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MINOR FLOODS OF 1938 IN THE NORTH ATLANTIC STATES

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CONTENTS

Page

ILLUSTRATIONS

Page

TABLES

MINOR FLOODS OF 1938 IN THE NORTH ATLANTIC STATES

ABSTRACT

Five noteworthy floods occurred during 1938 in the North Atlantic States. The first flood was in January, the others were in June, July, August, and September. The floods of January, June, and August were relatively local events in Connecticut, New Jersey, and New York, respectively. The floods of July and September were widespread, reaching from New Jersey and New York to New Hampshire in generally coincident locations. The flood of September, the most severe, is described in appropriate detail in Water-Supply Paper 867; the others in this volume are in separate sections arranged chronologically.

Extraordinary floods in Connecticut during January 1938 resulted from a critical combination of warm rainfall and virtual overnight melting of the accumulated snowfall of winter. Seven small streams in central and western Connecticut rose to levels on January 25 higher than those reached during the great floods of March 1936. Crest discharge of these streams approximated 100 second-feet per square mile. Ice cover was loosened and sent downstream in recurrent jams. In general, the larger rivers did not attain extraordinary stages. The Connecticut River at Hartford peaked at a stage 3.6 feet above ordinary flood level. Direct damage by the flood was relatively small. Snow cover on January 20, at the beginning of the rains, varied from 0.25 inch along the coast to 2.75 inches water equivalent in the northern part of the State. Precipitation between January 24 and 26 exceeded 2.75 inches in only three small areas. Total supply as water in snow and precipitation did not exceed 4.8 inches over any tributary area. Maximum measured flood run-off was 2.7 inches.

The flood of June 1938 in New Jersey was the immediate result of a 30-hour rainstorm on June 26-27 that centered along a line extending from Odessa, Del., to Milton, N. J. Storm rainfall exceeded 5 inches over a total area of 2,900 square miles. River stages in the central parts of the storm area rose to levels that approached and on a few rivers exceeded previous maxima of record. Damage was extensive throughout the storm area, especially in Burlington, N. J., where Sylvan Lake Dam failed. The highest rate of flow per unit of area measured was 88 second-feet per square mile. However, all peak discharges were exceeded during the later floods of 1938 or by the flood of September 1, 1940, which produced discharges over 1,000 second-feet per square mile in southern New Jersey. The maximum volume of direct runoff during the flood, expressed in mean depth in inches on the drainage area, was 2.1 inches.

From July 17 to 25, 1938, there was an irregular series of rainstorms over the eastern seaboard that brought more than 10 inches of rain over an area of 2,000 square miles and more than 6 inches over 23,000 square miles. Nearly 14 inches of rain fell at Long Branch, N. J. Extraordinary floods occurred mainly in the smaller tributary streams. Damage to highways, homes, factories, and crops, particularly the tobacco crop in Connecticut, was extensive. Crest discharges at 12 gaging stations exceeded those previously observed. Maximum rates of discharge varied from 601 second-feet per

square mile for an area of 2.91 square miles in New Jersey to 35 second-feet per square mile for an area of 711 square miles in Connecticut. Antecedent soil moisture prior to the storm was probably normal or a little above. The maximum volume of direct runoff was 4.75 inches in Massachusetts, 5.6 inches in eastern Connecticut, 6.75 inches in the Catskill Mountain region of New York, and 4.95 inches in the Raritan River Basin of New Jersey. Infiltration indices from 0.09 to 0.21 inch per hour were computed, such rates being within the range defined for basins in the same areas during the floods of September 1938.

The flood of August 6-11, 1938, in the Catskill Mountain region of New York resulted from heavy rains with a maximum of 8 inches at two centers. Rainfall exceeded 3 inches over more than 3,000 square miles. The storm was located over almost the same area as the greater storm of July, which occurred 3 weeks previously. The July storm so diminished the absorptive capacity of the ground that the volumes of runoff and the peak discharges were greater than average, though not of record-breaking magnitude. River stages, particularly in the Delaware River Basin, exceeded those reached in July, but damage in general was not so extensive. Discharges at five gaging stations exceeded 100 second-feet per square mile, and the greatest rate per square mile was 154 second-feet for an area of 12.2 square miles. More than 3 inches of direct runoff was measured at six gaging stations.

The report presents records of stage and discharge at 123 stream-gaging stations, records of storage in many reservoirs, summaries of flood discharges with comparative data, records of daily measurement of precipitation at about 575 places, and records of more frequent observations at about 76 places of measurement. The report also includes basic information in regard to the general weather conditions associated with the floods, analyses of rainfall and runoff, and many other data pertinent to the floods.

INTRODUCTION

Along the North Atlantic seaboard the year 1938 was notable for its sequence of floods. During the first month of the year, widespread floods occurred in Connecticut as a result of a critical combination of rainfall and virtual overnight melting of the accumulated snow of winter. Seven small streams in central and western Connecticut reached higher levels on January 25 than ever previously recorded.

There were three floods during the summer. In the period June 26–27 an area of 2,900 square miles in New Jersey and the adjoining part of Delaware received 5 inches or more of rainfall. River levels in the central part of the storm area rose to heights that approached and on a few rivers exceeded previous maxima of record.

During the period July 17–25 an irregular series of showers and thunderstorms deposited widely varying concentrations of rain over the eastern seaboard from Florida to New Hampshire. Within the storm area north of the Potomac River, where the floods were most severe, total precipitation exceeded 6 inches over 23,000 square miles. As a result, crest discharges at twelve long-established gaging stations exceeded those previously observed, and in general the floods were widespread and severe.

About 2 weeks later, from August 6 to 11, heavy rain again fell over the Catskill Mountain region in an area almost coincident with that of the July storm in the region. Rainfall exceeded 5 inches over an area of 950 square miles. Although the rainfall during the July storm was greater, the retentive capacity of the ground after that storm was so diminished that the runoff from the two storms was comparable in volume. Flood discharges closely approached but did not exceed previously recorded maxima. The floods were highest in the western part of the Catskill Mountains that is tributary to the Delaware River.

The floods and hurricane of September 1938 climaxed this sequence. The damaging effects of a combination of river floods, hurricane winds, and ocean storms produced unsurpassed havoc in the North Atlantic States from New Jersey to New Hampshire. Storm precipitation between September 17 and 21, 1938, averaged 11.5 inches over 10,000 square miles that generally coincided with the area of heavy rain during July. Peak stages in many places exceeded those previously recorded during the outstanding storms of November 1927 and March 1936. The floods of September 1938 are described in detail in Water-Supply Paper 867.

The floods of 1938, occurring in close sequence comparatively soon after the floods of November 1927 in New England, and the widespread inundations of March 1936 impressed upon the inhabitants of the flooded regions, as never before, the seriousness of the problem of controlling and confining flood waters. Each local, State, or Federal organization engaged in formulating plans for protective measures requires sound and adequate basic information relating to the stages, discharges, and other characteristics of these outstanding floods that have affected their particular areas. Such information has been published by the Geological Survey, United States Department of the Interior, for the floods of November 1927, March 1936, and September 1938 in Water-Supply Papers 636-C, 798, and 867, respectively.

This report aims to complete the history of the floods of 1938 for the North Atlantic States. It is divided into four parts, each part treating one of the floods from January to August 1938.

ADMINISTRATION AND PERSONNEL

The field and office work incident to the preparation of this report was performed by personnel of the Water Resources Branch of the Geological Survey under the general administrative direction of N. C. Grover, chief hydraulic engineer, up to the time of his retirement from Government service on January 31, 1939, then under C. G. Paulsen, acting chief hydraulic engineer, until October 17, 1939, and thereafter under G. L. Parker, chief hydraulic engineer. In the Surface Water Division of the branch, administrative direction was under C. G. Paulsen, chief, until April 1940, and thereafter under R. G. Kasel, acting chief.

Engineers in the district offices of the Geological Survey in the States of New Jersey, New York, Connecticut, and Massachusetts prepared the report, as credited in appropriate places in the report, computed the discharge data, and compiled records of stage, precipitation, and other related information concerning the floods in their respective districts. These engineers also prepared descriptions of the floods and general textual discussion. The general review, analysis, and integration of the data, as well as the assembling of the report, were carried on in the Division of Water Utilization, R. W. Davenport, chief, by W. B. Langbein, associate engineer, and M. D. Brands, assistant engineer.

ACKNOWLEDGMENTS

The Geological Survey, acting through its district field offices, cooperates with State and municipal agencies. Acknowledgment is made to these cooperating agencies for participation in the systematic collection of the records of river discharge that form the broad base for the specific flood information and in the maintenance of field organizations in which engineers trained for investigation of this kind were available for the special studies related to the collection of the field data and to the preparation of the report.

Information appearing in this report has been obtained from many sources, including individuals, corporations, and local, State, and Federal governmental organizations. Financial cooperation in connection with the regular river-measurement program of the Geological Survey in the areas covered by this report has been received from the following agencies: In Connecticut, the State Water Commission, the city of New Britain Board of Water Commissioners, and the city of Hartford Flood Investigation and Improvement Commission; in Massachusetts, the Department of Public Works, the Department of Public Health, the Metropolitan District Water Supply Commission, and the Metropolitan District Commission; in New Jersey, the State Water Policy Commission. the North Jersey District Water Supply Commission, and the Delaware River Joint Toll Bridge Commission; in New York, the State Water Power and Control Commission, the State Department of Public Works, the State Department of Conservation, and the New York City Board of Water Supply.

Federal agencies to whom acknowledgments are made for services rendered or data furnished include the Weather Bureau, the Corps of Engineers of the United States Army, the Soil Conservation Service, and the Works Progress Administration. Some financial assistance was rendered by the Federal Emergency Administration of Public Works in accordance with the National Industrial Recovery Act of 1933, through an allotment of funds to the Geological Survey in July 1938 for survey of floods and droughts.

Special assistance in collecting data and furnishing records was also rendered by the Connecticut State Water Commission, the Massachusetts Department of Public Health, the Water Bureau of the Hartford Metropolitan District, the Connecticut Light & Power Co., the Connecticut Power Co., the Hartford Electric Light Co., the Bureau of Engineering of the city of Waterbury, Conn., the Collins Co. of Connecticut, the Water & Aqueduct Co. of Rockville, Conn., the New York City Department of Water Supply, Gas & Electricity, and the Hackensack Water Co. So far as practicable, acknowledgments for individual contributions of information are given at appropriate places in the report.

GENERAL DESCRIPTION OF INFORMATION

ANTECEDENT CONDITIONS

To a considerable extent the foundation of a flood may be laid on the meteorologic events that precede the directly causative storm. In winter the most significant antecedent factors are the amount of snow on the ground and the extent and depth of frost in the ground. Information regarding these important factors is given in the section on the winter flood of January 1938 to which they apply. Of some importance in winter but of transcendary significance in the nonwinter seasons are the factors of soil moisture and ground-water levels, which influence the rate of infiltration into the soil and the volume available for storage in the soil and as ground water. As satisfactory direct measures of these quantities are not generally available, recourse is made to relative or indirect inference from pertinent climatologic data. Monthly variations from normal rainfall and temperatures based on Weather Bureau records are presented as a convenient means for studying seasonal conditions preceding the flood.

Tables of monthly precipitation, departure of monthly precipitation from normal, cumulative departure from normal for 3 or 4 months preceding and including the month in which the flood occurred, and monthly mean temperature and departure from normal are given for each flood. From the data in these tables the trend in soil moisture and ground-water levels can be inferred.

A persistence of above-normal precipitation in combination with below-normal temperature would strongly suggest above-normal soil moisture and hence a condition conducive to a lesser infiltration and retention of water in the soil. Ground-water levels under such a combination would likewise tend to be higher, and therefore available ground-water storage would be correspondingly low. A combination of below-normal precipitation and above-normal temperature would deplete soil moisture, and ground-water levels would recede. This combination of conditions preceded the outstanding storm of September 16–17, 1932, in New England, which, although it averaged more than 9 inches over 2,000 square miles, did not produce any flood. During 1938, however, rainfall was generally above normal, as is evident by the succession of flood-producing rainstorms. Monthly temperatures were both above and below normal, averaging above normal for the whole season. Specific data and conclusions with respect to the effect of antecedent precipitation and temperature are given under the heading "Antecedent conditions" for the respective floods.

Relative monthly soil-moisture changes during the summer of 1938 are presented for the Park River Basin in Connecticut in the section on the flood of July 1938. Similar studies have been given for the Westfield River Basin in Massachusetts.[1] These relative changes were computed from monthly precipitation, temperature, and stream flow by the methods explained in Water-Supply Paper 772[2] and represent evaluations of the fluctuations in climatologic elements on soil moisture.

Ground-water levels were inferred generally from the record of a selected typical observation well. Fluctuations of water level in different wells varied widely, owing to the depth of the well and to the vagaries of geologic, topographic, and water-bearing characteristics. In general, however, the fluctuations were in accordance with the trend in precipitation and temperature, which affect ground-water levels in the same degree as soil moisture.

Areal ground-water levels can be inferred also from rates of base flow as derived from inspection of hydrographs of discharge. This procedure, explained in detail by Youngquist and Langbein,[3]

[1] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, p. 44, fig. 23, 1940.

[2] Hoyt, W. G., and others, Studies of relations of rainfall and runoff in the United States: U. S. Geol. Survey Water-Supply Paper 772, pp. 248–255, 1936.

[3] Youngquist, C. V., and Langbein, Flood of August 1935 in the Muskingum River Basin, Ohio: U. S. Geol. Water-Supply Paper 869, pp. 73–88, 1941.

was utilized in a study of the conditions preceding the flood of July 1938.

PRECIPITATION

Considerable effort was made to collect all available precipitation records within the area covered by this report and also in bounding areas, so that the basic information might be as complete and accurate as possible. These records were furnished by several governmental agencies, public utility companies, and many individuals whose cooperation in this connection is hereby acknowledged. The daily precipitation during the respective storm periods are tabulated herein (tables 1, 13, 21, 33) with appropriate footnotes indicating the time of measurement and the source of the record. The numbers assigned to the rain gages conform to those used in Water-Supply Paper 867.[4] A majority of the records of precipitation were collected by the Weather Bureau and unless otherwise noted were obtained from that source. The other records, received from the sources as credited in the tables, have been of great value in supplementing the data of the Weather Bureau. The rainfall stations are grouped by major drainage basins and subdivided by States. Records in adjoining minor coastal basins are listed under the general heading "Minor basins."

The figures in the tables are the reported amounts of daily precipitation. They are not strictly comparable for the individual days because the observers read their nonrecording gages at different times of day. Much difficulty in interpretation was caused by the non-uniform practice of listing morning readings either for the day on which the observation was made or for the previous day, sometimes without indicating the method used. Comparison of the readings with hourly records from the nearest automatic gages occasionally showed that the readings were not listed in conformity with the tabulating method reportedly in use. Accordingly, the morning readings are listed as furnished, but the footnotes explaining whether the precipitation was measured in the morning of the day indicated or the following day have been adjusted, if necessary, to make the readings conform to recording-station data. Additional notations in the respective tables concerning days for which the precipitation was included in the following measurement, or for which the record was missing, were inserted after careful consideration definitely indicated that they were applicable.

Records of hourly precipitation based on autographic rain gages have also been compiled and presented in tables included in the

[4] Paulsen, C. G., and others, op. cit., pp. 46–61, table 4.

reports on the respective floods. The time of day, so far as ascertainable, is given in these tables as eastern standard, the original records based on daylight saving time having been corrected. Otherwise the records are published as furnished without modification.

All complete precipitation records were used in the preparation of isohyetal maps (pls. 3, 6, 11, fig. 45) of total storm rainfall to show areal distribution. The maps have been reduced to an appropriate scale for publication from the original drawn on Geological Survey base maps (scale 1:500,000). In drawing the isohyets, groups of stations in close proximity were generally averaged, but extra weight was given to some of the more consistent records of the group. The isohyets were interpolated between the points of known precipitation. No weight was given to the influence of topography other than as defined by available records, as time did not permit a thorough analysis of the recorded data with respect to altitude and aspect. The basic data included in this report will enable a reader to make other more detailed analyses if desired.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

One of the foremost purposes of this report is to publish useful, detailed information regarding the stages and discharges of streams during the floods described that will not be available in the summarized records of river discharge published annually in the surface water-supply papers of the Geological Survey. The justification for publication of such detailed information rests upon the recognized need for records of flood behavior that will show not only the mean daily discharge and the maximum rates of discharge during a flood, as usually published for a gaging station, but also the stages and rates of discharge at frequent times throughout the flood period which will make possible the definition of conditions of stage and discharge at all stations in a basin at a given time during the progress of a flood. This detail is essential for intensive and comprehensive studies of the characteristics of floods and promotes the formulation of appropriate plans for flood protection and control. It furnishes basic information for studying the behavior of flood crests, including the incidence of crests from the tributaries of a stream, the progress of flood crests throughout a river system, and other features useful in deriving the elements necessary for forecasting flood heights and for appraising the characteristics of different basins in the shedding of flood waters. Basic information is also provided for the consideration of the feasibility of detention reservoirs, channel improvement, forest management, soil treatment, flood forecasting, and other measures, with respect to their merits for reducing damage and losses caused by floods.

In general, records of gaging stations published in this report relate to those streams on which floods occurred or which are situated adjacent to the margins of the flooded regions and so serve to define the areal extent of the floods.

EXPLANATION OF DATA

The basic data systematically collected at stream-gaging stations consist of records of stage, measurements of discharge, and general information useful in determining the daily flow from the records of gage heights and discharge measurements.

The data presented in this report for each regular stream-gaging station comprise, in general, a description of the station, an upper table showing the daily discharges throughout a 2-month or longer period embracing a sufficient length of time before and after the flood to give a general perspective of the stream-flow conditions, and monthly volume of runoff. A lower table shows the stage and discharge at indicated times during the period of major flood flow in sufficient detail to permit the delineation of reasonably accurate graphs of the instantaneous stage and discharge throughout the flood period. The data are intended to be reasonably complete and explicit with respect to essential information, although they are presented in concise form.

The description of the station gives information concerning the type, location, and datum of the gage, the area of the drainage basin, and the record of gage heights. Information regarding gage heights describes the method of determining the stage during the flood and is of special technical significance because the flood conditions at some localities prevented the use of the usual method of obtaining records of stage and discharge. A statement regarding the stage-discharge relation explains briefly the methods used in the delineation of the rating curve over the ranges of stage in the respective flood and gives information on ice conditions or other factors that affected the stage-discharge relation. The description also includes information about auxiliary methods used in obtaining the discharge, such as by flow through turbines or gates or by venturi meters. The maximum stages and discharges at the gaging station are given for the respective flood and for the indicated period of record prior thereto, and also at some stations for floods antedating such period of continuous record. Miscellaneous notes and comments essential or helpful to an understanding of the record are included as remarks. When pertinent and when records are available, reference is made to daily or monthly records of change of contents of reservoirs and diversion that may be used to adjust the records of observed flow past the river-measurement station.

The lower tables showing stage and discharge at indicated times are designed to present the rise and recession of the flood in detail. In general, each table begins well before the beginning of the major flood rise and continues through the peak, until the flood has largely passed out of the river systems. Eastern standard time is used throughout. This table is accompanied by footnotes of supplemental records of stage and discharge necessary to afford an adequate record for the given river-measurement station.

The stages at the indicated times were obtained from records of continuous water-stage recorders, so far as such records were available. For stations for which the records of stage were intermittent and consisted of a few gage readings a day or for which the records were broken because of some failure in the recording system, stage graphs have been developed on the basis of all available information and the stages at indicated times have been obtained from these graphs.

In addition to records of the regular stream-flow stations, records are also included for the larger regulated reservoirs that affect the flow at regular stations. The data generally were furnished or computed from basic information furnished by the agencies that control the reservoirs. Acknowledgment is made herein for their cooperation in making available this valuable information, which shows the influence of storage reservoirs on flood flows and adds useful data on the characteristics of drainage basins in the shedding of flood waters. The descriptions of the reservoir stations and records are presented as similarly as possible to station descriptions of the regular gaging stations. For some of the reservoir stations, daily records of stage are shown, as well as diversion, if any, and change of contents as computed from a capacity curve. At the remaining reservoir stations, where observed discharge past the dam was measured by venturi meters or by calibrated spillways and gates or where it could be computed from spillway-discharge formulas, the daily observed discharges, changes in contents of reservoirs, and discharges adjusted for changes in contents and diversions, if any, are shown. The adjusted mean monthly flows at these reservoirs compare favorably with those of adjacent regular stream-gaging stations, but the inaccuracies of the computations should be kept in mind in using the daily figures. The records are presented primarily to define clearly the modifications and adjustments introduced by storage. Storage reservoirs as a factor influencing the flood discharge are considered further as a part of the discussion of the respective floods.

The records are presented in the order regularly used by the Geological Survey in its water-supply papers, that is, by major drainage basins, from north to south, in order of their discharge into the Atlantic Ocean.

Reference may be made to water-supply papers of the Geological Survey for other available published records of flow of the streams discussed in this report. The records of flow published here are based on all the information available at this time. Channel erosion and deposition in the river channels owing to the flood have changed the stage-discharge relation at some stream-gaging stations, and the changes may not have become fully defined within the period available for observations since the flood.

SUMMARY OF FLOOD STAGES AND DISCHARGES

The results of the determinations of maximum flood flows at existing stream-gaging stations and other places on streams in the flood areas where peak discharge has been determined have been tabulated for the respective floods (tables 8, 17, 24, 36) and compared with maximum flows previously recorded. The time of day in these tables is eastern standard time. The reference numbers conform to those given in Water-Supply Paper 847[5] have been platted on plate 12 to aid in identifying the places where discharges were determined. Some miscellaneous determinations of discharge have been given reference numbers that are not in Water-Supply Paper 847 because they were not available when that paper was published.

The discharges for existing stream-gaging stations were determined by methods described in greater detail in the section "Stages and discharges at stream-gaging stations." For existing stream-gaging stations the method of determination is designated "stage-discharge relation." Where the recorded discharge was not measured at a regular station a brief reference is made to the method of determination. For general information, some discharges are presented for streams in basins adjoining or near those most affected by the floods.

The basic data and computations for the determinations of discharge may be examined in the respective field offices of the Geological Survey.

[5] Williams, G. R., and Crawford, L. C., Maximum discharges at stream-measurement stations through December 31, 1937; U. S. Geol. Survey Water-Supply Paper 847, 272 pp., 1940.

RAINFALL AND RUNOFF STUDIES

The studies of rainfall and runoff are presented with the object of advancing an understanding of the significant features of precipitation and runoff during each of the several floods. Moreover, comparisons between rainfall and associated runoff serve as tests of the accuracy and adequacy of the base data. The first step in the analysis was the determination of the mean areal precipitation and mean water equivalent of the snow cover over the drainage area above each river-measurement station in the flood areas; the second, the determinations of flood runoff directly attributable thereto; and finally, the comparisons of the precipitation with its associated direct runoff. These essential results are summarized in tables of rainfall and runoff that accompany the section on each flood.

The preparation of the isohyetal maps for the respective storms has already been explained in detail, and the preparation of a map of water equivalent of snow on the ground before the storm of January 1938 is explained in the section on that report. On each of these maps the areas between isohyets were measured by planimeter within the drainage basin above each stream-gaging station and weighted to give the mean areal precipitation or mean water equivalent of snow, in inches, over the respective drainage areas.

Volumes of direct runoff at each gaging station were computed by plotting hydrographs of discharge by using the tables of discharge at indicated times previously explained. On these plotted hydrographs estimates were made of the discharge generated by meteorologic events preceding the storm under consideration and of the discharge resulting from base flow. The enclosed area above the antecedent discharge and the estimated base flow was assumed to represent the increment in stream flow resulting from the direct runoff associated with the given storm. No general rules can be stated for this procedure as these estimates were based in large part on storm and hydrograph characteristics peculiar to each flood. Therefore, the procedure followed for performing this operation is explained in connection with each flood with due regard to its special features.

FLOOD OF JANUARY 1938 IN CONNECTICUT

By L. W. Furness

INTRODUCTION

During 1938 the State of Connecticut was subjected to three extraordinary floods in addition to several of smaller magnitude. For the climatic year ending September 30, 1938, the runoff from

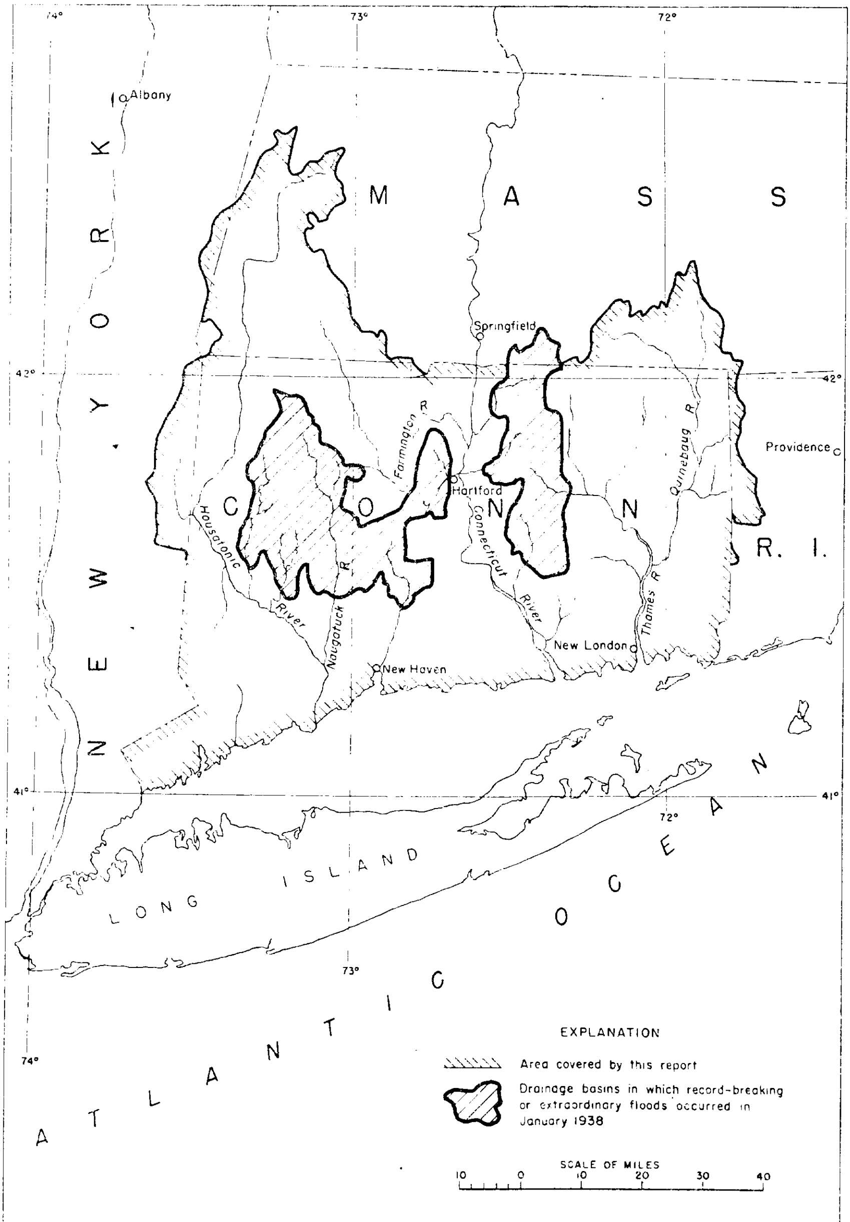


FIGURE 1.—Map showing location of areas in which record-breaking or noteworthy floods occurred in January 1938.

streams in Connecticut averaged more than 38 inches and from two streams was even greater than the normal yearly rainfall.

The first of these floods, the one on January 25, 1938, was the result of several days of warm weather followed by a short, intense rainfall that overnight removed virtually all of the accumulated snow fall of winter. A heavy ice cover on the streams was loosened and broken by the upward surge of the floodwaters and sent downstream in recurrent jams. Seven small streams in central and western Connecticut rose to levels higher than those reached during the great floods of March 1936, and peak rates of flow exceeded any previously recorded on these streams. Figure 1 shows the drainage basins where record-breaking or extraordinary floods occurred within the area covered by this report. In general, the larger rivers did not attain extraordinary discharges. The Connecticut River at Hartford, for instance, peaked at a stage only 3.6 feet above ordinary flood level. Accordingly, direct damage was relatively small. The State Highway Department of Connecticut estimated about $10,000 damage to the main highways. Ice hastened destruction of the flashboards on many dams, operation of several mills was interrupted by floodwater, sewers were overloaded, streets and highways were flooded, and numerous cellars and lower floors of low-lying houses were inundated.

As part of its Nation-wide stream-gaging program, the Geological Survey maintains in Connecticut, through its Hartford office, 32 regular river-measurement stations within the area affected by the floods of January 1938 shown on figure 1. These stations have been operated by the Geological Survey largely in cooperation with the State and municipalities and generally for periods beginning several years prior to 1938. By this program the Survey, assisted by the cooperating agencies, has collected systematic records of stages, rates, and volumes of flow of the streams covering the range from extreme drought to extraordinary flood.

At the beginning of the fiscal year 1938, funds were allotted to the Geological Survey by the Federal Emergency Administration of Public Works, in accordance with the provisions of the National Industrial Recovery Act of 1933, for "surveys of floods and droughts." From these funds a total of $4,000 was allocated to the Hartford district to supplement regular and cooperative appropriations in obtaining basic data on the recent floods. The devastating and widespread flood and hurricane of September 1938 generally wiped out evidences of flood stages and profiles established by the floods of January and July 1938 and temporarily interrupted studies in connection therewith until the report of the more important flood of September was completed.

This report contains all the basic information relating to stages and discharges collected at the regular river-measurement stations maintained by the Hartford district office, also computations from the operation records of nine reservoirs, the results of several flood-flow determinations made at points where regular gaging stations were not being maintained, all basic meteorologic and hydrologic information, and the results of analyses of rainfall and runoff. Figure 1 shows that the area covered by this report includes all of Connecticut and the out-of-State parts of the drainage areas of those streams on which gaging stations are maintained by the Hartford district office. Unless otherwise noted, all references herein involve only the area shown in figure 1.

GENERAL FEATURES OF THE FLOOD

During the early part of January 1938, weather and stream conditions in the flood area followed the normal trend. Rain and warm temperatures caused a so-called January thaw, which removed most of the snow along the coast of Connecticut and saturated and compressed the snow over the remainder of the area. As a result, stream flow increased on January 7 or 8, receded quickly again when the temperature fell below freezing on January 9, and continued to recede while the temperature remained below freezing, with the exception of but a few hours, until January 21. Frost penetrated deeper into the ground. Snowfall on January 13 varied in depth from 4 to 13 inches. Subsequent smaller snowstorms added their quota until, on January 20, the total depth of compacted snow reported by Weather Bureau stations varied from 2 to 10 inches. As shown on plate 5, the computed water content of snow on the ground on January 20 varied from 0.25 or 0.50 inch along the coast to as high as 2.75 inches in the northern parts of the drainage basins. After January 21, temperatures were above freezing during the warmer parts of the days, and consequently the 0.1 inch to 1.6 inches of precipitation between January 21 and 23 fell variously as snow, sleet, or rain. Streams that had been falling gradually as the groundwater was depleted now steadied or rose slightly.

The stage was set for the flood. The ground was frozen, water content of the snow cover was comparatively high, and the snow had been "ripened" by warm temperatures. The main flood-motivating factors made their entrance during the evening of January 24 and the morning of January 25. Temperatures rose rapidly into the fifties, and a warm, intense rainfall, accompanied by strong winds, removed practically all of the snow during the night. Plate 4 shows the areal distribution of precipitation for the period from January 24 to 26 during which most of the rain fell in 12 to 17 hours. Rainfall exceeded 2.75 inches in only three small areas. As shown in column 9 of table 9 the combined average precipitation and water content of snow did not exceed 4.8 inches on any tributary drainage area studied in this report.

Connecticut basins often have had more water available for runoff, but only occasionally in recent years have peak discharges on the smaller streams exceeded those attained during this flood. The snow melted rapidly, and most of its initial melt, finding passage into the frozen ground materially impaired, joined the fallen rain in a surface course to the swelling streams. Cover-ice on these channels cracked, was crowded downstream in recurrent jams, and took the flashboards from many dams. However, before the ice jams had done serious damage they were usually broken up by the press of the rapidly rising floodwater. Record-breaking discharges occurred only on the smaller tributary streams, which have more narrowly defined channels and steeper gradients than the larger streams of the State. Accordingly, damage was small in comparison with that caused by the greater and more widespread floods of March 1936 and September 1938. Direct damage resulted mainly from the flooding of several mills and numerous cellars and lower floors of low-lying buildings, and from the overloading of sewers and inundation or washing out of streets and highways. Plates 1 and 2 show typical examples of conditions existing during the flood. On figure 15 a comparison can be made between peak discharges, in second-feet per square mile, for the flood of January and the maxima of record in Connecticut, including those for September 1938. On the basis of drainage area alone, the envelope of peak discharges for the flood of January gives results varying from about one-half of the discharge rate shown by the maximum envelope for 10 square miles to about one-third for 1,000 square miles. Such a comparison, however, disregards the individual runoff characteristics of the various basins and the areal distribution of the several storms.

Considering each river-measurement station individually, the momentary peak discharge in January 1938 was the maximum for the prior period of record at the following seven stations in Connecticut:

Connecticut River Basin.—South Branch of Park River at Hartford, Park River at Hartford, North Branch of Park River at Hartford, Hockanum River near East Hartford.

Housatonic River Basin.—Shepaug River at Woodville, Naugatuck River near Thomaston.

Quinnipiac River Basin.—Quinnipiac River at Southington.

Peak discharges of the flood of January were greater than the hurricane flood of September 1938 at the following three gaging stations in Connecticut: Moosup River at Moosup, Park River at Hartford, North Branch of Park River at Hartford.

Few studies have been made of winter floods in Connecticut. Geological Survey Water-Supply Paper 798 contains analyses of the floods of March 1936 for which considerable snow cover was available for runoff. However, in Connecticut, information was limited concerning the water content of this snow and the part of it that ran off in the first of the two storms. Fortunately, Statewide snow surveys were completed just prior to the flood of January 1938, and almost all of this snow was removed during the short flood period. Therefore, these more complete data become especially valuable in analysis of the influence of snow on flood runoff. This report endeavors to present all the basic factors relating to this winter flood as a contribution toward devising sound measures of forewarning, control, and protection from like or greater floods in the future.

WEATHER ASSOCIATED WITH FLOODS IN CONNECTICUT ON JANUARY 25-26, 1938

By G. N. Brancato [6]

The storm that produced the heavy rain on the night of January 24–25, 1938, and associated high temperatures and wind velocities, which were very effective in rapidly melting the snow cover, had its origin over Texas on the morning of January 23. The synoptic and upper air charts for that morning showed a trough of low pressure from Texas northward through the Dakotas, with air of polar Pacific origin to the west of the trough and a northward flow of warm moist air with increasing tropical maritime characteristics to the east. The synoptic chart showed a separate weak low pressure center over Texas. Soundings in the tropical air showed it to be very moist and convectively unstable, as evidenced by the widespread thunderstorm activity over Texas, Oklahoma, and western Louisiana.

A chart showing the altitude of a selected value of the potential temperature, in millibars of pressure, is called an isentropic chart. The potential temperature is defined as the absolute temperature a parcel of air would possess if raised or lowered dry-adiabatically to 1,000 millibar pressure. The significance of the isentropic chart

[6] Meteorologist, U. S. Weather Bureau.

is that masses of air maintain the same potential temperature regardless of lifting or lowering, as long as radiation or condensation processes are not active. The order of magnitude of radiation processes are so small that they can be neglected for 24-hour changes. The isentropic charts are drawn on the assumption that if the flow pattern in the moist currents can be identified before condensation takes place, a reasonable extrapolation of the flow patterns after condensation takes place can be obtained from the shape of the area of condensation. The solid lines of pressure are almost a direct measure of the elevation of the potential temperature surface. The distribution of moisture on the potential temperature surface is best identified by the specific humidity. The specific humidity is a weight ratio between the mass of water vapor and the mass of air and is usually expressed in terms of grams of moisture per kilogram of moist air. Since for any given potential temperature surface a given value of specific humidity can have only one pressure at which saturation will result, the lines of specific humidity are also labeled in terms of the pressure at which saturation will be reached.[7]

The isentropic chart for January 23 indicates a deep mass of polar air over the Northwestern States that was advancing rapidly southeastward. The leading edge of this air mass at this time extended as far south as northwestern Texas. Moist tropical air was spreading northward from the Gulf over the southern Great Plains region with precipitation as far north as Oklahoma and Arkansas.

It has been shown by C. G. Rossby in an unpublished report that a strong southward thrust of cold air with little change in its lapse rate acquires an increasing cyclonic circulation as it moves southward. The mass of cold air over the Northwest on January 23 moved progressively southeastward on January 24–25, as shown by the isentropic charts on figures 2 and 3. Soundings taken in this air mass produced near record minimum temperatures at 5,000 meters at all stations. At Oklahoma City it produced a record minimum of —35.2°C. at 4,460 meters the morning of January 25, and if the lapse rate below this point were extrapolated up to 5,000 meters it would give a temperature of about —42°C. This would exceed the record minimum for that level by about 10°C. Atmospheric cross sections through the cold air on January 24 and 25 also show that there was little change in the lapse rate. The increasing cyclonic circulation induced by this strong southward thrust of cold air was attended by the

[7] Byers, H. R., On the thermodynamic interpretation of isentropic charts: Monthly Weather Rev., vol. 66, pp. 63–68, March 1938.

748116—48—3

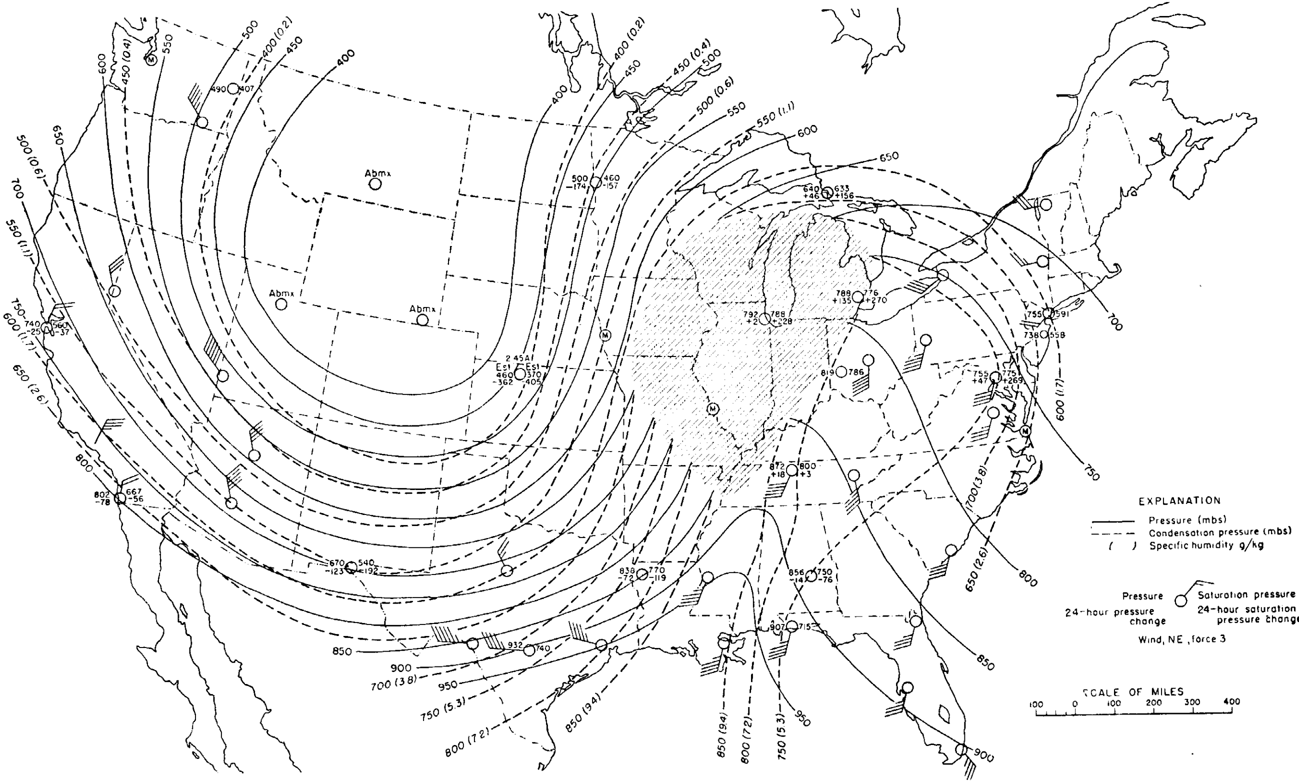


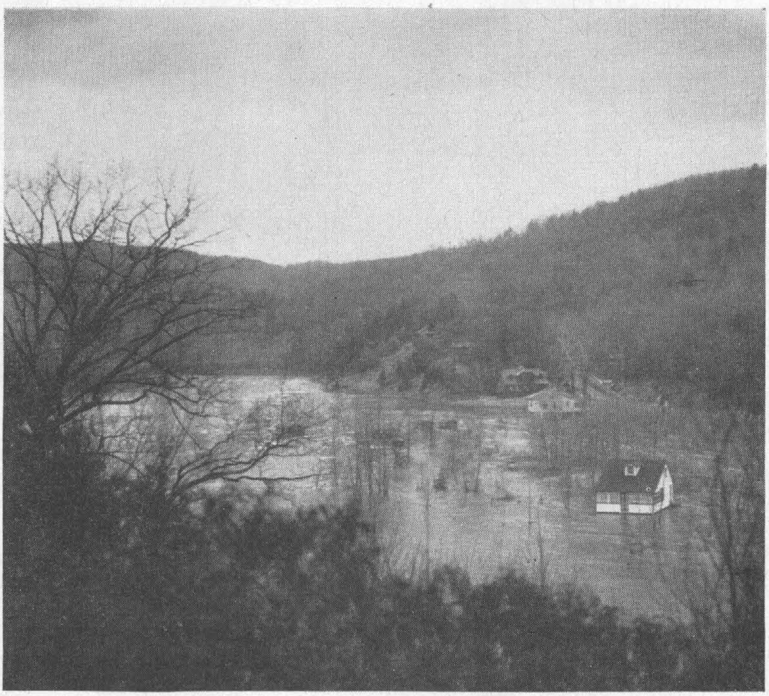
FIGURE 2.—Isentropic chart of the United States, January 24, 1938.

development of a center of low pressure in upper elevations over the cold air. The pressure in a vertical column of air decreases with height at a rate directly proportional to the density, and pressure decreases most rapidly with height in cold air as the colder the air the greater the density. Soundings made on the morning of January 23 indicate that this center of low pressure aloft was coincident with the lowest temperature over Spokane, Wash. As the cold air moved southward it tended to circulate cyclonically about the center of low pressure, while the increasing cyclonic circulation produced a pressure distribution that brought about balanced flow and caused a compensating northward flow of warm, moist air in advance of the cold air. This northward upglide flow of warm, moist air over the colder more stable air in the lower layers led to active condensation and precipitation over most of the Mississippi and Missouri Valleys.

The result of the increasing cyclonic circulation due to the southward thrust of cold air was a rapid decrease in pressure in the warm moist current to the east. The weak low that centered over Texas on the morning of January 23 developed a deep center and intense circulation that moved rapidly northeastward. At 7:30 p.m. on January 24 this intense cyclone centered over northern Michigan, as shown on figure 4. The leading edge of the cold air or surface cold front had advanced eastward to eastern Ohio and southward through eastern Tennessee and central Alabama. As shown by the cross section from Pensacola through Shreveport to Oklahoma City for the morning of January 24 (figure 5), polar Pacific air aloft had pushed ahead of the surface front and was identified on the 7:30 p.m. general chart of January 24 as a cold front aloft (figure 4) extending from western Pennsylvania southward through South Carolina and Florida. Ahead and in connection with this front there was active upglide motion and convergence of the unstable warm, moist tropical air over colder more stable air in the surface layers. The lifting produced convection in the warm, moist air, which together with convergence resulted in general heavy precipitation. Following the upper front, owing to active subsidence, there was little or no precipitation except with the passage of the surface cold front. This produced showers or thunderstorms of light to moderate intensity, followed by instability showers in the cold air, which produced no appreciable amounts of precipitation.

At 7:30 a.m. January 25, as shown by the surface weather map on figure 6, the upper cold front extended from Canton, N. Y., southward through Albany, and, as shown by precipitation records,

A. JANUARY 1938 FLOOD PASSING OVER DAM ON HOUSATONIC RIVER AT STEVENSON, CONN.



B. JANUARY 1938 FLOODWATERS ENCROACHING ON COTTAGES ALONG HOUSATONIC RIVER.

MAROONED RESIDENTS RESCUED BY POLICE IN BOATS.
Photo by Hartford (Conn.) Courant.

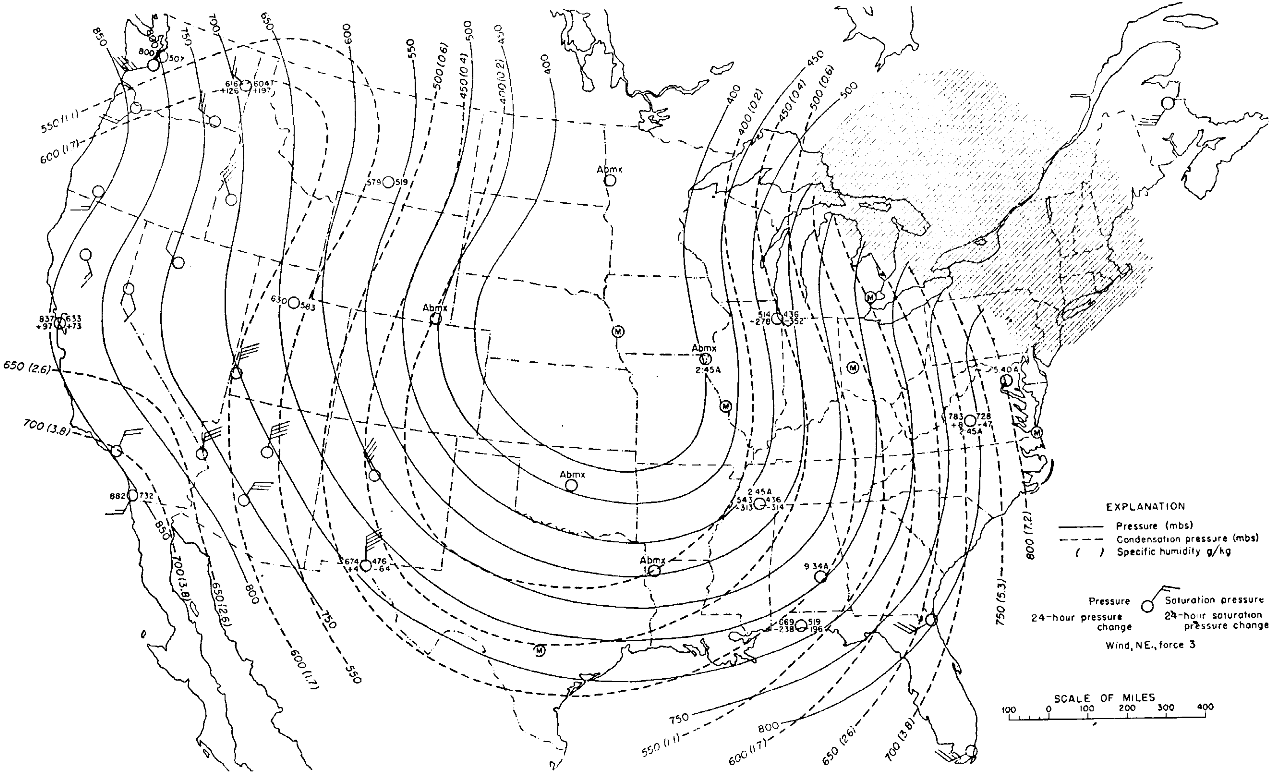


FIGURE 3.—Isentropic chart of the United States, January 25, 1938.

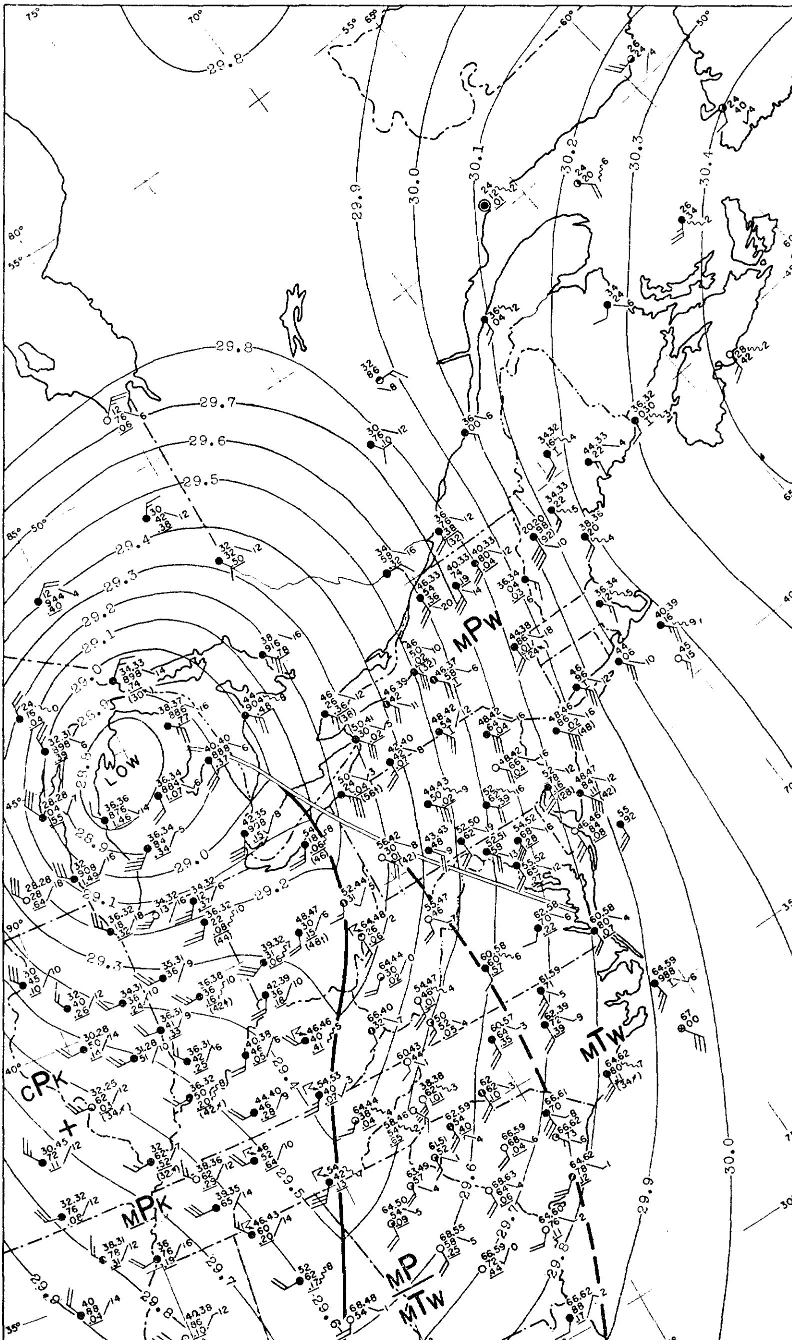
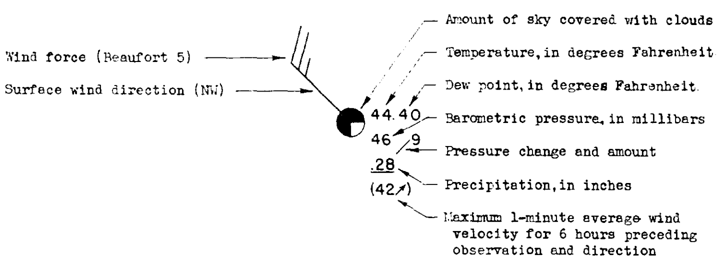


Fig. 4.—Surface weather chart of eastern United States and Canada, 7:30 p.m. Jan. 24, 1938

the heavy precipitation in Connecticut ended with its eastward passage during the morning.

During winter, when there is an appreciable snow cover, this type of storm is always a potential flood producer over the Northeastern States. The warm, moist southerly winds ahead of frontal developments of this type increase slowly and not only transport increasing amounts of precipitable water over the region but are very effective in rapidly melting the snow. Active convergence within the moist tropical air produced by the deepening depression and upglide motion over colder surface air is the direct cause of condensation and the resulting heavy precipitation. For a total period of 24 to 48 hours preceding and accompanying the period of heavy rain, temperatures in Connecticut rose about 20°F. above the mean freezing temperature of January 24 and were attended

Explanation of symbols used on surface weather charts (figs. 4 and 6)



Light lines are isobars drawn for each tenth of an inch

Fronts

Surface cold front

Surface warm front

Upper-air cold front

Air-mass symbols

MPW Maritime polar air, warmer than the surface over which it is passing (stable in lower layers)

MTW Maritime tropical air, warmer than the surface over which it is passing (stable at lower layers)

MP Maritime polar air

MPK Maritime polar air, colder than surface over which it lies or is passing (steep lapse rate)

CPK Continental polar air, colder than surface over which it is passing (steep lapse rate)

MP/MTW Maritime polar air aloft and Maritime tropical air below by strong wind velocities. Maximum wind velocities of 34 and 35 miles per hour, respectively, were registered at Hartford and New Haven, Conn., on January 25. These strong winds probably hastened the removal of snow cover by rapidly dispersing the colder atmosphere at the exposed surface. It is this sequence of events that makes this type of storm one of the most critical in producing floods where there is a deep snow cover.

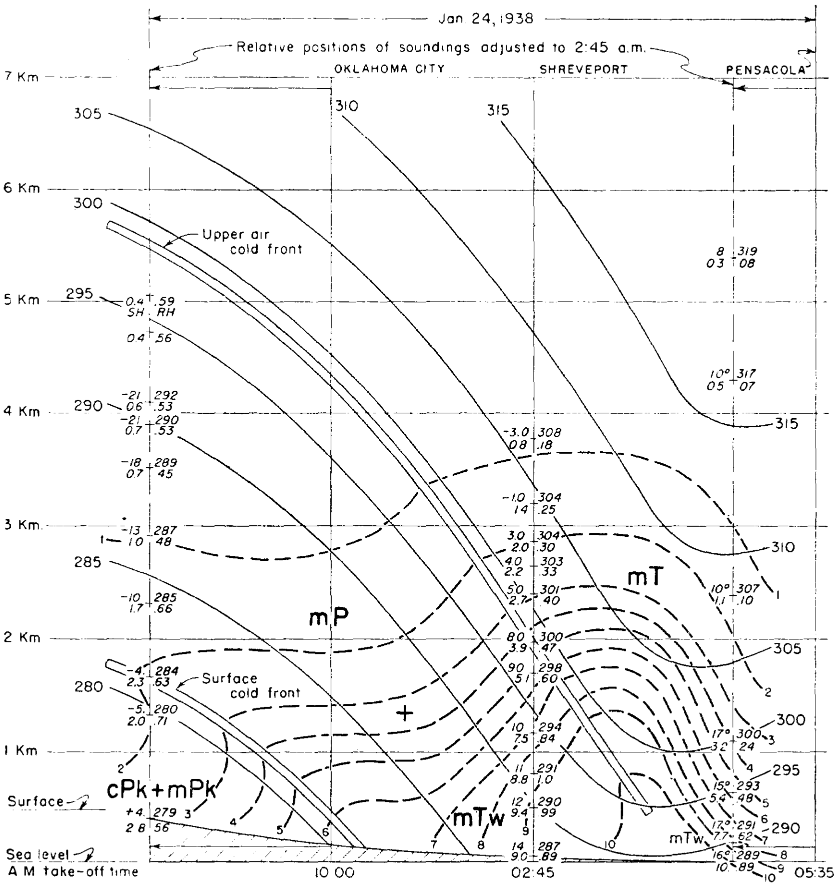


Figure 5.—Vertical cross section of atmosphere, January 24, 1938.

ANTECEDENT CONDITIONS

Monthly figures of precipitation, snowfall, and temperature with respective departures from normal taken from Weather Bureau records are shown graphically for Connecticut in figure 7 for the months of October 1937 to February 1938, inclusive. Weekly observations of water level in several hundred wells and daily

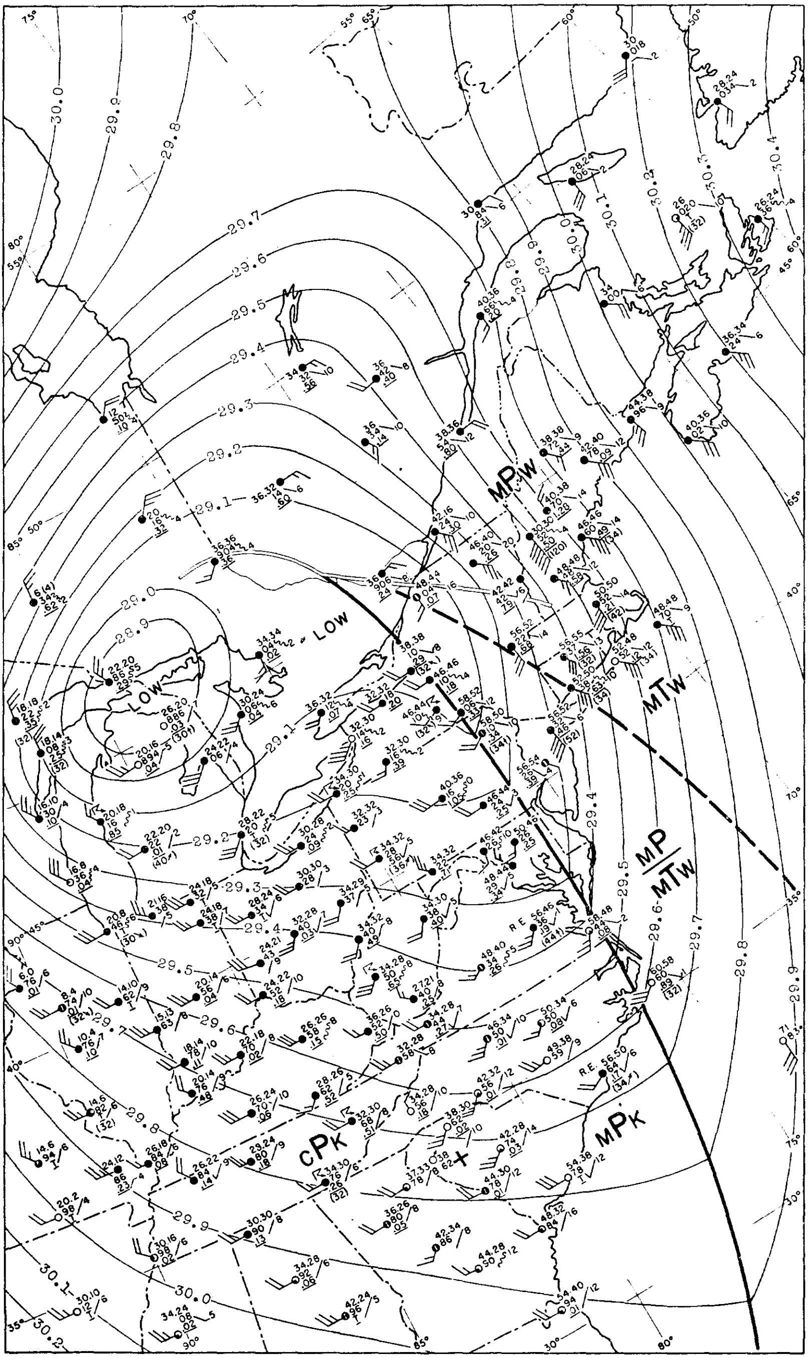


FIGURE 6.—Surface weather chart of eastern United States and Canada, 7:30 a.m., January 25, 1938. (For explanation of symbols see p. 23.)

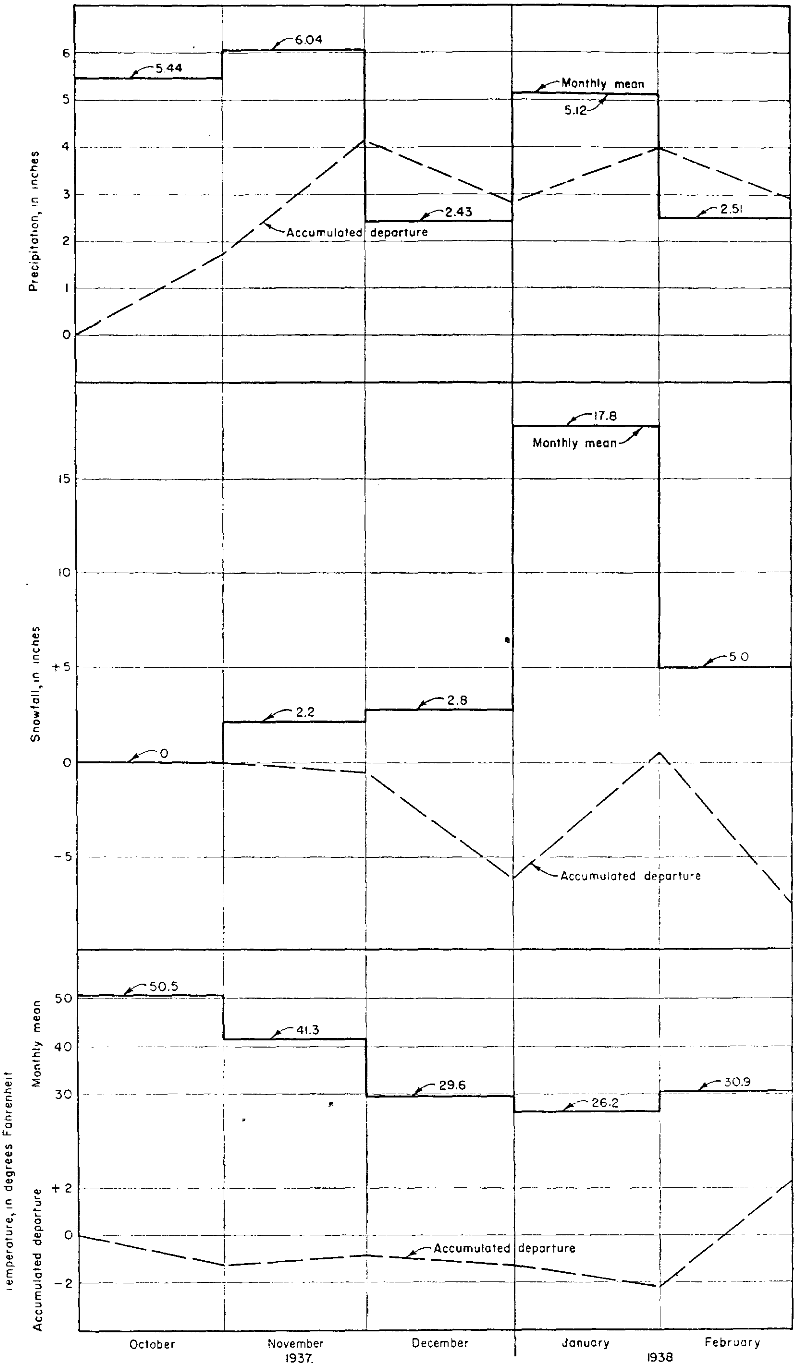


FIGURE 7.—Monthly precipitation, snowfall, temperature, and accumulated departures from normal for Connecticut, October 1, 1937, to February 28, 1938.

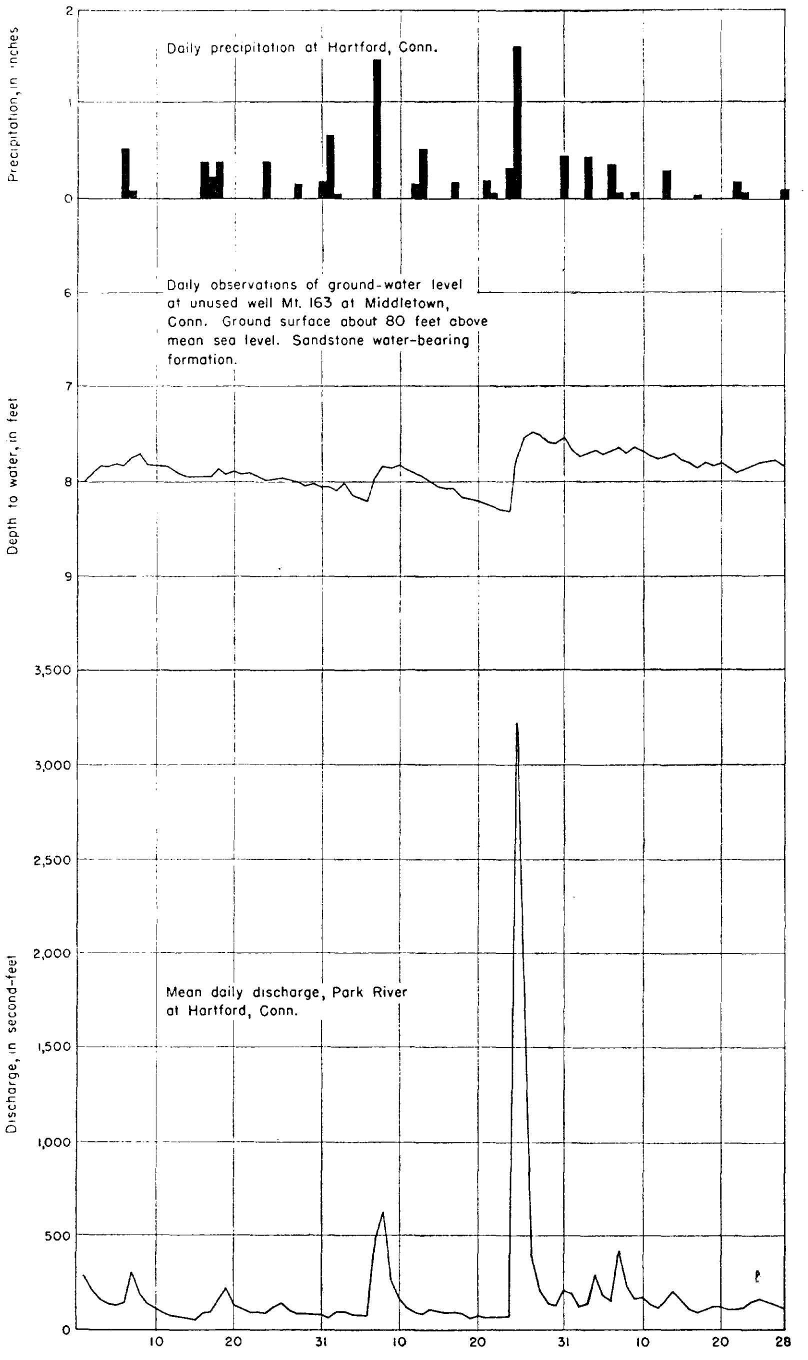


Figure 8.—Comparison of typical records of ground-water level with precipitation and stream flow.

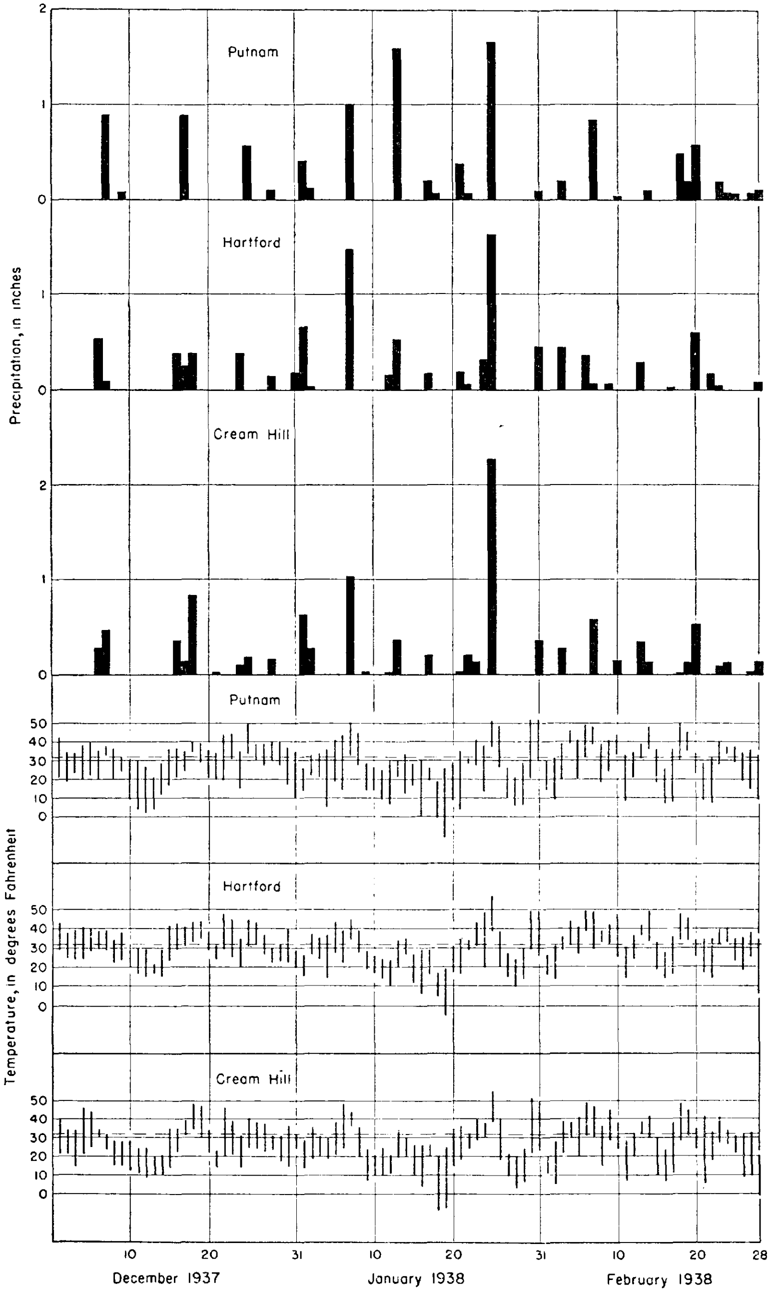


FIGURE 9.—Daily precipitation and temperature at representative stations in Connecticut for the period December 1, 1937, to February 28, 1938.

observations in a few other wells are available. These observations were made by the Federal Works Progress Administration under the sponsorship of the Connecticut State Water Commission and the supervision of the Geological Survey, As might be expected, the fluctuations of water level in the different wells covered a wide range, owing partly to the vagaries of topographic, geologic, and water-bearing characteristics. Figure 8 compares the daily changes at one of these wells with records of daily precipitation and stream flow. Figure 9 shows graphs of daily precipitation and range in temperature at three Weather Bureau stations in Connecticut.

From figures 7, 8, and 9 several facts may be noted. Monthly temperatures for Connecticut were close to normal from October 1937 to January 1938. Average temperatures for December and January were below freezing, and thus the penetration of frost into the ground was possible. Precipitation was greater in October and November than during January. A heavy warm rain during the latter part of November undoubtedly removed all the snow that had fallen prior thereto and raised the ground-water level. During December, precipitation averaged only 2.43 inches and included 3 inches of unmelted snow. The ground-water table lowered during the month either because of insufficient rain or because of obstruction of penetration by the frost barrier. A warm rain on January 7 raised the ground-water level at the Middletown well but not as much as the drop during the following cold period. Snowfall during January was 6.8 inches above normal in Connecticut. Considered by major drainage basins, snowfall in January at three Weather Bureau stations in the Thames River Basin averaged 5.9 inches above normal, at five stations in the lower Connecticut River Basin 5.4 inches above normal, and at seven stations in the Housatonic River Basin 5.3 inches above normal. Most of the snow during the month came prior to January 25. Seemingly inconsistent with the magnitude of the January flood, the precipitation for the month was only 1.20 inches above normal, thereby illustrating that large excesses of concurrent precipitation are not necessarily a prerequisite to a winter flood.

PRECIPITATION

Precipitation records collected at about 175 stations were compiled and used for the construction of the isohyetal maps presented herein and for the study of the relation between rainfall and run-off. Daily precipitation and computed total storm precipitation at these stations are presented in table 1.

The precipitation for the calendar days January 24-26, the period directly associated with the flood, is given in the next to the last column of table 1. The last column of table 1 shows the total precipitation measured from January 20 to 26. Plus signs after figures indicate that the records are probably incomplete. The numbers assigned to each precipitation station indicate its location on plate 11 and conform with those assigned to the same stations in the reports on the floods of July 1938 and September 1938.[8]

[8] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, pp. 46-61, table 4, 1940.

TABLE 1.—*Daily precipitation, in inches, January 20-26, 1938*

(Measured in the afternoon except as noted)

No. on pl. 11	Station	20	21	22	23	24	25	26	Storm of Jan. 24-26	Total Jan. 20-26
	Merrimack River Basin									
	Massachusetts:									
34	Boylston[1 2]	------	------	------	0.33	------	1.32	------	1.32	1.65
45	Jefferson[1 2]	------	0.25	------	.08	------	1.62	------	1.62	1.95
	Thames River Basin									
	Massachusetts:									
58	Charlton Depot[3 4]	------	.13	------	------	1.74	------	------	1.74	1.87
59	Southbridge[3 4]	------	.17	0.06	------	1.61	.32	------	1.93	2.16
60	Webster[3 4]	------	.13	.06	------	.92	.60	------	1.52	1.71
	Connecticut:									
61	Baltic[5]	------	------	.21	(*)	.04	1.31	------	1.35	1.56
62	Camp Fernow[6]	------	------	(*)	(*)	------	1.85	------	1.65[7]	1.85
63	Camp Lonergan[5 6]	------	------	.17	------	------	1.50	------	1.50	1.67
64	Griswold[8 9]	------	------	(*)	(*)	------	1.88	------	1.65[7]	1.88
65	New London	------	.05	.36	------	------	.76	T	.76	1.17
705	North Grosvenordale[5 10]	------	------	(*)	(*)	------	1.62	------	1.2[7]	1.62
67	Putnam	Tr.	.38	.05	------	------	1.66	------	1.66	2.09
68	Storrs	------	Tr.	.16	.02	------	1.86	------	1.86	2.04
	Connecticut River Basin									
	Massachusetts:									
123	Bondsville[3 4]	------	------	.12	------	.82	.47	------	1.29	1.41
124	Borden Brook Reservoir[3 11]	------	.17	.09	------	2.56	.20	------	2.76	3.02
126	Chester [3 4]	------	.12	.09	------	1.67	.23	------	1.90	2.11
127	Chesterfield[3 4]	------	.15	.05	------	1.75	.20	------	1.95	2.15
135	Hardwick[3 4]	------	.18	.10	------	1.10	------	------	1.10	1.38
137	Holyoke[5]	------	------	.10	.06	------	1.92	0.23	2.15	2.31
138	Hoosac Tunnel[5]	T	------	.16	.09	Tr.	1.48	.48	1.96	2.21
142	Ludlow Reservoir[3 11]	------	.12	.05	------	.86	.71	------	1.57	1.74
143	Middlefield[3 4]	------	------	.20	.08	1.69[7]	.10	------	1.79[7]	2.07[7]
144	Monson[4 5]	------	------	.18	.16	------	1.16	------	1.16	1.50
146	Montgomery[3 4]	------	.13	------	------	2.57	.10	------	2.67	2.80
150	Otis Reservoir[3 12]	------	------	.12	------	1.75	.55	------	2.30	2.42
151	Peru[3 4]	------	.17	------	------	1.34	------	------	1.34	1.51
155	Provin Mountain Reservoir[3 11]	------	------	.11	------	2.40	.14	------	2.54	2.65
160	Springfield	------	T	.11	.02	------	1.40	T	1.40	1.53
162	Springfield[13 14]	------	.09	.10	------	.12	1.81	------	1.93	2.12
167	Warren[3 4]	------	.15	.05	------	1.06	.54	------	1.60	1.80
170	West Brookfield[3 4]	------	.14	.03	------	1.09	.38	------	1.47	1.64
171	Westfield[3 4]	------	.13	.04	------	2.48	.17	------	2.65	2.82
172	Westfield Dam[3 4]	------	.09	.03	------	2.25	.13	------	2.38	2.50
173	Westfield Sanatorium	------	------	.18	.07	------	2.54	------	2.54	2.79
174	West Granville[5 15]	------	------	.14	.04	------	2.65	.10	2.75	2.93
176	West Otis[3 4]	------	.08	.05	------	1.55	------	------	1.55	1.68
179	West Rutland[2 3]	------	------	.24	------	1.18	.44	------	1.62	1.86
	Connecticut:									
186	Bakersville[5 15]	------	------	.22	.03	------	2.15	.10	2.25	2.50
187	Barkhamsted[5]	------	------	.20	------	------	2.10	.02	2.12	2.32
188	Bills Brook[5 15]	------	------	.23	------	------	.68	([16])	.68+	.91+
189	Bloomfield[13 17]	------	.18	.04	------	.33	1.61	------	1.94	2.16
190	Bristol[5 18]	------	------	.37	------	------	.80	.14	.94	1.31
191	Brown's Corner[5 15]	------	------	.19	.05	------	2.15	.20	2.35	2.59
192	Burlington (Phelps Brook Dam)[13 15]	------	[25].16	.06	.01	.22	1.51[23]	------	1.73	1.96

See footnotes at end of table.

TABLE 1.—*Daily precipitation, in inches, January 20-26, 1938*—Continued

[Measured in the afternoon except as noted]

No. on pl. 11	Station	20	21	22	23	24	25	26	Storm of Jan. 24-26	Total Jan. 20-26
193	Camp Buck[6]	------	------	1.56	------	------	1.75	------	1.75	3.31
194	Camp Connor[6]	------	------	(*)	(*)	0.17	1.00	------	1.00	1.17
195	Camp Filley[6]	------	------	.30	------	------	1.76	------	1.76	2.06
196	Camp Robinson[6]	------	------	.19	------	------	2.11	------	2.11	2.30
197	Camp White[6]	------	------	.26	------	------	2.83	------	2.83	3.09
198	Colchester	------	------	.13	Tr.	------	1.25	Tr.	1.25	1.38
199	Collinsville[5]	------	------	.29	Tr.	------	1.98	0.06	2.04	2.33
202	East Hartland[5]	------	------	.94	0.04	------	2.07	.52	2.59	3.57
748	Ellington[13 19]	------	0.11	.04	------	.13	1.05	------	1.18	1.33
203	Glastonbury[20]	------	------	(*)	(*)	------	2.02	------	1.75[7]	2.02
204	Hartford[13]	------	.19	.05	Tr.	.32	1.62	------	1.94	2.18
205	Hartland Hollow[5 15]	------	------	.22	------	------	2.08	.03	2.11	2.33
206	Manchester[3 20]	------	------	(*)	(*)	(*)	1.90	------	1.7[7]	1.90
750	Marek house[13 15]	------	.01	.01+	------	.11	.30+	------	.41+	.43+
750	Marek house[5 15]	------	------	.20	------	------	1.85	------	1.85	2.05
207	Middletown[8 21]	------	------	.35	------	------	2.00	------	2.00	2.35
208	New Britain[13 22]	------	.10	.04	.05	.50	1.50	.06	2.06	2.25
209	New Hartford[5 15]	------	------	.21	.03	------	1.95	.04	1.99	2.23
210	Newington[13 17]	------	.22	.05	------	.43	1.55	------	1.98	2.25
211	North Station[5 15]	------	------	.30	.03	------	2.15	.14	2.29	2.62
212	Shuttle Meadow[5 24]	------	------	.24	------	------	1.85	.31	2.16	2.40
213	South Meadows[13 17]	------	.21	.08	------	.31	1.47	------	1.78	2.07
214	Thompsonville[3 25]	------	(*)	(*)	------	1.20	.10	------	1.15[7]	1.30
215	West Hartford[5 15]	------	------	.19	.01	------	2.32	.08	2.40	2.60
216	West Hartford[13 15]	------	.01	.26	------	.39[23]	1.76[23]	------	2.15	2.42
218	West Hartland[5]	------	------	.30	------	------	(*)	2.75	2.75	3.05
219	West Hill[5 15]	------	------	.25	.10	------	1.75	.20	1.95	2.30
220	Whigville Reservoir[5 24]	------	------	.26	.02	------	1.92	.05	1.97	2.25
221	Windsor[5 26]	------	------	.12	------	------	1.39	------	1.39	1.51
	Housatonic River Basin									
	Massachusetts:									
223	Egremont[3 4]	------	.23	------	------	1.47	------	------	1.47	1.70
224	Pittsfield[3]	------	.12	.08	------	.83	.11	------	.94	1.14
225	Stockbridge	------	.04	.17	.11	Tr.	1.69	------	1.69	2.01
226	Stockbridge[3 4]	------	.15	------	.88	(16)	(16)	------	(16)	1.03+
	Connecticut:									
227	Ansonia[5 27]	------	------	.39	------	------	1.23	.02	1.25	1.64
228	Bulls Bridge[5 25]	------	------	.12	------	------	1.70	.23	1.93	2.05
229	Camp Cross[6]	------	------	.25	.05	------	1.73	------	1.73	2.03
230	Camp Toumey[5 6]	------	------	.19	.05	------	2.20	.20	2.40	2.64
751	Candlewood Isle[13 25]	------	(*)	(*)	(*)	.46	2.48	------	2.48	2.94
231	Cream Hill	------	.01	.20	.13	------	2.26	------	2.26	2.60
232	Danbury	------	Tr.	.36	Tr.	------	4.10	------	4.10	4.46
233	Derby[3 28]	------	.39	------	------	1.16	.11	------	1.27	1.66
234	Falls Village	------	------	.30	.06	------	1.35	.40	1.75	2.11
235	Naugatuck[5 29]	------	------	.36	Tr.	------	2.41	------	2.41	2.77
236	New Milford[1 30]	------	------	------	------	2.12	(16)	------	2.12+	2.12+
237	Norfolk[5 31]	------	------	.34	.06	Tr.	2.38	.41	2.79	3.19
238	Prospect[5 32]	------	------	.40	------	------	2.72	.12	2.84	3.24
239	Rocky River[5 25]	------	------	.35	------	------	2.55	.15	2.70	3.05
240	Salisbury	------	Tr.	.38	.02	------	1.25	------	1.25	1.65
241	Squantz Pond[6]	------	------	.22	.05	------	2.43	------	2.43	2.70
242	Stevenson Dam[5 25]	------	------	.37	------	------	1.89	.07	1.96	2.33
243	Torrington[5 33]	------	------	.25	------	.06	2.84	.14	2.98	3.29
244	Torrington[5 34]	------	------	.26	------	------	2.41	------	2.41	2.67
245	Torrington[1 35]	------	------	.25	------	------	2.78	------	2.78	3.03
752	Torrington[5 36]	------	------	(*)	------	.30	2.54	.11	2.65	2.95
246	Trap Falls Reservoir[5 37]	------	------	.35	------	------	1.03	------	1.03	1.38
247	Waterbury	------	.04	.37	.04	------	2.65	------	2.65	3.10
248	Waterbury[8 38]	------	------	.26	.02	------	2.65	.12	2.77	3.05
249	Wigwam Reservoir[8 41]	------	------	.34	.03	------	1.77	.04	1.81	2.18
250	Woodville[8 41]	------	------	.23	.04	------	2.23	.03	2.26	2.53
250	Woodville[13 41]	------	(16)	(16)	.04	.74	1.93	------	2.67	2.71
	Hudson River Basin									
	Massachusetts:									
252	Adams[5]	------	------	.13	.07	------	.90	.22	1.12	1.32
254	Williamstown	------	.02	.10	.20	.05	.89	.05	.99	1.31
	New York:									
255	Albany[13]	------	.12	.09	.01	.20	.86	------	1.06	1.28
258	Bedford Hills	------	Tr.	.30	Tr.	------	2.05	------	2.05	2.35
263	Cairo	------	Tr.	.16	Tr.	Tr.	2.40	------	2.40	2.56

See footnotes at end of table.

TABLE 1.—*Daily precipitation, in inches, January 20-26, 1938*—Continued

[Measured in the afternoon except as noted]

No. on pl. 11	Station	20	21	22	23	24	25	26	Storm of Jan. 24-26	Total Jan. 20-26
265	Carmel (West Branch)[3]	------	0.31	0.02	------	2.10	0.10	------	2.20	2.53
269	Croton Lake[3, 42]	------	.31	.02	------	1.95	.09	------	2.04	2.37
274	Elka Park[3, 42]	------	.23	.01	------	2.32	.20	------	2.52	2.76
277	Glenham[5]	------	------	.28	0.01	------	1.98	0.15	2.13	2.42
283	High Falls	------	.38	------	------	.68	1.00	------	1.68	2.06
293	Kingston[3, 43]	------	.25	------	------	1.45	.10	------	1.55	1.80
294	Kingston[13, 44]	------	.19	.06	------	.54	1.01	------	1.55	1.80
302	Mohonk Lake	------	------	.28	------	Tr.	1.47	------	1.47	1.75
309	Oak Hill[3, 43]	------	.25	------	------	.30	.25	------	.55	.80
314	Poughkeepsie[13]	------	.12	.08	------	.05	.49	------	.54	.74
317	Rifton	------	.24	.06	------	.64	.68	------	1.32	1.62
337	Voorheesville[5]	------	------	.18	.06	------	.42	.25	.67	.91
338	Walden	------	.30	.07	------	.03	.20	------	.23	.60
339	Wappinger Falls	------	Tr.	.30	------	Tr.	.74	Tr.	.74	1.04
342	Westerlo[3, 43]	------	.18	.03	------	.38	.30	------	.68	.89
345	West Point[13, 45]	------	.28	------	------	.07	.29	------	.36	.64
	Minor Basins									
	Massachusetts:									
733	Holden No. 2[3, 46]	------	.18	.13	------	1.45	.30	------	1.75	2.06
734	Kettle Brook No. 3[3, 46]	------	.17	.08	------	1.94	.02	------	1.96	2.21
735	Lynde Brook[3, 46]	------	.31	.03	------	1.43	.27	------	1.70	2.04
591	Milford[3, 4]	------	(*)	.13	.12	.43	.95	------	1.38	1.63
592	Millbury[5]	------	------	.20	.10	------	.69	.36	1.05	1.35
600	Northbridge[4, 5]	------	.22	.01	------	------	1.12	.40	1.52	1.75
625	Worcester[5]	------	Tr.	.17	.08	------	1.38	Tr.	1.38	1.63
736	Worcester[3, 46]	------	.31	.03	------	1.43	.27	------	1.70	2.04
	Rhode Island:									
627	Block Island[13]	Tr.	.18	.16	.04	.02	.35	------	.37	.75
737	Hopkins Mills[3, 47]	------	.18	.15	------	.41	.26	------	.67	1.00
738	Kent[3, 47]	------	.18	.04	------	.84	.83	------	1.67	1.89
630	Kingston	------	------	.27	.08	------	.60	------	.60	.95
740	North Scituate[3, 47]	------	.17	.12	------	.84	.83	------	1.67	1.96
632	Pawtucket[1, 48]	------	------	.29	.15	(*)	1.24	------	1.24	1.68
635	Providence[13]	Tr.	.09	.12	.02	.04	1.27	------	1.31	1.54
742	Rocky Hill[3, 47]	------	.15	.12	------	1.25	1.33	------	2.58	2.85
744	Westcott[3, 47]	------	.31	.14	------	.87	.90	------	1.77	2.22
745	Westerly[1, 49]	------	------	.18	------	------	1.02	------	1.02	1.20
	Connecticut:									
639	Bridgeport[37]	------	.22	.19	------	Tr.	.85	------	.85	1.26
640	Camp Hadley[6]	------	------	.41	------	------	.96	------	.96	1.37
642	Easton Lake[5, 37]	------	------	.46	------	------	1.17	------	1.17	1.63
643	Greenwich[5, 50]	------	------	.42	------	------	1.12	------	1.12	1.54
644	Groton[5, 51]	------	------	.41	------	------	.42	.28	.70	1.11
645	Hemlocks Reservoir[5, 37]	------	------	.41	------	------	.84	------	.84	1.25
646	Lake Dawson[5, 32]	------	------	.21	------	------	1.26	------	1.26	1.47
647	Lake Konomoc	------	------	.35	------	------	1.64	------	1.64	1.99
648	Lake Saltonstall[5, 32]	------	------	.41	------	------	.71	.07	.78	1.19
649	Lake Whitney[5, 32]	------	------	.41	------	------	.80	.05	.85	1.26
650	Laurel Reservoir[3, 52]	------	.45	.02	------	1.51	------	------	1.51	1.98
651	Mead Pond[3, 52]	------	.50	------	------	1.31	------	------	1.31	1.81
652	Milford[5, 32]	------	------	.41	------	------	.84	.03	.87	1.28
653	Mount Carmel[8, 26]	--	Tr.	.36	Tr.	Tr.	1.48	.01	1.49	1.85
654	New Haven[13]	------	.49	.09	.01	.19	.53	------	.72	1.31
655	North Branford[5, 32]	------	------	.45	.03	------	.71	.21	.92	1.40
656	North Guilford[5, 32]	------	------	.40	------	------	1.05	.10	1.15	1.55
657	North Stamford[3, 52]	------	.53	.02	------	.84	.02	------	.86	1.41
658	Norwalk	------	(*)	.48	------	(*)	.99	------	.99	1.47
660	Wepawaug Reservoir[5, 32]	------	------	.45	------	------	.78	.04	.82	1.27
661	Wilton (Norwalk)[5, 53]	------	------	.39	------	------	1.26	------	1.26	1.65
662	Wolcott Reservoir[5, 24]	------	------	.39	.03	------	1.90	.13	2.03	2.45
	New York:									
664	Bridgehampton	------	.01	.61	------	------	.53	.01	.54	1.16
667	Cutchogue	------	.30	.40	------	------	.49	------	.49	1.19
668	Flushing[13]	Tr.	.37	.02	------	.28	.41	------	.69	1.08
-----	Hicksville	------	.10	.10	------	Tr.	.63	------	.63	.83
673	Mineola[13, 54]	------	.34	.02	------	.25	.43	------	.68	1.04
675	Mount Vernon[13]	------	.43	------	------	.15	.02	------	.17	.60
676	New York (Battery Place)	------	Tr.	.37	.01	.17	.36	------	.53	.91
678	Patchogue	------	Tr.	.44	------	------	.57	Tr.	.57	1.01
680	Scarsdale	------	.03	.20	------	.20	1.25	Tr.	1.45	1.68
681	Setauket	------	.30	.17	------	.12	.60	------	.72	1.19

See footnotes on opposite page.

* Included in following measurement.
[1] Measured at irregular times.
[2] Metropolitan District Commission.
[3] Measured in morning after day indicated.
[4] Massachusetts Department of Public Health.
[5] Measured in morning of day indicated.
[6] Connecticut State Forestry Department.
[7] Estimated.
[8] Measured at noon.
[9] Jewett City Water Co., Jewett City, Conn.
[10] Grosvenordale Co., North Grosvenordale, Conn.
[11] Springfield Water Works, Springfield, Mass.
[12] Collins Co. Collinsville, Conn.
[13] Measured at midnight.
[14] City of Springfield, Department of Streets and Engineering.
[15] Hartford Metropolitan Water Bureau.
[16] Record missing or station not in operation.
[17] City Engineer, Hartford, Conn.
[18] Bristol Water Co., Bristol, Conn.
[19] Soil Conservation Service.
[20] Manchester Water Co., Manchester, Conn.
[21] City of Middletown, Middletown, Conn.
[22] City Engineer, New Britain, Conn.
[23] Adjusted to auxiliary non-recording gage record.
[24] Board of Water Commissioners, New Britain, Conn.
[25] Connecticut Light & Power Co.
[26] Connecticut Agricultural Experiment Station.
[27] Ansonia Water Co., Ansonia, Conn.
[28] Birmingham Water Co., Shelton, Conn.
[29] Naugatuck Water Co., Naugatuck, Conn.
[30] J. H. Nettleton, New Milford, Conn.
[31] Edward C. Childs, Norfolk, Conn.
[32] New Haven Water Co., New Haven, Conn.
[33] Torrington Register.
[34] General S. H. Wadhams.
[35] Torrington Water Co., Torrington, Conn.
[36] The American Brass Co.
[37] Bridgeport Hydraulic Co.
[38] City of Waterbury, Waterbury, Conn.
[41] City of Waterbury, Bureau of Engineering.
[42] New York City, Department of Water Supply, Gas, and Electricity
[43] New York City, Board of Water Supply.
[44] City Engineer, Kingston, N. Y.
[45] Signal Officer, U. S. Military Academy.
[46] Water Department, Worcester, Mass.
[47] Department of Public Works, Providence, R. I.
[48] City Engineer, Pawtucket, R.I.
[49] Board of Water Commissioners, Westerly, R. I.
[50] Water Co., Greenwich, Conn.
[51] Water and Electric Department, Groton, Conn.
[52] Water Co., Stamford, Conn.
[53] Water Department, South Norwalk, Conn.
[54] Nassau County, Department of Public Works, Hydrological Bureau.

TABLE 2.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	a.m. 1	2	3	4	5	6	7	8	9
	Connecticut River Basin										
162	Springfield, Mass.[1]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	0.11	0.17	0.17	0.15	0.22	0.24	0.12	0.37	0.22
189	Bloomfield, Conn.[2]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.21	.21	.17	.12	.20	.10	.20	.26	.10
192	Burlington (Phelps Brook Dam), Conn.[3]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25[4]	.08	.14	.18	.17	.19	.26	.19	.25	.02
148	Ellington, Conn.[5]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.05	.11	.06	.04	.12	.15	.05	.25	.22
204	Hartford, Conn.[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.16	.24	.12	.13	.17	.19	.13	.31	.13
208	New Britain, Conn.[7]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.20	.19	.19	.18	.18	.18	.17	.17	-----
		26	-----	-----	-----	-----	-----	-----	-----	-----	-----
210	Newington, Conn.[2]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.22	.19	.14	.11	.16	.14	.16	.25	.15
213	South Meadows, Conn.[2]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.13	.19	.10	.12	.12	.22	.15	.27	.14
216	West Hartford, Conn.[3]	24[4]	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25[4]	.19	.26	.18	.20	.19	.20	.15	.16	.15
	Housatonic River Basin										
751	Candlewood Isle, Conn.[8]	24	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)
		25	-----	.01	.02	.33	.11	.15	.11	.21	.24
250	Woodville, Conn.[10]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.17	.13	.28	.24	.26	.36	.16	.21	.06
	Hudson River Basin										
255	Albany, N.Y.[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.05	.06	.08	.07	.07	.08	.08	.02	.02
294	Kingston, N.Y.[11]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.22	.19	.15	.19	.03	.01	-----	-----	-----
	Minor basins										
627	Block Island, R.I.[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.07	.02	.01	Tr.	Tr.	-----	-----	Tr.	.06
635	Providence, R.I.[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.09	.13	.06	.06	.04	.01	.03	.15	.14
654	New Haven, Conn.[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.06	.03	.08	.03	.08	Tr.	.11	.11	Tr.
673	Mineola, N.Y.[12]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.03	.06	.07	.05	.04	.05	.13	-----	-----
676	New York, N.Y. (Battery Place)[6]	24	-----	-----	-----	-----	-----	-----	-----	-----	-----
		25	.02	.06	.03	.05	.12	.01	.03	-----	-----

NOTE.—No precipitation recorded on Jan. 26 if no data are shown for that day.
[1]City of Springfield, Department of Streets and Engineering.
[2]City Engineer, Hartford, Conn.
[3]Hartford Metropolitan Water Bureau.
[4]Hourly figures adjusted on basis of daily readings of auxiliary non-recording gage.
[5]Soil Conservation Service.
[6]U. S. Weather Bureau.
[7]City Engineer, New Britain, Conn.

ending at indicated time, January 24-26, 1938

			p. m.												Total
10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	----	----	----	----	----	----	----	----	----	----	----	T	0.07	0.05	0.12
0.01	----	0.01	----	0.01	----	----	----	0.01	----	----	----	----	----	----	1.81
----	----	----	----	----	----	----	----	----	----	----	0.02	0.08	.07	.16	.33
----	----	----	----	----	----	----	0.04	----	----	----	----	----	----	----	1.61
----	----	----	----	----	----	----	----	----	----	----	----	.05	.08	.09	.22
----	----	----	0.02	----	----	----	.01	----	----	----	----	----	----	----	1.51
----	----	----	----	----	----	----	----	----	----	----	----	.02	.04	.07	.13
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.05
----	----	----	----	----	----	----	----	----	Tr.	Tr.	Tr.	.03	.12	.17	.32
Tr.	----	----	Tr.	Tr.	----	----	.02	.02	----	----	----	----	----	----	1.62
----	----	----	----	----	0.02	----	----	----	----	----	.04	.16	.12	.16	.50
----	----	----	----	----	----	----	.04	----	----	----	----	----	----	----	1.50
----	----	----	----	----	----	----	----	----	----	0.04	.02	----	----	----	.06
----	----	----	----	----	----	----	----	----	----	----	.03	.11	.15	.14	.43
----	----	----	----	----	----	----	.03	----	----	----	----	----	----	----	1.55
----	----	----	----	----	----	----	----	----	----	----	.02	.05	.12	.12	.31
----	----	----	----	----	.02	----	----	.01	----	----	----	----	----	----	1.47
----	----	----	----	----	----	----	----	----	----	----	----	.07	.11	.21	.39
.01	----	----	----	----	----	----	----	.07	----	----	----	----	----	----	1.76
(9)	(9)	(9)	(9)	(9)	(9)	----	----	----	----	----	----	----	----	----	----
.10	0.44	.26	.40	.10	----	----	----	----	----	----	----	----	----	----	2.48
----	----	----	----	----	----	----	----	----	----	.01	.05	.28	.28	.12	.74
----	----	.02	.03	----	----	----	.01	----	----	----	----	----	----	----	1.93
----	----	----	----	----	T	T	T	T	T	.01	.04	.04	.06	.05	.20
----	.06	.18	.03	.03	Tr.	----	Tr.	.02	0.01	----	----	----	----	----	.86
----	----	----	----	----	----	----	----	----	----	.10	.22	.11	.08	.03	.54
----	.15	.04	.03	----	----	----	----	----	----	----	----	----	----	----	1.01
----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.	.02	.02
.02	.14	.02	----	.01	----	----	----	----	----	----	----	----	----	----	.35
----	----	----	----	----	----	----	----	----	----	----	----	Tr.	.01	.03	.04
.21	.23	.11	.01	----	----	----	----	----	----	----	----	----	----	----	1.27
----	----	----	----	----	----	----	----	Tr.	Tr.	Tr.	.02	.06	.04	.07	.19
----	----	----	Tr.	----	----	----	.02	.01	Tr.	Tr.	Tr.	----	----	----	.53
----	----	----	----	----	----	----	----	----	----	.04	.05	.03	.06	.07	.25
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.43
----	----	----	----	----	----	----	----	Tr.	.02	.02	.02	.01	.01	.09	.17
----	Tr.	.01	----	----	.01	0.01	.01	Tr.	Tr.	Tr.	----	----	----	----	.36

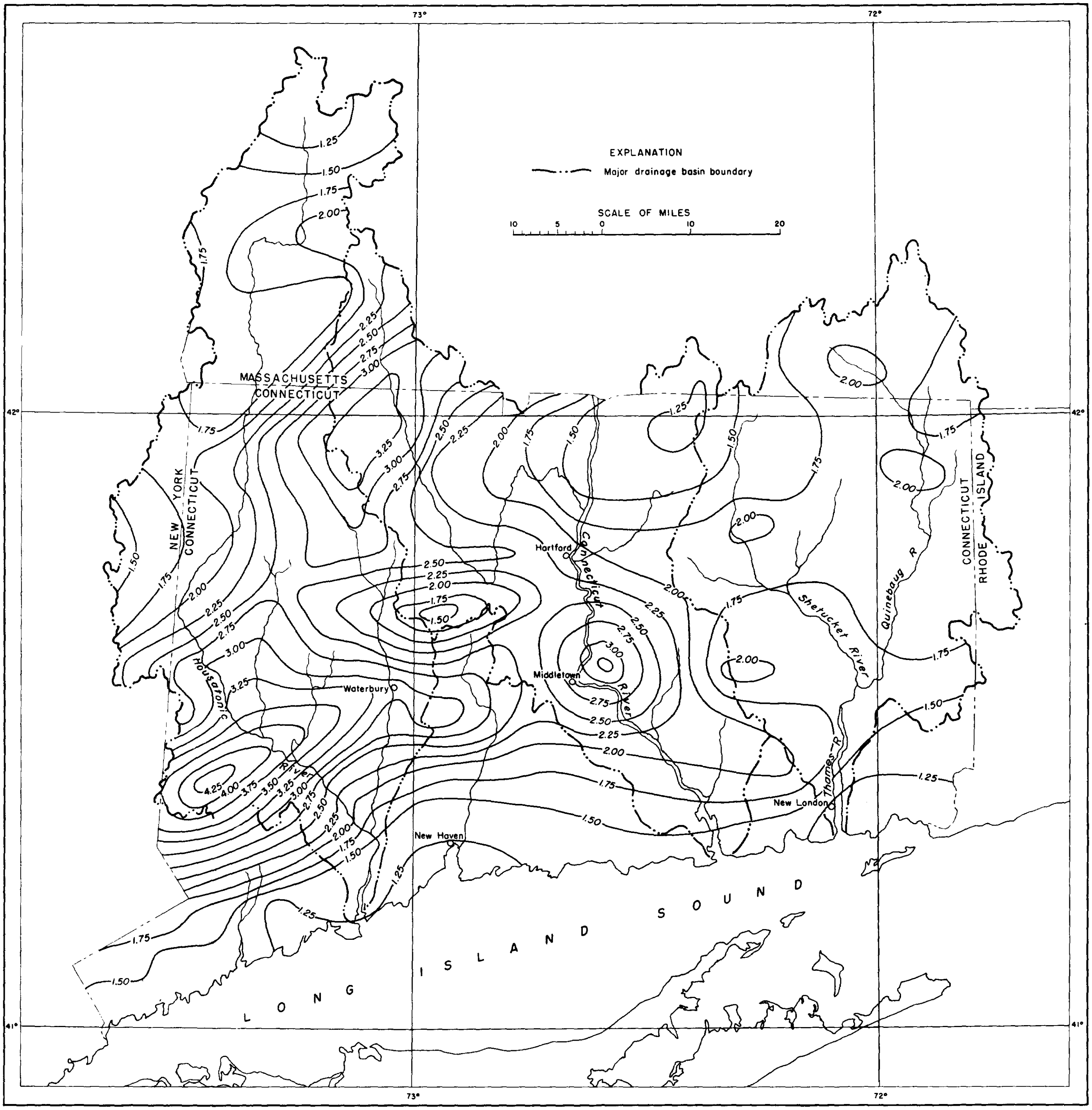
[8]Connecticut Light & Power Co.
[9]Record missing.
[10]City of Waterbury, Bureau of Engineering. See No. 250, table 1, for daily precipitation measured in nonrecording gage.
[11]City Engineer, Kingston, N.Y.
[12]Nassau County, Department of Public Works, Hydrological Bureau.

TABLE 3.—*Rate and duration of precipitation, January 24-26, 1938*

Station	Total precipitation (inches)	Total time, in hours, in which precipitation exceeded indicated rate, in inches per hour							Maximum 1-hour precipitation in inches	
		Trace	0.02	0.04	0.06	0.10	0.15	0.25	Date	Precipitation
Massachusetts										
Springfield[1]	1.93	15	11	11	10	9	6	1	Jan. 25	0.37
Rhode Island										
Block Island[2]	.37	9	3	3	2	1	0	0	do.	.14
Providence[2]	1.31	15	12	9	7	6	2	0	do.	.23
Connecticut										
Bloomfield[3]	1.94	14	13	12	12	8	7	1	do.	.26
Burlington (Phelps Brook Dam)[4]	1.73	14	11	11	10	7	6	1	do.	.26
Candlewood Isle[5]	2.48	13	11	11	11	9	6	4	do.	.44
Ellington[6]	1.18	12	11	9	6	5	2	0	do.	.25
Hartford[2]	1.94	14	12	11	11	11	6	1	do.	.31
New Britain[7]	2.06	16	14	11	11	11	10	0	do.	.20
New Haven[2]	.72	13	10	7	5	2	0	0	do.	.11
Newington[3]	1.98	14	14	12	12	12	5	0	do.	.25
South Meadows[3]	1.78	15	12	12	11	10	3	1	do.	.27
West Hartford[4]	2.15	14	13	13	13	11	8	1	do.	.26
Woodville[8]	2.67	17	14	13	11	11	9	4	do.	.36
New York										
Albany[2]	1.06	20	15	11	6	1	1	0	do.	.18
Kingston[9]	1.55	14	13	9	9	7	4	0	Jan. 24, 25	.22
Mineola[10]	.68	12	12	8	3	1	0	0	Jan. 25	.13
New York (Battery Place)[2]	.53	17	6	4	2	1	0	0	do.	.12

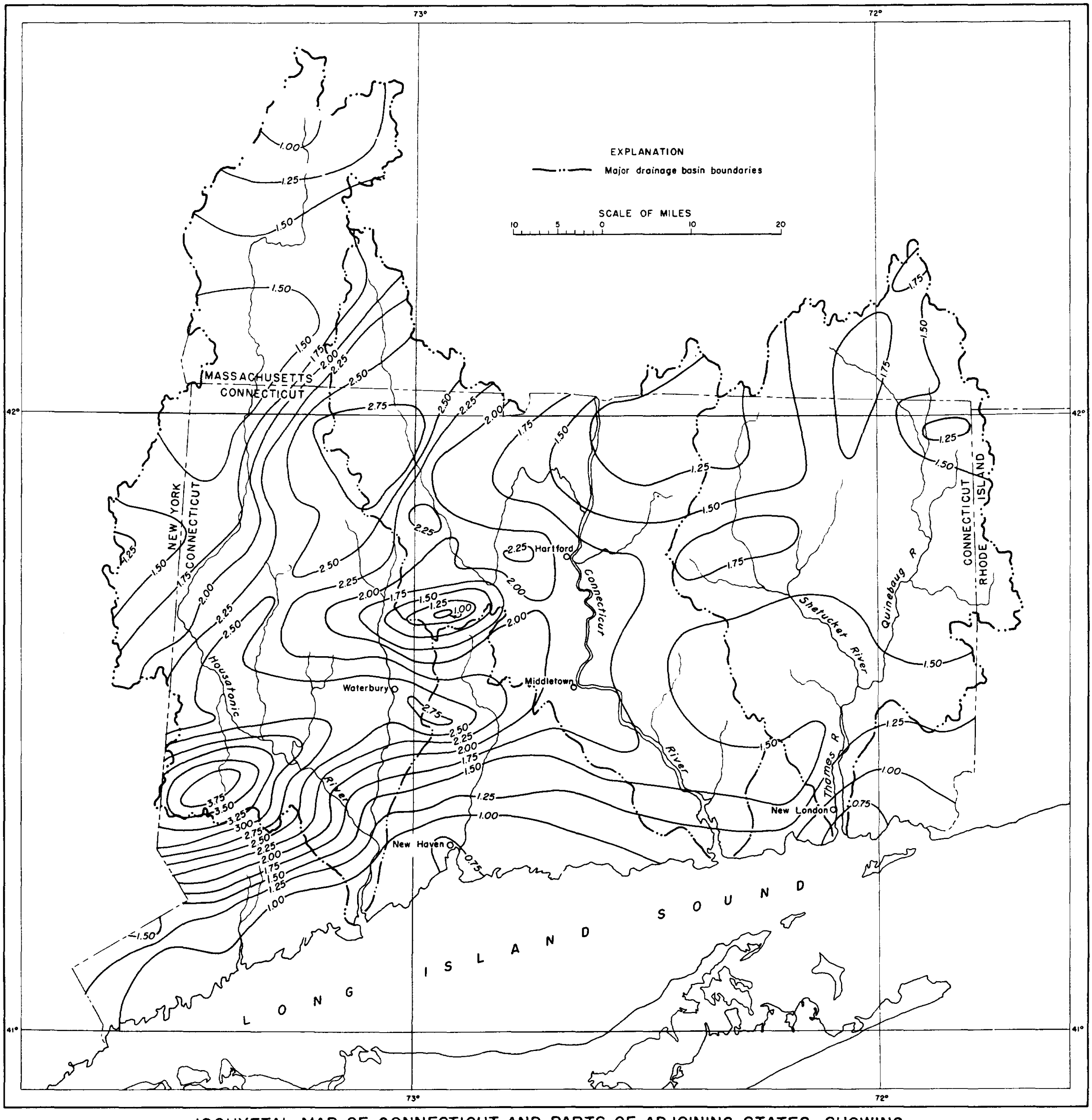
[1]City of Springfield, Department of Streets and Engineering.
[2]U. S. Weather Bureau.
[3]City Engineer, Hartford, Conn.
[4]Hartford Metropolitan Water Bureau. Hourly amounts adjusted on basis of daily determinations at auxiliary nonrecording gage.
[5]Connecticut Light & Power Co.
[6]Soil Conservation Service.
[7]City Engineer, New Britain, Conn.
[8]City of Waterbury, Bureau of Engineering.
[9]City Engineer, Kingston, N. Y.
[10]Nassau County, Department of Public Works, Hydrological Bureau.

