Use of Water by Riparian Vegetation Cottonwood Wash Arizona

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1858

Prepared in cooperation with the Arizona State Land Department and the Salt River Valley Water Users' Association

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By JAMES E. BOWIE *and* WILLIAM KAM

With a section on VEGETATION

By F. A. BRANSON and R. S. ARO

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USE OF WATER BY RIPARIAN VEGETATION, COTTONWOOD WASH, ARIZONA

By JAMES E. BOWIE and WILLIAM KAM

ABSTRACT

The change in water use as a result of the modification of riparian vegetation was measured in Cottonwood Wash, Mohave County, Ariz. A 4.1-mile length of the stream channel was selected and divided into a 2.6-mile upper reach and a 1.5-mile lower reach. Measurements of streamflow, ground-water levels, vegetation, and meteorological phenomena in the area defined the use of water by riparian vegetation under natural hydrologic conditions. Subsequent defoliation and eradication of the vegetation in the lower reach permitted the determination of the change in water use as a result of the modification. The computed average loss of water from the lower reach before modification was 80 acre-feet per growing season, a quantity which represented about 18 percent of the average flow entering the reach in the same period. The average loss after modification of the vegetation was 42 acre-feet per growing season, a quantity which represented about 12 percent of the average flow entering the reach in the same period.

INTRODUCTION

PURPOSE AND SCOPE

Arizona has many thousands of miles of stream channels lined with willow, cottonwood, saltcedar, and other water-loving plants. These plants, known as phreatophytes, "pump" water from the ground water adjacent to the stream and thereby are a factor in lowering the water level in the stream. The streamflow loss actually involves two processes: (1) transpiration, the discharge of water vapor through the stomata of the plant leaves, and (2) evaporation from the water and soil surfaces. These two processes, together, are called evapotranspiration, and the losses are known as riparian losses. Because of evapotranspiration the flow of each stream is depleted greatly as it travels from its origin to the points where it can be used beneficially.

The Cottonwood Wash project was undertaken to determine whether a measurable amount of water could be saved through a reduction in evapotranspiration as a result of the modification of riparian vegetation in Cottonwood Wash, Mohave County, Ariz. The U.S. Geological Survey made the investigation in cooperation with the Arizona State Land Department and the Salt River Valley Water Users' Association. The study was sponsored by the Arizona Water Resources Committee.

The Cottonwood Wash area (fig. 1) was selected for study as a result of the findings of two short reconnaissance surveys made in December 1957 and June 1958. The examination of the geology and vegetation in the area and the results of preliminary streamflow and ground-water measurements under summer and winter conditions indicated that the water-budget or inflow-outflow method could be used to determine water losses due to evapotranspiration. The site chosen was further suitable for a study of this type because there are no significant streamflow diversions or ground-water pumping in the area.

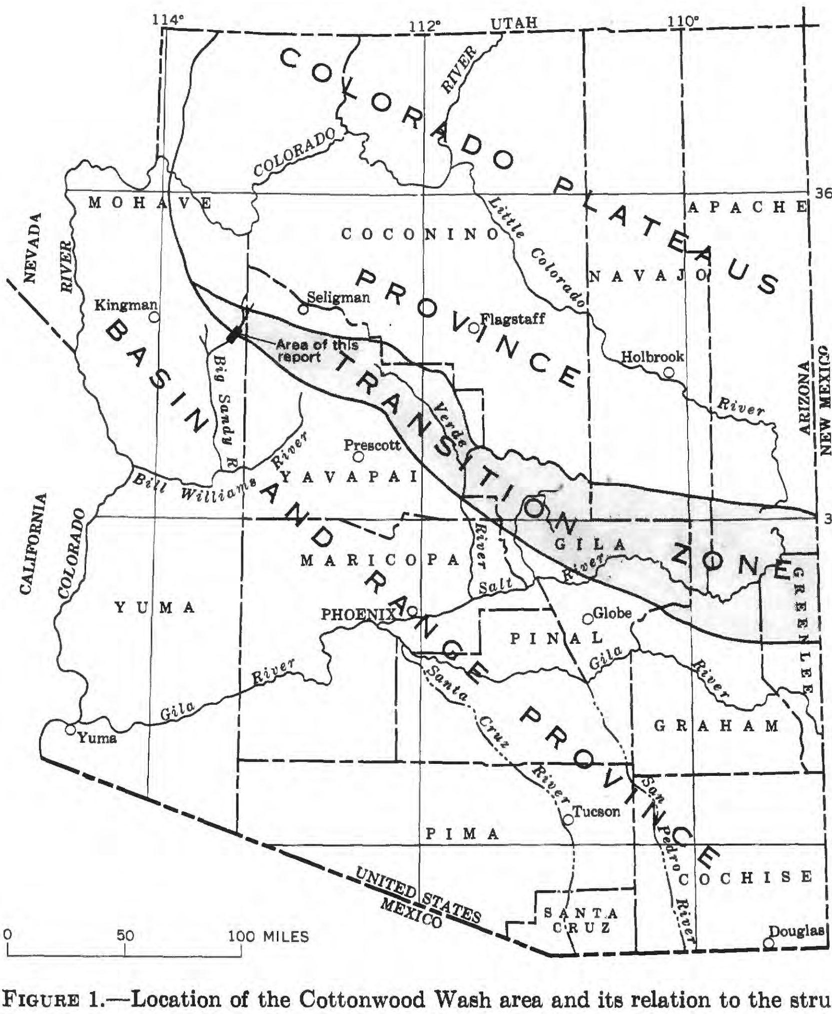

FIGURE 1.—Location of the Cottonwood Wash area and its relation to the structural provinces. (From Wilson and Moore, 1959.)

A 4.1-mile reach of the stream channel, beginning at a point about 10 miles upstream from the Big Sandy River, was chosen. For experimental purposes, the reach was divided into two parts—an upper 2.6-mile reach and a lower 1.5-mile reach.

Stream-gaging stations were installed at each end of the entire reach and at the dividing point between the upper and lower reaches to permit measurements of the changes in all downvalley flow through the two reaches. The three stations were located at points where the bedrock outcrops (pl. 1) forced all flow to the surface.

Riparian vegetation was modified for this study by chemical defoliation and by eradication. Chemical defoliation of vegetation removed the leaves for a very short time; transpiration reduction, therefore, was effective for only as long as regrowth of the vegetation was prohibited. Eradication of the vegetation is an extreme measure because costs are necessarily high.

It is important that the Cottonwood Wash project be recognized only as a pilot study; it has furnished a quantitative answer only for the reaches under study and indicates the possible results of riparian-vegetation modification only in similar environments common to parts of the Southwest.

PROJECT PLAN

The general project plan was to maintain the upper reach as a control by leaving it unchanged throughout all phases of the study (Hendricks and others, 1960, p. 3). The lower reach was to be used as a test reach, where the effects of vegetation modifications would be measured.

The project was set up in three phases. The first phase—from January 1, 1959, to June 21, 1960—was used as a calibration period to determine the natural hydrologic conditions in the area. The second phase—from June 22, 1960, to July 17, 1960—involved the chemical defoliation of vegetation in the lower reach and the measurement of the defoliation effect on streamflow and ground water. The third phase—from February 1, 1961, to August 8, 1963—involved the continuous eradication of riparian vegetation in the lower reach and the measurement of the hydrologic effects. The methods used for evaluating the effects of vegetation modification were the transpiration-well method (for qualitative comparisons) and the water-budget method.

Transpiration-well method.—The transpiration-well method involves obtaining continuous records of the daily water-level fluctuations and determining the specific yield of the soil in which the daily water-level fluctuations occur (White, 1932, p. 60–61).

The quantity of ground water withdrawn by transpiration and evaporation in a 24-hour period is determined by the formula $q=y(24r\pm s)$, in which q is the water withdrawn, measured in inches of depth, y is the specific yield of the soil in which the daily water-level fluctuation takes place, r is the hourly rate of rise of the water level, in inches, during a night period when evapotranspiration is negligible, and s is the net fall or rise of the water level in the 24-hour period, in inches. In field experiments, the quantities on the right-hand side of the formula, except the specific yield, can be determined readily from the automatic records of water-level fluctuation.

The transpiration-well method was included in the study only for use in making qualitative comparisons. A much broader sampling by wells would be necessary to use this method for an independent quantitative analysis.

Water-budget method.—The water-budget method for determining water gains or losses is based upon periodic inventories of the water resources of an area. All the water that enters and leaves an area and the increase or decrease in storage are measured for a given period. The general equation for this relation is:

$$\text{Inflow-outflow} \pm \text{change in storage} = 0$$

The project area is well suited for an inventory of this type because nearly all the principal components can be measured with reasonable accuracy.

ACKNOWLEDGMENTS AND PERSONNEL

Especial thanks for their cooperation and assistance in the project are due to O. M. Lassen, Commissioner, Arizona State Land Department; J. F. Arnold, Director, Watershed Management Division, Arizona State Land Department; J. A. West, Chief, Watershed Division, Salt River Valley Water Users' Association; and Ivan McKinney and his family, who permitted the use of their land and the eradication of the trees near their home; they also assisted as observers.

The project was under the general supervision of D. D. Lewis, district engineer, Surface Water Branch, and J. W. Harshbarger and P. E. Dennis, successive district geologists, Ground Water Branch, of the Geological Survey in Arizona. E. L. Hendricks, associate chief, Water Resources Division of the Geological Survey, served as a consultant throughout the project.

GEOHYDROLOGIC SETTING

The geologic environment is a major factor to be considered in the study of the surface-water and ground-water relations. The circulation of water as liquid or vapor within the area is, in effect, only a miniature replica of the earth's hydrologic cycle. The original source of water is precipitation. The liquid phase or the accumulation and transmission of this water as surface and subsurface flow depends on several factors but primarily on the geologic environment of the catchment area. This environment is represented by the landforms and the physical characteristics of the rock types underlying these landforms.

LANDFORMS AND DRAINAGE

The Cottonwood Wash and its tributaries are mainly in the Transition Zone between the Colorado Plateaus and the Basin and Range structural provinces in Arizona (fig. 1). The headwaters are in the Colorado Plateaus province, and the stream crosses the Transition Zone to discharge into the Big Sandy River. The mountainous parts of the drainage basin are alined almost parallel to the Big Sandy River and form a steep westward-facing escarpment, which rises 2,000 feet to an altitude of more than 6,000 feet. The plateau east of the escarpment is a dissected surface on slightly tilted sedimentary rocks and lava flows.

In the mountainous parts of the drainage basin the streams flow in V-shaped canyons with steep gradients. Some have convex profiles, which are normally associated with very steep gradients, rapids, and falls.

Cottonwood Wash has a narrow, relatively steep-walled, youthful valley. The bedrock floor of crystalline rocks is irregular, has rapids and falls along its course, and is covered sporadically with gravel, sand, and silt. In the study area the walls of the canyon have no soil cover, rise to a maximum altitude of about 5,000 feet, and have a maximum relief of about 1,000 feet. The gradient of the stream channel varies within short distances, but the average gradient for the test reach is about 102 feet per mile.

Along the base of the steep walls of the valley, remnants of terraces underlain by unconsolidated material are about 20 feet above the stream channel and can be traced upstream to a shallow infilled basin above the project area (fig. 2) where the terraces are about 4, 11, and 40 feet above the channel. It is apparent that a recent change in base level has occurred. This change also is indicated in the surrounding area tributary to the Big Sandy River.

DISTRIBUTION AND WATER-BEARING PROPERTIES OF THE ROCKS

Relatively impermeable crystalline rocks are exposed in more than 75 but less than 80 percent of the area mapped and thus form most of the basal and lateral boundaries of the ground-water system. The

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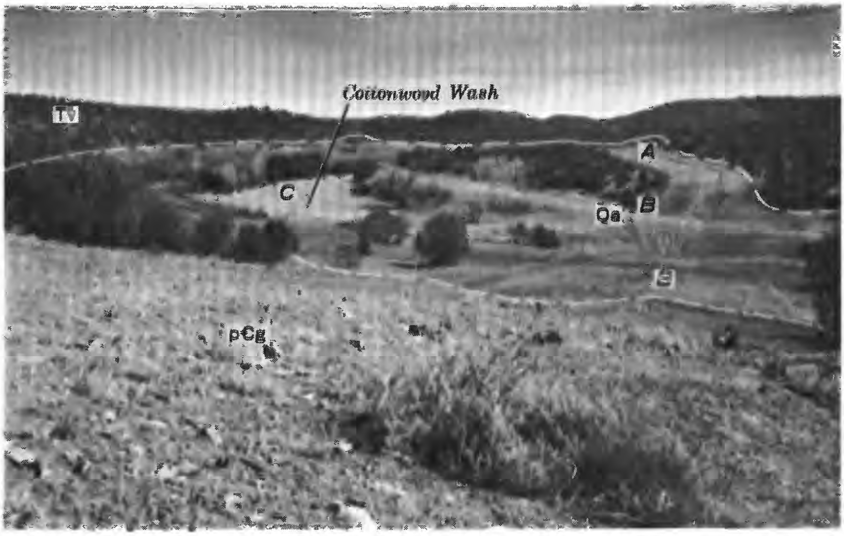

FIGURE 2.—Small basin filled with alluvial material and showing terrace development. A, B, and, C, terraces; Qa, older alluvium; Tv, volcanic rocks; p€g, granite and metamorphic rocks.

crystalline rocks also form the boundaries of the surface-water conduit in many parts of the main channel and its tributaries (pl. 1).

As far as can be determined from observation or streamflow records, none of the crystalline rocks can be regarded as a significant source of sustained ground-water seepage into the stream channel. Where joint systems are pronounced, some seepage into the channel was observed during wet periods; however, no such seepage was observed during the dry summer months.

Volcanic rocks are exposed only in the eastern part of the area mapped and are not involved in water gains or losses in the study area. However, part of the perennial flow of Cottonwood Wash probably is derived from seeps that issue from these rocks.

In the Cottonwood Wash area the volcanic-rock sequence consists of alternating layers of basalt, tuff, and tuffaceous sedimentary rocks. Where the base is exposed, this volcanic series lies on an erosional surface cut across the crystalline rocks. Upstream from gage 1 the volcanic rocks are overlain by alluvial deposits (pl. 1).

The water-bearing characteristics of the volcanic-rock sequence are highly variable. The basalt layers are dense and generally not water bearing. The tuff and tuffaceous layers contain interconnected pores and are moderately permeable. Outside the study area the tuff is referred to as "water rock" and yields water to stock wells.

The oldest unconsolidated sediments consist of alluvium, which underlies the terraces, and, in places, forms the streambed in the Cottonwood Wash drainage basin. Thin beds of younger alluvium are distributed as stream wash along the present streambed as a result of scour-and-fill processes.

The boundary of the older alluvium upstream from gage 1 is at the contact with the volcanic-rock sequence and the crystalline rocks. Here, the stream channel has been incised to the base of the older alluvium, and a maximum thickness of 45 feet is exposed. Downstream from gage 1 the older alluvium either is stripped from the area or the stream channel is cut below its base on the crystalline rocks, and thus terrace remnants are left hanging on the canyon walls. The older alluvium is below the level of the stream channel only in a few places (pl. 1).

The older alluvium stores very little water because the base of the unit generally is exposed and, therefore, drained. Where the base of the older alluvium has not been breached and is in contact with the stream wash, its lowest part is saturated, and the stored water has hydraulic connection with the stream. This older alluvium supplies part of the perennial flow to the stream upstream from gage 1. The greater thicknesses of the older alluvium along the project reach are above the water table and are drained.

The younger alluvium, mapped as stream wash, is distributed in discontinuous lenses along the floors of the main canyon and tributary drainages. The stream wash consists of a heterogeneous mixture of silt, sand, gravel, and boulders. In most of the area, the boundary of this unit is the contact with the crystalline rocks; for short lengths of the channel the stream wash is in contact with the older alluvium. The unit ranges from 0 to about 10 feet in thickness. The stream wash is the principal ground-water reservoir in the canyon and is highly permeable.

VEGETATION

By F. A. Branson and R. S. Aro

Sampling of vegetation was done between June 12 and June 18, 1960, prior to any treatments. Along the 4.1 miles of channel under investigation, 40 sample plots were located systematically at intervals of a tenth of a mile. Each rectangular plot had an area of at least 0.04 acre and extended the full width of the flood plain. The stream-axis length of each plot differed from plot to plot where the flood plain was less than 100 feet wide, but where the flood plain was more than 100 feet wide, the axial plot dimension was held at 17.4 feet, and the plot size was increased accordingly. Fourteen plots were located in the lower reach, and 26, in the upper reach.

Tree and shrub canopies were measured along one side of each plot the full width of the flood plain to estimate the areal cover of woody species. Plant species, foliage volume, and tree information—such as heights, stem diameters, and ages—were determined for entire plots.

Foliage volume was considered to be the most important vegetation quantity from a hydrologic standpoint in this study and was estimated from the height and width of tree and shrub crowns. To facilitate computation, each crown was considered to be cylindrical in shape; examination of the main species indicated that this assumption would give less error than alternative geometric shapes. The acre-foot was selected as the unit to best express the large volume of foliage measured for the easiest comprehension by hydrologists. In this study an acre-foot of foliage was defined as a space 1 foot deep and 1 acre in area that was actually occupied by live foliage. The volume so measured did not include the space devoid of live foliage, which in many places occurred below the canopy.

The use of full-channel-section sampling plots also gave an estimate of the area and the variations in width of the flood plain for the two reaches. The estimated flood-plain areas of the upper, lower, and combined reaches were 29, 22, and 51 acres, respectively. The bar diagram (fig. 3) shows the width of the flood plain in feet and the areal cover of red willow and Fremont cottonwood in percent at each of the 40 sampling plots. The width of the flood plain averaged about 130 feet for the lower reach, 90 feet for the upper reach, and 110 feet for the entire 4.1 miles of the channel.

Water losses by evapotranspiration should be related closely to foliage volume and canopy cover at any given time or for any physical environment. In Cottonwood Wash the plant species that used the greatest quantities of water were Fremont cottonwood, red willow, and seep willow. These three species accounted for 95 percent of the foliage volume sample and were distributed along the entire length of the channel under investigation. Table 1 lists the plant species sampled and estimates the acre-feet of foliage per species and total species per reach, per mile of reach, and per acre of flood plain. Foliage volumes can also be computed from the values presented in table 2, but different values are obtained. The correlation coefficient of 0.704 for foliage volumes and areal-cover values is highly significant or is significant beyond the one percent level. Considerably less time is required to make line interception measurements than is needed to measure all woody species within $\frac{1}{25}$-acre plots. Although the correlation coefficient obtained in this study is not as high as one might wish, conversions of areal-cover measurements to foliage volumes can be computed from the regression equation $\hat{Y}=.261+.1056X$, where X

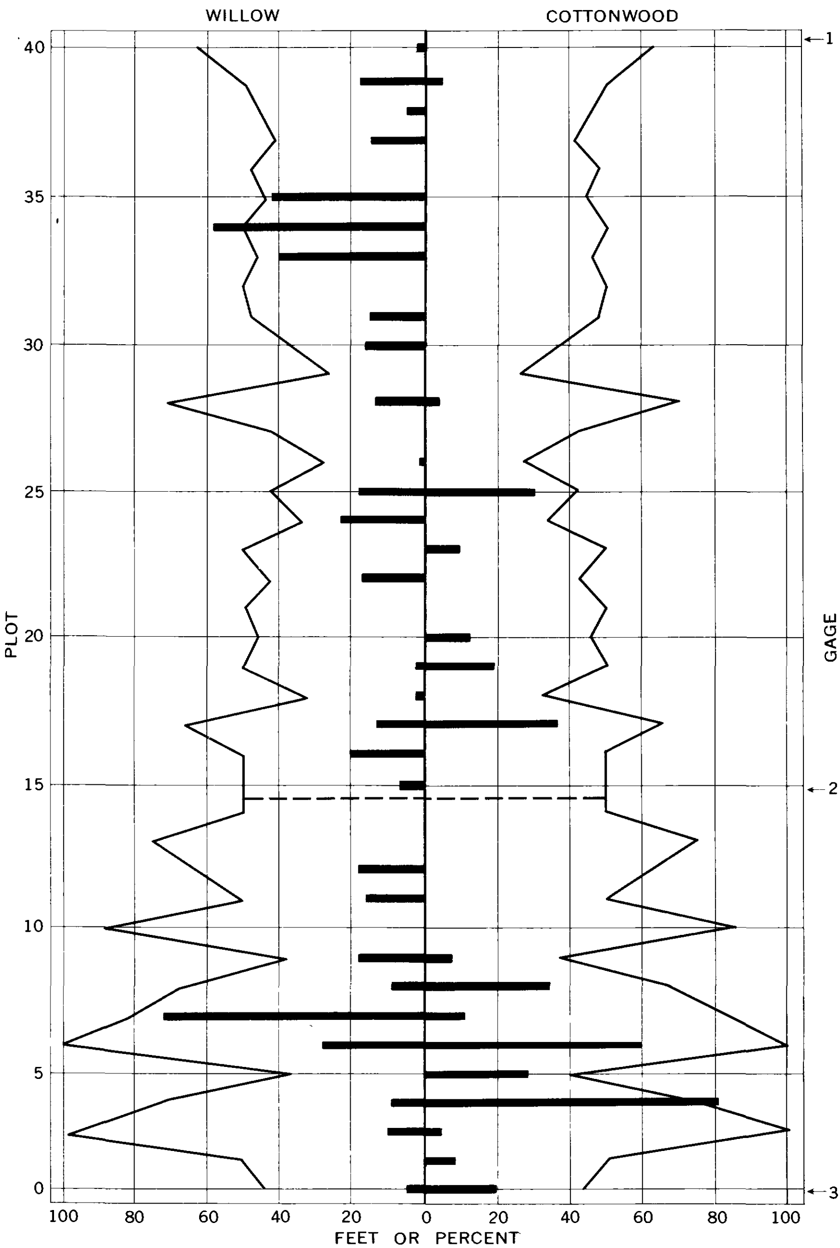

FIGURE 3.—Width of flood plain, in feet, shown by opposing line graph and areal cover of red willow and Fremont cottonwood, in percent, shown by bars, as measured at 40 channel-section plots along Cottonwood Wash, June 12–18, 1960.

is equal to the total intercept of woody species per plot. For streams having vegetation similar to that of Cottonwood Wash the equation should be useful.

Although the removal of foliage cut transpiration losses, it also reduced shading, probably allowed an increase of wind velocities at the ground level, and thus caused greater evaporation from the flood-plain surface. Table 2 gives data on the vegetation shading characteristics that were considered to be related to evaporation from the flood-plain surface. The depth of a tree or shrub crown was defined as the height of actual foliage for each plant sampled and did not include the distance between the ground and the bottom of the canopy.

The trees ranged in age from 10 to 19 years and had a mean age of 15 and a median of 14 years. From available hydrologic records (U.S. Geological Survey, 1954) a major flood in streams of the area occurred

TABLE 1.—*Foliage volume of riparian vegetation computed for units of stream distance and flood-plain area for the reaches of Cottonwood Wash, June 12–18, 1960*

[U, upper reach; L, lower reach; C, combined reaches. Tr (trace), indicates values less than 0.1 acre-foot]

Plant species	Acre-feet per reach			Acre-feet per mile of reach			Acre-feet per acre of flood plain		
	U	L	C	U	L	C	U	L	C
Fremont cottonwood (*Populus fremontii*)	25.5	43.6	69.1	9.8	29.1	16.8	0.9	2.0	1.4
Red willow (*Salix laevigata*)	56.5	16.1	72.6	21.7	10.7	17.7	1.9	.7	1.4
Velvet ash (*Fraxinus velutina*)	1.0	4.8	5.8	.4	3.2	1.4	Tr	.2	.1
Seep willow (*Baccharis glutniosa*)	1.8	4.3	6.1	.7	2.9	1.5	.1	.2	.1
Other species [1]	.2	1.0	1.2	.1	.7	.3	Tr	Tr	Tr
Total, all woody species	85.0	69.8	154.8	32.7	46.6	37.7	2.9	3.1	3.0

[1] Includes netleaf hackberry (*Celtis reticulata*), Utah juniper (*Juniperus osteosperma*), saltcedar (*Tamarix pentandra*), alderleaf mountain-mahogany (*Cercocarpus montanus*), desert-willow (*Chilopsis linearis*), skunkbush (*Rhus trilobata*), willow (*Salix* sp.), cliffrose (*Cowania mexicana*), and sunflower (*Compositae*).

TABLE 2.—*Areal cover of riparian vegetation on the flood plain and the average depth of tree and shrub crowns for the reaches of Cottonwood Wash, June 12–18, 1960*

Plant species	Upper reach (29 acres)			Lower reach (22 acres)			Combined reaches (51 acres)		
	Percent	Acres	Average depth (feet)	Percent	Acres	Average depth (feet)	Percent	Acres	Average depth (feet)
Fremont cottonwood (*Populus fremontii*).	4.8	1.4	17	13.9	3.1	17	8.6	4.4	17
Red willow (*Salix laevigata*)	13.8	4.0	12	10.2	2.2	13	12.2	6.2	13
Velvet ash (*Fraxinus velutina*)	.3	.1	6	2.2	.5	8	1.1	.6	7
Seep willow (*Baccharis glutinosa*)	1.3	.4	3	2.4	.5	3	1.8	.9	3
Gross canopy cover [1], all four species.	20.2	5.9		28.7	6.3		23.7	12.1	
Net canopy cover [2], all four species.	19.5	5.7		26.8	5.9		22.7	11.6	

[1] Includes all crown width measurements for each plant sampled, whether or not crowns overlapped.
[2] Equivalent to that part of the flood plain actually covered by vegetation and serves as an index of shading potential.

in 1941 or 19 years prior to the year of sampling. Thus, the maximum tree age is indicative of the date of the catastrophic event while the difference between the mean and maximum indicates the approximate time required for establishment of the tree population present when sampled in 1960. The tree heights and trunk diameters are given in table 3.

TABLE 3.—*Average heights and trunk diameters for main tree species sampled from June 12 to 18, 1960*

Tree species	Average height (feet)	Average trunk diameter (inches)
Fremont cottonwood	27	7
Red willow	19	6
Velvet ash	13	4

INSTRUMENTATION AND DATA COLLECTION

STREAM-GAGING STATIONS

The three stream-gaging stations were installed at valley sections where the stream flows over impermeable bedrock. Concrete cutoff walls that rest on the bedrock were constructed at each station to force all flow through the measuring flumes. These flumes were designed to carry only low discharges; flood discharges were not measured. The discharge measurements were made by standard U.S. Geological Survey volumetric or current-meter methods. When the daily variation in flow caused a stage change of more than 0.1 foot, discharge measurements were made at the high and low stages (fig. 4). The maximum discharge that could be measured at the flumes was about 1.5 cubic feet per second, which is slightly more than the maximum base runoff. Any streamflow greater than this was not included in the records because flows of more than 1.5 cubic feet per second occurred only during floods. The accuracy of the streamflow records from April through July for each year, when constant surveillance of the instruments was maintained, is excellent. The accuracy for the rest of the year is, for the most part, fair. In the fall and winter, the time interval between visits to the project area varied from 1 week to 1 month.

TRANSPIRATION WELLS

In August 1958 three transpiration wells were dug about 1½ feet below the shallow water table in the lower reach. Samples of material near the water table were collected from two wells, and the specific yield of each of the samples was determined by laboratory methods (Gatewood and others, 1950, p. 86). The results of the tests gave a point sample specific-yield factor of 35 percent for the stream wash and a point sample specific-yield factor of 10 percent for the older

FIGURE 4.—Comparison of maximum (upper view) and minimum (lower view) diurnal flow at gage 3 on June 19, 1960.

alluvium. Although each well was equipped with a continuous water-stage recorder, there were periods of missing record due to flood inundation and to recession of the water table below the bottom of the well. The daily withdrawal from the ground-water reservoir at each of the transpiration wells was computed, and poor or incomplete records were not used.

The daily withdrawal of ground water—derived from the transpiration-well data—was applied only in the area sampled by each well. These data provided a means by which comparisons between pretreatment, defoliation, and eradication periods could be made.

OBSERVATION WELLS

Information was needed about the changes in ground-water storage beneath the flood plain and adjoining terraces in order to use the inflow-outflow method of evaluating the water losses. Because the early reconnaissance indicated that the changes in storage would be small, the observation-well network was limited to three wells drilled in the older alluvium beneath the terrace at the McKinney Ranch headquarters and three transpiration wells in the stream wash beneath the flood plain (pl. 1). The terraced older alluvium, where the observation wells were drilled, represents the largest single volume of older alluvium in the project area; thus, any significant changes in ground-water storage elsewhere in these deposits might be evaluated by extrapolation from water-level changes in these wells.

