STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

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EARL WARREN, Governor

FRANK B. DURKEE, Director of Public Works

A. D. EDMONSTON, State Engineer

REPORT ON WATERMASTER SERVICE IN BUTTE CREEK WATERMASTER SERVICE AREA

Butte County, California

1951 SEASON

Sacramento, California

July, 1952

ORGANIZATION

Frank B. Durkee . . . . . Director of Public Works

A. D. Edmonston . . . . . State Engineer

Gordon Zender . . . . . Assistant State Engineer

This report was prepared under the direction of

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Supervising Hydraulic Engineer

By

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SUBMISSION TO, AND ADOPTION BY
DEPARTMENT OF PUBLIC WORKS

I, L. C. Jopson, Supervising Hydraulic Engineer, Division of Water Resources, Department of Public Works of the State of California, submit this "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1951 Season".

/s/ L. C. JOPSON
Supervising Hydraulic Engineer

I, Gordon Zander, Assistant State Engineer, Division of Water Resources, Department of Public Works of the State of California, approve this "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1951 Season".

/s/ GORDON ZANDER
Assistant State Engineer

I, A. D. Edmonston, State Engineer and Chief of the Division of Water Resources, Department of Public Works of the State of California, approve and adopt this "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1951 Season", as a report of the Department of Public Works.

WITNESS my hand and the seal of the Department of Public Works of the State of California, this 31st day of July, 1952.

DEPARTMENT OF PUBLIC WORKS

By /s/ A. D. EDMONSTON
A. D. Edmonston
State Engineer

(SEAL)

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INTRODUCTION

The Butte Creek Watermaster Service Area, which includes the water rights on Butte Creek between its confluence with Little Butte Creek and the Western Canal Crossing at Western Dam near Nelson Dam, was created by order of the State Engineer on January 7, 1943. The water rights within the service area are set forth in the Butte Creek decree No. 18917, entered by the Superior Court, Butte County, California, on November 6, 1942.

Watermaster service, as provided in Part 4 of Division 2 of the Water Code of California, was commenced for the 1951 season on June 1 and terminated September 30. J. Victor Scammon, Deputy Watermaster, was in charge of the distribution of water under the direction of P. E. Stephenson, Senior Hydraulic Engineer.

WATER SUPPLY

Precipitation

Monthly precipitation data at Chico, California as compiled from records of the U. S. Weather Bureau are presented in Table 1. The total precipitation for the 1950-51 season was 109.7 per cent of the 81-year mean.

Stream Flow

Water supply and diversion records were collected at nine stations equipped with water stage recorders in 1951. The location of the stations and their purposes are as follows:

Butte Creek U.S.G.S. Station below Covered Bridge

This station, located below the confluence of Butte Creek and Little Butte Creek, is used to measure the combined foreign water and natural flow which is available at the Parrott Dam located two and one-half miles downstream.

The discharge at the station is comprised of natural flow of Butte Creek and foreign water brought into the stream system from the West Branch of Feather River. The foreign water is controlled by the Pacific Gas and Electric Company and is released into Butte Creek as needed to supply the power demands of that company. The daily mean discharge from May 1 through September 30 is set forth in Table 2.

Hendricks Canal

This station is located a short distance above the confluence of the Hendricks Canal with the Butte Creek Canal above De Sabla Reservoir. The discharge at the station consists of foreign water brought into the Butte Creek Watershed. The daily mean discharge from May 22 through September 26 is set forth in Table 3.

Parrott Ditch

This station is located near the head of the Parrott Ditch above the Crouch and Hale takeouts. The record of discharge shows the amount of water diverted for the use of the Parrott, M. & T. Inc., Dayton Mutual Water Company and Miller (Hale) interests. The daily mean discharge from May 5 through September 27 is set forth in Table 4.

Butte Creek below Parrott Ditch

This station is located immediately below the Parrott Dam. The record of discharge shows the water supply available for filling the natural flow rights on Butte Creek below the Parrott Ditch. The daily mean discharge from May 21 through September 27 is set forth in Table 5.

Upper Colony Ditch

This station is located near the head of the Upper Colony Ditch. The record of discharge shows a portion of the water diverted by the Durham Mutual

Water Company. The daily mean discharge from May 23 through September 27, is set forth in Table 6.