All available records of hourly rainfall on January 24-26 are listed in table 2. Figure 10 shows the hourly distribution of precipitation at 14 selected recording stations for January 20-26, 1938. These data show that the main storm precipitation began between 7 and 8 p.m. on January 24 and stopped between 8 a.m. and noon on January 25. The rainfall within this period accounted for nearly all of the precipitation on January 24-25. Except for 0.06 inch recorded at New Britain, no precipitation fell on January 26. If these records may be used as criteria for the distribution of precipitation measured at non-recording stations, then the amounts reported from January 24 to 26 at nonrecording stations fell largely within a 24-hour period and the storm may be classified as of 1-day duration. Table 3 shows the rate and duration of precipitation of this storm period at the 18 recording stations given in table 2. For stations in Connecticut, disregarding consecutiveness, the total time in which precipitation was greater than a trace varied from 12 to 17 hours and the maximum precipitation in any 1 hour varied from 0.11 to 0.44 inch.



ISOHYETAL MAP OF CONNECTICUT AND PARTS OF ADJOINING STATES, SHOWING TOTAL PRECIPITATION, IN INCHES, JANUARY 20-26, 1938

748116 O - 48 (Face p. 36) No. 1



-ISOHYETAL MAP OF CONNECTICUT AND PARTS OF ADJOINING STATES, SHOWING TOTAL PRECIPITATION, IN INCHES, JANUARY 24-26, 1938

748116 O - 48 (Face p. 36) No. 2

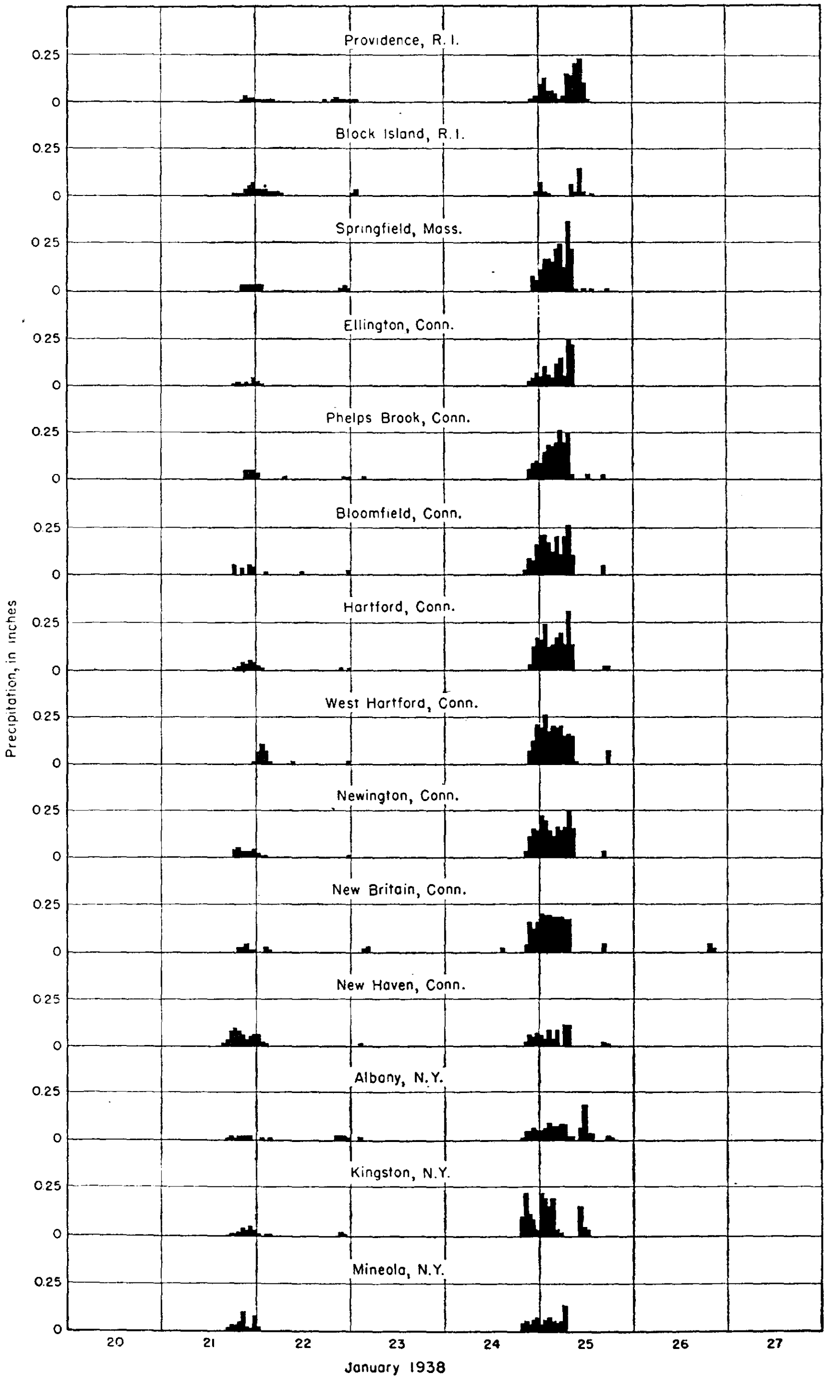


FIGURE 10.—Hourly precipitation at representative stations in and near Connecticut, January 20-26, 1938.

AREAL DISTRIBUTION

Lack of precipitation immediately before or after the period January 20–26 permitted convenient segregation of the period as a unit for study. Recording rainfall stations showed no precipitation on January 20, and, as that was the end of the cold period, records of water content of snow could be adjusted to this date. Precipitation from January 21 to 23 was reported mostly as snow except along the coast, where some sleet and rain were reported. However, temperatures rose and records at most river-measurement stations showed slight runoff therefrom. Accordingly, the total precipitation from January 20 to 26 could best be added to the water content of snow as of January 20 to determine the total water available for runoff in the flood.

Plate 3 presents an isohyetal map for the total period January 20–26, 1938, for the area covered by this report, and plate 4 presents a similar map for precipitation from January 24 to 26, which was largely received within a 24-hour period.

Plate 4 shows two major storm centers, the greater center in southwestern Connecticut and the lesser near the Connecticut-Massachusetts State line. Climatological data published by the Weather Bureau indicate that there was another center in Massachusetts just south of the intersection of the Massachusetts, New Hampshire, and Vermont State lines. Thus, the path of maximum precipitation ran about N. 30° E., with places of especially heavy precipitation about 50 miles apart. Flanking each side of this path were other scattered concentrations of less magnitude.

The areas between isohyetal lines were measured by planimeter on the original maps of plates 3 and 4 for the drainage basins upstream from each of the 32 river-measurement stations, and a value was obtained for the average total precipitation in each basin. The results of these determinations are given in table 9.

AREA-DEPTH RELATIONS

The areas within various isohyetal lines shown on plate 4 for this 1-day storm were planimetered for the area covered by this report. The results were as follows: More than 4 inches of precipitation on about 2 square miles, more than 3 inches on 130 square miles, more than 2 inches on 1,490 square miles, and more than 1 inch on 5,740 square miles. It should be emphasized that these areas are only those within the area of this report, which covers about 6,200 square miles. Time did not permit a determination for the entire area of the storm.

The Miami Conservancy District analyzed many of the notable storms in this region by comparing the area enclosed by each isohyetal of a storm with the average rainfall within it. The envelop of determinations for the various isohyets showed the variation of average precipitation with respect to areal extent. Table 4 compares the storms of January and July 1938 with those in this region computed by the Miami Conservancy District and also with other recent storms. (See page 84 of Geological Survey Water-Supply Paper 867.) Isohyets greater than 2 inches for the storm of January 1938 were defined beyond the area of this report using only the records published by the Weather Bureau in Climatological Data. The closure lines would undoubtedly have been more accurate if all possible rainfall records had been obtained. The rainfall of January 24-26, 1938, compared with that of other storms, was small in amount, and a combination with other factors was required to produce the flood. For a composite comparison of the rainfall, runoff, and peak-flow relations of recent great storms in Connecticut, reference should be made to table 10.

TABLE 4.—*Depth of average rainfall in relation to areal extent for notable storms in the North Atlantic coast region*

Date	Center of storm	Average rainfall, in inches, over indicated area, in square miles						Duration (days)
		1	500	1,000	2,000	4,000	6,000	
Oct. 3-4, 1869[1]	Connecticut	12.4	10.4	9.7	8.9	8.1	7.8	2
July 12-14, 1897[1]	do	10.3	9.5	9.1	8.5	7.5	6.9	2
Oct. 8-9, 1903[1]	New Jersey	15.0	11.9	10.9	9.9	9.0	8.4	2
July 19-23, 1919[1]	do	12.8	10.7	9.7	8.5	7.5	7.0	5
Aug. 13-17, 1919[1]	do	10.2	9.9	9.6	9.2	8.4	7.7	5
Nov. 3-4, 1927[1]	Vermont	9.4	9.1	8.9	8.6	8.1	7.7	2
Sept. 16-17, 1932[2]	Rhode Island	12.2	11.2	10.4	9.4	8.3	7.8	1
Mar. 9-13, 1936	New England	9.2	7.9	7.3	6.6	5.9	5.45	4
Mar. 16-19, 1936	do	9.0	8.0	7.7	7.4	7.0	6.8	3
Jan. 24-26, 1938	Connecticut	4.1	3.0	2.8	2.5	----	----	1
July 17-25, 1938[3]	North Atlantic coast	14.0	11.6	11.1	10.2	9.2	8.9	7
Sept. 17-21, 1938	New England	18.0	15.5	14.8	14.0	13.0	12.3	4

[1]Storm rainfall of eastern United States, Miami Conservancy District Tech. Repts, pt. 5 (revised), p. 278, Dayton, Ohio, 1936.
[2]White, G. W., Great storm of September 16 and 17, 1932, New England Water Works Assoc. Jour., vol. 47, No. 2, pp. 164-183, 1933.
[3]Area north of Potomac River only.

SNOW

In combination with rainfall and frozen ground, snow was one of the major factors contributing to the January flood. In a preceding section of this report, entitled "Antecedent conditions," data show by months the amounts and variations of antecedent snowfall. Presented herewith are basic data used and analyses made to determine finally the amount of potential water stored in the snow cover for runoff during the flood.

The best means for determining snow-water available for runoff during a flood is a survey made just prior thereto of the water equivalent of snow. As the time for such a survey can seldom be accurately anticipated, it is generally necessary to adjust some periodic survey to the date of the flood by adding intervening rainfall and snowfall adjusted for evaporation and runoff. Also records of depth of snow on the ground at Weather Bureau cooperative stations when converted to equivalent inches of water provide supplemental values for localities where no surveys are made.

Table 5 shows records of snow depth on various days of December 1937 and January 1938 for all available stations, principally of the United States Weather Bureau, within the area covered by this report and for some stations just outside the area. Footnotes indicate the source of the information. Most of these stations are situated in urban or rural communities and may not be accurately representative of the surrounding countryside. There are, moreover, significant differences between snow depths in areas of hardwood and coniferous trees.

It may be noted from table 5 that snow cover on December 25 was very light, but by January 5 snow storms had increased the depth. Records for January 10 indicate that the warm rain on January 7 had removed most of this snow in Rhode Island and from a band averaging somewhat more than 10 miles wide along the entire coast of Connecticut. Elsewhere the records show that this rain caused a definite decrease in snow depth. The remaining snow was probably well saturated, inasmuch as all the Connecticut stream-flow records showed a decided rise after January 7. From January 10 to 22 the snow depth increased at all stations. Records for January 25 show that the storm of that date had removed most of the snow in Connecticut, and by January 27 only two stations in the immediate vicinity, in northwestern Massachusetts, reported more than 0.4 inch still on the ground.

TABLE 5.—*Snow depth, in inches, on ground on indicated days, December 1937 and January 1938*

Station	December 1937		January 1938						
	25	31	5	10	15	20	22	25	27
Thames River Basin									
Connecticut:									
New London	0.0	------	0.0	0.0	3	2	4	2	0.0
Putnam	.0	1	3	0	6	8	9	.0	.0
Storrs	Tr.	1	4	1	9	8	9	Tr.	Tr.
Connecticut River Basin									
Massachusetts:									
Holyoke	.6	2	7	5	9	12	13	6	Tr.
Hoosac Tunnel	3	5	12	8	13	17	19	10	10
Springfield	Tr.	2	6	3	10	14	15	Tr.	Tr.
Connecticut:									
Colchester	.0	1	3	.0	6	7	8	.0	.0
Collinsville	1	1	3	1	11	9	11	Tr.	Tr.
East Hartland	------	------	------	------	------	------	------	------	Tr.
Hartford	.1	1	4	2	11	10	10	Tr.	.0
Housatonic River Basin									
Massachusetts:									
Stockbridge	Tr.	2	6	3	7	------	12	Tr.	------
Connecticut:									
Cream Hill	.0	2	7	2	6	9	11	Tr.	Tr.
Danbury	.0	.8	2	.0	4	3	8	.0	.0
Falls Village	------	.0	------	------	6	------	9	.0	------
Salisbury	1	2	5	3	7	9	13	Tr.	Tr.
Torrington[1]	------	------	------	[2]3	------	------	[2]7	------	Tr.
Waterbury	------	.0	.0	Tr.	6	3	6	.0	.0
Hudson River Basin									
Massachusetts:									
Adams	.0	2	8	6	14	16	12	------	[3]3
Williamstown	Tr.	2	8	2	6	8	7	------	.4
New York:									
Albany	Tr.	.6	7	3	4	6	7	Tr.	Tr.
Glenham	.1	Tr.	4	2	2	4	5	Tr.	.0
High Falls	.0	3	[2]9	------	7	------	------	------	------
Mohonk Lake	Tr.	2	[2].0	6	8	10	13	Tr.	.0
Poughkeepsie	.0	5	[2]6	------	5	7	7	.0	.0
Rifton	.0	4	5	4	5	7	9	.0	.0
Walden	.0	4	6	3	6	6	8	.0	.0
Wappingers Falls	Tr.	Tr.	[2]5	4	5	6	8	.0	.0
West Point	Tr.	.3	2	.5	1	3	6	Tr.	.0
Minor Basins									
Massachusetts:									
Millbury	1	2	5	3	13	18	18	3	.0
Worcester	.0	2	2	.4	10	9	9	.5	.0
Rhode Island:									
Block Island	.0	Tr.	.0	Tr.	------	------	------	------	------
Hopkins Mills[4]	------	------	------	.0	6	6	8	.0	.0
Kent[4]	------	------	------	.0	6	6	8	.0	.0
Kingston	.0	.0	Tr.	.0	7	6	6	.0	.0
North Scituate[4]	------	------	------	.0	5	7	10	.0	.0
Pawtucket	.0	.0	------	------	------	------	------	------	------
Providence	.0	Tr.	2	.0	6	6	6	.0	.0
Rocky Hill[4]	------	------	------	.0	8	6	8	.0	.0
Westcott[4]	------	------	------	.0	6	6	8	.0	.0
Connecticut:									
Bridgeport	.0	Tr.	.5	.0	6	6	7	Tr.	.0
Mount Carmel	Tr.	.9	2	Tr.	4	4	8	Tr.	.0
New Haven	.0	Tr.	.3	.0	4	2	5	.0	.0

NOTE.—Data furnished by U. S. Weather Bureau unless otherwise indicated.
[1]Data furnished by Torrington Register, Torrington, Conn.
[2]Estimated from observations on adjacent days.
[3]No snow on Jan. 31.
[4]Data furnished by State Department of Public Works, Providence, R. I.

TABLE 6.—*Snow depth, in inches, and water equivalent of snow, in inches, at snow courses in Connecticut, Massachusetts, and New York during January and February 1938*

No. on pl. 5	Place of measurement	Day of measurement	Snow depth	Water equivalent	
				Observed	Adjusted to January 20
	Thames River Basin				
1	Stafford, Conn. (along Furnace Brook 3 miles upstream from mouth)	Jan. 18	11.5	1.46	1.46
		Feb. 4	.0	.0	
2	South Coventry, Conn. (along Willimantic River 2 miles upstream from Hop River)	Jan. 18	7	1.19	1.19
		Feb. 9	.0	.0	
3	Hampton, Conn. (1 mile north of center of town)	Jan. 18	8	1.16	1.16
		Feb. 4	.0	.0	
4	Putnam, Conn. (along Quinebaug River near Muddy Brook)	Jan. 18	7.5	1.05	1.05
		Feb. 4	.0	.0	
5	Jewett City, Conn. (along Quinebaug River near Pachaug River)	Jan. 13	6	.44	.58
		Jan. 27	.0	.0	
	Connecticut River Basin				
6	Hartford, Conn. (in Goodwin Park, near Wethersfield township line, 2 miles west of Connecticut River)[1]	Jan. 16	8.5	1.58	1.70
7	Branford, Mass. (Borden Brook Reservoir)[2]	Jan. 20	13	1.09	1.09
		Jan. 21	15	1.26	
		Jan. 22	16	1.35	
8	Riverton, Conn. (along Farmington River below Still River)	Jan. 15	8	2.68	2.85
		Feb. 3	.0	.0	
9	Tariffville, Conn. (along Farmington River 1 mile southwest of Tariffville)	Jan. 15	11.5	2.02	2.16
		Feb. 2	Tr.	[3].1	
10	Burlington, Conn. (along Burlington Brook 1 mile north of Burlington)	Jan. 19	10	1.92	1.92
		Feb. 1	Tr.	[3,4].1	
11	Farmington, Conn. (2 miles east of town beside abandoned Hartford Reservoir)[5]	Jan. 3	4.5	1.08	1.52
		Jan. 14	11.5	1.42	
12	Newington, Conn. (1 mile southwest of confluence of Trout Brook and South Branch of Park River)[5]	Jan. 14	11	1.71	1.81
13	West Hartford, Conn. (1½ miles west of confluence of South and North Branches of Park River)[1]	Jan. 15	11	1.74	1.92
		Jan. 22	10.5	2.00	
14	Bloomfield, Conn. (in village, west of Wash Brook)[5]	Jan. 3	4.5	1.14	1.78
		Jan. 14	11	1.62	
15	Tolland, Conn. (1 mile east of Shenipsit Lake and on divide between Connecticut and Thames River Basins)	Jan. 18	10	1.49	1.49
		Feb. 4	.0	.0	
16	East Hampton, Conn. (along Salmon River 3 miles southeast of East Hampton)	Jan. 13	8	.69	.89
		Feb. 10	.0	.0	
17	North Lyme, Conn. (near confluence of East and West Branches of Eightmile River)	Jan. 13	7	.50	.59
		Jan. 31	----------	[3,4].1	
	Quinnipiac River Basin				
18	Plantsville, Conn. (near confluence of Quinnipiac and Eightmile Rivers)	Jan. 19	7.5	1.65	1.65
		Feb. 15	.0	.0	
19	Wallingford, Conn. (along Quinnipiac River west of borough)	Jan. 19	6	1.09	1.09
		Feb. 2	Tr.	[3].1	
	Housatonic River Basin				
20	Falls Village, Conn. (along Housatonic River 1 mile below Hollenbeck River)	Jan. 17	5.5	.86	.97
		Feb. 7	.0	.0	
21	Stevenson, Conn. (along Housatonic River near Eightmile Brook)	Jan. 14	6.5	.72	.85
		Jan. 31	.0	.0	
22	Norfolk, Conn. (2 miles east of town on divide between Housatonic and Connecticut River Basins)	Jan. 17	7	1.51	1.66
		Feb. 7	.0	.0	
23	Gaylordsville, Conn. (along Tenmile River 1 mile upstream from mouth)	Jan. 17	6.5	1.55	1.60
		Feb. 7	.0	.0	
24	New Fairfield, Conn. (north side of village)	Jan. 17	5	.71	.73
		Feb. 2	Tr.	[3].1	
25	Woodville, Conn. (along Shepaug River 3 miles above Bantam River)	Jan. 14	7	1.29	1.40
		Feb. 2	Tr.	[3].1	

See footnotes at end of table.

TABLE 6.—*Snow depth, in inches, and water equivalent of snow, in inches, at snow courses in Connecticut, Massachusetts, and New York during January and February 1938* —Continued

No. on pl. 5	Place of measurement	Day of measurement	Snow depth	Water equivalent	
				Observed	Adjusted to January 20
	Saugatuck River Basin				
26	Westport, Conn. (near confluence of Saugatuck and West Branch of Saugatuck Rivers)	Feb. 2	0.0	0.0	
	Hudson River Basin				
27	Kaaterskill Junction, N. Y. (Schoharie Creek Basin)	Jan. 24	15.5	3.28	3.00
28	Edgewood, N. Y. (Esopus Creek Basin)	Jan. 24	11	2.62	2.38

NOTE.—Observations by Geological Survey unless otherwise indicated.
[1]Observation by U. S. Weather Bureau.
[2]Observation by Springfield Water Works, Springfield, Mass.
[3]Estimated.
[4]Observer reported snow on ground to be of recent origin
[5]Observation by city engineer, Hartford, Conn.

Table 6 shows the depth and water content of snow at various snow courses. No data could be obtained for Rhode Island and for but one place in Massachusetts. Many determinations were made in New York, and the two listed are closest to the area covered by this report. Observations in Connecticut by the Geological Survey were obtained by averaging the depth and weight of eight samples taken 50 to 100 feet apart at courses laid out in a pattern to compensate best for snow drifting.

Most of the snow surveys prior to the flood were made during the period of January 13–20. From January 10 to 20 all precipitation was in the form of snow and temperatures were below freezing for all but a few hours. Average daily temperatures at Hartford for this period, computed from hourly readings, ranged from 8.4° to 30.2° F. and averaged 20.4° during the 11-day period. Considering the inaccuracy involved in applying a local determination over a large area, it was deemed permissible to neglect corrections for any slight evaporation, condensation, or melting that might have occurred during this period. Therefore, any observations between January 10 and 20 were readily converted to any other date in the period by adding or subtracting the intervening precipitation at the place. Where there were no precipitation stations in the vicinity of the snow-survey courses, a fair approximation for the intermediate course and a better mean for the surrounding area was made by computing a weighted average of the precipitation at several of the closest stations. Temperatures were above freezing for longer periods after January 20, and stream-flow records indicate a slight direct runoff. Accordingly, the snow surveys could be best adjusted to January 20 and the last column of table 6 shows these figures.

The map on plate 5 has been prepared to show an estimate of the water equivalent of snow on January 20. It was reduced to an appropriate scale for publication from the original traced over a Geological Survey base map, scale 1:500,000. Index numbers on the map correspond to those in table 6.

In drawing this map, considerable use was made of precipitation and snow-depth records to supplement the snow surveys. For the greater part of Rhode Island and areas along the coast of Connecticut, where it was reported that the ground was bare of snow on January 10, the water equivalent of snow on January 20 was about equal to the total precipitation during the intervening period. For the remaining area, various methods were used to estimate the water equivalent of snow from the supplemental information. The elevation of the snow courses in Connecticut varies from about 30 to 1,380 feet, which range includes the elevation of most of the stations where records of snow depth on the ground were taken. In this limited range of elevation no definite trend was discernible between altitude and snow density. Accordingly, snow cover at Weather Bureau stations that were within a few miles of snow courses was assumed to have a density equal to the snow of the same date at the snow courses. Adjusted as previously explained by using intervening precipitation to January 20 and weighted according to distances from the various snow courses, approximate values of water equivalent of snow were thus available for many of the Weather Bureau stations.

The water equivalent of snow could not be so accurately or readily determined for areas, particularly in Massachusetts and New York, that were distant from snow courses. The density of snow cover on January 10 was probably more uniform throughout the area because of the heavy rainfall on January 7 than it was after subsequent snowfall. The density on January 10 was computed to average about 0.6 at the snow courses in Connecticut where the depth of this old snow was determined separately from that of subsequent snowfalls. Assuming a density of 0.5 for the higher or more northern areas in Massachusetts and New York, a map was drawn showing roughly the water content of snow on January 10. It was fairly well defined in Connecticut by adjustment of the water-content-of-snow surveys to January 10 and seemed reasonable in Massachusetts and New York when compared with approximate computations of precipitation from December 25 to January 10 minus estimated loss of water content of the snow during that period. Estimated water equivalent of snow for January 10, plus precipitation from January 10 to 20, was then used as a basis for drawing the lines of equal water equivalent of snow as of January 20 (pl. 5) for the areas in Massachusetts and New York, some weight being given to topography.

The areas between the lines indicating water content were measured by planimeter, and the average water content of the snow, in depth in inches, for the drainage basins above the principal gaging stations was determined. These data are shown in table 9.

FROST IN THE GROUND

Frost in the ground prior to the January flood played an important part in causing river stages to rise to higher levels than they otherwise would have risen, in that the snow-melt and rain could not readily infiltrate into the ground.

Accurate frost observations are almost wholly lacking in New England and this constitutes a serious deficiency in climatologic information useful for the detailed study of the causes of winter floods. The observations and estimates of frost conditions are submitted in table 7. The estimates were obtained from superintendents of cemeteries, and as it is general practice to locate cemeteries in gravelly and sandy soils and in open areas these data may not be representative for other types of soil nor for wooded or more sheltered areas. In addition to these records the bulletin issued by the New York Cooperative Snow Survey on January 31, 1938, indicates that frost was 3 to 8 inches deep in certain areas of central New York prior to the flood.

TABLE 7.—*Frost conditions in cemeteries at indicated towns in Massachusetts and Connecticut during winter of 1937–1938*

Location	Date	Depth of frost penetration
Thames River Basin		
Willimantic, Conn	Dec. 16, 1937	6 inches.
Norwich, Conn	Dec. 20, 1937	About 3 inches.
	Jan. 20, 1938	About 12 inches.
New London, Conn	Jan. 24, 1938	3 inches.
	Feb. 4, 1938	No frost.
	Feb. 8, 1938	No frost.
Connecticut River Basin		
Huntington, Mass	During winter	8 to 14 inches; less than normal.
Brookfield, Mass	December 1937	Only frozen turf.
	Jan. 6, 1938	8 inches.
	Jan. 16, 1938	14 inches.
	Jan. 20, 1938	14 inches.
	Feb. 19, 1938	12 inches.
Palmer, Mass	During winter	Not over 2–3 inches.
Hartford, Conn	January 1938	4 to 6 inches; less than normal.
Minor basin		
Worcester, Mass	Prior to Jan. 25, 1938	12 to 14 inches; normal depth.

From table 7 it may be noted that before the flood on January 25 frost was in the ground at all the reporting places and ranged in depth from 2 to 14 inches. These records do not show conclusively that the frost came out of the ground during or immediately after January 25, but records of water level in wells throughout Connecticut show a general rise, and stream-flow records indicate an increased ground-water flow after the flood, all of which could be possible only if the ground were largely free from frost while water was available for infiltration.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

EXPLANATION OF DATA

Records of discharge at 32 stream-gaging stations in Connecticut are presented in this section. These records are the essence of this report and are of wide utility in many kinds of flood problems. The make-up of the tables, significance of the descriptive notes, methods of collecting and computing records of stream flow,

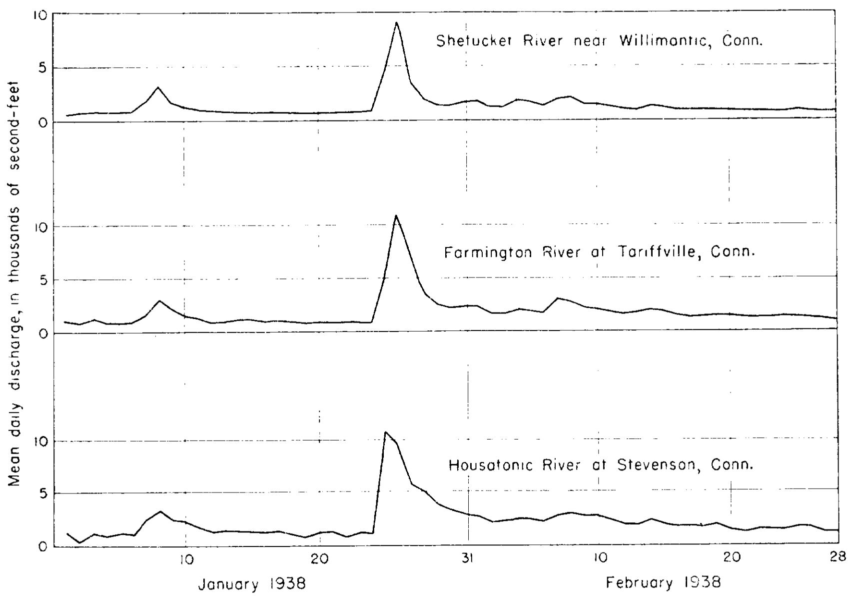


FIGURE 11.—Graphs of daily discharges at various stream-gaging stations for the period January 1 to February 28, 1938.

and extent of their limitations have been explained in appropriate detail in pages 8 to 11. Figure 11 gives a general perspective of stream-flow conditions during January and February based on records of daily discharge selected from among those included in this section. The rivers were in flood 4 days from about January 25 to about January 29. Flow preceding and following these dates was relatively low, though higher after the flood than before it. More detailed characteristics of the flood peaks and conditions of stream flow during the flood period are shown by hydrographs of discharge based on tables of "discharge at indicated time" for selected stream-gaging stations in the Thames, Connecticut, and Housatonic River Basins in figures 12 to 14, inclusive.

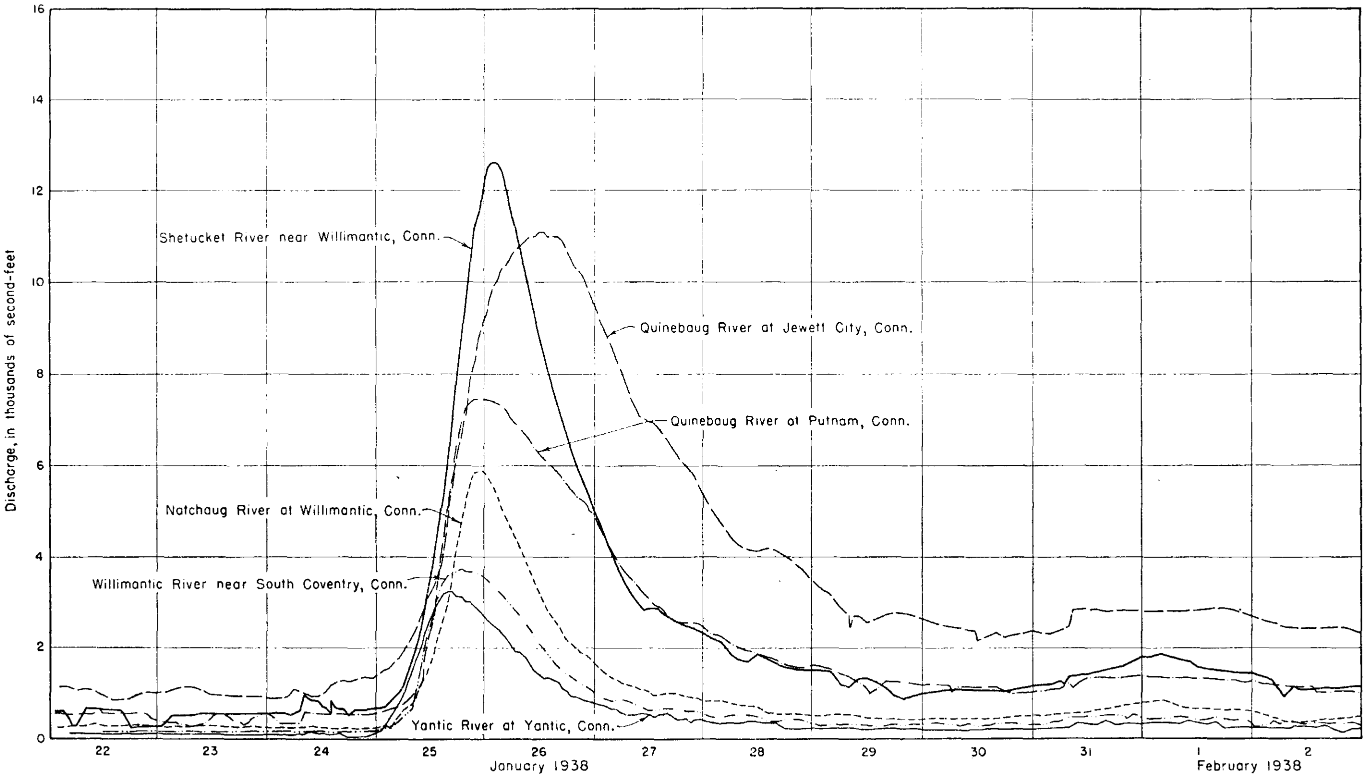


FIGURE 12.—Hydrographs of discharge at various stream-gaging stations in the Thames River Basin, January 1938.

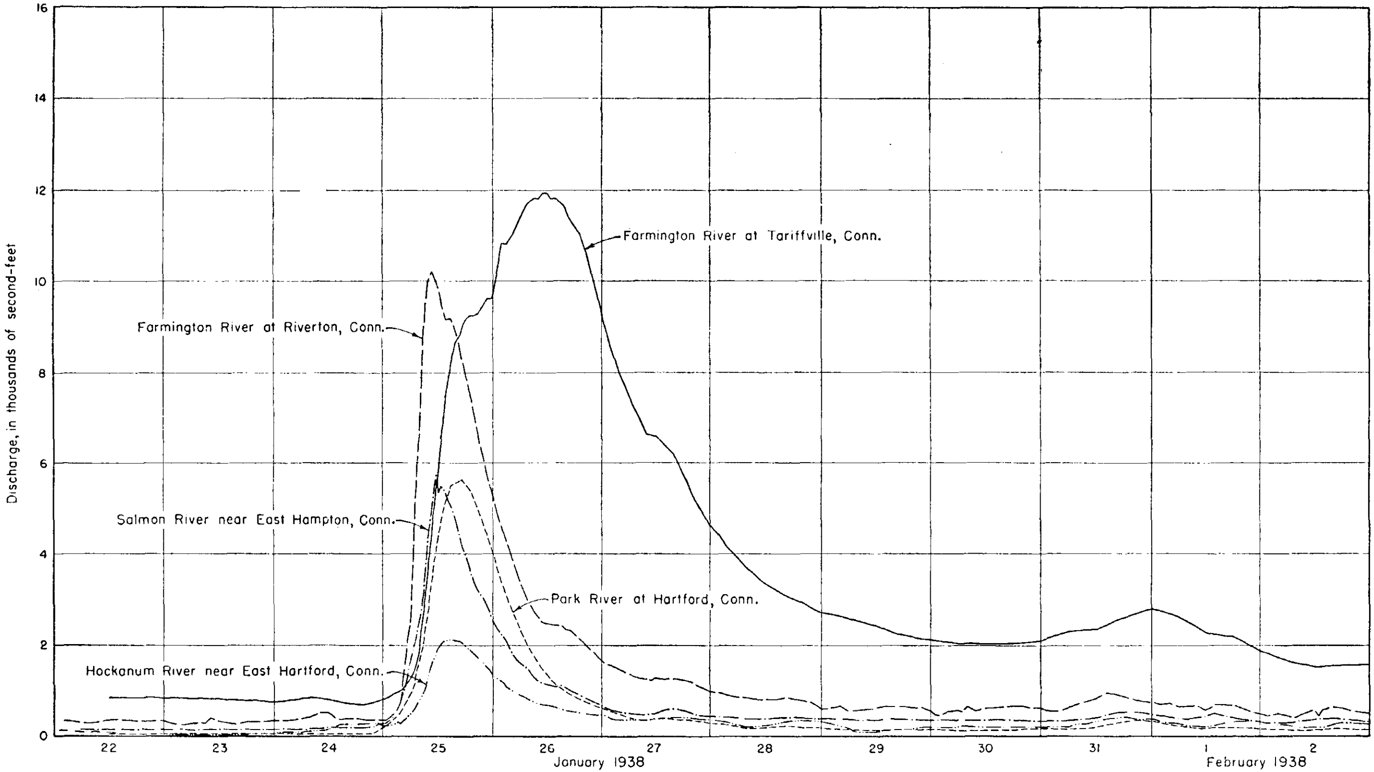


FIGURE 13.—Hydrographs of discharge at various stream-gaging stations in the Connecticut River Basin, January 1938.

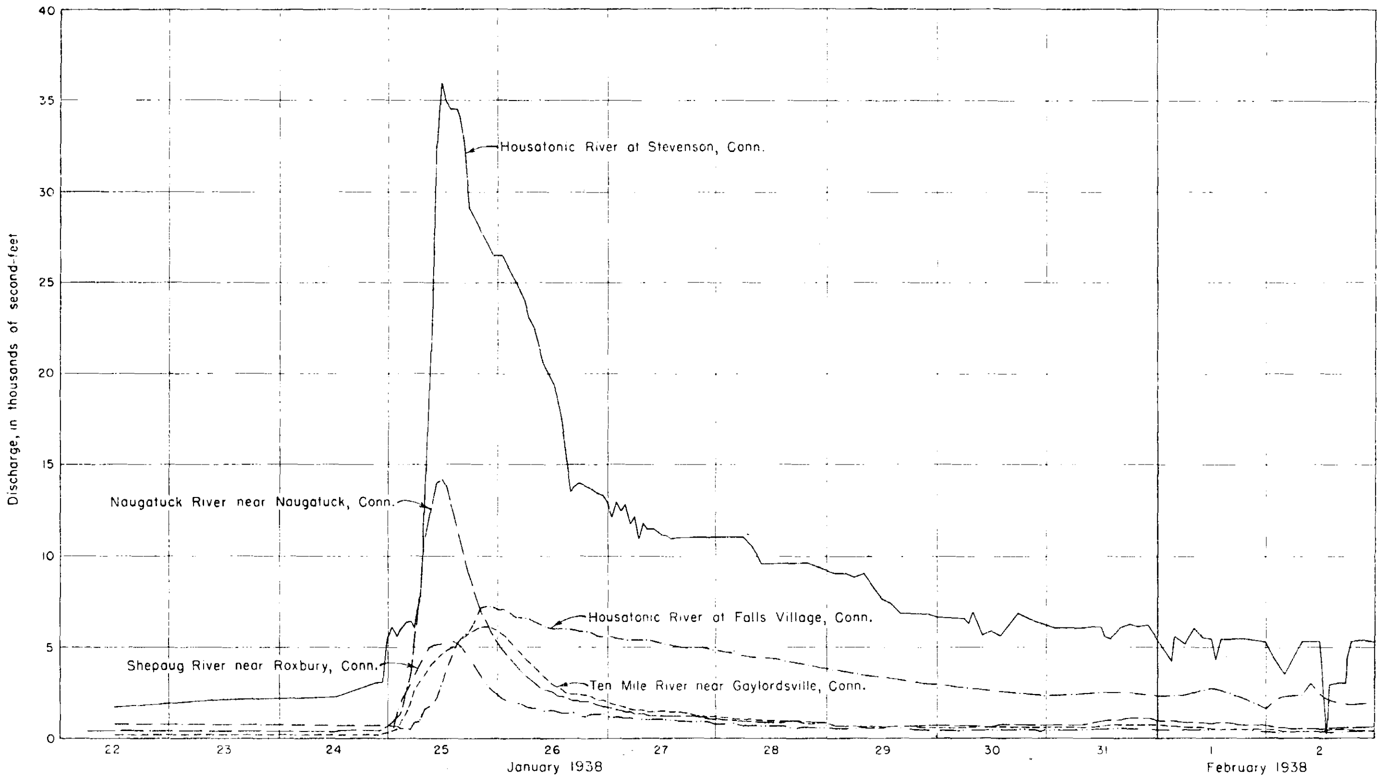


FIGURE 14.—Hydrographs of discharge at various stream-gaging stations in the Housatonic River Basin, January 1938.

THAMES RIVER BASIN

WILLIMANTIC RIVER NEAR SOUTH COVENTRY, CONN.

LOCATION.—Lat. 41°45′00″, long. 72°16′00″, 700 feet upstream from highway bridge, 2 miles southeast of South Coventry, Tolland County, and 2½ miles upstream from Hop River. Datum of gage is 239.05 feet above mean sea level, datum of 1929 (levels by Corps of Engineers, U. S. Army).

DRAINAGE AREA.—121 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods 4 p.m. Jan. 15 to 4 p.m. Jan. 18, 6 p.m. Jan. 18 to 2 p.m. Jan. 25, 6 p.m. Jan. 25 to 9 a.m. Jan. 27, when record was computed on basis of recorded range of stage, existing record, and hydrologic comparison with nearby stations.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements. Affected by ice Jan. 10-14, Feb. 27, 28.

MAXIMA.—January 1938: Discharge, 3,770 second-feet 7 p. m. Jan. 25 (gage height, 9.81 feet).

1931 to December 1937: Discharge, 7,880 second-feet Mar. 12, 1936 (gage height, 12.19 feet).

REMARKS.—Flood discharge affected by storage in several ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	144	466	9	362	432	17	170	231	25	2,150	249
2	199	365	10	280	407	18	170	214	26	2,210	226
3	222	346	11	220	341	19	170	251	27	762	150
4	168	545	12	200	256	20	170	252	28	497	150
5	188	408	13	190	282	21	170	268	29	343	
6	209	358	14	180	391	22	165	240	30	346	
7	800	648	15	180	335	23	165	240	31	482	
8	530	575	16	180	272	24	165	251			
Mean monthly discharge, in second-feet										400	327
Runoff, in inches										3.82	2.81

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Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	------	------	------	------	------	------	------	------
2	------	------	------	------	------	------	------	------	------	------	6.00	920
3	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	------	------	------	3.75	280	9.31	3,200	5.87	880
5	------	------	------	------	------	------	------	------	------	------	------	------
6	------	------	------	------	------	------	------	------	------	------	5.90	900
7	------	------	------	------	------	------	------	------	------	------	------	------
8	------	------	------	------	------	------	5.15	660	8.80	2,700	5.72	840
9	------	------	------	------	------	------	------	------	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	5.54	782
11	------	------	------	------	------	------	------	------	------	------	------	------
12 n.	------	------	------	------	------	------	8.75	2,600	8.19	2,130	5.12	656
1 p.m.	------	------	------	------	------	------	------	------	------	------	5.10	650
2	------	------	------	------	------	------	9.37	3,300	------	------	5.17	671
3	------	------	------	------	------	------	------	------	------	------	5.23	689
4	------	------	------	------	------	------	9.69	3,630	7.48	1,600	5.28	704
5	------	------	------	------	------	------	------	------	------	------	5.28	704
6	------	------	------	------	------	------	9.79	3,700	------	------	5.23	689
7	------	------	------	------	------	------	9.81	3,770	------	------	5.17	671
8	------	------	------	------	------	------	9.79	3,700	6.90	1,300	5.10	650
9	------	------	------	------	------	------	------	------	------	------	5.06	638
10	------	------	------	------	------	------	9.75	3,700	------	------	5.02	626
11	------	------	------	------	------	------	------	------	------	------	5.00	620
12 m.	------	------	------	------	3.35	195	9.65	3,600	6.35	1,050	4.89	587
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.64	512	3.93	328	4.00	345	4.00	345	4.50	470	3.92	325
4	4.65	515	4.00	345	3.97	338	4.13	378	4.54	482	4.19	392
6	4.72	536	4.00	345	3.93	328	4.20	395	4.48	465	4.03	352
8	4.82	566	4.11	372	3.90	320	4.60	500	4.71	533	4.37	438
10	4.82	566	4.01	348	3.99	342	4.60	500	4.56	488	4.08	365
12 n.	4.66	518	3.97	338	3.87	312	4.61	503	4.44	455	4.06	360
2 p.m.	4.36	435	3.86	310	3.90	320	4.71	533	4.44	455	4.01	348
4	4.39	442	3.90	320	4.09	368	4.80	560	4.49	468	4.07	362
6	4.50	470	4.00	345	4.11	372	4.82	566	4.42	450	4.13	378
8	4.50	470	4.03	352	4.10	370	4.82	566	4.43	452	4.11	372
10	4.42	450	4.04	355	4.10	370	4.88	584	4.43	452	4.13	378
12 m.	4.10	370	4.01	348	4.01	348	4.45	458	3.99	342	3.78	290

Supplemental records.—Jan. 30, 11 a.m., 4.06 ft., 360 sec.-ft.; Jan. 31, 9 p.m., 4.53 ft., 479 sec.-ft.; Feb. 1, 11 p.m., 4.39 ft., 442 sec.-ft.; Feb. 2, 12:30 a.m., 3.83 ft., 302 sec.-ft.; 3:30 a.m., 4.02 ft., 350 sec.-ft.; 4:30 a.m., 4.30 ft., 420 sec.-ft.; 7 a.m., 4.06 ft., 360 sec.-ft., 11 p.m., 4.11 ft., 372 sec.-ft.

SHETUCKET RIVER NEAR WILLIMANTIC, CONN.

Location.—Lat. 41°41′58″, long. 72°10′53″, at Bingham Bridge, 1 mile downstream from confluence of Willimantic and Natchaug Rivers and 1½ miles southeast of Willimantic, Windham County. Datum of gage is 131.40 feet above mean sea level, datum of 1929 (levels by Corps of Engineers, U. S. Army).

Drainage area.—401 square miles.

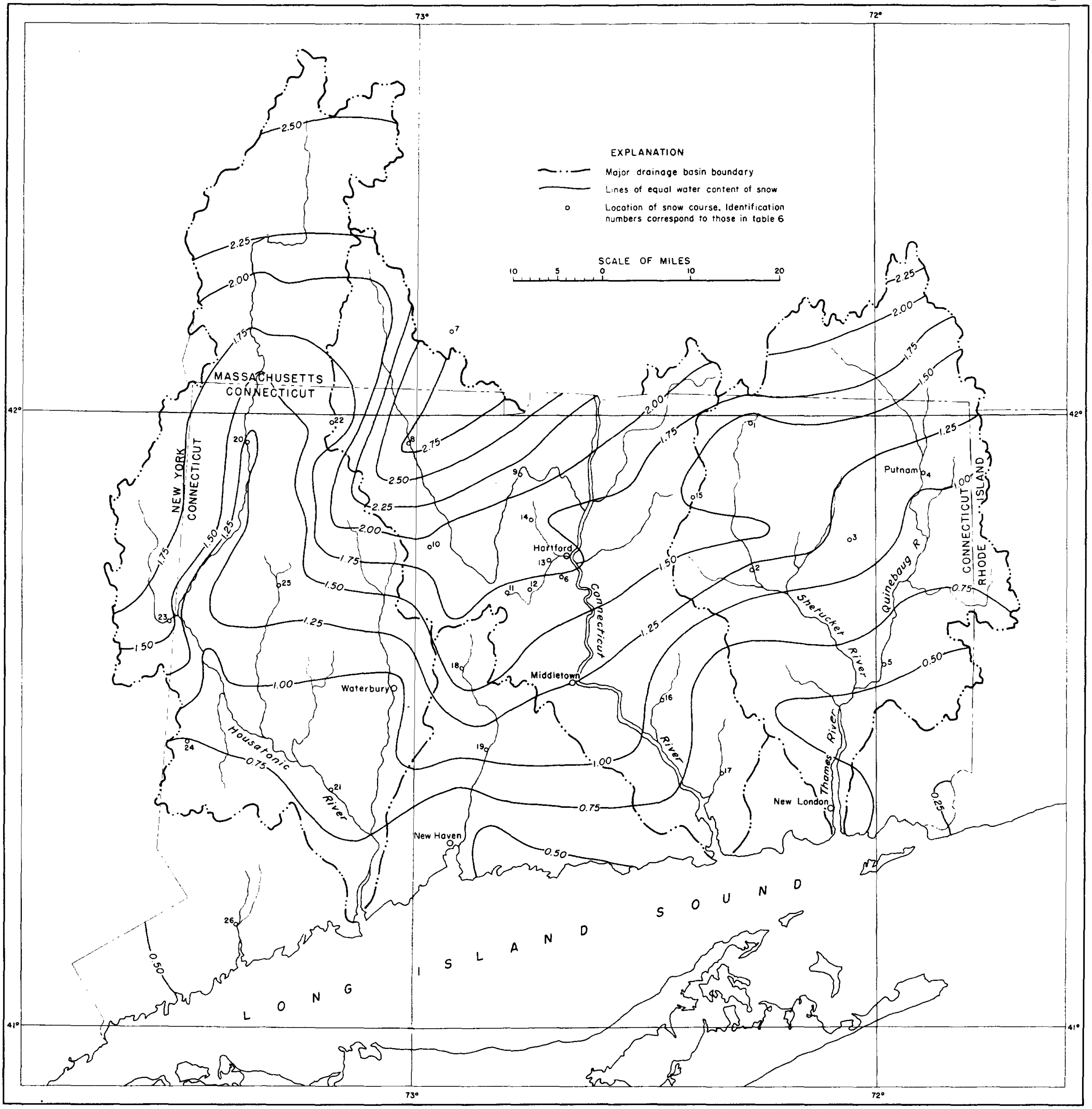
Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current meter measurements. Affected by ice Jan. 16-21.

Maxima.—January 1938: Discharge, 12,600 second-feet 2 a.m. Jan. 26 (gage height, 13.31 feet).

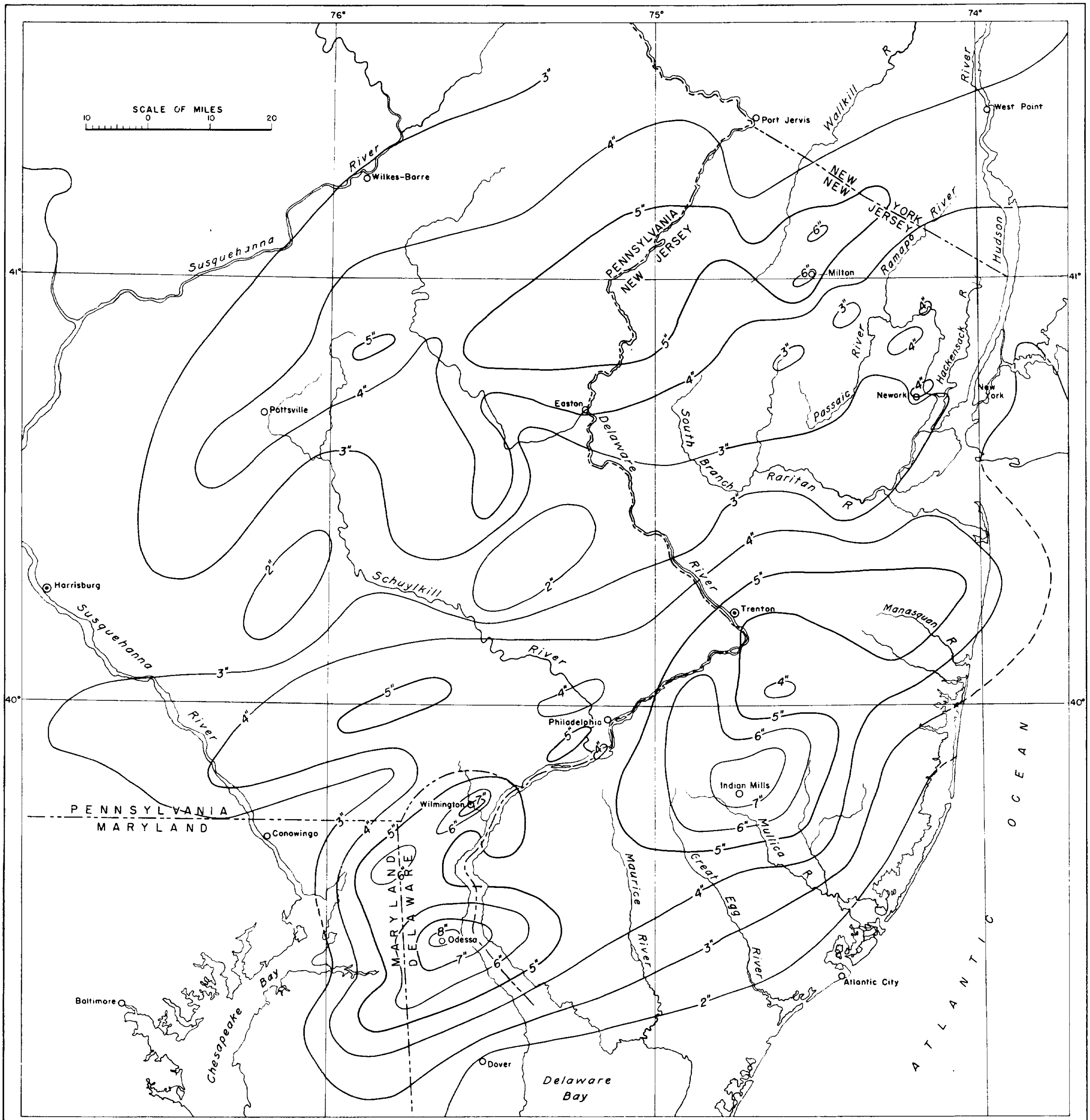
1904-5; 1933 to December 1937: Discharge, 23,900 second-feet Mar. 12, 1936 (gage height, 18.35 feet, from floodmarks).

Remarks.—Flood discharge affected by storage in numerous ponds and reservoirs.



MAP OF CONNECTICUT AND PARTS OF ADJOINING STATES, SHOWING DEPTH, IN INCHES, OF WATER EQUIVALENT OF SNOW ON GROUND, JANUARY 20, 1938

748116 O - 48 (Face p. 52) No. 1



ISOHYETAL MAP OF NEW JERSEY AND PARTS OF ADJOINING STATES, SHOWING TOTAL PRECIPITATION, JUNE 25-29, 1938

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	516	1,670	9	1,640	1,440	17	650	772	25	4,640	850
2	551	1,170	10	1,200	1,340	18	550	790	26	9,040	746
3	719	1,100	11	926	1,130	19	500	779	27	3,170	660
4	588	1,880	12	748	940	20	500	820	28	1,810	730
5	572	1,530	13	703	910	21	550	798	29	1,230	-------
6	553	1,240	14	692	1,270	22	510	757	30	1,080	-------
7	1,470	1,920	15	624	1,160	23	526	790	31	1,450	-------
8	3,150	2,040	16	550	880	24	679	820			
Mean monthly discharge, in second-feet										1,358	1,105
Runoff, in inches										3.91	2.87

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22 Feet	January 22 Sec.-ft.	January 23 Feet	January 23 Sec.-ft.	January 24 Feet	January 24 Sec.-ft.	January 25 Feet	January 25 Sec.-ft.	January 26 Feet	January 26 Sec.-ft.	January 27 Feet	January 27 Sec.-ft.
1 a.m.	3.51	615	2.75	285	3.40	565	3.71	715	13.26	12,500		
2	3.50	610	2.98	377	3.43	578	3.73	725	13.31	12,600	8.03	4,570
3	3.51	615	3.25	498	3.41	570	3.87	802	13.30	12,600		
4	3.34	538	3.30	520	3.38	556	4.05	910	13.20	12,400	7.61	4,060
5	2.80	305	3.29	516	3.32	529	4.20	1,000	13.01	12,000		
6	2.76	289	3.30	520	3.43	578	4.49	1,190	12.80	11,600	7.14	3,540
7	3.30	520	3.32	529	3.47	596	4.79	1,400	12.57	11,200		
8	3.60	660	3.34	538	4.32	1,070	5.16	1,690	12.30	10,700	6.82	3,210
9	3.64	680	3.33	534	4.00	880	5.46	1,930	12.03	10,300		
10	3.66	690	3.36	547	3.95	850	6.03	2,440	11.77	9,830	6.55	2,940
11	3.64	680	3.41	570	3.90	820	6.50	2,890	11.50	9,400		
12 n.	3.60	660	3.41	570	3.75	735	7.06	3,460	11.21	8,940	6.53	2,920
1 p.m.	3.60	660	3.40	565	3.70	710	7.52	3,960	10.90	8,450		
2	3.59	655	3.40	565	3.98	868	8.16	4,720	10.67	8,100	6.48	2,870
3	3.59	655	3.40	565	3.68	700	8.67	5,370	10.43	7,740		
4	3.60	660	3.40	565	3.63	675	9.26	6,140	10.19	7,410	6.32	2,710
5	3.30	520	3.39	560	3.55	635	9.76	6,800	9.90	7,000		
6	2.80	305	3.40	565	3.45	588	10.43	7,740	9.64	6,640	6.21	2,600
7	2.78	297	3.40	565	3.57	645	11.00	8,600	9.44	6,370		
8	2.78	297	3.40	565	3.59	655	11.56	9,500	9.21	6,070	6.13	2,530
9	2.78	297	3.40	565	3.60	660	12.08	10,300	9.00	5,800		
10	2.78	297	3.39	560	3.60	660	12.50	11,100	8.79	5,530	6.04	2,450
11	2.78	297	3.39	560	3.58	650	12.71	11,500	8.60	5,280		
12 m.	2.77	293	3.40	565	3.65	685	13.06	12,100	8.40	5,020	5.93	2,350

Hour	January 28 Feet	January 28 Sec.-ft.	January 29 Feet	January 29 Sec.-ft.	January 30 Feet	January 30 Sec.-ft.	January 31 Feet	January 31 Sec.-ft.	February 1 Feet	February 1 Sec.-ft.	February 2 Feet	February 2 Sec.-ft.
2 a.m.	5.80	2,230	4.97	1,540								
4	5.70	2,140	4.88	1,470			4.50	1,200	5.40	1,880	4.70	1,340
6	5.31	1,810	4.58	1,260	4.34	1,090						
8	5.24	1,750	4.49	1,190			4.78	1,400	5.30	1,800	4.31	1,070
10	5.20	1,720	4.73	1,360								
12 n.	5.37	1,860	4.69	1,330	4.32	1,070	4.86	1,450	5.06	1,610	4.33	1,080
2 p.m.	5.30	1,800	4.61	1,280								
4	5.15	1,680	4.44	1,160			4.96	1,530	5.00	1,560	4.40	1,130
6	5.06	1,610	4.11	946	4.30	1,060						
8	5.02	1,580	4.05	910			5.11	1,650	4.92	1,500	4.39	1,120
10	5.00	1,560	4.15	970								
12 m.	5.00	1,560	4.23	1,020	4.47	1,180	5.35	1,840	4.89	1,470	4.45	1,160

Supplemental records.—Jan. 22, 6:30 a.m., 2.77 ft., 293 sec.-ft.; 7:30 a.m., 3.59 ft., 655 sec.-ft.; Jan. 24, 1:15 p.m., 3.36 ft., 547 sec.-ft.; Jan. 27, 11 a.m., 6.46 ft., 2,850 sec.-ft.; Jan. 31, 7 a.m., 4.54 ft., 1,230 sec.-ft.; Feb. 2, 7 a.m., 4.17 ft., 982 sec.-ft.; 9 a.m., 4.48 ft., 1,190 sec.-ft.

HOP RIVER NEAR COLUMBIA, CONN.

Location.—Lat. 41°43′25″, long. 72°18′05″, 1,000 feet downstream from abandoned mill and dam, a quarter of a mile downstream from Hop River station on New York, New Haven & Hartford Railroad, 2 miles north of Columbia, Tolland County, and 3½ miles upstream from mouth. Datum of gage is 249.25 feet above mean sea level, datum of 1929 (levels by Corps of Engineers, U. S. Army).

Drainage area.—76.2 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements. Affected by ice Jan. 1-6, 10-12, Jan. 16 to 6 a.m. Jan. 24, 9 to 11 a.m. Jan. 27, 6 p.m. Jan. 27 to 11 a.m. Jan. 28, 10 p.m. Jan. 28 to 11 a.m. Jan. 29, 9 p.m. Jan. 29 to 7 a.m. Jan. 30, 4 p.m. Feb. 1 to 7 a.m. Feb. 2, 5 p.m. Feb. 2 to Feb. 3, Feb. 11-14, 16, 17, 20-23, 27, 28. Affected by change in recording conditions 2 to 9 p.m. Jan. 25, when water was above floor of gage shelter.

Maxima.—January 1938: Discharge, 2,970 second-feet 4:30 p. m. Jan. 25 (gage height, 12.99 feet).

1932 to December 1937: Discharge, 3,300 second-feet Mar. 12, 1936 (gage-height, 13.85 feet, from floodmarks).

Remarks.—Flood runoff affected by storage in two reservoirs.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	80	299	9	283	295	17	110	140	25	1,630	155
2	90	215	10	210	285	18	110	162	26	1,200	142
3	90	236	11	160	220	19	100	162	27	524	120
4	85	441	12	150	160	20	95	140	28	352	100
5	90	305	13	136	170	21	95	120	29	255	
6	90	275	14	129	240	22	100	120	30	232	
7	462	434	15	124	221	23	110	130	31	323	
8	616	355	16	120	170	24	119	158			
Mean monthly discharge, in second-feet										267	213
Runoff, in inches										4.04	2.92

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22		January 23		January 24		January 25		January 26		January 27	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.							4.00	133	10.76	2,080		
2							4.15	154	10.44	1,960	6.39	658
3					3.90	115	4.41	195	10.14	1,840		
4							4.70	245	9.89	1,740	6.14	595
5							5.10	322	9.59	1,620		
6					3.89	120	5.60	428	9.29	1,510	5.94	545
7							6.23	578	9.00	1,410		
8							6.97	762	8.72	1,310	5.82	515
9					3.89	119	7.90	1,040	8.47	1,230		
10							8.60	1,250	8.25	1,160	5.83	500
11							9.17	1,420	8.05	1,100		
12 n.					3.96	128	10.00	1,720	7.83	1,030	5.80	510
1 p.m.							11.05	2,130	7.65	980		
2							12.25	2,580	7.49	932	5.75	498
3					3.90	120	12.78	2,850	7.34	895		
4							12.98	2,970	7.22	865	5.75	498
5							12.97	2,960	7.14	845		
6					3.91	121	12.82	2,930	7.06	825	5.75	490
7							12.61	2,880	7.01	812		

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
8	------	-------	------	-------	------	-------	12.35	2,760	6.96	800	5.77	470
9	------	-------	------	-------	3.84	113	12.08	2,620	6.92	790	------	-------
10	------	-------	------	-------	------	-------	11.65	2,500	6.88	780	5.74	440
11	------	-------	------	-------	------	-------	11.34	2,350	6.81	762	------	-------
12 m.	------	-------	------	-------	3.92	123	11.04	2,200	6.70	735	5.71	410
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	5.64	380	4.96	280	4.56	235	4.57	249	5.20	375	4.48	210
4	5.51	360	4.90	260	4.51	230	4.58	251	5.08	351	4.39	195
6	5.39	350	4.86	250	4.47	225	4.60	255	4.93	321	4.32	195
8	5.30	340	4.82	245	4.43	221	4.63	261	4.79	293	4.27	190
10	5.18	340	4.67	240	4.41	217	4.71	277	4.79	293	4.33	201
12 n.	5.04	343	4.57	249	4.40	215	4.86	307	4.74	283	4.50	235
2 p.m.	5.22	379	4.68	271	4.41	217	5.05	345	4.78	291	4.45	225
4	5.14	363	4.60	255	4.47	229	5.19	373	4.80	290	4.48	231
6	5.10	355	4.59	253	4.54	243	5.33	404	4.86	280	4.54	235
8	5.04	343	4.56	247	4.61	257	5.39	417	4.87	260	4.58	225
10	5.00	320	4.57	245	4.61	257	5.37	412	4.75	245	4.59	220
12 m.	5.00	300	4.59	235	4.58	251	5.29	395	4.61	225	4.56	215

Supplemental records.—Jan. 25, 4:30 p.m., 12.99 ft., 2,970 sec.-ft.

NATCHAUG RIVER AT WILLIMANTIC, CONN.

Location.—Lat. 41°43′14″, long. 72°11′53″, 200 feet downstream from New York, New Haven & Hartford Railroad bridge and 1 mile northeast of Willimantic, Windham County. Datum of gage is 150.31 feet above mean sea level, datum of 1929 (levels by Corps of Engineers, U. S. Army).

Drainage area.—169 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements. Affected by ice Jan. 2-7, 10-16, 18-22, 5 a.m. to 1 p.m. Jan. 24, Feb. 21, 22, 28.

Maxima.—January 1938: Discharge, 5,880 second-feet 11 p.m. Jan. 25 (gage height, 11.02 feet).

1930 to December 1937: Discharge, resulting from breaking of dam above station, 14,200 second-feet Mar. 18, 1936 (gage height, 13.57 feet).

Remarks.—Flood discharge affected by storage in several small ponds. About one million gallons per day pumped from reservoir 2 miles above station for municipal supply of Willimantic.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	254	698	9	660	570	17	278	315	25	2,370	356
2	260	453	10	440	518	18	280	344	26	3,440	335
3	260	465	11	360	423	19	280	362	27	1,120	303
4	260	833	12	300	395	20	280	350	28	688	280
5	240	640	13	260	395	21	280	280	29	472	-------
6	240	518	14	260	500	22	285	300	30	461	-------
7	650	840	15	280	482	23	274	341	31	616	-------
8	1,340	810	16	280	350	24	244	365			
Mean monthly discharge, in second-feet										571	458
Runoff, in inches										3.90	2.82

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	----	----	----	----	----	----	2.32	230	10.92	5,730	5.52	1,570
2	2.55	260	2.44	262	2.29	222	2.51	281	10.76	5,490	5.35	1,480
3	----	----	----	----	----	----	2.73	244	10.59	5,240	5.19	1,400
4	2.64	290	2.51	281	2.34	235	2.96	416	10.38	4,990	5.06	1,340
5	----	----	----	----	----	----	3.28	528	10.14	4,770	4.97	1,300
6	2.66	290	2.52	284	2.41	245	3.58	642	9.95	4,600	4.87	1,240
7	----	----	----	----	----	----	3.74	706	9.69	4,360	4.78	1,200
8	2.66	290	2.51	281	2.45	250	3.89	770	9.42	4,150	4.70	1,160
9	----	----	----	----	----	----	4.32	970	9.13	3,910	4.67	1,140
10	2.77	330	2.61	309	2.61	280	4.73	1,200	8.84	3,680	4.59	1,100
11	----	----	----	----	----	----	5.15	1,380	8.54	3,440	4.53	1,080
12 n.	2.67	300	2.57	298	2.45	250	5.66	1,640	8.24	3,210	4.46	1,040
1 p.m.	----	----	----	----	----	----	6.19	1,900	7.93	2,990	4.36	990
2	2.63	290	2.48	273	2.36	241	6.83	2,290	7.67	2,810	4.36	990
3	----	----	----	----	----	----	7.39	2,620	7.43	2,650	4.39	1,000
4	2.60	280	2.45	264	2.35	238	8.02	3,050	7.17	2,490	4.40	1,010
5	----	----	----	----	----	----	8.70	3,570	6.94	2,350	4.39	1,000
6	2.59	280	2.43	259	2.34	235	9.42	4,150	6.73	2,230	4.37	995
7	----	----	----	----	----	----	10.13	4,760	6.54	2,110	4.33	975
8	2.58	270	2.43	259	2.35	238	10.57	5,210	6.36	2,010	4.30	960
9	----	----	----	----	----	----	10.85	5,620	6.22	1,920	4.26	940
10	2.57	270	2.42	256	2.36	241	10.99	5,840	6.07	1,840	4.22	920
11	----	----	----	----	----	----	11.02	5,880	5.91	1,760	4.18	901
12 m.	2.54	260	2.41	254	2.37	243	10.99	5,840	5.71	1,660	4.06	847

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.05	842	3.21	504	----	----	3.20	500	----	----	----	----
4	4.04	838	3.27	524	3.10	465	3.28	528	4.02	829	3.17	490
6	3.97	806	3.29	532	----	----	3.28	528	----	----	----	----
8	3.90	775	3.28	528	3.06	451	3.38	563	3.76	714	2.86	383
10	3.80	730	3.24	514	3.10	465	----	----	----	----	2.79	362
12 n.	3.71	694	3.10	465	3.04	444	3.43	582	3.58	642	2.90	395
2 p.m.	3.43	582	3.02	437	----	----	----	----	----	----	----	----
4	3.43	582	2.95	412	3.04	444	3.57	638	3.64	666	3.04	444
6	3.43	582	2.96	416	----	----	----	----	----	----	----	----
8	3.42	578	2.97	420	3.15	482	3.82	739	3.55	630	3.09	462
10	3.37	560	3.00	430	----	----	----	----	----	----	----	----
12 m.	3.31	538	2.96	416	3.27	524	3.97	806	3.49	606	3.22	507

QUINEBAUG RIVER AT QUINEBAUG, CONN.

LOCATION.—Lat. 42°01′20″, long. 71°57′15″, at Quinebaug, Windham County, 500 feet upstream from highway bridge, a quarter of a mile downstream from Massachusetts-Connecticut State line, and 7 miles upstream from French River.

DRAINAGE AREA.—157 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 2,000 second-feet; extended to peak stage on basis of computations of March 1936 and September 1938 peak flows at bridge 500 feet below station and determination of peak flow of March 1936 flood at dam a quarter of a mile above station.

MAXIMA.—January 1938: Discharge, 3,470 second-feet 9:30 p.m. Jan. 25 (gage height, 7.21 feet).

1931 to December 1937: Discharge, 10,500 second-feet Mar. 18, 1936 (gage height, 13.44 feet).

REMARKS.—Flood discharge doubtless affected by storage in several lakes and ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	244	568	9	510	555	17	288	287	25	1,770	263
2	215	441	10	465	495	18	342	271	26	2,160	263
3	316	455	11	392	410	19	310	283	27	1,140	267
4	291	580	12	349	371	20	257	287	28	753	267
5	276	500	13	337	345	21	263	295	29	577	-------
6	252	480	14	324	379	22	248	271	30	452	-------
7	417	694	15	295	366	23	213	275	31	572	-------
8	570	633	16	233	312	24	235	263			
Mean monthly discharge, in second-feet										486	388
Runoff, in inches										3.57	2.57

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	2.77	229	2.78	233	2.65	187	2.85	260	6.69	2,930	4.90	1,410
2	2.69	201	2.80	240	2.66	190	2.87	267	6.69	2,930	4.87	1,390
3	2.77	229	2.81	244	2.66	190	2.88	271	6.56	2,800	4.79	1,330
4	2.81	244	2.81	244	2.67	194	2.90	279	6.47	2,710	4.69	1,260
5	2.85	260	2.80	240	2.67	194	2.97	308	6.34	2,590	4.66	1,240
6	2.86	263	2.79	236	2.67	194	3.11	366	6.29	2,540	4.63	1,220
7	2.88	271	2.79	236	2.67	194	3.32	460	6.27	2,520	4.60	1,200
8	3.07	349	2.77	229	2.91	283	3.71	660	6.22	2,480	4.65	1,240
9	3.15	384	2.76	226	2.90	279	4.18	928	6.01	2,290	4.55	1,160
10	3.16	388	2.75	222	2.86	263	4.76	1,310	5.82	2,120	4.50	1,130
11	3.08	354	2.72	211	2.85	260	5.40	1,780	5.70	2,020	4.50	1,130
12 n.	2.91	283	2.72	211	2.85	260	6.43	2,670	5.64	1,970	4.52	1,140
1 p.m.	2.80	240	2.70	204	2.86	263	6.34	2,590	5.62	1,960	4.41	1,070
2	2.78	233	2.70	204	2.91	283	6.24	2,500	5.62	1,960	4.36	1,040
3	2.74	218	2.70	204	2.98	312	6.25	2,500	5.58	1,920	4.34	1,020
4	2.72	211	2.70	204	2.98	312	6.29	2,540	5.58	1,920	4.40	1,060
5	2.51	141	2.69	201	2.85	260	6.61	2,850	5.55	1,900	4.45	1,100
6	2.54	151	2.67	194	2.80	240	6.59	2,830	5.46	1,830	4.44	1,090
7	2.65	187	2.66	190	2.77	229	6.60	2,840	5.29	1,690	4.39	1,050
8	2.72	211	2.65	187	2.67	194	6.96	3,200	5.23	1,640	4.35	1,030
9	2.75	222	2.65	187	2.70	204	6.77	3,010	5.20	1,620	4.30	1,000
10	2.76	226	2.64	184	2.72	211	7.06	3,310	5.15	1,580	4.24	964
11	2.76	226	2.64	184	2.76	226	6.90	3,140	5.11	1,560	4.20	940
12 m.	2.76	226	2.64	184	2.81	244	6.78	3,020	5.04	1,510	4.09	874
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.00	820	3.60	600	3.43	515	3.35	475	3.57	585	3.36	480
4	4.00	820	3.64	622	3.40	500	3.36	480	3.56	580	3.36	480
6	4.02	832	3.66	633	3.39	495	3.40	500	3.56	580	3.37	485
8	4.10	880	3.67	638	3.43	515	3.52	560	3.65	628	3.41	505
10	4.00	820	3.55	575	3.39	495	3.55	575	3.54	570	3.34	470
12 n.	3.92	776	3.49	545	3.12	371	3.59	595	3.48	540	3.29	446
2 p.m.	3.16	388	3.52	560	2.84	256	3.55	575	3.49	545	3.27	436
4	3.70	655	3.46	530	3.10	362	3.74	677	3.52	560	3.22	414
6	3.89	760	3.47	535	3.30	450	3.74	677	3.51	555	3.11	366
8	3.85	738	3.50	550	3.36	480	3.66	633	3.57	585	3.15	384
10	3.74	677	3.50	550	3.36	480	3.59	595	3.53	565	3.12	371
12 m.	3.67	638	3.47	535	3.33	465	3.54	570	3.35	475	3.14	379

Supplemental records.—Jan. 25, 4:50 p.m., 6.33 ft., 2,580 sec.-ft.; 9:30 p.m., 7.21 ft., 3,470 sec.-ft.; Jan. 28, 1:30 p.m., 3.81 ft., 716 sec.-ft.; Jan. 30, 11 a.m., 3.36 ft., 480 sec.-ft.; 1 p.m., 2.91 ft., 283 sec.-ft.; Feb. 2, 7 a.m. 3.52 ft., 560 sec.-ft.

QUINEBAUG RIVER AT PUTNAM, CONN.

LOCATION.—Lat. 41°54'30", long. 71°54'30", at Putnam, Windham County, 600 feet downstream from Muddy Brook and 3 miles downstream from French River. Datum of gage is 216.76 feet above mean sea level, datum of 1929.

DRAINAGE AREA.—331 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,900 second-feet; extended to peak stage on basis of determination of flood flow at dam 1 mile above station plus inflow from Muddy Brook determined by flow over spillway at dam 2 miles above its mouth.

MAXIMA.—January 1938: Discharge, 7,450 second-feet midnight Jan. 25 (gage height, 11.68 feet).

1929 to December 1937: Discharge, 17,200 second-feet Mar. 19, 1936 (gage height, 17.28 feet, from floodmarks).

REMARKS.—Flood discharge affected by storage in several ponds and reservoirs. City of Putnam diverts about 1,000,000 gallons per day from Muddy Brook for municipal supply.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	494	1,330	9	1,110	1,320	17	564	662	25	3,380	620
2	450	1,130	10	1,040	1,180	18	597	640	26	6,290	600
3	569	1,080	11	742	1,040	19	502	640	27	3,270	600
4	584	1,320	12	685	836	20	550	620	28	1,910	600
5	566	1,180	13	620	820	21	541	701	29	1,310	
6	478	1,110	14	620	982	22	543	640	30	1,120	
7	864	1,510	15	592	824	23	403	620	31	1,260	
8	1,380	1,530	16	464	747	24	514	620			
Monthly mean discharge, in second-feet										1,097	911
Runoff, in inches										3.82	2.86

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	3.69	556	3.20	385	3.55	502	3.75	580	11.65	7,420	9.46	4,720
2	3.68	552	3.16	373	3.25	400	3.82	608	11.64	7,400	9.29	4,530
3	3.66	544	3.11	358	3.07	346	3.90	640	11.61	7,360	9.10	4,320
4	3.66	544	3.10	355	3.16	373	3.99	680	11.56	7,300	8.91	4,110
5	3.66	544	2.95	310	3.11	358	4.10	730	11.47	7,180	8.71	3,910
6	3.65	540	2.98	319	3.09	352	4.25	798	11.35	7,020	8.59	3,790
7	3.49	482	2.82	272	3.09	352	4.39	860	11.25	6,900	8.45	3,650
8	3.65	540	2.82	272	3.79	596	4.60	960	11.18	6,800	8.33	3,530
9	3.66	544	2.91	298	3.77	588	4.73	1,020	11.08	6,670	8.22	3,420
10	3.67	548	3.02	331	3.75	580	5.02	1,170	10.96	6,520	8.05	3,260
11	3.85	620	3.15	370	3.73	572	6.48	2,060	10.88	6,410	7.94	3,170
12 n.	3.71	564	3.54	499	3.72	568	7.06	2,460	10.76	6,260	7.88	3,110
1 p.m.	3.71	564	3.66	544	3.71	564	7.64	2,900	10.67	6,150	7.71	2,960
2	3.71	564	3.67	548	3.70	560	8.40	3,600	10.59	6,060	7.63	2,890
3	3.71	564	3.67	548	3.70	560	9.13	4,350	10.50	5,950	7.53	2,810
4	3.71	564	3.36	436	3.70	560	9.83	5,150	10.40	5,830	7.38	2,690
5	3.70	560	3.20	385	3.70	560	10.38	5,810	10.30	5,710	7.26	2,600
6	3.70	560	3.12	361	3.70	560	10.88	6,410	10.19	5,580	7.20	2,560
7	3.70	560	3.01	328	3.70	560	11.25	6,900	10.09	5,460	7.19	2,550
8	3.70	560	3.08	349	3.70	560	11.50	7,220	9.99	5,340	7.18	2,550
9	3.70	560	3.45	468	3.71	564	11.63	7,390	9.90	5,230	7.18	2,550
10	3.58	513	3.62	528	3.71	564	11.67	7,440	9.85	5,170	7.17	2,540
11	3.31	418	3.67	548	3.72	568	11.67	7,440	9.74	5,040	7.14	2,520
12 m.	3.25	400	3.68	552	3.74	576	11.68	7,450	9.60	4,870	7.07	2,470

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	6.85	2,320	5.73	1,580	5.08	1,200	4.80	1,060	5.40	1,380	5.17	1,240
4	6.76	2,250	5.63	1,520	5.06	1,190	4.84	1,080	5.35	1,350	5.10	1,210
6	6.59	2,130	5.50	1,440	5.03	1,180	4.92	1,120	5.33	1,340	5.06	1,190
8	6.43	2,020	5.40	1,380	4.96	1,140	5.16	1,240	5.35	1,350	5.01	1,160
10	6.39	1,990	5.16	1,240	4.96	1,140	5.13	1,220	5.35	1,350	5.00	1,160
12 n.	6.22	1,870	4.86	1,090	4.96	1,140	5.34	1,340	5.35	1,350	5.01	1,160
2 p.m.	5.91	1,690	4.97	1,140	4.97	1,140	5.35	1,350	5.32	1,330	4.78	1,050
4	5.95	1,710	5.20	1,260	4.94	1,130	5.36	1,360	5.30	1,320	4.74	1,030
6	5.87	1,660	5.18	1,250	4.81	1,060	5.36	1,360	5.27	1,300	4.78	1,050
8	5.76	1,600	5.15	1,240	4.72	1,020	5.37	1,360	5.26	1,300	4.78	1,050
10	5.75	1,590	5.10	1,210	4.71	1,020	5.43	1,400	5.22	1,270	4.76	1,040
12 m.	5.80	1,620	5.09	1,200	4.74	1,030	5.45	1,410	5.20	1,260	4.71	1,020

Supplemental records.—Jan. 29, 12:30 p.m., 4.76 ft., 1,040 sec. ft.; Jan. 30, 6:30 a.m., 4.87 feet, 1,100 sec.-ft.; Jan. 31, 9 a.m., 5.02 feet, 1,170 sec.-ft.; Feb. 2, 1 p.m., 5.00 feet, 1,160 sec.-ft.

QUINEBAUG RIVER AT JEWETT CITY, CONN.

LOCATION.—Lat. 41°35′55″, long. 71°59′05″, at Jewett City, New London County, 1,000 feet downstream from railroad bridge and 570 feet downstream from canal from Slater Mills (mouth of Pachaug River). Datum of gage is 63.07 feet above mean sea level, datum of 1929.

DRAINAGE AREA.—711 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—January 1938: Discharge, 11,100 second-feet 12:20 p.m. Jan. 26 (gage height, 15.51 feet).

1918 to December 1937: Discharge, 29,200 second-feet Mar. 19, 1936 (gage height, 24.0 feet, from floodmarks).

REMARKS.—Flood discharge affected by unregulated storage in numerous ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	1,010	2,810	9	2,750	2,840	17	1,220	1,480	25	4,050	1,500
2	1,110	2,470	10	2,320	2,510	18	1,260	1,450	26	10,500	1,350
3	1,260	2,190	11	1,910	2,190	19	1,140	1,340	27	7,170	1,290
4	1,230	2,930	12	1,450	1,840	20	1,050	1,380	28	4,260	1,470
5	1,250	2,930	13	1,380	1,700	21	1,140	1,470	29	2,830	-------
6	1,180	2,430	14	1,370	2,030	22	1,020	1,460	30	2,380	-------
7	1,830	3,020	15	1,260	1,990	23	1,000	1,420	31	2,660	-------
8	3,380	3,200	16	1,020	1,700	24	1,110	1,480			
Monthly mean discharge, in second-feet										2,210	1,995
Runoff, in inches										3.58	2.93

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	-------	------	-------	6.08	899	7.00	1,450	14.44	9,460	14.31	9,260
2	6.51	1,150	6.31	1,030	6.07	894	7.09	1,510	14.71	9,860	14.15	9,020
3	------	-------	------	-------	6.06	888	7.19	1,580	14.83	10,000	14.00	8,800
4	6.48	1,130	6.44	1,100	6.10	910	7.35	1,700	14.97	10,300	13.81	8,530
5	------	-------	------	-------	6.17	948	7.43	1,750	15.08	10,400	13.62	8,270
6	6.40	1,080	6.50	1,140	6.44	1,100	7.62	1,890	15.20	10,600	13.47	8,060
7	------	-------	------	-------	6.38	1,070	7.83	2,050	15.28	10,700	13.30	7,820

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	January 22		January 23		January 24		January 25		January 26		January 27	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
8	6.43	1,100	6.46	1,120	6.30	1,020	8.05	2,230	15.29	10,800	13.07	7,500
9	-----	-----	-----	-----	6.21	970	8.26	2,400	15.35	10,900	12.87	7,240
10	6.36	1,060	6.36	1,060	6.13	926	8.67	2,680	15.41	11,000	12.74	7,070
11	-----	-----	-----	-----	6.15	938	9.02	3,040	15.44	11,000	12.69	7,010
12 n.	6.20	965	6.23	982	6.26	998	9.21	3,210	15.49	11,100	12.66	6,970
1 p.m.	-----	-----	-----	-----	6.41	1,090	9.40	3,380	15.49	11,100	12.62	6,920
2	6.06	888	6.17	948	6.56	1,180	9.62	3,580	15.46	11,000	12.54	6,810
3	-----	-----	-----	-----	6.65	1,230	10.12	4,050	15.42	11,000	12.45	6,700
4	6.03	872	6.16	943	6.72	1,270	10.93	4,900	15.41	11,000	12.38	6,600
5	-----	-----	-----	-----	6.73	1,280	11.61	5,660	15.36	10,900	12.25	6,440
6	6.09	904	6.13	926	6.72	1,270	12.04	6,180	15.24	10,700	12.11	6,260
7	-----	-----	-----	-----	6.73	1,280	12.43	6,670	15.12	10,500	12.00	6,130
8	6.25	992	6.10	910	6.80	1,320	12.81	7,160	15.02	10,300	11.90	6,010
9	-----	-----	-----	-----	6.84	1,340	13.29	7,810	14.91	10,200	11.79	5,880
10	6.30	1,020	6.10	910	6.84	1,340	13.62	8,270	14.79	10,000	11.69	5,760
11	-----	-----	-----	-----	6.84	1,340	13.94	8,720	14.61	9,720	11.53	5,570
12 m.	6.27	1,000	6.09	904	6.90	1,380	14.22	9,130	14.46	9,490	11.36	5,380

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	11.05	5,040	9.34	3,330	8.47	2,570	-----	-----	-----	-----	-----	-----
4	10.77	4,730	9.15	3,160	8.40	2,510	8.18	2,330	8.77	2,810	8.47	2,570
6	10.52	4,450	8.89	2,920	8.35	2,470	-----	-----	-----	-----	-----	-----
8	10.34	4,270	8.69	2,740	8.30	2,430	8.38	2,490	8.74	2,790	8.31	2,440
10	10.23	4,160	8.62	2,690	8.28	2,410	-----	-----	-----	-----	-----	-----
12 n.	10.20	4,130	8.50	2,590	7.95	2,150	8.79	2,830	8.78	2,820	8.29	2,420
2 p.m.	10.28	4,210	8.53	2,610	8.07	2,250	-----	-----	-----	-----	-----	-----
4	10.19	4,120	8.68	2,730	8.17	2,330	8.76	2,800	8.81	2,850	8.34	2,460
6	10.09	4,020	8.71	2,760	8.07	2,250	-----	-----	-----	-----	-----	-----
8	9.96	3,890	8.69	2,740	8.11	2,280	8.78	2,820	8.79	2,830	8.31	2,440
10	9.76	3,700	8.63	2,690	8.19	2,340	-----	-----	-----	-----	-----	-----
12 m.	9.51	3,480	8.55	2,630	8.20	2,350	8.77	2,810	8.62	2,690	8.16	2,320

Supplemental records.—Jan. 26, 12:20 p.m., 15.51 ft., 11,100 sec.-ft.; Jan. 29, 8:30 a.m., 8.35 ft., 2,470 sec.-ft.; 9 a.m., 8.61 ft., 2,680 sec.-ft.; Jan. 30, 11:30 a.m., 8.26 ft., 2,400 sec.-ft.; Jan. 31, 9 a.m., 8.78 ft., 2,820 sec.-ft.

FIVE MILE RIVER AT KILLINGLY, CONN.

LOCATION.—Lat. 41°50′10″, long. 71°53′09″, at northwest abutment of New York, New Haven & Hartford Railroad bridge, five-eighths of a mile south of Killingly, Windham County, and 2.7 miles upstream from mouth. Datum of gage is 222.22 feet above mean sea level, datum of 1929.

DRAINAGE AREA.—58.2 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements. Affected by ice Jan. 15-19, noon Jan. 25.

MAXIMA.—January 1938: Discharge, 630 second-feet 5 to 6 a.m. Jan. 26 (gage height, 3.94 feet).

November-December 1937: Discharge, 730 second-feet Nov. 29, 1937 (gage height, 4.3 feet).

REMARKS.—Flood discharge affected by storage in ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	110	219	9	208	210	17	104	125	25	399	127
2	114	187	10	176	195	18	97	123	26	567	114
3	123	182	11	153	175	19	96	121	27	418	114
4	111	232	12	133	152	20	98	127	28	353	117
5	102	215	13	128	152	21	94	127	29	276	-------
6	102	198	14	120	165	22	79	114	30	208	-------
7	177	248	15	108	158	23	93	116	31	220	-------
8	250	238	16	92	141	24	107	124			

	Jan.	Feb.
Monthly mean discharge, in second-feet	175	161
Runoff, in inches	3.47	2.88

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							1.34	64	3.82	600		
2					1.52	90	1.40	72	3.86	610	3.18	461
3							1.54	94	3.89	618		
4					1.52	90	1.67	117	3.92	625	3.05	435
5							1.90	170	3.94	630		
6					1.52	90	2.13	228	3.94	630	2.97	419
7							2.30	270	3.93	628		
8					1.53	92	2.51	317	3.91	622	2.98	421
9							2.79	378	3.92	625	3.02	429
10					1.74	132	3.01	427	3.90	620	2.91	407
11							3.18	461	3.84	605		
12 n.					1.81	148	3.42	509	3.78	590	2.85	392
1 p.m.							3.51	528	3.71	572		
2					1.81	148	3.60	550	3.65	560	2.93	411
3							3.64	558	3.60	550		
4					1.79	143	3.68	566	3.54	535	3.04	433
5							3.66	562	3.47	519		
6					1.70	123	3.63	556	3.40	505	2.92	409
7							3.63	556	3.36	497		
8					1.50	87	3.65	560	3.34	493	2.87	398
9							3.67	564	3.32	489		
10					1.37	68	3.70	570	3.30	485	2.83	388
11							3.75	582	3.27	479		
12 m.					1.33	63	3.78	590	3.24	473	2.87	398
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	2.91	407	2.53	321			2.02	200	2.13	228	2.01	198
4	2.90	405	2.53	321			2.04	205	2.14	230	2.01	198
6	2.83	388	2.51	317	2.07	212	2.05	208	2.13	228	1.98	190
8	2.78	376	2.50	315			2.07	212	2.12	225	1.95	182
10	2.84	390	2.27	262			2.16	235	2.17	238	2.00	195
12 n.	2.48	310	2.15	232	2.03	202	2.10	220	2.09	218	1.92	175
2 p.m.	2.54	323	2.25	258			2.12	225	2.08	215	1.97	188
4	2.65	348	2.31	272			2.14	230	2.08	215	1.99	192
6	2.51	317	2.26	260	2.03	202	2.08	215	2.00	195	1.88	165
8	2.49	312	2.21	248			2.13	228	2.05	208	1.95	182
10	2.45	302	2.17	238			2.15	232	2.05	208	1.96	185
12 m.	2.50	315	2.15	232	2.02	200	2.12	225	1.99	192	1.91	172

Supplemental records.—Jan. 28, 9 a.m., 2.85 ft., 392 sec.-ft.; Jan. 31, 9 a.m. 2.25 ft., 258 sec.-ft.; Feb. 1, 9 a.m., 2.24 ft., 255 sec.-ft.; Feb. 2, 9 a.m., 2.10 ft., 220 sec.-ft.

MOOSUP RIVER AT MOOSUP, CONN.

Location.—Lat. 41°42′40″, long. 71°53′15″, at outlet of tailrace from Aldrich Bros. mill, 100 feet upstream from New York, New Haven & Hartford Railroad bridge at Moosup, Windham County, and 3½ miles upstream from mouth. Datum of gage is 196.64 feet above mean sea level, datum of 1929.

Drainage area.—83.5 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 1,000 second-feet; extended logarithmically to peak stage on basis of two determinations of flood discharge at dam a quarter of a mile above station. Affected by ice Jan. 16-19, 21.

Maxima.—January 1938: Discharge, 1,380 second-feet 4 to 5 p.m. Jan. 25 (gage height, 5.04 feet).

1932 to December 1937: Discharge, 4,260 second-feet Mar. 12, 1936 gage height, 8.35 feet) from a sharp, short rise of unknown origin; discharge (natural), 4,080 second-feet Mar. 12, 1936 (gage height, 8.18 feet).

Remarks.—Flood discharge affected by storage in several ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	112	334	9	383	286	17	140	160	25	892	203
2	139	265	10	283	255	18	130	162	26	1,140	193
3	159	253	11	200	217	19	130	173	27	612	169
4	125	412	12	170	193	20	123	164	28	400	189
5	124	390	13	157	184	21	120	171	29	265	-------
6	122	306	14	151	252	22	123	150	30	216	-------
7	389	373	15	138	225	23	84	161	31	321	-------
8	557	339	16	130	184	24	145	191			
Monthly mean discharge, in second-feet										264	234
Runoff, in inches										3.64	2.92

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	2.00	140	1.72	86	1.85	110	2.22	193	4.73	1,190	4.10	840
2	1.68	80	1.57	65	1.88	115	2.37	233	4.73	1,190	4.03	808
3	1.57	65	1.56	64	1.88	115	2.07	156	4.67	1,150	3.93	764
4	1.56	64	1.28	36	1.88	115	2.10	163	4.72	1,180	3.82	718
5	1.23	32	1.08	23	1.88	115	2.41	244	4.76	1,210	3.77	698
6	1.07	22	1.03	20	1.89	117	2.80	360	4.78	1,220	3.70	670
7	1.03	20	1.01	19	1.88	115	3.13	460	4.79	1,220	3.61	634
8	1.03	20	1.01	19	2.17	180	3.67	658	4.86	1,270	3.67	658
9	2.12	168	1.02	19	2.35	228	3.98	786	4.85	1,260	3.62	638
10	2.08	158	1.66	77	2.18	183	4.28	930	4.82	1,240	3.52	598
11	2.08	158	1.76	93	2.13	170	4.49	1,040	4.80	1,230	3.47	580
12 n.	2.07	156	1.79	98	2.11	166	4.66	1,150	4.78	1,220	3.43	566
1 p.m.	2.07	156	1.85	110	1.62	72	4.81	1,240	4.74	1,190	3.40	555
2	2.07	156	1.85	110	2.20	188	4.93	1,310	4.74	1,190	3.40	555
3	2.06	154	1.87	113	2.17	180	4.98	1,340	4.67	1,150	3.38	548
4	2.07	156	1.87	113	2.10	163	5.04	1,380	4.63	1,130	3.39	552
5	2.08	158	1.87	113	2.09	161	5.04	1,380	4.58	1,100	3.38	548
6	2.08	158	1.89	117	1.78	97	5.01	1,360	4.51	1,060	3.35	538
7	2.08	158	1.88	115	2.03	147	4.98	1,340	4.47	1,030	3.32	527
8	2.07	156	1.88	115	2.03	147	4.92	1,300	4.42	1,000	3.29	516
9	2.06	154	1.88	115	2.03	147	4.85	1,260	4.36	970	3.27	510
10	2.06	154	1.88	115	2.05	152	4.80	1,230	4.29	935	3.24	499
11	2.06	154	1.88	115	2.07	156	4.76	1,210	4.23	905	3.22	492
12 m.	2.06	154	1.88	115	2.12	168	4.73	1,190	4.17	875	3.19	482

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.13	460	2.60	300	2.08	158	2.40	241	2.77	351	2.54	282
4	2.92	396	2.31	217	2.23	196	2.42	247	2.52	276	2.24	198
6	2.94	402	2.41	244	2.28	209	2.46	258	2.62	306	2.35	228
8	3.13	460	2.73	339	2.29	211	2.70	330	2.84	372	2.60	300
10	3.03	429	2.67	321	2.29	211	2.68	324	2.77	351	2.53	279
12 n.	2.92	396	2.46	258	2.33	222	2.72	336	2.78	354	2.49	267
2 p.m.	2.92	396	2.43	250	2.36	230	2.79	357	2.80	360	2.58	294
4	2.91	393	2.43	250	2.37	233	2.78	354	2.75	345	2.50	270
6	2.88	384	2.43	250	2.38	236	2.78	354	2.71	333	2.48	264
8	2.79	357	2.41	244	2.37	233	2.82	366	2.68	324	2.48	264
10	2.70	330	2.37	233	2.37	233	2.80	360	2.62	306	2.44	253
12 m.	2.64	312	2.36	230	2.39	238	2.79	357	2.57	291	2.43	250

Supplemental records.—Jan. 23, 3:30 a.m., 1.56 ft., 64 sec.-ft.; Jan. 30, 1:30 a.m., 2.03 ft., 147 sec.-ft.; Jan. 31, 8:30 a.m., 2.91 ft., 393 sec.-ft.; Feb. 2, 3 a.m., 2.53 ft., 279 sec.-ft.; 1 p.m., 2.43 ft., 250 sec.-ft.

YANTIC RIVER AT YANTIC, CONN.

LOCATION.—Lat. 41°33′35″, long. 72°07′20″, 700 feet downstream from stone-arch highway bridge at Yantic, New London County, and 1 mile downstream from Susquetonscut Brook. Datum of gage is 94.46 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—88.6 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 10 a.m. Jan. 25 to 3 a.m. Jan. 26, when graph was based on floodmark, existing record, and normal shape of flood hydrographs.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements. Shifting-control method used 9 a.m. to 3 p.m. Jan. 25. Affected by ice Jan. 16, 19.

MAXIMA.—January 1938: Discharge, 3,230 second-feet 4 p.m. Jan. 25 (gage height, 8.07 feet, from floodmark).

1930 to December 1937: Discharge, 6,300 second-feet Mar. 12, 1936 (gage height, 11.32 feet).

REMARKS.—Flood discharge affected by storage in a few lakes and ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	114	334	9	425	293	17	135	155	25	2,060	229
2	132	252	10	263	276	18	135	161	26	1,580	212
3	135	263	11	206	232	19	130	187	27	556	197
4	122	487	12	154	200	20	130	203	28	340	201
5	111	369	13	139	215	21	134	182	29	231	
6	109	306	14	139	273	22	117	153	30	207	
7	814	396	15	130	261	23	114	175	31	317	
8	892	374	16	130	193	24	117	211			
Monthly mean discharge, in second-feet										333	250
Runoff, in inches										4.34	2.94

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	1.97	109	2.53	192	7.39	2,600	4.46	789
2	------	------	------	------	1.97	109	3.14	310	7.27	2,500	4.36	749
3	------	------	------	------	1.97	109	3.71	444	7.14	2,400	4.25	705
4	------	------	------	------	1.99	112	4.27	596	7.02	2,320	4.13	657
5	------	------	------	------	2.00	113	4.79	762	6.88	2,200	4.02	617
6	------	------	------	------	2.01	114	5.37	978	6.70	2,070	3.93	586
7	------	------	------	------	2.29	154	5.94	1,210	6.50	1,930	3.87	564
8	------	------	------	------	2.12	129	6.55	1,500	6.45	1,900	3.85	558
9	------	------	------	------	2.54	194	7.02	1,760	6.31	1,800	3.86	561
10	------	------	------	------	2.53	192	7.36	2,050	6.13	1,670	3.91	578
11	------	------	------	------	2.38	168	7.61	2,300	5.92	1,530	3.82	547
12 n.	------	------	------	------	2.31	157	7.83	2,600	5.73	1,420	3.80	540
1 p.m.	------	------	------	------	2.13	130	7.96	2,800	5.60	1,340	3.69	502
2	------	------	------	------	1.98	111	8.03	3,000	5.61	1,350	3.79	536
3	------	------	------	------	2.16	134	8.07	3,200	5.52	1,290	3.93	586
4	------	------	------	------	2.17	136	8.07	3,230	5.41	1,240	3.91	578
5	------	------	------	------	1.79	88	8.04	3,200	5.14	1,100	3.78	533
6	------	------	------	------	1.46	55	7.98	3,100	5.06	1,060	3.48	439
7	------	------	------	------	1.43	53	7.92	3,100	4.80	940	3.47	436
8	------	------	------	------	1.50	59	7.85	3,000	4.80	940	3.52	451
9	------	------	------	------	1.63	71	7.77	3,000	4.75	918	3.33	398
10	------	------	------	------	1.77	86	7.68	2,900	4.66	877	3.39	412
11	------	------	------	------	1.92	103	7.59	2,800	4.55	828	3.40	415
12 m.	------	------	------	------	2.14	132	7.49	2,700	4.51	810	3.36	405
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.29	388	2.67	239	2.50	204	2.59	222	3.21	368	2.80	267
4	3.26	380	2.68	241	2.50	204	2.63	230	3.18	360	2.76	258
6	3.30	390	2.72	249	2.50	204	2.81	269	3.14	350	2.70	245
8	3.28	385	2.71	247	2.48	200	2.90	290	3.09	338	2.73	252
10	3.33	398	2.60	224	2.47	198	3.22	370	3.41	418	2.90	290
12 n.	3.13	348	2.56	216	2.49	202	3.10	340	3.24	375	2.90	290
2 p.m.	3.13	348	2.62	228	2.53	210	3.12	345	3.02	320	2.78	263
4	3.17	358	2.64	232	2.53	210	3.44	427	3.26	380	3.00	315
6	2.74	254	2.62	228	2.54	212	2.95	302	2.74	254	2.47	198
8	2.72	249	2.59	222	2.55	214	3.10	340	2.76	258	2.27	162
10	2.76	258	2.56	216	2.56	216	3.22	370	2.81	269	2.56	216
12 m.	2.73	252	2.52	208	2.57	218	3.22	370	2.83	274	2.58	220

Supplemental records.—Feb. 2, 9 a.m., 2.97 ft., 308 sec.-ft.

CONNECTICUT RIVER BASIN

CONNECTICUT RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°46′10″, long. 72°40′00″, at Memorial Bridge in Hartford, Hartford County, three-quarters of a mile upstream from Park River and 1½ miles upstream from Hockanum River. Datum of gage is 0.55 foot below mean sea level.

DRAINAGE AREA.—10,480 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights given to tenths.

MAXIMA.—January 1938: Gage height, 19.6 feet 11 p.m. Jan. 26 (discharge, about 90,000 second-feet).

1896 to December 1937: Discharge, 313,000 second-feet Mar. 20, 1936, (augmented by breaching of Hartford dikes); gage height, 37.6 feet Mar. 21, 1936.

1639 to December 1937: stage known, that of Mar. 21 1936.

REMARKS.—Low stages affected by tide. Flow affected by a total storage capacity of 27,000,000,000 cubic feet (revised) above station. Record furnished by United States Weather Bureau.

Gage height, in feet, at 8 a.m., 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	-------	8.5	9	7.4	10.5	17	6.7	7.2	25	7.4	-------
2	3.7	7.8	10	5.8	10.1	18	6.3	7.0	26	18.5	-------
3	4.4	7.5	11	5.1	9.0	19	6.9	6.6	27	19.3	-------
4	5.4	7.6	12	5.7	7.8	20	6.9	6.5	28	17.4	-------
5	5.5	7.0	13	6.5	6.9	21	6.6		29	14.0	
6	5.3	6.4	14	7.4	6.5	22	6.6	-------	30	10.1	
7	5.6	7.2	15	8.0	7.3	23	5.9	-------	31	8.9	
8	6.0	9.2	16	7.4	7.7	24	5.0	-------			

SCANTIC RIVER AT BROAD BROOK, CONN.

LOCATION.—Lat. 41°54′45″, long. 72°34′05″, 300 feet upstream from highway bridge, half a mile downstream from Broad Brook, 1 mile southwest of town of Broad Brook, Hartford County, and 5½ miles upstream from mouth.

DRAINAGE AREA.—98.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 5 p.m. Jan. 24 to 5 p.m. Jan. 26 when graph was computed on basis of range line, floodmarks, one inspection, shape of normal recession graph, and, relation to time of peak at station on Hockanum River at East Hartford.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 550 second-feet; extended to peak stage on basis of determinations of flood flows of September 1938 at dams 7 and 9 miles above station.

MAXIMA.—January 1938: Discharge, 1,810 second-feet 6 a.m. Jan. 26 (gage height, 10.15 feet, from floodmark).

1928 to December 1937: Discharge, 1,820 second-feet Mar. 13, 1936 (gage height, 10.17 feet); gage height, 12.31 feet Mar. 21 (backwater from Connecticut River).

REMARKS.—Flood discharge affected by storage in one reservoir and several small ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	97	261	9	374	338	17	129	165	25	495	181
2	111	227	10	249	265	18	124	162	26	1,490	181
3	125	219	11	171	231	19	126	168	27	727	172
4	114	317	12	140	202	20	125	185	28	392	176
5	109	290	13	136	212	21	119	173	29	244	
6	112	260	14	137	236	22	112	156	30	221	
7	273	421	15	129	226	23	116	161	31	255	
8	415	436	16	141	196	24	128	180			
Monthly mean discharge, in second-feet										246	228
Runoff, in inches										2.88	2.42

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	-------	------	-------	1.24	117	1.56	165	9.15	1,500	6.73	939
2	------	-------	------	-------	1.24	117	1.60	170	9.55	1,600	6.54	903
3	------	-------	------	-------	1.24	117	1.68	180	9.90	1,700	6.38	873
4	------	-------	------	-------	1.23	116	1.80	200	10.08	1,800	6.26	852
5	------	-------	------	-------	1.22	114	1.90	210	10.13	1,800	6.13	828

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
6	------	------	------	------	1.21	113	2.00	220	10.15	1,810	6.03	810
7	------	------	------	------	1.21	113	2.11	230	10.13	1,800	5.92	791
8	------	------	------	------	1.20	111	2.23	245	10.11	1,800	5.82	773
9	------	------	------	------	1.20	111	2.38	260	10.00	1,750	5.74	758
10	------	------	------	------	1.20	111	2.57	280	9.88	1,700	5.68	747
11	------	------	------	------	1.22	114	2.77	300	9.75	1,650	5.62	737
12 n.	------	------	------	------	1.25	119	3.00	320	9.58	1,600	5.51	717
1 p.m.	------	------	------	------	1.27	122	3.32	360	9.40	1,550	5.47	710
2	------	------	------	------	1.28	124	3.63	410	9.20	1,500	5.45	706
3	------	------	------	------	1.29	125	4.10	480	9.00	1,450	5.43	703
4	------	------	------	------	1.31	129	4.60	560	8.78	1,400	5.36	691
5	------	------	------	------	1.35	135	5.10	640	8.55	1,300	5.26	674
6	------	------	------	------	1.40	145	5.60	740	8.31	1,260	5.12	650
7	------	------	------	------	1.44	150	6.20	840	8.08	1,210	4.96	623
8	------	------	------	------	1.47	155	6.65	920	7.87	1,170	4.78	593
9	------	------	------	------	1.49	155	7.20	1,050	7.66	1,120	4.61	565
10	------	------	------	------	1.50	160	7.65	1,100	7.43	1,080	4.46	541
11	------	------	------	------	1.51	160	8.20	1,250	7.19	1,030	4.34	521
12 m.	------	------	------	------	1.53	160	8.70	1,350	6.93	977	4.23	504
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.03	472	2.47	267	2.10	231	1.93	213	2.58	278	2.12	233
4	3.83	440	2.30	250	2.06	227	1.96	217	2.48	268	2.12	233
6	3.73	426	2.17	237	2.04	225	2.00	221	2.44	264	2.14	235
8	3.68	418	2.10	231	1.99	220	2.04	225	2.42	262	1.88	208
10	3.60	406	2.07	228	1.97	218	2.20	240	2.40	260	1.86	205
12 n.	3.50	391	2.11	232	2.12	233	2.35	255	2.37	257	2.11	232
2 p.m.	3.51	392	2.23	243	2.07	228	2.51	271	2.39	259	2.13	234
4	3.46	385	2.28	248	1.96	217	2.64	284	2.42	262	2.15	236
6	3.26	356	2.28	248	1.92	212	2.75	295	2.40	260	2.14	235
8	3.02	325	2.24	244	1.91	211	2.67	287	2.34	254	2.08	229
10	2.82	302	2.18	238	1.91	211	2.78	298	2.26	246	2.02	223
12 m.	2.63	283	2.13	234	1.92	212	2.72	292	2.17	237	1.91	211

FARMINGTON RIVER AT RIVERTON, CONN.

LOCATION.—Lat. 41°57′15″, long. 73°00′45″, a quarter of a mile downstream from Still River, 1 mile downstream from Riverton, Litchfield County, and 4 miles northeast of Winsted.

DRAINAGE AREA.—216 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 5,700 second-feet; extended. Affected by ice Jan. 3-7, 18-21, 3 to 4 a.m. and 8:10 a.m. Jan. 25, Feb. 21, 22, 26-28.

MAXIMA.—January 1938: Discharge, 10,200 second-feet 11 a.m. Jan. 25 (gage height, 9.52 feet); gage height, 9.96 feet 8:10 a.m. Jan. 25 (result of ice jam).

1929 to December 1937: Discharge, 19,900 second-feet Mar. 18, 1936 (gage height, 13.42 feet).

REMARKS.—Flow regulated by storage in Otis Reservoir (p. 69).