METEOROLOGICAL DATA

Precipitation, radiation, relative humidity, air temperature, wind velocity, and evaporation are factors that affect the transpiration rate of vegetation. Records of all these factors were obtained at different times during the investigation.

A partial weather station was operated at the McKinney Ranch. The group of measuring and recording instruments operated at this site included a recording gage for precipitation, a pyrheliograph for radiation, a hygrothermograph for relative humidity and air temperature, and a recording anemometer for wind speed. Two other recording rain gages were operated in the study area (pl. 1). The rain gages were used primarily to indicate the periods when local recharge to the older alluvium may have occurred and to indicate the origin of storm runoff in the study area.

Water temperature was recorded at stream-gaging stations 1 and 3 (pl. 1). The recorder at gaging station 1 was operated only until July 28, 1961, when it was washed away by a flood. The water temperature was recorded at transpiration well 1 only from April 11 to August 8, 1963. Two evaporation pans, U.S. Weather Bureau class A type, were operated in the lower reach from May to July 1963 (pl. 1).

Precipitation.—Precipitation in the Cottonwood Wash area occurs in two distinct seasons, as shown in the precipitation graphs (fig. 5). The summer thunderstorms in July, August, and September account

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for slightly less than 50 percent of the annual precipitation; the more gentle winter storms in December through March account for most of the remainder. Snow falls occasionally in the winter but rarely stays on the ground for more than a day or two.

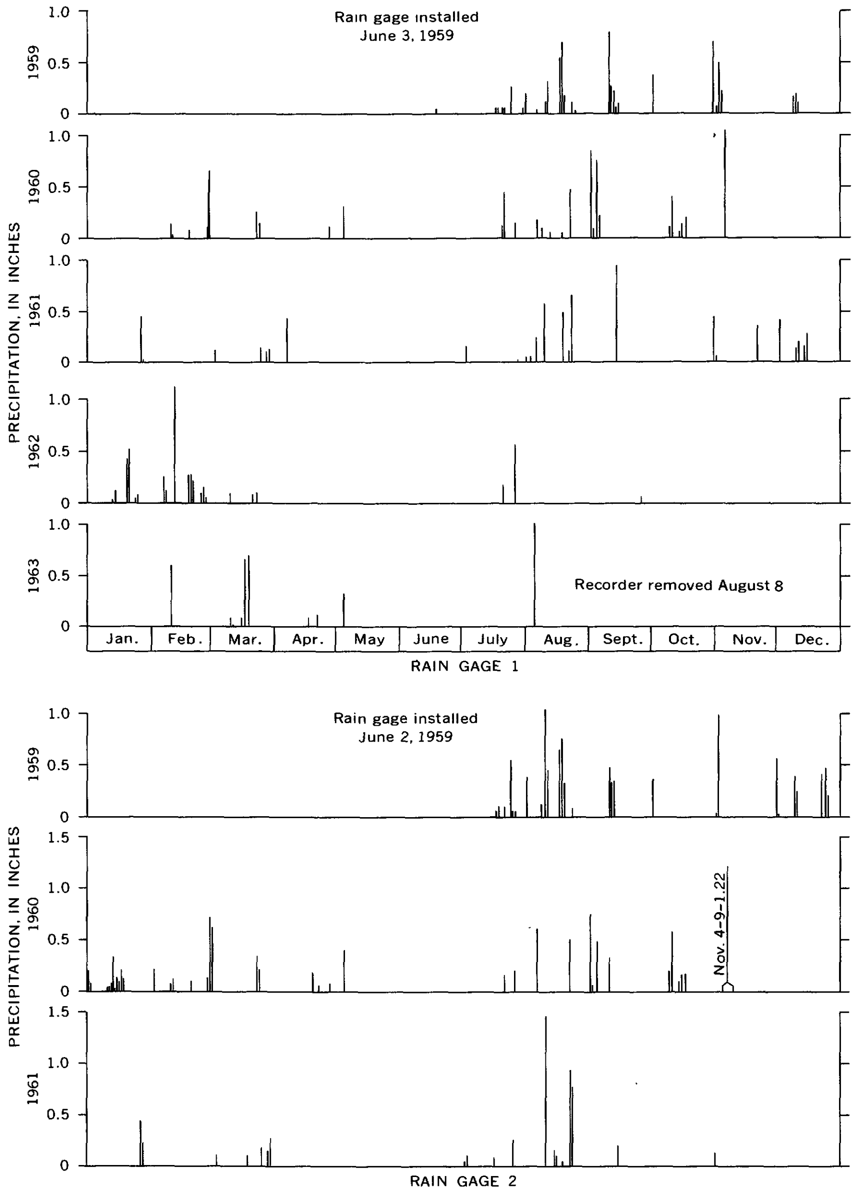
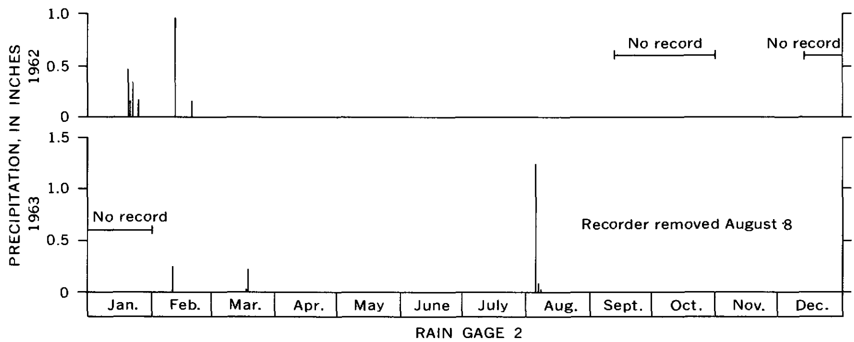


FIGURE 5.—Daily precipitation measured at three rain gages, 1959–63.

The precipitation records were used to (1) indicate any periods when precipitation caused direct runoff and (2) show where changes in ground-water storage occurred as a direct result of precipitation.

Solar radiation.—Solar radiation is the source of daylight energy from the sun impinging upon vegetation and the land surface. The use of water by vegetation responds rapidly to changes in the amount of radiant energy from the sun. The amount of mean daily radiation and the flow at gaging station 3 (table 4 and fig. 6) show the rapid



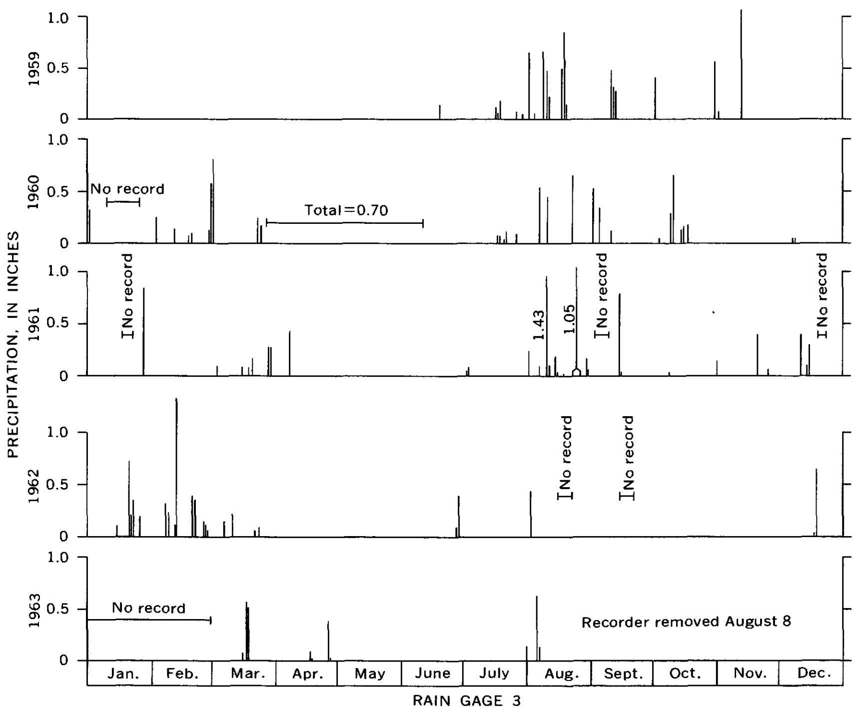


FIGURE 5.—Continued.

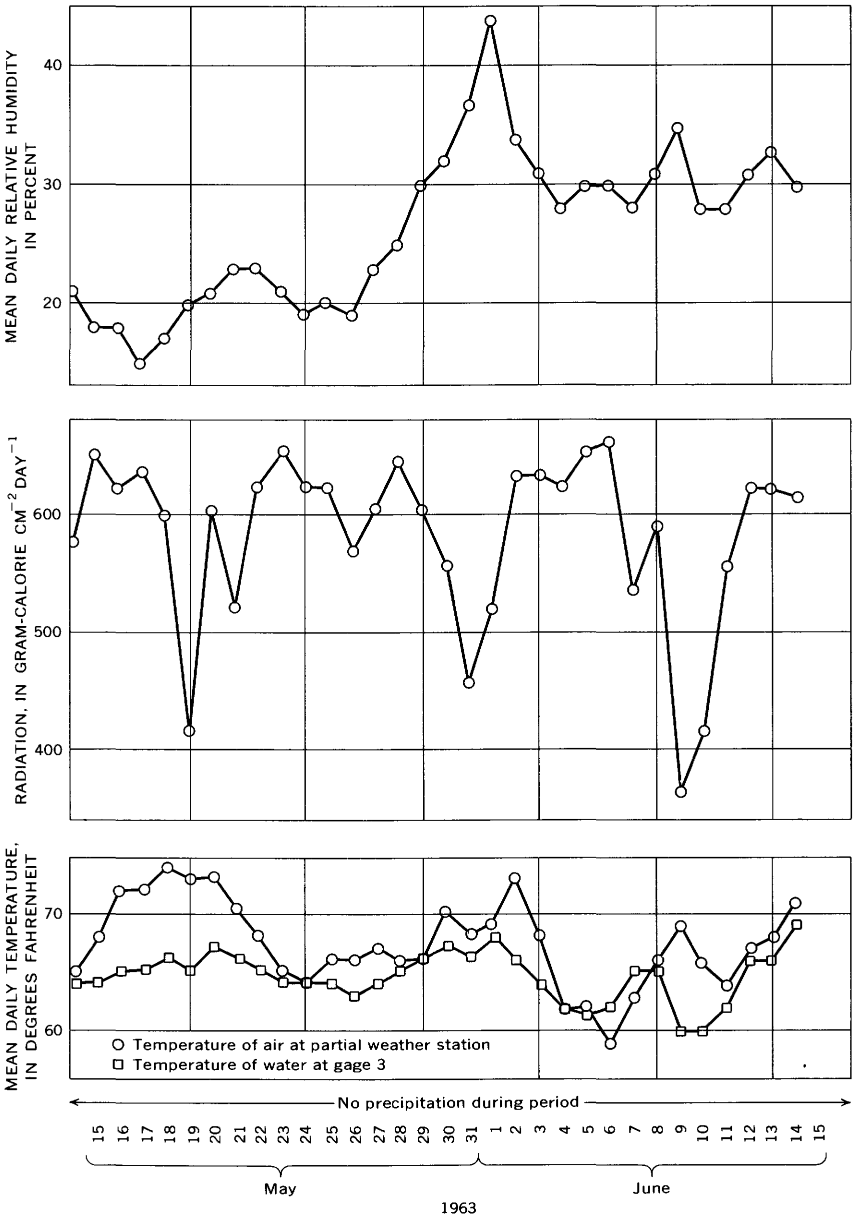


FIGURE 6.—The effects of the variations in meteorological conditions on streamflow and water-level fluctuations.

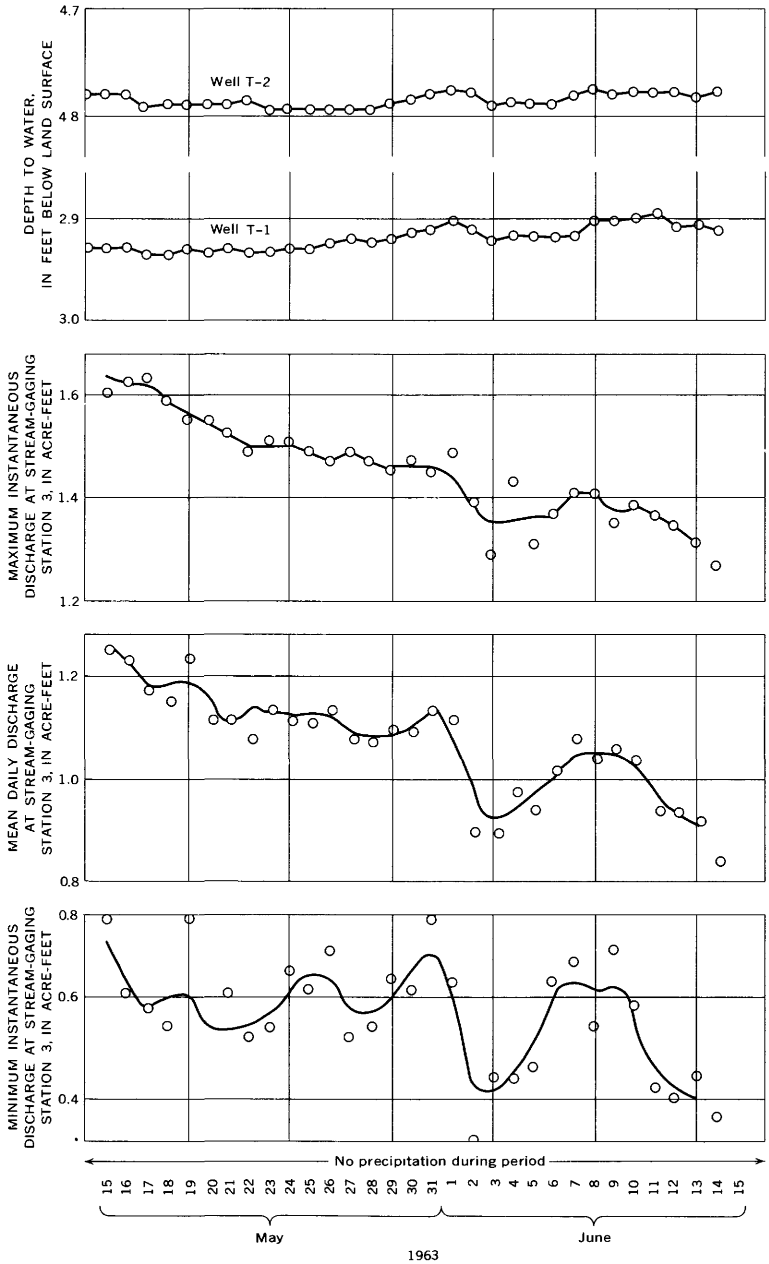


FIGURE 6.—Continued.

TABLE 4.—*Daily hydrologic and meteorologic data from May 15 to June 15, 1963*

Date	Maximum flow (acre-feet)	Minimum flow (acre-feet)	Mean flow (acre-feet)	Depth to water (feet) Well T-1	Well T-2	Mean air temperature (°F)	Mean water temperature (°F)	Mean relative humidity (percent)	Radiation (g-cal cm^{-2} day^{-1})
May 15	1.73	0.73	1.33	2.93	4.78	65	64	21	578
16	1.61	.76	1.25	2.93	4.78	68	64	18	650
17	1.63	.61	1.23	2.93	4.78	72	65	18	622
18	1.63	.58	1.17	2.93	4.79	72	65	15	636
19	1.59	.54	1.15	2.93	4.79	74	66	17	600
20	1.55	.75	1.23	2.93	4.79	73	65	20	416
21	1.55	.40	1.11	2.93	4.79	73	67	21	603
22	1.53	.61	1.11	2.93	4.79	70	66	23	520
23	1.49	.52	1.07	2.93	4.78	68	65	23	622
24	1.51	.54	1.13	2.93	4.79	65	64	21	652
25	1.51	.65	1.11	2.93	4.79	64	64	19	622
26	1.49	.61	1.11	2.93	4.79	66	64	20	622
27	1.47	.69	1.13	2.92	4.79	66	63	19	568
28	1.49	.52	1.07	2.92	4.79	67	64	23	603
29	1.47	.54	1.07	2.92	4.79	66	65	25	643
30	1.45	.63	1.09	2.92	4.79	66	66	30	603
31	1.47	.61	1.09	2.91	4.78	70	67	32	557
June 1	1.45	.75	1.13	2.91	4.78	68	66	37	456
2	1.49	.63	1.11	2.90	4.77	69	68	44	520
3	1.39	.32	.89	2.91	4.78	73	66	34	632
4	1.29	.44	.89	2.92	4.79	68	64	31	632
5	1.43	.44	.97	2.92	4.78	62	62	28	623
6	1.31	.46	.93	2.92	4.79	62	61.5	30	652
7	1.37	.63	1.01	2.92	4.79	59	62	30	661
8	1.41	.67	1.07	2.92	4.78	63	65	28	536
9	1.41	.54	1.03	2.90	4.77	66	65	31	590
10	1.35	.69	1.05	2.90	4.78	69	60	35	362
11	1.39	.58	1.03	2.90	4.78	66	60	28	416
12	1.37	.42	.93	2.90	4.78	64	62	28	557
13	1.35	.40	.93	2.91	4.78	67	66	31	622
14	1.31	.44	.91	2.91	4.78	68	66	33	622
15	1.27	.36	.83	2.91	4.78	71	69	30	611

response in reduction of water use, which is reflected by increased streamflow, as radiation decreases. Radiation was measured at the McKinney ranchhouse, and the record of average weekly radiation is shown in table 8.

Temperature.—Air temperature is one of the principal factors affecting the discharge of water by evapotranspiration. However, the data collected in this study show a closer relation between radiation and evapotranspiration, at least for short periods. As shown on figure 6, evapotranspiration generally was decreased by a lowering of the temperature; nevertheless, on May 19 and 31, 1963, when radiation was reduced by cloud cover but the temperature change was small, a larger reduction in evapotranspiration occurred.

Relative humidity.—The data on relative humidity (table 8) were recorded at the McKinney ranchhouse, and, as would be expected in an arid climate, the relative humidity usually was low. A period of high relative humidity would result in a decrease in the use of water by the riparian vegetation; however, in the study area the only time the relative humidity was high enough to measurably decrease transpiration rates was during rainstorms when the humidity effects could not be separated from other factors that influenced the reduction in evapotranspiration (fig. 6).

Evaporation.—Evaporation rates for this area are high; a general estimate for a free water surface is about 6 to 7 feet per year. The two evaporation pans that were operated in the study area for a short period were serviced each week. The pan evaporation measured in part of the summer is shown in table 8.

VEGETATION MODIFICATION

DEFOLIATION

The riparian vegetation was modified by chemical defoliation in June and July 1960. The defoliant, magnesium chlorate, was applied by power and handspray equipment after attempts to use a small airplane were unsuccessful because of air turbulence. The suitability of magnesium chlorate was determined by preliminary field tests. The chemical is nontoxic to humans and livestock. The dosage was a mixture of 20 pounds of magnesium chlorate, 200 gallons of water, and 1 quart of wetting agent per acre.

The spraying operation was started on the morning of June 22, and the lower reach was completely sprayed by the afternoon of June 27. Respraying was started June 28 and was continued until July 11. Estimates of the percent effectiveness of the spray were made at irregular intervals during the spraying operation. The maximum percent of area affected by the defoliant at any one time was estimated to be about 90 percent. Figure 7 shows a part of the area of the lower reach near the McKinney ranchhouse before defoliation on June 20 and during defoliation on July 15.

Although most of the leaves were removed, new buds were being formed before the spraying operation was completed. For example some trees began to leaf out on July 5, about 14 days after the start of the spraying operations. It can be assumed that water was being used and transpired by the trees as a result of this rebudding.

The quantitative effects of defoliation on evapotranspiration may not be demonstrated conclusively from the defoliation test data (table 5); however, there seems to have been some reduction. For example, from June 25 to July 3 the slope of the minimum-flow hydrograph for gaging station 3, at the lower end of the treated reach, was upward, whereas the slope at gaging station 2, at the upper end of the treated reach, was downward (fig. 8). This increase in outflow from the reach can be credited to the defoliation. The groundwater response to the defoliation reflected in wells T–1 and T–3 was more pronounced (fig. 8) and confirmed the conclusion that defoliation produced some reduction in evapotranspiration. A measure of potential evaporation during the defoliation period was made by computing the vapor-pressure deficit and multiplying by the wind movement in miles (table 5). The product was plotted and compared to

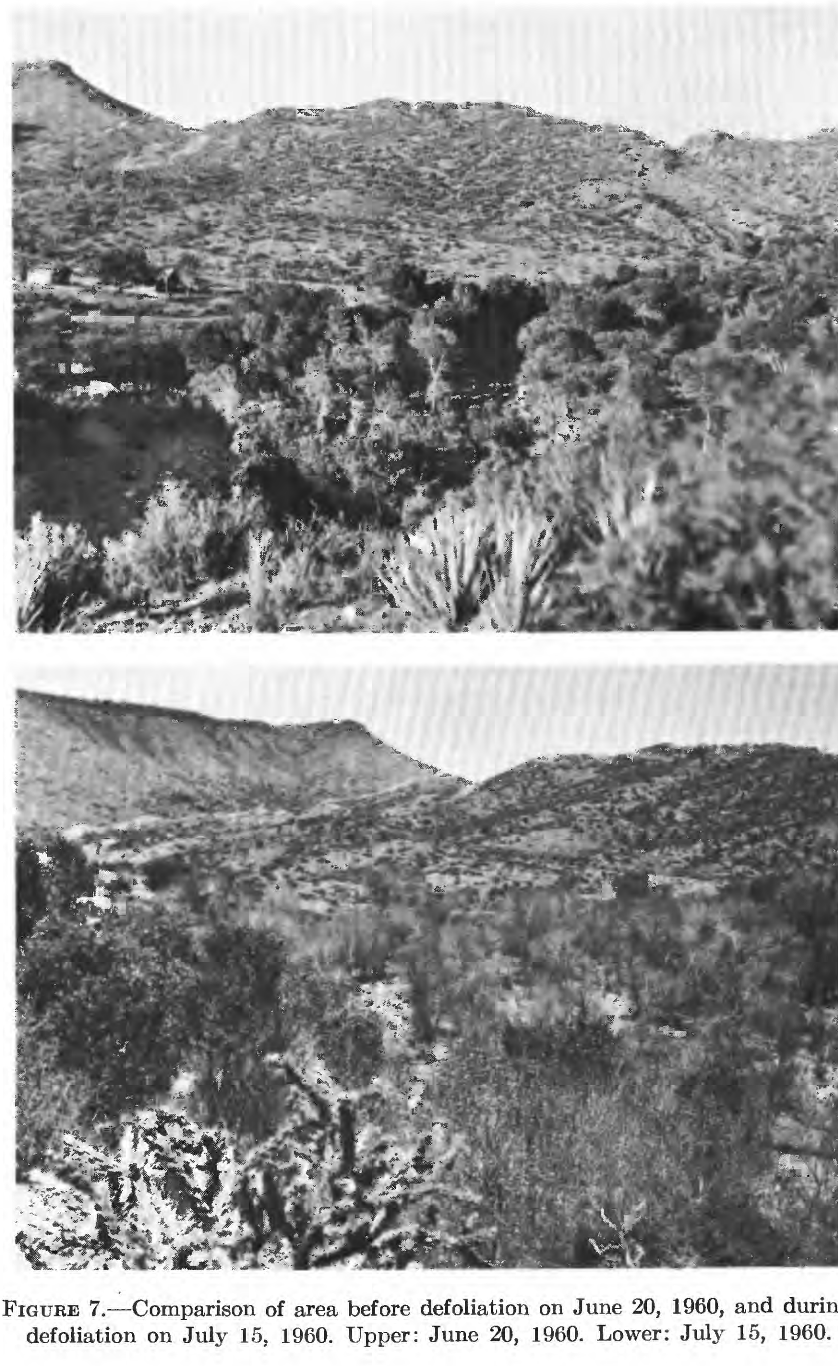


FIGURE 7.—Comparison of area before defoliation on June 20, 1960, and during defoliation on July 15, 1960. Upper: June 20, 1960. Lower: July 15, 1960.

TABLE 5.—*Hydrologic and meteorologic data for defoliation test from June 20 to July 17, 1960*

[e_o, saturation vapor pressure corresponding to the temperature of the water surface; e_a, vapor pressure of the air]

Date	Daily discharge, in acre-feet				Depth to water below land surface (feet)		Mean daily air temperature (°F)	Mean daily water temperature (° F)		Radiation (g-cal cm^{-2} day^{-1})	Mean daily relative humidity (percent)	e_o-e_a (mb)	Wind total (miles)	Wind × e_o-e_a
	Gage 3		Gage 2											
	Mean	Minimum	Mean	Minimum	Well T-1	Well T-3		Gage 1	Gage 3					
June 20	0.63	0.02	0.97	0.18	2.84	2.97	78	70	74	703	24	25.0	75	1875
21	.58	.02	1.01	.12	2.85	2.98	78	68	73	670	22	25.6	75	1920
22	.54	.02	.93	.06	2.85	2.99	80	68	74	670	22	27.3	75	2048
23	.61	.02	.93	.10	2.85	--	77	69	74	686	24	24.1	75	1808
24	.54	.02	.95	.26	2.85	2.98	78	70	72	694	22	25.6	75	1920
25	.63	.02	1.07	.24	2.84	2.95	75	68	69	686	23	22.8	75	1710
26	.60	.02	1.11	.22	2.79	2.94	76	68	67	694	26	22.6	86	1940
27	.56	.02	1.11	.20	2.81	2.92	76	71	68	694	19	24.8	74	1835
28	.56	.02	1.07	.14	2.80	2.93	76	71	69	694	18	25.1	69	1732
29	.58	.04	1.09	.14	--	2.92	76	71	69	703	21	24.2	83	2009
30	.56	.04	1.03	.12	2.86	2.92	77	68	71	712	18	26.0	53	1378
July 1	.60	.06	1.03	.12	2.84	2.90	80	68	71	633	27	25.6	69	1766
2	.65	.06	1.03	.18	--	2.91	82	69	71	580	32	25.4	70	1778
3	.60	.06	.99	.10	2.71	2.91	80	--	72	686	31	24.2	78	1888
4	.63	.08	1.01	.18	2.68	2.88	78	--	--	655	33	22.0	50	1100
5	.71	.10	1.09	.16	2.65	2.86	78	70	--	686	35	22.3	70	1561
6	.67	.08	1.07	.18	2.64	--	78	69	--	680	29	23.3	74	1724
7	.65	.10	1.17	.26	2.63	--	84	72	74	590	31	27.5	76	2090
8	.81	.22	1.23	.42	2.63	--	82	71	72	484	34	24.7	83	2050
9	.83	.16	1.07	.36	2.61	--	81	71	73	642	36	23.1	83	1917
10	.69	.12	.99	.20	2.61	2.85	74	68	69	679	29	20.3	83	1685
11	.77	.14	1.07	.28	2.61	2.83	76	70	71	686	23	23.6	83	1959
12	.73	.10	1.07	.16	2.60	2.86	78	71	71	662	27	24.0	83	1992
13	.61	.08	1.05	.10	2.60	2.88	80	71	72	679	23	27.0	82	2214
14	.60	.08	1.03	.12	--	2.88	78	70	71	679	21	25.9	86	2227
15	.63	.08	.91	.12	--	2.89	82	71	73	652	25	28.0	78	2184
16	.54	.06	.85	.06	--	2.91	86	72	75	633	15	36.0	80	2880
17	.52	.06	.99	.44	2.69	2.91	86	72	75	509	18	34.8	--	--

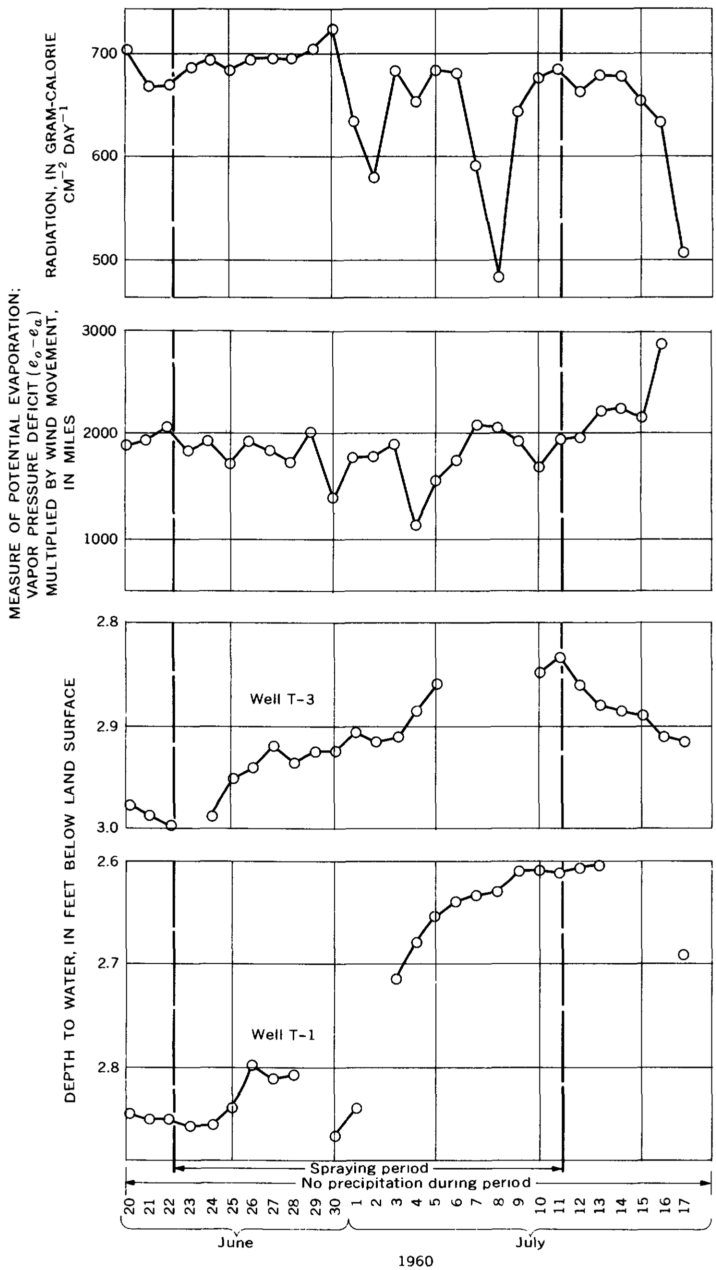


FIGURE 8.—Variations in the hydrologic and meteorologic conditions during the defoliation test period.

