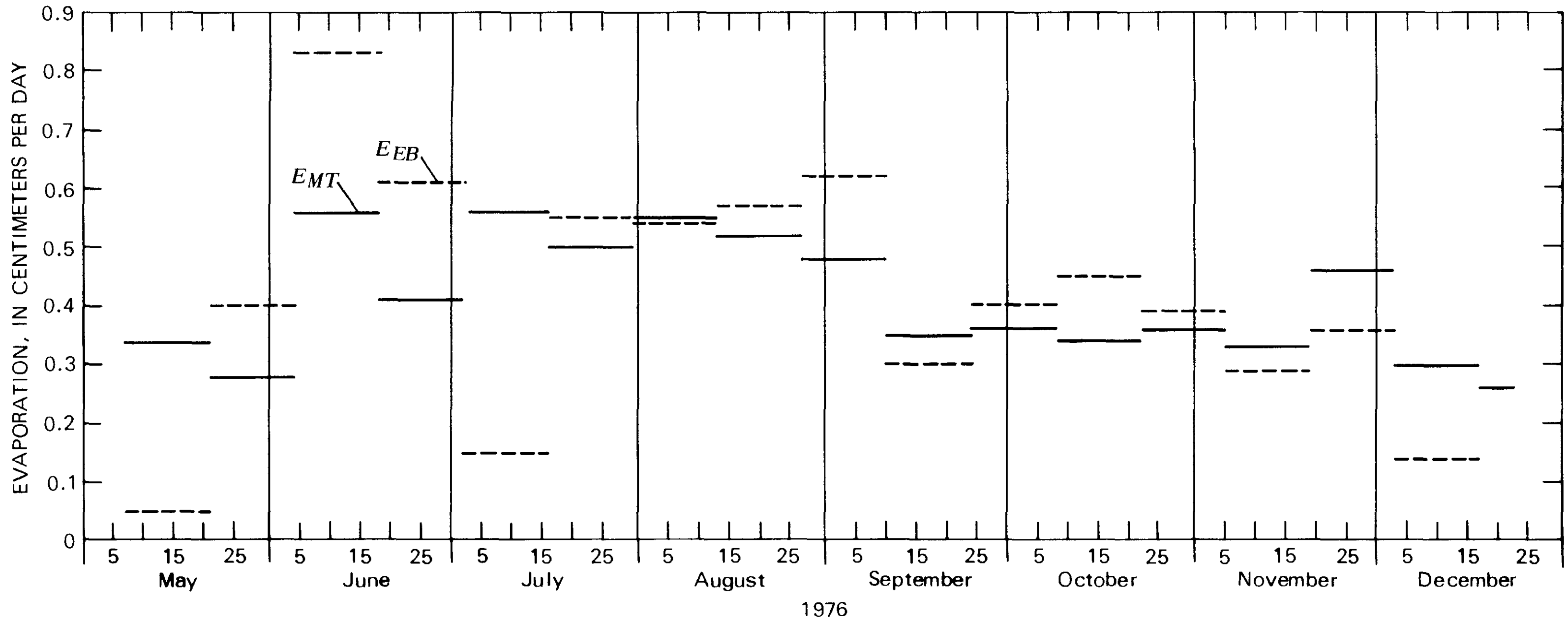

Figure 8.--Rates of energy-budget, E_{EB}, and mass-transfer, E_{MT}, evaporation from Ralston Reservoir for the 1975-76 record seasons--Continued.

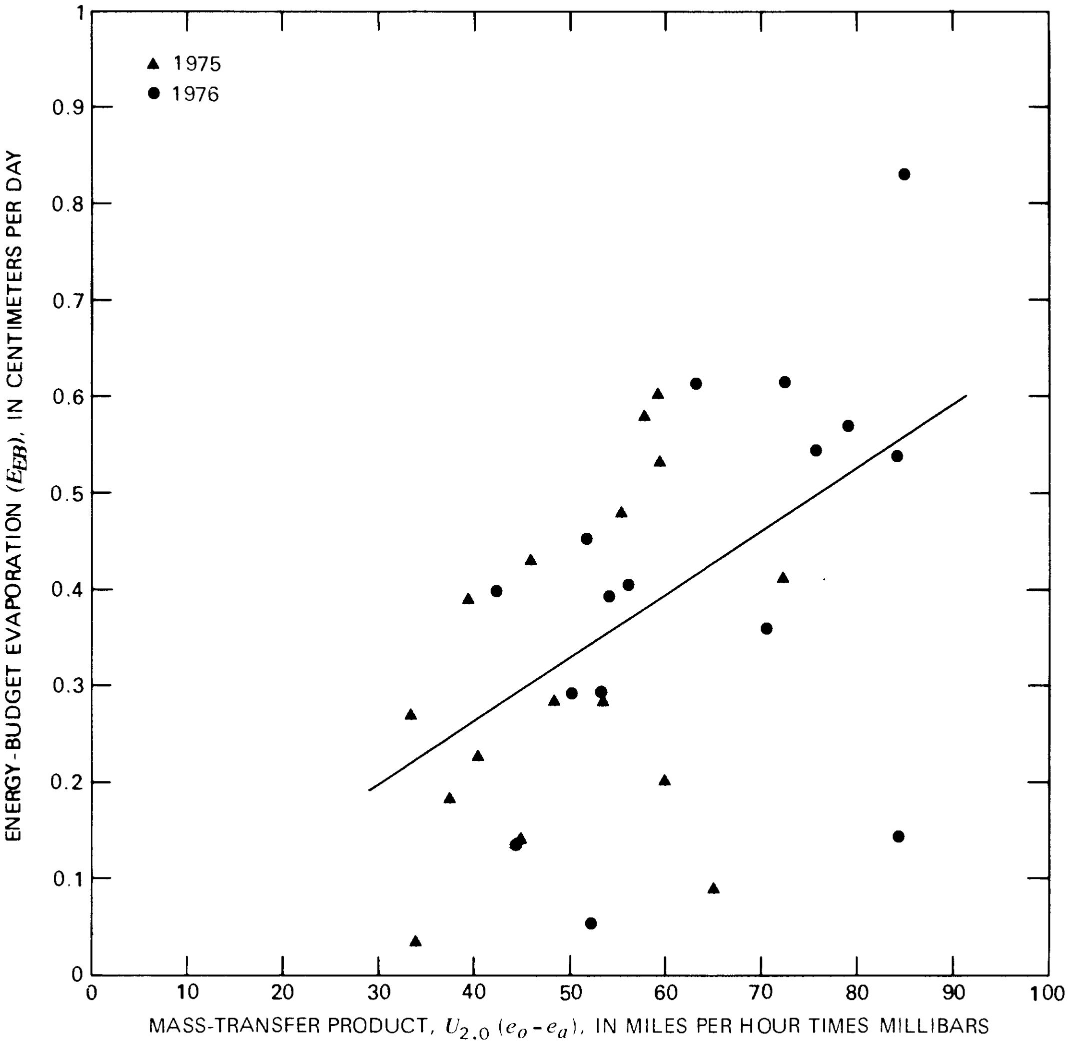

Figure 9.--Calibration of the mass-transfer product against evaporation measured by the energy-budget method at Ralston Reservoir.

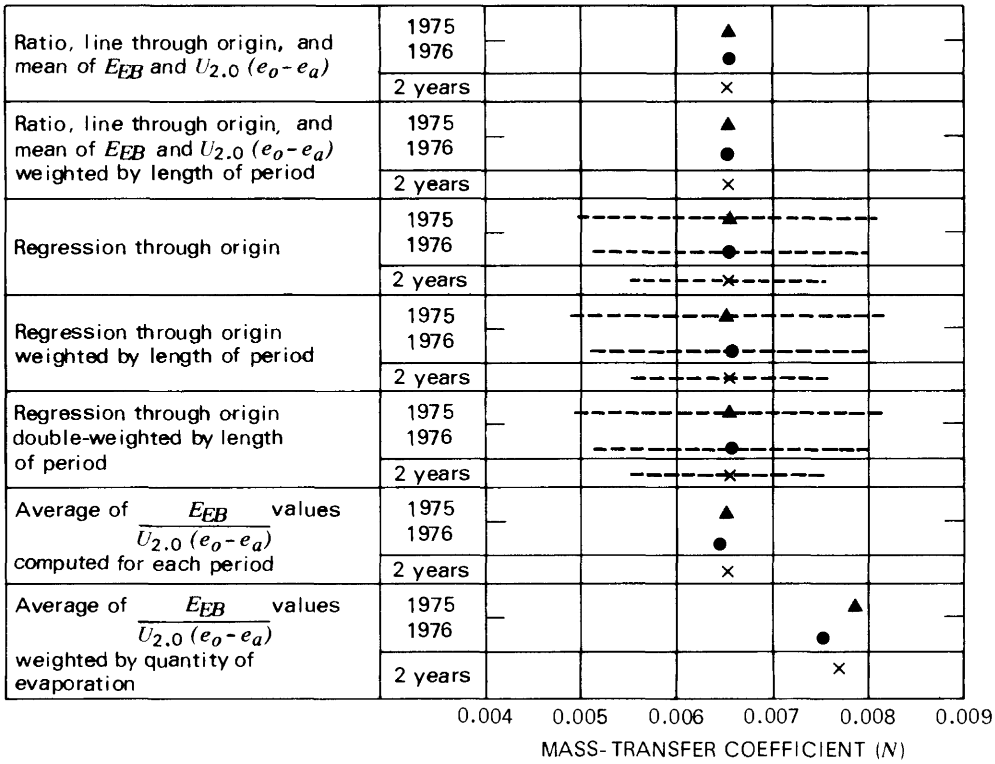

Figure 10.--Values of mass-transfer coefficients for Ralston Reservoir determined by different means of calculation from the energy-budget data. Dashed lines through some symbols represent 95-percent confidence limits.

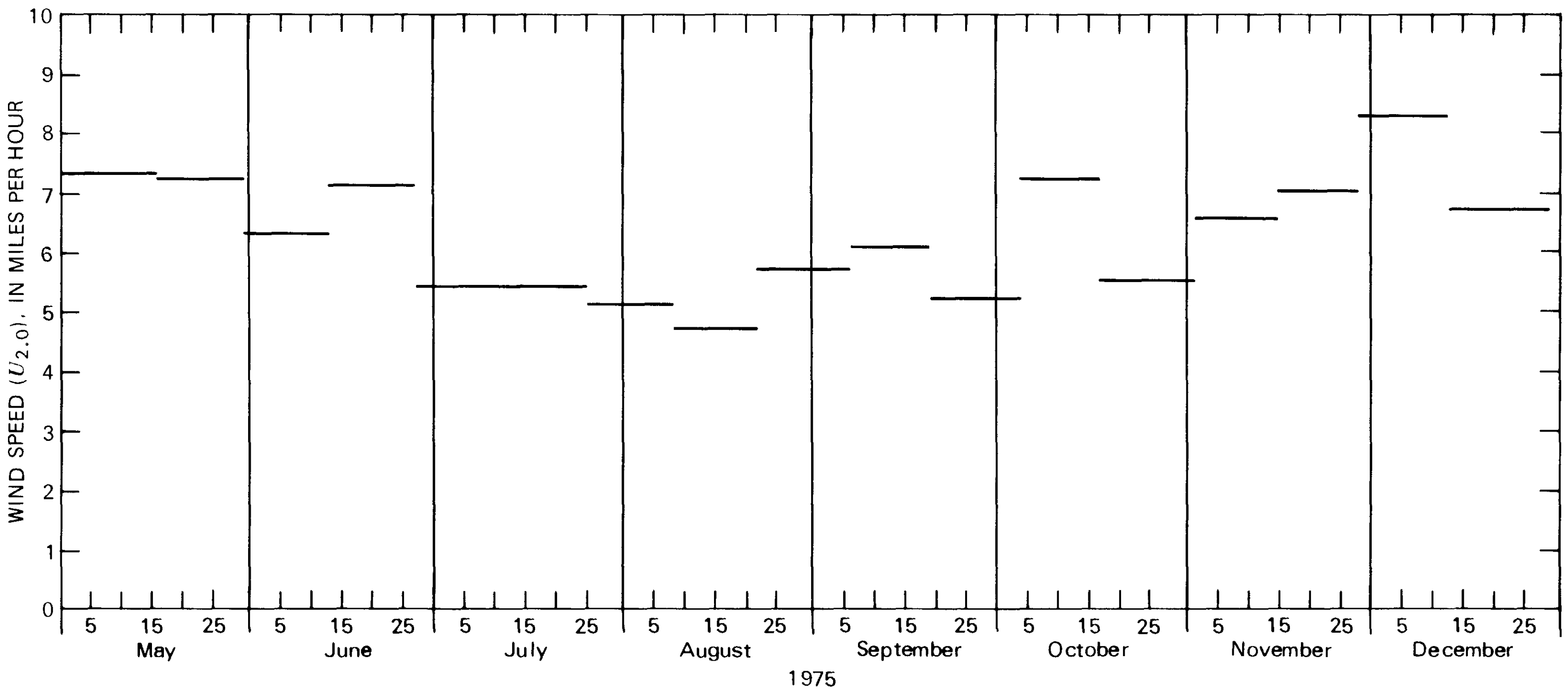

Figure 11.--Wind speeds, $U_{2.0}$, at Ralston Reservoir, May-December 1975.

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1972	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
1	16.2	JUNE 26- JULY 12	5.65	5.8	.22	3.51	19.2	----	----
2	27.9	JULY 12- AUG. 9	5.52	5.2	.19	5.26	28.2	----	----
3	7.0	AUG. 9- AUG. 16	5.94	6.4	.25	1.74	8.8	7.77	0.22
4	7.0	AUG. 16- AUG. 23	6.15	2.9	.12	.81	4.4	6.32	.13
5	7.0	AUG. 23- AUG. 30	5.38	2.3	.08	.57	3.1	3.63	.16
6	7.0	AUG. 30-SEPT. 6	6.01	3.1	.12	.84	4.6	6.15	.14
7	7.0	SEPT. 6-SEPT. 13	5.17	2.0	.07	.49	2.6	2.72	.18
8	7.0	SEPT. 13-SEPT. 20	7.31	6.1	.29	2.04	11.0	6.15	.33
9	7.0	SEPT. 20-SEPT. 27	5.34	8.0	.28	1.96	10.4	4.88	.40
10	7.0	SEPT. 27- OCT. 4	5.83	8.4	.32	2.24	11.8	5.56	.40
11	7.0	OCT. 4- OCT. 11	4.21	6.3	.17	1.21	6.6	2.57	.47
12	7.0	OCT. 11- OCT. 18	5.39	6.6	.23	1.62	8.9	4.06	.40
13	7.0	OCT. 18- OCT. 25	4.51	6.0	.18	1.23	6.6	1.47	.84
RECORD SEASON	121.1	JUNE 26- OCT. 25			0.19	23.52	126.2		
PAN SEASON	77.0	AUG. 9- OCT. 25			0.19	14.75		51.28	0.29

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
14	7.0	MAY 30- JUNE 6	5.92	9.2	.35	2.48	12.6	3.07	0.81
15	7.0	JUNE 6- JUNE 13	8.84	9.4	.54	3.82	19.3	7.49	.51
16	7.0	JUNE 13- JUNE 20	6.06	10.6	.42	2.95	15.4	7.29	.40
17	7.0	JUNE 20- JUNE 27	5.43	10.1	.36	2.51	13.0	8.00	.31
18	7.0	JUNE 27- JULY 4	6.62	8.5	.36	2.57	13.4	7.44	.34
19	6.9	JULY 4- JULY 11	6.50	8.3	.35	2.44	13.2	8.43	.29
20	7.0	JULY 11- JULY 18	4.98	7.1	.23	1.62	8.8	5.79	.28
21	7.1	JULY 18- JULY 25	5.44	8.3	.30	2.08	11.2	3.02	.69
22	7.0	JULY 25- AUG. 1	7.39	11.3	.54	3.78	20.5	4.17	.91
23	7.0	AUG. 1- AUG. 8	6.24	11.4	.47	3.24	17.4	6.83	.47
24	7.0	AUG. 8- AUG. 15	5.76	12.6	.48	3.32	17.6	7.37	.45
25	7.1	AUG. 15- AUG. 22	6.25	10.2	.42	2.95	15.6	7.54	.39
26	7.0	AUG. 22- AUG. 29	6.48	9.1	.38	2.69	14.3	7.85	.34
27	7.0	AUG. 29-SEPT. 5	4.89	9.7	.31	2.17	11.5	5.94	.36

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
28	6.9	SEPT. 5-SEPT. 12	4.73	8.0	.25	1.72	9.3	6.68	.26
29	7.0	SEPT. 12-SEPT. 19	6.07	9.7	.38	2.68	14.2	3.07	.87
30	7.0	SEPT. 19-SEPT. 26	5.76	9.5	.36	2.51	11.9	5.46	.46
31	6.9	SEPT. 26- OCT. 3	5.70	8.9	.33	2.26	9.9	2.64	.86
32	7.0	OCT. 3- OCT. 10	5.59	9.4	.34	2.40	10.2	3.99	.60
33	7.0	OCT. 10- OCT. 17	7.40	9.5	.46	3.22	13.5	2.41	1.34
34	8.0	OCT. 17- OCT. 25	4.38	10.5	.30	2.42	10.0	5.82	.42
35	6.0	OCT. 25- OCT. 31	6.61	8.4	.36	2.16	8.8	3.45	.63
36	7.2	OCT. 31- NOV. 7	5.62	7.5	.28	1.99	8.0	1.57	1.27
37	6.9	NOV. 7- NOV. 14	6.20	7.3	.30	2.05	8.3	3.48	.59
38	7.0	NOV. 14- NOV. 21	8.33	5.9	.32	2.26	11.2	3.81	.59
39	8.0	NOV. 21- NOV. 29	5.48	5.2	.18	1.47	7.8	----	----
RECORD SEASON	183.0	MAY 30- NOV. 29			0.36	65.76	326.9		
PAN SEASON	175.0	MAY 30- NOV. 21			0.37	64.29		132.61	0.48

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
40	5.9	JUNE 15- JUNE 21	7.22	8.0	.38	2.23	11.9	7.49	0.30
41	7.0	JUNE 21- JUNE 28	5.58	8.1	.29	2.06	11.1	7.54	.27
42	7.0	JUNE 28- JULY 5	6.30	9.5	.39	2.72	14.8	8.81	.31
43	7.0	JULY 5- JULY 12	6.30	6.0	.25	1.73	9.5	7.19	.24
44	7.0	JULY 12- JULY 19	6.29	7.5	.31	2.17	12.1	7.54	.29
45	7.1	JULY 19- JULY 26	6.18	12.1	.49	3.47	18.3	7.04	.49
46	7.0	JULY 26- AUG. 2	6.33	9.7	.40	2.79	14.5	5.04	.55
47	6.9	AUG. 2- AUG. 9	5.09	9.0	.30	2.07	11.0	5.00	.41
48	7.1	AUG. 9- AUG. 16	5.46	9.7	.34	2.46	13.2	6.48	.38
49	6.9	AUG. 16- AUG. 23	5.88	10.1	.39	2.67	14.3	6.04	.44
50	7.1	AUG. 23- AUG. 30	5.55	8.6	.31	2.23	12.0	5.21	.43
51	5.9	AUG. 30-SEPT. 5	5.85	9.2	.35	2.07	11.2	3.86	.54

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
52	9.1	SEPT. 5-SEPT. 14	6.04	9.6	.38	3.45	17.8	5.69	.61
53	6.1	SEPT. 14-SEPT. 20	6.26	8.8	.36	2.17	11.7	3.07	.71
54	13.8	SEPT. 20- OCT. 4	6.16	10.9	.44	6.06	33.1	10.72	.56
55	7.1	OCT. 4- OCT. 11	4.81	9.1	.29	2.04	10.8	3.10	.66
56	6.9	OCT. 11- OCT. 18	5.55	8.0	.29	2.00	10.6	2.95	.68
57	7.2	OCT. 18- OCT. 25	4.32	6.6	.19	1.33	7.2	2.16	.62
58	6.8	OCT. 25- NOV. 1	4.92	6.9	.22	1.50	7.9	----	----
59	14.0	NOV. 1- NOV. 15	6.41	8.5	.36	4.99	25.7	----	----
60	14.0	NOV. 15- NOV. 29	6.49	7.6	.32	4.48	22.9	----	----
61	7.1	NOV. 29- DEC. 6	4.49	6.9	.20	1.44	7.3	----	----
62	6.8	DEC. 6- DEC. 13	6.97	7.5	.34	2.33	12.2	----	----
RECORD SEASON	180.7	JUNE 15- DEC. 13			0.33	60.46	321.1		
PAN SEASON	132.0	JUNE 15- OCT. 25			0.35	45.72		104.93	0.44

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
63	15.1	MAY 1- MAY 16	7.35	6.3	.30	4.55	24.0	----	----
64	14.1	MAY 16- MAY 30	7.29	5.6	.26	3.73	20.0	6.48	0.58
65	14.0	MAY 30- JUNE 13	6.38	6.7	.28	3.91	21.4	10.36	.38
66	14.0	JUNE 13- JUNE 27	7.16	8.3	.39	5.41	29.6	12.12	.45
67	14.0	JUNE 27- JULY 11	5.45	7.3	.26	3.63	19.8	13.08	.28
68	14.0	JULY 11- JULY 25	5.47	11.0	.39	5.49	29.9	15.39	.36
69	14.0	JULY 25- AUG. 8	5.14	11.3	.38	5.30	28.2	14.76	.36
70	14.0	AUG. 8- AUG. 22	4.75	7.1	.22	3.09	16.9	11.46	.27
71	15.0	AUG. 22-SEPT. 6	5.76	10.4	.39	5.88	31.5	14.02	.42
72	13.3	SEPT. 6-SEPT. 19	6.11	8.0	.32	4.24	23.0	8.00	.53
73	14.8	SEPT. 19- OCT. 4	5.24	10.6	.36	5.36	29.2	9.27	.58
74	13.3	OCT. 4- OCT. 17	7.27	10.0	.47	6.27	33.1	9.75	.64
75	14.8	OCT. 17- NOV. 1	5.51	9.8	.35	5.20	23.0	----	----
76	14.0	NOV. 1- NOV. 15	7.60	8.6	.42	5.97	24.1	----	----
77	12.9	NOV. 15- NOV. 28	7.08	6.4	.30	3.85	16.9	----	----
78	15.0	NOV. 28- DEC. 13	8.30	4.1	.22	3.34	16.8	----	----
79	16.0	DEC. 13- DEC. 29	6.76	5.6	.24	3.93	20.5	----	----
RECORD SEASON	242.3	MAY 1- DEC. 29			0.33	79.15	407.9		
PAN SEASON	154.5	MAY 16- OCT. 17			0.37	56.86		124.69	0.46

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
80	14.0	MAY 7- MAY 21	6.52	8.1	.34	4.80	24.4	9.58	0.50
81	14.0	MAY 21- JUNE 4	5.45	7.8	.28	3.88	21.0	10.21	.38
82	13.9	JUNE 4- JUNE 18	7.96	10.7	.56	7.71	41.4	15.54	.50
83	13.9	JUNE 18- JULY 2	5.45	11.6	.41	5.74	30.8	12.29	.47
84	14.0	JULY 2- JULY 16	6.10	13.9	.56	7.76	41.0	14.15	.55
85	14.0	JULY 16- JULY 30	6.39	11.9	.50	6.96	36.9	12.50	.56
86	14.0	JULY 30- AUG. 13	6.43	13.1	.55	7.68	40.5	14.66	.52
87	14.0	AUG. 13- AUG. 27	6.71	11.8	.52	7.22	38.1	13.00	.56
88	14.0	AUG. 27-SEPT. 10	5.61	13.0	.48	6.66	35.0	14.17	.47
89	14.0	SEPT. 10-SEPT. 24	5.47	9.8	.35	4.91	26.2	9.32	.53
90	13.9	SEPT. 24- OCT. 8	5.05	11.1	.36	5.09	27.0	10.18	.50
91	14.1	OCT. 8- OCT. 22	5.20	10.0	.34	4.77	25.8	6.81	.70
92	14.1	OCT. 22- NOV. 5	6.10	8.9	.36	5.00	26.2	5.56	.90
93	13.9	NOV. 5- NOV. 19	6.54	7.7	.33	4.60	24.6	----	----
94	14.1	NOV. 19- DEC. 3	8.63	8.2	.46	6.55	34.8	----	----
95	14.0	DEC. 3- DEC. 17	7.02	6.4	.30	4.14	21.5	----	----
96	5.8	DEC. 17- DEC. 23	6.10	6.5	.26	1.50	7.7	----	----
RECORD SEASON	229.7	MAY 7- DEC. 23			0.41	94.97	502.9		
PAN SEASON	181.9	MAY 7- NOV. 5			0.43	78.18		147.97	0.53

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
97	7.0	MAY 6- MAY 13	6.69	5.3	.23	1.63	7.4	6.76	0.24
98	7.0	MAY 13- MAY 20	8.35	8.2	.45	3.14	15.2	5.84	.54
99	7.0	MAY 20- MAY 27	8.39	7.4	.40	2.82	13.8	6.50	.43
100	7.0	MAY 27- JUNE 3	5.64	7.5	.28	1.94	9.7	6.15	.32
101	7.1	JUNE 3- JUNE 10	6.63	7.6	.33	2.32	12.1	6.98	.33
102	7.0	JUNE 10- JUNE 17	6.70	9.2	.40	2.79	14.9	6.73	.41
103	7.1	JUNE 17- JUNE 24	6.58	8.5	.37	2.58	14.0	5.49	.47
104	6.9	JUNE 24- JULY 1	7.16	11.0	.51	3.55	19.2	8.76	.40
105	7.1	JULY 1- JULY 8	6.67	10.3	.45	3.17	17.0	7.19	.44
106	7.0	JULY 8- JULY 15	6.68	10.7	.47	3.26	17.3	6.76	.48
107	7.0	JULY 15- JULY 22	6.21	7.6	.31	2.14	11.5	7.26	.29
108	7.0	JULY 22- JULY 29	4.96	8.3	.27	1.87	10.2	5.26	.36
109	7.0	JULY 29- AUG. 5	6.98	10.6	.48	3.38	17.7	5.94	.57
110	7.0	AUG. 5- AUG. 12	5.54	8.4	.31	2.14	11.6	5.00	.43
111	7.0	AUG. 12- AUG. 19	5.78	5.5	.21	1.45	7.8	3.53	.41

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
112	7.0	AUG. 19- AUG. 26	6.32	9.2	.38	2.65	14.1	6.12	.43
113	7.0	AUG. 26-SEPT. 2	4.81	10.1	.32	2.21	11.9	5.21	.42
114	7.2	SEPT. 2-SEPT. 9	6.51	9.6	.41	2.94	15.3	6.83	.43
115	6.9	SEPT. 9-SEPT. 16	6.36	9.0	.37	2.55	11.6	5.59	.46
116	14.0	SEPT. 16-SEPT. 30	6.51	9.7	.41	5.77	22.3	12.45	.46
117	10.0	SEPT. 30- OCT. 10	6.50	7.5	.32	3.19	14.5	4.75	.67
118	4.0	OCT. 10- OCT. 14	6.24	9.4	.38	1.52	7.9	2.16	.70
119	7.2	OCT. 14- OCT. 21	5.81	5.2	.20	1.43	7.6	4.52	.32
120	6.8	OCT. 21- OCT. 28	6.45	6.3	.27	1.81	9.9	4.24	.43
121	7.2	OCT. 28- NOV. 4	6.43	7.0	.29	2.12	11.3	2.67	.79
122	7.0	NOV. 4- NOV. 11	8.97	7.2	.42	2.94	15.5	2.74	1.07
123	6.8	NOV. 11- NOV. 18	7.50	7.0	.34	2.34	12.2	----	----
124	7.0	NOV. 18- NOV. 25	7.99	6.1	.32	2.23	11.5	----	----
125	7.1	NOV. 25- DEC. 2	8.68	5.6	.32	2.27	11.6	----	----
RECORD SEASON	210.4	MAY 6- DEC. 2			0.35	74.15	376.6		
PAN SEASON	189.5	MAY 6- DEC. 2			0.36	67.31		151.43	0.44

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1978	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
126	10.1	APRIL 28- MAY 8	5.52	3.7	.13	1.35	6.3	----	----
127	3.9	MAY 8- MAY 12	6.85	6.7	.30	1.17	5.8	3.66	0.32
128	7.0	MAY 12- MAY 19	8.53	5.5	.30	2.13	10.4	7.67	.28
129	7.0	MAY 19- MAY 26	6.51	5.2	.22	1.54	7.8	5.72	.27
130	7.0	MAY 26- JUNE 2	5.74	3.4	.13	.90	4.8	3.30	.27
131	7.1	JUNE 2- JUNE 9	5.87	3.4	.13	.91	5.0	4.90	.18
132	6.9	JUNE 9- JUNE 16	6.19	7.9	.32	2.21	11.8	7.82	.28
133	7.0	JUNE 16- JUNE 23	5.16	5.9	.20	1.38	7.4	6.22	.22
134	7.0	JUNE 23- JUNE 30	5.73	4.2	.16	1.09	6.0	6.43	.17
135	7.0	JUNE 30- JULY 7	6.40	8.2	.34	2.39	12.8	7.72	.31
136	7.0	JULY 7- JULY 14	6.57	4.7	.20	1.42	7.7	7.24	.20
137	7.0	JULY 14- JULY 21	6.77	4.7	.21	1.46	7.9	5.92	.25
138	7.1	JULY 21- JULY 28	6.46	9.5	.40	2.86	15.6	8.86	.32
139	6.9	JULY 28- AUG. 4	6.80	2.8	.12	.84	4.7	4.47	.19
140	7.0	AUG. 4- AUG. 11	5.99	7.9	.31	2.16	11.5	7.04	.31
141	7.0	AUG. 11- AUG. 18	7.59	6.2	.31	2.14	11.4	7.04	.30

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
142	7.0	AUG. 18- AUG. 25	5.52	5.1	.19	1.31	6.9	6.38	.20
143	7.0	AUG. 25-SEPT. 1	5.94	4.9	.19	1.32	6.9	5.54	.24
144	7.2	SEPT. 1-SEPT. 8	5.32	7.7	.27	1.93	10.2	7.04	.27
145	6.9	SEPT. 8-SEPT. 15	5.90	6.4	.25	1.72	9.1	5.82	.30
146	6.8	SEPT. 15-SEPT. 22	6.07	7.1	.28	1.93	9.7	3.61	.53
147	7.1	SEPT. 22-SEPT. 29	6.17	8.1	.32	2.30	10.7	5.31	.43
148	6.9	SEPT. 29- OCT. 6	5.33	8.3	.29	2.00	8.7	4.34	.46
149	7.2	OCT. 6- OCT. 13	6.72	7.5	.33	2.37	10.5	6.04	.39
150	13.9	OCT. 13- OCT. 27	6.42	7.1	.30	4.12	17.0	6.76	.61
151	7.1	OCT. 27- NOV. 3	4.72	6.4	.20	1.40	6.0	2.72	.51
152	6.9	NOV. 3- NOV. 10	6.58	6.5	.28	1.93	8.8	4.09	.47
153	7.0	NOV. 10- NOV. 17	3.99	7.2	.19	1.33	6.3	----	----
154	6.9	NOV. 17- NOV. 24	5.20	5.6	.19	1.31	6.5	----	----
155	7.0	NOV. 24- DEC. 1	6.17	5.0	.20	1.42	7.2	----	----
RECORD SEASON	216.9	APRIL 28- DEC. 1			0.24	52.34	261.4		
PAN SEASON	196.0	MAY 8- NOV. 10			0.24	46.93		151.66	0.31

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
156	3.0	MAY 8- MAY 11	6.79	5.7	.25	.76	3.4	2.13	0.36
157	7.2	MAY 11- MAY 18	6.47	6.1	.26	1.86	9.0	5.94	.32
158	6.8	MAY 18- MAY 25	5.35	4.6	.16	1.09	5.6	3.43	.32
159	7.1	MAY 25- JUNE 1	5.63	8.7	.32	2.27	12.3	4.01	.57
160	6.9	JUNE 1- JUNE 8	6.29	10.0	.41	2.84	15.2	5.66	.50
161	7.0	JUNE 8- JUNE 15	6.96	13.9	.63	4.40	23.8	6.53	.67
162	7.0	JUNE 15- JUNE 22	6.47	14.1	.60	4.17	22.4	6.68	.62
163	7.0	JUNE 22- JUNE 29	4.78	10.1	.32	2.21	11.9	5.79	.38
164	7.1	JUNE 29- JULY 6	5.55	9.4	.34	2.42	13.1	5.51	.44
165	6.9	JULY 6- JULY 13	5.42	13.4	.48	3.28	17.8	8.46	.39
166	7.0	JULY 13- JULY 20	5.39	8.2	.29	2.02	10.8	5.84	.35
167	7.1	JULY 20- JULY 27	4.83	7.9	.25	1.76	9.5	5.92	.30
168	7.1	JULY 27- AUG. 3	5.22	9.1	.31	2.19	12.0	7.57	.29
169	7.0	AUG. 3- AUG. 10	6.25	10.9	.45	3.13	16.9	8.31	.38
170	6.9	AUG. 10- AUG. 17	4.59	6.0	.18	1.24	6.8	3.53	.35

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
171	7.1	AUG. 17- AUG. 24	5.63	8.0	.29	2.09	10.8	3.58	.58
172	6.9	AUG. 24- AUG. 31	5.12	8.0	.27	1.85	9.3	5.38	.34
173	7.0	AUG. 31-SEPT. 7	5.70	10.7	.40	2.77	13.7	6.81	.41
174	7.1	SEPT. 7-SEPT. 14	5.78	8.4	.32	2.27	11.7	4.17	.54
175	6.9	SEPT. 14-SEPT. 21	5.47	10.3	.37	2.53	13.6	5.26	.48
176	7.0	SEPT. 21-SEPT. 28	6.48	9.8	.41	2.89	15.4	6.12	.47
177	7.1	SEPT. 28- OCT. 5	6.34	10.7	.44	3.15	16.9	6.20	.51
178	6.9	OCT. 5- OCT. 12	7.04	9.4	.43	2.96	15.6	5.72	.52
179	7.1	OCT. 12- OCT. 19	5.11	7.9	.26	1.87	9.3	4.42	.42
180	6.9	OCT. 19- OCT. 26	5.93	8.0	.31	2.14	10.0	2.74	.78
181	7.1	OCT. 26- NOV. 2	7.43	8.2	.40	2.83	12.4	----	----
182	7.0	NOV. 2- NOV. 9	5.02	7.0	.23	1.61	7.2	----	----
183	6.8	NOV. 9- NOV. 16	5.64	6.8	.25	1.71	7.9	----	----
184	5.1	NOV. 16- NOV. 21	8.47	7.0	.39	1.99	9.7	----	----
RECORD SEASON	197.1	MAY 8- NOV. 21			0.35	68.30	354.0		
PAN SEASON	171.1	MAY 8- OCT. 26			0.35	60.16		135.71	0.44

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
185	7.0	MAY 21- MAY 28	6.90	9.7	.44	3.04	17.0	8.51	0.36
186	7.0	MAY 28- JUNE 4	6.37	10.9	.45	3.17	16.8	7.64	.41
187	7.1	JUNE 4- JUNE 11	6.17	10.4	.42	2.97	15.6	7.37	.40
188	7.0	JUNE 11- JUNE 18	6.25	12.8	.52	3.64	19.1	8.92	.41
189	7.0	JUNE 18- JUNE 25	5.78	12.6	.48	3.34	18.1	7.98	.42
190	7.0	JUNE 25- JULY 2	6.11	11.7	.47	3.28	18.1	7.32	.45
191	7.0	JULY 2- JULY 9	5.96	11.2	.44	3.05	16.4	8.28	.37
192	7.0	JULY 9- JULY 16	7.30	7.6	.36	2.55	13.6	8.64	.30
193	7.0	JULY 16- JULY 23	6.01	8.3	.33	2.28	12.2	7.16	.32
194	7.0	JULY 23- JULY 30	6.48	11.3	.48	3.36	18.2	8.10	.41
195	7.1	JULY 30- AUG. 6	6.39	13.6	.57	4.07	22.2	8.81	.46
196	6.8	AUG. 6- AUG. 13	5.94	9.3	.36	2.46	13.4	6.38	.39
197	7.0	AUG. 13- AUG. 20	6.74	10.6	.46	3.26	17.9	7.70	.42
198	7.0	AUG. 20- AUG. 27	6.23	10.8	.44	3.07	17.0	5.77	.53
199	7.0	AUG. 27-SEPT. 3	5.60	10.1	.37	2.60	14.3	6.68	.39

Table 4.--*Summary of mass-transfer terms and pan evaporation for Ralston Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
200	7.0	SEPT. 3-SEPT. 10	5.33	8.8	.31	2.14	11.6	4.72	.45
201	7.0	SEPT. 10-SEPT. 17	5.32	7.1	.25	1.73	9.4	5.97	.29
202	7.0	SEPT. 17-SEPT. 24	6.51	8.4	.36	2.51	13.2	5.61	.45
203	7.0	SEPT. 24- OCT. 1	5.92	9.0	.35	2.43	13.1	6.10	.40
204	7.3	OCT. 1- OCT. 8	6.47	8.9	.38	2.72	14.2	6.12	.44
205	6.8	OCT. 8- OCT. 15	5.64	8.4	.31	2.10	10.3	4.57	.46
206	6.9	OCT. 15- OCT. 22	6.08	10.8	.43	2.97	13.7	3.40	.87
207	7.0	OCT. 22- OCT. 29	5.65	11.3	.42	2.95	12.8	----	----
208	7.0	OCT. 29- NOV. 5	7.54	8.1	.40	2.79	11.4	----	----
209	8.0	NOV. 5- NOV. 13	4.75	7.8	.24	1.93	7.6	----	----
210	13.0	NOV. 13- NOV. 26	6.67	8.1	.35	4.59	18.5	----	----
211	7.0	NOV. 26- DEC. 3	7.81	5.5	.28	1.94	8.8	----	----
212	6.2	DEC. 3- DEC. 9	5.19	5.0	.17	1.06	5.2	----	----
213	7.8	DEC. 9- DEC. 17	10.97	4.0	.29	2.23	11.8	----	----
RECORD SEASON	210.0	MAY 21- DEC. 17			0.38	80.23	411.5		
PAN SEASON	154.0	MAY 21- OCT. 22			0.41	62.74		151.75	0.41

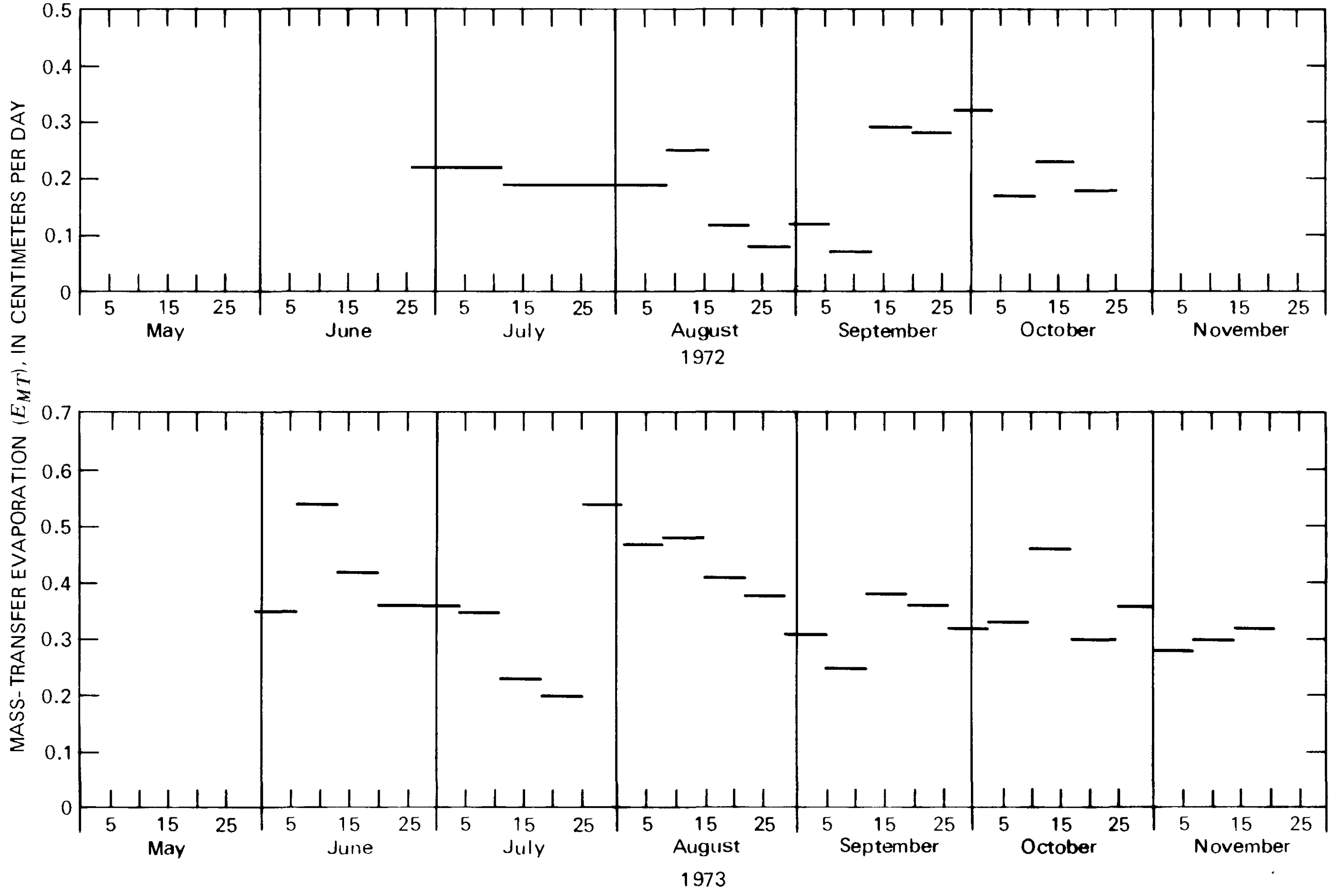

Figure 12.--Rates of mass-transfer evaporation, E_{MT}, from Ralston Reservoir for the 1972-74 and 1977-80 record seasons.

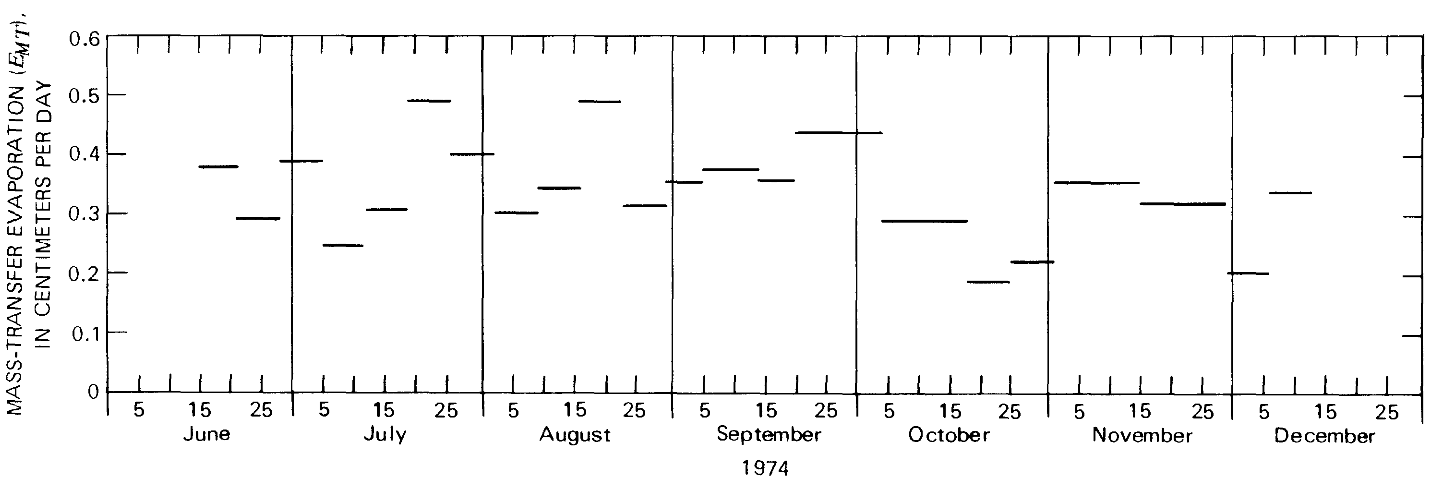

Figure 12.--Rates of mass-transfer evaporation, E_{MT}, from Ralston Reservoir for the 1972-74 and 1977-80 record seasons--Continued.

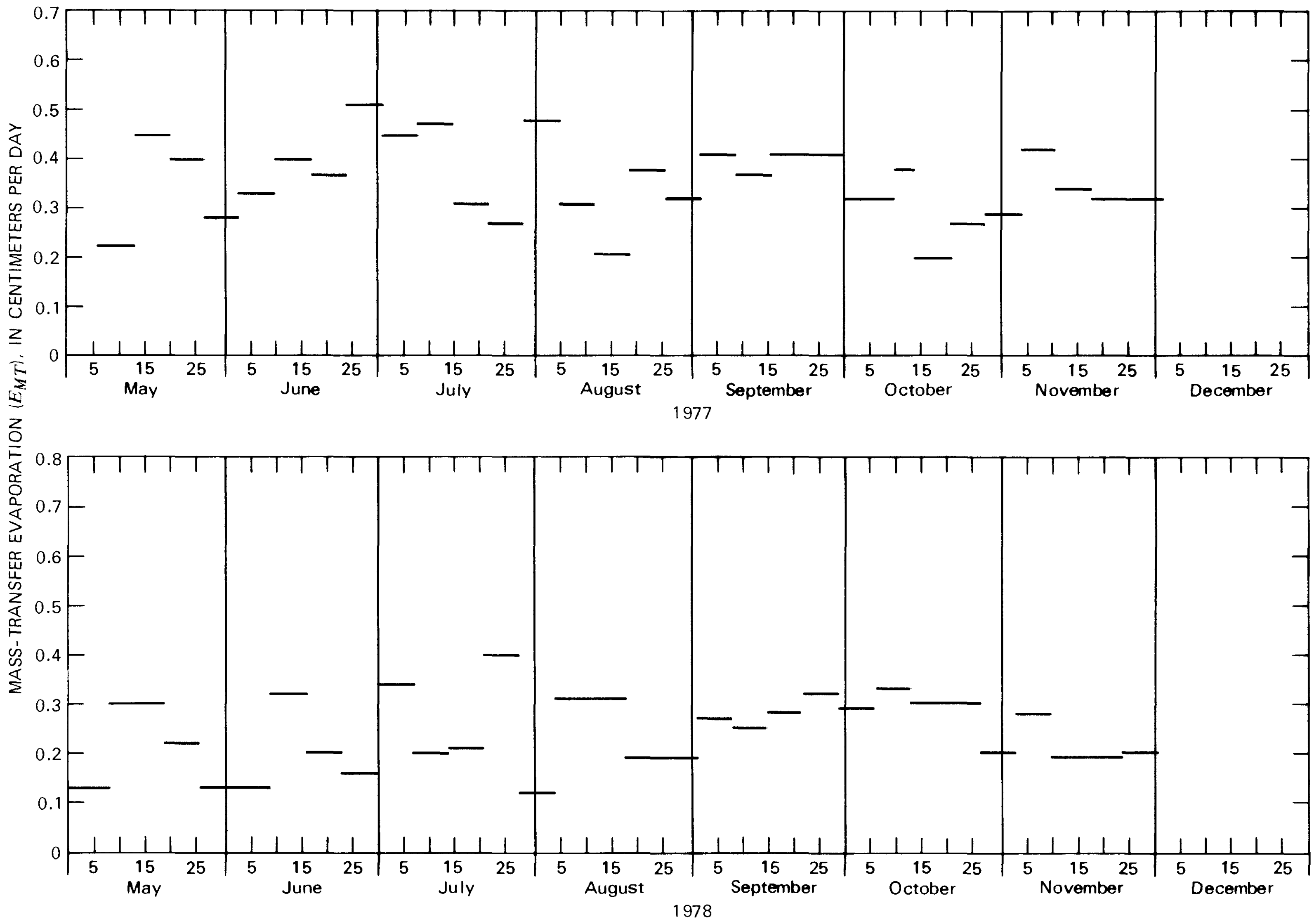

Figure 12.--Rates of mass-transfer evaporation, E_{MT}, from Ralston Reservoir for the 1972-74 and 1977-80 record seasons--Continued.

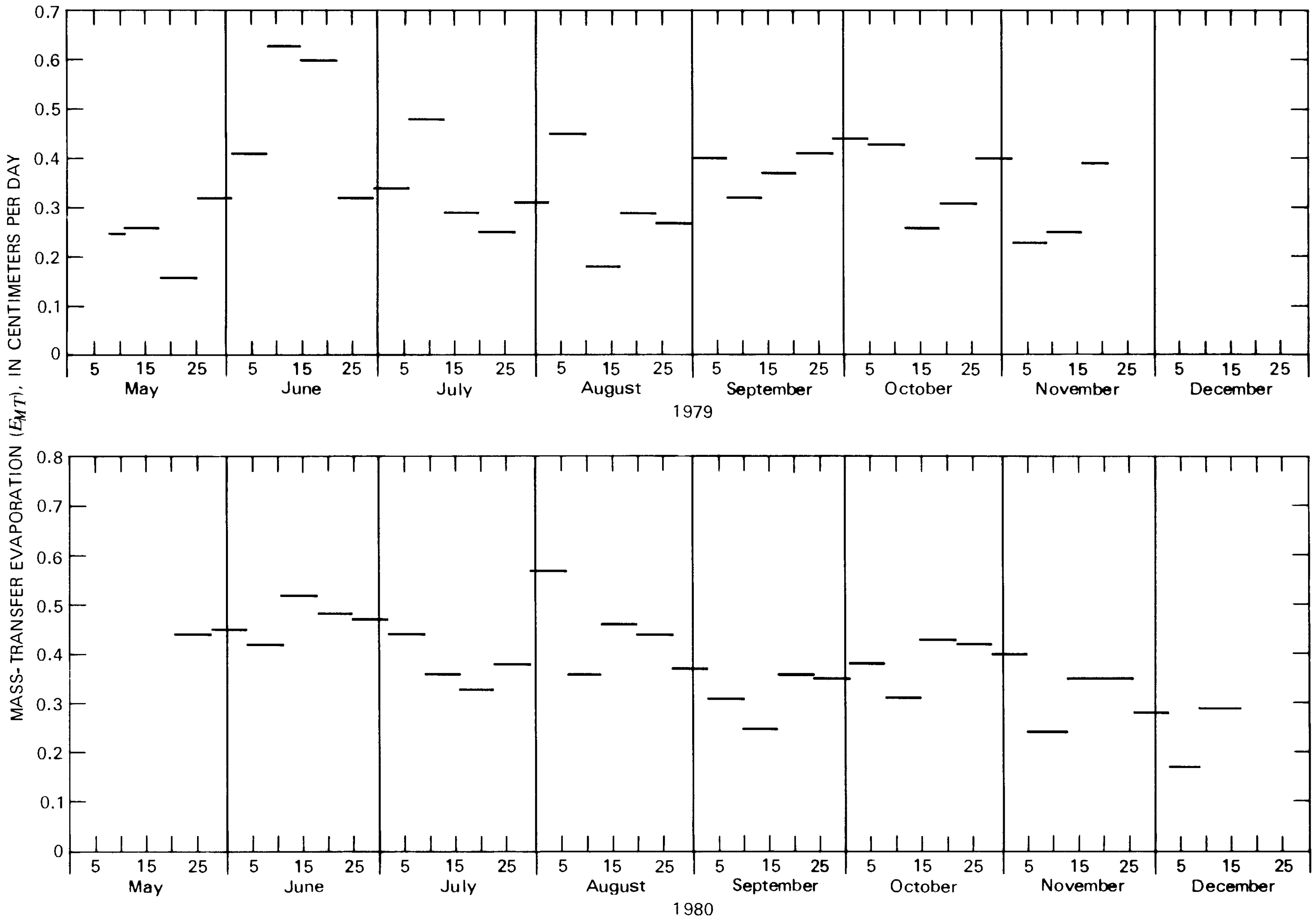

Figure 12.--Rates of mass-transfer evaporation, E_{MT}, from Ralston Reservoir for the 1972-74 and 1977-80 record seasons--Continued.

Pan Evaporation

Pan-evaporation data were collected at a station atop the dam. Pan evaporation per period and ratios of reservoir evaporation to pan evaporation also are given in table 4. The ratios varied throughout each season and between seasons.

EVAPORATION FROM CHEESMAN RESERVOIR

Cheesman Reservoir is about 40 miles southwest of Denver, Colo., on the South Fork of the South Platte River. The reservoir, completed in 1905, has a storage capacity of 79,064 acre-feet, a surface area of 871 acres, and a mean depth of 90.8 feet. At full pool the water surface is at an altitude of 6,842 feet. Drainage area above the reservoir is 1,752 square miles. The two major inflows are the South Fork of the South Platte River and Goose Creek.

Energy Budget

Energy-budget evaporation data were collected at Cheesman Reservoir during 1977 and 1978. Radiation and psychrometric data were collected at a station atop the dam. Total daily solar radiation, Q_s, and daily vapor pressures, e_o and e_a, measured during 1978 at Cheesman Reservoir are shown in figures 13 and 14.

Inflow temperatures were measured using thermographs during most of the evaporation periods and were measured at weekly intervals for the other periods. Outflow temperatures were measured at weekly intervals below the dam. Thermal surveys taken at 7- to 14-day periods provided data for the determination of stored energy. Advected energy minus changes in stored energy for 1978 is shown in figure 15. Water-surface temperatures measured at the raft during 1978 are shown in figure 16.

Values for the terms of equation 8 for 1977 and 1978 energy-budget evaporation from Cheesman Reservoir are shown in table 5. Hydrographs of the energy-budget evaporation rates are shown in figure 17. Evaporation rates ranged from 0.17 to 0.66 centimeter per day.

Mass Transfer

Determination of the mass-transfer coefficient, N.--The energy-budget and mass-transfer data for 1977 and 1978 were used to determine a value of N for Cheesman Reservoir. The evaporation rate from the energy budget, E_{EB}, is plotted against the mass-transfer product, $U_{2.0}(e_o-e_a)$ in figure 18. A summary of different methods used to determine a value of N from data in figure 18 is shown in figure 19.

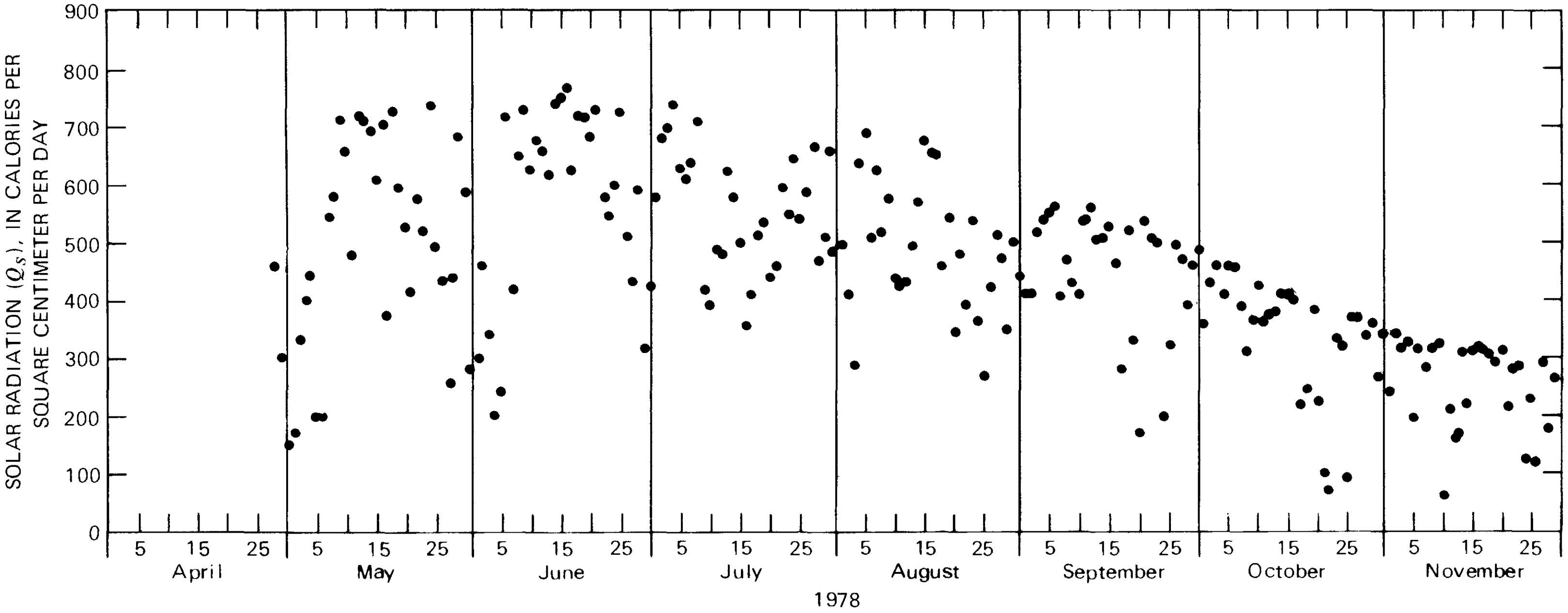

Figure 13.-- Total daily solar radiation, Q_s, at Cheesman Reservoir, April-November 1978.