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	284	628	9	692	716	17	354	396	25	6,060	395
2	324	493	10	555	674	18	320	434	26	2,870	340
3	300	486	11	462	520	19	300	467	27	1,280	300
4	300	615	12	422	462	20	320	426	28	809	240
5	280	530	13	433	516	21	320	380	29	596	
6	260	551	14	397	621	22	332	360	30	577	
7	900	1,730	15	377	520	23	313	414	31	734	
8	955	922	16	329	394	24	392	413			
Monthly mean discharge, in second-feet										737	534
Runoff, in inches										3.93	2.57

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	----	----	----	----	----	----	2.22	373	6.73	4,960	4.08	1,610
2	2.12	335	2.02	298	2.17	354	2.35	426	6.51	4,610	4.02	1,560
3	----	----	----	----	----	----	2.75	540	6.30	4,290	3.95	1,500
4	2.08	320	1.91	260	2.21	369	3.40	780	6.08	3,960	3.90	1,450
5	----	----	----	----	----	----	3.94	1,490	5.88	3,660	3.85	1,400
6	2.03	302	2.00	291	2.27	393	5.00	2,540	5.69	3,400	3.81	1,370
7	----	----	----	----	----	----	6.40	4,440	5.50	3,140	3.75	1,320
8	2.03	302	2.06	313	2.35	426	7.72	6,640	5.34	2,940	3.72	1,290
9	----	----	2.06	313	----	----	8.85	8,790	5.20	2,770	3.70	1,270
10	2.08	320	2.34	422	2.50	495	9.41	9,970	5.08	2,630	3.68	1,250
11	----	----	----	----	----	----	9.52	10,200	4.99	2,530	3.64	1,220
12 n.	2.21	369	2.07	316	2.53	510	9.39	9,930	4.95	2,480	3.66	1,240
1 p.m.	----	----	----	----	----	----	9.18	9,480	4.93	2,460	3.68	1,250
2	2.24	381	2.02	298	2.15	346	9.03	9,160	4.90	2,430	3.66	1,240
3	----	----	----	----	----	----	9.05	9,200	4.88	2,410	3.68	1,250
4	2.15	346	1.95	274	2.24	381	8.94	8,970	4.84	2,360	3.67	1,250
5	----	----	----	----	----	----	8.68	8,450	4.79	2,310	3.64	1,220
6	2.09	323	2.11	331	2.27	393	8.43	7,960	4.72	2,230	3.64	1,220
7	----	----	----	----	----	----	8.23	7,580	4.61	2,120	3.59	1,180
8	2.11	331	2.10	327	2.20	365	8.00	7,140	4.53	2,040	3.55	1,150
9	----	----	----	----	----	----	7.73	6,650	4.43	1,940	3.48	1,100
10	2.10	327	2.10	327	2.12	335	7.44	6,140	4.33	1,840	3.43	1,060
11	----	----	----	----	----	----	7.20	5,730	4.24	1,760	3.37	1,020
12 m.	2.07	316	2.12	335	2.14	342	6.96	5,330	4.16	1,680	3.32	984
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.24	928	2.71	600	2.40	448	2.59	540	2.87	692	2.34	422
4	3.15	868	2.75	622	2.62	555	2.61	550	2.88	698	2.46	476
6	3.10	835	2.58	535	2.62	555	2.77	634	2.76	628	2.33	418
8	3.07	816	2.64	565	2.79	644	2.84	674	2.76	628	2.30	405
10	3.04	796	2.70	595	2.59	540	3.02	783	2.77	634	2.44	467
12 n.	3.04	796	2.67	580	2.71	600	3.08	822	2.64	565	2.57	530
2 p.m.	3.06	809	2.77	634	2.73	612	3.21	907	2.82	662	2.65	570
4	3.09	828	2.75	622	2.74	617	3.20	900	2.81	656	2.73	612
6	3.05	802	2.77	634	2.76	628	3.09	828	2.82	662	2.71	600
8	2.99	764	2.70	595	2.76	628	3.02	783	2.72	606	2.55	520
10	2.86	686	2.75	622	2.71	600	2.96	746	2.54	515	2.48	486
12 m.	2.68	585	2.55	520	2.67	580	2.90	710	2.44	467	2.45	472

Supplemental records.—Jan. 25, 8:10 a.m., 9.96 ft. (ice jam); Jan. 30, 1 a.m., 2.38 ft., 439 sec.-ft.; 7 a.m., 2.61 ft., 550 sec.-ft.; Feb. 2, 1 p.m., 2.34 ft., 422 sec.-ft.

FARMINGTON RIVER AT TARIFFVILLE, CONN.

LOCATION.—Lat. 41°54′35″, long. 72°45′40″, at Tariffville, Hartford County, half a mile upstream from Hartford Electric Light Co.'s plant, three-quarters of a mile downstream from Salmon Brook, and 12 miles upstream from mouth.

DRAINAGE AREA.—578 square miles.

748116—48—6

Gage-height record.—Water-stage recorder graph, except for period Jan. 16-20 when float was frozen in well.

Stage-discharge relation.—Varies with number of generators operating at power plant. Base rating curves have been developed for flow through one and two generators operating at full capacity and for flow over spillway of dam with no generators operating. These ratings are correlated by stage-relation curves and are defined by discharge measurements and computations of flow over dam. When generators ran at less than full capacity discharge was determined from adjusted gage-height graph. Spillway rating used 6 p.m. Jan. 25 to 9 am. Jan. 29; one-generator rating used Jan. 8, 9, 10 a.m. Jan. 29 to 8 a.m. Jan. 30; two-generator rating used Jan. 1-7, Jan. 10 to 5 p.m. Jan. 25, 9 a.m Jan. 30 to Feb. 28, except for periods of ice effect, Jan. 1-4, Jan. 10 to 5 p.m. Jan. 25.

Maxima.—January 1938: Discharge, 11,900 second-feet 11 a.m. to noon January 26 (gage height, 9.62 feet).

1928 to December 1937: Discharge, 26,900 second-feet Mar. 19, 1936 (gage height, 13.4 feet).

Remarks.—Discharge during period of no gage-height record or periods of ice effect based on operation records of Hartford Electric Co.'s plant, half a mile below station. Flood discharge affected by storage and diversion. For information on storage and diversion see records for Otis Reservoir at Cold Spring, Mass., Barkhamsted Reservoir at Barkhamsted, Conn., East Branch Reservoir at New Hartford, Conn., Nepaug Reservoir near Collinsville, Conn.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	950	2,330	9	2,080	2,130	17	950	1,300	25	5,320	1,340
2	800	1,600	10	1,500	1,980	18	900	1,380	26	11,100	1,240
3	1,100	1,620	11	1,300	1,800	19	750	1,460	27	6,660	1,100
4	900	1,980	12	900	1,660	20	850	1,460	28	3,460	935
5	832	1,930	13	850	1,750	21	850	1,340	29	2,390	
6	832	1,840	14	1,000	1,980	22	860	1,340	30	2,060	
7	1,500	3,030	15	1,100	1,930	23	840	1,340	31	2,420	
8	2,960	2,770	16	900	1,540	24	777	1,460			
Monthly mean discharge, in second-feet										1,926	1,699
Runoff, in inches										3.84	3.06

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	------	------	2.78	860	9.00	10,300	------	------
2	------	------	------	------	------	------	2.81	900	9.20	10,800	8.22	8,530
3	------	------	------	------	------	------	2.90	960	9.18	10,800	------	------
4	------	------	------	------	2.70	780	3.05	1,050	9.27	10,900	7.97	7,980
5	------	------	------	------	------	------	3.26	1,150	9.36	11,200	------	------
6	------	------	------	------	------	------	3.66	1,250	9.45	11,400	7.75	7,520
7	------	------	------	------	------	------	4.25	1,450	9.50	11,600	------	------
8	------	------	------	------	2.74	860	5.27	1,850	9.55	11,700	7.53	7,050
9	------	------	------	------	------	------	5.95	2,850	9.58	11,800	------	------
10	------	------	------	------	------	------	6.50	3,800	9.60	11,800	7.33	6,650
11	------	------	------	------	------	------	7.15	4,800	9.62	11,900	7.29	------
12 n.	------	------	------	------	2.62	820	8.00	5,800	9.62	11,900	7.20	6,600
1 p.m.	------	------	------	------	------	------	8.33	6,600	9.60	11,800	------	------
2	------	------	------	------	------	------	8.60	7,600	9.58	11,800	7.10	6,400
3	------	------	------	------	------	------	8.64	8,200	9.54	11,700	------	------
4	------	------	------	------	2.40	720	8.69	8,600	9.50	11,600	6.98	6,200

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
5	------	------	------	------	------	------	8.78	8,800	9.46	11,400	------	------
6	------	------	------	------	------	------	8.48	9,110	9.38	11,200	6.79	5,800
7	------	------	------	------	2.60	------	8.53	9,220	9.30	11,000	------	------
8	------	------	------	------	2.70	700	8.53	9,220	9.20	10,800	6.66	5,370
9	------	------	------	------	------	------	8.56	9,290	9.07	10,500	------	------
10	------	------	------	------	------	------	8.63	9,450	8.91	10,100	6.42	4,940
11	------	------	------	------	------	------	8.69	9,590	8.73	9,680	------	------
12 m.	------	------	------	------	2.77	800	8.70	9,610	8.55	9,260	6.23	4,620
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	------	------	4.75	------	------	------	------	------	------	------	------	------
4	5.91	4,110	4.84	2,610								
6	------	------	------	------	4.13	2,050	4.04	2,300	4.44	2,600	3.44	1,650
8	5.61	3,660	4.77	2,520	4.11	------	------	------	------	------	------	------
10	5.42	------	4.69	------	3.95	------	------	------	------	------	------	------
12 n.	5.29	3,300	4.48	2,400	3.92	2,050	4.17	2,350	4.09	2,250	3.40	1,500
2 p.m.	------	------	4.46	------	------	------	------	------	------	------	3.27	------
4	5.10	3,100	4.33	2,250	------	------	------	------	------	------	------	------
6	------	------	------	------	3.94	2,050	4.37	2,600	3.99	2,150	3.32	1,550
8	4.96	2,900	4.22	2,150	------	------	------	------	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	------	------
12 m.	4.82	2,700	4.17	2,100	3.93	2,100	4.50	2,800	3.71	1,850	3.25	1,550

Supplemental records: Jan. 24, 4:30 p.m., 2.80 feet (ice effect).

OTIS RESERVOIR AT COLD SPRING, MASS.

LOCATION.—Staff gage at dam, lat. 42°09′35″, long. 73°03′33″, on unnamed stream three-quarters of a mile upstream from its debouchment into Farmington River and 1 mile northeast of Cold Spring, Hampden County.

DRAINAGE AREA.—17.2 square miles.

GAGE-HEIGHT RECORD.—One gage reading daily, usually at 7 a.m. Gage height at midnight computed from graph of gage readings and study of gate operation and weather records.

STAGE-DISCHARGE RELATION.—Outflow computed from record of gate openings. No flow over spillway during period Jan. 1 to Feb. 28.

REMARKS.—Inflow computed from outflow adjusted for change in contents of reservoir. No adjustments for evaporation from reservoir surface. Records based on data furnished by the Collins Co., Collinsville, Conn.

Discharge, in second-feet, and change in contents in equivalent second-feet, 1938

Day	January			February		
	Observed outflow	Change in Contents	Inflow	Observed outflow	Change in Contents	Inflow
1	59	−40	19	0.0	+80	80
2	59	−39	20	.0	+51	51
3	70	−58	12	.0	+46	46
4	88	−78	10	.0	+46	46
5	87	−78	9	.0	+46	46
6	75	−53	22	.0	+71	71
7	19	+58	77	.0	+107	107
8	29	+24	53	.0	+107	107
9	58	−19	39	.0	+57	57
10	58	−24	34	.0	+42	42
11	58	−24	34	.0	+42	42
12	58	−24	34	.0	+42	42

Discharge, in second-feet, and change in contents in equivalent second-feet, 1938 —Continued

Day	January			February		
	Observed outflow	Change in Contents	Inflow	Observed outflow	Change in Contents	Inflow
13	58	−24	34	0.0	+47	47
14	58	−24	34	.0	+42	42
15	58	−24	34	.0	+42	42
16	58	−24	34	.0	+42	42
17	58	−24	34	34	+21	55
18	58	−24	34	63	−10	53
19	58	−19	39	63	−10	53
20	58	−19	39	63	−10	53
21	58	−19	39	63	−10	53
22	57	−19	38	63	−10	53
23	57	−19	38	63	−10	53
24	65	.0	65	63	−10	53
25	27	+415	442	78	−37	41
26	0.0	+131	131	93	−57	36
27	0.0	+100	100	93	−62	31
28	0.0	+85	85	92	−78	14
29	0.0	+80	80	--	--	--
30	0.0	+80	80	--	--	--
31	0.0	+85	85	--	--	--

	January	February
Monthly mean outflow, in second-feet	46.6	29.7
Outflow, in inches	3.12	1.80
Monthly mean inflow, in second-feet	59.0	52.1
Inflow, in inches	3.95	3.16

BARKHAMSTED RESERVOIR NEAR BARKHAMSTED, CONN.

Location.—Lat. 41°54′55″, long. 72°57′05″, on East Branch of Farmington River 1¼ miles south of Barkhamsted, Litchfield County, and 3½ miles upstream from mouth.

Drainage area.—50.5 square miles.

Remarks.—Elevations of reservoir surface are for 8 a.m. Change in contents is for 24-hour period prior to 8 a.m. except after Sundays and holidays when figure shown is change in contents for total period between readings. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, and change in contents, in millions of gallons, 1938

Day	January		February	
	Elevation	Change in contents	Elevation	Change in contents
1	------	------	431.65	−19
2	------	------	430.60	−30
3	425.67	−30	429.75	−22
4	425.50	−3	429.21	−14
5	425.49	−1	429.00	−6
6	425.41	−2	------	------
7	425.84	+10	430.19	+31
8	430.40	+111	432.71	+76
9	------	----	432.35	−12
10	430.91	+14	431.59	−25
11	430.03	−24	430.79	−23
12	428.79	−31	429.90	−24
13	427.91	−21	------	----
14	427.50	−10	428.79	−27
15	427.08	−11	428.90	+2
16	------	----	427.45	−35

Elevation, in feet, and change in contents, in millions of gallons, 1938—Continued

Day	January		February	
	Elevation	Change in contents	Elevation	Change in contents
17	426.20	−19	427.29	−4
18	425.85	−8	427.00	−6
19	425.41	−9	426.97	−1
20	425.50	+1	------	----
21	425.38	−4	426.33	−15
22	425.50	+4	426.00	−7
23	------	----	426.90	+21
24	425.32	−5	427.35	+10
25	430.80	+134	426.75	−14
26	447.62	+829	427.00	+6
27	444.05	−202	------	----
28	439.35	−257	425.80	−28
29	435.25	−206	------	----
30	------	----	------	----
31	432.25	−121	------	----

	January	February
Change in contents, in millions of gallons	+139	−166

EAST BRANCH RESERVOIR AT NEW HARTFORD, CONN.

LOCATION.—Lat. 41°52′55″, long. 72°57′25″, on East Branch of Farmington River 1 mile east of New Hartford, Hartford County, and 1¼ miles upstream from mouth.

DRAINAGE AREA.—61.2 square miles.

REMARKS.—Elevations of reservoir surface are for 8 a.m. crest of spillway at elevation 422.5 feet. Change in contents is for 24-hour period previous to 8 a.m. except after Sundays and holidays when figure shown is change in contents for total period between readings. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, and change in contents, in millions of gallons, 1938

Day	January		February	
	Elevation	Change in contents	Elevation	Change in contents
1	------	----	422.90	−8
2	------	----	422.90	0
3	412.95	−347	422.85	−8
4	412.70	−23	422.55	−45
5	412.30	−39	422.45	−15
6	412.00	−28	------	----
7	411.55	−36	421.50	−138
8	413.05	+137	422.60	+160
9	------	----	422.65	+8
10	415.55	+277	422.60	−8
11	415.95	+40	422.45	−22
12	416.10	+19	423.00	+83
13	416.15	+6	------	----
14	416.05	−12	420.00	−426
15	415.90	−16	419.05	−117
16	------	----	417.95	−133
17	415.35	−58	416.70	−136
18	414.55	−84	415.25	−163
19	413.80	−82	414.00	−131
20	412.90	−105	------	----
21	412.40	−48	411.85	−227
22	412.10	−28	------	----
23	------	----	408.00	−343
24	411.35	−62	406.20	−143

Elevation, in feet, and change in contents, in millions of gallons, 1938—Continued

Day	January		February	
	Elevation	Change in contents	Elevation	Change in contents
25	411.30	−4	405.95	−22
26	418.20	+730	405.40	−49
27	422.70	+601	------	----
28	423.40	+110	404.70	−57
29	423.00	−63	------	----
30	------	----	------	----
31	422.95	−8	------	----

	January	February
Change in contents, in millions of gallons	+877	−1940

NEPAUG RESERVOIR NEAR COLLINSVILLE, CONN.

LOCATION.—Lat. 41°49′40″, long. 72°56′05″, on Nepaug River a quarter of a mile upstream from mouth and 1½ miles northwest of Collinsville, Hartford County.

DRAINAGE AREA.—32.0 square miles.

REMARKS.—Elevations of reservoir surface are for 8 a.m. crest of spillway at elevation of 485.0 feet. Change in contents is for 24-hour period prior to 8 a.m. Diversions for Hartford municipal supply are for calendar day. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, and change in contents and diversion, in millions of gallons, 1938

Day	January			February		
	Elevation	Change in contents	Diversion	Elevation	Change in contents	Diversion
1	482.44	−5.4	23.5	484.48	−13.7	19.5
2	482.54	+26.9	23.5	484.30	−49.4	19.5
3	482.54	0.0	23.5	484.09	−57.5	19.5
4	482.58	+10.8	23.5	483.99	−27.4	19.5
5	482.60	+5.4	23.5	483.85	−38.2	19.5
6	482.62	+5.4	23.5	483.70	−40.9	19.5
7	482.78	+43.1	23.5	483.76	+16.4	19.5
8	483.07	+78.4	23.5	483.88	+32.7	19.5
9	483.08	+2.7	23.5	483.80	−21.8	19.5
10	482.91	−46.0	23.5	483.66	−38.1	19.5
11	482.69	−59.4	23.5	483.48	−49.0	19.8
12	482.45	−64.6	23.5	483.29	−51.6	20.0
13	482.27	−60.3	23.0	483.10	−51.5	20.0
14	482.02	−55.0	23.0	482.96	−37.9	19.8
15	481.74	−74.8	23.0	482.83	−35.1	19.0
16	481.70	−10.7	23.0	482.92	+24.3	18.9
17	481.75	+13.4	23.0	483.01	+24.3	18.9
18	481.77	+5.3	23.0	483.07	+16.2	20.8
19	481.83	+16.0	23.0	483.17	+27.1	22.2
20	481.85	+5.3	23.0	483.25	+21.7	22.0
21	481.87	+5.3	23.0	483.35	+27.1	22.0
22	481.92	+13.4	23.0	483.39	+10.9	22.0
23	481.95	+8.0	23.0	483.47	+21.7	22.0
24	481.97	+5.4	23.0	483.36	−29.9	22.0
25	482.32	+93.8	22.0	483.12	−65.1	22.0
26	485.23	+793.5	19.5	482.87	−67.6	22.0
27	485.21	−5.5	19.5	482.90	+8.1	22.0
28	485.05	−44.3	19.5	483.00	+27.0	22.0

Elevation, in feet, and change in contents and diversion, in millions of gallons, 1938 —Continued

Day	January			February		
	Elevation	Change in contents	Diversion	Elevation	Change in contents	Diversion
29	484.88	−46.9	19.5	--	--	--
30	484.73	−41.4	19.5	--	--	--
31	484.53	−55.0	19.5	--	--	--

	January	February
Change in contents, in millions of gallons	+562.8	−417.2
Diversion, in millions of gallons	697.0	572.4

BURLINGTON BROOK NEAR BURLINGTON, CONN.

LOCATION.—Lat. 41°47′10″, long. 72°57′55″, 1¼ miles north of Burlington, Hartford County, 2½ miles upstream from mouth, and 3 miles southwest of Collinsville.

DRAINAGE AREA.—4.1 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Artificial control consists of a sharp-edged orifice 1 foot square and a sharp-crested rectangular weir 12 feet long with end contractions 5 feet high. Crest of weir is at gage height 1.02 feet and 1.02 feet above bottom edge of orifice. Rating curve which was developed from formula and coefficients checked by current-meter measurements below 49 second-feet. Affected by ice Jan. 1-4, 6, 9-21, 3 a.m. Jan. 27 to 11 a.m. Jan. 29, 5 a.m. to 12 m., 5 p.m., 6 p.m. Feb. 1, 12 p.m. Feb. 1 to 2 p.m. Feb. 2, Feb. 11, 16, 17, 20-22, 26, 28.

MAXIMA.—January 1938: Discharge, 474 second-feet 9:30 a.m. Jan. 25 (gage height, 6.42 feet).

1931 to December 1937: Discharge, 503 second-feet Mar. 12, 1936 (gage height, 6.58 feet).

REMARKS.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	6.3	13.5	9	11.5	12.1	17	5.8	8.0	25	173	7.71
2	6.0	9.54	10	8.6	12.1	18	5.0	6.85	26	35.7	7.8
3	7.2	10.1	11	7.7	9.3	19	4.8	8.63	27	16.2	5.52
4	6.0	17.6	12	7.1	8.95	20	5.5	8.3	28	10.9	5.3
5	5.77	11.4	13	5.5	10.3	21	5.8	8.6	29	12.0	
6	4.8	12.7	14	5.5	13.9	22	6.29	8.0	30	9.47	
7	32.3	32.2	15	6.0	10.6	23	5.05	8.00	31	18.5	
8	27.2	13.6	16	5.0	8.0	24	4.75	7.41			

	Jan.	Feb.
Monthly mean discharge, in second-feet	15.2	10.6
Runoff, in inches	4.28	2.70

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							1.23	8.00	2.35	66		
2	1.13	5.26					1.33	11.4	2.26	60		
3							1.46	16.4	2.20	56		
4	1.12	5.02					1.63	24.0	2.13	52	1.50	17.5
5							1.80	32.6	2.06	47.6		
6	1.12	5.02	1.12	5.02	1.11	4.78	1.98	42.8	1.96	41.6		
7							3.75	179	1.90	38.1		
8	1.12	5.02					5.85	394	1.85	35.4	1.52	17.5
9							6.28	451	1.80	32.6		
10	1.11	4.78					6.39	469	1.77	31.1		
11							6.05	418	1.78	31.6		
12 n.	1.11	4.78	1.12	5.02	1.10	4.55	5.40	345	1.94	40.5	1.58	17
1 p.m.							4.85	286	1.81	33.2		
2	1.11	4.78					4.45	246	1.76	30.6	1.60	
3							4.16	217	1.74	29.5		
4	1.22	7.71					3.88	191	1.72	28.5	1.49	16
5							3.60	165	1.71	27.9		
6	1.28	9.60	1.12	5.02	1.10	4.55	3.36	144	1.69	26.9		
7							3.18	129	1.67	26.0		
8	1.30	10.3			1.10	4.55	2.99	114	1.63	24.0	1.41	14.5
9							2.84	102	1.54	19.8		
10	1.22	7.71			1.12	5.02	2.70	91	1.48	17.2		
11							2.55	80	1.46	16.4		
12 m.	1.14	5.52	1.11	4.78	1.17	6.30	2.45	74	1.47	16.8	1.36	12.5

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.			1.30	10.5			1.33	11.4	1.44	15.6	1.32	9.3
4			1.30	10.5	1.26	8.95	1.34	11.7	1.42	14.7	1.34	9.0
6	1.32	11	1.30	10.5			1.37	12.8	1.40	13	1.35	8.6
8			1.30	10.5	1.25	8.63	1.41	14.3	1.41	12.5	1.36	8.6
10			1.30	10.5			1.46	16.4	1.43	12	1.36	8.6
12 n.	1.31	10.5	1.30	10.5	1.24	8.32	1.56	20.7	1.46	12	1.38	9.3
2 p.m.			1.31	10.6			1.65	25.0	1.46	16.4	1.44	12.5
4			1.42	14.7	1.27	9.27	1.70	27.4	1.44	15.6	1.37	12.8
6	1.30	10.5	1.47	16.8			1.68	26.4	1.43	13.5	1.29	9.93
8			1.45	16.0	1.32	11.0	1.63	24.0	1.40	13.9	1.25	8.63
10			1.36	12.4			1.51	18.5	1.29	9.93	1.24	8.32
12 m.	1.30	10.5	1.29	9.93	1.33	11.4	1.43	15.1	1.29	9.6	1.24	8.32

Supplemental records.—Jan. 25, 6:45 a.m., 2.20 ft., 56 second-feet; 9:30 a.m., 6.42 ft., 474 second-feet; Feb. 1, 3 p.m., 1.49 ft., 17.6 second-feet.

SOUTH BRANCH OF PARK RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°44′02″, long. 72°42′51″, at Newfield Avenue bridge, Hartford, Hartford County, 0.7 mile downstream from Trout Brook, and 3.3 miles upstream from confluence with North Branch of Park River. Datum of gage is 31.07 feet above mean sea level, (general adjustment of 1929).

DRAINAGE AREA.—40.6 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Affected by rate of change of stage above gage height about 5 feet. Base rating cure defined by current-meter measurements (adjusted for changing stage when required) below 1,300 second-feet and extended to peak stage on basis of comparison with stations on North Branch of Park River and Park River. Above gage heights about 5 feet, rather poorly defined rating curve developed for different rates of changing stage on basis of several measurements. Affected by change in recording conditions 1 to 8 p.m. Jan 25 when water entered gage house around door and through ventilators. Affected by ice Jan. 1-4, 7, Jan. 12 to 11 a.m. Jan. 23, 5 a.m. to 1 p.m. Jan. 27, 7 a.m. to 1 p.m. Jan. 28, 4 a.m. to 7 a.m. and 9 a.m. to 2 p.m. Jan. 29, 1 a.m. to 12 m. Feb. 2, Feb. 16, 17, 21, 22, 28.

MAXIMA.—January 1938: Discharge, 2,860 second-feet 4 p.m. Jan. 25; gage height, 12.65 feet 5 p.m. Jan. 25.

1936 to December 1937: Discharge, 1,660 second-feet Nov. 29, 1937 gage height, 9.66 feet, Nov. 29, 1937 occurred 1 hour later than maximum discharge. Flood of Mar. 12, 1936, reached a stage of 12.1 feet as determined from floodmarks by city engineers of Hartford (discharge not determined).

REMARKS.—Flood discharge not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	44	114	9	143	104	17	60	70	25	1,800	100
2	55	78	10	100	107	18	50	78	26	681	90
3	55	99	11	71	86	19	44	86	27	237	82
4	48	172	12	60	79	20	46	79	28	132	70
5	47	102	13	55	106	21	44	75	29	88	
6	44	97	14	70	118	22	42	75	30	83	
7	240	224	15	60	93	23	44	82	31	138	
8	276	126	16	55	75	24	45	100			
Monthly mean discharge, in second-feet										160	98.8
Runoff, in inches										4.54	2.53

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							2.67	91	10.60	1,920		
2					1.91	44	3.32	138	10.26	1,700	5.72	275
3							4.19	207	9.86	1,470		
4					1.90	44	5.10	305	9.52	1,270	5.29	250
5							5.87	465	9.17	1,070		
6					1.88	43	6.48	650	8.81	865	5.11	245
7							7.20	970	8.49	695		
8					1.87	42	8.01	1,290	8.17	590	5.26	245
9							8.94	1,670	7.84	485		
10					1.87	42	9.77	1,980	7.57	440	5.25	250
11							10.52	2,260	7.31	400		
12 n.					1.86	42	11.10	2,470	7.09	380	5.03	270
1 p.m.							12.15	2,640	6.92	370		
2					1.85	42	12.40	2,760	6.78	365	4.80	245
3							12.58	2,840	6.66	360		
4					1.90	44	12.64	2,860	6.57	360	4.59	230
5							12.65	2,850	6.49	365		
6					1.92	45	12.60	2,820	6.41	365	4.34	215
7							12.49	2,780	6.34	360		
8					1.92	45	12.28	2,720	6.28	350	4.14	200
9							11.77	2,600	6.21	330		
10					1.98	48	11.50	2,440	6.13	320	3.96	189
11							11.22	2,270	6.04	305		
12 m.					2.28	66	10.91	2,100	5.96	290	3.80	176
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.65	164	2.78	99			2.69	92	3.46	149	2.54	78
4	3.43	146	2.68	90	2.53	81	2.72	94	3.28	134	2.44	68
6	3.24	131	2.61	82			2.76	97	3.09	120	2.28	62
8	3.14	120	2.44	75	2.51	80	2.81	101	2.90	107	2.27	60
10	3.20	120	2.61	74			2.90	107	2.68	92	2.56	62
12 n.	3.37	125	2.84	80	2.49	78	3.19	127	3.01	115	2.60	82
2 p.m.	3.39	143	2.82	96			3.54	155	2.93	109	2.76	97
4	3.33	138	2.86	104	2.56	83	3.88	182	2.91	108	2.66	90
6	3.18	127	2.70	93			4.05	196	2.90	107	2.62	87
8	3.05	118	2.61	87	2.67	91	4.00	192	2.85	104	2.59	85
10	2.96	111	2.58	85			3.85	180	2.76	97	2.55	82
12 m.	2.88	106	2.56	83	2.68	92	3.65	164	2.63	88	2.49	78

Supplemental records.—Feb. 1, 10:30 a.m., 2.64 feet, 89 sec.-ft.

PARK RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°45′36″, long. 72°41′42″, at plate-girder footbridge on Riverside Street, Hartford, Hartford County, 1300 feet downstream from confluence of North and South Branches of Park River, and 2.3 miles upstream from mouth. Datum of gage is 27.13 feet above mean sea level, (general adjustment of 1929).

DRAINAGE AREA.—74.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—January 1938: Discharge, 5,650 second-feet 5:30 p.m. Jan. 25 (gage height, 9.16 feet).

1936 to December 1937: Discharge, 2,880 second-feet Nov. 29, 1937 (gage height, 6.81 feet).

Flood of Mar. 12, 1936, reached a stage of 9.0 feet as determined from floodmarks by city engineers of Hartford (discharge, 5,400 second-feet). Backwater from Connecticut River on Mar. 21, 1936, caused a stage of 10.7 feet as determined from floodmarks.

REMARKS.—Flood discharge probably not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	59	194	9	256	168	17	87	96	25	3,220	160
2	87	121	10	154	172	18	79	103	26	1,690	146
3	87	140	11	112	136	19	59	122	27	385	129
4	76	298	12	90	119	20	64	122	28	201	115
5	73	184	13	82	161	21	59	106	29	134	
6	70	152	14	103	206	22	63	106	30	124	
7	481	421	15	96	157	23	64	119	31	212	
8	626	232	16	82	112	24	66	150			
Monthly mean discharge, in second-feet										292	159
Runoff, in inches										4.55	2.24

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22		January 23		January 24		January 25		January 26		January 27	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.	------	------	------	------	------	------	3.05	222	7.57	3,700	------	------
2	------	------	------	------	2.59	64	3.31	334	7.30	3,400	3.73	535
3	------	------	------	------	------	------	3.50	402	7.03	3,100	------	------
4	------	------	------	------	2.59	64	3.74	540	6.78	2,850	3.58	460
5	------	------	------	------	------	------	4.09	730	6.53	2,600	------	------
6	------	------	------	------	2.58	61	4.38	907	6.28	2,360	3.43	388
7	------	------	------	------	------	------	4.78	1,180	6.07	2,170	------	------
8	------	------	------	------	2.58	61	5.37	1,600	5.83	1,960	3.34	348
9	------	------	------	------	------	------	6.00	2,110	5.62	1,800	------	------
10	------	------	------	------	2.58	61	6.67	2,740	5.40	1,620	3.32	339
11	------	------	------	------	------	------	7.37	3,480	5.21	1,480	------	------
12 n.	------	------	------	------	2.58	61	7.98	4,200	5.03	1,350	3.38	366
1 p.m.	------	------	------	------	------	------	8.44	4,750	4.87	1,240	------	------
2	------	------	------	------	2.58	61	8.79	5,170	4.73	1,140	3.41	380
3	------	------	------	------	------	------	9.03	5,480	4.62	1,060	------	------
4	------	------	------	------	2.58	61	9.10	5,570	4.51	992	3.38	366
5	------	------	------	------	------	------	9.14	5,620	4.41	926	------	------
6	------	------	------	------	2.58	61	9.08	5,540	4.32	868	3.35	352
7	------	------	------	------	------	------	8.99	5,430	4.23	813	------	------
8	------	------	------	------	2.59	64	8.82	5,210	4.14	759	3.32	339
9	------	------	------	------	------	------	8.62	4,960	4.07	718	------	------
10	------	------	------	------	2.61	70	8.39	4,690	4.00	680	3.26	312
11	------	------	------	------	------	------	8.12	4,360	3.93	642	------	------
12 m.	------	------	------	------	2.85	146	7.84	4,030	3.86	603	3.18	276

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.12	251	2.87	154	------	-------	2.83	140	3.18	276	2.81	132
4	3.06	226	2.83	140	------	-------	2.84	143	3.09	238	2.77	119
6	3.00	202	2.80	129	2.77	119	2.84	143	3.01	206	2.72	103
8	2.93	175	2.78	122	------	-------	2.85	146	2.95	183	2.69	93
10	2.90	164	2.73	106	------	-------	2.89	160	2.90	164	2.68	90
12 n.	2.94	179	2.76	116	2.76	116	3.00	202	2.89	160	2.76	116
2 p.m.	2.99	198	2.81	132	------	-------	3.07	230	2.95	183	2.80	129
4	3.02	210	2.84	143	------	-------	3.12	251	2.94	179	2.82	136
6	3.01	206	2.84	143	2.79	126	3.20	285	2.94	179	2.82	136
8	2.99	198	2.83	140	------	-------	3.25	308	2.94	179	2.82	136
10	2.95	183	2.81	132	------	-------	3.27	316	2.90	164	2.80	129
12 m.	2.91	168	2.80	129	2.83	140	3.23	298	2.85	146	2.78	122

Supplemental records.—Jan. 25, 5:30 p.m., 9.16 feet, 5,650 sec.-ft.

NORTH BRANCH OF PARK RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°47′03″, long. 72°42′31″, 60 feet downstream from stone arch bridge on Albany Avenue, Hartford, Hartford County, and 3 miles upstream from confluence with South Branch of Park River. Datum of gage is 34.20 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—25.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period Jan. 16-22 when float was bound by frost. Affected by change in recording conditions 11 a.m. to 5:30 p.m. Jan. 25 when water was over gage-house floor.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 800 second-feet; extended logarithmically to peak stage and verified by area-velocity computations and comparisons with flood records for stations on South Branch and Park River. Affected by ice Jan. 1-7, 12-15, 3 a.m. to 10 a.m. and 12 m. to 12 p.m. Jan. 28 1 a.m. to 2 p.m. Jan 29 (6 to 10 a.m. and 9:30 p.m. to 12 p.m.). Jan. 30 10:30 a.m. to 11:30 a.m. Jan. 31 3 a.m. to 12 m. and 8 p.m. to 12 p.m. Feb. 1, 1 a.m. to 11 a.m. Feb. 2 12, 13, 16, 17, 21, 22, 28. Affected by change in recording conditions 11 a.m. to 5:30 p.m. Jan. 25 when water was over gage-house floor.

MAXIMA.—January 1938: Discharge, 1,640 second-feet 2 p.m. Jan. 25 (gage height, 11.81 feet).

1936 to December 1937: Discharge, 960 second-feet Nov. 29, 1937 (gage height, 7.8 feet).

Flood of Mar. 12, 1936, reached a stage of 11.2 feet as determined from floodmarks by Hartford city engineers (discharge probably 1,520 second-feet).

REMARKS.—Flood discharge probably not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	10	58	9	95	48	17	17	20	25	1,060	47
2	16	39	10	47	50	18	16	24	26	414	43
3	22	42	11	29	36	19	15	34	27	104	37
4	18	110	12	20	32	20	14	32	28	55	30
5	18	63	13	18	50	21	14	24	29	38	
6	16	56	14	20	68	22	18	26	30	33	
7	230	185	15	19	42	23	21	29	31	80	
8	253	72	16	18	24	24	22	39			
Monthly mean discharge, in second-feet										89.4	48.6
Runoff, in inches										4.07	2.00

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							2.16	45	7.37	890		
2							2.45	88	6.91	822		
3							2.75	152	6.47	757	2.59	116
4					1.84	21	3.24	283	6.01	692		
5							4.45	495	5.56	629		
6							5.85	672	5.12	568	2.54	105
7							6.95	828	4.77	530		
8					1.84	21	8.40	1,060	4.42	492		
9							9.45	1,240	4.08	453	2.50	97
10							10.30	1,390	3.80	415		
11							10.90	1,500	3.61	382		
12 n.					1.85	22	11.50	1,580	3.42	335	2.51	99
1 p.m.							11.75	1,630	3.34	312		
2							11.81	1,640	3.29	297		
3							11.77	1,630	3.20	271	2.54	105
4					1.84	21	11.58	1,590	3.13	251		
5							11.31	1,540	3.05	230		
6							10.81	1,480	3.00	216	2.61	120
7							10.40	1,410	2.96	206		
8					1.84	21	9.93	1,330	2.90	190		
9							9.42	1,240	2.82	169	2.46	89
10					1.85	22	8.86	1,140	2.73	147		
11							8.34	1,050	2.68	136		
12 m.					1.95	28	7.84	968	2.65	129	2.37	73

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	2.30	62			2.01	33	2.12	41	2.36	72	2.30	39
4	2.28	54	2.34	41	1.99	31	2.13	42	2.40	52	2.29	38
6	2.27	49			1.98	30	2.16	45	2.40	45	2.28	38
8	2.24	45	2.20	33	1.97	28	2.20	49	2.41	44	2.27	37
10	2.16	43			1.96	28	2.27	58	2.33	47	2.12	36
12 n.	2.32	49	2.10	34	1.98	31	2.42	82	2.26	54	2.10	39
2 p.m.	2.51	60			2.02	33	2.53	103	2.34	68	2.11	40
4	2.55	66	2.10	39	2.04	35	2.60	118	2.38	75	2.16	45
6	2.55	62			2.06	36	2.62	122	2.34	68	2.13	42
8	2.48	56	2.11	40	2.09	38	2.61	120	2.27	56	2.08	38
10	2.44	52			2.30	40	2.58	114	2.31	49	2.04	35
12 m.	2.41	49	2.04	35	2.14	41	2.50	97	2.32	43	2.02	33

Supplemental records.—Jan. 28, 11 a.m., 2.15 ft., 44 sec.-ft.; Jan. 30, 9:30 p.m., 2.10 ft.; Jan. 31, 11 a.m., 2.41 ft.

HOCKANUM RIVER AT OUTLET OF SHENIPSIT LAKE, AT ROCKVILLE, CONN.

Location.—Lat. 41°52′06″, long. 72°25′56″, three-quarters of a mile east of Rockville, Tolland County.

Drainage area.—16.5 square miles.

Gage-height record.—One reservoir gage reading daily in morning except Sundays. Gage height at midnight determined from graph of gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow over spillway and through pumps, venturi meter, wheel, and gate.

REMARKS.—Daily and monthly mean discharges adjusted for change in contents of Shenipsit Lake. No corrections made for evaporation from lake surface. Basic data furnished by Rockville Water & Aqueduct Co.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	January			February		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	4	+15	19	60	−13	47
2	0.0	+18	18	60	−13	47
3	29	−6	23	60	−13	47
4	31	−12	19	60	−13	47
5	31	−6	25	23	+28	51
6	37	−6	31	0.0	+63	63
7	34	+124	158	45	+63	108
8	8	+41	49	61	−9	52
9	0.0	+47	47	60	−19	41
10	33	+9	42	60	−22	38
11	45	−3	42	60	−25	35
12	48	−9	39	23	+13	36
13	45	−15	30	0.0	+38	38
14	60	−36	24	45	+6	51
15	24	−3	21	60	−9	51
16	0.0	+21	21	50	−9	41
17	46	−27	19	48	−13	35
18	60	−41	19	55	−22	33
19	58	−41	17	27	+6	33
20	58	−41	17	0.0	+38	38
21	58	−38	20	36	−3	33
22	28	−6	22	36	−6	30
23	0.0	+21	21	33	−6	27
24	45	−15	30	33	−3	30
25	90	+405	495	32	−6	26
26	109	+66	175	21	+6	27
27	100	−32	68	6	+16	22
28	98	−35	63	36	−16	20
29	83	−32	51	--	--	--
30	58	−19	39	--	--	--
31	60	−13	47	--	-	--

	January	February
Monthly mean discharge, in second-feet (observed)	44.5	38.9
Runoff, in inches (observed)	3.11	2.46
Monthly mean discharge, in second-feet (adjusted)	55.2	41.0
Runoff, in inches (adjusted)	3.86	2.58

HOCKANUM RIVER NEAR EAST HARTFORD, CONN.

LOCATION.—Lat. 41°46′57″, long. 72°35′20″, at Case & Marshall paper mill, 1½ miles downstream from South Branch of Hockanum River and 2¾ miles east of East Hartford, Hartford County. Datum of gage is 54.5 feet above mean sea level (general adjustment of 1929, levels by Department of Engineering, City of Hartford).

DRAINAGE AREA.—74.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—January 1938: Discharge, 2,140 second-feet 2:20 p.m. Jan. 25 (gage height, 8.79 feet).

1919-21, 1928 to December 1937: Discharge, 1,920 second-feet Mar. 5, 1934 (gage height, 8.3 feet).

REMARKS.—Flow affected by storage in Shenipsit Lake (see record for Hockanum River at outlet of Shenipsit Lake at Rockville, Conn.).

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	70	256	9	205	236	17	165	164	25	1,270	159
2	42	238	10	215	229	18	121	171	26	740	110
3	137	215	11	136	177	19	84	108	27	375	71
4	104	255	12	160	111	20	139	68	28	280	168
5	126	164	13	137	108	21	178	193	29	164	
6	123	176	14	82	258	22	87	166	30	193	
7	252	347	15	88	188	23	51	140	31	200	
8	381	255	16	81	160	24	182	164			
Monthly mean discharge, in second-feet										215	181
Runoff, in inches										3.33	2.53

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22		January 23		January 24		January 25		January 26		January 27	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.	2.36	148	1.48	44	1.79	76	3.06	259	6.84	1,290	3.88	416
2	2.31	141	1.47	43	1.79	76	3.07	261	6.61	1,190	3.74	388
3	2.26	134	1.47	43	1.80	77	3.17	279	6.38	1,100	3.67	374
4	2.20	126	1.47	43	1.81	78	3.10	266	6.17	1,020	3.63	366
5	2.14	118	1.46	42	1.82	79	3.49	338	5.97	954	3.60	360
6	2.07	109	1.43	40	1.81	78	4.04	449	5.78	894	3.58	356
7	2.03	104	1.43	40	2.05	106	4.51	558	5.60	840	3.56	352
8	1.97	96	1.41	38	2.24	132	5.24	742	5.45	797	3.54	348
9	2.16	121	1.41	38	2.25	133	5.89	927	5.30	758	3.53	346
10	2.08	110	1.44	41	2.32	143	6.75	1,250	5.17	724	3.58	356
11	2.03	104	1.45	42	2.40	154	7.62	1,610	5.04	690	3.67	374
12 n.	1.75	72	1.46	42	2.53	174	8.20	1,870	4.94	664	3.71	382
1 p.m.	1.86	84	1.49	45	2.68	197	8.56	2,030	4.84	638	3.74	388
2	1.64	60	1.52	48	2.83	221	8.73	2,110	4.75	616	3.75	390
3	1.61	57	1.56	52	2.93	237	8.78	2,130	4.65	592	3.75	390
4	1.60	56	1.58	54	3.03	254	8.71	2,100	4.56	570	3.74	388
5	1.60	56	1.63	59	3.12	270	8.62	2,060	4.48	551	3.73	386
6	1.60	56	1.66	62	3.17	279	8.48	2,000	4.41	534	3.72	384
7	1.57	53	1.68	64	3.20	284	8.26	1,900	4.34	518	3.70	380
8	1.56	52	1.71	67	3.23	289	8.04	1,800	4.26	498	3.67	374
9	1.54	50	1.74	70	3.25	293	7.81	1,690	4.19	482	3.65	370
10	1.52	48	1.77	74	3.22	288	7.55	1,580	4.14	471	3.64	368
11	1.50	46	1.78	75	3.16	277	7.31	1,470	4.08	458	3.63	366
12 m.	1.50	46	1.78	75	3.10	266	7.07	1,380	4.03	447	3.63	366

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.40	320	3.13	271	2.58	185	2.63	192	3.26	295	3.30	302
4	3.11	268	2.86	228	2.62	191	2.64	194	3.01	252	3.03	255
6	2.85	226	2.63	192	2.65	196	2.63	192	2.79	216	2.79	216
8	2.70	203	1.94	101	2.66	197	3.00	250	2.62	191	2.59	186
10	2.67	198	1.89	95	2.66	197	3.13	271	2.57	184	2.50	173
12 n.	2.90	234	1.93	100	2.67	198	3.36	313	2.68	200	2.59	186
2 p.m.	3.14	273	2.05	114	2.67	198	3.56	352	2.84	224	2.70	203
4	3.30	302	2.17	128	2.65	196	3.69	378	3.06	260	2.86	228
6	3.40	320	2.27	141	2.63	192	3.73	386	3.26	295	3.05	258
8	3.46	332	2.36	153	2.62	191	3.61	362	3.34	309	3.17	279
10	3.46	332	2.43	163	2.61	190	3.52	344	3.40	320	3.15	285
12 m.	3.46	332	2.53	178	2.61	190	3.44	328	3.43	326	3.03	255

Supplemental records.—Jan. 25, 3:45 a.m., 3.32 ft., 306 sec.-ft.; 2:20 p.m., 8.79 ft., 2,140 sec.-ft.; Jan. 29, 7:40 a.m., 2.48 ft., 170 sec.-ft.; Jan. 31, 7 a.m., 2.63 ft., 192 sec.-ft.

SALMON RIVER NEAR EAST HAMPTON, CONN.

LOCATION.—Lat. 41°33'14", long. 72°27'00", at Comstock Bridge, on Hartford-Middlesex County line, 0.7 mile downstream from Dickinson Creek and 3½ miles southeast of East Hampton, Middlesex County.

DRAINAGE AREA.—105 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 500 second-feet; extended to peak stage on basis of shape of previous and subsequent rating curves. Affected by ice Jan. 4-7, Jan. 10 to 8 a.m. Jan. 25, 2 a.m. Jan. 28 to 2 p.m. Jan. 30, Feb. 16, 17, 21, 22.

MAXIMA.—January 1938: Discharge, 5,720 second-feet noon Jan. 25 (gage height, 6.21 feet).

1905-6, 1928 to December 1937: Discharge, 6,250 second-feet Mar. 12, 1936 (gage height, 6.98 feet, ice jam).

REMARKS.—Flood discharge not materially affected by storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	156	394	9	424	333	17	200	200	25	3,070	249
2	178	324	10	280	342	18	190	212	26	1,320	230
3	181	339	11	260	282	19	170	242	27	518	212
4	170	587	12	240	253	20	160	230	28	384	194
5	170	400	13	240	286	21	150	200	29	345	
6	170	347	14	220	347	22	140	200	30	326	
7	1,050	506	15	220	290	23	149	212	31	414	
8	894	405	16	200	220	24	183	253			
Monthly mean discharge, in second-feet										412	296
Runoff, in inches										4.52	2.94

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22 Feet	January 22 Sec.-ft.	January 23 Feet	January 23 Sec.-ft.	January 24 Feet	January 24 Sec.-ft.	January 25 Feet	January 25 Sec.-ft.	January 26 Feet	January 26 Sec.-ft.	January 27 Feet	January 27 Sec.-ft.
1 a.m.					1.57	160	1.98	300	4.11	2,390	2.18	593
2					1.57	160	2.08	380	3.97	2,220	2.15	575
3					1.56	160	2.70	540	3.84	2,070	2.12	557
4					1.56	160	3.00	800	3.71	1,910	2.08	534
5					1.60	170	3.23	1,100	3.57	1,770	2.06	523
6					1.56	155	3.48	1,500	3.45	1,650	2.02	501
7					1.55	155	3.90	1,900	3.35	1,550	1.99	485
8					1.55	155	4.45	2,500	3.24	1,440	1.96	470
9					1.54	155	4.79	3,310	3.13	1,330	1.95	465
10					1.62	165	5.40	4,260	3.03	1,240	1.97	475
11					1.78	195	5.80	4,960	2.96	1,170	1.99	485
12 n.					1.81	205	6.21	5,720	2.91	1,130	2.00	490
1 p.m.					1.78	200	6.09	5,480	2.91	1,130	2.07	528
2					1.78	200	6.04	5,390	2.89	1,110	2.14	569
3					1.73	195	5.86	5,070	2.84	1,070	2.19	599
4					1.69	190	5.71	4,800	2.77	1,020	2.19	599
5					1.67	185	5.45	4,340	2.71	968	2.15	575
6					1.67	185	5.25	4,020	2.68	944	2.09	540
7					1.67	190	5.05	3,700	2.63	904	2.08	534
8					1.66	190	4.84	3,380	2.56	850	1.98	480
9					1.68	195	4.70	3,180	2.47	784	1.94	460
10					1.72	210	4.58	3,010	2.41	742	1.90	440
11					1.81	250	4.44	2,820	2.31	676	1.87	425
12 m.					1.87	280	4.27	2,580	2.25	638	1.86	420

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.												
4	1.84	400	1.87	340	1.92	320	1.68	333	1.81	395	1.57	286
6												
8	1.86	370	1.96	320	1.92	320	1.72	352	1.73	356	1.62	307
10												
12 n.	1.92	380	2.02	350	1.90	340	1.82	400	1.87	425	1.71	347
2 p.m.									1.98	480		
4	1.99	400	2.04	370	1.69	338	2.03	506	1.89	435	1.79	385
6												
8	1.88	370	1.97	350	1.64	316	2.03	506	1.71	347	1.65	320
10												
12 m.	1.85	350	1.94	330	1.64	316	1.95	465	1.61	302	1.59	294

Supplemental records.—Jan. 25, 12:45 p.m., 6.01 ft., 5,340 sec.-ft.

EAST BRANCH OF EIGHTMILE RIVER NEAR NORTH LYME, CONN.

LOCATION.—Lat. 41°25′40″, long. 72°20′05″, at highway bridge 0.4 miles upstream from confluence with West Branch of Eightmile River, 1.1 miles north of North Lyme, New London County, and 5½ miles upstream from mouth of Eightmile River.

DRAINAGE AREA.—22.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 300 second-feet; extended to peak stage on basis of flow characteristics at control section. Affected by ice Jan. 4, 10-16, 18-21, 1 p.m. Jan. 23 to 11 a.m. Jan. 24, intermittently 1 a.m. to 5 p.m. Jan. 25, 12 p.m. Jan. 29 to 12 m. Jan. 30.

MAXIMA.—January 1938: Discharge, 514 second-feet 9 p.m. Jan. 25 (gage height, 3.68 feet).

September to December 1937: Discharge, 1,010 second-feet Nov. 29, 1937 (gage height, 5.25 feet).

REMARKS.—Flood discharge affected by storage in several small ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	36	82	9	101	63	17	45	44	25	259	58
2	44	66	10	70	62	18	42	45	26	273	54
3	44	63	11	65	56	19	36	51	27	108	48
4	44	110	12	65	51	20	32	53	28	81	45
5	43	96	13	55	53	21	28	48	29	69	
6	42	74	14	55	66	22	27	44	30	63	
7	141	75	15	48	63	23	30	45	31	74	
8	234	75	16	46	48	24	38	57			
Monthly mean discharge, in second-feet										75.4	60.5
Runoff, in inches										3.95	2.86

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22		January 23		January 24		January 25		January 26		January 27	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.												
2							1.35	54	3.40	430	1.90	124
3												
4							1.55	70	3.30	400	1.81	111
5												
6					1.20	36	1.72	90	3.06	341	1.78	107
7							1.76					
8							1.93	115	2.90	304	1.75	104
9												
10					1.26		2.10	153	2.74	269	1.79	109
11					1.12		2.25					
12 n.					1.12	38	2.55	205	2.68	257	1.88	121
1 p.m.							2.60				1.90	124
2							2.84	291	2.55	232	1.83	114
3							3.13					
4							3.31	380	2.44	211	1.72	100
5												
6					1.13	38	3.52	466	2.33	191	1.70	97
7							3.62	496				
8							3.67	511	2.24	176	1.69	96
9					1.15	40	3.68	514				
10							3.64	502	2.11	155	1.67	93
11							3.60	490				
12 m.					1.21	45	3.57	481	2.01	140	1.64	90

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.												
4	1.58	83	1.43	66					1.60	85	1.39	62
6					1.46	64	1.44	67				
8	1.52	76	1.42	65					1.52	76	1.36	59
10												
12 n.	1.61	86	1.50	74	1.39	62	1.49	73	1.70	97	1.51	75
2 p.m.												
4	1.60	85	1.48	72					1.58	83	1.44	67
6					1.40	63	1.56	81				
8	1.48	72	1.43	66					1.52	76	1.39	62
10												
12 m.	1.46	70	1.43	66	1.40	63	1.61	86	1.45	68	1.38	61

Supplemental records.—Jan. 25, 3:15 p.m., 3.30 ft.; Jan. 28, 1 p.m., 1.71 ft., 98 sec.-ft.; Jan. 29, 1 p.m., 1.56 ft., 81 sec.-ft.; Feb. 2, 1 p.m., 1.59 ft., 84 sec.-ft.

WEST BRANCH OF EIGHTMILE RIVER NEAR NORTH LYME, CONN.

LOCATION.—Lat. 41°25′55″, long. 72°20′10″, on highway bridge 300 feet upstream from confluence with East Branch of Eightmile River, 1½ miles north of North Lyme, New London County, and 5½ miles upstream from mouth of Eightmile River.

DRAINAGE AREA.—19.2 square miles.

GAGE-HEIGHT RECORD.—Staff gage read once daily at 4 p.m. except Jan. 7-9, 25-27, Feb. 4, 7, when it was read twice daily at 9 a.m. and 4 p.m. Gage-height graph based on gage readings and comparison with record for station on East Branch used Jan. 7, 8, 24-31, Feb. 1-5, 8, 13.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 225 second-feet; extended above on basis of determination of September 1938 peak flow at bridge half a mile above station. Affected by ice Jan. 16-24, 29, Feb. 16-18, 21, 22.

MAXIMA.—January 1938: Discharge observed 426 second-feet 4 p.m. Jan. 25 (gage height, 4.88 feet).

September to December 1937: Discharge, 1,020 second-feet Nov. 29, 1937 (gage height, 6.8 feet, from floodmark).

REMARKS.—Flood discharge not affected by artificial storage. Shaw Lake (Lake Hayward) controls headwater discharge to some extent.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	38	80	9	100	55	17	40	42	25	290	50
2	41	62	10	73	64	18	36	42	26	223	49
3	41	54	11	58	52	19	34	49	27	120	46
4	43	110	12	52	47	20	30	50	28	80	40
5	41	88	13	50	58	21	28	46	29	64	
6	39	67	14	47	64	22	26	44	30	59	
7	162	79	15	44	55	23	28	44	31	81	
8	184	68	16	40	46	24	38	54			
Monthly mean discharge, in second-feet										71.9	57.3
Runoff, in inches										4.31	3.10

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.												
2												
3												
4						33	2.35	123	24.0	280		
5												
6											2.5	134
7												
8						34	3.45	214	3.7	242		
9							3.88	264	3.64	235	2.40	127
10												
11												
12 n.						35	4.7	391	3.45	214	2.3	119
1 p.m.												
2												
3												
4					1.44	36	4.88	426	3.20	190	2.18	108
5												
6											2.15	105
7												
8						42	4.7	391	2.95	169		
9												
10												
11												
12 m.					1.73	63	4.35	332	2.75	153	2.05	94

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.												
4												
6											1.65	56
8												
10												
12 n.	1.9	79	1.75	64	1.7	60	1.95	84	1.9	79	1.85	74
2 p.m.												
4	1.88	77	1.84		1.68	58	2.06	96	1.84	73	1.76	65
6											1.7	60
8												
10												
12 m.	1.8	69	1.7	60	1.65	56	2.1	100	1.7	60	1.65	56

NOTE.—All gage readings are included in above table.

QUINNIPIAC RIVER BASIN

QUINNIPIAC RIVER AT WALLINGFORD, CONN.

LOCATION.—Lat. 41°26′58″, long. 72°50′29″, 0.4 mile downstream from Quinnipiac Street bridge in Wallingford, New Haven County, and 2 miles upstream from Worton Brook.

DRAINAGE AREA.—109 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,400 second-feet; extended to peak stage on basis of determination of flood flow at dam 1 mile above station.

MAXIMA.—January 1938: Discharge, 2,760 second-feet 4 to 5 a.m. Jan. 26 (gage height, 7.78 feet).

1930 to December 1937: Discharge, 3,240 second-feet Mar. 12, 1936 (gage height, 8.2 feet).

REMARKS.—Flood discharge affected by storage and regulation in several small ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	212	409	9	514	354	17	233	389	25	1,800	316
2	222	346	10	347	341	18	216	279	26	2,340	295
3	225	351	11	285	316	19	196	285	27	958	279
4	206	497	12	254	293	20	201	295	28	537	253
5	201	420	13	244	305	21	198	285	29	394	
6	197	358	14	245	357	22	204	271	30	352	
7	498	428	15	234	339	23	205	275	31	396	
8	765	420	16	220	336	24	212	305			
Monthly mean discharge, in second-feet										429	336
Runoff, in inches										4.54	3.21

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							2.32	351	7.70	2,680	6.10	1,510
2							2.75	440	7.75	2,730	5.99	1,460
3							3.32	554	7.77	2,750	5.86	1,390
4					1.65	208	4.02	705	7.78	2,760	5.70	1,310
5							4.77	921	7.78	2,760	5.56	1,240
6							5.44	1,180	7.77	2,750	5.41	1,160
7							5.92	1,420	7.75	2,730	5.28	1,110
8					1.65	208	6.22	1,580	7.73	2,710	5.25	1,100
9							6.50	1,750	7.71	2,690	5.23	1,090
10							6.83	1,980	7.65	2,630	5.09	1,040
11							7.00	2,100	7.57	2,550	4.91	964
12 n.					1.68	215	7.12	2,180	7.43	2,420	4.48	834
1 p.m.							7.20	2,240	7.37	2,380	4.39	807
2							7.32	2,340	7.31	2,330	4.38	804
3							7.34	2,350	7.20	2,240	4.27	771
4					1.64	205	7.35	2,360	7.09	2,160	4.17	742
5							7.36	2,370	6.96	2,070	3.92	682
6							7.34	2,350	6.81	1,970	3.75	645
7							7.39	2,390	6.69	1,880	3.74	643
8					1.64	205	7.45	2,440	6.61	1,830	3.75	645
9					1.67	212	7.51	2,490	6.52	1,760	3.75	645
10					1.72	225	7.56	2,540	6.44	1,710	3.74	643
11					1.80	243	7.62	2,600	6.34	1,650	3.72	638
12 m.					1.98	281	7.67	2,650	6.23	1,590	3.70	634

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	3.65	623	2.73	436	2.35	358	2.34	355	2.71	432	2.44	376
4	3.58	608	2.69	428	2.33	353	2.35	358	2.67	424	2.40	368
6	3.49	588	2.65	420	2.32	351	2.37	362	2.64	418	2.37	362
8	3.40	570	2.60	410	2.32	351	2.39	366	2.62	414	2.33	353
10	3.59	610	2.74	438	2.31	349	2.79	448	2.95	480	2.63	416
12 n.	3.39	568	2.62	414	2.31	349	2.77	444	2.80	450	2.47	383
2 p.m.	3.17	524	2.34	355	2.31	349	2.53	395	2.64	418	2.29	345
4	3.16	522	2.35	358	2.32	351	2.73	436	2.68	426	2.35	358
6	2.76	442	2.33	353	2.33	353	2.57	404	2.34	355	2.06	297
8	2.73	436	2.34	355	2.33	353	2.53	395	2.33	353	1.97	279
10	2.77	444	2.35	358	2.34	355	2.66	422	2.41	370	2.09	303
12 m.	2.77	444	2.35	358	2.34	355	2.71	432	2.44	376	2.14	313

Supplemental records.—Jan. 28, 1 p.m., 2.99 ft., 488 sec.-ft.; Jan. 31, 1:30 p.m., 2.36 ft., 360 sec.-ft.; Feb. 1, 1:15 p.m., 2.39 ft., 366 sec.-ft.; Feb. 2, 1:20 p.m., 2.09 ft., 303 sec.-ft.

HOUSATONIC RIVER BASIN

HOUSATONIC RIVER AT FALLS VILLAGE, CONN.

Location.—Lat. 41°57′15″, long. 73°22′05″, at Falls Village, Litchfield County, half a mile downstream from power plant of Connecticut Power Co., and 1¼ miles downstream from Hollenbeck River. Datum of gage is 522.41 feet above mean sea level (general adjustment of 1929).

Drainage area.—632 square miles.

Gage-height record.—Water-stage recorder graph except for periods 11 a.m. Jan. 25 to 11 a.m. Feb. 2 and Feb. 19 when record was based on observer's readings, power plant data, and computations of flow at dam at Bulls Bridge.

Stage-discharge relation.—Defined by current-meter measurements. Affected by ice Jan. 1-25, Feb. 25-28.

Maxima.—January 1938: Discharge, 7,200 second-feet 9 to 11 p.m. Jan. 25 (gage height, 11.6 feet, from power plant data).

1912 to December 1937: Discharge, 14,500 second-feet Mar. 20, 1936 (gage height, 17.41 feet).

Remarks.—Flood discharge affected by storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	750	2,350	9	1,800	2,640	17	650	1,260	25	3,500	1,100
2	600	2,180	10	1,500	2,470	18	650	1,290	26	6,190	1,000
3	550	1,840	11	1,200	2,110	19	650	1,200	27	5,200	950
4	750	1,830	12	1,100	1,870	20	600	1,190	28	4,350	750
5	850	1,920	13	1,000	1,640	21	700	1,090	29	3,380	
6	800	1,830	14	1,000	1,720	22	750	1,010	30	2,650	
7	1,200	2,220	15	950	1,590	23	750	1,030	31	2,410	
8	1,800	2,660	16	800	1,510	24	700	1,060			
Monthly mean discharge, in second-feet										1,606	1,618
Runoff, in inches										2.93	2.67

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	------	------	3.07	700	------	------	------	------
2	------	------	------	------	------	------	3.12	700	11.35	7,000	------	------
3	------	------	------	------	------	------	3.12	520	------	------	------	------
4	------	------	------	------	------	------	3.33	500	11.1	6,600	9.8	5,400
5	------	------	------	------	------	------	3.48	500	------	------	------	------
6	------	------	------	------	------	------	3.99	900	10.95	6,600	------	------
7	------	------	------	------	------	------	4.19	1,000	------	------	------	------
8	------	------	------	------	------	------	4.45	1,550	10.8	6,400	9.65	5,400
9	------	------	------	------	------	------	4.65	1,700	------	------	------	------
10	------	------	------	------	------	------	4.71	1,750	10.65	6,200	------	------
11	------	------	------	------	------	------	5.4	2,250	------	------	------	------
12 n.	------	------	------	------	------	------	6.6	3,000	10.5	6,000	9.5	5,200
1 p.m.	------	------	------	------	------	------	7.7	3,800	------	------	------	------
2	------	------	------	------	------	------	8.5	4,400	10.4	6,000	------	------
3	------	------	------	------	------	------	9.3	5,000	------	------	------	------
4	------	------	------	------	------	------	9.7	5,400	10.3	6,000	9.35	5,000
5	------	------	------	------	------	------	10.0	5,600	------	------	------	------
6	------	------	------	------	------	------	10.3	6,000	10.2	5,800	------	------
7	------	------	------	------	------	------	10.9	6,400	------	------	------	------
8	------	------	------	------	------	------	11.4	7,000	10.1	5,800	9.2	5,000
9	------	------	------	------	------	------	11.6	7,200	------	------	------	------
10	------	------	------	------	------	------	11.6	7,200	10.0	5,600	------	------
11	------	------	------	------	------	------	11.6	7,200	------	------	------	------
12 m.	------	------	------	------	------	------	11.5	7,000	9.95	5,600	9.05	4,800

Hour	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	------	------	------	------	------	------	------	------	------	------	5.2	2,100
4	8.85	4,700	7.55	3,700	------	------	------	------	------	------	5.4	2,250
6	------	------	------	------	6.3	2,800	5.6	2,350	5.7	2,400	5.5	2,300
8	8.65	4,500	7.3	3,500	------	------	------	------	------	------	5.7	2,400
10	------	------	------	------	------	------	------	------	------	------	6.5	3,000
12 n.	8.45	4,400	7.1	3,400	6.05	2,600	5.8	2,450	6.1	2,700	5.80	2,470
2 p.m.	------	------	------	------	------	------	------	------	------	------	5.31	2,180
4	8.25	4,200	6.9	3,200	------	------	------	------	------	------	4.99	1,980
6	------	------	------	------	5.85	2,500	5.9	2,500	5.5	2,300	4.89	1,920
8	8.0	4,000	6.7	3,100	------	------	------	------	------	------	4.82	1,880
10	------	------	------	------	------	------	------	------	------	------	4.81	1,880
12 m.	7.75	3,800	6.5	3,000	5.65	2,400	5.5	2,300	4.5	1,700	4.78	1,860

ZOAR LAKE AT STEVENSON, CONN.

LOCATION.—Staff gage, lat. 41°22′55″, long. 73°10′05″, on Housatonic River at Stevenson Dam of Connecticut Light & Power Co. at Stevenson, Fairfield County.

DRAINAGE AREA.—1,544 square miles.

REMARKS.—Change in contents in equivalent second-feet computed from elevations of lake at midnight as furnished by Connecticut Light & Power Co., Waterbury, Conn.

Change in contents, in equivalent second-feet, 1938

Day	January	February	Day	January	February
1	−358	−200	17	−209	[1]−250
2	+671	−100	18	−51	−100
3	−157	+50	19	+156	−677
4	+157	+150	20	+52	+385
5	−104	−150	21	−464	+692
6	+104	−250	22	+359	−400
7	+1120	+807	23	−155	+200
8	−216	−307	24	−154	+200
9	−533	−50	25	+2400	−250
10	−884	−400	26	−765	−394
11	+102	.0	27	−430	+195
12	+571	.0	28	−425	+449
13	.0	+50	29	−418	
14	−104	−197	30	−258	
15	+52	+49	31	−358	
16	−157	[1]+399			

	January	February
Change in contents, in equivalent second-feet	−14.7	−3.54

[1]Estimated.

HOUSATONIC RIVER AT STEVENSON, CONN.

LOCATION.—Lat. 41°23′05″, long. 73°09′55″, in New Haven County, a quarter of a mile upstream from Eightmile Brook and a quarter of a mile downstream from Stevenson Dam of Connecticut Light & Power Co. at Stevenson, Fairfield County. Datum of gage is 24.98 feet above mean sea level (general adjustment of 1929), levels by Corps of Engineers, U. S. Army.

DRAINAGE AREA.—1,545 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods 12 m. Jan. 25 to 12 m. Jan. 26 and 4 p.m. Jan. 27 to 9 a.m. Jan. 31 when record was based on floodmark and relation with hourly readings of tailrace gage at Stevenson Dam.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—January 1938: Discharge, 36,000 second-feet noon Jan. 25 (gage height, 16.80 feet, from floodmark).

1928 to December 1937: Discharge, 69,500 second-feet Mar. 12, 1936 (gage height, 23.5 feet, from floodmarks).

REMARKS.—Flow affected by artificial storage. For information on storage see records for Zoar Lake at Stevenson, Conn., Rocky River at outlet of Candlewood Lake, near New Milford, Conn., and Shepaug River at outlet of Shepaug Reservoir, at Woodville, Conn.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	2,340	5,260	9	4,900	5,450	17	2,920	3,550	25	21,500	3,290
2	1,330	4,340	10	4,470	5,600	18	2,090	3,360	26	19,100	3,180
3	2,370	4,460	11	3,390	4,640	19	1,630	3,870	27	11,500	2,470
4	1,900	4,890	12	2,510	3,950	20	2,300	2,760	28	10,000	2,190
5	2,370	4,670	13	3,060	4,060	21	2,280	2,350	29	7,840	
6	2,160	4,390	14	3,080	4,630	22	1,710	3,180	30	6,320	
7	5,060	5,660	15	2,750	3,900	23	2,100	2,870	31	5,980	
8	6,640	5,990	16	2,360	3,480	24	2,180	2,970			
Monthly mean discharge, in second-feet										4,843	3,979
Runoff, in inches										3.61	2.69

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	0.92	-------	1.22	-------	2.02	-------	7.70	6,140	14.7	26,500	10.62	12,100
2	.79	-------	.91	-------	1.02	-------	7.32	5,490	14.55	26,000	10.98	13,000
3	.76	-------	.81	-------	.86	-------	7.60	5,970	14.5	25,500	10.78	12,500
4	.74	-------	.78	-------	.79	-------	7.79	6,300	14.4	25,000	10.88	12,800
5	.74	-------	.76	-------	.75	-------	7.82	6,360	14.25	24,500	10.52	11,800
6	.74	-------	.75	-------	.75	-------	7.60	5,970	14.15	24,000	10.65	12,200
7	.84	-------	.75	-------	3.60	-------	8.57	7,750	13.95	23,000	10.10	10,900
8	3.45	-------	.75	-------	5.20	-------	10.26	11,300	13.85	22,500	10.48	11,800
9	3.52	-------	1.06	-------	6.30	-------	12.46	17,400	13.5	21,500	10.36	11,500
10	4.39	-------	4.40	-------	6.50	-------	13.86	22,700	13.35	20,500	10.37	11,500
11	4.39	-------	4.42	-------	6.60	-------	16.00	32,300	13.2	20,000	10.29	11,300
12 n.	4.37	[1]1,710	5.44	[1]2,100	6.12	[1]2,180	16.80	36,000	13.05	19,500	10.18	11,100
1 p.m.	4.33	-------	5.54	-------	3.00	-------	16.55	35,000	12.87	18,800	10.13	11,000
2	4.33	-------	5.22	-------	5.10	-------	16.5	34,500	12.48	17,500	10.08	10,900
3	4.39	-------	5.30	-------	5.56	-------	16.45	34,500	11.85	15,400	10.11	10,900
4	4.43	-------	5.56	-------	5.57	-------	16.4	34,000	11.16	13,400	10.15	11,000
5	5.60	-------	5.57	-------	5.56	-------	16.1	32,500	11.31	13,800	10.2	11,000
6	6.95	-------	6.92	-------	4.80	-------	15.3	29,000	11.33	13,900	10.2	11,000
7	6.66	-------	7.18	-------	5.57	-------	15.1	28,500	11.31	13,800	10.2	11,000
8	6.62	-------	7.18	-------	5.80	-------	15.05	28,000	11.26	13,700	10.2	11,000
9	6.44	-------	7.16	-------	5.75	-------	14.95	27,500	11.23	13,600	10.2	11,000
10	5.88	-------	6.62	-------	5.60	3,020	14.8	27,000	11.14	13,400	10.2	11,000
11	5.02	-------	5.70	-------	5.60	3,020	14.7	26,500	11.11	13,300	10.2	11,000
12 m.	2.92	-------	4.62	-------	7.24	5,360	14.7	26,500	11.00	13,000	10.2	11,000
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	10.2	11,000	9.25	9,000	8.0	6,600	7.65	6,000	6.72	4,550	6.52	4,250
4	10.2	11,000	9.2	9,000	8.0	6,600	7.65	6,000	7.38	5,600	5.98	3,500
6	10.1	11,000	9.1	8,800	8.0	6,600	7.65	6,000	7.07	5,090	6.53	4,260
8	9.9	10,500	9.2	9,000	8.1	6,800	7.65	6,000	7.64	6,040	7.21	5,320
10	9.5	9,600	8.8	8,200	7.4	5,600	7.66	6,070	7.23	5,350	7.22	5,330
12 n.	9.5	9,600	8.5	7,600	7.5	5,800	7.68	6,110	7.23	5,350	7.22	5,330
2 p.m.	9.5	9,600	8.4	7,400	7.4	5,600	7.25	5,380	7.22	5,330	5.50	2,900
4	9.5	9,600	8.1	6,800	7.7	6,200	7.70	6,140	7.23	5,350	5.54	2,950
6	9.5	9,600	8.1	6,800	8.1	6,800	7.72	6,180	7.23	5,350	6.60	4,370
8	9.5	9,600	8.1	6,800	7.9	6,600	7.69	6,120	7.23	5,350	7.20	5,300
10	9.4	9,400	8.1	6,800	7.8	6,400	7.71	6,160	7.23	5,350	7.23	5,350
12 m.	9.3	9,200	8.0	6,600	7.7	6,200	7.32	5,490	7.21	5,320	7.20	5,300

Supplemental Records.—Jan. 22, 4:45 p.m., 4.44 ft.; Jan. 24, 1:30 p.m., 1.60 ft.; Jan. 30, 7 a.m., 7.8 ft., 6,300 sec.-ft.; Jan. 31, 12:30 p.m., 7:30 ft., 5,460 sec.-ft.; Feb. 1, 3 a.m., 6.50 ft., 4,220 sec.-ft.; 1 p.m., 6.52 ft., 4,250 sec.-ft.; Feb. 2, 1:20 p.m., 1.60 ft., 232 sec.-ft., 5:30 p.m., 5.54 ft., 2,950 sec.-ft., 7 p.m., 7.20 ft., 5,300 sec.-ft.

[1]Mean for the day.

TENMILE RIVER NEAR GAYLORDSVILLE, CONN.

LOCATION.—Lat. 41°39′35″, long. 73°31′45″, 1 mile upstream from Connecticut-New York State line, 1½ mlies upstream from mouth, and 2½ miles northwest of Gaylordsville, Litchfield County.

DRAINAGE AREA.—204 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements. Affected by ice Jan. 1-6, Jan. 8 to 1 p.m. Jan. 24, 2 p.m. Jan. 27 to 8 a.m. Jan. 28, 3 p.m. Jan. 28 to 2 a.m. Jan. 29, 12 n. to 2 p.m. Jan. 29, 7 p.m. Feb. 1, to 2 a.m. Feb. 2, 11 a.m. to 1 p.m. Feb. 2, 5 p.m. Feb. 2 to Feb. 3, Feb. 16, 17, 26-28.

MAXIMA.—January 1938: Discharge, 6,120 second-feet 9 p.m. Jan. 25 (gage height, 9.13 feet).

1929 to December 1937: Discharge, 10,200 second-feet Mar. 12, 1936 (gage height, 11.61 feet).

REMARKS.—Flood discharge may be slightly affected by storage in several small ponds.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	200	581	9	600	580	17	200	300	25	4,030	317
2	220	435	10	460	568	18	200	333	26	3,410	260
3	200	440	11	380	455	19	200	356	27	1,440	220
4	180	620	12	320	423	20	200	356	28	945	200
5	180	522	13	280	457	21	190	292	29	672	
6	190	494	14	260	549	22	185	285	30	604	
7	585	912	15	240	472	23	195	304	31	676	
8	950	688	16	220	340	24	225	323			
Monthly mean discharge, in second-feet										608	432
Runoff, in inches										3.44	2.21

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	------	------	2.64	442	8.74	5,590	5.20	1,880
2	------	------	------	------	1.98	210	3.16	647	8.64	5,460	5.10	1,800
3	------	------	------	------	------	------	3.94	1,040	8.43	5,190	4.99	1,720
4	------	------	------	------	1.97	215	4.58	1,440	8.24	4,940	4.89	1,650
5	------	------	------	------	------	------	5.24	1,910	8.03	4,690	4.81	1,600
6	------	------	------	------	1.98	220	6.18	2,710	7.81	4,420	4.73	1,540
7	------	------	------	------	------	------	6.56	3,070	7.59	4,160	4.67	1,500
8	------	------	------	------	2.00	225	6.98	3,490	7.36	3,910	4.60	1,450
9	------	------	------	------	------	------	7.36	3,910	7.14	3,660	4.56	1,420
10	------	------	------	------	2.02	225	7.56	4,130	6.90	3,410	4.56	1,420
11	------	------	------	------	------	------	7.78	4,390	6.70	3,210	4.58	1,440
12 n.	------	------	------	------	2.07	225	7.96	4,600	6.49	3,000	4.58	1,440
1 p.m.	------	------	------	------	------	------	8.09	4,760	6.28	2,800	4.54	1,410
2	------	------	------	------	1.96	223	8.24	4,940	6.11	2,650	4.51	1,400
3	------	------	------	------	------	------	8.38	5,120	5.96	2,510	4.54	1,350
4	------	------	------	------	1.95	220	8.56	5,360	5.87	2,430	4.58	1,350
5	------	------	------	------	------	------	8.75	5,600	5.82	2,390	4.64	1,300
6	------	------	------	------	1.95	220	8.91	5,810	5.80	2,370	4.68	1,300
7	------	------	------	------	------	------	9.03	5,980	5.78	2,350	4.67	1,250
8	------	------	------	------	1.95	220	9.11	6,090	5.75	2,320	4.61	1,250
9	------	------	------	------	------	------	9.13	6,120	5.65	2,240	4.53	1,200
10	------	------	------	------	1.99	230	9.11	6,090	5.52	2,140	4.42	1,200
11	------	------	------	------	------	------	9.02	5,970	5.42	2,060	4.36	1,150
12 m.	------	------	------	------	2.33	333	8.90	5,800	5.31	1,970	4.29	1,150
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.15	1,100	3.35	720	3.11	624	3.06	604	3.29	706	2.74	460
4	4.04	1,050	3.29	706	3.09	616	3.07	608	3.24	683	2.61	431
6	3.93	1,000	3.23	678	3.06	604	3.09	616	3.14	638	2.56	413
8	3.83	960	3.19	660	3.05	600	3.12	629	3.05	600	2.54	405
10	3.76	940	3.17	652	3.02	588	3.16	647	2.97	568	2.53	402
12 n.	3.88	1,010	3.40	660	3.01	584	3.24	683	2.86	525	2.72	420
2 p.m.	3.76	940	3.24	660	3.02	588	3.31	715	2.85	522	2.72	472
4	3.76	900	3.24	683	3.02	588	3.37	745	2.90	541	2.72	472
6	3.70	860	3.19	660	3.06	604	3.37	745	2.92	549	2.76	450
8	3.58	820	3.16	647	3.08	612	3.35	735	2.95	540	2.76	430
10	3.52	800	3.15	642	3.08	612	3.33	725	2.95	500	2.79	420
12 m.	3.44	760	3.14	638	3.07	608	3.32	720	2.86	480	2.79	410

Supplemental records.—Jan. 29, 11 a.m., 3.18 feet; 1 p.m., 3.44 feet.

ROCKY RIVER AT OUTLET OF CANDLEWOOD LAKE, NEAR NEW MILFORD, CONN.

LOCATION.—Non-recording gage and venturi meter, lat. 41°35′00″, long. 73°26′00″, at Rocky River plant of Connecticut Light & Power Co., 1½ miles northwest of New Milford, Litchfield County.

DRAINAGE AREA.—40.4 square miles.

GAGE-HEIGHT RECORD.—One lake-gage reading usually daily at about 8 a.m. Gage height at midnight computed from gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow through venturi meters.

REMARKS.—Power plant is of pumped-storage type. Candlewood Lake stores flow of Rocky River and water pumped from Housatonic River, into which tailrace of plant discharges. Plus sign before observed discharge indicates water passed from lake through generators into Housatonic River; minus sign indicates water pumped from Housatonic River into lake. Daily and monthly mean discharges adjusted for change in contents of Candlewood Lake. No corrections for evaporation from reservoir surface, which is about 8 square miles. Record based on data furnished by the Connecticut Light & Power Co.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	January			February		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	0.0	0.0	0.0	−7	+137	130
2	+123	−110	13	+9	+110	119
3	+102	−55	47	+135	+27	162
4	+481	−406	75	0.0	+137	137
5	+406	−298	108	−59	+247	188
6	+152	−81	71	−91	+274	183
7	0.0	+54	54	−87	+274	187
8	−44	+271	227	−41	+165	124
9	−173	+271	98	−29	+137	108
10	−2	+135	133	−19	+137	118
11	+301	−162	139	0.0	+55	55
12	+290	−162	128	0.0	+83	83
13	+258	−135	123	−84	+138	54
14	+183	−162	21	−62	+138	76
15	+132	−108	24	+12	+55	67
16	+19	0.0	19	+223	−166	57
17	+345	−271	74	+325	−249	76
18	+226	−135	91	+116	−27	89
19	+472	−406	66	0.0	+83	83
20	+197	−190	7	0.0	+83	83
21	+140	−108	32	+244	−138	106
22	0.0	+27	27	+130	0	130
23	0.0	+27	27	+370	−110	260
24	+131	0.0	131	+319	−219	100
25	−14	+1408	1390	+113	−55	58
26	−61	+325	264	+252	−165	87
27	−29	+273	244	+294	−219	75
28	+22	+165	187	+353	−329	24
29	0.0	+192	192	--	--	--
30	−243	+329	86	--	--	--
31	−85	+165	80	--	--	--

	January	February
Monthly mean discharge, in second-feet (observed)	107	86.3
Runoff, in inches (observed)	3.06	2.23
Monthly mean discharge, in second-feet (adjusted)	135	108
Runoff, in inches (adjusted)	3.85	2.78

STILL RIVER NEAR LANESVILLE, CONN.

LOCATION.—Lat. 41°31′14″, long. 73°25′09″, at highway bridge 1½ miles south of Lanesville, Litchfield County, 2 miles upstream from mouth, and 4 miles south of New Milford. Datum of gage is 213.05 feet above mean sea level (general adjustment of 1929), levels by Corps of Engineers, U. S. Army.

DRAINAGE AREA.—68.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods Jan. 18 to 5 p.m. Jan. 25, 10 p.m. Jan. 26 to 6 p.m. Jan. 30, and Feb. 11-28 when record was based on range lines and records for Pomperaug River at Southbury, Shepaug River near Roxbury, and Tenmile River near Gaylordsville.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,900 second-feet; extended logarithmically to peak stage. Affected by ice Jan. 1-6, 11-17, 3 a.m. to 1 p.m. Feb. 2.

MAXIMA.—January 1938: Discharge, 2,450 second-feet 9 p.m. Jan. 25 (gage height, 9.52 feet).

1931 to December 1937: Discharge, 3,930 second-feet Mar. 12, 1936 (gage height, 10.58 feet).

REMARKS.—Flood discharge not appreciably affected by storage or regulation.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	95	260	9	416	227	17	110	120	25	1,070	120
2	95	208	10	240	209	18	100	130	26	1,210	100
3	100	184	11	190	180	19	100	140	27	588	85
4	90	255	12	140	170	20	100	140	28	313	80
5	90	240	13	130	190	21	100	120	29	220	
6	90	192	14	120	220	22	96	120	30	225	
7	240	272	15	110	190	23	96	120	31	239	
8	553	311	16	110	140	24	98	130			
Monthly mean discharge, in second-feet										241	173
Runoff, in inches										4.06	2.64

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							3.17	125	9.20	2,110	7.31	780
2							3.39	140	9.06	1,970	7.27	760
3							3.62	155	8.92	1,840	7.24	740
4							3.95	180	8.77	1,700	7.20	740
5							4.40	220	8.64	1,590	7.15	720
6							4.93	270	8.50	1,480	7.10	700
7							5.45	330	8.37	1,380	7.05	680
8							5.84	390	8.25	1,280	7.00	660
9							6.17	450	8.15	1,220	6.95	640
10							6.47	520	8.04	1,140	6.89	620
11							6.73	580	7.96	1,100	6.83	600
12 n.							7.00	660	7.87	1,040	6.76	580
1 p.m.							7.27	760	7.81	1,010	6.69	560
2							7.63	920	7.75	975	6.62	540
3							8.13	1,200	7.70	950	6.54	520
4							8.58	1,550	7.65	925	6.45	500
5							9.00	1,900	7.59	895	6.38	490
6							9.28	2,190	7.54	870	6.31	480
7							9.44	2,360	7.50	850	6.24	460
8					2.71	98	9.50	2,430	7.46	834	6.17	450
9					2.71	98	9.52	2,450	7.43	822	6.12	440
10					2.75	100	9.50	2,430	7.40	820	6.06	430
11					2.84	105	9.43	2,350	7.37	800	6.00	420
12 m.					2.98	115	9.33	2,240	7.34	780	5.95	410

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	January 28 Feet	January 28 Sec.-ft.	January 29 Feet	January 29 Sec.-ft.	January 30 Feet	January 30 Sec.-ft.	January 31 Feet	January 31 Sec.-ft.	February 1 Feet	February 1 Sec.-ft.	February 2 Feet	February 2 Sec.-ft.
2 a.m.	5.87	390	4.56	230	4.42	220						
4	5.80	380	4.52	230	4.45	220	4.47	224	5.01	277	4.62	230
6	5.70	360	4.48	225	4.48	225						
8	5.57	350	4.44	220	4.51	230	4.50	227	5.00	276	4.78	225
10	5.44	330	4.40	220	4.52	230						
12 n.	5.30	310	4.36	215	4.53	230	4.59	235	4.91	266	4.54	210
2 p.m.	5.14	290	4.34	215	4.54	230						
4	4.98	270	4.33	210	4.53	230	4.70	245	4.76	251	4.13	194
6	4.86	260	4.34	215	4.50	225						
8	4.76	250	4.35	215	4.47	224	4.82	257	4.61	237	3.99	183
10	4.68	245	4.37	215	4.46	223						
12 m.	4.61	235	4.39	215	4.45	222	4.93	268	4.55	232	3.98	182

SHEPAUG RIVER AT OUTLET OF SHEPAUG RESERVOIR, AT WOODVILLE, CONN.

LOCATION.—Nonrecording gages at dam at outlet of Shepaug Reservoir, lat. 41°43′16″, long. 73°17′40″, 1 mile north of Woodville, Litchfield County and 3 miles upstream from Bantam River.

DRAINAGE AREA.—38.0 square miles.

GAGE-HEIGHT RECORD.—One reservoir gage reading daily at noon; gage height at midnight determined from graph constructed from gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow through gates and fountain and over spillway for time when reservoir gage was read. During periods of rapid change in discharge, mean daily discharge computed from graphs drawn on basis of determinations of discharge at noon and records for station near Roxbury.

MAXIMA.—January 1938: Discharge, 4,100 second-feet about 11 a.m. Jan. 25, from graph developed from noon determinations of discharge and record for station near Roxbury.

1935 to December 1937: Discharge observed, 4,070 second-feet Mar. 12, 1936.

REMARKS.—Daily and monthly mean discharges adjusted for change in contents of Shepaug Reservoir. No diversion from reservoir to Naugatuck River drainage Jan. 1 to Feb. 28. No corrections for evaporation from reservoir surface. Minimum flow of 2.35 second-feet maintained below reservoir at all times. Basic data furnished by Bureau of Engineering, City of Waterbury.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	January Observed	January Change in contents	January Adjusted	February Observed	February Change in contents	February Adjusted
1	45	0.0	45	135	−6	129
2	48	+1	49	90	−4	86
3	51	0.0	51	92	+4	96
4	51	0.0	51	135	+3	138
5	55	0.0	55	125	−3	122
6	53	0.0	53	107	0.0	107
7	389	+49	438	386	+11	397
8	280	−27	253	155	−7	148
9	148	−8	140	141	0.0	141

Discharge, in second-feet, and change in contents in equivalent second-feet, 1938
—Continued

Day	January			February		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
10	98	−5	93	151	−5	146
11	79	−2	77	84	−5	79
12	74	−1	73	98	+2	100
13	69	0.0	69	104	+3	107
14	71	0.0	71	141	0.0	141
15	62	+2	64	101	−6	95
16	84	+2	86	64	−2	62
17	84	−1	83	71	0.0	71
18	71	−2	69	69	+1	70
19	71	0.0	71	79	0.0	79
20	71	−2	69	71	−2	69
21	53	−2	51	57	−2	55
22	53	0.0	53	53	+1	54
23	51	0.0	51	64	+1	65
24	48	+9	57	64	0.0	64
25	2,110	+47	2,160	62	−2	60
26	678	−27	651	44	−1	43
27	345	−41	304	53	0.0	53
28	144	+23	167	44	−2	42
29	131	+2	133	--	--	--
30	122	+3	125	--	--	--
31	173	+1	174	--	--	--

	January	February
Monthly mean discharge, in second-feet (observed)	189	101
Runoff, in inches (observed)	5.73	2.77
Monthly mean discharge, in second-feet (adjusted)	190	101
Runoff, in inches (adjusted)	5.76	2.77

SHEPAUG RIVER NEAR ROXBURY, CONN.

LOCATION.—Lat. 41°32′53″, long. 73°19′51″, at highway bridge 0.7 mile south of Roxbury Station. 1¼ miles southwest of village of Roxbury, Litchfield County, and 2 miles upstream from Jacks Brook. Datum of gage is 282.07 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—133 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 3,500 second-feet; extended logarithmically to peak stage, partly on basis of determinations of flow at dam at Roxbury Station. Affected by ice Jan. 4, 5, Jan. 8 to 1 a.m. Jan. 25, 3 a.m. Jan. 25, 2 p.m. Jan. 27 to 2 p.m. Jan. 28, 7 p.m. Jan. 28 to 10 a.m. Jan. 30, Feb. 14-17, 26-28.

MAXIMA.—January 1938: Discharge, 5,340 second-feet 1:15 p.m. Jan 25 (gage height, 9.22 feet).

1930 to December 1937: Discharge, 7,000 second-feet Mar. 12, 1936 (gage height, 10.77 feet).

REMARKS.—Flood discharge affected by storage in Shepaug Reservoir at Woodville (see page 93) and in Bantam Lake (drainage area at outlet, 33.2 square miles).

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	187	477	9	400	467	17	200	280	25	3,670	231
2	208	413	10	320	467	18	200	279	26	1,560	160
3	211	403	11	280	383	19	200	283	27	1,000	180
4	190	467	12	240	359	20	220	279	28	674	160
5	220	412	13	240	408	21	200	241	29	564	
6	211	404	14	220	440	22	200	234	30	517	
7	841	835	15	220	360	23	200	244	31	540	
8	650	525	16	200	300	24	200	258			
Monthly mean discharge, in second-feet										483	355
Runoff, in inches										4.18	2.78

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							3.82	400	6.21	2,230	4.80	1,210
2							4.72	1,160	6.04	2,090	4.75	1,180
3							7.34	1,850	5.92	2,000	4.71	1,160
4							6.50	2,460	5.81	1,910	4.65	1,120
5							6.99	2,890	5.69	1,820	4.61	1,100
6							7.48	3,350	5.59	1,750	4.58	1,080
7							8.07	3,970	5.48	1,680	4.54	1,050
8							8.57	4,530	5.39	1,610	4.51	1,040
9							8.91	4,940	5.31	1,560	4.50	1,030
10							8.94	4,980	5.23	1,500	4.49	1,020
11							9.03	5,090	5.16	1,450	4.51	1,040
12 n.							9.13	5,220	5.16	1,450	4.51	1,040
1 p.m.							9.20	5,310	5.12	1,420	4.49	1,020
2							9.19	5,300	5.10	1,410	4.47	980
3							9.12	5,210	5.10	1,410	4.45	920
4							8.97	5,010	5.10	1,410	4.43	900
5							8.72	4,710	5.08	1,400	4.42	880
6							8.43	4,370	4.83	1,230	4.41	880
7							8.04	3,930	4.85	1,240	4.39	880
8					2.85	200	7.62	3,490	4.92	1,280	4.38	880
9					2.83	200	7.23	3,110	4.94	1,300	4.36	880
10					2.83	200	6.90	2,810	4.92	1,280	4.34	860
11					2.89	220	6.61	2,550	4.90	1,270	4.27	840
12 m.					3.01	280	6.40	2,380	4.85	1,240	4.24	820
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.19	780	3.81	600	3.55	520						
4	4.13	760	3.77	580	3.53	520	3.43	494	3.43	494	3.22	403
6	4.05	720	3.72	580	3.52	520						
8	4.01	680	3.70	580	3.50	520	3.47	512	3.40	480	3.18	387
10	4.01	660	3.69	560	3.49	520						
12 n.	4.04	660	3.71	560	3.47	512	3.58	561	3.41	484	3.25	416
2 p.m.	3.82	660	3.69	560	3.46	507						
4	3.65	592	3.67	560	3.48	516	3.64	588	3.41	484	3.31	441
6	3.72	624	3.58	540	3.48	516						
8	3.80	620	3.59	540	3.48	516	3.58	561	3.34	454	3.22	403
10	3.82	620	3.58	540	3.46	507						
12 m.	3.82	600	3.57	540	3.47	512	3.53	538	3.27	424	3.22	403

Supplemental records.—Jan. 25, 1:15 a.m., 4.14 feet; 3:30 a.m., 6.22 ft.; 1:15 p.m., 9.22 ft., 5,340 sec.-ft.; Feb. 1, 11 a.m., 3.34 ft., 454 sec.-ft.; Feb. 2, 1 p.m. 3.33 ft., 450 sec.-ft.

POMPERAUG RIVER AT SOUTHBURY, CONN.

LOCATION.—Lat. 41°28′50″, long. 73°13′30″, 200 feet upstream from highway bridge, three-quarters of a mile west of Southbury, New Haven County, and 5½ miles upstream from mouth.

DRAINAGE AREA.—75.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 10 a.m. to 11 a.m. Jan. 25 (float against recorder table) when record was computed on basis of floodmark. Adjustments made for intake lag for periods 11 p.m. Jan. 24 to 8 a.m. Jan. 25, 3 to 12 p.m. Jan. 25.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,200 second-feet; extended to peak stage on basis of September 1938 peak flow determination at dam 2 miles below station.

MAXIMA.—January 1938: Discharge, 5,980 second-feet 10:30 a.m. Jan. 25 (gage height, 14.12 feet, from floodmark).

1932 to December 1937: Discharge, 5,990 second-feet Mar. 12, 1936 (gage height, 14.13 feet, from floodmark).

REMARKS.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	108	199	9	251	199	17	126	129	25	2,260	154
2	119	167	10	190	203	18	110	137	26	672	130
3	116	188	11	163	159	19	102	146	27	337	124
4	104	279	12	154	151	20	112	144	28	253	105
5	106	188	13	147	216	21	121	127	29	209	
6	100	176	14	142	227	22	103	121	30	204	
7	643	430	15	132	175	23	102	135	31	235	
8	448	232	16	129	133	24	103	171			
Monthly mean discharge, in second-feet										261	177
Runoff, in inches										4.00	2.45

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	January 22 Feet	January 22 Sec.-ft.	January 23 Feet	January 23 Sec.-ft.	January 24 Feet	January 24 Sec.-ft.	January 25 Feet	January 25 Sec.-ft.	January 26 Feet	January 26 Sec.-ft.	January 27 Feet	January 27 Sec.-ft.
1 a.m.					3.51	102	4.55	310	6.63	1,160	4.83	394
2					3.51	102	4.91	420	6.44	1,070	4.75	370
3					3.50	101	5.16	500	6.27	986	4.71	358
4					3.49	100	5.42	600	6.14	928	4.68	349
5					3.49	100	5.68	720	6.00	865	4.65	341
6					3.46	95	5.94	840	5.88	811	4.62	333
7					3.43	90	6.25	980	5.76	757	4.60	327
8					3.43	90	6.80	1,250	5.65	708	4.58	322
9					3.43	90	8.60	2,260	5.58	676	4.55	314
10					3.46	95	14.02	5,900	5.50	640	4.54	311
11					3.50	101	14.05	5,900	5.42	608	4.53	309
12 n.					3.46	95	13.55	5,550	5.36	584	4.53	309
1 p.m.					3.46	95	12.64	4,910	5.31	564	4.55	314
2					3.50	101	11.58	4,170	5.25	540	4.60	327
3					3.52	104	10.50	3,400	5.22	528	4.64	338
4					3.52	104	9.60	2,900	5.21	524	4.66	344
5					3.51	102	8.92	2,450	5.18	513	4.68	349
6					3.51	102	8.50	2,200	5.15	502	4.68	349
7					3.51	102	8.13	2,000	5.14	498	4.68	349
8					3.52	104	7.83	1,800	5.10	483	4.65	341
9					3.52	104	7.55	1,650	5.05	466	4.62	333
10					3.56	110	7.26	1,500	5.01	452	4.59	324
11					3.70	130	7.02	1,350	4.96	436	4.55	314
12 m.					4.02	190	6.83	1,250	4.91	419	4.51	304

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.41	278	4.13	214	4.11	209	4.12	211	4.25	240	3.78	146
4	4.35	264	4.10	207	4.10	207	4.12	211	4.16	220	3.78	146
6	4.29	250	4.09	205	4.10	207	4.12	211	4.07	201	3.78	146
8	4.25	240	4.08	203	4.09	205	4.12	211	3.96	178	3.82	153
10	4.23	236	4.11	209	4.07	201	4.12	211	3.91	169	3.85	158
12 n.	4.18	225	4.02	190	4.05	196	4.14	216	3.90	167	3.79	147
2 p.m.	4.25	240	4.06	199	4.05	196	4.18	225	3.98	182	3.86	160
4	4.33	259	4.11	209	4.07	201	4.26	243	4.08	203	4.00	186
6	4.40	276	4.14	216	4.08	203	4.39	274	4.18	225	4.12	211
8	4.35	264	4.16	220	4.10	207	4.45	288	4.12	211	4.06	199
10	4.25	240	4.15	218	4.11	209	4.42	281	4.00	186	3.98	182
12 m.	4.17	222	4.12	211	4.12	211	4.32	257	3.88	163	3.92	171

Supplemental records.—Jan. 25, 10:30 a.m., 14.12 ft., 5,980 sec.-ft.

NAUGATUCK RIVER NEAR THOMASTON, CONN.

LOCATION.—Lat. 41°42′11″, long. 73°03′56″, at highway bridge half a mile upstream from Leadmine Brook and 2 miles north of Thomaston, Litchfield County. Datum of gage is 389.44 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—71.9 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 6,000 second-feet; extended logarithmically to peak stage. Affected by ice Jan. 10, 11, 18-21.

MAXIMA.—January 1938: Discharge, 6,830 second-feet noon Jan. 25 (gage height, 9.57 feet).

1930 to December 1937: Discharge, 6,590 second-feet Mar. 12, 1936 (gage height, 9.37 feet).

REMARKS.—Flood discharge slightly affected by storage in small ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	89	223	9	242	218	17	106	117	25	3,800	119
2	108	167	10	170	228	18	90	123	26	1,060	102
3	100	189	11	140	164	19	80	137	27	393	104
4	93	272	12	130	154	20	90	137	28	261	78
5	88	198	13	125	201	21	90	119	29	194	
6	82	205	14	117	238	22	94	110	30	185	
7	669	702	15	108	180	23	91	121	31	270	
8	502	288	16	99	128	24	85	130			
Monthly mean discharge, in second-feet										315	184
Runoff, in inches										5.05	2.67

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	------	------	1.86	123	4.92	1,980	2.90	530
2	------	------	------	------	1.68	88	2.08	178	4.70	1,800	2.83	492
3	------	------	------	------	------	------	2.94	554	4.51	1,650	2.79	470
4	------	------	------	------	1.67	86	3.80	1,120	4.35	1,520	2.73	440
5	------	------	------	------	------	------	4.86	1,930	4.19	1,390	2.68	415
6	------	------	------	------	1.67	86	6.17	3,070	4.04	1,290	2.66	405
7	------	------	------	------	------	------	7.76	4,740	3.92	1,200	2.63	390
8	------	------	------	------	1.66	84	8.55	5,610	3.81	1,130	2.60	375
9	------	------	------	------	------	------	9.21	6,400	3.70	1,050	2.59	370
10	------	------	------	------	1.64	81	9.45	6,690	3.60	980	2.59	370
11	------	------	------	------	------	------	9.53	6,790	3.51	917	2.60	375
12 n.	------	------	------	------	1.64	81	9.57	6,830	3.44	868	2.62	385
1 p.m.	------	------	------	------	------	------	9.42	6,650	3.38	826	2.60	375
2	------	------	------	------	1.66	84	8.90	6,030	3.33	791	2.57	362
3	------	------	------	------	------	------	8.42	5,460	3.32	784	2.57	362
4	------	------	------	------	1.67	86	7.85	4,840	3.36	812	2.58	366
5	------	------	------	------	------	------	7.44	4,380	3.36	812	2.59	370
6	------	------	------	------	1.67	86	7.05	3,960	3.33	791	2.58	366
7	------	------	------	------	------	------	6.69	3,590	3.28	758	2.57	362
8	------	------	------	------	1.66	84	6.37	3,270	3.22	722	2.57	362
9	------	------	------	------	------	------	6.01	2,910	3.17	692	2.56	357
10	------	------	------	------	1.66	84	5.71	2,640	3.14	674	2.54	348
11	------	------	------	------	------	------	5.42	2,380	3.06	626	2.52	339
12 m.	------	------	------	------	1.76	102	5.15	2,160	2.97	572	2.50	330
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	------	------	------	------	------	------	2.12	189	------	------	------	------
4	2.41	292	2.16	202	2.10	183	2.12	189	2.31	253	2.03	164
6	------	------	------	------	------	------	2.13	192	------	------	------	------
8	2.28	242	2.10	183	2.09	180	2.16	202	2.21	218	1.98	151
10	------	------	------	------	------	------	2.23	224	------	------	------	------
12 n.	2.31	253	2.15	198	2.08	178	2.37	276	2.17	205	2.03	164
2 p.m.	------	------	------	------	------	------	2.56	357	------	------	------	------
4	2.30	249	2.12	189	2.11	186	2.60	375	2.18	208	2.03	164
6	------	------	------	------	------	------	2.56	357	------	------	------	------
8	2.31	253	2.12	189	2.14	195	2.50	330	2.21	218	2.10	183
10	------	------	------	------	------	------	2.45	309	------	------	------	------
12 m.	2.23	224	2.11	186	2.13	192	2.41	292	2.09	180	2.06	172

NAUGATUCK RIVER NEAR NAUGATUCK, CONN.

LOCATION.—Lat. 41°28′15″, long. 73°03′10″, 0.2 mile upstream from Beacon Hill Brook, 1.3 miles downstream from Naugatuck, New Haven County, and 12 miles upstream from mouth. Datum of gage is 155.17 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—246 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Adjustments made for intake lag for periods Jan. 7, Jan. 20 to 3 p.m. Jan. 22, 1 to 3 a.m. Jan. 25.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 4,700 second-feet; extended logarithmically to peak stage on basis of comparison with records for flood of September 1938 at stations on Leadmine Brook near Thomaston and Naugatuck River near Thomaston.

MAXIMA.—January 1938: Discharge, 14,200 second-feet noon Jan. 25 (gage height, 11.24 feet).

1918-24; 1928 to December 1937: Gage-height, 12.08 feet Apr. 7, 1924 (discharge uncertain; previously published figure probably too low).

Flood of November 1927 reached a stage of about 14 feet (discharge, about 18,300 second-feet).

REMARKS.—Discharge affected by storage in Wigwam and Morris Reservoirs (see record for Branch of Naugatuck River at outlet of Wigwam Reservoir, near Thomaston, Conn.).

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	338	787	9	917	727	17	414	427	25	7,920	467
2	405	581	10	642	721	18	367	431	26	2,830	397
3	392	670	11	528	563	19	287	462	27	1,280	384
4	338	975	12	472	528	20	300	485	28	882	341
5	334	727	13	462	635	21	320	427	29	676	
6	313	637	14	462	790	22	350	397	30	664	
7	1,600	1,600	15	418	621	23	344	431	31	864	
8	1,820	924	16	367	462	24	362	495			
Monthly mean discharge, in second-feet										893	610
Runoff, in inches										4.18	2.58

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938.

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.	------	------	------	------	1.39	342	2.32	800	6.10	4,900	3.46	1,640
2	------	------	------	------	1.38	338	2.70	1,050	5.88	4,570	3.38	1,570
3	------	------	------	------	1.37	334	3.10	1,350	5.67	4,260	3.29	1,490
4	------	------	------	------	1.36	330	4.40	2,580	5.48	3,970	3.20	1,420
5	------	------	------	------	1.34	321	5.30	3,720	5.30	3,720	3.14	1,370
6	------	------	------	------	1.34	321	6.38	5,320	5.12	3,470	3.08	1,320
7	------	------	------	------	1.33	317	8.20	8,290	4.96	3,260	3.02	1,280
8	------	------	------	------	1.33	317	9.46	10,500	4.80	3,050	3.00	1,260
9	------	------	------	------	1.34	321	10.14	11,900	4.66	2,880	2.96	1,230
10	------	------	------	------	1.33	317	10.72	13,100	4.53	2,730	2.95	1,220
11	------	------	------	------	1.34	321	11.14	14,000	4.40	2,580	2.94	1,210
12 n.	------	------	------	------	1.36	330	11.24	14,200	4.29	2,460	2.93	1,200
1 p.m.	------	------	------	------	1.43	359	10.98	13,700	4.18	2,340	2.94	1,210
2	------	------	------	------	1.45	367	10.52	12,600	4.10	2,260	2.96	1,230
3	------	------	------	------	1.45	367	9.98	11,600	4.04	2,200	2.97	1,240
4	------	------	------	------	1.45	367	9.44	10,500	3.97	2,130	2.96	1,230
5	------	------	------	------	1.45	367	8.95	9,610	3.93	2,090	2.96	1,230
6	------	------	------	------	1.47	375	8.38	8,600	3.87	2,030	2.94	1,210
7	------	------	------	------	1.48	380	7.97	7,900	3.83	1,990	2.90	1,180
8	------	------	------	------	1.48	380	7.58	7,240	3.80	1,960	2.88	1,170
9	------	------	------	------	1.49	384	7.24	6,680	3.74	1,900	2.86	1,150
10	------	------	------	------	1.61	436	6.92	6,170	3.67	1,830	2.84	1,140
11	------	------	------	------	1.77	509	6.62	5,690	3.60	1,770	2.80	1,110
12 m.	------	------	------	------	2.01	632	6.36	5,290	3.53	1,710	2.75	1,080
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	2.66	1,010	2.19	732	2.08	670	2.11	687	2.54	939	1.99	621
4	2.56	951	2.12	692	2.06	659	2.10	681	2.44	879	1.90	573
6	2.48	903	2.05	654	2.05	654	2.11	687	2.37	837	1.84	543
8	2.42	867	2.00	626	2.04	648	2.15	710	2.30	796	1.80	523
10	2.39	849	1.96	605	2.04	643	2.23	755	2.23	755	1.80	523
12 n.	2.33	814	2.00	626	2.04	648	2.45	885	2.23	755	1.82	533
2 p.m.	2.37	837	2.05	654	2.05	654	2.56	951	2.24	761	1.88	563
4	2.45	885	2.10	681	2.06	659	2.58	963	2.22	750	2.00	626
6	2.44	879	2.14	704	2.07	664	2.73	1,060	2.17	721	1.98	615
8	2.39	849	2.15	710	2.10	681	2.77	1,090	2.17	721	1.99	621
10	2.32	808	2.14	704	2.12	692	2.71	1,050	2.13	698	1.97	610
12 m.	2.26	773	2.10	681	2.12	692	2.63	994	2.06	659	1.94	594

LEADMINE BROOK NEAR THOMASTON, CONN.

LOCATION.—Lat. 41°42′10″, long. 73°03′36″, at highway bridge half a mile upstream from mouth and 2¼ miles northeast of Thomaston, Litchfield County. Datum of gage is 401.23 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—24.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods Jan. 28

to Feb. 3 when float was frozen in well and Feb. 5-8 when clock was stopped.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 500 second-feet; extended to peak stage on basis of logarithmic plotting and comparison with records for stations on Naugatuck River. Affected by ice Jan. 4, 5, Jan. 10 to 3 p.m. Jan. 23, Feb. 16, 17, 21, 22, 26-28.

MAXIMA.—January 1938: Discharge, 2,640 second-feet 9 a.m. Jan. 25 (gage height, 10.35 feet).

1930 to December 1937: Discharge, about 2,800 second-feet Sept. 17, 1934 (gage height 11.2 feet; from floodmarks).

REMARKS.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	27	80	9	78	73	17	30	38	25	1,210	39
2	33	55	10	60	73	18	28	39	26	264	32
3	27	60	11	50	54	19	26	46	27	134	32
4	26	85	12	44	51	20	28	41	28	85	22
5	26	70	13	42	68	21	32	38	29	70	
6	24	60	14	38	78	22	34	36	30	65	
7	276	240	15	34	57	23	32	41	31	95	
8	157	95	16	32	44	24	29	43			
Monthly mean discharge, in second-feet										101	60.4
Runoff, in inches										4.85	2.62

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							3.46	83				
2					2.86	30	4.05	166	5.20	440		
3							4.43	237			3.87	136
4					2.84	28	5.45	518	4.95	365		
5							6.90	1,060				
6					2.82	27	8.70	1,840	4.71	302	3.82	129
7							9.50	2,220				
8					2.81	27	10.15	2,540	4.54	261		
9							10.35	2,640			3.80	126
10					2.82	27	9.95	2,440	4.43	237		
11							9.60	2,270				
12 n.					2.88	31	8.95	1,950	4.40	231	3.87	136
1 p.m.							8.25	1,630				
2					2.87	30	7.75	1,410	4.50	252		
3							7.35	1,240			4.04	164
4					2.85	29	7.02	1,110	4.37	225		
5							6.76	1,000				
6					2.84	28	6.51	904	4.24	200	3.88	138
7							6.28	812				
8					2.84	28	6.07	734	4.08	171		
9							5.88	668			3.72	115
10					2.87	30	5.71	608	3.98	154		
11							5.56	556				
12 m.					3.08	45	5.43	510	3.92	144	3.64	104

Supplemental records.—Jan. 25, 3:45 a.m., 6.22 feet, 7:15 a.m., 10.05 ft., 2,500 sec.-ft.

BRANCH OF NAUGATUCK RIVER AT OUTLET OF WIGWAM RESERVOIR, NEAR THOMASTON, CONN.

LOCATION.—Nonrecording gage and venturi meter at dam, lat. 41°39′45″, long. 73°07′35″, 2½ miles west of Thomaston, Litchfield County, and 3 miles upstream from mouth.

Drainage area.—18.0 square miles.

Gage-height record.—Three reservoir gage readings daily; gage height at midnight determined from graph constructed from gage readings.

Stage-discharge relation.—Observed discharge computed from flow over spillways and through venturi meter.

Maxima.—January 1938: Discharge, 3,100 second-feet about 8 a.m. (from graph based on gage readings).