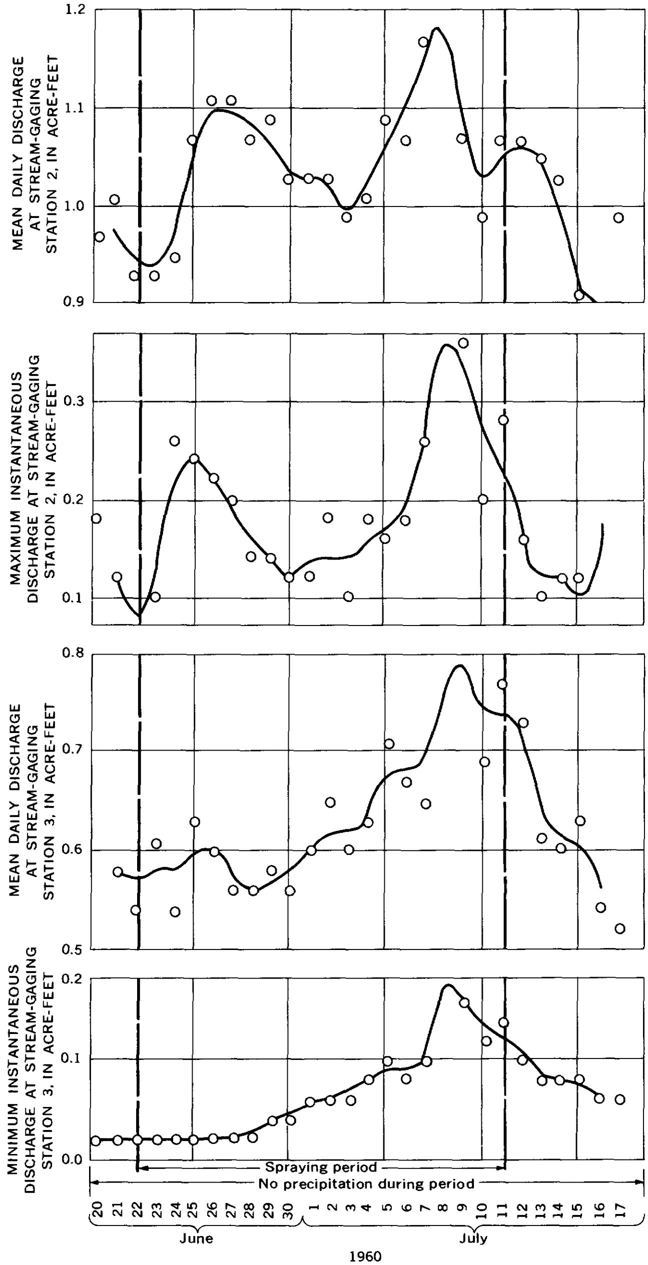


FIGURE 8.—Continued.

the changes in flow at gage 3 (fig. 8). There seems to be no correlation between the two graphs.

On July 7 a change in the weather conditions was indicated by a sharp drop in radiation. This reduction, the result of cloud cover, probably was responsible for the increase in flow measured at gages 2 and 3 that probably was the result of less evapotranspiration above gages 2 and 3.

Rain on July 17 ended the defoliation test; nevertheless, some decrease in evapotranspiration as a result of chemical defoliation of the vegetation was established, even though weather changes obscured the magnitude of this decrease in the last days of the test.

ERADICATION

Eradication of vegetation, the third phase of the experiment, was started on February 1 and completed on February 15, 1961. Each tree in the reach between gages 2 and 3 was either cut down or girdled and poisoned. The stumps of cut trees were poisoned with Ammate X in crystal form to kill the root system. The small brush and weeds were cut and poisoned with Ammate X in solution—3 pounds to 5 gallons of water and half a pint of a wetting agent, X77, to 5 gallons of water. All cut trees and brush were removed from the stream channel and burned. The effectiveness of the eradication is shown in figure 9. The trees and large bushes were eradicated, and the weeds and grass were controlled with spray from April 1961 to July 1963. The period of most complete control during each year was from late May until the rains in July.

The reduction in ground-water withdrawal is graphically illustrated by the comparison of water-level fluctuations before and after the major modification (fig. 10). The amplitude of the diurnal fluctuations in ground-water levels in well T–3 increased in June 1961 (fig. 11), probably as a result of the temporary regrowth of seep willow that occurred when the regrowth control was stopped. That the magnitude of diurnal fluctuations caused by evapotranspiration was about the same during the last four days of June 1959 and 1961 suggests that the amount of water used by the seep willow regrowth may have been as large as the amount used by the trees that were eradicated.

HYDROLOGY

SURFACE-WATER AND GROUND-WATER RELATIONS

The water-bearing units function as reservoirs for the streamflow by being recharged during periods of precipitation and storm runoff and discharging a part of this water into the streams during periods of less streamflow. As pointed out in a preceding section on "Distribution and water-bearing properties of the rocks," the water stored

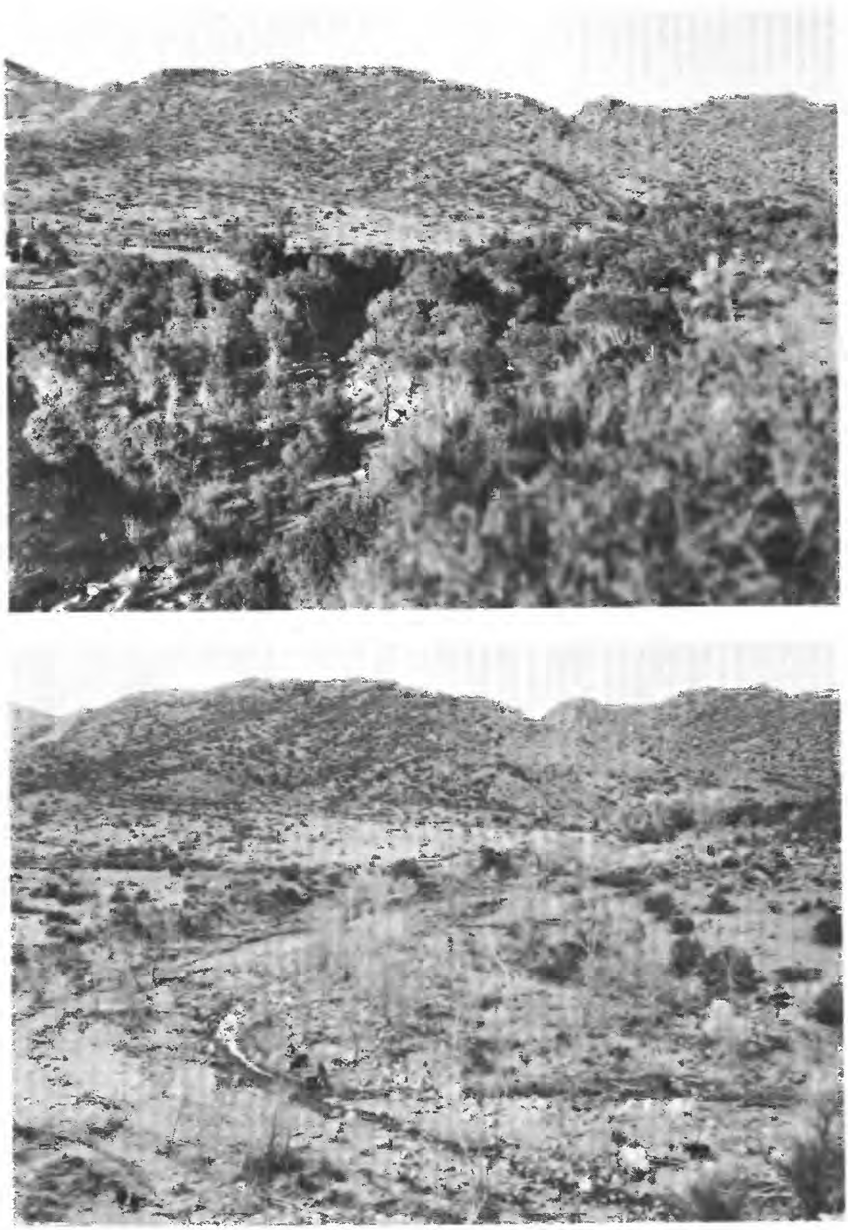


FIGURE 9.—The effectiveness of vegetation eradication. Upper view: June 1960. Lower view: July 1962.

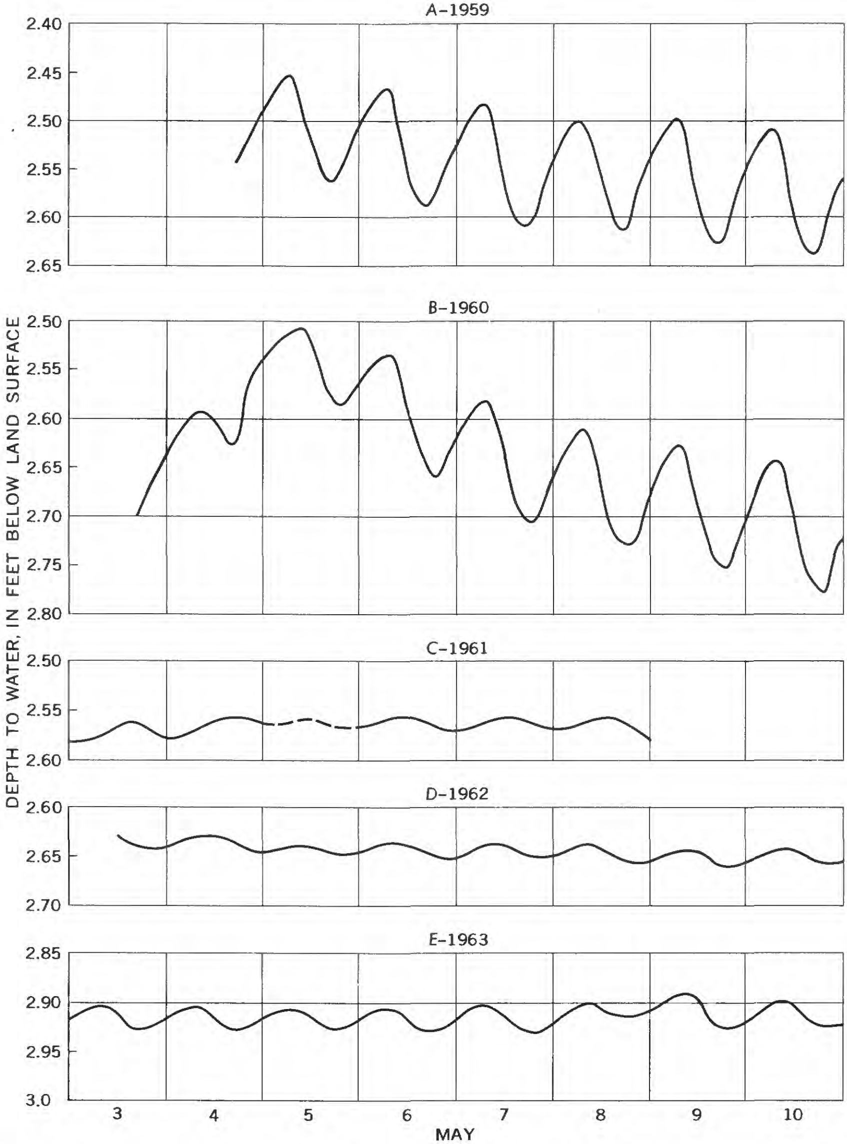


FIGURE 10.—Daily fluctuations of water level in well T–1 for a selected week in each of 5 years, 1959–63. Graphs *A* and *B* show the effect of undisturbed riparian vegetation growth on the water level; graphs *C*, *D*, and *E* show the effect on the water level after riparian vegetation was destroyed.

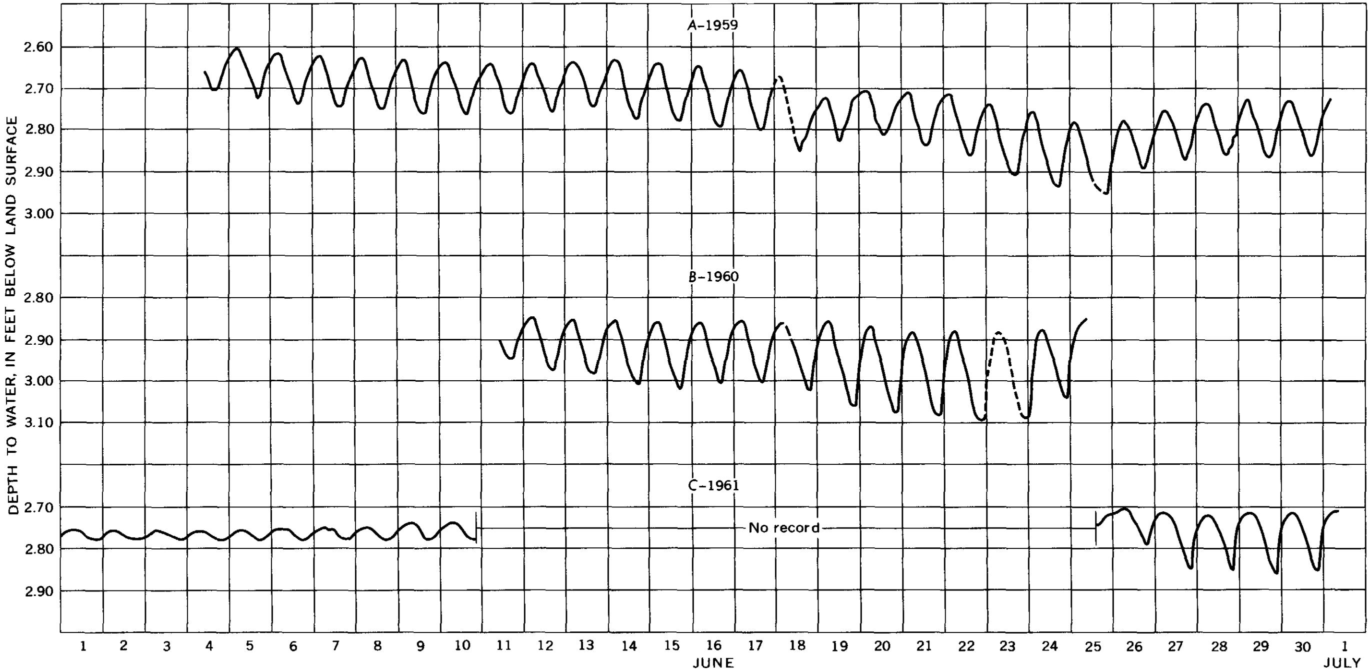


FIGURE 11.—Transpiration well T-3 for June 1959, 1960, and 1961. Graphs *A* and *B* show diurnal fluctuations under natural conditions; graph *C* shows diurnal fluctuations after eradication of riparian vegetation and partial regrowth of seep willow.

in the volcanic rocks and older alluvium upstream from the upper gaging station is the main source of the sustained low streamflow in the study area. This sustained flow is referred to as base runoff and is not a constant quantity because it fluctuates in response to wet and dry periods. The stream wash offers mainly temporary storage—it accepts recharge rapidly during periods of storm runoff, but it releases most of this water rather quickly after the storm runoff has passed—and contributes only a small amount of water to the stream in the winter when there is little precipitation.

The base runoff of Cottonwood Wash at gaging station 1 passes over relatively impermeable granitic and gneissic rocks (pl. 1). Then, the passage of the runoff is alternately over permeable stream wash, where part of the flow remains in temporary storage as ground water, and impermeable crystalline rocks, where the flow is unimpeded in its passage out of the area at gaging station 3.

Small tributary washes enter the stream channel from both sides. These tributary channels generally have steep gradients and are cut into granite and gneiss. Locally, along the channels and near their mouths, the tributaries contain thin deposits of stream wash. Where a tributary intersects remnants of older alluvium at the main channel, it has incised through or nearly through the alluvium. Thus, almost no ground-water storage is available to feed these tributary washes during dry periods.

GROUND-WATER STORAGE

The principal ground-water reservoir in the Cottonwood Wash area is the stream wash, which, in places, underlies the channel and flood plain; there is less storage in the older alluvium. The measured areal extent and estimated wetted thickness, by reaches, of the stream wash and older alluvium are given below.

	Lower reach (acres)	*Upper reach (acres)*	*Estimated average wetted thickness (feet)*
Stream wash	22	29	5
Older alluvium	10	8	1

The estimated saturated volume of each ground-water reservoir in the lower reach is about 110 acre-feet for the stream wash and 10 acre-feet for the older alluvium. Therefore, the effective storage of these reservoirs, based on a specific yield of 35 percent for the stream wash and 10 percent for the older alluvium, is 38 acre-feet and 1 acre-foot, respectively.

QUALITY OF WATER

The possibility that the chemical quality of the water might be altered measurably as a result of evapotranspiration was investigated. Inasmuch as water that is transpired and evaporated is relatively pure, it is possible that during periods of high evapotranspiration the chemical quality of the water may deteriorate progressively downstream. Therefore, it was assumed that if the transpiration was reduced significantly by modification of the vegetation in the lower reach, the chemical quality of the water would improve between gaging stations 2 and 3, as compared to the chemical quality before vegetation eradication.

Water samples were collected at each of the gaging stations prior to vegetation modification to determine the normal chemical quality changes between the upstream and downstream points. Subsequently, samples were taken more frequently during and after vegetation modification. Because little or no precipitation occurred during the period of sampling, runoff did not affect the results.

Comprehensive chemical analyses of the samples were not made, but the analytical work done on the individual daily samples was sufficient to provide the needed information (table 6). The analyses showed that there was a small but definite increase in mineral content downstream within each reach that may have been the result of the solution of mineral matter in the unconsolidated and crystalline rocks, the concentration of dissolved solids by evapotranspiration, or both. To evaluate the effect of evapotranspiration only on the chemical quality, samples were taken during high flows in the early morning and low flows in the late afternoon. There was no significant change in the chemical quality of the samples taken during high flows, when little or no evapotranspiration occurred, or during low flows, when a great deal of evapotranspiration occurred.

The data show no significant decrease in dissolved-solids content of the water in the lower reach as a result of the chemical defoliation of the vegetation.

On June 8, 1961, water samples were collected at the three gaging stations following the complete eradication of the vegetation in the lower reach (table 6). The analyses of the sample show no significant decrease in the dissolved-solids content that could be attributed to the eradication.

ANALYSIS OF WATER RECORDS

STREAMFLOW AND FLUCTUATIONS OF GROUND-WATER LEVELS

Fluctuations in streamflow and ground-water levels show a general seasonal pattern (tables 9 and 10; fig. 12). In the spring and early summer there is only a small amount of streamflow and a corresponding decline in the ground-water levels. The summer precipitation, generally beginning in late July and continuing to early September,

TABLE 6.—*Analyses of water samples*

[Defoliation period of lower subreach from June 22 to July 11, 1960. Eradication of vegetation in lower reach completed in February 1961]

Gaging station	Date of collection	Time of collection	Gage height (ft)	Discharge (cfs)	Temperature (° F)	Calcium and magnesium (Ca+Mg)		Bicarbonate (HCO_3)		Carbonate (CO_3)		Chloride (Cl)		Hardness		Specific conductance (micromhos at 25° C)	pH
						Epm	Ppm	Epm	Ppm	Epm	Ppm	Epm	Ppm	$CaCO_3$	Noncarbonate		
1	1-27-60	3:00 p.m.	------	1.44	57	------	------	------	251	------	7.0	------	21	228	------	478	8.4
2	1-27-60	4:00 p.m.	------	1.45	43	------	------	------	263	------	7.0	------	23	237	------	501	8.4
3	1-27-60	6:15 p.m.	------	1.43	45	------	------	------	290	------	0	------	26	248	------	531	7.8
1	6-23-60	10:00 a.m.	0.79	.68	------	4.18	------	4.15	253	0	0	0.93	33	209	2	500	8.0
1	6-24-60	4:30 p.m.	.81	.74	------	4.10	------	3.72	227	.30	9.0	.70	25	205	4	448	8.5
2	6-24-60	5:15 p.m.	.35	.13	------	4.50	------	4.44	271	0	0	.68	24	225	------	499	8.0
3	6-24-60	6:00 p.m.	.08	.01	------	4.98	------	4.90	299	.20	6.0	.87	31	249	0	562	8.3
1	6-25-60	7:25 a.m.	.96	1.06	60	4.52	------	4.11	251	.50	15	.54	19	226	0	483	8.3
2	6-25-60	8:30 a.m.	.79	.89	62	4.52	------	4.49	274	0	0	.65	23	226	2	493	8.2
3	6-25-60	10:00 a.m.	.62	.66	70	4.46	------	4.49	274	0	0	.73	26	223	0	504	7.9
3	6-25-60	4:00 p.m.	------	.03	75	4.74	------	4.79	292	0	0	.85	30	237	0	545	8.0
1	6-26-60	5:30 p.m.	.80	.73	70	4.48	------	4.34	265	0	0	.56	20	224	7	477	8.1
2	6-26-60	6:30 p.m.	.30	.12	67	4.64	------	4.44	271	.17	5.0	.68	24	232	2	505	8.3
3	6-26-60	8:00 p.m.	.08	.01	69	4.94	------	4.95	302	0	0	.82	29	247	0	560	7.3
1	6-27-60	7:30 a.m.	.96	1.16	62	4.46	------	4.36	266	0	0	.56	20	223	5	479	8.1
3	6-27-60	10:00 a.m.	.64	.60	72	4.58	------	4.59	280	0	0	.73	26	229	0	510	8.1
1	6-28-60	10:30 a.m.	.89	1.01	74	4.42	------	4.44	271	0	0	.62	22	221	0	484	8.2
1	6-29-60	8:00 a.m.	.96	1.11	62	4.46	------	4.33	264	0	0	.59	21	223	6	477	8.0
3	6-29-60	------	.65	.68	68	4.52	------	4.54	277	0	0	.76	27	226	0	512	8.1
1	7- 1-60	8:00 a.m.	.95	1.14	58	4.88	------	4.80	293	0	0	1.02	36	244	4	568	8.0
1	7- 1-60	6:00 p.m.	.79	.72	75	4.48	------	4.25	259	.20	6.0	.54	19	224	2	480	8.3
2	7- 1-60	6:45 p.m.	.28	.06	74	4.56	------	4.49	274	0	0	.70	25	228	4	508	7.5
3	7- 1-60	9:45 a.m.	.64	.69	70	4.66	------	4.67	285	0	0	.73	26	233	0	513	8.2
1	7- 2-60	10:30 a.m.	.89	.97	75	4.34	------	3.90	238	.33	10	.54	19	217	6	464	8.4
2	7- 2-60	7:30 a.m.	.78	.96	58	4.18	------	4.18	255	.10	3.0	.65	23	216	2	474	8.3
3	7- 2-60	8:15 a.m.	.66	.71	64	4.76	------	4.79	292	0	0	.73	26	238	0	529	8.1
3	7- 3-60	7:00 p.m.	.25	.05	67	4.60	------	4.57	279	0	0	.70	25	230	2	508	8.1
1	7- 7-60	6:45 a.m.	.96	1.15	------	4.40	------	4.33	264	0	0	.56	20	220	4	471	7.7
2	7- 7-60	8:00 a.m.	.78	.96	62	4.48	------	4.38	267	0	0	.65	23	224	5	484	7.8
3	7- 7-60	10:45 a.m.	.63	.64	76	4.58	------	4.57	279	0	0	.73	26	229	0	507	8.2
1	7-13-60	7:00 a.m.	.96	1.14	58	3.58	------	3.11	190	.33	10	.62	22	179	7	398	8.5
2	7-13-60	8:00 a.m.	.76	.95	60	4.04	------	3.79	231	.23	7.0	.70	25	202	1	452	8.4
3	7-13-60	9:00 a.m.	.65	.65	72	4.00	------	3.61	220	.33	10	.73	26	200	3	446	8.6
1	7-18-60	11:00 a.m.	.75	------	------	3.96	------	3.88	237	0	0	.56	20	198	4	431	8.2
3	7-18-60	------	.57	.58	------	4.62	------	4.62	282	0	0	.76	27	231	0	516	8.0
1	6- 8-61	3:30 p.m.	.78	.74	------	4.42	74	4.31	263	0	0	.56	20	221	6	488	7.6
2	6- 8-61	5:10 p.m.	.45	.24	65	3.92	65	3.92	239	0	0	.68	24	196	0	451	8.2
3	6- 8-61	7:45 p.m.	.34	.18	80	4.48	74	4.52	276	0	0	.70	25	224	0	502	8.2

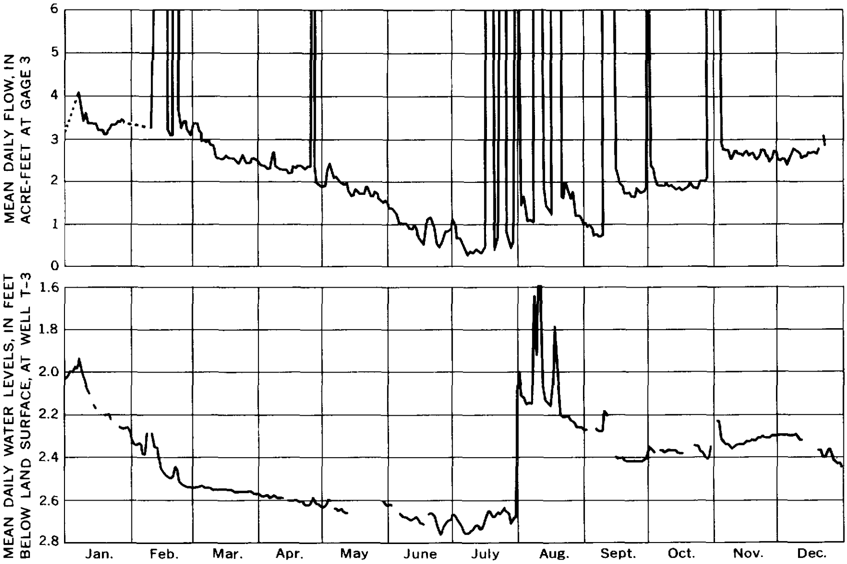


FIGURE 12.—Mean daily flow at gage 3 and mean daily water levels in well T-3, 1959.

causes an increase in streamflow from surface runoff and a rise in ground-water levels by recharge from the stream to the ground-water reservoir. The winter precipitation also causes an increase in streamflow and a corresponding rise in ground-water levels.