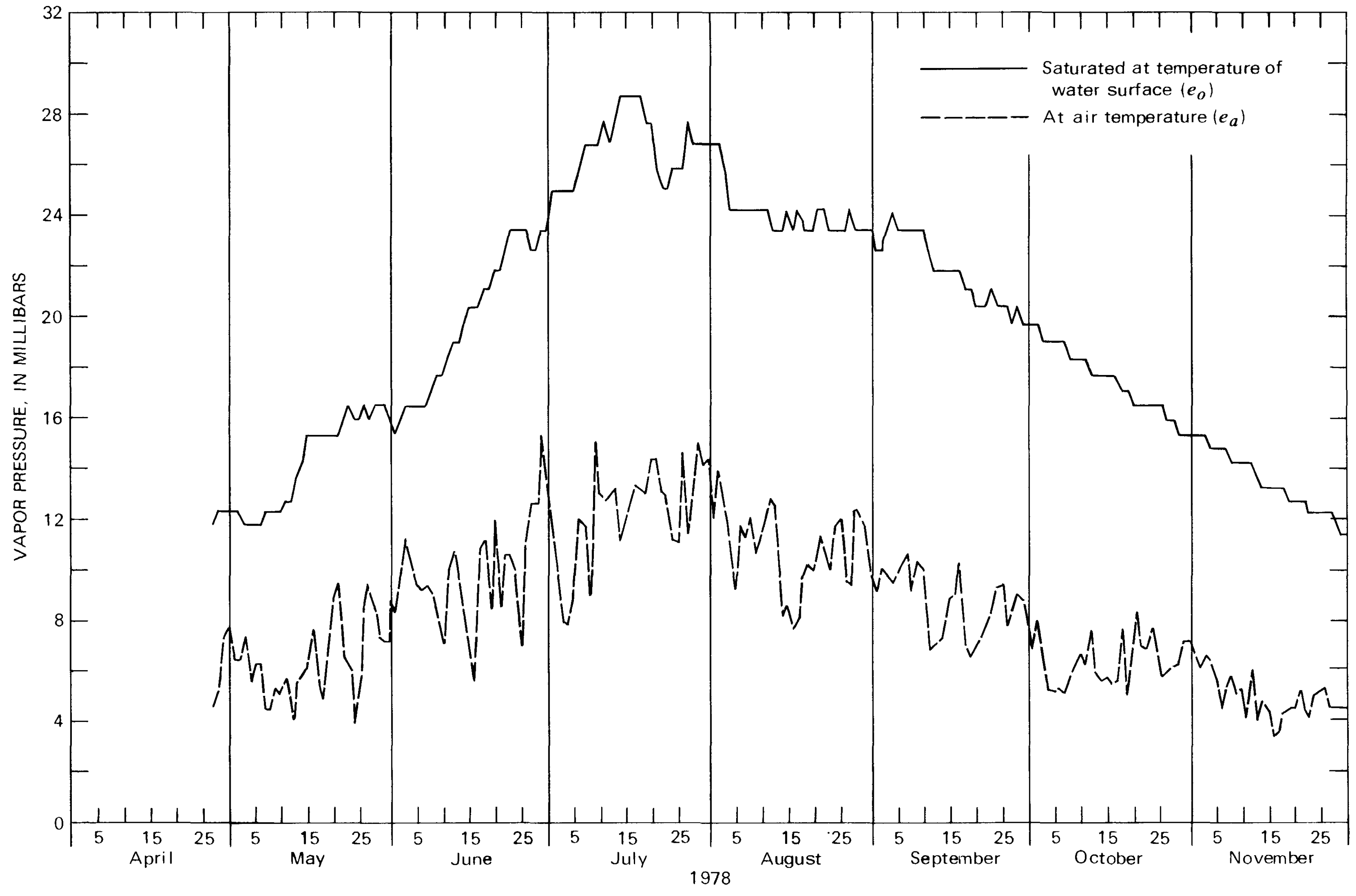

Figure 14.--Daily vapor pressures, e_o and e_a, at Cheesman Reservoir, April-November 1978.

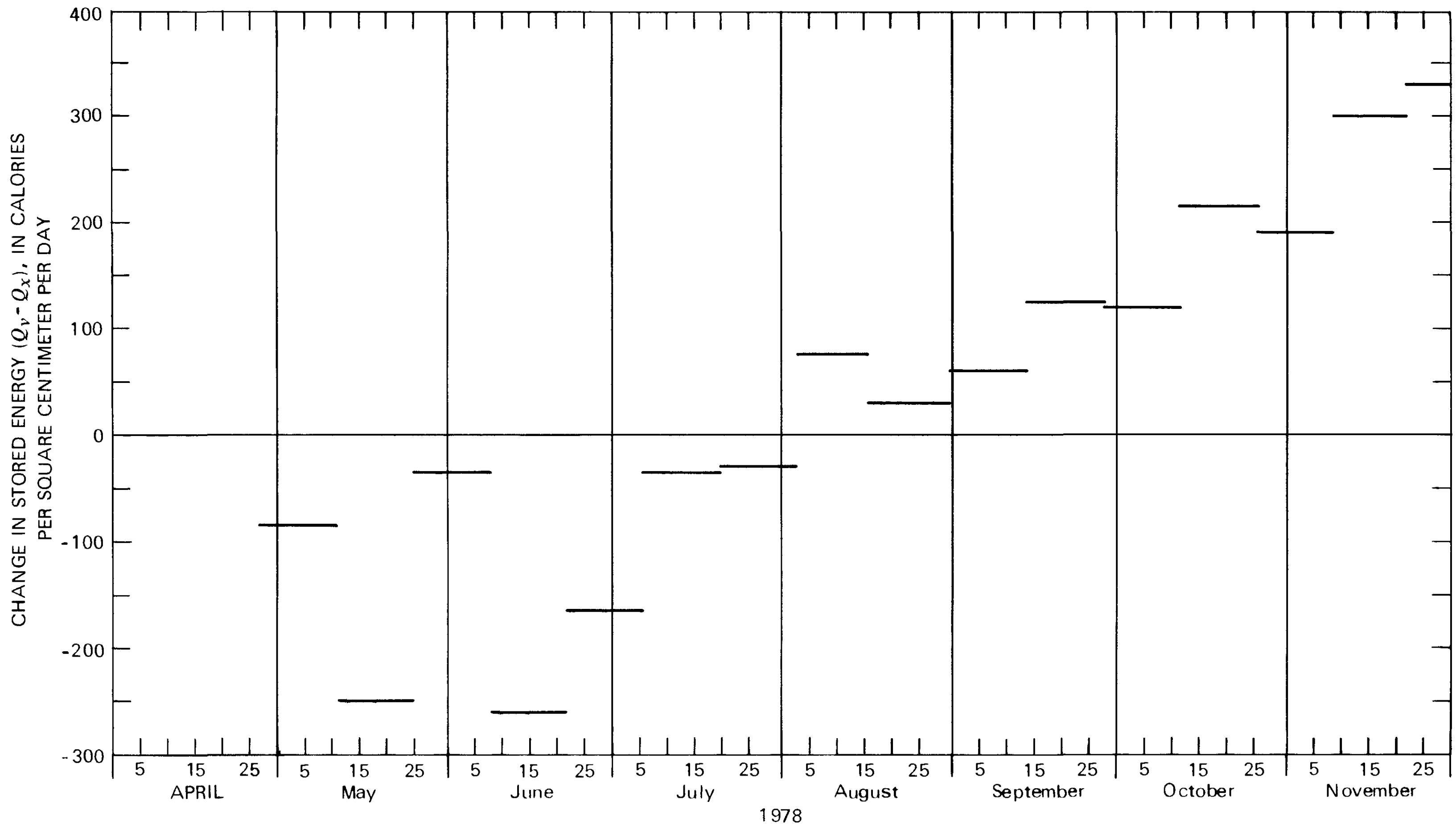

Figure 15.-- Advected energy minus changes in stored energy, Q_v-Q_x, for Cheesman Reservoir, April-November 1978.

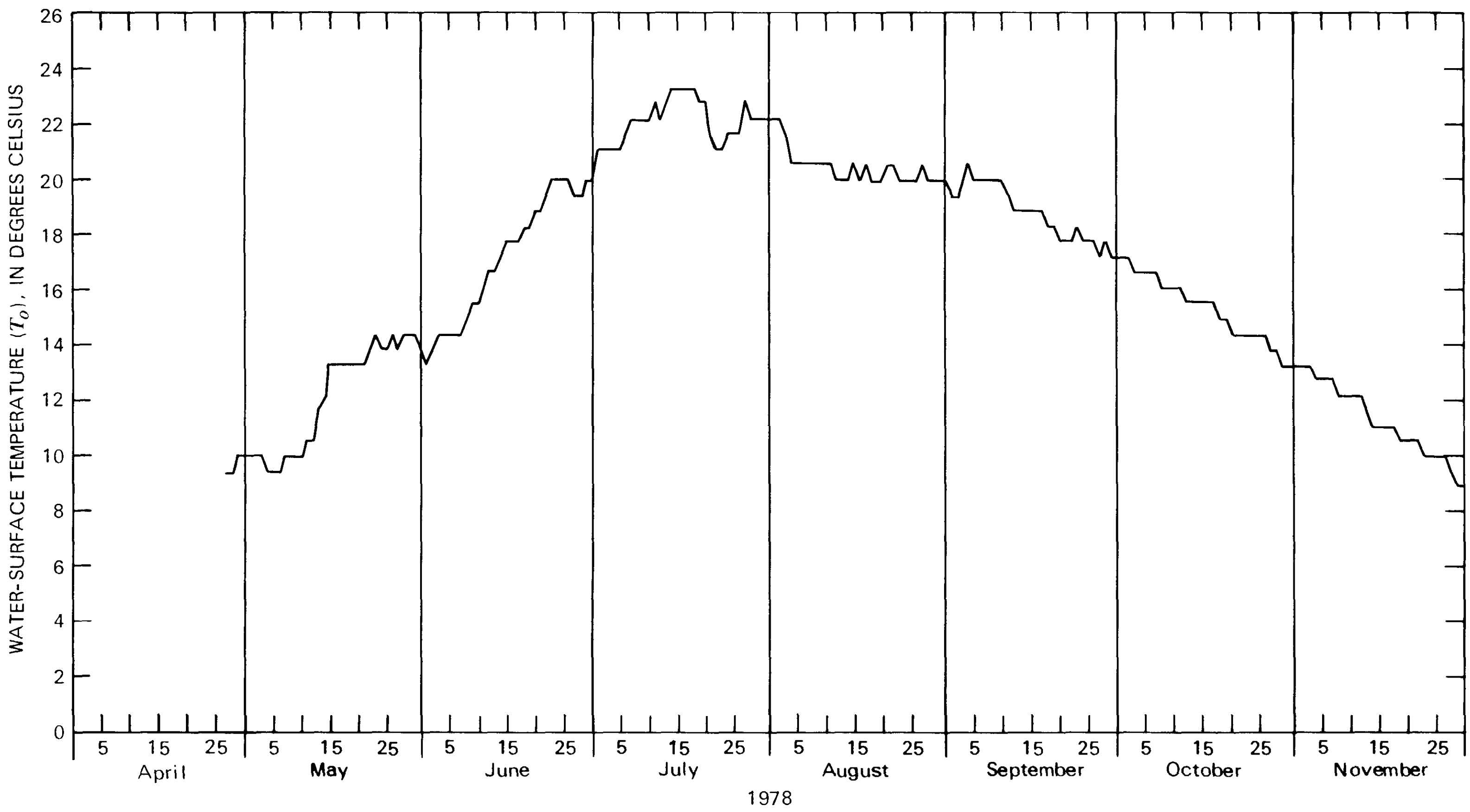

Figure 16.--Daily water-surface temperature, T_o, of Cheesman Reservoir, April-November 1978.

Table 5.--*Summary of energy-budget terms and evaporation for Cheesman Reservoir*

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1977	QS	QR	QA-QAR	QBS	QV	QA	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
1	14.0	MAY 19- JUNE 2	482	33	751	762	68	98	390	8	9	.021	.66	9.23
2	13.6	JUNE 2- JUNE 16	556	39	710	798	156	310	283	-16	8	-.058	.48	6.52
3	14.0	JUNE 16- JUNE 30	551	35	719	822	62	130	330	4	11	.012	.56	7.87
4	14.0	JUNE 30- JULY 14	499	33	712	833	61	129	267	1	9	.004	.46	6.39
5	14.0	JULY 14- JULY 28	341	26	716	839	142	195	126	8	4	.066	.22	3.02
6	14.0	JULY 28- AUG. 11	468	32	720	841	61	115	233	20	8	.088	.40	5.56
7	14.0	AUG. 11- AUG. 25	402	29	718	828	64	84	219	17	7	.076	.37	5.24
8	13.9	AUG. 25-SEPT. 8	473	34	617	829	9	37	181	12	6	.068	.31	4.30
9	14.0	SEPT. 8-SEPT. 22	334	26	650	820	-32	-232	286	41	9	.143	.49	6.83
10	14.0	SEPT. 22- OCT. 6	433	33	617	802	-33	-229	357	42	10	.119	.61	8.51
11	14.0	OCT. 6- OCT. 20	395	32	560	779	-81	-290	277	69	7	.247	.47	6.59
12	14.0	OCT. 20- NOV. 3	315	28	536	760	-46	-245	197	61	4	.308	.33	4.69
13	13.9	NOV. 3- NOV. 17	249	23	546	740	-51	-310	206	80	4	.389	.35	4.86
14	14.0	NOV. 17- DEC. 1	220	21	489	712	-24	-297	178	67	2	.377	.30	4.21
RECORD SEASON	195.4	MAY 19- DEC. 1											0.43	83.82

Table 5.--*Summary of energy-budget terms and evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1976	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
15	14.1	APRIL 27- MAY 11	387	28	583	727	30	117	102	23	2	.226	.17	2.43
16	14.0	MAY 11- MAY 25	601	38	628	759	77	327	187	-10	4	-.051	.32	4.46
17	14.0	MAY 25- JUNE 8	425	30	622	773	107	141	168	37	4	.219	.29	3.99
18	14.0	JUNE 8- JUNE 22	694	42	685	806	172	433	293	-32	9	-.110	.50	6.96
19	14.1	JUNE 22- JULY 6	578	37	699	841	125	291	224	1	8	.004	.38	5.38
20	14.0	JULY 6- JULY 20	517	35	696	869	170	206	249	14	10	.057	.43	5.97
21	14.0	JULY 20- AUG. 3	529	36	723	860	154	181	288	30	11	.106	.49	6.87
22	13.0	AUG. 3- AUG. 16	541	36	680	843	22	-55	376	30	13	.079	.64	8.37
23	14.9	AUG. 16- AUG. 31	456	32	687	839	46	15	277	17	10	.060	.47	7.06
24	14.0	AUG. 31-SEPT. 14	484	35	661	834	60	2	306	18	10	.059	.52	7.31
25	14.0	SEPT. 14-SEPT. 28	414	31	616	816	45	-80	252	47	8	.188	.43	6.00
26	14.0	SEPT. 28- OCT. 12	408	32	579	800	9	-112	222	47	6	.211	.38	5.30
27	14.0	OCT. 12- OCT. 26	286	24	560	781	-1	-215	187	62	5	.335	.32	4.43
28	14.0	OCT. 26- NOV. 9	315	28	522	762	-22	-214	178	55	4	.312	.30	4.21
29	13.0	NOV. 9- NOV. 22	255	23	455	743	-26	-324	155	84	3	.540	.26	3.41
30	8.0	NOV. 22- NOV. 30	222	21	484	727	-11	-338	177	105	3	.589	.30	2.40
RECORD SEASON	217.1	APRIL 27- NOV. 30											0.39	84.55

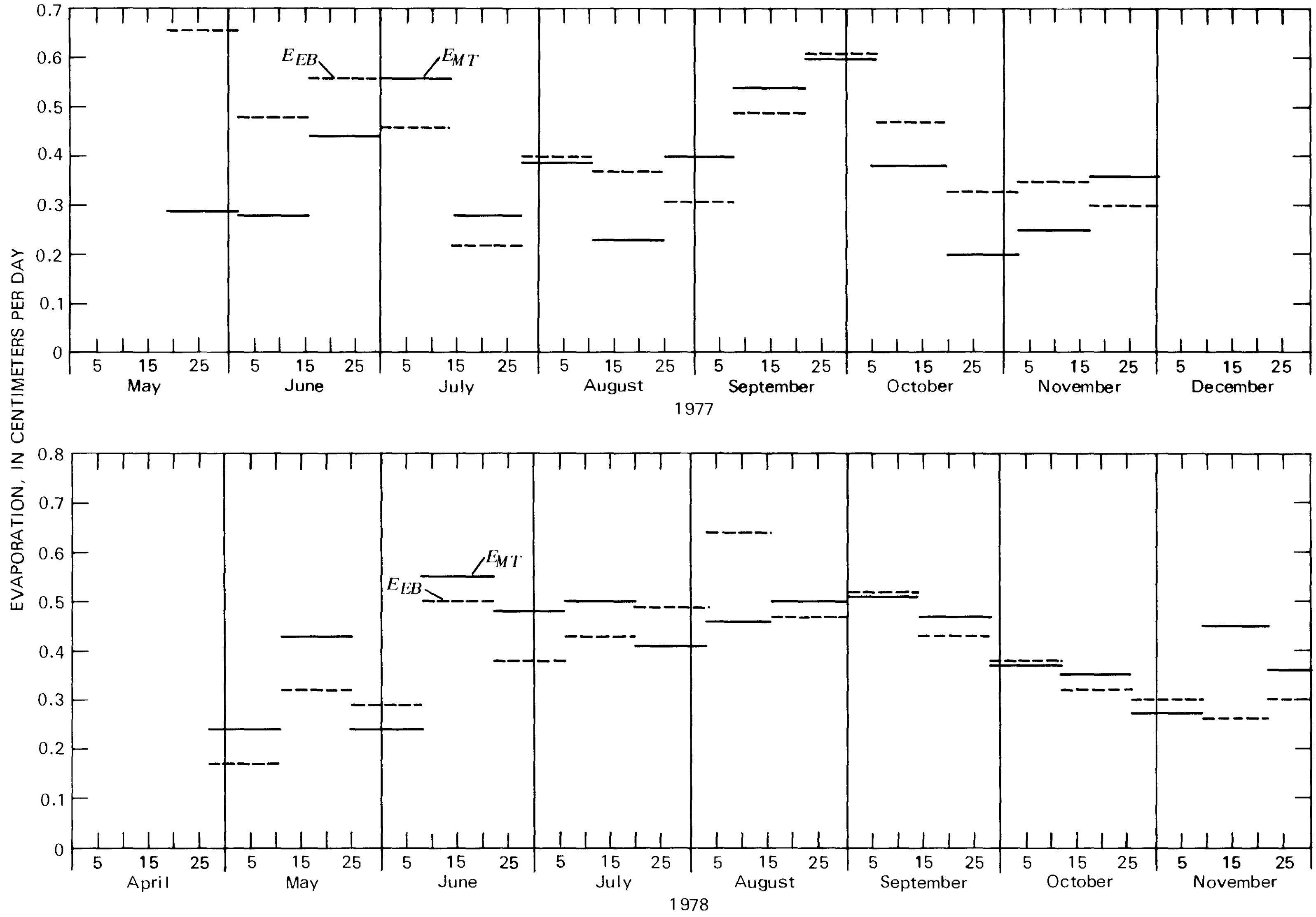

Figure 17.--Rates of energy-budget, E_{EB}, and mass-transfer, E_{MT}, evaporation from Cheesman Reservoir for the 1977-78 record seasons.

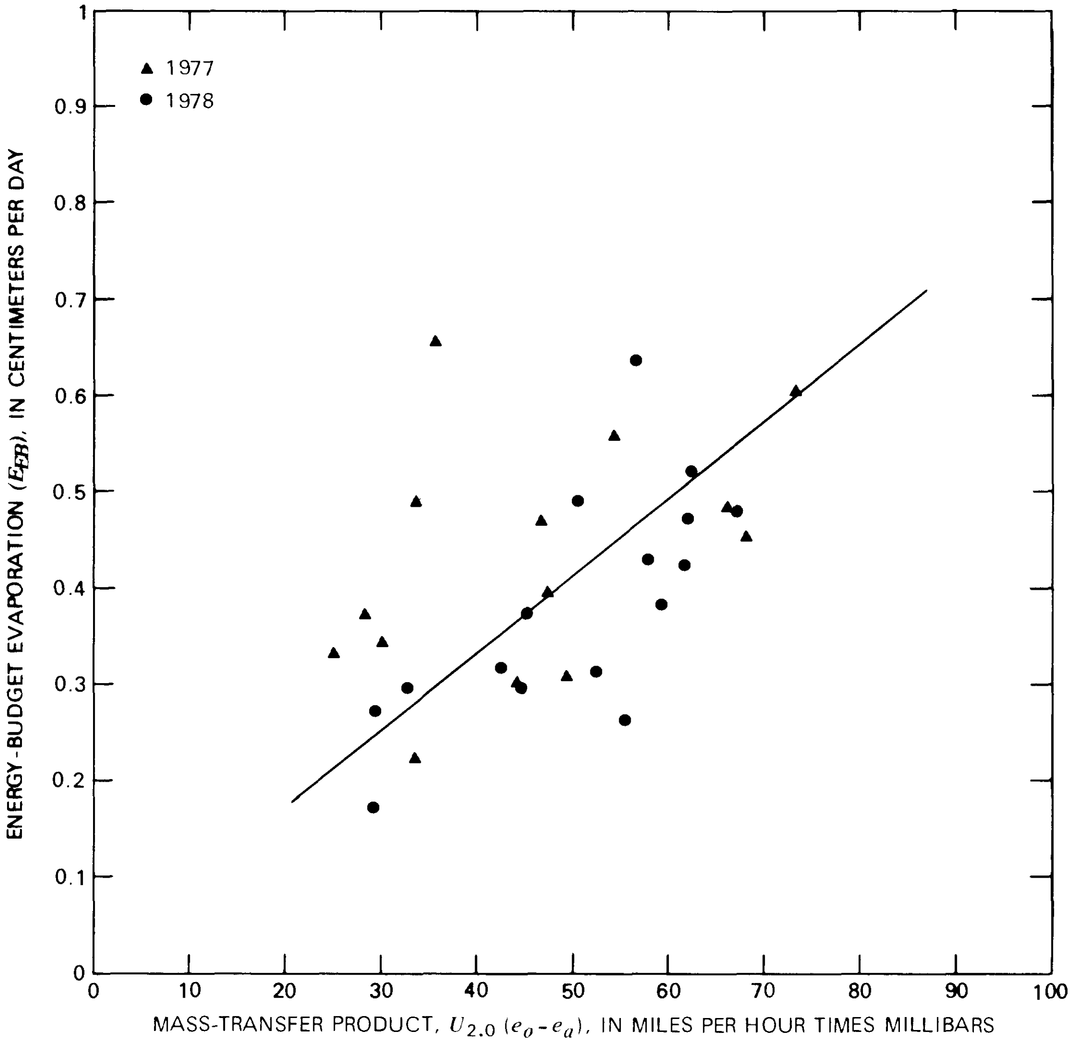

Figure 18.--Calibration of the mass-transfer product against evaporation measured by the energy-budget method at Cheesman Reservoir.

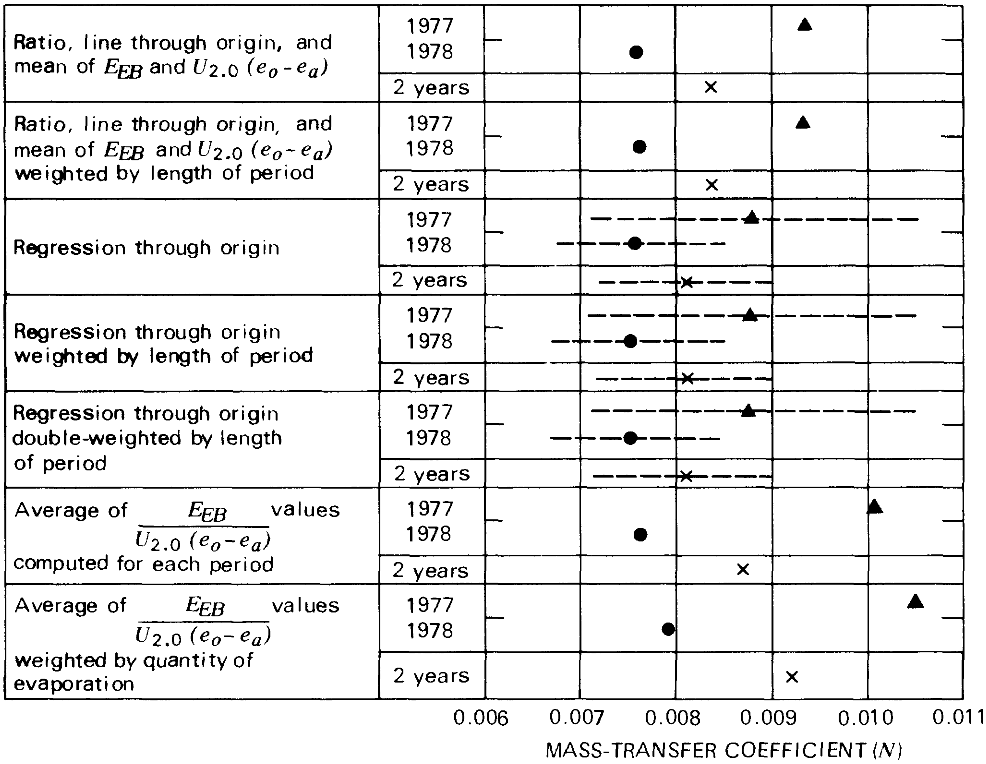

Figure 19.--Values of mass-transfer coefficients for Cheesman Reservoir as determined by different means of calculation from the energy-budget data. Dashed lines through some symbols represent 95-percent confidence limits.

The results shown in figure 19 were used to select an N value of 0.00810 for Cheesman Reservoir. Harbeck's equation (equation 13 in this report) yields values of N of about 0.0061, based upon the surface area of the reservoir. The selected value of 0.0081 is 33 percent greater than that predicted by equation 13.

Data.--Mass-transfer data were collected at Cheesman Reservoir from 1974 to 1980. Hygrothermograph data were collected at a station near the caretakers' houses. Wind-speed and water-surface-temperature data were collected as described earlier. Wind-speed data collected at the raft during 1978 are shown in figure 20.

A summary of mass-transfer terms and pan evaporation for Cheesman Reservoir for the 1967-80 seasons is given in table 6. Data for 1967-73 are from Ficke and others (1977), using a value of N of 0.0081 to determine the evaporation rates. Hydrographs of the mass-transfer evaporation rates for 1967-76 and 1979-80 are shown in figure 21. Mass-transfer evaporation rates for 1977-78 are shown in figure 17.

Pan Evaporation

Pan-evaporation data were collected at a station on the east side of Cheesman Reservoir. Available pan-evaporation data for each period and ratios of reservoir evaporation to pan evaporation are given in table 6. The ratio varies during the seasons and between seasons.

EVAPORATION FROM ANTERO RESERVOIR

Antero Reservoir is on the South Fork of the South Platte River near Hartsel, Colo. The reservoir is capable of storing more than 85,000 acre-feet of water, but is currently operated with about 15,878 acre-feet in storage. At this capacity the reservoir has a surface area of 1,931 acres and an average depth of 8 feet. At full pool the water surface is at an altitude of 8,978 feet. Drainage area above the reservoir is 337 square miles. The major inflow is the South Fork of the South Platte River.

Energy Budget

Energy-budget data were collected at Antero Reservoir during 1977-78. Radiation and psychrometric data were collected at a station atop the dam. Total daily solar radiation, Q_s, and daily vapor pressures, e_o and e_a, measured during 1978 at Antero Reservoir, are shown in figures 22 and 23.

Inflow temperatures were measured at weekly intervals during 1977 and recorded continuously with a thermograph during 1978. Outflow temperatures were measured at weekly intervals below the dam. Values of stored energy for the reservoir were obtained from weekly thermal surveys. Advected energy minus changes in stored energy during 1978 for Antero Reservoir is shown in figure 24. Water-surface temperatures measured at the raft during 1978 are shown in figure 25.

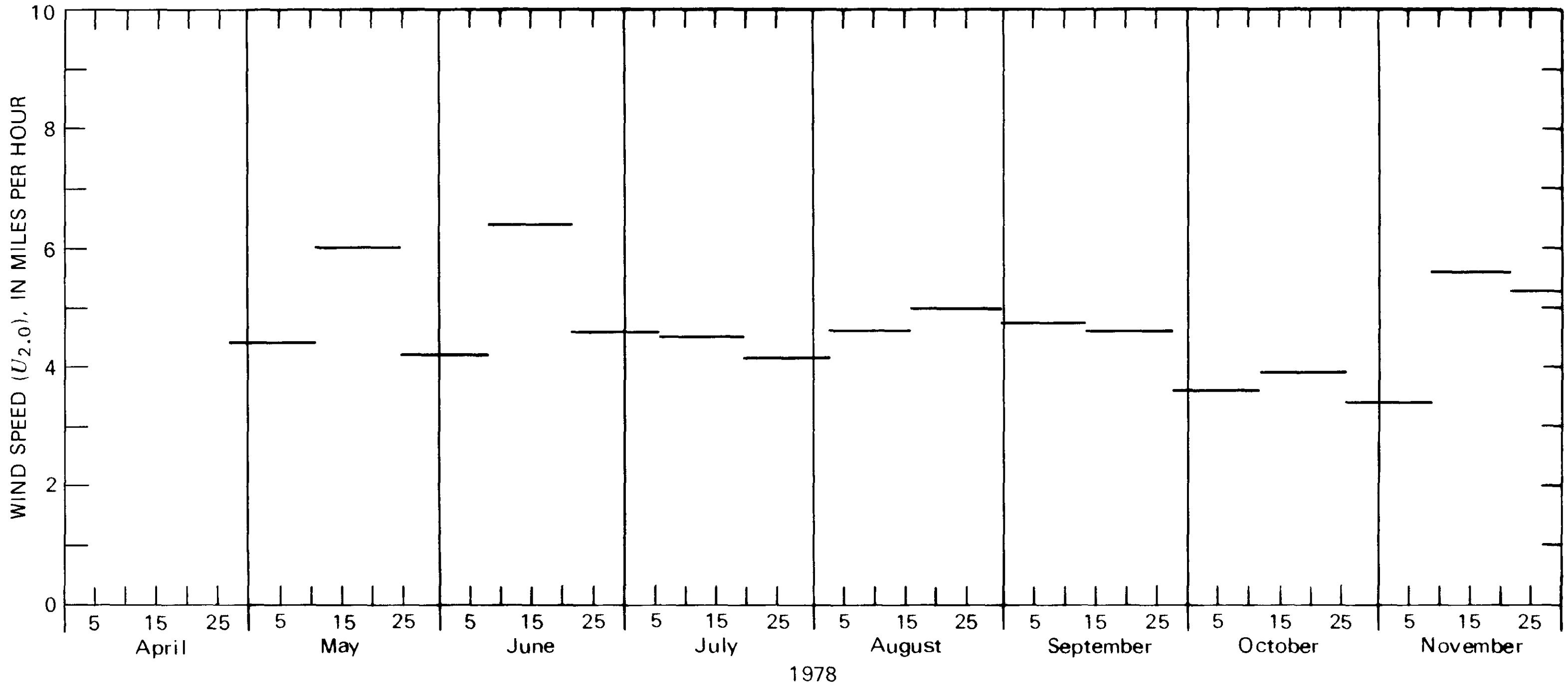

Figure 20.--Wind speeds, $U_{2.0}$, at Cheesman Reservoir, April-November 1978.

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1967	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
1	6.0	MAY 9- MAY 15	5.60	6.6	.30	1.80	30.2	3.02	0.60
2	7.0	MAY 15- MAY 22	4.20	7.0	.24	1.67	27.8	3.40	.49
3	7.0	MAY 22- MAY 29	3.80	8.1	.25	1.74	28.2	3.05	.57
4	7.0	MAY 29- JUNE 5	5.40	7.5	.33	2.30	36.9	3.81	.60
5	7.0	JUNE 5- JUNE 12	5.40	9.4	.41	2.88	46.1	3.99	.72
6	7.0	JUNE 12- JUNE 19	5.10	8.8	.36	2.54	40.4	3.20	.79
7	7.0	JUNE 19- JUNE 26	4.80	8.4	.33	2.29	36.2	2.92	.78
8	7.0	JUNE 26- JULY 3	4.40	9.6	.34	2.40	38.7	4.42	.54
9	7.0	JULY 3- JULY 10	4.40	9.5	.34	2.37	38.6	4.32	.55
10	7.0	JULY 10- JULY 17	4.30	12.9	.45	3.14	51.9	3.71	.85
11	7.0	JULY 17- JULY 24	3.50	13.9	.39	2.76	47.0	3.73	.74
12	7.0	JULY 24- JULY 31	4.20	12.6	.43	3.00	52.9	4.14	.72
13	7.0	JULY 31- AUG. 7	3.60	12.6	.37	2.57	45.2	3.20	.80

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1967	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
14	7.0	AUG. 7- AUG. 14	4.10	10.9	.36	2.53	44.1	3.07	.82
15	7.0	AUG. 14- AUG. 21	4.00	13.5	.44	3.06	53.1	3.38	.90
16	9.0	AUG. 21- AUG. 30	3.70	12.4	.37	3.34	55.4	4.50	.74
17	7.0	AUG. 30-SEPT. 6	4.40	10.4	.37	2.59	41.2	3.12	.83
18	7.0	SEPT. 6-SEPT. 13	5.70	11.8	.54	3.81	60.4	3.94	.97
19	7.0	SEPT. 13-SEPT. 20	4.40	10.8	.38	2.69	42.7	2.77	.97
20	7.0	SEPT. 20-SEPT. 27	3.70	10.0	.30	2.10	33.8	2.87	.73
21	9.0	SEPT. 27- OCT. 6	4.70	9.6	.36	3.29	54.3	4.42	.74
22	5.0	OCT. 6- OCT. 11	4.00	9.9	.32	1.60	27.0	1.40	1.14
23	7.0	OCT. 11- OCT. 18	4.00	10.8	.35	2.45	42.0	1.96	1.25
24	7.0	OCT. 18- OCT. 25	4.30	10.3	.36	2.51	43.4	2.39	1.05
25	7.0	OCT. 25- NOV. 1	4.60	9.5	.35	2.48	43.2	----	----
RECORD SEASON	176.0	MAY 9- NOV. 1			0.36	63.91	1060.7		
PAN SEASON	169.0	MAY 9- OCT. 25			0.36	61.43		80.73	0.76

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1968	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
26	6.0	MAY 16- MAY 22	4.90	6.2	.25	1.48	33.4	2.21	0.67
27	7.0	MAY 22- MAY 29	5.00	6.8	.28	1.93	43.8	3.89	.50
28	7.0	MAY 29- JUNE 5	4.40	8.5	.30	2.12	48.4	4.52	.47
29	8.0	JUNE 5- JUNE 13	5.30	11.4	.49	3.92	89.5	5.94	.66
30	6.0	JUNE 13- JUNE 19	5.00	11.2	.45	2.72	62.3	4.83	.56
31	7.0	JUNE 19- JUNE 26	5.10	12.1	.50	3.50	79.3	5.72	.61
32	8.0	JUNE 26- JULY 4	5.90	13.6	.65	5.20	115.6	7.47	.70
33	6.0	JULY 4- JULY 10	4.30	10.8	.38	2.26	49.0	3.38	.67
34	7.0	JULY 10- JULY 17	3.50	10.3	.29	2.04	43.7	3.61	.56
35	7.0	JULY 17- JULY 24	4.30	10.2	.36	2.49	51.9	4.57	.54
36	7.0	JULY 24- JULY 31	3.40	9.5	.26	1.83	37.5	2.82	.65
37	7.0	JULY 31- AUG. 7	3.50	10.1	.29	2.00	40.7	2.62	.76

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1968	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
38	7.0	AUG. 7- AUG. 14	3.80	9.3	.29	2.00	40.6	2.95	.68
39	7.0	AUG. 14- AUG. 21	6.60	12.5	.57	4.68	96.2	5.46	.86
40	7.0	AUG. 21- AUG. 28	5.20	11.8	.50	3.48	72.4	5.79	.60
41	7.0	AUG. 28-SEPT. 4	4.20	11.1	.38	2.64	54.0	3.15	.84
42	7.0	SEPT. 4-SEPT. 11	4.30	11.7	.41	2.85	58.2	4.50	.63
43	7.0	SEPT. 11-SEPT. 18	4.80	10.8	.42	2.94	59.9	3.28	.90
44	8.0	SEPT. 18-SEPT. 26	5.00	10.9	.44	3.53	68.1	3.76	.94
45	6.0	SEPT. 26- OCT. 2	4.50	10.1	.37	2.21	42.2	2.57	.86
46	7.0	OCT. 2- OCT. 9	4.10	9.5	.32	2.21	41.4	2.51	.88
47	14.0	OCT. 9- OCT. 23	4.40	9.6	.34	4.79	89.2	4.62	1.04
48	8.0	OCT. 23- OCT. 31	3.70	9.0	.27	2.16	40.1	2.34	.92
RECORD SEASON	168.0	MAY 16- OCT. 31			0.39	64.98	1357.4		
PAN SEASON	168.0	MAY 16- OCT. 31			0.39	64.98		92.51	0.70

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1969	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
49	7.0	MAY 14- MAY 21	4.20	5.3	.18	1.26	32.2	3.05	0.41
50	7.0	MAY 21- MAY 28	4.60	6.5	.24	1.70	45.5	3.25	.52
51	7.0	MAY 28- JUNE 4	4.80	7.7	.30	2.10	59.1	3.73	.56
52	7.0	JUNE 4- JUNE 11	5.00	6.2	.25	1.76	50.6	3.18	.55
53	7.0	JUNE 11- JUNE 18	4.40	5.7	.20	1.42	41.0	1.45	.98
54	8.0	JUNE 18- JUNE 26	6.90	6.2	.35	2.77	80.1	3.99	.69
55	6.0	JUNE 26- JULY 2	6.80	6.4	.35	2.12	60.9	5.11	.41
56	7.0	JULY 2- JULY 9	5.40	7.3	.32	2.24	64.4	5.18	.43
57	7.0	JULY 9- JULY 16	4.20	6.3	.21	1.50	43.1	3.96	.38
58	7.0	JULY 16- JULY 23	4.00	6.6	.21	1.50	42.8	3.05	.49
59	7.0	JULY 23- JULY 30	3.70	7.2	.22	1.51	43.4	3.53	.43
60	7.0	JULY 30- AUG. 6	4.30	10.2	.36	2.49	70.9	3.56	.70

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1969	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
61	7.0	AUG. 6- AUG. 13	5.00	14.4	.58	4.08	115.1	5.49	.74
62	7.0	AUG. 13- AUG. 20	3.70	12.6	.38	2.64	73.7	3.58	.74
63	7.0	AUG. 20- AUG. 27	4.00	11.0	.36	2.49	69.1	3.23	.77
64	7.0	AUG. 27-SEPT. 3	3.70	11.9	.36	2.50	69.0	3.30	.76
65	7.0	SEPT. 3-SEPT. 10	4.10	12.8	.42	2.98	81.6	3.18	.94
66	7.0	SEPT. 10-SEPT. 17	3.60	11.7	.34	2.39	63.6	2.26	1.06
67	7.0	SEPT. 17-SEPT. 24	4.40	11.3	.40	2.82	73.5	2.54	1.11
68	7.0	SEPT. 24- OCT. 1	3.90	12.4	.39	2.74	71.4	3.58	.76
69	7.0	OCT. 1- OCT. 8	4.50	11.4	.42	2.91	75.4	2.62	1.11
70	7.0	OCT. 8- OCT. 15	5.50	9.7	.43	3.02	80.7	----	----
71	7.0	OCT. 15- OCT. 22	4.70	7.4	.28	1.97	54.4	----	----
RECORD SEASON	161.0	MAY 14- OCT. 22			0.33	52.91	1461.5		
PAN SEASON	147.0	MAY 14- OCT. 8			0.32	47.92		72.82	0.66

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
72	8.0	JUNE 2- JUNE 10	5.10	7.5	.31	2.48	71.1	4.45	0.55
73	7.0	JUNE 10- JUNE 17	6.10	9.2	.45	3.18	91.5	4.17	.76
74	7.0	JUNE 17- JUNE 24	4.30	8.4	.29	2.05	58.7	3.96	.52
75	7.0	JUNE 24- JULY 1	5.50	11.4	.51	3.56	102.2	5.94	.60
76	7.0	JULY 1- JULY 8	3.90	11.1	.35	2.45	70.3	4.90	.50
77	7.0	JULY 8- JULY 15	4.00	10.8	.35	2.45	70.3	4.80	.51
78	7.0	JULY 15- JULY 22	3.90	11.6	.37	2.56	72.5	3.89	.66
79	7.0	JULY 22- JULY 29	4.10	11.6	.38	2.70	75.5	4.17	.65
80	7.0	JULY 29- AUG. 5	3.50	12.9	.36	2.56	70.6	4.75	.54
81	7.0	AUG. 5- AUG. 12	3.40	12.8	.35	2.47	67.8	3.66	.67
82	6.0	AUG. 12- AUG. 18	3.50	14.4	.41	2.45	67.1	3.07	.80

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
83	7.0	AUG. 18- AUG. 25	3.40	11.7	.32	2.26	61.7	3.00	.75
84	7.0	AUG. 25-SEPT. 1	3.20	11.2	.29	2.03	55.5	4.55	.45
85	7.0	SEPT. 1-SEPT. 8	5.10	13.2	.54	3.82	104.2	3.76	1.02
86	7.0	SEPT. 8-SEPT. 15	6.90	11.9	.66	4.66	126.6	4.19	1.11
87	9.0	SEPT. 15-SEPT. 24	5.40	11.9	.52	4.68	127.0	5.33	.88
88	5.0	SEPT. 24-SEPT. 29	4.20	11.9	.40	2.02	55.0	1.35	1.50
89	7.0	SEPT. 29- OCT. 6	3.50	10.1	.29	2.00	55.0	2.79	.72
90	7.0	OCT. 6- OCT. 13	4.40	10.0	.36	2.49	69.1	0.81	3.07
91	7.0	OCT. 13- OCT. 20	3.40	----	---	----	-----	----	----
RECORD SEASON	133.0	JUNE 2- OCT. 13			0.40	52.87	1471.7		
PAN SEASON	133.0	JUNE 2- OCT. 13			0.40	52.87		73.54	0.72

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1971	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
92	6.9	MAY 26- JUNE 2	6.26	8.3	.41	2.84	81.3	----	----
93	6.8	JUNE 2- JUNE 9	5.65	9.6	.44	2.98	85.6	5.18	0.58
94	7.0	JUNE 9- JUNE 16	4.29	8.6	.30	2.08	59.2	3.23	.64
95	7.0	JUNE 16- JUNE 23	4.64	9.5	.36	2.51	71.3	4.80	.52
96	7.0	JUNE 23- JUNE 30	5.16	11.5	.48	3.35	95.2	5.66	.59
97	7.0	JUNE 30- JULY 7	5.28	11.4	.48	3.39	97.2	3.78	.90
98	7.0	JULY 7- JULY 14	3.99	10.5	.34	2.37	68.1	4.29	.55
99	7.0	JULY 14- JULY 21	3.70	9.1	.27	1.91	55.0	4.11	.46
100	7.0	JULY 21- JULY 28	4.11	8.8	.29	2.04	58.7	3.45	.59
101	7.1	JULY 28- AUG. 4	4.42	9.8	.35	2.48	71.3	3.66	.68
102	6.9	AUG. 4- AUG. 11	4.25	10.7	.37	2.54	73.0	4.34	.58

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1971	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
103	7.0	AUG. 11- AUG. 18	4.02	10.4	.34	2.37	67.9	4.14	.57
104	7.0	AUG. 18- AUG. 25	3.52	9.6	.27	1.91	54.9	3.56	.54
105	7.0	AUG. 25-SEPT. 1	3.40	9.3	.26	1.80	51.8	2.44	.74
106	7.0	SEPT. 1-SEPT. 8	5.42	12.2	.54	3.75	107.7	5.38	.70
107	7.0	SEPT. 8-SEPT. 15	3.65	11.1	.33	2.27	65.1	4.11	.55
108	7.2	SEPT. 15-SEPT. 22	4.37	10.8	.38	2.75	78.9	1.42	1.94
109	7.9	SEPT. 22-SEPT. 30	7.33	8.2	.49	3.86	110.7	4.85	.80
110	6.1	SEPT. 30- OCT. 6	6.44	8.8	.46	2.79	79.9	2.87	.97
111	6.9	OCT. 6- OCT. 13	3.62	7.4	.22	1.50	42.9	2.34	.64
112	7.1	OCT. 13- OCT. 20	6.06	8.0	.39	2.77	79.6	2.51	1.10
RECORD SEASON	146.9	MAY 26- OCT. 20			0.37	54.26	1555.3		
PAN SEASON	140.0	JUNE 2- OCT. 20			0.37	51.42		76.12	0.68

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1972	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
113	6.7	MAY 31- JUNE 7	4.08	8.2	.27	1.82	46.5	----	----
114	8.0	JUNE 7- JUNE 15	3.61	9.5	.28	2.21	57.8	----	----
115	7.0	JUNE 15- JUNE 22	5.63	9.8	.45	3.13	82.4	----	----
116	7.1	JUNE 22- JUNE 29	4.66	11.7	.44	3.12	81.6	----	----
117	6.9	JUNE 29- JULY 6	4.92	9.8	.39	2.68	69.4	----	----
118	7.0	JULY 6- JULY 13	3.88	9.8	.31	2.15	55.7	4.11	0.52
119	7.0	JULY 13- JULY 20	6.38	9.4	.48	3.41	87.6	4.83	.71
120	7.0	JULY 20- JULY 27	4.40	9.7	.34	2.40	61.6	4.95	.48
121	7.0	JULY 27- AUG. 3	4.30	10.3	.36	2.51	64.3	5.38	.47
122	7.0	AUG. 3- AUG. 10	3.74	11.1	.34	2.37	60.2	4.01	.59
123	7.0	AUG. 10- AUG. 17	3.29	10.1	.27	1.90	47.4	4.22	.45

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1972	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
124	7.1	AUG. 17- AUG. 24	3.86	11.3	.35	2.49	61.6	2.90	.86
125	6.9	AUG. 24- AUG. 31	3.40	9.3	.26	1.77	43.9	2.24	.79
126	7.0	AUG. 31-SEPT. 7	4.32	9.3	.33	2.30	57.2	2.74	.84
127	7.0	SEPT. 7-SEPT. 14	4.41	8.3	.30	2.06	51.0	2.95	.70
128	7.0	SEPT. 14-SEPT. 21	4.61	11.0	.41	2.88	69.7	3.76	.76
129	7.0	SEPT. 21-SEPT. 28	7.32	10.7	.63	4.43	107.1	4.04	1.10
130	7.0	SEPT. 28- OCT. 5	4.73	9.9	.38	2.66	63.2	3.73	.71
131	7.0	OCT. 5- OCT. 12	4.40	9.1	.32	2.27	52.2	2.24	1.01
132	7.0	OCT. 12- OCT. 19	4.55	8.2	.30	2.12	47.6	2.34	.90
133	6.2	OCT. 19- OCT. 25	4.84	8.8	.35	2.14	47.6	1.09	1.96
RECORD SEASON	146.9	MAY 31- OCT. 25			0.36	52.82	1315.6		
PAN SEASON	111.2	JULY 6- OCT. 25			0.36	39.86		55.53	0.72

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
134	7.0	MAY 23- MAY 30	5.89	10.2	.49	3.41	95.3	----	----
135	7.0	MAY 30- JUNE 6	3.74	9.4	.28	1.99	56.8	----	----
136	6.8	JUNE 6- JUNE 13	3.72	7.6	.23	1.55	44.4	4.60	0.34
137	7.1	JUNE 13- JUNE 20	8.54	11.1	.77	5.41	155.2	6.99	.77
138	6.9	JUNE 20- JUNE 27	3.89	9.1	.29	1.98	56.9	5.79	.34
139	7.0	JUNE 27- JULY 4	4.14	10.4	.35	2.46	70.4	5.94	.41
140	7.3	JULY 4- JULY 11	4.21	12.1	.41	2.99	85.7	5.54	.54
141	6.8	JULY 11- JULY 18	3.91	9.7	.31	2.08	59.0	4.55	.46
142	7.0	JULY 18- JULY 25	4.62	10.1	.38	2.66	73.6	4.70	.56
143	7.0	JULY 25- AUG. 1	3.65	9.9	.29	2.05	57.4	4.70	.44
144	7.0	AUG. 1- AUG. 8	3.75	7.0	.21	1.47	42.3	3.56	.41
145	7.0	AUG. 8- AUG. 15	3.45	8.9	.25	1.74	49.5	4.17	.42
146	7.0	AUG. 15- AUG. 22	3.77	10.0	.30	2.13	60.1	4.90	.43
147	7.0	AUG. 22- AUG. 29	5.42	10.1	.44	3.11	82.9	5.18	.60

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
148	7.0	AUG. 29-SEPT. 5	4.96	10.3	.42	2.91	75.3	4.52	.64
149	7.0	SEPT. 5-SEPT. 12	4.93	8.2	.33	2.28	57.5	4.62	.49
150	7.0	SEPT. 12-SEPT. 19	4.49	9.8	.36	2.51	62.9	4.01	.62
151	7.0	SEPT. 19-SEPT. 26	6.75	9.0	.49	3.45	84.4	7.54	.46
152	7.0	SEPT. 26- OCT. 3	3.78	9.8	.30	2.10	50.9	7.62	.28
153	7.0	OCT. 3- OCT. 10	5.65	8.6	.39	2.75	67.6	3.84	.72
154	7.2	OCT. 10- OCT. 17	4.08	8.3	.27	1.97	47.8	3.56	.55
155	6.8	OCT. 17- OCT. 24	4.23	7.7	.26	1.79	43.2	3.02	.59
156	7.0	OCT. 24- OCT. 31	4.40	8.6	.31	2.14	51.7	2.69	.80
157	7.0	OCT. 31- NOV. 7	7.02	8.4	.48	3.35	80.3	2.24	1.50
158	7.0	NOV. 7- NOV. 14	6.16	5.6	.28	1.95	46.9	3.00	.65
159	8.3	NOV. 14- NOV. 22	6.75	7.6	.42	3.46	81.8	2.72	1.27
160	6.7	NOV. 22- NOV. 29	5.43	7.2	.32	2.13	49.7	----	----
RECORD SEASON	189.9	MAY 23- NOV. 29			0.36	67.82	1789.5		
PAN SEASON	169.2	JUNE 6- NOV. 22			0.36	60.29		110.00	0.55

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
161	7.1	MAY 18- MAY 25	6.45	8.0	.42	2.94	76.4	5.61	0.52
162	7.1	MAY 25- JUNE 1	4.87	8.0	.32	2.25	56.6	4.90	.46
163	7.8	JUNE 1- JUNE 9	4.18	7.4	.25	1.98	47.9	3.15	.63
164	6.2	JUNE 9- JUNE 15	3.65	6.3	.19	1.16	28.1	3.86	.30
165	8.0	JUNE 15- JUNE 23	3.79	6.7	.20	1.64	39.4	4.70	.35
166	5.8	JUNE 23- JUNE 29	4.14	9.1	.31	1.77	41.6	4.50	.39
167	8.0	JUNE 29- JULY 7	4.76	9.9	.38	3.06	69.6	6.25	.49
168	6.0	JULY 7- JULY 13	4.31	8.3	.29	1.75	38.9	4.55	.38
169	7.0	JULY 13- JULY 20	3.92	7.8	.25	1.73	38.4	3.63	.48
170	8.1	JULY 20- JULY 28	3.44	6.9	.19	1.57	34.7	4.19	.37
171	5.8	JULY 28- AUG. 3	3.69	7.6	.23	1.34	29.4	2.34	.57
172	7.3	AUG. 3- AUG. 10	4.14	7.6	.25	1.85	40.9	3.86	.48
173	6.8	AUG. 10- AUG. 17	4.27	8.3	.29	1.95	43.4	4.90	.40
174	7.0	AUG. 17- AUG. 24	4.75	10.1	.39	2.74	61.0	5.08	.54
175	7.1	AUG. 24- AUG. 31	4.29	9.2	.32	2.29	50.5	3.33	.69

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1974	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
176	6.8	AUG. 31-SEPT. 7	4.31	10.7	.37	2.54	54.0	3.89	.65
177	7.2	SEPT. 7-SEPT. 14	4.68	9.3	.35	2.55	56.2	3.58	.71
178	7.0	SEPT. 14-SEPT. 21	3.97	8.3	.27	1.86	38.1	2.46	.76
179	7.1	SEPT. 21-SEPT. 28	3.76	8.8	.27	1.89	38.7	3.05	.62
180	7.8	SEPT. 28- OCT. 6	4.49	7.6	.27	2.13	43.9	4.04	.53
181	7.0	OCT. 6- OCT. 13	3.47	7.8	.22	1.54	31.1	2.49	.62
182	7.0	OCT. 13- OCT. 20	3.02	7.9	.19	1.36	26.9	2.21	.62
183	7.0	OCT. 20- OCT. 27	3.73	6.1	.19	1.29	25.3	1.12	1.15
184	7.1	OCT. 27- NOV. 3	4.84	7.7	.30	2.14	41.8	1.55	1.38
185	6.1	NOV. 3- NOV. 9	2.58	8.6	.18	1.10	21.5	0.71	1.55
186	7.0	NOV. 9- NOV. 16	4.18	7.1	.24	1.68	33.0	1.12	1.50
187	7.9	NOV. 16- NOV. 24	4.42	5.8	.21	1.63	32.3	1.80	.91
188	6.0	NOV. 24- NOV. 30	4.74	6.6	.26	1.53	30.5	----	----
189	8.0	NOV. 30- DEC. 8	2.87	5.4	.13	1.00	20.0	----	----
RECORD SEASON	204.1	MAY 18- DEC. 8			0.27	54.26	1190.1		
PAN SEASON	190.1	MAY 18- NOV. 24			0.27	51.73		92.87	0.56

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
190	7.1	MAY 10- MAY 17	4.73	3.2	.12	.88	18.6	3.91	0.22
191	6.9	MAY 17- MAY 24	6.01	4.4	.22	1.49	33.0	3.38	.44
192	7.1	MAY 24- MAY 31	4.54	5.5	.20	1.43	32.0	1.98	.72
193	7.2	MAY 31- JUNE 7	4.61	5.1	.19	1.37	31.3	4.17	.33
194	8.0	JUNE 7- JUNE 15	4.53	7.1	.26	2.07	49.0	3.53	.59
195	6.0	JUNE 15- JUNE 21	7.49	6.0	.36	2.19	54.7	4.55	.48
196	6.8	JUNE 21- JUNE 28	7.15	6.3	.37	2.48	64.3	6.68	.37
197	7.1	JUNE 28- JULY 5	3.97	8.4	.27	1.93	49.9	5.64	.34
198	7.9	JULY 5- JULY 13	4.54	5.9	.22	1.72	44.2	4.67	.37
199	6.0	JULY 13- JULY 19	3.44	7.6	.21	1.27	33.2	2.95	.43
200	7.2	JULY 19- JULY 26	4.02	7.1	.23	1.66	43.1	3.23	.51
201	6.9	JULY 26- AUG. 2	3.68	6.8	.20	1.40	35.6	4.22	.33
202	7.2	AUG. 2- AUG. 9	3.71	7.9	.24	1.70	43.0	4.90	.35

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
203	6.8	AUG. 9- AUG. 16	3.37	7.2	.20	1.34	33.6	2.41	.56
204	7.2	AUG. 16- AUG. 23	3.60	6.4	.19	1.33	33.4	3.25	.41
205	7.0	AUG. 23- AUG. 30	4.09	7.1	.24	1.64	40.6	4.67	.35
206	7.9	AUG. 30-SEPT. 7	3.82	7.8	.24	1.89	45.9	4.88	.39
207	7.0	SEPT. 7-SEPT. 14	3.51	8.4	.24	1.67	40.4	2.16	.77
208	7.0	SEPT. 14-SEPT. 21	4.75	10.1	.39	2.72	65.0	3.00	.91
209	7.0	SEPT. 21-SEPT. 28	4.12	10.1	.34	2.35	54.7	3.35	.70
210	7.1	SEPT. 28- OCT. 5	3.51	9.2	.26	1.86	42.0	2.67	.70
211	6.8	OCT. 5- OCT. 12	6.99	8.4	.48	3.25	72.9	4.88	.67
212	7.0	OCT. 12- OCT. 19	5.80	8.8	.41	2.89	63.4	3.15	.92
213	7.0	OCT. 19- OCT. 26	4.86	4.8	.19	1.31	27.7	2.39	.55
214	11.0	OCT. 26- NOV. 6	3.80	6.6	.20	2.22	48.1	----	----
RECORD SEASON	180.2	MAY 10- NOV. 6			0.26	46.06	1099.6		
PAN SEASON	169.2	MAY 10- OCT. 26			0.26	43.84		90.62	0.48

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1976	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
215	8.8	MAY 11- MAY 20	4.06	6.3	.21	1.83	33.8	4.60	0.40
216	7.0	MAY 20- MAY 27	3.43	5.3	.15	1.03	18.3	2.60	.40
217	5.0	MAY 27- JUNE 1	3.74	6.9	.21	1.04	18.7	2.13	.49
218	9.0	JUNE 1- JUNE 10	4.32	7.6	.27	2.40	42.6	6.48	.37
219	7.1	JUNE 10- JUNE 17	4.25	12.0	.41	2.95	49.2	6.35	.46
220	6.9	JUNE 17- JUNE 24	4.47	8.7	.31	2.16	33.5	4.47	.48
221	7.0	JUNE 24- JULY 1	4.69	9.4	.36	2.50	35.3	5.31	.47
222	9.0	JULY 1- JULY 10	3.72	5.8	.17	1.56	21.0	5.79	.27
223	5.0	JULY 10- JULY 15	3.82	6.0	.19	.94	12.6	4.42	.21
224	7.0	JULY 15- JULY 22	3.73	5.5	.17	1.16	16.2	3.76	.31
225	7.0	JULY 22- JULY 29	3.34	7.2	.19	1.36	19.7	2.95	.46
226	7.0	JULY 29- AUG. 5	3.85	6.9	.21	1.50	23.2	2.82	.53
227	7.0	AUG. 5- AUG. 12	5.06	13.7	.56	3.94	65.2	4.62	.85
228	7.0	AUG. 12- AUG. 19	4.66	12.2	.46	3.23	55.3	4.93	.66
229	6.9	AUG. 19- AUG. 26	3.04	12.6	.31	2.14	36.4	3.71	.58
230	7.1	AUG. 26-SEPT. 2	3.72	13.4	.40	2.85	44.9	3.58	.80