Remarks.—Daily and monthly mean discharges adjusted for change in contents of Wigwam and Morris Reservoirs. No corrections for evaporation from reservoir surfaces. Basic data furnished by Bureau of Engineering, city of Waterbury.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	January			February		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	25	+2	27	29	−1	28
2	17	−1	16	24	−4	20
3	20	−2	18	29	+37	66
4	19	−2	17	72	−27	45
5	19	−2	17	36	−6	30
6	17	−2	15	45	+21	66
7	198	+50	248	122	−12	110
8	100	−26	74	47	−6	41
9	71	−8	63	42	0.0	42
10	52	−6	46	42	0.0	42
11	26	−2	24	29	−4	25
12	24	+1	25	23	+1	24
13	26	+1	27	35	+8	43
14	24	−2	22	48	−5	43
15	23	−3	20	29	−5	24
16	21	0.0	21	24	−3	21
17	21	−1	20	21	−1	20
18	21	−3	18	21	+1	22
19	19	−1	18	26	+3	29
20	19	0.0	19	27	0.0	27
21	18	+1	19	23	−2	21
22	21	+1	22	21	0.0	21
23	23	−1	22	22	+1	23
24	23	+10	33	26	+3	29
25	1,240	+64	1,300	26	−1	25
26	142	−53	89	22	−3	19
27	60	−11	49	20	0.0	20
28	36	−5	31	17	−5	12
29	29	−2	27	--	--	--
30	30	+2	32	--	--	--
31	38	+3	41	--	--	--

	January	February
Monthly mean discharge, in second-feet (observed)	78.1	33.9
Runoff, in inches (observed)	5.00	1.96
Monthly mean discharge, in second-feet (adjusted)	78.1	33.5
Runoff, in inches (adjusted)	5.00	1.94

SAUGATUCK RIVER BASIN

SAUGATUCK RIVER NEAR WESTPORT, CONN.

Location.—Lat. 41°10′15″, long. 72°22′00″, on old Ford Road (Clinton), 400 feet downstream from West Branch of Saugatuck River, 600 feet downstream from dam of Dorr Co., and 2 miles north of Westport, Fairfield County.

Drainage area.—77.5 square miles.

Gage-height record.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,700 second-feet; extended to peak stage on basis of September 1938 flood flow determination at Dorr Co.'s dam. Affected by ice Jan. 1-6, 16-22, 6 p.m. Jan. 27 to 2 p.m. Jan. 28, 7 p.m. to m. Jan. 28, 7 p.m. Feb. 2 to Feb.3.

MAXIMA.—January 1938: Discharge, 2,230 second-feet 5 p.m. Jan. 25 (gage height, 7.63 feet).

1932 to December 1937: Discharge, 5,310 second-feet Mar. 12, 1936 (gage height, 11.30 feet).

REMARKS.—Bridgeport Hydraulic Co. occasionally diverts the flow from 17 square miles of the Aspetuck River Basin. Water for diversion is stored in Aspetuck Reservoir and diverted by canal into Hemlocks Reservoir in Mill River Basin from which it is released for water supply. Daily and monthly mean discharges not adjusted for diversion. Runoff computations are based on total drainage area above station.

Mean discharge, in second-feet, 1938

Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.	Day	Jan.	Feb.
1	110	316	9	345	245	17	130	151	25	1,420	204
2	100	234	10	260	247	18	110	163	26	1,100	163
3	95	250	11	220	204	19	100	161	27	541	155
4	95	375	12	192	188	20	100	239	28	367	135
5	85	282	13	192	223	21	100	188	29	302	
6	85	250	14	180	288	22	110	163	30	281	
7	631	351	15	162	229	23	119	181	31	327	
8	631	293	16	140	177	24	118	232			
Monthly mean discharge, in second-feet										282	225
Runoff, in inches										4.20	3.02

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 22		January 23		January 24		January 25		January 26		January 27	
1 a.m.							3.45	190				
2					3.13	119	3.65	242	6.64	1,560	4.90	660
3							3.90	310				
4					3.10	113	4.21	403	6.41	1,430	4.78	612
5							4.58	533				
6					3.08	109	4.94	676	6.21	1,310	4.69	576
7							5.32	839				
8					3.06	105	5.75	1,040	6.04	1,200	4.60	540
9							6.15	1,270				
10					3.08	109	6.49	1,470	5.90	1,120	4.52	510
11							6.82	1,670				
12 n.					3.18	129	7.03	1,810	5.77	1,060	4.50	503
1 p.m.							7.22	1,940				
2					3.14	121	7.39	2,060	5.64	990	4.51	507
3							7.54	2,170				
4					3.13	119	7.62	2,220	5.50	920	4.58	533
5							7.63	2,230				
6					3.12	117	7.60	2,210	5.37	862	4.58	530
7							7.50	2,140				
8					3.11	115	7.39	2,060	5.25	808	4.56	500
9							7.26	1,970				
10					3.16	125	7.14	1,890	5.16	767	4.53	460
11							7.02	1,800				
12 m.					3.30	155	6.90	1,720	5.03	712	4.46	420

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	January 28		January 29		January 30		January 31		February 1		February 2	
2 a.m.	4.34	390	3.89	307								
4	4.24	370	3.84	293	3.82	288	3.79	279	4.05	354	3.54	214
6	4.18	350	3.82	288								
8	4.11	340	3.81	285	3.78	277	3.80	282	3.90	310	3.49	202
10	4.08	340	3.81	285								
12 n.	4.08	350	3.83	290	3.78	277	3.91	313	3.85	296	3.60	229
2 p.m.	4.13	380	3.88	304								
4	4.22	407	3.94	322	3.78	277	4.09	366	3.95	324	3.76	271
6	4.20	400	3.96	327								
8	4.13	370	3.91	313	3.80	282	4.16	388	3.84	293	3.70	245
10	4.06	340	3.88	304								
12 m.	3.96	320	3.84	293	3.80	282	4.14	381	3.70	255	3.68	230

SUMMARY OF FLOOD DISCHARGES

Maximum discharges at all gaging stations and at other places on streams in Connecticut where the peak discharge was determined are presented in table 8. Reference should be made to the introductory "General description of information," particularly pages 9 to 12, for an outline of the data given in this table. Records in table 8 compare only the flood of January 1938 with that of the previous maximum of record. For detailed information of other notable floods in this area the reader may refer to Water-Supply Paper 162, which includes a brief description of the flood of July 1905 on the Pepuonnock River, Conn.; Water-Supply Paper 636-C, The New England flood of November 1927; Water-Supply Paper 798, The floods of March 1936, part I, New England Rivers; Water-Supply Paper 836-A, Stages and flood discharges of the Connecticut River at Hartford, Conn.; and Water-Supply Paper 867, Hurricane floods of September 1938. Water-Supply Papers 798 and 867 also contain detailed accounts and comparisons of many historic floods. This information is not repeated in this report.

TABLE 8.—*Maximum discharges for flood of January 1938 in Connecticut*

No. on pl. 12	Stream and place of determination	Drainage area square miles	Period of record	Maximum discharge prior to January 1938		Maximum discharge during flood of January 1938			
				Date	Second-feet	Time	Second-feet	Second-feet per square mile	Method of determination
	Thames River Basin								
264	Willimantic River near South Coventry	121	1931–38	Mar. 12, 1936	7,880	Jan. 25, 7 p.m.	3,770	31.2	Stage-discharge relation
267	Shetucket River near Willimantic	401	1904–05 1933–38	do	23,900	Jan. 26, 2 a.m.	12,600	31.4	Do.
272	Hop River near Columbia	76.2	1932–38	do	3,300	Jan. 25, 4:30 p.m.	2,970	39.0	Do.
275	Natchaug River at Willimantic	169	1930–38	Mar. 18, 1936	14,200	Jan. 25, 11 p.m.	5,880	34.8	Do.
282	Quinebaug River at Quinebaug	157	1931–38	do	10,500	Jan. 25, 9:30 p.m.	3,470	22.1	Do.
284	Quinebaug River at Putnam	331	1929–38	Mar. 19, 1936	17,200	Jan. 25, 12 p.m.	7,450	22.5	Do.
286	Quinebaug River at Dyer Dam, below Danielson	465				Jan. 26, 6 a.m.	7,260	15.6	Flow over dam.
289	Quinebaug River at Jewett City	711	1918–38	Mar. 19, 1936	29,200	Jan. 26, 12:20 p.m.	11,100	15.6	Stage-discharge relation
290	Quinebaug River at Taftville	743				Jan. 26, 11 a.m. to 7 p.m.	12,100	16.3	Flow over dam.
294	French River at North Grosvenordale	98.5				Jan. 26, 5 a.m.	1,840	18.7	Do.
295	Muddy Brook at Harrisville	36.4				Jan. 25	[1]825	22.7	Do.
295.5	Five Mile River at Killingly	58.2	1937–38	Nov. 29, 1937	730	Jan. 26, 5 to 6 a.m.	630	10.8	Stage-discharge relation
298	Moosup River at Moosup	83.5	1932–38	Mar. 12, 1936	4,260	Jan. 25, 4 to 5 p.m.	1,380	16.5	Do.
301	Yantic River at Yantic	88.6	1930–38	do	6,300	Jan. 25, 4 p.m.	3,230	36.5	Do.
	Connecticut River Basin								
318	Connecticut River at Hartford	10,480		Mar. 21, 1936	[2]37.6	Jan. 26, 11 p.m.	[3]19.6		
413	Scantic River at Broad Brook	98.4	1928–38	Mar. 13, 1936	1,820	Jan. 26, 6 a.m.	1,810	18.4	Stage-discharge relation
416	Farmington River at Riverton[4]	216	1929–38	Mar. 18, 1936	19,900	Jan. 25, 11 a.m.	10,200	47.2	Do.
418	Farmington River at Collinsville[5]	354				Jan. 25, 1 p.m.	[6]13,500	38.1	Flow over dam.
419	Farmington River at Tariffville[5]	578	1928–38	Mar. 19, 1936	26,900	Jan. 26, 11 a.m. to 12 n.	11,900	20.6	Stage-discharge relation
420	Farmington River at Rainbow[5,7]	590				Jan. 26, 3 p.m.	[6]13,000	22.0	Flow over dam.
423	Burlington Brook near Burlington	4.1	1931–38	Mar. 12, 1936	503	Jan. 25, 9:30 a.m.	474	116	Stage-discharge relation
427	South Branch of Park River at Hartford	40.6	1936–38	Nov. 29, 1937	1,660	Jan. 25, 4 p.m.	2,860	70.4	Do.
428	Park River at Hartford	74.0	do	Mar. 12, 1936	5,400	Jan. 25, 5:30 p.m.	5,650	76.4	Do.
429	North Branch of Park River at Hartford	25.3	do	do	1,520	Jan. 25, 2 p.m.	1,640	64.8	Do.
431	Hockanum River near East Hartford[4]	74.5	1919–21 1928–38	Mar. 5, 1934	1,920	Jan. 25, 2:20 p.m.	2,140	28.7	Do.
432	Salmon River near East Hampton	105	1905–06 1928–38	Mar. 12, 1936	6,250	Jan. 25, 12 n.	5,720	54.5	Do.
433.3	East Branch of Eightmile River near North Lyme	22.0	1937–38	Nov. 29, 1937	1,010	Jan. 25, 9 p.m.	514	23.4	Do.
433.7	West Branch of Eightmile River near North Lyme	19.2	do	do	1,020	Jan. 25, 4 p.m.	[1]426	22.2	Do.

	Quinnipiac River Basin								
434	Quinnipiac River at Southington	17.6	1935–38	Mar. 12, 1936	[8]568	do	[8]655	37.2	Do.
435	Quinnipiac River at Wallingford	109	1930–38	do	3,240	Jan. 26, 4 to 5 a.m.	2,760	25.3	Do.
436	Eightmile River at Plantsville	14.9	1935–38	do	[8]755	Jan. 25, 1 p.m.	[8]755	50.7	Do.
	Housatonic River Basin								
446	Housatonic River at Falls Village	632	1912–38	Mar. 20, 1936	14,500	Jan. 25, 9 to 11 p.m.	7,200	11.4	Do.
446.5	Housatonic River at Bulls Bridge[9]	782				Jan. 26, 3 a.m.	10,400	13.3	Flow over dam.
450	Housatonic River at Stevenson[4]	1,545	1928–38	Mar. 12, 1936	69,500	Jan. 25, 12 n.	36,000	23.3	Stage-discharge relation
353	Tenmile River near Gaylordsville	204	1929–38	do	10,200	Jan. 25, 9 p.m.	6,120	30.0	Do.
455	Still River near Lanesville	68.5	1931–38	do	3,930	do	2,450	35.8	Do.
456	Shepaug River at outlet of Shepaug Reservoir, at Woodville[4] [10]	38.0	1935–38	do	[4]4,070	Jan. 25, 11 a.m.	[8]4,100	108	Dam.
458	Shepaug River near Roxbury[4]	133	1930–38	do	7,090	Jan. 25, 1:15 p.m.	5,340	40.2	Stage-discharge relation
459	Pomperaug River at Southbury	75.3	1932–38	do	5,990	Jan. 25, 10:30 a.m.	5,980	79.4	Do.
462	Naugatuck River near Thomaston	71.9	1930–38	do	6,590	Jan. 25, 12 n.	6,830	95.0	Do.
463	Naugatuck River near Naugatuck[1]	246	1918–24 1928–38	Nov., 1927	18,300	do	14,200	57.7	Do.
464	Leadmine Brook near Thomaston	24.0	1930–38	Sept. 17, 1934	2,800	Jan. 25, 9 a.m.	2,640	110	Do.
	Saugatuck River Basin								
466	Saugatuck River near Westport	77.5	1932–38	Mar. 12, 1936	5,310	Jan. 25, 5 p.m.	2,230	28.8	Do.

[1]Maximum observed.
[2]Maximum stage known since 1639; maximum discharge, 313,000 second-feet Mar. 20, 1936.
[3]Gage height from records of U.S. Weather Bureau; discharge, about 90,000 second-feet.
[4]Affected by storage.
[5]Affected by storage and diversion.
[6]Condition of flashboards uncertain at time of peak.
[7]Record furnished by Stanley Works, New Britain, Conn.
[8]From graph based on gage readings.
[9]Records furnished by Connecticut Light & Power Co.
[10]Basic data furnished by Bureau of Engineering, city of Waterbury, Conn.

Figure 15 shows all the flood discharges in Connecticut, in second-feet per square mile, that are listed in tables 8 and 24 and plotted against the corresponding drainage areas. In this connection it should be understood that the discharges are given as observed, and many are affected by artificial storage, concerning which available information is presented in the preceding section, "Stages and discharges at stream-gaging stations." For comparative purposes, figure 15 also shows the maximum known discharges of record in Connecticut prior to 1939. Only those records are plotted that exceed the envelope of the floods of January and July 1938 and only the maximum of record for any one place. Appropriate symbols distinguish the various floods. When compared by drainage areas, it may be noted that maximum discharges of the flood of January 1938 were generally somewhat larger than for the flood of July 1938, but varied from about one-half of the envelope of maxima of record for areas of 10 square miles to about one-third for areas of 1,000 square miles.

STORAGE RESERVOIRS

Basic data for most of the important storage reservoirs have been given in the section "Stages and discharges at stream-gaging stations." The effect of these reservoirs on the flow at regular gaging stations is presented in the following section, "Rainfall and runoff studies." The section herewith is limited to a brief discussion of some of the examples of storage regulation.

Before the advent of steam and electricity for industrial use, the gradient of streams in Connecticut had been found well suited for water-power development, and consequently hundreds of small dams were constructed at existing natural ponds or at constrictions in the stream channels to divert water through the water wheels of mills. Later, detention reservoirs were constructed in the headwater streams to regulate the flow of water, and some of the natural ponds and lakes were enlarged or artificial reservoirs created for recreational or municipal water-supply purposes. Many of the old dams have been destroyed by floods and not rebuilt. Of the hundreds that remain, some have no control works and others have gates of various kinds, some used and some not used. The small ponds and reservoirs that remain practically full throughout the year have little effect individually in decreasing the peak flow of floods, but as a group, together with swamps and intervales, they provide excellent retarding basins, wider than the normal river channels, which are filled synchronously with the rising flood and do not release the temporarily stored water until the peak has passed. Hence, although this storage may be classi-

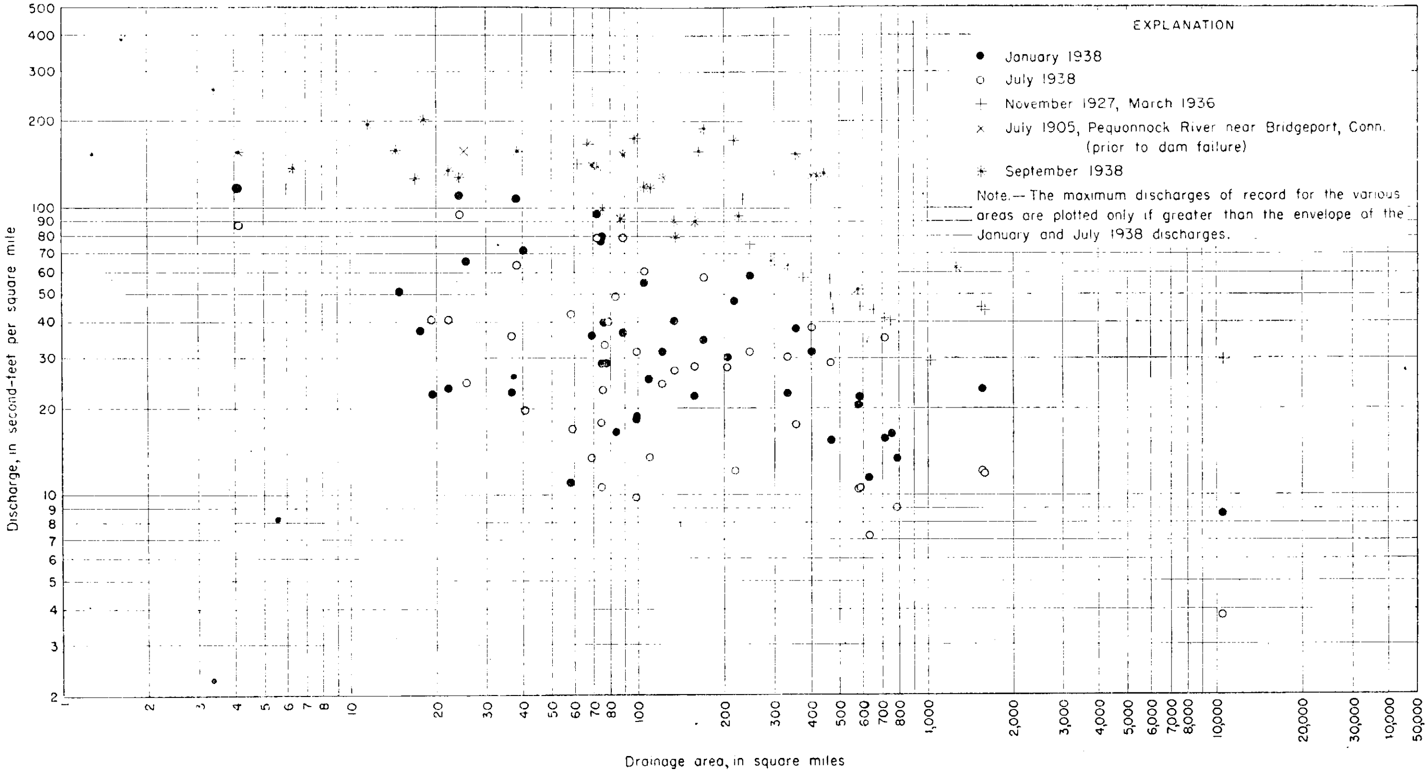


Figure 15.—Chart showing maximum discharges, in second-feet per square mile, for drainage basins given in tables 8 and 24 for floods of January and July 1938 in comparison with maximum discharges of record for Connecticut prior to 1939.

fied as more "natural" than "artificial," it does operate to reduce the magnitude of peak stages downstream. No records are available as to the areal extent or actual effect of these numerous small ponds, reservoirs, and flood basins in Connecticut.

The larger reservoirs, having appreciable storage capacity below the level of the spillway, have a more marked effect on flood flow. Records for nine reservoirs are presented in the section "Stages and discharges at stream-gaging stations," and they disclose some interesting facts. On January 25 the small discharge gates on Otis Reservoir at Cold Spring, Mass., were closed, and all the flood flow from 17.2 square miles of the Farmington River Basin was retained until February 17. Although the peak flow of the Hockanum River near East Hartford, Conn., on January 25 was greater than any previously recorded, outflow from Shenipsit Lake (drainage area, 16.5 square miles) in the headwaters of the river was held to less than 120 second-feet, while the retained storage averaged an equivalent of 405 second-feet. At Candlewood Lake on Rocky River near New Milford, Conn., all the runoff during the flood period from its 40.4 square miles of drainage area was stored, and, as it was a pumped-storage type of reservoir, water was pumped into storage from the Housatonic River. Zoar Lake at Stevenson, Conn., may be considered representative of the larger reservoirs at power developments, which are kept nearly full most of the time. The area of the lake surface is about 1.6 square miles, and for the calendar day of maximum flood flow its contents increased the equivalent of 2,400 second-feet, which was released again as the flood flow receded. Shepaug Reservoir on the Shepaug River at Woodville, Conn., is perhaps indicative of the effect of the smaller ponds and reservoirs mentioned in the preceding paragraph. This reservoir, which has a surface area of about 0.15 square mile, or 100 acres, affects the runoff from 38.0 square miles of drainage area. It was spilling water prior to the January flood. From a graph plotted from daily readings of reservoir elevation and discharge, the increase in contents of the reservoir for the 6-hour period before the peak was about 150 acre-feet, equivalent to 0.07 inch over the drainage basin. For the 6-hour period after the peak the reservoir lost about 80 acre-feet, equivalent to 0.04 inch over the basin. Of course this comparatively small temporary storage of water was undoubtedly greater than would have been retained as storage in the same stretch of the river if the dam had not been there.

The manner in which several reservoirs operated during the flood period of January 1938 can be illustrated by constructing hydrographs of observed and adjusted natural flow from the data given in the section "Stages and discharges at stream-gaging stations."

RAINFALL AND RUNOFF STUDIES

Climatologic, hydraulic, and hydrologic data previously presented provide information for a variety of detailed studies of runoff characteristics. This report includes only a limited appraisal of the data, as compiled in table 9, for the 32 regular river-measurement stations in Connecticut. Index numbers to the left of the station names in table 9 indicate plotted locations on plate 12. The three major basins are discussed separately later in this section.

Various investigators have studied the amount of evaporation from snow[9] and have found that it generally increases with factors such as wind velocity, temperature, exposure, porosity of snow, and decrease of humidity. Evaporation occurs at temperatures below 0° F., but, as explained in the section on "Snow," no corrections for evaporation were used in determining the water content of snow as of January 20 because of the rough approximations in other assumptions that were made. However, during the warmer period from January 20 until the start of flood-producing precipitation on January 24, evaporation from snow may be computed by methods to be between 0.05 and 0.15 inch. Accordingly, the figures in column 8 of table 9, showing the computed water equivalent of the snow on the ground on January 24, are equal to the figures in column 7 plus column 5 minus column 6 and minus a flat correction of 0.1 inch for evaporation losses after January 20. Probably neither the amount involved nor the accuracy of existing information on evaporation from snow warrants a closer refinement.

The values of direct runoff for the antecedent period January 20–24 and for the flood period, shown in columns 6 and 10, respectively, of table 9 were based on records of discharge at the gaging stations published in this report and were computed by the following procedure, conforming to methods described in previous flood reports of the Geological Survey.

A discharge hydrograph was constructed for each gaging-station record to be analyzed, covering the period from about January 10 to February 28. A part of the hydrograph for Naugatuck River

[9] Lee, C. H., An intensive study of the water resources of a part of Owens Valley, Calif.: U. S. Geol. Survey Water-Supply Paper 294, pp. 49, 50, 118, 1912. Horton, R. E., Evaporation from snow and errors of rain gage when used to catch snowfall: Monthly Weather Rev., pp. 99-100, February 1914; Water losses in high latitudes and at high elevations: Am. Geophys. Union Trans., pp. 351-379, 1934. Baker, F. S., Some field experiments on evaporation from snow surfaces: Monthly Weather Rev., pp. 363-366, July 1917. Church, J. E., Evaporation at high altitudes and latitudes: Am. Geophys. Union Trans., pp. 326-351, 1934.

TABLE 9.—*Precipitation, water equivalent of snow, and associated direct runoff of flood of January 1938 in Connecticut*

[Mean depth, in inches, over drainage basins]

No. on pl. 12	Stream and point of measurement	Drainage area (square miles)	Precipitation Jan. 20-26	Precipitation Jan. 24-26	Precipitation Jan. 20-23[1]	Direct runoff Jan. 20-24	Water equivalent of snow Jan. 20	Water equivalent of snow Jan. 24[2]	Column 4 plus column 8	Direct runoff associated with column 9	Column 9 minus column 10	Ratio of maximum 24-hour runoff to total direct runoff associated with storm (percent)
	1	2	3	4	5	6	7	8	9	10	11	12
	Thames River Basin											
264	Willimantic River near South Coventry	121	1.65	1.4	0.25	0.05	1.5	1.6	3.0	1.6	1.4	60
267	Shetucket River near Willimantic	401	1.75	1.55	.2	.05	1.35	1.4	2.95	1.6	1.35	56
272	Hop River near Columbia	76.2	1.75	1.65	.1	.05	1.4	1.35	3.0	1.7	1.3	59
275	Natchaug River at Willimantic	169	1.8	1.65	.15	.05	1.35	1.35	3.0	1.55	1.45	60
282	Quinebaug River at Quinebaug	157	1.9	1.7	.2	.0	1.9	2.0	3.7	1.2	[3]2.5	48
284	Quinebaug River at Putnam	331	1.9	1.6	.3	.05	1.75	1.9	3.5	1.55	1.95	47
289	Quinebaug River at Jewett City	711	1.85	1.6	.25	.05	1.25	1.35	2.95	1.3	1.65	39
295.5	Five Mile River at Killingly	58.2	1.85	1.4	.45	.05	1.1	1.4	2.8	1.00	1.8	35
298	Moosup River at Moosup	83.5	1.85	1.65	.2	.0	.8	.9	2.55	1.2	1.35	42
301	Yantic River at Yantic	88.6	1.65	1.35	.3	.0	.65	.85	2.2	1.7	.5	61
	Total gaged area	1,201	1.8	1.55	0.25	0.05	1.25	1.35	2.9	1.45	1.45	
	Connecticut River Basin											
413	Scantic River at Broad Brook	98.4	1.3	1.15	.15	0.0	1.9	1.95	3.1	1.05	2.05	51
416	Farmington River at Riverton	216	2.75	2.5	.25	[4]0	2.15	2.3	4.8	[4]1.85	[3]2.95	
419	Farmington River at Tariffville	578	2.45	2.2	.25	[5]0	2.2	2.35	4.55	[5]1.95	2.6	
423	Burlington Brook near Burlington	4.1	2.6	2.05	.55	.05	1.85	2.25	4.3	1.9	2.4	85
427	South Branch of Park River at Hartford	40.6	2.2	2.0	.2	.0	1.7	1.8	3.8	2.45	1.35	77
428	Park River at Hartford	74.0	2.2	2.0	.2	.0	1.8	1.9	3.9	2.65	1.25	74
429	North Branch of Park River at Hartford	25.3	2.15	1.95	.2	.05	1.8	1.85	3.8	2.3	1.5	74
431	Hockanum River near East Hartford	74.5	1.65	1.55	.1	[6]0	1.6	1.6	3.15	[6]1.35	1.8	61
432	Salmon River near East Hampton	105	2.1	1.5	.6	.05	.9	1.35	2.85	1.6	1.25	73
433.3	East Branch of Eightmile River near North Lyme	22.0	2.05	1.45	.6	.05	.6	1.05	2.5	1.05	1.45	59

433.7	West Branch of Eightmile River near North Lyme	19.2	2.1	1.45	.65	.05	.65	1.15	2.6	1.15	1.45	53
	Total gaged area	971	2.2	1.9	0.3	0.0	1.9	2.1	4.0	1.8	2.2	----------
	Quinnipiac River Basin											
435	Quinnipiac River at Wallingford	109	2.55	2.15	0.4	0.05	1.4	1.65	3.8	1.7	2.1	47
	Housatonic River Basin											
446	Housatonic River at Falls Village	632	1.8	1.5	.3	.0	2.05	2.25	3.75	1.1	[3]2.65	31
450	Housatonic River at Stevenson	1,545	2.25	1.95	.3	[7]0	1.55	1.75	3.7	[7]1.4	2.3	----------
453	Tenmile River near Gaylordsville	204	1.85	1.55	.3	.0	1.75	1.95	3.5	1.65	1.85	54
455	Still River near Lanesville	68.5	3.9	3.5	.4	.0	.65	.95	4.45	1.5	2.95	58
458	Shepaug River near Roxbury	133	2.75	2.4	.35	[8]0	1.4	1.65	4.05	[8]1.7	2.35	60
459	Pomperaug River at Southbury	75.3	3.0	2.5	.5	.0	1.05	1.45	3.95	1.5	2.45	74
462	Naugatuck River near Thomaston	71.9	2.95	2.6	.35	.05	1.95	2.15	4.75	2.7	2.05	76
463	Naugatuck River near Naugatuck	246	2.7	2.35	.35	[9].05	1.45	1.65	4.0	[9]1.75	2.25	70
464	Leadmine Brook near Thomaston	24.0	2.55	2.2	.35	.05	1.75	1.95	4.15	2.4	1.75	79
	Total gaged area	1,791	2.3	2.0	0.3	0.0	1.55	1.75	3.75	1.45	2.3	----------
	Saugatuck River Basin											
466	Saugatuck River near Westport	77.5	2.6	2.2	0.4	0.05	0.65	0.9	3.1	1.45	1.65	55

[1]Difference between columns 3 and 4.
[2]Adjusted for evaporation of 0.1 inch, Jan. 20–24.
[3]Records of snow depth on ground January 27 indicate that this figure may include residual snow equivalent of 0.2 inch water.
[4]Adjusted for change in contents of Otis Reservoir.
[5]Adjusted for diversion and change in contents in Otis, Nepaug, East Branch, and Barkhamsted Reservoirs.
[6]Adjusted for change in contents in Shenipsit lake.
[7]Adjusted for change in contents in Zoar and Candlewood Lakes and Shepaug Reservoir.
[8]Adjusted for change in contents in Shepaug Reservoir.
[9]Adjusted for change in contents in Wigwam and Morris Reservoirs.

near Thomaston, Conn., is presented in figure 16 and is in general typical of the behavior of the other streams that were studied. The graph in figure 16 outlined by letters *A-B-C-D-E-F-G-H* represents the observed discharge, in second-feet, past the gaging station. From *A* to *B* the stream flow consisted entirely of ground-water flow, which gradually diminished as the ground-water supply was depleted during this cold period. Slight diurnal fluctuations occurred because of the formation and release of temporary ice obstructions upstream, particularly on January 19, and because of minor regulation from mills on this river. If ground water had remained as the only contribution to flow, the graph of daily discharge would have continued approximately as drawn from *B* to *C*. However, from *B* to *D* warmer temperatures released some of the water stored in the form of snow and the stream flow steadied or rose slightly. The rainfall, starting late on January 24 and continuing into the 25th, together with thawing temperatures caused most of the snow to melt, and the streams rose rapidly to flood peaks as at *E*. The peaks occurred on January 25 or 26 depending on the various runoff characteristics of the basins. Fortunately for the purpose of this study, there was negligible precipitation during the period January 26–30. Below-freezing temperatures generally prevailed from the morning of January 26 through the 29th, and the recession side of the flood hydrographs departed from normal as the cold temperatures caused temporary ice obstructions upstream and froze the surface of the ground and possibly some subsurface water that had not yet reached the stream channels. Sunshine and warmer midday temperatures intermittently released part of this ice-bound storage so that the hydrographs of flow of the smaller streams showed the effects of the diurnal variations in temperature. During January 30 and 31, temperatures rose well above freezing, and on January 31 precipitation reported as rain and snow caused minor rises in stream flow (*F* to *G*).

The total area under the discharge hydrograph, *A-B-D-E-F-L-M*, represents the runoff that reached the stream channels during the period both as surface and as ground-water runoff resulting from melted snow and from precipitation prior to January 27, plus the runoff under *A-B-C* that would have been maintained if there had been no increment of supply after January 19. The area under *A-B-J-K-L* represents the estimate of ground-water flow during the period, and the area between this line and *A-B-D-E-F-L* is believed to include essentially all the direct surface runoff resulting from the melted snow and rain and may include some ground water that was discharged into stream channels with a promptness approaching that of surface runoff. Some difficulty was encountered in determining the magnitude and time of maximum ground-water flow (K) after the flood peak, because subsequent rains prevented the accurate definition of the ground-water depletion curve. The time of K was therefore determined from comparisons with other isolated uniform flood recessions on the same stream, and its magnitude was determined by estimating from the appearance of the graph the amount of delayed direct runoff that was being released by the warm weather at the time.

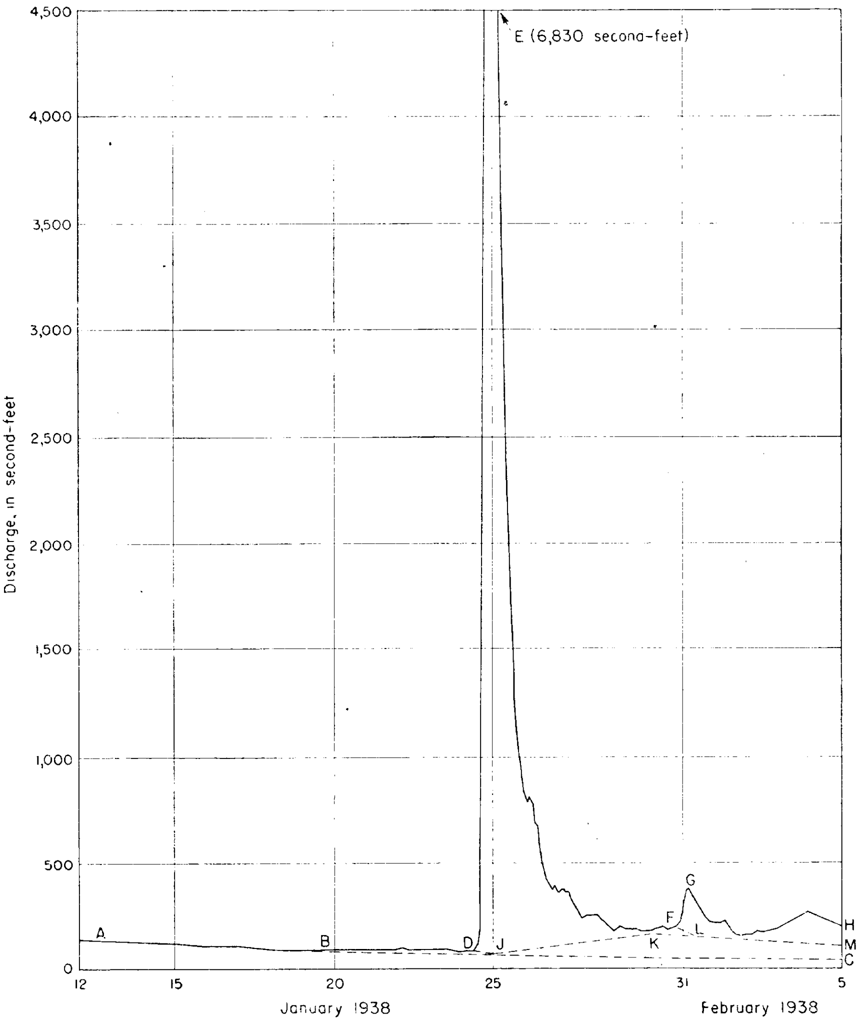


FIGURE 16.—Hydrograph of discharge of Naugatuck River near Thomaston, Conn., showing method of analysis used in determining the direct runoff associated with the flood of January 1938.

K-M represents the subsequent estimated ground-water depletion curve, that is, the ground-water flow that would have occurred if there had been no subsequent direct surface runoff.

By estimating the positions of the short recession curves *D-J* and *F-L*, the hydrograph can be analyzed to show within reasonable limits the direct runoff, *B-D-J*, directly attributable to the antecedent period of warm weather January 20–24, and the direct runoff, *D-E-F-L-K-J*, directly attributable to melted snow and rainfall during the flood period. Point *F* is not well defined. Warm weather on January 30–31 released some water that should have previously reached the stream channels had it not been delayed by freezing temperatures, but it could not be ascertained whether all this water was released before the small rise *F-G* on January 31. However, the runoff directly attributable to this rise was a small proportion of the rainfall on January 31 and could include only a slight amount, if any, of the direct runoff applicable to the previous flood. Accordingly, point *F* was arbitrarily located on the hydrograph just prior to the time of significant direct runoff from the rain of January 31. As other investigators might make other estimates of direct runoff by drawing the separation curves differently, the basic data and methods of analysis are presented in sufficient detail so that they may do so if desired. But, in general, such differences in judgment would result in mathematical differences that would be relatively small in relation to the magnitude of direct runoff.

Values of direct runoff for the antecedent period and flood period are given to the nearest 0.05 inch in columns 6 and 10, respectively, of table 9. Footnotes refer to the available records of diversion and change of contents in reservoirs that were used to adjust the observed stream flow to natural discharge during the periods. Other retarding basins probably affected the flow, but no records were available for determining their effect. Also during periods of low flow most streams were affected by diurnal fluctuations caused by the operation of relatively small millponds whose storage capacity is generally limited to less than 1 or 2 days' supply of normal low flow. The plotted discharge hydrographs were adjusted during the periods of low flow to balance these diurnal fluctuations and thus to improve the accuracy in determining the trend and amount of ground-water flow.

If the records of precipitation plus water content of snow shown in column 9 of table 9 and values of direct flood runoff shown in column 10 are substantially correct, then the difference between columns 9 and 10, or basin retention, represents the amount of water that was retained in the basin in the form of snow or as surface storage and absorption, or that was exaporated during the flood period. Most of these values seem reasonably consistent.

The direct flood runoff shown in column 10 of table 9 resulted from the rainfall of January 24–26 and the melting of the snow. The total water thus available for runoff is shown in column 9. Direct runoff should be less than the supply by the amount of residual snow or ice on the ground plus evaporation, transpiration, change in soil moisture, and accretion to the ground-water table. Figure 17 presents a graphical comparison of the data in columns 9 and 10 and indicates that the direct runoff generally increased with the supply. Points plotted for the 32 regular river-measurement stations appear to have reasonably consistent results.

As the direct flood runoff generally is believed to be accurate within 10 percent, larger inconsistencies may indicate deficiencies in basic data or limitations in methods of analysis of the data. Figure 17 shows the place names of five gaging stations that appear to be the most inconsistent. Table 5 shows that at several rainfall stations in Connecticut, particularly at higher latitudes and altitudes, traces of snow were reported on the ground after the flood on January 27. These reported traces possibly consisted of patches of snow in more sheltered spots and probably were of negligible consequence over the basins as a whole. In Massachusetts a measureable amount of snow on January 27 was reported at three stations, at one of which the snow was reported to be gone by January 31. Headwater streams of the three primary drainage basins, namely, Quinebaug River above Quinebaug, Conn., Farmington River above Riverton, Conn., and Housatonic River above Falls Village, Conn., extend into Massachusetts. As these basins lie at a higher elevation and latitude, it was presumed that a light snow cover amounting to possibly 0.2 inch of equivalent water content remained on them after the flood period. An examination of figure 17 shows that if the results for these three stations were adjusted by the estimated snow residual, they would plot more consistently with the results obtained for other stations. Also, as explained in the section on "Snow," the equivalent water content of snow in Massachusetts prior to the flood was determined from less comprehensive data than in Connecticut, and if the areal water content of snow was more accurately known for the above-mentioned stations a further revision of results might be indicated. The water content of snow on January 24 plus precipitation January 24-26 seems high and low, respectively, for the drainage basins above Still River near Lanesville, Conn., and

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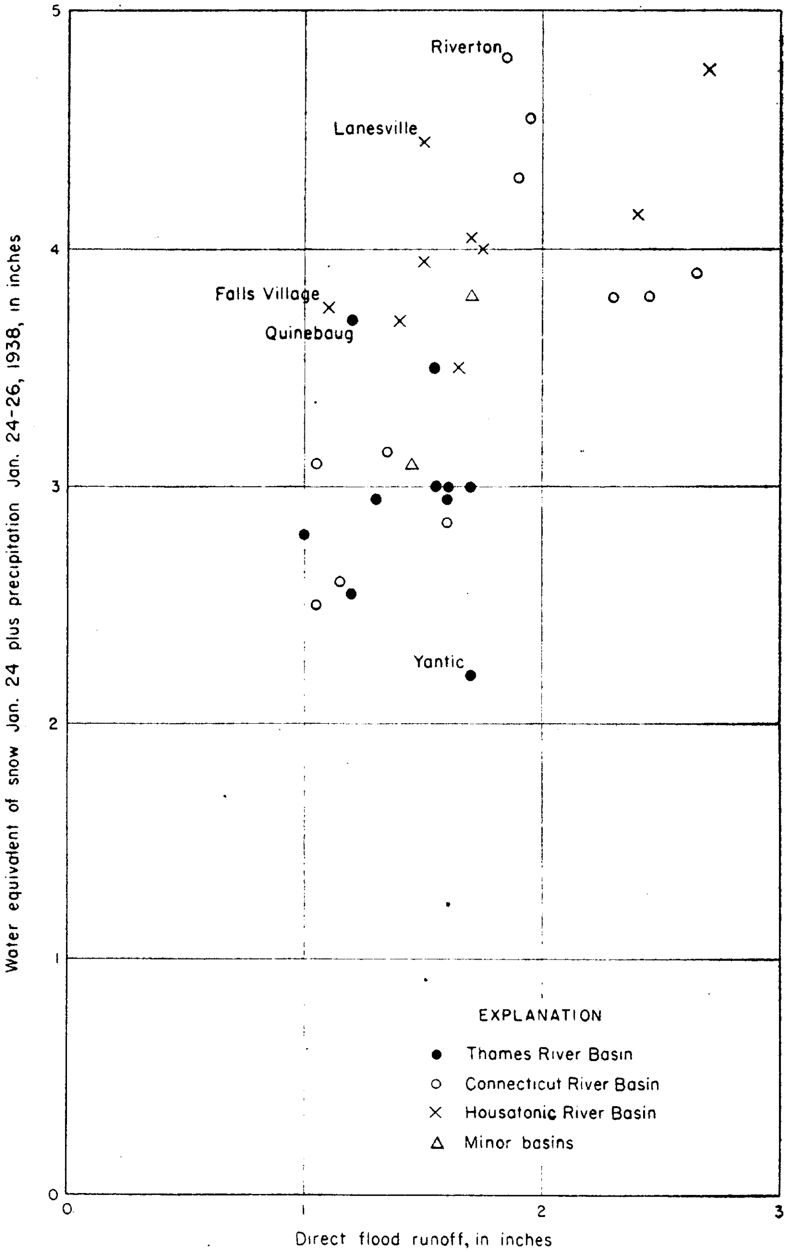

FIGURE 17.—Relation of water equivalent of snow plus storm rainfall to direct runoff for river-measurement stations in Connecticut during flood of January 1938.

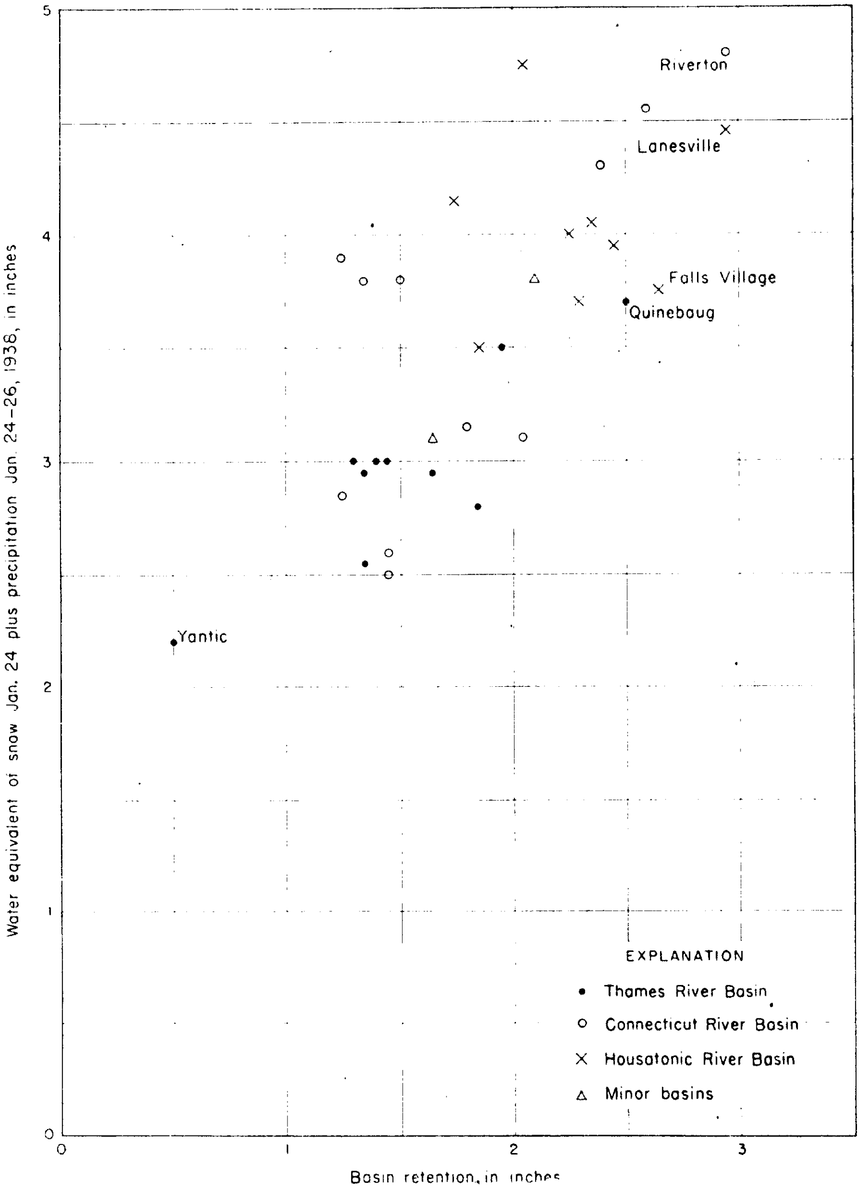

FIGURE 18.—Relation of water equivalent of snow plus storm rainfall to basin retention for river-measurement stations in Connecticut during flood of January 1938.

Yantic River at Yantic, Conn., possibly because of inadequacies in the delineation of storm precipitation.

The initial part of a winter rainfall is utilized in aiding the melting of any snow on the ground and combines with the melted snow to wet vegetation and ground surface, to fill surface depressions, and to aid the thawing of frost. Controlled by the extent that frost intereferes with absorption, the additional water after satisfying these initial requirements follows the surface courses to the stream channels. Release of frost from the surface downward permits increasing increments of water to be absorbed by the soil and provides subsurface passages to the streams. It is apparent that the frost was largely removed from the ground during the January flood.

The differences between the available water and the corresponding direct runoff, as shown in column 11 of table 9, include accretions to the ground both above the groundwater table as soil moisture and below it within the zone of saturation as ground water, the water equivalent of the slight residual snow cover previously discussed, the interception of vegetation and soil, and any slight direct evaporation and transpiration. They represent the basin retentions as closely as may be determined from the available data.

Figure 18 presents a graphical comparison between the available water and corresponding basin retentions for the 32 regular river-measurement stations in Connecticut. Most of the plotted points seem reasonably consistent. The 5 stations whose place names appear on the plot are the same stations discussed in connection with figure 17.

An important characteristic of flood runoff is its concentration with respect to time. The concentration may be conveniently evaluated in the form of a ratio between discharge during a selected short interval of time and the total direct discharge during the flood period. The last column of table 9 lists the ratio between the direct runoff during the maximum 24 hours and the total direct flood runoff. The factors believed to be of greatest influence upon these concentration ratios are as follows: Duration and intensity of storm, direction of storm movement, rapidity of snow melting, channel characteristics, and shape and slope of drainage basin. As the characteristics of the storm were fairly uniform over the area, variations in concentration ratio between different basins may be largely ascribed to rapidity of snow melting and inherent basin characteristics. Further reference to concentration ratios is made in the discussions of rainfall and runoff relations for the separate major basins.

The ground-water discharge was estimated to increase during the flood period, as from *J* to *K* in figure 16, and increased ground-water flow attributable to the flood continued until such a time as the extended ground-water depletion curve, *K-M*, approaches the extension of the initial ground-water depletion curve, *JC*. The area of the three-sided figure thus formed, expressed in inches of runoff, represents an increased volume of storage over the basin equivalent to the apparent ground-water recharge caused by the flood. Although generally less than total recharge by the amount of transpiration and evaporation from the ground-water supplies, it is probably closely equivalent to total recharge during the winter season. A direct computation of the area enclosed in the above-mentioned three-sided figure would be somewhat cumbersome, and the area is customarily solved by the algebraic summation of other areas under the flood hydrograph. As explained by Langbein and others,[10] from a derived average ground-water depletion curve for the gaging station in question a relationship curve can be developed between the rate of ground-water discharge and the associated volume of storage. Then the apparent ground-water recharge may be computed by adding to the estimated base runoff during the flood period (represented by the area below the line *J-K-L* the volume of ground-water storage equivalent to the discharge at *L*, less the volume of storage equivalent to the discharge at *J*. Apparent ground-water recharge was computed at only a few stations by this method as time did not permit such an analysis for all stations. An average coefficient was obtained to convert the difference between the ground-water flow, such as at *J* and *K*, into the corresponding increment in ground-water storage for summation with the ground-water flow during the flood period to give the apparent ground-water recharge. Thus, values were approximately computed for each station, and an average figure was obtained for each of the three primary drainage basins, as presented in the discussion of the basins in a subsequent part of this section of the report.

COMPARISON WITH OTHER FLOODS

A general comparison of floods is of necessity indecisive because of the many variables involved. Minor storms of equal magnitude, duration, and intensity, but occurring during different seasons and under dissimilar soil-moisture conditions, cause widely variable amounts of surface runoff. Identical major storms may cause less divergent volumes of surface runoff because the variations in immediate losses, such as soil absorption and infiltration, represent a much less important proportion of the total precipitation. Also

[10] Langbein, W. B., and others, Major winter and nonwinter floods in selected basins in New York and Pennsylvania: U. S. Geol. Survey Water-Supply Paper 915.

storms of equal magnitude but of varying duration or intensity produce widely variant flows. In Connecticut the runoff has been analyzed for major storms of March 1936 in Water-Supply Paper 798, of July 1938 in another part of this report, and of September 1938 in Water-Supply Paper 867. Water-Supply Paper 867 also includes a brief analysis of the storms of November 1927 and September 1932. Table 4 presents the area-depth relations for the precipitation during these storms.

Each storm was of a different type. In March 1936, major storms, spaced about a week apart, produced heavy precipitation when other prevailing conditions were favorable to the development of great volumes of flood runoff. In November 1927 both the duration and the intensity of precipitation were unusual and resulted in floods of extraordinary magnitude. In the storms of July and September 1938, seasonal flood-deterrent conditions were eliminated by extraordinary excesses of precipitation for several days immediately preceding the flood-producing rains. The storm of September 1932 is notable as an intense 1-day rainfall which, however, produced no important flood principally because of the absorptive capacity of the ground. Conversely, the 1-day storm of January 1938 was of minor magnitude, and only the combination of such factors as snow cover, frost, and warm temperatures produced a noteworthy flood.

Table 10 summarizes factors, as explained in the column headings, for the above-mentioned storms for river-measurement stations in Connecticut for which rainfall and runoff data are available. The data shown for each flood are influenced by the particular rainfall and snow-cover distribution, and by the runoff characteristics of the basins in that group. Such variations affect the interrelations among the data.

From table 10 it may be observed that the basin retention for the two winter floods was much less than for those of other seasons, partly because a frost barrier initially obstructed absorption of water into the ground. The storm of January 1938 supplied 30 percent less water but yielded three times greater direct runoff and seven times greater average peak rate of flow than the storm of September 1932. The average rainfall plus water equivalent of snow, the direct runoff, and the retention for the flood of January 1938 were about one-half of the like values for the flood of July 1938, whereas the average peak discharge was greater. The range of the extremes of ratios of direct runoff to the supply for the Quinebaug River at Jewett City is noteworthy, as it was only 11 percent of the rainfall in the storm of September 1932 but 88 percent of the available water in the storms of March 1936.

TABLE 10.—*Comparison of recent floods in Connecticut*

Date of storm	Duration of storm (days)	Number of gaging stations considered	Average of Maximum discharges (second-feet per square mile)	Total gaged area involved (square miles)	Weighted mean over gaged area involved			Quinebaug River at Jewett City			Maximum discharge (second-feet per square mile)	Housatonic River at Falls Village			
					Precipitation plus snow melt (inches)	Direct flood runoff associated with storm (inches)	Retention (inches)	Precipitation plus snow melt (inches)	Direct flood runoff associated with storm (inches)	Retention (inches)		Precipitation plus snow melt (inches)	Direct flood runoff associated with storm (inches)	Retention (inches)	Maximum discharge (second-feet per square mile)
Nov. 2-5, 1927	2	2	18.0	1,343	6.0	2.35	3.65	5.9	1.7	4.2	17.6	6.15	3.05	3.1	18.5
Sept. 16-17, 1932	1	7	5.9	1,310	5.1	.55	4.55	6.4	.7	5.7	7.7				
Mar. 9-22, 1936		25	59.5	3,956	9.8	8.45	1.35	10.7	9.4	1.3	41.1	10.3	8.65	1.65	22.9
Mar. 9-13, 1936	4	25	55.0	3,956		[1]4.15			4.4		32.3		4.55		17.2
Mar. 16-19, 1936	3	25	44.8	3,956		[1]3.6			5.0		41.1		4.05		22.9
Jan. 24-26, 1938	1	[2]25	41.8	3,956	3.55	1.5	2.05	2.95	1.3	1.65	15.6	[3]3.55	1.1	2.65	11.4
		32	41.9	4,149	3.55	1.55	2.0								
July 17-25, 1938	7	[2]25	35.7	3,956	7.05	2.6	4.45	8.85	4.3	4.55	35.2	4.85	1.35	3.5	7.2
		32	35.0	4,149	7.05	2.6	4.45								
Sept. 17-21, 1938	4	[2]25	91.0	3,956	10.35	5.35	5.0	8.9	4.3	4.6	32.1	8.65	4.95	3.7	31.5
		32	87.3	4,149	10.4	5.35	5.05								

[1]Not adjusted for change in contents of reservoirs above stations.
[2]For purposes of comparison these stations are identical with those considered for the floods of March 1936.
[3]Adjusted by 0.2 inch of water equivalent of snow estimated not to have melted during period of direct runoff. Adjustments for other values included herein are considered negligible.

THAMES RIVER BASIN

Available records of precipitation in the Thames River Basin show comparatively uniform amounts over the area for the flood period. Plate 4 shows a minimum of less than 0.75 inch at the south end and an increase to somewhat more than 1.75 inches in other localities. Only 11 rainfall records were available for the whole area, and three of these were not fully usable. Additional records doubtless would have given a closer refinement of results. Plate 5 shows that the water content of snow on the ground January 20 increased from less than 0.5 inch near the south end of the basin to more than 2.25 inches at the northern extremity. The total available water on the tributary stream basins varied from 2.2 to 3.7 inches and averaged 2.9 inches over the 1,201 square miles of gaged drainage area.

Net artificial storage in the Thames River Basin was small for the total period considered in computing direct runoff, and accordingly the runoff values shown in column 10 of table 9 closely represent natural-flow conditions. The basin retention is shown in column 11 of table 9. The figures seem reasonably consistent except for the Quinebaug River at Quinebaug, records for which are probably affected by a residual of snow, and for the Yantic River at Yantic, results for which may reflect poorly defined precipitation within its basin.

An analysis of hydrographs showed an accretion to ground water of 0.8 inch to 1.3 inches, which averaged about 80 percent of the total retention. This accretion represents that part of the retention that appeared as ground-water effluent during and after the flood.

The concentration of direct flood runoff with respect to time, as measured by the ratio between the direct runoff during the maximum 24 hours and the total direct flood runoff, ranged from 35 to 61 percent. On the same river this concentration ratio usually decreases in a downstream direction, which indicates the increasing effect of channel storage and the leveling effect of tributary streams that discharge their peak rates of flow into the main stem at varying times. Under uniform storm conditions, with no snow on the ground, the concentration ratio may be presumed to be definitive of the topographic and channel characteristics of the basin. However, during the flood of January 1938 the rate and amount of snow melting probably obscured the normal display of those characteristics.

CONNECTICUT RIVER BASIN

Thirty-nine records of precipitation within the area of the Connecticut River Basin studied in this report, together with records just outside the area, well define the variations in rainfall except possibly for three drainage areas in the southern part of the basin. Plate 4 shows that the rainfall reported for the period January 24-26, 1938, ranged from less than 1.0 inch to more than 2.75 inches. Plate 5 shows that the water equivalent of snow on the ground January 20 increased from less than 0.75 inch in the southern extremity of the basin to more than 2.75 inches in certain places elsewhere. Total available water during the flood period on the tributary stream basins varied from 2.5 to 4.8 inches and averaged 4.0 inches on the 971 square miles of gaged area.

The data on direct runoff shown in table 9 have been adjusted for change in contents of all upstream reservoirs for which daily records are available. In addition, there are numerous small regulated ponds and reservoirs for which no records were available. The four large reservoirs above the Farmington River at Tariffville, Conn., reduced the direct flood runoff at that station by the equivalent of 0.3 inch of water over the entire basin. In table 9 the figures representative of basin retention seem reasonably consistent except for the Farmington River at Riverton, which possibly includes some residual snow.

On the basis of analyses of hydrographs, it is estimated that the part of the ground-water accretions that later appeared as stream flow ranged between 0.65 inch and 1.45 inches and averaged about 65 percent of the basin retention.

The concentration of direct flood runoff with respect to time, as measured by the ratio between the direct runoff during the maximum 24 hours and the total direct flood runoff, ranged between 51 and 85 percent. The ratio of 85 percent for Burlington Brook near Burlington indicates the tendency to greater concentration of flow on small streams.

HOUSATONIC RIVER BASIN

A maximum precipitation of 4.10 inches for the storm period January 24-26, 1938, was recorded at Danbury, Conn., in the Housatonic River Basin. The steep gradient of precipitation on all sides of this station, not defined by any nearby rainfall records, affected the accuracy of the computation of average precipitation principally for the basins above the Still River near Lanesville and the Saugatuck River near Westport. Figures 17 and 18 show the relations of total available water with direct runoff and basin retention. The plotted relations for the Saugatuck River near

Westport seem consistent, but the relations for Still River near Lanesville indicate that the estimated available water was perhaps too high. This apparent discrepancy could have been adjusted by assuming a steeper gradient of precipitation north and east of Danbury, but this was not done as the isohyetal maps were prepared solely on the basis of precipitation data and independently of the evidence of the rainfall-runoff studies.

Plates 4 and 5 show, respectively, the variations in storm rainfall and the water equivalent of snow on the ground. As in other basins, the water equivalent of snow shows a tendency to increase with latitude and possibly with altitude, but this basin was probably more affected than other basins by the residual snow from old storms. Table 9 shows that total available water on the tributary stream basins within the Housatonic watershed varied from 3.5 to 4.75 inches and averaged 3.75 inches over the 1,791 square miles of the basin above the river-measurement stations.

The data on direct runoff in table 9 have been adjusted for change in contents of all upstream reservoirs for which daily records are available. No adjustments could be applied for the many small regulated ponds and reservoirs for which no records were available. During the flood period, storage in three reservoirs or lakes reduced the direct flood runoff above the gaging station at Stevenson, Conn., by the equivalent of 0.07 inch over the basin. In table 9 the figures representative of basin retention for the various streams seem reasonably consistent except for Housatonic River at Falls Village, which retention possibly includes some residual snow, and for Still River near Lanesville.

Estimates made by methods previously described indicate that the accretion to ground water during the flood period ranged from 1.1 to 1.8 inches and averaged about 60 percent of the basin retention.

FLOOD OF JUNE 1938 IN NEW JERSEY

By Otto Lauterhahn and W. B. Langbein

INTRODUCTION AND GENERAL FEATURES

The flood of June 1938 in New Jersey was the immediate result of a 30-hour rainstorm on June 26-27 that centered around Odessa, Del., which received 8.55 inches rainfall, Indian Mills, N. J., which received 7.71 inches, and Milton, N. J., which received 6.29 inches. The rainfall about these three concentrations exceeded 5 inches over a total area of 2,900 square miles. River stages in the central parts of storm areas rose to levels that approached, and on a few rivers exceeded, previous maxima of record. The highest rates of flow per unit area were reached by Deep Run near Browntown and Oldmans Creek near Woodstown, which crested at 88 and 61.7

second-feet per square mile, respectively. The areas in New Jersey in which noteworthy floods occurred are delineated on figure 19.

No records of discharge are available in Delaware, the area of most intense rainfall, and therefore rainfall-runoff relations in that part of the storm area cannot be studied.

Within New Jersey the storm was most intense in the southern part, a low region of small relief and not generally productive of intensive rates of discharge. However, during September 1, 1940, the area from Mount Holly to Salem was the center of a storm of West Indian origin that in 12 hours precipitated in excess of 10 inches of rainfall over an area of 1,000 square miles and produced rates of discharge on Oldmans Creek of more than 420 second-feet per square mile and on Salem Creek of 7,090 second-feet, or 1,650 second-feet per square mile from the tributary area of 4.3 square miles above Woods Mill. These rates of discharge vastly exceed any previously observed in this area. In contrast, the rates of the flood of June 1938 do not seem outstanding. Nevertheless, the latter flood caused much damage and merits study as a means to the amelioration of flood conditions in New Jersey.

A vivid impression of the storm and flood of June 1938 may be obtained from newspaper accounts, of which the following reflect the damage and effect on normal activities within the flooded region:

Flood waters from rain-swollen streams rolled with heavy toll today over farm fields and roads in Delaware, New Jersey, and Pennsylvania.

Damage was counted in millions of dollars in the tri-State area in the wake of a 24-hour northeast storm setting new records for June rainfall.

Delaware's downpour of 5.11 inches sent the Brandywine and Christina Rivers over their banks in places, and burst a dam at Silver Lake, Middletown.

Four square miles of land were under water today at Burlington, N. J., where 300 families were driven from their homes, mostly temporarily, in the collapse of a dam last night at Sylvan Lake.

Injury to crops, roads, and private and public property was placed at $2,000,000 by unofficial estimate in Camden, Gloucester, Burlington, and Salem Counties, N. J.[11]

Three boys and two men were missing and feared drowned, and between 200 and 300 homes in the south and west portions of the city of Burlington were inundated shortly after 7 o'clock last night, when Sylvan Lake ripped through its banks under the pounding of torrential rain.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

This was the worst of the consequences of a storm which was heralded Monday night by a series of savage electric storms, and which then settled down to almost continuous rain.[12]

[11] Journal—Every Evening, Wilmington, Del., Tuesday, June 28, 1938.

[12] Inquirer, Philadelphia, Pa., Tuesday morning, June 28, 1938.

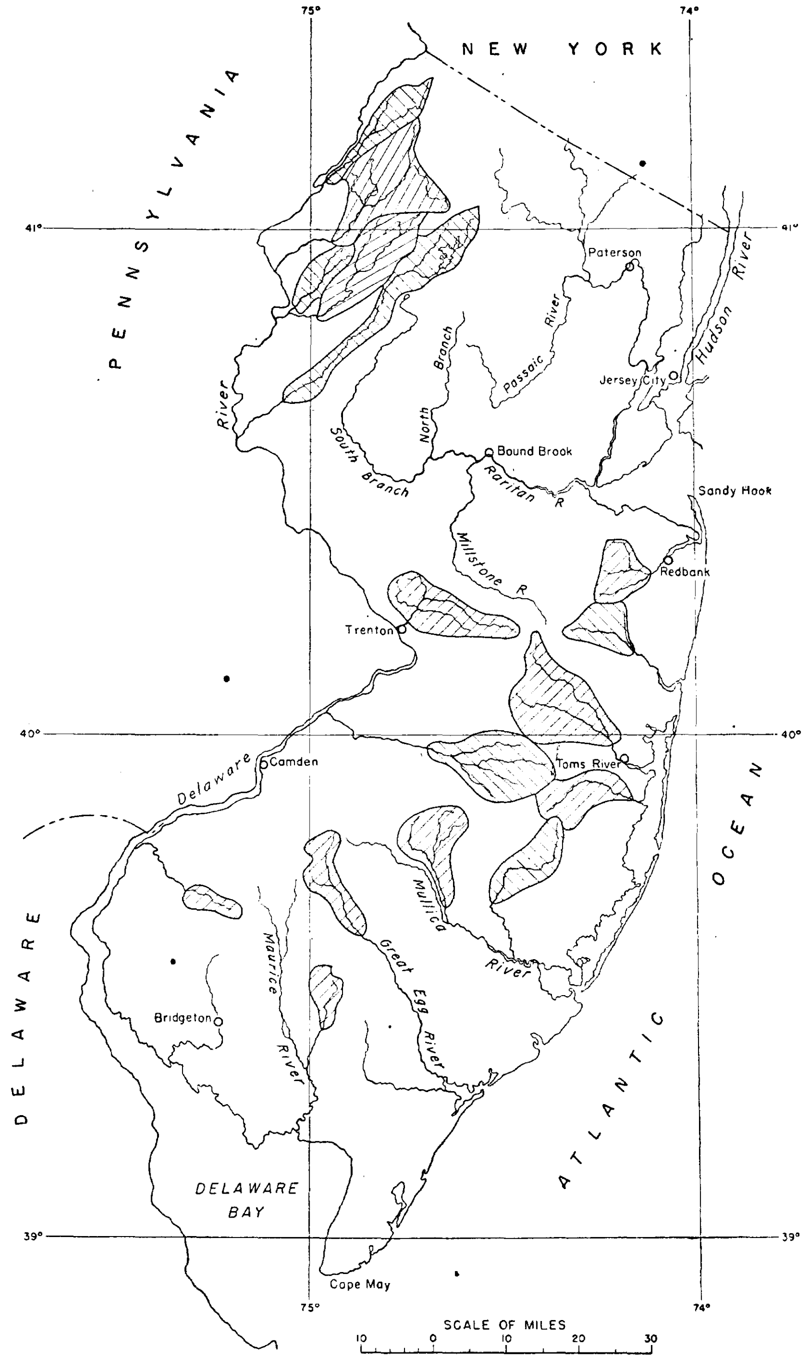

FIGURE 19.—Map of New Jersey showing drainage areas in which noteworthy floods occurred during June 1938.

A downpour of 4½ inches of rain in 24 hours flooded the flat, sea-level country of southern New Jersey on June 26-27 causing considerable damage to county roads and highway bridges, and washing out an old earth dike that created a diversion lake at Burlington, releasing some 75 million gallons of water upon the city.

★ ★ ★

County roads and bridges were washed out in Burlington County. Road Supervisor L. A. MacFarland says the main damage to the county road system is loss of several miles of gravel shoulders, just completed and ready for oiling. The floods overtopped and washed out roads at many small culverts that were inadequate for the discharge, according to F. L. Branin, county engineer. A few old timber bridges were swept away, and fills behind abutments on newer structures were washed out. Damage on the State highway system was restricted to undermining of concrete slabs at a few points and erosion of wet slopes. [13]

New Jersey contains many large cities and has a high density of population. Fortunately, the storm was heaviest in the more sparsely populated regions, and damages were much smaller than they would have been otherwise.

MONTHLY DISTRIBUTION OF FLOODS

Floods in New Jersey predominate in two seasons, namely, late winter and late summer. Table 11 lists the dates and discharges of the annual floods on Paulins Kill at Blairstown in the northern part of the State and on Great Egg River at Folsom in the southern part. On Paulins Kill 11 floods occurred during the months from February to April and 5 floods from July to September. On Great Egg River, 7 annual floods occurred from February to April and 7 during August and September. No maximum annual flood occurred in either basin during May, June, October, or November. Floods during the late winter are generally produced by the melting of accumulated snowfall, rainfall, and high soil moisture, a combination of conditions especially favorable to production of major floods. This combination of conditions occurs more frequently in the northern basins than in the southern. Annual floods in summer occur as a result of heavy rainstorms, such as are produced by West Indian hurricanes or local thunderstorms. These storms are characterized by great intensity for short periods and over small areas and therefore tend to be productive of great floods on small drainage areas, such as are typical of streams in southern New Jersey. On large streams the late winter and early spring floods predominate. A count of annual floods on Passaic River at Paterson, a drainage area of 785 square miles, as obtained from

[13] Engineering News-Record, vol. 121, p. 5, July 7, 1938.

data given in Water-Supply Paper 771[14] for a period of 36 years, discloses that 26 occurred during the 3 months of February to April. Unusually widespread West Indian hurricanes, as those in October 1903 and August 1933, produce maxima during the late summer on drainage areas as large as the basin above Paterson, as well as on smaller basins such as those given in table 11.

TABLE 11.—*Annual floods of two selected streams in New Jersey*

Water year	Great Egg River at Folsom[1]		Paulins Kill at Blairstown[2]	
	Date	Discharge (second-feet)	Date	Discharge (second-feet)
1939–40	Sept. 3	1,440	Mar. 15	1,910
1938–39	Aug. 22	543	Dec. 6	3,120
1937–38	Sept. 23	718	Sept. 22	4,480
1936–37	Jan. 22–23	206	Jan. 26	1,070
1935–36	Jan. 6	368	Mar. 12	3,480
1934–35	Sept. 8	599	July 10	2,060
1933–34	Mar. 7–8 Aug. 18	203	Mar. 6	1,280
1932–33	Aug. 25	370	Aug. 24	[3]2,300
1931–32	Mar. 31–Apr. 1	216	Mar. 29	1,070
1930–31	Apr. 3	127	----------	----------
1929–30	Mar. 11	160	Mar. 9	700
1928–29	Apr. 19–20	229	Mar. 6	1,310
1927–28	Apr. 29–30	195	July 15	1,590
1926–27	Aug. 21	160	Aug. 29	925
1925–26	Feb. 22	150	Feb. 26	1,170
1924–25	----------	----------	Feb. 12	[3]1,800
1923–24	----------	----------	Apr. 7	[3]1,680
1922–23	----------	----------	Mar. 17	1,750
1921–22	----------	----------	Mar. 8	1,800

[1]Drainage area, 56.3 square miles.
[2]Drainage area, 126 square miles.
[3]Approximate figure.

There were three storms during the summer of 1938, each storm greater in intensity and in areal extent than the preceding. That of June 1938 was fairly local, centering in southern New Jersey and northern Delaware, but those of July and September covered wide areas including New Jersey. As a result of these three storms every stream in the State except one reached its annual flood during this summer, but only one stream, Oldmans Creek in the southern part of the State, reached its annual flood as a result of the storm of June 1938.

METEOROLOGIC FEATURES OF THE FLOOD

ANTECEDENT CONDITIONS

Precipitation during March and April 1938, as indicated by the rain gage at Indian Mills (table 12), was below normal, while the mean temperature was above normal. This combination of conditions would tend to produce a dry soil favorable for the retention of potential flood-producing rainfall. Precipitation during May, however, was slightly in excess of normal and temperature was

[14] Jarvis, C. S., and others, Floods in the United States, magnitude and frequency: U. S. Geol. Survey Water-Supply Paper 771, p. 136, 1936.

1.3° below normal, which would tend to build up soil moisture. The first 24 days of June, which preceded the flood, were about normal with respect to precipitation and to temperature. In general, therefore, it might be deduced that soil-moisture conditions were normal on June 25, except locally, to the extent that soil-moisture content may have been raised on June 23-24 by rainfall, which at four stations exceeded 2 inches but averaged less than 1 inch over the south half of the State.

TABLE 12.—*Monthly precipitation and temperature at Indian Mills, N. J., during spring and summer of 1938*

Period	Precipitation			Temperature	
	Total inches	Departure from normal (inches)	Cumulative departure from normal (inches)	Mean (°F.)	Departure from normal (°F.)
March	1.98	−2.10	−2.10	45.0	+3.9
April	1.98	−1.82	−3.92	54.6	+4.1
May	3.83	+.49	−3.43	60.4	−1.3
June 1–24	3.15	+.15	−3.28	70.0	+.5
June 25–30	7.71	+6.78	+3.50	69.5	−1.5
July	7.08	+2.33	+5.83	76.0	+1.5
August	1.93	−3.60	+2.23	75.8	+3.4
September	11.00	+7.51	+9.74	64.4	−2.0

NOTE.—Figures determined from U.S. Weather Bureau records.

WEATHER CONDITIONS ASSOCIATED WITH THE STORM

The intense rainfall of June 26 and 27 in New Jersey was associated with a trough-shaped low-pressure area extending in a northeasterly direction and situated between a high-pressure area moving slowly southeastward over Lake Superior and a high-pressure area east of Bermuda. The surface weather chart on the morning of June 27 illustrates these conditions. (See figure 20.)

On the afternoon of June 26, when the first heavy rainfall began abruptly, the low-pressure area was centered over the central Ohio River Basin and was advancing nearly due east. A well-defined cold front extended northeastward over New Jersey from this low-pressure center. On the morning of June 26 the front passed over Port Jervis, N. J., and on the morning of June 27, as shown on figure 20, it lay over southern New Jersey. By the morning of June 28 it had passed to a position about a hundred miles to the southeast. The passage of this front over the State may be noted from the time of beginning of rainfall as given in table 14. The passage of the front was marked by large lowering of temperature, as noted in figure 20. A few stations in New Jersey reported a drop of 20° or more in temperature, as for example Flemington, which had a maximum temperature of 91° F. on June 26 and of 65° F. on June 27. On June 27, when most of New Jersey was

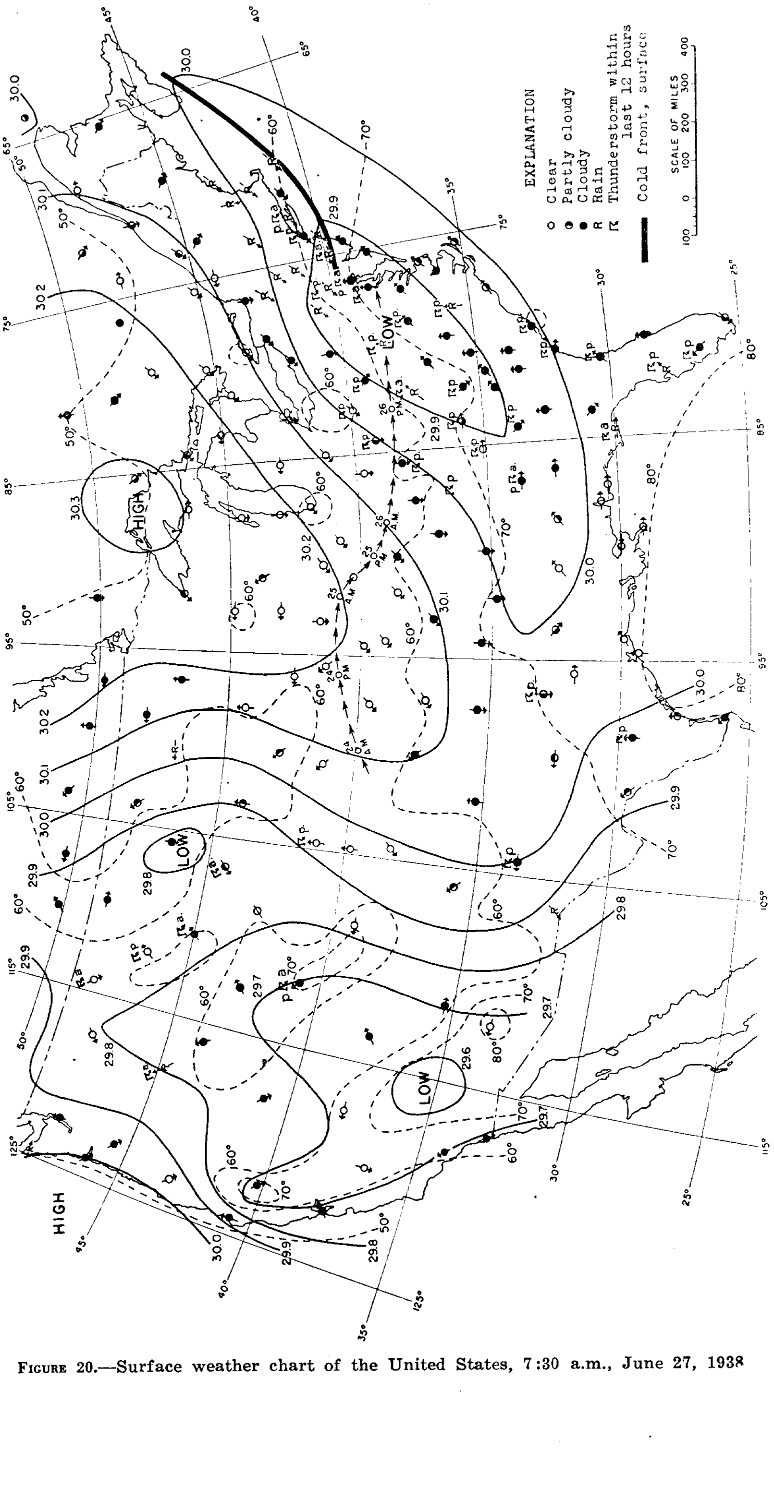

FIGURE 20.—Surface weather chart of the United States, 7:30 a.m., June 27, 1938

covered by cold air, fluctuations in temperature were small and most stations reported a difference of only 5° or less between maximum and minimum. Along this cold front, violent thunderstorms occurred on the afternoon and evening of June 26. After the passage of the front steady rainfall continued throughout the morning of June 27 and culminated in most parts of the State in another period of heavy rainfall on the afternoon and evening of June 27. Heavy rain also occurred over the northeastern part of New Jersey on the early morning of June 28, but in the rest of the State precipitation was light. Very little rain fell on June 29 as the low-pressure area had moved out to sea and the high-pressure area, which had centered over Lake Superior, now had extended over practically the entire eastern part of the United States.

PRECIPITATION

A total of 96 records of daily precipitation in New Jersey, including a few selected records in the central storm area in Delaware and adjoining parts of New York and Pennsylvania, are given in table 13. Most of the records were furnished by the United States Weather Bureau, but a thorough effort was made to compile records collected by other agencies and persons, with special emphasis on those in New Jersey. Among these records are 38 autographic records at which continuous records of precipitation are available. Precipitation at these gages during each hour of the storm is given in table 14. Most of these rain gages are in the northern part of the State, and none are at the places of heaviest rainfall. Days on which no precipitation fell during the period June 25-29 are omitted from table 14.

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Table 13.—*Daily precipitation, in inches, June 20-30, 1938*

[Measured in the afternoon except as noted]

No. on pl. 11	Station	20	21	22	23	24	25	26	27	28	29	30	Total, 25–29
	Hudson River Basin												
	New York:												
754	Sparkill[1, 2]	(3)	(3)	(3)	(3)	(3)		0.87	1.82	0.51			3.20
	New Jersey:												
755	Beemerville[2, 4]				0.07	0.01	0.02	1.24	2.57	.07			3.90
756	Libertyville[2, 4]			0.18			.04	.88	2.63	.17			3.72
757	Sussex			.14	.01			.99	1.62	1.76			4.37
	Hackensack River Basin												
	New York:												
758	Spring Valley[1, 2]	(3)	(3)	(3)	(3)	(3)		1.46	2.02	.24			3.72
	New Jersey:												
379	New Milford[1, 2]							1.00	.85	1.21			3.06
385	Ridgefield[1, 2]				Tr.	.08		.80	.52	2.53			3.85
390	Woodcliff Lake[1, 2]					.13		.98	2.13	.69			3.80
	Passaic River Basin												
	New York:												
348	Palisades Park[2, 5]				.63	.26		1.70	2.50	.34	0.05	0.04	4.59
349	Southfields[2, 5]				.80			1.80	2.65	.22			4.67
	New Jersey:												
350	Boonton[6]					.20	.87	.02	1.57	1.13	.22		2.94
351	Bowling Green[2, 5]		(3)	(3)	(3)	(3)	(3)	(3)	1.62+	.54	.05	.03	2.24+
352	Brook Valley[2, 5]				.83			1.91	1.46	.45			3.82
353	Canistear Reservoir[7]				2.40	.15		1.80	1.70	2.60	.05		6.15
354	Canoe Brook[6]					.10			1.14	1.45	.15		2.74
355	Cedar Grove Reservoir[6, 7]					.03		.01	2.54	1.94	.34		4.83
356	Charlotteburg				.60	.03		.40	2.00	1.63	.07		4.10
357	Chatham[6]					.12		Tr.	1.36	1.81	.37		3.54
358	Dover				1.75			1.92	1.24	.33			3.49

368	Greenwood Lake[8,9]				3.03		.04	2.63	2.55	.05			5.27
370	Little Falls[6]					.03		Tr.	2.00	1.50	.14		3.64
372	Macopin intake[6,7]				.06	1.06	.01	.14	2.81	1.60	.07		4.61
373	Mahwah[2,5]							1.96	1.63	.08			3.67
374	Millington[2,5]							1.55	.79	.86			3.20
375	Milton[6,10]					.20		.19	3.42	2.55	.13		6.29
376	Morristown[2,11]				.21			1.97	.99	.60			3.56
377	Morristown Reservoir[2,5]				1.00	.02		1.10	.93	.56	.03	.02	2.62
380	Oak Ridge Reservoir[7]					.38		1.29	2.48	1.84	.08		5.69
381	Paterson							1.50	.87	1.65	.02		4.04
382	Do[6,12]					.01		.03	1.70	1.56	.14		3.43
384	Raymond Dam[6,9]				.18		.15	2.25	1.45	.12			3.82
386	Ringwood[6,9]				07			2.60	2.22	.02			4.84
387	Rockaway[2,5]				1.81			2.03	.87	.19			3.09
389	Splitrock Pond[6,10]					1.89	.16			3.46	18		3.64
	Raritan River Basin												
	New Jersey:												
359	Flemington			Tr.	.02			.41	1.57	.63	.01		2.62
360	Freehold			Tr.	1.63				4.30	1.42	.03		5.75
362	Freehold (Oakland Mills R-2)[2,4]				2.91			.95	4.26	.29			5.50
366	Freehold (Cahills Corner R-6)[2,4]				.67			.70	4.52	.24			5.46
369	Hightstown			.03	.47			Tr.	5.30	.25	.02		5.57
371	Long Valley				.61			1.63	.90	1.11			3.64
760	Manville[13,14]			.12	1.98			1.10	.64	.70			2.44
378	New Brunswick			.10	.07			.05	1.76	.51	.02		2.34
383	Plainfield				.15			.23	1.30	1.30			2.83
388	Somerville				1.61			.60	1.11	.79	.02		2.52
361	West Freehold No. R-1[2,4]				2.05	.02		1.43	3.88	.26			5.57
	Delaware River Basin												
	New Jersey:												
425	Belvidere			.25	.40			.35	(15)	5.07			5.42
426	Bridgeton			.14	.04				2.63	1.55	.05		4.23
427	Burlington			1 04	Tr.				5.25	.76			6.01
429	Camden[2]			.27	.46			1.26	3.23	.17			4.66
430	Culvers Lake				.26			1.38	1.05	2.60			5.03
763	Deepwater[6,16]							3.2	2.1		.25		5.55
431	Lambertville			.06	Tr.			.08	1.86	.78	.03		2.75
432	Layton				.47			.67	3.78	.29	Tr.		4.74
433	Moorestown[6]				.48	.02			3.12	3.16	.11		6.39
764	New Lisbon[6,17]			.02	.03	.79			2.00	4.72	.16		6.88
434	Newton				1.75			1.56	2.44	1.05	.01		5.06
435	North Merchantville			.26	.26				4.43	.32	Tr.		4.75
436	Pemberton			.81	1.22				3.54	1.27	.04		4.85
437	Phillipsburg			.24	.53			1.72	2.02	.26			4.00
765	Pine Run[18]	(3)	(3)	(3)	(3)			2.50	2.67	.50			5.67

TABLE 13.—*Daily precipitation, in inches, June 20-30, 1938*—Continued

No. on pl. 11	Station	20	21	22	23	24	25	26	27	28	29	30	Total, 25–29
438	Trenton No. 1[2]			0.20	0.09			2.19	2.75	0.27			5.21
439	Trenton No. 2[2]			.19	.04			1.86	2.79	.51			5.16
766	Wrightstown (Fort Dix)[6 19]				.22	.23			1.20	2.55	0.14		3.89
	Delaware:												
	Delaware City			.01	.28	.04			3.66	.95	.02		4.63
	Odessa	Tr.		.06	.22	Tr.			7.83	.72	Tr.		8.55
	Wilmington (Municipal Building			Tr.	.60	.03			7.22	.40	Tr.		7.62
	Wilmington (Porter Reservoir)			Tr.	1.77	Tr.			4.77	.35	.02		5.14
	Minor basins												
	New York:												
771	Bronx (New York University)[2]					Tr.		.57	1.25	1.19			3.01
666	Brooklyn Eagle[2]							1.27	1.09	.86			3.22
772	Floyd Bennett Airport[2]							.45	1.84	.44			2.73
668	Flushing[2]			.05				.73	.82	1.27			2.82
675	Mount Vernon[2]							.55	2.00	.78			3.33
676	New York (Battery Place)[2]			Tr.	Tr.	.03		1.06	1.07	1.01			3.14
677	New York (Central Park)[2]			.04		.08		.94	1.07	1.69			3.70
682	Westerleigh[2]			Tr.	.02	Tr.		1.23	1.28	.73			3.24
	New Jersey:												
683	Atlantic City[2]			.02				.20	.46	.71			1.37
684	Belleplain			.07					.12	1.35	.19		1.66
686	Colts Neck No. R–8[2 4]				.07			2.20	3.29	.42	.08		5.99
687	Elizabeth				.07			.31	1.12	1.14	.01		2.58
688	Elizabethport[2 20]				.02	.02		.72	.96	.61	.02		2.31
689	Hammonton			.08	1.57				2.96	1.42	.02		4.40
690	Indian Mills			.14	.27			Tr.	6.78	.89	.04		7.71

691	Irvington[2 20]				.08			.87	.80	.65	.07		2.39
692	Jersey City				Tr.	.73			1.27	1.70	.28		3.25
774	Lakehurst[2 21]	(3)	(3)	(3)	(3)	(3)		.29	3.61	.18			4.08
693	Lakewood			.05	.70				2.65	2.12	.15		4.92
694	Long Branch[2]			.04	Tr.			.28	3.75	.40			4.43
695	Marlboro[2 4]				.14			1.09	3.51	.38			4.98
698	Newark[2 22]					.01		1.41	1.32	2.02	.01		4.76
775	Newark Airport[2]			Tr.	Tr.	Tr.		.72	1.02	.69			2.43
699	Northfield			.05					.20	1.11	.12		1.43
700	Pleasantville[6]			.04	.02				.02	1.27	.39		1.68
776	Rahway[8 23]				.09		.06	1.16	.99	.10			2.31
701	Runyon				.43				2.45	.88			3.33
702	Sandy Hook[2]			Tr.				.52	2.38	.27			3.17
703	Tuckerton			.09					.15	1.66	.22		2.03

[1] Hackensack Water Co., Wechawken, N. J.
[2] Measured at midnight.
[3] No record.
[4] Soil Conservation Service.
[5] Corps of Engineers, U. S. Army.
[6] Measured in morning of day indicated.
[7] City of Newark, Department of Public Affairs.
[8] Measured in morning after day indicated.
[9] North Jersey District Water Supply Commission.
[10] Department of Public Works, Jersey City, N. J.
[11] Town engineer, Morristown, N. J.
[12] The Society for Establishing Useful Manufactures.
[13] Elizabethtown Water Co., Elizabeth, N. J.
[14] Measured at 11 p.m.
[15] Included in following measuremnet.
[16] E. I. duPont de Nemours & Co., Inc., Dye Works.
[17] U. S. Forest Service.
[18] Wm. C. Armstrong, Blairstown, N. J., time of reading unknown.
[19] Commanding officer, Fort Dix, N. J.
[20] Joint meeting maintenance, Irvington, N. J.
[21] Naval Air Station.
[22] Kresge Department Store, William Wiener, meterologist. Recorder adjusted to conform with stick readings.
[23] Rahway Valley joint meeting.

Table 14.—*Precipitation, in inches, for*

No. on pl. 11	Station	Day	1	2	3	4	5	6
	Hudson River Basin							
754	Sparkill, N. Y.	26	---	---	---	---	---	---
	Hackensack Water Co., Weehawken, N. J.	27	0.07	0.01	0.07	0.02	---	---
		28	---	.02	.08	.11	0.04	---
755	Beemerville, N. J.	25	---	---	---	---	---	---
	U. S. Department of Agriculture, Soil Conservation Service	26	---	.01	.01	---	---	---
		27	.02	.04	.01	.01	---	0.24
		28	.01	---	.02	---	---	.01
756	Libertyville, N. J., Gage 2-R.	25	---	---	---	---	---	---
	U. S. Department of Agriculture, Soil Conservation Service	26	.01	---	---	---	---	---
		27	.01	.04	---	---	.02	---
		28	---	---	.03	.04	---	.02
	Hackensack River Basin							
758	Spring Valley, N. Y.	26	---	---	---	---	---	---
	Hackensack Water Co., Weehawken, N. J.	27	.06	.01	.04	---	---	---
		28	---	---	---	---	---	---
379	New Milford, N. J.	26	---	---	---	---	---	---
	Hackensack Water Co., Weehawken, N. J.	27	.05	.01	.09	.03	---	.01
		28	.01	.04	.25	.31	.01	.08
390	Woodcliff Lake, N. J.	26	---	---	---	---	---	---
	Hackensack Water Co., Weehawken, N. J.	27	.09	.01	.06	---	---	---
		28	---	.04	.27	.02	.01	.01
	Passaic River Basin							
348	Palisades Park, N. Y.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.04	.02	---	.01	.01	.02
		28	---	---	.03	---	.01	.03
		29	---	---	---	---	---	---
349	Southfield, N. Y.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.06	.07	---	---	---	---
		28	---	.05	---	---	.02	.03
351	Bowling Green, N. J.	27	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	28	.01	.03	.08	.03	.02	.02
		29	---	---	---	---	---	---
352	Brook Valley, N. J.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.01	.04	.04	Tr.	Tr.	Tr.
		28	.05	.04	.04	.01	.01	.04
373	Mahwah, N. J.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.01	.07	---	---	---	---
		28	---	---	.02	---	---	---
374	Millington, N. J.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.05	.01	.01	---	---	---
		28	.20	.20	.20	.02	.15	.03
376	Morristown, N. J.	26	---	---	---	---	---	---
	Town engineer, Morristown, N. J.	27	.07	.07	.06	.10	.07	.05
		28	.25	.13	.05	.02	.01	.03
377	Morristown, Reservoir, N. J.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.18	.01	.07	.03	---	---
		28	.10	.03	.02	.05	.04	.01
		29	---	---	---	---	---	---
387	Rockaway, N. J.	26	---	---	---	---	---	---
	Corps of Engineers, U. S. Army	27	.02	.07	.01	---	---	---
		28	.05	.01	.01	.02	.03	.01
	Raritan River Basin							
362	Freehold (Oakland Mills R-2), N. J.	26	---	---	---	---	---	---
	U. S. Department of Agriculture, Soil Conservation Service	27	.09	.02	.15	.12	---	.14
		28	.04	---	.05	---	---	.01
366	Freehold (Cahills Corner R-6), N. J.	26	---	---	---	---	---	---
	U. S. Department of Agriculture, Soil Conservation Service	27	.13	.03	.14	.07	---	.25
		28	.03	---	.04	---	.01	---
361	West Freehold No. R-1, N. J.	26	---	---	---	---	---	---
	U. S. Department of Agriculture, Soil Conservation Service	27	.06	.03	.11	.13	---	.08
		28	.04	---	.04	---	.01	.01

period ending at indicated time, June 1938

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
									0.04	0.23	0.18	0.37	0.02				0.03	0.87
	0.01	0.02	0.01	0.03	0.26				.01	.06	.05	.11	.16	0.23	0.07	0.60	.03	1.82
	.07	.04		.08							.01	.01	.05					.51
																	.02	.02
						0.20	0.15	0.17	.26	.26		.11	.01			.02	.04	1.24
		.11	.18			.02	.09	.07	.13	.30	.44	.81	.07	.02			.01	2.57
								.02	.01									.07
																	.04	.04
							.19	.13	.17	.29	.01				.01	.03	.04	.88
0.51	.10		.08	.01		.05	.09	.08	.14	.32	.27	.78	.11		.02			2.63
.01			.02		.01	.01	.02	.01										.17
									.10	.23	.71	.18	.01	.03	.09	.05	.06	1.46
		.04		.07	.05				.05	.02	.08	.13	.18	.62	.64	.03		2.02
		.04	.07	.03	.03	.01	.01	.02				.03						.24
									.17	.17	.19	.34	.01			.03	.05	.96
.01	.02	.01	.01	.03	.01		.01	.01	.05	.05	.05	.10	.08	.15	.04	.01	.03	.86
.02	.09	.04		.20	.01	.01				.02	.02	.02	.02					1.15
									.08	.27	.40	.14		.01	.01	.02	.04	.97
.02	.01	.06		.22	.08		.01	.01	.03	.05	.09	.21	.12	.24	.24	.55	.04	2.14
.01	.04	.03		.05	.01		.01		.01	.07	.02	.03	.01					.64
							.14	.35	.50	.35	.04	.01	.10	.10		.07	.04	1.70
.08			.04	.02			.02	.04	.08	.10	.30	1.05	.25	.10	.30	.02		2.50
.01	.01	.05	.02	.01	.08	.01	.05		.02	.01								.34
		.01	.01	.02	.01			Tr.										.05
								.20	.50	.60	.27		.01	.02	.07	.03	.10	1.80
.05	.07	.02	.10	.05	.03	.02	.10	.05	.10	.15	.60	.80	.30	.08				2.65
.02		.01		.01	.03	.02			.01	.01		.01						.22
						1	.03	.05	.12	.24	.06	.15	.55	.09	.05	.06	.22	1.62
.04	.05	.02	.03	.02	.03	.02	.02	.02	.02	.02	.02	.02	.02					.54
		.01	.02	.01	.01													.05
								.02	.40	.90	.25	.03	.02	.10	.05	.05	.09	1.91
Tr.	.05	.02						.05	.02	.21	.20	.17	.01	.44	.10	.05	.05	1.46
.04	.02	.01		.02	.02	.03	.01	.09	.01	.01								.45
								.05	.80	.50	.09	.05	.06	.25	.05	.10	.01	1.96
.03	.04	.02					.03	.04	.03	.08	.30	.30	.50	.18				1.63
		.04			.02													.08
							.05	.30	.20	.45	.03	.04		.18	.10	.02	.18	1.55
	.02	.10						.20	.02	.02	.14	.02	.08	.02	.05	.05		.79
.04							.02											.86
								.90	.22	.34	.20	.06	.04	.04	.04	.08	.05	1.97
.06	.05	.01					.01	.05	.01	.09	.07	.10	.08	.02			.02	.99
.09	.02																	.60
									.28	.14	.08	.34	.13			.09	.04	1.10
.01			.01	.01	.01			.04	.04	.10	.17	.19	.03	.02	.01			.93
.13	.05		.01	.02	.01	.02	.03	.01		.01	.01	.01						.56
	.01	.01		.01														.03
								.05	.80	.70	.10	.05	.10	.04	.01	.15	.03	2.03
	.02	.04	.06					.05		.15	.15	.15	.05	.05			.05	.87
.01	.01					.02	.02											.19
														.33	.03	.52	.07	.95
.54	.05	.06	.03	.08	.13	.18	.16	.36	.54	.25	.19	.81	.08	.13	.08		.07	4.26
.01	.01		.07	.02			.03					.02			.03			.29
														.14	.01	.43	.12	.70
.41	.03	.06	.03	.07	.17	.15	.13	.35	.69	.32	.32	.84	.16	.13	.02		.02	4.52
.02	.01		.05	.03		.02	.03											.24
														.49	.31	.56	.07	1.43
.55	.11	.01	.03	.07	.11	.18	.17	.38	.21	.33	.16	.80	.06	.18	.03		.09	3.88
.02		.13	.01															.26

TABLE 14.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
	Delaware River Basin							
429	Camden (*airport*), N. J.	26	----	----	----	----	----	----
	U. S. Weather Bureau (Measured at 1:30 a.m., 7:30 a.m.,	27	1.74	*	*	*	*	*
	1:30 p.m., 7:30 p.m.)	28	.08	*	*	*	*	*
		29	Tr.	----	----	----	----	----
433	Moorestown, N. J.	26	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	27	.14	0.02	0.42	0.35	0.10	0.11
		28	----	----	.05	----	.04	.01
438	Trenton No. 1, N. J.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.13	.15	.01	.33	.22	.16
		28	.02	Tr.	Tr.	Tr.	.04	.05
	Minor basins							
771	Bronx (New York University), N. Y.	25	*	*	*	*	*	*
	New York University Meteorological Dept.	26	*	*	*	*	*	*
		27	*	*	*	*	*	*
		28	*	*	*	*	*	*
666	Brooklyn, N. Y., (Brooklyn Eagle)	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.09	.18	.01	Tr.	Tr.	.03
		28	.06	.24	.09	.02	.04	Tr.
772	Floyd Bennett Airport, N. Y.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	*	.12	*	*	*	*
		28	*	.09	*	*	*	*
668	Flushing, N. Y.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.04	.17	.02	----	----	.01
		28	.02	.55	.27	.02	Tr.	.02
676	New York, N. Y. (Battery Place)	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.08	.16	.01	Tr.	Tr.	.03
		28	.05	.27	.15	.03	.11	.01
677	New York, N. Y. (Central Park)	26	----	----	----	----	----	.02
	U. S. Weather Bureau	27	.03	.23	.01	Tr.	Tr.	Tr.
		28	.49	.26	.25	.13	.26	.05
682	Westerleigh, N. Y.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.10	.16	.03	.01	.01	.08
		28	.01	.14	.05	.01	.05	.01
683	Atlantic City, N. J.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	----	----	----	Tr.	.01	.01
		28	.11	Tr.	.02	.05	.08	.08
686	Colts Neck No. R–8, N. J.	26	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	27	.04	----	.06	.12	----	.06
		28	.03	.01	.07	----	.01	----
		29	----	----	----	----	.01	.01
688	Elizabethport, N. J.	26	----	----	----	----	----	----
	Chief engineer, Joint Meeting Maintenance,	27	.25	.02	.02	----	.02	----
	Irvington, N. J.	28	.09	.09	.11	----	.07	----
		29	----	----	----	----	----	----
691	Irvington, N. J.	26	----	----	----	----	----	----
	Chief engineer, Joint Meeting Maintenance,	27	.09	.04	.07	.05	.02	.02
	Irvington, N. J.	28	.04	.06	.09	.04	.04	.04
		29	.01	.01	.01	.01	.01	.02
774	Lakehurst, N. J.	26	----	----	----	----	----	----
	Naval Air Station	27	----	.05	.08	----	.17	.23
		28	----	----	----	----	----	----
694	Long Branch, N. J.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.04	Tr.	.16	.02	----	.07
		28	.03	.01	.04	Tr.	Tr.	.03
695	Marlboro, N. J.	26	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	27	.09	.01	.11	.08	----	.14
		28	.05	.05	.10	----	----	----
698	Newark, N. J.	26	----	----	----	----	----	.10
	Kresge department store, William Wiener, meteorologist	27	.41	.19	.06	----	----	----
		28	.35	.82	.08	.28	.09	.02
		29	.01	----	----	----	----	----
775	Newark Airport, N. J.	26	----	*	*	*	*	*
	U. S. Weather Bureau (Measured at 1:30 a.m., 7:30 a.m.,	27	0.42	*	*	*	*	*
	1:30 p.m., 7:30 p.m.)	28	.58	*	*	*	*	*
		29	Tr.	----	----	----	----	----
702	Sandy Hook, N. J.	26	----	----	----	----	----	----
	U. S. Weather Bureau	27	.03	.01	.05	.01	.04	.16
		28	.03	.06	Tr.	Tr.	Tr.	.02

[1]Record began at 12:10 p.m.
[2]Total for 24-hour period ending at 7:30 a.m. of day indicated.
*Included in following measurement.

ending at indicated time, June 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	----	----	----	----	----	----	*	*	*	*	*	Tr.	*	*	*	*	*	----
1.11	*	*	*	*	*	0.98	*	*	*	*	*	0.61	*	*	*	*	*	[2]2.85
.08	*	*	*	*	*	.05	*	*	*	*	*	.01	*	*	*	*	*	[2]1.75
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	[2].06
----	----	----	----	----	----	.02	----	----	----	----	----	.18	0.70	0.02	0.10	0.51	0.29	1.82
.04	0.22	0.18	0.12	0.31	0.10	.22	0.95	0.42	0.01	0.07	0.04	----	.02	.04	.02	----	----	3.90
----	.05	.02	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.17
----	----	----	----	----	----	----	----	----	----	----	Tr.	.80	.07	.61	.47	.11	.13	2.19
.02	.15	.06	.01	.16	.10	.03	.12	.09	.27	.29	.30	Tr.	Tr.	Tr.	Tr.	Tr.	.15	2.75
.07	.01	Tr.	.02	.01	.01	Tr.	Tr.	.01	Tr.	Tr.	Tr.	.01	.01	.01	----	----	----	.27
*	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	*	*	*	*	Tr.
*	Tr.	----	----	----	----	*	*	*	*	.04	*	*	.53	*	*	*	*	.57
*	.51	*	*	*	.09	*	*	*	*	.25	*	*	.40	*	*	*	*	1.25
*	1.08	*	*	*	.11	----	----	----	----	----	----	----	----	----	----	----	----	1.19
.01	----	----	----	----	----	----	----	.29	.40	----	.12	.04	.04	.05	.06	.21	.05	1.27
.02	----	Tr.	.03	.01	.01	.02	.04	.06	.09	.04	.05	.34	.04	.02	.01	Tr.	Tr.	1.09
.01	Tr.	.01	.05	.09	.01	.01	.13	.09	Tr.	----	Tr.	Tr.	Tr.	.01	----	----	----	.86
Tr.	----	----	----	----	----	----	----	----	*	*	*	*	.05	*	*	*	.40	.45
*	.38	*	*	*	*	*	.10	*	*	*	*	*	1.19	*	*	.05	----	1.84
*	.16	*	*	*	*	*	.12	*	*	*	*	*	.03	*	.04	----	----	.44
.01	----	----	----	----	----	----	----	----	.24	----	.10	.02	.01	.08	.01	.15	.11	.73
.02	Tr.	Tr.	.01	.02	Tr.	.02	.03	.11	.08	.11	.04	.06	.04	.01	.02	.01	Tr.	.82
Tr.	.01	Tr.	.08	.05	.04	.02	.01	.06	.10	.01	Tr.	Tr.	Tr.	.01	----	----	----	.127
Tr.	----	----	----	----	----	----	----	.42	.05	----	.16	.04	.04	.05	.06	.19	.05	1.06
.02	----	Tr.	.03	.01	.01	.03	.03	.07	.14	.03	.05	.28	.05	.03	.01	Tr.	Tr.	1.07
.01	Tr.	.03	.01	.05	.02	Tr.	.20	.06	Tr.	----	Tr.	.01	Tr.	Tr.	----	----	----	1.01
Tr.	----	----	----	----	----	----	----	Tr.	.13	----	.51	.04	.02	.02	.02	.12	.06	.94
Tr.	----	Tr.	.02	.01	Tr.	.03	.05	.06	.12	.02	.05	.24	.05	.07	.03	.02	.03	1.07
.01	----	.04	.04	Tr.	.01	Tr.	.05	.10	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.	----	----	----	1.69
.02	----	----	----	----	----	----	----	.12	.16	Tr.	.35	.03	.05	.08	.14	.23	.05	1.23
Tr.	Tr.	Tr.	.03	.02	.02	.03	.02	.05	.23	.02	.09	.25	.07	.04	.02	Tr.	Tr.	1.28
.01	.01	.02	.01	.09	.02	Tr.	.27	.02	.01	Tr.	Tr.	Tr.	Tr.	Tr.	----	----	----	.73
----	----	----	----	----	----	----	Tr.	----	----	----	----	----	----	----	----	Tr.	.20	.20
Tr.	----	----	----	----	----	----	----	Tr.	Tr.	----	----	----	----	Tr.	.19	.14	.11	.46
.02	.02	.04	Tr.	----	Tr.	Tr.	Tr.	----	Tr.	Tr.	.09	.13	.04	.02	.01	----	----	.71
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.61	1.49	.10	2.20
.31	.13	.01	.05	.03	.10	.18	.17	.15	.16	.23	.15	.69	.09	.38	.08	----	.10	3.29
.01	.01	.02	.09	.06	.01	----	.02	.06	.01	.01	----	----	----	----	----	----	----	.42
.03	----	----	.01	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	.08
.03	----	----	----	----	----	----	----	.04	----	.08	.04	.06	.12	.04	.10	.17	.04	.72
----	----	----	----	----	.04	.02	.02	.09	.06	.03	.15	.11	.11	.02	----	----	----	.96
.02	.02	.08	.05	.03	----	----	.03	.02	----	----	----	----	----	----	----	----	----	.61
----	.02	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.02
----	----	----	----	----	----	----	----	.10	.02	----	----	.47	.04	.07	.04	.07	.06	.87
.07	.02	.02	.01	.02	.02	.02	.02	.05	.02	.02	.06	.04	.02	.02	----	.02	.06	.80
.04	.02	.04	.02	.02	.02	.02	.02	.02	.02	.01	.01	.02	.02	.02	.02	----	----	.65
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.07
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.16	.13	----	.29
.06	.12	.11	.25	.33	.26	.23	.05	.02	.07	.15	.17	.13	.17	.07	.19	.10	.04	3.61
.01	.01	.02	.01	.02	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	----	----	.18
----	----	----	----	----	----	----	----	----	----	----	----	----	----	.02	.09	.17	Tr.	.28
.44	.05	.04	.06	.11	.17	.15	.11	.17	.30	.26	.16	.86	.11	.25	.04	.09	.09	3.75
Tr.	----	.08	.03	----	Tr.	.06	.07	Tr.	.01	Tr.	.01	.01	.01	Tr.	.01	----	----	.40
----	----	----	----	----	----	----	----	----	----	----	----	----	----	.37	.09	.54	.09	1.09
.35	.11	.01	.03	.04	.06	.17	.11	.21	.39	.49	.15	.67	.11	.02	.10	.02	.04	3.51
----	.02	----	.02	.06	----	.02	----	.02	----	.02	----	.02	----	----	----	----	----	.38
----	----	----	----	----	----	----	.12	----	----	----	.60	.03	.10	.04	.18	.17	.07	1.41
.01	----	----	.12	.01	----	.02	.04	.05	.06	.03	.10	.08	.01	.06	----	.02	.05	1.32
.04	.01	.13	.05	----	.02	----	.04	.09	----	----	----	----	----	----	----	----	----	2.02
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.01
Tr.	*	*	*	*	*	Tr.	*	*	*	*	*	.30	*	*	*	*	*	[2]Tr.
.11	*	*	*	*	*	.08	*	*	*	*	*	.25	*	*	*	*	*	[2].83
.49	*	*	*	*	*	.17	*	*	*	*	*	.03	*	*	*	*	*	[2]1.40
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	[2].20
----	----	----	----	----	----	----	----	Tr.	----	----	----	----	----	.05	.10	.36	.01	.52
.18	Tr.	.01	.02	.01	.08	.04	.07	.24	.58	.17	.18	.44	.01	.02	.01	.01	.01	2.38
Tr.	.01	Tr.	.03	.03	Tr.	.05	.02	.01	Tr.	----	.01	Tr.	Tr.	Tr.	----	----	----	.27

TABLE 15.—*Intense rainstorms in New Jersey and nearby parts of adjoining States*

Place	Date	Precipitation (inches)
1-hour periods		
Philadelphia, Pa	Aug. 3, 1898	3.79
New York, N. Y. (Central Park)	Sept. 4, 1913	3.31
Atlantic City, N. J	July 22, 1903	2.97
Newark, N. J	Aug. 24, 1897	2.95
Colts Neck, N. J	June 26, 1938	1.49
2-hour periods		
Long Level, York Co., Pa	July 15, 1914	6.2
New Lisbon, N. J	Aug. 19, 1939	[1]5.5
Philadelphia, Pa	Aug. 3, 1898	5.43
Whitesbog, N. J	Aug. 19, 1939	5.1
Colts Neck, N. J	June 26, 1938	2.10
6-hour periods		
Manawaken, N. J	Aug. 19, 1939	[1]12.2
Cohansey, N. J	Sept. 1, 1940	10.93
Paterson, N. J	Sept. 23, 1882	[1]8.7
Atlantic City, N. J	July 22, 1903	5.40
Freehold, N. J	June 27, 1938	2.68
24-hour periods		
Paterson, N. J	Oct. 8–9, 1903	[1]14.30
Do	Sept. 22–23, 1882	[1]12.0
New York, N. Y	Oct. 7–8, 1903	9.40
Atlantic City, N. J	Oct. 8–9, 1903	9.21
West Chester, Pa	May 20–21, 1894	[2]9.03
Elizabeth, N. J	July 28, 1897	[2]8.73
Odessa, Del	June 26–27, 1938	[2]7.83

NOTE.—Based on compilation made by the New Jersey State Water Policy Commission, in cooperation with the Geological Survey.