TRANSPIRATION-WELL METHOD

The relative changes in the amount of water used by riparian vegetation under normal and modified conditions were determined by the transpiration-well method (White, 1932). The water use for standard 7-day periods was computed for three transpiration wells. The mean sum for each of the standard periods for wells T–1 and T–2 was plotted on graphs for each of the 5 years of the study (fig. 13).

The curve for 1959 is the result of water use during the period in which there was no modification of vegetation. In late June and early July 1960 the lower reach was chemically defoliated. The response to the treatment was indicated clearly by well T–1 (fig. 13) and showed that transpiration decreased from the beginning of the test until July 17 when rain obscured the effects of the modification. After July 17 the transpiration, as shown by well T–1, increased until it returned to a normal pretreatment level in early August. In February 1961 the riparian vegetation in the lower reach was eradicated almost completely by cutting or poisoning. The curves for 1961–63 show the

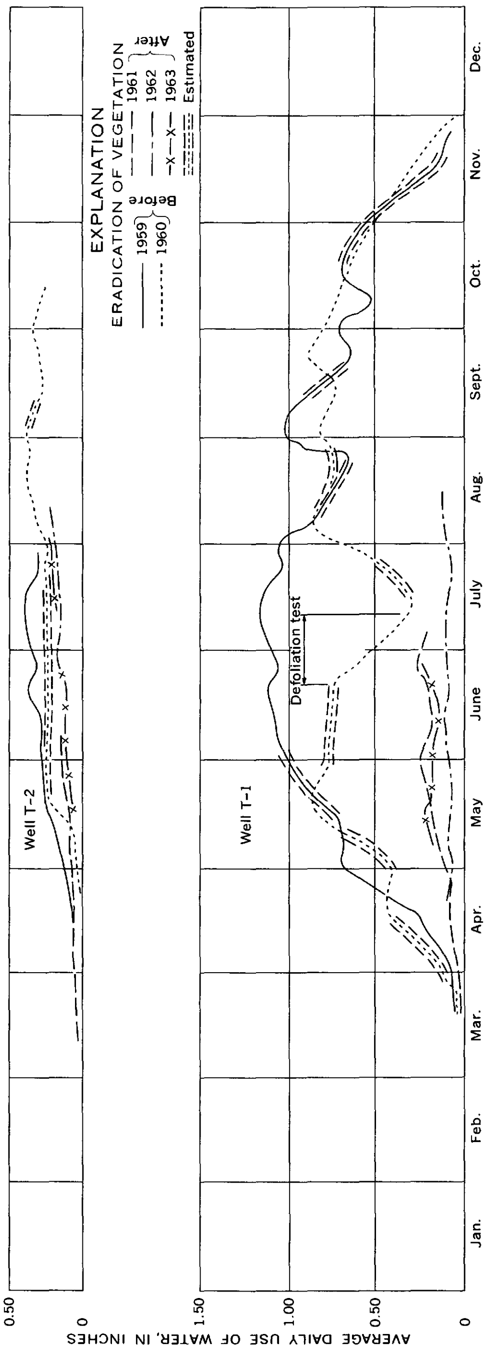


FIGURE 13.—The effect of vegetation modification on transpiration—1959, no vegetation modification; 1960, defoliation in lower reach from June 22 to July 11; 1961–63, complete eradication of vegetation in lower reach.

significant decrease in water use that resulted from this eradication. Figure 10 shows the same effect on the daily fluctuations for a selected week in each of 5 years, 1959–63.

A comparison of the curves for wells T–1 and T–2 (fig. 13) shows a general similarity in shape and also a marked response to the eradication of vegetation. The difference in the rate of water use between wells T–1 and T–2, as illustrated in the curves, is chiefly related to the difference in the specific yield of the material at each of the well sites.

The curves for well T–1 indicate that eradication reduced the rate of use of ground water during May, June, and part of July 1961 to about one-fourth of that used in the same months of 1959. For the same period in 1962 and 1963, the response was similar. The maximum reduction in water use near well T–1 was about 90 percent in July; the curves for well T–2 indicate similar but smaller water savings.

WATER-BUDGET METHOD

The water-budget method was used to determine the riparian water losses in the upper and lower reaches. By this method the outflow from the reach was subtracted from the inflow into the reach and the difference was adjusted for changes in storage in the soil-moisture reservoir, the stream channel, and the ground-water reservoir.

The principal part of the inflow was surface flow over the impervious barrier at gage 1. Similarly, outflow from the upper reach and inflow to the lower reach were over the impermeable barrier at gage 2, and the outflow from the lower reach crossed an impermeable barrier at gage 3. Any other inflow to the area was ground water moving through remnants of the older alluvium and was considered negligible. (See section "Surface-water and ground-water relations.") Direct precipitation was eliminated as an inflow factor by selecting periods when rainfall and subsequent runoff did not affect the system.

The evaluation of changes in storage in the soil-moisture reservoir was not attempted. In Cottonwood Wash the main areas of evapotranspiration are the channel and flood-plain deposits. The depth to the ground water is generally less than 2 feet below the land surface, and it is less than 5 feet, at a maximum, near the banks. The channel and flood-plain deposits are mainly sand, which has a capillary-rise potential of 1 to 2 feet. Near the banks of the channel the material is less sandy and has a capillary-rise potential of more than 4 feet. Therefore, generally all the unsaturated materials adjacent to the stream are in the capillary fringe. Because ground water is a constant source of replacement for capillary water that is removed by evapotranspiration and because streamflow is a constant source of ground water, any depletion from the capillary fringe is replaced by ground water which is replaced by streamflow; thus, there is basically no net change in soil-moisture storage in the study area.

Theoretically, changes in storage in the stream channel should have been considered in the water-budget method of measuring the evapotranspiration in the test reach. In this area, however, the amount of water involved in these changes was inconsequential.

Adjustments for changes in ground-water storage were not made because the periods in which precipitation or significant changes in ground-water levels occurred were eliminated from the analysis. Periods during which there were only minor water-level declines (table 3) were included in the analysis but were not corrected for the change in storage.

The water-budget period used in this analysis is a week. Standard weeks or 7-day periods used as basic observation time units were started on January 1, 1959, and were continued throughout the study. The water gain or loss for each of these standard weeks has been computed for the upper and lower reaches by subtracting the outflow from the inflow.

The losses for each standard week for the growing season in 1959–63 were plotted for the upper and lower reaches. The growing season was considered to be 35 weeks long, from March through October. Smoothed curves were drawn to represent the changes in loss rate in these periods. For the unmodified upper reach the close grouping of the five loss curves (fig. 14) indicated relatively little difference

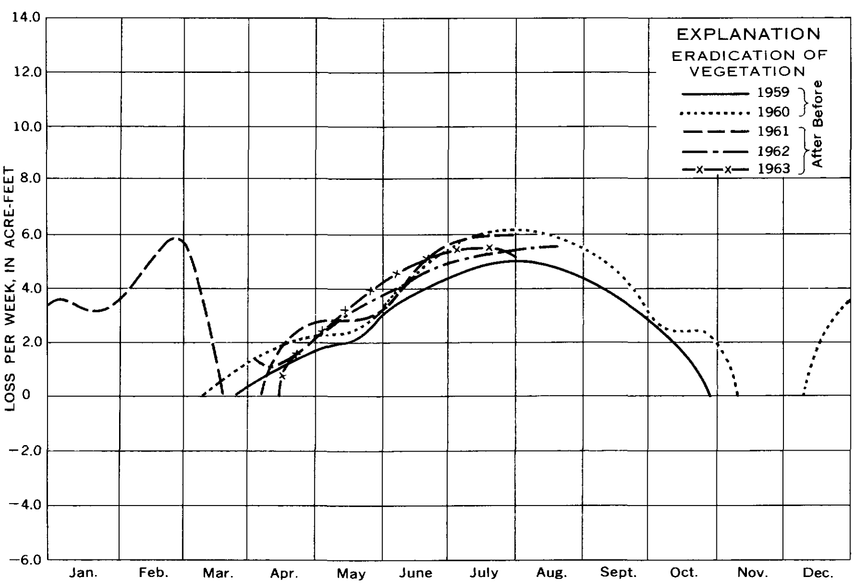


FIGURE 14.—Computed weekly water loss due to riparian vegetation between stream gages 1 and 2.

in the natural factors affecting evapotranspiration during the 5-year study period; on this basis, a single average curve was drawn for the 5-year period (fig. 15). A comparison of the smoothed curves that represent the evapotranspiration in the lower reach for each of the 5 years (fig. 16) indicates a significant change in water-loss rate after eradication of the vegetation.

Therefore, two summary curves were drawn to represent the average-loss rates, one before and one after the eradication of riparian vegetation (fig. 17). The difference between the two curves is the approximate water savings due to vegetation eradication. The evapotranspiration, as computed from the average-loss curves, is tabulated by months for the growing season for each year (table 7). By using the water-use figures for the test reach between gages 2 and 3, the average seasonal total water loss before eradication was computed as 80 acre-feet (rounded); the average seasonal water loss for this reach after eradication was 42 acre-feet (rounded). The difference, 38 acre-feet, is the computed water savings that resulted from the eradication of the vegetation in the lower reach. The 80-acre-foot water loss before eradication is about 18 percent of the inflow for the period, and the 42-acre-foot water loss after eradication is about 12 percent of the inflow for the period.

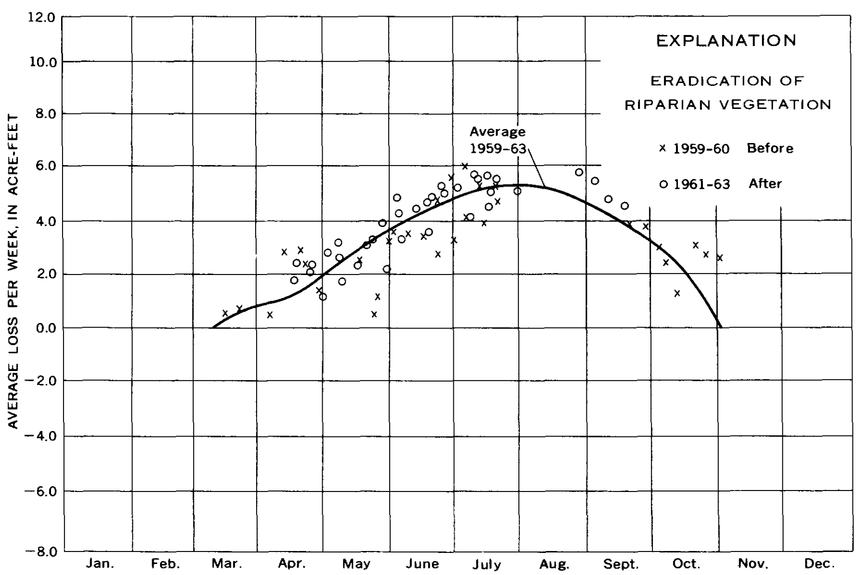


FIGURE 15.—Average of computed weekly water loss due to riparian vegetation between stream gages 1 and 2 in the unmodified reach.

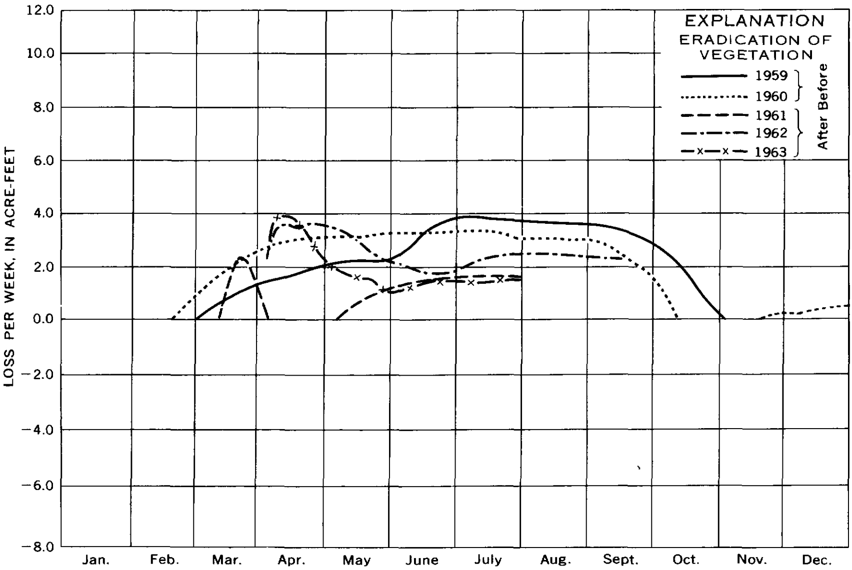


FIGURE 16.—Computed weekly water loss due to riparian vegetation between stream gages 2 and 3.

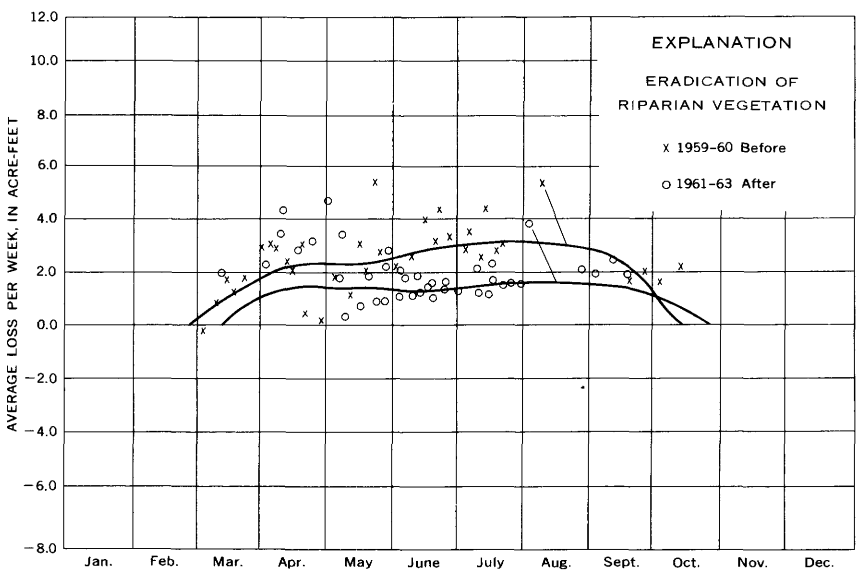


FIGURE 17.—Average of computed weekly water loss due to riparian vegetation between stream gages 2 and 3.

TABLE 7.—*Evapotranspiration, in acre-feet, computed from average-loss curves*

Period	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Average water loss in upper reach from figure 14									
1959	[1]2.22	4.01	8.83	14.18	22.12	18.77	16.72	9.45	91.86
1960	.75	7.23	10.32	17.56	18.89	24.35	13.94	8.71	101.75
1961	9.00	5.29	11.51	16.57	23.26	[2]23.81	[2]17.92	[2]7.42	114.78
1962	[1,2]1.50	4.85	12.20	16.96	20.66	22.37	17.92	6.08	99.54
1963	[1,2]5.00	2.08	12.27	18.47	21.55	[2]18.37	[2]15.87	[2]4.67	88.28
Average water loss in lower reach from figure 16									
1959	2.50	6.69	8.68	12.06	15.25	15.20	10.93	[1]0.10	71.21
1960	5.75	11.53	12.63	12.72	13.09	12.34	12.57	9.29	89.92
1961	1.80	[1]2.07	1.55	5.36	6.57	[2]10.06	[2]5.01	[2]2.75	31.03
1962	[1,2].20	10.50	11.06	6.97	8.54	[2]5.33	[2]8.02	[2]6.36	56.58
1963	[1,2].10	9.88	6.51	4.83	5.34	[2]4.89	[2]5.01	[2]2.75	39.31
Average water loss in lower reach from figure 17									
Before eradication	4.12	9.11	10.66	12.39	14.17	13.77	11.75	4.60	80.57
After eradication	.50	6.10	6.37	5.72	6.82	6.76	6.01	3.95	42.23

[1] Net gain.
[2] Estimated.

SUMMARY AND CONCLUSIONS

The eradication of riparian vegetation along the lower reach of the project area reduced water losses that resulted from evapotranspiration. The water-budget analysis, an observational method, was used to evaluate evapotranspiration for the growing season, and the transpiration-well method was used to indicate the effects of vegetation modification on water use. The average evapotranspiration computed by the water-budget method in the lower reach before vegetation eradication was 80 acre-feet for the growing season—March through October—or 18 percent of the inflow; after eradication it was 42 acre-feet, or 12 percent of the inflow. The average amount of water saved per growing season was computed to be 38 acre-feet.

The evaluation of transpiration-well data indicated that vegetation eradication may reduce the calculated water use near the transpiration well by as much as 90 percent. The eradication of the vegetation reduced shading of the soil and water surfaces and probably allowed an increase in wind speed at ground level along with greater evaporation. Therefore, the decrease in water use as computed is not a measure of transpiration alone but also includes a probable increase in evaporation.

Regrowth of shrub-type vegetation, such as seep willow, reduced the water savings effected by the eradication of tree-type vegetation. The regrowth may have been due to the decrease of shade and the resulting increase in area available for shrub-type regrowth.

The chemical quality of the water did not change significantly as a result of the eradication of riparian vegetation.

Magnesium chlorate was an effective defoliant on all types of vegetation in the project area. The eradication of the vegetation required cutting and poisoning of the trees. An effective method for killing the root systems of shrubs was not found.

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BASIC DATA

TABLE 8.—*Water and meteorological*

Standard week		Period	Total streamflow (acre-feet)			Changes in water level (feet)					
						Transpiration wells			Observation wells		
Start	End		Gage 1	Gage 2	Gage 3	1	2	3	1	2	3
1959											
Jan. 1	7	1	------	------	------	+0.13	+0.04	+0.10	------	------	------
8	14	2	22.22	23.42	24.22	−.13	−.12	−.22	------	------	------
15	21	3	21.02	------	------	−.04	−.01	−.04	------	------	------
22	28	4	21.32	19.66	23.64	.00	−.04	−.07	------	------	------
29	Feb. 4	5	20.43	------	------	+.03	+.05	−.05	------	------	------
Feb. 5	11	6	------	------	------	+.07	+.04	−.02	------	------	------
12	18	7	------	------	------	−.04	−.06	−.14	------	------	------
19	25	8	------	------	------	−.03	−.05	−.04	------	------	------
26	Mar. 4	9	20.55	22.67	22.75	−.06	−.03	.00	------	------	------
Mar. 5	11	10	------	21.10	20.21	−.01	−.01	−.01	------	------	------
12	18	11	------	19.24	17.95	.00	−.01	.00	------	------	------
19	25	12	------	19.36	17.61	−.01	−.02	−.01	------	------	------
26	Apr. 1	13	18.33	20.35	17.40	−.03	.00	−.01	------	------	------
Apr. 2	8	14	18.49	20.07	17.10	−.03	−.02	−.01	------	------	------
9	15	15	18.72	18.12	16.03	−.05	−.01	−.02	------	------	------
16	22	16	18.96	16.74	16.22	−.01	−.02	−.02	------	------	------
23	29	17	------	------	------	−.04	−.01	.00	------	------	------
30	May 6	18	18.55	16.46	14.68	+.02	−.01	−.02	------	------	------
May 7	13	19	14.08	14.92	13.75	------	−.02	−.02	------	------	------
14	20	20	13.53	14.24	12.12	------	------	------	------	------	------
21	27	21	15.91	14.92	12.14	------	------	------	------	------	------
28	June 3	22	15.95	12.42	10.18	------	------	------	------	------	------
June 4	10	23	13.45	9.96	7.34	------	------	−.06	------	------	------
11	17	24	12.61	9.26	5.24	−.04	.00	−.03	------	------	------
18	24	25	13.27	10.51	6.13	−.01	−.01	−.02	------	------	------
25	July 1	26	11.86	8.64	5.51	+.02	+.04	+.07	------	------	------
July 2	8	27	11.56	7.36	3.83	−.07	−.02	−.09	------	------	------
9	15	28	10.71	6.86	2.42	−.01	−.01	+.03	------	------	------
16	22	29	12.06	7.43	------	+.03	+.03	+.08	------	------	------
23	29	30	12.44	------	------	−.02	.00	−.02	------	------	------
30	Aug. 5	31	------	------	------	+.26	+.28	+.53	------	------	------
Aug. 6	12	32	------	------	------	+.35	+.18	+.05	------	------	------
13	19	33	------	------	------	−.08	−.02	−.01	------	------	------
20	26	34	------	------	------	−.30	−.24	−.16	------	------	------
27	Sept. 2	35	------	------	7.67	−.17	−.07	−.03	------	------	------
Sept. 3	9	36	18.09	------	5.53	−.03	−.01	−.01	------	------	------
10	16	37	------	------	------	+.30	+.14	−.13	------	------	------
17	23	38	17.57	12.47	12.61	−.18	------	−.01	------	------	------
24	30	39	------	10.72	12.49	−.02	------	+.01	------	------	------
Oct. 1	7	40	------	------	------	+.01	+.01	+.04	------	------	------
8	14	41	16.60	------	13.27	−.05	−.02	.00	------	------	------
15	21	42	18.45	15.39	13.07	------	------	------	------	------	------
22	28	43	21.80	16.01	13.65	------	------	------	------	------	------
29	Nov. 4	44	------	------	------	+.15	+.19	+.09	------	------	------
Nov. 5	11	45	14.96	17.35	18.78	−.13	−.06	−.02	------	------	------
12	18	46	15.50	17.81	18.58	+.03	+.03	+.02	------	------	------
19	25	47	15.65	19.00	18.33	+.01	.00	+.01	------	------	------
26	Dec. 2	48	16.09	18.35	18.13	.00	+.01	+.01	------	------	------
Dec. 3	9	49	17.71	------	------	+.06	.00	+.01	------	------	------
10	16	50	17.99	------	------	------	------	------	------	------	------
17	23	51	17.32	------	------	------	------	------	------	------	------
24	30	52	------	------	------	−.04	------	−.05	------	------	------
31	Jan. 6	53	------	------	------	------	------	------	------	------	------
1960											
Jan. 7	13	54	------	------	------	------	------	------	------	------	------
14	20	55	18.74	------	------	------	------	------	------	------	------
21	27	56	------	------	------	------	------	------	------	------	------
28	Feb. 3	57	19.99	------	------	−.04	------	------	------	------	------
Feb. 4	10	58	20.35	------	------	.00	−.03	+.03	------	------	------
11	17	59	19.04	19.68	------	−.04	------	−.04	------	------	------
18	24	60	18.92	------	------	.00	------	------	------	------	------
25	Mar. 2	61	------	------	------	+.39	+.30	------	------	------	------
Mar. 3	9	62	------	22.21	------	−.37	−.32	−.30	------	------	------
10	16	63	------	------	------	−.02	−.01	.00	------	------	------
17	23	64	------	------	------	+.03	+.05	−.02	−.02	------	------
24	30	65	------	------	------	−.06	−.06	−.07	−.02	------	------
31	Apr. 6	66	19.76	14.34	16.32	−.06	−.06	------	−.02	−.01	------
Apr. 7	13	67	------	------	------	−.03	−.01	------	.00	+.02	------
14	20	68	20.19	17.38	14.30	−.06	−.03	−.02	.00	−.04	------
21	27	69	------	------	------	+.08	+.02	+.03	.00	−.12	------
28	May 4	70	------	------	------	−.04	−.01	+.01	+.01	−.07	------

data for standard-week periods

Precipitation (inches)			Average weekly values of—							
Rain gages			Air temperature (°F)	Water temperature (° F)			Relative humidity (percent)	Solar radiation (g-cal cm^{-2} day^{-1})	Pan evaporation (inches)	
1	2	3		Gage 1	Gage 3	Well T-1			Pan 1	Pan 2
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0.05	------	------	76	57	59	-------	27	634	------	-------
.05	------	0.15	75	71	71	-------	41	----------	------	-------
-------	------	------	77	72	69	-------	40	651	------	-------
-------	------	------	78	74	70	-------	42	682	------	-------
-------	------	------	80	74	72	-------	32	654	------	-------
.20	0.26	.36	76	76	74	-------	52	563	------	-------
.25	.65	.12	78	75	74	-------	47	542	------	-------
.48	.38	.71	74	75	72	-------	66	438	------	-------
.43	1.62	1.35	74	71	71	-------	63	469	------	-------
1.38	1.72	1.49	78	67	-------	-------	62	559	------	-------
.12	.08	------	71	-------	-------	-------	63	497	------	-------
-------	------	.26	73	-------	68	-------	46	593	------	-------
-------	------	------	72	70	66	-------	----------	581	------	-------
1.37	1.14	1.07	65	68	63	-------	65	356	------	-------
-------	------	------	64	64	59	-------	52	487	------	-------
-------	------	------	62	62	57	-------	44	458	------	-------
.36	.36	.40	55	60	53	-------	51	381	------	-------
-------	------	------	67	61	55	-------	40	396	------	-------
-------	------	------	----------	61	55	-------	----------	395	------	-------
-------	------	------	----------	62	55	-------	----------	----------	------	-------
1.38	1.02	1.71	47	54	45	-------	----------	173	------	-------
-------	------	------	54	53	44	-------	34	326	------	-------
-------	------	------	51	54	45	-------	58	----------	------	-------
-------	------	------	49	54	42	-------	43	----------	------	-------
-------	.57	------	49	52	38	-------	27	----------	------	-------
.33	.38	.35	46	51	37	-------	----------	----------	------	-------
-------	.23	.15	----------	51	36	-------	----------	----------	------	-------
-------	.40	.45	----------	53	38	-------	----------	120	------	-------
-------	.65	.69	----------	49	34	-------	----------	152	------	-------
-------	.28	.33	----------	47	26	-------	----------	----------	------	-------
-------	.51	------	----------	49	33	-------	----------	----------	------	-------
-------	.63	------	----------	48	29	-------	----------	----------	------	-------
-------	------	------	----------	53	36	-------	----------	----------	------	-------
-------	.22	.25	----------	52	39	-------	----------	----------	------	-------
.15	.08	------	----------	52	37	-------	----------	287	------	-------
.03	.12	.14	----------	51	37	-------	----------	355	------	-------
.08	.10	.18	----------	50	35	-------	----------	326	------	-------
1.31	1.47	1.55	----------	50	36	-------	----------	----------	------	-------
-------	------	------	----------	56	49	-------	----------	----------	------	-------
-------	------	------	----------	53	52	-------	----------	476	------	-------
.26	.33	.25	54	58	-------	-------	33	457	------	-------
.15	.20	.18	55	60	57	-------	58	----------	------	-------
-------	------	------	60	60	58	-------	40	----------	------	-------
-------	------	------	62	61	58	-------	40	543	------	-------
-------	.18	.22	59	60	58	-------	35	613	------	-------
.11	.14	.10	52	58	56	-------	48	525	------	-------
.31	.39	.38	55	59	57	-------	55	----------	------	-------