Butte Creek above Lower Colony Dam

This station is located on Butte Creek between the Baxter Pump and the Lower Colony Dam. The record of discharge shows the water supply available for diversion by the Lower Colony, Brandt, Adams, Gorrill, and White diversions. The daily mean discharge from June 1 through September 27 is set forth in Table 7.

Lower Colony Ditch

The Lower Colony Ditch is used by the Durham Mutual Water Company to divert the portion of its water not taken through the Upper Colony Ditch. Diversion is by means of a submerged orifice with varying water levels both above and below the orifice. Two recorders were installed, one to measure the water level above the orifice and the other to measure the discharge water level. The daily mean discharge was computed as the flow through an orifice with a head equivalent to the difference in the two water levels. The orifice area is controlled by a screw gate which was locked. Current meter measurements taken during 1950 and 1951 established the coefficient of the orifice as 0.70.

The daily mean discharge from June 1 through September 27 is set forth in Table 8.

Butte Creek at Durham Bridge

This station is located on Butte Creek below the Oroville-Durham highway bridge. The record of discharge shows the water supply available for diversion at the Brandt pump, Roy White pump, Adams Ditch, Gorrill Ditch and E. E. White pumps. The daily mean discharge from May 15 through September 27 is set forth in Table 10.

Butte Creek below Adams Dam

This station is located on Butte Creek immediately below the Adams Dam. The record of discharge shows the water supply available for diversion by the Roy White, the Gorrill and the E. E. White ranches. The daily mean discharge from May 24 through September 27 is set forth in Table 11.

DISTRIBUTION OF WATER

General

Distribution during the 1951 irrigation season was based upon the water supply available at the U.S.G.S. gaging station. The flow at this station comprises natural flow of Butte Creek and foreign water brought in from the West Branch of Feather River through the Hendricks Canal.

In utilizing the water for power generation above the gaging station it is the practice to pass Butte Creek water through at all times without fluctuation. The foreign water, however, is regulated through De Sabla Reservoir and the power plants to supply peak power demands resulting in wide variations in discharge during periods of low flow.

Prior to about June 26, the natural flow of Butte Creek plus foreign water was large enough to provide near maximum capacity flow through the De Sabla and Centerville power plants. Little fluctuation of flow occurred due to the foreign water during this period.

After June 26, the total water available at the De Sabla Power Plant was less than that required for continuous operation and it was necessary for the power company to regulate the foreign water by storage in De Sabla Reservoir during periods of low power demands and draw on this storage to supply the peak power demands. The result of this operation was an increasing fluctuation of flow in Butte Creek at the U.S.G.S. gaging station as the water supply decreased.

Since the amount of foreign water released from De Sabla Reservoir varied from day to day it was necessary to average the daily discharge at the U.S.G.S. station over a seven day period and deduct the like average discharge of the Hendricks Canal in order to determine the natural flow of Butte Creek. Table 12 has been prepared to show this computation. The seven day period used extended from Monday through Sunday as the reservoir was generally recharged over the week ends.

Foreign water delivered into the Butte Creek stream system from the West Branch of Feather River varied from a high of 60 cubic feet per second the forepart of June to 37 cubic feet per second during the second week in July. Beginning about July 14, the supply of foreign water was increased by the release of stored water from Philbrook and Round Valley Reservoirs into the system. Thereafter the flow of foreign water was maintained at about 45 cubic feet per second for the remainder of the season.

The natural flow of Butte Creek varied from a high of about 190 cubic feet per second during the first week in June to a low of 76 cubic feet per second in mid August. Prior to July 5, some water was available for "surplus class" rights but after that date the entire supply was diverted for use by the rights set forth in Schedule 7 of the Butte Creek decree. During the lowest period of flow, water was available for only 76 per cent of the first priority rights in the schedule.

Parrott Diversion

According to the "Memorandum and Order" entered May 10, 1949 by the Superior Court, Butte County, the full natural flow allotment of the users below Parrott Dam must be provided at all times without undue fluctuations caused by the intermittent presence of foreign water. In order to better accomplish this regulation a combination wier and orifice structure was placed in the head of the

Parrott Ditch.