[1]Based on once-daily readings of rain gage supplemented by study of observers notes of time of beginning and ending of rainfall and comparison with time-distribution of rainfall at nearby stations.

[2]Based on once-daily readings of rain gages. The duration of rainfall may be less than 24 hours.

Table 15 compares the rainfall for given periods during the storm of June 1938 with similar data for other storms. The maximum rainfall of record for each indicated time interval is given, and a few records near the maximum are given in order of magnitude, followed by the maximum rainfall observed at any station for the same time intervals during the storm of June 1938. For each interval from 1 hour to 24 hours, the storm of June 1938 was much less than the maximum of record in the New Jersey area.

Figure 21 shows the hourly distribution of rainfall during the storm at four rain gages in New Jersey. June 25 and the morning of June 26 were fair. Heavy rain began abruptly during the afternoon or evening of June 26, and some stations in the Passaic River Basin, of which the recording rain gage at Rockaway indicated on figure 21 is representative, registered the maximum intensity during this initial part of the storm period. This was also true of some stations in Monmouth County. In fact, the maximum 1- and 2-hour intensities at all the recording rain gages during the whole storm were measured at Colts Neck, Monmouth County, during the first 2 hours of the storm on June 26.

The rainfall continued with significant intensities until the afternoon of June 27, when at most stations, as illustrated by the records for Beemerville, Freehold, and Moorestown on figure 21, the maximum intensities during the storm were registered. This second period of high intensity began earlier at the southern stations than at the northern stations, whereas the cold front associated with the storm progressed from northwest toward southeast. The storm lasted longer in the northern than in the southern part of the State. After the heavy rain on June 27, light intermittent rains continued until about noon on June 28, except in northeastern New Jersey, where the fall was quite heavy. The afternoon of June 28 and of June 29 was generally fair, although some scattered light showers were reported.

Although the time of beginning and ending of precipitation varied, at nearly all stations 90 percent of the total storm precipitation registered fell within a 30-hour period on June 26-27.

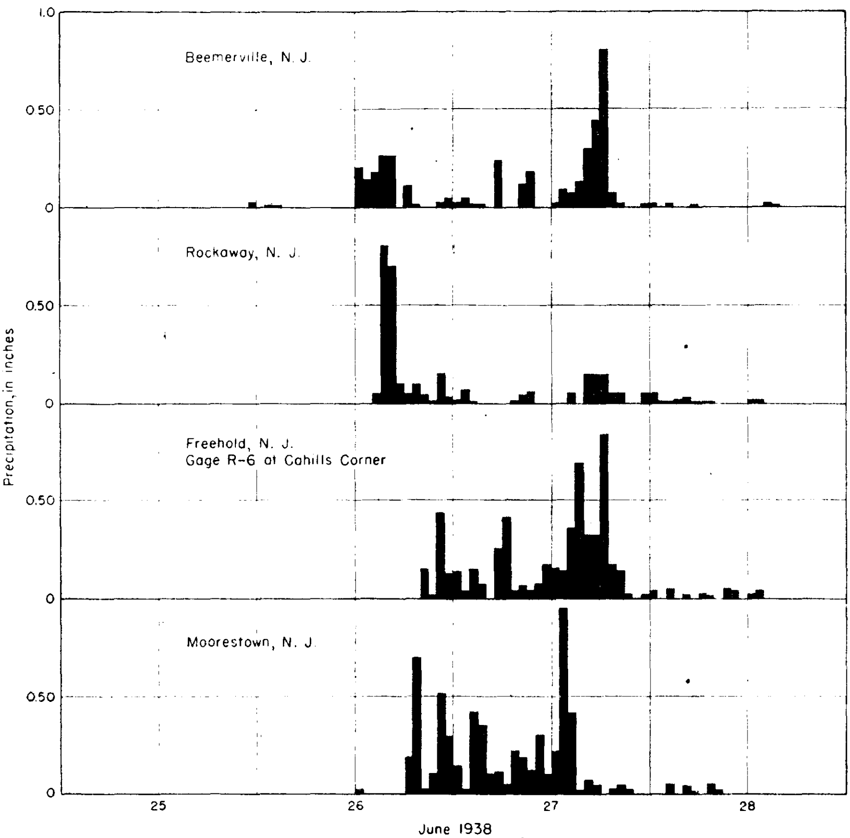


FIGURE 21.—Hourly precipitation at selected recording rain gages in New Jersey during storm of June 1938.

To determine the total amount of precipitation during the storm, readings given in table 13 for June 25–29, inclusive, were added together irrespective of the time of day at which the gages were read, with the exception that entries made on June 25 for those gages read in the morning and entered on the day of reading were omitted. Thus, the total in the final column of table 13 includes the light initial rains of June 25–26 and the light residual rains of June 28–29, as well as the 30-hour major storm of June 26–27. Separation, although possible, was not considered necessary.

Storm precipitation at the several stations given in table 13 has been plotted on a map, and lines of equal precipitation have been drawn to compare with the plotted points. The resultant isohyetal map is reproduced in this report as plate 6. The map shows three well-defined storm centers—one at Odessa, Del., with precipitation of 8.55 inches, a second at Indian Mills, N. J., with 7.71 inches, and a third less closely defined in the northern part of the State with a maximum at Milton, N. J., of 6.29 inches. The area within the several isohyetal lines was measured by planimeter, and the mean precipitation over these areas was computed about each of the three centers. From these data a graph was made showing area plotted against mean precipitation for each of the three storm centers during the storm of June 25-29, 1938, and a curve was drawn to envelop the plotted points. The following table gives the coordinates of the enveloping curve so defined:

Area (square miles)	*Precipitation (inches)*
1	[1] 8.55
100	7.5
500	6.5
1,000	6.0
2,000	5.6
4,000	5.2
5,000	5.1

[1] Recorded at Odessa, Del.

The results given in the foregoing table when compared with seven important storms of equivalent duration in New Jersey and adjoining areas, as reported by the Miami Conservancy District,[15] indicate that the storm of June 1938 was exceeded by all but one. Although not of major proportion, the storm of June 1938 ranks among the important storms of record in New Jersey.

[15] Storm rainfall of eastern United States, Miami Conservancy District Tech. Repts. pt. 5 (revised), p. 278, 1936.

STAGES AND DISCHARGES

Records of the stage and discharge at stream-gaging stations during the flood are included in the section "Floods of July 1938."

In general, the data presented for each stream-gaging station comprise a description of the station and a table giving the daily discharges during June, July, and August 1938. For the 14 stream-gaging stations in New Jersey where the storm of June 1938 produced noteworthy stages tables are given showing stage and corresponding discharge at indicated times during the flood period in sufficient detail for reasonably reliable delineation of hydrographs. These tables are discussed on pages 9 to 11.

Graphs of discharge during the flood in June at stream-gaging stations on two selected streams in the region are shown on figure 22. The rains of June 25-29 produced a single peak on all streams that occurred late on June 27 or thereafter depending on the characteristics of concentration of the particular basin. For example, the Manasquan River at Squankum, a stream of average

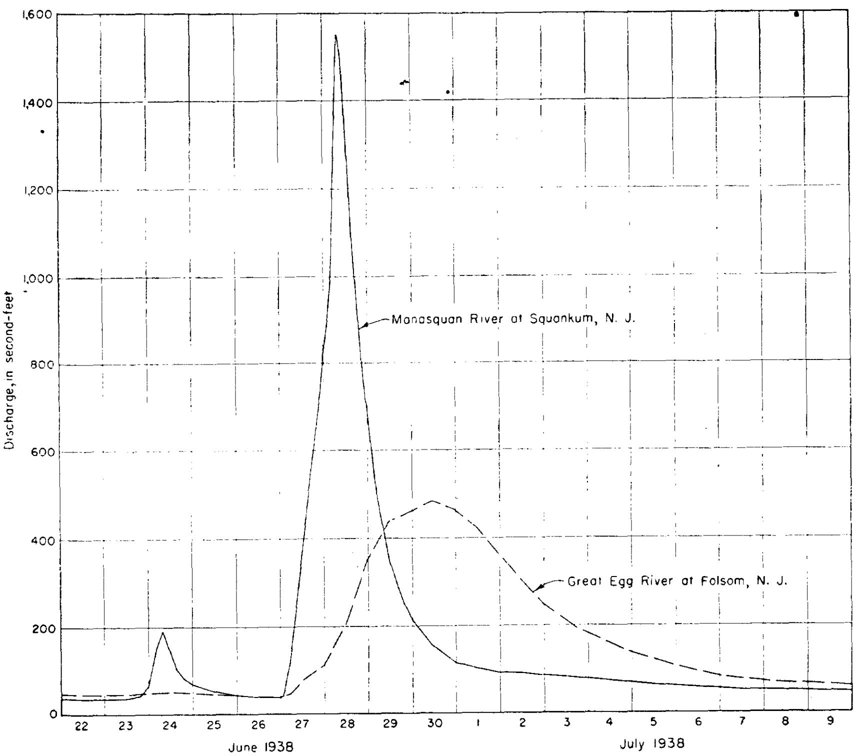


FIGURE 22.—Hydrographs of discharge at selected gaging stations in New Jersey during flood of June 1938.

responsiveness to rainfall, with a drainage area of 43.4 square miles, reached its crest early on June 28, whereas the Great Egg River at Folsom, with a drainage area of 56.3 square miles, crested more than 2 days later. This difference in behavior illustrated on figure 22 may be ascribed in large part to the topographic characteristics of these two drainage basins. (See table 16.)

The Great Egg River Basin above Folsom has a gradient about one-half that of the Manasquan River Basin. The differences in areas of swamp are also significant.

TABLE 16.—*Topographic characteristics of the Manasquan River Basin and the Great Egg River Basin*

	Manasquan River at Squankum, N. J.	Great Egg River at Folsom, N. J.
Drainage area .... square miles	43.4	56.3
Mean land slope .... feet per mile	121	52
Mean slope of tributary streams .... feet per mile	27	12
Mean slope of principal streams .... feet per mile	8	6
Swamp area .... square miles	1.8	9.2

SUMMARY OF FLOOD STAGES AND DISCHARGES

The maximum flood discharges at the stream-gaging stations in New Jersey that reached noteworthy stages are summarized in table 17. The numbers assigned to each station conform to those given in Water-Supply Paper 847 [16] and refer to its position on plate 12. The crest discharges during the flood of June 1938 exceeded the maximum discharges previously known on four streams. These discharges, however, were exceeded again during the floods of July and September 1938 on all but one stream, namely, Oldmans Creek near Woodstown. Nevertheless, the hurricane storm of September 1, 1940, which demolished the gaging station on Oldmans Creek, produced a discharge of more than 8,000 second-feet in comparison with only 1,190 second-feet during June 1938. Thus, none of the crest discharges attained during June 1938 stand as maxima at this date (1941).

Table 18 summarizes available altitudes and times of flood crests at several places along the affected rivers. Many of the data in this table were furnished by the New Jersey Riparian Stream and Waterways Survey of the Works Progress Administration.

[16] Williams, G. R., and Crawford, L. C., Maximum discharges at stream-measurement stations through December 31, 1937: U. S. Geol. Survey Water-Supply Paper 847, 272 pp., 1940.

TABLE 17.—*Maximum discharges for flood of June 1938 in New Jersey*

No. on pl. 12	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum discharge prior to June 1938		Maximum discharge during flood of June 1938		
				Date	Second-feet	Time	Second-feet	Second-feet per square mile
	Raritan River Basin							
629	Deep Run near Browntown	8.07	1932–38	Sept. 9, 1934	917	June 27, 11 p.m.	710	88.0
630	Tennent Brook near Browntown	5.25	do	Sept. 8, 1934	166	June 28, 12:30 a.m.	87	16.6
	Coastal basins							
632	Swimming River near Red Bank[1]	48.5	1922–38	Sept. 9, 1934	2,930	June 28, 2 to 3 a.m.	1,610	33.2
633	Manasquan River at Squankum	43.4	1931–38	Jan. 3, 1936	1,020	June 28, 8 a.m.	1,550	35.7
634	Toms River near Toms River	124	1928–38	Apr. 18, 1929	851	June 29, 4 to 5 p.m.	1,240	10.0
635	Cedar Creek at Lanoka Harbor	56.0	1932–38	Feb. 16, 1936	(2)	June 28, 7 to 10 p.m.	248	4.43
636	Batsto River at Batso	70.5	1927–38	Aug. 24, 1933	[3]824	June 29–30	[3]641	9.1
637	East Branch of Wasing River at Harrisville	64.0	1931–38	do	859	June 29, 3 p.m., to June 30, 2 a.m.	270	4.22
639	Great Egg River at Folsom	56.3	1925–38	Sept. 8, 1935	599	June 30, 12 m. to 4 p.m.	483	8.58
640	Maurice River at Norma	113	1932–38	do	1,090	June 29, 11 a.m. to 2 p.m.	552	4.88
641	Manantico Creek near Millville	22.3	1931–38	Sept. 7, 1935	566	June 28, 9 p.m.	74	3.32
	Delaware River Basin							
671	Flat Brook near Flatbrookville	65.1	1923–38	Apr. 7, 1924 Feb. 11, 1925	3,470	----------	1,560	24.0
673	Paulins Kill at Blairstown	126	1921–38	Mar. 12, 1936	3,480	June 28, 8 a.m.	3,700	29.4
674	Pequest River at Pequest	108	do	Mar. 14, 1936	1,810	June 28, 8 to 9 a.m.	678	6.28
675	Beaver Brook near Belvidere	36.2	1922–38	Mar. 12, 1936	1,510	June 28, 11 p.m.	292	8.07
678	Musconetcong River at outlet of Lake Hopatcong[1]	25.6	1928–38	Mar. 19, 1936	534	June 30, 12 m.	267	10.4
679	Musconetcong River near Hackettstown[1]	70.0	1921–38	Mar. 12, 1936	1,430	June 28, 6 p.m.	613	8.76
680	Musconetcong River near Bloomsbury[1]	143	1903–07 1921–38	Oct. 10, 1903	[3]2,780	June 27, 8 p.m.	904	6.32
683	Assunpink Creek at Trenton	89.4	1923–38	Apr. 7, 1924	2,400	June 28, 7:30 to 10 p.m.	1,420	15.9
686	North Branch of Rancocas Creek at Pemberton	111	1921–38	Oct. 20, 1927	[3]1,310	June 29, 2 to 5 p.m.	1,300	11.7
698	Oldmans Creek near Woodstown	19.3	1931–38	Aug. 27, 1937	362	June 27, 4 p.m.	1,190	61.7

[1]Affected by storage.
[2]Discharge not determined.
[3]Daily mean discharge.

TABLE 18.—*Flood crest stages, June 1938*

[U. S. Coast and Geodetic Survey datum except as noted]

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Deep Run:			
Brownton, N. J., Geological Survey gage at Spring Valley road bridge, 1¾ miles south of Browntown	5.0	June 27, 11 p.m.	[1]7.47
Tennent Brook:			
Browntown, N. J., Geological Survey gage 1¼ miles northeast of Browntown	2.4	June 28, 12:30 a.m.	[2]19.12
Swimming River:			
Red Bank, N. J., Geological Survey gage on right bank, above dam of Monmouth Consolidated Water Co. and 4 miles upstream from Red Bank	4.0	June 28, 2 to 3 a.m.	[1]4.60
Manasquan River:			
Squankum, N. J., Geological Survey gage on right bank, just upstream from Farmingdale-Lakewood road bridge	10.5	June 28, 8 a.m.	[1]10.09
Toms River:			
Toms River, N. J., Geological Survey gage on left bank, 1 mile downstream from Union Branch and 2½ miles northwest of Toms River	9.0	June 29, 4 to 5 p.m.	19.2
Cedar Creek:			
Lanoka Harbor, N. J., Geological Survey gage on right bank, upstream from highway bridge	2.2	June 29, 1 to 2 a.m.	[2] [3]3.52
East Branch of Wading River:			
Harrisville, N. J., Geological Survey gage on right bank, just downstream from Jenkins-New Gretna road bridge	.5	June 29–30, 3 p.m. to 2 a.m.	[1]3.98
Great Egg River:			
Folsom, N. J., Geological Survey gage on right bank, just upstream from highway bridge and 1 mile south of Folsom	29.0	June 30, 12 m. to 4 p.m.	[1]5.72
Delaware River:			
Milford, Pa., Geological Survey gage on highway bridge	212.4	June 29, 8 a.m.	[4]378.88
Portland, Pa., Geological Survey gage on highway bridge	173.1	June 29, 5 to 6 a.m.	274.43
Delaware, N. J., Geological Survey gage on highway bridge	170.9	June 29, 8 a.m.	[4] [5]263.48
Belvidere, N. J., Geological Survey gage on left bank, just downstream from Pequest River	163.4	June 29, 4 to 8 a.m.	235.38
Easton, Pa., Geological Survey gage on highway bridge	149.5	June 28, 2 to 3 p.m.	165.53
Riegelsville, N. J., Geological Survey gage on left bank, just upstream from suspension bridge	140.6	June 28, 3 to 4 p.m.	136.57
Milford, N. J., Geological Survey gage on highway bridge	133.6	June 28, 4 to 5 p.m.	116.91
Frenchtown, N. J., Geological Survey gage on highway bridge	130.4	June 28, 5 to 6 p.m.	107.91
Point Pleasant, Pa., Geological Survey gage on highway bridge	123.2	June 28, 2 p.m.	81.65
Lumberville, Pa., Geological Survey gage on highway bridge	121.5	June 28, 4 p.m.	[4]74.02
Stockton, N. J., Geological Survey gage on highway bridge	118.0	June 28, 5 p.m.	[4]62.16
Lambertville, N. J., Geological Survey gage on highway bridge	114.9	June 28, 6 to 8 p.m.	53.81
Washington Crossing, N. J., Geological Survey gage on highway bridge	108.0	June 28, 4 p.m.	[4]32.04
Yardley, Pa., Geological Survey gage on highway bridge	104.1	June 28, 6 p.m.	[4]22.26
Trenton, N. J., Geological Survey gage on left bank, 200 feet upstream from Calhoun Street	100.6	June 28, 7 to 8 p.m.	13.45
Flat Brook:			
Flatbrookville, N. J., Geological Survey gage 1 mile upstream from Flatbrookville	1.2	June 28, 9 a.m.	352.95
Paulins Kill:			
Blairstown, N. J., Geological Survey gage 1,200 feet upstream from bridge on State Highway 8	9.8	June 28, 8 a.m.	342.94
Pequest River:			
Pequest, N. J., Geological Survey gage 100 feet upstream from Lehigh & Hudson River Railway bridge	6.6	June 28, 8 to 9 a.m.	402.06
Beaver Brook:			
Belvidere, N. J., Geological Survey gage 2,000 feet upstream from mouth and 2 miles east of Belvidere	.4	June 28, 11 p.m.	306.47
Musconetcong River:			
Landing, N. J., Geological Survey gage just above dam on Lake Hopatcong	42.4	June 29, 10 to 11 a.m.	[2]924.31
Landing, N. J., Geological Survey gage, just upstream from highway bridge and 300 feet dowstream from Lake Hopatcong	42.3	June 30, 12 m.	[2]907.23

TABLE 18.—*Flood crest stages, June 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Hackettstown, N. J., Geological Survey gage on left bank, 500 feet upstream from Delaware, Lackawanna & Western R.R. bridge and 3 miles northeast of Hackettstown	32.7	June 28, 6 p.m.	[2]608.10
Bloomsbury, N. J., Geological Survey gage, just downstream from highway bridge and 1½ miles upstream from Bloomsbury	9.4	June 27, 8 p.m.	278.19
Assunpink Creek:			
Trenton, N. J., Geological Survey gage at Chambers Street Bridge	1.5	June 28, 7:30 to 10 p.m.	[2]31.62
North Branch of Rancocas Creek:			
Pemberton, N. J., Geological Survey gage, 600 feet downstream from highway bridge	12.0	June 29, 2 to 5 p.m.	33.43
North Branch of Cooper Creek:			
Ellisburg, N. J., at upstream side of bridge on State Highway 41	10.5	June 27	16.0
Ellisburg, N. J., at upstream side of Kings Highway Bridge	10.0	do	13.6
Cooper Creek:			
Camden, N. J., just upstream from Admiral Wilson Boulevard	1.3	do	9.7
South Branch of Big Timber Creek:			
Turnersville, N. J., at county highway bridge 90–7, 35 feet upstream from Little Lebanon Creek and 1¼ miles southeast of Turnersville	7.7	do	80.56
Turnersville, N. J., at spillway from Neely's Lake and county highway bridge 9C–4	6.4	do	61.36
Turnersville, N. J., at country highway bridge 9C–1 (Sicklertown road)	6.3	do	47.49
Grenloch, N. J., at Black Horse Pike Bridge over Grenloch Lake	5.5	do	42.49
Grenloch, N. J., on dam of Grenloch Lake	5.3	do	43.63
Asyla, N. J., at country highway bridge 8C–11 (Lakeland road)	4.5	do	23.45
Blackwood, N. J., upstream from Blackwood Lake Dam	3.2	do	21.18
Blackwood, N. J., downstream from Blackwood Lake Dam	3.2	do	12.38
Blackwood, N. J., at upstream side of Lower Landing Road Bridge	3.1	do	5.91
Oldmans Creek:			
Woodstown, N. J., Geological Survey gage, just upstream from Woodstown-Swedesboro highway bridge and 2 miles north of Woodstown	16.0	June 27, 4 p.m.	[1]9.08

[1]Assumed datum.
[2]New Jersey Geological Survey datum.
[3]High tide.
[4]Highest stage observed, peak stage may have been higher.
[5]Based on Pennsylvania Railroad bench mark.

RAINFALL AND RUNOFF STUDIES

Figure 23 shows the hydrograph of Deep Run near Browntown during the flood, together with a graph showing 4-hour amounts of rainfall at Marlboro, N. J., 4 miles from the Deep Run Basin. Deep Run, with a drainage area of 8.07 square miles, was chosen for study because it most nearly reflects runoff conditions unobscured by the channel and excess swamp storage, which is characteristic of the larger streams in this region.

On June 22, stream flow was low (A, fig. 23). In response to a local storm that centered near Freehold, stream flow rose to a crest (B) and then receded until June 26 (C), when its rate of flow was only slightly greater than on June 22. The intense rains began late on June 26, as shown by the graph of rainfall on figure

23, and continued through June 28. Stream flow rose slowly until about noon on June 27 (D), when the rate of rise slackened owing to a dropping off in rainfall intensity about that time. On the afternoon of June 27 rainfall increased and reached its maximum intensity between 3 and 7 p.m., producing a sharp crest in stream flow (E). Rainfall continued through most of June 28 but with intensities too light to sustain the high rate of stream flow. The discharge receded steadily to July 9.

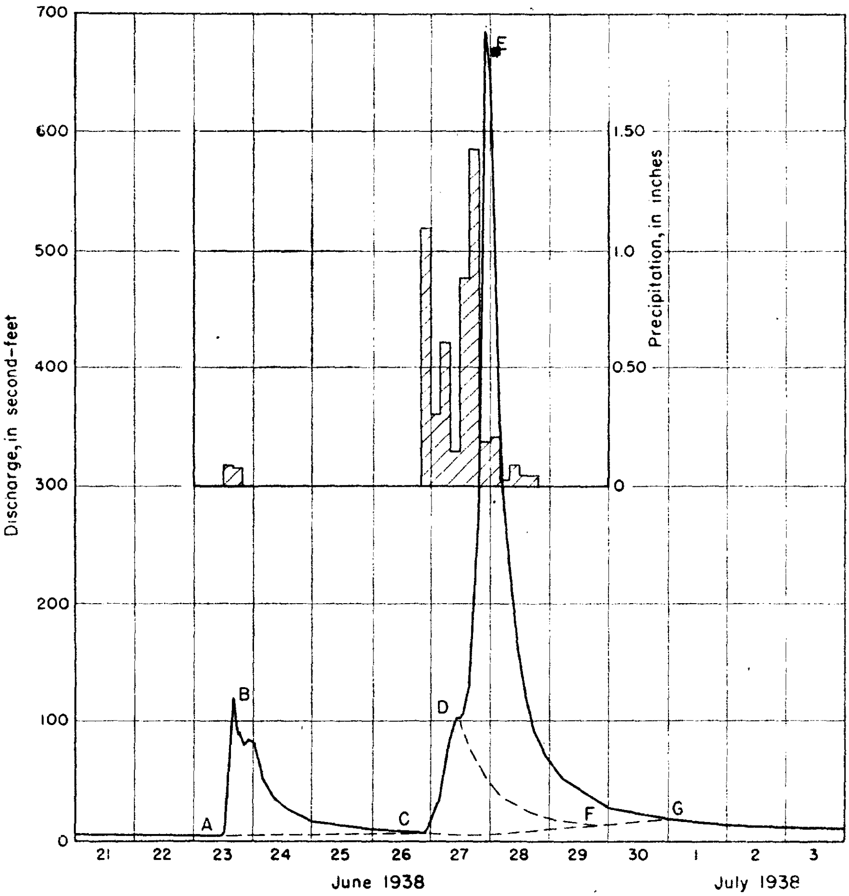


FIGURE 23.—Hydrograph of discharge for gaging station on Deep Run near Brownton, N. J., and graph of precipitation at Marlboro, N. J., during flood of June 1938.

TABLE 19.—*Precipitation and associated direct runoff of flood of June 1938 in New Jersey*

[Mean depth, in inches, over drainage basins]

No. on pl. 12	Stream and location	Drainage area (square miles)	Precipitation	Runoff	Difference
575	Hackensack River at New Milford	113	3.5	1.1	2.4
576	Pascack Brook at Westwood	29.6	3.7	1.0	2.7
583.5	Rockaway River above reservoir, at Boonton	116	4.2	1.4	2.8
606	Saddle River at Lodi	54.6	3.8	.9	2.9
608	Elizabeth River at Elizabeth	18.0	2.7	.8	1.9
609	Rahway River at Rahway	40.9	2.7	.6	2.1
614	South Branch of Raritan River at Stanton	147	3.5	.7	2.8
616	Raritan River at Manville	490	3.4	.8	2.6
619	Neshanic River at Reaville	25.7	2.7	.6	2.1
622	North Branch of Raritan River at Milltown	190	3.4	.8	2.6
624	Millstone River near Kingston	171	4.7	1.1	3.6
625	Millstone River at Blackwells Mills	258	4.4	1.2	3.2
625.5	Green Brook at Plainfield	9.75	2.9	.7	2.2
628	Lawrence Brook at Farrington Dam	34.4	3.4	.5	2.9
629	Deep Run near Browntown	8.07	4.4	1.9	2.5
632	Swimming River near Red Bank	48.5	5.2	1.2	4.0
633	Manasquan River at Squankum	43.4	5.2	1.5	3.7
634	Toms River near Toms River	124	4.4	1.0	3.4
635	Cedar Creek at Lanoka Harbor	56.0	3.2	.4	2.8
636	Batsto River at Batsto	70.5	6.5	1.2	5.3
637	East Branch of Wading River at Harrisville	64.0	4.0	.4	3.6
639	Great Egg River at Folsom	56.3	5.4	1.4	4.0
641	Manantico Creek near Millville	22.3	3.5	.2	3.3
671	Flat Brook near Flatbrookville	65.1	4.4	1.6	2.8
673	Paulins Kill at Blairstown	126	5.0	2.1	2.9
680	Musconetcong River near Bloomsbury	143	4.5	1.2	3.3
683	Assunpink Creek at Trenton	89.4	5.0	1.8	3.2
686	North Branch of Rancocas Creek at Pemberton	111	5.2	1.5	3.7
698	Oldmans Creek near Woodstown	19.3	4.5	2.0	2.5

Volumes of direct runoff associated with the storm of June 1938 have been computed by the following method for each of the gaging stations for which stream-flow records are included in this report. A hydrograph comparable to that on figure 23 has been drawn for each of these stations and on this hydrograph has been drawn a line representing the flow from antecedent and ground-water sources by the method explained in Water-Supply Paper 867.[17] This line is shown on figure 23 as A-C-G. The area between this line and the hydrograph of total flow, G-D-E-G-C, represents the direct runoff produced by the rains of June 26-28 and is tabulated in table 19 for each gaging station in terms of mean depth in inches over the respective drainage basins. Table 19 also lists the mean areal precipitation over the drainage area tributary to each gaging station listed. This information was obtained from the isohyetal map, plate 6.

The relation between rainfall volumes and the associated direct runoff are shown on figure 24. The results indicate that at least 2 inches of rain were required to produce an appreciable flood runoff. On figure 24 have been plotted lines of an equal infiltration index computed on the basis of records of hourly rainfall given in

[17] Paulsen, C. G. and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, pp. 421-423, 1940.

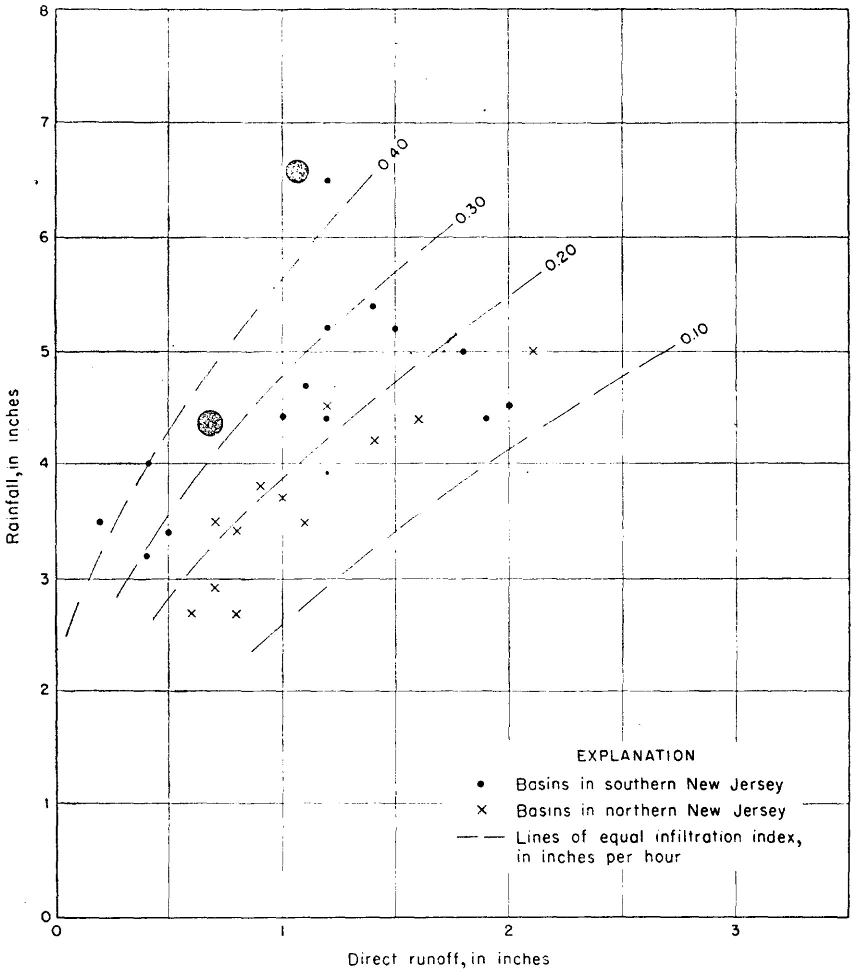


FIGURE 24.—Relation between precipitation and associated direct runoff during flood of June 1938 in New Jersey.

table 14 by the method explained by Langbein.[18] Most of the points on figure 24 are located between infiltration indices of about 0.15 and 0.30 inch per hour.

Variations inherent in basin and soil characteristics are the principal factors to which the scattering of the plotted points on figure 24 may be attributed. There is a tendency, for example, for points representing basins in southern New Jersey to plot to the left of the points representing basins in the northern part of the State, which indicates that the former basins have a greater re-

[18] Langbein, W. B. and others, Maximum winter and non-winter floods in selected basins in New York and Pennsylvania: U. S. Geol. Survey Water-Supply Paper 915.

tentive capacity. This characteristic conforms to the one indicated for this region during the hurricane flood of September 1938, as reported in Water-Supply Paper 867.[19] Some variations in the rainfall-runoff relation shown on figure 24 may also be due to the fact that antecedent soil moisture was not the same over each basin. Moreover, errors in the determination of precipitation are probably substantial, particularly in basins distant from rain gages. For example, Oldmans Creek flows along the axis of heaviest storm precipitation, but it is in the center of an area of 1,500 square miles without a rain gage. Determinations of precipitation over specific small drainage areas during a summer storm may be of doubtful accuracy, although large areal averages may be reasonably correct. For the State as a whole there is an average of 95 square miles per rain gage, the coverage being most complete in the northern part of the State.

To show the variation in retention during the storm, the runoff represented by the hydrograph in figure 23 has been subdivided to show approximately the runoff before and after noon of June 26. The subdivision was indicated on figure 23 by drawing a recession line D-F to conform to B-C and E-G. Volume C-D-F is 0.5 inch, and volume D-E-G-F is 1.4 inches. The depths of rainfall over the Deep Run Basin during these two periods are 1.8 inches and 2.5 inches, respectively. The infiltration indices for these periods are 0.20 and 0.08 inch per hour, respectively, and indicate the decreasing capacity of the soil to absorb water.

FLOODS OF JULY 1938 IN THE NORTHEASTERN STATES

By L. W. Furness, C. E. Knox, Otto Lauterhahn, C. C. McDonald, and W. B. Langbein

INTRODUCTION AND GENERAL FEATURES

During the period July 17–25, 1938, an irregular series of showers and thunderstorms deposited widely varying concentrations of water over the eastern seaboard from Florida to New Hampshire. As the resulting floods were more severe in the northern part of this area than in the southern, that part including New Jersey to Massachusetts is made the subject of this report. Within this area total precipitation from July 17 to 25 exceeded 10 inches at three centers in New Jersey, at one center in the Catskill Mountain region of New York, and at one elongated center extending through eastern Connecticut and Massachusetts. An area of almost 1,900 square miles received more than 10 inches of precipitation, and 23,000 square miles received 6 inches or more. The individual

[19] Paulsen, C. G. and others, op. cit., pp. 440–442.

storms within this 8-day period were not unusual in themselves, but the rapid sequence in which they succeeded one another prevented the streams from recovering normality during the intervening intervals. A closer sequence of the storms would have produced greater peak flows, whereas, conversely, a wider sequence would have given the streams a chance to recede to lower stages between storms. As a result of the erratic distribution and intensity of precipitation within the respective drainage basins, most streams were pushed to successively higher stages in a series of peaks occurring irregularly from July 20 to 25, as illustrated on the hydrographs of selected gaging stations in New Jersey, New York, and Connecticut. (See figs. 25-28.)

The drainage basins in which record-breaking or extraordinary floods occurred are shown on figure 29.

Crest discharges at 12 gaging stations (omitting those established in 1937) exceeded all discharges previously observed. The drainage areas of these stations ranged in size from 2.91 to 490 square miles. Rates of discharge reached 601 second-feet per square mile for Elizabeth River at Irvington, N. J., from an area of 2.91 square miles. Neversink River near Curry, N. Y., draining 68 square smiles, crested at 182 second-feet per square mile, and Raritan River at Manville, N. J., draining 490 square miles, reached 53.1 second-feet per square mile. Quinebaug River at Jewett City, Conn., draining 711 square miles, crested at 35.2 second-feet per square mile, but this was not the maximum of record, as it was exceeded once before during the flood of March 1936.

The flood of July 1938 was followed by the widespread floods of September 1938, which produced discharges that exceeded record-breaking discharges attained during July 1938 at the following five gaging stations, omitting those with 2 years of record or less.

Yantic River at Yantic, Conn.
Salmon River near East Hampton, Conn.
Raritan River at Manville, N. J.
Millstone River near Kingston, N. J.
Millstone River at Blackwells Mills, N. J.

With the exception of the lower Quinebaug River in Connecticut, the lower Raritan River in New Jersey, and the Charles River in Massachusetts, extraordinary flood stages occurred only in smaller tributary streams, which have narrowly confined channels and steep gradients. Accordingly, damage was slight in comparison with that caused by the greater and more widespread floods of March 1936 and September 1938. As the flood and excessive rainfall occurred during the height of the growing season, they damaged crops by inundation or erosion. A number of small dams and bridges were destroyed, and many mills, homes, and highways were flooded. Plate 7, *A*, shows damage to a highway near Killingworth, Conn., caused by water released by failure of a small dam.

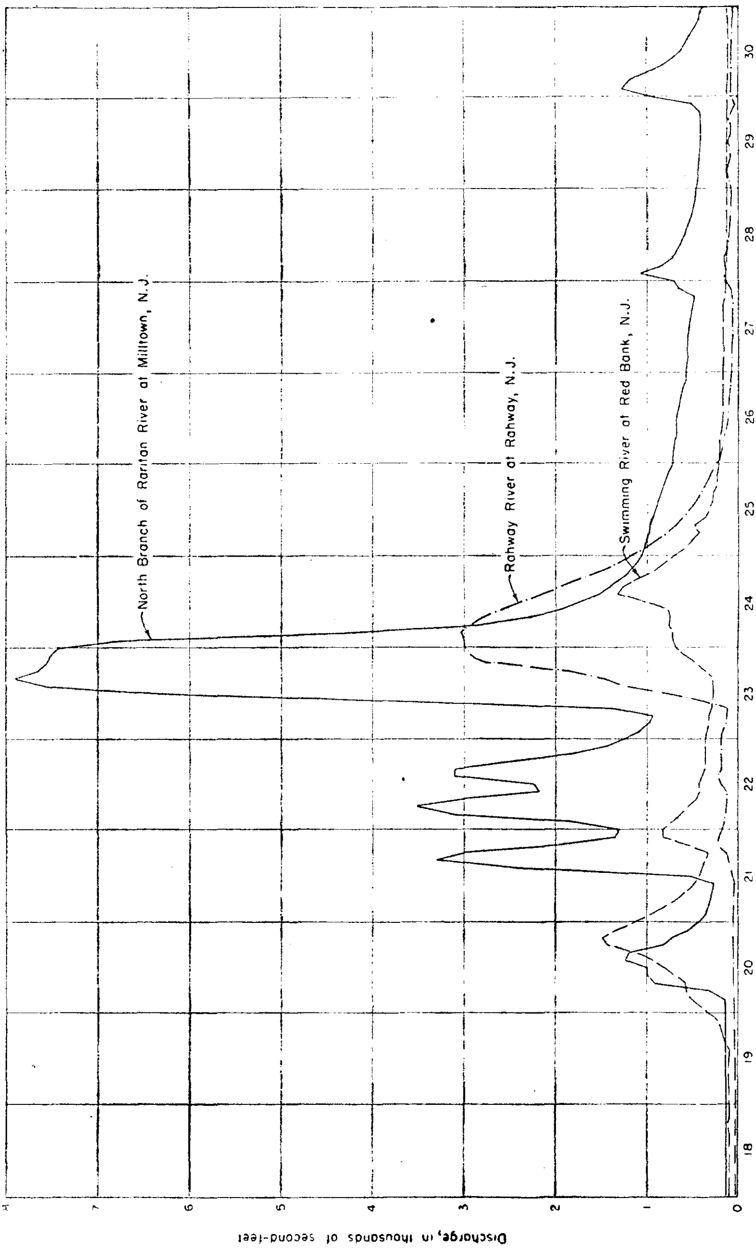


FIGURE 25.—Hydrographs of discharge at selected stream-gaging stations in New Jersey during flood of July 1938.

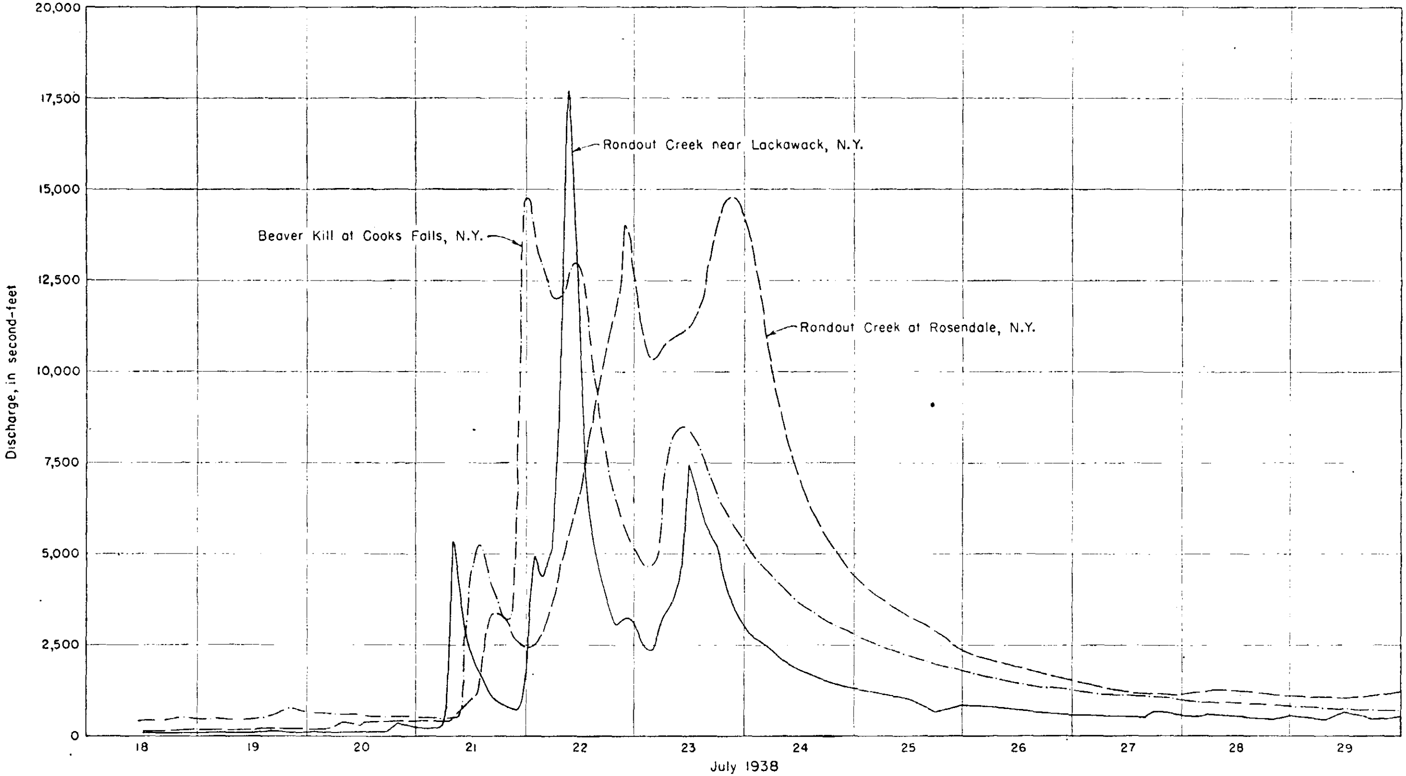


FIGURE 26.—Hydrographs of discharge at selected stream-gaging stations in New York during flood of July 1938.

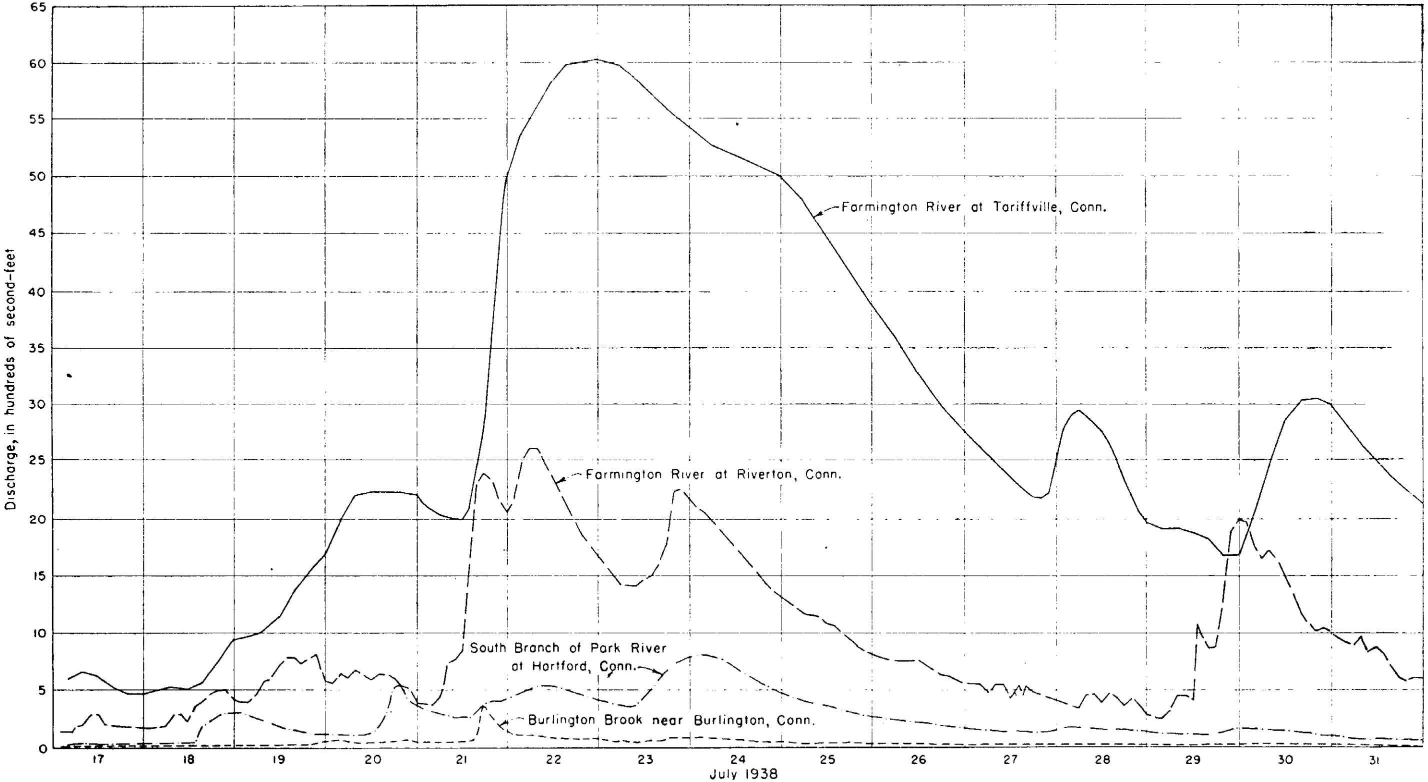


FIGURE 27.—Hydrographs of discharge at selected stream-gaging stations in Connecticut River Basin, Conn., during flood of July 1938.

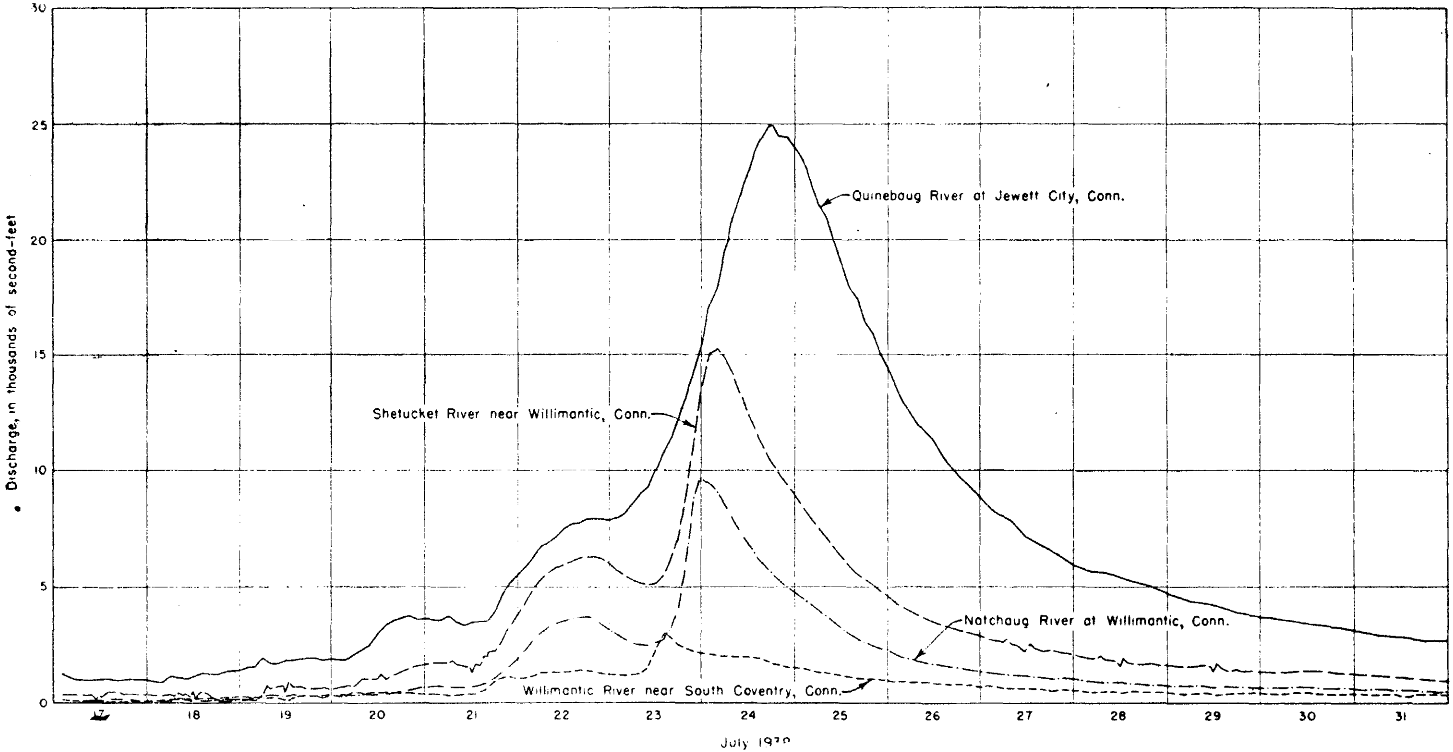


FIGURE 28.—Hydrographs of discharge at selected stream-gaging stations in Thames River Basin, Conn., during flood of July 1938.

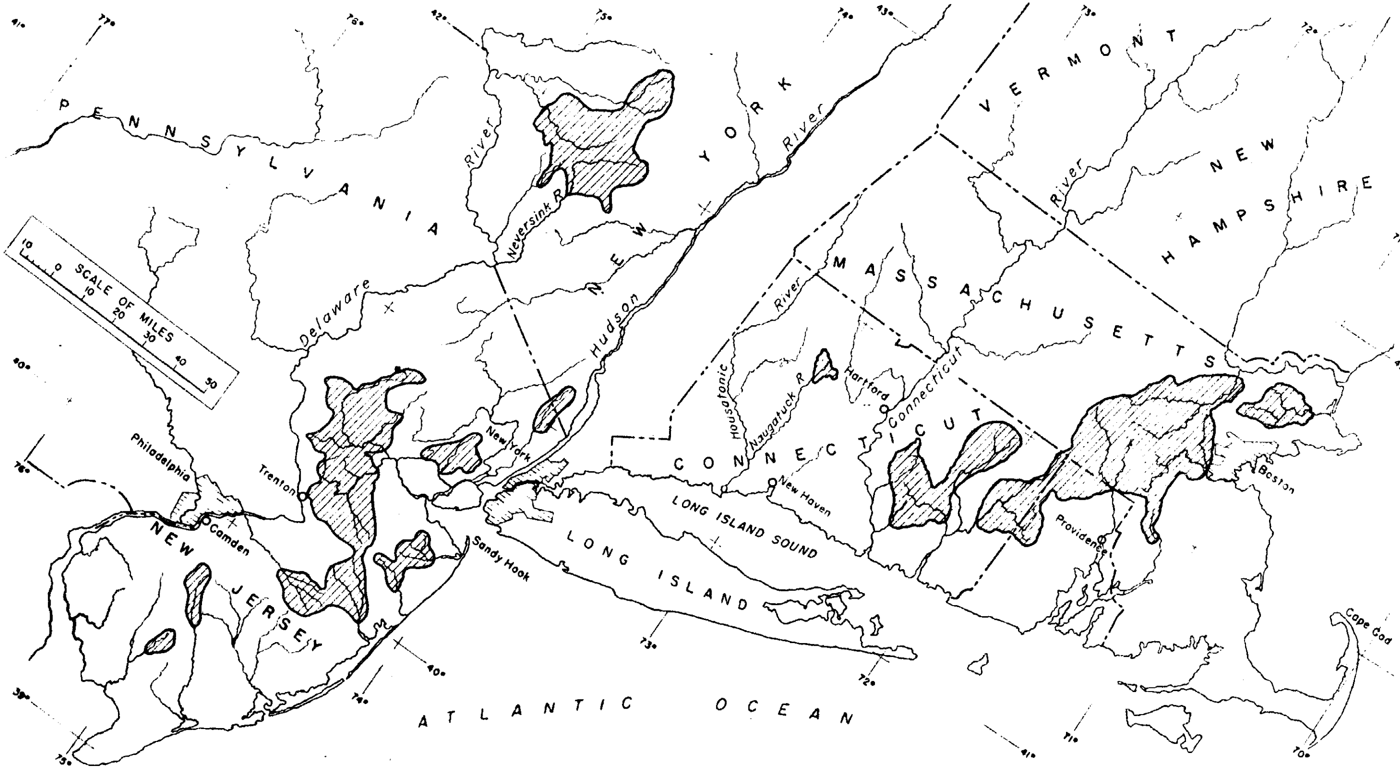


FIGURE 29.—Map showing drainage basins in which record-breaking or extraordinary floods occurred in July 1938.

The area having the heaviest precipitation in Massachusetts embraces the headwaters of the Concord and Charles Rivers and the lower third of the Blackstone River drainage area above Woonsocket, R. I. Both the Concord and the Charles River Basin are for the most part very flat, contain much swamp and low meadow land, and produce long, flat hydrographs with slow rises, flat peaks, and gradual recessions.

The floods on the Concord River Basin and minor coastal basins in Massachusetts were light, and the damage was generally small.

In the upper reaches of the Charles River Basin in eastern Massachusetts the flood was the highest on record, but in the lower reaches it was lower than the floods of February 1886 and March 1936. Highways out of Millis, Mass., were flooded, and families were forced to abandon their homes. In the lower reaches of the Charles River, meadows, low highways, and some cellars were inundated with flood water. (See pl. 7, *B*.) As the velocities were low, the water was clear and very little silt deposited. Despite inconvenience, damage was comparatively small. Stages in the Charles River Basin above the pumping plant at Newton Upper Falls were reported to be ½ foot to 4 feet higher than they were in the flood of March 1936. These excessive stages were due, in part, to backwater effect caused by the rank vegetation growing in the river channel, thus retarding the flow and decreasing the available cross section in the river. During the flood of March 1936 practically no vegetation was present in the river channel.

The Blackstone River Basin is steeper and has considerably less swamp area than the Charles River Basin. The river rises faster, the peaks are sharper, and the recessions are shorter. The peak discharge for July 1938 at Worcester was but 65 percent of the flood of March 1936, while at Woonsocket it was 100 second-feet greater. The flood of March 1936 was basinwide, whereas that of July 1938 was a downstream flood. Numerous textile mills, homes, and highways in the lower part of the Blackstone River Basin were inundated by the flood, which was there the highest on record. Mills were forced to shut down until the water receded. Sandbagging prevented serious damage to property. In Connecticut two small dams and bridges were reported destroyed. The Hartford County Farm Bureau estimated that crops in Connecticut were damaged by inundation or excessive rainfall to the extent of $2,302,000, with the important tobacco crop accounting for $2,060,000 of this figure. Several mills, numerous homes, and thoroughfares again were flooded. The Providence office of the Corps of Engineers, United States Army, determined the total direct flood losses in the Thames River Basin to be about $115,000, which included $46,000 for rural losses. Two views of the flood passing over dams in the Thames River Basin are given in plate 8.

Along Rondout Creek (pl. 9) in New York, swollen above flood stages, two bridges were destroyed, a house and barn near Lackawack were washed away, three cottages in Grahamsville were demolished, several bungalows near Eureka were partly submerged, and State Highway 55 was flooded in several places. The Ellenville-Kingston highway was overflowed at Napanoch, where in 1928 the bridge was destroyed by a great flood. At Lackawack, where a large dam was under construction, a contractor's bridge and a small highway bridge were washed away.

In the Upper Wallkill River Basin the overflow from Wallkill River and Quaker Creek severely damaged about 1,200 acres of muck land planted with onions. (See pl. 10).

The magnitude of floods is dependent on many factors, such as amount and distribution of rainfall, antecedent precipitation, and the absorptive capacity of the ground. Variation of any one of these factors affects the peak flow and the amount of immediate runoff. Those who are working toward a better understanding of the causes of floods with intent to alleviate or utilize their effect, require detailed information on the types of floods that have occurred in the past as a basis of planning for similar or greater occurrences in the future. Accordingly, this report presents the basic factors relating to the flood of July 1938.

METEOROLOGIC AND HYDROLOGIC CONDITIONS

WEATHER ASSOCIATED WITH FLOODS OF JULY 17-25, 1938

By A. K. SHOWALTER[20]

The flood period July 17–25, 1938 was characterized by no outstanding meteorological phenomena, but from the standpoint of movement of pressure systems it was characterized by inactivity.

Recent investigations have shown that flood rains are most apt to occur when the general circulation of the atmosphere from west to east is decreasing in strength or is at a minimum. During such a period there are large fluctuations of cold, dry air far to the south and of warm, moist air far to the north. Abnormally low temperatures usually occur in the middle troposphere in the cold tongues, and moderate precipitation occurs below the central, forward, and west parts of the moist tongue.

During the period July 17–25 the general circulation from west to east was at a minimum, as indicated by the light westerly components reported in the winds aloft and also by the slow movement

[20] Meteorologist, U. S. Weather Bureau.

and stagnation of surface fronts and pressure systems. The following temperatures at 5 kilometers above sea level set new low records during the latter part of July 1938:

July 15, —9.5°C. at Billings, Mont.
July 20, —9.2°C. at Oklahoma City, Okla.
July 20, —9.0°C. at Omaha, Nebr.
July 21, —15.8°C. at Fargo, N. Dak.
July 21, —6.2°C. at St. Thomas, V. I.

It is significant that while record low temperatures were occurring at 5 kilometers in the Middle West, there was stagnation of warm, moist air over the eastern States. However, no record high temperatures occurred in the warm, moist air because the moist tongue was identified by unusually steep temperature lapse rates. An air mass is potentially or conditionally unstable if, when given an initial impulse, it is capable of sustaining internal convection. A rising mass of saturated air cools with lifting at what is known as the saturated adiabatic lapse rate. If the observed decrease in temperature with elevation is in excess of that indicated for a rising saturated parcel, the air mass is considered conditionally unstable. During the period July 17–25, 1938, the upper air soundings for eastern stations showed a preponderance of flights, with temperature lapse rates that indicated conditional instability.

The pseudoadiabatic diagrams for July 19 to 23, shown on figure 30, illustrate the potential instability of the persistent southwest current of tropical air.

These diagrams show the lapse in temperature with height. The ordinates are millibars of pressure, the measure of height, and the abscissae are temperatures in degrees centigrade. The sloping broken lines represent the lapse of temperature for a saturated particle of dry air under pseudoadiabatic conditions. Dry air is unstable if it has a lapse rate greater than 5.5°F. per 1,000 feet; saturated air is unstable whenever it has a lapse rate greater than the saturated adiabats shown on figure 30, which is less than the dry adiabat; and moist air may be unstable if it has a lapse rate intermediate between the two, depending on its moisture content. Increasing moisture content decreases its stability. Such air is said to be conditionally unstable because its instability is conditioned on some initial disturbing force or impulse raising the moist air to the level of free convection where it is saturated and completely unstable. The lapse rates at Washington were intermediate between the dry adiabats and the saturated adiabats and hence were conditionally unstable. The high moisture content of the tropical air between July 20–23 is indicated on figure 30 by the figures of relative humidity, generally above 80 percent.

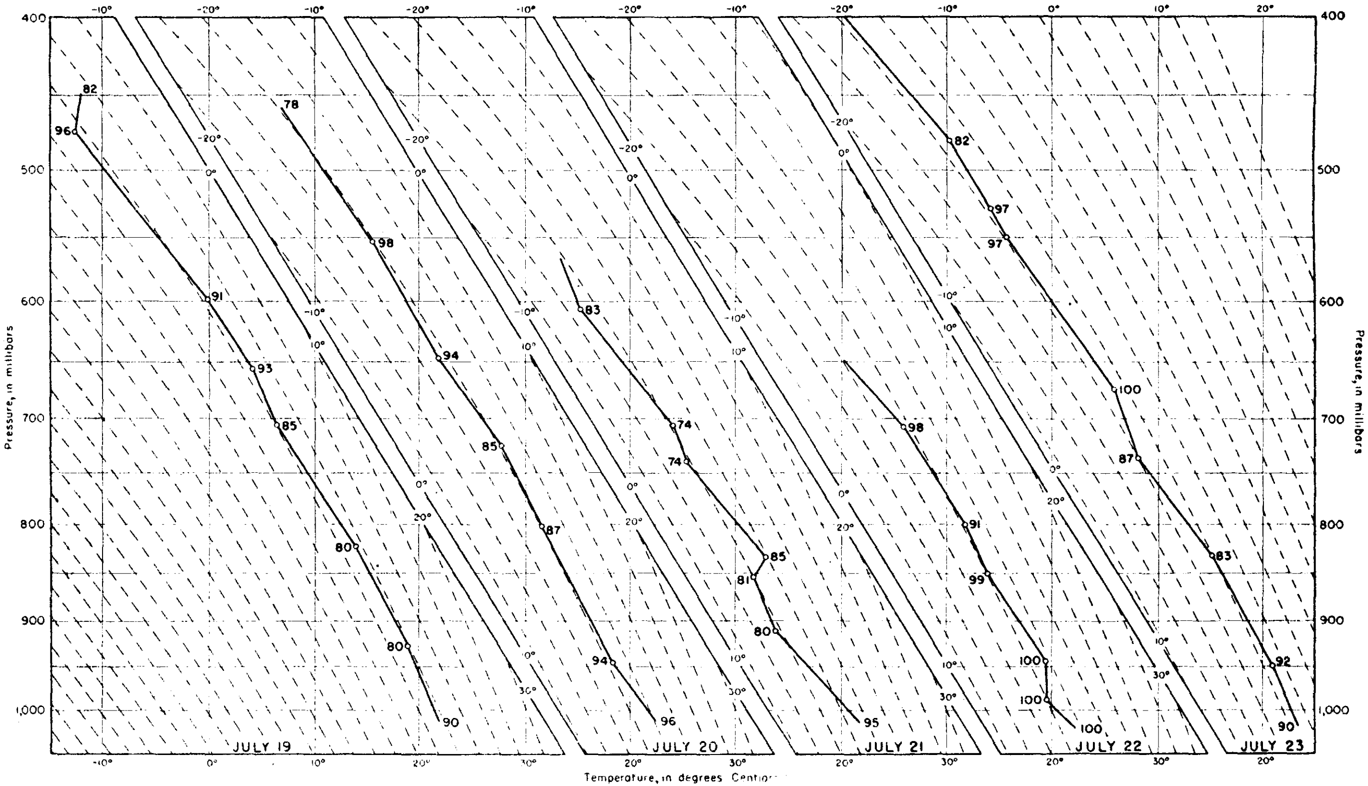


Figure 30.—Diagrams showing temperature distribution in the atmosphere above Washington, D. C., July 19–23, 1938.

The stagnation of a mass of moist conditionally unstable air over the eastern United States resulted in widespread showers and thunderstorms. Local concentrations of thunderstorm activity produced critical discharges in smaller basins.

ANTECEDENT CONDITIONS

Monthly precipitation and temperature and accumulated departures from normal precipitation in New Jersey and Connecticut from March to July 1938, inclusive, as determined from Weather Bureau records, are listed in table 20. Figure 31 compares the daily changes of water level in a well at Middletown, Conn., with precipitation and stream flow at Hartford, Conn. The records of this well were reasonably typical of others throughout Connecticut, but actual fluctuations of water level in the different wells varied widely, depending partly on the depth of the well and partly on the vagaries of topographic, geologic, and water-bearing charactertistics. The observations at wells were made by the Federal Works Progress Administration under the sponsorship of the Connecticut State Water Commission and the supervision of the Geological Survey.

TABLE 20.—*Monthly precipitation and temperature in New Jersey and Connecticut, March–July, 1938*

Month	Precipitation			Temperature	
	Total (inches)	Departure from normal (inches)	Cumulative departure from normal (inches)	Average (°F.)	Departure from normal (°F.)
New Jersey					
March	2.15	−1.63	−1.63	43.2	+4.1
April	2.82	−.79	−2.42	53.0	+3.3
May	3.52	−.22	−2.64	59.2	−1.2
June	7.79	+4.08	+1.44	67.2	−1.6
July	8.84	+4.05	+5.49	74.7	+1.0
Connecticut					
March	2.14	−1.91	−1.91	39.7	+4.0
April	3.17	−.52	−2.43	49.9	+3.3
May	4.05	+.41	−2.02	55.8	−1.7
June	6.92	+3.44	+1.42	66.6	+.5
July	9.57	+5.61	+7.03	71.7	+1.0

From table 20 and figure 31 several facts may be noted. Precipitation during March and April was below normal while temperatures averaged above normal, a climatic combination that tends to reduce soil moisture below average. Precipitation during May was nearly normal. June, however, was wet, and the deficiencies in March-May precipitation were eliminated. A large part of the pre-

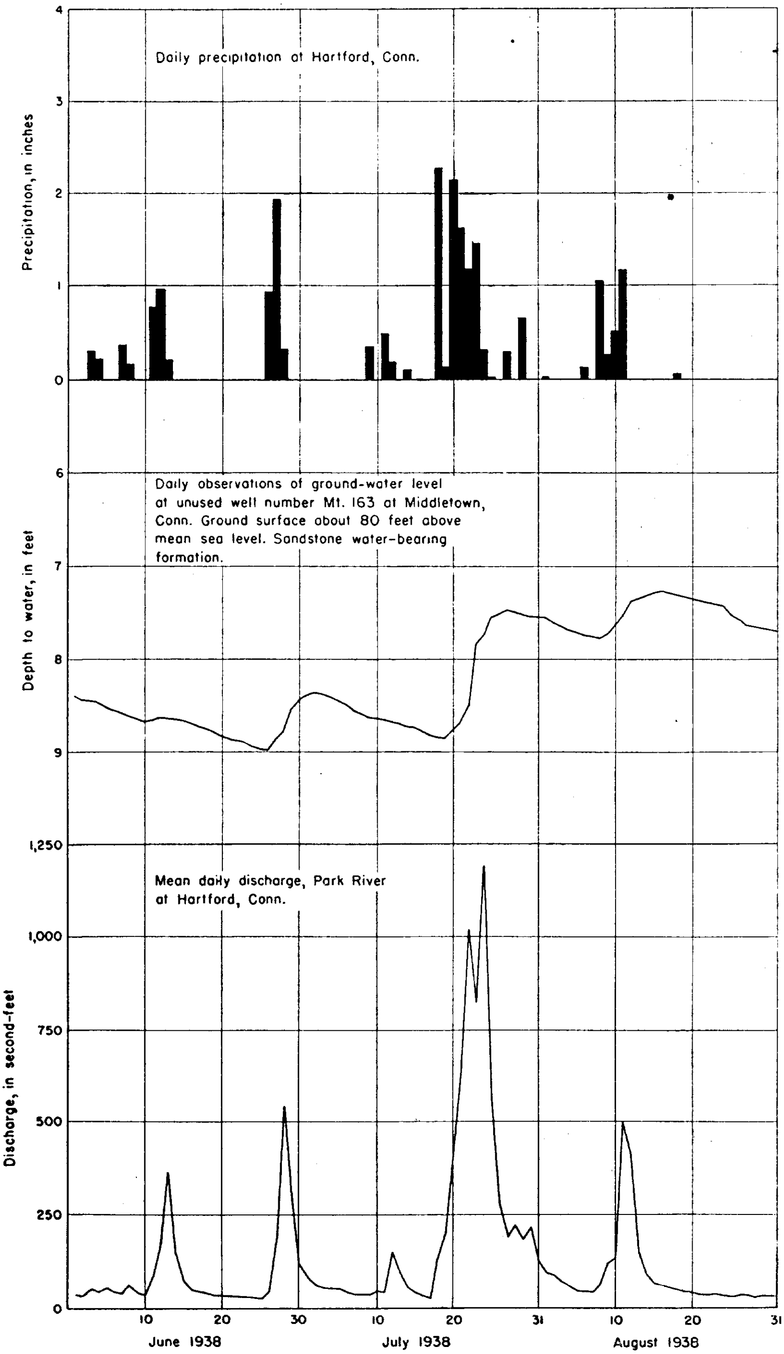


FIGURE 31.—Comparison of typical records of ground-water levels with precipitation and stream flow in Connecticut, June to August 1938.

cipitation in June occurred within a few days during the latter part of the month, causing sizeable floods in New Jersey and minor floods on streams in New York and Connecticut and replenishing the ground-water supply. Although the total precipitation for July was 4 to 6 inches above normal, precipitation for the first 17 days of the month was slightly below normal, and this period of deficiency permitted a reduction in soil moisture and a lowering of the ground-water table and stream discharge.

The flood-producing storms began on July 18. The discharge of the streams just prior to the rain on July 18 consisted primarily of subsurface and ground-water flow. A computation of the average ground-water flow of the Salmon River near East Hampton, Conn., during July for 11 years of record, including 1938, indicated that the mean ground-water flow for the period July 1–18, 1938, was about 210 percent greater than average and on July 18, 1938, about 150 percent greater. Ground-water flow probably indicates the absorptive capacity of the ground on the basis that there is a general relation between the rate of such base flow, the level of the

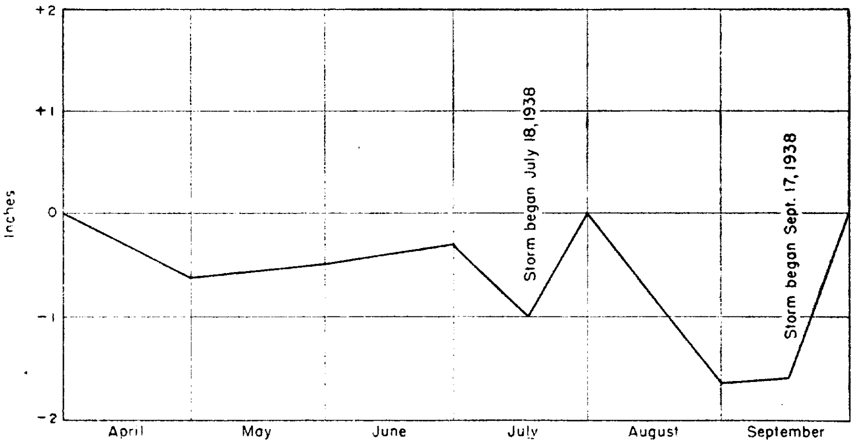
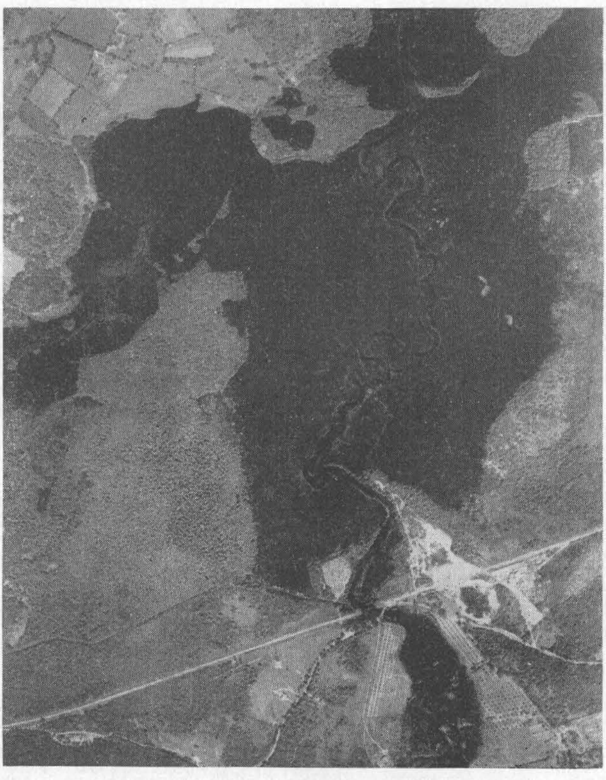


FIGURE 32.—Cumulative relative soil moisture in Park River Basin above Hartford, Con., April to September 1938.

ground-water table, and soil-moisture conditions. Hence, it seems evident that on July 18 soil moisture was above normal in the Salmon River Basin. Time did not permit such analysis for other drainage basins, but probably similar conditions existed throughout the area.

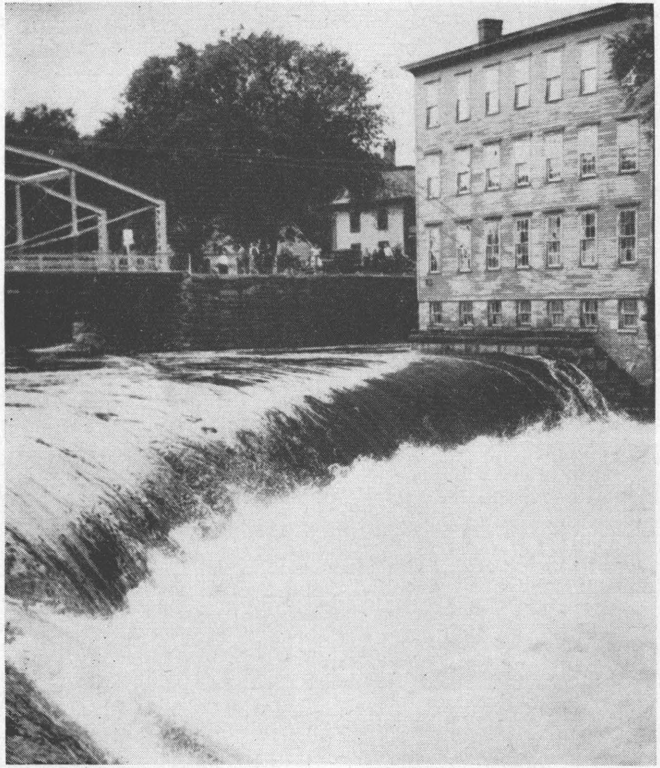
Figure 32 shows a study of the cumulative relative soil moisture of the Park River Basin beginning April 1, 1938, and continuing through September 30 in order to compare the soil moisture prior to the July flood with that prior to the September flood. This graph

A. CONCRETE BOX CULVERT DESTROYED BY JULY 1938 FLOOD AT KILLINGWORTH, CONN.

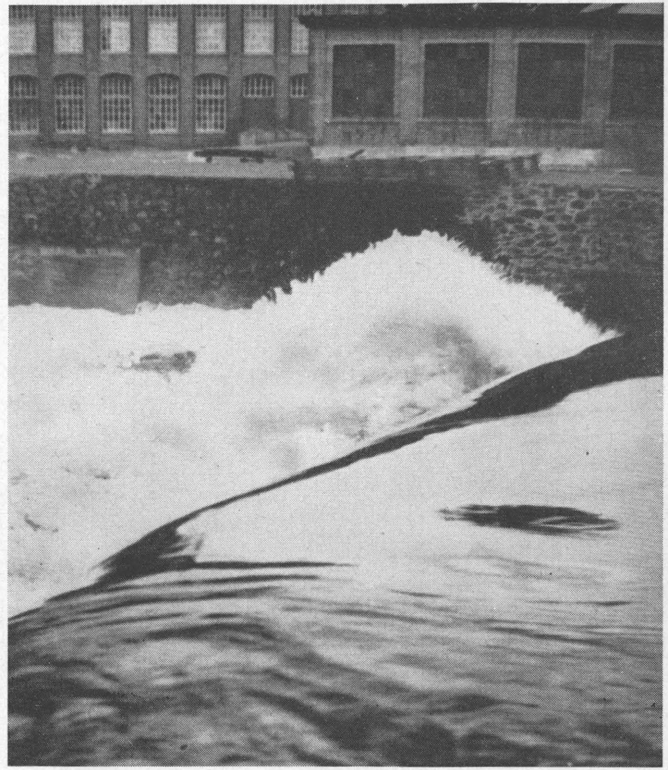


B. AERIAL PHOTOGRAPH OF REACH OF CHARLES RIVER NEAR MEDFIELD JUNCTION, MASS.

Photo by Corps of Engineers, U. S. Army.

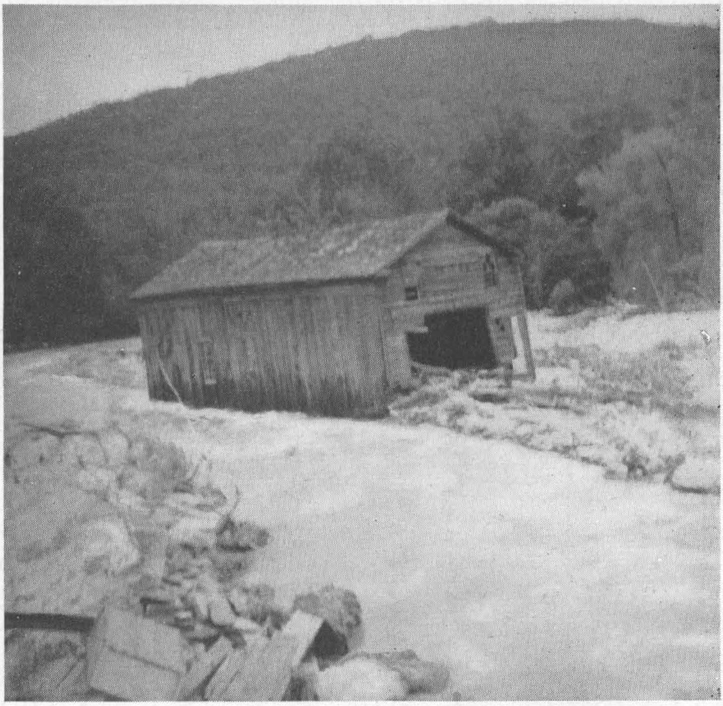


A. QUINEBAUG RIVER AT DANIELSON, CONN., NEAR PEAK, JULY 24, 1938.

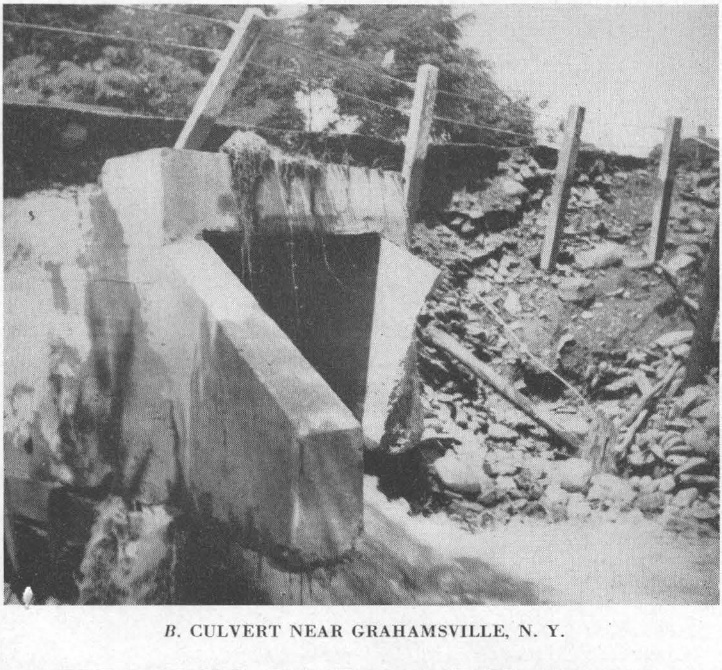


B. FIVE MILE RIVER AT DANIELSON, CONN., NEAR PEAK, JULY 24, 1938.

Photos by Guerino Del Pesco.



A. BARN WASHED FROM FOUNDATION NEAR LOWES CORNERS, N. Y.

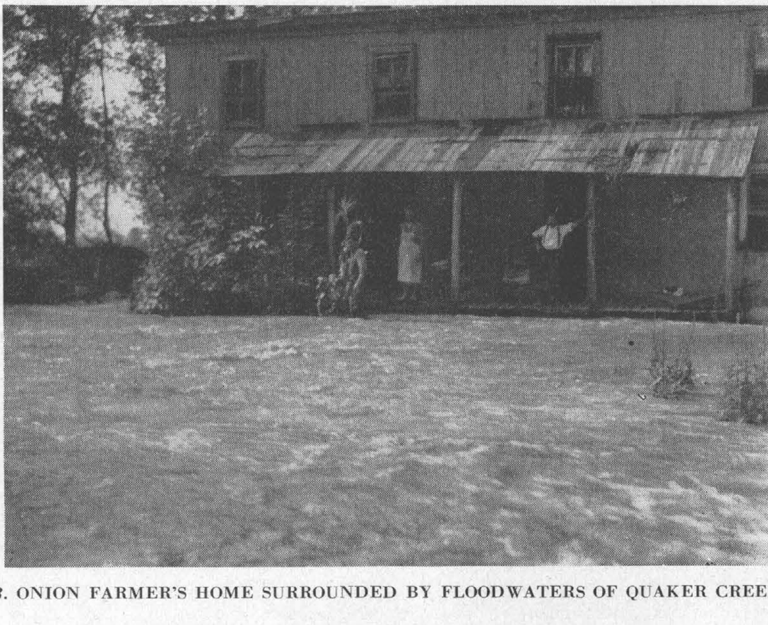


B. CULVERT NEAR GRAHAMSVILLE, N. Y.

FLOOD SCENES ON RONDOUT CREEK, JULY 1938.

Photos by Middletown (N. Y.) Times-Herald.

A. ONION FIELDS OVERFLOWED BY QUAKER CREEK.



B. ONION FARMER'S HOME SURROUNDED BY FLOODWATERS OF QUAKER CREEK.

FLOOD SCENES NEAR FLORIDA, N. Y., JULY 1938.

Photos by Middletown (N. Y.) Times-Herald.

was computed by methods outlined in Water-Supply Paper 772[21] from records of precipitation, temperature, and stream-flow data in the Park River Basin. The normal tendency toward depletion of soil moisture during spring and summer was not evident in 1938, but the period of deficient precipitation during the first half of July was favorable to an increase in the rain-absorbing capacity of the ground. Further reference to this graph is made on page 389. Similar graphs for other drainage basins might show differences owing to variations in the controlling factors. Water-Supply Paper 867[22] shows a similar graph for the Westfield River Basin above Knightville, Mass., for 1938 and also for periods before the floods of 1927 and 1932.

PRECIPITATION

Precipitation records collected at about 575 stations were compiled and used for the construction of the isohyetal map presented herein and for the study of the relation between rainfall and runoff. Table 21 lists the daily precipitation for the period July 15–26, 1938, with appropriate footnotes indicating the time of measurement and the source of record.

The last column of table 21 shows the total precipitation measured July 17–25. Plus signs after figures indicate that the records are probably incomplete. For convenience, the numbers assigned to each station in the first column show its location on plate 11 and are the same as those for the storm of September 1938 listed in Water-Supply Paper 867[23].

[21] Hoyt, W. G., and others, Studies of rainfall and runoff in the United States: U. S. Geol. Survey Water-Supply Paper 772, pp. 248–255, 1936.

[22] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, p. 44, fig. 23. 1940.

[23] Paulsen, C. G., and others, idem, pp. 46–61.

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*

[Measured in the afternoon except as noted. Asterisk indicates that data are included in following measurement]

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17-25
	Merrimack River Basin													
	New Hampshire:													
3	Bristol (Ayers Island)[1,2]	(3)	(3)			0.09	0.10		0.18	1.43	0.19			1.99
4	Concord[4]				0.59	.21	.17	0.69	1.27	.91	.07	Tr.		3.91
6	Franklin	0.10			.25	.03		.29	.77	.25	.16			1.75
8	Garvins Falls[1,5]	(3)	(3)		.80	.56	.01	.80	.60	.29	.01		(3)	3.07
10	Greenville[2]	(3)	(3)	0.49	Tr.		1.00	.04	.03	.64	.02		(3)	2.22
11	Greggs Falls (Goffstown)[1,5]	(3)	(3)		1.95	.64	.01	1.27	.20	.21	.01	Tr.	(3)	4.29
12	Hillsboro[2]	.03				.60	.33	.01	.34	.51	.53	Tr.		2.32
13	Hillsboro (Jackman Falls Dam)[1,5]	(3)	(3)		.56	.38	.04	.28	.63	.48				2.37
16	Lakeport[2]	(3)	(3)			.94			.24	1.06	.18			2.42
18	Lincoln[2,6]	.08			.16	.74	.02	.04	.07	.48	.45			1.96
19	Manchester[1,4]	.01			2.31	.58	.02	.75	.53	.19	.10	0.02		4.50
704	Milford[2,7]	(3)	(3)			1.55	.96		1.05	.02	.15			3.73
20	Nashua[5]				1.93	1.28	.03	.89	.05	.51	.04	.04		4.77
21	New Durham[2]					.42	.29	.23	2.42	.04	.75			4.15
25	Plymouth	.35			.49	Tr.		.64	.86	.88		Tr.		2.87
30	West Wilton[1]	(3)	(3)		1.35	.68	.15	.34	.74	.40			(3)	3.66
	Massachusetts:													
32	Ashby[2,8]	(3)	(3)			2.47	.45	.58	.37	.78	.08	.33		5.06
33	Ashland[9,10]	.02			.91	.93	.69	3.67	1.20	3.80	.34	.04		11.58
34	Boylston[9,10]	.09			*	*	*	*	*	*	6.14	.25		6.39
35	Clinton[5,9]	Tr.			*	*	2.15	.01	*	*	3.39	.28		5.83
36	Concord	Tr.			1.61	.52	.30	1.87	.48	1.57	.50	.26		7.11
37	Cordaville[2,9]	(3)	(3)		*	*	*	*	*	4.97	3.39	.33		8.69
38	East Pepperell[2,8]	(3)	(3)			2.66	.92	.09	1.19	.04	.78		0.19	5.68
39	Fitchburg			1.78	.90	1.36	.03	1.11	.09	.61		.35		6.23
40	Framingham[9]	.02			1.16	.71	.65	2.83	1.43	2.60	.32	.02		9.72
41	Gates Pond[2,8]	(3)	(3)			1.43	.36	.30	2.10	.56	1.65	.26	.22	6.88
42	Groton[5,8]				1.85	1.18	.52	1.16	.12	1.30	.02	.12		6.27
43	Haverhill (City Hall)[11]	.08			1.80	1.10	.21	1.25	1.91	.80	.45	.12	.15	7.64
44	Haverhill (Kenoza L.)[5]	(3)	(3)		2.31	.28	.05	2.00	.74	1.22	.04	.70		7.34
45	Jefferson[9,10]				*	*	2.09	1.25	Tr.		1.69	.10		5.13
46	Kendall Reservoir[5,8]	(3)			1.85	.38	.13	1.90	.20	1.65	.02	.03		6.16
47	Lake Cochituate[9]	.01				1.19	.66	1.01	3.66	.88	4.23	.41		12.04
48	Lawrence	Tr.			2.45	.40	.15	2.79	.30	1.00	.41	.25		7.75
49	Littleton[5,8]	(3)			3.06	.86	.13	1.55	.19	.94	.03	.20		6.96
50	Lowell[12]				2.16	1.10	.13	2.21	.32	1.22	.04	.86		8.04
52	Mount Wachusett[9,10]	(3)	(3)		*	*	*	*	*	*	6.21	.05		6.26

53	Newburyport[5,8]	----	----	----	2.52	.38	.12	1.86	1.46	1.60	.08	----	----	8.02
54	North Andover[2,8]	(3)	0.09	----	----	2.85	.28	.55	2.43	.47	1.83	.05	(3)	8.46
55	Princeton[9,10]	----	----	----	*	*	3.96	*	1.28	*	1.21	.26	----	6.71
56	Sterling[9,10]	----	----	----	*	*	2.59	*	1.32	*	1.18	.13	----	5.22
57	Sudbury Dam[2,9]	(3)	(3)	----	----	1.26	.51	.52	2.18	1.03	2.34	.23	.01	8.07
	Thames River Basin													
	Massachusetts:													
58	Charlton Depot[5,8]	(3)	(3)	----	----	.89	.20	2.14	.32	1.42	.06	----	----	5.03
59	Southbridge[5,8]	.33	----	----	1.78	.23	.34	3.14	1.37	2.66	.12	.08	----	9.72
60	Webster[5,8]	.23	----	----	.66	.19	.36	2.92	.85	2.80	.30	----	----	8.08
	Connecticut:													
61	Baltic[2]	.42	.13	----	.10	1.05	1.71	2.23	.32	4.73	1.71	----	----	11.85
62	Camp Fernow[13]	.04	----	----	.40	.60	1.53	2.52	1.75	2.84	1.50	----	----	11.14
63	Camp Lonergan[13]	(3)	.27	----	.23	.34	.55	.21	.46	1.61	1.50	1.55	----	6.45
64	Griswold[14,15]	(3)	(3)	----	.75	.12	1.25	.88	.50	3.00	2.00	----	----	8.50
65	New London	.95	----	Tr.	.62	.06	.86	.19	.46	1.79	2.32	----	Tr.	6.30
705	North Grosvenordale[2,16]	(3)	(3)	----	.57	.71	2.07	3.06	2.06	2.04	1.03	----	----	11.54
66	Norwich[5,17]	(3)	----	----	*	*	*	1.10	*	*	5.81	----	----	6.91
67	Putnam	.12	----	----	.55	.55	1.01	2.40	.80	2.14	1.35	----	Tr.	8.80
68	Storrs	.08	----	----	1.57	.38	1.22	2.29	.108	3.36	.96	Tr.	----	10.86
	Connecticut River Basin													
	New Hampshire:													
72	Fitzwilliam[5,8]	----	----	----	1.03	.78	.03	.90	.93	.67	----	----	----	4.34
76	Keene[1,2]	(3)	(3)	----	.62	.22	.06	.27	.58	1.37	----	----	----	3.12
77	Do	.29	----	----	.66	.15	.08	.01	1.18	1.64	Tr.	----	----	3.72
79	Minnewawa[1,5]	(3)	(3)	----	1.27	.54	.02	.26	.58	.52	----	----	(3)	3.19
	Vermont:													
91	Brattleboro[2]	.29	----	----	----	.67	.28	.07	.33	.71	1.25	Tr.	.01	3.31
98	Mays Mill[2]	.41	----	----	----	.77	.15	.67	.56	.86	1.79	.13	.10	4.93
106	Somerset[2]	.42	----	----	----	.68	.03	----	.22	.95	.45	----	----	2.33
108	Vernon[4]	.26	----	----	----	.58	.13	Tr.	.25	.58	1.39	Tr.	Tr.	2.93
	Massachusetts:													
117	Amherst[4]	----	----	----	2.07	1.28	----	.57	.60	.30	.07	----	----	4.89
119	Athol[5,8]	----	----	----	1.37	.72	.05	1.01	.03	.32	----	----	----	3.50
120	Baldwinsville[5,8]	(3)	----	----	2.36	1.42	.02	1.01	.02	.07	.21	----	(3)	5.11
121	Barre[5,8]	(3)	----	Tr.	1.74	1.96	.08	1.52	.05	.61	Tr.	Tr.	(3)	5.96
122	Blandford[5,8]	(3)	.08	----	1.79	.40	.20	1.03	.05	.91	Tr.	----	(3)	4.46
123	Bondsville[5,8]	(3)	----	----	1.54	.55	.68	1.76	.12	.78	Tr.	Tr.	Tr.	5.43
124	Borden Brook Res.[5,18]	(3)	(3)	----	1.25	.55	.18	1.30	.11	1.07	----	----	----	4.46

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
126	Chester[5,8]	0.01			1.06	0.08	0.19	1.10	0.07	0.75				3.25
127	Chesterfield[5,8]				2.35	.08	.10	.98	.11	.93		0.06		4.55
746	Chicopee Falls (Bircham Bend)[5,8]	(3)			2.25	1.20	.02	2.08	.14	.67		Tr.	(3)	6.36
128	Colrain[5,8]	(3)			1.94	.05		.37	.77	1.02			(3)	4.15
129	Cummington[5,8]	(3)			1.61	.10	.72	.82	.33	1.19			(3)	4.77
130	East Northfield[5,8]	(3)			1.54	.26	.08	.66	.08	.64			(3)	3.26
131	Enfield[5,9]	(3)	(3)		2.42	1.90	.05	2.20	.07	.62		.02		7.28
132	Fryville (Athol)[5,8]	(3)			2.40	.56	.07	1.01	.06	.41	0.04		(3)	4.55
133	Gardner[5,8]				2.56	1.26		1.00	.10	.30				5.22
134	Greenfield[5,8]	(3)			1.82	.36	.12	1.13	.05	.88			(3)	4.36
135	Hardwick[5,8]				1.76	.78	*	1.58	*	.63			0.07	4.75
136	Heath[5,8]			Tr.	.80	.19	.20	.50	1.01	1.51	.04	Tr.		4.25
137	Holyoke[2]	(3)	(3)		.37	1.83	.98	.05	1.63	.06	.37		Tr.	5.29
138	Hoosac Tunnel[2]	.60				.99	.24	.47	.38	1.23	.62	Tr.		3.93
139	Hubbardston[5,8]			Tr.	1.81	1.72	.01	1.17	.06	.44	.01			5.22
140	Knightville[5,8]	(3)			2.48	.17	.09	1.05	.04	.36				4.19
141	Lake Pleasant[5,8]	(3)			1.15	.59	.07	1.54	.30	.53	.02		(3)	4.20
142	Ludlow Reservoir[5,18]	(3)			1.78	1.05	.04	1.86	.16	.57		.04		5.46
143	Middlefield[5,8]	(3)			2.07		.40		1.19	1.20	.02			4.88
144	Monson[5,8]	.33			1.15	.51	.33	1.84	.10	1.46	Tr.	.45		5.39
146	Montgomery[5,8]	(3)			1.55	1.10	.10	1.24	.12	.69				4.80
147	New Braintree[5,8]	(3)			1.56	.56	.12	1.39	.10	.69	.02		(3)	4.44
148	New Salem[5,8]	(3)			3.00	.55			1.40	.51			(3)	5.46
149	North Rutland[5,8]	(3)			1.90	1.60	.17	.98	.82	.64	.65	.02	.04	6.78
150	Otis Reservoir[5,19]	(3)	(3)		.70	.65	.05	1.50	.10	.57				3.57
151	Peru[5,8]	.34			2.11	.10	.35	.62	1.01	.10				4.29
152	Petersham[2,9]	(3)	(3)		*	*	2.74	*	*	*	2.28			5.02
153	Phillipston[5,8]	(3)			2.35	1.18	.25	1.00	.02	.25			(3)	5.05
154	Plainfield[5,8]	.03			2.03	.75	.46	.55	.85	.90				5.54
155	Provin Mountain Residence[5,18]	(3)	(3)		1.44	1.16	.09	2.17	.09	.71	.02			5.68
156	Rutland[5,8]	(3)			1.24	.98	.11	1.26	.27	1.08	.02			4.96
747	Shelburne Falls[2,20]	.28	0.04			1.46	.09	.60	.47	.40	.88			3.90
158	Shutesbury[5,8]	(3)			2.70	.85	.04	1.06	.04	.48				5.17
159	South Deerfield[5,8]	(3)			1.75	1.18	.22	.84	.34	.55			(3)	4.88
160	Springfield	.38			1.51	.84	.56	1.56	.96	*	.60	.11		6.14
162	Springfield[4,21]	(3)	(3)		1.33	1.41	.03	1.50	.49	.32	.18	.12		5.38
163	Turners Falls				1.33	.45	.09	2.00	.06	.90				4.83
164	Ware[5]	(3)	(3)		1.87	.55	.02	1.61	.08	.73		.06		4.92
165	Ware Centre[5,8]				2.30	.75	.05	1.58	.08	.80		.55		5.56
166	Ware River intake[5,9]	(3)	(3)		2.15	.72	.02	1.50			.79	.10		5.28
167	Warren[5,8]	(3)			1.95	.40	.13	1.78	.05	1.34		.03		5.68
168	Warwick[5,8]	(3)			.85	.74	.09	.88	.66	.43			(3)	3.65
169	Wendell[5,8]	(3)			1.42	1.10	.08	1.04	.35	.70			(3)	4.69
170	West Brookfield[5,8]	(3)			2.19	.45	.12	1.82	.04	1.12		.05		5.79
171	Westfield[5,8]	(3)			1.45	1.17	.06	1.58	.07	.40			.02	4.73

172	Westfield Dam (Granville)[5, 8]	[3]			.95	1.23	.20	1.52	07	.47				4.44
173	Westfield Santorium	.23			1.21	1.04	.58	1.46	.74	.52	.54	04	.05	6.13
174	West Granville[2, 22]	[3]	[3]		1.25	.65	.18	1.30	.11	1.07				4.56
176	West Otis[5, 8]	.21			1.65	.14	.36	.93	.34	1.38				4.80
178	West Pelham[5, 8]	[3]			3.42	.91	.03	1.07	.05	.40				5.88
179	West Rutland[5, 9]	[3]	[3]		1.63	.69	.01	1.28			.84	.09		4.54
180	West Ware[5, 8]	[3]	[3]		*	2.75		1.84	*	.54				5.13
182	Williamsburg[5, 8]	[3]			2.67	.65	.28	.78	08	.50			[3]	4.96
183	Williamsville[5, 8]	[3]			2.32	2.10	.05	1.50	.06	.40				6.43
184	Winchendon[5, 8]				2.02	.88	.03	1.20	.14	.40				4.67
185	Worthington[5, 8]	[3]			1.82	.07	.16	.90	.30	.97		03		4.22
	Connecticut:													
186	Bakersville[2, 22]	[3]	[3]		.01	.55	1.80	.84	4.28	.20	1.22	.01		8.91
187	Barkhamsted[2]	.01			.08	.58	1.41	.32	3.00	16	59			6.14
188	Bills Brook[2, 22]	[3]	[3]		.09	.89	1.45	.21	3.19	.10	*	.64		6.57
189	Bloomfield[4, 23]				.36	.20	1.22	1.48	.74	1.09	.39			5.48
190	Bristol[2, 24]	[3]	[3]			2.82	.88	.11	1.98	.21	1.95	.03		7.98
191	Brown's Corner[2, 22]	[3]	[3]			.70	1.06	.28	2.20	.33	.80			5.37
192	Burlington (Phelps Brook Dam)[2, 22]	.13	.01		.17	.43	1.33	.92	3.38	.24	1.08		.01	7.55
193	Camp Buck[13]	.6			.40	1.60	1.25	1.25	1.20	2.10	90			8.70
194	Camp Connor[13]	.95			.60	.51	.32	.72	.48	.70	.63	.01		3.97
196	Camp Robinson[13]	.57			1.00	.45	.66	1.54	.66	.28	.24			4.83
197	Camp White[13]				.10	.65	1.10	2.60	.87	.65				5.97
198	Colchester		.55			.57	.67	1.44	.68	3.10	3.58			10.04
199	Collinsville[2]	.13				.48	1.13	.89	3.06	.21	1.01			6.78
202	East Hartland[2]	.38				1.04	1.40	.22	2.15	.26	.58	.55		6.20
748	Ellington[4, 25]	.10			.37	.12	.28	1.40	.43	1.11	.31	.28		4 30
749	Enfield[4, 25]	[3]	[3]		.93	.50	.24	1.34	.55	.69	.34			4.59
203	Glastonbury[26]	[3]	[3]		.09	*	*	3.76	*	*	2.68			6.53
204	Hartford[4]	Tr.			2.28	.13	2.15	1.62	1.17	1.46	.32	.02		9.15
205	Hartland Hollow[2, 22]	[3]	[3]		.43	2.00	.92	.21	1.88	.10	*	.48		6.02
206	Manchester[5, 26]	[3]	[3]		2.36	.42	.48	2.00	.30	2.12	.09			7.77
750	Marek House[2, 22]	[3]	[3]		.11	.99	1.50	.26	3.22	.13	.70			6.91
207	Middletown[27]	[3]	[3]		.14	.84	.86	.22	.95	1.75	1.18			5.94
208	New Britain[4, 28]	[3]	[3]		.70	.97	.57	.40	.34	1.52	.28			4.78
209	New Hartford[2, 22]	.02			*	.55	1.54	.59	2.64	.19	.72			6.23
210	Newington[4, 23]				1.67	.28	.21	.99	.51	1.78	.24			5.68
211	North Station[2, 22]	[3]	[3]			.72	1.18	*	4.30	.24	.84			7.28
212	Shuttle Meadow[2, 29]	[3]	[3]			1.50	.36	.16	1.35	.28	2.20	.07		5.92
213	South Meadows[4, 23]				1.84	.18	.27	.68	.65	1.81	.34	.24		6.01
214	Thompsonville[2, 30]	.06	.60			.93	.56	.17	2.02	.16	.86			4.70
215	West Hartford[2, 22]				.03	2.30	.38	.91	1.40	.14	2.03	.01		7.20
216	Do[4, 22]			0.01	2.35	.27	.75	.98	.53	1.61	.42			6.92
218	West Hartland[2]		.75			.80	*	1.76	1.45	.76	.56			5.33
219	West Hill[2, 22]	[3]	[3]			.68	2.25	.65	3.50	.30		.65		8.03
220	Whigville Reservoir[2, 29]	[3]	[3]			.83	1.31	.14	2.29	.16	1.24			5.97
221	Windsor[2, 31]	[3]	[3]			.55	.25	1.25	2.02	.14	1.60			5.81

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
	Housatonic River Basin													
	Massachusetts:													
223	Egremont[5 8]	0.13	----	----	0.35	0.04	0.27	1.21	0.16	0.79	0.01	----	----	2.83
224	Pittsfield[5]	----	----	----	1.30	.12	.10	.96	1.93	2.38	----	----	----	6.79
225	Stockbridge	.23	----	----	1.09	.24	----	.40	1.01	1.96	.03	----	----	4.73
226	Do[5 8]	(3)	(3)	----	1.05	.05	.25	.90	.80	1.90	1.85	----	----	6.80
	Connecticut:													
227	Ansonia[2 32]	(3)	(3)	----	.17	.17	.78	.14	.49	.87	1.82	Tr.	----	4.44
228	Bulls Bridge[2 30]	(3)	(3)	----	----	.73	.23	.53	3.96	.27	1.32	----	----	7.04
229	Camp Cross[13]	----	----	----	.50	.37	.07	4.00	1.17	1.76	.06	----	----	7.93
230	Camp Toumey[2 13]	----	----	----		.62	.22	1.92	3.32	.45	.82	----	----	7.35
751	Candlewood Isle[4 30]	(3)	(3)	----	.26	.18	.65	1.24	.45	1.42	.08	----	----	4.28
231	Cream Hill	----	----	----	1.41	.43	.02	2.30	1.02	.83	.12	----	----	6.13
232	Danbury	.04	.02	Tr.	.78	2.10	.30	1.45	1.17	1.84	.18	Tr.	Tr.	7.82
233	Derby[5 33]	(3)	----	.10	.31	.73	.29	.63	.27	2.20	.01	----	----	4.54
234	Falls Village	.30	----	----	----	.98	.13	1.83	1.71	1.95	1.77	----	----	8.37
235	Naugatuck[2 34]	(3)	(3)	----	.62	2.17	1.05	.11	1.20	.29	2.75	Tr.	----	8.19
236	New Milford[10 35]	(3)	(3)	----	1.32	.25	1.22	.12	*	4.69	----	----	----	7.60
237	Norfolk[2 36]	(3)	(3)	----	.17	.96	.14	1.09	1.61	.10	.76	----	----	4.83
238	Prospect[2 37]	(3)	(3)	----	.39	1.62	.91	.10	1.45	.24	2.78	0.02	----	7.51
239	Rocky River[2 30]	(3)	(3)	----	----	.80	.86	.14	3.03	.25	1.24	----	----	6.32
240	Salisbury	.38	----	----	.04	1.00	.04	1.47	.87	1.17	----	----	----	4.59
242	Stevenson Dam[2 30]	(3)	(3)	----	.12	.52	1.43	.20	.93	.36	2.89	.15	----	6.60
243	Torrington[2 38]	(3)	.65	----	----	(3)	.32	(3)	.72	.25	.35	.37	0.73	2.01+
244	Do[5 39]	(3)	(3)	----	*	*	*	*	6.95	1.08	----	----	----	8.03
245	Do[10 40]	(3)	(3)	----	----	*	1.81	*	5.33	1.92	----	----	----	8.43
752	Do[2 41]	(3)	(3)	----	----	.53	1.35	1.59	4.13	----	1.33	----	----	8.93
246	Trap Falls Res.[5 42]	(3)	(3)	----	.43	1.02	1.24	.42	.57	2.47	----	----	----	6.15
247	Waterbury	.13	----	----	.54	1.50	.40	.73	1.50	2.20	.60	----	----	7.47
248	Waterbury (City Hall)[43]	(3)	(3)	----	.07	1.30	1.00	.20	1.58	1.52	1.41	----	----	7.08
249	Wigwam Reservoir[44]	(3)	(3)	----	.42	1.54	1.12	.93	1.90	.96	.75	----	.05	7.62
250	Woodville[45 46]	(3)	(3)	----	.05	.53	.58	2.31	2.45	.56	1.13	----	----	7.61
	Hudson River Basin													
	Vermont:													
251	Bennington	----	----	----	.45	.03	----	----	.53	.76	----	----	----	1.77

	Massachusetts:													
252	Adams[2]	.99				1.30	.25	.18	.25	1.17	.94			4.09
254	Williamstown	.79			1.24	.04	.04	.02	.92	.47	.06			2.79
	New York:													
255	Albany[4]	(3)	(3)		.67	.12	Tr.	.05	.39	.64	.07		.28	1.94
256	Albany (airport)[4]	.01			.25	.05	Tr.	.05	.28	.42	Tr.		.21	1.05
719	Amawalk[5 47]	.02		.10	.06	.60	2.04	2.22	.43	1.85		.01	(3)	7.31
258	Bedford Hills	.94				.58	.48	.95	1.10	2.60	.82	.05		6.58
259	Big Indian[5 47]				1.04	.72	.15	2.00	.67	.25				4.83
261	Boyds Corners[5 47]			.03	.38	1.01	.76	4.03	.44	1.50	.03		(3)	8.18
262	Brown Station[5 47]				.14	.12	.31	2.03	2.02	.87			2.55	5.49
263	Cairo				.87	.13	.05	.43	1.57	.91				3.96
265	Carmel (West Branch)[5]			.10	.36	.67	.52	3.44	.30	1.67	.03			7.09
266	Coldbrook[5 48]			.33	.36	.28	.78	3.31	1.82	1.04			.31	7.92
720	Cross River[5 47]	.06		.04		.98	.41	2.00	.34	2.41			(3)	6.18
721	Croton Falls[5 47]	.01		.34	.11	.39	.87	2.21	.34	1.94			(3)	6.20
269	Croton Lake[5 47]	.03		.05	.03	.56	.91	2.07	.33	1.75		.01	(3)	5.70
722	East Branch Reservoir (Sodom)[5 47]			.14	.18	.48	.51	2.15	.27	2.03			(3)	5.76
272	East Jewett[5 47]			.02	1.16	.32	.38	1.17	1.07	.74			.01	4.86
273	Edgewood[5 47]				.57	.26	.88	2.73	1.96	.70				7.10
274	Elka Park[5 47]			.04	.55	.31	.48	2.60	1.35	1.11	.01			6.45
277	Glenham[2]	.01			Tr.	1.75	.05	.11	3.90	.25	1.16			7.22
280	Grahamsville[5 48]				.72	.19	1.91	5.13	.77	1.30	.02			10.04
281	Grand Gorge[5 47]			.53	1.07	.17	.51	1.74	.94	.12			.06	5.08
283	High Falls					Tr.	.03	.86	2.71	1.64	.62			5.86
286	Honk Falls	(3)	(3)			.35	.37	1.39	2.01	1.05				5.17
293	Kingston[2 48]				.35	.10	.30	1.88	.15	1.10	.55			4.43
294	Do[4 49]	(3)	(3)		.47			1.27	1.20	1.49			.06	4.43
295	Lackawack[5 48]				.18	.23	2.00	2.83	1.72	.42				7.38
296	Lake Hill[5 47]				.65	.24	.55	2.55	2.03	1.07			.01	7.09
297	Lexington[5 47]			.07	1.20	.23	.53	1.17	.68	.21			.01	4.09
300	Manor Kill[5 47]			.02	1.08	.25	.02	.96	1.00	.01			.35	3.34
302	Mohonk Lake				.06	.16	.07	2.07	2.30	1.60				6.26
753	Do[2]					.25	.09	1.35	2.47	.58	.70			5.44
307	North Settlement[5 47]			.17	1.05	.18	.50	1.19	1.22	.12	.01	.01	.04	4.45
309	Oak Hill[5 48]			.05	.85	.27	.15	.82	1.05	.12	.40		.05	3.71
311	Peekamoose[5 48]	Tr.			.20	.11	.73	2.80	1.65	1.67			3.05	7.16
312	Phoenicia[5 47]			.01	.59	.35	.23	3.00	1.08	.70			.02	5.96
313	Pine Hill[5 47]				.84	.80	.40	1.65	.85	.37				4.91
314	Poughkeepsie[4]			Tr.	.28	.70	.02	2.70	1.25	1.06				6.01
315	Prattsville[5 47]			.07	.72	.19	1.30	1.21	.68	.07	.01		.06	4.25
316	Preston Hollow[5 48]				1.00	.28	.45	.72	1.11	.10	.11			3.77
317	Rifton[50]				Tr.	.28		1.02	1.89	1.53				4.72
326	Slide Mountain[5 47]			.04	1.70	.07	.54	3.49	1.43	.32				7.59
327	Southeast Reservoir (Middle Branch)[5 47]			.14	.19	.38	.56	2.34	.26	1.66				5.53
759	Sparkill[4 51]	(3)			.02	.58	.52	1.01	1.20	3.10	.23	(3)	(3)	6.66
332	Sundown[5 48]				.53	.40	2.78	4.78	1.19	1.60				11.28