TABLE 8.—*Water and meteorological data*

Standard week		Period	Total streamflow (acre-feet)			Changes in water level (feet)					
						Transpiration wells			Observation wells		
Start	End		Gage 1	Gage 2	Gage 3	1	2	3	1	2	3
1960—Con.											
May 5	11	71	------	------	------	−0.14	−0.06	−0.09	−0.02	−0.07	------
12	18	72	15.49	13.11	9.96	−.02	+.01	.00	−.02	−.04	------
19	25	73	15.57	15.24	9.84	+.01	−.01	.00	−.02	−.04	------
26	June 1	74	16.46	13.27	10.27	------	------	------	−.02	−.03	------
June 2	8	75	------	------	------	------	------	------	−.02	−.04	------
9	15	76	------	10.71	------	------	------	------	−.03	−.03	------
16	22	77	13.07	8.20	4.96	−.01	------	−.05	−.05	−.03	------
23	29	78	12.91	------	4.07	------	------	+.07	−.03	−.03	------
30	July 6	79	13.21	------	4.42	------	------	------	.00	.00	−0.06
July 7	13	80	12.97	7.68	5.12	+.04	------	------	−.01	−.10	−.04
14	20	81	12.46	8.06	------	−.06	−.01	+.09	−.01	−.06	−.04
21	27	82	------	------	------	−.05	−.05	−.04	−.01	−.06	−.06
28	Aug. 3	83	------	7.29	------	−.14	−.07	−.12	−.03	−.06	−.03
Aug. 4	10	84	------	------	------	+.05	+.04	+.10	−.02	−.10	−.03
11	17	85	------	------	------	−.06	−.01	−.10	−.04	−.10	−.04
18	24	86	------	------	------	+.08	+.01	+.07	+.02	−.12	−.01
25	31	87	------	8.67	------	−.06	+.05	+.03	+.03	−.08	.00
Sept. 1	7	88	------	------	------	+.37	+.10	+.09	+.07	+.05	+.01
8	14	89	------	------	------	−.29	−.07	−.07	+.02	+.03	+.02
15	21	90	13.29	9.51	------	------	−.03	+.01	−.04	+.03	+.02
22	28	91	12.99	9.31	7.22	------	−.03	+.05	−.04	−.02	+.01
29	Oct. 5	92	13.76	10.93	9.34	+.04	+.03	+.06	−.01	−.11	.00
Oct. 6	12	93	14.80	------	------	------	+.06	+.06	+.05	−.10	−.01
13	19	94	13.71	12.83	------	------	------	------	+.04	−.05	−.02
20	26	95	12.71	10.02	14.04	------	------	------	+.01	−.03	.00
27	Nov. 2	96	13.01	10.35	14.54	------	------	------	+.01	−.04	+.01
Nov. 3	9	97	------	------	------	------	------	------	+.02	−.04	.00
10	16	98	13.64	16.32	------	−.03	.00	------	+.01	−.04	+.02
17	23	99	13.55	15.27	15.53	−.02	------	.00	+.01	−.04	.00
24	30	100	------	------	------	+.05	------	−.02	.00	+.02	+.04
Dec. 1	7	101	14.98	------	------	−.01	+.01	−.04	−.01	+.06	+.02
8	14	102	17.47	------	------	+.02	+.01	−.06	.00	+.09	−.03
15	21	103	19.16	------	------	------	------	------	−.01	+.11	−.01
22	28	104	19.56	------	15.81	------	------	------	−.02	+.11	+.01
29	Jan. 4	105	------	------	------	------	------	------	−.03	+.10	−.02
1961											
Jan. 5	11	106	------	------	------	------	------	------	−.03	+.04	−.05
12	18	107	18.76	------	------	------	------	------	−.02	+.01	−.02
19	25	108	18.68	------	------	------	------	------	+.02	−.03	−.02
26	Feb. 1	109	------	------	------	------	------	------	.00	−.03	−.02
Feb. 2	8	110	18.49	------	------	------	------	------	+.01	−.02	−.02
9	15	111	------	13.23	17.18	−.01	.00	−.02	+.03	−.02	−.02
16	22	112	17.41	13.17	16.44	+.01	+.02	+.05	+.02	−.02	−.01
23	Mar. 1	113	------	13.37	------	.00	−.01	------	+.02	−.01	−.01
Mar. 2	8	114	19.95	------	15.91	.00	−.03	------	+.01	−.02	−.01
9	15	115	18.80	16.62	16.09	+.01	+.06	+.01	+.03	−.02	−.01
16	22	116	18.09	19.14	16.70	.00	−.02	+.01	.00	−.03	+.02
23	29	117	------	------	------	+.03	+.01	+.02	.00	−.06	.00
30	Apr. 5	118	------	16.78	------	−.04	−.01	−.01	+.01	−.06	+.01
Apr. 6	12	119	------	------	------	.00	−.01	------	------	−.05	+.01
13	19	120	16.36	14.02	------	−.01	−.01	------	−.07	−.06	+.02
20	26	121	16.22	13.90	14.94	+.01	+.01	+.01	+.07	−.06	+.01
27	May 3	122	16.82	14.04	14.50	−.03	.00	.00	+.01	−.06	+.03
May 4	10	123	16.05	14.32	13.98	------	−.01	.00	−.02	−.12	+.02
11	17	124	14.96	12.65	12.02	------	−.01	−.02	−.05	−.09	+.02
18	24	125	14.12	10.87	10.02	−.01	.00	------	−.04	−.11	+.01
25	31	126	14.20	12.06	9.30	.00	+.01	------	−.03	−.12	+.01
June 1	7	127	14.08	10.75	8.99	+.01	−.02	.00	−.03	−.18	+.01
8	14	128	12.16	7.78	6.57	−.03	−.03	------	−.05	−.19	−.01
15	21	129	10.95	6.13	4.78	−.02	−.01	------	−.02	dry	−.03
22	28	130	11.15	------	3.99	−.03	−.02	------	−.04	------	−.05
29	July 5	131	------	------	------	+.05	+.01	------	------	------	------
July 6	12	132	10.12	4.56	3.35	−.08	------	------	------	------	------
13	19	133	9.66	4.58	2.98	------	------	------	------	------	------
20	26	134	10.21	4.64	3.07	------	------	------	------	------	------
27	Aug. 2	135	------	------	------	------	------	------	------	------	------
Aug. 3	9	136	------	------	------	------	------	------	------	------	------
10	16	137	------	------	------	------	------	------	------	------	------
17	23	138	------	------	------	------	------	------	------	------	------
24	30	139	------	------	------	------	------	------	------	------	------
31	Sept. 6	140	14.42	------	8.85	------	------	------	------	------	------

for standard-week periods—Continued

Precipitation (inches): Rain gages 1	Precipitation (inches): Rain gages 2	Precipitation (inches): Rain gages 3	Average weekly values of—: Air temperature (°F)	Water temperature (° F): Gage 1	Water temperature (° F): Gage 3	Water temperature (° F): Well T-1	Relative humidity (percent)	Solar radiation (g-cal cm^{-2} day^{-1})	Pan evaporation (inches): Pan 1	Pan evaporation (inches): Pan 2
--------	------	------	70	64	62	--------	40	645	------	-------
--------	------	------	69	--------	64	--------	38	639	------	-------
--------	------	------	61	--------	--------	--------	23	674	------	-------
--------	------	------	74	--------	--------	--------	22	----------	------	-------
--------	------	------	72	--------	--------	--------	40	----------	------	-------
--------	------	------	74	69	72	--------	26	628	------	-------
--------	------	------	79	70	72	--------	----------	658	------	-------
--------	------	------	78	70	70	--------	22	693	------	-------
--------	------	------	81	--------	--------	--------	29	662	------	-------
--------	------	------	80	70	72	--------	30	632	------	-------
0.12	0.15	0.19	82	--------	73	--------	26	516	------	-------
.60	.34	.21	80	--------	78	--------	50	546	------	-------
--------	------	------	81	74	76	--------	37	572	------	-------
.28	.77	1.01	80	75	77	--------	51	570	------	-------
.05	------	------	83	75	78	--------	40	587	------	-------
.52	.50	.67	77	72	74	--------	42	531	------	-------
.20	.05	.25	76	68	71	--------	38	532	------	-------
1.89	1.25	.91	72	69	74	--------	60	----------	------	-------
--------	.32	.14	77	73	--------	--------	48	----------	------	-------
--------	------	------	73	65	69	--------	37	457	------	-------
--------	------	------	73	62	66	--------	20	507	------	-------
--------	------	.05	68	60	65	--------	38	478	------	-------
.49	.76	.97	61	58	60	--------	56	345	------	-------
.39	.42	.49	54	55	56	--------	62	251	------	-------
--------	------	------	62	59	60	--------	38	308	------	-------
--------	------	------	57	54	56	--------	33	----------	------	-------
1.03	------	------	----------	52	52	--------	----------	----------	------	-------
--------	------	------	----------	50	--------	--------	52	292	------	-------
--------	------	------	----------	48	46	--------	----------	----------	------	-------
--------	------	------	----------	--------	44	--------	----------	----------	------	-------
--------	------	.05	39	45	39	--------	60	181	------	-------
--------	.08	.05	40	46	33	--------	64	223	------	-------
--------	------	------	47	49	36	--------	46	210	------	-------
--------	------	------	49	49	43	--------	41	212	------	-------
--------	------	------	43	48	39	--------	38	233	------	-------
--------	------	------	48	48	41	--------	28	267	------	-------
--------	------	------	51	48	40	--------	28	276	------	-------
--------	------	------	----------	49	41	--------	----------	227	------	-------
.48	.68	.85	----------	49	42	--------	----------	206	------	-------
--------	------	------	----------	50	43	--------	----------	340	------	-------
--------	------	------	----------	51	47	--------	----------	297	------	-------
--------	------	------	45	51	44	--------	43	----------	------	-------
--------	------	------	44	52	45	--------	24	414	------	-------
.12	.10	.10	43	51	45	--------	46	334	------	-------
--------	------	.08	51	52	49	--------	26	480	------	-------
--------	.10	.08	48	55	51	--------	47	448	------	-------
.38	.60	.47	46	53	49	--------	54	367	------	-------
--------	------	------	58	58	56	--------	35	552	------	-------
.43	.33	.33	51	56	54	--------	44	483	------	-------
--------	------	------	61	58	58	--------	24	----------	------	-------
--------	------	------	51	58	55	--------	----------	----------	------	-------
--------	------	------	62	61	61	--------	----------	644	------	-------
--------	------	------	62	59	60	--------	31	609	------	-------
--------	------	------	60	62	60	--------	28	670	------	-------
--------	------	------	65	62	64	--------	23	681	------	-------
--------	------	------	63	64	62	--------	28	620	------	-------
--------	------	------	67	63	64	--------	28	684	------	-------
--------	------	------	76	66	67	--------	20	685	------	-------
--------	------	------	85	70	73	--------	26	617	------	-------
--------	------	------	85	71	--------	--------	29	562	------	-------
.15	.14	.14	79	70	--------	--------	38	528	------	-------
--------	------	------	85	70	74	--------	19	624	------	-------
--------	.08	------	86	71	--------	--------	23	573	------	-------
--------	------	------	83	73	75	--------	35	----------	------	-------
.07	.25	.70	80	--------	78	--------	48	----------	------	-------
.29	1.46	------	79	--------	78	--------	46	----------	------	-------
.56	1.69	1.78	75	--------	76	--------	----------	438	------	-------
1.30	1.73	------	79	--------	--------	--------	----------	----------	------	-------
--------	------	------	76	--------	74	--------	----------	----------	------	-------
.10	------	------	70	--------	--------	--------	----------	----------	------	-------

TABLE 8.—*Water and meteorological data*

Standard week		Period	Total streamflow (acre-feet)			Changes in water level (feet)					
						Transpiration wells			Observation wells		
Start	End		Gage 1	Gage 2	Gage 3	1	2	3	1	2	3
1961—Con.											
Sept. 7	13	141	------	------	------	------	------	------	------	------	------
14	20	142	------	------	------	------	------	------	------	------	------
21	27	143	15.39	------	10.59	------	------	------	------	------	------
28	Oct. 4	144	14.06	------	10.17	------	−0.07	−0.11	------	------	------
Oct. 5	11	145	------	------	------	------	−.05	−.08	------	------	------
12	18	146	15.10	------	13.26	------	−.05	−.08	------	------	------
19	25	147	------	------	13.54	------	−.01	−.12	------	------	------
26	Nov. 1	148	------	------	------	------	+.03	−.02	------	------	------
Nov. 2	8	149	------	------	17.58	------	−.02	−.01	------	------	------
9	15	150	------	------	18.94	------	.00	.00	------	------	------
16	22	151	------	------	------	------	+.01	+.01	------	------	------
23	29	152	16.98	------	------	------	−.01	−.07	------	------	------
30	Dec. 6	153	------	------	------	------	.00	−.07	------	------	------
Dec. 7	13	154	------	------	------	------	+.03	+.03	------	------	------
14	20	155	------	------	------	------	−.02	−.02	------	------	------
21	27	156	------	------	------	+0.01	−.03	−.03	------	------	------
28	Jan. 3	157	------	------	15.82	−.02	.00	−.01	------	------	------
1962											
Jan. 4	10	158	------	------	------	+.01	.00	−.01	------	------	------
11	17	159	------	------	------	.00	−.02	+.03	------	------	+0.01
18	24	160	------	------	------	------	−.04	−.01	------	------	+.04
25	31	161	------	------	------	------	.00	+.01	------	------	−.03
Feb. 1	7	162	------	------	------	−.01	+.03	.00	------	------	−.05
8	14	163	------	------	------	------	------	------	------	------	+.06
15	21	164	------	------	------	------	------	------	------	------	−.01
22	28	165	------	------	------	−.05	−.02	------	------	------	−.11
Mar. 1	7	166	------	------	------	.00	+.03	.00	------	------	−.01
8	14	167	------	------	------	+.03	−.05	.00	------	------	+.09
15	21	168	17.90	------	------	+.03	−.01	.00	------	------	+.09
22	28	169	------	------	------	------	.00	.00	------	------	+.03
29	Apr. 4	170	18.82	20.11	17.76	------	------	------	------	------	−.06
Apr. 5	11	171	19.02	20.24	15.94	------	------	------	------	------	+.10
12	18	172	18.30	16.58	13.78	+.01	.00	−.02	------	------	−.30
19	25	173	18.24	16.24	13.07	+.02	+.03	+.01	------	------	+.02
26	May 2	174	16.74	15.64	10.89	+.02	−.01	−.01	------	------	+.30
May 3	9	175	15.26	12.70	9.23	------	+.02	−.01	------	------	+.08
10	16	176	15.38	------	10.11	------	−.01	------	−0.08	------	−.01
17	23	177	15.40	------	9.78	−.06	.00	------	−.12	------	−.01
24	30	178	14.88	11.76	9.59	−.01	−.05	------	−.11	------	.00
31	June 6	179	14.60	10.17	8.15	------	------	------	−.07	------	.00
June 7	13	180	------	8.93	7.07	------	------	------	−.08	------	−.02
14	20	181	13.02	9.49	7.85	.00	−.02	+.04	−.21	------	−.02
21	27	182	11.27	6.33	4.62	.00	−.03	−.03	−.21	------	−.07
28	July 4	183	------	------	------	−.04	+.02	------	−.15	------	−.07
July 5	11	184	11.45	5.79	3.65	−.03	−.03	------	−.21	------	−.10
12	18	185	10.83	5.45	3.16	−.03	.00	−.08	−.03	------	−.10
19	25	186	10.97	------	------	------	------	------	−.04	------	−.08
26	Aug. 1	187	------	------	------	------	------	------	−.05	------	−.07
Aug. 2	8	188	------	------	------	------	−.04	−.05	−.07	------	−.07
9	15	189	------	------	2.88	.00	−.01	+.03	------	------	------
16	22	190	------	------	------	------	------	------	------	------	------
23	29	191	11.43	5.71	3.64	------	.00	------	------	------	------
30	Sept. 5	192	11.25	5.79	3.87	------	------	------	------	------	------
Sept. 6	12	193	11.77	7.07	------	------	------	------	------	------	------
13	19	194	11.27	6.83	4.91	------	------	------	------	------	------
20	26	195	------	------	------	------	------	------	------	------	------
27	Oct. 3	196	------	------	------	------	------	------	------	------	------
Oct. 4	10	197	------	------	------	------	------	------	------	------	------
11	17	198	------	------	------	------	------	------	------	------	------
18	24	199	------	------	------	------	------	------	------	------	------
25	31	200	------	------	------	------	------	------	------	------	------
Nov. 1	7	201	------	------	12.57	+.10	------	------	------	------	------
8	14	202	------	------	------	------	------	------	------	------	------
15	21	203	------	------	13.10	------	------	------	------	------	------
22	28	204	------	------	12.85	------	------	------	------	------	------
29	Dec. 5	205	------	------	13.92	------	------	------	------	------	------
Dec. 6	12	206	------	------	14.76	------	------	------	------	------	------
13	19	207	------	------	------	------	------	------	------	------	------
20	26	208	------	------	------	------	------	------	------	------	------
27	Jan. 2	209	------	------	------	------	------	------	------	------	------

for standard-week periods—Continued

Precipitation (inches)			Average weekly values of—							
Rain gages			Air temperature (°F)	Water temperature (° F)			Relative humidity (percent)	Solar radiation (g-cal cm^{-2} day^{-1})	Pan evaporation (inches)	
1	2	3		Gage 1	Gage 3	Well T-1			Pan 1	Pan 2
----	----	----	71	----	67	----	----	----	----	----
0.93	0.20	0.84	66	----	68	----	----	----	----	----
----	----	----	68	----	66	----	----	478	----	----
----	----	----	70	----	64	----	----	488	----	----
----	----	.03	60	----	56	----	----	412	----	----
----	----	----	69	----	59	----	----	403	----	----
----	----	----	61	----	54	----	----	354	----	----
.46	.12	----	46	----	48	----	----	275	----	----
----	----	----	53	----	48	----	----	314	----	----
----	----	----	50	----	47	----	----	318	----	----
.33	----	.40	42	----	41	----	----	274	----	----
----	----	.07	51	----	46	----	----	178	----	----
.39	----	.22	49	----	44	----	----	250	----	----
.28	----	.40	35	----	36	----	----	200	----	----
.38	----	.40	38	----	39	----	----	129	----	----
----	----	----	46	----	40	----	----	235	----	----
----	----	----	46	----	----	----	----	210	----	----
----	----	----	46	----	41	----	----	257	----	----
.16	----	.10	----	----	----	----	----	----	----	----
1.09	.95	1.28	----	----	----	----	----	----	----	----
.09	.17	.19	----	----	42	----	----	----	----	----
.25	----	.31	----	----	45	----	----	----	----	----
1.17	.96	1.69	----	----	47	----	----	----	----	----
.76	.17	.74	----	----	44	----	----	----	----	----
.29	----	.32	43	----	----	----	----	----	----	----
----	----	.15	51	----	----	----	62	387	----	----
.10	----	.22	41	----	----	----	53	451	----	----
.08	----	.06	46	----	48	----	38	423	----	----
.10	----	.10	51	----	51	----	27	472	----	----
----	----	----	51	----	54	----	27	534	----	----
----	----	----	58	----	58	----	20	----	----	----
----	----	----	67	----	----	----	----	----	----	----
----	----	----	63	----	----	----	26	----	----	----
----	----	----	----	----	59	----	----	----	----	----
----	----	----	66	----	62	----	25	----	----	----
----	----	----	----	----	59	----	----	586	----	----
----	----	----	----	----	62	----	----	648	----	----
----	----	----	----	----	62	----	----	628	----	----
----	----	----	68	----	----	----	----	597	----	----
----	----	----	71	----	66	----	16	663	----	----
----	----	----	72	----	66	----	24	621	----	----
----	----	.09	80	----	71	----	----	643	----	----
----	----	.41	81	----	73	----	30	580	----	----
----	----	----	81	----	72	----	24	623	----	----
----	----	----	75	----	70	----	20	632	----	----
.18	----	----	81	----	70	----	32	534	----	----
.57	----	----	80	----	----	----	33	549	----	----
----	----	.22	----	----	72	----	----	542	----	----
----	----	----	----	----	73	----	----	----	----	----
.10	----	----	----	----	76	----	----	----	----	----
----	----	----	----	----	76	----	----	561	----	----
----	----	----	----	----	70	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	73	----	----	----	----	----
.05	----	----	----	----	71	----	----	----	----	----
.90	----	----	----	----	67	----	----	----	----	----
----	----	----	----	----	62	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	54	----	----	----	----	----
----	----	----	----	----	56	----	----	328	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----
----	----	----	----	----	48	----	----	----	----	----
----	----	----	----	----	46	----	----	234	----	----
----	----	.70	----	----	45	----	----	----	----	----
----	----	----	----	----	40	----	----	----	----	----
----	----	----	----	----	----	----	----	----	----	----

TABLE 8.—*Water and meteorological data*

Standard week		Period	Total streamflow (acre-feet)			Changes in water level (feet)					
						Transpiration wells			Observation wells		
Start	End		Gage 1	Gage 2	Gage 3	1	2	3	1	2	3
1963											
Jan. 3	9	210	------	------	------	------	------	dry	------	------	------
10	16	211	------	------	------	------	------	dry	------	------	------
17	23	212	------	------	------	------	------	dry	------	------	------
24	30	213	------	------	------	------	------	dry	------	------	------
31	Feb. 6	214	17.22	------	15.82	−0.01	------	dry	------	------	------
Feb. 7	13	215	------	------	------	------	------	dry	------	------	------
14	20	216	------	------	------	------	------	dry	------	------	------
21	27	217	16.30	------	16.44	------	------	dry	------	------	------
28	Mar. 6	218	------	------	------	−.04	0.16	dry	−0.02	------	------
Mar. 7	13	219	16.56	------	------	------	------	dry	−.02	------	0.02
14	20	220	------	------	------	------	------	dry	−.01	------	−.02
21	27	221	16.26	------	------	−.11	------	dry	−.01	------	−.02
28	Apr. 3	222	17.14	------	15.22	------	------	dry	−.02	------	−.02
Apr. 4	10	223	16.74	17.48	14.00	------	------	dry	.00	------	−.03
11	17	224	------	------	------	------	−.02	dry	−.02	------	+.01
18	24	225	16.60	------	------	------	.00	dry	−.03	------	+.03
25	May 1	226	------	------	------	------	−.01	dry	−.01	------	+.03
May 2	8	227	14.38	12.02	10.29	.00	.00	dry	+.03	------	------
9	15	228	------	11.15	------	−.02	.00	dry	−.08	------	------
16	22	229	13.16	10.11	8.25	.00	−.01	dry	+.06	------	------
23	29	230	12.44	8.59	7.69	.00	.00	dry	−.01	------	.00
30	June 5	231	12.98	8.19	7.17	.00	+.01	dry	.00	------	−.02
June 6	12	232	------	8.17	7.05	+.02	.00	dry	.00	------	+.01
13	19	233	11.59	6.95	5.43	−.03	−.02	dry	−.07	------	−.03
20	26	234	10.23	4.99	3.64	−.02	−.02	dry	−.02	------	−.02
27	July 3	235	9.57	4.49	3.18	−.01	−.01	dry	−.02	------	−.01
July 4	10	236	9.55	4.49	------	+.01	+.05	dry	−.02	------	−.03
11	17	237	8.95	3.37	2.23	−.03	−.05	dry	.00	------	.00
18	24	238	------	3.65	2.14	.00	.00	dry	------	------	------
25	31	239	8.05	2.92	1.38	.00	.00	dry	------	------	------
Aug. 1	7	240	------	------	------	------	------	dry	------	------	------

for standard-week periods—Continued

Precipitation (inches)			Average weekly values of—							
Rain gages			Air temperature (°F)	Water temperature (° F)			Relative humidity (percent)	Solar radiation (g-cal cm^{-2} day^{-1})	Pan evaporation (inches)	
1	2	3		Gage 1	Gage 3	Well T-1			Pan 1	Pan 2
--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	53	--	--	--	--	--
0.60	0.24	--	--	--	48	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	50	--	--	400	--	--
--	--	--	--	--	46	--	--	--	--	--
.09	--	--	43	--	--	--	--	--	--	--
1.42	.26	1.17	42	--	44	--	--	329	--	--
--	--	--	57	--	54	--	30	394	--	--
--	--	--	52	--	54	--	43	426	--	--
--	--	--	56	--	55	--	36	420	--	--
.08	--	.09	54	--	52	56	42	455	--	--
.11	--	.02	47	--	54	55	36	547	--	1.00
--	--	.43	56	--	58	55	43	506	--	--
.32	--	--	68	--	57	58	26	558	--	2.93
--	--	--	64	--	62	61	25	595	--	2.57
--	--	--	72	--	65	63	19	578	--	2.87
--	--	--	66	--	63	65	21	619	--	2.83
--	--	--	68	--	65	66	34	575	2.56	2.79
--	--	--	64	--	61	66	30	539	2.91	2.78
--	--	--	75	--	70	67	29	605	3.14	2.84
--	--	--	74	--	--	70	18	633	4.10	3.91
--	--	--	76	--	--	71	14	635	3.50	3.41
.11	--	--	81	--	--	73	28	548	--	3.18
--	--	--	82	--	--	74	28	575	--	--
--	--	--	85	--	--	76	36	574	--	--
--	--	.15	81	--	--	77	30	601	--	--
--	1.32	.80	76	--	--	76	--	421	--	--

TABLE 9.—*Mean daily flow, in acre-feet*

GAGE 1

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1959						
1	3.27	2.77	3.07	2.53	2.21	2.26	1.78	------	2.46	------	2.54	2.38
2	3.27	2.97	3.07	2.61	2.46	2.17	1.74	------	2.88	2.38	------	2.38
3	3.27	2.98	3.07	2.62	2.88	2.10	1.70	------	2.78	2.38	------	2.38
4	3.27	2.98	2.70	2.62	2.98	2.07	1.70	2.06	2.54	2.38	2.02	2.46
5	3.27	2.98	2.54	2.62	2.98	1.97	1.63	1.86	2.54	2.32	2.02	2.46
6	------	3.17	2.26	2.62	2.78	1.97	1.61	1.96	2.54	2.32	2.10	2.46
7	2.98	3.17	2.54	2.70	2.26	1.90	1.59	1.96	2.54	2.26	2.10	2.46
8	3.17	------	2.54	2.70	2.16	1.90	1.59	------	2.54	2.22	2.02	2.61
9	3.17	------	------	2.70	2.16	1.82	1.55	------	2.61	2.32	2.22	2.88
10	3.17	3.27	------	2.70	2.02	1.82	1.59	------	------	2.38	2.26	3.07
11	3.17	3.27	------	2.70	1.82	1.82	1.59	------	------	2.38	2.24	2.62
12	3.18	------	------	2.70	1.90	1.82	1.59	------	------	2.38	2.22	2.54
13	3.18	3.61	2.88	2.70	1.76	1.83	1.51	------	------	2.46	2.22	2.54
14	3.18	3.37	2.88	2.70	1.92	1.83	1.47	------	------	2.46	2.22	2.46
15	2.98	3.37	2.88	2.52	1.92	1.78	1.41	------	------	2.46	2.22	2.38
16	2.98	3.61	2.98	2.54	1.92	1.78	1.55	------	------	2.46	2.18	2.38
17	2.77	3.37	2.78	2.60	1.92	1.75	1.78	------	2.54	2.46	2.22	2.38
18	2.98	3.17	2.70	2.78	1.92	1.86	1.82	------	2.62	1.61	2.22	2.38
19	3.17	3.17	----	2.78	2.00	2.02	1.78	------	2.54	2.78	2.22	2.38
20	3.07	2.98	2.70	2.78	1.93	2.06	1.67	------	2.38	2.70	2.22	2.38
21	3.07	------	2.70	2.78	2.16	2.02	1.70	------	2.54	2.98	2.22	2.88
22	3.07	3.49	2.70	2.70	2.26	1.90	1.76	------	2.70	5.01	2.22	2.46
23	3.07	2.88	2.70	2.70	2.22	1.73	1.67	------	2.25	3.93	2.22	2.46
24	2.88	2.88	2.70	2.54	2.16	1.68	1.73	------	2.62	2.54	2.22	-------
25	3.17	2.88	2.78	2.70	2.26	1.63	1.78	------	2.54	2.54	2.33	-------
26	3.17	2.88	2.70	------	2.39	1.63	1.78	2.38	2.54	2.54	2.22	-------
27	2.98	2.88	2.62	2.38	2.46	1.68	1.78	2.26	2.38	2.54	2.26	2.46
28	2.98	2.88	2.54	2.38	2.46	1.70	1.83	2.26	2.38	2.70	2.26	2.38
29	2.98	------	2.62	2.26	2.32	1.72	1.87	2.26	2.54	2.88	2.26	2.26
30	2.98	------	2.70	2.26	2.26	1.72	------	2.26	------	3.75	2.33	2.22
31	2.77	------	2.62	------	2.38	------	------	2.22	------	2.54	------	2.46
						1960						
1	2.22	2.96	------	2.76	2.58	2.38	1.90	------	------	1.96	1.88	2.03
2	------	2.88	------	2.70	2.36	2.38	1.89	------	------	1.99	1.88	2.03
3	------	2.54	------	2.86	2.40	2.48	1.85	------	------	2.02	1.88	2.10
4	------	2.70	------	2.90	------	------	1.93	------	------	2.02	2.02	2.14
5	------	2.98	------	2.86	------	------	1.89	------	------	2.00	------	2.14
6	------	3.05	------	2.90	2.30	2.60	1.94	------	------	2.18	------	2.20
7	------	2.98	------	2.86	2.26	2.36	1.91	------	------	1.96	2.06	2.34
8	2.88	2.88	------	2.94	2.22	2.26	1.90	------	------	1.98	1.98	2.36
9	2.78	2.78	------	3.01	2.22	------	1.85	1.95	------	2.18	1.96	2.46
10	2.88	2.98	------	2.98	2.16	------	1.82	------	------	2.72	1.98	2.46
11	2.98	2.78	------	2.98	2.08	------	1.87	------	1.98	1.90	1.96	2.46
12	4.15	2.70	------	------	2.00	------	1.83	2.26	1.93	1.88	1.94	2.54
13	3.27	2.78	------	3.05	2.02	------	1.79	2.23	1.92	1.83	1.96	2.58
14	2.62	2.78	------	2.97	2.18	------	1.76	2.17	1.88	2.02	1.96	2.61
15	2.78	2.78	------	2.94	2.51	1.92	1.71	2.16	1.94	2.04	1.94	2.66
16	2.86	2.61	------	2.94	2.38	1.93	1.68	2.30	1.94	1.89	1.90	2.66
17	2.62	2.61	------	2.82	2.18	1.93	1.74	2.41	1.92	2.10	1.94	2.74
18	2.62	2.62	------	2.85	2.22	1.90	1.88	2.49	1.89	1.94	1.90	2.78
19	2.62	2.97	------	2.82	2.20	1.86	1.83	2.44	1.86	1.89	1.94	2.73
20	2.62	2.77	------	2.85	2.08	1.84	1.86	2.78	1.88	1.82	1.94	2.78
21	------	2.70	------	2.74	2.14	1.84	------	3.05	1.86	1.81	1.95	2.81
22	------	2.62	------	2.78	2.14	1.77	1.81	------	1.83	1.86	1.99	2.74
23	------	2.62	------	2.82	2.20	1.78	1.82	------	1.87	1.83	1.89	2.74
24	2.98	2.62	------	2.90	2.37	1.84	1.75	------	1.87	1.80	1.88	2.74
25	2.70	2.70	2.94	2.94	2.42	1.84	1.66	2.00	1.87	1.79	1.90	2.82
26	2.70	2.62	2.90	2.90	2.34	1.85	1.69	1.99	1.85	1.80	------	2.85
27	2.88	2.62	2.94	------	2.32	1.90	1.74	1.99	1.87	1.83	----	2.82
28	2.88	2.98	2.90	2.86	2.32	1.92	1.72	2.09	1.83	1.87	1.90	2.85
29	2.88	------	2.90	2.78	2.30	1.78	1.70	2.13	1.86	1.86	1.94	2.90
30	2.88	------	2.86	2.74	2.36	1.81	1.69	2.15	1.91	1.83	1.96	2.82
31	2.97	------	2.78	------	2.42	------	------	------	------	1.86	------	2.86