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
231	7.1	SEPT. 2-SEPT. 9	3.73	12.7	.38	2.71	40.0	3.63	.75
232	6.9	SEPT. 9-SEPT. 16	3.65	11.3	.33	2.32	34.2	2.34	.99
233	7.0	SEPT. 16-SEPT. 23	3.75	11.6	.35	2.48	36.7	2.74	.90
234	7.0	SEPT. 23-SEPT. 30	2.22	11.9	.21	1.49	22.2	1.55	.96
235	7.0	SEPT. 30- OCT. 7	4.59	11.1	.41	2.88	44.0	2.44	1.18
236	7.0	OCT. 7- OCT. 14	2.40	11.6	.22	1.57	24.2	2.21	.71
237	7.0	OCT. 14- OCT. 21	4.33	11.5	.40	2.82	44.2	----	----
238	7.0	OCT. 21- OCT. 28	3.43	10.3	.29	2.00	32.6	----	----
239	7.0	OCT. 28- NOV. 4	2.19	8.9	.16	1.11	18.9	----	----
240	7.0	NOV. 4- NOV. 11	2.67	8.1	.18	1.23	21.8	----	----
241	7.0	NOV. 11- NOV. 18	2.62	7.6	.16	1.13	20.5	----	----
242	7.0	NOV. 18- NOV. 25	3.09	7.0	.18	1.23	22.5	----	----
243	7.0	NOV. 25- DEC. 2	3.64	7.8	.23	1.59	29.2	----	----
244	7.0	DEC. 2- DEC. 9	3.54	6.2	.18	1.25	22.9	----	----
245	7.0	DEC. 9- DEC. 16	2.74	6.1	.14	.95	17.4	----	----
RECORD SEASON	218.8	MAY 11- DEC. 16			0.27	59.35	957.2		
PAN SEASON	155.8	MAY 11- OCT. 14			0.30	46.04		83.43	0.55

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1977	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
246	13.9	MAY 19- JUNE 2	4.62	7.8	.29	4.06	71.2	----	----
247	14.0	JUNE 2- JUNE 16	3.96	8.6	.28	3.88	68.2	9.52	0.41
248	14.0	JUNE 16- JUNE 30	4.99	11.0	.44	6.20	108.6	9.60	.64
249	14.0	JUNE 30- JULY 14	5.09	13.5	.55	7.75	135.1	11.35	.68
250	14.1	JULY 14- JULY 28	3.30	10.3	.28	3.88	64.9	6.60	.59
251	14.0	JULY 28- AUG. 11	3.92	12.2	.39	5.42	91.0	8.71	.62
252	14.0	AUG. 11- AUG. 25	3.39	8.5	.23	3.30	55.3	5.36	.62
253	13.9	AUG. 25-SEPT. 8	4.04	12.3	.40	5.63	94.1	8.05	.70
254	14.0	SEPT. 8-SEPT. 22	4.96	13.4	.54	7.55	125.6	7.39	1.02
255	14.0	SEPT. 22- OCT. 6	5.89	12.5	.60	8.34	138.2	8.15	1.02
256	14.0	OCT. 6- OCT. 20	3.93	12.0	.38	5.32	88.2	5.61	.95
257	14.0	OCT. 20- NOV. 3	3.00	8.4	.20	2.87	47.5	----	----
258	14.0	NOV. 3- NOV. 17	3.99	7.6	.25	3.44	56.6	----	----
259	14.1	NOV. 17- DEC. 1	7.02	6.3	.36	5.03	82.1	----	----
RECORD SEASON	196.0	MAY 19- DEC. 1			0.37	72.67	1226.6		
PAN SEASON	140.0	JUNE 2- OCT. 20			0.41	57.27		80.34	0.71

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
260	14.0	APRIL 27- MAY 11	4.44	6.6	.24	3.31	53.3	----	----
261	14.0	MAY 11- MAY 25	6.06	8.7	.43	6.00	97.6	10.69	0.56
262	14.0	MAY 25- JUNE 8	4.24	6.9	.24	3.33	55.3	4.77	.70
263	14.0	JUNE 8- JUNE 22	6.35	10.6	.55	7.65	131.5	14.96	.51
264	14.0	JUNE 22- JULY 6	4.61	12.9	.48	6.73	111.1	11.48	.59
265	14.0	JULY 6- JULY 20	4.46	13.9	.50	7.05	116.2	9.86	.72
266	13.9	JULY 20- AUG. 3	4.15	12.2	.41	5.71	97.2	8.97	.64
267	13.0	AUG. 3- AUG. 16	4.63	12.3	.46	6.00	103.3	9.42	.64
268	15.0	AUG. 16- AUG. 31	4.97	12.5	.50	7.54	129.5	9.52	.79
269	14.0	AUG. 31-SEPT. 14	4.75	13.2	.51	7.09	123.4	10.82	.66
270	14.0	SEPT. 14-SEPT. 28	4.61	12.6	.47	6.56	116.7	7.16	.92
271	14.0	SEPT. 28- OCT. 12	3.58	12.8	.37	5.20	94.5	6.07	.86
272	14.0	OCT. 12- OCT. 26	3.91	11.0	.35	4.88	90.3	3.94	1.24
273	14.0	OCT. 26- NOV. 9	3.43	9.6	.27	3.75	70.8	3.63	1.03
274	13.0	NOV. 9- NOV. 22	5.62	9.9	.45	5.88	110.4	----	----
275	8.1	NOV. 22- NOV. 30	5.28	8.4	.36	2.92	54.9	----	----
RECORD SEASON	217.0	APRIL 27- NOV. 30			0.41	89.60	1556.0		
PAN SEASON	181.9	MAY 11- NOV. 9			0.43	77.49		111.29	0.70

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
276	6.9	MAY 7- MAY 14	5.06	8.3	.34	2.35	53.3	2.92	0.80
277	7.3	MAY 14- MAY 21	3.72	7.0	.21	1.54	35.9	2.82	.55
278	6.7	MAY 21- MAY 28	4.48	5.4	.19	1.31	31.3	2.39	.55
279	7.0	MAY 28- JUNE 4	3.97	8.6	.28	1.93	48.0	2.92	.66
280	7.1	JUNE 4- JUNE 11	3.25	8.9	.23	1.65	43.6	2.72	.61
281	7.1	JUNE 11- JUNE 18	4.68	8.3	.31	2.22	62.8	5.89	.38
282	6.8	JUNE 18- JUNE 25	6.13	7.7	.38	2.60	74.7	4.85	.54
283	7.0	JUNE 25- JULY 2	3.70	6.5	.20	1.38	39.7	4.50	.31
284	7.1	JULY 2- JULY 9	3.89	7.7	.24	1.73	49.7	4.44	.39
285	6.9	JULY 9- JULY 16	4.05	6.3	.21	1.42	40.9	5.38	.26
286	7.0	JULY 16- JULY 23	3.46	5.5	.15	1.07	30.7	4.01	.27
287	7.0	JULY 23- JULY 30	3.77	5.7	.17	1.21	34.7	3.61	.34
288	7.0	JULY 30- AUG. 6	3.76	9.6	.29	2.05	58.6	5.21	.39
289	7.0	AUG. 6- AUG. 13	3.73	6.4	.19	1.35	38.5	3.50	.38
290	7.1	AUG. 13- AUG. 20	5.08	9.4	.39	2.72	78.0	2.29	1.19

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1979	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
291	7.0	AUG. 20- AUG. 27	3.50	9.4	.27	1.85	53.1	2.44	.76
292	7.0	AUG. 27-SEPT. 3	4.32	9.8	.34	2.41	69.0	4.44	.54
293	7.0	SEPT. 3-SEPT. 10	2.95	9.4	.22	1.57	44.8	4.06	.39
294	7.0	SEPT. 10-SEPT. 17	4.49	10.2	.37	2.59	74.1	3.38	.77
295	7.0	SEPT. 17-SEPT. 24	3.86	8.6	.27	1.89	54.2	2.72	.69
296	7.0	SEPT. 24- OCT. 1	3.79	8.2	.25	1.77	50.6	3.35	.53
297	6.9	OCT. 1- OCT. 8	3.89	8.3	.26	1.82	50.4	3.22	.56
298	7.0	OCT. 8- OCT. 15	3.48	7.0	.20	1.37	37.0	2.44	.56
299	7.1	OCT. 15- OCT. 22	6.21	6.8	.34	2.41	63.3	2.74	.88
300	7.0	OCT. 22- OCT. 29	3.51	6.6	.19	1.31	34.3	2.01	.65
301	7.0	OCT. 29- NOV. 5	5.76	9.0	.42	2.95	77.2	----	----
302	6.9	NOV. 5- NOV. 12	4.25	7.8	.27	1.86	48.5	----	----
303	7.1	NOV. 12- NOV. 19	2.76	7.3	.16	1.16	30.0	----	----
RECORD SEASON	196.0	MAY 7- NOV. 19			0.26	51.49	1406.9		
PAN SEASON	175.0	MAY 7- OCT. 19			0.26	45.52		88.25	0.52

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

	Period		U2.0	EO-EA	Reservoir evaporation computed by mass-transfer method			Pan evaporation	Ratio of reservoir to pan evaporation
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
304	5.8	MAY 13- MAY 19	3.47	4.6	.13	.75	21.6	1.04	0.72
305	7.1	MAY 19- MAY 26	7.14	6.8	.39	2.79	80.2	5.49	.51
306	7.0	MAY 26- JUNE 2	6.47	7.0	.37	2.54	73.2	6.63	.38
307	7.1	JUNE 2- JUNE 9	7.98	6.8	.44	3.10	89.4	5.97	.52
308	7.0	JUNE 9- JUNE 16	6.07	9.0	.44	3.09	89.2	6.32	.49
309	7.0	JUNE 16- JUNE 23	4.25	8.4	.29	2.02	58.3	5.18	.39
310	7.0	JUNE 23- JUNE 30	5.90	10.5	.50	3.53	101.5	6.48	.54
311	7.0	JUNE 30- JULY 7	4.39	9.8	.35	2.44	70.3	4.47	.54
312	7.0	JULY 7- JULY 14	4.23	10.2	.35	2.45	70.3	5.00	.49
313	7.0	JULY 14- JULY 21	4.60	11.3	.42	2.95	84.6	5.61	.52
314	7.0	JULY 21- JULY 28	4.34	11.9	.42	2.94	80.5	4.11	.72
315	7.0	JULY 28- AUG. 4	4.07	11.8	.39	2.71	77.9	4.70	.58
316	7.0	AUG. 4- AUG. 11	4.43	11.4	.41	2.87	75.5	4.42	.65
317	7.0	AUG. 11- AUG. 18	4.29	12.1	.42	2.95	77.6	4.57	.64
318	7.0	AUG. 18- AUG. 25	6.45	11.8	.62	4.33	114.6	5.56	.78
319	7.0	AUG. 25-SEPT. 1	4.77	12.1	.47	3.28	86.6	3.96	.83

Table 6.--*Summary of mass-transfer terms and pan evaporation for Cheesman Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
320	7.0	SEPT. 1-SEPT. 8	3.98	10.3	.33	2.32	62.1	4.04	.57
321	7.0	SEPT. 8-SEPT. 15	5.82	9.8	.46	3.26	86.5	3.56	.92
322	7.0	SEPT. 15-SEPT. 22	6.61	11.3	.60	4.23	111.9	5.41	.78
323	7.0	SEPT. 22-SEPT. 29	4.45	11.2	.40	2.81	74.4	3.30	.85
324	7.0	SEPT. 29- OCT. 6	3.81	11.0	.34	2.38	63.1	3.56	.67
325	7.0	OCT. 6- OCT. 13	3.95	10.1	.32	2.25	59.9	3.00	.75
326	7.0	OCT. 13- OCT. 20	5.71	10.9	.50	3.53	94.1	2.34	1.51
327	7.0	OCT. 20- OCT. 27	4.15	10.4	.35	2.45	65.2	----	----
328	7.0	OCT. 27- NOV. 3	2.86	9.0	.21	1.45	38.3	----	----
329	7.0	NOV. 3- NOV. 10	4.69	7.7	.29	2.04	53.7	----	----
330	7.0	NOV. 10- NOV. 17	3.93	8.1	.26	1.81	47.8	----	----
331	7.0	NOV. 17- NOV. 24	3.16	8.2	.21	1.45	38.5	----	----
332	7.0	NOV. 24- DEC. 1	3.13	6.3	.16	1.12	29.9	----	----
333	7.0	DEC. 1- DEC. 8	3.80	5.4	.17	1.17	31.5	----	----
RECORD SEASON	209.0	MAY 13- DEC. 8			0.37	77.01	2108.2		
PAN SEASON	160.0	MAY 13- OCT. 20			0.41	65.52		104.72	0.62

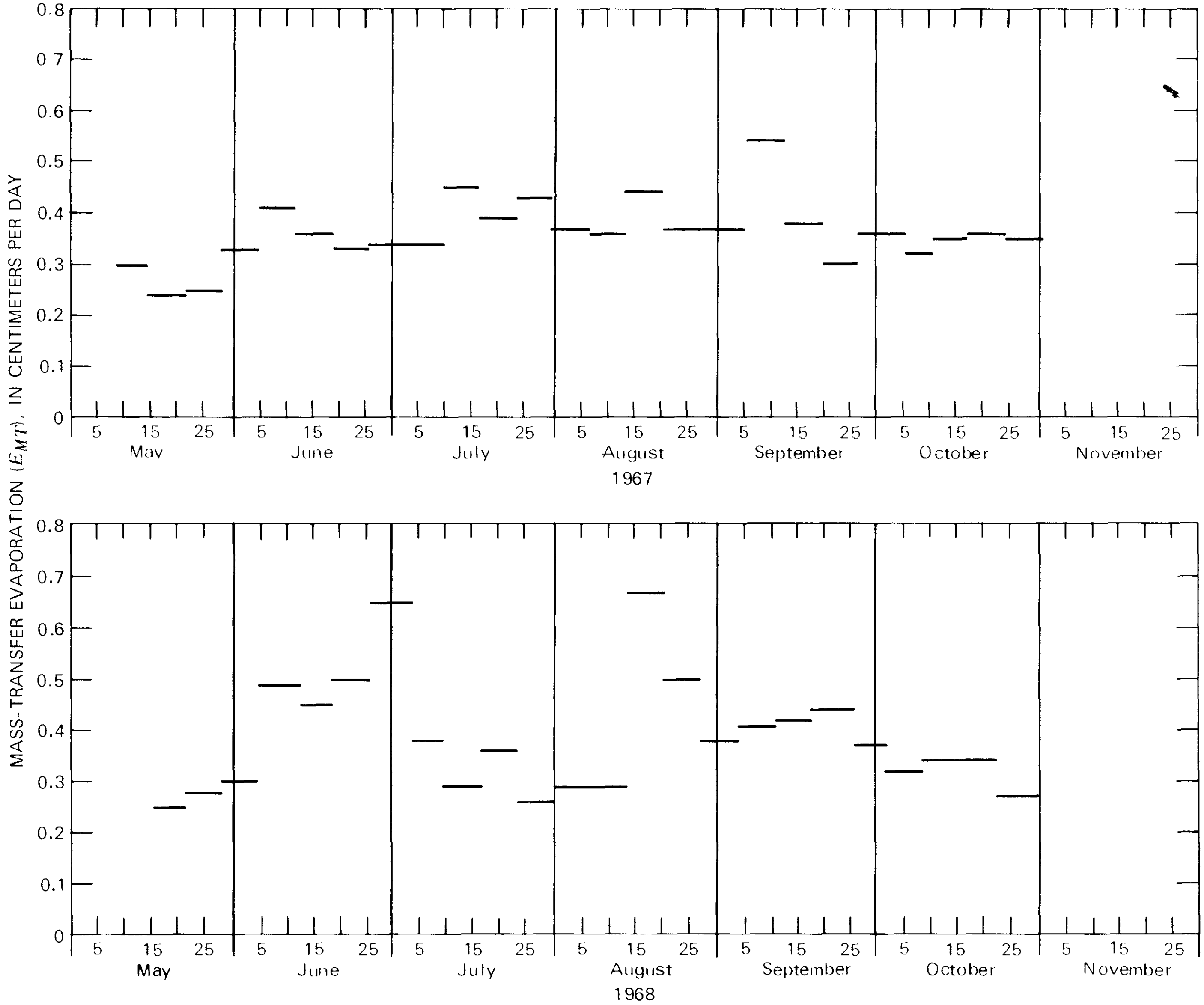

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons.

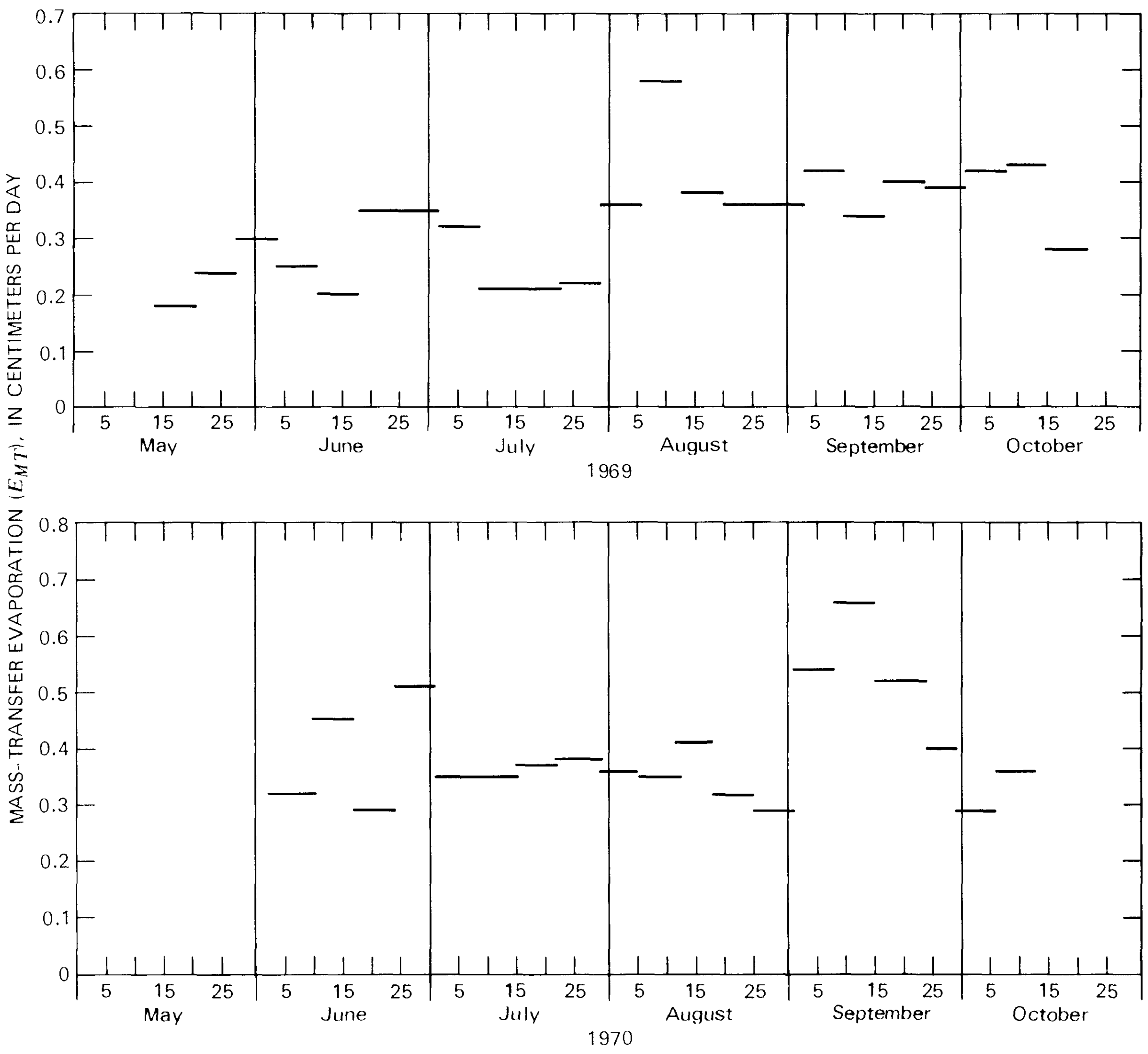

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons--Continued.

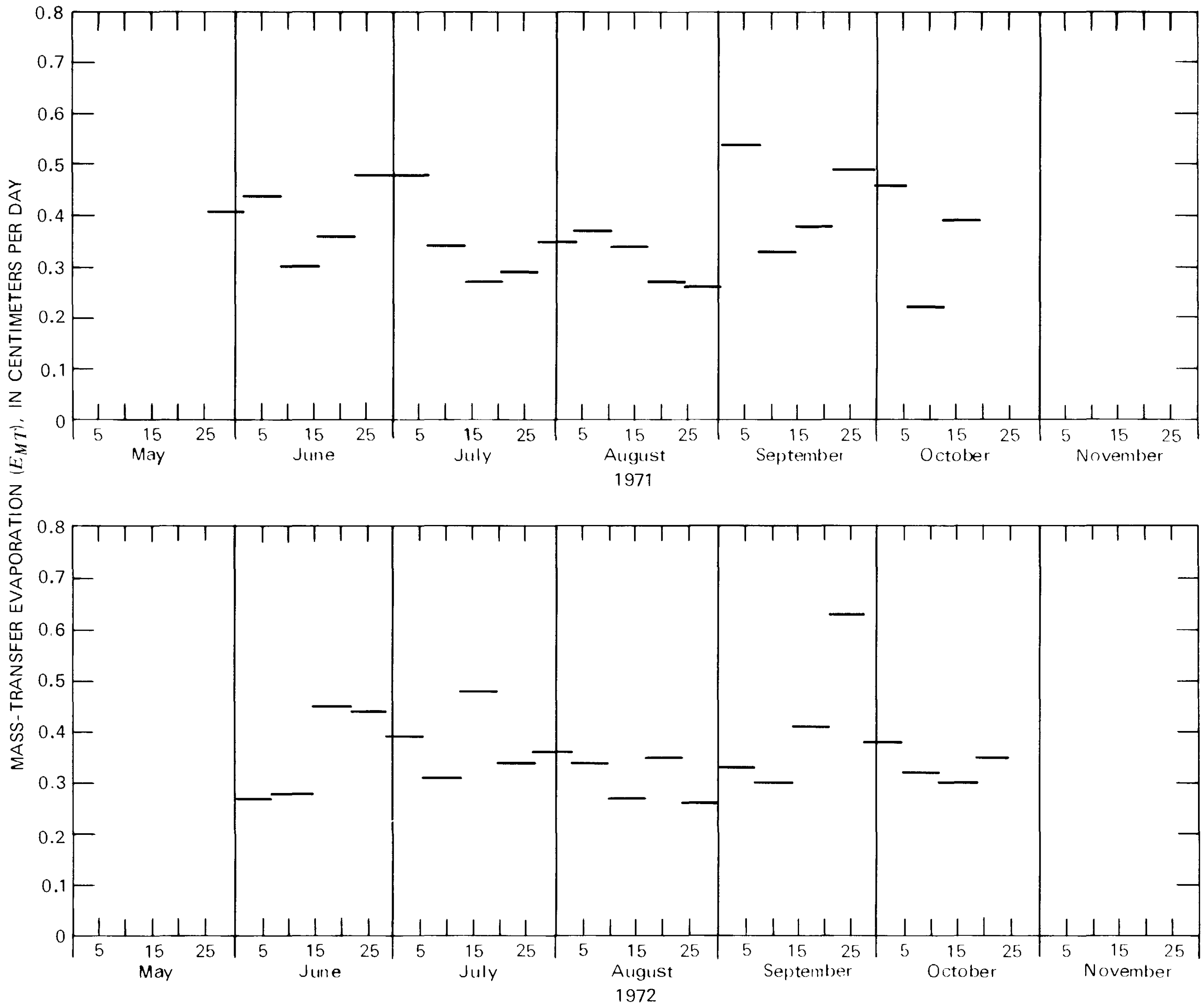

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons--Continued.

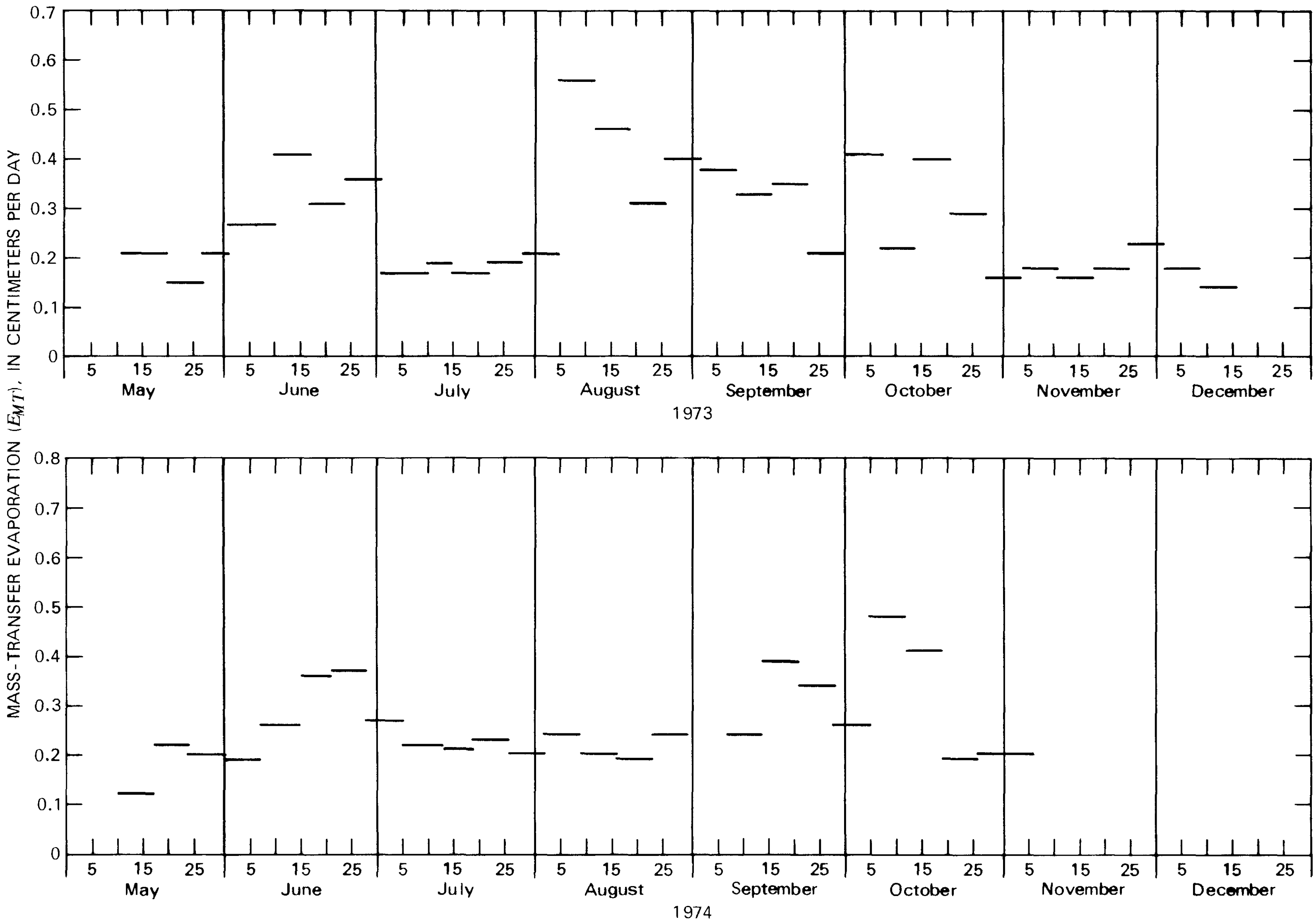

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons--Continued.

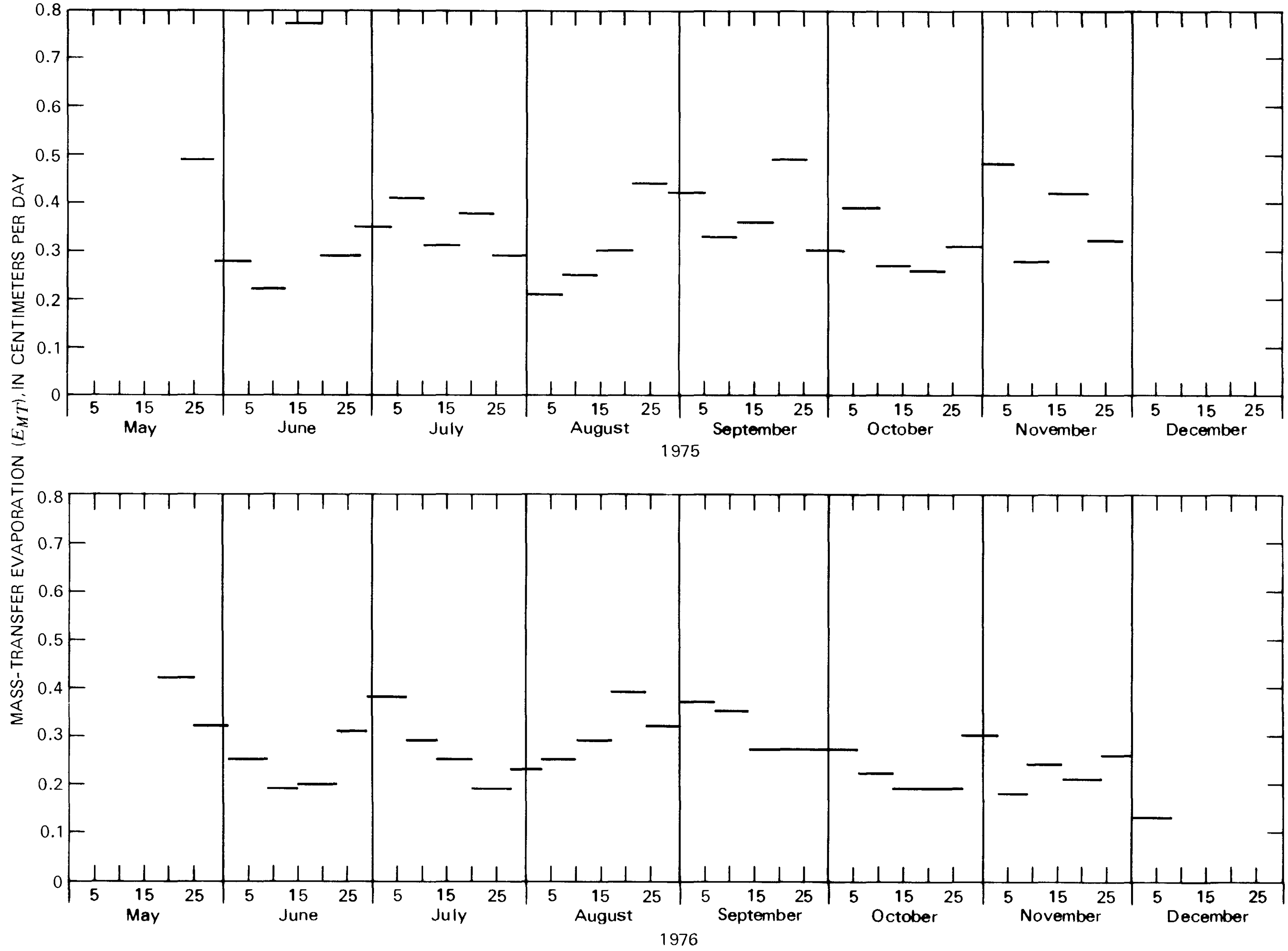

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons--Continued.

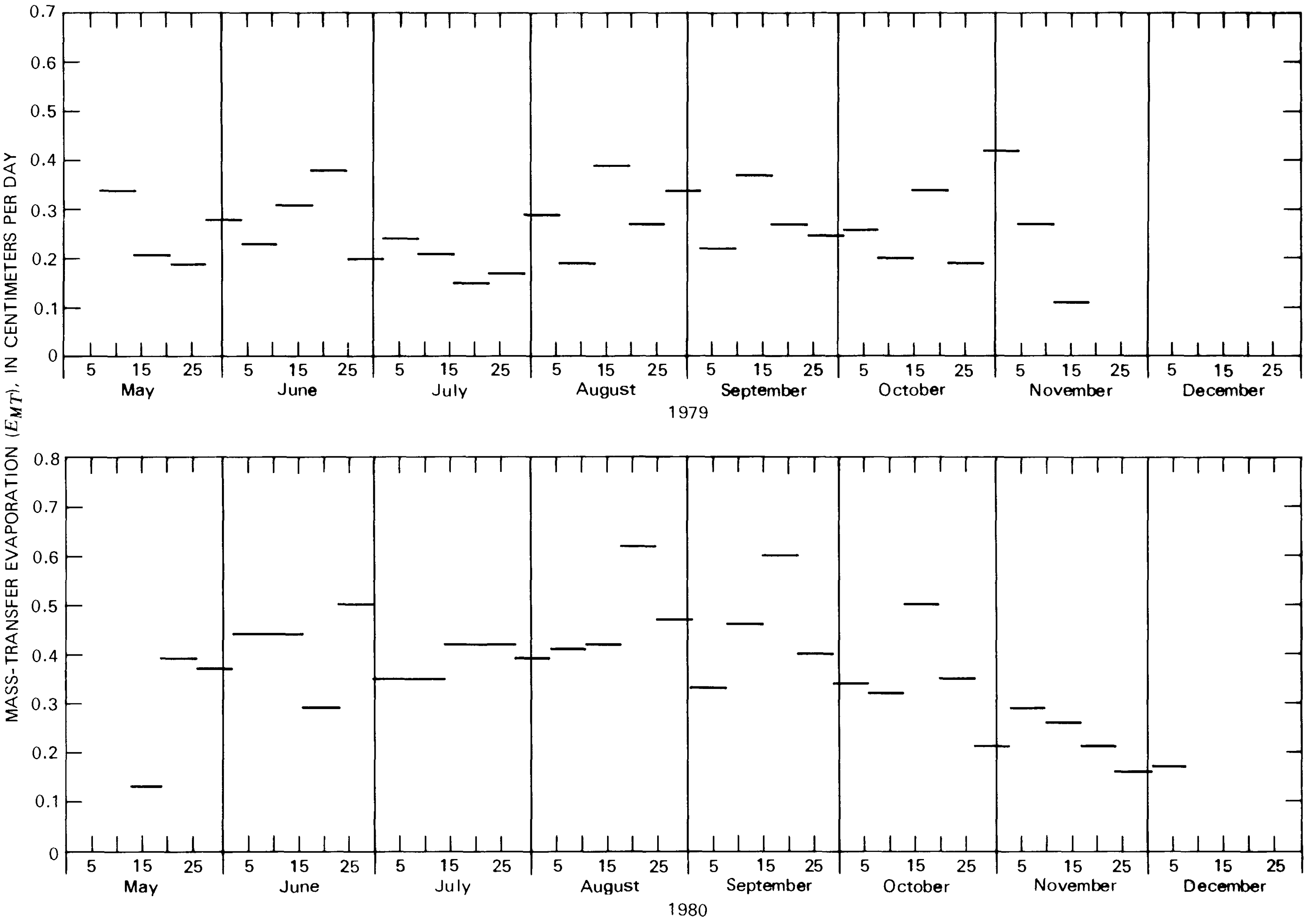

Figure 21.--Rates of mass-transfer evaporation, E_{MT}, from Cheesman Reservoir for the 1967-76 and 1979-80 record seasons--Continued.

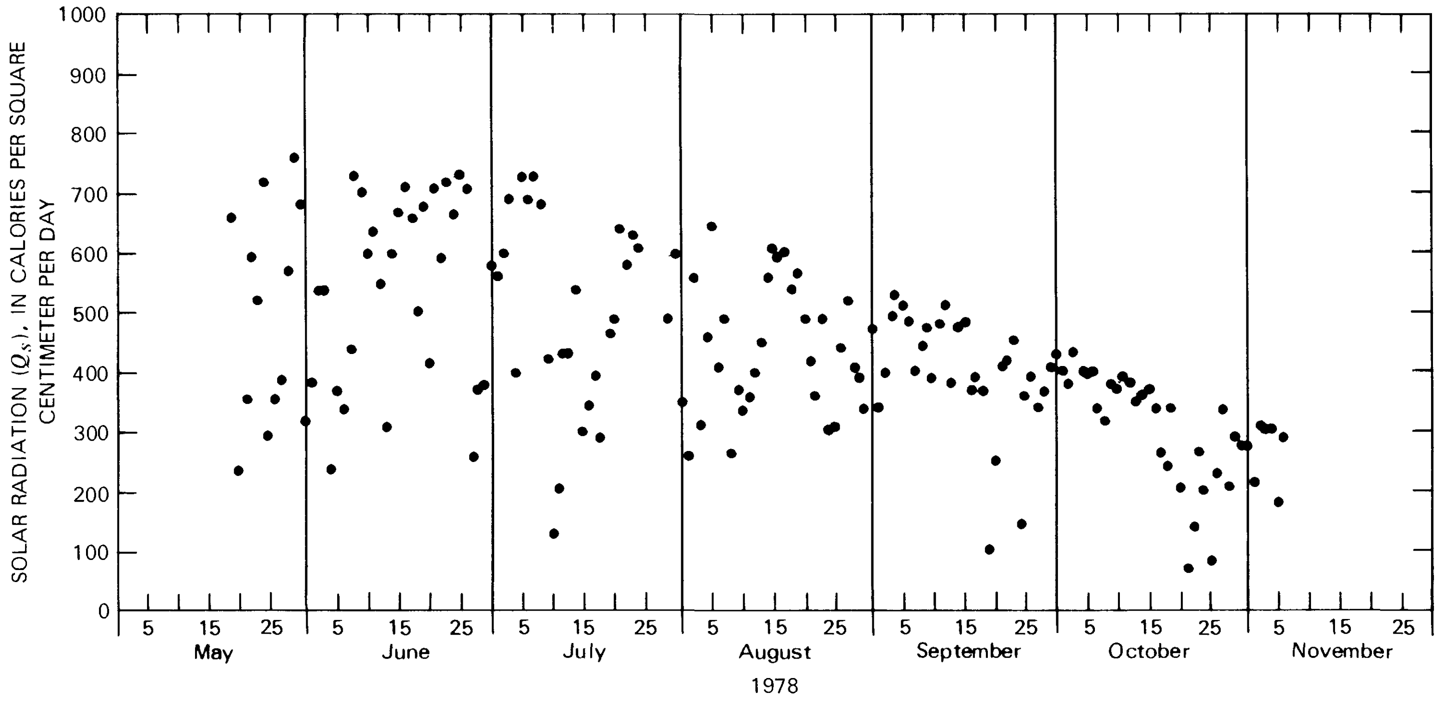

Figure 22.-- Total daily solar radiation, Q_S, at Antero Reservoir, May-November 1978.

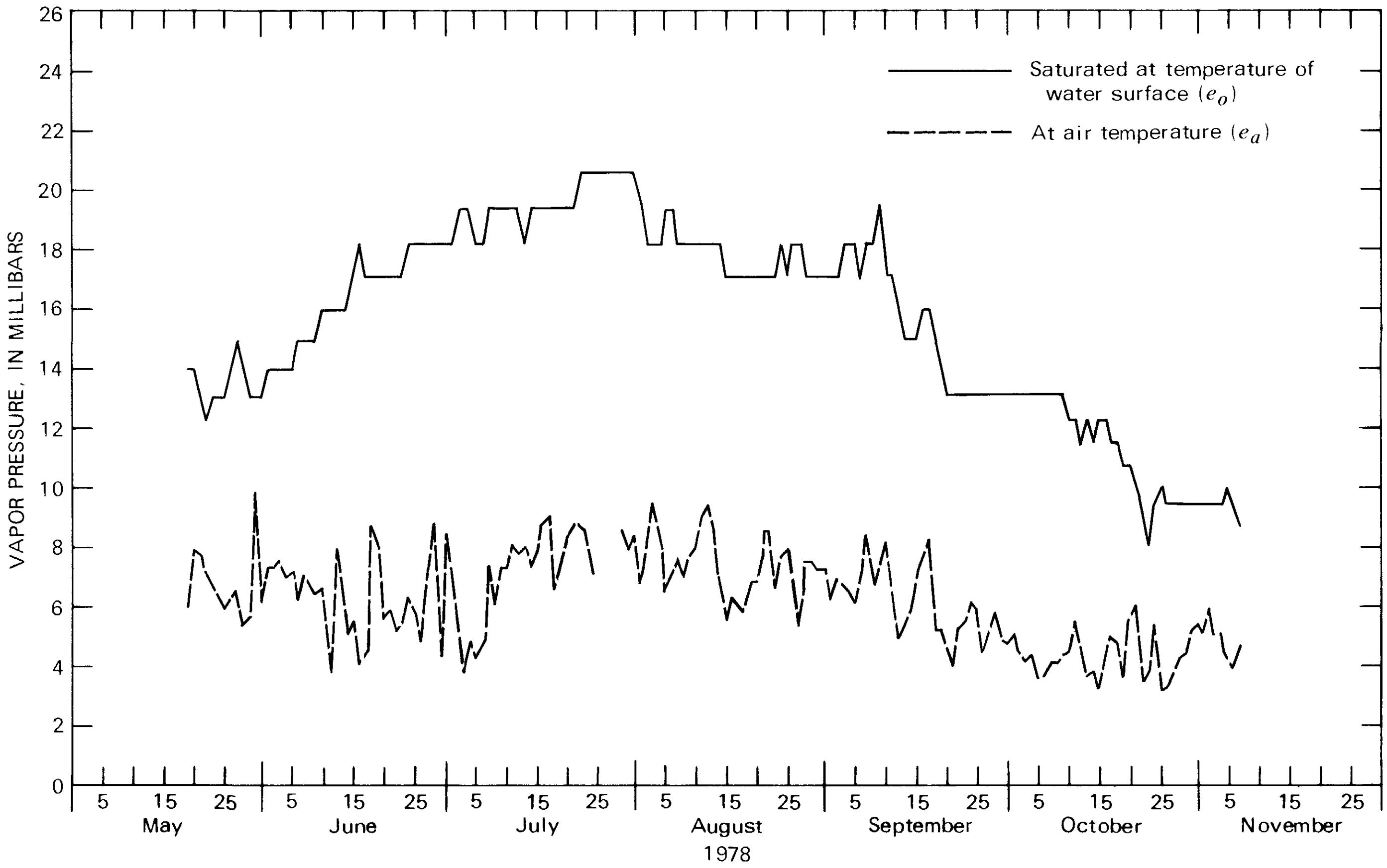

Figure 23.--Daily vapor pressures, e_o and e_a, at Antero Reservoir, May-November 1978.

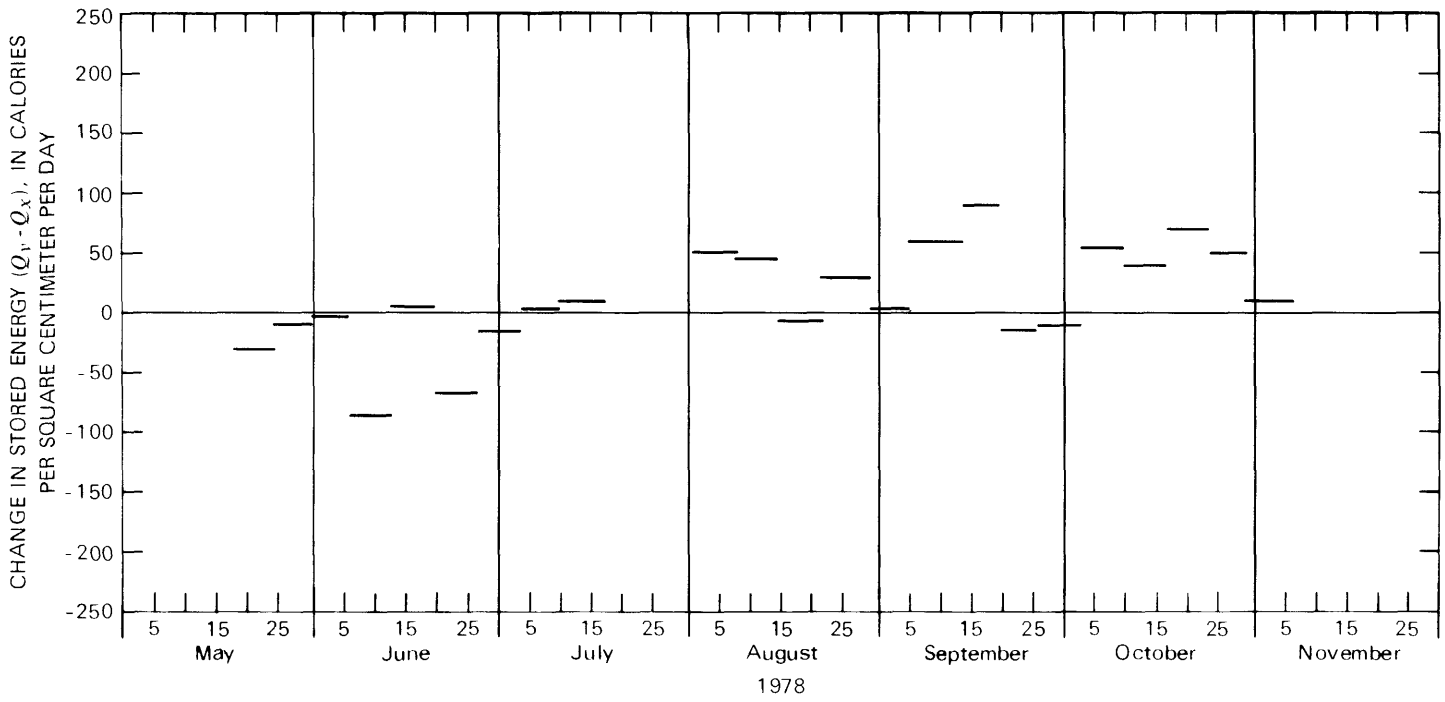

Figure 24.--Advected energy minus changes in stored energy, Q_v-Q_x, for Antero Reservoir, May-November 1978.

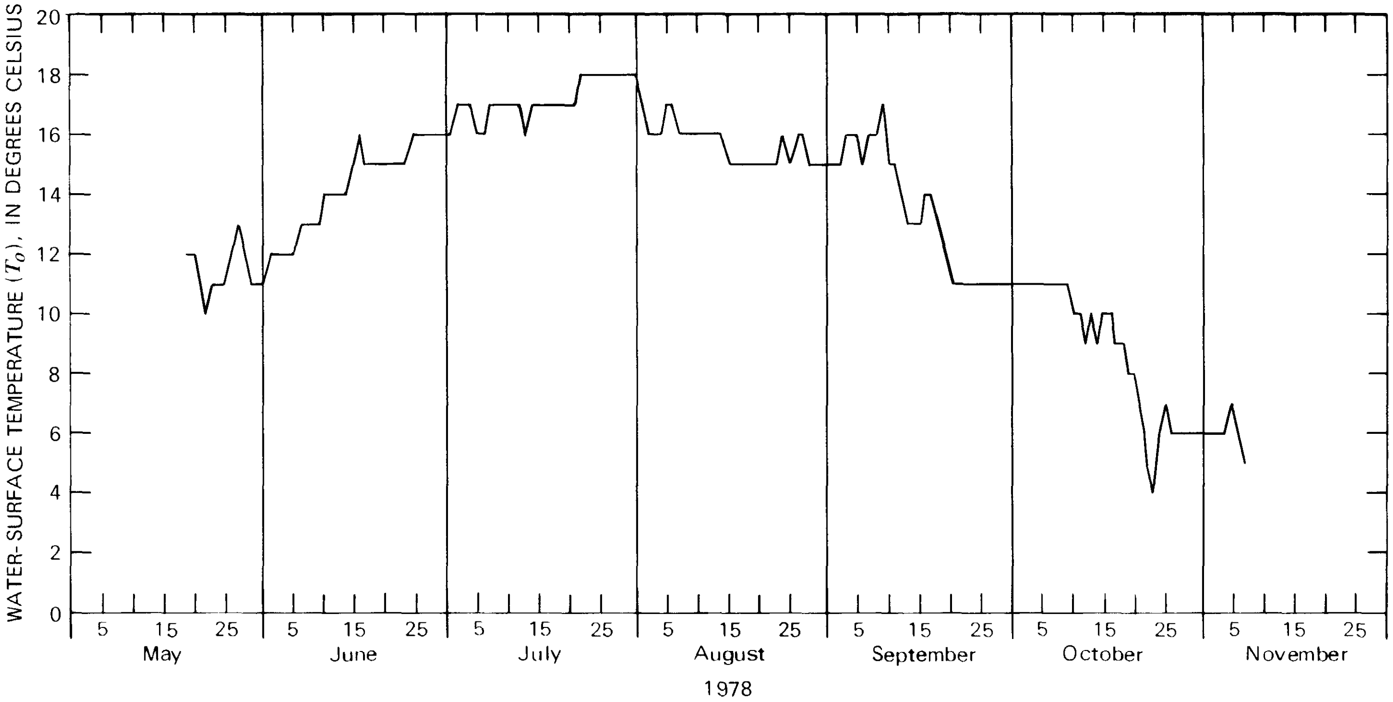

Figure 25.--Daily water-surface temperature, T_o, of Antero Reservoir, May-November 1978.

Values for the terms in equation 8 for 1977 and 1978 energy-budget evaporation from Antero Reservoir are shown in table 7. Hydrographs of energy-budget evaporation rates are shown in figure 26. Evaporation rates ranged from 0.05 to 0.74 centimeters per day. The recorder for the radiation station was inoperative for a short period during 1978. During this time, energy-budget determinations of evaporation were not made.

Mass Transfer

Determination of the mass-transfer coefficient, *N*.--The energy-budget and mass-transfer data for 1977 and 1978 were used to determine a value of *N* for Antero Reservoir. The evaporation rate from the energy budget, E_{EB}, is plotted against the mass-transfer product, $U_{2.0}(e_o - e_a)$ in figure 27. A summary of different methods used to determine a value of *N* from data in figure 27 is given in figure 28.

The results shown in figure 28 were used to select an *N* value of 0.00650 for Antero Reservoir. Using Harbeck's equation (equation 13 of this report), a value for *N* of 0.0059 was determined. The value determined by the energy-budget analysis is within 10 percent of the value predicted by Harbeck's equation. A large seasonal variation in the values of *N* is apparent in figure 28. A greater number of periods of evaporation was measured in 1978 than in 1977. The 1978 data also encompassed a larger range of values; therefore, the overall value of *N* was weighted towards the 1978 data.

Data.--Mass-transfer data were collected at Antero Reservoir from 1977 to 1980. Hygrothermograph data were collected at a station near the caretakers' houses on the south side of the reservoir. Wind-speed data collected at the raft during 1978 are shown in figure 29. All data were collected as described earlier. No evaporation data were obtained at Antero Reservoir from 1972 through 1976.

A summary of mass-transfer terms and pan evaporation for Antero Reservoir for the 1967-71 and 1977-80 seasons is given in table 8. Data for 1967-71 are from Ficke and others (1977), using the updated value of *N* of 0.00650 to determine evaporation rates.

Mass-transfer evaporation rates ranged from 0.08 to 0.75 centimeter per day. Hydrographs of the mass-transfer evaporation rates are shown for the 1967-71 and 1979-80 seasons in figure 30. Mass-transfer evaporation rates for 1977-78 are shown in figure 26.

Pan Evaporation

Pan-evaporation data were collected at a station near the caretakers' houses. Period of pan evaporation and ratios of reservoir evaporation to pan evaporation are given in table 8. The ratios vary within and between seasons.

Table 7.--*Summary of energy-budget terms and evaporation for Antero Reservoir*

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1977	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
1	7.0	MAY 31- JUNE 7	451	32	728	768	11	56	298	28	7	.092	.51	3.53
2	7.0	JUNE 7- JUNE 14	568	41	744	786	3	88	355	35	9	.100	.60	4.24
3	7.0	JUNE 14- JUNE 21	647	40	686	799	-5	-19	437	58	12	.132	.74	5.17
4	7.0	JUNE 21- JUNE 28	557	36	687	797	4	24	330	51	9	.156	.56	3.93
5	7.1	JUNE 28- JULY 5	577	37	682	802	-3	15	349	43	10	.125	.59	4.19
6	6.9	JULY 5- JULY 12	533	35	665	802	-2	-51	332	69	10	.206	.56	3.92
7	7.0	JULY 12- JULY 19	493	34	682	804	1	46	254	30	7	.117	.43	3.02
8	7.1	JULY 19- JULY 26	384	28	704	810	33	17	210	48	6	.229	.36	2.53
9	6.9	JULY 26- AUG. 2	567	38	699	812	2	16	335	56	10	.167	.57	3.92
10	7.2	AUG. 2- AUG. 9	505	34	735	811	-5	-22	354	47	11	.132	.60	4.32
11	7.0	AUG. 9- AUG. 16	406	30	690	813	5	-12	219	44	7	.203	.37	2.61
12	6.9	AUG. 16- AUG. 23	392	29	712	814	7	-8	216	53	7	.244	.37	2.54
13	6.9	AUG. 23- AUG. 30	483	33	651	806	-1	-67	296	55	9	.187	.50	3.48
14	7.0	AUG. 30-SEPT. 6	475	38	655	797	-1	-21	251	56	7	.221	.43	3.00
15	7.1	SEPT. 6-SEPT. 13	369	28	703	798	-1	-50	231	57	7	.249	.39	2.79
16	7.0	SEPT. 13-SEPT. 20	454	34	680	776	-2	-50	281	83	7	.297	.48	3.32
17	7.0	SEPT. 20-SEPT. 27	457	35	718	751	-3	-69	355	92	7	.260	.60	4.20
RECORD SEASON	119.1	MAY 31-SEPT. 27											0.51	60.71

Table 7.--*Summary of energy-budget terms and evaporation for Antero Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1978	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
18	7.0	MAY 18- MAY 25	485	34	599	741	0	29	225	52	4	.230	.38	2.65
19	6.1	MAY 25- MAY 31	515	36	568	746	0	11	207	79	4	.379	.35	2.14
20	5.9	MAY 31- JUNE 6	389	29	609	750	-1	0	152	63	3	.415	.26	1.52
21	7.0	JUNE 6- JUNE 13	571	38	678	765	3	85	301	55	7	.183	.51	3.56
22	6.9	JUNE 13- JUNE 20	592	39	707	781	14	9	408	65	10	.160	.69	4.80
23	7.1	JUNE 20- JUNE 27	646	41	709	787	18	85	410	38	11	.093	.70	4.96
24	6.9	JUNE 27- JULY 4	487	33	691	796	7	21	278	49	8	.177	.47	3.27
25	6.1	JULY 4- JULY 10	612	40	654	800	7	4	360	57	10	.159	.61	3.73
26	8.0	JULY 10- JULY 18	351	27	699	802	10	-2	196	30	6	.152	.33	2.68
27	6.7	AUG. 1- AUG. 8	435	31	655	796	7	-43	242	65	7	.267	.41	2.76
28	7.0	AUG. 8- AUG. 15	401	30	672	792	6	-41	231	61	6	.262	.39	2.73
29	7.0	AUG. 15- AUG. 22	541	37	697	782	2	8	354	51	9	.145	.60	4.20

Table 7.--*Summary of energy-budget terms and evaporation for Antero Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1978	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
30	8.0	AUG. 22- AUG. 30	403	30	666	786	1	-29	227	50	6	.219	.39	3.09
31	6.0	AUG. 30-SEPT. 5	436	32	645	785	0	-3	221	39	6	.177	.38	2.27
32	9.0	SEPT. 5-SEPT. 14	454	33	625	784	-0	-61	263	54	7	.204	.45	4.01
33	6.2	SEPT. 14-SEPT. 20	370	28	631	761	-1	-87	224	68	5	.302	.38	2.37
34	5.8	SEPT. 20-SEPT. 26	330	30	577	739	-1	17	87	32	2	.368	.15	.85
35	7.0	SEPT. 26- OCT. 3	397	31	572	739	-1	7	154	34	3	.223	.26	1.82
36	7.0	OCT. 3- OCT. 10	378	30	533	739	-1	-54	144	47	3	.326	.24	1.71
37	6.9	OCT. 10- OCT. 17	355	30	509	726	-1	-39	109	36	2	.328	.18	1.27
38	7.0	OCT. 17- OCT. 24	238	20	517	700	-1	-71	66	37	1	.567	.11	.78
39	6.0	OCT. 24- OCT. 30	201	19	505	690	-1	-51	27	20	0	.735	.05	.27
40	7.9	OCT. 30- NOV. 7	279	26	478	689	0	-12	36	18	0	.486	.06	.48
RECORD SEASON	158.5	MAY 18- JULY 18 AUG. 1- NOV. 7											0.36	57.92

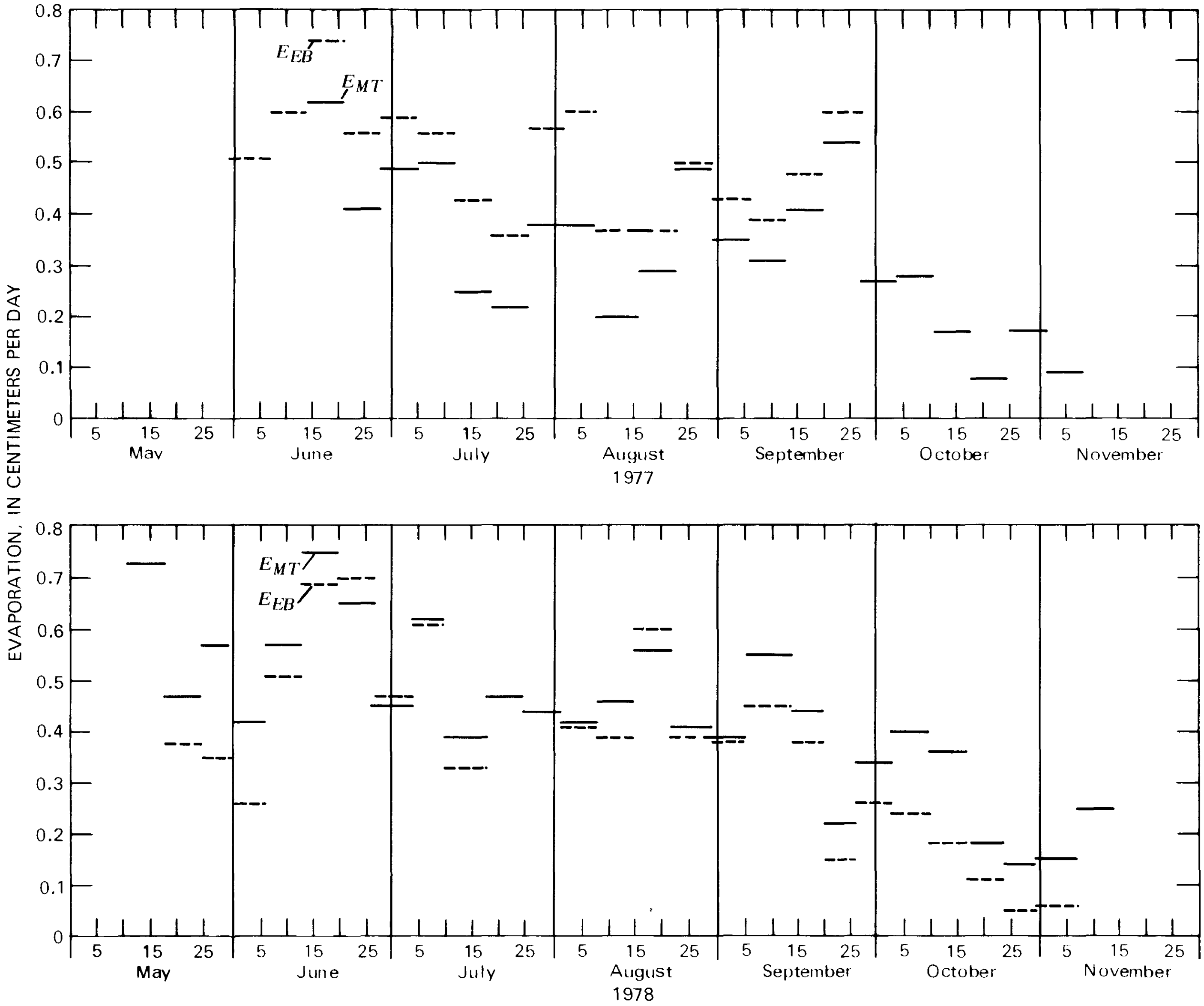

Figure 26.--Rates of energy-budget, E_{EB}, and mass-transfer, E_{MT}, evaporation from Antero Reservoir for the 1977-78 record seasons.