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
333	Tannersville[5] [47]			0.03	0.54	0.17	0.90	2.25	1.13	0.39				5.41
725	Titicus Reservoir[5] [47]	0.05		.46	.05	.65	.95	2.07	.27	2.32			(3)	6.77
337	Voorheesville[2]	.62				.42	.15		.26	.45	0.40	1.09		2.77
338	Walden				.03	.50		2.06	2.61	1.89				7.09
339	Wappinger Falls	.04		.02	.42	2.10	.04	2.31	2.75	1.02	.04			8.70
341	Warwick	.13		Tr.		.17	.45	2.80	.95	1.33	.10			5.80
342	Westerlo[5] [48]				1.26	.28	.20	.30	.45	1.15	.02		0.07	3.66
343	West Hurley[5] [47]				.19	.20	.44	1.85	1.98	.91			.02	5.57
344	West Kill[5] [47]			.08	1.21	.30	.38	1.19	.98	.18			.03	4.32
345	West Point[4] [52]				.39	.12	.64	2.86	.41	1.00	.02			5.44
346	West Shokan[5] [47]				.15	.53	.30	4.22	1.32	1.78	.04	.01	.04	8.35
726	White Pond[5] [47]			.17	.83	.51	.31	3.88	.60	1.18		(3)	(3)	7.48
347	Windham[5] [47]	.02		.40	1.45	.37	.44	1.40	.65	.19			.02	4.90
	New Jersey:													
755	Beemerville[4] [25]				.58	.08	.25	1.86	1.88	1.77			(3)	6.42
756	Libertyville[4] [25]				.52	.11	.23	1.88	2.11	1.84			(3)	6.69
757	Sussex	.20			.58		.36	2.40	1.24	1.34				5.92
	Hackensack, Passaic, and Raritan River Basins													
	New York:													
348	Palisades Park[4] [53]	(3)	(3)	.44		.15	.89	2.17	.61	1.43	.05	(3)	(3)	5.74
349	Southfields[4] [53]	(3)		.65		.15	1.30	3.19	.48	1.10				6.87
758	Spring Valley[4] [51]	(3)		.23		.19	.64	1.58	.83	2.09	.08		(3)	5.64
	New Jersey:													
350	Boonton[2]	.75	.03		.15	.08	.60	.31	2.60	.52	1.69			5.95
351	Bowling Green[4] [53]	.05		.33	.05	.19	1.08	3.19	.46	1.50	.06	.03	(3)	6.89
352	Brook Valley[4] [53]	.08				.28	1.35	2.44	.51	2.28	.02		(3)	6.88
353	Canistear Reservoir[54]	.25			.10	.20	1.25	2.90	.70	1.65	.30		(3)	7.10
354	Canoe Brook[2]	.36	.26		.12	.11	.46	.64	1.41	2.76	1.22			6.72
355	Cedar Grove Reservoir[2] [54]	.35	.09			.10	.62	.52	1.99	.92	2.43		(3)	6.58
356	Charlotteburg[54]	.06		.25	.02	.23	2.10	1.85	.82	1.65	.16			7.08
357	Chatham[2]	.44	.23		.11	.11	.51	.48	1.33	2.14	1.40			6.08
759	Clinton Junction[2] [25]	.16	.30		.48	.27	.98	.90	.66	1.00	.48	1.28	(3)	6.05
358	Dover	.09		.18		.31	2.26	1.69	.71	2.04	.05			7.24
359	Flemington	.22		.67	.06	.18	2.13	.99	1.48	1.84	.17	.01		7.53
360	Freehold	.81		.23		.35	2.80	.52	.45	.53	1.71		.02	6.59
362	Freehold (Oakland Mills R-2)[4] [25]	.78			.15	.17	2.54	.65	.28	.64	1.21		(3)	5.64
366	Freehold (Cahills Corner R-6)[4] [25]	.85			.26	.25	3.55	1.15	.15	.76	1.11		(3)	7.23

368	Greenwood Lake[5, 55]			.11	.08	.28	1.03	3.78	.17	1.18			(3)	6.63
369	Hightstown	.12		.11	.02	.47	2.03	.93	.58	2.69	.98	.01	Tr.	7.82
370	Little Falls[2]	.45	.09		.05	.10	.52	.72	1.37	.73	1.52			5.01
371	Long Valley	.33		.30		.26	1.82	1.65	.82	2.15	.22			7.22
372	Macopin intake[2, 54]				.25	.11	1.30	.60	2.40	.20	2.23		(3)	7.09
373	Mahwah[4, 53]	.02		.20		.41	.95	2.39	.45	2.09	.02		(3)	6.51
760	Manville[50, 56]	.13		.70	.08	.19	1.30	1.33	1.25	5.58	.20		(3)	10.63
374	Millington[4, 53]	.80		.52	.05	.21	.60	.75	1.13	2.15	.18		(3)	5.59
375	Milton[2, 57]	.05			.66	14	.29	1.55	3.44	.24	2.25		(3)	8.57
376	Morristown[4, 58]	.55		.05	.02	.15	.57	1.06	1.52	2.11	.06		(3)	5.54
377	Morristown Reservoir[4, 53]	.20		.14	.01	.21	.81	2.29	.75	2.14	.08		(3)	6.43
378	New Brunswick[4, 25]			.32	.09	.15	.87	1.18	.22	1.75	.40	.05	(3)	5.03
378	Do	.09		.41	.14	.20	.87	1.06	.44	1.80	.62	.08		5.62
379	New Milford[4, 51]	.54		.04	.04	.54	.43	1.13	1.68	3.25	.20			7.31
380	Oak Ridge Reservoir[54]	.06			.36	.17	1.57	2.96	.78	1.21	.20		(3)	7.25
381	Paterson	.44		Tr.		.14	.58	1.19	1.13	2.01	.17			5.22
382	Do[2, 59]	.44	.08		.01	.08	.45	.70	1.55	.59	1.91		(3)	5.29
383	Plainfield	.62		1.50	.02	.28	.82	1.32	1.08	5.95	.24	.11	Tr.	11.32
761	Quakertown[2, 25]	.30		.77	.19	.23	1.12	39	1.11	.62	1.47		(3)	5.90
384	Raymond Dam[2, 55]			.23	.13	1.70	.47	1.60	.37	2.11			(3)	6.61
385	Ridgefield[50]	.11		.02	.06	.52	.71	.52	.42	2.89	.39			5.53
386	Ringwood[2, 55]			.17	.07	1.48	.81	1.89	.30	1.12			(3)	5.84
387	Rockaway[4, 53]	11		.08	.10	.20	1.55	2.23	.40	1.72			(3)	6.28
288	Somerville	65		.29	.01	.30	1.22	.79	1.27	2.29	.21			6.38
389	Splitrock Pond[2, 57]	.34			.12	24	2.21	1.73	1.10	.40	2.04		(3)	7.84
361	West Freehold No. R-1[4, 25]	.70		.25	.05	.95	2.37	.41	.50	.65	1.41		(3)	6.59
365	West Freehold No. R-5[25]	.67		.15	.07	1.18	2.20	.73	.35	.60	1.35		(3)	6.63
390	Woodcliff Lake[4, 51]	.24		.04	.04	25	.64	1.47	.77	2.07	.17			5.45
	Delaware River Basin													
	New York:													
391	Andes[5, 48]			.08	1.01	.09		1.08	.68	.03			.14	2.97
392	Arena[5, 48]			.65	1.07		.81	1.06	1.36	.12			.02	5.07
393	Arkville[5, 48]	Tr.			.80	.45	.86	1.35	1.88	.15			.17	5.49
394	Balsam Lake[5, 48]				1.11	.42	3.00	2.62	1.15	.40				8.70
396	Bovina[5, 48]			.06	1.56	.33		1.62	.75	.07		.15	.05	4.54
397	Butternut Brook[5, 48]			.17	1.15	.06	1.37	4.36	.69	.33	Tr.			8.13
398	China (Cold Spring Brook)[4, 6]	.02			.79			.21	.27	.24			.89	1.51
399	Claryville[6, 48]	(3)	(3)	.22	1.23	.08	1.36	4.36	1.17	1.16	.02			9.60
400	Craigie Clair[5, 48]	Tr.			.60		1.60	3.35	1.12					6.67
401	Delhi	(3)	(3)		1.05			.54	3.00	.56	.84			5.99
402	Downsville[5, 48]	.02		.05	.78		.15	2.15	.64	.14			.12	3.91
403	East Delhi[5, 48]				1.23	.50	2.10	1.40	.85	.05			.17	6.13
404	Frost Valley[5, 48]			.05	1.17	.25	1.98	4.92	1.25	.42				10.04
405	Halcott Center[5, 48]	.02		.80	.70	.02	.68	.97	1.58	.15			.04	4.90
407	Harvard[4, 48]				.55			2.42	.31	.75				4.03
408	Jeffersonville				.51	.51		.18	2.81	1.18				5.19
409	Kortright Station[5, 48]				1.41	.12		.11	.52	.02			.12	2.18
410	Lake Delaware[5, 48]				1.04	1.09	1.61	.96	.32	.61			.60	5.63

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
411	Lewbeach[5, 48]				0.33	0.14	1.10	3.63	2.21					7.41
412	Mary Smith[5, 48]			Tr.	.49	.07	.69	1.91	1.29	0.29	Tr.		0.06	4.74
414	New Kingston[5, 48]				.98	.18	.35	1.70	.82	.15			.17	4.18
415	Oakland Valley[4, 60]				.30	.57	.15	1.67	1.09	1.42				5.20
416	Parkston[5, 48]	0.03			.52	.01	.02	4.65	1.02	.43				6.65
417	Port Jervis					.48	.97	.37	1.80	1.36				4.98
418	Relay[5, 48]				1.22	.25	.40	1.69	.94	Tr.				4.50
419	Roxbury	.28			.86	.03	.11	.28	2.48	1.32	Tr.			5.08
419	Do[5, 48]			0.11	.75	.14	.28	2.48	1.18	.14			.08	5.08
421	Seager[5, 48]				.78	.70	1.75	2.00	1.27	.09				6.59
423	Stamford[5, 48]				1.55	.05		1.70	1.03				.52	4.33
424	Terry Clove[5, 48]				.95	.05	.84	.98	.71	.05			.17	3.58
762	Woodbourne[5, 48]			.35	.22	.15	.57	3.60	.80	.50	0.01			6.20
	New Jersey:													
425	Belvidere	.70			Tr.	.52	1.50	2.49	.95	.92	.05			6.43
426	Bridgeton	.05		Tr.	.61	.18	.28	1.18	1.58	1.02	2 80		.20	7.65
427	Burlington	.07			.09	.35	2.02	1.10	.40	.71	.96			5.63
429	Camden[4, 61]	.28		Tr.	.28	Tr.	3.08	1.59	.04	.59	1.10	Tr.	.25	6.68
430	Culvers Lake	.12				.60	.36	1.76	1.56	1.90	.03			6.21
763	Deepwater[2, 62]				.10		1.24		.26	3.00	.23		(3)	4.83
431	Lambertville	.19		1.41		.45	.73	1.04	1.42	4.52	.33	Tr.		9.90
432	Layton	.14				.75	.20	.40	2.11	1.94	.01			5.41
433	Moorestown[2, 25]	.46			.04	.21	1.06	1.42	.21	.24	1.84	.02	.05	5.04
764	New Lisbon[2, 63]	.79			.62	1.13	.43	1.55	.03	1.16	2.23	.25	(3)	7.40
434	Newton	.06				.47	.47	2.57	.71	1.20	.05			5.47
435	North Merchantville	.49		Tr.	.35	.04	2.41	1.82	.26	.38	1.12	Tr.	Tr.	6.38
436	Pemberton	.28		.69		.26	1.38	1.31	.39	.35	2.08		.03	6.46
437	Phillipsburg	.32		.15	.03	.24	1.86	1.86	.49	.77	.05			5.45
765	Pine Run[64]	(3)	(3)	(3)	(3)	.66	.50	2.75	1.00	1.00	(3)	(3)	(3)	5.91+
438	Trenton No. 1[4]	.08		.06	.05	.31	1.98	1.45	.47	1.37	.59	Tr.		6.28
439	Trenton No. 2[4]	.31		.01	Tr.	.08	1.28	2.38	.44	2.25	.67	Tr.		7.11
766	Wrightstown (Fort Dix)[2, 65]	.40			.03	.11	1.80	1.72	.22	.26	2.30	.20	(3)	7.40
	Pennsylvania:													
767	Allentown[4, 60]	.03		.03	.20	.47	1.63	2.12	.74	.48	(3)			5.94
768	Phoenixville[4, 60]	.10		.22		.14	.11	2.39	.50	2.22	.08	.10		5.76
769	Sellersville[4, 60]	.46		.79	.03	.10	1.06	1.28	.83	1.60	.04			5.73
770	Stroudsburg[4, 60]				.80	.11	.36	.83	1.14	.99				4.23

	Susquehanna River Basin													
	New York:													
440	Bainbridge	.43			.52			.08	.29	.17				1.06
443	Binghamton[4]	Tr.			.55			.31	.15	.07	Tr.		.11	1.08
466	Oneonta	.10			.26			.25	.22	.53	Tr.		Tr.	1.26
473	South New Berlin (Sage Brook)[4 6]	.14				.19			.55	.12	.11			.97
	Minor basins													
	New Hampshire:													
556	Berlin[2]	.06			.19	.24			.45	.25	.25	.01		1.39
557	Durham				1.23	.76	.33	.54	.54	.29	.69			4.38
732	Exeter[5]	(3)	(3)		1.50	.75		2.00						4.25
560	Great Falls[1 2]	(3)	(3)	(3)	2.31	.50		.75	.25				(3)	3.81
561	Hampton	.08			1.32	.59	.08	1.16	.48	.84	.47			4.94
	Massachusetts:													
564	Accord Pond[5 8]	(3)		.21	.70	.44	1.00	1.40	.34	2.20	.30		(3)	6.59
565	Attleboro[5 8]	(3)		.10	1.03	.04	1.34	.77	.61	1.93	.84		(3)	6.66
566	Beechwood[5 8]	.09		.27	.73	.34	1.30	1.15	.47	2.37	.27		Tr.	6.90
567	Blue Hill[66]	.04			1.03	.91	1.64	2.09	.72	1.71	1.85			9.95
568	Boston[4]	Tr.			.92	.40	.88	2.33	.83	1.76	.55	Tr.		7.67
569	Brockton	.03	0.06		.21	.40	1.55	.71	.07	2.20	.69	Tr.		5.83
570	Do[5 8]	(3)		.10	.57	.06	1.75	.89	1.16	1.67	.55	Tr.	Tr.	6.75
571	Chatham[5 8]	(3)	Tr.	Tr.	1.20	.42	.70	.18	Tr.	.44	1.20	.24	(3)	4.14
572	Chestnut Hill[5 9]				1.12	.53	.93	3.11	.21	2.00	.45			8.35
573	East Walpole[5 8]	(3)		.03	.93	.84	1.91	2.41	*	*	3.93		(3)	10.05
574	East Wareham[2]	.40			.02	1.18	.25	.30	.40	.46	1.06	.28	.01	3.95
575	Everett[5 8]	(3)		.12	.87	.33	1.84	3.35	.50	1.19	.32			8.52
576	Fall River	.13			.28	.15	.58	.13	.12	1.74	1.02	.04	.05	4.06
577	Falmouth[5 8]			.01	.72	.08	.43	.28	.40	.14	.31	.03	Tr.	2.37
578	Franklin[5 8]	.05			1.01	.88	.90	2.25	.65	2.33	.74			8.76
579	Gloucester	.06			1.13	.45	.55	3.85	.50	1.12	.75			8.35
580	Greenbush[5 8]	(3)		Tr.	.27	.22	1.56	.49	.48	1.81	.22		(3)	5.05
733	Holden No. 2[5 67]	(3)	(3)		1.55	.26	.14	1.92	.21	1.38	.02	.03		5.51
581	Hyannis	Tr.			.18	.68	.23	.10	Tr.	.53	.10	.13	Tr.	1.95
582	Ipswich[5 8]	Tr.			2.34	.33	.84	2.27	.53	1.77	.17			8.25
583	Jamaica Plain[5 8]	(3)		.01	1.51	.64	1.02	3.74	.80	1.73	.42		(3)	9.87
734	Kettle Brook No. 3[5 67]	(3)	(3)		1.58	.18	.25	1.96	.26	1.23	.02			5.48
735	Lynde Brook[5 67]	(3)	(3)		1.30	.29	.75	2.24	.84	1.47	.47	.16		7.52
585	Lynn[5 8]	(3)			.80	.55	1.50	4.14	.55	1.10	.57			9.21
586	Manchester[5 8]	(3)		.01	.69	.30	.68	4.22	.31	1.33	.27			7.81
587	Mansfield[5 8]	.24		.09	.88	.08	1.03	1.67	.57	2.18	.87			7.37
589	Middleboro[5 8]	.50		Tr.	1.55	.08	.43	.12	.71	2.16	.27	.05	.02	5.32
590	Middleton[5]	.01			1.48	.36	.64	2.71	.59	1.93	.13	.01		7.85
591	Milford[5 8]	.03			1.21	.61	1.37	3.88	1.33	3.37	.52			12.29
592	Millbury[2]	.05	.40			1.13	.36	.67	2.64	.80	2.19	.15		7.94

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
593	Millis[5] [8]	(3)			0.98	0.75	1.19	3.20	0.43	2.63	0.40		(3)	9.59
594	Nantucket[4]	0.02			.19	.32	.34	.13		.05	.19	0.38	0.05	1.60
595	Needham[5] [8]	(3)			1.19	.72	1.00	3.09	.30	2.13	.37		(3)	8.80
596	New Bedford[4]	.65			.65	.06	.33	.06	.44	.23	.58			2.35
597	New Bedford (Clark's Point)[5] [8]	(3)	Tr.	Tr.	1.14	.06	.40	1.30	.13	.48	.18	.01	(3)	3.69
598	New Bedford (Clifford)[5] [8]	(3)		Tr.	.77	.16	.38	.29	.26	.56	.17	.04	(3)	2.59
599	Newton[5] [8]	(3)			1.37	.60	1.29	3.32	.38	1.94	.41	Tr.	(3)	9.31
600	Northbridge[5] [8]	.12			.91	1.03	.97	2.66	1.14	2.66	.37	.13		9.87
602	Norwood[5] [8]	(3)		.01	1.10	1.82	.32	2.31	.56	2.33	.61		(3)	9.06
603	Onset[5] [8]	(3)		Tr.	1.14	.05	.42	.49	.59	.57	.46	Tr.	Tr.	3.72
604	Peabody[5] [8]	(3)			.43	.52	.57	4.08	.45	1.15	.28			7.48
605	Pembroke[5] [8]	.86			.47	.21	.97	.12	1.54	2.13	.17	.01	.02	5.62
606	Plymouth	.37			.38	1.22	.37	.12	.09	1.34	.72	Tr.	.03	4.24
607	Do[5] [8]	(3)			1.05		.38	.16	.44	.59	.35		(3)	2.97
608	Provincetown	.28	.01		Tr.	.70	.36	.05	.12	.12	.88	.02	Tr.	2.25
609	Rockport	.05			.18	1.00	.55	1.40	2.00	1.04	.70	.02		6.89
610	Salem[5] [8]	(3)			.56	.52	.55	3.95	.38	1.32	.35	Tr.		7.63
612	Spot Pond[5] [9]	.01			.53	.45	.87	3.41	.65	1.85	.26			8.02
613	State Farm[5] [8]	(3)	(3)		.46	.10	.58	.20	1.48	1.78	.20		.04	4.80
614	Swampscott				.95	.29	.83	2.94	.67	1.32	.70	.01		7.71
615	Taunton[5] [8]	.58		Tr.	.40	.09	.64	.15	.62	2.00	.33		.05	4.23
616	Tisbury[5] [8]	(3)				4.10	.15	.60		.54	.29		(3)	5.68
617	Uxbridge[5] [8]	(3)			.66	1.09	.69	3.16	.95	4.68	.32	.02		11.57
618	Waltham[5] [8]	(3)			1.02	.45	1.31	3.90	1.02	2.64	.28		(3)	10.62
619	Wenham Lake[5] [8]	(3)			.71	.46	.55	3.28	.36	1.37	.29		(3)	7.02
620	Weston (Weston College)	.03			.32	1.25	.73	1.63	1.45	3.08	1.54	Tr.		10.00
621	West Roxbury[5] [8]	(3)		Tr.	1.34	.56	1.15	2.53	.58	1.53	.53		(3)	8.22
622	Wilmington[5] [8]	(3)			2.40	.27	.96	2.54	.49	1.83	.12	.02	(3)	8.61
623	Winchester[5] [8]	(3)			.60	.36	.90	2.93	.76	2.18	.30			8.03
624	Wollaston[5] [8]			.13	1.64	.63	.97	2.71	.46	1.96	.66			9.16
625	Worcester	Tr.			1.64	.32	.30	1.71	.36	1.72	.48	.12		6.65
736	Do[5] [67]	(3)	(3)		1.30	.29	.75	2.24	.84	1.47	.47	.16		7.52
626	Wrentham[5] [8]	(3)		.24	1.72	1.01	1.05	2.92	.47	2.97	.95		(3)	11.33
	Rhode Island:													
627	Block Island[4]	.37			.18	Tr.	.66	.18	.23	.34	.68		.02	2.27
629	Greenville	(3)			1.31	.23	1.15	2.20	.13	2.16	2.36	.23		9.77
737	Hopkins Mills[5] [68]	(3)	(3)	.02	1.74	.60	.97	2.13	1.49	3.47	1.32	.07		11.81
738	Kent[5] [68]	(3)	(3)	.01	.83	.86	.26	.51	.56	2.53	.96			6.52
630	Kingston	.12			.12	.31	.85	.10	.33	1.25	1.08		.03	4.04
740	North Scituate[5] [68]	(3)	(3)	.05	1.38	1.35	.15	.83	.48	2.67	1.05	.03		7.99
631	North Smithfield[2] [69]	(3)	(3)			.85	1.70	.05	2.85	1.40	2.60	1.80		11.25
634	Portsmouth	.11			.18	.58	.56	.08	.18	.44	.58		.01	2.60
635	Providence[4]	.62			.50	.07	.87	.60	.17	2.51	1.10	Tr.	Tr.	5.82

742	Rocky Hill[5, 68]	(3)	(3)	.03	1.50	1.10	.74	2.66	1.50	3.07	1.08	.06		11.74
636	Slocum	(3)			.48	.04	.58	.10	.19	1.18	1.03		.02	3.60
743	Warren[2, 70]	(3)	(3)	*	.53		*	.79	*	3.45	.72			5.49
744	Westcott[5, 68]	(3)	(3)	.26	1.13	1.77	.17	.60	.57	2.65	1.12			8.27
745	Westerly[71]	(3)	(3)	.25	.03	1.04	*	.59	*	3.65	*	.06		5.62
637	Wood River Junction	(3)			.47	.07	.92	.18	.48	1.14	1.61	.02	.03	4.89
638	Woonsocket[2, 72]	(3)	(3)			.92	.74	.10	2.60	1.18	2.37	.62	(3)	8.53
	Connecticut:													
639	Bridgeport[42]	.37			.21	.54	.55	.49	.51	1.48	.43	Tr.		4.21
640	Camp Hadley[13]				*	*	2.49	1.33	.28	*	5.02			9.12
641	Cannondale[73]	(3)	(3)		.44	.26	.84	.52	.73	2.19	2.40	.09		7.47
642	Easton Lake[2, 42]	(3)	(3)		*	*	*	1.62	.56		2.12			4.30
643	Greenwich[2, 74]	(3)	(3)			.06	2.14	.55	.85	.62	5.04			9.26
644	Groton[46, 75]	(3)	(3)		.19	.03	.82	.16	.43	1.68	1.42			4.73
645	Hemlocks Reservoir[2, 48]	(3)	(3)		*	*	*	*	*	*	4.99			4.99
646	Lake Dawson[2, 37]	(3)	(3)		.14	.28	.68	.16	.67	.75	2.17	.17		5.02
647	Lake Konomoc	1.05			.83	.15	1.00	.50	.18	2.25	3.21			8.12
648	Lake Saltonstall[2, 37]	(3)	(3)		.37	.02	.52	.45	.80	1.43	2.16	.15		5.90
649	Lake Whitney[2, 37]	(3)	(3)		.30	.15	.57	.18	.95	.36	2.58	.15		5.24
650	Laurel Reservoir[5, 76]	(3)			.22	1.16	.30	1.07	.40	4.93	.05			8.13
651	Mead Pond[5, 76]	(3)		.02	.18	1.15	.24	1.16	.40	4.66	.04	.01		7.86
652	Milford[2, 37]	(3)	(3)		.26	.32	.61	.18	1.14	1.07	1.60	.05		5.23
653	Mount Carmel[14, 31]	.18	.02	Tr.	.07	.60	.69	.27	.42	1.75	1.11	Tr.	Tr.	4.91
654	New Haven[4]	.24			.41	.23	.58	.42	.98	2.10	.53	Tr.	Tr.	5.25
655	North Branford[2, 37]	(3)	(3)		.01	.26	.76	.45	1.10	1.78	1.90	.37		6.63
656	North Guilford[2, 37]	(3)	(3)		.17	.13	.72	.27	1.48	1.85	1.80	.45		6.87
657	North Stamford[5, 76]	(3)		.09	.11	1.54	.35	.76	.36	4.03	.03			7.27
658	Norwalk	.12		*	.42	.84	.62	.79	.65	*	1.72	.67		5.71
660	Wepawaug Reservoir[2, 37]	(3)	(3)		.17	.38	.58	.26	.58	.55	2.20			4.72
661	Wilton (Norwalk)[2, 77]	(3)	(3)		.24	.10	1.45	.36	1.05		3.31	.50		7.01
662	Wolcott Reservoir[2, 29]	(3)	(3)			1.08	.78	.09	1.55	.32	2.56	.07		6.45
	New York:													
664	Bridgehampton	.05			.09	Tr.	1.30	.18	.31	.39	1.49		.04	3.76
771	Bronx (New York University)[4]	.32		Tr.	.08	.06	.78	.44	.28	3.58	.32		(3)	5.54
665	Brooklyn[4, 78]	(3)	(3)	.04	.08	.55	1.10	.61	.20	2.47	1.13	(3)	(3)	6.18
666	Brooklyn Eagle[4]	.21		.12	.15	.10	.79	.68	.31	1.99	.53		(3)	4.67
667	Cutchogue	.50		.06	.10		.75	.17	.71	.58	1.00		.04	3.37
772	Floyd Bennett Airport[4]	.08		.02	.13	.34	1.09	.88	.54	1.68	.98		(3)	5.66
668	Flushing[4]	.44		.02	.07	.19	.90	.70	.23	2.40	.33			4.84
669	Freeport[4, 79]	.07			.48	.19	1.72	.69	.69	.83	.92			5.52
671	Long Beach[4, 80]	(3)	(3)	Tr.	1.32	.12	2.34	.36	.53	.67	.91		(3)	6.25
672	Manhasset[4, 79]	.66			.17	.18	.88	.43	.36	1.86	.84			4.72
673	Mineola[4, 79]	.29			.34	.14	3.17	.84	.33	1.69	.92			7.43
674	Mitchell Field[4, 81]	.46		.40	.53	.70	3.08	.81	.22	1.44	1.15			8.33
675	Mount Vernon[4]	.15		Tr.		.09	.85	.83	.27	4.75	.32			7.11
676	New York (Battery Place)[4]	.14		.09	.08	.04	.85	.63	.28	2.07	.49		Tr.	4.53
677	New York (Central Park)[4]	.39		Tr.	.16	.03	.72	.35	.30	2.40	.33		(3)	4.29

TABLE 21.—*Daily precipitation, in inches, July 15-26, 1938*—Continued

No. on pl. 11	Station	15	16	17	18	19	20	21	22	23	24	25	26	Total, July 17–25
678	Patchogue	0.55			1.07	0.06	2.85	0.25	0.40	0.53	1.14		0.01	6.30
679	Riverhead	.51			.81	.02	1.04	.18	.41	.98	1.21	0.01		4.66
773	St. George[4, 82]	.06		*	.63	.03	.71	.60	.34	1.81	.55			4.67
680	Scarsdale	.28		Tr.		2.02	.69	.97	.58	5.03	.38			9.67
681	Setauket	.16			.68	Tr.	1.75	1.16	.56	.06	.97	.10		5.28
682	Westerleigh[4]	.30		1.17	.08	.17	1.14	.64	.26	2.11	.59	Tr.	(3)	6.16
	New Jersey:													
683	Atlantic City[4]	Tr.			.53		3.04	.34	.10	.41	1.02		.40	5.44
684	Belleplain	.20			.60	1.27	.44	2.61	.27	.51	1.90		.21	7.60
685	Clayton	.16		.86	.06	.29	.63	1.50	.35	.25	3.20		.16	7.14
686	Colts Neck No. R–8[4, 25]	.85		.24	.38	2.43	2.68	.50	.75	1.33	1.20		(3)	9.51
687	Elizabeth	.11	0.12	.35	.01	.12	.75	1.28	.63	2.01	.40			5.55
688	Elizabethport[4, 83]	.20	.02	.54	.02		.71	.48	.18	1.57	.52		(3)	4.02
689	Hammonton	.04		.37	.08	2.34	1.11	2.80	1.21	1.14	1.55	.02		10.62
690	Indian Mills	.21		.32	.38	.21	.46	.78	.93	1.43	1.15		.06	5.66
691	Irvington[4, 83]	.06		.30	.02	.12	.63	.63	.47	2.99	.20		(3)	5.36
692	Jersey City	.45	.23	Tr.	.05	.06	.80	.29	.34	2.38	.39	Tr.		4.31
774	Lakehurst[4, 84]	(3)	(3)	2.00	.27	.43	1.90	.46	1.04	1.03	.59	.08	(3)	7.80
693	Lakewood	.15		.97	.03	.26	2.18	.95	1.15	1.05	1.02	.02	.05	7.63
694	Long Branch[4]	.26		.01	2.52	1.55	6.08	.24	1.12	1.65	.69		.03	13.86
695	Marlboro[4, 25]	.35		.50	.36	.63	2.48	1.74	.22	.66	1.33		(3)	7.92
698	Newark[4, 85]	.18		.15	.03	.15	1.12	.77	.66	4.14	.32		(3)	7.34
775	Newark Airport[4]	.05		.13	.05	.13	.79	.78	.34	2.55	.24			5.01
699	Northfield	.20			.20	.21	.58	2.38	.09	.23	.98		.21	4.67
700	Pleasantville[2]	.23			.07	.41	.25	2.68	.05	.10	.80	.38	.10	4.74
776	Rahway[5, 86]	.26		1.14	.03	.55	.65	.43	.47	2.02			(3)	5.29
701	Runyon	.14			.04	.27	1.02	1.31	.45	3.10	1.07	.36		7.62
702	Sandy Hook[4]	.02		Tr.	.10	.28	1.34	1.01	.48	1.33	1.11		Tr.	5.65
703	Tuckerton	.22			.06	.32	.81	2.98	.46	.03	1.39		.14	6.05

[1]Public Service Co. of New Hampshire.
[2]Measured in morning of day indicated.
[3]Record missing.
[4]Measured at midnight.
[5]Measured in morning after day indicated.
[6]U. S. Geological Survey.
[7]Town of Milford.
[8]Massachusetts Department of Public Health.
[9]Metropolitan District Commission.
[10]Measured at irregular times.
[11]City engineer, Haverhill, Mass.
[12]Proprietors of the locks and canals on Merrimack River.
[13]Connecticut State Forestry Department.
[14]Measured at noon.
[15]Jewett City Water Co.
[16]Grosvernordale Co.
[17]Norwich Water Department.
[18]Springfield Water Works.
[19]Collins Co., Collinsville, Conn.
[20]Board of Water Commissioners.
[21]City of Springfield, Department of Streets and Engineering.
[22]Hartford Metropolitan Water Bureau.
[23]City Engineer, Hartford, Conn.
[24]Bristol Water Co., Bristol, Conn.
[25]U. S. Department of Agriculture, Soil Conservation Service.
[26]Manchester Water Co., Manchester, Conn.
[27]City of Middletown; measured at noon.
[28]City engineer, New Britain, Conn.
[29]New Britain Water Co., New Britain, Conn.
[30]Connecticut Light & Power Co.
[31]Connecticut Agricultural Experiment Station.
[32]Ansonia Water Co., Ansonia, Conn.
[33]Birmingham Water Co., Shelton, Conn.
[34]Naugatuck Water Co., Naugatuck, Conn.
[35]J. H. Nettleton, New Milford, Conn.
[36]Edward C. Childs, Norfolk, Conn.
[37]New Haven Water Co., New Haven, Conn.
[38]Torrington Register.
[39]General S. H. Wadhams.
[40]Torrington Water Co., Torrington, Conn.
[41]American Brass Co.
[42]Bridgeport Hydraulic Co.
[43]City of Waterbury; measured at noon.
[44]Waterbury Water Co., Waterbury, Conn.; measured at noon.
[45]City of Waterbury, Bureau of Engineering.
[46]Measured at 11 a.m.
[47]New York City, Department of Water Supply, Gas, and Electricity.
[48]New York City Board of Water Supply.
[49]City engineer, Kingston, N. Y.
[50]Measured at 11 p.m.
[51]Hackensack Water Co., Weehawken, N. J.
[52]Signal Officer, U. S. Military Academy.
[53]Corps of Engineers, U. S. Army.
[54]City of Newark, N. J., Department of Public Affairs.
[55]North Jersey District Water Supply Commission.
[56]Elizabethtown Water Co., Elizabeth, N. J.
[57]Department of Public Works, Jersey City, N. J.
[58]Town engineer, Morristown, N. J.
[59]Society for the Establishment of Useful Manufactures.
[60]Federal-State Flood Forecasting Service of Pennsylvania, Harrisburg, Pa.
[61]Central Airport.
[62]E. I. duPont de Nemours & Co. Inc., dye works.
[63]U. S. Forest Service.
[64]Wm. C. Armstrong, Blairstown, N. J.
[65]Commanding Officer, Fort Dix, N. J.
[66]Blue Hill Observatory, Milton, Mass.
[67]Public Works Department, Bureau of Water, Worcester, Mass.
[68]Department of Public Works, Providence, R. I.
[69]Woonsocket, R. I., Water Department.
[70]Bristol County Water Co.
[71]Board of Water Commissioners, Westerly, R. I.
[72]Woonsocket, R. I., sewage works.
[73]D. Henry Miller, Cannondale, Conn.
[74]Greenwich, Conn., Water Co.
[75]Water and Electric Department, Groton, Conn.
[76]Stamford, Conn., Water Co.
[77]Water Department, South Norwalk, Conn.
[78]Gravesend-Ave. V; City of New York, Department of Sewers.
[79]Nassau County, Department of Public Works, Hydrological Bureau.
[80]City of Long Beach, N. Y.
[81]U. S. Army Air Corps.
[82]President of The Borough of Richmond.
[83]Joint Meeting Maintenance.
[84]Naval Air Station.
[85]Kresge Department Store, William Wiener, meteorologist.
[86]Rahway Valley Joint Meeting.

TABLE 22.—*Precipitation, in inches, for*

No. on pl. 11	Station	Day	1	2	3	4	5	6
	Merrimack River Basin							
4	Concord, N. H. U. S. Weather Bureau	18						
		19						
		20	0.06	0.09	0.02			
		21						
		22			.2	0.11	0.14	0.04
		23		.0	1.01			
		24	Tr.	Tr.	.03	Tr.	.03	.01
		25						
19	Manchester, N. H. Public Service Company of New Hampshire	18						
		19						
		20		.01	.01			
		21						
		22		Tr.	.04	.16	.21	.04
		23					Tr.	
		24	.01	.03	.01	.01	.02	.01
		25						
	Connecticut River Basin							
108	Vernon, Vt.	18						
		19						
		20	*	*	*	*	*	*
		22						
		23	*	*	*	.18	*	.05
		24	*	*	*	*	*	*
117	Amherst, Mass. Massachusetts State College	18						
		19						.03
		21						
		22	.02	.37	.05	04	.04	.01
		23						
		24	.02	.02	.01	.02		
162	Springfield, Mass. City of Springfield, Department of Streets and Engineering	18						
		19	.04	.02	.01			.07
		20						
		21						
		22	.10	.14	.05	.04	.03	.01
		23						
		24	.03	.05	.04	.03	.01	.02
		25						
189	Bloomfield, Conn. City engineer, Hartford, Conn.	18						
		19						
		20						.02
		21					.03	.02
		22	.44	.06		.09	.07	
		23						
		24	.24	.03	.04	.03	.02	.02
192	Burlington, Conn. (Phelps Brook Dam) Hartford Metropolitan Water Bureau	18						
		19	.01	.01				.06
		20				.01		.03
		21						.02
		22	.44	.06	.02	.07	.01	
		23						
		24	.07	.02	.04	.02	.01	.01
748	Ellington, Conn. U. S. Department of Agriculture, Soil Conservation Service	18						
		19						
		20						
		21						.16
		22	.07	.12	.03	.02	.04	.04
		23						
		24	.07	.08	.02	.05	.02	.01
		25						
749	Enfield, Conn. U. S. Department of Agriculture, Soil Conservation Service	18						
		19	.02					
		20						
		21					.03	.01
		22	.14	.15	.01	.03	.03	.02
		23						
		24	.06	.16	.03	.05	02	.02

period ending at indicated time, July 1938

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	----	----	Tr.	0.15	0.02	0.23	0.08	0.06	0.03	0.01	----	----	----	Tr.	0.01	----	----	0.59
----	----	----	----	----	Tr.	.03	.07	.04	.03	.03	0.01	----	----	----	----	----	Tr.	.21
----	----	----	Tr.	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	.17
----	----	----	Tr.	.57	.04	Tr.	----	Tr.		.01	.03	0.03	0.01	----	----	----	----	.69
0.01	Tr.	0.01	0.02	.09	.69	.12	.01	Tr.		----	.01	----	----	----	----	----	----	1.27
----	----	----	----	.02	.03	.06	Tr.	----	Tr.	Tr.	.03	.09	.58	0.06	Tr.	0.01	0.01	.91
Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.07
----	----	----	----	----	----	----	----	Tr.	----	----	----	----	----	----	----	----	----	Tr.
----	----	----	.60	.45	.13	.26	.47	.34	.06	----	----	----	----	----	----	----	----	2.31
----	----	----	Tr.	.18	.20	.10	.03	.02	.03	.01	----	----	----	----	Tr.	----	.01	.58
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.02
----	----	.01	.26	.03	.01	.07	.03	.07	.05	.05	.12	.05	----	----	----	----	----	.75
.02	0.01	.01	.01	----	.02	.01	----	----	----	----	----	----	----	----	----	----	----	.53
----	----	----	----	.03	.02	.02	.01	----	----	----	----	.11	----	----	----	----	----	.19
.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.10
----	----	----	----	----	----	----	----	----	----	.01	.01	----	----	----	----	----	----	.02
----	----	----	Tr.	----	.23	----	.17	*	*	*	.13	*	.05	----	----	----	----	.58
----	----	*	*	*	.03	*	.03	*	.04	*	*	*	*	*	*	*	*	.10
*	.03	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.03
----	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	.02	*	.05	*	.18	*	.34	*	*	*	*	*	*	*	*	*	*	.82
*	.01	*	.02	*	.46	*	.71	*	.08	*	.07	*	.05	----	----	----	----	1.40
----	.06	----	----	.01	1.05	.07	.50	.35	----	----	----	.03	----	----	----	----	----	2.07
.11	.06	.23	.24	.06	----	.01	----	----	.06	----	----	----	----	.01	.44	.02	.01	1.28
----	.02	.02	----	----	.05	.05	.08	.18	.13	.04	----	----	----	----	----	----	----	.57
.02	.01		.03	----	----	----	----	.01	----	----	----	----	----	----	----	----	----	.60
----	----	.07	.09	.02	.06	----	----	.01	----	.02	.03	----	----	----	----	----	----	.30
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.07
Tr.	.58	.01	----	----	----	----	.13	.57	.01	----	----	----	.02	.01	----	----	----	1.33
.02	.79	.07	.11	.01	Tr.	.01	.01	.02	.02	----	----	----	----	.12	.07	.02	Tr.	1.41
----	.01	----	.02	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	.03
.01	.06	.01	Tr.	.01	.15	.36	.32	.23	.34	.01	----	----	----	----	----	----	----	1.50
----	.01	Tr.	----	----	----	.01	.04	.03	.03	----	----	----	----	----	----	----	----	.49
----	----	Tr.	.01	.09	.03	.01	.01	.02	.01	.06	.01	.01	.01	.01	.01	----	.02	.32
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.18
----	----	----	----	----	----	----	----	.12	----	----	----	----	----	----	----	----	----	.12
.01	.05	.01	.09	----	----	.04	.08	.05	.01	----	----	----	.02	----	----	----	----	.36
.02	----	----	.02	----	----	----	----	.03	.02	----	.05	.03	.01	.01	.01	----	----	.20
.03	.01	.01	.05	.18	.50	.40	.01	.01	----	----	----	----	----	----	----	----	----	1.22
.02	.01	.01	.26	.15	.10	.14	.26	.15	.19	----	.08	.01	----	----	----	.01	.04	1.48
.01	----	----	----	----	----	----	.01	.05	.01	----	----	----	----	----	----	----	----	.74
----	.01	.02	.34	.09	.07	.03	.10	----	----	.30	.01	.01	----	----	.01	.01	.09	1.09
.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.39
.17	----	.05	----	----	----	----	.05	.04	----	----	----	----	.03	----	----	----	----	.34
.18	----	.02	.01	----	----	----	.03	.03	.01	.02	.21	.42	.47	.06	----	----	----	1.54
.01	----	.01	.02	.02	.07	.77	----	----	----	----	----	----	----	----	----	----	----	.94
.01	.01	----	.13	.10	.36	.62	.38	.51	.43	.13	.02	----	----	----	----	.01	.07	2.80
.01	----	----	----	----	----	.02	.12	.10	----	----	----	----	----	----	----	----	----	.85
----	----	.04	.20	.16	.07	.03	.04	.03	----	.22	.04	.01	----	.01	----	.01	.04	.90
.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.18
----	----	.06	----	.01	----	----	.04	.18	.05	----	----	----	.02	.01	----	----	----	.37
----	----	----	.02	----	----	----	----	.02	.04	----	.04	----	----	----	----	----	----	.12
.08	.02	----	.03	.01	.01	.09	.04	----	----	----	----	----	----	----	----	----	----	.28
.10	.03	.02	.02	.07	.13	.10	.10	.22	.18	.18	.03	.02	----	----	----	----	.04	1.40
----	----	----	----	----	----	----	.05	.05	.01	----	----	----	----	----	----	----	----	.43
----	.01	.10	.24	.15	.16	.10	.05	.15	----	.01	.03	.03	.02	.01	.02	----	.03	1.11
.02	.01	.02	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.31
----	----	----	----	----	----	----	----	.28	----	----	----	----	----	----	----	----	----	.28
.02	.30	.01	.01	.03	----	----	.06	.07	.33	----	----	----	.03	.01	----	----	.06	.93
.09	.08	.09	----	.03	----	.01	.01	.01	.04	.07	.01	----	----	----	.03	.01	----	.50
----	.03	----	.03	----	.01	.17	----	----	----	----	----	----	----	----	----	----	----	.24
.05	.04	.02	----	.03	.10	.13	.13	.35	.39	.06	----	----	----	----	----	----	----	1.34
----	----	.02	.02	----	----	----	.03	.07	.01	----	----	.02	----	----	----	----	----	.55
----	----	.04	.09	.09	.06	.01	.04	.16	.01	----	.10	----	.02	.02	.02	.01	.02	.69
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.34

TABLE 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
204	Hartford, Conn. U. S. Weather Bureau	18	0.02	Tr.	----	----	----	----
		19	Tr.	0.01	Tr.	Tr.	Tr.	Tr.
		20	Tr.	Tr.	Tr.	----	Tr.	0.02
		21	----	----	----	----	Tr.	Tr.
		22	.49	.14	Tr.	0.14	0.20	.05
		23	----	----	----	----	----	.01
		24	.08	.08	0.03	.02	.02	.02
		25	----	----	----	----	Tr.	Tr.
750	Marek House, Conn. Hartford Metropolitan Water Bureau	18	----	----	----	----	----	----
		19	.05	.01	----	----	----	.01
		20	----	----	----	.01	----	----
		21	----	----	----	----	.07	.07
		22	.21	.15	.03	.08	.01	.01
		23	----	----	----	----	----	----
		24	.05	.01	.03	.03	----	.01
208	New Britain, Conn. City Engineer, New Britain, Conn.	18	----	----	----	----	----	----
		19	.05	.03	.05	.03	.03	.04
		20	.02	.02	.02	.03	.02	.03
		21	.02	.02	.02	.02	.02	.02
		22	.02	.02	.02	.02	.07	.03
		23	----	----	----	----	----	.07
		24	.03	.03	.03	.03	.03	.01
210	Newington, Conn. City engineer, Hartford, Conn.	18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	----	.01	.08
		21	----	----	----	----	----	.01
		22	----	.10	.04	----	.12	.09
		23	----	----	----	----	----	.01
		24	.05	.01	.04	.04	.01	.03
213	South Meadows, Conn. City engineer, Hartford, Conn.	18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	.02	----	----	----	----
		21	.01	.01	----	----	----	----
		22	.16	.15	----	.09	.04	.04
		23	----	----	----	----	----	.01
		24	.06	.05	.03	.04	.05	.02
		25	----	----	----	----	----	----
216	West Hartford, Conn. Hartford Metropolitan Water Bureau	17	----	----	----	----	----	----
		18	.03	----	----	----	----	----
		19	----	.01	----	----	----	.01
		20	----	----	----	----	----	----
		21	----	----	----	----	.01	----
		22	.19	.05	----	.08	.08	.01
		23	----	----	----	----	----	----
		24	.08	.22	.03	.02	.02	.01
	Housatonic River Basin							
751	Candlewood Isle, Conn. Connecticut Light & Power Co.	18	----	----	----	----	----	----
		19	----	----	.01	----	.01	----
		20	----	.45	----	----	.01	----
		21	----	----	----	----	.03	----
		22	.07	----	.14	----	.02	----
		23	----	----	----	----	----	----
		24	----	.02	.01	----	.02	.03
250	Woodville, Conn. City of Waterbury, Bureau of Engineering	18	----	----	----	----	----	----
		19	.01	----	.01	.09	.07	.02
		20	----	----	.01	----	.01	.02
		21	----	----	.01	.83	.18	.11
		22	.44	.05	.09	.06	.01	----
		23	----	----	----	----	----	----
		24	.02	----	.03	.01	.01	----
	Hudson River Basin							
255	Albany, N. Y. U. S. Weather Bureau	18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	----	Tr.	Tr.
		21	----	----	----	----	----	----
		22	.07	.02	.05	.01	.02	.01
		23	.01	Tr.	.04	.05	.16	.05
		24	----	----	----	----	----	----

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
0.01	Tr.	0.12	Tr.	----	----	Tr.	1.62	0.33	0.17	----	Tr.	Tr.	0.01	Tr.	Tr.	Tr.	Tr.	2.28
Tr.	0.01	Tr.	0.01	Tr.	0.01	Tr.	Tr.	Tr.	Tr.	0.04	0.01	0.03	.01	Tr.	Tr.	Tr.	Tr.	.13
.06	Tr.	.02	.01	Tr.	.04	1.36	.64	Tr.	----	----	----	----	----	----	----	----	----	2.15
.01	.01	.01	.03	0.08	.05	.04	.13	.68	.39	.02	.08	Tr.	----	----	Tr.	0.01	0.08	1.62
Tr.	Tr.	Tr.	Tr.	----	Tr.	.03	.03	.08	.01	----	----	----	----	----	----	----	----	1.17
.03	Tr.	.32	.23	.07	.18	.02	.23	.06	.05	.02	.16	.01	.01	0.01	0.02	Tr.	.03	1.46
.03	.02	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.32
Tr.	Tr.	Tr.	----	----	----	----	.02	----	----	----	----	----	----	----	----	----	----	.02
----	.11	----	----	.02	----	.08	.01	----	----	----	----	----	.08	.01	----	.02	.05	.38
.59	.03	.05	.01	----	.05	.03	.03	.01	.01	----	.01	.20	.46	.58	.01	----	----	2.14
.02	----	.01	----	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	.06
.08	.01	.02	.03	.21	.46	.37	.53	.97	.05	----	----	----	----	----	----	.02	.01	2.90
----	----	.02	----	.01	----	.01	.09	.01	----	----	----	----	----	----	----	----	----	.63
----	----	.03	.06	.12	.01	.01	.05	.02	----	.22	.01	.01	.01	.01	----	----	----	.56
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.13
----	.03	.03	.02	----	----	.02	.07	.07	.06	.06	.04	.04	.04	.04	.06	.06	.06	.70
.04	.22	.03	.03	.02	.04	.04	.02	.03	.04	.03	.03	.04	.02	.02	.03	.03	.03	.97
.03	.02	.02	.02	.01	.02	.01	.02	.04	.05	.04	.02	.04	.02	.02	.02	.01	.02	.57
.01	.01	.02	.01	.02	.03	.02	.02	.02	.02	.02	.01	.01	.01	.01	.01	.01	.02	.40
.01	----	.01	----	----	----	.03	.05	.06	----	----	----	----	----	----	----	----	----	.34
.01	.14	.36	.14	.08	.02	.08	.04	.06	.04	.08	.10	.12	.04	.04	.03	.03	.04	1.52
.01	.01	.03	.01	.01	.02	.01	.01	.01	----	----	----	----	----	----	----	----	----	.28
----	.02	.06	----	----	----	.38	.41	.29	.04	----	----	.12	.34	.01	----	----	----	1.67
----	.02	.02	.02	----	----	----	----	----	.04	.04	.05	.05	.01	.01	.01	.01	----	.28
.08	.01	.03	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.21
.01	----	----	.13	.05	.05	.05	.14	.16	----	----	.02	----	----	----	----	.08	.29	.99
----	----	----	.04	----	----	.02	.08	.02	----	----	----	----	----	----	----	----	----	.51
----	.33	.30	.14	.14	.04	.26	.03	.01	.08	.23	.04	.01	.01	.02	.02	.01	.10	1.78
.01	.04	----	----	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	.24
----	.02	.15	.13	.15	.14	.14	.13	.14	.14	.13	.14	.14	.14	.15	----	----	----	1.84
----	----	.02	.02	----	----	----	----	----	----	.04	.01	.05	.02	----	----	.02	----	.18
.13	.04	.02	.03	----	----	.02	.01	----	----	----	----	----	----	----	----	----	----	.27
----	----	.01	.01	.12	.05	.04	.15	.06	.01	.02	----	----	----	----	----	----	.19	.68
.02	----	.01	.01	----	----	.02	.03	.08	----	----	----	----	----	----	----	----	----	.65
----	.02	.38	.45	.20	.09	.10	.18	.06	----	.01	.23	.01	.01	.02	.02	----	.02	1.81
.03	.03	.03	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.34
----	----	----	----	----	----	.24	----	----	----	----	----	----	----	----	----	----	----	.24
----	----	----	----	----	----	----	----	----	----	----	----	.01	----	----	----	----	----	.01
----	.04	.11	----	.04	----	----	1.26	.35	.51	----	----	----	.01	----	----	----	----	2.35
----	----	.01	.03	----	----	----	----	.03	.01	.05	.05	.04	.01	----	----	.02	----	.27
.08	.01	.02	----	----	.34	.16	.09	.05	----	----	----	----	----	----	----	----	----	.75
.03	----	.01	.03	.10	.09	.06	.23	.24	.02	.01	.04	.01	----	----	.01	.01	.08	.98
----	----	----	----	----	----	----	.01	.10	.01	----	----	----	----	----	----	----	----	.53
----	----	.32	.32	.12	.15	.05	.11	.11	----	.07	.28	.02	.03	----	.01	----	.02	1.61
.04	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.42
----	.15	.01	----	.02	----	.02	----	.01	----	.03	----	.01	----	----	----	.01	----	.26
.02	----	.01	----	.01	----	.02	----	.03	----	.05	----	.02	----	----	----	----	----	.18
.04	----	.11	----	.02	----	----	----	.02	----	----	----	----	----	----	----	----	----	.65
.02	----	.10	----	.13	.04	.42	.18	.03	.14	----	----	----	----	.06	----	.04	.05	1.24
.01	----	.02	----	.14	----	----	----	.03	----	----	----	.01	----	----	----	.01	----	.45
.02	----	.08	.17	.06	.04	----	.07	.30	.53	.01	.06	----	.02	----	----	----	.06	1.42
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.08
----	.05	----	----	----	.01	.02	----	----	----	----	----	.02	.02	.01	.01	.04	.09	.27
.01	.04	.03	.01	.02	.01	.02	----	.03	.02	.06	.07	.22	----	----	----	----	----	.74
----	----	.01	.08	----	.18	----	----	----	----	----	----	----	----	----	----	----	----	.31
.10	.01	.01	.21	.62	.46	.48	.33	.18	.05	.03	----	----	----	----	.06	.02	.09	3.78
.01	.06	.01	----	.01	.03	.08	.05	.01	----	----	----	----	----	----	----	----	----	.91
----	.08	----	.14	.21	.02	.47	.14	.02	.28	.07	.02	.01	.01	.01	----	.03	.03	1.54
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.07
Tr.	.02	.02	.06	.25	.06	.15	.07	.03	.01	----	----	----	----	----	----	----	----	.67
----	----	Tr.	.01	.01	.09	.01	Tr.	----	----	----	----	----	----	----	----	----	----	.12
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.
----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.	.01	Tr.	Tr.	.04	.05
.05	.08	.07	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.01	.39
.11	.06	.05	.07	.03	.01	Tr.	Tr.	Tr.	Tr.	----	----	----	----	----	----	----	----	.64
----	----	----	----	----	----	Tr.	.01	.06	----	----	----	----	----	----	----	----	----	.07

Table 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
256	Albany, N. Y. (airport)	18						
	Corps of Engineers, U. S. Army	19						
		20					Tr.	Tr.
		21						
		22	0.08	0.02	0.02	0.02	0.01	0.01
		23	Tr.	Tr.	Tr.	.08	.08	.04
		24						
294	Kingston, N. Y.	18					.25	.12
	City engineer, Kingston, N. Y.	21					.09	.01
		22	.15	.20	.10	.07	.16	.11
		23		.03	.35	.02	.01	
754	Sparkill, N. Y.	18						
	Hackensack Water Co., Weehawken, N. J.	19						
		20						
		21				.29	.09	.09
		22	.13	.07		.32	.10	
		23						
		24	.10			.05	.01	.02
345	West Point, N. Y.	18						
	Signal Officer, U. S. Military Academy	19		.01			.01	.01
		20		.22			.01	
		21	.01	.04	.04	.04	.02	.04
		22	.04	.07	.10	.02	.01	
		23						
		24			.01		.01	
755	Beemerville, N. J.	18						
	U. S. Department of Agriculture, Soil Conservation Service	19	.06			.01	.01	
		20						
		21					.01	.01
		22	.86	.10	.10	.06	.02	
		23						.19
756	Libertyville, N. J.	18						
	U. S. Department of Agriculture, Soil Conservation Service	19	.08		.01		.01	.01
		20						
		21						
		22	1.08	.20	.04	.13	.03	
		23						.17
	Hackensack, Passaic and Raritan River Basins							
348	Palisades Park, N. Y.	17					.08	
	Corps of Engineers, U. S. Army	19						
		20					.05	.08
		21				.03	.03	.01
		22	.13	.10	.12	.03	.01	
		23						
		24		.01			.01	
349	Southfields, N. Y.	17						
	Corps of Engineers, U. S. Army	19		.05				
		20	.30				.02	.03
		21					.05	.03
		22	.02	.10	.10	.04	.04	
		23						
758	Spring Valley, N. Y.	17						
	Hackensack Water Co., Wehawken, N. J.	19				.01	.06	.04
		20					.01	.03
		21					.05	.05
		22	.23	.05	.12	.18	.02	
		23						.03
		24		.01	.01	.01	*	*
351	Bowling Green, N. J.	17						
	Corps of Engineers, U. S. Army	18						
		19	.01	.02	.02	.01		
		20				.05	.09	.04
		21				.02	.03	
		22	.08	.14	.02	.02	.01	
		23						
		24	.01					
		25						

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	Tr.	0.01	0.05	0.07	0.03	0.07	Tr.	0.02	----	----	----	----	----	----	----	----	----	0.25
----	----	Tr.	.01	.01	.01	Tr.	0.02	Tr.	----	----	----	----	----	----	----	----	----	.05
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.
Tr.	----	----	----	----	----	----	----	----	----	----	----	----	Tr.	Tr.	Tr.	Tr.	0.05	.05
0.04	0.05	.02	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.	.28
.10	.04	.04	.03	Tr.	Tr.	Tr.	.01	Tr.	----	Tr.	----	Tr.	Tr.	----	----	----	----	.42
----	----	----	----	----	----	Tr.	Tr.	Tr.	----	----	----	Tr.	----	----	----	----	----	Tr.
----	.02	----	.02	----						----	----	----	----	0.06	----	----	----	.47
.10	.05	.01	.04	.06	.02	----		----		----	----	----	----	----	0.10	0.47	.32	1.27
.11	.11	.08	----	----	----					----	----	----	----	.02	----	.08	.01	1.20
----	.38	.12	.02	.07	.22	.02	.02	.09	0.14	----	----	----	----	----	----	----	----	1.49
----	----	----	----	----	----					0.02	----	----	----				----	.02
----	----	----	----	----	----	.03	----	.03	.52	----	----	----	----	----	----	----	----	.58
.13	.06	.03	.15	.15	----	----	----	----	----	----	----	----	----	----	----	----	----	.52
.02	.01	.01	.10	.29	.11	----	----	----	----	----	----	----	----	----	----	----	----	1.01
----	.03	.03	.22	.05	.03	----	.22	----	----	----	----	----	----	----	----	----	----	1.20
----	.21	.72	.61	.30	.13	.31	.10	.02	----	.42	0.17	0.11	----	----	----	----	----	3.10
.04	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.23
----		----	----		----	----	----	----	----	----	----	----	----	.22	.13	----	.04	.39
----	----		----	.01	.02	.01	.04	.01	----	----	----	----	----	----	----	----	----	.12
.06	.13	.12	.07	----	----	.03	----	----	----	----	----	----	----	----	----	----	----	.64
----	.02	.17	.91	.57	.48	.17	.01	.07	----	----	----	----	----	.01	.06	.05	.15	2.86
.01	----		.01	.05	.02	.06	.01	----	.01	----	----	----	----	----	----	----	----	.41
.01	----	.03	.17	.06	.04	.24	.17	.15	.06	.02	.01	.01	0.01	.01	----	----	.01	1.00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.02
----	----	----	----	----	----	----		----	----	----	----	----	----	40	----	.16	.02	.58
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.08
----	.14	.11	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.25
----	.03	.19	.67	.62	.03	.01	.01	.01	----	----	----	----	----	----	----	----	----	1.86
----	.03	.02	.06	.32	.24	.02	----	.01	.04	----	----	----	----	----	----	----	----	1.88
----	----	.04	----	----	.02	1.26	.08	.03	.10	.02	----	.03	----	----	----	----	----	1.77
----	----	----	----	----	----	----	----	----	----	----	----	----	.25	----	.03	.09	.15	.52
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.11
----	.06	.13	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.23
----	----	.17	.59	.57	.48	.01	.01	.01	----	----	----	----	----	----	----	----	.04	1.88
----	.01	.01	.04	.25	.25	.06	----	.01	----	----	----	----	----	----	----	----	----	2.11
----	----	.09	.09	----	.04	1.22	.10	.02	.08	----	.01	.02	----	----	----	----	----	1.84
----	----	----	----	.29	.07		----	----	----	----	----	----	----	----	----	----	----	.44
----	----	----	----	----	.08	.07	----	----	----	----	----	----	----	----	----	----	----	.15
.10	.20	.40	.04	----	----	.01	.01	----	----	----	----	----	----	----	----	----	----	.89
----	.05	.30	.20	.48	.56	.15	.01	----	----	----	----	----	----	.02	.30	.01	.02	2.17
.01	.01	.01	.03	.07	.06	.02	.01	----	----	----	----	----	----	----	----	----	----	.61
.08	----	.07	.08	.02	.12	.46	.32	.14	.08	.04	----	----	.01	.01	----	----	----	1.43
----	.01	.01	----	----	----	----	.01	----	----	----	----	----	----	----	----	----	----	.05
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.65	----	.65
----	----	----	----	----	----	----	.10	----	----	----	----	----	----	----	----	----	----	.15
.07	.18	.55	.15	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.30
----	----	.25	.90	.60	.70	.15		----	----	----	----	----	----	.15	.02	.32	.02	3.19
----	----	----	.02	.09	.02	.05	----	----	----	----	----	----	----	----	----	----	----	.48
----	----	----	.10	.03	.02	.20	.20	.30	.18	.07	----	----	----	----	----	----	----	1.10
----	----	----	----	----	----	----	----	----	----	.23	----	----	----	----	----	----	----	.23
----	----	----	----	----	----	.08	----	----	----	----	----	----	----	----	----	----	----	.19
.07	.12	.11	.16	.12	.02	----	----	----	----	----	----	----	----	----	----	----	----	.64
.05	----	----	.20	.36	.17	.30	.02	----	----	----	----	----	----	.04	.26	.01	.07	1.58
----	----	.01	.04	.05	.09	----	.04	----	----	----	----	----	----	----	----	----	----	.83
----	.10	.01	.16	.16	.10	.15	.38	.01	.58	.30	.06	.02	----	.01	.01	----	----	2.09
*	*	.05	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.08
----	----	----	----	----	----	----	----	.16	.10	.02	.03	.02	----	----	----	----	----	.33
----	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	.02	.01	.05
----	----	.01	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	.10	.19
.40	.30	.12	.06		.01	.01	----	----	----	----	----	----	----	----	----	----	----	1.08
.02	.08	.07	.80	.70	.91	.02	.01	.01	----	----	----	----	.12	----	.02	.35	.03	3.19
.01	.01	.02	.06	.05	.01	.02	----	.01	----	----	----	----	----	----	----	----	----	.46
----	.15	.09	.01	.50	.19	.11	.20	.14	.06	.02	----	.03	----	----	----	----	----	1.50
.01	----	.01	----	.01	----	.01	.01	----	----	----	----	----	----	----	----	----	----	.06
.01	.01	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.03

TABLE 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
352	Brook Valley, N. J.	19	----	----	----	0.03	0.02	----
	Corps of Engineers, U. S. Army	20	----	----	----	.02	.15	0.15
		21	----	----	----	.05	.05	----
		22	0.01	0.15	0.06	.05	.02	----
		23	----	----	----	----	----	----
		24	Tr.	.02	----	----	----	----
759	Clinton Junction, N. J.	18	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	19	----	----	----	----	----	----
		20	.02	.03	.08	.02	----	----
		21	----	----	.02	.20	.21	.34
		22	----	----	.02	.03	.04	.03
		23	.15	.03	----	----	----	----
		24	----	----	----	----	.04	.04
		25	.02	.01	.01	.01	----	----
362	Freehold (Oakland Mills R–2), N. J.	18	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	19	----	----	----	----	----	----
		20	----	----	----	----	.93	.37
		21	----	.03	----	.12	.07	.03
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.06	.05	.07	.06	.43	.42
366	Freehold (Cahills Corner R–6), N. J.	18	----	----	----	----	----	.14
	U. S. Department of Agriculture, Soil Conservation Service	19	----	----	----	----	----	----
		20	----	----	----	----	1.08	.36
		21	----	----	----	.14	.06	.05
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.06	.04	.08	.13	.33	.33
373	Mahwah, N. J.	17	----	----	----	----	----	----
	Corps of Engineers, U. S. Army	19	----	.15	.02	----	----	----
		20	----	----	----	----	.10	.15
		21	----	----	----	.05	.05	----
		22	.02	.15	.03	.03	----	----
		23	----	----	----	----	----	.06
		24	----	----	----	----	----	----
374	Millington, N. J.	17	----	----	----	----	----	----
	Corps of Engineers, U. S. Army	18	----	----	----	----	----	----
		19	.03	.01	.02	.01	.02	----
		20	----	----	----	----	.10	.07
		21	----	----	----	----	.05	.02
		22	.10	----	.28	.02	.02	----
		23	----	----	----	----	.05	----
		24	----	.06	.02	.02	.02	.04
376	Morristown, N. J.	17	----	----	----	----	----	----
	Town Engineer, Morristown, N. J.	18	----	----	----	----	----	----
		19	----	.02	.03	.07	----	----
		20	----	----	----	.09	.08	.16
		21	----	----	----	.04	.02	.01
		22	.05	.05	.05	.05	.05	.04
		23	----	----	----	----	----	----
		24	----	.03	.01	.01	.01	----
377	Morristown Reservoir, N. J.	17	----	----	----	----	----	----
	Corps of Engineers, U. S. Army	18	----	----	----	----	----	----
		19	----	----	.05	.06	----	----
		20	----	----	----	.12	.08	.08
		21	----	.01	.01	.03	.02	.01
		22	.04	.12	.07	.02	.01	.01
		23	----	----	----	.01	----	.13
		24	.02	.01	.01	----	----	----
378	New Brunswick, N. J.	17	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	18	----	.07	.02	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	.08	.18	.07
		21	----	.11	.08	.07	.07	.07
		22	----	----	----	----	----	----
		23	----	----	----	----	----	.07
		24	.07	.02	.05	.17	.07	.02
		25	----	----	----	----	----	----

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
					0.03	0.20												0.28
0.15	0.20	0.60	0.08															1.35
	.15	.15	.05	0.35	.10	.05							0.70			0.08	0.71	2.44
	.01	.01	.02	.10	.03	.05												.51
.10		.30	.10	.10	.20	.60	0.02	0.07	0.59	0.12	0.03		.04	Tr.	0.01	Tr.	Tr.	2.28
																		.02
							.16	.07			.20							.43
															.05	.02	.02	.09
							.02											.17
.13	.08	.24	.13															1.35
.09	.17	.03	.25	.19	.02											.11	.05	1.03
	.04	.11	.11	.09	.03					.02								.58
	.06			.05	.16	.11		.18	.27	.20	.14		.05	0.01				1.31
																		.05
											.12	0.01	.01	.01				.15
									.08	.01		.01		.07				.17
.36	.17		.07	.03	.35	.15		.05				.01				.05		2.54
.06	.03		.01	.05		.20	.05											.65
				.10	.04	.11	.03											.28
		.03	.02			.20				.01	.08	.16	.10		.01	.02	.01	.64
.07	.04	.01																1.21
.04	.02	.01	.01	.01								.02	.01					.26
									.10	Tr.	.01	.05	.01	.09				.25
.48	.18		.20	.21	.82	.11	.01						.04			.05	.01	3.55
.06	.03		.01	.01	.01	.78												1.15
					.05	.10												.15
		.05	.01		.03	.18				.15	.05	.16	.09			.02	.02	.76
.07	.07																	1.11
									.20									.20
				.02	.20	.02												.41
.15	.30	.15	.05									.05						.95
	.20	.05	.25	.70	.25	.04							.05	.35		.15	.25	2.39
			.07	.05	.05	.05												.45
	.04	.20	.10	.20	.20	.15	.15	.70	.20	.06			.02	.01	Tr.	Tr.		2.09
				.02														.02
								.52										.52
															.01	.01	.03	.05
									.12									.21
.13	.20		.07	.03														.60
.03	.03	.07	.05	.20	.10	.10											.10	.75
	.13	.13	.22	.10	.05	.05	.03											1.13
.50		.40	.45	.15	.10	.18	.04		.05	.10	.11	.01		.01				2.15
.02																		.18
									.05									.05
																.02		.02
					.03													.15
.11		.13																.57
.01	.06	.07	.08	.22	.16	.12						.02	.06	.04	.04	.06	.05	1.06
.05	.04	.07	.85	.17		.03	.01				.01							1.52
.11	.02	.74	.10	.32	.15	.05	.01		.49	.11		.01						2.11
																		.06
						.14												.14
																	.01	.01
				.01	.03	.06												.21
.33	.05	.14	.01															.81
.02	.23	.08	.10	.36	.16	.01		.02				.55	.01	.01	.03	.08	.55	2.29
.01	.06	.05	.17	.10	.06	.02		.01										.75
	.36	.20	.07	.13	.52	.01	.01	.46	.10	.10		.02	.02					2.14
	.01	.01			Tr.	.01		.01										.08
								.04	.28									.32
																		.09
								.09	.06									.15
.01	.03		.25	.19	.06													.87
.05	.02	.01	.04		.43				.01	.01						.21		1.18
		.03	.17	.02														.22
	.11	.06		1.00	.04		.11			.18	.09	.03	.01		.01	.02	.02	1.75
																		.40
									.03	.02								.05

Table 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
379	New Milford, N. J.	17	----			----		----
	Hackensack Water Co., Weehawken, N. J.	18	----					
		19				----	----	
		20	----		----	----	----	0.11
		21	----		0.20	0.13	0.06	.06
		22	0.29	0.04	.04	.19	.07	----
		23	----	----	----	----	----	----
		24	.04	.01	.03	.03	----	.04
761	Quakertown, N. J.	17	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	18	----	----	----	----		----
		19	.01	.01	.06	.03	----	----
		20	----	----	.06	.81	.06	.11
		21	----	----	.04	.03	.05	.05
		22	.21	.02	----	(*)	(*)	(*)
		23	----	----	----	----	.04	.04
		24	.02	.02	----	.02	----	----
387	Rockaway, N. J.	17	----	----	----	----	----	----
	Corps of Engineers, U. S. Army	18	----	----	----	----	----	----
		19	----	----	----	----	.10	----
		20	----	----	----	.10	.10	.08
		21	----	----	.01	.02	.03	----
		22	.02	.18	----	----	----	----
		23	----	----	----	----	----	----
361	West Freehold No. R–1, N. J.	17	----	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	----	.62	.17
		21	----	.02	----	.11	.07	.05
		22	.09	.01	----	----	----	----
		23	----	----	----	----	----	----
		24	.05	.03	.10	.07	.35	.70
390	Woodcliff Lake, N. J.	18	----	----	----	----	----	----
	Hackensack Water Co., Weehawken, N. J.	19	----	----	----	----	----	.01
		20	----	----	----	----	.02	.11
		21	----	----	.05	.38	.07	.05
		22	.06	.06	.20	.14	.03	.01
		23	----	----	----	----	----	----
		24	.04	----	.05	.02	----	.02
	Delaware River Basin							
398	China (Cold Spring Brook), N. Y.	18	----	----	----	----	----	----
	U. S. Geological Survey	21	----	----	----	----	.01	.01
		22	.01	.04	.04	.08	.08	.02
		23	----	----	----	.04	.14	.06
407	Harvard, N. Y.	18	----	----	----	----	----	----
	New York City Board of Water Supply	21	----	----	----	----	----	----
		22	.10	.04	.04	.02	.03	.04
		23	----	----	----	.12	.16	.27
415	Oakland Valley, N. Y.	18	----	----	----	----	----	----
	Federal-State Flood Forecasting Service of Pennsylvania,	19	.01	.09	.04	.01	----	----
	Harrisburg, Pa.	20	----	----	----	----	----	----
		21	----	.96	----	----	----	----
		22	.15	.05	.15	.05	.05	.04
		23	.29	.33	----	----	.02	.34
429	Camden (airport), N. J.	17	----	----	----	----	----	----
	U. S. Weather Bureau (Measured at 1:30 a.m., 7:30 a.m.,	18	*	Tr.	*	*	*	*
	1:30 p.m., 7:30 p.m.)	19	*	.01	*	*	*	*
		20	*	Tr.	*	*	*	*
		21	*	.90	*	*	*	*
		22	*	.05	*	*	*	*
		23	----	----	*	*	*	*
		24	*	.13	*	*	*	*
		25	----	----	*	*	*	*
433	Moorestown, N. J.	18	.04	----	----	----	----	----
	U. S. Department of Agriculture, Soil Conservation Service	19	----	----	----	----	----	----
		20	----	.16	.04	.36	----	----
		21	.24	.06	.10	.10	.07	----
		22	----	----	----	----	----	----
		23	----	----	----	.10	.08	----
		24	.14	.50	.28	.08	.04	----

ending at indicated time, July 1938—Continued

a.m.						p.m.												
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	Total
										0.04								0.04
									0.04									.04
				0.02	0.02	0.02		0.40	.06	.02								.54
0.05	0.05	0.04	0.06	.09		.01	0.01	.01										.43
	.02	.02	.14	.16	.11	.10	.04	.01									0.08	1.13
	.01	13	.47	.04	.02	.04	.32	.02										1.68
	.30	82	.40	.46	.34	.27	.11			.11	0.33	0.06	0.01	0.01	0.02		.01	3.25
.05																		.20
						.20	.06			.01	.10	.36						.73
																0.05		.05
				.01			.21											.33
		.02																1.06
.22	.05	.16	.27	.04						.18	*	*	*	*	*	.02	.09	1.20
07	.08	.16	.15	.07	.04				.02		.02							.84
	.29		.04	.10	.24			.30	.34	*	*	*	.08	.02				1.49
																		.06
									.08									.08
											.02	.02	.02	.02	.01	.01		.10
						.10												.20
.27	.30	.65	.05															1.55
.02	.18	.30	.10	.55	.22							.10	.40				.30	2.23
			.08	.10	.01	.01												.40
.12		.12	.02	.02	.12	.43	.12	50	10	.13			.02	.02				1.72
							.25											.25
												.01	.01	.03				.05
									.20		.10	.15	.10	.40				.95
.36	17	03	.08	17	.45	.18	.07						.01			.04	.02	2.37
.05	.03		.08															.41
			.04	.17	.04	.12	.03											.50
		.01	.04		.01	.20	.04				.05	.15	.10	.02	.01	.02		.65
.07	.04																	1.41
										.04								.04
.01		.01		.01	.03	.09	.01	.07	01									.25
.07	.08	.04	.15	.16														.63
.02	.01	09	27	16	.11	.13	.02	.01						.04		.03	.03	1.47
		.04	.02	.07		.06	.07	02										.78
	.15	.14	.50	.23	.19	.15	.17	.03	.02	.24	.08	.08			.02		.02	2.02
.03																		.16
	.04	29	.08	18	.10	.06	.04											.79
.01	.01										.01	.01	.01		.08	.05	.01	.21
																		.27
																		.24
.14		.02	.08	.12	.04	.12	.03											.55
.19	.13	.01									1.08	.69	.06	.04	.16	.04	.02	2.42
.02	.02																	.31
.01	.06	.04	.02	.01	.01	.01	.02	.01	.01									.75
																.10	.20	.30
										.12	.30							.57
											.10	.03	.02					.15
		.04	.06	.01												.43	.17	1.67
.03	.03									.16	.15	.01	.08	.14				1.09
.06	.02	.02	.10	.03	.05	.13	.03											1.42
								*	*	*	*	*	Tr.	*	*	*	*	[2]
*	.05							*	*	*	*	*	.22	*	*	*	*	[2].05
*	Tr.													*	*	*	*	[2].23
*	.43	*	*	*	*	*	2.07	*	*	*	*	*	.59	*	*	*	*	[2].43
*	.50	*	*	*	*	*	.16							*	*	*	*	[2]4.06
*	Tr.	*	*	*	*	*	.03	*	*	*	*	*	Tr.					[2].21
*	.10	*	*	*	*	*	.16	*	*	*	*	*	.32	*	*	*	*	[2].13
*	1.02	*	*	*	*	*	Tr.	*	*	*	*	*	Tr.					[2]1.63
*	.01																	[2].01
									.21									.25
											.50							.50
		.45	.15							.07		.02					.13	1.38
	.10	.08	.03															.78
				.02	.04													.06
	.08	.02					.03	.45	.08	.06		.01	.01	.02		.02	.02	.98
						.02												1.06

TABLE 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
438	Trenton No. 1, N. J.	17	----	----	----	----	----	----
	U. S. Weather Bureau	18	----	----	----	----	----	----
		19	----	Tr.	----	Tr.	Tr.	----
		20	----	0.01	1.04	0.04	0.09	0.01
		21	Tr.	.04	.38	.19	.10	.11
		22	----	----	----	----	----	----
		23	Tr.	Tr.	.01	Tr.	.04	.08
		24	0.05	.01	.27	.17	.04	.02
		25	*	*	*	*	*	*
	Coastal and Minor basins							
568	Boston, Mass.	18	----	----	----	----	----	----
	U. S. Weather Bureau	19	Tr.	----	----	----	----	.02
		20	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.
		21	----	----	----	----	----	.05
		22	Tr.	Tr.	.75	.01	----	.05
		23	Tr.	----	Tr.	.02	.05	.30
		24	Tr.	Tr.	Tr.	.01	.02	.02
		25	----	----	----	----	----	----
625	Worcester, Mass.	18	----	----	----	----	----	----
	Winter Hill Meteorological Observatory	19	.03	.01	----	----	----	----
		20	.02	.01	----	----	----	----
		21	----	----	----	----	----	----
		22	.01	.04	.19	.01	----	.01
		23	----	.05	----	----	----	.17
		24	.02	.02	.03	.04	.02	.02
		25	----	----	----	----	----	----
736	Worcester, Mass. sewage-treatment plant	18	----	----	----	----	----	----
		19	.01	----	----	----	----	----
		20	----	----	----	----	----	----
		21	----	----	----	----	----	----
		22	----	.18	.18	.02	.01	.03
		23	----	.01	.01	.03	.03	.14
		24	.03	----	.02	.03	.07	.02
		25	----	----	----	----	----	----
627	Block Island, R. I.	18	----	----	----	----	----	----
	U. S. Weather Bureau	19	----	----	----	----	----	----
		20	----	----	----	----	.01	.05
		21	----	.07	.01	.04	.02	.02
		22	----	----	----	.02	.07	Tr.
		23	----	----	----	----	----	----
		24	Tr.	.08	.02	.15	.01	Tr.
635	Providence, R. I.	18	----	Tr.	----	----	----	.01
	U. S. Weather Bureau	19	.01	Tr.	Tr.	.01	Tr.	Tr.
		20	----	----	----	----	----	Tr.
		21	----	----	----	Tr.	.01	.02
		22	----	----	----	----	.03	.04
		23	----	----	Tr.	.04	.48	.24
		24	.01	Tr.	.07	.17	.02	.01
		25	----	----	----	----	----	----
654	New Haven, Conn.	18	.12	----	----	----	----	.05
	U. S. Weather Bureau	19	Tr.	Tr.	Tr.	Tr.	Tr.	.02
		20	----	----	----	----	.01	.22
		21	----	----	Tr.	.01	Tr.	.02
		22	.71	Tr.	Tr.	.02	.02	Tr.
		23	.01	Tr.	Tr.	Tr.	Tr.	.04
		24	.05	.01	.02	.03	.04	.10
		25	----	Tr.	Tr.	Tr.	Tr.	Tr.
665	Brooklyn, N. Y. (Gravesend, Avenue V)	17	----	----	----	----	----	----
	City of New York, Department of Sewers	18	----	----	----	----	----	----
		19	.01	Tr.	.01	Tr.	Tr.	----
		20	----	----	Tr.	.02	.41	.11
		21	Tr.	.02	.06	Tr.	Tr.	.02
		22	Tr.	Tr.	Tr.	----	----	----
		23	Tr.	Tr.	Tr.	----	.02	Tr.
		24	.08	.08	.11	.04	.48	.23
666	Brooklyn, N. Y. Brooklyn Eagle [3]	22	.01	Tr.	Tr.	----	----	----
	U. S. Weather Bureau	23	Tr.	Tr.	Tr.	----	----	.02
		24	.03	.05	.08	.10	.12	.11

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	----	----	----	----	----	----	Tr.	0.06	----	----	----	----	----	----	----	----	----	0.06
----	----	----	----	----	----	----	----	----	Tr.	0.03	0.01	Tr.	0.01	Tr.	Tr.	----	----	.05
Tr.	----	Tr.	----	----	----	----	0.11	.20	----	Tr.	Tr.	----	----	----	----	----	----	.31
----	0.01	0.23	0.14	0.14	Tr.	----	----	Tr.	0.01	.04	.01	Tr.	----	Tr.	0.06	Tr.	0.15	1.98
0.02	Tr.	.04	.12	.17	Tr.	Tr.	----	----	----	----	----	Tr.	Tr.	Tr.	.11	0.17	----	1.45
Tr.	Tr.	.04	.23	.01	0.17	0.02	Tr.	Tr.	----	Tr.	Tr.	Tr.	Tr.	----	----	----	Tr.	.47
.04	Tr.	.03	.23	.19	Tr.	.06	.23	----	.02	.31	.02	0.05	.01	0.01	.01	Tr.	.03	1.37
Tr.	----	----	----	----	----	----	----	----	Tr.	.03	----	----	----	----	----	----	----	.59
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	Tr.
Tr.	Tr.	.01	.02	.01	Tr.	.01	Tr.	.04	.08	.64	.08	Tr.	----	Tr.	Tr.	Tr.	.03	.92
Tr.	.02	.16	.03	.04	.04	.01	.01	Tr.	Tr.	.01	Tr.	.01	.02	.01	.01	.01	Tr.	.40
.01	.14	.16	.17	.38	.01	Tr.	Tr.	Tr.	.01	----	----	----	----	----	----	----	----	.88
.02	.09	.02	.01	----	Tr.	.06	.03	.18	.32	.78	.70	.05	Tr.	.01	.01	----	----	2.33
.01	----	----	----	----	----	----	Tr.	Tr.	Tr.	Tr.	Tr.	.01	----	----	----	Tr.	Tr.	.83
.12	.05	.15	.11	.26	.01	----	.09	.06	.12	.02	Tr.	Tr.	Tr.	.12	.21	.06	.01	1.76
.02	.09	.05	.07	.16	.10	.01	Tr.	Tr.	----	----	----	----	----	----	----	----	----	.55
Tr.	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.
----	----	----	----	----	----	----	.02	.14	1.22	.04	----	----	.02	.01	----	.01	----	1.46
.02	.07	.09	.02	.03	.01	----	----	----	----	----	----	----	----	----	----	----	----	.28
----	.04	.04	----	----	----	.06	.04	.05	----	----	----	----	----	----	----	----	----	.26
----	.03	.03	.01	----	.02	.10	.35	.45	.54	.12	.02	----	----	----	----	----	----	1.67
.04	.02	----	----	----	----	----	----	.01	----	----	----	----	----	----	----	----	----	.33
.47	.01	.01	.26	.12	.46	.02	.01	.02	.05	----	----	.03	.16	.06	.02	.01	.02	1.95
.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.16
----	----	----	----	----	----	----	----	----	----	.07	----	.05	----	----	----	----	----	.12
----	----	.09	.13	.01	----	----	----	.02	.10	.35	.05	----	----	.01	.01	----	.01	.78
----	----	.07	.01	.01	.02	----	----	.01	----	----	.04	.01	----	.01	----	----	----	.19
----	.03	.11	.05	.22	----	----	----	.06	----	----	----	----	----	----	----	----	----	.47
----	.15	.04	.01	----	.03	.21	.14	.39	.73	.60	.40	.04	.01	.01	----	----	----	2.76
.05	.02	.01	.01	.01	.01	.01	.01	.04	.04	----	----	----	----	----	----	----	----	.63
.28	.02	.01	.23	.18	.16	.05	----	.05	.12	.02	.06	.18	.07	.13	.10	.03	.01	1.92
.03	.03	.02	.01	.05	----	----	----	----	----	----	----	----	----	----	----	----	----	.31
----	----	----	----	.01	----	----	----	.01	----	----	----	----	----	----	----	----	----	.02
----	----	----	----	----	----	----	.03	.01	.01	.04	----	Tr.	.08	----	----	----	.01	.18
----	----	----	----	----	----	----	----	Tr.	----	----	Tr.	Tr.	----	----	----	----	----	Tr.
.11	.22	.05	.02	.03	.01	Tr.	.14	Tr.	Tr.	.01	.01	----	----	----	----	----	----	.66
.01	Tr.	----	Tr.	----	----	Tr.	----	Tr.	----	Tr.	Tr.	.01	----	----	----	----	----	.18
----	Tr.	----	----	----	----	----	----	----	Tr.	.13	.01	----	----	----	----	----	----	.23
Tr.	.06	Tr.	----	----	.03	Tr.	----	----	----	----	----	----	----	----	.01	.24	Tr.	.34
.04	.06	.06	.13	.05	.05	.01	Tr.	.02	----	----	----	----	----	----	----	----	----	.68
----	.01	Tr.	----	----	.01	----	.01	Tr.	.05	.17	Tr.	----	----	----	.08	.13	.03	.50
.02	Tr.	Tr.	Tr.	.01	.01	----	Tr.	----	.01	Tr.	----	----	----	----	----	----	----	.07
.06	.50	.25	.02	.02	Tr.	Tr.	.01	Tr.	.01	Tr.	Tr.	----	----	----	----	----	----	.87
.02	Tr.	.01	Tr.	Tr.	.01	.01	.31	.19	.02	Tr.	Tr.	Tr.	----	----	----	----	----	.60
.01	----	----	----	----	Tr.	Tr.	----	----	Tr.	Tr.	Tr.	Tr.	----	Tr.	Tr.	.09	Tr.	.17
.11	.20	.28	.05	.06	----	.05	.01	.06	.63	.02	----	Tr.	Tr.	.07	.18	.02	.01	2.51
.04	.07	.10	.14	.08	.08	.29	.02	Tr.	----	----	----	----	----	----	----	----	----	1.10
----	----	----	----	----	----	Tr.	----	----	----	----	----	----	----	----	----	----	----	Tr.
.20	Tr.	----	----	----	Tr.	.02	----	----	----	----	----	----	Tr.	Tr.	Tr.	Tr.	.02	.41
----	Tr.	Tr.	Tr.	Tr.	Tr.	Tr.	----	----	.01	.07	.08	Tr.	.01	Tr.	Tr.	Tr.	.04	.23
.17	.06	.03	Tr.	.02	.05	.01	----	.01	----	----	----	----	----	----	----	----	----	.58
.02	.01	.02	.02	.18	.06	.01	.07	Tr.	----	----	----	----	----	----	----	Tr.	Tr.	.42
----	----	Tr.	Tr.	Tr.	.01	.08	.07	.07	Tr.	----	----	----	----	----	Tr.	Tr.	Tr.	.98
.07	.73	.09	.07	.03	Tr.	.02	.17	----	Tr.	.25	Tr.	.55	.03	.03	Tr.	Tr.	.01	2.10
.11	.09	.06	.02	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	.53
Tr.	Tr.	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	Tr.
----	----	----	----	----	----	----	----	----	.03	.01	----	----	----	----	----	----	----	.04
----	----	----	----	----	----	----	----	----	----	----	.06	----	----	.02	----	Tr.	Tr.	.08
----	----	----	----	----	----	----	----	.16	.35	.01	----	----	.01	----	----	----	----	.55
.14	.04	Tr.	.05	.08	.15	.10	----	----	----	----	----	----	----	----	----	----	Tr.	1.10
.04	Tr.	Tr.	.03	.01	.35	.05	.01	----	----	----	----	----	----	----	----	Tr.	.02	.61
----	Tr.	Tr.	Tr.	.07	.03	.09	Tr.	----	----	----	----	Tr.	.01	----	----	----	----	.20
Tr.	Tr.	.08	.01	Tr.	1.41	.05	.07	.23	.36	.13	.04	.05	Tr.	.01	Tr.	.01	Tr.	2.47
.07	.04	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.13
----	Tr.	Tr.	.03	.16	.05	.06	Tr.	----	----	----	----	Tr.	----	----	----	----	----	.31
Tr.	Tr.	.28	.02	Tr.	.62	.07	Tr.	.33	----	.36	.15	.05	.02	Tr.	Tr.	.01	.06	1.99
.03	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.53

TABLE 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
772	Floyd Bennett Airport, N. Y.[3]	22	*	Tr.	----	*	Tr.	----
	U. S. Weather Bureau	23	*	Tr.	----	----	----	*
		24	*	0.07	*	*	*	*
668	Flushing, N. Y.[3]	22	Tr.	----	----	----	----	----
	U. S. Weather Bureau	23	Tr.	Tr.	Tr.	----	----	Tr.
		24	0.06	.04	0.03	0.04	0.08	0.06
669	Freeport, N. Y.	19	----	----	----	----	----	----
	Nassau County Department of Public Works,	20	----	----	----	----	.52	.07
	Hydrological Bureau	21	----	----	----	.02	.03	.02
		22	----	----	----	----	----	----
		23	----	----	----	----	----	.12
		24	.12	.01	.02	.03	.04	.55
671	Long Beach, N. Y.	17	----	----	----	----	----	----
	City of Long Beach, N. Y.	18	----	.34	Tr.	----	----	----
		19	Tr.	Tr.	Tr.	Tr.	.01	.01
		20	----	----	----	.32	.71	.06
		21	Tr.	.01	Tr.	.01	.02	.03
		22	----	----	----	----	----	----
		23	----	----	----	----	Tr.	.03
		24	.08	.05	.11	.11	.34	.16
672	Manhasset, N. Y.	19	----	----	----	----	----	----
	Nassau County Department of Public Works,	20	----	----	----	----	.06	.17
	Hydrological Bureau	21	----	----	----	----	.02	.02
		22	.01	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.04	.05	.05	.04	.21	.31
673	Mineola, N. Y.	18	----	.04	.01	.01	.27	----
	Nassau County Department of Public Works,	19	----	----	----	----	----	----
	Hydrological Bureau	20	----	----	----	----	1.86	.47
		21	----	----	----	----	.02	.02
		22	----	----	----	----	----	----
		23	----	----	----	----	.04	.02
		24	.03	.06	.02	.03	.17	.44
676	New York, N. Y. (Battery Place)	17	----	----	----	----	----	----
	U. S. Weather Bureau	18	----	.04	----	----	----	----
		19	.02	Tr.	Tr.	Tr.	Tr.	----
		20	----	----	----	.03	.17	.10
		21	Tr.	Tr.	.02	.04	.04	.01
		22	Tr.	Tr.	Tr.	----	----	----
		23	Tr.	Tr.	Tr.	----	----	.03
		24	.03	.05	.07	.09	.11	.10
677	New York, N. Y. (Central Park)	17	----	----	----	----	----	----
	U. S. Weather Bureau	18	----	.14	.01	Tr.	----	----
		19	.03	Tr.	Tr.	Tr.	Tr.	----
		20	----	----	Tr.	.06	.16	.07
		21	Tr.	Tr.	Tr.	.04	.02	.01
		22	Tr.	Tr.	Tr.	.01	.01	----
		23	Tr.	Tr.	Tr.	----	----	.11
		24	.06	.04	.03	.04	.08	.06
773	St. George, N. Y.	17	(*)	(*)	(*)	(*)	(*)	(*)
	President of the Borough of Richmond	18	(*)	(*)	(*)	(*)	*	*
		19	----	----	----	----	----	----
		20	----	----	----	.05	.21	.09
		21	----	----	.03	.03	.02	.03
		22	----	----	----	----	----	----
		23	----	----	----	----	----	.01
		24	.05	.04	.03	.18	.13	.08
682	Westerleigh, N. Y.[3]	22	Tr.	Tr.	----	----	----	----
	U. S. Weather Bureau	23	Tr.	Tr.	Tr.	----	Tr.	.04
		24	.08	.04	.04	.18	.14	.08
683	Atlantic City, N. J.	18	----	----	.15	----	.04	.07
	U. S. Weather Bureau	20	----	----	----	Tr.	.01	----
		21	.12	.19	----	----	----	----
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.03	.01	.01	.51	.06	.02

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
			*	*	*	*	*	*	0.54			*	Tr.				Tr.	0.54
0.01			*	*	*	*	0.63	*	*	*	*	*	0.98	*	*	*	0.06	1.68
*	0.91	Tr.																.98
		Tr.	0.03	0.06	0.04	0.08	.02					Tr.						.23
.01	Tr.	0.06	.05	Tr.	.10	.74	.12	0.33	Tr.	0.70	0.18	0.01	.01	Tr.	0.01	0.01	.07	2.40
.02	Tr.	Tr.																.33
									.15	.02			.02					.19
.19	.03	.03	.18	.20	.11	.29	.04									.06		1.72
.02	.03	.07	.02	.05	.01	.40	.01			.01								.69
			.01	.02	.44	.11	.09	.01	.01									.69
.04			.03			.12	.01	.01	.05	.01	.07	.26	.05				.06	.83
.11	.02	.01	.01															.92
							Tr.			Tr.								Tr.
								.08	.32	Tr.	.54	.01	.01	0.01	.01	Tr.	Tr.	1.32
								.01	.06	.02		.01	Tr.					.12
.12	.04	.01	.21	.30	.11	.33	.06								Tr.	.06	.01	2.34
.02	.02	.02	.02	.05	Tr.	.16	Tr.						Tr.			Tr.	Tr.	.36
			Tr.	Tr.	.37	.08	.08	Tr.	Tr.									.53
.17	Tr.	Tr.	.02	Tr.	Tr.	.03	Tr.	Tr.		Tr.	.04	.27	.08	Tr.	.01	.01	.01	.67
.05	.01																	.91
									.09	.08	.01							.18
.12	.08	.01	.01	.12	.15	.12	.03		.01									.88
.02		.01	.01	.03	.01	.25	.01										.05	.43
				.07	.10	.08	.09	.01										.36
.04			.08	.01	.01	.30	.01		.30	.51	.45	.06	.06		.01		.02	1.86
.05	.07	.01					.01											.84
.01																		.34
									.06	.08								.14
.11	.13	.04	.03	.04	.08	.15	.23	.02		.01								3.17
.02	.01	.05	.02	.02	.01	.59	.06	.01	.01									.84
.01			.01	.02	.09	.11	.07	.01	.01									.33
.17	.02	.01	.04	.01		.43	.01	.01	.30	.38	.17	.04	.01	.01		.01	.01	1.69
.08	.06	.01			.01		.01											.92
									.09									.09
				.01										Tr.		Tr.	.03	.08
								Tr.	.01	.01								.04
.12	Tr.	.06	.11	.08	.10	.08											Tr.	.85
.03	.01	.01	.01	.01	.22	Tr.					.01					.01	.21	.63
	.01	Tr.	.03	.14	.05	.04	.01					Tr.						.28
Tr.	.01	.56	.03	.01	.47	.04	Tr.	.31		.34	.14	.04	.02	Tr.	Tr.	.01	.06	2.07
.03	.01																	.49
									Tr.									Tr.
				Tr.										Tr.	Tr.	Tr.	.01	.16
			Tr.					Tr.	Tr.	Tr.	Tr.		Tr.					.03
.06	Tr.	.03	.09	.12	.09	.04	Tr.										Tr.	.72
.03	Tr.	.04	.02	.03	.08	.01					Tr.					Tr.	.07	.35
	Tr.	.02	.01	.11	.06	.07	.01					Tr.						.30
.04	.04	.53	.09	.01	.46	.08	Tr.	.14	Tr.	.63	.17	.01	.01	Tr.	.01	.01	.06	2.40
.02	Tr.	Tr.																.33
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	.63	.63
									.02	.01								.03
.10	.01	.01	.06	.05	.06	.07	Tr.											.71
.02	.01			.03	.25	.03	Tr.										.15	.60
			.08	.18	.03	.05	Tr.											.34
Tr.		.41	.02		.39	.05		.30	Tr.	.42	.14	.02	.02	Tr.			.03	1.81
.04	Tr.	Tr.																.55
	Tr.	.03	.07	.08	.03	.04	.01			Tr.	Tr.	Tr.	Tr.					.26
Tr.	.01	.52	.01	.23	.25	.02	.14	.16		.34	.28	.04	.02	Tr.	.01	.01	.03	2.11
.03	Tr.																	.59
.02											Tr.	.11	.11	.02	.01			.53
						.09	.02	.18	.60	.05				.96	.31	.34	.48	3.04
Tr.	.03																	.34
					.04		Tr.	.03	.03	Tr.								.10
				Tr.	Tr.	.01			Tr.		.02	.04	.07	.02	.01	.14	.10	.41
.05	.05	.17	.06	.02	.02	.01		Tr.										1.02

TABLE 22.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
686	Colts Neck No. R–8, N. J. U. S. Department of Agriculture, Soil Conservation Service	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	----	0.47	0.07
		21	----	0.02	----	0.08	.05	.03
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	0.06	.04	0.05	.05	.10	.78
688	Elizabethport, N. J. Chief engineer, Joint Meeting Maintenance, Irvington, N. J.	17	----	----	----	----	----	----
		18	----	----	----	----	.02	----
		20	----	----	----	.06	.15	.05
		21	----	----	----	.07	.04	----
		22	.01	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.03	.09	.09	.09	.09	.08
691	Irvington, N. J. Chief engineer, Joint Meeting Maintenance, Irvington, N. J.	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	.01	.01	----	----
		20	----	----	----	.04	.04	.06
		21	----	----	.01	.04	.04	.02
		22	.05	.03	----	.01	----	----
		23	----	----	----	----	----	----
		24	.02	.03	.03	.03	.01	----
774	Lakehurst, N. J. Naval Air Station	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	.02	.06	.02	.03
		21	.06	.05	.09	.03	.03	.02
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.03	.05	.04	.03	.28	.08
		25	----	----	----	----	----	----
694	Long Branch, N. J. U. S. Weather Bureau	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	1.94	.33	.28
		21	.04	.01	.02	.04	.03	.02
		22	----	----	----	----	----	----
		23	----	----	----	----	----	.02
		24	.07	.01	.04	.03	.07	.33
695	Marlboro, N. J. U. S. Department of Agriculture, Soil Conservation Service	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	----	----	.47	.19
		21	----	.03	----	.04	.06	----
		22	----	----	----	----	----	----
		23	----	----	----	----	----	----
		24	.06	.07	.08	.07	.30	.63
698	Newark, N. J. Kresge Department Store, William Wiener, meteorologist	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	.03	.01	----	.01	----	----
		20	----	----	.01	.10	.16	.07
		21	----	.02	.06	.04	.05	.01
		22	.02	----	----	----	(*)	(*)
		23	----	----	----	----	----	.06
		24	.06	.06	.06	.02	.06	.05
775	Newark Airport, N. J. U. S. Weather Bureau (Me asured at 1:30 a.m., 7:30 a.m., 1:30 p.m., 7:30 p.m., 12 p.m.)	17	----	----	----	----	----	----
		18	----	----	(*)	(*)	----	----
		19	----	----	(*)	(*)	(*)	----
		20	----	----	*	*	*	*
		21	*	Tr.	*	*	*	*
		22	----	----	*	*	*	*
		23	----	----	----	----	----	*
		24	----	----	*	*	*	*
702	Sandy Hook, N. J. U. S. Weather Bureau	17	----	----	----	----	----	----
		18	----	----	----	----	----	----
		19	----	----	----	----	----	----
		20	----	----	Tr.	.11	.23	.09
		21	.01	.01	.03	.03	.04	.03
		22	----	----	----	----	----	----
		23	----	----	----	Tr.	.01	Tr.
		24	.08	.03	.11	.11	.58	.15

*Included in following measurement.
[1]Hourly records adjusted on basis of daily readings of auxiliary nonrecording gage.

ending at indicated time, July 1938—Continued

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
----	----	----	----	----	----	----	0.22	0.02	----	----	----	----	----	----	----	----	----	0.24
----	----	----	----	----	----	----	----	----	----	----	0.26	0.11	0.01	----	----	----	----	.38
----	----	----	----	----	----	----	----	.02	1.04	0.03	.07	.62	.17	0.48	----	----	----	2.43
0.47	0.16	----	0.48	0.32	0.21	0.32	.07	.01	.01	.01	----	----	----	----	----	0.06	0.02	2.68
.03	.03	----	.01	.03	.01	.21	----	----	----	----	----	----	----	----	----	----	----	.50
----	----	----	----	.13	.40	.13	.07	.02	----	----	----	----	----	----	----	----	----	.75
----	----	----	.02	----	.25	.55	----	----	----	.20	.08	.10	.12	.01	----	----	----	1.33
.08	.04	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.20
----	----	----	----	----	----	----	----	----	----	.54	----	----	----	----	----	----	----	.54
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.02
.04	----	----	.11	.18	.07	.05	----	----	----	----	----	----	----	----	----	----	----	.71
.04	.02	0.01	.05	.02	.12	.06	----	----	----	----	----	----	----	----	----	----	.05	.48
----	----	----	.06	.07	----	.02	.02	----	----	----	----	----	----	----	----	----	----	.18
.13	.05	.04	.20	----	.10	.14	.06	.04	.08	----	.40	.05	.05	.08	0.04	.08	.03	1.57
.04	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.52
----	----	----	----	----	----	----	----	----	.15	.08	.03	.02	----	.01	.01	----	----	.30
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.01	.01	.02
----	----	----	----	----	----	----	----	.04	.06	----	----	----	----	----	----	----	----	.12
.06	.07	.07	.06	.07	.05	.04	.04	.02	.01	----	----	----	----	----	----	----	----	.63
.02	.03	.04	.11	.05	.04	.06	.04	.03	----	----	.04	.01	----	----	----	.01	.04	.63
.01	.01	.04	.03	.04	.04	.02	.02	.03	.03	.03	.03	.03	.02	----	----	----	----	.47
.04	.05	.08	1.15	1.50	.08	.02	.01	----	----	.03	.03	----	----	----	----	----	----	2.99
.04	.02	.01	----	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	.20
----	----	----	----	----	.30	.40	.50	.80	----	----	----	----	----	----	----	----	----	2.00
----	----	----	----	----	----	----	----	----	----	----	.14	.05	.04	.03	.01	----	----	.27
----	----	----	----	----	----	----	----	.02	.10	.10	.18	.02	.01	----	----	----	----	.43
.03	.05	----	.23	.85	.20	.02	----	----	----	----	.05	.06	.04	.04	.09	.04	.07	1.90
.03	.02	.06	----	.03	.02	----	----	----	.02	----	----	----	----	----	----	----	----	.46
----	----	----	----	.36	.30	.18	.12	.08	----	----	----	----	----	----	----	----	----	1.04
----	.01	.01	----	.06	.01	----	----	.16	----	.25	.30	.07	.03	.02	.02	.03	.06	1.03
.03	.02	.02	.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.59
----	----	----	----	----	----	.01	.03	.02	.02	----	----	----	----	----	----	----	----	.08
----	----	----	----	----	----	Tr.	.01	----	----	----	----	----	----	----	----	----	----	.01
----	----	----	----	----	----	----	----	.28	----	----	1.84	.37	.01	.01	.01	Tr.	----	2.52
----	----	Tr.	Tr.	----	----	.01	.07	.46	.48	Tr.	.30	.07	.06	.10	Tr.	----	----	1.55
.38	.04	.50	.87	.38	1.09	.11	Tr.	----	----	----	----	Tr.	.01	----	.05	.10	Tr.	6.08
.02	.04	Tr.	Tr.	.01	----	.01	----	----	----	----	Tr.	----	----	Tr.	----	----	----	.24
----	----	----	----	.83	.13	.13	.01	.02	----	----	----	Tr.	----	----	----	----	----	1.12
.02	Tr.	.03	Tr.	----	Tr.	.03	----	.31	.71	.01	.10	.35	.01	.01	Tr.	.01	.04	1.65
.12	Tr.	.02	Tr.	----	----	----	Tr.	----	----	----	----	----	----	----	----	----	----	.69
----	----	----	----	----	----	----	.48	.02	----	----	----	----	----	----	----	----	----	.50
----	----	----	----	----	----	----	----	----	----	----	.30	.01	.03	----	.02	----	----	.36
----	----	----	----	----	----	----	----	.19	.35	.02	----	.02	.01	.04	----	----	----	.63
.13	.26	.01	.14	.51	.50	.19	.03	----	----	----	----	----	----	----	----	.02	.03	2.48
.12	.03	.01	----	----	----	1.45	----	----	----	----	----	----	----	----	----	----	----	1.74
----	----	----	----	----	.08	.09	.05	----	----	----	----	----	----	----	----	----	----	.22
----	----	----	.03	----	----	.28	.01	----	.01	.02	.06	.12	.10	----	----	.02	.01	.66
.08	.04	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.33
----	----	----	----	----	----	----	----	----	.15	----	----	----	----	----	----	----	----	.15
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.03	.03
----	----	----	----	----	----	----	----	.02	.08	----	----	----	----	----	----	----	----	.15
.05	.03	.06	.30	.31	.03	----	----	----	----	----	----	----	----	----	----	----	----	1.12
.03	.02	.21	.12	.06	.11	.02	----	----	----	----	----	----	----	----	----	----	.02	.77
*	*	*	.52	.07	.02	.02	.01	----	----	----	----	----	----	----	----	----	----	.66
.20	1.01	.25	.36	1.04	.29	.07	----	.13	----	.58	.09	.01	.01	----	----	.01	.03	4.14
.01	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	.32
----	----	----	----	----	----	----		*	*	*	----	----	.13	----	----	----	----	.13
----	Tr.	----	----	(*)	----	----	Tr.	----	----	----	----	----	----	*	*	*	.05	.05
----	.04	----	----	----	----	(*)	.06	*	*	*	*	----	.03	----	----	----	----	.13
*	.32	*	*	*	*	*	.47	----	----	----	----	----	----	----	----	----	----	.79
*	.17	----	----	----	----	*	.30	----	----	----	*	*	.24	*	*	*	.07	.78
*	.04	----	----	----	----	----	.26	*	*	*	*	*	Tr.	*	*	*	.04	.34
*	.13	*	*	*	*	*	1.28	*	*	*	*	*	1.02	*	*	*	.12	2.55
*	.24	*	*	*	*	*	Tr.	----	----	----	----	----	----	----	----	----	----	.24
----	----	----	----	----	----	----	Tr.	----	----	Tr.	----	----	----	----	----	----	----	Tr.
----	----	----	----	----	----	----	----	Tr.	----	.05	Tr.	.05	Tr.	Tr.	Tr.	----	----	.10
----	----	----	----	----	----	----	.11	.11	.05	----	----	.01	Tr.	----	----	----	----	.28
.10	.02	Tr.	.21	.30	.16	.09	Tr.	----	----	----	Tr.	Tr.	----	----	Tr.	.03	Tr.	1.34
.03	.01	.01	.01	Tr.	.45	.34	----	----	----	----	----	----	Tr.	----	----	Tr.	.01	1.01
----	----	----	Tr.	.28	.08	.11	.01	Tr.	Tr.	----	----	----	----	----	----	----	----	.48
----	----	.04	Tr.	.05	.71	.03	----	.13	.02	.12	.06	.09	.01	Tr.	.01	Tr.	.05	1.33
.05	Tr.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.11

[2]24-hour total at 7:30 a.m. of day indicated.
[3]Hourly records not available for July 17–21. See table 21 for daily records.