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 1—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1961						
1	2.78	2.66	2.90	2.40	2.36	2.18	1.71	------	2.18	1.96	------	2.44
2	------	2.66	2.85	2.40	2.36	2.10	1.77	------	1.96	1.96	------	------
3	------	2.66	3.00	2.34	2.40	2.04	------	------	1.84	2.02	------	------
4	------	2.58	2.94	------	2.36	2.02	1.77	2.14	2.06	2.06	------	------
5	------	2.58	2.86	------	2.32	1.94	1.59	2.24	2.04	2.04	------	------
6	------	2.70	2.78	------	2.32	1.94	1.57	2.20	2.06	2.06	------	------
7	2.78	2.70	2.74	------	2.35	1.86	1.51	2.24	1.98	1.94	------	------
8	2.70	2.61	2.78	------	2.32	1.80	1.51	2.16	2.06	------	------	------
9	2.70	2.50	2.73	------	2.22	1.79	1.46	2.16	2.22	------	------	------
10	2.70	2.50	2.73	2.34	2.16	1.75	1.37	------	2.12	------	------	------
11	2.74	------	2.70	2.26	2.07	1.71	1.33	------	2.18	------	------	------
12	2.65	------	2.70	2.22	2.19	1.73	1.37	------	2.20	2.22	------	------
13	2.65	2.46	2.70	2.26	2.20	1.69	1.37	------	------	2.12	------	------
14	2.66	2.50	2.62	2.34	2.16	1.69	1.33	------	------	2.10	------	------
15	2.70	2.50	2.62	2.34	2.16	1.60	1.33	------	------	2.12	------	------
16	2.70	2.57	2.62	2.34	2.14	1.58	1.42	------	------	2.14	------	------
17	2.70	2.50	2.82	2.40	2.04	1.63	1.41	------	------	2.20	------	------
18	2.70	2.50	2.70	2.34	2.04	1.63	1.41	------	------	2.20	------	------
19	2.70	2.46	2.57	2.34	2.00	1.56	1.39	------	------	2.20	------	------
20	2.70	2.46	2.46	2.34	2.06	1.47	1.41	------	------	2.14	------	------
21	2.66	2.46	2.46	2.06	2.00	1.48	1.45	------	2.28	------	------	------
22	2.60	2.46	2.46	2.08	2.02	1.50	1.47	------	2.28	------	------	------
23	2.66	------	2.44	2.22	2.02	1.50	1.55	------	2.28	------	2.40	------
24	2.66	------	2.40	2.48	1.98	1.53	1.55	------	2.30	------	2.44	------
25	2.70	------	------	2.54	1.96	1.71	1.43	------	2.18	------	2.46	------
26	------	------	2.46	2.50	1.96	1.63	1.35	------	2.05	------	2.36	------
27	------	2.86	2.36	2.54	2.00	1.63	1.35	2.04	2.02	------	2.40	------
28	2.70	2.90	------	2.46	2.00	1.65	------	1.94	2.00	------	2.46	------
29	2.74	------	------	2.36	2.14	1.63	------	------	2.02	------	2.46	------
30	2.78	------	2.44	2.34	2.08	1.63	------	2.34	2.04	------	2.44	------
31	2.66	------	2.40	------	2.06	------	------	2.28	------	------	------	------
						1962						
1	------	------	------	2.66	2.18	2.20	------	------	1.59	------	------	2.70
2	------	------	------	2.70	2.30	2.08	------	------	1.59	------	------	2.70
3	------	------	------	2.66	2.26	2.04	1.63	1.55	1.59	------	------	2.70
4	------	------	2.82	2.74	2.22	2.02	1.67	1.47	1.61	------	------	------
5	------	------	------	2.70	2.12	2.06	1.65	1.41	1.67	------	------	------
6	------	------	------	2.66	2.12	2.00	1.57	1.47	1.71	------	------	------
7	------	------	------	2.70	2.16	1.90	1.59	1.47	1.67	------	------	------
8	------	------	------	2.74	2.18	1.86	1.59	1.51	1.67	------	------	------
9	------	------	------	2.78	2.20	1.88	1.65	1.51	1.71	------	------	------
10	------	------	------	2.74	2.14	1.88	1.69	1.43	1.71	------	------	------
11	------	------	------	2.70	2.10	------	1.71	1.39	1.69	------	------	------
12	------	------	------	2.68	2.10	------	1.63	1.41	1.61	------	------	------
13	------	------	------	2.64	2.18	1.79	1.67	1.49	1.65	------	------	------
14	------	------	------	2.62	2.22	1.84	1.59	1.47	1.65	------	------	------
15	------	------	2.58	2.56	2.26	1.98	1.53	------	1.67	------	------	------
16	------	------	2.54	2.58	2.38	2.04	1.47	------	1.59	------	------	------
17	------	------	2.50	2.60	2.32	1.96	1.49	1.63	1.57	------	------	------
18	------	3.09	2.54	2.62	2.22	1.80	1.45	1.65	1.57	------	------	------
19	------	------	2.54	2.56	2.18	1.71	1.47	------	1.57	------	------	------
20	------	------	2.58	2.62	2.12	1.69	1.54	1.71	1.63	------	------	------
21	------	------	2.62	2.70	2.18	1.71	1.66	1.59	1.71	------	------	------
22	------	------	2.54	2.62	2.26	1.67	1.66	1.59	------	------	------	------
23	------	------	------	2.62	2.12	1.61	1.59	1.71	------	------	------	------
24	------	------	2.62	2.58	2.04	1.61	1.56	1.65	------	------	------	------
25	------	------	2.62	2.54	2.06	1.61	1.49	1.61	------	------	------	------
26	------	------	2.70	2.54	2.14	1.49	------	1.63	------	------	------	------
27	------	------	2.66	2.52	2.12	1.57	------	1.61	------	------	2.66	------
28	------	------	2.66	2.48	2.16	------	------	1.59	------	------	2.66	------
29	------	------	2.70	2.42	2.20	------	------	1.63	------	------	2.66	------
30	------	------	2.66	2.30	2.16	------	------	1.59	------	------	2.70	------
31	------	------	2.70	------	2.20	------	------	1.61	------	------	------	------

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 1—Continued

1963

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	------	2.54	2.32	2.44	2.10	1.88	1.39	1.49	------	------	------	------
2	------	2.44	2.30	2.32	2.10	1.90	1.35	1.51	------	------	------	------
3	------	2.44	------	2.32	2.04	1.82	1.33	1.43	------	------	------	------
4	------	2.44	2.42	2.32	2.10	1.86	1.35	1.39	------	------	------	------
5	------	2.44	2.42	2.38	2.10	1.88	1.35	------	------	------	------	------
6	------	2.46	2.42	2.38	2.06	1.96	1.31	------	------	------	------	------
7	------	2.40	2.44	2.34	2.02	------	1.29	------	------	------	------	------
8	------	2.44	2.46	2.44	1.96	------	1.29	------	------	------	------	------
9	------	2.40	2.36	2.44	1.96	------	1.51	------	------	------	------	------
10	------	------	2.39	2.44	------	------	1.45	------	------	------	------	------
11	------	------	2.33	2.48	2.04	1.80	1.35	------	------	------	------	------
12	------	------	2.33	2.48	2.10	1.75	1.31	------	------	------	------	------
13	------	------	2.25	2.44	2.10	1.77	1.31	------	------	------	------	------
14	------	------	2.24	2.44	2.06	1.79	1.27	------	------	------	------	------
15	------	------	2.26	2.44	2.04	1.73	1.25	------	------	------	------	------
16	------	------	2.22	2.48	2.04	1.67	1.25	------	------	------	------	------
17	------	------	------	------	1.96	1.59	1.21	------	------	------	------	------
18	------	------	------	2.44	1.90	1.53	1.25	------	------	------	------	------
19	------	2.26	------	2.42	1.86	1.51	1.23	------	------	------	------	------
20	------	2.30	2.32	2.38	1.84	1.47	------	------	------	------	------	------
21	------	2.32	2.24	2.38	1.79	1.43	------	------	------	------	------	------
22	------	2.32	2.18	2.34	1.77	1.43	1.39	------	------	------	------	------
23	------	2.32	2.24	2.32	1.73	1.45	1.27	------	------	------	------	------
24	------	2.34	2.30	2.32	1.71	1.51	1.17	------	------	------	------	------
25	------	2.34	2.38	2.26	1.80	1.51	1.09	------	------	------	------	------
26	------	2.34	2.44	------	1.82	1.43	1.11	------	------	------	------	------
27	------	2.32	2.48	------	1.82	1.31	1.13	------	------	------	------	------
28	------	2.32	2.58	------	1.77	1.35	1.15	------	------	------	------	------
29	------	------	2.56	2.16	1.79	1.41	1.17	------	------	------	------	------
30	------	------	2.48	2.14	1.82	1.43	1.17	------	------	------	------	------
31	2.46	------	2.44	------	1.82	------	1.23	------	------	------	------	------

GAGE 2

1959

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.31	------	3.25	2.84	2.18	1.74	1.42	1.50	1.27	3.00	2.69	2.64
2	------	------	3.25	2.84	2.34	1.66	1.35	1.42	1.27	2.06	------	2.64
3	------	------	3.19	2.89	2.46	1.62	1.15	1.34	1.35	1.98	------	2.64
4	------	------	3.10	2.89	2.54	1.59	1.09	1.27	1.31	1.82	2.98	2.58
5	------	------	3.19	2.89	2.34	1.50	1.07	1.09	1.27	1.90	2.70	2.46
6	------	------	3.12	2.74	2.38	1.39	.95	1.09	1.43	1.98	2.58	2.58
7	3.55	3.13	3.12	2.98	2.18	1.39	.84	1.07	1.39	1.90	2.64	2.58
8	3.31	------	3.09	2.84	2.14	1.39	.91	1.19	1.43	1.90	2.46	2.62
9	2.25	------	2.96	2.77	2.22	1.35	.91	1.31	1.43	1.90	2.30	------
10	3.38	3.37	2.84	2.70	2.22	1.35	.97	1.43	1.43	1.90	2.26	------
11	3.43	3.25	2.78	2.70	2.14	1.39	1.03	1.55	1.43	1.90	2.41	2.74
12	3.43	------	2.78	2.57	2.04	1.39	1.07	1.55	1.52	2.00	2.49	2.70
13	3.31	------	2.74	2.54	1.98	1.39	.97	1.55	1.61	1.95	2.46	2.64
14	3.31	------	2.74	2.54	1.98	1.31	1.03	1.55	1.71	1.95	2.38	2.46
15	3.43	------	2.64	2.30	1.98	1.31	.88	1.55	1.80	2.07	2.46	2.54
16	3.61	------	2.76	2.22	2.06	1.26	1.03	1.55	1.90	2.14	2.54	2.54
17	3.49	------	2.84	2.38	2.06	1.21	1.27	1.55	1.90	2.14	2.70	2.64
18	3.37	------	2.74	2.46	1.95	1.43	1.11	1.55	1.90	2.14	2.78	2.64
19	3.19	2.98	2.74	2.50	2.03	1.82	1.07	1.55	1.82	2.22	2.69	2.64
20	3.03	3.03	2.64	2.38	2.18	1.78	.85	1.55	1.70	2.30	2.69	2.70
21	------	------	2.76	2.46	2.26	1.70	1.03	1.55	1.74	2.38	2.78	------
22	2.94	------	2.74	2.34	2.14	1.51	1.07	1.55	1.67	2.38	2.70	2.94
23	3.04	------	2.74	2.38	2.18	1.19	1.08	1.55	1.74	2.32	2.74	2.78
24	2.94	3.61	2.90	2.34	2.14	1.03	1.08	1.55	1.74	2.22	2.70	3.05
25	2.84	3.49	2.84	2.34	2.14	1.03	1.08	1.55	1.59	2.22	2.70	4.58
26	2.74	3.38	3.01	2.34	2.14	1.21	1.08	1.55	1.51	2.18	2.58	------
27	2.64	3.25	2.94	2.34	1.92	1.27	1.08	1.55	1.43	2.26	2.58	------
28	2.54	3.25	2.94	2.30	1.89	1.31	1.09	1.55	1.43	2.43	2.58	------
29	------	------	2.94	2.30	1.89	1.19	1.35	1.55	1.43	2.30	2.63	------
30	------	------	2.84	2.22	1.87	1.21	1.57	1.55	1.59	4.66	2.70	------
31	------	------	2.84	------	1.81	------	1.57	1.43	------	2.74	------	------

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 2—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1960						
1	......	......	3.67	2.81	2.34	1.88	1.04	0.91	1.60	1.55	1.48	2.30
2	......	2.98	3.67	2.91	2.26	1.98	1.04	.82	1.60	1.58	1.55	2.30
3	......	2.90	3.67	2.76	2.26	1.98	.99	.80	1.60	1.72	1.53	2.34
4	......	2.90	3.25	2.74	2.32	2.00	1.01	.80	1.60	1.69	1.73	2.34
5	......	2.78	3.31	2.66	2.41	2.20	1.09	.85	1.60	1.64	......	......
6	......	2.78	3.13	2.70	2.34	2.10	1.08	1.14	1.60	1.59	......	......
7	......	2.74	2.97	2.62	2.18	1.82	1.17	1.44	1.60	1.53	......	......
8	......	2.84	2.94	2.58	2.16	1.60	1.23	1.12	1.60	1.63	2.76	......
9	......	......	2.94	2.54	2.06	1.61	1.08	1.10	1.60	2.38	2.58	......
10	......	2.90	2.74	2.50	2.00	1.68	.99	1.24	1.60	2.38	2.46	......
11	......	2.78	2.64	2.54	1.92	1.74	1.08	1.37	1.65	1.65	2.42	2.40
12	......	2.90	2.70	2.82	1.78	1.53	1.08	1.20	1.45	1.53	2.34	......
13	......	2.78	2.74	2.54	1.83	1.50	1.05	1.04	1.32	1.45	2.34	2.40
14	......	2.78	2.74	2.56	1.82	1.33	1.03	1.00	1.30	1.84	2.28	......
15	......	2.78	2.75	2.66	1.89	1.32	.92	.86	1.40	2.02	2.26	......
16	......	2.89	2.76	2.70	1.95	1.37	.86	.90	1.43	1.71	2.22	......
17	......	2.77	2.78	2.58	1.91	1.36	.99	.98	1.36	2.40	2.11	......
18	......	......	2.79	2.32	1.93	1.29	1.43	.89	1.37	1.80	2.14	2.38
19	......	2.78	2.80	2.28	2.00	1.15	1.36	.87	1.36	1.61	2.22	2.34
20	......	2.78	2.81	2.28	2.03	1.10	1.47	1.02	1.32	1.48	2.18	2.30
21	......	2.78	2.82	2.14	1.98	1.00	1.71	1.25	1.27	1.42	2.18	......
22	......	......	2.84	2.16	1.95	.93	1.52	1.36	1.29	1.42	2.22	......
23	......	......	2.85	2.38	2.26	.93	1.44	1.48	1.37	1.44	2.22	2.34
24	......	......	2.86	2.38	2.50	1.04	1.35	1.36	1.36	1.43	......	2.30
25	......	2.78	2.87	2.46	2.52	1.08	1.12	1.28	1.34	1.43	......	2.34
26	......	2.90	2.88	2.42	2.18	1.11	1.20	1.21	1.32	1.40	......	2.38
27	2.94	3.04	2.82	2.98	1.87	1.10	1.37	1.14	1.36	1.47	......	2.22
28	2.90	5.97	2.78	2.54	1.77	1.06	1.17	1.14	1.27	1.45	2.34	2.38
29	2.90	......	2.82	2.46	1.76	1.04	1.06	1.13	1.32	1.45	2.34	2.38
30	2.90	......	2.82	2.44	1.83	1.03	1.34	1.22	1.43	1.47	2.30	......
31	2.78	......	2.76	......	1.98	......	1.19	1.55	......	1.48	......	......
						1961						
1	......	2.16	1.92	2.42	1.94	1.68	0.79	......	......	......	......	......
2	......	2.16	1.90	2.38	1.96	1.61	1.01	......	......	......	......	......
3	......	2.14	1.90	2.34	2.09	1.64	1.00	......	......	......	......	......
4	......	2.06	2.28	2.30	2.17	1.57	1.00	......	......	......	......	......
5	......	2.04	2.06	2.40	2.15	1.51	.97	0.83	......	......	......	......
6	......	......	2.10	2.40	2.08	1.43	.81	......	......	......	......	......
7	......	1.90	2.14	2.39	2.10	1.31	.67	1.03	......	......	......	......
8	......	1.90	2.16	2.38	2.06	1.26	.65	.85	......	......	......	......
9	......	1.90	2.16	2.16	1.92	1.19	.69	.71	......	......	......	......
10	......	1.86	2.22	2.14	1.84	1.13	.60	......	......	......	......	......
11	......	1.86	2.28	2.10	1.75	1.13	.58	......	......	......	......	......
12	......	1.90	2.38	2.26	1.92	1.07	.56	......	......	......	......	......
13	......	1.90	2.42	2.29	1.93	1.09	.70	......	......	......	......	......
14	......	1.92	2.50	2.24	1.86	.91	.65	......	......	......	......	......
15	......	1.89	2.66	1.94	1.77	.83	.63	......	......	......	......	......
16	......	1.92	2.60	1.86	1.73	.81	.66	......	......	......	......	......
17	......	1.90	2.76	1.96	1.69	.93	.70	......	......	......	......	......
18	......	1.90	2.94	1.94	1.62	1.02	.63	......	......	......	......	......
19	......	1.87	2.74	1.79	1.53	.93	.61	......	......	......	......	......
20	......	1.86	2.74	1.90	1.58	.75	.50	......	......	......	......	......
21	......	1.86	2.66	1.90	1.57	.85	.60	......	......	......	......	......
22	......	1.86	2.70	1.86	1.59	.83	.58	......	......	......	......	......
23	2.16	1.82	2.70	1.98	1.53	.80	.68	......	......	......	......	......
24	2.16	1.92	2.70	2.06	1.45	.78	.87	......	......	......	......	......
25	2.16	1.92	2.73	2.14	1.41	.75	.75	......	......	......	......	......
26	......	1.93	2.76	2.06	1.49	.72	.68	......	......	......	......	......
27	......	1.92	2.58	2.05	1.59	.69	.79	......	......	......	......	......
28	2.34	1.94	2.56	2.04	1.84	.67	.80	......	......	......	......	......
29	2.28	......	2.54	1.98	1.88	.79	.80	......	......	......	......	......
30	2.22	......	2.52	1.98	1.97	.67	.80	......	......	......	......	......
31	2.16	......	2.42	......	1.88	......	.80	......	......	......	......	......

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 2—Continued

1962

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	------	------	------	2.90	2.22	1.57	0.93	------	0.79	------	2.77	2.10
2	------	------	------	2.94	2.06	1.41	.85	------	.75	------	2.86	2.10
3	------	------	------	2.90	2.00	1.33	.93	------	.79	------	2.78	2.16
4	------	------	------	2.94	1.90	1.39	.97	.83	.91	------	2.90	2.10
5	------	------	------	2.98	1.84	1.53	.87	.75	1.03	------	2.90	------
6	------	------	------	2.94	1.79	1.49	.85	.83	1.13	------	2.90	------
7	------	------	------	2.94	1.75	1.41	.79	.85	.99	------	------	------
8	------	------	------	2.90	1.69	1.33	.79	.97	.99	------	------	------
9	------	------	------	2.88	1.73	1.31	.79	------	.99	------	------	------
10	------	------	------	2.86	1.80	1.27	.83	.87	1.03	------	------	------
11	------	------	------	2.74	1.67	1.25	.87	.85	.97	------	------	------
12	------	------	------	2.60	1.59	1.21	.79	.81	.97	------	------	------
13	------	------	------	2.50	1.77	1.15	.79	.89	1.05	------	------	2.54
14	------	------	------	2.38	1.86	1.33	.87	1.03	1.09	------	------	2.50
15	------	------	------	2.30	1.94	1.56	.81	.97	1.05	------	------	2.42
16	------	------	------	2.28	1.91	1.74	.73	------	.97	------	2.76	2.54
17	------	------	------	2.28	1.88	1.51	.71	------	.89	------	2.70	2.74
18	------	------	------	2.24	1.86	1.25	.75	------	.89	------	2.74	------
19	------	------	------	2.22	1.71	1.07	.79	------	.89	------	------	2.82
20	------	------	------	2.30	1.61	1.03	1.07	------	.95	------	------	2.70
21	------	------	------	2.42	1.80	1.03	1.07	------	1.03	------	------	2.64
22	------	------	------	2.40	2.02	.97	1.07	------	------	------	------	2.64
23	------	------	------	2.30	1.75	.91	1.07	1.03	------	------	------	2.64
24	------	------	------	2.30	1.61	.93	1.07	.93	------	------	------	2.62
25	------	------	------	2.30	1.65	.87	.99	.73	------	------	------	------
26	------	------	------	2.34	1.77	.73	.90	.77	------	------	------	------
27	------	------	------	2.28	1.86	.89	.90	.81	------	------	1.98	------
28	------	------	------	2.20	1.75	.90	.90	.73	------	------	1.98	------
29	------	------	2.76	2.32	1.59	.90	.90	.71	------	------	2.02	------
30	------	------	2.78	2.22	1.53	1.11	.90	.75	------	------	2.10	------
31	------	------	2.87	------	1.45	------	.90	.77	------	2.64	------	------

1963

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.70	------	2.34	2.52	1.88	1.35	0.63	------	------	------	------	------
2	2.70	------	2.40	2.50	1.84	1.29	.58	------	------	------	------	------
3	------	------	------	2.42	1.77	1.03	.56	------	------	------	------	------
4	3.09	------	------	2.42	1.73	1.05	.61	------	------	------	------	------
5	2.98	------	------	2.52	1.69	1.05	.56	------	------	------	------	------
6	2.98	------	------	2.54	1.65	1.07	.56	------	------	------	------	------
7	2.94	------	------	2.50	1.61	1.19	.52	------	------	------	------	------
8	------	------	2.70	2.58	1.73	1.19	.60	------	------	------	------	------
9	------	------	2.62	2.50	1.57	1.15	.85	------	------	------	------	------
10	------	------	2.58	2.42	1.53	1.21	.79	------	------	------	------	------
11	------	------	------	2.40	1.53	1.19	.67	------	------	------	------	------
12	------	------	2.46	2.40	1.69	1.17	.52	------	------	------	------	------
13	------	------	2.34	2.34	1.57	1.15	.48	------	------	------	------	------
14	------	------	2.26	2.28	1.65	1.15	.44	------	------	------	------	------
15	------	------	------	2.22	1.61	1.11	.38	------	------	------	------	------
16	------	------	2.34	2.26	1.48	.99	.46	------	------	------	------	------
17	------	------	------	2.32	1.51	.95	.42	------	------	------	------	------
18	------	------	------	2.38	1.51	.81	.42	------	------	------	------	------
19	------	------	------	2.18	1.54	.79	.42	------	------	------	------	------
20	------	------	2.52	2.16	1.58	.71	.56	------	------	------	------	------
21	------	2.30	2.26	2.16	1.23	.67	.65	------	------	------	------	------
22	------	2.30	------	2.16	1.26	.69	.58	------	------	------	------	------
23	------	------	------	1.92	1.25	.69	.56	------	------	------	------	------
24	------	2.28	------	1.87	1.25	.75	.46	------	------	------	------	------
25	------	2.28	------	1.82	1.25	.75	.38	------	------	------	------	------
26	------	2.34	------	1.80	1.19	.73	.36	------	------	------	------	------
27	------	2.30	------	1.94	1.21	.67	.40	------	------	------	------	------
28	------	2.38	------	2.08	1.23	.67	.46	------	------	------	------	------
29	------	------	2.58	2.10	1.21	.71	.44	------	------	------	------	------
30	------	------	2.52	1.90	1.21	.67	.42	------	------	------	------	------
31	------	------	2.46	------	1.21	------	.46	------	------	------	------	------