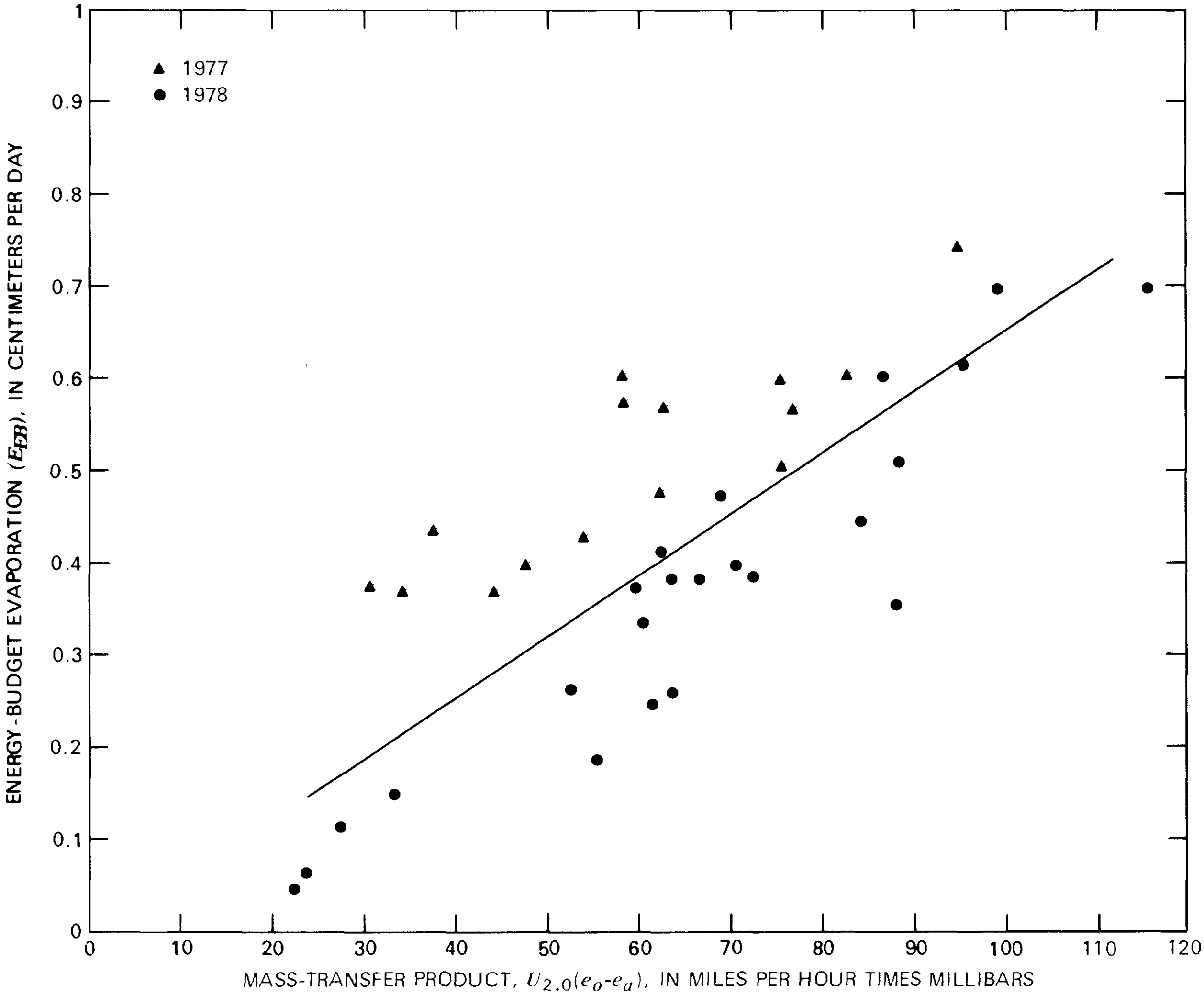

Figure 27.--Calibration of the mass-transfer product against evaporation measured by the energy-budget method at Antero Reservoir.

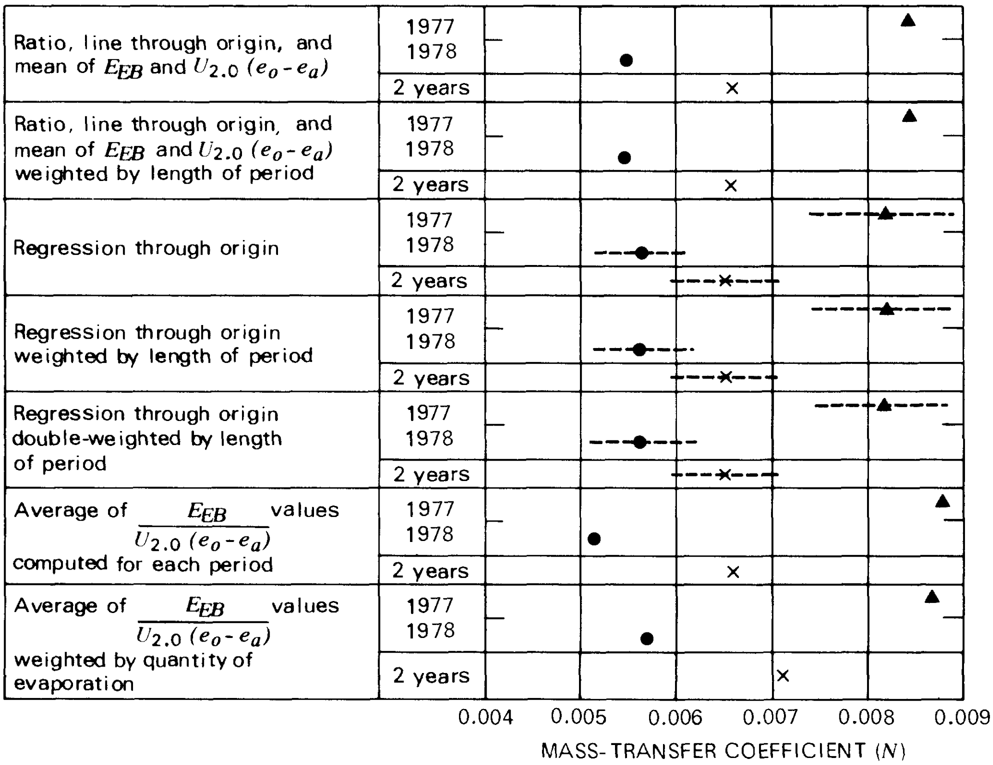

Figure 28.-- Values of mass-transfer coefficients for Antero Reservoir as determined by different means of calculation from the energy-budget data. Dashed lines through some symbols represent 95-percent confidence limits.

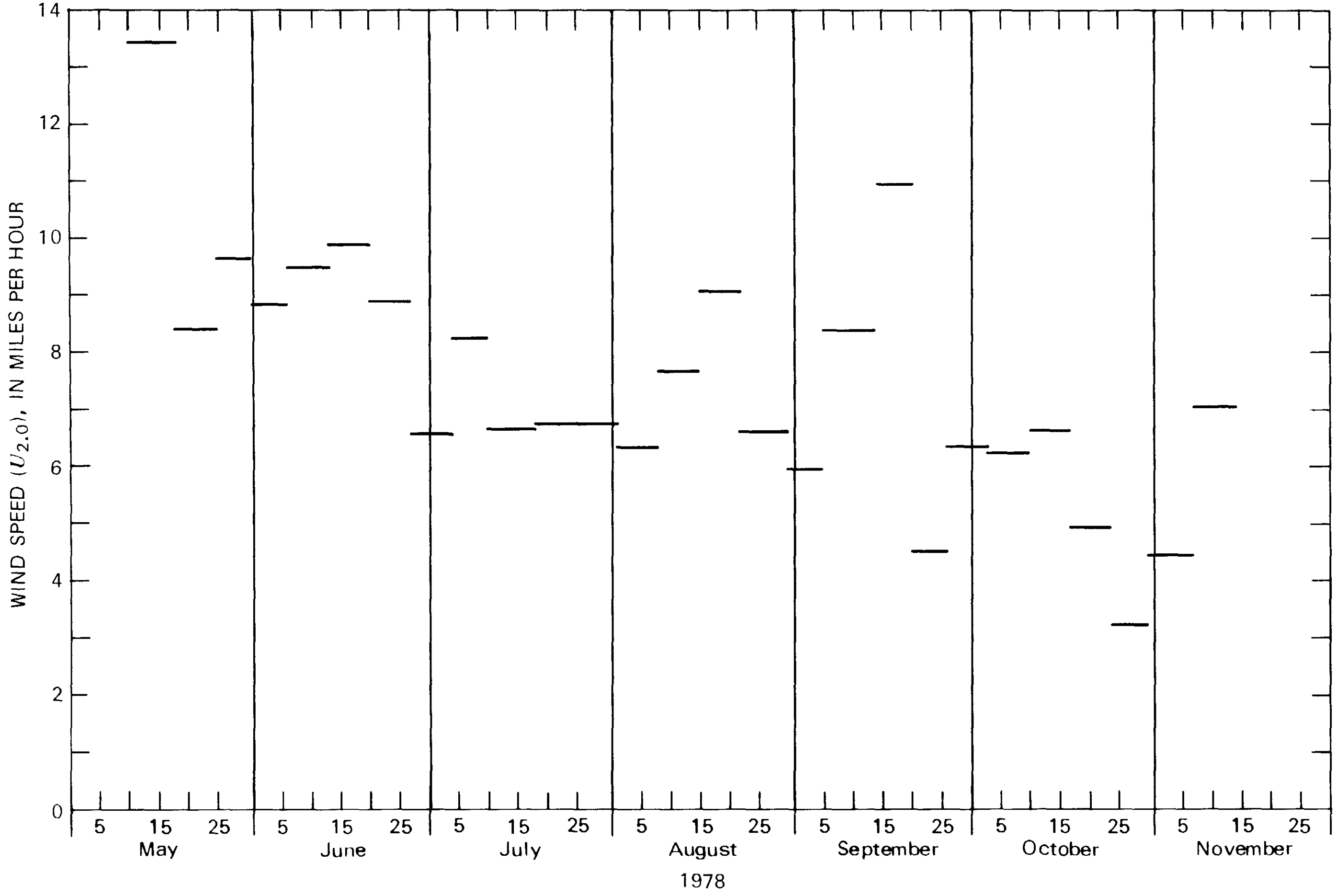

Figure 29.--Wind speeds, $U_{2.0}$, at Antero Reservoir, May-November 1978.

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*

	PERIOD		U2.0	E0-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1967	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
1	7.0	JULY 25- AUG. 1	5.20	11.7	.40	2.77	165.8	4.14	0.67
2	7.0	AUG. 1- AUG. 8	5.10	10.5	.35	2.44	146.1	3.25	.75
3	7.0	AUG. 8- AUG. 15	5.00	10.1	.33	2.30	138.6	2.97	.77
4	7.0	AUG. 15- AUG. 22	5.40	10.5	.37	2.58	156.0	3.28	.79
5	8.0	AUG. 22- AUG. 30	4.80	8.9	.28	2.22	134.4	3.53	.63
6	7.0	AUG. 30-SEPT. 6	5.60	7.9	.29	2.01	122.2	2.67	.75
7	7.0	SEPT. 6-SEPT. 13	7.50	8.7	.42	2.97	180.3	3.18	.93
8	7.0	SEPT. 13-SEPT. 20	6.70	8.9	.39	2.71	164.8	2.94	.92
9	7.0	SEPT. 20-SEPT. 27	4.20	7.5	.20	1.43	87.0	2.84	.50
10	7.0	SEPT. 27- OCT. 4	5.90	8.0	.31	2.15	130.4	3.68	.58
11	7.0	OCT. 4- OCT. 11	6.50	7.1	.30	2.10	127.5	2.21	.95
12	7.0	OCT. 11- OCT. 18	6.80	6.8	.30	2.10	127.7	2.57	.82
13	7.0	OCT. 18- OCT. 25	8.20	6.7	.36	2.50	151.7	2.92	.86
14	7.0	OCT. 25- NOV. 1	10.80	----	---	----	-----	2.26	----
RECORD SEASON	92.0	JULY 25- OCT. 25			0.33	30.28	1832.5	40.18	0.75
PAN SEASON	99.0	JULY 25- NOV. 1						42.44	

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1968	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
15	7.0	MAY 17- MAY 22	7.70	----	---	----	-----	2.54	----
16	7.0	MAY 22- MAY 29	10.30	7.7	.52	3.61	228.9	5.31	0.68
17	7.0	MAY 29- JUNE 5	5.90	7.2	.28	1.93	122.1	4.98	.39
18	7.0	JUNE 5- JUNE 12	7.80	9.8	.50	3.48	219.9	4.90	.71
19	7.0	JUNE 12- JUNE 19	7.60	10.0	.49	3.46	219.6	6.45	.54
20	7.0	JUNE 19- JUNE 26	6.60	9.8	.42	2.94	187.7	6.05	.48
21	7.0	JUNE 26- JULY 3	9.10	11.7	.69	4.84	309.0	7.80	.62
22	7.0	JULY 3- JULY 10	5.90	7.3	.28	1.96	125.2	3.56	.55
23	7.0	JULY 10- JULY 17	5.30	8.0	.28	1.93	123.2	4.50	.43
24	7.0	JULY 17- JULY 24	5.70	9.6	.36	2.49	159.1	4.34	.57
25	7.0	JULY 24- JULY 31	5.10	6.9	.23	1.60	102.4	2.84	.56
26	7.0	JULY 31- AUG. 7	4.60	7.8	.23	1.63	104.2	2.46	.66
27	7.0	AUG. 7- AUG. 14	4.90	6.9	.22	1.54	98.5	2.46	.63

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1968	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
28	7.0	AUG. 14- AUG. 21	9.50	11.4	.70	4.93	314.6	5.11	.96
29	7.0	AUG. 21- AUG. 28	6.80	10.1	.45	3.12	199.9	4.55	.68
30	7.0	AUG. 18-SEPT. 4	6.10	9.2	.36	2.55	163.1	2.97	.86
31	7.0	SEPT. 4-SEPT. 11	5.60	9.8	.36	2.50	159.5	3.81	.66
32	7.0	SEPT. 11-SEPT. 18	7.70	9.0	.45	3.15	201.4	3.43	.92
33	7.0	SEPT. 18-SEPT. 25	6.90	7.6	.34	2.39	152.2	3.73	.64
34	7.0	SEPT. 25- OCT. 2	5.60	7.4	.27	1.88	120.5	3.12	.60
35	7.0	OCT. 2- OCT. 9	6.60	6.6	.28	1.98	126.6	2.90	.68
36	7.0	OCT. 9- OCT. 16	7.40	5.4	.26	1.82	116.1	2.44	.74
37	7.0	OCT. 16- OCT. 23	7.70	6.7	.34	2.35	149.8	----	----
38	7.0	OCT. 23- OCT. 30	5.50	5.3	.19	1.33	84.8	----	----
RECORD SEASON	161.0	MAY 22- OCT. 30			0.37	59.41	3788.3		
PAN SEASON	147.0	MAY 22- OCT. 16			0.38	55.73		87.71	0.64

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1969	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
39	7.0	MAY 14- MAY 21	5.60	7.1	.26	1.81	115.7	3.96	0.46
40	7.0	MAY 21- MAY 28	6.00	7.8	.30	2.12	136.6	4.62	.46
41	7.0	MAY 28- JUNE 4	7.60	9.5	.47	3.28	210.7	6.07	.54
42	7.0	JUNE 4- JUNE 11	6.90	8.3	.37	2.60	167.2	4.60	.56
43	7.0	JUNE 11- JUNE 18	6.10	7.7	.30	2.14	138.0	2.13	1.00
44	8.0	JUNE 18- JUNE 26	8.80	7.2	.41	3.29	211.6	5.11	.64
45	6.0	JUNE 26- JULY 2	9.00	7.5	.44	2.63	168.4	5.28	.50
46	7.0	JULY 2- JULY 9	6.50	7.8	.33	2.31	148.0	5.97	.39
47	7.0	JULY 9- JULY 16	4.70	7.9	.24	1.69	108.3	4.39	.38
48	7.0	JULY 16- JULY 23	----	----	---	----	-----	4.06	----
49	7.0	JULY 23- JULY 30	----	----	---	----	-----	4.62	----
50	7.0	JULY 30- AUG. 6	----	----	---	----	-----	4.85	----

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1969	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
51	7.0	AUG. 6- AUG. 13	----	----	---	----	-----	5.69	----
52	7.0	AUG. 13- AUG. 29	5.40	11.6	.41	2.85	182.0	3.63	.78
53	7.0	AUG. 20- AUG. 27	5.00	9.6	.31	2.18	139.7	3.81	.57
54	7.0	AUG. 27-SEPT. 3	5.20	8.7	.29	2.06	131.3	3.43	.60
55	7.0	SEPT. 3-SEPT. 10	5.60	10.0	.36	2.55	162.6	3.78	.67
56	7.0	SEPT. 10-SEPT. 17	4.80	9.3	.29	2.03	129.7	2.46	.82
57	7.0	SEPT. 17-SEPT. 24	5.10	8.1	.27	1.88	120.3	2.34	.80
58	7.0	SEPT. 24- OCT. 1	5.30	8.8	.30	2.12	135.5	3.38	.63
59	7.0	OCT. 1- OCT. 8	7.30	8.3	.39	2.76	176.8	2.11	1.31
60	8.0	OCT. 8- OCT. 16	6.60	----	---	----	-----	----	----
61	6.0	OCT. 16- OCT. 22	5.70	----	---	----	-----	----	----
RECORD SEASON	119.0	MAY 14- JULY 16 AUG. 13- OCT. 8			0.34	40.30	2582.4	67.07	0.60
PAN SEASON	147.0	MAY 14- OCT. 8						86.29	

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
62	7.0	JUNE 3- JUNE 10	7.40	7.6	.36	2.56	155.1	4.67	0.55
63	7.0	JUNE 10- JUNE 17	8.90	7.3	.42	2.96	184.7	5.26	.56
64	7.0	JUNE 17- JUNE 24	6.10	7.5	.30	2.08	132.9	5.54	.38
65	7.0	JUNE 24- JULY 1	6.80	9.9	.44	3.06	195.6	6.60	.46
66	7.0	JULY 1- JULY 8	5.00	11.3	.37	2.57	165.1	5.18	.50
67	7.0	JULY 8- JULY 15	4.40	10.9	.31	2.18	140.0	4.32	.50
68	7.0	JULY 15- JULY 22	5.40	12.5	.44	3.07	196.2	4.57	.67
69	7.0	JULY 22- JULY 29	5.60	10.6	.38	2.70	172.7	3.94	.68
70	7.0	JULY 29- AUG. 5	4.50	10.8	.32	2.21	141.3	4.75	.46
71	7.0	AUG. 5- AUG. 12	4.00	10.2	.26	1.86	118.9	6.20	.30

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
72	7.0	AUG. 12- AUG. 19	4.70	11.4	.35	2.44	155.9	4.01	.61
73	7.0	AUG. 19- AUG. 26	3.90	9.1	.23	1.61	103.0	3.35	.48
74	7.0	AUG. 26-SEPT. 2	4.70	9.4	.29	2.01	128.3	3.61	.56
75	7.0	SEPT. 2-SEPT. 9	7.30	8.7	.41	2.89	184.3	3.73	.77
76	7.0	SEPT. 9-SEPT. 16	8.10	7.0	.37	2.58	164.7	3.81	.68
77	7.0	SEPT. 16-SEPT. 23	6.00	8.3	.32	2.26	144.8	4.04	.56
78	7.0	SEPT. 23-SEPT. 30	3.90	7.2	.18	1.28	81.6	1.50	.85
79	8.0	SEPT. 30- OCT. 8	5.20	6.0	.20	1.62	103.5	2.84	.57
80	7.0	OCT. 8- OCT. 15	----	----	---	----	-----	----	----
RECORD SEASON	127.0	JUNE 3- OCT. 8			0.33	41.94	2668.6		
PAN SEASON	127.0	JUNE 3- OCT. 8			0.33	41.94		77.92	0.54

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1971	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
81	3.8	JUNE 6- JUNE 10	6.51	8.1	.34	1.31	85.0	3.72	0.35
82	6.0	JUNE 10- JUNE 16	6.35	7.8	.32	1.95	126.5	4.83	.40
83	7.0	JUNE 16- JUNE 23	6.10	8.0	.32	2.22	144.0	5.72	.39
84	7.2	JUNE 23- JUNE 30	7.01	10.5	.48	3.42	222.0	8.53	.40
85	6.8	JUNE 30- JULY 7	7.56	9.6	.47	3.19	207.1	6.15	.52
86	7.0	JULY 7- JULY 14	5.79	9.4	.35	2.48	161.2	6.84	.36
87	7.0	JULY 14- JULY 21	4.88	8.8	.28	1.94	126.2	4.84	.40
88	7.1	JULY 21- JULY 28	5.54	8.5	.31	2.17	141.2	4.61	.47
89	7.0	JULY 28- AUG. 4	5.71	8.7	.32	2.25	146.2	5.29	.42
90	6.9	AUG. 4- AUG. 11	5.60	8.0	.29	2.01	130.5	4.90	.41
91	8.0	AUG. 11- AUG. 19	4.98	7.4	.24	1.93	124.9	5.33	.36
92	6.0	AUG. 19- AUG. 25	4.20	6.7	.18	1.09	71.0	3.25	.34
93	7.0	AUG. 25-SEPT. 1	4.02	7.9	.21	1.44	93.6	3.45	.42
94	7.0	SEPT. 1-SEPT. 8	7.33	10.2	.49	3.42	221.6	5.07	.67
95	7.0	SEPT. 8-SEPT. 15	4.85	9.7	.30	2.13	130.4	5.77	.37
96	7.1	SEPT. 15-SEPT. 22	5.26	8.5	.29	2.07	134.8	----	----
97	7.1	SEPT. 22-SEPT. 29	7.55	6.7	.33	2.32	150.9	----	----
RECORD SEASON	115.0	JUNE 6-SEPT. 29			0.32	37.34	2425.1		
PAN SEASON	100.8	JUNE 6-SEPT. 15			0.33	32.95		78.30	0.42

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1977	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
98	7.0	JUNE 14- JUNE 21	7.91	12.0	.62	4.30	275.5	8.23	0.52
99	7.0	JUNE 21- JUNE 28	6.42	9.7	.41	2.84	181.8	5.44	.52
100	7.0	JUNE 28- JULY 5	7.86	9.6	.49	3.44	219.6	6.07	.57
101	7.0	JULY 5- JULY 12	6.36	12.1	.50	3.48	221.0	5.72	.61
102	7.0	JULY 12- JULY 19	5.37	7.0	.25	1.72	108.6	5.46	.32
103	7.0	JULY 19- JULY 26	5.28	6.5	.22	1.57	100.0	5.13	.31
104	7.0	JULY 26- AUG. 2	5.77	10.1	.38	2.64	169.2	5.26	.50
105	6.0	AUG. 2- AUG. 8	6.67	8.7	.38	2.27	144.3	3.84	.59
106	8.0	AUG. 8- AUG. 16	3.78	8.1	.20	1.60	101.5	4.04	.40
107	7.0	AUG. 16- AUG. 23	5.82	7.6	.29	2.03	129.6	3.78	.54
108	6.9	AUG. 23- AUG. 30	7.20	10.5	.49	3.36	213.4	5.05	.66

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
109	7.0	AUG. 30-SEPT. 6	6.07	8.9	.35	2.46	155.4	3.96	.62
110	7.1	SEPT. 6-SEPT. 13	5.81	8.2	.31	2.19	138.2	3.56	.62
111	6.9	SEPT. 13-SEPT. 20	6.96	9.0	.41	2.81	176.3	4.88	.58
112	7.0	SEPT. 20-SEPT. 27	9.21	9.0	.54	3.76	234.4	5.21	.72
113	7.0	SEPT. 27- OCT. 4	6.14	6.8	.27	1.91	118.2	3.96	.48
114	7.0	OCT. 4- OCT. 11	7.07	6.0	.28	1.95	120.7	2.87	.68
115	7.0	OCT. 11- OCT. 18	3.87	6.9	.17	1.22	75.1	----	----
116	7.0	OCT. 18- OCT. 25	2.67	4.3	.08	.53	32.7	----	----
117	7.0	OCT. 25- NOV. 1	5.08	5.1	.17	1.16	71.7	----	----
118	7.1	NOV. 1- NOV. 8	3.88	3.7	.09	.66	40.8	----	----
RECORD SEASON	147.0	JUNE 14- NOV. 8			0.33	47.90	3028.0		
PAN SEASON	118.9	JUNE 14- OCT. 11			0.37	44.33		82.46	0.54

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
119	7.1	MAY 11- MAY 18	13.41	8.4	.73	5.18	328.8	6.83	0.76
120	6.9	MAY 18- MAY 25	8.39	8.7	.47	3.28	207.2	4.98	.66
121	6.0	MAY 25- MAY 31	9.63	9.2	.57	3.46	218.2	4.93	.70
122	5.9	MAY 31- JUNE 6	8.85	7.2	.42	2.47	155.3	3.38	.73
123	7.0	JUNE 6- JUNE 13	9.49	9.3	.57	4.00	250.6	7.42	.54
124	6.9	JUNE 13- JUNE 20	9.89	11.7	.75	5.20	326.5	8.74	.59
125	7.0	JUNE 20- JUNE 27	8.98	11.1	.65	4.54	287.5	7.26	.62
126	7.0	JUNE 27- JULY 4	6.58	10.5	.45	3.17	202.2	6.86	.46
127	6.1	JULY 4- JULY 10	8.25	11.6	.62	3.78	241.1	4.42	.86
128	8.0	JULY 10- JULY 18	6.65	9.1	.39	3.13	200.4	5.69	.55
129	7.0	JULY 18- JULY 25	6.71	10.7	.47	3.26	210.1	6.40	.51
130	7.2	JULY 25- AUG. 1	6.74	10.0	.44	3.17	204.2	5.44	.58
131	6.7	AUG. 1- AUG. 8	6.32	9.9	.41	2.73	176.4	4.72	.58
132	7.0	AUG. 8- AUG. 15	7.68	9.2	.46	3.23	209.5	5.26	.61

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
133	7.0	AUG. 15- AUG. 22	9.06	9.6	.56	3.94	254.9	5.92	.66
134	8.0	AUG. 22- AUG. 30	6.57	9.7	.41	3.30	213.5	5.05	.65
135	6.0	AUG. 30-SEPT. 5	5.97	10.0	.39	2.34	151.5	4.44	.53
136	9.0	SEPT. 5-SEPT. 14	8.38	10.1	.55	4.96	319.8	6.81	.73
137	6.2	SEPT. 14-SEPT. 20	10.95	6.1	.44	2.72	174.3	3.12	.87
138	5.8	SEPT. 20-SEPT. 26	4.50	7.4	.22	1.25	79.9	1.73	.72
139	7.0	SEPT. 26- OCT. 3	6.37	8.3	.34	2.42	154.8	4.32	.56
140	7.0	OCT. 3- OCT. 10	6.25	9.9	.40	2.81	179.0	4.47	.63
141	6.9	OCT. 10- OCT. 17	6.65	8.3	.36	2.50	159.1	----	----
142	7.2	OCT. 17- OCT. 24	4.93	5.6	.18	1.29	82.0	----	----
143	5.9	OCT. 24- OCT. 30	3.23	6.7	.14	.83	53.2	----	----
144	7.9	OCT. 30- NOV. 7	4.48	5.3	.15	1.22	78.4	----	----
145	7.0	NOV. 7- NOV. 14	7.05	5.4	.25	1.73	111.4	----	----
RECORD SEASON	186.7	MAY 11- NOV. 14			0.44	81.91	5229.8		
PAN SEASON	151.8	MAY 11- OCT. 17			0.49	74.34		118.19	0.62

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
146	9.9	MAY 21- MAY 31	7.40	7.1	.34	3.39	219.8	5.03	0.67
147	5.9	MAY 31- JUNE 6	5.72	9.7	.36	2.11	137.1	3.73	.56
148	5.2	JUNE 6- JUNE 11	8.14	8.4	.44	2.32	151.3	2.92	.79
149	8.9	JUNE 11- JUNE 20	9.14	10.8	.64	5.73	371.6	7.85	.73
150	6.8	JUNE 20- JUNE 27	5.95	9.4	.36	2.48	160.7	4.34	.57
151	7.1	JUNE 27- JULY 4	5.70	9.8	.36	2.55	165.3	4.50	.57
152	6.0	JULY 4- JULY 10	5.81	12.1	.46	2.73	177.3	5.08	.54
153	7.1	JULY 10- JULY 17	6.19	9.7	.39	2.79	180.2	4.11	.68
154	6.9	JULY 17- JULY 24	5.71	10.5	.39	2.66	171.7	4.93	.54
155	7.0	JULY 24- JULY 31	6.37	9.3	.39	2.70	174.7	4.80	.56
156	7.0	JULY 31- AUG. 7	5.72	12.8	.47	3.32	215.3	6.07	.55
157	9.0	AUG. 7- AUG. 16	6.73	9.2	.40	3.65	236.9	4.19	.87

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
158	7.0	AUG. 16- AUG. 23	5.84	9.1	.34	2.39	154.9	3.40	.70
159	7.0	AUG. 23- AUG. 30	5.23	9.3	.32	2.21	143.4	3.94	.56
160	7.0	AUG. 30-SEPT. 6	4.75	10.8	.33	2.32	150.5	4.39	.53
161	7.2	SEPT. 6-SEPT. 13	5.10	9.9	.33	2.39	154.8	3.07	.77
162	6.0	SEPT. 13-SEPT. 19	4.28	10.0	.28	1.67	108.1	----	----
163	6.8	SEPT. 19-SEPT. 26	7.85	8.3	.42	2.88	187.0	----	----
164	7.0	SEPT. 26- OCT. 3	6.54	8.6	.37	2.55	165.3	----	----
165	7.0	OCT. 3- OCT. 10	8.31	9.6	.52	3.61	234.1	----	----
166	8.2	OCT. 10- OCT. 18	6.71	7.8	.34	2.77	179.2	----	----
167	5.0	OCT. 18- OCT. 23	8.40	6.8	.37	1.87	121.4	----	----
RECORD SEASON	155.0	MAY 21- OCT. 23			0.39	61.09	3960.5		
PAN SEASON	115.0	MAY 21-SEPT. 13			0.40	45.74		72.35	0.63

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
168	11.0	MAY 21- JUNE 1	8.74	8.8	.50	5.47	354.9	9.65	0.57
169	5.0	JUNE 1- JUNE 6	9.63	10.3	.64	3.23	209.8	5.33	.61
170	6.0	JUNE 6- JUNE 12	8.05	10.2	.53	3.18	207.0	5.08	.62
171	8.0	JUNE 12- JUNE 20	8.74	12.1	.69	5.48	356.3	7.47	.73
172	6.1	JUNE 20- JUNE 26	6.46	12.2	.51	3.12	202.3	5.26	.59
173	7.9	JUNE 26- JULY 4	7.70	12.0	.60	4.73	308.0	7.19	.66
174	6.0	JULY 4- JULY 10	7.62	12.0	.60	3.56	231.0	4.44	.80
175	7.1	JULY 10- JULY 17	5.48	12.5	.44	3.17	205.2	5.66	.56
176	8.0	JULY 17- JULY 25	7.15	12.6	.58	4.66	300.8	5.76	.81
177	6.9	JULY 25- AUG. 1	6.66	11.0	.48	3.28	210.7	4.55	.72
178	6.4	AUG. 1- AUG. 7	5.96	11.1	.43	2.75	176.1	4.98	.55
179	8.6	AUG. 7- AUG. 16	7.22	11.4	.53	4.57	292.6	4.98	.92

Table 8.--*Summary of mass-transfer terms and pan evaporation for Antero Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1980	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
180	8.0	AUG. 16- AUG. 24	7.32	10.0	.47	3.81	244.4	5.16	.74
181	6.0	AUG. 24- AUG. 30	8.10	10.4	.55	3.31	212.7	4.29	.77
182	8.1	AUG. 30-SEPT. 7	5.47	7.9	.28	2.26	145.4	4.55	.50
183	7.0	SEPT. 7-SEPT. 14	6.70	9.8	.43	3.00	194.7	3.35	.90
184	5.9	SEPT. 14-SEPT. 20	9.64	9.9	.62	3.65	236.6	4.65	.78
185	9.0	SEPT. 20-SEPT. 29	6.94	8.2	.37	3.33	215.8	4.60	.72
186	9.1	SEPT. 29- OCT. 8	4.53	8.3	.24	2.22	144.3	----	----
187	11.2	OCT. 8- OCT. 19	7.93	6.7	.34	3.85	249.8	----	----
188	8.7	OCT. 19- OCT. 28	4.61	6.6	.20	1.72	111.9	----	----
189	7.0	OCT. 28- NOV. 4	3.89	5.1	.13	.90	58.6	----	----
190	7.9	NOV. 4- NOV. 12	5.82	3.6	.14	1.09	71.0	----	----
RECORD SEASON	174.9	MAY 21- NOV. 12			0.44	76.34	4940.1		
PAN SEASON	131.0	MAY 21-SEPT. 29			0.51	66.56		96.95	0.69

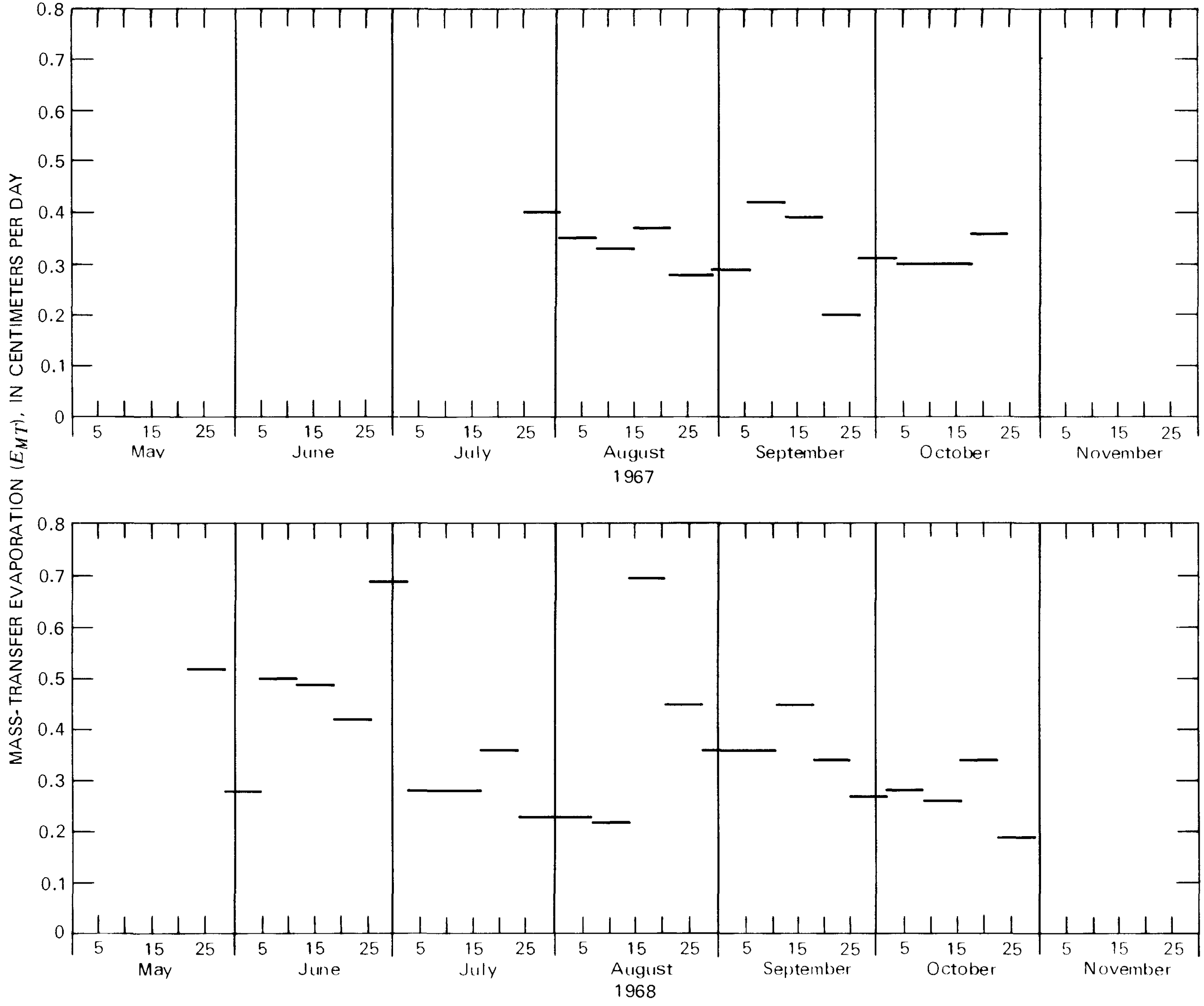

Figure 30.-- Rates of mass-transfer evaporation, E_{MT}, from Antero Reservoir for the 1967-71 and 1979-80 record seasons.

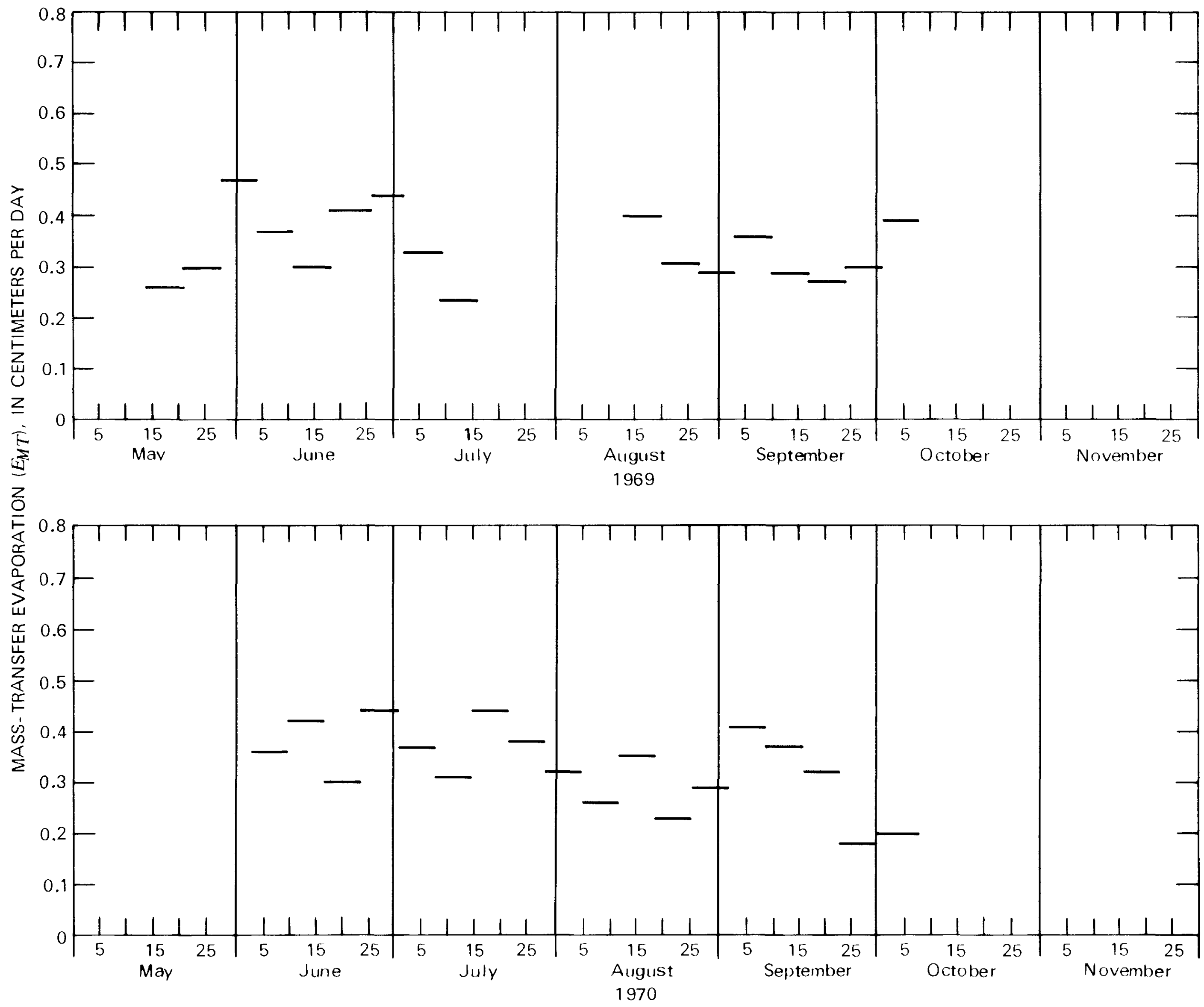

Figure 30.--Rates of mass-transfer evaporation, E_{MT}, from Antero Reservoir for the 1967-71 and 1979-80 record seasons--Continued.

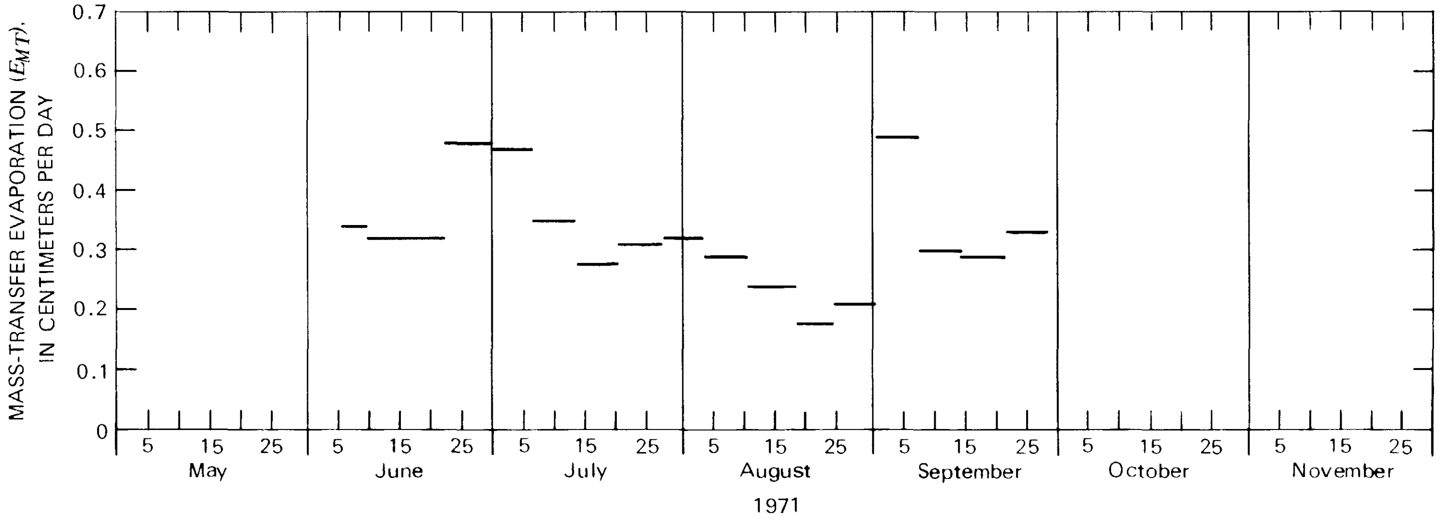

Figure 30.--Rates of mass-transfer evaporation, E_{MT}, from Antero Reservoir for the 1967-71 and 1979-80 record seasons--Continued.

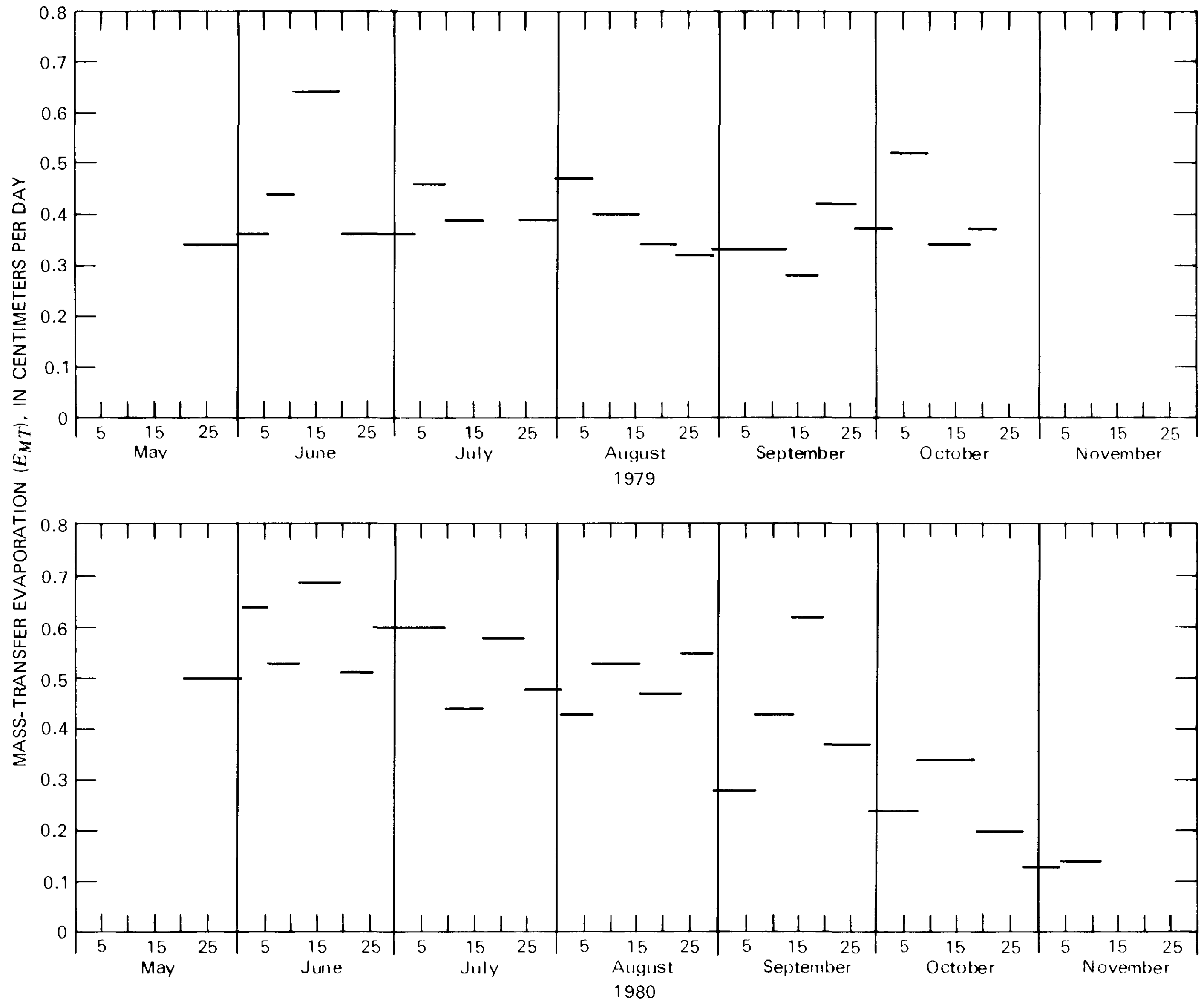

Figure 30.--Rates of mass-transfer evaporation, E_{MT}, from Antero Reservoir for the 1967-71 and 1979-80 record seasons--Continued.

EVAPORATION FROM WILLIAMS FORK RESERVOIR

Williams Fork Reservoir is on the Williams Fork (tributary to the Colorado River) near Parshall, Colo. The drainage area above the reservoir is 230 square miles, and the Williams Fork River is the major inflow. The reservoir has a storage capacity of 96,822 acre-feet, a surface area of 1,618 acres, and a mean depth of 59.8 feet. At full pool the water surface is at an altitude of 7,803 feet.

Energy Budget

Energy-budget data were collected during 1979-80 at Williams Fork Reservoir. Radiation and psychrometric data were collected at a station on the southwest side of the reservoir. Total daily solar radiation, Q_s, and daily vapor pressures, e_o and e_a, measured during 1980 at Williams Fork Reservoir, are shown in figures 31 and 32.

Inflow temperature of the Williams Fork River was measured continuously with a recording thermograph just upstream from the reservoir. During periods of recorder malfunction, inflow temperatures were determined by point measurements. Outflow temperatures were measured continuously with a recording thermograph during 1979 and were measured at weekly intervals during 1980. Weekly thermal survey measurements provided data on the changes in stored energy of the reservoir. Advected energy minus changes in stored energy for 1980 is shown in figure 33. Water-surface temperatures measured at the raft during 1980 are shown in figure 34.

Values for the terms of equation 8 for Williams Fork Reservoir during 1979-80 are given in table 9. Hydrographs of the energy-budget evaporation rates for 1979-80 are shown in figure 35. Energy-budget evaporation rates range from 0.18 to 0.70 centimeter per day. The date logger at the radiation station was inoperative during three periods in 1979. Therefore, there was no energy-budget determination of evaporation for these periods.

Mass Transfer

Determination of the mass-transfer coefficient, N.--The energy-budget and mass-transfer data for 1979 and 1980 were used to determine a value of N for Williams Fork Reservoir. The evaporation rate from the energy budget, E_{EB}, is plotted against the mass-transfer product, $U_{2.0}(e_o-e_a)$ in figure 36. A summary of different methods used to determine a value of N from the data in figure 36 is given in figure 37.

Based upon the results shown in figure 37, a value of N of 0.00863 was chosen for Williams Fork Reservoir. This value is considerably larger than the 0.00600 determined using Harbeck's equation (equation 13 of this report). The values of N for 1979 and 1980 are very similar although the 1980 data plot slightly above the 1979 data.

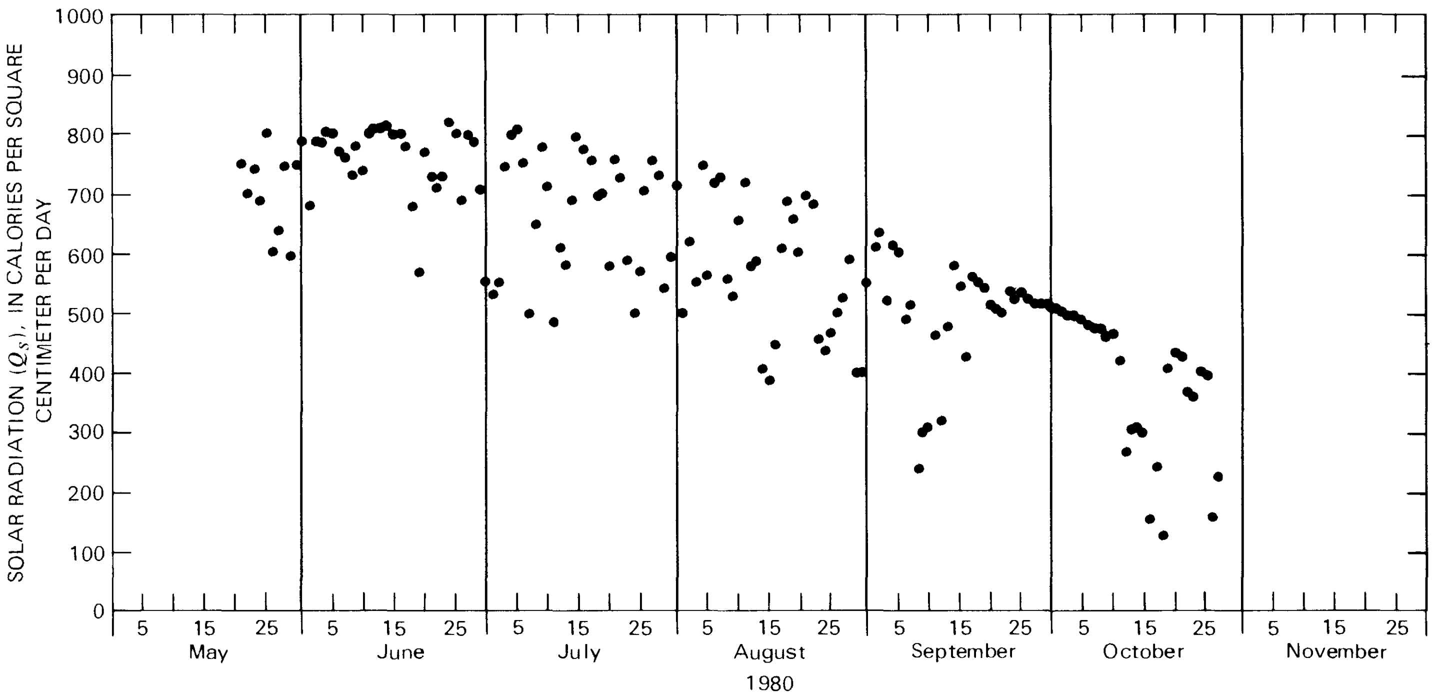

Figure 31.-- Total daily solar radiation, Q_S, at Williams Fork Reservoir, May-October 1980.