This structure was adjusted so that, during periods of daily low flow (i.e. when no foreign water was present) the natural flow allotment of the Parrott Ditch passed through the orifice into the ditch and the remainder of the flow passed through the Parrott Dam for downstream users. During periods of high flow (i.e. when foreign water was present) the water level above the Parrott Dam rose and allowed the major portion of the foreign water to flow freely over the weir into the ditch.

During the time that water was discharging over the weir, the increased water level above the Parrott Dam also forced more water through the openings in the Parrott Dam which had been adjusted for low flow conditions. A daily average flow of about 10 cubic feet per second of foreign water was lost to the Parrott Ditch in this manner.

U. S. Plant Garden Pump

The Plant Garden Pump, rated at 1,000 g.p.m., operated approximately six hours a day, five days a week throughout the 1951 season. This represents a use considerably less than their allotment (2.0 c.f.s. 1st priority) and consequently no regulation of this diversion was required.

Compton-Entler-Marybill Ditch and the Upper Colony Ditch

These two diversions are located on opposite sides of Butte Creek immediately above the Upper Colony Dam.

The Compton-Entler-Marybill Ditch was regulated to divert its full first priority allotment of 10 cubic feet per second on June 15. A subsequent regulation on August 15, reduced the flow to 8 cubic feet per second which was maintained the remainder of the season.

The Durham Mutual Water Company elected to divert approximately 60 per cent of the water to which it was entitled through the Upper Colony Ditch and

regulation was made throughout the season on this basis. The remainder of its water and the allotments of the diverters below the Upper Colony Dam were passed over and through the Upper Colony Dam along with the foreign water which had passed Parrott Dam.

Van Nuys, Wakefield and Baxter Pumps

These pumps, located between the Upper and Lower Colony Dams, have an aggregate total first priority allotment of 4.61 cubic feet per second. The pumps operate largely during the daylight hours and divert an average amount somewhat less than their continuous flow allotment. No regulation was required in 1951.

Lower Colony Ditch

The Lower Colony Dam was maintained at a height of about three and one-half feet thus providing considerable storage in the rather flat channel behind the dam. The Lower Colony Ditch headgates were regulated to provide the Durham Mutual Water Company with the remainder of the water to which it was entitled until September 26 when the ditch was closed for the season.

Occasionally, for short periods of time, the flow reaching the pool above the Lower Colony Dam was less than the amount required to fill allotments due to the Van Nuys, Wakefield and Baxter pumps diverting an amount in excess of their continuous flow allotments for a portion of the day. During such periods the amount of water necessary to supply the remainder of the water to which the users from the Lower Colony Dam were entitled was drawn from the storage in the pool. The flow reaching the pool during the night when the pumps were not operating was sufficient to replace the storage.

The foreign water passing Parrott Dam caused an average fluctuation of about three cubic feet per second between "high" and "low" flow in the Lower Colony Ditch.

A daily mean of approximately six cubic feet per second of the foreign water passed below the Lower Colony Dam and was picked up at the Adam's Dam for use on the lands of E. L.Adams.

The amount diverted by the Durham Mutual Water Company is set forth in Table 10. A comparison of the total allotment to the amount diverted is shown graphically on Plate III.

SUMMARY

The requirements set forth in the court "Memorandum and Order", dated May 10, 1949, were complied with during the 1951 season and such compliance resulted in a loss to the Parrott Investment Company, M. & T. Corp., and the Dayton Mutual Water Company of approximately 10 cubic feet per second of the foreign water present in the Butte Creek stream system. This appeared to be about as low a loss of foreign water as was possible with the available facilities for controlling the power generation induced fluctuation in flow. The method of controlling the flow into the Parrott Ditch in 1951 was the same as that used in 1950. It consisted of a temporary "weir-orifice" structure in the intake of the conduit.

Subsequent to the 1951 irrigation season a permanent "weir-orifice" structure was built in the intake of the ditch to provide a longer weir crest for the passage of the foreign water. A total length of crest of 32 feet is provided in the new structure. Continuous diversion of the natural flow allotment to the Parrott Ditch is by means of a submerged orifice. The new structure should decrease the fluctuations in Butte Creek below Parrott Dam materially over past years and permit a greater portion of the foreign water to enter the Parrott Ditch.

The hydrographs on Plates 1, 2 and 3 show the daily mean flow of Butte Creek at the U.S.G.S. station, Butte Creek below the Parrott Ditch, Parrott Ditch and combined diversion by the Upper and Lower Colony Ditches together with minimum daily flows and allotments at all except the U.S.G.S. station.