Records of hourly precipitation July 17–25 at 76 recording rain gages are given in table 22. Figure 33 shows the hourly precipitation at 5 selected rain gages. These graphs show that virtually no precipitation fell on July 17 and 25. If these records may be accepted as criteria for the distribution of precipitation measured at nonrecording stations, then the storm period, for all practical purposes, lasted 7 days—July 18–24. The concentration of rainfall was erratic, as evidenced by comparison of the rainfall graph for New Milford, N. J., with that for Long Branch, N. J. An initial heavy downpour occurred during the early afternoon of July 18 at most stations. For example, 2.52 inches of rain fell at Long Branch, N. J., during 8 hours of the afternoon of July 18, whereas at Sandy Hook, N. J., nearby, only 0.10 inch was registered during the 12

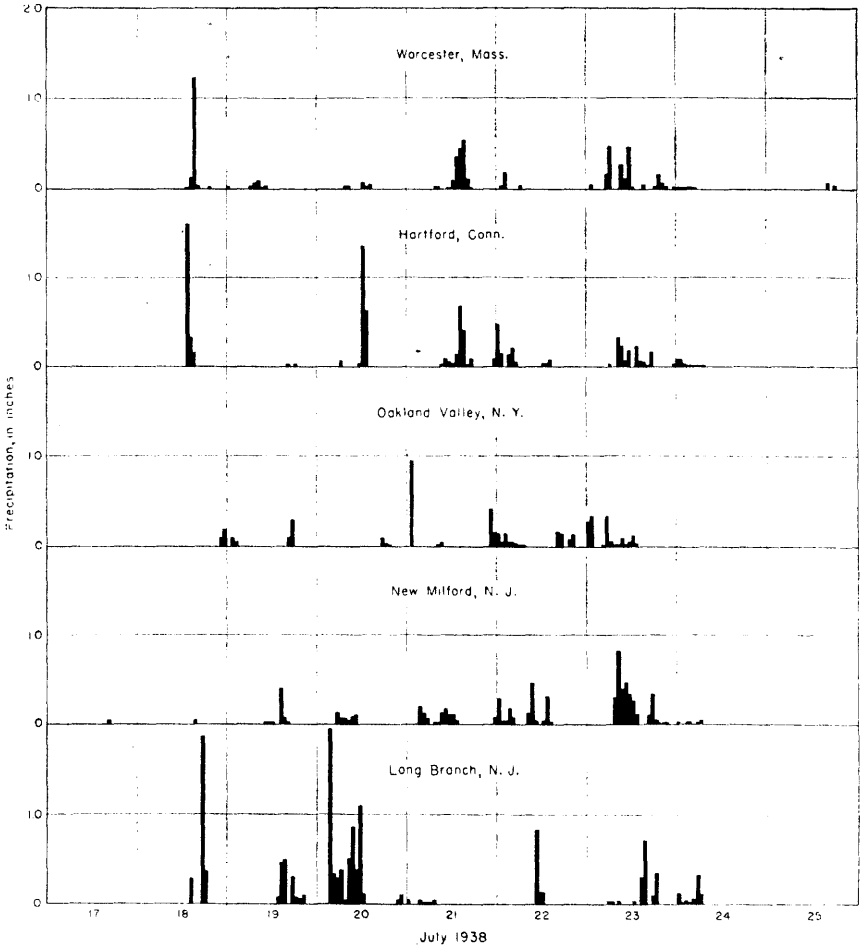


FIGURE 33.—Hourly precipitation at selected recording rain gages during storm of July 1938.

hours between noon and midnight of July 18. Many other examples of the erratic distribution may be found.

The maximum storm precipitation recorded along the northern Atlantic seaboard was 13.96 inches at Crisfield, Md., but within the area studied the maximum recorded was 13.85 inches at Long Branch, N. J., where an autographic rain gage is located. Table 23 lists maximum storm precipitation for intervals from 1 hour to 7 days at any station within the storm area. Maximum 7-day precipitation was registered at Long Branch, N. J., where also was registered the maximum 2-day, 1-day, 10-hour, 6-hour, and 1-hour rainfall. The amounts given in table 23 have, however, all been exceeded in other storms, as reported in table 15.

AREAL DISTRIBUTION

Plate 11 presents an isohyetal map of the area covered by this report for the storm period July 17–25, 1938, based on records published in table 21. With minor exceptions this storm lasted 7 days.

TABLE 23.—*Maximum storm precipitation during indicated intervals, storm of July 17-25, 1938*

Period	Place	Date	Precipitation (inches)
7-day	Long Branch, N. J.	July 18–24	13.85
2-day	Crisfield, Md.	July 23–24	8.20
Do	Long Branch, N. J.	July 20	7.63
1-day	Crisfield, Md.	July 24	8.00
Do	Long Branch, N. J.	July 20	6.08
10-hour	do	do	5.92
6-hour	do	do	3.47
2-hour	Irvington, N. J.	July 23	2.65
1-hour	Long Branch, N. J.	July 20	1.94

The isohyetals on plate 11 define a major axis of intense precipitation through Dover, Del. (11.02 inches); Hammondton, N. J. (10.62 inches); Long Branch, N. J. (13.86 inches); and an elongated center in Connecticut and Massachusetts with its maximum at Milford, Mass. (12.29 inches). The axis defined by these centers has an approximate bearing of N. 45° E. There are other centers, notably one to the east of the above-mentioned axis at Crisfield, Md. (13.96 inches). Another area of intense precipitation covered the Catskill Mountains, the areal distribution apparently being influenced by orographic effects of altitude.

The isohyetal lines on plate 11 may be compared advantageously with those for the hurricane storm of September 1938 given in Water-Supply Paper 867[24]. Although of different meteorologic or-

[24] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, Pl. 1 (in pocket), 1940.

igin, the storm positions in general nearly coincided. Precipitation during the storm of July 1938 was heavier in parts of New Jersey and the Catskill Mountains than during the September storm; but the latter extended farther across central Massachusetts into New Hampshire and Vermont. In spite of these and other differences in areal distribution the storms were of sufficiently great geographic coincidence and shape that the unfavorable effect of the earlier storm in reducing soil retentive capacity before the later and heavier September storm cannot be questioned.

AREA-DEPTH RELATIONS

The areas within the various isohyetals shown on plate 11 for the 7-day storm have been planimetered, and the total areas over which the precipitation was greater than the indicated amounts were approximately as follows:

Over 12 inches, 175 square miles.
Over 11 inches, 890 square miles.
Over 10 inches, 1,930 square miles.
Over 9 inches, 3,740 square miles.
Over 8 inches, 7,580 square miles.
Over 6 inches, 23,600 square miles.

The areas tablulated above include those within all isohyetals north of the Potomac River shown on plate 11. The mean precipitation within the isohyetals about each storm center has been computed, and the results were used to prepare an enveloping curve showing the relation between maximum mean precipitation and the area enclosed within a continuous isohyetal. From this enveloping curve the following points were selected for comparing the storm of July 17–25, 1938, with other storms in the region:

Area (square miles)	*Mean precipitation (inches)*
1	[1] 13.96
100	12.9
500	11.6
1,000	11.1
2,000	10.2
4,000	9.2
6,000	8.9
10,000	8.4
[2] 23,600	7.7

[1] Total storm precipitation recorded at Crisfield, Md.
[2] Area within the 6-inch isohyet.

That the flood-producing storms of July 1938 continued for 7 consecutive days was a most unusual circumstance. The Miami Conservancy District Report[25] analyzes on an area-depth basis 33

[25] Storm rainfall of eastern United States; Miami Conservancy District, Technical Reports, pt. 5 (revised), pp. 278, 279, 1936.

important rainstorms that occurred from 1869 to 1933 in the northeastern United States. Only durations up to 5 days are shown in this report. If the 4-day storm of September 1938 is included, the 7-day storm of July 1938 was exceeded by six storms on the basis of 6,000 square miles, by four storms on the basis of 1,000 square miles, and only by the storm of September 1938 if point rainfalls are compared.

STAGES AND DISCHARGES AT STREAM-GAGING STATIONS

The data presented in the following pages for each regular stream-gaging station comprise in general a description of the station, an upper table showing the daily discharges throughout the 3-month period from June to August 1938 (except in New York, where discharges for July and August only are given), and a lower table showing the stage and discharge at the indicated times during the period of major flood flow. For those streams in New Jersey and in New York that were affected by the floods of June or August 1938 the table of discharge at indicated times has been expanded to include the respective flood periods. The latter table is sufficiently detailed to permit the delineation of reasonably accurate graphs of the instantaneous stage and discharge for the flood period. The data are intended to be reasonably complete and explicit with respect to essential information, although they are presented in concise form. Reference should be made to pages 8 to 11 for discussions of the tables of discharge presented herein.

Figure 34 shows hydrographs of daily mean discharge for this 3-month period for one stream-gaging station in New Jersey, New York, and Connecticut. This figure shows the relative size of the floods during June, July, and August 1938 in these three States. In all of them, the flood of July was either the largest or a close second. It was the only sizable flood in Connecticut during the 3 months shown. In New Jersey the flood of June 1938 was comparable to that of July and in New York (Catskill Mountains) that of August was comparable to that of July. These floods are described in separate parts of this volume, but the records of stream flow are presented in this part because the flood of July was common to all three States and for convenience, as the recession of one flood was nearly continuous with the beginning of the next.

The lower tables, showing stage and discharge at indicated times, are designed to present the rise and recession of the flood in detail. The table of discharge at indicated time begins well before the beginning of the major flood rise and continues until the

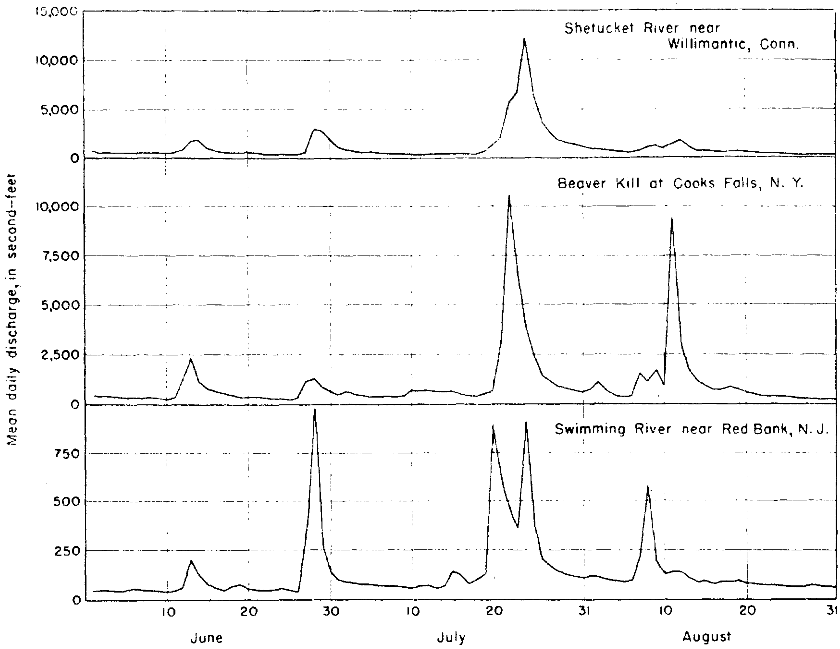


FIGURE 34.—Hydrographs of daily discharges at selected stream-gaging stations for the period June 1 to August 31, 1938.

flood had largely passed out of the river systems. Hydrographs of discharge showing the characteristics of flood peaks and the conditions of stream flow during the flood period are shown for stream-gaging stations in New Jersey, New York, and Connecticut in figures 25 to 28, inclusive. A striking example of the effect of the erratic distribution of rainfall on stream flow during this flood may be discerned in figure 25 by observing the very different fluctuations in discharge of the Rahway River at Rahway, N. J., and of the North Branch of the Raritan River at Milltown, N. J. These basins are about 20 miles apart.

Records for seven stations in New Jersey, presented in this part of the report, include discharges for the hurricane floods of September 1938. The records are presented in this report because they were not available when Water-Supply Paper 867[26] was published and because they serve to complete the flood data presented in Water-Supply Paper 867.

[26] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, 562 pp., 1940.

MERRIMACK RIVER BASIN

CONCORD RIVER BELOW RIVER MEADOW BROOK, AT LOWELL, MASS.

LOCATION.—Lat. 42°38'15", long. 71°18'10", at Lowell, Middlesex County, 300 feet downstream from Rogers Street Bridge, 0.3 mile downstream from River Meadow Brook, and 0.8 mile upstream from mouth. Datum of gage is 67.41 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—Total area above gage, 405 square miles; net above gage, 312 square miles (Boston Metropolitan district).

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 3,670 second-feet.

MAXIMA.—July 1938: Discharge, 3,790 second-feet 6 a. m. and 4:45 p. m. July 29 (gage height, 8.11 feet).

1936 to June 1938: Discharge, 1,900 second-feet Dec. 23, 1936 (gage height, 6.75 feet). discharge known, 6,490 second-feet Mar. 15, 1936 at North Billerica, Mass. (drainage area 374 square miles).

REMARKS.—Flood discharge affected by natural storage in swamps by water wasted by Boston Metropolitan district in diverting from 92.6 square miles in Sudbury River and Lake Cochituate Basins. Wasted water is included in discharge records. For information on wastage see record for wastage from Sudbury River Basin at outlets of Framingham Reservoir No. 1 near Framingham Center, Mass. and Lake Cochituate at Cochituate, Mass.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	555	1,110	3,150	11	274	620	1,300	21	614	1,120	718
2	521	1,130	2,940	12	297	600	1,250	22	568	1,480	697
3	487	1,130	2,690	13	448	588	1,160	23	532	1,800	655
4	421	1,100	2,440	14	562	588	1,090	24	487	2,350	594
5	426	1,060	2,180	15	641	614	1,040	25	406	2,990	555
6	437	982	1,900	16	690	574	958	26	395	3,370	515
7	416	902	1,720	17	711	549	926	27	515	3,630	448
8	380	823	1,570	18	662	652	870	28	662	3,660	411
9	360	725	1,440	19	641	744	823	29	870	3,710	448
10	323	655	1,340	20	655	877	746	30	1,010	3,450	448
								31	--------	3,290	426
Monthly mean discharge, in second-feet (adjusted for wastage[1])									379	1,005	1,053
Runoff, in inches (adjusted for wastage)									1.35	3.71	3.90

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	5.20	555	5.25	588	5.48	746	5.59	823	5.81	998	6.29	1,430
12 n.	5.19	549	5.21	562	5.43	711	5.64	862	5.86	1,040	6.33	1,470
6 p.m.	5.18	544	5.56	802	5.49	753	5.73	934	6.14	1,290	6.40	1,540
12 m.	5.16	532	5.45	725	5.53	781	5.75	950	6.23	1,370	6.44	1,580
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	6.51	1,660	6.99	2,230	7.45	2,820	7.82	3,320	7.98	3,570	8.04	3,670
12 n.	6.60	1,760	7.10	2,370	7.60	3,020	7.92	3,470	8.03	3,650	8.03	3,650
6 p.m.	6.75	1,930	7.22	2,530	7.73	3,190	7.88	3,410	8.04	3,670	8.02	3,630
12 m.	6.88	2,090	7.34	2,680	7.74	3,210	7.94	3,500	8.05	3,680	8.07	3,720

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	8.11	3,790	7.93	3,490	7.83	3,340	7.70	3,150	7.58	2,990	7.38	2,730
12 n.	8.07	3,720	7.90	3,440	7.80	3,290	7.71	3,160	7.52	2,920	7.35	2,700
6 p.m.	8.06	3,700	7.88	3,410	7.77	3,250	7.67	3,110	7.50	2,890	7.30	2,630
12 m.	7.95	3,520	7.84	3,350	7.74	3,210	7.65	3,080	7.45	2,820	7.25	2,560
	August 4		August 5		August 6		August 7		August 8		August 9	
6 a.m.	7.20	2,500	7.00	2,240	6.78	1,970	6.60	1,760	6.45	1,600	6.35	1,490
12 n.	7.17	2,460	6.97	2,200	6.72	1,890	6.56	1,720	6.44	1,580	6.32	1,460
6 p.m.	7.11	2,380	6.90	2,110	6.67	1,840	6.53	1,680	6.39	1,530	6.29	1,430
12 m.	7.05	2,300	6.84	2,040	6.64	1,800	6.49	1,640	6.36	1,500	6.24	1,380
	August 10											
6 a.m.	6.25	1,390	------	------	------	------	------	------	------	------	------	------
12 n.	6.22	1,360	------	------	------	------	------	------	------	------	------	------
6 p.m.	6.21	1,350	------	------	------	------	------	------	------	------	------	------
12 m.	6.16	1,300	------	------	------	------	------	------	------	------	------	------

[1]Adjusted for wastage by Boston metropolitan district in diverting from 92.6 square miles in Sudbury River and Lake Cochituate Basins.

WASTAGE FROM SUDBURY RIVER BASIN AT OUTLETS OF FRAMINGHAM RESERVOIR NO. 1, NEAR FRAMINGHAM CENTER, MASS., AND LAKE COCHITUATE AT COCHITUATE, MASS.

LOCATION.—Outlet of Framingham Reservoir No. 1, lat. 42°17′30″, long. 71°26′40″, half a mile upstream from outlet of Farm Pond and three-quarters of a mile southwest of Framingham Center, Middlesex County.

Outlet of Lake Cochituate, lat. 42°18′45″, long. 71°23′15″, three-eighths of a mile north of Cochituate railroad station, Middlesex County, and 1¼ miles upstream from Sudbury River.

DRAINAGE AREA.—92.6 square miles (tributary to Concord River).

REMARKS.—Discharge is water wasted into Concord River and does not include diversions from Sudbury River Basin for water supply. Records furnished by water division of the Metropolitan District Commission.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	95	435	500	11	42	48	138	21	110	599	104
2	84	297	460	12	89	74	120	22	61	1,040	99
3	51	197	287	13	220	88	100	23	57	1,720	105
4	54	169	238	14	204	86	93	24	49	2,150	98
5	59	142	224	15	281	92	129	25	42	1,720	88
6	50	119	180	16	289	80	126	26	57	1,430	82
7	42	106	179	17	272	72	130	27	162	1,040	73
8	37	57	153	18	158	80	127	28	432	848	77
9	32	50	172	19	126	146	120	29	583	763	31
10	28	46	132	20	124	367	110	30	537	687	32
								31		642	45

IPSWICH RIVER BASIN

IPSWICH RIVER AT SOUTH MIDDLETON, MASS.

LOCATION.—Lat. 42°34'10", long. 71°01'35", at South Middleton, Essex County, 700 feet downstream from Boston Street highway bridge, 1.3 miles downstream from Will's Brook, and 2 miles south of Middleton.

DRAINAGE AREA.—43.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 590 second-feet.

MAXIMA.—July 1938: Discharge, 608 second-feet 8 to 12 p. m. July 24 (gage height, 5.72 feet).

REMARKS.—Flood discharge considerably affected by natural storage and slightly affected by diversions.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	64	134	301	11	36	33	84	21	54	161	56
2	61	138	274	12	42	55	72	22	51	323	56
3	58	134	246	13	68	42	72	23	47	397	52
4	54	119	221	14	71	37	67	24	41	584	47
5	52	108	186	15	64	37	62	25	38	584	41
6	49	79	158	16	67	37	59	26	32	527	29
7	47	81	138	17	68	35	70	27	54	474	28
8	47	66	126	18	67	37	68	28	103	427	30
9	46	56	110	19	62	83	65	29	116	383	29
10	41	49	100	20	57	96	62	30	134	383	27
								31		334	23
Monthly mean discharge, in second-feet (adjusted for diversions[1])									60.7	196	96.4
Runoff, in inches (adjusted for diversions)									1.56	5.21	2.56

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	0.79	35	0.77	33	1.07	68	1.32	91	1.59	108	3.82	314
12 n.	.79	35	.77	33	1.29	88	1.41	98	2.21	151	3.95	328
6 p.m.	.78	34	.82	38	1.29	88	1.45	100	2.86	212	4.00	334
12 m.	.77	33	.98	58	1.31	90	1.51	104	3.38	266	4.02	336
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.08	344	5.52	568	5.69	602	5.38	541	5.09	489	4.76	436
12 n.	4.39	382	5.67	598	5.63	590	5.31	529	5.01	476	4.67	422
6 p.m.	4.82	445	5.71	606	5.55	574	5.23	514	4.92	461	4.57	408
12 m.	5.32	531	5.72	608	5.47	558	5.16	502	4.85	450	4.46	391
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	4.34	375	4.48	394	4.12	348	3.79	311	3.53	282	3.24	250
12 n.	4.47	393	4.40	383	4.03	338	3.73	304	3.46	275	3.18	244
6 p.m.	4.48	394	4.30	370	3.93	326	3.64	294	3.36	264	3.12	238
12 m.	4.51	398	4.20	358	3.86	319	3.59	289	3.30	257	3.07	233

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	August 4		August 5		August 6		August 7		August 8		August 9	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
6 a.m.	3.01	227	2.69	195	2.38	165	2.07	140	1.96	131	1.72	114
12 n.	2.98	224	2.61	187	2.30	158	2.01	135	1.90	126	1.66	111
6 p.m.	2.85	211	2.53	179	2.22	152	2.07	140	1.83	121	1.60	108
12 m.	2.77	203	2.45	172	2.14	145	2.02	136	1.79	118	1.55	106
	August 10											
6 a.m.	1.50	103	------	------	------	------	------	------	------	------	------	------
12 n.	1.43	99	------	------	------	------	------	------	------	------	------	------
6 p.m.	1.37	95	------	------	------	------	------	------	------	------	------	------
12 m.	1.31	90	------	------	------	------	------	------	------	------	------	------

[1]Adjusted for diversions for municipal supply of Reading, Lynn, and Peabody.

IPSWICH RIVER NEAR IPSWICH, MASS.

LOCATION.—Lat. 42°39′35″, long. 70°53′35″, 200 feet downstream from Willowdale Dam, 1½ miles downstream from Howlett Brook, and 4 miles upstream from Ipswich, Essex County. Datum of gage is 20.63 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—124 square miles (not including area drained by Suntaug Lake).

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Rating curve defined by current-meter measurements below 2,530 second-feet.

MAXIMA.—July 1938: Discharge, 1,700 second-feet 6 to 8 a. m. July 26 (gage height, 6.29 feet).

1930 to June 1938: Discharge, 2,610 second-feet Mar. 15, 1936 (gage height, 7.70 feet).

REMARKS.—Flood discharge considerably affected by natural storage and slightly affected by diversions.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	171	247	932	11	110	157	368	21	136	236	274
2	163	290	858	12	108	154	341	22	130	410	251
3	154	302	768	13	118	144	302	23	123	700	225
4	146	298	708	14	120	139	270	24	116	1,220	206
5	146	282	640	15	127	132	240	25	108	1,600	187
6	141	262	584	16	139	127	219	26	102	1,680	171
7	134	240	522	17	152	118	222	27	114	1,540	160
8	127	219	474	18	163	127	236	28	136	1,400	146
9	123	193	430	19	154	139	262	29	171	1,220	134
10	114	174	395	20	146	163	278	30	212	1,120	123
								31		1,010	114
Monthly mean discharge, in second-feet (adjusted for diversions[1])									140	520	359
Runoff, in inches (adjusted for diversions[1])									1.26	4.83	3.34

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	3.60	118	3.58	114	3.68	136	[1]3.72	146	3.90	199	4.33	368
12 n.	3.60	118	3.58	114	3.69	139	3.75	154	3.95	216	4.42	410
6 p.m.	3.60	118	3.78	163	3.70	141	3.82	174	4.18	302	4.52	462
12 m.	3.59	116	3.69	139	3.71	144	3.85	184	4.23	323	4.61	516
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.71	577	5.40	1,080	6.08	1,560	6.29	1,700	6.13	1,590	5.92	1,440
12 n.	4.87	692	5.61	1,230	6.20	1,640	6.26	1,680	6.06	1,540	5.85	1,400
6 p.m.	5.07	842	5.80	1,360	6.25	1,680	6.24	1,670	6.00	1,500	5.77	1,340
12 m.	5.22	954	5.96	1,470	6.27	1,690	6.19	1,630	5.98	1,490	5.70	1,290
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	5.64	1,250	5.51	1,160	5.35	1,040	5.22	954	5.12	880	5.00	790
12 n.	5.63	1,240	5.48	1,140	5.32	1,020	5.19	932	5.08	850	4.96	760
6 p.m.	5.60	1,220	5.42	1,090	5.28	996	5.16	910	5.05	828	4.94	745
12 m.	5.56	1,190	5.39	1,070	5.25	975	5.15	902	5.02	805	4.93	738
	August 4		August 5		August 6		August 7		August 8		August 9	
6 a.m.	4.92	730	4.82	655	4.74	598	4.65	540	4.56	486	4.48	440
12 n.	4.90	715	4.80	640	4.72	584	4.62	522	4.54	474	4.46	430
6 p.m.	4.85	678	4.78	626	4.70	570	4.60	510	4.51	456	4.45	425
12 m.	4.83	662	4.75	605	4.67	552	4.58	498	4.50	450	4.43	415
	August 10											
6 a.m.	4.41	405	------	------	------	------	------	------	------	------	------	------
12 n.	4.40	400	------	------	------	------	------	------	------	------	------	------
6 p.m.	4.38	391	------	------	------	------	------	------	------	------	------	------
12 m.	4.36	382	------	------	------	------	------	------	------	------	------	------

[1]Adjusted for diversions for municipal supply of Reading, Lynn, Peabody, Danvers, Salem, and Beverly

CHARLES RIVER BASIN

CHARLES RIVER AT CHARLES RIVER VILLAGE, MASS.

LOCATION.—Lat. 42°15′20″, long. 71°15′40″, in Charles River Village, Norfolk County, 0.25 mile downstream from highway bridge, and 0.8 mile downstream from unnamed tributary. Datum of gage is 89.76 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—184 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 3,020 second-feet.

MAXIMA.—July 1938: Discharge, 3,110 second-feet 3 p. m. July 27 (gage height, 9.00 feet).

1937 to June 1938: Discharge 1,260 second-feet 8 a. m. Jan. 29, 1938 (gage height, 4.66).

Discharge known, 3,170 second-feet March 1936, by computation of flow over dam at site a quarter of a mile above station.

REMARKS.—Flood discharge considerably affected by natural storage and slightly affected by diversions for municipal supply of Wellesley and Needham.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	363	718	1,660	11	185	418	601	21	363	561	502
2	342	814	1,460	12	206	406	550	22	340	994	478
3	316	862	1,280	13	305	374	514	23	310	1,240	455
4	270	862	1,110	14	374	363	478	24	281	1,870	412
5	254	782	990	15	406	352	444	25	267	2,300	382
6	246	702	902	16	440	335	402	26	265	2,780	353
7	239	640	787	17	464	322	444	27	303	3,020	320
8	216	568	705	18	464	326	444	28	429	2,860	294
9	202	514	705	19	429	363	466	29	540	2,500	250
10	188	464	640	20	406	429	502	30	625	2,200	214
								31		1,920	198
Monthly mean discharge, in second-feet (adjusted for diversions[1])									338	1,063	614
Runoff, in inches (adjusted for diversions[1])									2.05	6.66	3.85

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	2.21	326	2.13	313	2.36	355	2.46	376	2.88	470	4.61	997
12 n.	2.20	324	2.14	314	2.44	371	2.68	424	2.92	480	4.70	1,030
6 p.m.	2.17	319	2.33	348	2.47	378	2.87	468	3.53	649	4.68	1,020
12 m.	2.15	316	2.41	365	2.47	378	2.88	470	4.22	868	4.71	1,030
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.81	1,060	6.61	1,740	7.55	2,180	8.46	2,670	8.87	3,000	8.82	2,960
12 n.	5.18	1,200	6.88	1,860	7.78	2,290	8.64	2,810	8.90	3,020	8.73	2,880
6 p.m.	5.73	1,400	7.13	1,970	8.02	2,410	8.74	2,890	8.96	3,070	8.61	2,790
12 m.	6.27	1,610	7.34	2,070	8.25	2,530	8.81	2,950	8.91	3,030	8.48	2,690
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	8.34	2,590	7.76	2,280	7.15	1,980	6.57	1,730	6.04	1,520	5.51	1,310
12 n.	8.20	2,500	7.61	2,200	7.01	1,920	6.44	1,680	5.92	1,470	5.40	1,280
6 p.m.	8.05	2,420	7.45	2,120	6.86	1,850	6.31	1,620	5.77	1,410	5.26	1,230
12 m.	7.91	2,360	7.30	2,050	6.72	1,790	6.17	1,570	5.64	1,360	5.15	1,200
	August 4		August 5		August 6		August 7		August 8		August 9	
6 a.m.	5.04	1,150	4.62	1,030	4.24	914	3.89	812	3.59	729	3.58	727
12 n.	4.93	1,120	4.52	996	4.16	890	3.81	790	3.50	705	3.51	708
6 p.m.	4.83	1,090	4.42	966	4.06	861	3.73	767	3.40	679	3.46	695
12 m.	4.72	1,060	4.32	937	3.97	835	3.66	748	3.59	729	3.40	679
	August 10		August 11		August 12		August 13		August 14		August 15	
6 a.m.	3.34	663	3.14	611	2.97	568	2.77	519	2.62	483	2.48	451
12 n.	3.27	645	3.14	611	2.92	555	2.74	512	2.59	476	2.45	444
6 p.m.	3.19	624	3.09	598	2.85	538	2.69	500	2.55	466	2.37	427
12 m.	3.13	609	3.03	583	2.81	528	2.65	490	2.51	457	2.33	418

[1]Adjusted for diversions for municipal supply of Wellesley and Needham.

CHARLES RIVER AT WALTHAM, MASS.

LOCATION.—Lat. 42°22′20″, long. 71°14′05″, 600 feet downstream from Moody Street Bridge in Waltham, Middlesex County, and a third of a mile upstream from Clematis Brook. Datum of gage is 20.02 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—227 square miles (not including 23.6 square miles drained by Stony Brook).

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,130 second-feet.

MAXIMA.—July 1938: Discharge, 2,180 second-feet 1 p. m. July 26, 9 a. m. and 2 p. m. July 29 (gage height) 4.56 feet.

1931 to June 1938: Discharge, 2,540 second-feet Mar. 19, 1936 (gage height, 4.79 feet).

REMARKS.—Flood discharge considerably affected by artificial and natural storage and diversions to Mother Brook and slightly affected by wastage from Stony Brook Reservoir and diversions for municipal supply of Wellesley, Needham, Dedham, Brookline, Newton, and Waltham.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	287	445	1,820	11	176	439	543	21	298	525	374
2	324	492	1,530	12	198	434	500	22	287	990	390
3	302	530	1,280	13	232	422	460	23	283	1,460	394
4	280	560	1,170	14	210	394	420	24	262	1,970	411
5	274	695	1,020	15	227	382	370	25	234	1,970	390
6	254	595	925	16	255	335	340	26	229	2,020	382
7	231	555	828	17	266	291	320	27	296	2,070	366
8	224	540	765	18	302	332	340	28	350	2,120	362
9	143	438	723	19	282	367	350	29	378	2,170	332
10	197	439	658	20	339	391	366	30	398	2,070	291
								31		1,920	269
Monthly mean discharge, in second-feet (adjusted for wastage and storage[1])									401	1,226	849
Runoff, in inches (adjusted for wastage and storage[1])									1.98	6.23	4.31

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	------	-------	------	-------	------	-------	------	-------	2.16	414	3.06	899
12 n.	------	-------	------	-------	------	-------	------	-------	2.19	426	3.42	1,140
6 p.m.	------	-------	------	-------	------	-------	------	-------	2.83	753	3.23	1,010
12 m.	------	-------	------	-------	------	-------	------	-------	2.90	795	3.17	970
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	3.23	1,010	4.30	1,920	4.35	1,970	4.33	1,950	4.45	2,070	4.48	2,100
12 n.	4.00	1,620	4.35	1,970	4.36	1,980	4.37	1,990	4.46	2,080	4.53	2,150
6 p.m.	4.21	1,830	4.42	2,040	4.35	1,970	4.47	2,090	4.48	2,100	4.54	2,160
12 m.	4.27	1,890	4.40	2,020	4.33	1,950	4.44	2,060	4.50	2,120	4.53	2,150
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	4.53	2,150	4.52	2,140	4.31	1,930	4.16	1,780	3.95	1,580	3.73	1,380
12 n.	4.54	2,160	4.47	2,090	4.36	1,980	4.31	1,930	3.88	1,510	3.68	1,340
6 p.m.	4.54	2,160	4.44	2,060	4.24	1,860	4.17	1,790	3.83	1,470	3.42	1,140
12 m.	4.53	2,150	4.29	1,910	4.21	1,830	4.03	1,650	3.77	1,420	3.49	1,190
	August 4		August 5		August 6		August 7		August 8		August 9	
6 a.m.	3.47	1,180	3.30	1,060	3.14	951	3.00	860	2.86	771	2.80	735
12 n.	3.46	1,180	3.27	1,040	3.14	951	2.98	847	2.85	765	2.79	729
6 p.m.	3.40	1,130	3.22	1,000	3.07	906	2.94	821	2.81	741	2.75	705
12 m.	3.35	1,100	3.17	970	3.04	886	2.90	795	2.83	753	2.72	687

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	August 10		August 11		August 12		August 13		August 14		August 15	
6 a.m.	2.69	670										
12 n.	2.67	658										
6 p.m.	2.65	648										
12 m.	2.62	631										

[1]Adjusted for diversions to Mother Brook and for municipal supply of Wellesley, Needham, Dedham Brookline, Newton, and Waltham, and for wastage from Stony Brook Reservoir.

MOTHER BROOK AT DEDHAM, MASS.

LOCATION.—Lat. 42°15′20″, long. 71°09′55″, in Dedham, Norfolk County, 0.3 mile downstream from point of diversion from Charles River. Datum of gage is 0.03 foot below mean sea level (general adjustment of 1929).

GAGE-HEIGHT RECORD.—Two or more gage readings daily on float gage.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 871 second-feet.

MAXIMA.—July 1938: Discharge, 909 second-feet July 28, 29 (gage height 91.84 feet from graph based on gage readings.

1931 to June 1938: Discharge, 900 second-feet Mar. 19, 1936 (gage height, 91.37 feet).

REMARKS.—Entire flow of Mother Brook represents water diverted from Charles River.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	128	199	693	11	62	180	238	21	128	166	162
2	124	220	617	12	65	171	220	22	120	245	162
3	120	245	543	13	83	158	199	23	116	333	158
4	112	258	489	14	97	148	184	24	108	471	153
5	108	258	426	15	104	140	171	25	98	579	140
6	99	252	383	16	116	132	158	26	94	713	132
7	90	245	341	17	124	124	171	27	104	835	120
8	82	226	302	18	132	120	171	28	132	900	116
9	76	209	280	19	136	128	166	29	162	900	101
10	67	194	258	20	132	140	162	30	180	835	87
								31		773	76
Monthly mean discharge, in second-feet									110	339	244

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
July 18			July 19			July 20			July 21			July 22			July 23		
8:30 a.m.	86.86	117	10:00 a.m.	87.03	130	10:00 a.m.	87.13	138	11:00 a.m.	87.37	159	9:45 a.m.	88.17	241	8:30 a.m.	88.72	320
7:30 p.m.	86.97	126	8:00 p.m.	87.05	132	9:15 p.m.	87.23	147	7:15 p.m.	87.67	186	9:00 p.m.	88.46	281	6:30 p.m.	88.99	364
July 24			July 25			July 26			July 27			July 28			July 29		
7:45 a.m.	89.43	440	7:30 a.m.	90.13	566	9:00 a.m.	90.84	701	9:00 a.m.	91.46	827	7:00 a.m.	91.79	898	7:15 a.m.	91.82	904
5:30 p.m.	89.76	500	6:15 p.m.	90.38	613	6:15 p.m.	91.10	753	5:00 p.m.	91.60	856	4:30 p.m.	91.84	909	5:00 p.m.	91.74	887

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
July 30			July 31			August 1			August 2			August 3			August 4		
7:45 a.m.	91.55	846	9:00 a.m.	91.23	779	7:30 a.m.	90.85	703	9:30 a.m.	90.38	613	9:30 a.m.	90.04	550	9:45 a.m.	89.68	485
7:00 p.m.	91.44	822	6:30 p.m.	90.98	729	6:45 p.m.	90.65	664	5:30 p.m.	90.26	590	6:30 p.m.	89.90	525	7:30 p.m.	89.57	466
August 5			August 6			August 7			August 8			August 9			August 10		
9:15 a.m.	89.39	433	9:00 a.m.	89.12	386	9:00 a.m.	88.87	344	9:00 a.m.	88.64	308	9:00 a.m.	88.49	286	9:15 a.m.	88.33	262
8:30 p.m.	89.26	410	7:45 p.m.	89.01	368	8:45 p.m.	88.76	327	7:15 p.m.	88.53	292	8:30 p.m.	88.42	275	9:30 p.m.	88.23	249

Supplemental records.—July 26, 3:35 p.m., 91.04 ft., 741 sec.-ft.; July 27, 12:10 p.m., 91.50 ft., 835 sec.-ft.; July 28, 12:50 p.m., 91.84 ft., 909 sec.-ft.; 1:30 p.m., 91.83 ft., 907 sec.-ft.; July 29, 9:10 a.m., 91.84 ft., 909 sec.-ft.; 10:10 a.m., 91.84 ft., 909 sec.-ft.; Aug. 1, 8:55 a.m., 90.85 ft., 703 sec.-ft.; Aug. 4., 3:05 p.m., 89.60 ft., 471 sec.-ft.

TAUNTON RIVER BASIN

TAUNTON RIVER AT STATE FARM, MASS.

LOCATION.—Lat. 41°56′05″, long. 70°57′20″, at State Farm, Plymouth County, 1 mile upstream from Saw Mill Brook. Datum of gage is 9.61 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—260 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,990 second-feet.

MAXIMA.—July 1938: Discharge, 2,480 second-feet 4 to 8 p. m. July 25 (gage height, 8.95 feet).

1929 to June 1938: Discharge, 3,050 second-feet Apr. 14, 1935; (gage height, 10.68 feet).

REMARKS.—Flood discharge affected by artificial storage and natural pondage and slightly affected by diversions.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	352	2,120	800	11	199	437	288	21	365	875	247
2	374	1,720	675	12	211	432	288	22	324	975	284
3	356	1,350	560	13	420	428	275	23	316	1,300	271
4	324	1,120	464	14	650	410	231	24	243	2,080	247
5	263	850	450	15	540	419	293	25	223	2,420	231
6	352	725	414	16	500	486	293	26	227	2,380	227
7	370	580	338	17	468	460	280	27	387	2,080	199
8	334	545	370	18	383	460	324	28	1,140	1,720	120
9	311	478	347	19	306	473	320	29	2,220	1,300	178
10	271	424	311	20	360	525	298	30	2,420	1,120	207
								31		950	195
Monthly mean discharge, in second-feet (adjusted for diversions[1])									518	1,030	335
Runoff, in inches (adjusted for diversions[1])									2.22	4.56	1.49

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	4.62	464	4.57	442	4.63	468	4.65	478	5.32	810	5.59	945
12 n.	4.59	450	4.62	464	4.62	464	4.65	478	5.49	895	5.64	970
6 p.m.	4.58	446	4.65	478	4.64	473	4.82	560	5.59	945	5.72	1,010
12 m.	4.59	450	4.65	478	4.66	482	5.13	715	5.60	950	5.79	1,040
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	5.92	1,110	7.70	1,940	8.81	2,420	8.84	2,440	8.24	2,190	7.41	1,810
12 n.	6.27	1,280	8.05	2,000	8.90	2,460	8.72	2,390	8.03	2,090	7.20	1,720
6 p.m.	6.69	1,490	8.39	2,260	8.95	2,480	8.59	2,340	7.84	2,010	6.94	1,600
12 m.	7.25	1,740	8.64	2,360	8.92	2,470	8.42	2,270	7.64	1,920	6.65	1,470
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	6.47	1,380	6.02	1,160	5.69	995	5.41	855	5.09	695	4.92	610
12 n.	6.32	1,310	5.92	1,110	5.56	930	5.33	815	5.05	675	4.89	595
6 p.m.	6.21	1,260	5.87	1,080	5.52	910	5.18	740	5.01	655	4.70	500
12 m.	6.12	1,210	5.79	1,040	5.45	875	5.13	715	4.95	625	4.64	473
	August 4		August 5		August 6		August 7					
6 a.m.	4.62	464	4.62	464	4.55	432	4.35	342	------	-------	------	-------
12 n.	4.61	460	4.58	446	4.50	410	4.30	320	------	-------	------	-------
6 p.m.	4.62	464	4.57	442	4.47	396	4.32	329	------	-------	------	-------
12 m.	4.63	468	4.57	442	4.45	388	4.33	334	------	-------	------	-------

Supplemental record.—July 25, 4 to 8 p.m., 8.95 ft., 2,480 sec.-ft.

[1]Adjusted for diversions from Namasket River for municipal supply of Taunton and New Bedford and for pumpage from Silver Lake into Taunton River Basin for municipal supply of Brockton and other cities.

WADING RIVER NEAR NORTON, MASS.

LOCATION.—Lat. 41°56′50″, long. 71°10′40″, 200 feet downstream from highway bridge, three-quarters of a mile upstream from confluence with Rumford River, and 1½ miles southeast of Norton, Bristol County. Datum of gage is 49.63 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—42.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 691 second-feet.

MAXIMA.—July 1938: Discharge, 714 second-feet 2 to 3 a.m. July 25 (gage height, 9.52 feet).

1925 to June 1938: Discharge, 1,030 second-feet Mar. 12, 13, 1936 (gage height, 10.01 feet).

REMARKS.—Flood discharge affected by artificial and natural storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	59	353	162	11	28	57	103	21	65	214	58
2	55	271	149	12	56	70	78	22	58	307	61
3	49	228	118	13	123	69	47	23	53	415	55
4	38	203	124	14	181	62	65	24	48	630	48
5	45	139	112	15	154	74	65	25	34	690	33
6	42	129	83	16	113	103	61	26	39	590	30
7	50	107	85	17	104	74	58	27	102	484	21
8	24	94	72	18	70	67	102	28	306	352	27
9	44	85	95	19	73	106	84	29	491	307	38
10	19	72	47	20	72	145	44	30	441	253	30
								31		214	29
Monthly mean discharge, in second-feet									101	225	70.5
Runoff, in inches									2.66	6.12	1.91

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	5.92	79	5.79	66	5.98	86	6.06	95	6.75	192	7.37	302
12 n.	5.85	72	5.82	69	6.43	143	6.63	173	6.82	203	7.60	343
6 p.m.	5.80	67	5.74	62	6.21	112	6.66	178	7.00	235	7.32	293
12 m.	5.80	67	5.88	75	6.10	99	6.64	174	7.26	282	7.31	291
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	7.50	325	9.03	616	9.48	706	9.10	630	8.51	512	7.84	386
12 n.	8.14	442	9.02	614	9.44	698	8.94	598	8.39	489	7.43	312
6 p.m.	8.44	499	9.29	668	9.38	686	8.70	550	8.24	461	7.59	341
12 m.	8.72	554	9.50	710	9.28	666	8.63	536	7.93	402	7.53	330
	July 29		July 30		July 31		August 1		August 2			
6 a.m.	7.46	318	7.19	269	6.95	226	6.72	189	6.39	138	------	-------
12 n.	7.40	307	7.19	269	6.88	214	6.55	160	6.64	174	------	-------
6 p.m.	7.35	298	6.90	217	6.82	203	6.33	129	6.48	150	------	-------
12 m.	7.27	284	6.97	230	6.78	197	6.32	128	6.38	136	------	-------

PROVIDENCE RIVER BASIN

BLACKSTONE RIVER AT WORCESTER, MASS.

LOCATION.—Lat. 42°14'00", long. 71°50'10", at Webster Street Bridge in Worcester, Worcester County, three-quarters of a mile upstream from Tatnuck Brook. Datum of gage is 472.86 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—31.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 550 second-feet.

MAXIMA.—July 1938: Discharge, 728 second-feet 8 to 10 a.m. July 24 (gage height, 5.12 feet).

1923 to June 1938: Discharge, 2,520 second-feet Mar. 18, 1936 (gage height, 8.58 feet, from floodmarks).

REMARKS.—Flood discharge affected by artificial and natural storage and slightly affected by diversions.

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Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	28	67	101	11	17	46	64	21	21	204	34
2	31	50	93	12	25	93	66	22	18	504	31
3	35	37	77	13	52	178	48	23	18	480	32
4	34	32	67	14	60	148	44	24	16	700	26
5	33	28	62	15	46	97	40	25	15	448	20
6	30	28	67	16	54	67	37	26	15	294	20
7	26	26	70	17	45	52	42	27	52	216	23
8	15	22	63	18	36	54	49	28	118	201	30
9	14	22	62	19	30	80	46	29	116	172	26
10	13	32	52	20	25	123	41	30	89	142	22
								31		114	20
Monthly mean discharge, in second-feet (adjusted for diversion[1])									47.2	163	57.5
Runoff, in inches (adjusted for diversion[1])									1.68	6.01	2.12

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	2.99	55	2.91	45	3.08	67	3.33	114	3.53	162	4.62	528
12 n.	2.97	52	2.93	48	3.17	82	3.35	118	3.54	165	4.69	556
6 p.m.	2.94	49	3.07	66	3.23	93	3.40	130	3.80	240	4.57	508
12 m.	2.92	46	3.08	67	3.30	107	3.48	150	4.21	368	4.40	440
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.28	393	5.09	716	4.54	496	4.10	330	3.74	222	3.68	204
12 n.	4.39	436	5.11	724	4.37	428	3.98	294	3.69	207	3.67	201
6 p.m.	4.67	548	5.05	700	4.31	404	3.84	252	3.65	195	3.65	195
12 m.	4.96	664	4.75	580	4.23	376	3.78	234	3.71	213	3.63	189
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	3.60	180	3.47	148	3.36	121	3.28	103	3.24	95	3.16	80
12 n.	3.57	172	3.44	140	3.33	114	3.26	99	3.24	95	3.14	77
6 p.m.	3.55	168	3.45	142	3.31	109	3.24	95	3.22	91	3.15	78
12 m.	3.50	155	3.40	130	3.29	105	3.25	97	3.19	85	3.08	67

[1]Adjusted for diversion for municipal supply of Worcester.

BLACKSTONE RIVER AT WOONSOCKET, R. I.

LOCATION.—Lat. 42°00′20″, long. 71°30′05″, in Woonsocket, Providence County, 50 feet downstream from Peters River. Datum of gage is 107.42 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—416 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Graph adjusted for intake lag for period 2 p.m. July 24 to Aug. 3.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 15,000 second-feet.

MAXIMA.—July 1938: Discharge, 15,100 second-feet 2 p.m. July 24 (gage height, 14.43 feet).

1929 to June 1938: Discharge, 15,000 second-feet Mar. 19, 1936 (gage height, 14.40 feet).

REMARKS.—Flood discharge affected by artificial and natural storage and slightly affected by diversions. Figures of discharge include flow diverted from Nashua River Basin to Blackstone River Basin for municipal supply of Worcester and flow diverted around station in Hamlet trench.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	716	1,840	1,780	11	283	559	968	21	755	1,950	766
2	646	1,360	1,500	12	505	626	1,030	22	593	5,490	808
3	569	1,120	1,280	13	2,760	1,020	898	23	660	7,160	678
4	445	968	1,180	14	2,540	1,060	810	24	517	13,700	640
5	426	947	1,060	15	1,660	1,000	877	25	356	10,700	615
6	465	754	919	16	1,200	604	822	26	313	6,260	625
7	573	672	940	17	1,000	449	1,340	27	979	4,150	445
8	573	618	1,130	18	726	650	1,480	28	3,040	3,120	321
9	501	339	1,070	19	686	755	1,220	29	3,490	2,590	577
10	449	331	1,020	20	920	1,240	820	30	2,560	2,180	666
								31		1,820	625
Monthly mean discharge, in second-feet (adjusted for diversion[1])									1,018	2,449	922
Runoff, in inches (adjusted for diversion[1])									2.73	6.79	2.56

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	2.53	473	2.37	408	2.40	425	3.02	753	3.96	1,420	6.30	3,760
4	2.51	465	2.37	408	2.48	461	3.41	1,020	4.05	1,490	6.57	4,080
6	2.50	460	2.36	404	2.95	705	3.44	1,040	4.10	1,540	6.80	4,360
8	2.66	535	2.99	724	3.28	921	4.06	1,500	4.40	1,810	7.36	5,030
10	2.65	530	2.90	670	3.11	807	3.81	1,300	4.24	1,670	7.68	5,430
12 n.	2.39	411	2.99	724	3.05	767	3.83	1,310	4.17	1,600	8.09	5,970
2 p.m.	2.38	407	3.00	730	3.01	741	3.80	1,290	4.20	1,630	8.30	6,240
4	2.38	407	3.15	828	3.02	748	3.86	1,340	4.41	1,820	8.46	6,450
6	2.37	403	3.04	756	3.20	865	3.93	1,390	5.15	2,520	8.48	6,470
8	2.37	403	3.00	730	3.27	914	3.97	1,430	5.26	2,630	8.51	6,510
10	2.36	399	2.99	724	3.30	935	4.03	1,480	5.67	3,070	8.52	6,530
12 m.	2.36	399	2.80	610	2.96	711	3.80	1,290	5.95	3,370	8.36	6,320

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	8.34	6,300	12.04	11,600	13.03	13,000	9.30	7,600	7.10	4,750	5.91	3,360
4	8.29	6,240	12.62	12,400	12.55	12,300	9.02	7,220	7.00	4,630	5.90	3,340
6	8.26	6,200	13.13	13,100	12.29	11,900	8.80	6,940	7.15	4,810	6.15	3,620
8	8.22	6,150	13.63	13,900	12.03	11,500	8.60	6,680	6.90	4,510	5.85	3,300
10	8.37	6,340	14.13	14,700	11.79	11,200	8.40	6,420	6.65	4,210	5.74	3,160
12 n.	8.51	6,520	14.33	14,900	11.49	10,700	8.25	6,220	6.53	4,070	5.70	3,120
2 p.m.	8.72	6,800	14.43	15,100	11.23	10,300	8.10	6,020	6.44	3,960	5.65	3,080
4	9.07	7,250	14.25	14,900	10.93	9,910	7.95	5,840	6.36	3,860	5.59	3,000
6	9.43	7,740	13.99	14,500	10.58	9,420	7.75	5,580	6.25	3,740	5.52	2,920
8	9.81	8,270	13.75	14,100	10.30	9,030	7.57	5,340	6.18	3,660	5.44	2,840
10	10.93	9,840	13.52	13,700	10.00	8,610	7.38	5,100	6.08	3,550	5.37	2,760
12 m.	11.41	10,500	13.25	13,400	9.65	8,120	7.26	4,960	6.00	3,460	5.33	2,720

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	5.32	2,710	4.92	2,300	4.59	1,990	4.23	1,670	4.10	1,550	3.73	1,220
4	5.37	2,760	4.90	2,280	4.52	1,930	4.23	1,670	4.10	1,550	3.73	1,220
6	5.66	3,080	4.89	2,280	4.49	1,900	4.40	1,820	4.50	1,910	3.95	1,420
8	5.40	2,790	4.86	2,240	4.45	1,860	4.88	2,260	4.25	1,680	4.20	1,640
10	5.13	2,520	4.84	2,220	4.40	1,820	4.79	2,170	4.10	1,550	3.90	1,360
12 n.	5.09	2,480	4.80	2,180	4.37	1,790	4.42	1,840	4.00	1,460	3.80	1,280
2 p.m.	5.06	2,450	4.74	2,140	4.34	1,770	4.32	1,750	3.96	1,420	3.77	1,240
4	5.03	2,420	4.70	2,100	4.32	1,750	4.26	1,690	3.95	1,420	3.75	1,240
6	5.00	2,390	4.66	2,060	4.30	1,730	4.22	1,660	3.93	1,400	3.70	1,180
8	4.99	2,380	4.62	2,020	4.29	1,720	4.18	1,620	3.89	1,360	3.64	1,140
10	4.97	2,360	4.61	2,020	4.27	1,700	4.13	1,580	3.80	1,280	3.64	1,140
12 m.	4.94	2,330	4.60	2,000	4.24	1,680	4.11	1,560	3.76	1,240	3.65	1,140

[1] Adjusted for diversion from Nashua River Basin to Blackstone River Basin for municipal supply of Worcester.

THAMES RIVER BASIN

WILLIMANTIC RIVER NEAR SOUTH COVENTRY, CONN.

LOCATION.—Lat. 41°45′00″, long. 72°16′00″, 700 feet upstream from highway bridge, 2 miles southeast of South Coventry, Tolland County, and 2½ miles upstream from Hop River. Datum of gage is 239.05 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—121 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,950 second-feet 2:30 p.m. July 23 (gage height, 9.09 feet).

1931 to June 1938: Discharge, 7,880 second-feet Mar. 12, 1936 (gage height, 12.19 feet).

REMARKS.—Flood discharge affected by storage in several ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	224	315	284	11	155	78	509	21	163	586	69
2	187	242	228	12	413	125	481	22	128	1,290	174
3	156	158	219	13	740	151	344	23	138	1,940	176
4	161	171	195	14	725	152	197	24	48	1,880	155
5	218	204	182	15	408	142	256	25	43	1,160	80
6	229	160	165	16	277	146	199	26	63	810	88
7	152	137	222	17	211	53	176	27	410	595	95
8	163	132	389	18	183	171	182	28	875	447	30
9	166	104	457	19	162	245	176	29	740	380	63
10	135	15	390	20	186	409	171	30	469	367	106
								31		282	93
Monthly mean discharge, in second-feet									278	421	211
Runoff, in inches									2.57	4.01	2.01

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	3.17	158	2.63	69	3.60	248	3.70	271	4.12	375	6.35	1,040
4	2.70	79	2.73	84	3.32	188	3.50	226	3.88	315	6.64	1,160
6	2.19	25	2.74	85	3.37	199	4.61	503	3.89	318	6.91	1,300
8	2.05	17	3.30	184	3.51	228	4.58	494	4.08	365	7.02	1,350
10	2.03	16	3.40	205	3.60	248	4.48	465	4.01	348	7.04	1,360
12 n.	2.02	15	3.40	205	3.10	145	4.39	442	4.00	345	7.01	1,340
2 p.m.	2.20	26	3.40	205	3.59	246	4.36	435	4.45	458	7.05	1,360
4	2.03	16	3.40	205	3.70	271	4.36	435	5.18	674	7.08	1,380
6	2.55	59	3.41	207	3.78	290	4.35	432	6.10	950	7.02	1,350
8	2.25	30	3.45	216	3.84	305	4.33	428	6.45	1,080	7.00	1,340
10	2.51	54	3.51	228	3.88	315	4.31	422	6.46	1,080	6.94	1,310
12 m.	2.66	73	3.59	246	3.86	310	4.23	402	6.38	1,050	6.85	1,260

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	6.73	1,200	8.13	2,080	7.18	1,440	5.92	896	5.20	680	4.54	482
4	6.61	1,140	8.08	2,040	7.01	1,340	5.88	884	5.05	635	4.37	438
6	6.70	1,190	8.01	1,990	6.90	1,290	5.70	830	4.90	590	4.35	432
8	6.86	1,270	8.00	1,980	6.89	1,280	5.76	848	5.07	641	4.54	482
10	7.31	1,520	8.01	1,990	6.71	1,200	5.70	830	4.97	611	4.42	450
12 n.	8.48	2,370	7.98	1,970	6.56	1,120	5.62	806	4.90	590	4.35	432
2 p.m.	9.06	2,920	7.92	1,920	6.47	1,090	5.60	800	4.89	587	4.36	435
4	8.93	2,790	7.84	1,870	6.34	1,040	5.58	794	4.88	584	4.40	445
6	8.64	2,520	7.63	1,720	6.24	999	5.50	770	4.81	563	4.39	442
8	8.46	2,350	7.52	1,640	6.18	978	5.42	746	4.77	551	4.36	435
10	8.31	2,230	7.40	1,570	6.10	950	5.38	734	4.70	530	4.36	435
12 m.	8.22	2,160	7.30	1,510	6.00	920	5.09	647	4.60	500	4.30	420

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938 —Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	4.19	392	4.15	382	3.84	305	3.89	318	3.60	248	3.49	224
4	4.09	368	4.05	358	3.70	271	3.80	295	3.65	260	3.25	174
6	4.09	368	3.97	338	3.77	288	3.72	276	3.53	233	3.26	176
8	4.23	402	4.27	412	3.53	233	3.76	285	3.56	239	3.27	178
10	4.13	378	4.16	385	3.91	322	3.90	320	3.66	262	3.59	246
12 n.	4.02	350	4.14	380	3.66	262	3.80	295	3.45	216	3.52	230
2 p.m.	4.08	365	4.10	370	3.70	271	3.76	285	3.47	220	3.50	226
4	4.04	355	4.09	368	3.78	290	3.75	283	3.39	203	3.51	228
6	4.17	388	4.02	350	3.71	273	3.60	248	3.36	197	3.53	233
8	4.20	395	4.01	348	3.70	271	3.61	250	3.40	205	3.54	235
10	4.20	395	4.00	345	3.70	271	3.65	260	3.42	209	3.53	233
12 m.	4.20	395	4.00	345	3.90	320	3.72	276	3.49	224	3.51	228

Supplemental records.—July 17, 9 p.m., 2.66 ft., 73 sec.-ft.; July 19, 9 a.m., 3.70 ft., 271 sec.-ft.; 11 a.m., 3.53 ft., 233 sec.-ft.; 1 p.m., 2.79 ft., 92 sec.-ft.; July 23, 2:30 p.m., 9.09 ft., 2,950 sec.-ft.; Aug. 3, 9 a.m., 3.59 ft., 246 sec.-ft.

SHETUCKET RIVER NEAR WILLIMANTIC, CONN.

LOCATION.—Lat. 41°41′58″, long. 72°10′53″, at Bingham Bridge, 1 mile downstream from confluence of Willimantic and Natchaug Rivers, and 1½ miles southeast of Willimantic, Windham County. Datum of gage is 131.40 feet above mean sea level, (general adjustment of 1929).

DRAINAGE AREA.—401 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 10,900 second-feet; extended logarithmically to peak stage on basis of computation of flood flow of March 1936 and of September 1938 over spillway of dams 5 and 8 miles below station correlated with combined flow at gaging stations on three main headwater streams.

MAXIMA.—July 1938: Discharge, 15,300 second-feet 4 a.m. July 24 (gage height, 14.65 feet).

1904-5; 1933 to June 1938: Discharge, 23,900 second-feet Mar. 12, 1936 (gage height, 18.35 feet, from floodmarks).

REMARKS.—Flood discharge affected by storage in numerous ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	668	1,040	880	11	377	247	1,370	21	387	2,070	488
2	564	790	760	12	888	241	1,780	22	338	5,680	428
3	492	610	685	13	1,660	304	1,100	23	313	6,750	421
4	502	524	633	14	1,840	337	735	24	286	12,600	406
5	606	502	577	15	1,130	335	678	25	251	6,500	368
6	603	433	542	16	779	349	586	26	258	3,560	307
7	514	362	761	17	629	341	553	27	728	2,430	183
8	442	312	1,020	18	547	289	594	28	3,000	1,790	167
9	467	300	1,270	19	480	556	602	29	2,790	1,460	251
10	394	249	1,080	20	444	1,090	565	30	1,680	1,310	252
								31		1,050	254
Monthly mean discharge, in second-feet									802	1,755	655
Runoff, in inches									2.23	5.05	1.88

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.83	317	2.81	309	2.19	115	3.60	660	5.21	1,730	7.87	4,370
4	2.84	321	2.84	321	2.10	97	3.65	685	5.24	1,750	8.31	4,900
6	2.86	329	2.87	333	3.05	408	3.64	680	5.21	1,730	8.65	5,340
8	2.85	325	3.10	430	3.62	670	4.29	1,050	5.14	1,670	8.90	5,670
10	2.86	329	3.00	385	3.70	710	4.31	1,070	5.07	1,620	9.05	5,860
12 n.	2.58	222	3.20	475	3.33	534	4.10	940	4.72	1,350	9.11	5,940
2 p.m.	3.10	430	3.10	430	3.70	710	4.30	1,060	5.03	1,580	9.24	6,110
4	3.10	430	2.91	349	3.64	680	4.40	1,130	5.52	1,980	9.33	6,230
6	3.03	398	2.32	145	3.50	610	4.70	1,340	5.80	2,230	9.40	6,320
8	2.99	381	2.28	135	3.45	588	4.90	1,480	6.27	2,660	9.38	6,290
10	2.96	369	2.27	133	3.58	650	5.04	1,590	6.92	3,310	9.29	6,180
12 m.	2.91	349	2.28	135	3.51	615	5.12	1,660	7.41	3,840	9.13	5,970
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	8.94	5,720	14.55	15,100					6.38	2,770	5.56	2,010
4	8.75	5,480	14.65	15,300	10.60	8,000	7.66	4,120	6.30	2,690	5.49	1,950
6	8.64	5,330	14.47	14,900					6.23	2,620	5.42	1,900
8	8.51	5,160	14.08	14,100	10.04	7,200	7.35	3,780	6.15	2,540	5.32	1,820
10	8.50	5,150	13.66	13,300					6.07	2,470	5.29	1,790
12 n.	8.52	5,180	13.24	12,400	9.41	6,330	7.05	3,440	5.84	2,270	5.02	1,580
2 p.m.	8.75	5,480	12.82	11,700					5.94	2,360	5.23	1,740
4	9.36	6,270	12.45	11,000	8.86	5,620	6.85	3,240	5.77	2,200	5.10	1,640
6	10.04	7,200	12.13	10,400					5.82	2,250	5.14	1,670
8	11.22	8,950	11.82	9,910	8.45	5,080	6.65	3,040	5.75	2,180	5.11	1,650
10	12.60	11,300	11.53	9,450					5.70	2,140	5.06	1,610
12 m.	13.81	13,600	11.22	8,950	8.04	4,580	6.50	2,890	5.62	2,070	5.03	1,580
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	4.98	1,540										
4	4.95	1,520	4.65	1,300								
6	4.92	1,500			4.40	1,130						
8	4.96	1,530	4.65	1,300								
10	5.05	1,600										
12 n.	4.72	1,350	4.69	1,330	4.25	1,030						
2 p.m.	4.86	1,450										
4	4.72	1,350	4.68	1,330								
6	4.77	1,390			4.17	982						
8	4.68	1,330	4.64	1,300								
10	4.72	1,350										
12 m.	4.69	1,330	4.54	1,230	4.06	916						

Supplemental records.—July 17, 11 a.m., 2.30 ft., 140 sec.-ft.; 1 p.m., 2.60 ft., 229 sec.-ft.; July 18, 9 a.m., 2.94 ft., 361 sec.-ft.; 11 a.m., 2.65 ft., 247 sec.-ft.; 12:40 p.m., 2.55 ft., 212 sec.-ft.; 1:20 p.m. 3.29 ft., 516 sec.-ft.; 5 p.m., 2.39 ft., 163 sec.-ft.; July 19, 7 a.m., 3.84 ft., 784 sec.-ft.; 11:30 a.m., 3.72 ft., 720 sec.-ft.; 1 p.m., 4.04 ft., 904 sec.-ft.; July 20, 11:30 a.m., 4.34 ft., 1,090 sec.-ft.; 1 p.m., 4.61 ft., 1,280 sec.-ft.; July 21, 7 a.m., 5.30 ft., 1,800 sec.-ft.; 11:40 a.m., 4.99 ft., 1,550 sec.-ft.; 1 p.m., 5.20 ft., 1,720 sec.-ft.; 3 p.m., 5.63 ft., 2,080 sec.-ft.; 4:30 p.m., 5.72 ft., 2,160 sec.-ft.; July 24, 3 a.m., 14.64 ft., 15,200 sec-ft.; July 27, 7 a.m., 6.34 ft., 2,730 sec.-ft.; 11:30 a.m., 5.84 ft., 2,270 sec.-ft.; 1 p.m., 6.12 ft., 2,520 sec.-ft.; July 28, 7 a.m., 5.53 ft., 1,990 sec.-ft.; 11:30 a.m., 5.26 ft., 1,770 sec.-ft.; 1 p.m., 5.44 ft., 1,910 sec.-ft.; July 29, 11:30 a.m., 4.95 ft., 1,520 sec.-ft.; 1 p.m., 5.15 ft., 1,680 sec.-ft.

HOP RIVER NEAR COLUMBIA, CONN.

LOCATION.—Lat. 41°43′25″, long. 72°18′05″, 1,000 feet downstream from abandoned mill and dam, a quarter of a mile downstream from Hop River station on New York, New Haven & Hartford Railroad, 2 miles north of Columbia, Tolland County, and 3½ miles upstream from mouth. Datum of gage is 249.25 feet above mean sea level, (general adjustment of 1929).

DRAINAGE AREA.—76.2 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,530 second-feet 8 p.m. July 23 (gage height, 11.70 feet).

1932 to June 1938: Discharge, 3,300 second-feet Mar. 12, 1936 (gage height, 13.85 feet, from floodmarks).

REMARKS.—Flood discharge affected by storage in two reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	129	229	142	11	68	51	360	21	53	447	73
2	105	170	122	12	158	53	331	22	47	1,000	64
3	96	115	104	13	245	58	190	23	44	1,510	60
4	93	92	90	14	193	50	141	24	42	1,600	53
5	122	79	84	15	140	50	105	25	39	914	46
6	101	66	77	16	113	43	88	26	40	604	46
7	83	57	71	17	93	41	92	27	195	454	34
8	88	53	84	18	79	48	118	28	680	362	43
9	82	46	208	19	68	153	107	29	495	298	47
10	67	37	147	20	59	219	86	30	315	250	38
								31		177	33
Monthly mean discharge, in second-feet									138	301	106
Runoff, in inches									2.02	4.55	1.60

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	----	----	2.99	37	4.17	172	3.87	125	4.98	331	7.55	950
4	----	----	2.97	36	4.24	184	3.88	126	4.87	309	7.67	986
6	3.04	41	2.95	35	4.26	188	3.89	128	4.91	317	7.69	992
8	----	----	2.95	35	4.21	179	4.12	163	4.79	293	7.70	995
10	----	----	2.98	37	4.20	177	4.41	217	4.65	265	7.85	1,040
12 n.	3.06	42	3.20	53	4.13	165	4.45	225	4.57	249	8.05	1,100
2 p.m.	----	----	3.35	66	4.03	149	4.50	235	4.97	329	8.13	1,120
4	----	----	3.32	63	3.97	140	4.57	249	5.99	558	8.01	1,090
6	3.04	41	3.24	56	3.92	132	4.64	263	6.29	632	7.79	1,020
8	----	----	3.20	53	3.82	118	4.87	309	6.54	695	7.55	950
10	----	----	3.15	49	3.77	111	5.09	353	6.90	785	7.34	895
12 m.	3.00	38	3.78	113	3.84	121	5.10	355	7.27	878	7.17	852
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	7.02	815	10.57	2,010	----	----	----	----	----	----	----	----
4	6.91	788	10.21	1,860	8.01	1,090	----	----	----	----	----	----
6	7.00	810	9.96	1,760	----	----	6.34	645	5.68	481	5.22	379
8	7.15	848	9.70	1,660	7.63	974	----	----	----	----	----	----
10	7.80	1,020	9.52	1,590	----	----	----	----	----	----	----	----
12 n.	8.91	1,380	9.38	1,540	7.29	882	6.17	602	5.57	456	5.14	363
2 p.m.	9.43	1,560	9.27	1,500	----	----	----	----	----	----	----	----
4	10.50	1,980	9.17	1,470	7.03	818	----	----	----	----	----	----
6	11.56	2,460	9.07	1,430	----	----	6.00	560	5.42	423	5.05	345
8	11.70	2,530	8.93	1,390	6.78	755	----	----	----	----	----	----
10	11.38	2,370	8.70	1,300	----	----	----	----	----	----	----	----
12 m.	10.98	2,170	8.47	1,230	6.56	700	5.82	515	5.30	397	4.96	327
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	----	----	4.65	265	----	----	----	----	----	----	----	----
4	----	----	4.69	273	----	----	4.02	147	3.89	128	3.74	108
6	4.90	315	4.70	275	4.25	186	----	----	----	----	----	----
8	----	----	4.70	275	----	----	4.02	147	3.88	126	3.74	108
10	----	----	4.69	273	----	----	----	----	----	----	----	----
12 n.	4.84	303	4.63	261	4.21	179	4.02	147	3.97	140	3.87	125
2 p.m.	----	----	4.47	229	----	----	----	----	----	----	----	----
4	----	----	4.49	233	----	----	3.99	142	3.86	123	3.73	107
6	4.73	281	4.53	241	4.13	165	----	----	----	----	----	----
8	----	----	4.52	239	----	----	3.92	132	3.74	108	3.60	91
10	----	----	4.37	209	----	----	----	----	----	----	3.47	77
12 m.	4.62	259	4.33	201	4.06	154	3.80	115	3.67	99	3.56	87

Supplemental records.—July 18, 10:30 p.m., 3.14 ft., 48 sec.-ft.; 11 p.m., 3.22 ft., 55 sec.-ft.; July 21 1 p.m., 4.59 ft., 253 sec.-ft.

NATCHAUG RIVER AT WILLIMANTIC, CONN.

LOCATION.—Lat. 41°43'14", long. 72°11'53", 200 feet downstream from New York, New Haven & Hartford Railroad bridge, and 1 mile northeast of Willimantic, Windham County. Datum of gage is 150.31 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—169 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 6,530 second-feet; extended to peak stage on basis of determinations of flood flows of March 1936 and September 1938 at dam 2 miles above station.

MAXIMA.—July 1938: Discharge, 9,740 second-feet 11:30 p.m. July 23 (gage height, 12.51 feet).

1930 to June 1938: Discharge, resulting from breaking of dam above station, 14,200 second-feet Mar. 18, 1936 (gage height, 13.57 feet).

REMARKS.—Flood discharge affected by storage in several small ponds. Small diversions for municipal supply of Willimantic pumped from reservoir 2 miles above station. Monthly mean diversions: June, 1.45 second-feet; July, 1.33 second-feet; August, 1.39 second feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	233	382	412	11	132	100	589	21	135	933	187
2	200	300	363	12	368	133	709	22	120	3,230	162
3	184	259	322	13	816	153	426	23	118	3,980	141
4	184	205	267	14	803	123	302	24	99	7,030	123
5	241	175	235	15	452	120	250	25	85	3,340	114
6	230	144	224	16	320	117	215	26	96	1,710	97
7	179	119	474	17	267	108	225	27	352	1,150	91
8	159	100	517	18	225	102	238	28	1,330	834	148
9	166	103	503	19	193	263	267	29	1,160	665	112
10	140	93	393	20	162	406	242	30	648	616	89
								31		498	95
Monthly mean discharge, in second-feet									327	887	275
Runoff, in inches									2.15	6.05	1.88

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.67	93	1.61	83	1.80	116	2.50	278	3.73	702	6.88	2,320
4	1.76	109	1.67	63	2.15	188	2.49	275	3.77	718	7.52	2,700
6	1.78	112	1.71	100	2.42	256	2.53	286	3.77	718	8.02	3,050
8	1.79	114	1.95	145	2.60	306	2.86	383	3.78	722	8.37	3,310
10	1.78	112	1.85	126	2.61	309	2.82	371	3.67	678	8.50	3,410
12 n.	1.80	116	1.77	111	2.62	312	2.82	371	3.64	666	8.59	3,480
2 p.m.	1.98	151	1.74	105	2.63	315	2.92	402	3.97	806	8.72	3,590
4	1.87	129	1.73	103	2.62	312	3.00	430	4.18	901	8.83	3,670
6	1.80	116	1.71	100	2.59	303	3.15	482	4.44	1,030	8.84	3,680
8	1.76	109	1.70	98	2.55	292	3.31	538	5.06	1,340	8.73	3,590
10	1.48	62	1.70	98	2.45	264	3.46	594	5.62	1,620	8.50	3,410
12 m.	1.46	59	1.44	56	2.51	281	3.59	646	6.20	1,910	8.18	3,170

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938
—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	7.87	2,950	12.45	9,520	9.88	4,530	6.50	2,090	------	------	------	------
4	7.60	2,760	12.33	9,100	9.58	4,270	6.33	1,990	4.92	1,270	4.19	906
6	7.38	2,620	12.14	8,520	9.25	4,010	6.17	1,900	------	------	------	------
8	7.23	2,530	11.93	7,890	8.93	3,750	6.03	1,820	4.82	1,220	4.08	856
10	7.17	2,490	11.71	7,320	8.57	3,470	5.85	1,740	------	------	------	------
12 n.	7.23	2,530	11.50	6,800	8.25	3,220	5.71	1,660	4.66	1,140	4.03	834
2 p.m.	7.62	2,770	11.24	6,280	7.96	3,010	5.60	1,610	------	------	------	------
4	8.30	3,250	11.03	5,900	7.69	2,820	5.49	1,560	4.54	1,080	3.95	798
6	9.45	4,170	10.82	5,580	7.43	2,650	5.38	1,500	------	------	------	------
8	11.22	6,240	10.60	5,250	7.20	2,510	5.28	1,450	4.43	1,020	3.88	766
10	12.27	8,910	10.39	5,000	6.96	2,370	5.19	1,400	------	------	------	------
12 m.	12.49	9,660	10.15	4,780	6.73	2,230	5.05	1,340	4.31	965	3.78	722
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	------	------	------	------	------	------	------	------	------	------	------	------
4	3.73	702	3.49	606	3.35	552	3.00	430	2.83	374	2.70	335
6	------	------	------	------	------	------	------	------	------	------	------	------
8	3.71	694	3.62	658	3.26	521	3.05	448	2.90	395	2.78	359
10	------	------	------	------	------	------	------	------	------	------	------	------
12 n.	3.63	662	3.55	630	3.19	496	2.94	409	2.78	359	2.66	323
2 p.m.	------	------	------	------	------	------	------	------	------	------	2.63	315
4	3.59	646	3.53	622	3.14	479	2.91	398	2.77	356	2.63	315
6	------	------	------	------	------	------	------	------	------	------	------	------
8	3.55	630	3.49	606	3.10	465	2.88	389	2.75	350	2.60	306
10	------	------	3.45	590	2.98	423	2.85	380	2.73	344	------	------
12 m.	3.45	590	3.33	546	3.02	437	2.78	359	2.64	318	2.56	295

Supplemental records.—July 17, 1 p.m., 1.97 ft., 149 sec.-ft.; July 18, 7 a.m., 1.92 ft., 139 sec.-ft.; July 19, 7 a.m., 2.60 ft., 306 sec.-ft.; July 21, 7 a.m., 3.83 ft., 744 sec.-ft.; July 23, 11:30 p.m., 12.51 ft., 9740 sec.-ft.; Aug. 3, 3 p.m., 2.50 ft., 278 sec.-ft.

QUINEBAUG RIVER AT QUINEBAUG, CONN.

LOCATION.—Lat. 42°01′20″, long. 71°57′15″, at Quinebaug, Windham County, 500 feet upstream from highway bridge, a quarter of a mile downstream from Massachusetts-Connecticut State line, and 7 miles upstream from French River.

DRAINAGE AREA.—157 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 2000 second-feet; extended to peak stage on basis of computations of March 1936 and September 1938 peak flows at bridge 500 feet below station and determination of peak flow of March 1936 flood at dam a quarter of a mile above station. Affected by backwater from aquatic growth June 7 to 3 p.m. July 23.

MAXIMA.—July 1938: Discharge, 4,390 second-feet 6:10 p.m. July 23 (gage height, 8.01 feet).

1931 to June 1938: Discharge, 10,500 second-feet Mar. 18, 1936 (gage height, 13.44 feet).

REMARKS.—Flood discharge doubtless affected by storage in several lakes and ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	248	575	478	11	208	201	555	21	236	793	184
2	211	458	454	12	257	453	530	22	192	1,680	279
3	223	359	394	13	808	433	423	23	153	2,760	229
4	195	305	358	14	705	332	341	24	112	3,090	215
5	226	287	311	15	551	250	349	25	203	2,070	213
6	271	240	328	16	433	241	316	26	119	1,500	201
7	238	180	485	17	367	184	295	27	391	1,130	178
8	231	177	470	18	245	277	275	28	866	851	174
9	217	112	535	19	254	387	279	29	886	704	233
10	197	111	505	20	290	420	230	30	736	628	197
								31		526	190
Monthly mean discharge, in second-feet									342	700	329
Runoff, in inches									2.43	5.14	2.42

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.											5.24	1,610
4	3.04	200	3.00	177	3.41	381	3.38	361	3.55	455	5.31	1,670
6											5.40	1,740
8	2.95	160	3.02	185	3.42	385	3.44	395	3.56	461	5.42	1,760
10											5.48	1,800
12 n.	3.01	184	3.39	372	3.43	391	3.53	445	3.59	478	5.41	1,750
2 p.m.									3.58	471	5.35	1,700
4	3.01	184	3.13	237	3.39	369	3.51	434	3.90	656	5.35	1,700
6									4.71	1,180	5.30	1,660
8	3.02	187	3.44	398	3.43	391	3.57	467	5.30	1,640	5.21	1,590
10									5.41	1,740	5.18	1,570
12 m.	2.94	151	3.50	432	3.40	374	3.56	461	5.27	1,630	5.08	1,500
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	5.03	1,470	7.34	3,610							4.20	940
4	5.06	1,490	7.16	3,420	6.09	2,360	5.20	1,620	4.62	1,210	4.20	940
6	5.20	1,590	7.03	3,270							4.17	922
8	5.45	1,790	6.96	3,200	5.92	2,210	5.20	1,620	4.59	1,190	4.11	886
10	5.95	2,210	6.90	3,140							4.04	844
12 n.	6.40	2,620	6.88	3,120	5.70	2,020	4.96	1,450	4.50	1,130	4.06	856
2 p.m.	6.84	3,070	6.80	3,040							4.01	826
4	7.69	4,010	6.72	2,960	5.61	1,950	4.95	1,440	4.47	1,110	4.04	844
6	8.00	4,380	6.62	2,860							3.90	765
8	7.64	3,950	6.52	2,760	5.40	1,780	4.81	1,350	4.30	1,000	3.94	787
10	7.60	3,900	6.32	2,570							3.92	776
12 m.	7.50	3,790	6.21	2,470	5.30	1,700	4.72	1,280	4.26	976	3.94	787
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.							3.37	485	3.30	450	3.20	405
4	3.87	748	3.70	655	3.50	550	3.38	490	3.30	450	3.20	405
6							3.40	500	3.30	450	3.20	405
8	3.84	732	3.82	721	3.49	545	3.40	500	3.33	465	3.11	366
10							3.46	530	3.41	505	3.20	405
12 n.	3.75	682	3.63	616	3.48	540	3.34	470	3.34	470	3.21	410
2 p.m.							3.31	455	3.30	450	3.10	362
4	3.73	672	3.63	616	3.42	510	3.42	510	3.34	470	3.07	349
6							3.44	520	3.30	450	3.18	396
8	3.72	666	3.59	595	3.40	500	3.10	362	3.28	441	3.21	410
10							3.25	428	3.24	423	3.22	414
12 m.	3.70	655	3.48	540	3.36	480	3.30	450	3.20	405	3.18	396

Supplemental records.—July 23, 6:10 p.m., 8.01 ft., 4,390 sec.-ft.; July 28, 5 p.m., 3.76 ft., 688 sec.-ft.; July 30, 7 a.m., 3.68 ft., 644 sec.-ft.; Aug. 1, 4:30 p.m., 3.51 ft., 555 sec.-ft.

QUINEBAUG RIVER AT PUTNAM, CONN.

LOCATION.—Lat. 41°54′30″, long. 71°54′30″, at Putnam, Windham County, 600 feet downstream from Muddy Brook and 3 miles downstream from French River.

DRAINAGE AREA.—331 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,900 second-feet; extended to peak stage on basis of September 1938 determination of flood flow at dam 1 mile above station, combined with inflow from Muddy Brook determined by flow over spillway at dam 2 miles above its mouth.

MAXIMA.—July 1938: Discharge 10,000 second-feet 2 a.m. July 24 (gage height, 13.51 feet).

1929 to June 1938: Discharge, 17,200 second-feet Mar. 19, 1936 (gage height, 17.28 feet from floodmarks).

REMARKS.—Flood discharge affected by storage in several ponds and reservoirs. City of Putnam diverts about 1,000,000 gallons per day from Muddy Brook for municipal supply.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	496	1,230	1,070	11	332	340	986	21	580	1,410	314
2	430	962	997	12	292	729	1,040	22	349	4,030	534
3	386	772	918	13	2,030	916	907	23	415	6,170	536
4	328	672	854	14	1,660	878	566	24	241	9,560	423
5	292	708	647	15	1,210	660	731	25	367	7,040	464
6	472	606	638	16	962	662	714	26	373	4,240	383
7	420	440	1,060	17	681	429	633	27	672	2,790	300
8	344	341	990	18	644	540	652	28	1,740	2,110	433
9	329	342	1,000	19	384	832	542	29	1,940	1,760	566
10	344	250	962	20	644	889	598	30	1,640	1,460	434
								31		1,210	381
Monthly mean discharge, in second-feet									700	1,773	686
Runoff, in inches									2.35	6.18	2.39

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.			3.17	376	3.92	649	4.29	816	4.86	1,090	7.82	3,060
4			3.13	364	4.12	739	3.92	649	4.77	1,040	8.09	3,300
6			3.13	364	4.32	829	3.66	544	4.90	1,110	8.33	3,530
8			3.80	600	4.64	980	3.62	528	5.11	1,220	8.60	3,800
10			3.79	596	4.55	935	3.68	552	5.01	1,160	8.83	4,030
12 n.			3.74	576	4.45	888	4.50	910	4.96	1,140	9.12	4,340
2 p.m.			3.76	584	4.40	865	4.91	1,120	4.96	1,140	9.18	4,410
4			3.90	640	4.38	856	5.06	1,190	5.32	1,330	9.29	4,530
6			3.81	604	4.35	842	5.06	1,190	5.78	1,610	9.34	4,580
8			3.80	600	4.35	842	4.99	1,160	6.32	1,940	9.34	4,580
10			3.80	600	4.35	842	4.90	1,110	6.75	2,240	9.34	4,580
12 m.			3.81	604	4.35	842	4.82	1,070	7.46	2,760	9.32	4,560

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938
—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	9.30	4,540	13.51	10,000	12.46	8,510	9.88	5,210	7.96	3,180	6.93	2,370
4	9.28	4,520	13.49	9,980	12.26	8,230	9.73	5,030	7.89	3,120	6.85	2,320
6	9.28	4,520	13.45	9,920	12.04	7,930	9.54	4,800	7.79	3,030	6.79	2,270
8	9.34	4,580	13.36	9,790	11.86	7,690	9.37	4,620	7.73	2,980	6.72	2,220
10	9.63	4,910	13.26	9,640	11.61	7,360	9.24	4,470	7.63	2,890	6.72	2,220
12 n.	10.12	5,490	13.16	9,490	11.36	7,040	9.08	4,300	7.50	2,790	6.65	2,180
2 p.m.	10.46	5,900	13.16	9,490	11.16	6,780	8.91	4,110	7.33	2,650	6.34	1,960
4	11.04	6,620	13.12	9,440	10.84	6,360	8.64	3,840	7.05	2,460	6.24	1,890
6	11.67	7,440	13.06	9,350	10.56	6,020	8.33	3,530	7.12	2,500	6.30	1,930
8	12.55	8,640	12.96	9,210	10.40	5,830	8.22	3,420	7.17	2,540	6.32	1,940
10	13.24	9,610	12.82	9,020	10.26	5,660	8.06	3,270	7.13	2,510	6.29	1,920
12 m.	13.43	9,900	12.66	8,790	10.06	5,420	8.03	3,250	7.03	2,440	6.18	1,850

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	6.17	1,840	5.81	1,630	5.23	1,280	4.96	1,140	------	-------	------	-------
4	6.13	1,820	5.73	1,580	5.22	1,270	4.92	1,120	4.70	1,010	------	-------
6	6.12	1,810	5.70	1,560	5.11	1,220	4.98	1,150	------	-------	4.56	940
8	6.12	1,810	5.67	1,540	5.15	1,240	5.01	1,160	4.67	995	------	-------
10	6.12	1,810	5.61	1,510	5.11	1,220	4.86	1,090	------	-------	------	-------
12 n.	6.09	1,790	5.59	1,490	5.08	1,200	4.95	1,140	4.67	995	4.50	910
2 p.m.	6.06	1,780	5.59	1,490	5.07	1,200	4.96	1,140	------	-------	------	-------
4	6.03	1,760	5.33	1,340	5.06	1,190	4.77	1,040	4.63	975	------	-------
6	5.95	1,710	5.29	1,310	5.03	1,180	4.70	1,010	------	-------	4.48	901
8	5.60	1,500	5.27	1,300	5.08	1,200	4.70	1,010	4.66	990	------	-------
10	5.98	1,730	5.26	1,300	5.01	1,160	4.15	752	------	-------	------	-------
12 m.	5.92	1,690	5.22	1,270	5.00	1,160	4.82	1,070	4.61	965	4.43	878

Supplemental records.—July 20, 7 a.m., 3.29 ft., 412 sec.-ft.

QUINEBAUG RIVER AT JEWETT CITY, CONN.

LOCATION.—Lat. 41°35′55″, long. 71°59′05″, at Jewett City, New London County, 1,000 feet downstream from railroad bridge and 570 feet downstream from outlet of canal from Slater Mills (mouth of Pachaug River). Datum of gage is 63.07 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—711 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods June 12 to July 4 when record was computed on basis of records for station at Putnam; and 1 a.m. July 24 to 11 a.m. July 26 when record was computed on basis of floodmark, inspection by engineer and observer, hourly gage readings at Aspinook Co. dam 1 mile above station, and inflow from Pachaug River as determined by peak flow computation, and comparison with records for station on Moosup River at Moosup, Conn. Record poor intermittently during period July 29 to Aug. 1 when pen was tearing recorder chart.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 15,000 second-feet; extended to peak stage on basis of hourly determinations of flow at dam 1 mile above station during floods of March 1936 and July 1938 and at dam 6 miles below station in September 1938.

MAXIMA.—July 1938: Discharge, 25,000 second-feet 5 p.m. July 24 (gage height, 22.5 feet, from floodmark).

1918 to June 1938: Discharge, 29,200 second-feet Mar. 19, 1936 (gage height, 24.0 feet, from floodmarks).

REMARKS.—Flood discharge affected by unregulated storage in numerous ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	1,200	3,600	2,640	11	612	836	2,350	21	1,100	3,890	1,180
2	1,050	2,800	2,260	12	700	984	2,550	22	1,000	7,230	1,180
3	966	2,200	2,010	13	2,600	1,310	2,080	23	950	10,600	1,220
4	716	1,800	1,800	14	2,800	1,400	1,530	24	850	21,900	1,100
5	625	1,480	1,500	15	2,400	1,320	1,610	25	750	19,100	975
6	946	1,300	1,400	16	2,000	1,250	1,420	26	650	11,300	1,030
7	992	1,080	1,910	17	1,800	1,020	2,120	27	700	7,330	842
8	930	912	2,200	18	1,600	1,140	2,220	28	1,800	5,370	600
9	794	613	2,320	19	800	1,750	1,760	29	5,000	4,180	1,070
10	701	616	2,080	20	1,000	2,850	1,450	30	4,600	3,450	1,030
								31		2,810	922
Monthly mean discharge, in second-feet									1,421	4,110	1,624
Runoff, in inches									2.23	6.66	2.63

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	6.67	1,240	6.08	899	7.04	1,480	7.59	1,860	9.66	3,610	11.80	5,890
4	6.44	1,100	6.01	860	7.14	1,550	7.56	1,840	9.57	3,530	12.07	6,210
6	6.30	1,020	6.43	1,100	7.68	1,930	7.89	2,100	9.79	3,730	12.50	6,760
8	6.22	976	6.46	1,120	7.37	1,710	8.07	2,250	9.53	3,500	12.64	6,940
10	6.17	948	6.29	1,010	7.30	1,660	8.41	2,520	9.37	3,350	12.80	7,150
12 n.	6.21	970	6.49	1,130	7.47	1,780	8.96	2,980	9.50	3,470	13.10	7,540
2 p.m.	6.23	982	6.67	1,240	7.51	1,810	9.34	3,330	9.52	3,490	13.26	7,760
4	6.17	948	6.68	1,250	7.60	1,870	9.52	3,490	9.55	3,520	13.32	7,850
6	6.15	938	6.60	1,200	7.69	1,940	9.72	3,670	10.06	3,990	13.40	7,960
8	6.24	987	6.79	1,310	7.63	1,890	9.80	3,740	10.72	4,670	13.42	7,990
10	6.30	1,020	6.81	1,330	7.49	1,790	9.66	3,610	11.21	5,210	13.41	7,970
12 m.	6.17	948	6.96	1,420	7.59	1,860	9.70	3,650	11.53	5,570	13.38	7,930
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	13.44	8,020	18.86	17,000	21.98	23,500	------	------	------	------	------	------
4	13.54	8,160	19.60	18,000	21.61	22,500	16.70	13,000	13.62	8,270	11.64	5,700
6	13.85	8,590	20.32	19,500	21.21	21,500	------	------	------	------	------	------
8	14.13	9,000	20.88	21,000	20.85	21,000	16.10	12,000	13.34	7,880	11.60	5,650
10	14.35	9,320	21.39	22,000	20.41	20,000	------	------	------	------	------	------
12 n.	14.84	10,100	21.82	23,000	20.00	19,000	15.70	11,400	12.83	7,190	11.36	5,380
2 p.m.	15.26	10,700	22.17	24,000	19.59	18,000	------	------	------	------	------	------
4	15.70	11,400	22.46	24,500	19.12	17,500	15.02	10,300	12.50	6,760	11.18	5,180
6	16.10	12,100	22.48	25,000	18.71	16,500	------	------	------	------	------	------
8	16.77	13,200	22.44	24,500	18.30	16,000	14.52	9,580	12.24	6,420	11.0	5,000
10	17.46	14,400	22.34	24,500	17.90	15,000	------	------	------	------	------	------
12 m.	18.07	15,400	22.20	24,000	17.50	14,500	14.09	8,940	11.87	5,970	10.75	4,700
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	------	------	------	------	------	------	8.58	2,650	8.20	2,350	7.88	2,090
4	------	------	------	------	------	------	8.53	2,610	8.11	2,280	7.86	2,080
6	10.5	4,400	9.7	3,600	8.9	2,900	8.80	2,840	8.22	2,370	7.89	2,100
8	------	------	------	------	------	------	------	------	8.19	2,340	8.07	2,250
10	------	------	------	------	------	------	------	------	8.04	2,220	7.84	2,060
12 n.	10.25	4,200	9.49	3,460	8.7	2,800	8.7	2,800	8.05	2,230	7.70	1,950
2 p.m.	------	------	------	------	------	------	------	------	8.20	2,350	7.88	2,090
4	------	------	------	------	------	------	------	------	8.18	2,330	7.80	2,030
6	9.95	3,900	9.3	3,300	8.60	2,670	8.4	2,500	7.94	2,140	7.56	1,840
8	------	------	------	------	------	------	------	------	7.99	2,180	7.64	1,900
10	------	------	------	------	------	------	------	------	7.84	2,060	7.55	1,840
12 m.	9.81	3,750	9.05	3,100	8.58	2,650	8.22	2,370	7.86	2,080	7.49	1,790

Supplemental records.—July 24, 5 p.m., 22.5 ft., 25,000 sec.-ft.

FIVE MILE RIVER AT KILLINGLY, CONN.

LOCATION.—Lat. 41°50'10", long. 71°53'09", at northwest abutment of New York, New Haven & Hartford Railroad bridge, five-eighths of a mile south of Killingly, Windham County, and 2.7 miles upstream from mouth. Datum of gage is 222.22 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—58.2 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,600 second-feet; extended to peak stage by logarithmic plotting.

MAXIMA.—July 1938: Discharge, 2,480 second-feet 2 p.m. July 24 (gage height, 8.52 feet).

November 1937 to June 1938: Discharge, 730 second-feet Nov. 29, 1937 (gage height, 4.3 feet).

REMARKS.—Flood discharge affected by storage in ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	109	310	251	11	51	95	155	21	93	198	101
2	95	258	178	12	92	79	155	22	77	524	108
3	84	212	148	13	154	91	134	23	77	1,000	81
4	67	162	138	14	319	92	119	24	74	2,370	84
5	90	121	125	15	370	88	119	25	53	1,740	79
6	96	109	127	16	284	70	106	26	69	1,080	77
7	80	99	172	17	228	73	206	27	144	724	60
8	75	93	168	18	182	83	179	28	368	551	74
9	68	68	150	19	145	81	147	29	491	449	88
10	68	80	136	20	109	111	115	30	405	377	75
								31		322	75
Monthly mean discharge, in second-feet									154	378	127
Runoff, in inches									2.96	7.48	2.51

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.			1.38	69	1.23	51	1.25	53	1.74	132	2.84	390
4			1.37	68	1.22	49	1.34	64	1.76	136	2.92	409
6	1.42	75	1.37	68	1.23	51	1.43	76	1.77	138	3.04	433
8			1.38	69	1.30	59	1.57	99	1.86	160	3.19	463
10			1.59	102	1.56	97	1.80	145	1.96	185	3.39	503
12 n.	1.41	74	1.63	110	1.70	123	1.90	170	1.96	185	3.52	530
2 p.m.			1.66	115	1.74	132	1.90	170	1.96	185	3.66	562
4			1.69	121	1.74	132	1.89	168	2.04	205	3.79	592
6	1.39	71	1.55	96	1.58	101	1.68	119	1.91	172	3.86	610
8			1.37	68	1.39	71	1.52	90	2.38	286	3.95	632
10			1.29	58	1.29	58	1.53	92	2.66	350	4.02	650
12 m.	1.38	69	1.25	53	1.25	53	1.67	117	2.78	376	4.06	660
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.11	673	8.22	2,330	7.78	2,110	5.80	1,280			3.86	610
4	4.15	685	8.31	2,380	7.60	2,020	5.68	1,230	4.54	814	3.80	595
6	4.22	706	8.32	2,380	7.43	1,940	5.55	1,180			3.75	582
8	4.32	737	8.35	2,400	7.28	1,870	5.45	1,140	4.39	762	3.71	572
10	4.47	790	8.42	2,430	7.12	1,810	5.37	1,110			3.76	585
12 n.	4.71	874	8.46	2,450	6.94	1,740	5.26	1,070	4.28	724	3.67	564
2 p.m.	5.00	975	8.52	2,480	6.77	1,670	5.17	1,030			3.47	519
4	5.23	1,060	8.48	2,460	6.57	1,590	5.09	1,010	4.07	662	3.45	515
6	5.42	1,130	8.37	2,400	6.38	1,510	4.98	968			3.40	505
8	5.89	1,320	8.21	2,320	6.23	1,450	4.90	940	3.94	630	3.41	507
10	6.75	1,660	8.06	2,250	6.07	1,390	4.81	908			3.38	501
12 m.	7.83	2,140	7.86	2,150	5.90	1,320	4.72	877	3.93	628	3.34	493

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938
—Continued

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.												
4	3.26	477	2.87	398			2.36	282				
6					2.60	335						
8	3.20	465	2.78	376			2.41	292				
10												
12 n.	3.12	449	2.78	376	2.53	321	2.21	248				
2 p.m.												
4	3.04	433	2.75	370			2.10	220				
6					2.48	310						
8	2.96	417	2.71	362			2.07	212				
10												
12 m.	2.92	409	2.66	350	2.43	298	2.03	202				

Supplemental record.—July 23, 11 p.m., 7.41 ft., 1920 sec.-ft.

MOOSUP RIVER AT MOOSUP, CONN.

LOCATION.—Lat. 41°42′40″, long. 71°53′15″, at outlet of tailrace from Aldrich Bros. mill, 100 feet upstream from New York, New Haven & Hartford Railroad bridge, at Moosup, Windham County, and 3½ miles upstream from mouth.

DRAINAGE AREA.—83.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,000 second-feet; extended logarithmically to peak stage on basis of two determinations of flood flow during March 1936 at dam a quarter of a mile above station.

MAXIMA.—July 1938: Discharge, 4,160 second-feet 7:20 p.m. July 24 (gage height, 8.25 feet), from sharp, short rise of unknown origin, discharge (natural), 4,100 second-feet 5 p. m. July 24 (gage height, 8.20 feet).

1932 to June 1938: Discharge, 4,260 second-feet Mar. 12, 1936 (gage height, 8.25 feet), from a sharp, short rise of unknown origin; discharge (natural), 4,080 second-feet Mar. 12, 1936 (gage height, 8.18 feet).

REMARKS.—Flood discharge affected by storage in several ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	113	451	274	11	53	106	343	21	70	998	137
2	101	297	230	12	105	115	349	22	61	1,300	141
3	96	221	196	13	272	105	262	23	59	1,980	114
4	48	179	175	14	245	91	188	24	70	3,500	95
5	103	164	162	15	175	132	178	25	54	2,220	96
6	131	122	260	16	126	220	127	26	16	1,130	99
7	108	102	260	17	112	173	307	27	118	732	65
8	90	91	222	18	83	189	276	28	772	570	42
9	70	61	316	19	52	364	225	29	1,080	434	126
10	67	75	266	20	106	911	158	30	756	356	90
								31		298	76
Monthly mean discharge, in second-feet									177	571	189
Runoff, in inches									2.36	7.89	2.61

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.28	209	1.79	98	2.81	363	2.71	333	4.16	870	5.19	1,480
4	2.25	201	1.88	115	2.65	315	2.54	282	4.12	850	5.10	1,420
6	2.22	193	1.97	134	2.80	360	2.75	345	4.19	885	5.11	1,430
8	2.20	188	2.21	191	2.88	384	4.14	860	4.20	890	5.10	1,420
10	2.17	180	2.13	170	2.86	378	4.60	1,110	4.20	890	5.06	1,390
12 n.	2.14	173	2.11	166	2.86	378	4.98	1,340	4.21	895	5.01	1,360
2 p.m.	2.11	166	2.09	161	2.85	375	5.01	1,360	4.30	940	4.92	1,300
4	2.09	161	1.94	127	2.79	357	5.01	1,360	4.44	1,010	4.80	1,230
6	2.07	156	2.46	258	2.81	363	4.79	1,220	4.67	1,150	4.73	1,190
8	2.05	152	2.56	288	2.80	360	4.55	1,080	4.75	1,200	4.64	1,130
10	2.01	142	2.65	315	2.76	348	4.38	980	4.84	1,250	4.55	1,080
12 m.	1.79	98	2.76	348	2.69	327	4.27	925	5.05	1,380	4.44	1,010
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.43	1,010	7.59	3,470	7.02	2,930	5.04	1,380	4.09	836	3.57	618
4	4.46	1,030	7.55	3,430	6.84	2,770	4.94	1,310	3.94	768	3.42	562
6	4.57	1,090	7.33	3,210	6.64	2,590	4.84	1,250	4.00	795	3.58	622
8	5.35	1,600	7.18	3,070	6.49	2,460	4.79	1,220	3.97	782	3.55	610
10	5.80	1,910	7.17	3,060	6.31	2,320	4.68	1,160	3.90	750	3.52	598
12 n.	6.03	2,090	7.34	3,220	6.16	2,200	4.64	1,130	3.85	730	3.48	583
2 p.m.	6.42	2,410	7.92	3,800	6.01	2,080	4.52	1,060	3.80	710	3.44	569
4	6.51	2,480	8.16	4,060	5.84	1,940	4.45	1,020	3.75	690	3.37	544
6	6.42	2,410	8.12	4,010	5.67	1,820	4.37	975	3.71	674	3.35	538
8	6.49	2,460	7.92	3,800	5.50	1,700	4.29	935	3.66	654	3.31	524
10	7.19	3,080	7.61	3,490	5.31	1,570	4.22	900	3.63	642	3.27	510
12 m.	7.43	3,310	7.28	3,160	5.16	1,460	4.16	870	3.60	630	3.23	496
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.19	482	2.89	387	2.62	306	------	------	------	------	------	------
4	2.99	417	2.81	363	2.64	312	------	------	------	------	------	------
6	3.17	474	2.81	363	2.65	315	------	------	------	------	------	------
8	3.13	460	2.86	378	2.63	309	------	------	------	------	------	------
10	3.10	450	2.81	363	2.63	309	------	------	------	------	------	------
12 n.	3.06	438	2.78	354	2.62	306	------	------	------	------	------	------
2 p.m.	3.02	426	2.78	354	2.60	300	------	------	------	------	------	------
4	2.96	408	2.76	348	2.58	294	------	------	------	------	------	------
6	2.96	408	2.74	342	2.56	288	------	------	------	------	------	------
8	2.94	402	2.73	339	2.54	282	------	------	------	------	------	------
10	2.92	396	2.71	333	2.52	276	------	------	------	------	------	------
12 m.	2.91	393	2.57	291	2.51	273	------	------	------	------	------	------

Supplemental records.—July 18, 7 a.m., 2.32 ft., 219 sec.-ft.; 11 a.m., 1.86 ft., 111 sec.-ft.; 3 p.m., 2.21 ft., 191 sec.-ft.; July 19, 3 a.m., 2.82 ft., 366 sec.-ft.; 7 a.m., 3.04 ft., 432 sec.-ft.; July 20, 3 a.m., 2.71 ft., 333 sec.-ft.; 7 a.m., 3.62 ft., 638 sec.-ft.; July 24, 5 p.m., 8.20 ft., 4,100 sec.-ft.; 7 p.m., 8.01 ft., 3,890 sec.-ft.; 7:20 p.m., 8.25 ft., 4,160 sec.-ft.

YANTIC RIVER AT YANTIC, CONN.

LOCATION.—Lat. 41°33′35″, long. 72°07′20″, 700 feet downstream from stone-arch highway bridge at Yantic, New London County, and 1 mile downstream from Susquetonscut Brook. Datum of gage is 94.46 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—88.6 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 4,600 second-feet; extended to peak stage on basis of determinations of March 1936 and September 1938 flood flows over spillway of dam 2½ miles above station and determination of September 1938 flood flow over spillway of dam, 3 miles below station. Affected by change in recording conditions 10 p.m. July 23 to 8 p.m. July 24, when water entered gage house through ventilators.

MAXIMA.—July 1938: Discharge, 6,980 second-feet 1:20 a.m. July 24 (gage height, 11.47 feet).

1930 to June 1938: Discharge, 6,300 second-feet Mar. 12, 1936 (gage height, 11.32 feet).

REMARKS.—Flood discharge affected by storage in a few lakes and ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	96	262	231	11	19	59	501	21	56	750	140
2	80	156	191	12	47	77	522	22	63	1,270	137
3	117	116	162	13	187	71	345	23	74	2,330	122
4	29	85	147	14	161	64	210	24	68	5,180	103
5	45	103	83	15	110	67	161	25	17	2,320	86
6	94	80	105	16	90	22	132	26	32	1,190	82
7	73	67	137	17	79	37	551	27	100	725	31
8	64	63	152	18	19	92	353	28	764	495	58
9	67	16	345	19	18	94	249	29	1,090	394	84
10	66	17	286	20	63	310	181	30	532	355	59
								31		277	60
Monthly mean discharge, in second-feet									144	553	194
Runoff, in inches									1.82	7.19	2.52

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	0.97	20	1.41	51	1.13	30	1.85	98	4.02	617	5.44	1,250
4	.98	21	1.38	48	1.13	30	1.98	116	4.12	653	5.39	1,220
6	1.01	23	1.51	60	1.13	30	2.25	158	4.23	697	5.46	1,260
8	1.06	26	1.70	80	1.41	51	2.66	237	4.39	761	5.76	1,440
10	1.16	32	2.48	200	2.53	210	2.87	283	4.25	705	5.73	1,420
12 n.	1.27	40	2.44	193	2.51	206	2.81	269	3.89	572	5.54	1,300
2 p.m.	1.38	48	2.21	152	2.38	181	3.15	352	4.10	645	5.76	1,440
4	1.41	51	2.37	180	2.40	185	3.41	418	4.09	642	5.53	1,300
6	1.41	51	1.52	61	1.57	66	3.47	436	4.20	685	5.21	1,140
8	1.41	51	1.25	38	1.33	44	3.73	516	4.95	1,010	5.30	1,180
10	1.41	51	1.18	34	1.30	42	3.86	561	5.31	1,180	5.23	1,140
12 m.	1.41	51	1.15	32	1.57	66	3.92	582	5.47	1,260	5.14	1,100

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	5.06	1,060	11.41	6,890	7.88	3,050	5.85	1,490	4.63	864	3.83	550
4	5.06	1,060	11.07	6,390	7.74	2,930	5.72	1,410	4.57	836	3.79	536
6	5.44	1,250	10.73	5,910	7.51	2,720	5.63	1,360	4.64	868	3.93	586
8	6.15	1,680	10.43	5,500	7.43	2,650	5.77	1,440	4.72	904	4.15	665
10	6.67	2,050	10.21	5,220	7.21	2,470	5.52	1,290	4.58	841	3.92	582
12 n.	6.90	2,220	10.05	5,010	6.91	2,230	5.09	1,080	4.10	645	3.47	436
2 p.m.	7.14	2,410	10.05	5,010	6.85	2,180	5.29	1,180	4.35	745	3.76	526
4	7.34	2,570	10.04	5,000	6.54	1,960	4.76	922	3.86	561	3.26	380
6	7.44	2,660	9.68	4,570	6.39	1,850	4.80	940	3.82	547	3.18	360
8	7.67	2,860	8.95	4,000	6.26	1,760	4.82	949	3.90	575	3.35	402
10	9.55	4,410	8.44	3,600	6.13	1,670	4.77	926	3.91	578	3.41	418
12 m.	11.30	6,720	8.08	3,240	5.99	1,570	4.70	895	3.88	568	3.43	424

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938
—Continued

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	3.42	421	3.30	390	2.95	302	2.65	234	2.49	202	2.23	155
4	3.41	418	3.30	390	2.93	298	2.64	232	2.48	200	2.25	158
6	3.56	463	3.29	388	2.92	295	2.64	232	2.47	198	2.26	160
8	3.79	536	3.30	390	2.90	290	2.89	288	2.67	239	2.45	195
10	3.59	472	3.19	362	2.88	285	3.13	348	2.97	308	2.89	288
12 n.	3.14	350	3.17	358	2.86	281	2.96	305	2.72	249	2.70	245
2 p.m.	3.50	445	3.14	350	2.84	276	2.69	243	2.57	218	2.37	180
4	3.00	315	3.08	335	2.81	269	2.72	249	2.52	208	2.51	206
6	2.80	267	3.05	328	2.76	258	1.94	111	1.70	80	1.67	77
8	2.99	312	3.01	318	2.72	249	2.10	134	1.80	92	1.37	48
10	3.12	345	2.98	310	2.69	243	2.34	174	2.07	130	1.70	80
12 m.	3.25	378	2.97	308	2.67	239	2.45	194	2.18	147	1.93	109

Supplemental records.—July 18, 1 p.m., 1.92 ft., 108 sec.-ft.; July 20, 1 p.m., 2.55 ft., 214 sec.-ft.; July 21, 5 p.m., 3.66 ft., 493 sec.-ft.; July 23, 9 p.m., 8.07 ft., 3,230 sec.-ft.; July 24, 1:20 a.m., 11.47 ft., 6,980 sec.-ft.; July 26, 3 p.m., 5.19 ft., 1,120 sec.-ft.; July 29, 5 p.m., 2.71 ft., 247 sec.-ft.; Aug. 3, 9 a.m., 2.92 ft., 295 sec.-ft.

CONNECTICUT RIVER BASIN

CONNECTICUT RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°46′10″, long. 72°40′00″, at Memorial Bridge in Hartford, Hartford County, three-quarters of a mile upstream from Park River and 1½ miles upstream from Hockanum River. Datum of gage is 0.55 foot below mean sea level.

DRAINAGE AREA.—10,480 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights given to tenths.

MAXIMA.—July 1938: Gage height, 11.2 feet 2:30 a.m. July 25 (discharge, about 40,000 second-feet).

1896 to June 1938: Discharge, 313,000 second-feet Mar. 20, 1936 (augmented by breaching of Hartford dikes); gage height, 37.6 feet Mar. 21, 1936.

1639 to June 1938: Stage known, that of Mar. 21, 1936.

REMARKS.—Low stages affected by tide. Flow affected by a total storage capacity of 27,000,000,000 cubic feet (revised) above station. Record furnished by U. S. Weather Bureau.

Gage height, in feet, at 8 a.m., 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	4.0	5.3	9.6	11	2.8	1.8	4.6	21	3.0	5.0	3.6
2	3.8	4.7	7.9	12	2.8	3.0	5.3	22	3.2	6.7	2.9
3	3.8	4.3	8.0	13	3.7	3.6	5.3	23	2.7	9.1	3.0
4	3.7	4.7	8.0	14	6.4	4.1	4.5	24	2.6	10.5	3.7
5	3.6	5.4	6.7	15	6.0	4.2	3.6	25	2.4	11.1	3.7
6	2.9	2.8	5.4	16	5.1	3.6	3.7	26	1.8	9.5	3.8
7	2.9	2.6	4.4	17	4.3	4.0	4.0	27	2.1	7.5	4.1
8	2.6	2.5	3.3	18	3.7	2.6	3.8	28	4.9	6.7	4.0
9	2.7	2.2	3.7	19	3.0	3.7	3.6	29	9.4	6.0	3.1
10	2.7	1.9	4.2	20	2.7	5.3	3.5	30	7.5	7.1	3.3
								31		10.6	3.3

SCANTIC RIVER AT BROAD BROOK, CONN.

LOCATION.—Lat. 41°54'45", long. 72°34'05", 300 feet upstream from highway bridge, half a mile downstream from Broad Brook, 1 mile southwest of town of Broad Brook, Hartford County, and 5½ miles upstream from mouth.

DRAINAGE AREA.—98.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except period July 4 to Aug. 26 when graph was computed on basis of range line, records for stations on Hockanum River near East Hartford, Farmington River at Riverton, and Willimantic River near South Coventry, and weather records.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 550 second-feet; extended to peak stage on basis of determinations of flood flows of September 1938 at dams 7 and 9 miles above station.