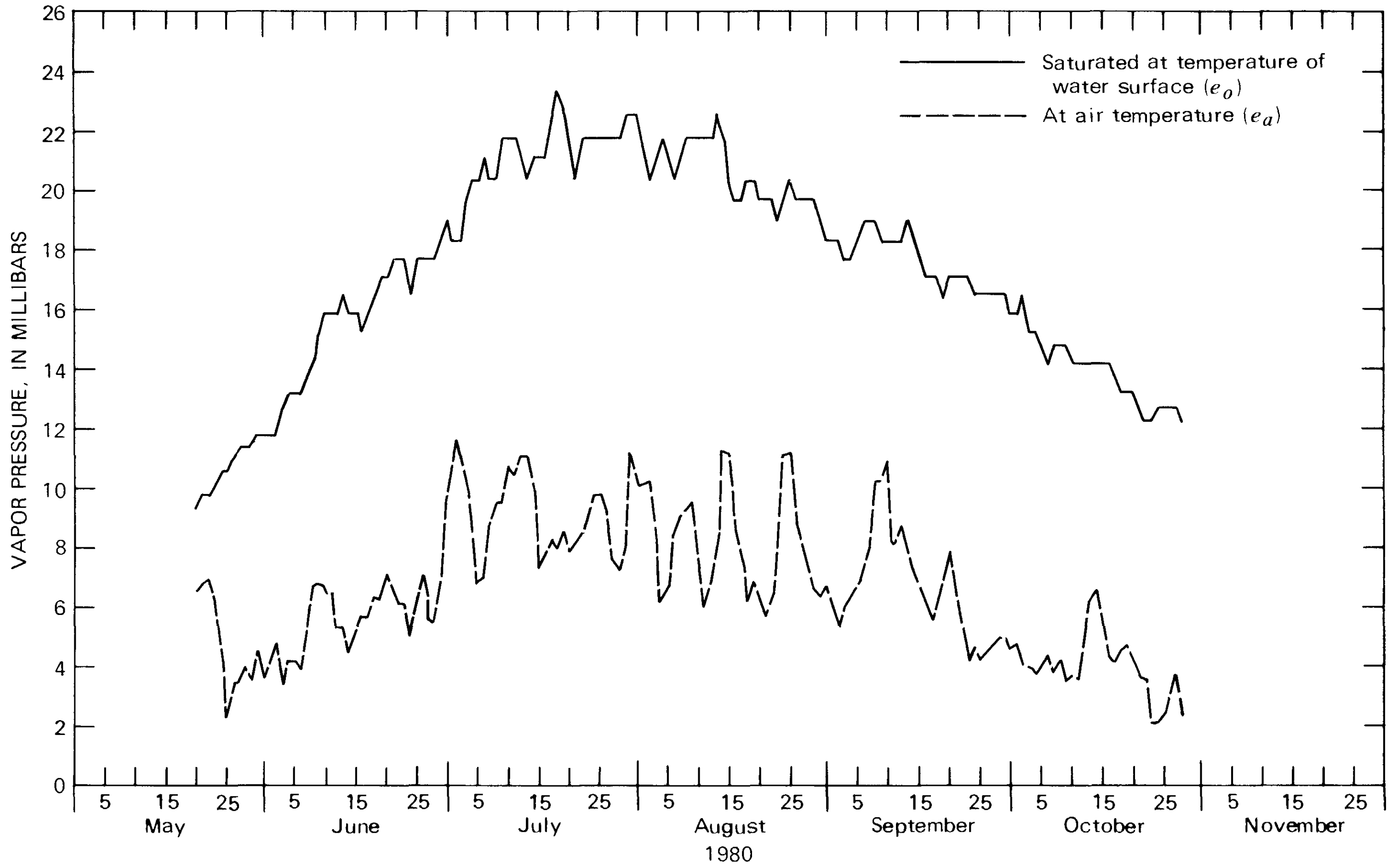

Figure 32.--Daily vapor pressures, e_o and e_a, at Williams Fork Reservoir, May-October 1980.

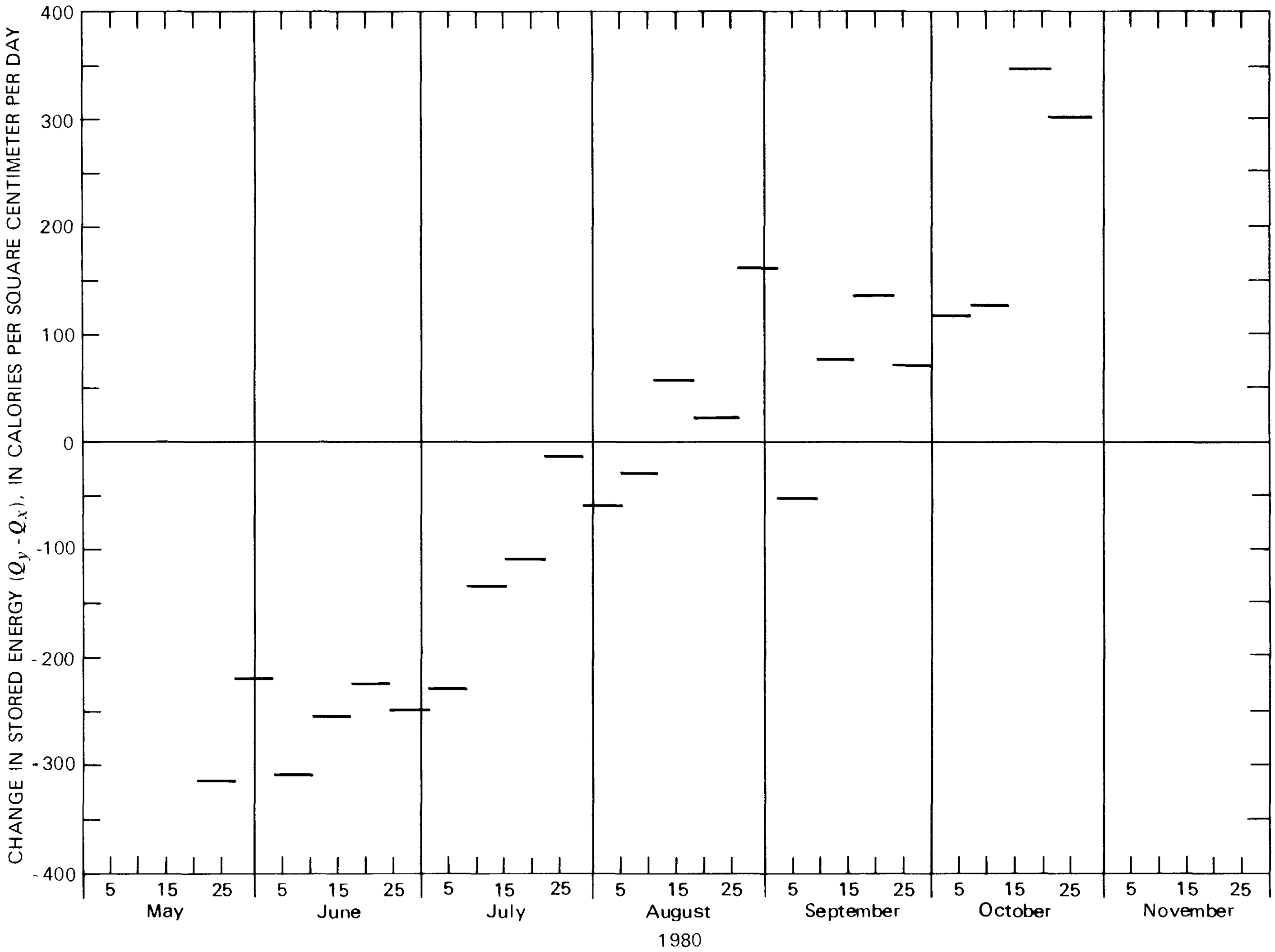

Figure 33.-- Advected energy minus changes in stored energy, Q_v-Q_x, for Williams Fork Reservoir, May-October 1980.

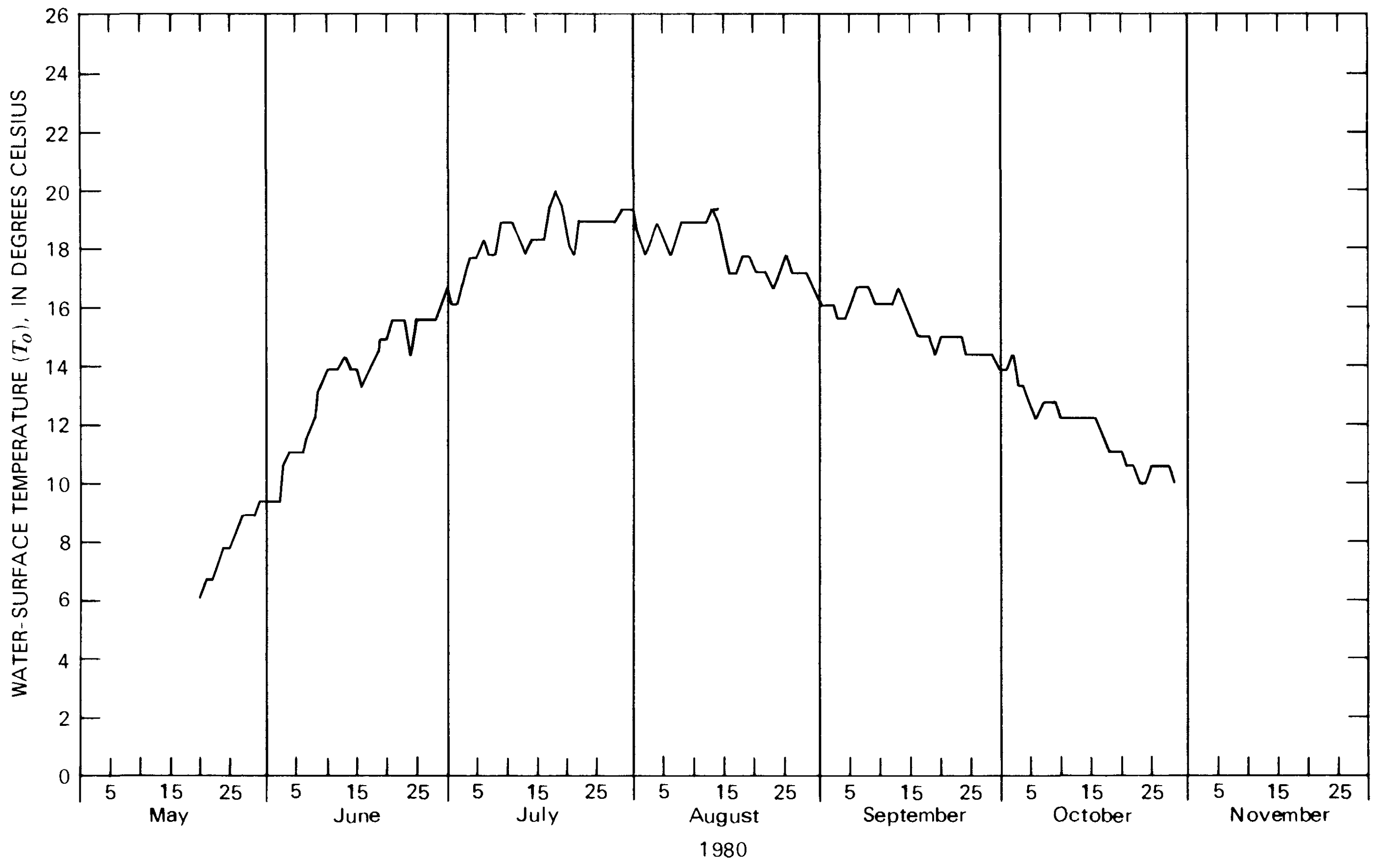

Figure 34.--Daily water-surface temperature, T_o, of Williams Fork Reservoir, May-October 1980.

Table 9.--*Summary of energy-budget terms and evaporation for Williams Fork Reservoir*

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1979	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
1	7.0	MAY 29- JUNE 5	617	40	577	756	88	230	197	55	4	.279	.33	2.33
2	7.0	JUNE 12- JUNE 19	697	43	646	772	285	652	143	13	3	.092	.24	1.70
3	7.0	JUNE 26- JULY 3	588	38	680	797	198	443	169	14	5	.082	.29	2.02
4	7.0	JULY 3- JULY 10	682	43	647	806	67	187	299	51	9	.172	.51	3.56
5	7.0	JULY 10- JULY 17	742	47	685	817	-20	164	337	32	10	.094	.57	4.01
6	7.0	JULY 17- JULY 24	626	41	683	817	-44	62	285	51	9	.181	.48	3.41
7	7.0	JULY 24- JULY 31	638	41	698	823	-15	25	371	49	12	.131	.63	4.39
8	7.0	JULY 31- AUG. 7	695	44	691	831	-28	31	391	48	13	.122	.67	4.66
9	7.0	AUG. 14- AUG. 21	362	28	619	822	-34	-88	134	45	4	.336	.23	1.61
10	7.0	AUG. 21- AUG. 28	542	38	661	808	-44	-138	356	85	11	.238	.61	4.24
11	7.0	AUG. 28-SEPT. 4	572	39	666	799	-56	-111	376	69	11	.183	.64	4.47
12	7.0	SEPT. 4-SEPT. 11	563	40	678	803	-68	-79	348	51	10	.146	.59	4.15

Table 9.--*Summary of energy-budget terms and evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1979	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
13	7.0	SEPT. 11-SEPT. 18	541	38	619	791	-79	-227	374	94	10	.250	.64	4.45
14	7.0	SEPT. 18-SEPT. 25	464	35	643	773	-91	-157	298	58	7	.194	.51	3.56
15	7.0	SEPT. 25- OCT. 2	467	36	622	764	-101	-208	315	73	7	.231	.53	3.74
16	6.9	OCT. 2- OCT. 9	470	36	606	753	-111	-289	380	75	8	.199	.64	4.45
17	7.1	OCT. 9- OCT. 16	413	34	581	752	-132	-261	263	67	5	.255	.44	3.15
18	7.0	OCT. 16- OCT. 23	267	23	542	746	-85	-397	239	108	5	.453	.40	2.82
19	7.0	OCT. 23- OCT. 30	320	28	504	735	-131	-344	184	85	3	.464	.31	2.18
20	7.0	OCT. 30- NOV. 6	269	25	443	721	-84	-420	172	125	3	.729	.29	2.03
21	7.0	NOV. 6- NOV. 13	196	19	473	704	-47	-361	146	112	2	.771	.25	1.72
22	14.0	NOV. 13- NOV. 27	219	20	433	680	-52	-310	109	100	1	.914	.18	2.57
RECORD SEASON	161.0	MAY 29- JUNE 5 JUNE 12- JUNE 19 JUNE 26- AUG. 7 AUG. 14- NOV. 27											0.44	71.22

Table 9.--*Summary of energy-budget terms and evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1980	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
23	7.1	MAY 20- MAY 27	698	44	579	702	56	390	207	-14	3	-.067	.35	2.48
24	7.0	MAY 27- JUNE 3	710	44	565	721	41	284	242	20	4	.084	.41	2.84
25	7.0	JUNE 3- JUNE 10	777	47	609	747	172	495	267	-3	5	-.011	.45	3.16
26	7.0	JUNE 10- JUNE 17	795	46	613	770	299	556	307	21	7	.067	.52	3.63
27	7.0	JUNE 17- JUNE 24	713	44	639	782	224	451	277	14	7	.050	.47	3.31
28	7.0	JUNE 24- JULY 1	734	45	628	789	196	448	270	-2	7	-.008	.46	3.21
29	7.0	JULY 1- JULY 8	673	42	591	808	131	362	158	19	5	.122	.27	1.88
30	7.0	JULY 8- JULY 15	643	40	626	820	56	192	237	26	7	.111	.40	2.81
31	7.0	JULY 15- JULY 22	723	44	710	824	9	119	410	32	13	.079	.70	4.89
32	7.0	JULY 22- JULY 29	658	42	682	825	12	28	388	55	13	.142	.66	4.66
33	7.0	JULY 29- AUG. 5	609	40	686	823	48	109	316	44	10	.140	.54	3.77
34	6.0	AUG. 5- AUG. 11	629	41	693	821	34	65	382	33	12	.088	.65	3.91

Table 9.--*Summary of energy-budget terms and evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1980	QS	QR	QA-QAR	QBS	QV	QX	QE	QH	QW	BOWEN RATIO R	EVAPORATION CENTIMETERS PER DAY	EVAPORATION CENTIMETERS PER PERIOD
			CALORIES PER SQUARE CENTIMETER PER DAY											
35	7.0	AUG. 11- AUG. 18	534	37	669	818	-28	-85	332	61	10	.184	.57	3.96
36	8.0	AUG. 18- AUG. 26	584	39	654	807	-33	-51	335	65	10	.194	.57	4.56
37	7.0	AUG. 26-SEPT. 2	514	37	601	801	-24	-185	337	91	10	.271	.57	4.01
38	7.0	SEPT. 2-SEPT. 9	511	36	648	795	-32	22	234	32	6	.139	.40	2.79
39	7.0	SEPT. 9-SEPT. 16	428	32	633	793	-11	-88	250	56	7	.226	.42	2.97
40	7.0	SEPT. 16-SEPT. 23	519	38	596	781	-25	-158	340	80	9	.237	.58	4.04
41	7.0	SEPT. 23-SEPT. 30	528	40	565	776	-34	-104	264	77	6	.291	.45	3.15
42	7.0	SEPT. 30- OCT. 7	494	38	564	764	-16	-130	286	76	6	.265	.48	3.37
43	7.0	OCT. 7- OCT. 14	410	33	573	754	-8	-132	245	69	5	.282	.41	2.90
44	7.0	OCT. 14- OCT. 21	285	25	538	745	-12	-358	251	142	5	.564	.43	2.98
45	7.0	OCT. 21- OCT. 28	334	29	496	732	-24	-325	230	134	4	.585	.39	2.72
RECORD SEASON	161.1	MAY 20- OCT. 28											0.48	78.00

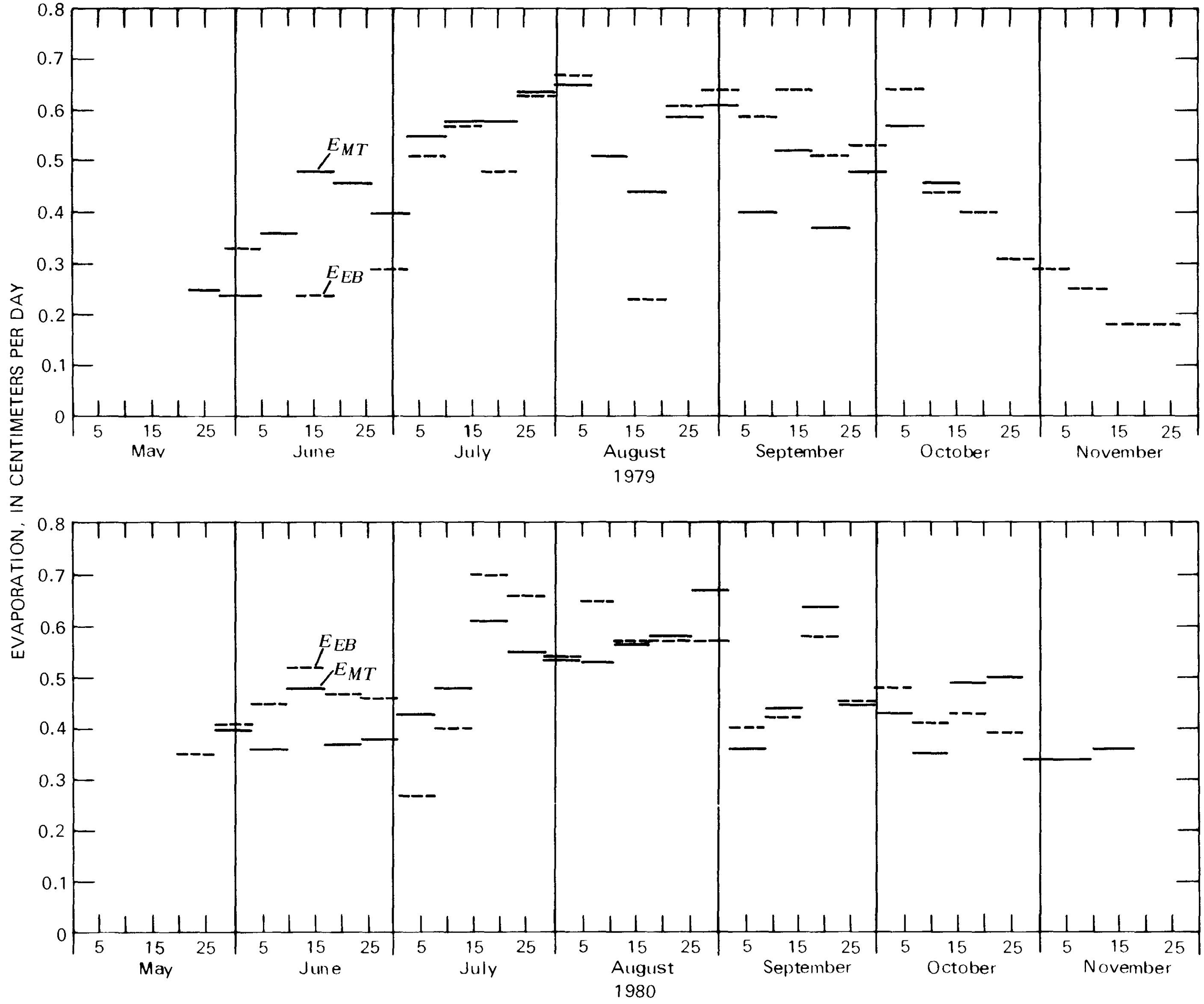

Figure 35.--Rates of energy-budget, E_{EB}, and mass-transfer, E_{MT}, evaporation from Williams Fork Reservoir for the 1979-80 record seasons.

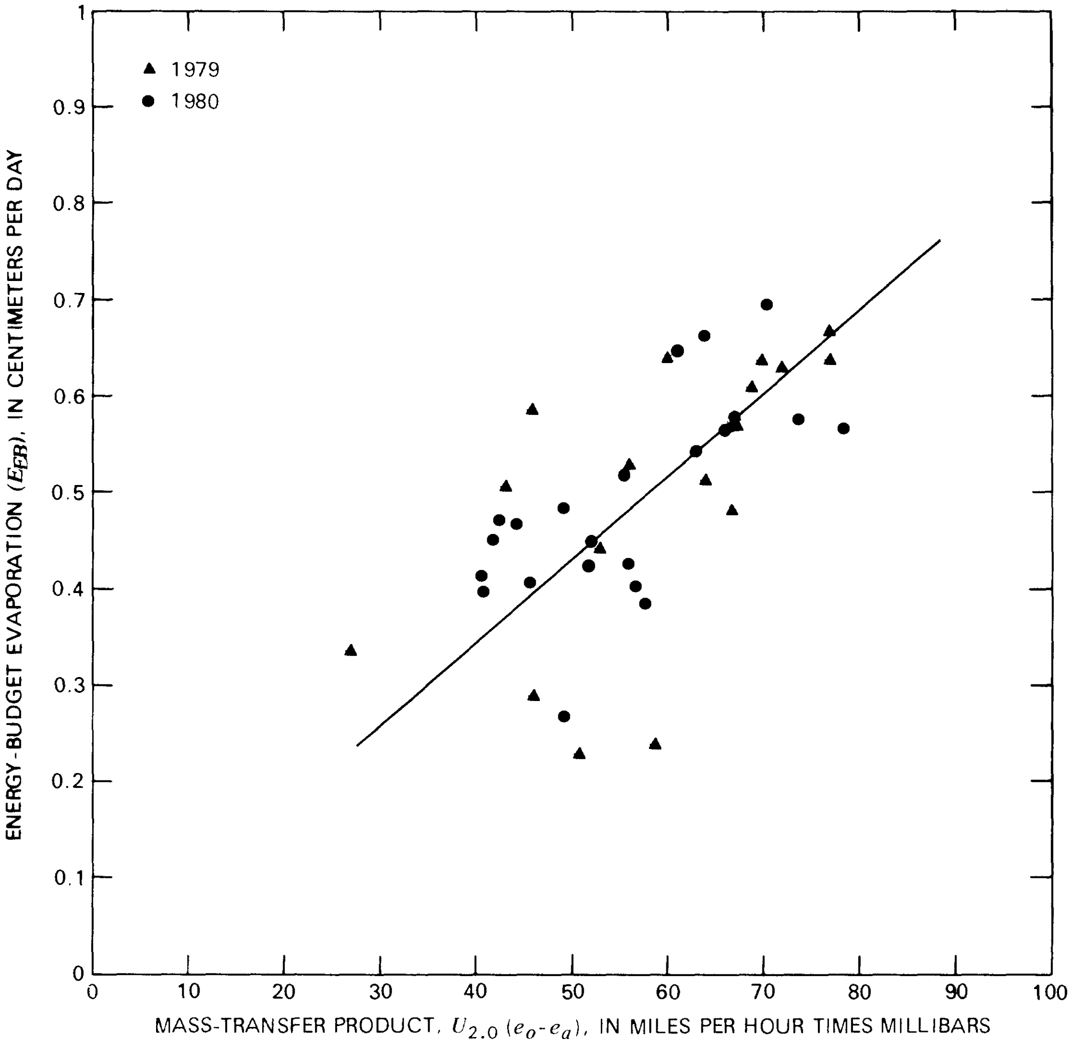

Figure 36.--Calibration of the mass-transfer product against evaporation measured by the energy-budget method at Williams Fork Reservoir.

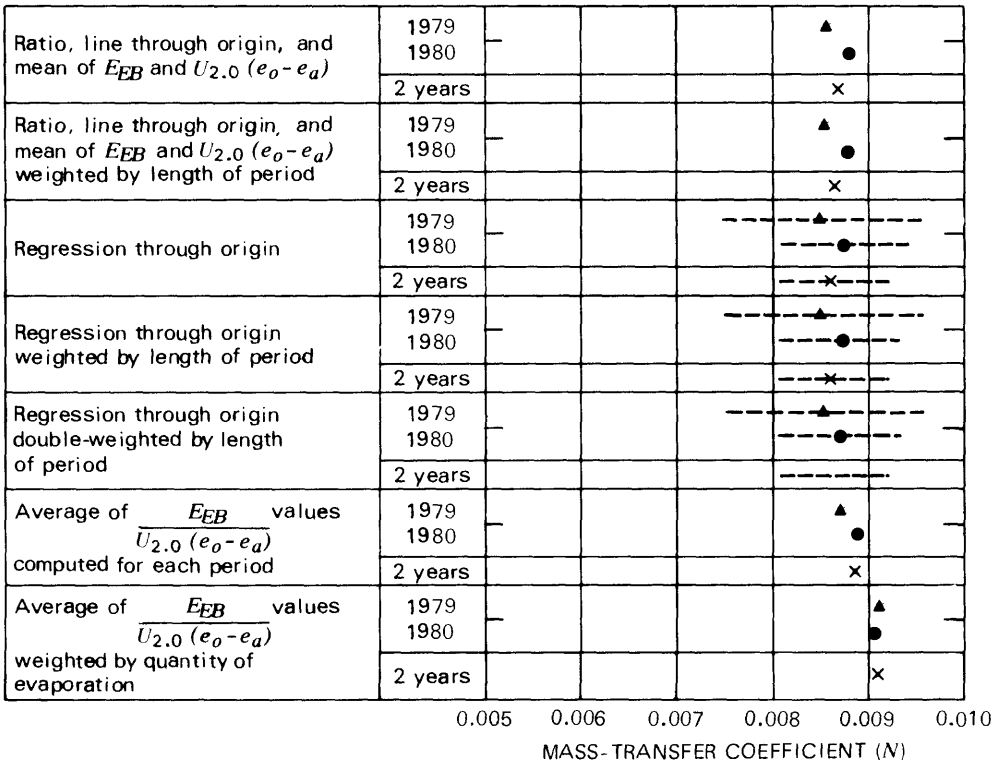

Figure 37.--Values of mass-transfer coefficients for Williams Fork Reservoir determined by different means of calculation from the energy-budget data. Dashed lines through some symbols represent 95-percent confidence limits.

Data.--Mass-transfer data were collected at Williams Fork Reservoir from 1972-80. Hygrothermograph data were collected at a station near the caretakers' houses below the dam. All data were collected as described earlier. Wind-speed data collected at the raft during 1980 are shown in figure 38.

A summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir for the 1969-80 seasons is given in table 10. Data for 1969-73 are from Ficke and others (1977), using the updated value of N to determine evaporation rates. Hydrographs of the mass-transfer evaporation rates for the 1969-78 seasons are shown in figure 39. Mass-transfer evaporation rates for 1979-80 ranged from 0.21 to 0.90 centimeter per day and are shown in figure 35.

During 1977, problems were experienced with the hygrothermograph. From July 26 to September 7, evaporation rates were not determined because of inadequate humidity data. Wind-speed data for this period are listed in table 10.

Pan Evaporation

Pan-evaporation data and ratios of reservoir evaporation to pan evaporation are given in table 10. The ratios varied greatly during the seasons and also between seasons.

EVAPORATION FROM ELEVENMILE CANYON RESERVOIR

Elevenmile Canyon Reservoir is on the South Fork of the South Platte River, approximately 60 miles south-southwest of Denver, Colo. The reservoir has a storage capacity of 97,779 acre-feet, a surface area of 3,323 acres, and a mean depth of 29.4 feet. At full pool the water surface is at an altitude of 8,597 feet. Drainage area above the reservoir is 880 square miles. The major inflow is the South Fork of the South Platte River.

Energy-budget studies were conducted at Elevenmile Canyon Reservoir during 1967-70. Evaporation data for 1967-73 were reported by Ficke and others (1977), who determined an N value of 0.00800 for the reservoir. Using this value of N, mass-transfer evaporation rates were calculated for the 1974-80 record seasons.

Mass Transfer

Hygrothermograph data were collected at a station about 500 feet downstream from the dam. Water-surface temperatures and wind speeds were measured as described earlier. Vapor pressures, water-surface temperatures, and wind speeds collected during 1980 at Elevenmile Canyon Reservoir are shown in figures 40, 41, and 42.

A summary of mass-transfer terms and pan evaporation for the 1974-80 seasons at Elevenmile Canyon Reservoir is given in table 11. Hydrographs of the mass-transfer evaporation rates are shown in figure 43. Mass-transfer evaporation rates ranged from 0.05 to 0.90 centimeter per day.

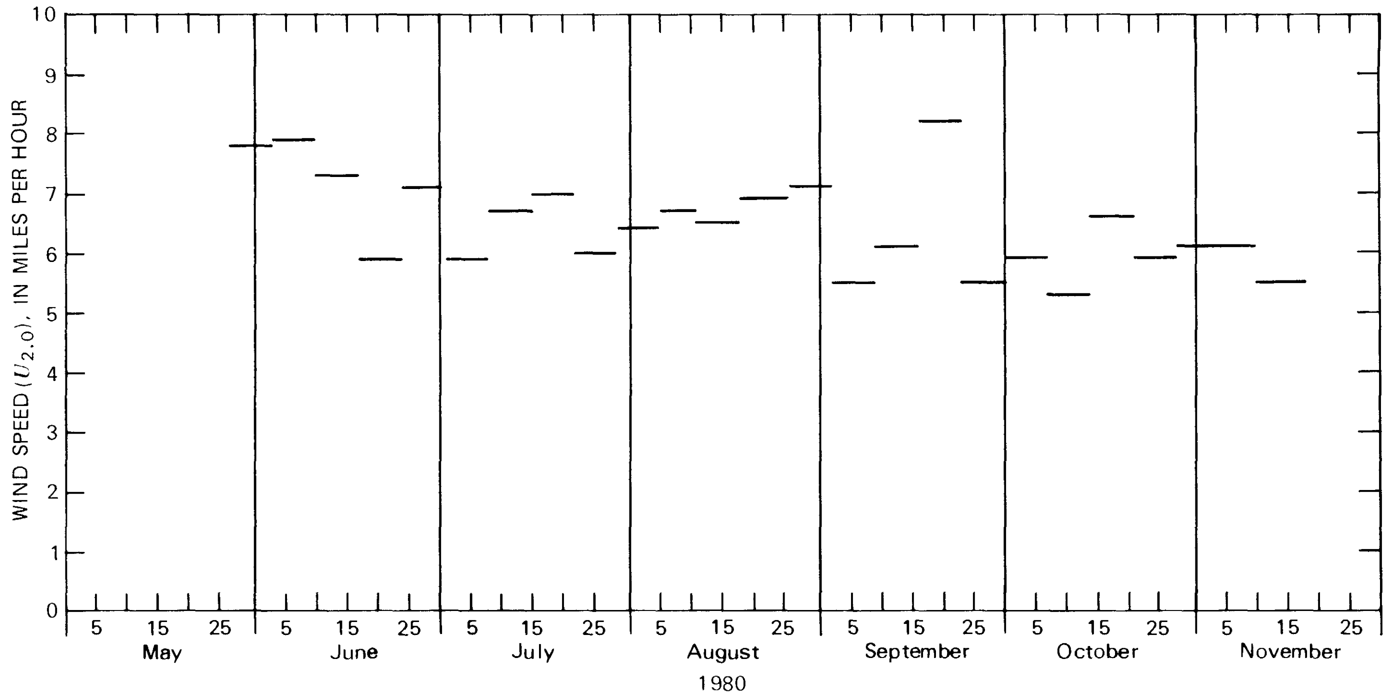

Figure 38.--Wind speeds, $U_{2.0}$, at Williams Fork Reservoir, May-November 1980.

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1969	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
1	5.0	MAY 23- MAY 28	5.60	7.6	.37	1.84	53.8	----	----
2	7.0	MAY 28- JUNE 4	7.70	8.5	.56	3.95	124.9	----	----
3	7.0	JUNE 4- JUNE 11	6.90	8.0	.48	3.33	114.4	3.78	0.88
4	7.0	JUNE 11- JUNE 18	5.20	6.6	.30	2.07	76.4	1.60	1.29
5	8.0	JUNE 18- JUNE 26	7.90	7.1	.48	3.87	158.0	3.33	1.16
6	6.0	JUNE 26- JULY 2	8.70	6.9	.52	3.11	135.6	3.45	.90
7	7.0	JULY 2- JULY 9	7.70	7.0	.46	3.26	147.2	5.08	.64
8	7.0	JULY 9- JULY 16	5.40	9.9	.46	3.23	150.1	5.18	.62
9	7.0	JULY 16- JULY 23	5.70	10.3	.51	3.55	168.0	4.04	.88
10	7.0	JULY 23- JULY 30	6.10	11.6	.61	4.27	205.6	5.13	.83
11	7.0	JULY 30- AUG. 6	5.80	11.0	.55	3.85	187.9	4.72	.82
12	7.0	AUG. 6- AUG. 13	6.50	12.2	.68	4.79	232.6	5.79	.83

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1969	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
13	7.0	AUG. 13- AUG. 20	5.60	11.5	.56	3.89	186.9	3.96	.98
14	7.0	AUG. 20- AUG. 27	5.40	11.0	.51	3.59	170.5	3.61	.99
15	7.0	AUG. 27-SEPT. 3	6.00	10.8	.56	3.91	182.8	4.06	.96
16	7.0	SEPT. 3-SEPT. 10	6.90	10.3	.61	4.29	197.2	3.68	1.16
17	7.0	SEPT. 10-SEPT. 17	5.90	9.4	.48	3.35	151.8	2.36	1.42
18	7.0	SEPT. 17-SEPT. 24	5.90	9.1	.46	3.24	145.8	1.83	1.77
19	7.0	SEPT. 24- OCT. 1	5.80	9.2	.46	3.22	143.5	3.00	1.07
20	7.0	OCT. 1- OCT. 8	6.90	9.2	.55	3.83	169.6	----	----
21	7.0	OCT. 8- OCT. 15	9.00	9.0	.70	4.89	215.0	----	----
22	7.0	OCT. 15- OCT. 22	5.90	7.2	.37	2.57	111.8	----	----
23	5.0	OCT. 22- OCT. 27	5.10	----	---	----	-----	----	----
RECORD SEASON	152.0	MAY 23- OCT. 27			0.51	77.90	3429.4		
PAN SEASON	119.0	JUNE 4- OCT. 1			0.51	60.82		64.60	0.94

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
24	9.0	JUNE 1- JUNE 9	6.60	6.7	.38	3.43	129.7	5.00	0.69
25	6.0	JUNE 9- JUNE 15	7.90	5.8	.40	2.37	96.1	2.18	1.09
26	8.0	JUNE 15- JUNE 23	6.30	6.1	.33	2.65	114.0	5.56	.48
27	6.0	JUNE 23- JUNE 29	7.10	6.6	.40	2.43	111.8	4.42	.55
28	7.0	JUNE 29- JULY 6	5.90	8.8	.45	3.14	150.4	5.94	.53
29	7.0	JULY 6- JULY 13	5.80	9.2	.46	3.22	156.5	3.73	.86
30	7.0	JULY 13- JULY 20	6.00	9.9	.51	3.59	174.2	4.75	.76
31	7.0	JULY 20- JULY 27	6.40	9.7	.54	3.75	180.4	4.32	.87
32	7.0	JULY 27- AUG. 3	6.30	9.9	.54	3.78	179.2	5.08	.74
33	7.0	AUG. 3- AUG. 10	5.70	9.6	.47	3.30	156.4	4.32	.76
34	7.0	AUG. 10- AUG. 17	5.70	11.4	.56	3.92	184.0	4.27	.92

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1970	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
35	8.0	AUG. 17- AUG. 25	5.10	9.8	.43	3.45	159.4	4.04	.85
36	6.0	AUG. 25- AUG. 31	6.10	8.4	.44	2.65	120.8	3.73	.71
37	7.0	AUG. 31-SEPT. 7	8.00	10.1	.70	4.88	219.6	2.57	1.90
38	7.0	SEPT. 7-SEPT. 14	9.20	8.8	.70	4.89	217.6	3.56	1.37
39	7.0	SEPT. 14-SEPT. 21	7.90	10.0	.68	4.77	210.7	3.76	1.27
40	7.0	SEPT. 21-SEPT. 28	5.90	10.4	.53	3.71	162.8	----	----
41	7.0	SEPT. 28- OCT. 5	4.70	8.6	.35	2.44	106.5	----	----
42	7.0	OCT. 5- OCT. 12	6.20	8.5	.45	3.18	138.2	----	----
43	7.0	OCT. 12- OCT. 19	4.60	8.0	.32	2.22	95.8	----	----
RECORD SEASON	141.0	JUNE 1- OCT. 19			0.48	67.77	3064.1		
PAN SEASON	113.0	JUNE 1-SEPT. 21			0.50	56.22		67.23	0.84

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1971	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
44	6.9	JUNE 8- JUNE 15	6.08	6.4	.34	2.33	89.5	3.28	0.71
45	6.9	JUNE 15- JUNE 22	5.85	7.6	.39	2.68	115.5	5.05	.53
46	7.0	JUNE 22- JUNE 29	7.32	9.1	.57	4.04	195.9	7.34	.55
47	7.0	JUNE 29- JULY 6	7.15	8.9	.55	3.87	202.8	5.66	.68
48	6.9	JULY 6- JULY 13	7.32	7.9	.50	3.45	183.1	5.66	.61
49	7.1	JULY 13- JULY 20	5.41	9.6	.45	3.18	168.5	5.51	.58
50	7.0	JULY 20- JULY 27	6.28	10.6	.58	4.02	214.0	4.72	.85
51	7.0	JULY 27- AUG. 3	7.01	12.3	.75	5.21	276.2	5.72	.91
52	7.0	AUG. 3- AUG. 10	6.10	10.2	.54	3.75	196.6	5.38	.70
53	7.0	AUG. 10- AUG. 17	6.01	9.0	.47	3.27	168.3	5.77	.57
54	7.0	AUG. 17- AUG. 24	6.06	9.2	.48	3.35	168.7	4.93	.68
55	7.0	AUG. 24- AUG. 31	5.55	8.2	.39	2.75	135.6	3.96	.69
56	7.0	AUG. 31-SEPT. 7	7.54	10.6	.69	4.84	234.4	3.43	1.41
57	6.9	SEPT. 7-SEPT. 14	5.99	10.5	.54	3.78	180.0	4.22	.90
58	7.1	SEPT. 14-SEPT. 21	9.02	11.7	.91	6.46	300.5	2.44	2.65
59	14.0	SEPT. 21- OCT. 5	7.90	9.2	.63	8.77	369.0	5.51	1.59
RECORD SEASON	118.8	JUNE 8- OCT. 5			0.55	65.75	3198.6		
PAN SEASON	118.8	JUNE 8- OCT. 5			0.55	65.75		78.58	0.84

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1972	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
60	7.0	MAY 30- JUNE 6	5.33	5.5	.25	1.77	64.3	3.00	0.59
61	7.0	JUNE 6- JUNE 13	5.93	8.2	.42	2.94	118.8	4.06	.72
62	6.9	JUNE 13- JUNE 20	7.31	8.3	.52	3.62	158.2	3.84	.94
63	7.0	JUNE 20- JUNE 27	8.27	8.3	.60	4.18	192.0	4.60	.91
64	7.0	JUNE 27- JULY 4	6.89	9.5	.56	3.92	185.9	5.26	.74
65	7.0	JULY 4- JULY 11	5.92	8.5	.43	3.05	146.5	3.94	.77
66	7.0	JULY 11- JULY 18	6.86	7.9	.47	3.26	158.3	5.23	.62
67	7.0	JULY 18- JULY 25	7.26	7.7	.48	3.36	163.9	5.54	.61
68	7.0	JULY 25- AUG. 1	5.52	8.1	.39	2.71	132.3	4.24	.64
69	7.0	AUG. 1- AUG. 8	6.01	9.0	.47	3.27	159.3	3.63	.90
70	7.0	AUG. 8- AUG. 15	6.42	9.5	.52	3.66	177.4	6.02	.61

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1972	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
71	7.0	AUG. 15- AUG. 22	5.65	8.7	.42	2.99	142.9	2.49	1.20
72	6.9	AUG. 22- AUG. 29	6.08	7.1	.37	2.58	121.7	3.25	.79
73	7.0	AUG. 29-SEPT. 5	5.14	6.6	.29	2.07	96.6	1.65	1.25
74	7.0	SEPT. 5-SEPT. 12	6.42	6.4	.35	2.47	114.9	1.83	1.35
75	6.9	SEPT. 12-SEPT. 19	6.95	8.5	.51	3.54	163.7	3.20	1.08
76	7.0	SEPT. 19-SEPT. 26	8.13	8.0	.56	3.96	182.3	2.59	1.53
77	7.0	SEPT. 26- OCT. 3	8.37	7.5	.54	3.77	173.0	----	----
78	9.1	OCT. 3- OCT. 12	5.68	4.0	.19	1.77	81.2	----	----
79	4.9	OCT. 12- OCT. 17	6.33	4.3	.24	1.16	53.0	----	----
80	7.0	OCT. 17- OCT. 24	5.38	4.7	.22	1.53	70.0	----	----
RECORD SEASON	146.7	MAY 30- OCT. 24			0.42	61.58	2856.2		
PAN SEASON	118.7	MAY 30-SEPT. 26			0.45	53.35		64.37	0.83

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
81	7.0	JUNE 5- JUNE 12	5.50	5.9	.28	1.96	76.8	----	----
82	7.9	JUNE 12- JUNE 20	9.20	7.2	.57	4.55	194.8	----	----
83	6.0	JUNE 20- JUNE 26	5.92	5.8	.29	1.78	79.9	----	----
84	6.0	JUNE 26- JULY 2	6.47	7.8	.44	2.62	125.1	----	----
85	8.1	JULY 2- JULY 10	6.24	7.1	.38	3.13	155.8	7.06	0.44
86	6.8	JULY 10- JULY 17	6.09	8.2	.43	2.92	148.3	3.38	.86
87	7.1	JULY 17- JULY 24	5.82	7.4	.37	2.63	135.4	3.05	.86
88	6.9	JULY 24- JULY 31	5.44	7.4	.35	2.42	124.9	3.96	.61
89	7.0	JULY 31- AUG. 7	5.42	7.2	.34	2.36	121.3	3.00	.79
90	9.3	AUG. 7- AUG. 16	5.51	7.6	.36	3.35	170.4	5.28	.63
91	6.7	AUG. 16- AUG. 23	5.54	5.8	.28	1.88	93.9	4.17	.45
92	5.1	AUG. 23- AUG. 28	7.29	6.9	.44	2.20	109.2	2.62	.84

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1973	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
93	7.9	AUG. 28-SEPT. 5	6.34	9.4	.52	4.09	198.8	4.06	1.01
94	8.0	SEPT. 5-SEPT. 13	6.03	8.1	.42	3.36	159.4	3.25	1.03
95	6.0	SEPT. 13-SEPT. 19	7.04	9.2	.56	3.36	155.7	2.46	1.36
96	7.0	SEPT. 19-SEPT. 26	8.36	8.2	.59	4.17	188.7	2.79	1.49
97	7.0	SEPT. 26- OCT. 3	6.14	7.7	.41	2.84	125.9	----	----
98	7.0	OCT. 3- OCT. 10	7.25	7.2	.45	3.15	136.4	----	----
99	7.0	OCT. 10- OCT. 17	6.67	7.6	.44	3.08	130.2	----	----
100	7.0	OCT. 17- OCT. 24	6.31	7.2	.39	2.73	112.5	----	----
101	7.0	OCT. 24- OCT. 31	7.05	7.4	.45	3.18	127.2	----	----
102	7.0	OCT. 31- NOV. 7	8.30	7.5	.54	3.75	146.9	----	----
RECORD SEASON	154.8	JUNE 5- NOV. 7			0.42	65.51	3017.5		
PAN SEASON	85.9	JULY 2-SEPT. 26			0.42	35.87		45.08	0.80

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1974	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
103	7.1	JUNE 18- JUNE 25	6.02	8.8	.46	3.23	139.5	6.48	0.50
104	7.9	JUNE 25- JULY 3	6.66	13.1	.75	5.96	275.0	5.82	1.02
105	6.1	JULY 3- JULY 9	6.74	10.4	.60	3.65	172.1	3.96	.92
106	8.0	JULY 9- JULY 17	6.81	9.3	.55	4.36	205.4	5.05	.86
107	6.0	JULY 17- JULY 23	5.16	8.7	.39	2.31	108.9	2.90	.80
108	7.0	JULY 23- JULY 30	5.76	10.5	.52	3.67	174.1	3.63	1.01
109	7.0	JULY 30- AUG. 6	5.83	10.4	.52	3.66	173.5	3.91	.94
110	7.1	AUG. 6- AUG. 13	6.22	10.5	.56	4.00	189.3	2.90	1.38
111	7.0	AUG. 13- AUG. 20	6.27	11.0	.60	4.18	197.8	4.88	.86
112	7.0	AUG. 20- AUG. 27	6.39	11.3	.62	4.34	204.0	4.42	.98
113	7.0	AUG. 27-SEPT. 3	7.37	10.9	.69	4.83	224.4	4.09	1.18

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1974	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
114	7.0	SEPT. 3-SEPT. 10	6.54	9.8	.55	3.86	175.4	3.30	1.17
115	7.0	SEPT. 10-SEPT. 17	6.12	9.6	.51	3.53	156.9	2.36	1.50
116	8.0	SEPT. 17-SEPT. 25	5.25	9.9	.45	3.57	155.0	3.40	1.05
117	7.0	SEPT. 25- OCT. 2	6.69	11.2	.65	4.54	192.1	2.67	1.70
118	7.0	OCT. 2- OCT. 9	6.41	8.0	.44	3.08	127.2	1.52	2.03
119	7.1	OCT. 9- OCT. 16	5.53	7.5	.36	2.51	100.7	1.40	1.79
120	7.0	OCT. 16- OCT. 23	4.49	6.3	.25	1.71	66.2	1.68	1.02
121	7.0	OCT. 23- OCT. 30	5.89	6.8	.34	2.40	89.8	1.62	1.48
122	7.1	OCT. 30- NOV. 6	6.71	7.6	.44	3.12	113.2	----	----
123	6.0	NOV. 6- NOV. 12	6.24	7.3	.39	2.34	83.2	----	----
RECORD SEASON	147.4	JUNE 18- NOV. 12			0.51	74.85	3323.7		
PAN SEASON	134.3	JUNE 18- OCT. 30			0.52	69.39		65.99	1.05

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
124	7.0	JUNE 17- JUNE 24	6.84	6.2	.36	2.56	88.8	4.52	0.57
125	7.0	JUNE 24- JULY 1	6.71	10.2	.59	4.10	154.8	5.36	.76
126	7.0	JULY 1- JULY 8	5.29	7.6	.35	2.43	100.4	4.29	.57
127	6.9	JULY 8- JULY 15	5.93	10.0	.51	3.56	155.1	4.60	.77
128	7.0	JULY 15- JULY 22	5.63	9.2	.45	3.13	141.6	3.63	.86
129	7.3	JULY 22- JULY 29	5.68	11.8	.58	4.21	194.6	4.57	.92
130	6.8	JULY 29- AUG. 5	6.56	12.8	.73	4.90	230.6	3.96	1.24
131	7.0	AUG. 5- AUG. 12	5.99	10.1	.52	3.65	172.3	4.50	.81
132	6.0	AUG. 12- AUG. 18	6.78	10.1	.59	3.55	167.5	2.95	1.20
133	9.0	AUG. 18- AUG. 27	6.24	9.8	.53	4.75	224.1	4.42	1.07

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
134	6.0	AUG. 27-SEPT. 2	6.63	9.8	.56	3.33	156.1	3.45	.96
135	7.0	SEPT. 2-SEPT. 9	6.08	9.1	.48	3.34	154.9	4.22	.79
136	6.3	SEPT. 9-SEPT. 15	5.45	6.6	.31	1.95	89.4	1.83	1.06
137	7.8	SEPT. 15-SEPT. 23	7.14	10.1	.62	4.82	218.6	3.18	1.52
138	6.0	SEPT. 23-SEPT. 29	6.33	9.5	.52	3.11	139.2	2.56	1.21
139	7.0	SEPT. 29- OCT. 6	5.49	8.7	.41	2.90	128.2	2.90	1.00
140	8.0	OCT. 6- OCT. 14	8.49	8.1	.60	4.79	210.1	2.90	1.65
141	7.0	OCT. 14- OCT. 21	6.04	8.7	.45	3.19	138.5	1.93	1.65
142	7.0	OCT. 21- OCT. 28	7.55	8.7	.57	3.97	170.4	----	----
RECORD SEASON	133.1	JUNE 17- OCT. 28			0.51	68.24	3035.2		
PAN SEASON	126.1	JUNE 17- OCT. 21			0.51	64.27		65.77	0.98

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
143	6.9	MAY 11- MAY 18	7.76	5.1	.34	2.35	73.9	4.19	0.56
144	7.1	MAY 18- MAY 25	5.69	4.1	.20	1.44	46.5	3.73	.39
145	7.2	MAY 25- JUNE 1	5.14	5.6	.25	1.79	59.4	4.19	.43
146	6.8	JUNE 1- JUNE 8	5.71	7.2	.35	2.42	83.8	4.44	.54
147	6.9	JUNE 8- JUNE 15	9.75	8.6	.72	4.97	182.1	4.78	1.04
148	7.0	JUNE 15- JUNE 22	6.28	7.0	.38	2.69	101.3	3.76	.72
149	6.9	JUNE 22- JUNE 29	8.50	6.9	.50	3.49	136.4	4.62	.76
150	7.0	JUNE 29- JULY 6	5.82	9.4	.47	3.31	133.4	5.23	.63
151	7.0	JULY 6- JULY 13	6.38	9.4	.52	3.62	148.4	5.64	.64
152	7.0	JULY 13- JULY 20	5.51	11.3	.54	3.77	156.2	4.70	.80
153	7.0	JULY 20- JULY 27	6.01	10.2	.53	3.71	155.3	4.14	.90
154	7.0	JULY 27- AUG. 3	6.24	9.5	.51	3.59	152.1	5.31	.68
155	7.2	AUG. 3- AUG. 10	7.36	9.3	.59	4.29	179.6	3.68	1.16
156	6.8	AUG. 10- AUG. 17	6.54	9.3	.52	3.54	147.9	3.45	1.03

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1976	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
157	7.0	AUG. 17- AUG. 24	5.53	9.2	.44	3.07	128.7	3.89	.79
158	7.0	AUG. 24- AUG. 31	5.92	11.0	.56	3.92	163.8	3.68	1.06
159	7.1	AUG. 31-SEPT. 7	5.56	12.2	.58	4.18	173.5	3.86	1.08
160	6.9	SEPT. 7-SEPT. 14	6.11	8.2	.43	2.96	122.1	2.67	1.11
161	15.0	SEPT. 14-SEPT. 29	5.06	8.5	.37	5.55	227.8	3.63	1.53
162	7.0	SEPT. 29- OCT. 6	6.62	8.5	.48	3.37	137.5	2.29	1.47
163	7.0	OCT. 6- OCT. 13	5.54	8.4	.40	2.82	114.2	2.18	1.29
164	7.2	OCT. 13- OCT. 20	7.03	8.3	.51	3.64	145.9	1.70	2.14
165	7.8	OCT. 20- OCT. 28	5.57	8.6	.41	3.22	127.7	----	----
166	7.0	OCT. 28- NOV. 4	4.50	7.2	.28	1.96	76.8	----	----
167	5.2	NOV. 4- NOV. 9	4.52	6.2	.24	1.26	49.0	----	----
168	7.0	NOV. 9- NOV. 16	5.19	6.6	.29	2.06	79.1	----	----
169	7.0	NOV. 16- NOV. 23	4.94	5.9	.25	1.75	66.6	----	----
RECORD SEASON	196.0	MAY 11- NOV. 23			0.43	84.74	3369.0		
PAN SEASON	162.0	MAY 11- OCT. 20			0.46	74.49		85.76	0.87

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
170	6.0	MAY 10- MAY 16	8.22	4.9	.35	2.09	64.6	3.71	0.56
171	9.0	MAY 16- MAY 25	7.77	6.0	.40	3.62	112.3	6.45	.56
172	6.0	MAY 25- MAY 31	6.78	5.6	.33	1.95	60.8	3.10	.63
173	7.2	MAY 31- JUNE 7	5.93	6.6	.34	2.42	76.9	4.80	.50
174	6.9	JUNE 7- JUNE 14	6.21	8.7	.47	3.22	107.0	5.56	.58
175	6.9	JUNE 14- JUNE 21	8.08	10.7	.75	5.17	174.4	5.94	.87
176	7.0	JUNE 21- JUNE 28	6.32	8.2	.45	3.16	106.4	4.75	.66
177	7.0	JUNE 28- JULY 5	7.39	8.6	.55	3.85	129.0	4.62	.83
178	7.0	JULY 5- JULY 12	6.59	10.5	.60	4.18	138.1	4.78	.87
179	7.0	JULY 12- JULY 19	5.86	6.9	.35	2.44	79.8	3.86	.63
180	7.0	JULY 19- JULY 26	5.13	7.0	.31	2.18	70.5	3.43	.64
181	7.0	JULY 26- AUG. 2	6.38	----	---	----	-----	5.10	----
182	7.0	AUG. 2- AUG. 9	6.31	----	---	----	-----	3.48	----

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1977	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
183	7.0	AUG. 9- AUG. 16	5.48	----	---	----	-----	3.43	----
184	7.0	AUG. 16- AUG. 23	5.01	----	---	----	-----	3.02	----
185	7.0	AUG. 23- AUG. 30	6.72	----	---	----	-----	3.18	----
186	7.0	AUG. 30-SEPT. 6	6.00	----	---	----	-----	3.35	----
187	8.0	SEPT. 6-SEPT. 14	5.38	----	---	----	-----	3.33	----
188	7.0	SEPT. 14-SEPT. 21	7.18	----	---	----	-----	3.45	----
189	6.0	SEPT. 21-SEPT. 27	8.93	----	---	----	-----	2.62	----
190	10.0	SEPT. 27- OCT. 7	5.93	----	---	----	-----	3.12	----
191	11.0	OCT. 7- OCT. 18	7.36	8.9	.56	6.21	151.1	----	----
192	13.0	OCT. 18- OCT. 31	4.89	7.3	.31	4.01	96.5	----	----
193	14.0	OCT. 31- NOV. 14	5.61	7.5	.36	5.09	120.4	----	----
RECORD SEASON	115.0	MAY 10- JULY 26 OCT. 7- NOV. 14			0.43	49.59	1487.8		
PAN SEASON	77.0	MAY 10- JULY 26			0.44	34.28		51.00	0.67
	150.0	MAY 10- OCT. 7						85.08	

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	E0-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
194	5.9	MAY 9- MAY 15	8.72	4.1	.31	1.81	44.0	----	----
195	8.0	MAY 15- MAY 23	6.71	3.7	.21	1.71	42.9	4.01	0.43
196	8.0	MAY 23- MAY 31	7.51	6.4	.42	3.35	90.2	4.62	.72
197	6.0	MAY 31- JUNE 6	6.43	4.7	.26	1.57	42.7	2.77	.57
198	7.0	JUNE 6- JUNE 13	7.46	5.9	.38	2.63	77.6	5.46	.48
199	7.0	JUNE 13- JUNE 20	8.23	9.7	.69	4.81	162.6	6.17	.78
200	7.0	JUNE 20- JUNE 27	7.47	8.4	.54	3.76	145.6	6.12	.61
201	6.0	JUNE 27- JULY 3	5.79	6.8	.34	2.05	87.5	3.45	.59
202	7.0	JULY 3- JULY 10	7.95	9.7	.66	4.66	209.1	5.33	.87
203	7.0	JULY 10- JULY 17	6.40	8.1	.45	3.13	145.1	4.78	.65
204	7.0	JULY 17- JULY 24	5.57	9.2	.44	3.08	145.0	5.26	.58
205	7.0	JULY 24- JULY 31	5.77	8.8	.44	3.05	144.2	4.72	.65
206	7.0	JULY 31- AUG. 7	6.08	10.8	.57	3.98	190.0	5.05	.79

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY,	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
207	8.0	AUG. 7- AUG. 15	6.17	9.3	.50	3.96	190.0	4.22	.94
208	6.0	AUG. 15- AUG. 21	8.19	10.8	.76	4.58	218.1	3.89	1.18
209	7.0	AUG. 21- AUG. 28	5.99	9.1	.47	3.29	156.7	4.01	.82
210	8.1	AUG. 28-SEPT. 5	5.69	8.6	.42	3.42	160.2	4.95	.69
211	6.0	SEPT. 5-SEPT. 11	6.10	8.6	.45	2.72	123.9	3.20	.85
212	14.0	SEPT. 11-SEPT. 25	7.19	9.5	.59	8.28	364.9	6.58	1.26
213	14.0	SEPT. 25- OCT. 9	6.07	9.5	.50	7.01	293.6	6.10	1.15
214	7.0	OCT. 9- OCT. 16	6.77	8.7	.51	3.56	142.2	2.44	1.46
215	7.0	OCT. 16- OCT. 23	5.87	7.5	.38	2.67	102.9	1.32	2.02
216	7.0	OCT. 23- OCT. 30	5.43	8.2	.39	2.70	100.3	1.24	2.18
217	14.0	OCT. 30- NOV. 13	6.97	6.8	.41	5.75	202.6	----	----
RECORD SEASON	188.0	MAY 9- NOV. 13			0.46	87.53	3581.9		
PAN SEASON	168.1	MAY 15- OCT. 30			0.48	79.97		95.69	0.84