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 3

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1959												
1	3.07	------	3.36	2.44	1.90	1.39	1.07	------	1.01	------	2.86	2.50
2	------	------	3.36	2.38	1.92	1.33	.95	1.45	.91	2.38	------	2.50
3	------	------	3.21	2.38	2.25	1.33	.65	1.68	.99	2.30	------	2.54
4	------	------	3.13	2.34	2.44	1.28	.65	1.39	.89	2.02	2.94	2.54
5	------	------	2.94	2.30	2.25	1.07	.56	1.07	.71	1.92	2.74	2.34
6	------	------	3.00	2.30	2.06	1.01	.42	1.13	.77	1.92	2.74	2.54
7	4.12	------	2.94	2.66	2.12	1.01	.32	1.01	.71	1.92	2.74	2.66
8	3.78	------	3.01	2.74	2.05	1.01	.28	------	.71	1.92	2.54	2.80
9	3.41	------	2.86	2.35	2.00	1.01	.36	------	.75	1.96	2.54	------
10	3.63	3.29	2.86	2.30	1.95	.95	.32	------	------	1.90	2.74	------
11	3.35	3.29	2.60	2.30	1.92	.89	.34	------	------	1.93	2.74	2.66
12	3.35	------	2.54	2.30	1.95	.89	.41	------	------	1.90	2.66	2.54
13	3.35	------	2.54	2.30	1.78	.99	.35	1.78	------	1.83	2.66	2.60
14	3.35	------	2.54	2.30	1.65	.78	.28	1.43	------	1.83	2.60	2.60
15	3.35	------	2.54	2.18	1.69	.65	.36	1.33	------	1.86	2.66	2.74
16	3.21	------	2.65	2.18	1.83	.56	.46	1.23	2.24	1.83	2.74	2.74
17	3.21	3.78	2.60	2.34	1.79	.48	------	------	2.02	1.79	2.60	2.74
18	3.21	3.21	2.54	2.30	1.72	.83	------	------	1.90	1.83	2.66	2.74
19	3.13	3.07	2.54	2.38	1.72	1.13	------	------	1.86	1.86	2.65	2.66
20	3.13	3.07	2.54	2.38	1.72	1.19	.38	------	1.72	1.90	2.50	2.80
21	------	------	2.50	2.34	1.93	1.03	.54	1.65	1.74	2.00	2.50	------
22	3.34	------	2.38	2.30	1.82	.95	.75	1.63	1.72	1.87	2.60	3.13
23	3.34	3.69	2.50	2.30	1.65	.56	------	2.00	1.65	1.87	2.74	2.80
24	3.34	3.21	2.65	2.34	1.65	.44	------	1.74	1.65	1.82	2.74	------
25	3.40	3.41	2.50	2.34	1.78	.48	------	1.59	1.86	1.97	2.60	------
26	3.40	3.41	2.44	------	1.72	.62	.77	1.75	1.78	2.02	2.60	------
27	3.48	3.21	2.44	2.38	1.59	.79	.60	1.19	1.72	2.00	2.54	------
28	3.34	3.07	2.50	1.92	1.53	.83	.40	1.19	1.74	2.10	2.60	------
29	------	------	2.54	1.90	1.53	.83	.56	1.19	1.78	------	2.74	------
30	------	------	2.54	1.86	1.58	.89	------	1.15	1.96	------	2.65	------
31	------	------	2.50	------	1.49	------	------	1.03	------	------	------	------
1960												
1	------	2.88	------	2.38	2.24	1.57	0.60	0.60	------	1.31	2.10	2.34
2	------	------	------	2.38	2.04	1.59	.65	.40	------	1.31	2.14	2.30
3	------	3.01	------	2.36	1.96	------	.60	.34	------	1.51	2.14	2.36
4	------	2.86	------	2.34	------	1.90	.63	.36	------	1.52	2.36	2.30
5	------	2.94	------	2.26	------	------	.71	.34	------	1.51	------	------
6	------	2.66	------	2.26	2.02	------	.67	------	------	1.41	------	------
7	3.07	2.80	------	2.18	1.82	1.45	.65	------	------	1.37	------	------
8	3.35	2.66	------	2.22	1.75	1.15	.82	------	------	1.33	------	------
9	4.36	2.66	------	2.16	1.67	1.27	.84	------	------	1.41	------	------
10	4.88	------	------	2.06	1.59	------	.69	------	------	------	------	------
11	5.06	2.94	2.60	2.34	1.43	1.21	.77	------	------	2.34	------	2.38
12	------	2.80	2.60	------	1.27	------	.73	------	------	2.14	------	------
13	6.49	2.80	2.50	2.18	1.39	.97	.62	------	------	2.04	------	2.34
14	5.16	2.66	2.50	2.11	1.39	.83	.60	------	------	2.58	2.24	2.26
15	5.69	------	2.38	2.06	1.55	.81	.63	------	------	2.82	2.22	------
16	5.16	2.60	------	2.06	1.52	.87	.54	------	------	2.42	2.22	------
17	------	------	------	2.06	1.45	.86	.52	------	1.15	------	2.22	------
18	------	------	------	2.02	1.39	.79	------	------	1.11	2.66	2.17	2.34
19	------	------	------	2.02	1.33	.69	------	------	1.11	2.26	2.22	2.34
20	------	------	------	1.97	1.31	.63	------	------	1.09	2.12	2.22	2.26
21	------	------	------	1.88	1.23	.58	------	------	1.03	2.04	2.24	2.26
22	------	------	------	1.86	1.35	.54	------	------	1.02	1.98	2.22	2.30
23	3.01	------	------	2.30	1.43	.60	.99	------	1.09	2.02	2.24	2.30
24	3.01	------	------	2.42	1.59	.54	.95	------	1.09	2.00	2.24	2.34
25	3.01	------	------	2.30	1.60	.63	.75	.81	1.03	1.96	2.22	2.19
26	3.01	2.74	------	2.18	1.45	.60	------	.79	1.03	1.92	2.22	2.26
27	2.94	2.80	------	------	1.39	.56	------	.71	.99	2.08	------	2.18
28	2.86	------	2.46	3.19	1.27	.56	------	.65	.97	2.02	2.36	2.24
29	2.86	------	2.46	2.86	1.41	.58	------	.71	1.03	2.02	2.34	2.20
30	3.01	------	2.42	2.66	1.48	.56	------	.79	1.15	2.06	2.34	2.24
31	2.86	------	2.34	------	1.70	------	.90	------	------	2.12	------	------

TABLE 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 3—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1961												
1	------	2.42	2.24	------	1.98	1.33	0.56	------	1.31	1.45	------	2.70
2	------	2.42	2.16	------	2.00	1.36	------	------	1.03	1.39	2.62	------
3	------	2.50	2.19	2.38	2.16	1.38	------	------	1.15	1.51	2.60	------
4	------	2.42	2.48	2.34	2.18	1.32	------	1.11	1.35	1.57	2.60	2.70
5	------	2.42	2.36	2.26	2.10	1.26	.85	.81	1.23	1.59	2.42	2.60
6	------	------	2.24	2.50	1.98	1.20	.67	------	1.19	1.55	2.30	2.58
7	------	2.60	2.24	------	2.08	1.14	.54	------	1.11	1.51	2.42	2.58
8	------	2.54	2.24	------	2.01	1.03	.50	.69	1.15	1.51	2.62	------
9	------	2.50	2.30	2.26	1.84	1.03	.54	.52	1.07	------	2.70	------
10	------	2.50	2.24	2.26	1.79	.99	.46	------	1.27	------	2.70	------
11	------	2.46	2.22	2.22	1.61	.91	.34	------	1.15	------	2.70	------
12	------	2.46	2.24	2.10	1.80	.91	.30	------	1.15	2.02	2.70	------
13	------	2.42	2.34	------	1.88	.91	.48	------	------	1.90	2.60	------
14	------	2.46	2.35	------	1.82	.79	.46	------	------	1.82	2.76	------
15	2.26	2.38	2.40	2.50	1.69	.69	.40	------	------	1.86	2.78	------
16	2.30	2.42	2.34	2.48	1.63	.65	.38	------	------	1.86	2.86	------
17	2.26	2.38	2.36	2.12	1.59	.75	.52	------	------	1.92	2.96	------
18	------	2.38	2.62	2.18	1.51	.83	.42	------	------	1.88	2.92	2.50
19	2.24	2.30	2.42	1.92	1.51	.77	.32	------	------	1.86	2.96	2.42
20	2.26	2.34	2.36	2.00	1.65	.59	.29	------	------	1.90	------	2.42
21	2.30	2.36	2.30	2.06	1.39	.50	.30	1.11	1.48	1.94	------	2.38
22	------	2.26	2.30	2.14	1.37	.54	.36	------	1.48	1.96	------	2.36
23	2.30	2.22	2.24	2.08	1.32	.41	.40	------	1.67	1.92	------	2.26
24	2.34	------	2.24	2.14	1.27	.54	.59	------	1.61	2.02	2.92	2.26
25	2.36	2.18	------	2.30	1.25	.67	.65	2.94	1.51	1.94	2.96	2.26
26	------	2.24	------	2.22	1.33	.89	.52	2.36	1.45	2.00	2.96	2.26
27	------	------	2.48	2.14	1.27	.50	.62	1.76	1.39	2.00	2.78	------
28	2.60	2.16	------	2.14	1.30	.44	------	1.49	1.35	2.06	2.76	2.26
29	2.60	------	------	2.04	1.43	.52	------	------	1.47	2.18	2.76	2.26
30	2.48	------	2.54	2.04	1.37	.50	------	1.86	1.43	2.30	2.70	2.26
31	2.42	------	2.46	------	1.35	------	------	1.59	------	------	------	2.26
1962												
1	2.24	2.30	------	2.58	1.49	1.33	0.71	------	0.52	------	1.77	2.00
2	2.30	2.24	------	2.54	1.43	1.25	.63	------	.52	------	1.80	2.00
3	2.24	2.24	2.54	2.46	1.35	1.03	.67	------	.52	------	1.80	2.02
4	2.24	------	2.46	2.46	1.35	1.03	.67	0.40	.60	------	1.79	2.00
5	------	2.30	2.42	2.42	1.33	1.11	.69	.28	.75	------	1.80	2.02
6	2.36	2.50	2.38	2.34	1.29	1.13	.58	.32	------	------	1.82	2.04
7	2.30	------	------	2.24	1.35	1.15	.54	.36	.61	------	1.79	2.04
8	2.30	------	------	2.34	1.31	1.11	.48	.38	.61	------	1.79	2.06
9	2.38	------	------	2.24	1.25	1.01	.46	.56	.63	------	1.79	2.10
10	------	------	------	2.20	1.31	.97	.46	.40	.69	------	1.79	2.18
11	------	------	------	2.16	1.25	.95	.44	.34	.67	------	1.86	2.18
12	------	------	------	2.10	1.19	1.03	.36	.30	.67	------	1.86	2.16
13	------	------	------	2.06	1.41	.85	.44	.34	.79	------	1.86	2.18
14	------	------	------	2.02	1.57	.93	.56	.50	.79	------	------	2.18
15	------	------	------	1.94	1.63	1.29	.52	.44	.75	------	1.94	2.22
16	------	------	2.06	1.90	1.75	1.51	.48	------	.71	------	1.84	2.18
17	------	------	2.12	1.90	1.86	1.35	.40	------	.63	------	1.86	2.46
18	------	------	2.24	1.86	1.51	1.07	.40	------	.63	------	1.84	------
19	------	------	2.30	1.86	1.27	.89	.50	------	.61	------	1.88	------
20	------	------	2.42	1.88	1.17	.81	.56	------	.63	1.53	1.88	------
21	------	------	------	1.96	1.33	.79	------	------	.73	1.61	1.86	------
22	------	------	2.48	1.96	1.41	.73	------	------	------	1.51	1.86	------
23	------	------	------	1.82	1.23	.67	.85	.58	------	1.47	1.86	------
24	------	------	------	1.79	1.15	.67	.67	.60	------	1.55	1.86	------
25	------	------	------	1.80	1.25	.61	.73	.52	------	1.67	1.84	------
26	------	------	------	1.77	1.41	.54	.61	.48	------	1.75	1.82	------
27	------	------	------	1.65	1.55	.61	------	.52	------	1.71	1.77	------
28	2.42	------	2.60	1.51	1.51	------	------	.50	------	1.67	1.84	------
29	2.36	------	2.54	1.55	1.41	------	------	.44	------	1.67	1.88	------
30	2.36	------	2.58	1.49	1.31	------	------	.46	------	------	2.00	------
31	2.36	------	2.60	------	1.27	------	------	.50	------	1.78	------	------

Table 9.—*Mean daily flow, in acre-feet*—Continued

GAGE 3—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1963						
1	......	2.34	2.26	2.22	1.49	1.13	0.44	0.65	......	......	......	......
2	......	2.26	2.22	2.14	1.57	1.11	.42	.85	......	......	......	......
3	......	2.22	......	2.06	1.55	.89	.36	.63	......	......	......	......
4	......	2.22	......	2.10	1.49	.89	.40	.58	......	......	......	......
5	......	2.22	......	2.04	1.47	.97	.40	......	......	......	......	......
6	......	2.22	2.30	2.10	1.39	.93	.38	......	......	......	......	......
7	......	2.18	2.26	1.94	1.37	1.01	.36	......	......	......	......	......
8	......	2.26	2.32	1.98	1.45	1.07	.38	......	......	......	......	......
9	......	2.34	2.28	1.94	......	1.03	......	......	......	......	......	......
10	......	......	2.30	1.90	......	1.05	......	......	......	......	......	......
11	......	......	......	1.80	1.33	1.03	.54	......	......	......	......	......
12	......	......	2.22	1.76	1.45	.93	.40	......	......	......	......	......
13	......	......	2.18	1.76	1.43	.93	.30	......	......	......	......	......
14	......	......	2.16	1.78	1.35	.91	.30	......	......	......	......	......
15	......	......	......	1.71	1.33	.83	.24	......	......	......	......	......
16	......	......	......	1.71	1.25	.79	.24	......	......	......	......	......
17	......	......	......	......	1.23	.73	.21	......	......	......	......	......
18	......	......	......	......	1.17	.63	.20	......	......	......	......	......
19	......	......	......	1.73	1.15	.61	.22	......	......	......	......	......
20	......	2.42	......	1.71	1.23	.56	.28	......	......	......	......	......
21	......	2.38	......	......	1.11	.46	.46	......	......	......	......	......
22	......	2.40	2.38	1.73	1.11	.46	.38	......	......	......	......	......
23	......	2.38	2.34	1.69	1.07	.50	.38	......	......	......	......	......
24	......	2.34	2.34	1.63	1.13	.54	.22	......	......	......	......	......
25	......	2.34	2.28	1.71	1.11	.56	.16	......	......	......	......	......
26	......	2.30	2.28	......	1.11	.56	.14	......	......	......	......	......
27	......	2.30	2.26	......	1.13	.50	.20	......	......	......	......	......
28	......	2.30	2.34	1.71	1.07	.48	.24	......	......	......	......	......
29	......	......	2.20	1.67	1.07	.50	.24	......	......	......	......	......
30	2.30	......	2.16	1.63	1.09	.48	.22	......	......	......	......	......
31	2.34	......	2.10	......	1.09	......	.18	......	......	......	......	......

Table 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*

TRANSPIRATION WELL T-1

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1959						
1	2.27	2.28	2.32	2.39	2.54	......	2.71	2.37	2.70	2.58	......	2.41
2	2.27	2.27	2.33	2.40	2.52	......	2.70	2.41	2.72	2.52	2.32	2.41
3	2.26	2.28	2.33	2.40	2.48	......	2.72	2.44	2.73	2.55	2.24	2.40
4	2.23	2.28	2.34	2.42	2.46	......	2.74	2.48	......	2.58	2.31	2.40
5	2.22	2.28	2.34	2.42	......	2.65	2.74	2.52	......	2.62	2.37	2.40
6	2.17	2.28	2.34	2.43	2.51	2.64	2.76	2.55	2.75	2.63	2.41	......
7	2.14	2.27	2.34	2.42	2.52	2.66	2.78	2.54	2.75	2.64	2.43	2.40
8	2.17	2.15	2.34	2.42	2.54	2.66	2.78	2.39	2.75	2.66	2.45	2.39
9	2.20	......	2.35	2.42	2.55	2.67	2.80	2.29	2.75	2.66	2.45	2.35
10	2.20	2.19	2.35	2.43	2.56	2.68	2.79	2.25	2.73	2.67	2.45	2.32
11	2.23	2.21	2.35	2.44	2.57	2.68	2.80	1.99	2.55	2.63	2.44	2.34
12	2.25	2.10	2.35	2.45	2.58	2.69	2.78	2.17	2.24	2.68	2.44	......
13	2.26	2.07	2.35	......	......	2.68	2.79	2.38	......	2.70	2.43	......
14	2.27	2.17	2.35	2.46	......	2.69	2.79	2.46	......	2.69	2.48	......
15	2.28	2.21	2.36	2.47	......	2.70	2.79	2.51	2.37	2.70	2.41	......
16	2.28	2.23	2.35	2.47	......	2.71	2.79	2.54	2.45	2.70	2.41	......
17	2.29	2.23	2.35	2.46	......	2.72	2.75	2.55	2.50	2.72	2.41	......
18	2.30	2.25	2.35	2.46	......	2.72	2.72	2.25	2.52	2.71	2.41	......
19	2.31	2.27	2.35	2.45	......	2.66	2.75	2.25	2.55	......	2.41	......
20	2.31	2.28	2.36	2.46	......	2.63	2.78	2.31	2.57	......	2.41	2.38
21	2.31	2.21	2.35	2.47	......	2.64	2.78	2.41	2.60	......	2.40	2.37
22	2.29	2.09	2.36	2.48	......	2.67	2.76	2.46	2.61	......	2.41	2.33
23	2.29	2.19	2.36	2.49	......	2.71	2.74	2.48	2.63	2.52	2.40	2.31
24	2.30	2.24	2.36	2.49	......	2.73	2.75	2.47	2.64	2.51	2.40	2.34
25	2.31	2.28	2.36	2.49	......	2.75	2.74	2.50	2.65	2.52	2.40	2.25
26	2.31	2.29	2.36	2.44	......	2.74	2.74	2.55	2.66	2.51	2.40	2.25
27	2.31	2.30	2.36	2.46	......	2.71	2.75	2.59	2.68	2.49	2.40	2.32
28	2.31	2.31	2.37	2.50	......	2.71	2.78	2.62	2.67	2.46	2.40	2.34
29	2.31	......	2.37	2.53	......	2.71	2.78	2.65	2.67	2.44	2.41	2.35
30	2.31	......	2.37	2.54	......	2.72	2.70	2.66	2.65	......	2.41	2.35
31	2.29	......	2.38	......	......	......	2.56	2.68	......	......	......	......

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-1—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1960						
1	------	2.38	2.15	2.40	2.62	------	2.84	2.79	2.58	2.80	------	2.54
2	------	------	2.06	2.40	------	------	------	2.83	2.47	2.79	------	2.54
3	------	2.41	2.18	------	------	------	2.71	2.85	------	2.78	------	2.54
4	------	2.42	2.26	2.52	2.59	------	2.68	2.86	2.48	2.77	2.69	2.54
5	------	2.42	2.32	2.53	2.54	------	2.65	2.86	2.12	2.78	2.59	2.54
6	------	2.43	2.36	2.54	2.59	------	2.64	2.82	2.26	2.79	2.43	2.55
7	------	2.44	2.39	2.55	2.64	------	2.63	2.78	2.47	2.80	2.40	2.54
8	------	2.44	2.41	2.56	2.67	------	2.63	2.81	2.58	2.81	2.48	2.52
9	------	2.45	2.43	2.57	2.69	------	2.61	2.82	2.63	------	2.53	2.52
10	------	2.41	2.44	2.58	2.71	------	2.61	2.80	2.68	------	2.55	2.51
11	------	2.40	2.44	2.59	------	------	2.61	------	2.67	------	------	2.51
12	2.20	2.43	2.45	2.56	2.75	2.82	2.60	------	2.70	------	------	2.52
13	2.19	2.44	2.45	2.57	2.76	2.83	2.60	------	2.73	2.65	------	2.52
14	2.24	2.44	2.45	2.59	2.77	2.83	------	2.84	2.76	2.66	2.56	2.52
15	2.24	2.44	2.45	2.59	2.75	2.84	------	2.85	2.77	------	2.55	2.52
16	2.28	2.45	2.45	2.59	2.75	2.84	------	2.86	2.77	------	2.56	2.52
17	2.31	2.45	2.45	2.60	2.75	2.84	2.69	2.86	2.78	------	2.58	------
18	------	2.45	2.45	------	2.75	2.84	2.67	2.87	------	------	2.58	------
19	------	2.43	2.46	2.62	2.74	2.84	2.65	2.88	2.79	------	2.58	------
20	------	2.42	2.46	2.63	2.75	2.84	2.66	2.87	------	------	2.58	------
21	------	2.44	2.46	2.64	2.76	2.85	2.63	2.85	------	------	------	------
22	------	2.45	2.46	2.64	2.76	2.85	2.60	2.76	------	------	2.58	------
23	------	2.45	2.42	2.60	2.76	2.85	2.64	2.74	------	------	2.58	------
24	------	2.45	2.39	2.57	2.75	2.85	2.66	2.78	------	------	2.57	------
25	2.36	2.45	2.41	2.57	2.74	2.84	2.70	2.81	2.81	------	2.57	------
26	2.36	2.44	2.45	2.58	------	2.79	2.74	2.82	2.82	------	2.56	------
27	2.37	------	2.47	2.55	------	2.81	2.71	2.83	2.82	------	2.53	------
28	2.37	------	2.48	2.53	------	2.80	2.73	2.84	2.82	------	2.52	------
29	2.38	2.33	2.48	2.55	------	------	2.75	2.85	2.81	------	2.52	------
30	2.38	------	2.48	2.59	------	2.86	------	2.85	2.81	------	2.53	------
31	------	------	2.49	------	------	------	2.75	2.84	------	------	------	------
						1961						
1	------	------	2.55	2.54	2.57	2.61	2.69	------	------	2.59	------	------
2	------	------	2.55	2.55	2.58	2.61	2.67	------	------	2.59	------	------
3	------	------	2.54	2.55	2.58	2.60	2.64	------	------	2.60	------	------
4	------	------	2.53	2.55	2.58	2.61	2.61	------	------	2.60	------	------
5	------	------	2.53	2.55	2.57	2.60	2.63	------	------	2.60	------	------
6	------	2.56	2.54	2.55	2.56	2.60	2.65	2.67	------	2.60	------	------
7	------	2.56	2.54	2.51	2.56	2.60	2.66	2.67	------	------	------	------
8	------	2.55	2.55	2.49	2.56	2.60	2.67	2.65	------	------	------	------
9	------	2.55	2.55	------	2.56	2.60	2.68	2.64	------	------	------	------
10	------	2.56	2.55	2.54	------	2.61	2.68	------	------	------	------	------
11	------	2.56	2.55	2.55	------	2.61	2.70	------	------	------	------	------
12	------	2.56	2.55	2.55	------	2.62	2.71	------	------	------	------	------
13	------	2.56	2.55	2.56	2.58	2.62	2.70	------	------	------	------	------
14	------	2.56	2.55	2.55	2.58	2.63	2.69	------	------	------	------	------
15	------	2.56	2.54	2.56	2.59	2.63	2.70	------	------	------	------	------
16	------	2.56	2.54	2.55	2.59	2.63	2.70	------	------	------	------	------
17	------	2.56	2.54	2.56	2.60	2.63	2.69	------	------	------	------	2.71
18	------	2.56	2.54	2.56	2.60	2.63	------	------	------	------	------	2.71
19	------	2.56	2.53	2.56	2.60	2.63	------	------	------	------	------	2.71
20	------	2.56	2.53	2.56	------	2.64	------	------	------	------	------	2.71
21	------	2.56	2.54	2.56	------	2.65	2.72	------	------	------	------	2.70
22	------	2.55	2.54	2.56	2.61	2.66	2.71	------	------	------	------	2.70
23	------	2.56	2.54	2.56	2.61	2.66	2.71	------	------	------	------	2.71
24	------	------	2.54	2.56	2.61	2.66	2.72	------	------	------	------	2.71
25	------	------	2.53	2.55	2.62	------	2.73	------	------	------	------	2.71
26	------	2.55	2.53	2.55	2.62	2.66	2.74	------	------	------	------	2.71
27	------	2.55	2.53	2.55	2.62	2.67	2.74	------	------	------	------	2.70
28	------	2.55	2.53	2.55	2.62	2.68	------	------	------	------	------	2.71
29	------	------	2.51	2.56	2.61	2.68	------	------	------	------	------	2.71
30	------	------	2.51	2.57	2.60	2.69	------	------	------	------	------	2.71
31	------	------	2.53	------	2.61	------	------	------	------	------	------	2.71

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-1—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1962						
1	2.71	2.75	------	------	2.64	2.70	2.78	------	------	------	2.67	2.47
2	2.71	2.75	------	------	2.63	2.70	2.79	------	------	------	2.64	2.47
3	2.72	2.75	------	------	2.62	2.71	2.80	2.85	------	------	2.72	2.49
4	2.72	2.75	2.71	------	2.62	2.71	2.80	2.87	------	------	2.66	2.49
5	2.72	2.75	2.71	------	2.62	------	2.81	2.88	------	------	2.55	------
6	2.72	2.75	2.71	------	2.63	------	2.82	2.88	------	------	2.53	------
7	2.72	2.75	2.70	------	2.63	2.86	2.82	2.88	------	------	2.57	------
8	2.72	2.75	2.71	2.69	2.62	2.84	2.83	2.87	------	------	------	------
9	2.72	2.71	2.68	2.69	------	2.82	2.83	2.85	------	------	------	------
10	2.71	2.74	------	2.69	2.65	2.81	2.83	2.86	------	------	------	------
11	2.70	2.74	2.66	------	2.65	2.79	2.83	2.87	------	------	------	------
12	2.70	------	2.67	2.68	2.65	2.76	2.84	2.87	------	------	------	------
13	2.70	------	2.68	2.68	2.64	2.76	2.84	2.87	2.86	------	------	------
14	2.70	------	2.67	2.68	2.63	2.75	2.85	2.86	2.86	------	------	2.55
15	2.70	------	2.67	2.68	2.62	2.73	2.86	2.87	2.86	------	------	2.61
16	2.70	------	2.65	2.68	------	2.72	2.87	------	2.86	------	------	2.61
17	2.71	2.71	2.65	2.68	2.62	2.71	2.86	------	2.87	------	------	2.60
18	2.72	2.73	2.65	2.67	2.64	2.74	2.86	------	2.87	------	------	2.57
19	2.72	2.69	2.65	2.67	2.65	2.75	2.85	------	2.87	------	------	------
20	2.73	2.65	2.65	2.67	2.67	2.76	2.84	------	------	------	------	------
21	------	2.65	2.64	2.67	2.67	2.76	2.80	------	------	------	------	------
22	------	2.67	------	------	2.68	2.76	2.78	------	------	------	------	------
23	------	------	------	2.66	2.68	2.76	------	2.86	------	------	------	------
24	------	------	------	2.66	2.69	2.76	------	2.87	------	------	------	------
25	------	2.69	2.66	2.65	2.69	2.76	------	2.87	------	------	------	------
26	------	2.68	2.67	2.65	2.68	2.76	------	2.87	------	------	------	------
27	------	2.68	------	------	2.67	2.76	2.55	2.87	------	------	------	------
28	2.74	2.70	------	2.65	2.67	2.75	2.53	2.87	------	------	2.47	------
29	2.74	------	------	2.64	2.68	2.74	2.64	2.88	------	------	2.49	------
30	2.74	------	------	2.64	2.69	2.76	2.72	------	------	------	2.47	------
31	2.74	------	------	------	2.69	------	------	------	------	------	------	------
						1963						
1	------	2.86	2.84	------	2.91	2.91	2.95	2.97	------	------	------	------
2	------	2.86	2.82	------	2.91	2.90	2.96	2.95	------	------	------	------
3	------	2.87	2.83	------	2.91	2.92	2.96	2.95	------	------	------	------
4	------	2.88	2.83	------	2.91	2.92	2.96	2.96	------	------	------	------
5	------	2.88	2.84	------	2.92	2.92	2.96	2.72	------	------	------	------
6	------	------	2.85	3.01	2.92	2.92	2.96	2.59	------	------	------	------
7	------	------	------	3.01	2.92	2.92	2.96	------	------	------	------	------
8	------	------	------	3.01	2.91	2.91	2.96	------	------	------	------	------
9	------	------	2.86	------	2.91	2.90	2.96	------	------	------	------	------
10	------	------	2.85	------	2.92	2.90	2.95	------	------	------	------	------
11	------	------	2.84	------	2.92	2.90	2.96	------	------	------	------	------
12	------	------	2.86	2.88	2.92	2.90	2.97	------	------	------	------	------
13	------	------	------	2.88	2.92	2.91	2.97	------	------	------	------	------
14	------	------	------	2.88	2.92	2.91	2.97	------	------	------	------	------
15	------	------	2.85	2.89	2.93	2.91	2.97	------	------	------	------	------
16	------	------	2.85	------	2.93	2.92	2.97	------	------	------	------	------
17	------	------	2.72	2.88	2.93	2.92	2.98	------	------	------	------	------
18	------	------	2.56	2.88	2.93	2.92	2.98	------	------	------	------	------
19	------	------	2.63	2.89	2.93	2.93	2.98	------	------	------	------	------
20	------	------	2.70	------	2.93	2.93	2.98	------	------	------	------	------
21	------	2.82	2.76	------	2.93	2.94	2.98	------	------	------	------	------
22	------	2.82	------	------	2.93	2.94	2.98	------	------	------	------	------
23	------	2.83	2.83	------	2.93	2.94	2.98	------	------	------	------	------
24	------	2.83	2.85	------	2.93	2.95	2.98	------	------	------	------	------
25	------	2.83	2.86	------	2.93	2.95	2.98	------	------	------	------	------
26	------	2.84	2.87	2.82	2.93	2.95	2.98	------	------	------	------	------
27	------	2.81	2.87	2.83	2.93	2.95	2.98	------	------	------	------	------
28	------	------	2.87	2.88	2.92	2.95	2.98	------	------	------	------	------
29	------	------	------	------	2.92	2.95	2.98	------	------	------	------	------
30	2.85	------	------	------	2.92	2.95	2.98	------	------	------	------	------
31	2.86	------	------	------	2.91	------	2.98	------	------	------	------	------