CHANGES IN OWNERSHIP OF LANDS AND WATER RIGHTS

The changes in ownership of lands and water rights, which occurred subsequent to filing "Statement for Butte Creek Watermaster Service Area, County of Butte, State of California, for 1951", and which have been included in the statement for said service area for 1952 are listed in the following tabulation:

Tract No.	Name of Water Right Owner Appearing in 1951 Statement	Name and Address of Water Right Owner to Appear in 1952 Statement	Water c.f.s.
13-9	White, Roy	Gooch, Milfred W.	0.66
13-21	Atkins, Barbara Ina	Atkins, Lester J. and Buck, Barbara Ina	0.36
13-21	Atkins, Barbara Ina	Logan, Russell P. and Logan, Helen	0.01
13-23	Atkins, Barbara Ina	Atkins, Lester J. and Buck, Barbara Ina	0.18
13-23	Atkins, Barbara Ina	Wakefield, Varney F.	0.25

PLATE I

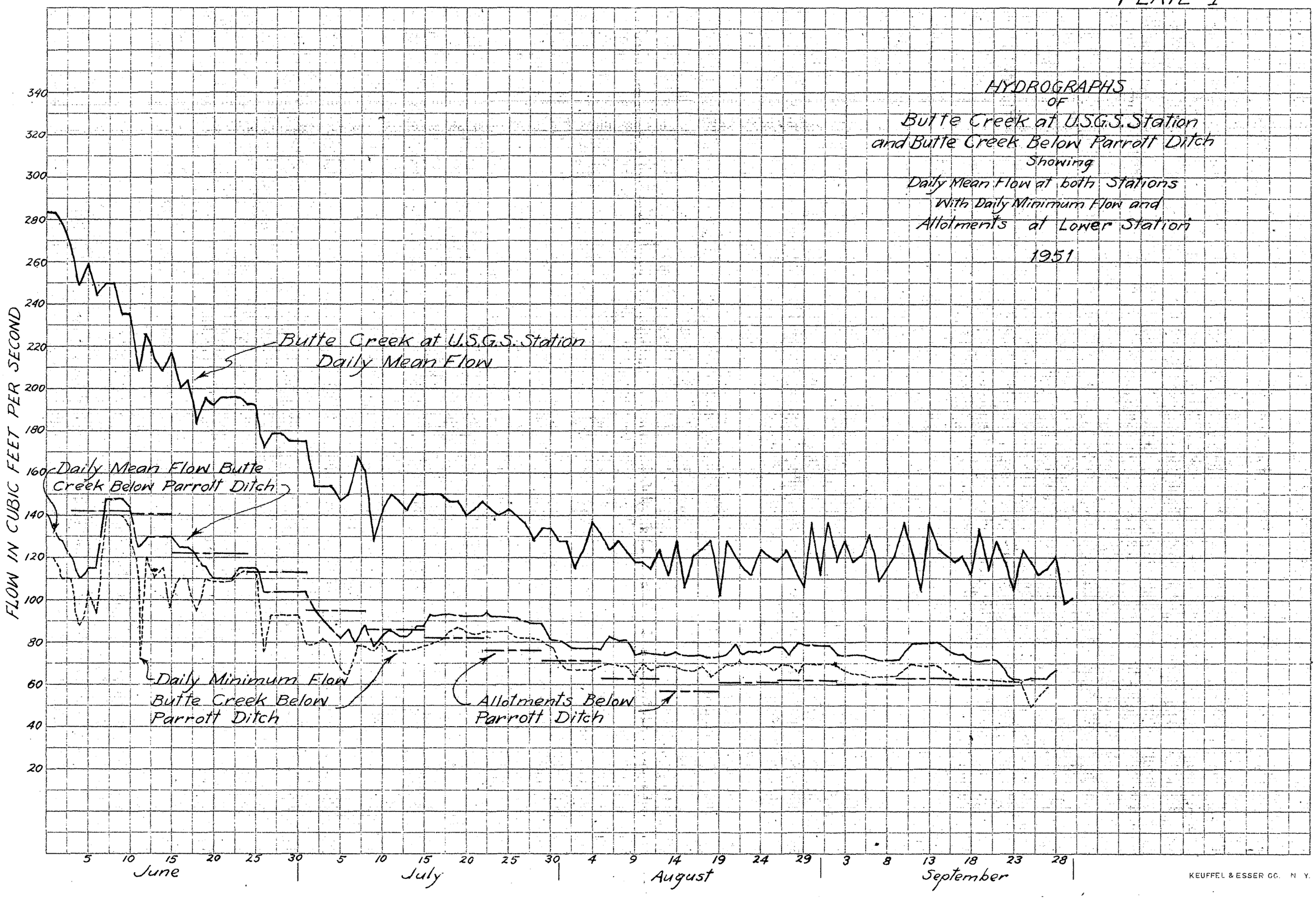

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PLATE II

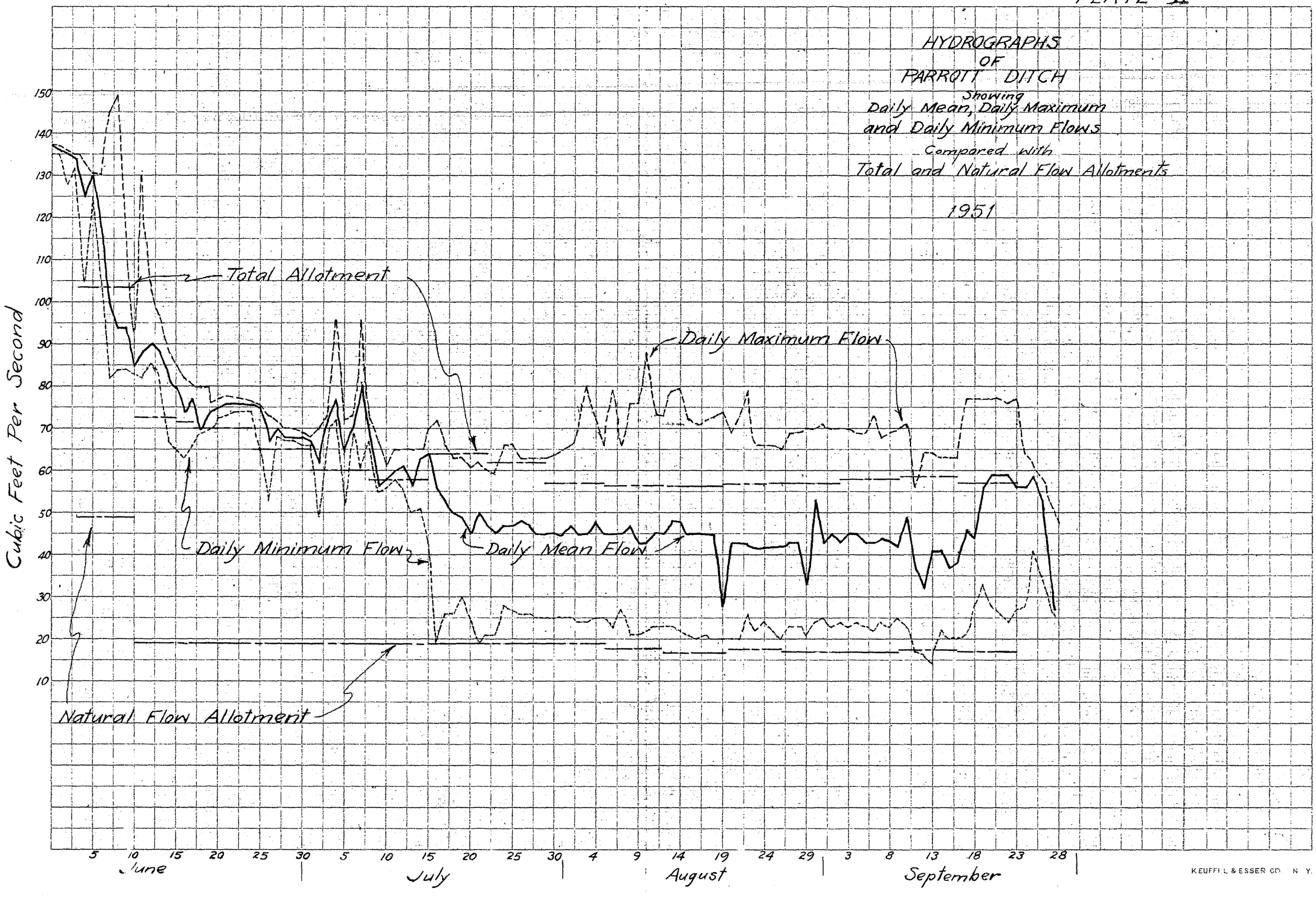

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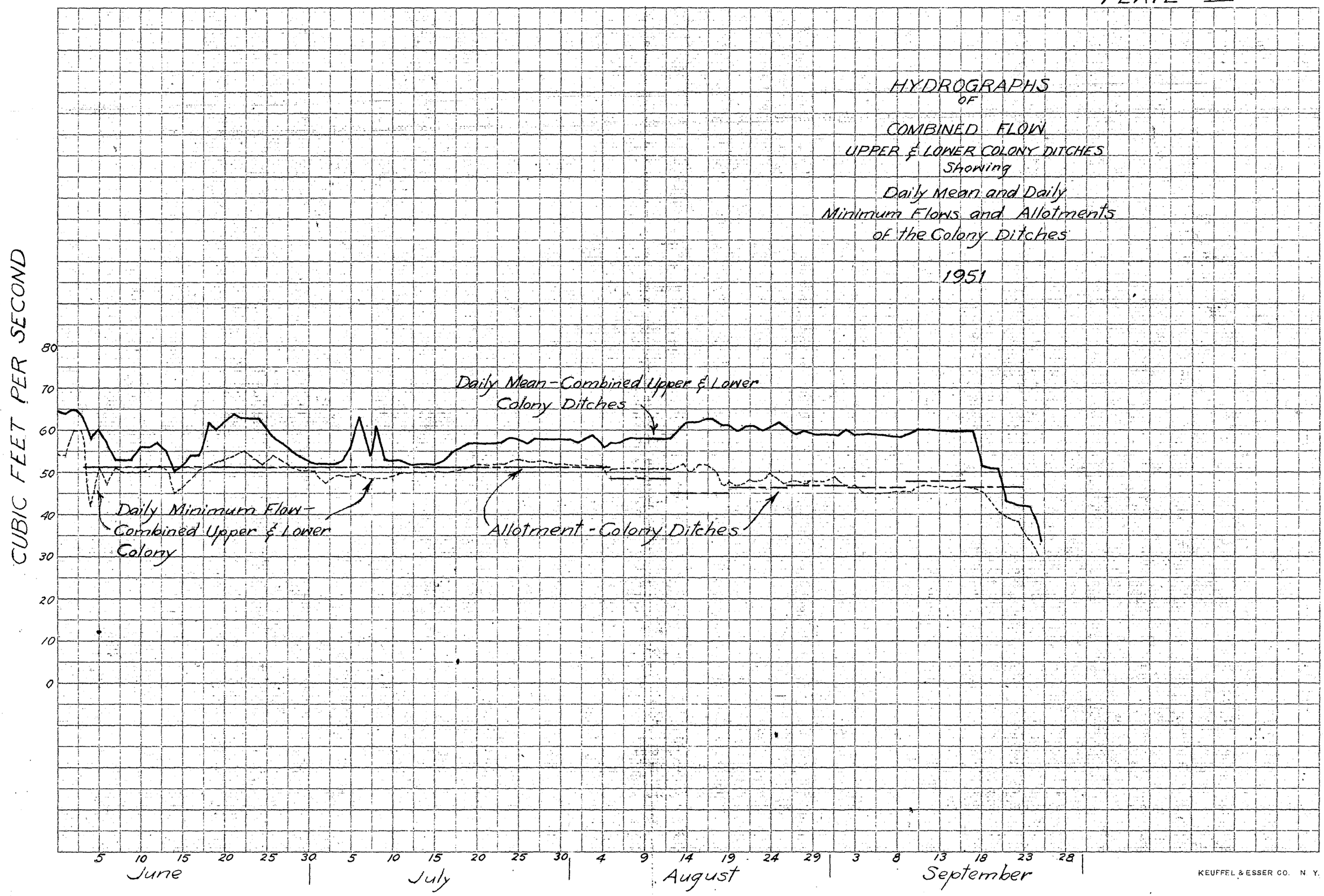
PLATE III



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