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
218	7.0	MAY 22- MAY 29	4.60	6.2	.25	1.74	59.7	5.16	0.34
219	7.0	MAY 29- JUNE 5	3.65	7.5	.24	1.65	59.9	3.89	.42
220	7.0	JUNE 5- JUNE 12	7.03	6.0	.36	2.54	98.5	3.20	.79
221	7.0	JUNE 12- JUNE 19	6.59	8.5	.48	3.38	143.9	4.09	.83
222	7.0	JUNE 19- JUNE 26	6.46	8.2	.46	3.21	147.9	4.82	.66
223	7.0	JUNE 26- JULY 3	5.60	8.3	.40	2.82	140.7	4.29	.66
224	7.0	JULY 3- JULY 10	5.81	11.0	.55	3.86	198.4	4.67	.83
225	7.0	JULY 10- JULY 17	6.13	11.0	.58	4.05	208.2	5.23	.77
226	7.0	JULY 17- JULY 24	6.09	11.0	.58	4.05	204.5	4.09	.99
227	7.0	JULY 24- JULY 31	6.25	11.6	.63	4.38	217.5	4.19	1.04
228	7.0	JULY 31- AUG. 7	5.40	14.0	.65	4.59	223.9	5.31	.86

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1979	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
229	7.0	AUG. 7- AUG. 14	5.62	10.4	.51	3.52	168.7	3.12	1.13
230	7.0	AUG. 14- AUG. 21	4.92	10.4	.44	3.10	145.9	1.85	1.68
231	7.0	AUG. 21- AUG. 28	6.04	11.4	.59	4.14	190.7	4.01	1.03
232	7.0	AUG. 28-SEPT. 4	6.41	11.0	.61	4.26	191.8	4.11	1.04
233	7.0	SEPT. 4-SEPT. 11	4.58	10.1	.40	2.80	123.1	4.42	.63
234	7.0	SEPT. 11-SEPT. 18	5.08	11.9	.52	3.67	156.9	3.25	1.13
235	7.0	SEPT. 18-SEPT. 25	4.80	8.9	.37	2.58	107.5	2.77	.93
236	7.0	SEPT. 25- OCT. 2	5.87	9.5	.48	3.36	136.0	2.67	1.26
237	6.9	OCT. 2- OCT. 9	7.25	9.2	.57	3.98	155.1	3.15	1.26
238	7.0	OCT. 9- OCT. 16	6.04	8.8	.46	3.23	121.0	2.21	1.46
RECORD SEASON	146.9	MAY 22- OCT. 16			0.48	70.91	3199.5		
PAN SEASON	146.9	MAY 22- OCT. 16			0.48	70.91		80.50	0.88

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
239	7.0	MAY 27- JUNE 3	7.76	5.9	.40	2.77	85.8	6.04	0.46
240	7.0	JUNE 3- JUNE 10	7.89	5.3	.36	2.53	82.3	5.92	.43
241	7.0	JUNE 10- JUNE 17	7.34	7.5	.48	3.32	118.9	5.92	.56
242	7.0	JUNE 17- JUNE 24	5.91	7.2	.37	2.57	101.3	5.54	.46
243	7.0	JUNE 24- JULY 1	7.11	6.2	.38	2.64	111.7	5.51	.48
244	7.0	JULY 1- JULY 8	5.89	8.4	.43	2.99	132.8	4.95	.60
245	7.0	JULY 8- JULY 15	6.71	8.3	.48	3.33	151.3	4.19	.79
246	7.1	JULY 15- JULY 22	6.98	10.1	.61	4.30	197.6	5.92	.73
247	7.0	JULY 22- JULY 29	6.04	10.6	.55	3.86	178.8	4.62	.84
248	7.0	JULY 29- AUG. 5	6.45	9.8	.54	3.82	178.8	4.44	.86
249	6.0	AUG. 5- AUG. 11	6.67	9.2	.53	3.17	149.2	4.80	.66
250	7.0	AUG. 11- AUG. 18	6.54	10.1	.57	3.98	186.6	3.63	1.10
251	8.0	AUG. 18- AUG. 26	6.90	9.7	.58	4.62	212.0	4.27	1.08

Table 10.--*Summary of mass-transfer terms and pan evaporation for Williams Fork Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1980	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
252	7.1	AUG. 26-SEPT. 2	7.07	11.1	.67	4.77	215.6	3.45	1.38
253	6.9	SEPT. 2-SEPT. 9	5.46	7.5	.36	2.46	110.2	3.45	.71
254	7.0	SEPT. 9-SEPT. 16	6.09	8.5	.44	3.11	138.2	2.49	1.25
255	7.0	SEPT. 16-SEPT. 23	8.21	9.0	.64	4.45	196.4	3.22	1.38
256	7.0	SEPT. 23-SEPT. 30	5.55	9.5	.45	3.19	139.2	2.46	1.30
257	7.0	SEPT. 30- OCT. 7	5.86	8.4	.43	2.98	129.0	2.87	1.04
258	7.0	OCT. 7- OCT. 14	5.26	7.7	.35	2.44	105.2	3.07	.79
259	7.0	OCT. 14- OCT. 21	6.58	8.5	.49	3.39	146.4	----	----
260	7.0	OCT. 21- OCT. 28	5.93	9.7	.50	3.47	149.6	----	----
261	13.2	OCT. 28- NOV. 10	6.12	6.5	.34	4.52	194.1	----	----
262	7.9	NOV. 10- NOV. 18	5.52	7.5	.36	2.84	121.7	----	----
RECORD SEASON	175.2	MAY 26- NOV. 18			0.46	81.52	3532.7		
PAN SEASON	140.1	MAY 26- OCT. 14			0.48	67.30		86.76	0.78

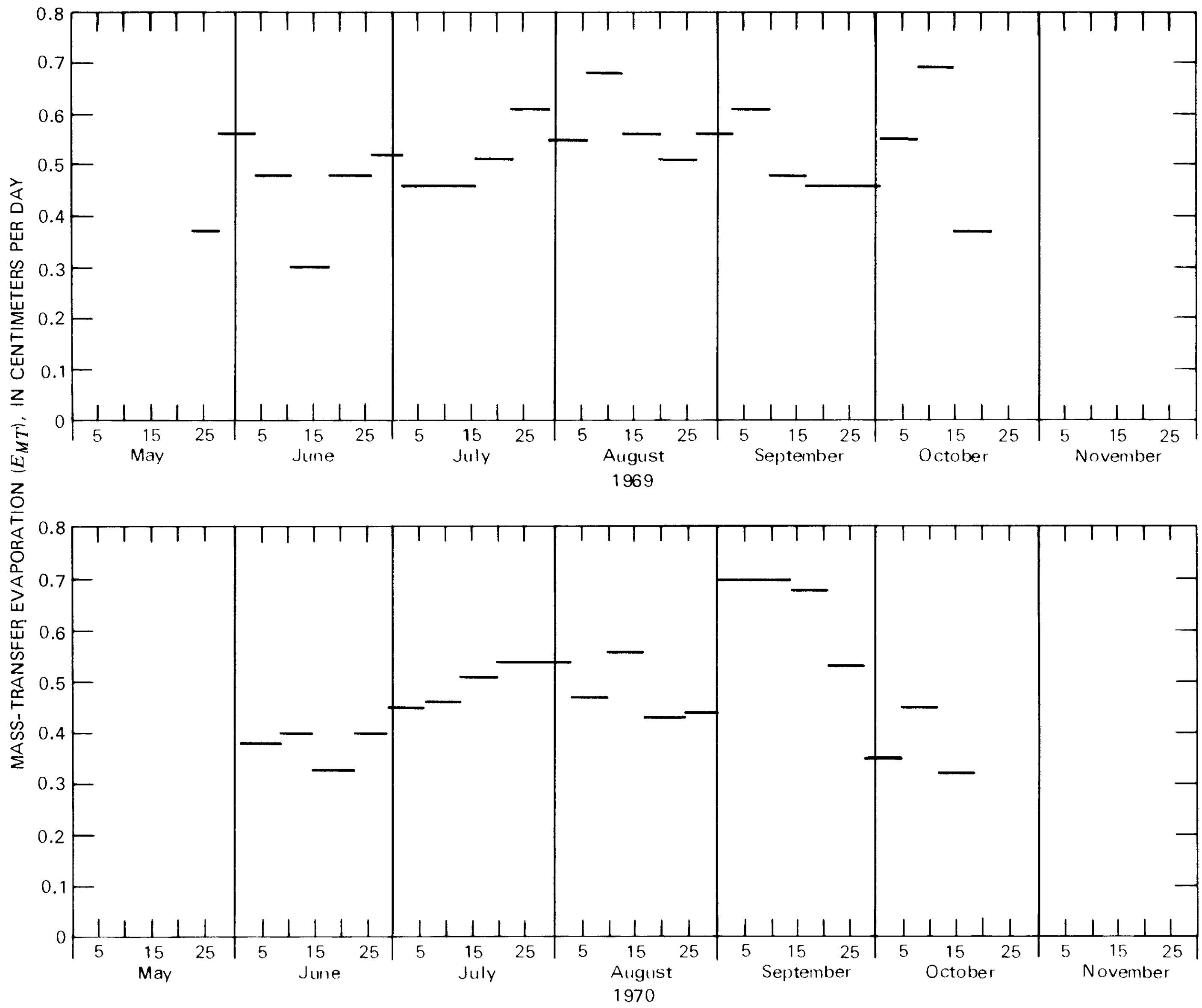

Figure 39.--Rates of mass-transfer evaporation, E_{MT}, from Williams Fork Reservoir for the 1969-78 record seasons.

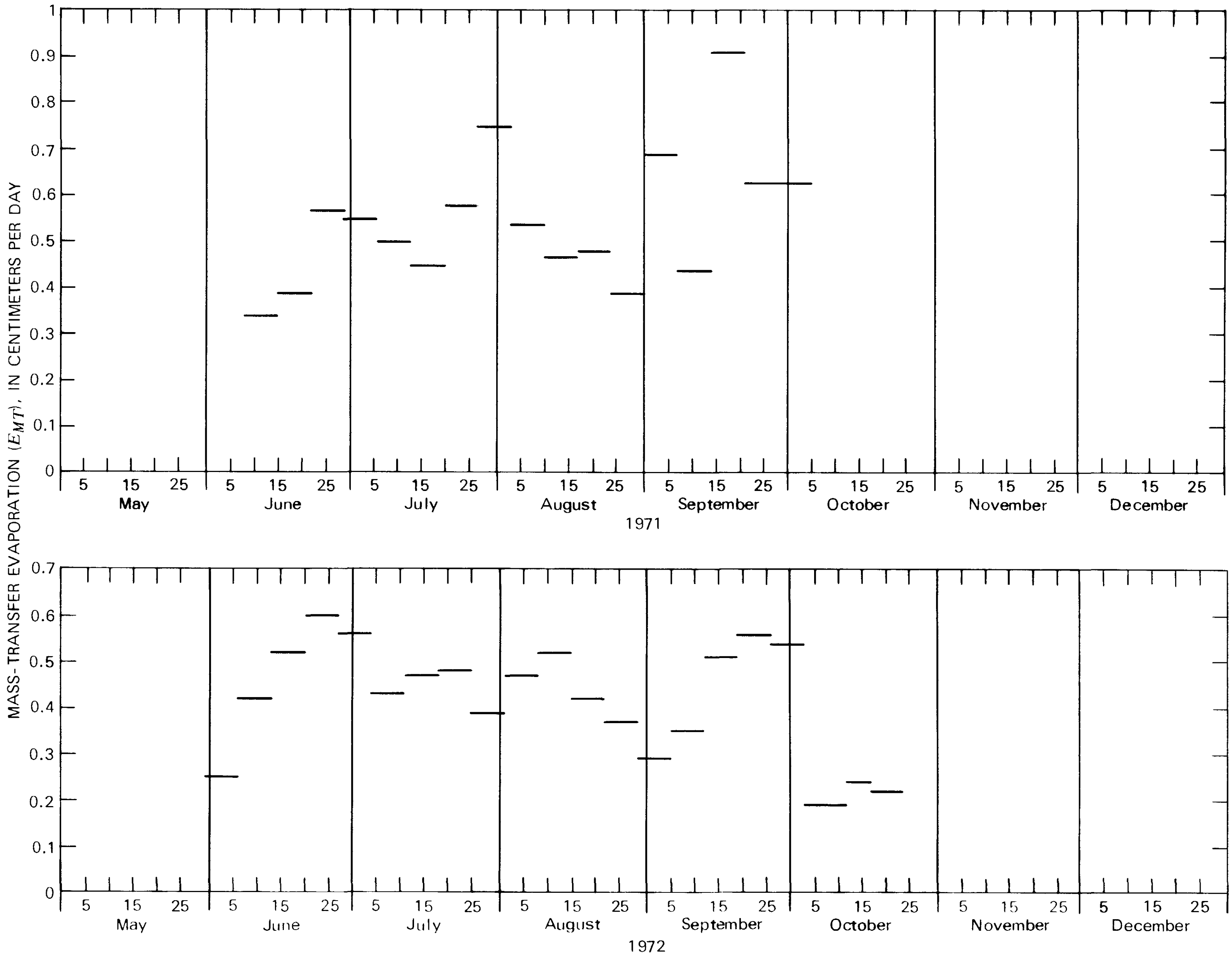

Figure 39.--Rates of mass-transfer evaporation, E_{MT}, from Williams Fork Reservoir for the 1969-78 record seasons--Continued.

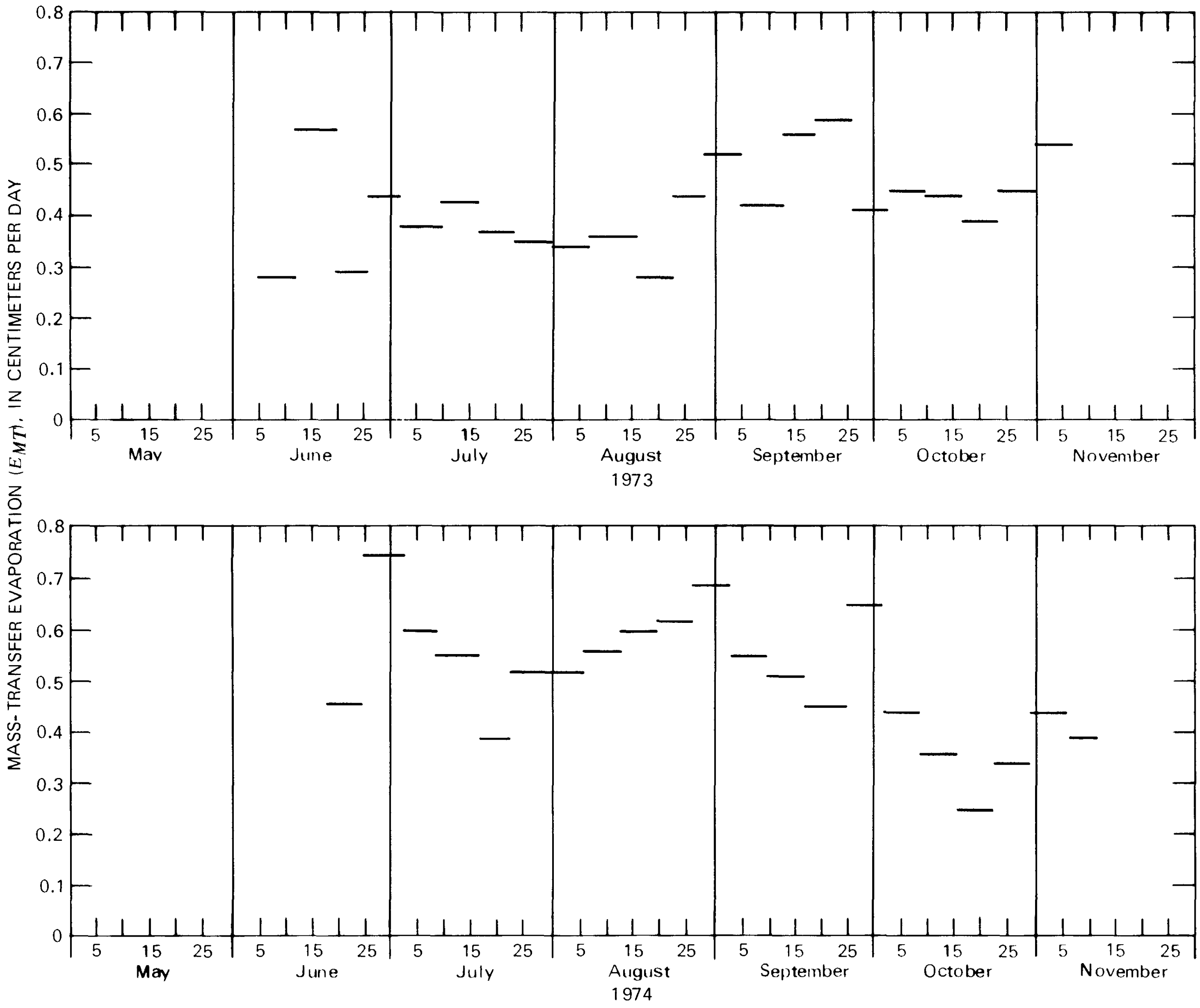

Figure 39.--Rates of mass-transfer evaporation, E_{MT}, from Williams Fork Reservoir for the 1969-78 record seasons--Continued.

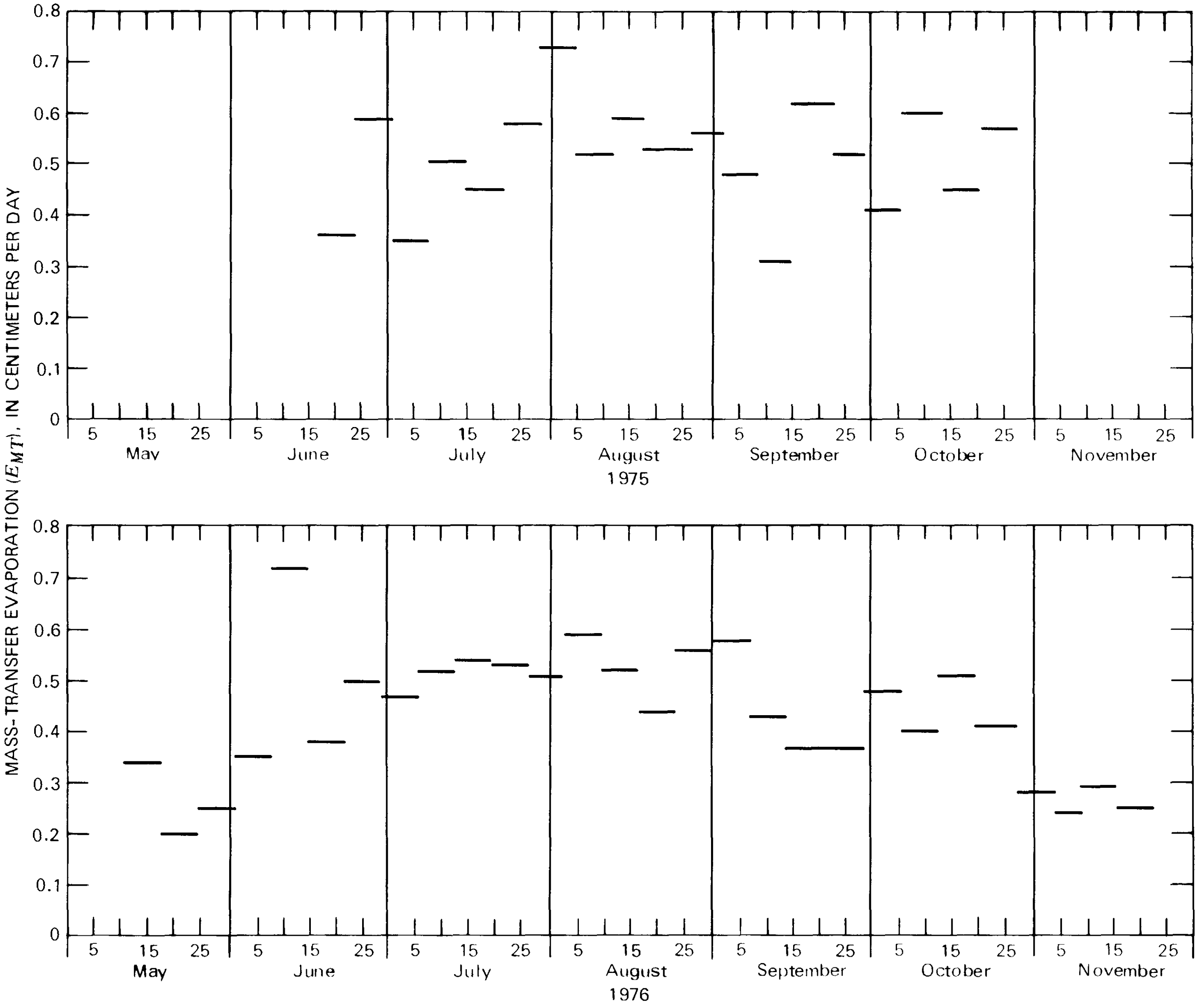

Figure 39.--Rates of mass-transfer evaporation, E_{MT}, from Williams Fork Reservoir for the 1969-78 record seasons--Continued.

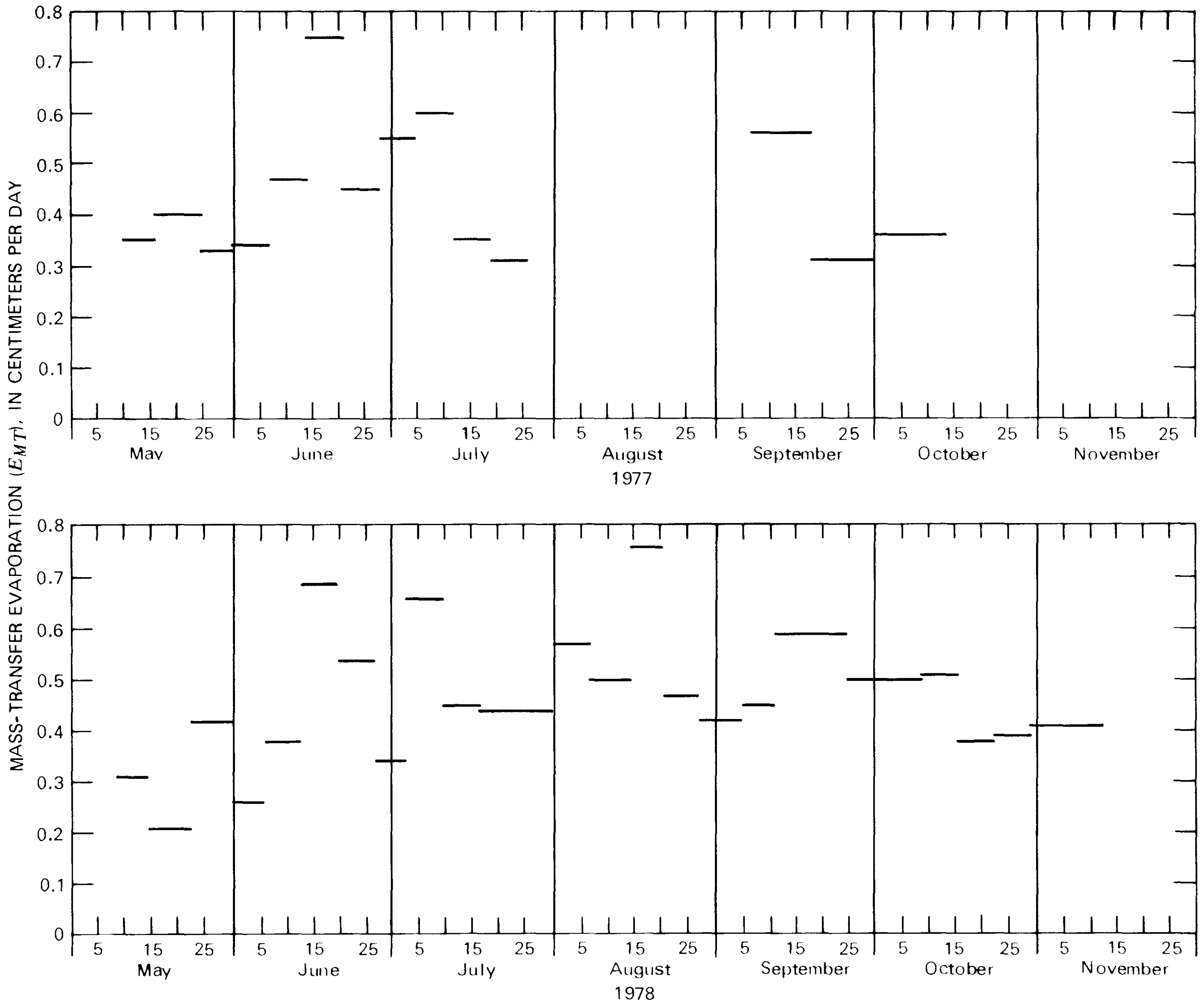

Figure 39.--Rates of mass-transfer evaporation, E_{MT}, from Williams Fork Reservoir for the 1969-78 record seasons--Continued.

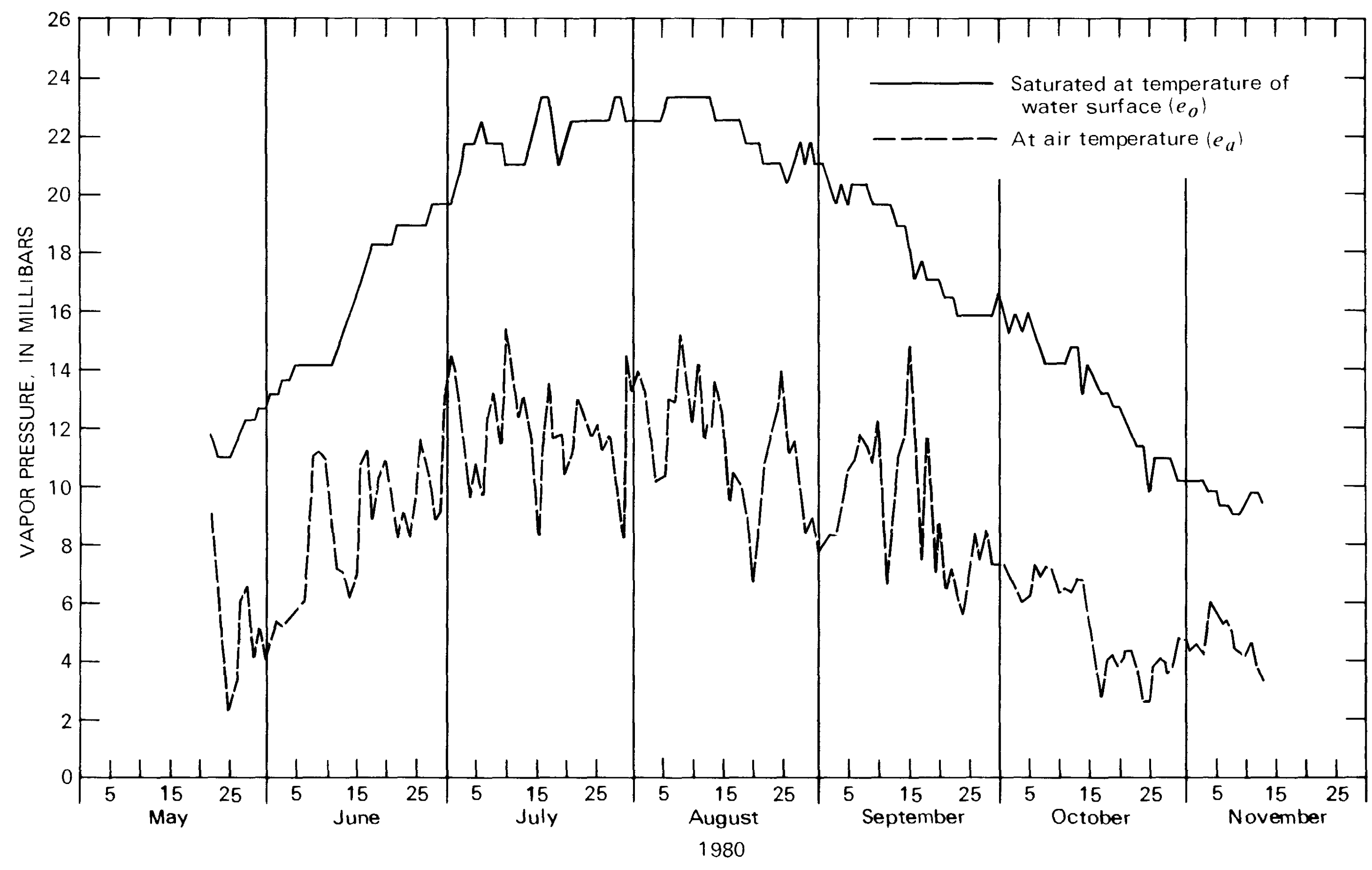

Figure 40.--Daily vapor pressures, e_o and e_a, at Elevenmile Canyon Reservoir, May-November 1980.

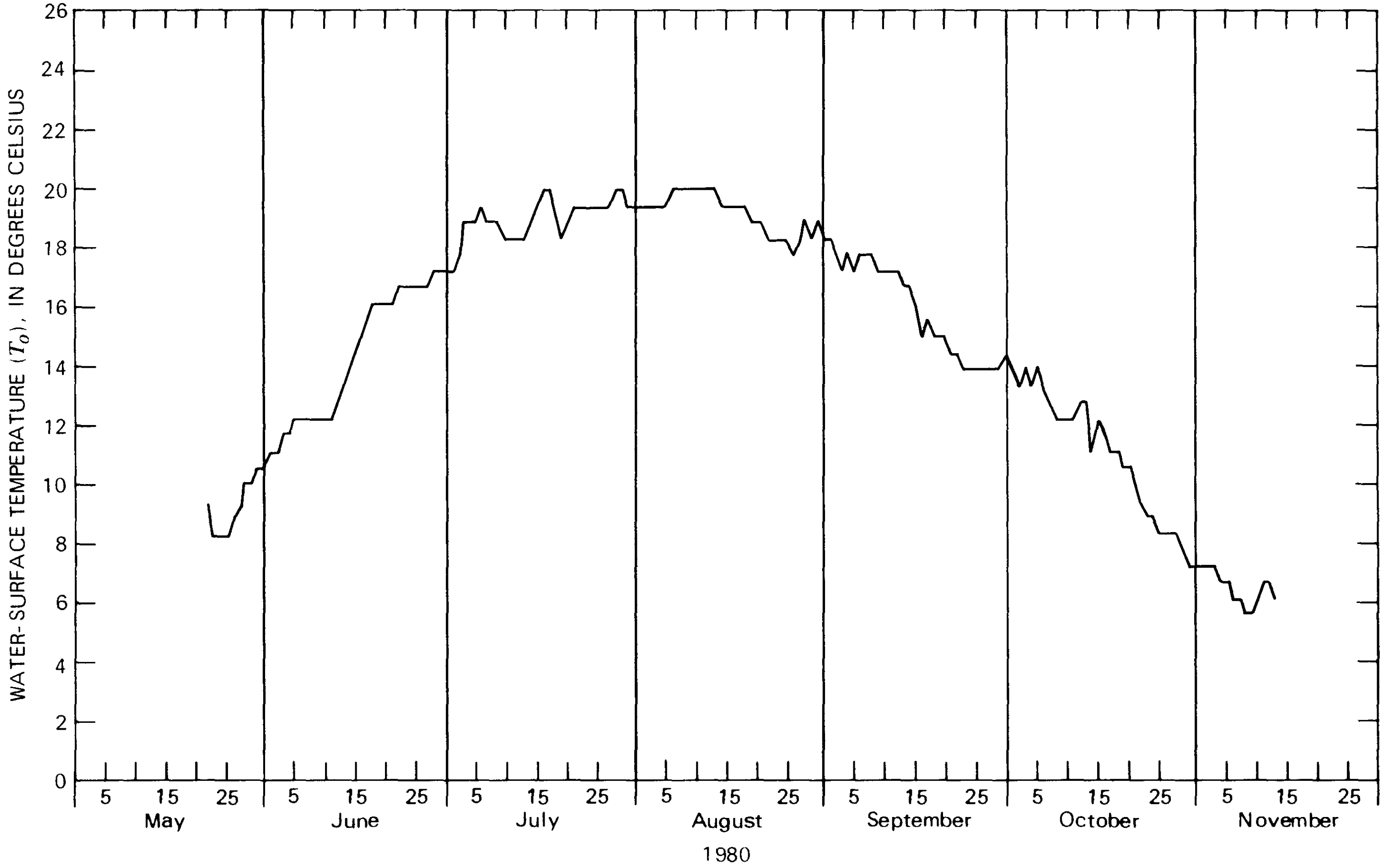

Figure 41.--Daily water-surface temperature, T_o, of Elevenmile Canyon Reservoir, May-November 1980.

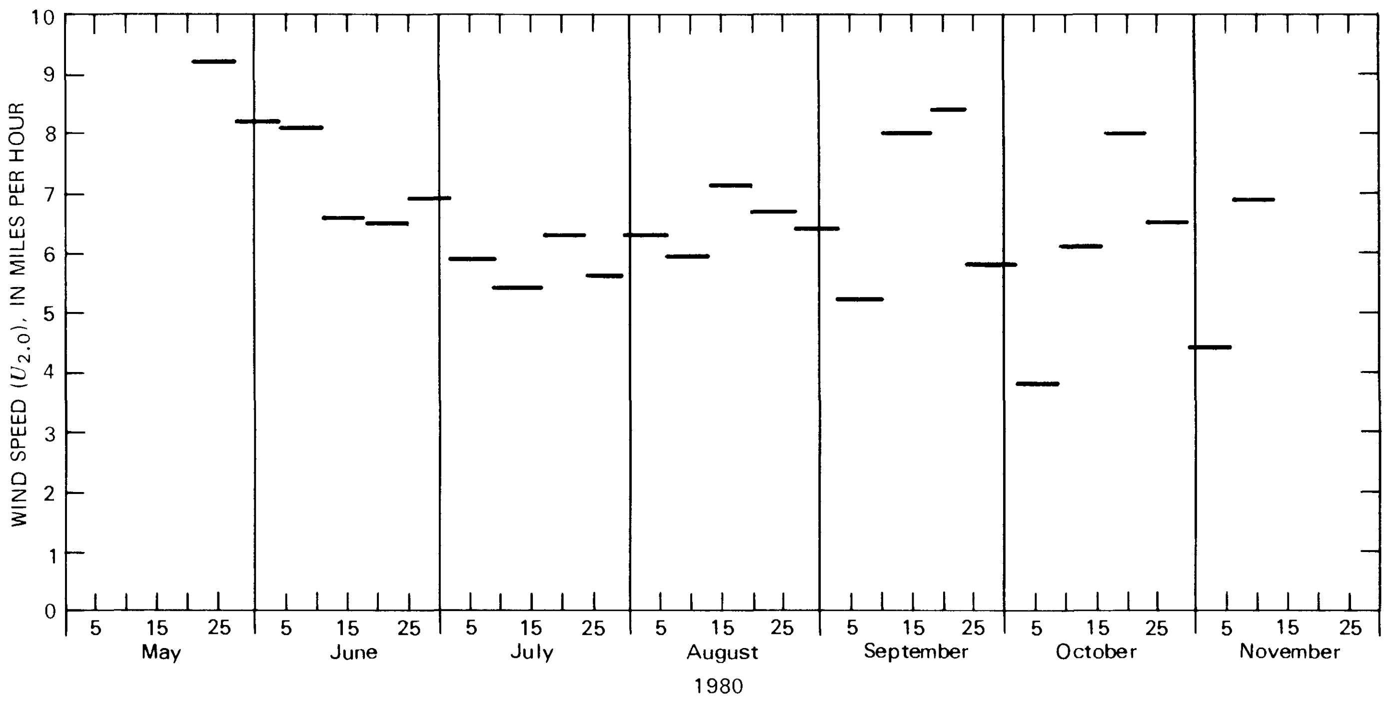

Figure 42.--Wind speeds, $U_{2.0}$, at Elevenmile Canyon Reservoir, May-November 1980.

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
116	7.0	MAY 22- MAY 29	6.60	6.7	.36	2.49	266.8	4.88	0.51
117	7.3	MAY 29- JUNE 5	6.62	6.4	.34	2.46	264.0	2.64	.93
118	6.7	JUNE 5- JUNE 12	10.24	6.3	.52	3.46	372.1	4.19	.82
119	7.0	JUNE 12- JUNE 19	6.17	4.2	.21	1.44	155.4	4.42	.32
120	7.0	JUNE 19- JUNE 26	6.72	----	---	----	-----	5.23	----
121	7.0	JUNE 26- JULY 3	6.68	----	---	----	-----	5.74	----
122	7.0	JULY 3- JULY 10	5.92	----	---	----	-----	4.37	----
123	7.0	JULY 10- JULY 17	5.99	----	---	----	-----	4.93	----
124	7.0	JULY 17- JULY 24	5.66	----	---	----	-----	3.99	----
125	7.0	JULY 24- JULY 31	5.70	11.3	.52	3.62	398.0	3.25	1.11
126	7.0	JULY 31- AUG. 7	6.33	10.6	.54	3.75	413.0	3.07	1.22
127	7.0	AUG. 7- AUG. 14	6.52	12.1	.63	4.41	485.3	4.04	1.09
128	7.0	AUG. 14- AUG. 21	5.77	11.5	.53	3.73	410.8	4.27	.87
129	7.0	AUG. 21- AUG. 28	5.99	10.1	.49	3.40	373.4	2.97	1.14

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
130	7.0	AUG. 28-SEPT. 4	7.30	10.6	.62	4.35	477.2	3.20	1.36
131	7.0	SEPT. 4-SEPT. 11	5.54	9.7	.43	3.02	330.3	3.53	.86
132	7.0	SEPT. 11-SEPT. 18	6.99	10.2	.57	3.96	432.3	1.85	2.14
133	7.0	SEPT. 18-SEPT. 25	6.54	8.8	.46	3.21	350.7	3.45	.93
134	7.0	SEPT. 25- OCT. 2	5.76	9.9	.46	3.19	348.3	2.56	1.24
135	7.0	OCT. 2- OCT. 9	6.12	8.4	.41	2.87	312.2	2.64	1.09
136	7.0	OCT. 9- OCT. 16	5.87	8.1	.38	2.67	290.8	1.90	1.40
137	7.0	OCT. 16- OCT. 23	4.78	5.8	.22	1.54	167.3	1.65	.93
138	7.0	OCT. 23- OCT. 30	5.93	6.2	.29	2.05	223.6	1.14	1.80
139	7.0	OCT. 30- NOV. 6	6.91	7.4	.41	2.86	312.8	----	----
140	8.0	NOV. 6- NOV. 14	8.73	6.3	.44	3.52	385.7	----	----
141	6.0	NOV. 14- NOV. 20	4.06	4.7	.15	.92	100.6	----	----
142	7.1	NOV. 20- NOV. 27	3.47	3.6	.10	.71	78.4	----	----
RECORD SEASON	154.1	MAY 22- JUNE 19 JULY 24- NOV. 27			0.41	63.63	6949.0		
PAN SEASON	126.0	MAY 22- JUNE 19 JULY 24- OCT. 30			0.44	55.62		55.65	1.00
	161.0	MAY 22- OCT. 30						79.91	

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1975	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
143	7.9	MAY 27- JUNE 4	6.95	----	---	----	-----	----	----
144	7.1	JUNE 4- JUNE 11	6.33	6.9	.35	2.48	275.0	4.65	0.53
145	7.0	JUNE 11- JUNE 18	9.35	6.2	.46	3.22	364.3	5.41	.60
146	6.9	JUNE 18- JUNE 25	8.65	7.4	.51	3.56	402.5	5.31	.67
147	7.0	JUNE 25- JULY 2	5.53	7.2	.32	2.23	252.3	6.58	.34
148	7.2	JULY 2- JULY 9	5.07	6.4	.26	1.89	215.4	5.56	.34
149	6.8	JULY 9- JULY 16	5.10	7.5	.31	2.08	239.5	5.38	.39
150	7.0	JULY 16- JULY 23	4.65	9.2	.34	2.40	275.2	3.45	.70
151	7.0	JULY 23- JULY 30	5.90	9.6	.45	3.16	361.3	3.89	.81
152	7.0	JULY 30- AUG. 6	4.82	11.4	.44	3.08	350.0	4.37	.70
153	7.0	AUG. 6- AUG. 13	5.16	9.0	.37	2.60	293.4	3.15	.82
154	7.0	AUG. 13- AUG. 20	4.79	9.8	.37	2.61	295.8	3.30	.79
155	7.0	AUG. 20- AUG. 27	6.19	10.5	.52	3.63	409.5	4.47	.81

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
156	7.0	AUG. 27-SEPT. 3	5.17	9.4	.39	2.72	306.6	4.14	.66
157	7.0	SEPT. 3-SEPT. 10	5.12	8.2	.34	2.36	265.8	3.05	.77
158	7.0	SEPT. 10-SEPT. 17	5.82	9.0	.42	2.93	329.9	2.51	1.17
159	7.0	SEPT. 17-SEPT. 24	6.57	10.8	.57	3.99	449.6	3.20	1.25
160	7.0	SEPT. 24- OCT. 1	6.19	9.3	.46	3.20	359.0	3.00	1.07
161	8.0	OCT. 1- OCT. 9	6.79	8.4	.46	3.67	411.3	4.11	.89
162	6.0	OCT. 9- OCT. 15	8.52	7.9	.54	3.26	365.2	3.35	.97
163	7.0	OCT. 15- OCT. 22	4.52	7.2	.26	1.83	205.4	2.51	.73
164	7.1	OCT. 22- OCT. 29	8.30	7.8	.52	3.65	409.1	----	----
165	7.0	OCT. 29- NOV. 5	5.18	5.6	.23	1.63	183.0	----	----
166	6.9	NOV. 5- NOV. 12	3.80	6.5	.20	1.36	153.1	----	----
RECORD SEASON	161.0	JUNE 4- NOV. 12			0.39	63.54	7172.2		
PAN SEASON	140.0	JUNE 4- OCT. 22			0.41	56.90		81.39	0.70

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1976	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER PERIOD	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
167	6.0	APRIL 29- MAY 5	6.09	4.8	.23	1.41	157.8	----	----
168	8.2	MAY 5- MAY 13	8.71	5.2	.37	3.00	337.1	2.79	1.08
169	5.8	MAY 13- MAY 19	7.78	6.1	.38	2.21	248.7	3.45	.64
170	8.0	MAY 19- MAY 27	5.93	5.5	.26	2.09	234.4	2.41	.87
171	6.0	MAY 27- JUNE 2	5.50	6.2	.27	1.64	184.4	2.82	.58
172	7.0	JUNE 2- JUNE 9	5.78	6.0	.28	1.93	216.3	3.56	.54
173	6.9	JUNE 9- JUNE 16	11.37	9.9	.90	6.22	700.0	6.40	.97
174	8.1	JUNE 16- JUNE 24	7.46	9.9	.59	4.78	537.4	5.36	.89
175	5.9	JUNE 24- JUNE 30	7.92	10.0	.63	3.76	422.7	4.50	.84
176	7.1	JUNE 30- JULY 7	6.50	7.1	.37	2.63	295.9	4.50	.58
177	7.1	JULY 7- JULY 14	5.76	6.9	.32	2.24	252.2	3.84	.58
178	7.9	JULY 14- JULY 22	5.73	5.3	.24	1.94	218.7	5.03	.38
179	6.0	JULY 22- JULY 28	5.59	6.1	.27	1.63	184.6	2.56	.64
180	7.0	JULY 28- AUG. 4	5.49	6.3	.27	1.92	217.7	3.10	.62

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
181	7.1	AUG. 4- AUG. 11	6.76	7.6	.41	2.89	329.1	3.89	.74
182	7.1	AUG. 11- AUG. 18	6.43	7.3	.38	2.68	301.9	4.55	.59
183	7.0	AUG. 18- AUG. 25	5.74	6.1	.28	1.96	218.9	2.87	.68
184	6.9	AUG. 25-SEPT. 1	6.02	8.2	.39	2.72	301.9	3.25	.84
185	7.1	SEPT. 1-SEPT. 8	5.63	7.8	.35	2.48	274.9	3.99	.62
186	8.2	SEPT. 8-SEPT. 16	5.81	6.2	.29	2.37	261.6	2.92	.81
187	6.7	SEPT. 16-SEPT. 23	7.15	6.4	.36	2.43	267.7	2.90	.84
188	6.2	SEPT. 23-SEPT. 29	5.07	7.0	.28	1.76	194.1	1.02	1.72
189	6.8	SEPT. 29- OCT. 6	6.11	6.6	.32	2.20	240.0	2.11	1.04
190	7.2	OCT. 6- OCT. 13	5.01	6.8	.27	1.98	216.2	2.29	.86
191	6.8	OCT. 13- OCT. 20	6.84	7.3	.40	2.70	294.9	2.03	1.33
192	8.2	OCT. 20- OCT. 28	5.77	6.9	.32	2.60	278.5	----	----
193	5.9	OCT. 28- NOV. 3	3.76	4.9	.15	.86	90.5	----	----
RECORD SEASON	188.2	APRIL 29- NOV. 3			0.36	67.03	7478.1		
PAN SEASON	168.1	MAY 5- OCT. 20			0.37	62.16		82.14	0.76

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
194	6.0	MAY 5- MAY 11	7.46	6.5	.39	2.33	241.9	5.05	0.46
195	8.0	MAY 11- MAY 19	10.01	7.5	.60	4.81	499.0	5.51	.87
196	6.1	MAY 19- MAY 25	8.16	7.7	.50	3.09	320.5	3.45	.90
197	6.9	MAY 25- JUNE 1	7.26	5.8	.34	2.32	239.5	3.94	.59
198	7.1	JUNE 1- JUNE 8	5.84	5.4	.25	1.80	186.0	3.50	.51
199	7.0	JUNE 8- JUNE 15	6.28	8.0	.40	2.83	291.3	5.69	.50
200	7.0	JUNE 15- JUNE 22	7.91	8.9	.56	3.96	406.9	5.38	.74
201	7.8	JUNE 22- JUNE 30	6.47	6.8	.35	2.72	279.5	5.00	.54
202	6.0	JUNE 30- JULY 6	8.11	7.7	.50	2.99	305.9	4.47	.69
203	7.0	JULY 6- JULY 13	5.92	9.1	.43	3.04	310.2	5.18	.59
204	7.2	JULY 13- JULY 20	5.54	7.8	.34	2.46	250.6	4.27	.58
205	7.0	JULY 20- JULY 27	4.90	5.2	.20	1.43	146.0	3.33	.43
206	6.9	JULY 27- AUG. 3	5.24	10.3	.43	2.97	301.2	5.03	.59
207	7.1	AUG. 3- AUG. 10	5.97	7.9	.38	2.67	270.7	3.94	.68
208	7.1	AUG. 10- AUG. 17	6.16	6.3	.31	2.18	220.7	3.05	.71
209	6.9	AUG. 17- AUG. 24	5.84	6.3	.30	2.05	206.9	3.66	.56

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
210	6.9	AUG. 24- AUG. 31	7.00	9.5	.53	3.65	367.2	4.32	.84
211	7.1	AUG. 31-SEPT. 7	5.77	8.0	.37	2.63	262.8	3.71	.71
212	6.9	SEPT. 7-SEPT. 14	5.91	8.5	.40	2.79	278.5	2.95	.94
213	7.9	SEPT. 14-SEPT. 22	7.43	10.6	.63	4.99	495.2	5.13	.97
214	6.2	SEPT. 22-SEPT. 28	9.99	9.8	.78	4.82	474.9	4.09	1.19
215	6.8	SEPT. 28- OCT. 5	6.88	8.2	.45	3.09	303.0	3.56	.87
216	7.1	OCT. 5- OCT. 12	8.29	9.1	.60	4.24	414.6	----	----
217	7.1	OCT. 12- OCT. 19	4.89	7.5	.29	2.07	202.0	----	----
218	6.9	OCT. 19- OCT. 26	5.05	6.2	.25	1.74	170.0	----	----
219	7.0	OCT. 26- NOV. 2	6.99	6.8	.38	2.64	256.7	----	----
220	7.2	NOV. 2- NOV. 9	6.51	4.9	.25	1.82	177.5	----	----
221	7.8	NOV. 9- NOV. 17	3.87	4.5	.14	1.08	104.7	----	----
222	6.2	NOV. 17- NOV. 23	5.27	3.7	.16	.97	94.6	----	----
223	5.9	NOV. 23- NOV. 29	6.37	3.2	.16	.96	92.8	----	----
RECORD SEASON	208.1	MAY 5- NOV. 29			0.39	81.14	8171.3		
PAN SEASON	152.9	MAY 5- OCT. 5			0.43	65.62		94.16	0.70

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1978	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
224	6.7	MAY 3- MAY 10	9.56	5.3	.41	2.74	267.0	3.33	0.82
225	7.0	MAY 10- MAY 17	9.03	4.8	.34	2.42	206.1	6.02	.40
226	7.3	MAY 17- MAY 24	8.96	4.7	.34	2.45	237.1	5.66	.43
227	6.7	MAY 24- MAY 31	8.05	5.5	.36	2.39	230.6	4.29	.56
228	7.2	MAY 31- JUNE 7	8.34	4.2	.28	2.03	195.8	2.39	.85
229	6.9	JUNE 7- JUNE 14	7.56	6.7	.41	2.78	268.8	6.40	.43
230	7.0	JUNE 14- JUNE 21	8.98	7.9	.57	3.99	391.1	7.52	.53
231	7.0	JUNE 21- JUNE 28	8.16	8.5	.56	3.88	386.1	6.27	.62
232	7.1	JUNE 28- JULY 5	6.17	7.8	.39	2.72	275.3	6.38	.43
233	6.9	JULY 5- JULY 12	7.92	8.4	.53	3.67	375.1	5.46	.67
234	7.2	JULY 12- JULY 19	5.86	8.2	.38	2.78	287.7	4.72	.59
235	6.8	JULY 19- JULY 26	6.80	10.3	.56	3.81	397.5	4.55	.84
236	7.0	JULY 26- AUG. 2	6.55	9.6	.51	3.54	371.1	4.57	.77
237	7.0	AUG. 2- AUG. 9	6.05	9.4	.45	3.16	333.8	3.38	.93
238	7.2	AUG. 9- AUG. 16	7.32	9.9	.58	4.18	444.6	4.60	.91
239	6.8	AUG. 16- AUG. 23	8.07	9.5	.62	4.15	443.2	5.10	.81

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
240	8.0	AUG. 23- AUG. 31	6.19	7.3	.36	2.91	311.4	4.44	.66
241	6.0	AUG. 31-SEPT. 6	5.59	6.9	.31	1.86	199.9	4.06	.46
242	7.0	SEPT. 6-SEPT. 13	7.73	9.2	.57	3.96	422.7	4.93	.80
243	7.3	SEPT. 13-SEPT. 20	8.87	9.3	.66	4.79	508.6	4.50	1.06
244	7.0	SEPT. 20-SEPT. 27	4.95	7.9	.31	2.18	230.2	3.12	.70
245	7.0	SEPT. 27- OCT. 4	5.85	8.5	.40	2.77	291.9	3.76	.74
246	7.0	OCT. 4- OCT. 11	5.93	8.7	.41	2.88	302.6	3.38	.85
247	6.9	OCT. 11- OCT. 18	6.22	7.2	.36	2.46	257.6	3.07	.80
248	7.0	OCT. 18- OCT. 25	6.31	5.9	.30	2.10	218.9	1.09	1.93
249	7.0	OCT. 25- NOV. 1	5.16	6.3	.26	1.82	190.2	----	----
250	6.9	NOV. 1- NOV. 8	5.74	4.7	.22	1.49	155.5	----	----
251	7.1	NOV. 8- NOV. 15	5.56	5.6	.25	1.75	181.8	----	----
252	7.0	NOV. 15- NOV. 22	2.39	4.9	.09	.65	67.8	----	----
253	5.0	NOV. 22- NOV. 27	2.06	3.3	.05	.27	28.2	----	----
RECORD SEASON	208.0	MAY 3- NOV. 27			0.40	82.58	8478.2		
PAN SEASON	175.0	MAY 3- OCT. 25			0.44	76.60		112.99	0.68

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
254	6.9	MAY 16- MAY 23	5.33	1.8	.08	.53	55.8	3.18	0.17
255	7.0	MAY 23- MAY 30	6.04	1.9	.09	.63	67.0	2.54	.25
256	7.0	MAY 30- JUNE 6	5.34	3.8	.16	1.13	122.1	3.94	.29
257	7.1	JUNE 6- JUNE 13	7.01	5.1	.29	2.03	226.3	3.53	.58
258	7.1	JUNE 13- JUNE 20	9.41	7.3	.55	3.89	441.6	5.66	.69
259	6.8	JUNE 20- JUNE 27	5.27	4.7	.20	1.34	153.1	5.05	.26
260	7.3	JUNE 27- JULY 4	6.06	8.0	.39	2.84	324.8	4.06	.70
261	6.7	JULY 4- JULY 11	5.27	8.1	.34	2.29	259.0	5.03	.46
262	7.2	JULY 11- JULY 18	6.03	8.0	.39	2.77	308.4	4.22	.66
263	7.8	JULY 18- JULY 26	5.52	8.5	.38	2.94	326.4	5.26	.56
264	6.2	JULY 26- AUG. 1	5.57	8.2	.36	2.27	252.7	2.95	.77
265	7.0	AUG. 1- AUG. 8	5.02	9.9	.40	2.80	312.0	5.23	.54
266	7.9	AUG. 8- AUG. 16	5.94	8.0	.38	3.02	337.2	2.54	1.19
267	6.1	AUG. 16- AUG. 22	6.16	9.3	.46	2.78	310.0	2.08	1.34

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1979	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
268	7.0	AUG. 22- AUG. 29	5.40	8.8	.38	2.69	299.1	3.68	.73
269	6.9	AUG. 29-SEPT. 5	5.39	9.5	.41	2.82	313.7	4.83	.58
270	7.0	SEPT. 5-SEPT. 12	5.95	8.0	.38	2.69	298.8	4.01	.67
271	7.1	SEPT. 12-SEPT. 19	5.94	9.6	.46	3.22	358.5	2.68	1.19
272	7.0	SEPT. 19-SEPT. 26	5.09	7.5	.31	2.14	238.2	2.44	.88
273	6.8	SEPT. 26- OCT. 3	5.72	6.8	.31	2.14	237.9	3.20	.67
274	6.9	OCT. 3- OCT. 10	6.43	7.5	.39	2.67	297.8	3.50	.76
275	7.3	OCT. 10- OCT. 17	5.40	6.5	.28	2.04	226.7	2.56	.80
276	7.0	OCT. 17- OCT. 24	7.93	6.3	.40	2.79	311.4	1.37	2.04
277	6.8	OCT. 24- OCT. 31	7.33	6.2	.36	2.47	275.0	----	----
278	7.3	OCT. 31- NOV. 7	3.83	6.5	.20	1.45	161.4	----	----
279	8.0	NOV. 7- NOV. 15	1.60	4.7	.06	.48	53.8	----	----
RECORD SEASON	183.2	MAY 16- NOV. 15			0.32	58.86	6568.7		
PAN SEASON	161.1	MAY 16- OCT. 24			0.34	54.46		83.55	0.65

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	E0-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
280	7.0	MAY 21- MAY 28	9.19	6.0	.44	3.11	352.7	6.15	0.51
281	7.0	MAY 28- JUNE 4	8.21	8.2	.54	3.76	425.8	6.30	.60
282	6.8	JUNE 4- JUNE 11	8.12	5.4	.35	2.38	271.3	6.35	.37
283	7.1	JUNE 11- JUNE 18	6.61	8.2	.43	3.08	355.0	6.07	.51
284	7.0	JUNE 18- JUNE 25	6.52	9.2	.48	3.38	388.7	5.74	.59
285	7.0	JUNE 25- JULY 2	6.92	8.0	.44	3.09	354.8	5.59	.55
286	6.8	JULY 2- JULY 9	5.94	10.7	.51	3.48	398.9	5.44	.64
287	8.0	JULY 9- JULY 17	5.39	9.5	.41	3.27	372.4	5.49	.60
288	7.1	JULY 17- JULY 24	6.27	10.6	.53	3.75	422.9	4.78	.78
289	6.0	JULY 24- JULY 30	5.69	11.5	.52	3.13	349.2	4.16	.75
290	7.0	JULY 30- AUG. 6	6.33	10.4	.53	3.68	406.3	4.65	.79
291	7.2	AUG. 6- AUG. 13	5.95	10.3	.49	3.52	387.0	3.89	.90
292	6.8	AUG. 13- AUG. 20	7.14	12.1	.69	4.75	521.9	4.22	1.12

Table 11.--*Summary of mass-transfer terms and pan evaporation for Elevenmile Canyon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
293	7.1	AUG. 20- AUG. 27	6.69	9.5	.51	3.62	398.5	3.68	.98
294	7.1	AUG. 27-SEPT. 3	6.41	12.5	.64	4.54	499.8	4.75	.96
295	7.1	SEPT. 3-SEPT. 10	5.17	9.1	.37	2.64	290.7	2.56	1.03
296	7.8	SEPT. 10-SEPT. 18	7.98	8.2	.52	4.07	449.3	4.90	.83
297	6.0	SEPT. 18-SEPT. 24	8.41	9.6	.64	3.83	422.8	4.09	.94
298	8.1	SEPT. 24- OCT. 2	5.78	8.3	.38	3.09	341.4	4.04	.76
299	6.9	OCT. 2- OCT. 9	3.78	8.3	.25	1.75	192.8	3.66	.48
300	7.2	OCT. 9- OCT. 16	6.09	8.2	.40	2.87	316.4	2.90	.99
301	6.9	OCT. 16- OCT. 23	8.03	8.6	.55	3.78	418.1	----	----
302	7.1	OCT. 23- OCT. 30	6.47	7.1	.37	2.59	286.5	----	----
303	7.0	OCT. 30- NOV. 6	4.37	5.0	.17	1.22	134.5	----	----
304	6.9	NOV. 6- NOV. 13	6.88	4.6	.25	1.76	194.1	----	----
RECORD SEASON	176.0	MAY 21- NOV. 13			0.46	80.14	8951.8		
PAN SEASON	148.1	MAY 21- OCT. 16			0.48	70.79		99.41	0.71

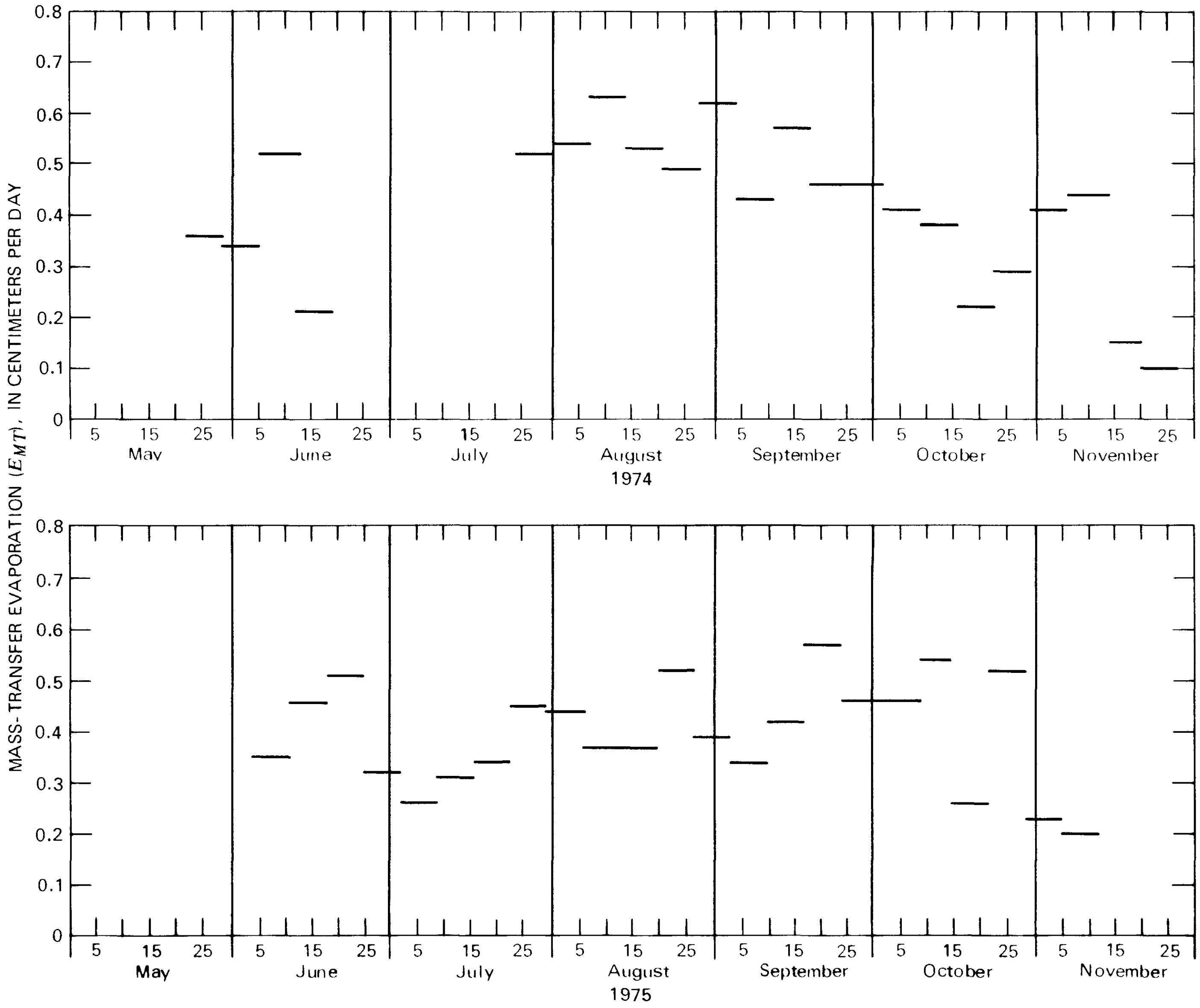

Figure 43.--Rates of mass-transfer evaporation, E_{MT}, from Elevenmile Canyon Reservoir for the 1974-80 record seasons.