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-3

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1959						
1	4.14	4.19	4.27	4.33	4.40	------	4.43	3.85	4.41	4.44	------	4.24
2	4.13	4.18	4.28	4.33	4.38	------	4.45	4.13	4.41	4.43	4.20	4.24
3	4.11	4.21	4.28	4.34	4.37	------	4.44	4.14	4.41	4.44	4.12	4.24
4	4.10	4.19	4.29	4.34	------	------	4.44	4.13	------	4.44	4.22	4.24
5	4.09	4.19	4.29	4.35	------	4.42	4.43	4.19	------	------	4.25	4.25
6	4.07	4.19	4.29	4.36	4.40	4.44	4.44	4.20	4.42	4.42	4.27	4.24
7	4.07	4.20	4.29	4.35	4.41	4.44	4.45	4.20	4.41	4.43	4.28	4.25
8	4.09	------	4.30	4.35	4.41	4.44	4.45	3.89	4.42	4.44	4.28	4.25
9	4.11	------	4.30	4.35	4.41	4.44	4.44	4.00	4.42	4.44	4.28	4.24
10	4.13	4.14	4.30	4.36	4.41	4.46	4.44	3.87	4.36	4.44	4.28	4.24
11	4.16	4.15	4.30	4.36	4.41	4.46	4.45	3.75	4.33	4.45	4.28	4.24
12	4.13	4.12	4.30	4.37	4.42	4.45	4.46	4.08	------	4.45	4.28	4.25
13	4.18	4.12	4.31	------	------	4.44	4.47	4.23	------	4.44	4.26	------
14	4.19	4.15	4.31	4.36	------	4.46	4.49	4.24	------	4.45	4.26	------
15	4.20	4.19	4.31	4.36	------	4.46	4.50	4.26	4.27	4.45	4.25	------
16	4.21	4.20	4.31	4.36	------	4.47	4.49	4.27	4.28	4.45	4.25	------
17	4.21	4.20	4.31	4.36	------	4.46	4.46	4.23	4.28	4.46	4.25	------
18	4.22	4.21	4.31	4.36	------	------	4.46	3.88	4.29	------	4.26	------
19	4.22	4.22	4.31	4.37	------	4.42	4.47	4.10	4.29	------	4.25	------
20	4.22	4.23	4.31	4.37	------	4.41	4.49	4.14	4.29	------	4.25	------
21	4.20	4.20	4.31	4.38	------	4.42	4.48	4.25	------	------	4.25	------
22	4.18	4.14	4.31	4.38	------	4.43	4.47	4.31	------	------	4.25	------
23	4.21	4.24	4.32	4.38	------	4.46	4.47	4.31	------	------	4.25	------
24	4.23	4.25	4.32	4.38	------	4.47	4.47	4.32	------	4.44	4.25	------
25	4.23	4.26	4.33	4.38	------	4.48	4.45	4.33	------	4.44	4.25	------
26	4.24	4.26	4.33	------	------	4.46	4.46	4.34	------	4.44	4.25	------
27	4.24	4.26	4.30	------	------	4.45	4.46	4.38	------	4.42	4.24	------
28	4.24	4.26	4.27	4.39	------	4.44	4.47	4.41	------	4.41	4.24	------
29	4.24	------	4.30	4.39	4.42	4.44	4.47	4.41	------	4.41	4.24	------
30	4.23	------	4.32	4.40	4.41	4.44	4.42	4.41	4.44	------	4.24	------
31	4.21	------	4.32	------	4.41	------	4.03	4.41	------	------	------	------
						1960						
1	------	------	4.09	4.40	4.49	------	------	4.61	4.40	4.59	------	4.46
2	------	------	4.05	4.40	------	------	------	4.63	4.42	4.59	------	4.46
3	------	4.31	4.18	------	------	------	------	4.64	------	4.58	------	4.46
4	------	4.32	4.23	4.43	4.48	------	------	4.64	4.41	4.58	4.53	4.46
5	------	4.32	4.30	4.44	4.47	------	------	4.63	------	4.59	4.46	4.46
6	------	4.33	------	4.45	4.49	------	------	4.58	------	4.60	4.29	4.46
7	------	4.33	4.36	4.45	4.50	------	------	4.58	4.49	4.61	4.30	4.45
8	------	4.34	4.36	4.45	4.53	------	------	4.61	4.51	4.59	4.42	4.44
9	------	4.35	4.37	4.46	4.53	------	------	4.61	4.53	4.54	4.46	4.45
10	------	4.34	4.37	4.47	4.54	------	------	4.60	------	4.48	4.47	4.45
11	------	4.34	4.37	4.46	------	------	------	4.59	------	4.52	------	4.44
12	------	4.35	4.37	4.45	4.55	4.57	4.49	4.61	4.53	4.53	------	4.44
13	------	4.35	4.37	4.46	4.55	4.57	4.50	4.60	4.55	4.54	------	4.44
14	------	4.35	4.38	4.46	4.55	4.57	4.51	4.64	4.56	4.51	4.46	4.44
15	------	4.35	4.38	4.46	4.54	4.57	4.52	4.65	4.57	------	4.46	4.44
16	------	4.35	4.38	4.46	4.54	4.57	4.54	4.65	4.57	------	4.46	4.44
17	------	------	4.38	4.47	4.53	4.57	4.55	4.65	4.58	------	4.46	4.44
18	------	------	4.38	------	4.53	------	4.52	4.67	4.58	------	4.46	------
19	------	------	4.39	4.49	4.54	------	4.51	4.68	4.58	------	------	------
20	------	------	4.39	4.49	4.54	------	4.51	4.67	4.58	------	------	------
21	------	4.36	4.40	4.49	4.54	------	4.50	4.63	4.59	------	------	------
22	------	4.36	4.40	4.49	4.54	------	4.51	4.54	4.59	------	------	------
23	------	4.36	4.33	4.48	4.54	------	4.52	4.58	4.59	------	------	------
24	------	4.35	4.34	4.47	4.54	------	4.52	4.64	4.59	------	------	------
25	------	4.36	------	4.48	4.54	------	4.56	4.62	4.60	------	------	------
26	------	4.36	------	4.49	------	------	4.57	4.63	4.61	------	------	------
27	------	------	4.39	4.47	------	------	4.57	4.63	4.67	------	------	------
28	------	------	4.39	4.47	------	------	4.57	4.64	4.62	------	4.44	------
29	------	4.38	4.39	4.48	------	------	4.59	4.64	4.60	------	4.45	------
30	------	------	4.39	4.42	------	------	4.57	4.64	4.60	------	4.46	------
31	------	------	4.40	------	------	------	4.57	------	------	------	------	------

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-2—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						1961						
1	------	------	4.49	4.49	4.50	4.52	4.59	------	------	4.26	4.36	4.38
2	------	------	4.49	4.49	4.50	4.51	4.58	------	------	4.27	4.37	4.35
3	------	------	4.50	4.50	4.50	4.51	4.55	------	------	4.27	4.38	4.35
4	------	------	4.50	4.50	4.49	4.52	4.55	------	------	4.28	4.38	4.37
5	------	------	4.49	4.49	4.49	4.53	4.58	------	------	4.29	4.38	4.37
6	------	4.56	4.48	4.48	4.50	4.52	4.59	------	------	4.30	4.38	4.38
7	------	4.56	4.45	4.45	4.50	4.58	------	------	------	4.30	4.38	4.38
8	------	4.55	4.46	4.46	4.50	------	------	------	------	4.31	4.38	4.38
9	------	4.55	4.50	4.50	4.51	------	------	------	------	4.32	4.38	4.37
10	------	4.55	4.49	4.49	4.51	------	------	------	------	4.33	4.38	4.34
11	------	4.55	4.50	4.50	4.52	------	------	------	------	4.33	4.38	4.34
12	------	4.55	4.50	4.50	4.51	4.55	------	------	------	4.33	4.38	4.35
13	------	4.55	4.49	4.49	4.51	4.55	------	4.46	------	4.35	4.38	4.35
14	------	4.55	4.50	4.50	4.51	4.56	------	4.49	------	4.36	4.38	4.34
15	------	4.55	4.50	4.50	4.52	4.56	------	4.49	------	4.37	4.38	4.32
16	------	4.54	4.50	4.50	4.52	4.56	------	4.39	------	4.37	4.37	4.32
17	------	4.54	4.50	4.50	4.52	4.56	------	4.39	------	4.37	4.37	4.33
18	------	4.54	4.50	4.50	4.53	4.55	------	4.48	------	4.38	4.37	4.35
19	------	4.54	4.51	4.51	4.53	4.55	------	------	------	4.38	4.37	4.36
20	------	4.54	4.51	4.51	------	4.57	------	------	------	4.39	4.37	4.37
21	------	4.54	4.50	4.50	------	4.57	4.57	------	------	4.39	4.33	4.37
22	------	4.53	4.51	4.51	4.52	4.57	4.56	------	------	4.38	4.37	4.38
23	------	4.53	4.51	4.51	4.52	4.57	4.56	------	----	4.38	4.38	4.39
24	------	4.53	4.50	4.50	4.52	4.57	4.55	------	4.17	4.38	4.38	4.40
25	------	4.53	4.50	4.50	4.53	------	4.55	------	4.18	4.39	4.39	4.40
26	------	4.54	4.50	4.50	4.53	4.58	4.55	------	4.19	4.38	4.38	4.40
27	------	4.54	4.50	4.50	4.53	4.59	------	------	4.21	4.38	4.38	4.40
28	------	4.54	4.50	4.50	4.52	4.59	------	------	4.23	4.38	4.38	4.40
29	------	------	4.50	4.50	4.51	4.59	------	------	4.24	4.38	4.38	4.40
30	------	------	4.50	4.50	4.51	4.59	------	------	4.26	4.38	4.38	4.39
31	------	------	------	----	4.51	------	------	------	------	4.37	------	4.39
						1962						
1	4.39	4.45	4.44	------	4.46	4.50	4.53	4.59	------	------	4.41	4.46
2	4.39	4.45	4.44	------	4.46	4.50	4.53	4.59	------	------	4.47	4.46
3	4.39	4.45	4.43	------	------	4.51	4.53	4.59	------	------	4.50	4.48
4	4.39	4.45	4.42	------	4.43	4.51	4.53	4.61	------	------	4.41	4.48
5	4.39	4.44	4.42	------	4.43	------	4.54	4.62	------	------	4.30	------
6	4.39	4.44	4.42	------	4.44	------	4.54	4.63	------	------	4.41	------
7	4.39	4.42	4.42	------	4.44	4.46	4.54	4.63	------	------	------	------
8	4.38	4.39	4.43	4.48	4.44	4.47	4.55	4.63	------	------	------	------
9	4.38	4.42	4.42	4.48	4.44	4.47	4.55	4.64	------	------	------	------
10	4.39	4.44	4.41	4.48	4.44	4.47	4.56	4.64	------	------	------	------
11	4.40	4.44	4.45	4.48	4.44	4.47	4.56	4.64	------	------	------	------
12	4.39	------	4.46	4.49	4.44	4.47	4.56	4.65	------	------	------	------
13	4.36	------	4.46	4.49	4.44	4.50	4.56	4.65	4.67	------	------	------
14	4.34	------	4.47	4.50	------	4.50	4.56	4.64	4.66	------	------	4.45
15	4.35	------	4.47	4.50	------	4.48	4.56	4.64	4.66	------	------	4.51
16	4.40	------	4.47	4.49	4.45	4.47	4.56	------	4.67	------	------	4.52
17	4.41	------	4.48	4.48	4.46	4.48	4.56	------	4.67	------	------	4.54
18	4.44	4.47	4.48	4.48	4.47	4.49	4.56	------	4.67	------	------	4.51
19	4.45	4.45	4.48	4.47	4.47	4.50	4.55	------	4.67	------	------	4.45
20	4.41	4.44	4.48	4.46	4.46	4.52	4.55	------	------	------	------	4.52
21	4.35	4.43	4.48	4.45	------	4.53	4.54	------	------	------	------	------
22	4.42	4.45	4.48	4.45	------	4.53	4.53	------	------	------	------	------
23	4.45	4.46	4.47	4.45	4.44	4.54	4.54	4.64	------	------	------	------
24	4.45	4.46	4.48	4.45	4.46	4.54	------	4.64	------	------	------	------
25	4.43	4.44	4.48	4.45	4.46	4.54	------	4.64	------	------	------	------
26	4.44	4.43	4.48	4.45	4.47	4.54	------	4.64	------	------	------	------
27	4.45	4.43	4.48	4.46	4.47	4.55	4.14	4.64	------	------	------	------
28	4.45	4.45	4.48	4.46	4.48	4.53	4.14	4.64	------	------	4.46	------
29	4.45	------	4.48	4.46	4.48	4.52	4.52	4.64	------	------	4.47	------
30	4.45	------	4.48	4.46	4.49	4.53	4.55	------	------	------	4.46	------
31	4.45	------	------	------	4.50	------	4.58	------	------	------	------	------

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-2—Continued

1963

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	------	4.69	4.70	------	4.78	4.78	4.82	4.80	------	------	------	------
2	------	4.69	4.69	------	4.78	4.77	4.83	4.86	------	------	------	------
3	------	4.69	4.68	------	4.78	4.79	4.83	4.78	------	------	------	------
4	------	4.69	4.68	------	4.78	4.79	4.83	4.78	------	------	------	------
5	------	4.68	4.69	------	4.78	4.78	4.82	4.45	------	------	------	------
6	------	------	4.69	4.75	4.78	4.79	4.82	4.54	------	------	------	------
7	------	------	4.69	4.75	4.78	4.79	4.82	------	------	------	------	------
8	------	------	------	4.74	4.78	4.78	4.82	------	------	------	------	------
9	------	------	------	4.74	4.78	4.78	4.79	------	------	------	------	------
10	------	------	------	4.75	4.78	4.78	4.78	------	------	------	------	------
11	------	------	------	4.75	4.78	4.78	4.80	------	------	------	------	------
12	------	------	------	4.75	4.78	4.78	4.81	------	------	------	------	------
13	------	------	------	4.75	4.77	4.78	4.82	------	------	------	------	------
14	------	------	------	4.76	4.78	4.78	4.82	------	------	------	------	------
15	------	------	------	4.76	4.78	4.78	4.82	------	------	------	------	------
16	------	------	------	4.77	4.78	4.78	4.82	------	------	------	------	------
17	------	------	------	4.77	4.78	4.78	4.83	------	------	------	------	------
18	------	------	------	------	4.78	4.79	4.83	------	------	------	------	------
19	------	------	------	------	4.79	4.80	4.83	------	------	------	------	------
20	------	------	------	------	4.79	4.80	4.83	------	------	------	------	------
21	------	4.65	4.65	------	4.78	4.81	4.81	------	------	------	------	------
22	------	4.67	4.67	------	4.79	4.81	4.81	------	------	------	------	------
23	------	4.67	4.67	4.77	4.79	4.82	4.80	------	------	------	------	------
24	------	4.67	4.67	4.77	4.79	4.82	4.83	------	------	------	------	------
25	------	4.67	4.67	4.77	4.79	4.82	4.83	------	------	------	------	------
26	------	4.64	4.84	4.72	4.79	4.82	4.84	------	------	------	------	------
27	------	4.53	4.53	4.73	4.79	4.82	4.84	------	------	------	------	------
28	------	------	------	4.77	4.79	4.82	4.83	------	------	------	------	------
29	------	------	------	4.77	4.79	4.82	4.83	------	------	------	------	------
30	4.69	------	------	------	4.79	4.82	4.82	------	------	------	------	------
31	4.69	------	------	------	4.79	------	4.83	------	------	------	------	------

TRANSPIRATION WELL T-3

1959

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.03	2.32	2.54	2.57	2.63	2.62	2.67	2.00	2.27	2.35	------	2.30
2	2.02	2.34	2.54	2.58	2.62	2.63	2.67	2.11	2.27	2.36	2.23	2.30
3	2.00	2.34	2.54	2.58	2.60	------	2.70	2.11	------	2.37	2.23	2.30
4	2.00	2.33	2.54	2.58	2.60	------	2.71	2.14	------	2.38	2.32	2.30
5	1.97	2.34	2.53	2.58	------	2.66	2.72	2.15	------	------	2.33	2.30
6	1.99	2.38	2.54	2.59	2.64	2.67	2.75	2.14	2.27	2.37	2.34	2.30
7	1.93	2.39	2.54	2.58	2.64	2.68	2.76	2.15	2.28	2.37	2.34	2.30
8	1.98	2.28	2.54	2.58	2.65	2.68	2.76	1.64	2.28	2.38	2.36	2.30
9	2.01	------	2.54	2.59	2.64	2.69	2.75	1.92	2.28	2.37	2.36	2.29
10	2.04	2.28	2.55	2.59	2.65	2.69	2.74	1.59	2.18	2.37	2.35	2.31
11	2.07	2.35	2.55	2.59	2.66	2.70	2.72	1.58	2.20	2.37	2.34	2.32
12	2.10	2.35	2.55	2.59	2.66	2.69	2.71	2.07	------	2.37	2.34	2.32
13	------	2.39	2.55	------	------	2.68	2.74	2.12	------	2.37	2.34	------
14	2.15	2.42	2.55	2.60	------	2.70	2.74	2.14	------	2.37	2.34	------
15	2.17	2.45	2.55	2.60	------	2.71	2.73	2.15	2.40	2.38	2.33	------
16	------	2.47	2.55	2.60	------	2.71	2.68	2.16	2.41	2.38	2.33	------
17	------	2.48	2.55	2.60	------	2.72	2.65	2.06	2.41	2.38	2.33	------
18	------	2.49	2.55	2.60	------	------	2.65	1.78	2.41	------	2.32	------
19	2.20	2.49	2.55	2.61	------	2.67	2.66	2.08	2.41	------	2.32	2.37
20	2.20	2.49	2.56	2.61	------	2.66	2.69	2.16	2.42	------	2.32	2.37
21	2.19	2.44	2.56	2.61	------	2.67	2.67	2.20	2.42	------	2.31	2.37
22	2.22	2.46	2.56	2.62	------	2.68	2.66	2.21	2.42	------	2.31	2.40
23	------	2.51	2.56	2.62	------	2.72	2.67	2.21	2.42	2.35	2.31	2.40
24	------	2.52	2.56	2.62	------	2.74	2.65	2.21	2.42	2.35	2.30	2.37
25	------	2.53	2.56	2.62	------	2.77	2.63	2.23	2.42	2.37	2.31	2.36
26	2.25	2.54	2.56	2.58	------	2.73	2.66	2.24	2.42	2.38	2.31	2.41
27	2.26	2.54	2.56	2.61	------	2.71	2.67	2.25	2.42	2.40	2.31	2.42
28	2.26	2.54	2.56	2.62	------	2.70	2.72	2.26	2.42	2.41	2.30	2.43
29	2.26	------	2.57	2.62	2.61	2.70	2.68	2.26	2.41	2.40	2.30	2.43
30	2.25	------	2.57	2.63	2.62	2.69	2.68	2.26	2.40	2.34	2.30	2.45
31	2.28	------	2.57	------	2.63	------	2.21	2.17	------	------	------	------

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-3—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1960												
1	------	------	2.35	2.77	2.84	------	2.90	2.91	2.67	2.74	------	2.65
2	------	------	2.37	2.77	------	------	2.91	2.94	2.79	2.73	------	2.66
3	------	2.58	2.60	------	------	------	2.91	2.95	------	2.72	------	2.66
4	------	2.58	2.64	2.79	2.79	------	2.88	2.95	2.61	2.71	2.60	2.67
5	------	2.58	2.66	2.79	2.80	------	2.86	2.90	------	2.71	2.54	2.68
6	------	2.59	2.67	------	2.86	------	------	2.81	2.71	2.71	2.46	2.65
7	------	2.59	2.67	------	2.86	------	------	2.83	2.76	2.71	------	2.68
8	------	2.59	2.67	------	2.87	------	------	2.88	2.78	2.69	------	2.71
9	------	2.58	2.67	------	2.88	------	------	2.87	2.80	2.66	------	2.72
10	------	2.55	2.67	------	2.88	------	2.85	2.85	2.79	2.61	------	2.72
11	------	2.58	2.67	2.81	------	------	2.83	2.85	------	2.64	------	2.74
12	2.40	2.59	2.67	2.80	2.89	2.91	2.86	2.86	2.81	2.65	------	2.74
13	2.43	2.60	2.67	2.81	2.89	2.91	2.88	2.88	2.82	2.65	------	2.74
14	2.47	2.60	2.67	2.81	2.88	2.93	2.88	2.93	2.83	2.63	2.61	2.74
15	2.48	2.60	2.67	2.81	2.88	2.94	2.89	2.96	2.82	2.62	2.61	2.75
16	2.49	2.60	2.67	2.82	2.88	2.93	2.91	2.93	2.82	------	2.62	2.75
17	2.48	2.59	2.67	2.82	2.88	2.93	2.91	2.95	2.82	------	2.62	2.75
18	------	2.60	2.67	------	2.88	2.94	2.80	2.97	2.82	------	2.62	------
19	------	2.58	2.68	2.82	2.88	2.96	2.81	2.97	2.81	------	2.62	------
20	------	2.60	2.69	2.83	2.88	2.97	2.79	2.92	2.81	------	2.63	------
21	------	2.61	2.70	2.83	2.89	2.98	2.78	2.87	2.82	2.65	2.63	------
22	------	2.62	2.72	2.83	2.89	2.99	2.80	2.77	2.81	2.66	2.62	------
23	------	------	2.69	2.81	2.88	------	2.81	2.86	2.80	------	2.62	------
24	------	------	2.71	2.82	2.88	2.98	2.83	2.88	2.80	------	2.63	------
25	------	------	2.72	2.82	2.88	2.95	2.87	2.89	2.80	2.65	2.63	------
26	------	------	2.74	2.83	------	2.94	2.85	2.90	2.79	2.65	2.62	------
27	------	------	2.74	2.80	------	2.92	2.83	2.91	2.78	2.65	2.60	------
28	------	------	2.74	2.81	------	2.93	2.84	2.91	2.77	2.64	2.63	------
29	------	2.52	2.74	2.82	------	2.92	2.87	2.90	2.76	2.64	2.64	------
30	------	------	2.76	2.83	------	2.92	2.84	2.90	2.76	2.64	2.64	------
31	------	------	2.76	------	------	------	2.86	2.85	------	2.64	------	------
1961												
1	------	------	------	------	2.75	2.76	2.78	------	------	2.01	2.44	2.56
2	------	------	------	2.80	2.75	2.76	2.72	------	------	2.02	2.45	2.57
3	------	------	------	2.80	2.75	2.76	2.70	------	------	2.03	2.45	2.58
4	------	------	------	2.80	2.75	2.76	------	------	------	2.04	2.45	2.58
5	------	------	------	2.80	2.74	2.76	------	------	------	2.05	2.45	2.58
6	------	2.95	2.84	2.79	2.74	2.76	------	3.14	------	2.07	2.45	2.58
7	------	2.95	2.84	2.77	2.74	2.76	------	3.13	------	2.08	2.45	2.58
8	------	2.96	2.83	2.77	2.74	2.76	2.78	3.15	------	2.09	2.45	2.59
9	------	------	2.83	------	2.74	2.75	2.77	3.15	------	2.10	2.45	2.60
10	------	------	2.83	2.79	2.74	2.75	2.79	------	------	2.11	2.46	2.61
11	------	------	2.82	2.79	2.75	------	2.80	------	------	2.12	2.46	2.61
12	------	2.97	2.82	------	2.75	------	2.82	------	------	2.13	2.46	2.61
13	------	2.98	2.82	------	2.75	------	2.80	------	------	2.14	2.46	2.61
14	------	2.98	2.82	------	2.75	------	2.77	------	------	2.16	2.45	2.62
15	------	2.98	2.82	------	2.75	------	2.79	------	------	2.19	2.45	2.62
16	------	2.98	2.82	------	2.76	------	2.80	------	------	2.23	2.45	2.62
17	------	2.97	2.82	2.77	2.76	------	2.77	------	------	2.26	2.45	2.61
18	------	2.97	2.81	2.77	2.76	------	------	------	------	2.30	2.45	2.62
19	------	2.96	2.81	2.77	2.76	------	------	------	------	2.33	2.45	2.62
20	------	2.95	2.81	2.77	------	------	------	------	------	2.37	2.46	2.63
21	------	2.94	2.81	2.77	2.77	------	------	------	------	2.40	2.45	2.63
22	------	2.93	2.81	2.77	2.77	------	------	------	------	2.41	2.44	2.64
23	------	2.92	2.81	2.76	2.77	------	2.84	------	------	2.41	2.43	2.65
24	------	2.91	2.81	2.76	------	------	2.81	------	1.86	2.42	2.43	2.65
25	------	------	2.80	2.76	------	------	2.84	------	1.89	2.42	2.44	2.65
26	------	------	------	2.76	------	2.75	2.84	------	1.91	2.42	2.46	2.65
27	------	------	2.81	2.76	------	2.78	------	------	1.93	2.42	2.47	2.66
28	------	------	2.80	2.76	2.76	2.79	------	------	1.96	2.43	2.49	2.66
29	------	------	2.79	2.75	2.75	2.79	------	------	1.98	2.44	2.51	2.66
30	------	------	------	2.75	2.76	2.79	------	------	2.00	2.44	2.54	2.66
31	------	------	------	------	2.76	------	------	------	------	2.44	------	2.66

TABLE 10.—*Mean daily water levels from recorder charts, in feet below land-surface datum*—Continued

TRANSPIRATION WELL T-3—Continued

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1962												
1	2.66	2.65	2.80	------	3.02	3.07	3.07	3.00	------	------	3.16	3.28
2	2.66	2.65	------	------	3.02	3.06	------	3.02	------	------	3.16	------
3	2.67	2.65	------	------	3.02	3.06	------	3.00	------	------	3.16	------
4	2.67	2.65	2.80	------	3.03	3.07	------	3.03	------	------	3.15	------
5	2.67	2.65	2.80	------	3.03	------	------	3.06	------	------	3.15	------
6	2.67	2.65	2.80	------	3.03	------	------	3.07	------	------	3.15	------
7	2.68	2.65	2.80	------	3.03	3.06	------	3.05	------	------	------	------
8	2.68	2.65	2.80	2.99	3.03	3.07	------	3.05	------	------	------	------
9	2.68	2.65	2.80	2.98	3.03	3.07	------	3.01	------	------	------	------
10	2.68	------	2.80	3.00	------	3.08	------	3.04	------	------	------	------
11	2.68	------	2.80	3.00	------	3.08	3.03	3.05	------	------	------	------
12	2.68	------	2.80	3.01	------	3.09	3.04	3.06	------	------	------	------
13	2.67	------	2.80	3.01	------	3.09	3.07	3.06	3.03	------	------	------
14	2.66	------	2.80	3.01	------	3.09	3.05	3.02	3.01	------	------	------
15	2.65	------	2.80	3.02	------	3.06	3.06	3.02	3.00	------	------	------
16	2.64	------	2.80	3.02	------	3.04	3.09	------	3.02	------	------	------
17	2.65	------	2.80	3.02	------	3.03	3.09	------	3.03	------	------	------
18	2.65	------	2.80	3.02	------	3.03	3.11	------	3.04	------	------	------
19	2.65	------	2.80	3.02	------	3.04	3.10	------	3.05	------	------	------
20	2.66	------	2.80	3.02	------	3.04	3.10	------	------	------	------	------
21	2.65	------	2.80	3.02	------	3.06	3.06	------	------	------	------	------
22	2.64	------	2.80	------	------	3.06	3.02	------	------	------	------	------
23	2.65	------	2.80	3.01	------	3.06	3.04	3.04	------	------	------	------
24	2.66	------	2.80	3.01	3.08	3.07	------	3.05	------	------	------	------
25	2.66	------	2.80	3.01	3.08	3.07	------	3.05	------	------	------	------
26	2.65	2.80	2.80	3.01	3.08	3.07	------	3.07	------	------	------	------
27	2.65	2.80	2.80	3.01	3.08	3.07	------	3.07	------	------	------	------
28	2.65	2.80	2.80	3.02	3.08	3.02	------	3.07	------	------	3.25	------
29	2.65	------	2.80	3.02	3.06	3.00	2.92	3.07	------	------	3.26	------
30	2.65	------	2.80	3.02	3.06	3.06	2.97	------	------	------	3.27	------
31	2.65	------	------	------	3.07	------	2.99	------	------	3.16	------	------

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