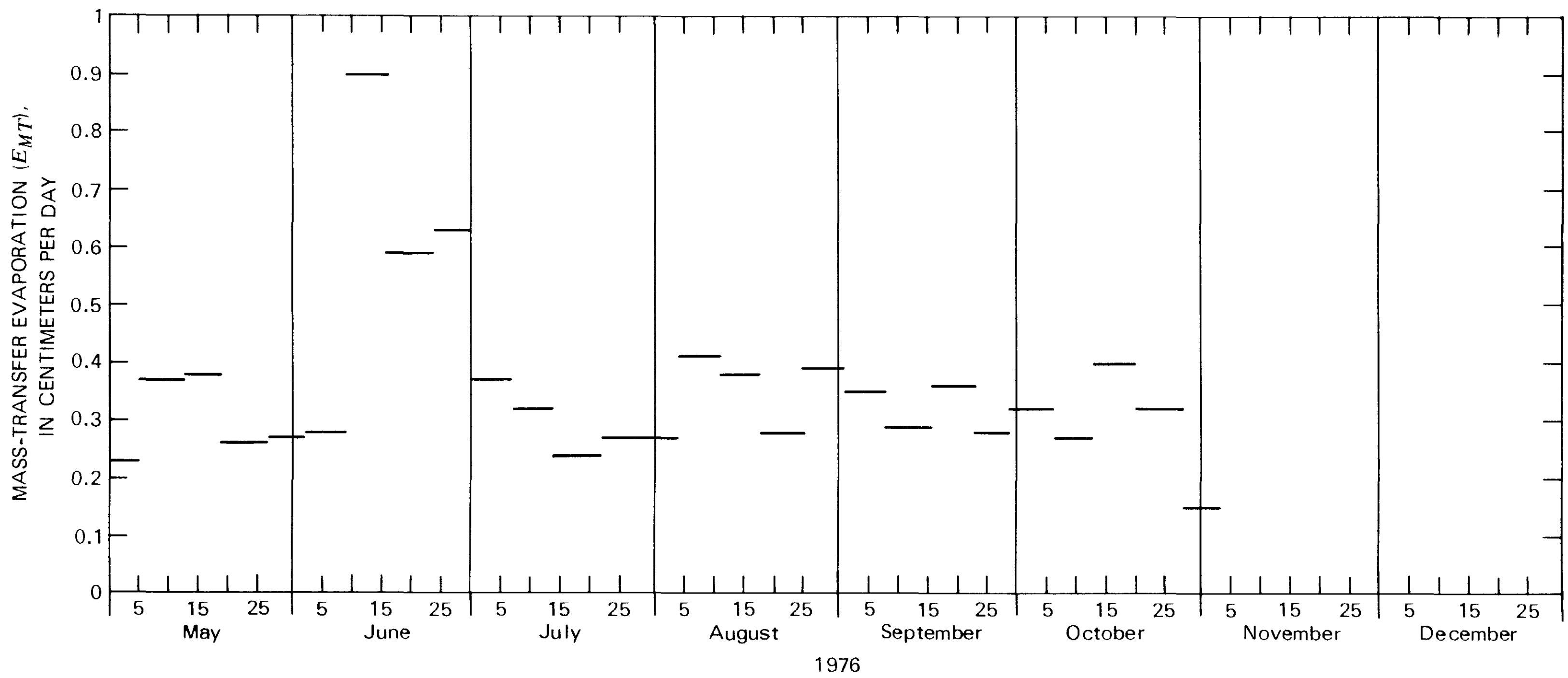

Figure 43.--Rates of mass-transfer evaporation, E_{MT}, from Elevenmile Canyon Reservoir for the 1974-80 record seasons--Continued.

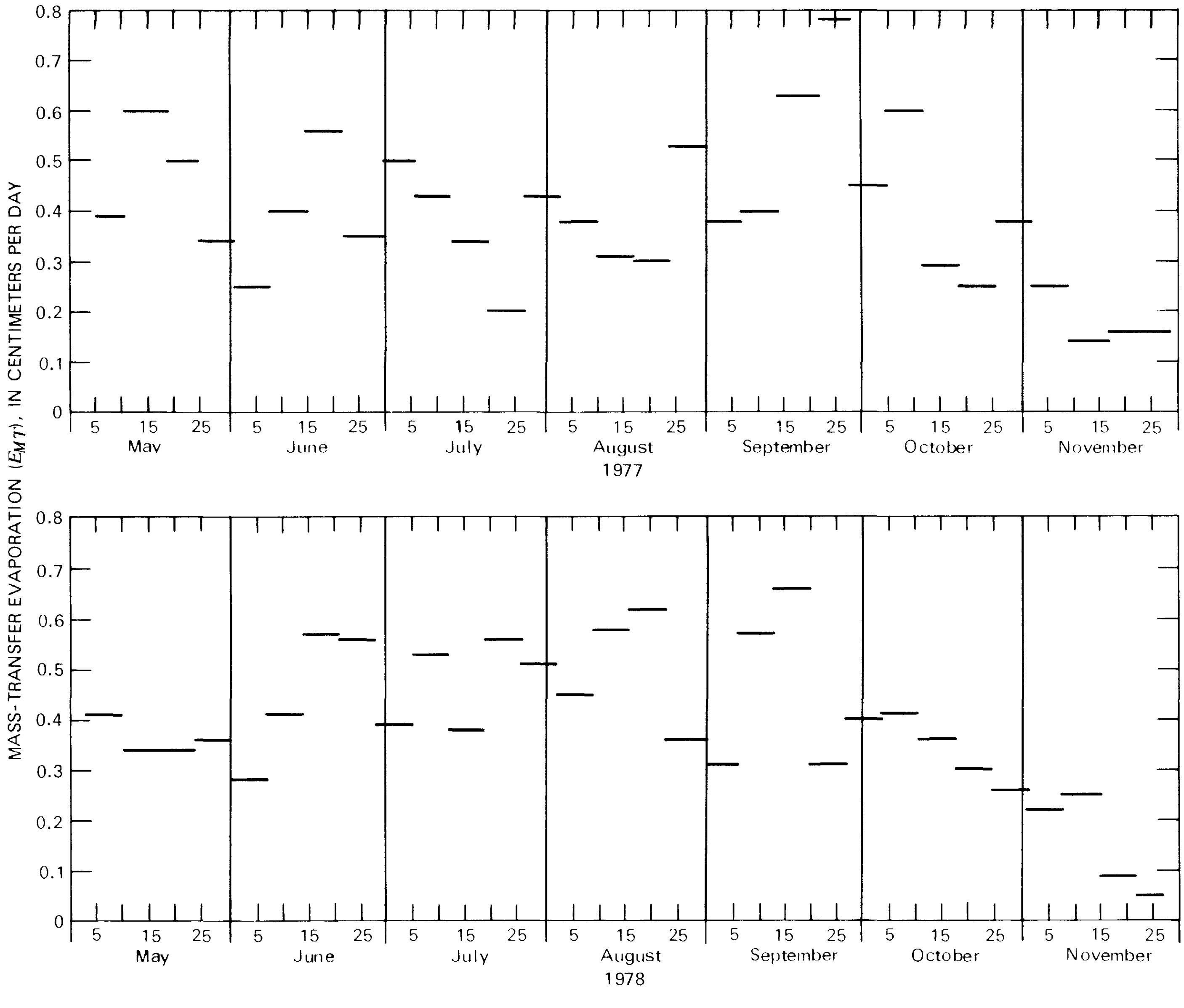

Figure 43.--Rates of mass-transfer evaporation, E_{MT}, from Elevenmile Canyon Reservoir for the 1974-80 record seasons--Continued.

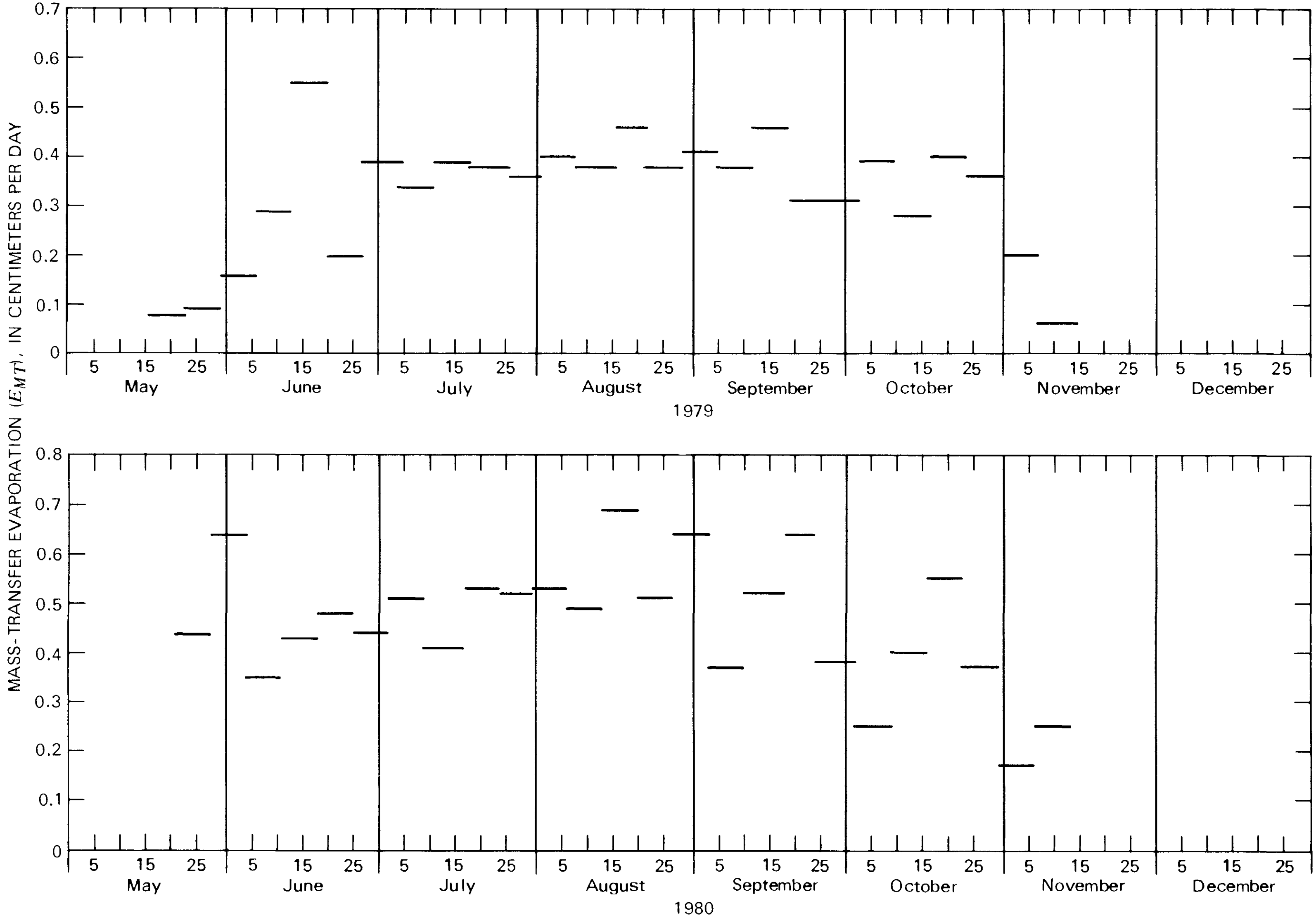

Figure 43.--Rates of mass-transfer evaporation, E_{MT}, from Elevenmile Canyon Reservoir for the 1974-80 record seasons--Continued.

Pan Evaporation

Pan-evaporation data were collected at a station about 500 feet downstream of the dam. Pan evaporation per period and the ratios of reservoir evaporation to pan evaporation are given in table 11.

The ratios varied within and between seasons. The between-season variation was not as great as within-season variation. Because of differences in season length, direct comparisons are not given.

EVAPORATION FROM DILLON RESERVOIR

Dillon Reservoir is on the Blue River about 80 miles west of Denver, Colo. The three major inflows to the reservoir are Tenmile Creek and the Blue and the Snake Rivers. Drainage area above the reservoir is 335 square miles.

Dillon Reservoir has an active storage capacity of 254,036 acre-feet, a surface area of 3,222 acres and a mean depth of 78.8 feet. At full pool, the water surface is at an altitude of 9,017 feet.

Energy-budget studies were conducted at Dillon Reservoir during 1969-71. Evaporation data for 1969-73 were reported by Ficke and others (1977), who determined an N value of 0.00796. Using this value of N, mass-transfer evaporation rates were calculated for the 1974-80 record seasons.

Mass Transfer

Hygrothermograph data were collected at a station near the caretaker's house on the east side of the reservoir. Water-surface temperatures and wind speeds were collected as described earlier. Vapor pressures, water-surface temperatures, and wind speeds collected during 1980 at Dillon Reservoir are shown in figures 44, 45, and 46.

A summary of mass-transfer terms and pan evaporation for the 1974-80 record seasons at Dillon Reservoir is given in table 12. Hydrographs of the mass-transfer evaporation rates are shown in figure 47. Mass-transfer evaporation rates ranged from 0.08 to 0.66 centimeter per day.

Pan Evaporation

Pan-evaporation data were collected at a station near the caretaker's house on the east side of the reservoir. Pan evaporation per period and the ratios of reservoir evaporation to pan evaporation are given in table 12. The ratios varied within seasons and between seasons. Because of differences in season length, direct comparisons are not given.

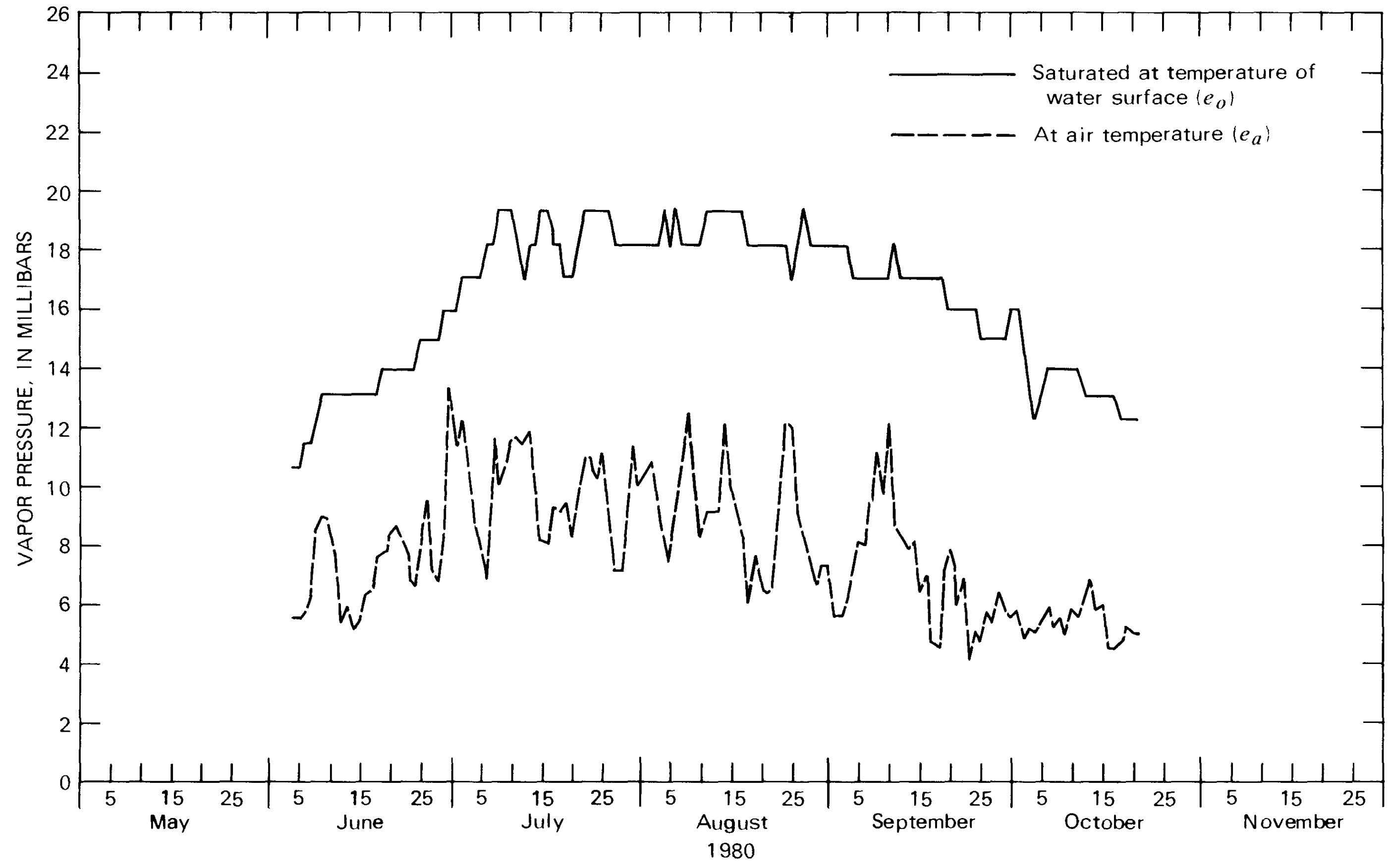

Figure 44.--Daily vapor pressures, e_o and e_a, at Dillon Reservoir, June-October 1980.

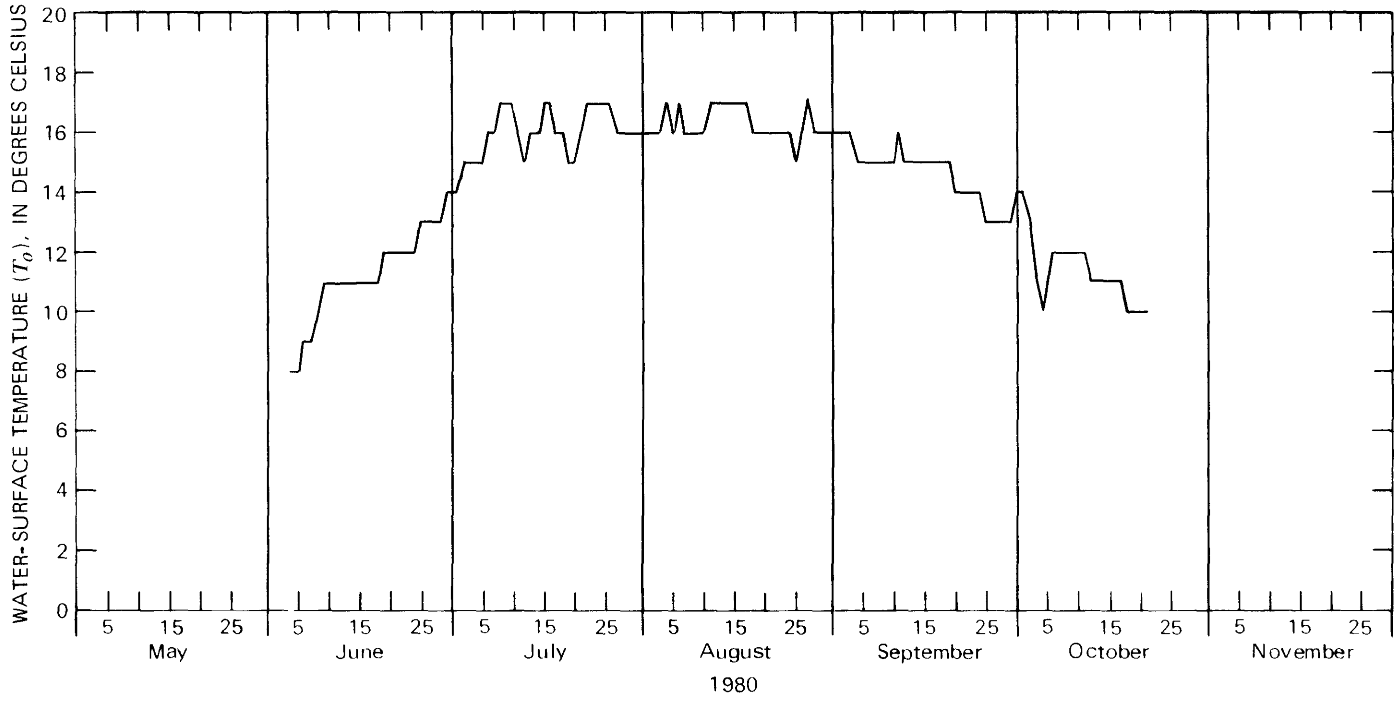

Figure 45.-- Daily water-surface temperature, T_o, of Dillon Reservoir, June-October 1980.

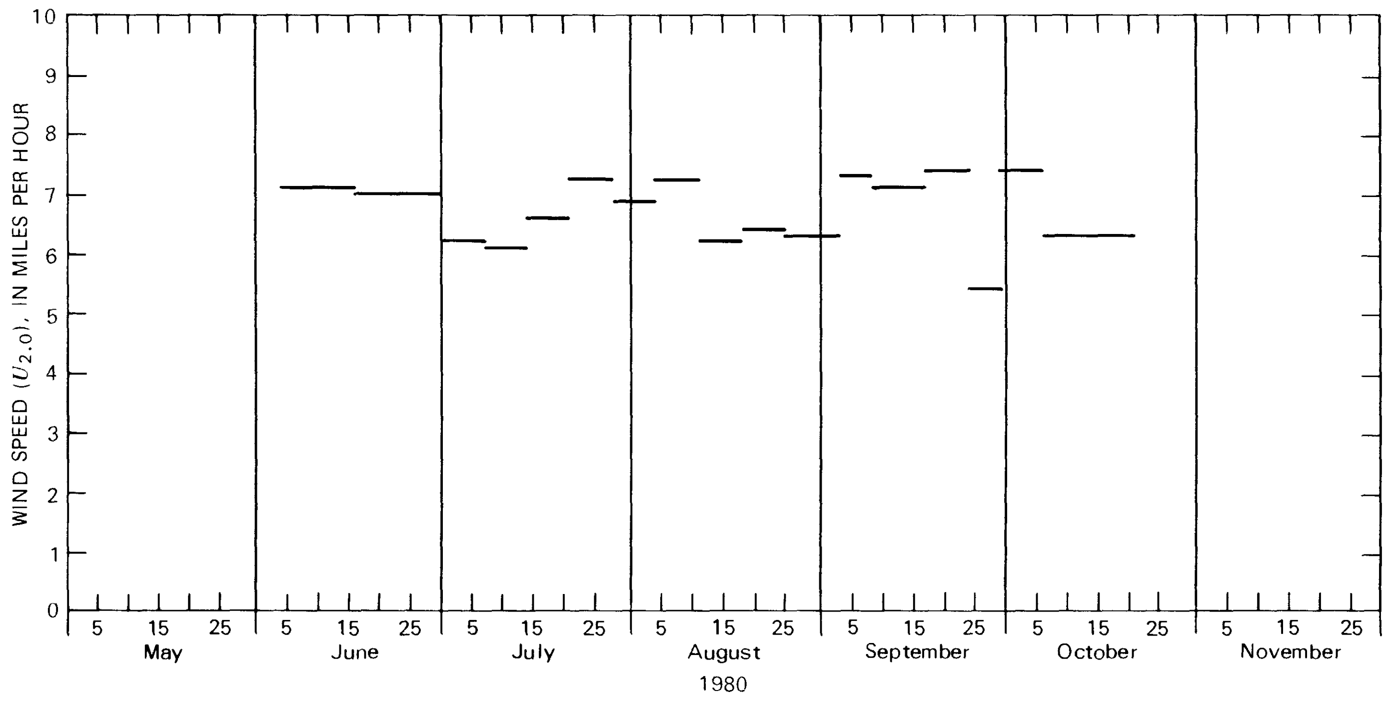

Figure 46.-- Wind speeds, $U_{2.0}$, at Dillon Reservoir, June-October 1980.

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
73	9.9	MAY 31- JUNE 10	7.42	4.4	.26	2.60	284.8	3.96	0.66
74	9.9	JUNE 10- JUNE 20	6.16	4.7	.23	2.28	250.0	6.81	.33
75	7.0	JUNE 20- JUNE 27	7.02	6.3	.35	2.48	271.8	6.22	.40
76	7.0	JUNE 27- JULY 4	7.06	10.0	.56	3.91	425.3	6.70	.58
77	7.0	JULY 4- JULY 11	5.66	9.2	.42	2.91	312.0	4.98	.58
78	7.0	JULY 11- JULY 18	6.10	9.2	.45	3.12	329.9	3.89	.80
79	7.0	JULY 18- JULY 25	5.72	8.2	.37	2.63	276.7	3.66	.72
80	6.9	JULY 25- AUG. 1	6.12	8.8	.43	2.96	307.6	3.63	.82
81	7.1	AUG. 1- AUG. 8	6.96	8.3	.46	3.26	332.5	4.01	.81
82	7.0	AUG. 8- AUG. 15	6.61	8.9	.47	3.27	326.7	3.89	.84
83	7.0	AUG. 15- AUG. 22	6.48	9.3	.48	3.37	330.6	5.16	.65
84	7.0	AUG. 22- AUG. 29	6.53	9.2	.48	3.33	321.1	4.88	.68
85	7.0	AUG. 29-SEPT. 5	8.01	9.5	.60	4.23	404.2	5.00	.85

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
86	7.0	SEPT. 5-SEPT. 12	7.63	8.2	.50	3.50	333.4	4.34	.81
87	7.0	SEPT. 12-SEPT. 19	6.00	7.9	.38	2.65	252.2	2.59	1.02
88	7.0	SEPT. 19-SEPT. 26	5.99	8.2	.39	2.74	260.0	3.20	.86
89	7.0	SEPT. 26- OCT. 3	6.74	8.6	.46	3.22	304.5	2.97	1.08
90	7.0	OCT. 3- OCT. 10	5.48	7.2	.31	2.18	205.9	1.60	1.36
91	7.0	OCT. 10- OCT. 17	6.31	6.6	.33	2.31	217.3	1.98	1.17
92	7.0	OCT. 17- OCT. 24	5.67	4.4	.20	1.39	130.5	2.01	.69
93	7.0	OCT. 24- OCT. 31	6.05	4.2	.20	1.43	133.9	1.35	1.06
94	7.0	OCT. 31- NOV. 7	6.05	5.2	.25	1.75	164.0	----	----
95	7.0	NOV. 7- NOV. 14	9.29	4.4	.32	2.27	212.0	----	----
96	7.0	NOV. 14- NOV. 21	7.31	3.9	.23	1.58	147.2	----	----
97	6.9	NOV. 21- NOV. 28	7.96	3.5	.22	1.54	143.8	----	----
RECORD SEASON	180.7	MAY 31- NOV. 28			0.37	66.91	6677.9		
PAN SEASON	152.8	MAY 31- OCT. 31			0.39	59.77		82.83	0.72

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
98	6.0	JUNE 17- JUNE 23	5.64	1.8	.08	.48	46.0	3.20	0.15
99	7.0	JUNE 23- JUNE 30	6.58	5.3	.28	1.92	191.9	6.45	.30
100	7.0	JUNE 30- JULY 7	5.64	4.1	.18	1.29	136.6	5.10	.25
101	7.0	JULY 7- JULY 14	6.48	3.9	.20	1.42	155.1	5.38	.26
102	7.1	JULY 14- JULY 21	5.37	4.2	.18	1.28	140.2	3.89	.33
103	6.9	JULY 21- JULY 28	5.88	7.4	.35	2.40	260.9	4.24	.57
104	7.0	JULY 28- AUG. 4	5.52	8.2	.36	2.53	273.2	4.47	.56
105	7.1	AUG. 4- AUG. 11	5.67	7.6	.34	2.42	255.3	5.10	.47
106	7.0	AUG. 11- AUG. 18	5.98	7.4	.35	2.45	253.7	3.12	.78
107	7.0	AUG. 18- AUG. 25	6.02	7.9	.38	2.64	269.6	4.06	.65
108	7.1	AUG. 25-SEPT. 1	5.18	7.9	.33	2.30	233.2	4.47	.51
109	7.0	SEPT. 1-SEPT. 8	5.71	8.5	.38	2.67	268.6	4.50	.59
110	7.0	SEPT. 8-SEPT. 15	5.02	6.3	.25	1.78	178.5	1.40	1.27

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
111	7.0	SEPT. 15-SEPT. 22	7.04	8.4	.47	3.30	330.5	3.68	.90
112	7.0	SEPT. 22-SEPT. 29	6.72	8.1	.44	3.03	303.9	3.73	.81
113	7.0	SEPT. 29- OCT. 6	5.81	7.0	.32	2.27	227.3	3.25	.70
114	7.0	OCT. 6- OCT. 13	7.22	7.4	.43	3.01	301.3	3.12	.96
115	7.0	OCT. 13- OCT. 20	6.17	6.5	.32	2.22	222.4	2.16	1.03
116	7.0	OCT. 20- OCT. 27	6.63	5.7	.30	2.09	208.7	----	----
117	7.0	OCT. 27- NOV. 3	5.62	5.4	.24	1.69	167.9	----	----
118	7.0	NOV. 3- NOV. 10	7.08	4.4	.25	1.74	172.8	----	----
119	7.0	NOV. 10- NOV. 17	6.56	4.6	.24	1.68	166.5	----	----
120	7.0	NOV. 17- NOV. 24	4.71	4.9	.18	1.28	126.3	----	----
121	7.1	NOV. 24- DEC. 1	6.06	5.0	.24	1.70	168.1	----	----
RECORD SEASON	167.3	JUNE 17- DEC. 1			0.30	49.59	5058.5		
PAN SEASON	118.2	JUNE 17- OCT. 20			0.33	39.41		71.32	0.55

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
122	8.0	JUNE 1- JUNE 9	4.78	4.4	.17	1.33	134.5	4.80	0.28
123	7.0	JUNE 9- JUNE 16	9.32	6.0	.45	3.14	333.2	4.39	.72
124	10.0	JUNE 16- JUNE 26	7.02	4.8	.27	2.70	291.8	6.43	.42
125	7.0	JUNE 26- JULY 3	6.36	5.7	.29	2.00	216.9	5.13	.40
126	7.0	JULY 3- JULY 10	6.01	6.5	.31	2.18	235.2	4.98	.44
127	7.0	JULY 10- JULY 17	6.79	6.5	.35	2.45	262.1	5.79	.42
128	7.0	JULY 17- JULY 24	5.67	6.3	.28	1.99	211.7	4.52	.44
129	7.1	JULY 24- JULY 31	5.89	7.9	.37	2.65	279.6	3.61	.73
130	6.9	JULY 31- AUG. 7	5.57	7.5	.33	2.27	236.6	3.76	.60
131	6.0	AUG. 7- AUG. 13	6.73	8.3	.45	2.69	279.0	2.82	.95
132	6.9	AUG. 13- AUG. 20	5.73	6.3	.29	2.00	204.4	3.53	.57
133	8.0	AUG. 20- AUG. 28	6.11	8.4	.41	3.28	330.3	4.93	.66
134	7.0	AUG. 28-SEPT. 4	6.09	8.9	.43	3.00	301.9	4.16	.72

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
135	7.0	SEPT. 4-SEPT. 11	6.10	7.9	.38	2.68	268.7	3.91	.68
136	7.0	SEPT. 11-SEPT. 18	5.92	6.8	.32	2.23	220.8	2.44	.91
137	7.0	SEPT. 18-SEPT. 25	5.80	7.8	.36	2.54	250.1	2.06	1.23
138	7.0	SEPT. 25- OCT. 2	5.41	8.4	.36	2.51	246.2	2.26	1.11
139	7.0	OCT. 2- OCT. 9	6.98	8.2	.45	3.19	312.2	2.24	1.42
140	7.0	OCT. 9- OCT. 16	5.42	7.7	.33	2.32	227.7	2.46	.94
141	7.0	OCT. 16- OCT. 23	7.25	8.3	.48	3.39	330.9	----	----
142	7.0	OCT. 23- OCT. 30	7.00	7.8	.43	3.02	294.5	----	----
143	7.0	OCT. 30- NOV. 6	5.67	5.9	.27	1.87	182.1	----	----
144	7.0	NOV. 6- NOV. 13	6.44	6.5	.33	2.32	224.1	----	----
145	7.0	NOV. 13- NOV. 20	3.83	5.5	.17	1.16	111.7	----	----
RECORD SEASON	171.9	JUNE 1- NOV. 20			0.34	58.91	5985.9		
PAN SEASON	136.9	JUNE 1- OCT. 16			0.34	47.15		74.22	0.64

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1977	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
146	7.2	MAY 19- MAY 26	6.89	4.4	.24	1.72	148.1	3.43	0.50
147	6.8	MAY 26- JUNE 2	5.52	3.5	.15	1.04	89.8	4.29	.24
148	7.0	JUNE 2- JUNE 9	5.93	2.5	.12	.83	73.1	4.09	.20
149	7.0	JUNE 9- JUNE 16	5.79	7.6	.35	2.45	221.1	5.82	.42
150	8.0	JUNE 16- JUNE 24	6.89	8.5	.46	3.72	335.7	6.12	.61
151	7.0	JUNE 24- JULY 1	6.75	8.3	.45	3.11	278.6	6.12	.51
152	7.2	JULY 1- JULY 8	5.98	7.6	.36	2.59	228.5	4.52	.57
153	6.8	JULY 8- JULY 15	7.24	9.7	.56	3.80	329.7	5.54	.68
154	6.1	JULY 15- JULY 21	5.74	6.2	.28	1.72	146.9	2.90	.59
155	6.9	JULY 21- JULY 28	5.78	6.2	.29	1.96	166.5	4.55	.43
156	7.0	JULY 28- AUG. 4	7.03	11.0	.61	4.28	359.5	5.97	.72
157	7.2	AUG. 4- AUG. 11	6.70	7.4	.39	2.82	233.5	4.62	.61
158	6.9	AUG. 11- AUG. 18	5.19	7.0	.29	1.99	163.4	2.64	.75

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
159	6.3	AUG. 18- AUG. 24	5.83	6.4	.30	1.87	152.5	2.59	.72
160	6.7	AUG. 24- AUG. 31	7.00	9.0	.50	3.35	270.7	3.76	.89
161	7.0	AUG. 31-SEPT. 7	6.22	8.5	.42	2.97	237.0	4.50	.66
162	7.1	SEPT. 7-SEPT. 14	6.98	8.5	.47	3.37	263.6	3.25	1.04
163	8.0	SEPT. 14-SEPT. 22	6.89	10.7	.59	4.66	351.4	4.57	1.02
164	7.0	SEPT. 22-SEPT. 29	7.46	9.1	.54	3.78	272.1	3.81	.99
165	7.0	SEPT. 29- OCT. 6	6.78	7.7	.41	2.89	198.2	----	----
166	6.9	OCT. 6- OCT. 13	8.54	9.4	.64	4.45	296.7	----	----
167	7.1	OCT. 13- OCT. 20	5.66	7.5	.34	2.39	156.0	----	----
168	5.1	OCT. 20- OCT. 25	5.67	7.7	.35	1.75	112.2	----	----
169	9.8	OCT. 25- NOV. 4	6.59	8.5	.45	4.37	274.4	----	----
RECORD SEASON	169.1	MAY 19- NOV. 4			0.40	67.88	5359.2		
PAN SEASON	133.2	MAY 19-SEPT. 29			0.39	52.03		83.09	0.63

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
170	6.0	MAY 24- MAY 30	6.85	5.0	.27	1.64	92.1	2.92	0.56
171	6.8	MAY 30- JUNE 6	6.72	2.7	.15	.99	59.2	2.95	.34
172	7.1	JUNE 6- JUNE 13	6.94	5.2	.29	2.02	132.5	4.93	.41
173	6.9	JUNE 13- JUNE 20	8.90	9.3	.66	4.55	354.1	6.63	.69
174	7.0	JUNE 20- JUNE 27	7.72	8.0	.49	3.44	298.2	6.25	.55
175	6.2	JUNE 27- JULY 3	4.80	7.5	.28	1.77	164.3	3.91	.45
176	10.8	JULY 3- JULY 14	6.88	9.8	.54	5.84	565.5	9.60	.61
177	3.9	JULY 14- JULY 18	6.76	7.8	.42	1.65	162.2	2.59	.64
178	7.0	JULY 18- JULY 25	6.46	10.3	.53	3.72	368.8	5.61	.66
179	7.0	JULY 25- AUG. 1	6.09	7.7	.37	2.62	259.6	4.93	.53
180	7.0	AUG. 1- AUG. 8	7.27	10.3	.60	4.18	413.1	5.03	.83
181	7.0	AUG. 8- AUG. 15	6.78	8.8	.48	3.32	323.1	3.58	.93
182	7.2	AUG. 15- AUG. 22	6.95	10.9	.61	4.36	414.4	4.62	.94

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1978	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
183	6.8	AUG. 22- AUG. 29	6.01	9.8	.47	3.17	295.4	4.52	.70
184	7.0	AUG. 29-SEPT. 5	6.02	8.2	.39	2.77	254.2	4.19	.66
185	7.0	SEPT. 5-SEPT. 12	5.89	8.4	.39	2.73	249.0	3.78	.72
186	7.0	SEPT. 12-SEPT. 19	7.59	7.4	.45	3.13	283.5	3.12	1.00
187	7.1	SEPT. 19-SEPT. 26	6.17	7.7	.38	2.68	240.0	3.15	.85
188	7.2	SEPT. 26- OCT. 3	7.03	7.2	.40	2.89	256.1	3.99	.72
189	6.8	OCT. 3- OCT. 10	6.16	7.6	.37	2.52	218.9	----	----
190	8.1	OCT. 10- OCT. 18	6.70	6.1	.33	2.63	224.4	----	----
191	12.9	OCT. 18- OCT. 31	4.38	5.8	.20	2.62	219.3	----	----
192	15.2	OCT. 31- NOV. 15	5.16	5.6	.23	3.51	287.8	----	----
193	5.9	NOV. 15- NOV. 21	5.69	6.4	.29	1.73	139.5	----	----
194	8.0	NOV. 21- NOV. 29	3.84	5.2	.16	1.29	103.4	----	----
RECORD SEASON	188.9	MAY 24- NOV. 29			0.38	71.77	6378.6		
PAN SEASON	132.0	MAY 24- OCT. 3			0.44	57.47		86.30	0.66

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
195	7.1	JUNE 11- JUNE 18	6.55	6.0	.31	2.23	217.6	5.61	0.40
196	6.8	JUNE 18- JUNE 25	7.03	6.0	.33	2.26	239.7	4.93	.46
197	7.1	JUNE 25- JULY 2	6.31	7.4	.37	2.62	287.6	5.36	.49
198	7.0	JULY 2- JULY 9	6.23	8.2	.41	2.86	313.0	5.33	.54
199	7.9	JULY 9- JULY 17	5.89	8.6	.40	3.20	348.3	6.55	.49
200	6.0	JULY 17- JULY 23	7.81	8.6	.54	3.22	348.9	4.14	.78
201	8.1	JULY 23- JULY 31	7.24	9.2	.53	4.27	460.4	6.78	.63
202	7.0	JULY 31- AUG. 7	6.97	10.8	.60	4.17	446.8	6.55	.64
203	7.2	AUG. 7- AUG. 14	6.45	8.1	.42	2.99	318.9	3.53	.85
204	5.8	AUG. 14- AUG. 20	5.44	9.0	.39	2.24	240.3	1.93	1.16
205	7.0	AUG. 20- AUG. 27	6.59	10.0	.52	3.67	393.9	3.71	.99

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
206	8.3	AUG. 27-SEPT. 4	6.84	9.1	.50	4.11	439.3	5.44	.76
207	5.7	SEPT. 4-SEPT. 10	5.93	9.2	.43	2.48	264.1	4.16	.60
208	7.0	SEPT. 10-SEPT. 17	6.91	10.5	.58	4.03	426.0	4.24	.95
209	7.0	SEPT. 17-SEPT. 24	7.27	9.0	.52	3.65	381.8	3.76	.97
210	8.0	SEPT. 24- OCT. 2	6.86	8.1	.44	3.54	367.1	4.09	.86
211	6.0	OCT. 2- OCT. 8	8.67	9.5	.65	3.93	407.3	3.68	1.07
212	7.0	OCT. 8- OCT. 15	7.55	7.1	.43	2.96	306.8	----	----
213	7.1	OCT. 15- OCT. 22	7.71	6.0	.37	2.60	269.7	----	----
214	7.0	OCT. 22- OCT. 29	6.18	5.8	.29	2.00	206.8	----	----
215	6.9	OCT. 29- NOV. 5	7.72	7.5	.46	3.21	328.8	----	----
RECORD SEASON	147.0	JUNE 11- NOV. 5			0.45	66.24	7013.1		
PAN SEASON	119.0	JUNE 11- OCT. 8			0.47	55.47		79.79	0.70

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
216	5.1	JUNE 4- JUNE 9	7.14	4.8	.27	1.40	139.6	5.10	0.27
217	6.8	JUNE 9- JUNE 16	7.18	6.7	.38	2.59	269.3	6.40	.40
218	7.0	JUNE 16- JUNE 23	7.05	5.9	.33	2.31	247.3	5.72	.40
219	7.0	JUNE 23- JUNE 30	7.07	6.5	.37	2.57	277.6	5.99	.43
220	7.1	JUNE 30- JULY 7	6.25	7.2	.36	2.52	275.2	5.54	.45
221	7.0	JULY 7- JULY 14	6.17	7.4	.37	2.55	277.7	4.50	.57
222	7.0	JULY 14- JULY 21	6.63	9.3	.49	3.43	372.3	6.25	.55
223	7.0	JULY 21- JULY 28	7.30	9.5	.55	3.87	418.7	5.46	.71
224	7.0	JULY 28- AUG. 4	6.92	8.5	.47	3.27	352.5	5.10	.64
225	7.0	AUG. 4- AUG. 11	7.29	8.7	.51	3.54	379.0	6.04	.59
226	7.0	AUG. 11- AUG. 18	6.29	10.0	.50	3.50	369.7	3.66	.96

Table 12.--*Summary of mass-transfer terms and pan evaporation for Dillon Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
227	7.0	AUG. 18- AUG. 25	6.46	9.3	.48	3.36	348.5	3.61	.93
228	9.0	AUG. 25-SEPT. 3	6.34	11.3	.57	5.08	518.0	5.41	.94
229	5.0	SEPT. 3-SEPT. 8	7.37	8.2	.48	2.42	242.6	2.29	1.06
230	9.3	SEPT. 8-SEPT. 17	7.14	9.0	.51	4.71	466.9	3.86	1.22
231	6.9	SEPT. 17-SEPT. 24	7.42	10.2	.60	4.13	404.0	3.86	1.07
232	4.9	SEPT. 24-SEPT. 29	5.42	9.3	.40	1.96	191.1	2.39	.82
233	7.0	SEPT. 29- OCT. 6	7.41	8.8	.52	3.64	352.4	3.73	.98
234	7.2	OCT. 6- OCT. 13	6.32	8.0	.40	2.91	277.8	2.90	1.00
235	8.0	OCT. 13- OCT. 21	6.34	7.6	.38	3.05	285.9	----	----
RECORD SEASON	139.3	JUNE 4- OCT. 21			0.45	62.89	6466.1		
PAN SEASON	131.3	JUNE 4- OCT. 13			0.46	59.76		87.81	0.68

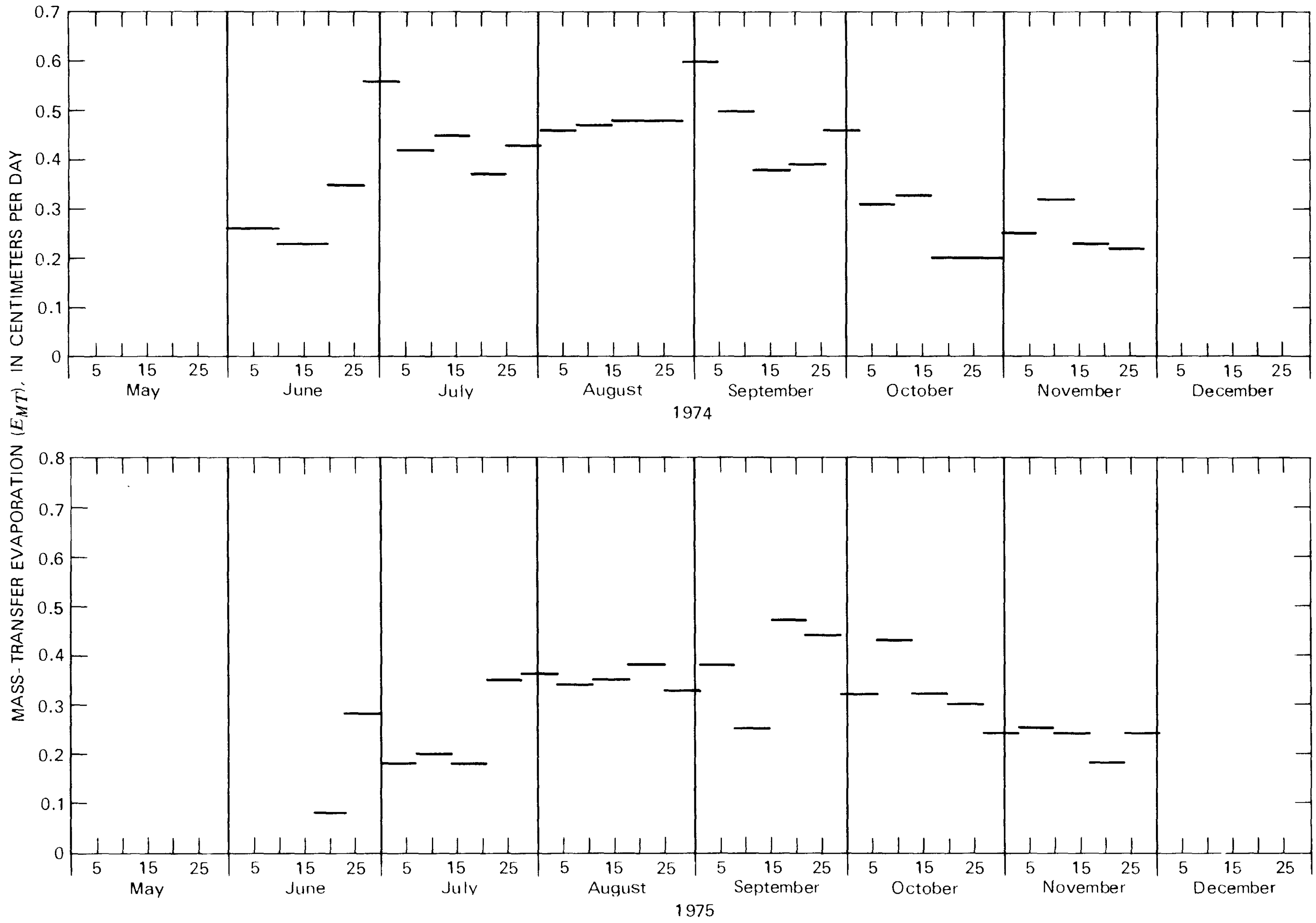

Figure 47.--Rates of mass-transfer evaporation, E_{MT}, from Dillon Reservoir for the 1974-80 record seasons.

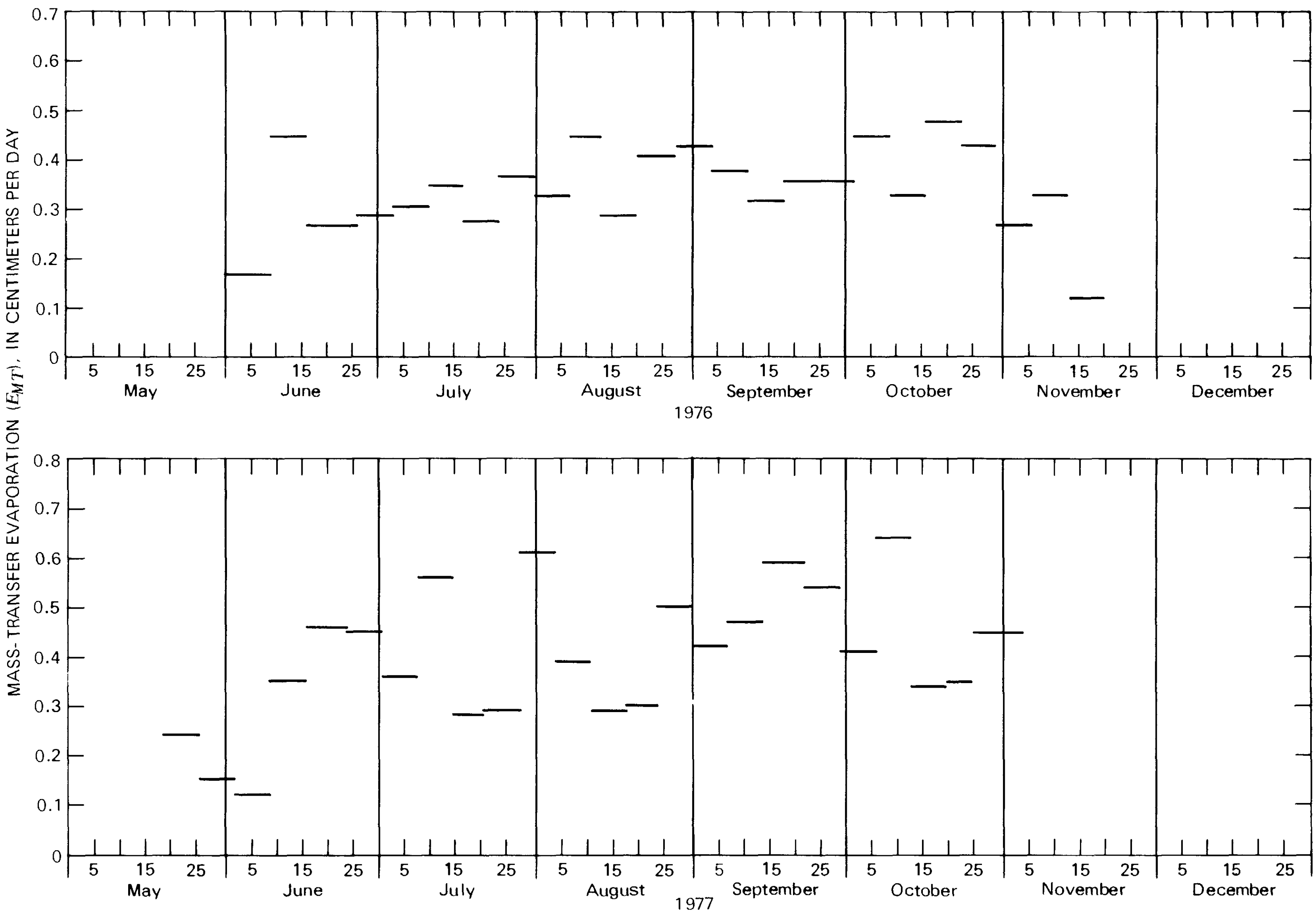

Figure 47.--Rates of mass-transfer evaporation, E_{MT}, from Dillon Reservoir for the 1974-80 record seasons--Continued.

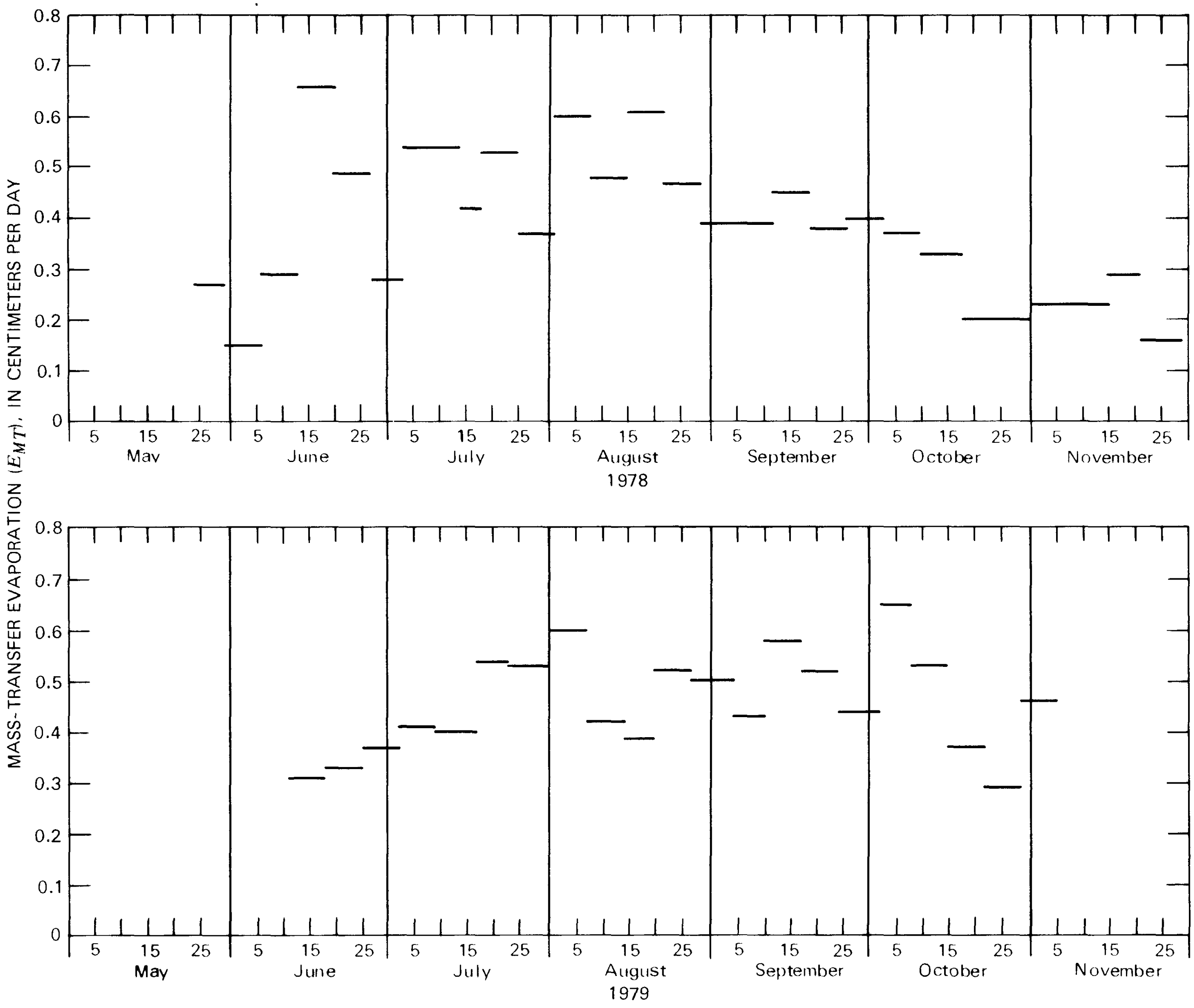

Figure 47.--Rates of mass-transfer evaporation, E_{MT}, from Dillon Reservoir for the 1974-80 record seasons--Continued.

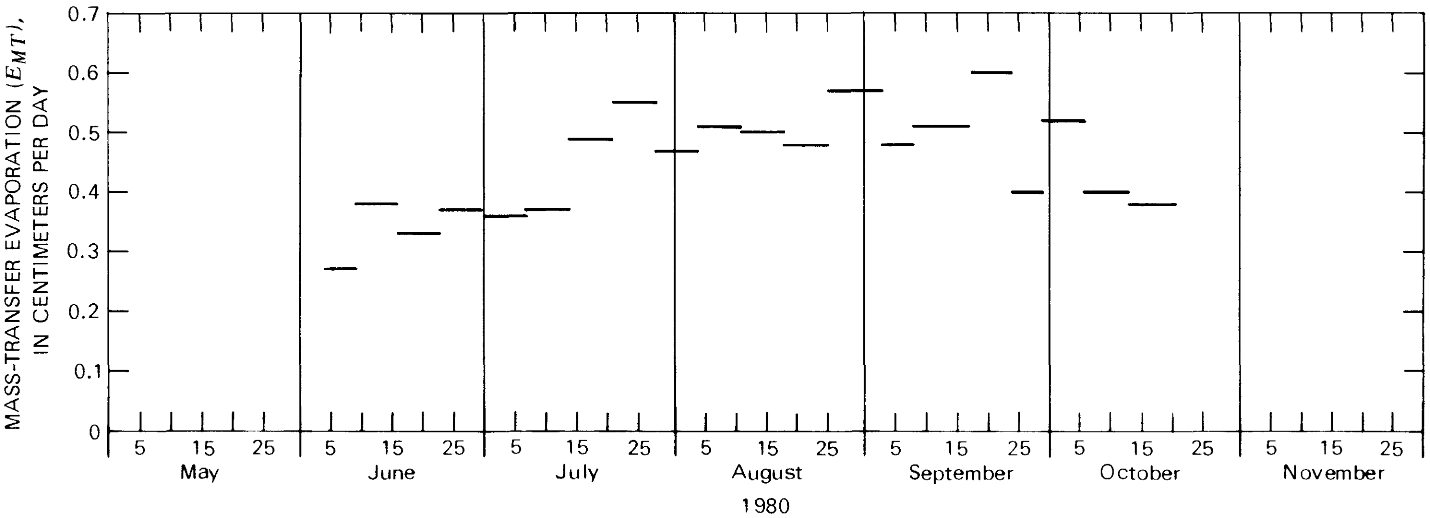

Figure 47.--Rates of mass-transfer evaporation, E_{MT}, from Dillon Reservoir for the 1974-80 record seasons--Continued.

EVAPORATION FROM GROSS RESERVOIR

Gross Reservoir is on South Boulder Creek about 30 miles northwest of Denver, Colo. The reservoir has a storage capacity of 41,811 acre-feet (with 2 feet of flashboards in spillway), a surface area of 415 acres, and a mean depth of 100.8 feet. At full pool the water surface is at an altitude of 7,282 feet. Drainage area above the reservoir is 93 square miles. The major inflow is South Boulder Creek.

Energy-budget studies were conducted at Gross Reservoir during 1972 and 1973. Evaporation data for 1972-73 were reported by Ficke and others (1977), who determined an N value of 0.00690 for the reservoir. Using this value of N, mass-transfer evaporation rates were calculated for the 1974-80 record seasons.

Mass Transfer

Hygrothermograph data were collected at a station at the reservoir operation headquarters downstream from the dam. Water-surface temperatures and wind speeds were collected as described earlier. Vapor pressures, water-surface temperatures, and wind speeds collected during 1980 at Gross Reservoir are shown in figures 48, 49, and 50.

A summary of mass-transfer terms and pan evaporation for the 1974-80 record seasons at Gross Reservoir is given in table 13. Hydrographs of the mass-transfer evaporation rates for the 1974-80 seasons are shown in figure 51.

Numerous problems were encountered with the hygrothermograph at Gross Reservoir. The mass-transfer terms and evaporation rates during 1976 were derived from values of wet- and dry-bulb temperatures because the hygrothermograph record was inaccurate. During 1979, evaporation rates for periods 153-158 also were determined from wet- and dry-bulb temperatures because hygrothermograph records were missing.

Mass-transfer evaporation rates for the 1974-80 record seasons ranged from 0.05 to 0.69 centimeter per day.

Pan Evaporation

Pan-evaporation data were collected at a station atop the dam. Pan evaporation per period and the ratio of reservoir to pan evaporation are given in table 13. The ratios varied greatly within seasons and to a lesser degree between seasons. Because of differences in season length, direct comparisons are not given.

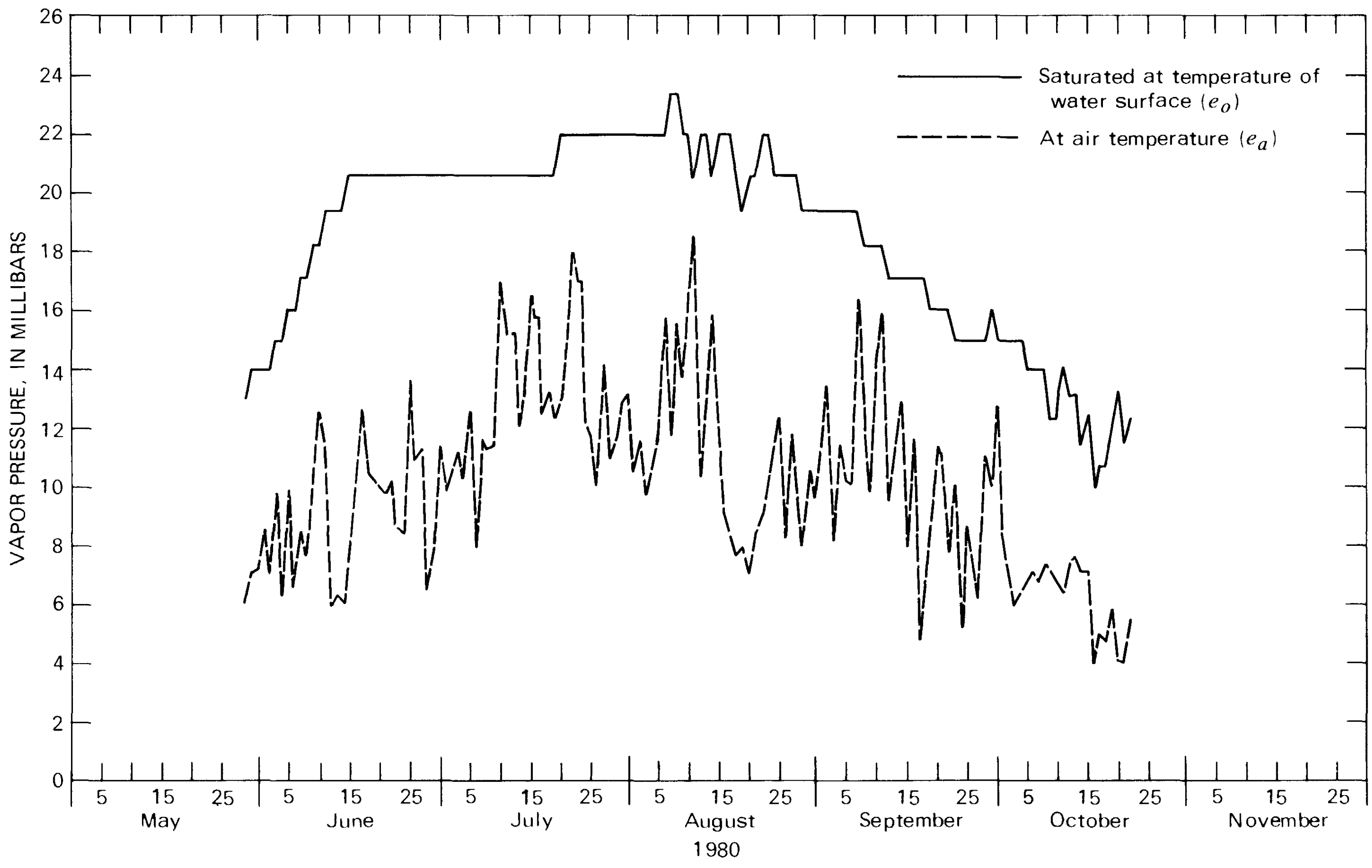

Figure 48.--Daily vapor pressures, e_o and e_a, at Gross Reservoir, May-October 1980.

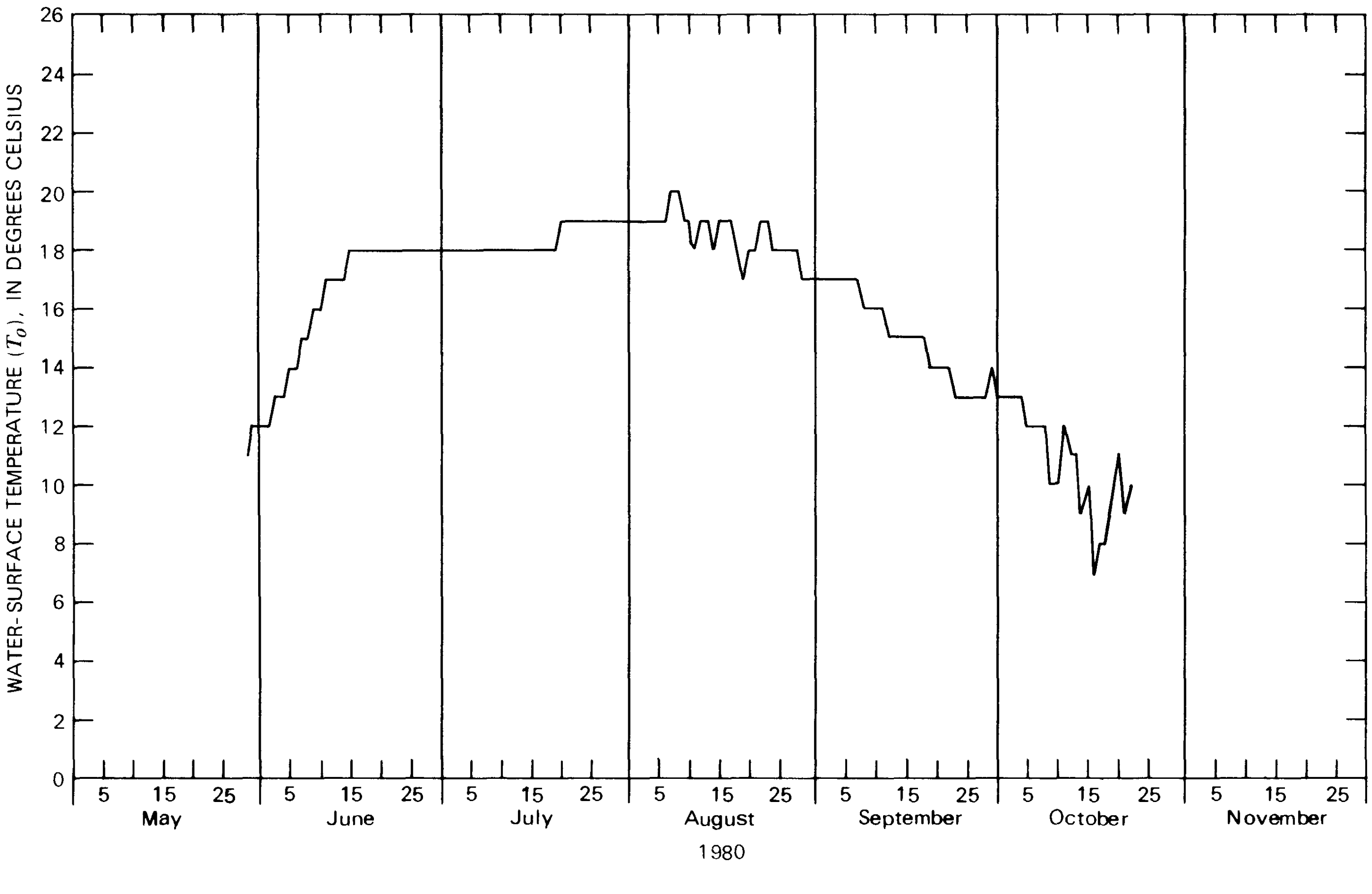

Figure 49.--Daily water-surface temperature, T_o, of Gross Reservoir, May-October 1980.

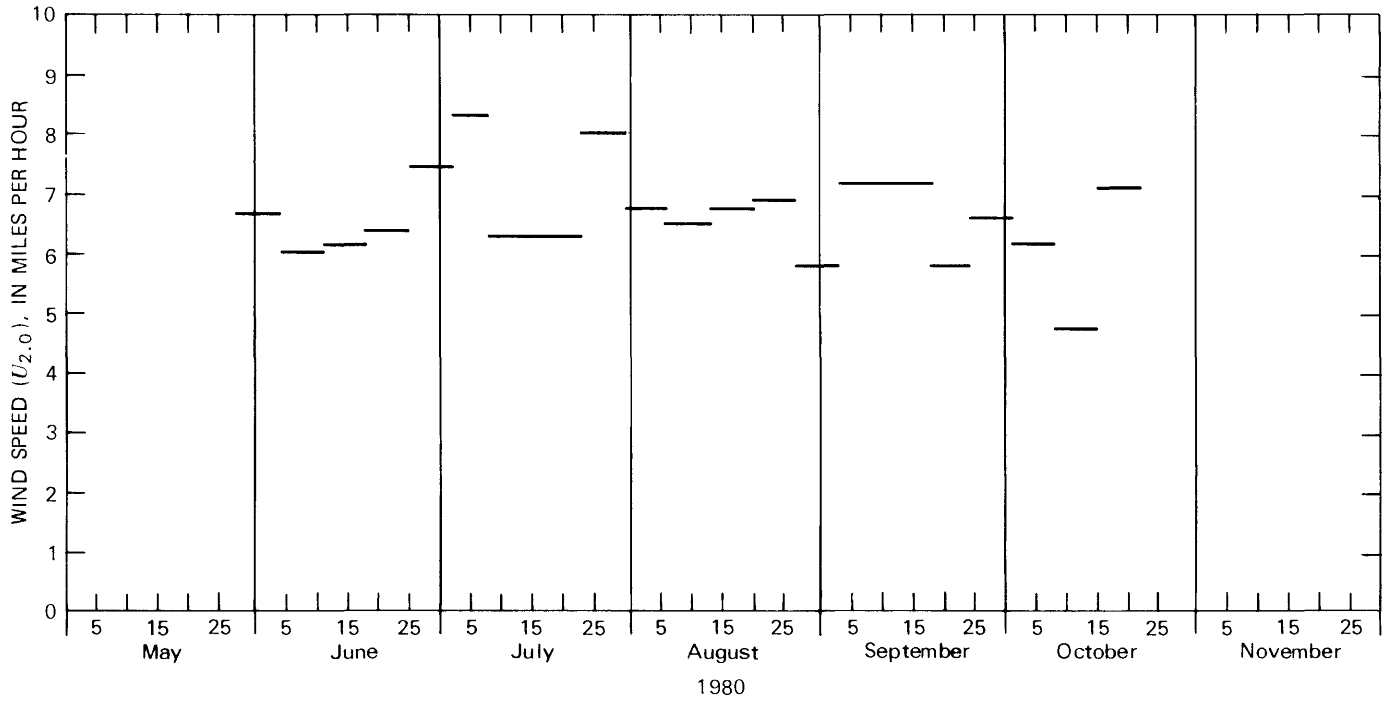

Figure 50.--Wind speeds, $U_{2.0}$, at Gross Reservoir, May-October 1980.

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*

NO.	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
26	4.0	JUNE 7- JUNE 11	6.38	6.7	.29	1.18	14.5	----	----
27	6.9	JUNE 11- JUNE 18	6.80	6.1	.29	1.99	26.2	6.20	0.32
28	7.1	JUNE 18- JUNE 25	5.85	8.0	.32	2.27	30.5	6.02	.38
29	7.0	JUNE 25- JULY 2	7.44	9.7	.50	3.45	46.3	7.26	.48
30	7.0	JULY 2- JULY 9	7.08	10.2	.50	3.48	46.8	6.10	.57
31	6.0	JULY 9- JULY 15	7.79	8.5	.46	2.71	36.3	4.29	.63
32	8.0	JULY 15- JULY 23	5.56	8.7	.33	2.69	36.3	5.59	.48
33	7.0	JULY 23- JULY 30	7.00	9.4	.45	3.18	42.7	5.31	.60
34	7.0	JULY 30- AUG. 6	4.68	8.2	.27	1.86	24.4	3.56	.52
35	7.0	AUG. 6- AUG. 13	7.07	8.7	.43	2.98	38.1	4.75	.63
36	7.0	AUG. 13- AUG. 20	6.23	7.1	.30	2.13	26.4	6.32	.34
37	7.0	AUG. 20- AUG. 27	5.94	7.2	.30	2.07	24.6	4.95	.42
38	7.0	AUG. 27-SEPT. 3	5.20	8.8	.32	2.21	25.0	3.15	.70
39	7.0	SEPT. 3-SEPT. 10	6.00	7.6	.31	2.21	24.6	5.16	.43

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1974	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
40	6.9	SEPT. 10-SEPT. 17	6.59	7.7	.35	2.42	26.0	1.78	1.36
41	7.0	SEPT. 17-SEPT. 24	2.80	7.1	.14	.97	10.0	3.18	.30
42	7.0	SEPT. 24- OCT. 1	7.46	8.2	.42	2.96	29.8	4.42	.70
43	7.0	OCT. 1- OCT. 8	5.55	7.0	.27	1.88	18.6	3.43	.55
44	7.2	OCT. 8- OCT. 15	4.55	6.1	.19	1.39	13.6	2.11	.66
45	6.8	OCT. 15- OCT. 22	5.22	4.5	.16	1.10	10.7	2.41	.46
46	7.1	OCT. 22- OCT. 29	3.96	5.4	.15	1.06	10.2	----	----
47	6.9	OCT. 29- NOV. 5	5.18	7.2	.26	1.76	17.0	----	----
48	7.0	NOV. 5- NOV. 12	6.77	6.9	.32	2.25	21.6	----	----
49	7.0	NOV. 12- NOV. 19	8.92	6.1	.38	2.63	25.0	----	----
50	7.0	NOV. 19- NOV. 26	8.52	5.3	.31	2.19	20.5	----	----
51	6.0	NOV. 26- DEC. 2	6.32	5.9	.26	1.56	14.3	----	----
RECORD SEASON	177.9	JUNE 7- DEC. 2			0.32	56.58	660.0		
PAN SEASON	132.9	JUNE 11- OCT. 22			0.33	43.95		85.99	0.51

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

NO.	PERIOD LENGTH (DAYS)	PERIOD DATES 1975	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
52	8.0	MAY 1- MAY 9	9.35	5.4	.35	2.79	15.8	----	----
53	7.0	MAY 9- MAY 16	4.00	5.3	.15	1.01	5.2	----	----
54	7.0	MAY 16- MAY 23	5.69	5.1	.20	1.42	7.3	----	----
55	7.0	MAY 23- MAY 30	5.46	6.5	.24	1.70	9.6	----	----
56	7.0	MAY 30- JUNE 6	5.13	4.9	.17	1.20	7.6	----	----
57	7.0	JUNE 6- JUNE 13	5.54	6.0	.23	1.60	13.8	----	----
58	7.0	JUNE 13- JUNE 20	7.89	8.0	.43	3.02	33.6	----	----
59	7.0	JUNE 20- JUNE 27	8.33	8.9	.51	3.58	45.7	----	----
60	6.0	JUNE 27- JULY 3	7.21	8.3	.41	2.48	33.3	----	----
61	7.3	JULY 3- JULY 10	5.76	8.1	.32	2.36	31.9	----	----
62	6.8	JULY 10- JULY 17	6.36	10.7	.47	3.21	43.2	4.93	0.65
63	7.0	JULY 17- JULY 24	6.01	11.0	.46	3.20	43.0	5.41	.59
64	6.9	JULY 24- JULY 31	7.29	11.5	.58	4.02	54.0	5.59	.72
65	7.1	JULY 31- AUG. 7	7.28	11.4	.57	4.06	53.0	7.16	.56
66	8.0	AUG. 7- AUG. 15	6.18	9.3	.40	3.16	39.5	----	----

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1975	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
67	6.0	AUG. 15- AUG. 21	5.75	8.6	.34	2.05	25.4	----	----
68	6.9	AUG. 21- AUG. 28	6.64	10.3	.47	3.26	39.5	----	----
69	8.1	AUG. 28-SEPT. 5	6.15	9.6	.41	3.29	37.8	----	----
70	6.9	SEPT. 5-SEPT. 12	5.48	7.8	.29	2.04	22.0	----	----
71	7.0	SEPT. 12-SEPT. 19	6.06	6.9	.29	2.02	21.3	----	----
72	7.0	SEPT. 19-SEPT. 26	5.17	9.4	.34	2.37	24.2	3.76	.63
73	6.1	SEPT. 26- OCT. 2	4.80	8.3	.27	1.66	16.3	2.49	.67
74	6.9	OCT. 2- OCT. 9	8.15	5.5	.31	2.13	20.6	4.95	.43
75	6.9	OCT. 9- OCT. 16	6.68	5.5	.25	1.75	16.7	3.56	.49
76	7.0	OCT. 16- OCT. 23	6.74	5.6	.26	1.82	17.7	4.42	.41
77	6.9	OCT. 23- OCT. 30	6.41	4.8	.21	1.47	14.6	1.62	.91
78	7.1	OCT. 30- NOV. 6	5.37	3.0	.11	.80	8.1	2.49	.32
79	8.0	NOV. 6- NOV. 14	9.70	4.5	.30	2.43	24.4	----	----
RECORD SEASON	196.9	MAY 1- NOV. 14			0.33	65.90	725.1		
PAN SEASON	75.7	JULY 10- AUG. 7 SEPT. 19- NOV. 6			0.35	26.49		46.38	0.57

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
80	7.0	JUNE 17- JUNE 24	5.58	6.0	.23	1.62	15.3	----	----
81	7.0	JUNE 24- JULY 1	6.12	7.3	.31	2.15	21.5	----	----
82	7.1	JULY 1- JULY 8	5.69	7.7	.30	2.17	22.7	4.83	0.45
83	6.8	JULY 8- JULY 15	6.14	9.1	.39	2.62	27.0	5.26	.50
84	14.0	JULY 15- JULY 29	5.56	8.4	.32	4.51	44.7	10.77	.42
85	7.0	JULY 29- AUG. 5	4.43	9.0	.28	1.94	18.8	4.34	.45
86	7.0	AUG. 5- AUG. 12	7.11	9.7	.48	3.34	32.5	5.00	.67
87	7.0	AUG. 12- AUG. 19	5.68	8.8	.35	2.42	22.6	3.84	.63
88	7.0	AUG. 19- AUG. 26	5.72	9.5	.37	2.60	22.5	4.44	.58
89	7.0	AUG. 26-SEPT. 2	5.82	10.2	.41	2.87	23.3	4.67	.61
90	7.2	SEPT. 2-SEPT. 9	6.01	11.5	.48	3.43	26.0	4.67	.73
91	6.8	SEPT. 9-SEPT. 16	5.36	7.5	.28	1.89	13.8	----	----

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1976	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
92	7.0	SEPT. 16-SEPT. 23	5.15	5.9	.21	1.47	10.7	----	----
93	7.0	SEPT. 23-SEPT. 30	4.49	5.7	.18	1.24	9.4	----	----
94	7.0	SEPT. 30- OCT. 7	5.92	5.7	.23	1.63	12.4	----	----
95	6.9	OCT. 7- OCT. 14	6.04	5.4	.22	1.56	12.0	----	----
96	7.2	OCT. 14- OCT. 21	4.92	8.3	.28	2.04	16.1	----	----
97	6.9	OCT. 21- OCT. 28	5.66	7.4	.29	1.98	16.2	----	----
98	6.9	OCT. 28- NOV. 4	5.56	5.2	.20	1.39	11.5	----	----
99	6.0	NOV. 4- NOV. 10	6.88	4.8	.23	1.35	11.3	----	----
100	7.1	NOV. 10- NOV. 17	6.17	6.2	.26	1.86	15.4	----	----
101	7.0	NOV. 17- NOV. 24	8.34	5.3	.30	2.13	17.8	----	----
RECORD SEASON	159.9	JUNE 17- NOV. 24			0.30	48.21	423.5		
PAN SEASON	70.1	JULY 1-SEPT. 9			0.37	25.90		47.82	0.54

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
102	7.0	MAY 12- MAY 19	7.59	3.8	.20	1.37	13.9	4.62	0.30
103	7.0	MAY 19- MAY 26	6.28	3.3	.14	1.02	10.6	3.91	.26
104	7.0	MAY 26- JUNE 2	6.12	2.0	.09	.60	6.4	4.62	.13
105	7.0	JUNE 2- JUNE 9	6.90	2.0	.09	.66	7.7	4.65	.14
106	7.1	JUNE 9- JUNE 16	5.49	4.0	.15	1.07	13.5	5.38	.20
107	7.0	JUNE 16- JUNE 23	5.33	4.5	.17	1.16	15.1	3.81	.30
108	6.9	JUNE 23- JUNE 30	7.72	4.2	.23	1.57	20.6	6.83	.23
109	7.1	JUNE 30- JULY 7	7.31	5.5	.28	1.95	25.5	6.70	.29
110	6.9	JULY 7- JULY 14	7.59	6.8	.36	2.49	32.5	6.02	.41
111	7.0	JULY 14- JULY 21	6.41	5.3	.23	1.64	20.9	5.00	.33
112	7.0	JULY 21- JULY 28	4.70	5.5	.18	1.27	15.9	4.60	.28
113	7.1	JULY 28- AUG. 4	6.50	9.2	.41	2.95	36.8	6.88	.43
114	6.9	AUG. 4- AUG. 11	5.37	5.7	.21	1.46	17.6	3.86	.38
115	7.0	AUG. 11- AUG. 18	4.89	3.1	.10	.72	8.4	3.38	.21
116	7.0	AUG. 18- AUG. 25	6.35	3.9	.17	1.19	13.8	3.96	.30

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1977	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
117	6.9	AUG. 25-SEPT. 1	5.68	6.4	.25	1.73	19.4	3.73	.46
118	7.3	SEPT. 1-SEPT. 8	6.89	5.5	.26	1.90	20.6	4.88	.39
119	6.7	SEPT. 8-SEPT. 15	6.15	7.4	.31	2.12	23.1	4.75	.45
120	7.0	SEPT. 15-SEPT. 22	6.70	7.6	.35	2.48	27.1	4.04	.61
121	7.0	SEPT. 22-SEPT. 29	9.70	5.9	.40	2.79	29.4	5.94	.47
122	7.0	SEPT. 29- OCT. 6	6.12	6.5	.28	1.94	19.0	2.62	.74
123	7.0	OCT. 6- OCT. 13	9.61	8.6	.57	3.96	35.7	----	----
124	7.1	OCT. 13- OCT. 20	6.44	6.1	.27	1.91	16.0	----	----
125	7.0	OCT. 20- OCT. 27	6.46	6.0	.27	1.87	15.1	----	----
126	7.0	OCT. 27- NOV. 3	8.43	6.9	.40	2.80	22.5	----	----
127	7.0	NOV. 3- NOV. 10	6.64	6.5	.30	2.10	17.1	----	----
128	6.9	NOV. 10- NOV. 17	9.79	5.6	.38	2.63	21.7	----	----
129	6.0	NOV. 17- NOV. 23	8.32	6.7	.39	2.34	19.4	----	----
130	8.0	NOV. 23- DEC. 1	10.77	3.9	.29	2.33	19.5	----	----
RECORD SEASON	202.9	MAY 12- DEC. 1			0.27	54.02	564.8		
PAN SEASON	146.9	MAY 12- OCT. 6			0.23	34.08		100.18	0.34

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
131	7.0	JUNE 8- JUNE 15	5.86	4.9	.20	1.38	12.1	7.16	0.19
132	7.0	JUNE 15- JUNE 22	6.14	8.2	.35	2.42	26.8	6.35	.38
133	7.0	JUNE 22- JUNE 29	5.54	7.0	.27	1.89	23.9	5.69	.33
134	7.0	JUNE 29- JULY 6	6.65	9.4	.43	3.02	40.5	6.93	.44
135	7.0	JULY 6- JULY 13	6.27	5.3	.23	1.59	21.7	7.32	.22
136	7.0	JULY 13- JULY 20	7.18	4.7	.23	1.63	21.9	5.79	.28
137	7.2	JULY 20- JULY 27	6.24	9.0	.39	2.79	37.4	5.61	.50
138	6.9	JULY 27- AUG. 3	7.01	7.5	.36	2.49	32.8	5.00	.50
139	7.0	AUG. 3- AUG. 10	5.73	9.7	.38	2.68	35.0	5.28	.51
140	7.0	AUG. 10- AUG. 17	8.06	8.7	.48	3.37	42.3	5.69	.59
141	7.0	AUG. 17- AUG. 24	6.25	9.2	.39	2.76	33.2	5.18	.53
142	7.0	AUG. 24- AUG. 31	5.29	9.3	.34	2.38	27.2	3.78	.63

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1978	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
143	7.0	AUG. 31-SEPT. 7	6.06	10.9	.46	3.18	34.3	5.92	.54
144	7.0	SEPT. 7-SEPT. 14	7.36	9.5	.48	3.38	33.8	5.23	.65
145	8.0	SEPT. 14-SEPT. 22	5.86	9.5	.38	3.07	29.4	3.22	.95
146	6.1	SEPT. 22-SEPT. 28	5.52	8.8	.33	2.02	19.2	3.78	.53
147	7.0	SEPT. 28- OCT. 5	3.99	10.1	.28	1.95	18.2	3.66	.53
148	7.0	OCT. 5- OCT. 12	6.99	10.0	.48	3.40	31.1	3.94	.86
149	6.9	OCT. 12- OCT. 19	4.34	8.9	.27	1.84	17.0	2.59	.71
150	7.0	OCT. 19- OCT. 26	5.73	8.1	.32	2.24	20.9	----	----
151	7.0	OCT. 26- NOV. 2	6.47	7.2	.32	2.26	20.6	----	----
152	6.0	NOV. 2- NOV. 8	7.61	7.6	.40	2.38	21.2	----	----
RECORD SEASON	153.1	JUNE 8- NOV. 8			0.35	54.12	600.6		
PAN SEASON	133.1	JUNE 8- OCT. 19			0.35	47.24		98.12	0.48

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
153	6.9	MAY 31- JUNE 7	6.20	1.2	.05	.36	3.6	4.37	0.08
154	7.0	JUNE 7- JUNE 14	5.34	2.9	.11	.76	9.4	3.10	.24
155	7.0	JUNE 14- JUNE 21	7.48	5.4	.28	1.97	26.4	3.12	.63
156	7.0	JUNE 21- JUNE 28	5.35	4.2	.16	1.09	14.6	4.47	.24
157	7.0	JUNE 28- JULY 5	6.81	7.1	.33	2.32	31.2	4.95	.47
158	7.2	JULY 5- JULY 12	7.36	5.9	.30	2.14	28.8	6.93	.31
159	7.0	JULY 12- JULY 19	6.69	10.5	.49	3.39	45.9	4.88	.69
160	7.0	JULY 19- JULY 26	6.49	7.9	.35	2.48	33.2	5.13	.48
161	6.9	JULY 26- AUG. 2	6.84	9.8	.46	3.19	41.6	5.92	.54
162	7.1	AUG. 2- AUG. 9	7.48	13.3	.69	4.86	60.9	7.52	.65
163	6.8	AUG. 9- AUG. 16	4.68	8.6	.28	1.88	23.0	2.34	.80
164	7.0	AUG. 16- AUG. 23	6.19	8.4	.36	2.52	31.5	3.43	.73

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

	PERIOD		U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1979	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
165	7.0	AUG. 23- AUG. 30	6.17	7.5	.32	2.24	28.2	4.04	.55
166	7.1	AUG. 30-SEPT. 6	5.86	6.5	.26	1.86	22.8	5.33	.35
167	6.8	SEPT. 6-SEPT. 13	5.75	9.8	.39	2.66	30.9	3.25	.82
168	7.0	SEPT. 13-SEPT. 20	5.60	9.5	.37	2.56	28.4	3.63	.70
169	7.2	SEPT. 20-SEPT. 27	6.00	8.2	.34	2.41	25.9	4.14	.58
170	7.1	SEPT. 27- OCT. 4	6.67	8.9	.41	2.90	30.1	4.29	.68
171	6.9	OCT. 4- OCT. 11	7.58	9.4	.49	3.40	34.6	4.88	.70
172	6.8	OCT. 11- OCT. 18	5.42	7.0	.26	1.78	18.4	2.92	.61
173	7.0	OCT. 18- OCT. 25	6.90	6.8	.33	2.28	24.0	----	----
174	7.2	OCT. 25- NOV. 1	5.49	7.5	.28	2.04	21.6	----	----
RECORD SEASON	154.0	MAY 31- NOV. 1			0.33	51.09	615.0		
PAN SEASON	139.8	MAY 31- OCT. 18			0.33	46.77		88.64	0.53

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

PERIOD			U2.0	EO-EA	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD			PAN EVAPORATION	RATIO OF RESERVOIR TO PAN EVAPORATION
NO.	LENGTH (DAYS)	DATES 1980	(MILES PER HOUR)	(MILLIBARS)	CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	CENTIMETERS PER PERIOD	
175	7.0	MAY 28- JUNE 4	6.68	6.8	.31	2.18	29.0	5.36	0.41
176	7.0	JUNE 4- JUNE 11	6.02	8.0	.33	2.34	31.8	5.72	.41
177	7.0	JUNE 11- JUNE 18	6.18	11.5	.49	3.43	46.2	6.68	.51
178	7.0	JUNE 18- JUNE 25	6.40	10.5	.46	3.27	44.1	6.50	.50
179	7.0	JUNE 25- JULY 2	7.48	10.8	.56	3.89	52.5	7.39	.53
180	6.0	JULY 2- JULY 8	8.34	9.9	.57	3.43	46.3	6.04	.57
181	8.0	JULY 8- JULY 16	6.31	6.1	.27	2.13	28.7	7.32	.29
182	7.0	JULY 16- JULY 23	6.30	7.0	.31	2.13	28.2	6.30	.34
183	7.0	JULY 23- JULY 30	8.05	10.1	.56	3.92	49.7	6.50	.60
184	7.0	JULY 30- AUG. 6	6.75	10.1	.47	3.31	40.2	6.07	.55
185	7.2	AUG. 6- AUG. 13	6.53	8.2	.37	2.64	30.8	4.57	.58

Table 13.--*Summary of mass-transfer terms and pan evaporation for Gross Reservoir*--Continued

NO.	PERIOD: LENGTH (DAYS)	PERIOD: DATES 1980	U2.0 (MILES PER HOUR)	EO-EA (MILLIBARS)	RESERVOIR EVAPORATION COMPUTED BY MASS-TRANSFER METHOD: CENTIMETERS PER DAY	CENTIMETERS PER PERIOD	ACRE-FEET PER PERIOD	PAN EVAPORATION: CENTIMETERS PER PERIOD	RATIO OF RESERVOIR TO PAN EVAPORATION
186	6.8	AUG. 13- AUG. 20	6.79	11.3	.53	3.59	40.2	5.28	.68
187	7.2	AUG. 20- AUG. 27	6.92	10.6	.50	3.62	38.9	4.47	.81
188	7.0	AUG. 27-SEPT. 3	5.83	9.5	.38	2.67	27.9	5.18	.52
189	8.0	SEPT. 3-SEPT. 11	7.18	6.2	.31	2.44	24.6	6.02	.41
190	7.0	SEPT. 11-SEPT. 18	7.18	7.9	.39	2.76	27.5	4.04	.68
191	5.8	SEPT. 18-SEPT. 24	5.81	6.6	.27	1.55	15.3	4.42	.35
192	7.0	SEPT. 24- OCT. 1	6.61	5.7	.26	1.82	17.6	4.06	.45
193	7.0	OCT. 1- OCT. 8	6.18	7.7	.33	2.29	21.9	3.71	.62
194	7.1	OCT. 8- OCT. 15	4.79	5.6	.19	1.32	12.7	2.84	.46
195	6.9	OCT. 15- OCT. 22	7.13	6.8	.33	2.31	22.3	2.01	1.15
RECORD SEASON	147.0	MAY 28- OCT. 22			0.39	57.04	676.4		
PAN SEASON	147.0	MAY 28- OCT. 22			0.39	57.04		110.48	0.52

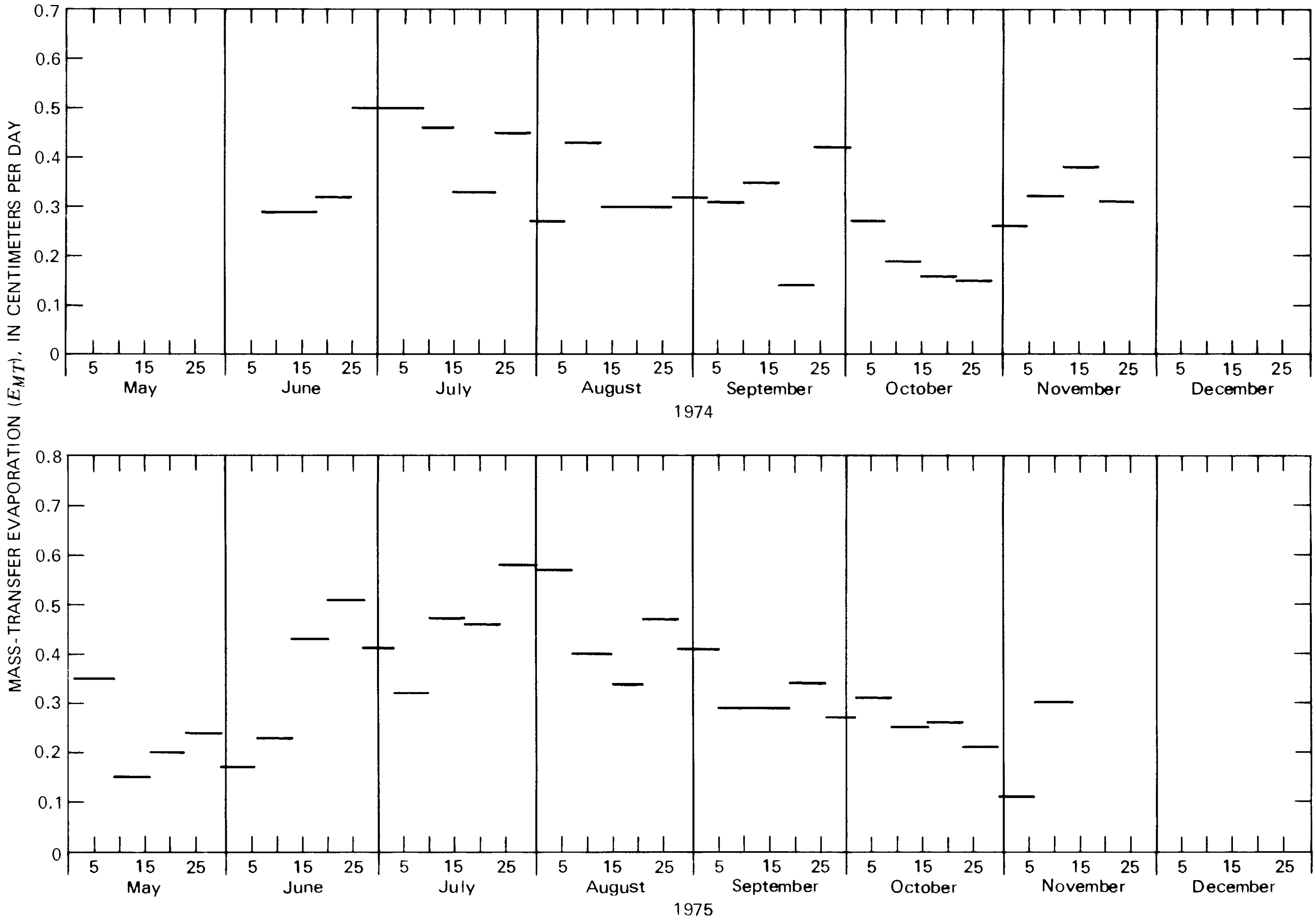

Figure 51.--Rates of mass-transfer evaporation, E_{MT}, from Gross Reservoir for the 1974-80 record seasons.

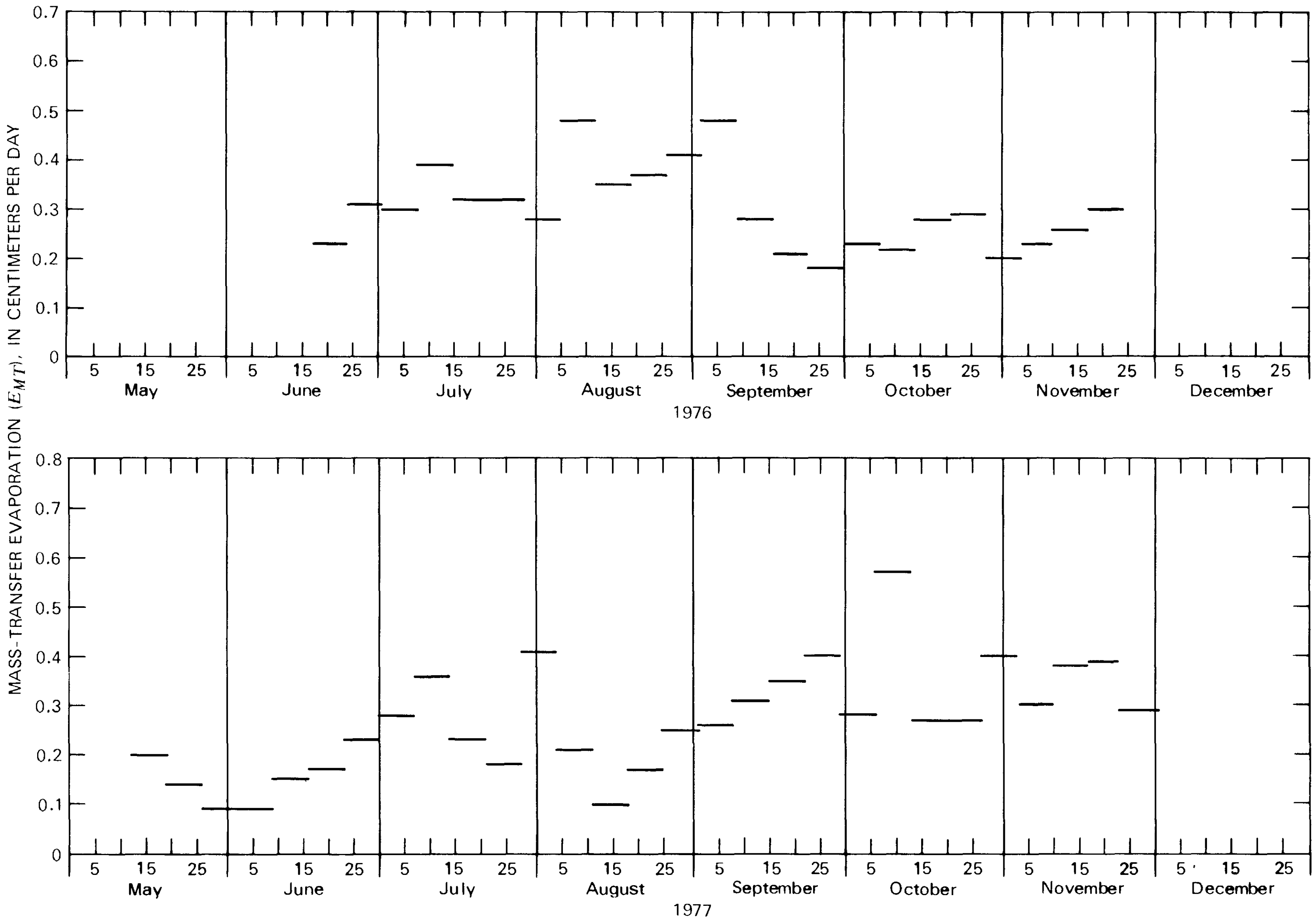

Figure 51.--Rates of mass-transfer evaporation, E_{MT}, from Gross Reservoir for the 1974-80 record seasons--Continued.

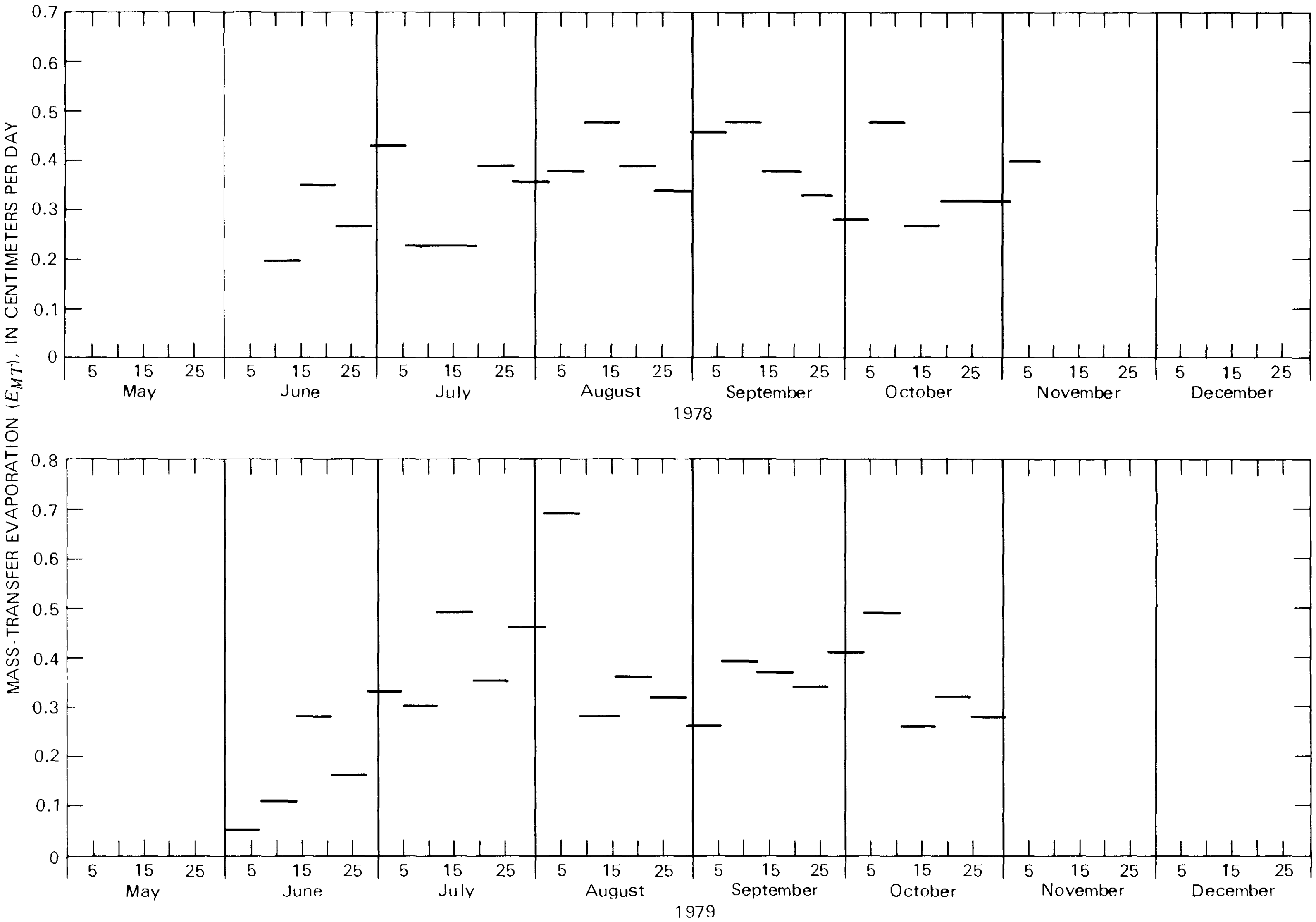

Figure 51.--Rates of mass-transfer evaporation, E_{MT}, from Gross Reservoir for the 1974-80 record seasons--Continued.

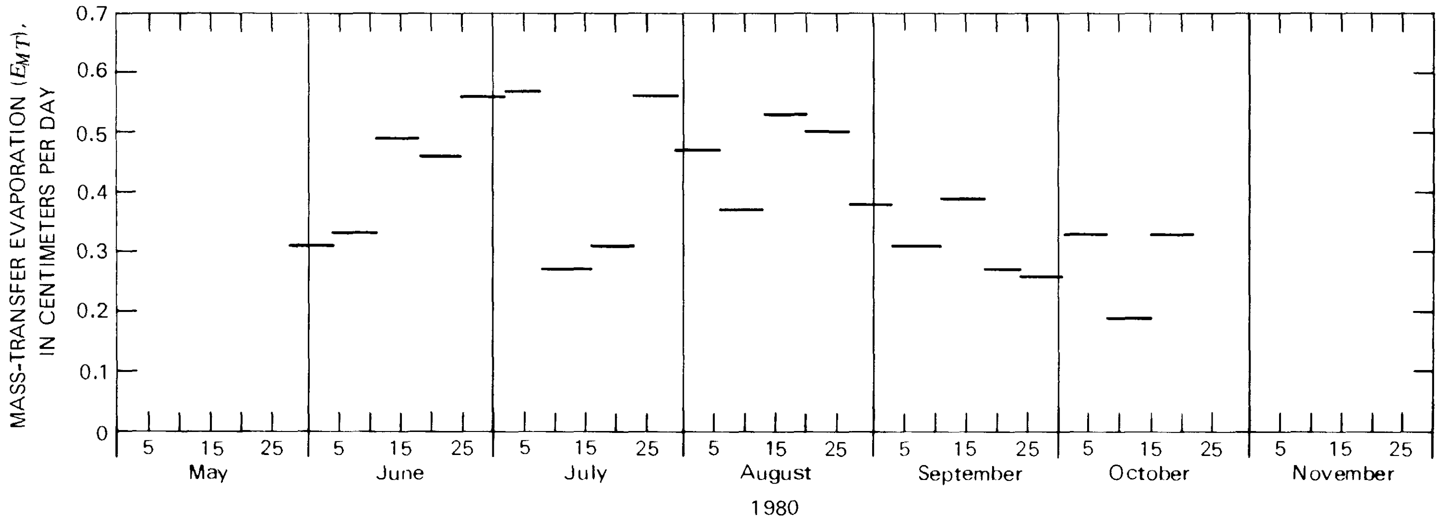

Figure 51.--Rates of mass-transfer evaporation, E_{MT}, from Gross Reservoir for the 1974-80 record seasons-- Continued.

SEASONAL VALUES OF EVAPORATION

Seasonal summaries of energy-budget and mass-transfer evaporation values are shown in tables 14 and 15. Comparisons between values were not made because of the variation in season length. Mass-transfer results from Ficke and others (1977) are also shown in table 15.

Ratios of reservoir evaporation (as determined by the mass-transfer method) to pan evaporation are shown in table 16. These ratios are based upon the length of season described previously. If the seasons were of the same length, the variation would be smaller than that shown in table 16.

Table 14.--*Seasonal summary of energy-budget evaporation*

Year	Reservoir							
	Ralston		Cheesman		Antero		Williams Fork	
	Total evaporation (centimeters)	Season length (days)	Total evaporation (centimeters)	Season length (days)	Total evaporation (centimeters)	Season length (days)	Total evaporation (centimeters)	Season length (days)
1975	79.4	242	----	---	----	---	----	---
1976	93.3	224	----	---	----	---	----	---
1977	----	---	83.8	195	60.7	119	----	---
1978	----	---	84.6	217	57.9	158	----	---
1979	----	---	----	---	----	---	71.2	161
1980	----	---	----	---	----	---	78.0	161

Table 15.--*Seasonal summary of mass-transfer evaporation*

Year	Ralston: Total evaporation (centimeters)	Ralston: Season length (days)	Cheesman: Total evaporation (centimeters)	Cheesman: Season length (days)	Antero: Total evaporation (centimeters)	Antero: Season length (days)	Williams Fork: Total evaporation (centimeters)	Williams Fork: Season length (days)
1967	----	---	[1]63.9	176	[1]30.3	92	----	---
1968	----	---	[1]65.0	168	[1]59.4	161	----	---
1969	----	---	[1]52.9	161	[1]40.3	119	[1]77.2	152
1970	----	---	[1]52.9	133	[1]41.9	127	[1]67.8	141
1971	----	---	[1]54.3	147	[1]37.3	115	[1]65.8	119
1972	[1]23.5	121	[1]53.0	147	----	---	[1]61.6	147
1973	[1]65.8	183	67.8	190	----	---	[1]65.5	155
1974	60.5	181	54.3	204	----	---	74.8	147
1975	79.2	242	46.1	180	----	---	68.2	133
1976	95.0	230	59.4	219	----	---	84.7	196
1977	74.2	210	72.7	196	47.9	147	49.6	115
1978	52.3	217	89.6	217	81.9	187	87.5	188
1979	68.3	197	51.5	196	61.1	155	70.9	147
1980	80.2	210	77.0	209	76.3	175	81.5	175

Year	Elevenmile Canyon: Total evaporation (centimeters)	Elevenmile Canyon: Season length (days)	Dillon: Total evaporation (centimeters)	Dillon: Season length (days)	Gross: Total evaporation (centimeters)	Gross: Season length (days)
1967	[2]78.5	182	----	---	----	---
1968	[2]82.5	166	----	---	----	---
1969	[2]74.3	168	[2]67.8	155	----	---
1970	[2]59.2	126	[2]58.7	140	----	---
1971	[2]65.2	139	[2]58.6	135	----	---
1972	[2]68.3	153	[2]59.0	140	[2]51.0	146
1973	[2]69.3	191	[2]62.5	157	[2]69.6	180
1974	63.6	154	66.9	181	56.6	178
1975	63.5	161	49.6	167	65.9	197
1976	67.0	188	58.9	172	48.2	160
1977	81.1	208	67.9	169	54.0	203
1978	82.6	208	71.2	189	54.1	153
1979	58.9	183	66.2	147	51.1	154
1980	80.1	176	62.9	139	57.0	147

[1]From Ficke and others (1977) using updated values of the mass-transfer coefficient.

[2]From Ficke and others (1977).

Table 16.--*Summary of pan coefficients*

Year	Reservoir						
	Ralston	Cheesman	Antero	Williams Fork	Elevenmile Canyon	Dillon	Gross
1967	----	[1]0.76	[1]0.75	----	[2]0.86	----	----
1968	----	[1].70	[1].64	----	[2].88	----	----
1969	----	[1].66	[1].60	[1].94	[2].86	[2]0.94	----
1970	----	[1].72	[1].54	[1].84	[2].92	[2].74	----
1971	----	[1].68	[1].42	[1].84	[2].87	[2].76	----
1972	[1]0.29	[1].72	----	[1].83	[2].69	[2].82	[2]0.61
1973	[1].48	[1].55	----	[1].80	[2].74	[2].73	[2].55
1974	.44	.56	----	1.05	1.00	.72	.51
1975	.46	.48	----	.49	.70	.55	.57
1976	.53	.55	----	.87	.76	.64	.54
1977	.44	.71	.54	.67	.70	.63	.34
1978	.31	.70	.62	.84	.68	.66	.48
1979	.44	.52	.63	.88	.65	.70	.53
1980	.41	.62	.69	.78	.71	.68	.52

[1]From Ficke and others (1977) using updated values of the mass-transfer coefficient.
[2]From Ficke and others (1977).

SUMMARY AND CONCLUSIONS

The energy-budget method was the most accurate method of determining evaporation used in this study. During the spring and fall, evaporation computed using the energy-budget method may contain more error than during other seasons. This increase in error is due to rapid changes in water temperature during warming and cooling of the water mass. Also influencing this error is the rapid filling and drawdown associated with water-supply reservoirs. These changes are not fully accounted for in the averaging of advected and stored energy.

The energy-budget method requires a major data-collection effort and is an expensive undertaking. By using the energy budget to calibrate the mass-transfer coefficient, cost-effective determinations of evaporation can be made using the mass-transfer method. Listed below are the values of the mass-transfer coefficients, N, determined in this report. Also shown are the values of N determined using Harbeck's relation (equation 13 in this report) with surface area of the reservoir.

Reservoir	N	
	Energy budget	Harbeck's relation
Ralston------------	0.00653	0.00667
Cheesman-----------	.00810	.00610
Antero-------------	.00650	.00590
Williams Fork------	.00863	.00600

Equipment and data collection required for the mass-transfer evaporation determinations are much less involved than those needed for the energy-budget method. During this study, the major problems encountered in using the mass-transfer method were errors in the hygrothermograph record.

Relations of pan evaporation to lake evaporation were determined for the periods of record available in this study. The pan coefficients were found to vary during a season, generally being smaller in the spring and greater in the fall. The coefficients also varied between seasons, but direct comparisons were not made because of differences in season lengths. The pan coefficient includes all factors affecting the reservoir and pan environment. Relative changes in the environments account for some of the variation. The variability in coefficient values means that pan data are of limited usefulness in estimating reservoir evaporation.

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