MAXIMA.—July 1938: Discharge, 962 second-feet 2 to 4 p.m. July 24 (gage height, 6.85 feet).

1928 to June 1938: Discharge, 1,820 second-feet Mar. 13, 1936 (gage height, 10.17 feet); maximum gage height, 12.31 feet Mar. 21 (backwater from Connecticut River).

REMARKS.—Flood discharge affected by storage in one reservoir and several small ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	132	309	222	11	111	140	200	21	121	340	65
2	106	209	240	12	245	130	260	22	101	541	90
3	104	171	199	13	426	130	200	23	90	703	85
4	88	130	190	14	698	120	160	24	85	939	85
5	122	120	150	15	502	130	150	25	72	823	85
6	138	130	110	16	267	50	140	26	64	646	80
7	118	100	150	17	204	60	140	27	200	496	58
8	113	80	200	18	154	150	130	28	436	409	66
9	108	60	180	19	146	225	130	29	630	350	89
10	102	90	180	20	140	246	60	30	547	246	82
								31		200	77
Monthly mean discharge, in second-feet									212	273	137
Runoff, in inches									2.40	3.19	1.60

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	-------	0.89	60	1.95	215	2.17	235	2.70	290	3.83	440
4	------	-------	.91	62	1.86	205	2.04	225	2.65	280	3.89	450
6	------	-------	.95	68	1.82	200	1.95	215	2.60	280	3.93	460
8	------	-------	.99	74	1.78	195	1.89	210	2.65	280	3.97	460
10	------	-------	1.19	110	1.82	200	1.95	215	2.77	300	4.02	470
12 n.	0.90	60	1.59	170	1.91	210	2.04	225	2.94	320	4.17	490
2 p.m.	------	-------	1.82	200	2.02	225	2.18	240	3.14	340	4.45	540
4	------	-------	1.99	220	2.18	240	2.42	260	3.36	370	4.75	580
6	------	-------	2.09	230	2.28	250	2.60	280	3.56	400	5.01	640
8	------	-------	2.14	235	2.36	260	2.70	290	3.71	420	5.24	680
10	------	-------	2.09	230	2.40	260	2.73	290	3.79	430	5.41	700
12 m.	.90	60	2.04	225	2.32	250	2.72	290	3.80	440	5.53	720

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	5.42	700	6.42	880	6.55	900	5.34	680	4.46	540	4.01	470
4	5.29	680	6.58	920	6.43	880	5.22	660	4.26	500	3.83	440
6	5.18	660	6.70	940	6.31	860	5.14	660	4.08	480	3.63	410
8	5.10	640	6.77	940	6.20	840	5.09	640	4.02	470	3.49	390
10	5.06	640	6.81	960	6.10	820	5.06	640	4.02	470	3.44	380
12 n.	5.11	640	6.84	960	6.03	820	5.09	640	4.05	480	3.36	370
2 p.m.	5.23	660	6.85	962	5.97	800	5.13	660	4.12	490	3.47	390
4	5.40	700	6.85	962	5.97	800	5.12	660	4.17	490	3.57	400
6	5.64	740	6.84	960	5.93	800	5.02	640	4.20	500	3.63	410
8	5.84	780	6.82	960	5.86	780	4.94	620	4.20	500	3.61	410
10	6.04	820	6.76	940	5.72	760	4.82	600	4.19	500	3.56	400
12m.	6.24	840	6.66	920	5.53	720	4.66	580	4.14	490	3.49	390

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.40	380	3.11	340	------	-------	1.82	200	2.20	240	1.83	200
4	3.29	360	2.85	310	------	-------	1.82	200	2.14	235	1.70	185
6	3.19	350	2.56	280	------	-------	1.84	205	2.09	230	1.66	180
8	3.11	340	2.32	250	------	-------	1.87	205	2.09	230	1.68	180
10	3.07	330	2.17	235	------	-------	1.91	210	2.14	235	1.75	190
12 n.	3.06	330	2.04	225	1.82	200	1.96	215	2.20	240	1.82	200
2 p.m.	3.09	330	1.95	215	------	-------	2.04	225	2.25	245	1.86	205
4	3.15	340	1.91	210	------	-------	2.15	235	2.30	250	1.92	210
6	3.24	350	1.88	210	------	-------	2.25	245	2.30	250	1.91	210
8	3.29	360	1.85	205	------	-------	2.30	250	2.30	250	1.88	210
10	3.27	360	1.83	200	------	-------	2.30	250	2.20	240	1.85	205
12 m.	3.21	350	1.82	200	1.82	200	2.25	245	2.06	225	1.82	200

FARMINGTON RIVER NEAR NEW BOSTON, MASS.

LOCATION.—Lat. 42°04′40″, long. 73°04′25″, at highway bridge a quarter of a mile downstream from Clam River and 1 mile south of New Boston, Berkshire County. Datum of gage is 758.21 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—92.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,380 second-feet.

MAXIMA.—July 1938: Discharge, 1,680 second-feet 10 to 11 p.m. July 29 (gage height, 6.50 feet).

1913 to June 1938: Discharge, 9,080 second-feet Mar. 18, 1936, from rating curve extended above 1,380 second-feet on basis of contracted-opening and slope-area; gage height, 11.20 feet Mar. 12, 1936 (ice jam).

REMARKS.—Flood discharge regulated by storage in Otis Reservoir (page 234).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	65	301	431	11	91	104	684	21	88	275	221
2	57	286	467	12	166	144	472	22	78	492	215
3	65	232	336	13	806	146	319	23	72	496	210
4	59	199	244	14	431	118	218	24	65	601	210
5	62	176	164	15	250	64	195	25	78	346	184
6	60	157	222	16	162	66	218	26	206	235	50
7	49	128	364	17	117	108	204	27	1,780	171	61
8	59	55	253	18	92	136	197	28	1,420	135	179
9	61	57	197	19	79	259	121	29	686	710	181
10	48	115	259	20	85	174	132	30	403	1,070	176
								31		525	171
Monthly mean discharge, in second-feet (adjusted for storage[1])									271	266	194
Runoff, in inches (adjusted for storage[1])									3.29	3.33	2.43

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	3.58	111	3.52	101	3.94	191	3.96	197	3.67	129	5.05	595
12 n.	3.59	113	3.56	108	4.41	328	3.86	171	3.99	204	4.93	535
6 p.m.	3.55	106	3.85	169	4.34	307	3.79	155	4.98	560	4.76	459
12 m.	3.53	102	3.96	199	4.07	227	3.71	137	4.69	431	4.64	411
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.50	360	5.26	706	4.57	384	4.18	259	3.91	184	3.75	142
12 n.	4.44	339	5.06	600	4.46	346	4.11	238	3.86	171	3.71	137
6 p.m.	5.33	748	4.83	488	4.35	310	4.01	210	3.80	157	3.67	129
12 m.	5.41	796	4.69	431	4.25	280	3.95	194	3.75	146	3.63	121
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	3.66	127	6.09	1,300	5.08	610	4.54	374	5.29	724	4.51	364
12 n.	5.28	718	5.74	1,020	4.88	511	4.55	378	4.94	540	4.45	342
6 p.m.	5.60	920	5.46	826	4.71	439	4.48	353	4.75	455	4.35	310
12 m.	6.47	1,650	5.26	706	4.61	399	5.48	838	4.59	392	4.29	292
	August 4		August 5		August 6		August 7		August 8		August 9	
6 a.m.	4.26	283	3.95	194	3.65	125	4.68	427	4.20	265	4.08	229
12 n.	4.09	232	3.85	169	3.63	121	4.46	346	4.15	250	3.89	179
6 p.m.	4.01	210	3.73	142	4.37	316	4.35	310	4.10	235	3.77	150
12 m.	3.97	199	3.67	129	4.78	467	4.26	283	4.10	235	4.15	250
	August 10											
6 a.m.	4.24	277										
12 n.	4.21	268										
6 p.m.	4.10	235										
12 m.	4.11	238										

Supplemental records.—July 23, 3 p.m., 4.49 ft., 356 sec.-ft.; 8 to 9 p.m., 5.48 ft., 838 sec.-ft.; July 29, 9 a.m., 4.96 ft., 550 sec.-ft.; 2 p.m., 5.22 ft., 682 sec.-ft.; 4 p.m., 5.27 ft., 712 sec.-ft.; 8 p.m., 6.42 ft., 1,600 sec.-ft.; 10 to 11 p.m., 6.50 ft., 1,680 sec.-ft.; Aug. 6, 9 p.m., 4.87 ft., 506 sec.-ft.

[1]Adjusted for storage in Otis Reservoir.

FARMINGTON RIVER AT RIVERTON, CONN.

LOCATION.—Lat. 41°57′15″, long. 73°00′45″, a quarter of a mile downstream from Still River, 1 mile downstream from Riverton, Litchfield County, and 4 miles northeast of Winsted.

DRAINAGE AREA.—216 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,610 second-feet 6 to 7 a.m. July 22 (gage height, 5.06 feet).

1929 to June 1938: Discharge, 19,900 second-feet Mar. 18, 1936 (gage height, 13.42 feet).

REMARKS.—Flow regulated by storage in Otis Reservoir (page 234).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	180	595	620	11	176	234	1,310	21	158	1,280	315
2	156	540	934	12	338	344	991	22	138	2,200	309
3	175	408	572	13	1,270	370	600	23	163	1,670	302
4	165	355	396	14	764	256	395	24	154	1,720	284
5	154	330	316	15	448	210	354	25	114	1,060	268
6	176	271	340	16	320	216	347	26	223	703	144
7	154	242	609	17	251	183	331	27	2,990	491	112
8	164	162	468	18	178	309	328	28	3,320	392	185
9	160	130	470	19	150	623	300	29	1,570	776	236
10	126	178	506	20	162	585	237	30	892	1,440	237
								31		795	224
Monthly mean discharge, in second-feet									513	615	421
Runoff, in inches									2.66	3.29	2.25

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.45	134	1.56	160	2.27	393	2.63	560	2.15	346	4.67	2,180
4	1.43	129	1.61	173	2.27	393	2.76	628	2.19	361	4.96	2,500
6	1.59	168	1.63	178	2.42	457	2.71	600	2.39	444	5.06	2,610
8	1.64	181	1.95	274	2.66	575	2.83	668	2.93	728	5.05	2,600
10	1.96	277	1.96	277	2.69	590	2.75	622	2.98	758	4.95	2,480
12 n.	1.96	277	1.76	214	2.92	722	2.64	565	3.12	848	4.83	2,350
2 p.m.	1.66	186	2.16	350	3.02	783	2.77	634	3.96	1,500	4.71	2,220
4	1.65	184	2.25	385	3.01	776	2.77	634	4.78	2,300	4.59	2,100
6	1.62	175	2.40	448	2.91	716	2.73	612	4.86	2,390	4.45	1,960
8	1.61	173	2.47	481	3.00	770	2.56	525	4.81	2,330	4.32	1,830
10	1.59	168	2.48	486	3.06	809	2.50	495	4.64	2,150	4.23	1,750
12 m.	1.57	162	2.30	405	2.67	580	2.21	369	4.53	2,040	4.13	1,660
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.04	1,580	4.57	2,080	3.66	1,240	3.03	790	2.58	535	2.26	389
4	3.96	1,500	4.52	2,030	3.61	1,200	3.00	770	2.57	530	2.19	361
6	3.87	1,420	4.45	1,960	3.56	1,160	2.97	752	2.45	472	2.10	327
8	3.86	1,410	4.37	1,880	3.55	1,150	2.98	758	2.59	540	2.41	453
10	3.85	1,400	4.29	1,800	3.52	1,130	2.98	758	2.59	540	2.43	462
12 n.	3.90	1,450	4.20	1,720	3.46	1,080	2.96	746	2.31	409	2.23	377
2 p.m.	3.93	1,480	4.12	1,650	3.42	1,050	2.90	710	2.57	530	2.42	457
4	4.07	1,600	4.03	1,570	3.34	998	2.83	668	2.55	520	2.33	418
6	4.27	1,780	3.95	1,500	3.26	942	2.76	628	2.44	467	2.17	354
8	4.72	2,230	3.86	1,410	3.16	874	2.72	606	2.40	448	2.30	405
10	4.74	2,250	3.78	1,340	3.10	835	2.67	580	2.36	431	2.17	354
12 m.	4.65	2,160	3.72	1,290	3.06	809	2.58	535	2.32	414	1.95	274
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	1.89	254	4.46	1,970	3.28	956	2.70	595	3.45	1,080	2.61	550
4	1.86	245	4.24	1,760	3.22	914	2.69	590	3.41	1,050	2.58	535
6	2.07	316	4.10	1,630	3.17	880	2.66	575	3.42	1,050	2.57	530
8	2.41	453	4.20	1,720	3.31	977	2.88	698	3.57	1,170	2.88	698
10	2.37	435	4.09	1,620	3.09	828	2.84	674	3.50	1,110	2.85	680
12 n.	2.32	414	3.92	1,470	3.18	887	2.63	560	3.23	921	2.63	560
2 p.m.	3.35	1,000	3.79	1,350	3.08	822	2.76	628	3.28	956	2.81	656
4	3.15	868	3.60	1,190	2.86	686	2.79	644	3.12	848	2.67	580
6	3.17	880	3.46	1,080	2.72	606	2.68	585	3.08	822	2.63	560
8	3.68	1,250	3.36	1,010	2.66	575	2.69	590	2.98	758	2.55	520
10	4.38	1,890	3.40	1,040	2.72	606	2.73	612	2.89	704	2.47	481
12 m.	4.48	1,990	3.34	998	2.73	612	3.09	828	2.80	650	2.42	457

Supplemental records.—July 17, 5 a.m., 1.43 ft., 129 sec.-ft.; July 22, 7 a.m., 506 ft., 2,610 sec.-ft.; July 29, 1 p.m., 3.41 ft., 1,050 sec.-ft.; Aug. 1, 1 p.m., 2.55 ft., 520 sec.-ft.; Aug. 3, 7 a.m., 2.58 ft., 535 sec.-ft.

FARMINGTON RIVER AT TARIFFVILLE, CONN.

LOCATION.—Lat. 41°54′35″, long. 72°45′40″, at Tariffville, Hartford County, half a mile upstream from Hartford Electric Light Co.'s plant, three-quarters of a mile downstream from Salmon Brook, and 12 miles upstream from mouth.

DRAINAGE AREA.—578 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Varies with number of generators operating at power plant. Base rating curves have been developed for flow through one and two generators operating at full capacity and for flow over spillway of dam with no generators operating. These ratings are correlated by stage relation curves and are defined by discharge measurements and computations of flow over dam. When generators ran at less than full capacity, discharge was determined from gage-height graph adjusted to various ratings. One-generator rating was used June 1-11, 16-26, July 5-10, Aug. 26-31; two-generator rating used for intervening periods.

MAXIMA.—July 1938: Discharge, 6,020 second-feet 12 p.m. July 22; gage height, 6.98 feet 1:20 a.m. July 23.

1928 to June 1938: Discharge, 26,900 second-feet Mar. 19, 1936 (gage height, 13.4 feet).

REMARKS.—Flood discharge affected by storage and diversion. For information on storage and diversion see records for Otis Reservoir at Cold Spring, Mass., Barkhamsted Reservoir at Barkhamsted, Conn., East Branch Reservoir at New Hartford, Conn., and Nepaug Reservoir near Collinsville, Conn.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	690	1,640	1,870	11	582	629	2,0[illegible]0	21	640	2,590	768
2	665	1,060	1,830	12	832	1,470	3,130	22	611	5,710	768
3	640	995	1,790	13	1,310	1,200	2,340	23	532	5,770	768
4	615	898	1,420	14	1,890	1,030	1,540	24	535	5,190	728
5	512	825	1,160	15	1,240	832	1,130	25	452	4,470	702
6	506	742	995	16	825	678	1,130	26	359	3,290	615
7	690	715	1,460	17	770	560	1,100	27	1,170	2,410	512
8	715	615	1,420	18	566	581	1,130	28	4,480	2,590	409
9	690	525	1,340	19	467	1,210	1,200	29	4,340	1,830	421
10	611	528	1,460	20	438	2,130	1,100	30	2,640	2,630	563
								31		2,530	546
Monthly mean discharge, in second-feet									1,030	1,870	1,210
Runoff, in inches									1.99	3.74	2.41

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	----	----	----	----	----	----	----	----	3.79	2,120	----	----
4	2.06	598	1.77	490	2.40	962	3.80	1,980	3.74	2,070	6.45	5,370
6	----	----	----	----	----	----	----	----	3.74	2,030	----	----
8	2.00	658	1.86	520	2.41	995	3.87	2,200	3.69	2,010	6.67	5,590
10	----	----	----	----	----	----	----	----	3.66	1,990	----	----
12 n.	1.93	622	1.82	496	2.58	1,120	3.90	2,230	3.65	1,980	6.83	5,810
2 p.m.	----	----	----	----	----	----	----	----	3.75	2,080	----	----
4	1.83	526	1.98	562	2.92	1,360	3.89	2,220	4.08	2,420	6.90	5,970
6	----	----	----	----	----	----	----	----	4.49	2,880	----	----
8	1.65	462	2.08	722	3.14	1,530	3.89	2,220	5.01	3,520	6.93	6,000
10	----	----	----	----	----	----	----	----	5.66	4,420	----	----
12 m.	1.67	462	2.38	930	3.32	1,680	3.87	2,200	6.12	4,990	6.95	6,020

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	----	----	----	----	----	----	----	----	----	----	4.40	2,770
4	----	----	----	----	----	----	----	----	----	----	4.51	2,900
6	6.92	5,970	6.48	5,260	6.20	4,780	5.07	3,590	4.21	2,560	4.54	2,940
8	----	----	----	----	----	----	----	----	----	----	4.50	2,890
10	----	----	----	----	----	----	----	----	----	----	4.45	2,830
12 n.	6.82	5,790	6.44	5,180	5.86	4,480	4.82	3,280	4.03	2,360	4.38	2,750
2 p.m.	----	----	----	----	----	----	----	----	----	----	4.29	2,650
4	----	----	----	----	----	----	----	----	----	----	4.16	2,510
6	6.73	5,590	6.38	5,100	5.73	4,180	4.58	2,990	3.85	2,180	4.01	2,340
8	----	----	----	----	----	----	----	----	3.96	2,150	3.85	2,180
10	----	----	----	----	----	----	----	----	3.91	2,210	3.71	2,040
12 m.	6.58	5,420	6.30	4,990	5.31	3,870	4.39	2,760	4.16	2,510	3.62	1,950

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	----	----	----	----	----	----	----	----	----	----	----	----
4	3.58	1,910	3.80	2,040	4.45	2,830	3.71	2,040	3.38	1,730	3.65	1,980
6	----	----	----	----	----	----	----	----	----	----	----	----
8	3.58	1,910	4.12	2,460	4.29	2,650	3.60	1,930	3.39	1,740	3.56	1,890
10	----	----	----	----	----	----	----	----	----	----	----	----
12 n.	3.54	1,880	4.48	2,870	4.17	2,520	3.50	1,840	3.41	1,760	3.47	1,810
2 p.m.	----	----	----	----	----	----	----	----	----	----	----	----
4	3.48	1,820	4.62	3,030	4.04	2,370	3.42	1,770	3.55	1,880	3.34	1,700
6	----	----	----	----	----	----	----	----	----	----	----	----
8	3.43	1,670	4.63	3,050	3.92	2,250	3.48	1,730	3.66	1,990	3.20	1,580
10	----	----	----	----	----	----	----	----	----	----	----	----
12 m.	3.44	1,680	4.58	2,990	3.81	2,140	3.37	1,720	3.70	2,030	3.11	1,510

Supplemental records.—July 23, 1:20 p.m., 6.98 feet.

OTIS RESERVOIR AT COLD SPRING, MASS.

LOCATION.—Staff gage at dam, lat. 42°09′35″, long. 73°03′33″, on unnamed stream three-quarters of a mile upstream from its debouchment into Farmington River and 1 mile northeast of Cold Spring, Hampden County.

DRAINAGE AREA.—17.2 square miles.

GAGE-HEIGHT RECORD.—One gage reading daily, usually at 7 a. m. Gage-height at midnight computed from graph of gage readings and study of gate operation and weather records.

STAGE-DISCHARGE RELATION.—Outflow computed from records of gate openings and flow over spillway of dam.

REMARKS.—Inflow computed from outflow adjusted for change in contents of reservoir. No adjustments for evaporation from reservoir surface. Records based on data furnished by the Collins Co., Collinsville, Conn.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	June			July			August		
	Observed Outflow	Change in Contents	Inflow	Observed Outflow	Change in Contents	Inflow	Observed Outflow	Change in Contents	Inflow
1	0	+21	21	82	−48	34	102	−32	70
2	0	+21	21	80	−53	27	145	−64	81
3	0	+21	21	80	−53	27	90	−48	42
4	0	+21	21	80	−53	27	58	−21	37
5	0	+21	21	80	−59	21	19	+53	72
6	0	+16	16	80	−59	21	48	+48	96
7	0	+11	11	60	−43	17	102	−43	59
8	0	+16	16	0	+11	11	75	−43	32
9	0	+16	16	20	−11	9	28	+32	60
10	0	+11	11	80	−48	32	17	+53	70
11	0	+16	16	80	−48	32	86	−5	81
12	0	+43	43	80	−48	32	84	−32	52
13	0	+112	112	80	−43	37	75	−48	27
14	0	+37	37	60	−16	44	26	−5	21
15	0	+16	16	0	+43	43	54	−32	22
16	0	+16	16	20	+27	47	80	−59	21
17	0	+16	16	80	−21	59	80	−58	22
18	1	+16	17	53	+11	64	60	−32	28
19	3	+16	19	0	+37	37	0	+16	16
20	30	−11	19	0	+37	37	73	−59	14
21	42	−27	15	0	+101	101	160	−149	11
22	41	−27	14	0	+106	106	158	−149	9
23	41	−27	14	0	+69	69	158	−149	9
24	40	−21	19	0	+69	69	156	−144	12
25	68	−53	15	0	+64	64	110	−101	9
26	67	−43	24	1	+48	49	0	+11	11
27	45	+287	332	4	+27	31	46	−37	9
28	240	−74	166	8	+32	40	154	−149	5
29	86	−16	70	32	+48	80	154	−149	5
30	84	−21	63	84	+27	111	154	−149	5
31	---------	---------	---------	83	+32	115	152	−144	8

	June	July	August
Monthly mean outflow, in second-feet	26.3	42.2	87.2
Outflow, in inches	1.71	2.82	5.84
Monthly mean inflow, in second-feet	40.6	48.2	32.8
Inflow, in inches	2.63	3.23	2.20

BARKHAMSTED RESERVOIR NEAR BARKHAMSTED, CONN.

LOCATION.—Lat. 41°54′55″, long. 72°57′05″, on East Branch of Farmington River, 1¼ miles south of Barkhamsted, Litchfield County, and 3½ miles upstream from mouth.

DRAINAGE AREA.—50.5 square miles.

REMARKS.—Elevations of reservoir surface are for 8 a.m. Change in contents is for 24-hour period prior to 8 a.m. except after Sundays and holidays when figure shown is change in contents for total period between readings. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, and change in contents, in millions of gallons, 1938

Day	June		July		August	
	Elevation	Change in Contents	Elevation	Change in Contents	Elevation	Change in Contents
1	431.35	−8	440.25	−70	441.45	−180
2	431.08	−9	438.80	−78	440.60	−47
3	430.85	−6	----------	----------	439.70	−49
4	430.80	−1	----------	----------	438.50	−64
5	----------	----------	433.40	−257	437.40	−57
6	430.60	−6	431.35	−68	436.00	−69
7	430.50	−3	429.65	−47	----------	----------
8	429.10	−36	427.25	−59	436.30	+16
9	427.30	−44	425.90	−30	435.50	−39
10	425.85	−33	----------	----------	434.50	−47
11	424.60	−27	424.50	−31	434.65	+7
12	----------	----------	425.10	+12	436.75	+100
13	426.60	+45	425.30	+5	435.55	−58
14	431.50	+124	425.35	+1	----------	----------
15	431.30	−6	426.50	+26	434.50	−49
16	429.90	−39	428.05	+37	433.20	−53
17	428.40	−37	----------	----------	431.80	−47
18	429.45	+26	425.70	−55	430.05	−50
19	----------	----------	426.15	+10	429.10	−24
20	428.50	−24	429.10	+70	428.20	−32
21	427.70	−31	431.50	+65	----------	----------
22	425.75	−33	437.60	+259	425.80	−46
23	425.30	−10	441.60	+213	424.90	−20
24	424.70	−13	----------	----------	424.80	−2
25	424.45	−6	444.55	+165	424.30	−11
26	----------	----------	444.35	−12	424.80	+11
27	424.85	+10	443.45	−50	424.20	−13
28	437.40	+412	443.30	−8	----------	----------
29	441.70	+230	441.15	−119	425.50	+28
30	441.55	−10	442.91	+197	424.80	−15
31	----------	----------	----------	----------	424.10	−15

	June	July	August
Change in contents, in millions of gallons	+465	+176	−825

EAST BRANCH RESERVOIR AT NEW HARTFORD, CONN.

LOCATION.—Lat. 41°52′55″, long. 72°57′25″, on East Branch of Farmington River, 1 mile east of New Hartford, Hartford County, and 1¼ miles upstream from mouth.

DRAINAGE AREA.—61.2 square miles.

REMARKS.—Elevations of reservoir surface are for 8 a.m. Crest of spillway at elevation 422.5 feet. Change in contents is for 24-hour period previous to 8 a.m. except after Sundays and holidays when figure shown is change in contents for total period between readings. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, and change in contents, in millions of gallons, 1938

Day	June		July		August	
	Elevation	Change in contents	Elevation	Change in contents	Elevation	Change in contents
1	420.60	−180	421.20	+169	422.60	−174
2	419.80	−106	422.25	+150	422.65	+8
3	419.05	−92			422.60	−8
4	418.60	−55			422.58	−3
5			422.90	+98	422.52	−9
6	418.80	+25	422.75	−23	422.45	−10
7	417.80	−119	422.40	−53		
8	417.20	−63	422.05	−52	422.50	+7
9	416.70	−57	421.80	−36	422.45	−7
10	416.25	−54			422.38	−11
11	416.05	−24	420.35	−200	422.45	+11
12			419.80	−72	422.55	+15
13	417.15	+130	419.30	−61	422.48	−11
14	417.85	+73	418.45	−116		
15	418.70	+101	417.35	−111	422.30	−27
16	419.20	+62	416.40	−109	421.75	−80
17	419.25	+6			421.00	−105
18	418.90	−43	416.30	−12	420.05	−128
19			415.60	−88	418.90	−142
20	419.20	+37	416.30	+88	417.75	−136
		0				
21	418.30	−110	417.15	+100		
22	417.30	−114	419.50	+273	417.45	−32
23	416.40	−104	421.65	+287	417.00	−47
24	416.60	+26			416.55	−54
25	415.20	−15	423.00	+200	415.95	−71
26			423.00	.0	415.35	−63
27	415.50	+32	422.60	−61	414.95	−42
28	416.90	+160	422.50	−15		
29	418.55	+184	422.65	+23	414.90	−5
30	419.95	+172	423.70	+166	414.30	−63
31					413.85	−50

	June	July	August
Change in contents, in millions of gallons	−267	+545	−1237

NEPAUG RESERVOIR NEAR COLLINSVILLE, CONN.

Location.—Lat. 41°49′40″, long. 72°56′05″, on Nepaug River a quarter of a mile upstream from mouth and 1½ miles northwest of Collinsville, Hartford County.

Drainage area.—32.0 square miles.

Remarks.—Elevations of reservoir surface are for 8 a.m. Crest of spillway at elevation 485.0 feet. Change in contents is for 24-hour period prior to 8 a.m. Diversions for Hartford municipal supply are for calendar day. Record furnished by Water Bureau of the Metropolitan District Commission, Hartford, Conn.

Elevation, in feet, change in contents and diversion, in millions of gallons, 1938

Day	June			July			August		
	Elevation	Change in Contents	Diversion	Elevation	Change in Contents	Diversion	Elevation	Change in Contents	Diversion
1	485.03	+8.3	12.1	484.68	−82.7	28.5	485.18	−13.8	25.0
2	485.00	−8.3	23.2	484.68	.0	28.2	485.14	−11.1	25.5
3	484.97	−8.3	23.5	484.63	−13.8	27.8	485.13	−2.8	25.5
4	484.96	−2.8	23.5	484.58	−13.8	27.8	485.10	−8.3	25.5
5	484.96	.0	23.5	484.53	−13.7	28.2	485.04	−16.6	25.5
6	484.95	−2.8	23.5	484.47	−16.5	27.5	485.02	−5.5	25.5
7	484.91	−11.0	24.0	484.41	−16.5	25.5	485.05	+8.3	25.0
8	484.90	−2.8	24.0	484.36	−13.7	24.5	485.05	.0	25.0
9	484.92	+5.5	23.5	484.29	−19.2	24.0	485.08	+8.3	25.0
10	484.90	−5.5	23.5	484.27	−5.5	24.0	485.07	−2.8	25.0
11	484.86	−11.0	23.5	484.24	−8.2	26.0	485.19	+33.2	25.0
12	485.09	+63.5	23.5	484.56	+87.8	28.0	485.26	+19.4	25.0
13	485.15	+16.6	23.5	484.75	+52.3	26.8	485.04	−60.9	25.5
14	485.17	+5.5	23.5	484.85	+27.6	26.0	485.00	−11.1	25.0
15	485.11	−16.6	23.5	484.86	+2.8	26.0	485.01	+2.8	25.0
16	485.05	−16.6	23.5	484.84	−5.5	26.0	485.00	−2.8	25.5
17	485.03	−5.5	23.5	484.79	−13.8	25.5	484.99	−2.8	25.0
18	484.97	−16.6	23.5	484.74	−13.8	25.0	484.98	−2.8	25.0
19	484.93	−11.1	23.5	484.74	.0	25.0	484.98	.0	25.5
20	484.88	−13.8	24.5	484.97	+63.5	25.0	484.95	−8.3	25.5
21	484.83	−13.8	25.0	485.14	+47.0	25.0	484.94	−2.8	25.0
22	484.78	−13.8	26.3	486.47	+370.9	25.5	484.90	−11.0	25.0
23	484.70	−22.0	28.0	485.81	−184.7	25.5	484.86	−11.0	25.0
24	484.68	−5.5	28.5	485.62	−52.9	25.0	484.81	−13.8	25.0
25	484.63	−13.8	28.5	485.44	−50.0	25.0	484.75	−16.5	25.0
26	484.57	−16.5	28.0	485.20	−66.6	25.5	484.69	−16.5	25.5
27	484.56	−2.8	28.0	485.02	−49.8	25.5	484.61	−22.0	25.5
28	485.01	+124.1	28.5	485.05	+8.3	25.5	484.57	−11.0	25.0
29	485.14	+35.9	28.5	485.09	+11.1	25.5	484.50	−19.2	25.0
30	484.98	−44.2	28.2	485.18	+24.9	25.0	484.45	−13.7	25.0
31	---------	---------	---------	485.23	+13.8	25.0	484.39	−16.5	25.0

	June	July	August
Change in contents, in millions of gallons	−5.7	+69.3	−231.6
Diversion, in millions of gallons	737.8	803.3	780.5

BURLINGTON BROOK NEAR BURLINGTON, CONN.

LOCATION.—Lat. 41°47′10″, long. 72°57′55″, 1¼ miles north of Burlington, Hartford County, 2½ miles upstream from mouth, and 3 miles southwest of Collinsville.

DRAINAGE AREA.—4.1 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Artificial control consists of a sharp-edged orifice 1 foot square and a sharp-crested rectangular weir 12 feet long with end contractions 5 feet high. Crest of weir is at gage height 1.02 feet and 1.02 feet above bottom edge of orifice. Rating curve which was developed from formula and coefficients checked by current-meter measurements below 49 second-feet. Discharge computed on basis of gage-height graph when record was affected by backwater from trash in orifice June 1-4, 2 p.m. July 17 to 3 p.m. Aug. 1, Aug. 29-31.

MAXIMA.—July 1938: Discharge, 357 second-feet 5:30 p.m. July 21 (gage height, 5.54 feet).

1931 to June 1938: Discharge, 503 second-feet Mar. 12, 1936 (gage height, 6.58 feet).

REMARKS.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	3.29	2.95	6.50	11	8.74	9.01	39.3	21	2.37	97	3.42
2	4.55	3.57	9.05	12	9.60	24.2	13.8	22	2.09	73	3.15
3	4.78	3.11	6.05	13	13.4	10.1	7.41	23	1.97	46.0	2.97
4	4.33	2.71	5.02	14	6.85	4.55	5.77	24	1.89	44.4	2.76
5	4.13	2.33	4.78	15	4.78	4.55	5.02	25	1.85	22.0	2.22
6	3.57	1.97	4.78	16	3.74	3.29	4.33	26	2.31	15.5	2.50
7	3.29	1.85	5.02	17	3.42	2.86	4.13	27	15.2	12.1	2.46
8	7.48	1.82	5.26	18	3.15	3.58	5.02	28	28.5	8.69	2.42
9	5.52	1.70	8.32	19	2.89	7.80	5.77	29	13.1	8.68	2.95
10	3.93	2.58	5.52	20	4.62	31.4	4.13	30	5.26	10.1	2.42
								31		7.29	2.46
Monthly mean discharge, in second-feet									6.02	15.2	5.96
Runoff, in inches									1.64	4.28	1.67

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.					1.15	4.8	1.91	37.0	1.67	24.5	2.87	102
4					1.14	4.5	1.89	35.9	1.60	21.0	2.66	86
6			1.06	2.7	1.14	4.5	1.78	30.0	1.55	18.9	2.67	87
8					1.15	4.8	1.68	24.9	1.53	18.0	2.65	85
10					1.17	5.2	1.60	21.0	1.54	18.4	2.56	79
12 n.			1.10	3.6	1.19	5.8	1.54	18.4	1.60	21.0	2.43	70
2 p.m.					1.21	6.3	1.65	23.5	1.85	33.7	2.29	60
4					1.22	6.6	1.83	32.6	2.95	108	2.20	54
6			1.13	4.3	1.23	6.9	2.00	42.2	5.46	348	2.14	51
8					1.33	10.2	2.03	44.0	4.56	254	2.18	53
10					1.51	17.1	1.91	37.0	3.82	183	2.21	55
12 m.			1.15	4.8	1.76	29.0	1.77	29.5	3.24	132	2.17	53
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	2.09	47.5										
4	2.00	42.2	2.21	55	1.68	24.9					1.30	9.1
6	1.92	37.5					1.50	16.6	1.42	13.4		
8	1.86	34.2	2.12	49.4	1.65	23.5					1.31	9.4
10	1.82	32.0										
12 n.	1.83	32.6	2.06	45.7	1.62	22.0	1.48	15.8	1.41	13.0	1.30	9.1
2 p.m.	1.91	37.0										
4	2.03	44.0	1.93	38.1	1.58	20.2					1.25	7.4
6	2.22	56					1.45	14.7	1.35	10.9		
8	2.32	62	1.81	31.5	1.53	18.0					1.28	8.4
10	2.39	67										
12 m.	2.37	66	1.73	27.4	1.50	16.6	1.42	13.4	1.30	9.1	1.28	8.4
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.												
4	1.28	8.4					1.21	6.3	1.32	11.0		
6			1.37	11.6	1.26	7.8					1.18	6.57
8	1.28	8.4					1.21	6.3	1.30	10.3		
10												
12 n.	1.28	8.4	1.34	10.5	1.25	7.4	1.22	6.6	1.28	9.60	1.17	6.30
2 p.m.												
4	1.28	8.4					1.17	6.30	1.26	8.95		
6			1.29	8.7	1.23	6.9					1.14	5.52
8	1.29	8.7					1.16	6.03	1.19	6.85		
10												
12 m.	1.36	11.2	1.26	7.8	1.21	6.3	1.25	8.63	1.18	6.57	1.12	5.02

Supplemental records.—July 20, 3 a.m., 1.92 ft., 37.5 sec.-ft.; July 21, 3 p.m., 2.02 ft., 43.4 sec.-ft.; 3:30 p.m., 2.15 ft., 51.3 sec.-ft.; 5 p.m., 5.30 ft., 331 sec.-ft.; 5:30 p.m., 5.54 ft., 357 sec.-ft.; July 25, 6 p.m., 1.61 ft., 21.5 sec.-ft.

SOUTH BRANCH OF PARK RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°44'02", long. 72°42'51", at Newfield Avenue bridge, Hartford, Hartford County, 0.7 mile downstream from Trout Brook, and 3.3 miles upstream from confluence with North Branch of Park River. Datum of gage is 31.07 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—40.6 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Affected by rate of change of stage above gage height about 5 feet. Shift in low-water rating occurred 5 p.m. June 11; low-water curve used prior to that time well defined by current-meter measurements and low-water curve used after that time fairly well defined. Base rating for high stages defined by current-meter measurements (adjusted for changing stage) below 1,300 second-feet and extended to peak stage on basis of comparison with records for stations on North Branch of Park River and Park River. Above gage height about 5 feet, rather poorly defined rating curve developed for different rates of changing stage on basis of several measurements. Correction applied for backwater from unknown source Aug. 21-31.

MAXIMA.—July 1938: Discharge, 800 second-feet 2 to 4 a.m. July 24; gage height, 7.84 feet 4 to 6 a.m. July 24.

1936 to June 1938: Discharge, 2,860 second-feet Jan. 25, 1938; gage height, 12.65 feet Jan. 25, 1938, 1 hour later than maximum discharge. Flood of Mar. 12, 1936, reached a stage of 12.1 feet as determined from floodmarks by city engineers of Hartford (discharge not determined).

REMARKS.—Flood discharge not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	32	47	60	11	47	26	339	21	21	312	26
2	30	43	53	12	49	38	208	22	21	474	29
3	44	44	48	13	125	39	90	23	20	505	29
4	39	48	41	14	50	37	63	24	22	665	28
5	41	48	36	15	34	31	46	25	24	347	26
6	36	42	33	16	35	27	40	26	33	207	25
7	33	30	33	17	30	24	36	27	140	131	23
8	46	24	47	18	26	108	35	28	298	150	22
9	35	23	85	19	23	186	32	29	140	114	24
10	31	30	96	20	21	222	28	30	62	133	24
								31		69	24
Monthly mean discharge, in second-feet									52.9	136	55.8
Runoff, in inches									1.45	3.86	1.58

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17		July 18		July 19		July 20		July 21		July 22	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.			1.81	24	5.27	287	3.07	96	6.30	320		
4	1.77	23	1.80	24	5.23	270	3.01	91	6.09	300	6.54	470
6			1.80	24			2.95	86	5.85	280		
8	1.82	25	1.82	25	4.71	220	2.97	88	5.58	265	6.85	520
10			1.87	27			3.04	93	5.27	250	6.95	525
12 n.	1.82	25	1.90	28	4.03	178	3.26	111	4.99	245	7.00	520
2 p.m.			1.93	29			3.81	158	4.85	252		
4	1.81	24	3.95	170	3.60	139	5.00	290	5.14	300	6.95	485
6			4.49	224			6.20	510	5.61	370		
8	1.80	24	4.87	260	3.27	112	6.64	505	5.95	400	6.83	440
10			5.13	290			6.62	390	6.13	390		
12 m.	1.82	25	5.21	290	3.13	100	6.48	345	6.23	410	6.67	400

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	6.56	385	7.79	800							3.81	158
4	6.45	370	7.84	800	6.71	410	4.89	240	3.60	139	3.90	166
6	6.32	355	7.84	790								
8	6.17	340	7.82	765	6.48	375	4.59	225	3.50	130	3.82	159
10	6.07	357	7.75	725								
12 n.	6.23	430	7.67	675	6.22	345	4.35	205	3.44	125	3.76	153
2 p.m.	6.49	505	7.57	635								
4	6.83	590	7.45	595	5.93	310	4.17	190	3.42	124	3.72	150
6	7.14	670	7.34	560								
8	7.38	715	7.23	530	5.62	280	3.97	172	3.35	118	3.57	136
10	7.57	750	7.10	490					3.50	130		
12 m.	7.70	780	6.97	460	5.25	260	3.78	155	3.58	137	3.40	122

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.34	117	3.88	164								
4	3.29	113	3.83	160								
6	3.25	110			2.77	74						
8	3.22	108	3.74	152								
10	3.19	105										
12 n.	3.16	103	3.59	138	2.68	68						
2 p.m.	3.15	102										
4	3.14	101	3.36	119								
6	3.20	106			2.58	62						
8	3.35	118	3.14	101								
10	3.70	148										
12 m.	3.86	162	2.97	88	2.50	57						

Supplemental records.—July 18, 3 p.m. 3.28 feet, 112 sec.-ft.; 5 p.m., 4.36 feet, 211 sec.-ft.; July 20, 5 p.m., 5.70 feet, 420 sec.-ft.; 7 p.m., 6.51 feet, 530 sec.-ft.; 9 p.m., 6.66 feet, 442 sec.-ft.; July 29, 5 p.m., 3.12 feet, 100 sec.-ft.

PARK RIVER AT HARTFORD, CONN.

Location.—Lat. 41°45′36″, long. 72°41′42″, at plate-girder footbridge on Riverside Street in Hartford, Hartford County, 1,300 feet downstream from confluence of North and South Branches of Park River, and 2.3 miles upstream from mouth. Datum of gage is 27.13 feet above mean sea level, (general adjustment of 1929).

Drainage area.—74.0 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements.

Maxima.—July 1938: Discharge, 1,320 second-feet 8 a.m. July 24 (gage height, 4.99 feet).

1936 to June 1938: Discharge, 5,650 second-feet Jan. 25, 1938 (gage height, 9.16 feet).

Flood of Mar. 12, 1936, reached a stage of 9.0 feet as determined from floodmarks by city engineers of Hartford (discharge, 5,400 second-feet). Backwater from Connecticut River on Mar. 21, 1936, caused a stage of 10.7 feet as determined from floodmarks.

Remarks.—Flood discharge probably not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	37	76	95	11	88	40	500	21	29	626	37
2	35	61	86	12	176	150	406	22	27	1,020	37
3	51	56	72	13	365	89	145	23	27	825	37
4	46	51	59	14	150	54	93	24	27	1,190	35
5	56	51	49	15	73	40	64	25	25	566	31
6	46	46	46	16	51	33	59	26	42	282	33
7	42	37	46	17	46	27	54	27	193	190	33
8	59	35	65	18	40	132	49	28	540	222	31
9	46	35	121	19	35	201	46	29	291	183	33
10	35	42	134	20	31	393	40	30	123	221	33
								31		130	33
Monthly mean discharge, in second-feet									94.4	229	83.9
Runoff, in inches									1.43	3.56	1.30

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	------	2.43	27	3.12	251	2.79	126	4.14	759	4.52	998
4	------	------	2.42	25	3.13	255	2.77	119	4.06	713	4.50	985
6	2.43	27	2.42	25	3.13	255	2.76	116	3.95	652	4.63	1,070
8	------	------	2.42	25	3.11	246	2.78	122	3.82	581	4.68	1,110
10	------	------	2.47	35	3.06	226	2.78	122	3.69	515	4.70	1,120
12 n.	2.43	27	2.46	33	3.00	202	2.78	122	3.62	480	4.71	1,130
2 p.m.	------	------	3.03	214	2.94	179	3.63	485	3.54	440	4.69	1,110
4	------	------	3.22	294	2.90	164	3.91	630	3.78	560	4.63	1,070
6	2.43	27	3.16	268	2.87	154	4.18	783	3.85	598	4.54	1,010
8	------	------	3.12	251	2.84	143	4.25	825	3.97	664	4.43	940
10	------	------	3.11	246	2.82	146	4.22	807	4.10	735	4.33	874
12 m.	2.43	27	3.11	246	2.80	129	4.19	789	4.25	825	4.22	807

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	4.11	741	4.95	1,300	4.17	777	------	------	------	------	------	------
4	4.01	686	4.96	1,300	4.06	713	3.32	339	2.98	194	3.02	210
6	3.92	636	4.97	1,310	3.96	658	------	------	------	------	------	------
8	3.84	592	4.99	1,320	3.88	614	3.23	298	2.95	183	3.08	234
10	4.05	708	4.97	1,310	3.81	576	------	------	------	------	------	------
12 n.	4.07	718	4.92	1,270	3.75	545	3.17	272	2.93	175	3.09	238
2 p.m.	4.17	777	4.85	1,220	3.69	515	------	------	------	------	------	------
4	4.31	862	4.76	1,160	3.63	485	3.12	251	2.92	172	3.08	234
6	4.48	972	4.66	1,090	3.57	455	------	------	------	------	------	------
8	4.63	1,070	4.55	1,020	3.52	430	3.08	234	2.91	168	3.04	218
10	4.74	1,150	4.42	933	3.47	406	------	------	------	------	------	------
12 m.	4.83	1,210	4.30	855	3.42	384	3.03	214	2.98	194	3.00	202

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	2.98	194	------	------	------	------	------	------	------	------	------	------
4	2.96	187	3.09	238	------	------	------	------	------	------	------	------
6	2.94	179	------	------	2.84	143	------	------	------	------	------	------
8	2.93	175	3.13	255	------	------	------	------	------	------	------	------
10	2.92	172	------	------	------	------	------	------	------	------	------	------
12 n.	2.91	168	3.10	242	2.79	126	------	------	------	------	------	------
2 p.m.	2.90	164	------	------	------	------	------	------	------	------	------	------
4	2.89	160	3.03	214	------	------	------	------	------	------	------	------
6	2.89	160	------	------	2.76	116	------	------	------	------	------	------
8	3.00	202	2.97	191	------	------	------	------	------	------	------	------
10	2.98	194	------	------	------	------	------	------	------	------	------	------
12 m.	3.01	206	2.91	168	2.72	103	------	------	------	------	------	------

Supplemental records.—July 18, 1:30 p.m., 2.45 feet, 31 sec.-ft.; 2:30 p.m., 3.42 feet, 384 sec.-ft.; July 21, 5 p.m., 3.85 feet, 598 sec.-ft.; July 22, 1 a.m., 4.38 ft., 907 sec.-ft.; July 23, 8:30 a.m., 3.82 feet, 581 sec.-ft.; July 27, 9 p.m., 3.15 feet, 264 sec.-ft.; July 29, 6:30 p.m., 3.08 feet, 234 sec.-ft.

NORTH BRANCH OF PARK RIVER AT HARTFORD, CONN.

LOCATION.—Lat. 41°47′03″, long. 72°42′31″, 60 feet downstream from stone arch bridge on Albany Avenue, Hartford, Hartford County, and 3 miles upstream from confluence with South Branch of Park River. Datum of gage is 34.20 feet above mean sea level, (general adjustment of 1929).

DRAINAGE AREA.—25.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements. Below gage-height 3.2 feet, affected slightly by backwater from trash on masonry control, 8 a.m. July 7 to 4:30 p.m. Aug. 1.

MAXIMA.—July 1938: Discharge, 623 second-feet 3:30 p.m. July 20 (gage height, 5.52 feet).

1936 to June 1938: Discharge, 1,640 second-feet Jan. 25, 1938 (gage height, 11.81 feet).

Flood of Mar. 12, 1936, reached a stage of 11.2 feet as determined from floodmarks by city engineers of Hartford (discharge, probably 1,520 second-feet).

REMARKS.—Flood discharge probably not appreciably affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	9.6	21	31	11	56	13	190	21	6.4	340	8.7
2	8.4	16	33	12	102	131	94	22	5.1	504	7.8
3	9.9	12	24	13	248	46	35	23	5.4	336	7.3
4	11	9.3	18	14	68	21	20	24	5.4	396	6.4
5	16	8.4	16	15	28	14	16	25	5.0	137	5.3
6	13	7.1	14	16	16	11	13	26	5.6	68	5.2
7	9.3	6.2	16	17	13	8.4	12	27	78	47	5.1
8	13	6.0	16	18	12	15	12	28	262	80	5.1
9	12	5.6	20	19	9.6	18	12	29	128	62	5.1
10	7.8	6.0	27	20	7.5	263	9.9	30	41	86	4.7
								31		44	4.6
Monthly mean discharge, in second-feet									40.4	88.3	22.4
Runoff, in inches									1.78	4.02	1.02

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	1.58	7.8	------	-------	1.90	22	3.55	368	5.10	565
4	------	-------	1.58	7.8	------	-------	1.91	23	3.30	300	5.30	595
6	------	-------	1.58	7.8	1.83	18	1.94	24	3.10	243	5.45	615
8	------	-------	1.58	7.8	------	-------	1.98	27	2.99	213	5.39	608
10	------	-------	1.58	7.8	------	-------	2.01	29	2.91	190	5.21	582
12 n.	------	-------	1.59	8.1	1.83	18	2.03	31	2.91	190	4.92	547
2 p.m.	------	-------	2.34	62	------	-------	5.05	560	3.05	230	4.58	508
4	------	-------	1.98	27	------	-------	5.50	620	3.61	382	4.22	467
6	------	-------	1.87	20	1.82	17	5.07	562	4.04	449	3.89	428
8	------	-------	1.80	16	------	-------	4.48	498	4.46	496	3.62	384
10	------	-------	1.79	16	------	-------	4.01	446	4.78	532	3.40	380
12 m.	------	-------	1.79	16	1.88	21	3.77	410	4.98	553	3.25	286

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	3.13	249	4.19	464	------	------	------	------	------	------	------	------
4	3.06	230	4.21	466	2.85	172	------	------	2.23	48	2.43	78
6	3.00	213	4.25	470	------	------	2.41	75	------	------	------	------
8	2.93	195	4.23	468	2.76	150	------	------	2.21	46	2.50	91
10	3.20	271	4.12	457	------	------	------	------	------	------	------	------
12 n.	3.37	321	3.97	440	2.68	131	2.37	67	2.20	45	2.50	91
2 p.m.	3.65	390	3.80	415	------	------	------	------	------	------	------	------
4	3.87	426	3.61	382	2.62	116	------	------	2.18	43	2.45	82
6	3.98	442	3.41	332	------	------	2.32	59	------	------	------	------
8	4.10	455	3.24	283	2.56	103	------	------	2.17	42	2.41	75
10	4.19	464	3.10	243	------	------	------	------	------	------	------	------
12 m.	4 20	465	2.99	211	2.49	89	2.27	53	2.31	58	2.38	68

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	------	------	------	------	------	------	------	------	------
6	2.33	61	2.59	110	2.22	47	------	------	------	------	------	------
8	------	------	------	------	------	------	------	------	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	------	------
12 n.	2.29	56	2.50	91	2.18	43	------	------	------	------	------	------
2 p.m.	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	------	------	------	------	------	------	------	------	------
6	2.27	53	2.39	72	2.14	39	------	------	------	------	------	------
8	------	------	------	------	------	------	------	------	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	------	------
12 m.	2.48	88	2.30	57	2.09	35	------	------	------	------	------	------

Supplemental records.—July 18, 1 p.m., 1.59 feet, 8.4 sec.-ft.; 3 p.m., 1.98 feet, 27 sec.-ft. July 20, 1 p.m., 4.11 feet, 456 sec.-ft.; 3 p.m., 5.49 feet, 619 sec.-ft., 3:30 p.m., 5.52 ft., 623 sec.-ft. (published to limits as 620 sec.-ft. in W. S. P. 851).

HOCKANUM RIVER AT OUTLET OF SHENIPSIT LAKE, AT ROCKVILLE, CONN.

LOCATION.—Lat. 41°52′06″, long. 72°25′56″, three-quarters of a mile east of Rockville, Tolland County.

DRAINAGE AREA.—16.5 square miles.

GAGE-HEIGHT RECORD.—One reservoir gage reading daily in morning except Sundays. Gage height at midnight determined from graph of gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow over spillway and through pumps, venturi meter, wheel, and gate.

REMARKS.—Daily and monthly mean discharges adjusted for change in contents of Shenipsit Lake. No corrections made for evaporation from lake surface. Basic data furnished by Rockville Water & Aqueduct Co.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	June			July			August		
	Observed	Change in Contents	Adjusted	Observed	Change in Contents	Adjusted	Observed	Change in Contents	Adjusted
1	33	−13	20	42	−22	20	33	−22	11
2	31	−9	22	22	−3	19	33	−22	11
3	34	−9	25	11	+3	14	33	−22	11
4	10	+13	23	20	−9	11	33	−22	11
5	9	+13	22	36	−28	8	44	−35	9

Discharge, in second-feet, and change in contents in equivalent second-feet, 1938 —Continued

Day	June			July			August		
	Observed	Change in Contents	Adjusted	Observed	Change in Contents	Adjusted	Observed	Change in Contents	Adjusted
6	33	−13	20	33	−28	5	14	−6	8
7	33	−13	20	33	−28	5	28	−13	15
8	34	−16	18	33	−28	5	33	−13	20
9	33	−19	14	7	−3	4	33	0	33
10	32	−19	13	0	+3	3	33	−6	27
11	6	+60	66	31	−25	6	33	+19	52
12	25	+107	132	33	−25	8	44	−6	38
13	74	+16	90	33	−19	14	21	0	21
14	68	−25	43	34	−22	12	0	+16	16
15	55	−32	23	35	−24	11	31	−19	12
16	44	−25	19	3	+6	9	33	−22	11
17	34	−19	15	0	+9	9	33	−22	11
18	14	0	14	32	−21	11	33	−24	9
19	11	+3	14	35	−6	29	33	−30	3
20	33	−22	11	34	+9	43	6	−3	3
21	33	−28	5	33	+112	145	0	+3	3
22	33	−28	5	33	+136	169	31		
23	32	−28	4	57	+152	209	33		
24	32	−28	4	92	+17	109	33		
25	7	0	7	120	−34	86	33	−25	1
26	0	+9	9	91	−44	47	32		
27	31	+76	107	69	−39	30	6		
28	42	+101	143	65	−47	18	0		
29	53	−6	47	59	−44	15	31		
30	47	−22	25	18	−3	15	32		
31	--------	--------	--------	4	+9	13	32		

	June	July	August
Monthly mean discharge, in second-feet (observed)	31.9	37.0	27.3
Runoff, in inches (observed)	2.15	2.58	1.90
Monthly mean discharge, in second-feet (adjusted)	32.7	35.5	11.1
Runoff, in inches (adjusted)	2.21	2.48	.78

HOCKANUM RIVER NEAR EAST HARTFORD, CONN.

LOCATION.—Lat. 41°46′57″, long. 72°35′20″, at Case & Marshall paper mill, 1½ miles downstream from South Branch of Hockanum River, and 2¾ miles east of East Hartford, Hartford County. Datum of gage is 54.5 feet above mean sea level, (general adjustment of 1929, levels by Department of Engineering, City of Hartford).

DRAINAGE AREA.—74.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 781 second-feet 1 to 2 a.m. July 24 (gage height, 5.39 feet).

1919-21, 1928 to June 1938: Discharge, 2,140 second-feet Jan. 25, 1938 gage height, 8.79 feet).

REMARKS.—Flow affected by storage in Shenipsit Lake (see record for Hockanum River at outlet of Shenipsit Lake, at Rockville, Conn.).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	127	173	219	11	61	100	208	21	104	291	44
2	121	101	158	12	55	75	211	22	93	457	79
3	142	43	132	13	193	99	109	23	89	510	83
4	123	73	130	14	208	130	59	24	108	674	82
5	51	151	125	15	188	143	139	25	89	541	62
6	83	144	99	16	168	77	119	26	46	425	97
7	112	81	48	17	188	20	114	27	112	368	65
8	149	82	148	18	106	103	124	28	264	307	41
9	128	58	177	19	41	168	133	29	252	271	58
10	91	33	148	20	75	173	83	30	222	181	60
								31		155	72
Monthly mean discharge, in second-feet									126	200	111
Runoff, in inches									1.89	3.09	1.72

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.45	52	0.91	12	2.35	152	2.01	109	2.50	173	3.66	372
4	1.45	52	.93	13	2.20	132	1.88	94	2.53	178	3.44	328
6	1.01	18	.95	14	2.08	118	1.86	92	2.62	191	3.69	378
8	.94	13	1.78	83	1.99	107	1.81	86	2.72	206	3.80	400
10	.90	11	1.77	82	2.15	126	1.92	98	3.00	250	4.13	469
12 n.	.88	10	1.82	87	2.52	176	2.34	151	3.27	297	4.34	518
2 p.m.	.86	9	1.94	101	2.86	228	2.76	212	3.42	324	4.46	546
4	.85	8	2.45	166	3.04	256	3.14	273	3.60	360	4.48	551
6	.84	8	2.67	198	2.93	239	3.15	275	3.73	386	4.32	513
8	.85	8	2.68	200	2.59	186	3.12	270	3.81	402	4.25	496
10	.86	9	2.60	188	2.32	148	3.00	250	3.86	412	4.17	477
12 m.	.89	11	2.46	167	2.14	125	2.73	208	3.87	414	4.09	460
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.90	420	5.39	781	4.61	582	4.00	440	3.61	362	3.49	338
4	3.73	386	5.31	761	4.56	570	3.89	418	3.46	332	3.36	313
6	3.66	372	5.20	732	4.49	554	3.86	412	3.42	324	3.20	284
8	3.62	364	5.09	703	4.47	549	4.11	464	3.70	380	3.09	264
10	3.62	364	4.99	677	4.55	568	4.10	462	3.73	386	3.11	268
12 n.	3.93	426	4.90	654	4.60	580	4.11	464	3.79	398	3.18	280
2 p.m.	4.27	501	4.84	638	4.55	568	4.06	453	3.76	392	3.27	297
4	4.61	582	4.79	626	4.44	542	3.86	412	3.72	384	3.37	315
6	4.84	638	4.76	618	4.26	498	3.73	386	3.67	374	3.42	324
8	5.08	701	4.72	609	4.18	480	3.71	382	3.60	360	3.43	326
10	5.27	750	4.69	602	4.14	471	3.71	382	3.59	358	3.45	330
12 m.	5.37	776	4.65	592	4.10	462	3.70	380	3.57	354	3.45	330
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.37	315	3.23	289	2.21	133	2.37	155	2.57	184	2.10	120
4	3.23	289	3.07	261	2.27	141	2.36	153	2.41	160	2.01	109
6	3.11	268	2.95	242	2.33	149	2.35	152	2.27	141	1.93	100
8	3.01	252	2.68	200	2.36	153	2.66	197	2.15	126	1.87	93
10	3.00	250	2.61	190	2.39	158	2.77	214	2.15	126	1.90	96
12 n.	3.01	252	2.51	174	2.43	163	2.95	242	2.26	140	2.04	113
2 p.m.	3.02	253	2.39	158	2.45	166	3.06	260	2.37	155	2.19	131
4	3.00	250	2.07	116	2.45	166	3.14	273	2.54	179	2.37	155
6	2.98	247	2.03	112	2.44	165	3.16	277	2.61	190	2.59	186
8	3.08	263	2.03	112	2.43	163	3.10	266	2.48	170	2.54	179
10	3.22	288	2.08	118	2.41	160	2.87	229	2.35	152	2.41	160
12 m.	3.34	309	2.15	126	2.39	158	2.73	208	2.22	135	2.27	141

Supplemental records.—July 17, 5:30 a.m., 1.45 ft., 52 sec.-ft.; July 20, 9 a.m., 1.80 ft., 85 sec.-ft.; 5 p.m., 3.20 ft., 284 sec.-ft.; July 30, 2:20 p.m., 2.13 ft., 124 sec.-ft.; Aug. 1, 6:20 a.m., 2.75 ft., 210 sec.-ft.

SALMON RIVER NEAR EAST HAMPTON, CONN.

LOCATION.—Lat. 41°33'14", long. 72°27'00", at Comstock Bridge, on Hartford-Middlesex County line, 0.7 mile downstream from Dickinson Creek, 3½ miles southeast of East Hampton, Middlesex County.

DRAINAGE AREA.—105 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods when records were destroyed by mice, June 24 to July 4, July 15 to 11 a.m. Aug. 2, and Aug. 12; graph computed on basis of fragmentary records, hourly records of operation of Connecticut Light and Power Co. plant 4 miles below station, records for East Branch of Eightmile River near North Lyme, floodmark, and shape of previous peaks.

STAGE-DISCHARGE RELATION.—Defined by current meter measurements below 500 second-feet; extended to peak stage on basis of shape of previous and subsequent rating curves.

MAXIMA.—July 1938: Discharge, 6,300 second-feet 8 p.m. July 23 (gage height, 6.5 feet, from floodmark).

1905-6, 1928 to June 1938: Discharge, 6,250 second-feet Mar. 12, 1936 (gage height, 6.98 feet, ice jam).

REMARKS.—Flood discharge not materially affected by storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	145	240	217	11	109	60	903	21	54	873	142
2	123	200	189	12	178	67	550	22	49	933	128
3	120	170	161	13	278	64	320	23	49	3,120	113
4	123	130	142	14	191	57	230	24	48	2,660	103
5	159	101	131	15	123	100	188	25	48	746	93
6	133	82	131	16	97	135	180	26	50	502	86
7	108	71	136	17	86	111	371	27	390	401	86
8	103	64	494	18	80	126	282	28	1,200	348	80
9	95	57	716	19	73	252	208	29	950	310	75
10	80	67	390	20	62	642	165	30	380	279	69
								31		245	67
Monthly mean discharge, in second-feet									189	426	231
Runoff, in inches									2.01	4.68	2.54

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
Hour	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.												
4	1.07	120	0.98	98	1.25	170	1.43	230	2.30	660	2.80	1,050
6												
8	1.06	115	.97	96	1.67	330	1.85	420	2.23	620	2.80	1,050
10												
12 n.	1.04	110	1.00	100	1.58	290	2.75	1,000	2.19	600	2.72	980
2 p.m.												
4	1.02	105	1.19	150	1.54	270	2.65	920	3.00	1,200	2.57	860
6												
8	1.01	105	1.29	180	1.49	250	2.50	800	3.05	1,250	2.45	760
10												
12 m.	1.00	100	1.22	160	1.46	240	2.38	720	2.90	1,100	2.35	700

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	2.32	680	5.8	5,000								
4	2.28	660	5.4	4,300	2.60	880	2.10	540	1.87	420	1.74	360
6	2.47	780	5.0	3,600								
8	3.00	1,200	4.7	3,200	2.47	780	2.05	520	1.84	410	1.72	350
10	3.70	1,900	4.35	2,700								
12 n.	4.35	2,700	4.05	2,300	2.38	720	2.01	500	1.82	400	1.71	350
2 p.m.	5.0	3,600	3.80	2,000								
4	5.65	4,700	3.50	1,700	2.29	660	1.98	480	1.80	390	1.70	340
6	6.15	5,600	3.25	1,450								
8	6.5	6,300	3.05	1,250	2.22	620	1.94	460	1.78	380	1.69	340
10	6.45	6,200	2.95	1,150								
12 m.	6.15	5,600	2.80	1,050	2.16	580	1.90	440	1.76	370	1.67	330
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.												
4												
6	1.65	320	1.57	290	1.49	250	1.41	225	1.34	200	1.26	172
8												
10												
12 n.	1.63	310	1.55	280	1.47	245	1.39	215	1.32	191	1.23	162
2 p.m.												
4												
6	1.61	300	1.53	270	1.45	240	1.37	210	1.27	175	1.20	153
8												
10												
12 m.	1.59	290	1.51	260	1.43	230	1.36	205	1.26	172	1.17	145

EAST BRANCH OF EIGHTMILE RIVER NEAR NORTH LYME, CONN.

LOCATION.—Lat. 41°25′40″, long. 72°20′05″, at highway bridge 0.4 mile upstream from confluence with West Branch of Eightmile River, 1.1 miles north of North Lyme, New London County, and 5½ miles upstream from mouth of Eightmile River.

DRAINAGE AREA.—22.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 300 second-feet; extended to peak stage on basis of flow characteristics at control section.

MAXIMA.—July 1938: Discharge, 897 second-feet noon July 24 (gage height, 4.92 feet).

September 1937 to June 1938: Discharge, 1,010 second-feet Nov. 29, 1937 (gage height, 5.25 feet).

REMARKS.—Flood discharge affected by storage in several small ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	27	78	52	11	17	21	116	21	12	55	45
2	24	54	46	12	41	17	159	22	11	107	38
3	23	44	40	13	50	16	86	23	10	188	34
4	24	36	35	14	40	15	57	24	10	794	30
5	29	29	37	15	27	28	45	25	10	549	26
6	30	24	52	16	21	29	40	26	10	245	23
7	24	20	67	17	19	20	95	27	22	155	21
8	21	18	59	18	17	21	130	28	137	112	21
9	19	16	114	19	16	28	82	29	278	88	18
10	16	22	90	20	14	35	59	30	162	76	17
								31		63	16
Monthly mean discharge, in second-feet									38.7	96.9	56.5
Runoff, in inches									1.96	5.07	2.96

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.												
4									1.24	48	1.56	81
6			0.83	17	1.01	29	0.98	27				
8									1.25	48	1.70	97
10												
12 n.	0.89	20	.89	20	1.01	29	1.08	34	1.25	48	1.83	114
2 p.m.												
4									1.31	54	1.91	125
6			.94	24	1.00	28	1.19	43				
8									1.49	73	1.91	125
10												
12 m.	.82	16	1.00	28	.99	27	1.22	46	1.51	75	1.88	121
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	1.84	116	3.66	508	4.55	775						
4	1.82	113	4.30	700	4.43	739	2.80	282				
6	1.90	124	4.70	820	4.21	673			2.20	169		
8	2.00	138	4.89	886	4.03	619	2.71	263				
10	2.07	148	4.91	894	3.90	580						
12 n.	2.08	150	4.92	897	3.79	547	2.60	241	2.10	153	1.80	110
2 p.m.	2.14	159	4.90	890	3.61	493						
4	2.30	186	4.81	858	3.45	445	2.50	222				
6	2.45	213	4.76	841	3.40	430			2.00	138		
8	2.64	249	4.70	820	3.23	382	2.41	206				
10	3.21	378	4.67	811	3.08	346						
12 m.	3.39	427	4.61	793	2.99	325	2.31	188	1.94	130	1.70	97

Supplemental records.—July 23, 11 p.m., 3.38 ft., 424 sec.-ft.; July 24, 1 a.m., 3.41 ft., 433 sec.-ft.; 5 a.m., 4.59 ft., 787 sec.-ft.; 11 a.m., 4.90 ft., 890 sec.-ft.; July 25, 5 p.m., 3.39 ft., 427 sec.-ft.

WEST BRANCH OF EIGHTMILE RIVER NEAR NORTH LYME, CONN.

LOCATION.—Lat. 41°25′55″, long. 72°20′10″, on highway bridge, 300 feet upstream from confluence with East Branch of Eightmile River, 1½ miles north of North Lyme, New London County, and 5½ miles upstream from mouth of Eightmile River.

DRAINAGE AREA.—19.2 square miles.

GAGE-HEIGHT RECORD.—Staff gage read once or twice daily. Gage-height graph based on gage readings and comparison with record for station on East Branch used June 4, 6, 11, 14, 15, 26-30, July 1, 3, 6-31, Aug. 1-27.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 225 second-feet; extended to peak stage on basis of determination of September 1938 peak flow at bridge half a mile above station.

MAXIMA.—July 1938: Discharge, 785 second-feet 8 a.m. July 24 (gage height, 6.20 feet, from graph based on gage readings).

September 1937 to June 1938: Discharge, 1,020 second-feet Nov. 29, 1937 (gage height, 6.8 feet, from floodmarks).

REMARKS.—Flood discharge not affected by artificial storage. Shaw Lake (Lake Hayward) controls headwater discharge to some extent.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	29	61	55	11	22	19	176	21	12	74	45
2	25	44	48	12	41	18	147	22	10	114	40
3	23	36	41	13	52	16	89	23	10	253	33
4	24	29	37	14	31	16	63	24	10	732	32
5	31	26	56	15	22	24	49	25	9.5	410	26
6	29	22	72	16	19	23	44	26	9.8	214	23
7	24	18	70	17	18	16	136	27	33	150	18
8	22	16	56	18	16	19	119	28	145	118	18
9	19	14	119	19	15	23	78	29	248	97	17
10	16	26	78	20	13	32	56	30	122	79	15
								31		64	15
Monthly mean discharge, in second-feet									36.7	90.4	60.4
Runoff, in inches									2.13	5.43	3.63

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.												
4									1.38	36	2.06	96
6			1.05	16			1.18	23	a1.36	34	c2.34	122
8			a1.06	16	a1.16	22	a1.18	23	1.37	35	2.37	125
10												
12 n.	1.07	16	1.12	19	1.16	22	1.28	29	1.65	56	2.52	135
2 p.m.												
4									2.24	114	2.35	123
6			1.19	23	b1.16	22	1.50	44				
8	1.02	14	1.20	24			1.52	46	2.42	128	2.16	106
10												
12 m.	1.01	14	1.21	25	1.16	22	1.48	43	2.13	103	2.10	100

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.												
4	2.20	110	6.15	768								
6					5.2	495						
8	2.55	138	6.20	785	c5.04	458	a3.60	230				
10												
12 n.	2.75	153	6.15	768	4.7	391	3.4	209	2.7	149	2.3	119
2 p.m.												
4	3.65	236	6.05	732								
6					4.25	316						
8	5.14	480	5.90	685	4.10	294	3.14	185	2.50	134	2.20	110
10												
12 m.	5.95	700	5.65	610	3.9	267	3.0	173	2.45	130	2.15	105

*a*Gage height at 7:00 a.m.
*b*Gage height at 6:45 a.m.
*c*Gage height at 7:30 a.m.
NOTE.—All gage readings are included in above table.

QUINNIPIAC RIVER BASIN

QUINNIPIAC RIVER AT WALLINGFORD, CONN.

LOCATION.—Lat. 41°26′58″, long. 72°50′29″, 0.4 mile downstream from Quinnipiac Street bridge in Wallingford, New Haven County and 2 miles upstream from Worton Brook.

DRAINAGE AREA.—109 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 1,460 second-feet 9 p.m. July 24 (gage height, 6.00 feet).

1930 to June 1938: Discharge, 3,240 second-feet Mar. 12, 1936 (gage height, 8.2 feet).

REMARKS.—Flood discharge affected by storage and regulation in several small ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	187	254	322	11	199	169	437	21	159	336	202
2	179	222	305	12	229	176	540	22	156	411	200
3	183	210	267	13	249	78	375	23	152	800	190
4	194	205	210	14	257	58	281	24	142	1,320	182
5	205	196	210	15	210	52	252	25	138	1,120	172
6	203	192	215	16	193	50	265	26	151	681	161
7	193	190	220	17	181	112	295	27	198	468	150
8	199	184	218	18	187	137	277	28	388	404	150
9	190	182	254	19	187	281	254	29	554	364	153
10	181	185	285	20	172	360	215	30	359	350	156
								31		334	153
Monthly mean discharge, in second-feet									212	325	244
Runoff, in inches									2.16	3.44	2.58

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.23	96	1.29	111	1.77	236	2.23	332	2.34	355	2.28	343
4	1.28	109	1.29	111	1.87	258	2.26	339	2.30	347	2.25	336
6	1.30	114	1.30	114	1.91	267	2.26	339	2.25	336	2.33	353
8	1.31	117	1.30	114	1.93	271	2.33	353	2.22	330	2.42	372
10	1.33	122	1.44	153	2.14	313	2.35	358	2.37	362	2.56	402
12 n.	1.34	125	1.50	169	2.12	309	2.41	370	2.30	347	2.67	424
2 p.m.	1.33	122	1.52	174	1.88	261	2.57	404	2.10	305	2.74	438
4	1.31	117	1.58	190	2.12	309	2.57	404	2.15	316	2.82	454
6	1.29	111	1.29	111	1.97	279	2.37	362	2.19	324	2.84	458
8	1.29	111	1.20	88	2.03	291	2.34	355	2.21	328	2.89	468
10	1.29	111	1.43	150	2.11	307	2.37	362	2.23	332	2.94	478
12 m.	1.29	111	1.71	222	2.18	322	2.37	362	2.21	328	2.96	482
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	2.98	486	5.54	1,230	5.84	1,380	4.45	825	3.19	528	2.65	420
4	3.01	492	5.53	1,220	5.74	1,330	4.34	792	3.11	512	2.64	418
6	3.01	492	5.53	1,220	5.64	1,280	4.22	756	3.03	496	2.63	416
8	3.08	506	5.55	1,240	5.52	1,220	4.09	722	2.96	482	2.63	416
10	3.74	643	5.61	1,260	5.46	1,190	3.97	693	2.90	470	2.63	416
12 n.	3.86	669	5.65	1,280	5.25	1,100	3.86	669	2.87	464	2.65	420
2 p.m.	4.39	807	5.72	1,320	5.14	1,060	3.75	645	2.82	454	2.74	438
4	5.08	1,030	5.80	1,360	5.03	1,010	3.64	621	2.77	444	2.58	406
6	5.38	1,150	5.90	1,410	4.91	964	3.54	599	2.73	436	2.49	387
8	5.54	1,230	5.99	1,460	4.79	927	3.45	580	2.68	426	2.42	372
10	5.57	1,240	5.99	1,460	4.68	894	3.36	562	2.66	422	2.35	358
12 m.	5.54	1,230	5.93	1,420	4.57	861	3.27	544	2.65	420	2.33	353
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	----	----	----	----	----	----	----	----	2.13	311	----	----
4	2.31	349	2.38	364	2.25	336	2.21	328	2.13	311	2.03	291
6	----	----	----	----	----	----	----	----	2.14	313	----	----
8	2.36	360	2.36	360	2.25	336	2.20	326	2.14	313	2.03	291
10	----	----	----	----	----	----	----	----	2.15	316	----	----
12 n.	2.43	374	2.31	349	2.25	336	2.21	328	2.15	316	2.03	291
2 p.m.	----	----	----	----	----	----	----	----	2.23	332	----	----
4	2.42	372	2.27	341	2.23	332	2.17	320	2.13	311	1.90	265
6	----	----	----	----	----	----	----	----	1.96	277	----	----
8	2.40	368	2.25	336	2.22	330	2.13	311	1.97	279	1.68	215
10	----	----	----	----	----	----	----	----	2.00	285	----	----
12m.	2.40	368	2.25	336	2.22	330	2.13	311	2.02	289	1.65	208

Supplemental records.—July 18, 1:20 p.m., 1.31 ft., 117 sec.-ft.; 5:15 p.m., 1.55 ft., 182 sec.-ft.; July 24, 9 p.m., 6.00 ft., 1,460 sec.-ft.

HOUSATONIC RIVER BASIN

HOUSATONIC RIVER AT COLTSVILLE, MASS.

LOCATION.—Lat. 42°28′10″, long. 73°11′50″, in Coltsville, Berkshire County, 1 mile upstream from Unkamet Brook and 2 miles northeast of Pittsfield. Datum of gage is 993.49 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—57.1 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,060 second-feet 4 p.m. July 23 (gage height, 7.65 feet).

1936 to June 1938: Discharge, 6,000 second-feet Mar. 18, 1936 (gage height, 10.14 feet), from rating curve extended on basis of computation of flow over dam.

REMARKS.—Flood discharge not materially affected by artificial or natural storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	50	63	141	11	62	43	417	21	61	372	60
2	43	65	218	12	464	173	274	22	58	751	90
3	50	64	134	13	814	102	125	23	55	1,160	88
4	34	47	95	14	373	65	96	24	52	732	103
5	39	52	90	15	164	65	103	25	29	328	91
6	38	50	54	16	101	60	108	26	35	196	78
7	56	38	132	17	87	48	101	27	199	132	36
8	74	41	144	18	54	138	109	28	285	118	41
9	73	34	135	19	54	272	114	29	147	228	77
10	39	50	159	20	74	304	57	30	79	274	58
								31		169	51
Monthly mean discharge, in second-feet									125	2.01	115
Runoff, in inches									2.44	4.06	2.32

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	2.65	48	2.68	50	4.07	296	3.66	200	3.70	209	4.44	399
12 n.	2.61	45	2.73	55	4.06	293	4.46	405	4.72	486	5.80	915
6 p.m.	2.64	47	3.88	249	3.88	249	4.24	341	4.74	493	6.20	1,110
12 m.	2.84	66	4.10	303	3.75	220	3.96	268	4.30	358	5.42	748
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.84	525	5.69	866	4.48	411	3.73	216	3.52	170	3.26	122
12 n.	6.12	1,070	5.38	732	4.22	336	3.65	198	2.97	80	3.25	120
6 p.m.	7.52	1,960	4.94	559	3.87	247	3.57	181	3.35	137	3.21	114
12 m.	6.32	1,180	4.62	454	3.76	222	3.55	176	3.31	130	3.24	118
	July 29		July 30		July 31							
6 a.m.	3.34	135	3.91	256	3.60	187						
12 n.	3.68	205	3.99	276	3.51	168						
6 p.m.	4.28	352	3.85	242	3.40	146						
12 m.	4.30	358	3.71	211	3.32	132						

Supplemental discharges.—July 22, 2 p.m., 6.50 ft., 1,280 sec.-ft.; July 23, 6:40 a.m., 4.55 ft., 432 sec.-ft.; 9:00 a.m., 5.23 ft., 672 sec.-ft.; 4 p.m., 7.65 ft., 2,060 sec.-ft.; 9 p.m., 6.47 ft., 1,250 sec.-ft.; July 24, 3 a.m., 5.92 ft., 970 sec.-ft.

HOUSATONIC RIVER NEAR GREAT BARRINGTON, MASS.

LOCATION.—Lat. 42°13'45", long. 73°21'35", just upstream from Williams River, and highway bridge at Van Deusenville and 2 miles north of Great Barrington, Berkshire County. Datum of gage is 683.04 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—280 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 3,420 second-feet 2 a.m. to 6 a.m. July 25 (gage height, 7.10 feet).

1913 to June 1938: Discharge, 8,990 second-feet Mar. 19, 1936 (gage height, 10.60 feet), from rating curve extended on basis of computation of flow over dam.

REMARKS.—Flood discharge affected by artificial and natural storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	466	544	1,180	11	364	147	1,170	21	414	694	210
2	425	427	1,460	12	504	315	1,380	22	422	1,020	298
3	370	321	1,180	13	1,470	458	1,180	23	280	1,780	398
4	283	160	945	14	2,010	471	809	24	252	3,030	418
5	124	292	797	15	1,570	391	691	25	280	3,220	430
6	153	344	652	16	1,050	272	640	26	222	2,380	450
7	246	280	476	17	790	137	570	27	468	1,490	226
8	368	233	546	18	599	249	568	28	1,140	1,050	32
9	380	302	690	19	356	572	660	29	1,050	1,130	304
10	360	343	779	20	291	693	487	30	779	1,900	322
								31		1,460	319
Monthly mean discharge, in second-feet									583	842	654
Runoff, in inches									2.32	3.47	2.70

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
6 a.m.	2.20	113	2.21	116	3.04	445	3.45	675	3.33	603	3.83	904
12 n.	2.12	97	2.62	248	3.21	536	3.48	693	3.37	627	4.09	1,070
6 p.m.	2.33	148	2.71	286	3.44	669	3.45	675	3.60	765	4.15	1,110
12 m.	2.37	161	2.94	395	3.50	705	3.39	639	3.70	825	4.36	1,250
	July 23		July 24		July 25		July 26		July 27		July 28	
6 a.m.	4.58	1,410	6.49	2,850	7.10	3,420	6.24	2,650	4.95	1,670	4.17	1,130
12 n.	4.82	1,580	6.73	3,060	7.02	3,340	5.89	2,380	4.72	1,500	4.10	1,080
6 p.m.	5.65	2,200	6.91	3,230	6.80	3,120	5.54	2,120	4.37	1,260	3.96	988
12 m.	6.15	2,580	7.08	3,400	6.55	2,900	5.26	1,900	4.22	1,160	3.38	937
	July 29		July 30		July 31		August 1		August 2		August 3	
6 a.m.	3.93	970	5.27	1,910	4.84	1,590	4.20	1,140	4.71	1,500	4.36	1,250
12 n.	4.05	1,050	5.35	1,970	4.68	1,480	4.17	1,130	4.64	1,450	4.27	1,190
6 p.m.	4.30	1,210	5.22	1,880	4.50	1,350	4.20	1,140	4.57	1,400	4.18	1,130
12 m.	4.91	1,640	5.03	1,730	4.32	1,220	4.55	1,380	4.46	1,320	4.00	1,020
	August 4		August 5		August 6		August 7					
6 a.m.	3.90	950	3.65	795	3.57	747	3.04	445				
12 n.	3.85	918	3.63	783	3.47	687	3.11	480				
6 p.m.	3.85	918	3.64	789	3.35	615	3.14	497				
12 m.	3.72	837	3.54	729	3.20	530	3.12	486				

HOUSATONIC RIVER AT FALLS VILLAGE, CONN.

LOCATION.—Lat. 41°57′15″, long. 73°22′05″, at Falls Village, Litchfield County, half a mile downstream from power plant of Connecticut Power Co., and 1¼ miles downstream from Hollenbeck River. Datum of gage is 522.41 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—632 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 4,580 second-feet 6 p.m. July 25 (gage height, 8.72 feet).

1912 to June 1938: Discharge, 14,500 second-feet Mar. 20, 1936 (gage height, 17.41 feet).

REMARKS.—Flood discharge affected by storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	520	1,930	2,920	11	680	678	2,540	21	551	1,300	1,110
2	691	1,260	2,870	12	861	607	3,170	22	554	2,200	840
3	598	1,100	2,840	13	1,140	810	2,820	23	580	3,230	634
4	610	950	2,390	14	2,190	960	2,300	24	472	4,120	667
5	468	650	1,990	15	2,470	868	1,830	25	414	4,420	697
6	389	542	1,580	16	2,170	832	1,580	26	584	4,360	700
7	338	621	1,380	17	1,540	576	1,220	27	1,600	3,790	706
8	608	596	1,170	18	1,230	430	1,150	28	4,000	2,880	534
9	630	571	1,630	19	1,060	747	1,240	29	3,720	2,160	352
10	636	592	1,940	20	768	923	1,220	30	2,740	2,820	393
								31		3,260	460
Monthly mean discharge, in second-feet									1,160	1,638	1,512
Runoff, in inches									2.05	2.99	2.76

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	------	------	------	------	------	------	------	3.69	1,220	4.08	1,440
4	------	------	------	------	------	------	------	------	3.70	1,230	4.48	1,680
6	------	------	------	------	------	------	------	------	3.36	1,060	4.77	1,850
8	------	------	------	------	------	------	------	------	3.74	1,250	4.96	1,970
10	------	------	------	------	------	------	------	------	3.81	1,280	5.09	2,040
12 n.	------	------	------	------	------	------	------	------	3.86	1,310	5.27	2,150
2 p.m.	------	------	------	------	------	------	3.55	1,160	3.96	1,370	5.74	2,430
4	------	------	------	------	------	------	3.55	1,160	4.04	1,410	5.97	2,580
6	------	------	------	------	------	------	3.56	1,160	4.06	1,430	6.08	2,660
8	------	------	------	------	------	------	3.64	1,200	4.03	1,410	6.17	2,720
10	------	------	------	------	------	------	3.67	1,220	3.99	1,380	6.26	2,780
12 m.	------	------	------	------	------	------	3.68	1,220	3.97	1,370	6.34	2,840

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	6.37	2,860	7.88	3,920	8.45	4,360	8.57	4,460	8.14	4,110	6.90	3,230
4	6.40	2,880	7.89	3,920	8.48	4,380	8.56	4,450	8.08	4,060	6.80	3,160
6	6.42	2,890	7.94	3,960	8.48	4,380	8.55	4,440	7.99	3,990	6.71	3,100
8	6.43	2,900	8.01	4,010	8.48	4,380	8.53	4,420	7.93	3,950	6.60	3,020
10	6.41	2,890	8.10	4,080	8.48	4,380	8.50	4,400	7.83	3,880	6.50	2,950
12 n.	6.45	2,920	8.17	4,140	8.48	4,380	8.49	4,390	7.73	3,810	6.37	2,860
2 p.m.	6.78	3,150	8.24	4,190	8.49	4,390	8.46	4,370	7.65	3,760	6.25	2,780
4	7.17	3,420	8.29	4,230	8.53	4,420	8.41	4,330	7.52	3,660	6.16	2,710
6	7.62	3,730	8.34	4,270	8.72	4,580	8.38	4,300	7.41	3,590	6.11	2,680
8	7.83	3,880	8.38	4,300	8.65	4,520	8.31	4,250	7.29	3,500	6.04	2,630
10	7.86	3,900	8.40	4,320	8.58	4,460	8.26	4,210	7.16	3,410	5.96	2,570
12 m.	7.87	3,910	8.44	4,350	8.57	4,460	8.19	4,150	7.01	3,310	5.86	2,510

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	5.78	2,460	5.48	2,280	7.00	3,300	6.68	3,080	------	------	------	------
4	5.67	2,390	5.63	2,370	7.03	3,320	6.65	3,060	------	------	------	------
6	5.56	2,330	5.82	2,480	7.03	3,320	6.58	3,010	------	------	------	------
8	5.40	2,230	6.02	2,610	7.00	3,300	6.55	2,980	------	------	------	------
10	5.09	2,040	6.33	2,830	7.01	3,310	6.36	2,850	------	------	------	------
12 n.	4.95	1,960	6.48	2,940	6.97	3,280	6.32	2,820	------	------	------	------
2 p.m.	4.92	1,940	6.59	3,010	6.97	3,280	6.38	2,870	------	------	------	------
4	4.93	1,950	6.67	3,070	6.95	3,260	6.33	2,830	------	------	------	------
6	5.12	2,060	6.74	3,120	6.93	3,250	6.22	2,750	------	------	------	------
8	5.12	2,060	6.82	3,170	6.84	3,190	6.47	2,930	------	------	------	------
10	5.18	2,100	6.87	3,210	6.75	3,120	6.41	2,890	------	------	------	------
12 m.	5.35	2,200	6.98	3,290	6.74	3,120	6.35	2,840	------	------	------	------

ZOAR LAKE AT STEVENSON, CONN.

LOCATION.—Staff gage, lat. 41°22′55″, long. 73°10′05″, on Housatonic River at Stevenson Dam of Connecticut Light & Power Co., at Stevenson, Fairfield County.

DRAINAGE AREA.—1,544 square miles.

REMARKS.—Change of contents in equivalent second-feet computed from elevations of lake at midnight as furnished by Connecticut Light & Power Co., Waterbury, Conn.

Change in contents, in equivalent second-feet, 1938

Day	June	July	August
1	−205	−738	−267
2	+102	+366	−53
3	+155	−53	−53
4	−614	+106	−474
5	+771	0	+157
6	+52	−472	+105
7	0	−310	−105
8	−312	+51	−104
9	−51	−51	−157
10	−307	+782	+261
11	0	−211	+1340
12	+932	0	−165
13	−157	−209	−325
14	+263	−311	−323
15	+53	−102	−372
16	−159	+414	−419
17	−727	+157	+313
18	+257	−104	−209
19	+470	−104	+315
20	−624	+104	−884
21	0	+1500	−306
22	−51	−55	+152
23	+154	+220	−152
24	0	−274	+255
25	0	+220	+51
26	−51	−274	+517
27	+312	0	0
28	+1060	−108	+52
29	+216	−270	+52
30	−592	−54	−52
31		0	−209

	June	July	August
Change in contents, in equivalent second-feet--------	+31.6	+7.10	−34.2

HOUSATONIC RIVER AT STEVENSON, CONN.

LOCATION.—Lat. 41°23'05", long. 73°09'55", in New Haven County, a quarter of a mile upstream from Eightmile Brook and a quarter of a mile downstream from Stevenson Dam of Connecticut Light & Power Co. at Stevenson, Fairfield County. Datum of gage is 24.98 feet above mean sea level (general adjustment of 1929), levels by Corps of Engineers, U. S. Army.

DRAINAGE AREA.—1,545 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 18,700 second-feet 6 a.m. July 24 (gage height, 12.84 feet).

1928 to June 1938: Discharge, 69,500 second-feet Mar. 12, 1936 (gage height, 23.5 feet, from floodmarks).

REMARKS.—Flow affected by artificial storage and diversion. For information on storage and diversion see records for Zoar Lake at Stevenson, Conn., Rocky River at outlet of Candlewood Lake, near New Milford, Conn., and for Shepaug River at outlet of Shepaug Reservoir, at Woodville, Conn.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	1,420	5,120	6,050	11	1,410	1,740	10,600	21	1,780	5,060	2,980
2	1,130	3,340	5,850	12	3,130	1,730	10100	22	1,400	15,600	2,250
3	1,590	2,930	5,300	13	3,760	2,120	7,710	23	1,020	13,700	2,230
4	2,160	2,390	5,140	14	3,260	2,160	6,220	24	1,310	16,200	1,500
5	712	1,980	3,910	15	3,870	2,180	5,280	25	1,260	12,000	1,760
6	1,410	2,190	3,800	16	3,800	1,410	4,560	26	1,200	10,400	1,400
7	1,200	1,710	4,140	17	3,720	1,340	3,620	27	2,710	8,610	1,500
8	1,980	1,460	3,680	18	2,040	1,400	3,310	28	8,020	8,800	1,390
9	1,540	1,520	4,740	19	1,500	2,380	3,300	29	8,070	6,830	1,170
10	1,750	987	4,140	20	2,340	2,850	3,980	30	6,530	6,370	1,280
								31		6,120	1,400
Monthly mean discharge, in second-feet									2,567	4,923	4,009
Runoff, in inches									1.85	3.68	2.99

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.50	-------	2.00	-------	2.90	-------	0.80	-------	3.35	955	12.20	16,500
4	.80	-------	.85	-------	3.20	-------	.70	-------	3.43	1,010	11.91	15,500
6	.73	-------	3.14	-------	3.30	-------	.68	-------	3.60	1,130	10.89	12,800
8	4.80	-------	5.93	-------	6.86	-------	7.16	-------	7.05	5,060	12.30	16,800
10	4.70	-------	7.13	-------	5.90	-------	7.22	-------	7.20	5,300	12.23	16,600
12 n.	5.63	a1,340	2.30	a1,400	3.67	a2,380	2.20	a2,850	4.55	1,900	12.19	16,500
2 p.m.	3.85	-------	6.10	-------	7.16	-------	7.18	-------	7.21	5,320	12.11	16,200
4	2.60	-------	3.50	-------	4.76	-------	6.50	-------	7.23	5,350	12.02	15,900
6	3.91	-------	.81	-------	3.60	-------	6.50	-------	8.00	6,680	11.90	15,500
8	5.00	-------	.73	-------	6.82	-------	5.65	-------	8.55	7,720	11.75	15,000
10	5.50	-------	.69	-------	6.50	-------	5.65	-------	10.10	10,900	11.55	14,400
12 m.	2.99	-------	4.18	-------	2.30	-------	3.12	812	11.54	14,400	11.39	14,000

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 25		July 27		July 28	
2 a.m.	11.00	13,000	12.30	16,800	11.00	13,000	10.19	11,100	9.46	9,520	8.87	8,340
4	10.77	12,500	12.37	17,100	11.03	13,100	10.03	10,800	9.08	8,760	9.06	8,720
6	10.70	12,300	12.84	18,700	10.90	12,800	9.76	10,200	9.03	8,660	9.33	9,260
8	10.84	12,600	12.65	18,100	11.17	13,500	9.84	10,300	9.43	9,460	9.56	9,730
10	10.93	12,900	12.36	17,100	11.01	13,100	10.03	10,800	9.30	9,200	9.88	10,400
12 n.	10.93	12,900	12.15	16,300	10.37	11,500	9.90	10,500	9.26	9,120	9.60	9,820
2 p.m.	11.00	13,000	12.04	15,900	10.20	11,100	9.87	10,400	8.64	7,890	9.37	9,340
4	11.16	13,400	11.88	15,400	9.20	9,000	9.80	10,300	8.73	8,060	9.19	8,980
6	11.40	14,000	11.71	14,900	9.65	9,930	9.73	10,100	8.77	8,140	8.44	7,510
8	11.89	15,500	11.64	14,700	10.49	11,800	9.66	9,950	8.82	8,240	8.48	7,580
10	12.25	16,700	11.50	14,300	10.33	11,400	9.55	9,710	8.80	8,200	8.45	7,520
12 m.	12.43	17,300	11.20	13,600	10.25	11,200	9.52	9,640	8.90	8,400	8.40	7,430
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	8.34	7,320	7.90	6,500	7.15	5,220	5.85	3,340	7.28	-------	7.79	-------
4	8.27	7,180	7.72	6,180	7.10	5,140	7.75	6,230	7.20	-------	7.59	-------
6	7.95	6,590	7.72	6,180	7.25	5,380	7.82	6,360	7.33	-------	6.20	-------
8	8.32	7,280	7.74	6,210	7.95	6,590	7.82	6,360	7.66	-------	7.29	-------
10	8.04	6,750	7.77	6,270	7.83	6,370	7.77	6,270	7.73	-------	7.29	-------
12 n.	7.97	6,630	7.78	6,280	7.89	6,480	7.80	6,320	7.40	a5,850	7.00	a5,300
2 p.m.	7.98	6,640	7.92	6,540	7.80	6,320	7.80	6,320	7.70	-------	7.72	-------
4	7.93	6,550	7.92	6,540	7.97	6,630	7.76	6,250	7.60	-------	7.45	-------
6	7.95	6,590	7.89	6,480	7.77	6,270	7.78	6,280	7.77	-------	6.78	-------
8	7.98	6,640	7.89	6,480	7.90	6,500	7.77	6,270	7.72	-------	7.28	-------
10	8.00	6,680	7.88	6,460	7.83	6,370	7.79	6,300	7.72	-------	7.10	-------
12 m.	8.00	6,680	7.57	5,920	7.83	6,370	7.80	7,320	7.79	-------	7.27	-------

Supplemental records.—July 17, 7 a.m., 0.70 ft.; 7 p.m., 2.86 ft.; 9 p.m., 6.60 ft.; July 18, 1 a.m., 3.60 ft.; 5:30 a.m., 0.82 ft.; 6:30 a.m., 2.04 ft.; 11 a.m., 7.13 ft.; 1 p.m., 6.30 ft.; 11 p.m., 0.68 ft.; July 19, 3 a.m., 2.46 ft.; 6:30 a.m., 1.88 ft.; 8:30 a.m., 4.60 ft.; 1 p.m., 7.10 ft.; 3 p.m., 7.24 ft.; 7 p.m. 2.51 ft., 11 p.m. 6.50 ft.; July 20, 11 a.m., 7.23 ft., 1 p.m., 7.10 ft., 7 p.m., 5.64 ft.; 9 p.m., 6.48 ft.; July 21, 12:30 a.m., 4.51 ft., 1,870 sec.-ft.; 6:30 a.m., 2.10 ft., 370 sec.-ft.; 11:30 a.m., 7.22 ft., 5,330 sec.-ft.; 1 p.m., 7.15 ft., 5.220 sec.-ft.-ft.; July 22, 3 a.m., 12.49 ft., 17,500 sec.-ft.; 7 a.m., 12.38 ft., 17,100 sec.-ft.; July 24, 6:30 a.m., 12.43 ft., 17,300 sec.-ft.; July 25, 6:30 a.m., 11.27 ft., 13,700 sec.-ft.; 11 a.m., 10.96 ft., 13,000 sec.-ft.; 7 p.m., 10.53 ft., 11,900 sec.-ft.; July 27, 7 a.m. 9.50 ft., 9,600 sec.-ft.; 1 p.m., 8.60 ft., 7,810 sec.-ft.; 10:30 p.m., 7.96 ft., 6,610 sec.-ft.; July 28, 8:30 a.m., 10.10 ft., 10,900 sec.-ft.; July 31. 6:30 a.m., 8.01 ft., 6,700 sec.-ft.; 11 p.m., 7.25 ft., 5,380 sec.-ft.; Aug. 2, 11:20 a.m., 4.70 ft.; Aug. 3, 11:20 a.m., 4.80 ft.

*a*Mean for the day.

TENMILE RIVER NEAR GAYLORDSVILLE, CONN.

LOCATION.—Lat. 41°39′35″, long. 73°31′45″, 1 mile upstream from Connecticut-New York State line, 1½ miles upstream from mouth, and 2½ miles northwest of Gaylordsville, Litchfield County.

DRAINAGE AREA.—204 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 5,660 second-feet 9 a.m. July 22 (gage height, 8.79 feet).

1929 to June 1938: Discharge, 10,200 second-feet Mar. 12, 1936 (gage height, 11.61 feet).

REMARKS.—Flood discharge may be slightly affected by storage in several small ponds.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	148	810	658	11	150	302	1,770	21	140	1,980	388
2	140	688	880	12	658	377	1,730	22	128	5,000	336
3	146	557	666	13	665	427	1,020	23	171	3,540	297
4	148	453	522	14	522	343	810	24	228	3,660	261
5	140	388	453	15	391	285	665	25	148	2,600	233
6	134	330	416	16	304	236	572	26	135	1,770	210
7	122	276	438	17	253	199	522	27	896	1,420	200
8	163	250	416	18	210	180	514	28	2,040	1,090	185
9	161	236	502	19	181	315	600	29	1,700	938	172
10	130	330	529	20	159	397	460	30	1,140	871	165
								31		702	159
Monthly mean discharge, in second-feet									388	998	540
Runoff, in inches									2.12	5.64	3.06

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.							2.71	468	2.29	320	8.34	5,070
4			1.78	179	1.99	230	2.68	457	2.29	320	8.39	5,140
6	1.90	207							2.39	353	8.61	5,420
8			1.77	176	2.13	270	2.58	420	2.79	498	8.77	5,630
10									3.74	930	8.76	5,620
12 n.	1.87	200	1.76	174	2.24	304	2.49	388	4.98	1,720	8.60	5,410
2 p.m.									5.75	2,320	8.40	5,150
4			1.77	176	2.38	349	2.43	366	6.18	2,710	8.19	4,880
6	1.83	190							6.73	3,240	7.98	4,630
8			1.80	183	2.54	405	2.38	349	7.62	4,190	7.81	4,420
10									8.01	4,660	7.64	4,220
12 m.	1.80	183	1.89	205	2.70	464	2.32	330	8.02	4,670	7.47	4,030
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	7.29	3,830	7.30	3,840					4.65	1,480		
4	7.12	3,640	7.26	3,800	6.46	2,970	5.30	1,960	4.60	1,450	4.18	1,190
6	6.98	3,490	7.25	3,780					4.55	1,420		
8	6.86	3,370	7.26	3,800	6.25	2,780	5.17	1,860	4.53	1,400	4.09	1,130
10	6.72	3,230	7.25	3,780					4.60	1,450		
12 n.	6.68	3,190	7.22	3,750	6.03	2,580	5.03	1,750	4.65	1,480	4.01	1,090
2 p.m.	6.69	3,200	7.19	3,720					4.66	1,490		
4	6.78	3,290	7.12	3,640	5.82	2,390	4.91	1,670	4.61	1,460	3.92	1,030
6	6.95	3,460	7.02	3,530					4.51	1,390		
8	7.27	3,810	6.92	3,430	5.64	2,230	4.80	1,590	4.41	1,330	3.87	1,000
10	7.42	3,970	6.81	3,320					4.37	1,300		
12 m.	7.38	3,930	6.69	3,200	5.47	2,100	4.70	1,520	4.28	1,250	3.82	972
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.							3.21	670	3.43	775		
4	3.79	955	3.77	945	3.37	745	3.18	656	3.49	805	3.36	740
6							3.19	660	3.54	830		
8	3.75	935	3.70	910	3.33	725	3.21	670	3.63	875	3.26	692
10							3.20	665	3.73	925		
12 n.	3.71	915	3.62	870	3.28	701	3.19	660	3.79	955	3.18	656
2 p.m.	3.69	905					3.18	656	3.81	966		
4	3.71	915	3.55	835	3.23	678	3.16	647	3.80	960	3.11	624
6							3.14	638	3.76	940		
8	3.77	945	3.48	800	3.19	660	3.17	652	3.69	905	3.03	592
10							3.17	652	3.61	865		
12 m.	3.81	966	3.41	765	3.15	642	3.30	710	3.51	815	2.97	568

Supplemental records.—July 22, 9 a.m., 8.79 ft., 5,660 sec.-ft.

ROCKY RIVER AT OUTLET OF CANDLEWOOD LAKE, NEAR NEW MILFORD, CONN.

LOCATION.—Nonrecording gage and venturi meter, lat. 41°35′00″, long. 73° 26′00″, at Rocky River plant of Connecticut Light & Power Co., 1½ miles northwest of New Milford, Litchfield County.

DRAINAGE AREA.—40.4 square miles.

GAGE-HEIGHT RECORD.—One lake-gage reading usually daily at about 8 a.m. Gage height at midnight computed from gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow through venturi meters.

REMARKS.—Power plant is of pumped-storage type. Candlewood Lake stores flow of Rocky River and water pumped from Housatonic River, into which tailrace of plant discharges. Plus sign before observed discharge indicates water passed from lake through generators into Housatonic River; minus sign indicates water pumped from Housatonic River into lake. Daily and monthly mean discharges adjusted for change in contents of Candlewood Lake. No corrections for evaporation from reservoir surface, which is about 8 square miles. Negative adjusted discharge figures indicate that evaporation and seepage from reservoir exceeded the inflow. Record based on data furnished by the Connecticut Light & Power Co.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	June			July			August		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	0	+28	28	−69	+84	15	+3	+84	+87
2	0	+55	55	0	0	0	+57	0	+57
3	0	+55	55	+58	−56	2	+62	−28	+34
4	0	+83	83	+12	0	12	+79	−56	+23
5	+60	0	60	0	0	0	+22	0	+22
6	0	+55	55	0	0	0	+160	−112	+48
7	+45	0	45	0	0	0	+28	+112	+140
8	+95	−83	12	+6	0	6	+108	+28	+136
9	0	+55	55	+144	−139	5	+92	+56	+148
10	0	+28	28	+10	0	10	+14	+591	+605
11	+6	+83	89	+2	+56	58	+72	+562	+634
12	+73	+138	211	0	+28	28	0	+253	+253
13	−5	+55	50	0	+28	28	0	+225	+225
14	+12	0	12	+37	0	37	−96	+169	+73
15	0	0	0	+56	−28	28	+44	0	+44
16	0	0	0	0	+28	28	+52	−28	+24
17	0	0	0	0	+28	28	+251	−225	+26
18	+9	0	9	+125	−84	41	0	0	0.0
19	0	0	0	+203	+56	259	0	0	0.0
20	0	0	0	+45	+84	129	0	0	0.0
21	+209	−194	15	+16	+697	713	0	0	0.0
22	+214	−194	20	+21	+809	830	0	0	0.0
23	0	0	0	+123	+502	625	+37		
24	0	0	0	−19	+418	399	+25		
25	0	0	0	−43	+224	181	0		
26	+15	0	15	+41	+141	182	+273	−103	−20
27	−2	+443	441	+30	+56	86	0		
28	−158	+498	340	+7	+84	91	0		
29	−113	+138	25	+96	+84	180	+106		
30	−128	+138	10	0	+197	197	+189		
-----	---------	---------	---------	0	+253	253	+119		

	June	July	August
Monthly mean discharge, in second-feet (observed)	11.1	29.1	54.7
Runoff, in inches (observed)	.31	.83	1.56
Monthly mean discharge, in second-feet (adjusted)	57.1	144	77.4
Runoff, in inches (adjusted)	1.57	4.10	2.21

STILL RIVER NEAR LANESVILLE, CONN.

LOCATION.—Lat. 41°31'14", long. 73°25'09", at highway bridge 1½ miles south of Lanesville, Litchfield County, 2 miles upstream from mouth, and 4 miles south of New Milford. Datum of gage is 213.05 feet above mean sea level (general adjustment of 1929), levels by Corps of Engineers, U. S. Army.

DRAINAGE AREA.—68.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except period Aug. 12-25 when record was based on range line and records for Tenmile River near Gaylordsville and Shepaug River near Roxbury.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 920 second-feet 10 to 12 p.m. July 24 (gage height, 7.64 feet).

1931 to June 1938: Discharge, 3,930 second-feet Mar. 12, 1936 (gage height, 10.58 feet).

REMARKS.—Flood discharge not appreciably affected by storage or regulation.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	59	106	255	11	59	37	496	21	34	260	150
2	54	83	191	12	108	38	950	22	32	394	120
3	60	66	155	13	88	74	500	23	33	515	100
4	64	53	129	14	80	73	400	24	31	773	90
5	58	44	117	15	66	58	340	25	29	802	80
6	69	40	190	16	57	49	300	26	29	592	70
7	57	36	265	17	50	40	260	27	98	456	68
8	66	34	275	18	45	37	260	28	198	336	64
9	72	32	214	19	40	63	280	29	250	272	59
10	54	35	260	20	35	183	220	30	177	343	56
								31		380	57
Monthly mean discharge, in second-feet									71.7	203	225
Runoff, in inches									1.17	3.41	3.78

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.							2.86	106	4.48	225	5.41	324
4			1.45	35	1.73	46	3.21	127	4.49	226	5.54	341
6	1.64	43					3.59	152	4.49	226	5.67	360
8			1.45	35	1.92	56	3.88	174	4.47	224	5.77	376
10							4.07	190	4.43	221	5.84	388
12 n.	1.59	41	1.44	35	2.04	62	4.21	201	4.54	231	5.90	399
2 p.m.					2.02	61	4.30	209	4.87	262	5.96	410
4			1.55	39	1.99	60	4.35	214	5.16	294	6.02	421
6	1.49	37			2.18	69	4.39	217	5.30	311	6.07	430
8			1.58	40	2.55	88	4.42	220	5.33	315	6.13	442
10					2.71	98	4.44	222	5.34	316	6.17	450
12 m.	1.44	35	1.51	37	2.74	99	4.46	223	5.36	318	6.20	456

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	6.23	462	6.92	627	7.61	905						
4	6.26	468	6.97	644	7.57	885						
6	6.28	472	7.03	666	7.53	865	6.93	630	6.35	486	5.69	362
8	6.31	478	7.11	694	7.47	838						
10	6.34	484	7.19	726	7.43	822						
12 n.	6.40	497	7.28	762	7.38	802	6.79	588	6.20	456	5.48	333
2 p.m.	6.47	512	7.40	810	7.33	782						
4	6.53	526	7.51	855	7.28	762						
6	6.68	560	7.58	890	7.23	742	6.64	551	6.04	425	5.28	309
8	6.77	582	7.63	915	7.18	722						
10	6.84	602	7.64	920	7.13	702						
12 m.	6.88	614	7.64	920	7.08	683	6.50	519	5.86	392	5.11	288

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.												
4												
6	4.99	275	5.28	309	5.93	404	5.04	280	4.22	202	3.74	163
8												
10												
12 n.	4.90	265	5.57	345	5.87	394	4.72	247	4.09	191	3.61	154
2 p.m.												
4												
6	4.87	262	5.78	378	5.68	361	4.49	226	3.94	179	3.48	145
8												
10												
12 m.	5.04	280	5.89	397	5.38	321	4.34	213	3.85	172	3.43	141

Supplemental records.—July 19, 5 p.m., 1.99 ft., 60 sec.-ft.

SHEPAUG RIVER AT OUTLET OF SHEPAUG RESERVOIR, AT WOODVILLE, CONN.

LOCATION.—Nonrecording gages at dam at outlet of Shepaug Reservoir, lat. 41°43′16″, long. 73°17′40″, 1 mile north of Woodville, Litchfield County, and 3 miles upstream from Bantam River.

DRAINAGE AREA.—38.0 square miles.

GAGE-HEIGHT RECORD.—One reservoir gage reading daily at noon; gage height at midnight determined from graph constructed from gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow over spillway and through fountain for time when reservoir gage was read. During periods of rapid change in discharge, mean daily discharge computed from graphs constructed from determinations of discharge at noon and records for stations near Roxbury, Pomperaug River at Southbury, and Naugatuck River near Thomaston.

MAXIMA.—July 1938: Discharge, 2,400 second-feet about 8 p.m. July 21, from graph developed from noon determinations of discharge and records for adjacent stations.

1935 to June 1938: Discharge, 4,100 second-feet Jan. 25, 1938, from graph of noon determinations of discharge and record for station near Roxbury.

REMARKS.—Daily and monthly mean discharges adjusted for change in contents of Shepaug Reservoir and diversion to Naugatuck River drainage through Morris Reservoir. No corrections for evaporation from reservoir surface. Minimum flow of 2.35 second-feet maintained below reservoir at all times. Basic data furnished by Bureau of Engineering, City of Waterbury.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	June			July			August		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	31	−1	30	90	0	90	95	0	95
2	29	0	29	141	−2	139	128	−1	127
3	35	+2	37	69	−8	61	90	−9	81
4	42	0	42	51	−3	48	35	*a*+4	39
5	35	−1	34	44	−1	43	23	*a*+60	83
6	31	−1	30	38	−4	34	42	*a*+17	59
7	26	+2	28	18	*a*+4	22	202	+17	219
8	44	+3	47	13	*a*+10	23	138	−5	133
9	46	−3	43	9.8	*a*+19	29	125	−5	120
10	26	−2	24	38	*a*+18	56	79	−5	74
11	29	+3	32	33	0	33	700	+56	756
12	263	+21	284	38	+1	39	473	−25	448
13	128	−7	121	40	−1	39	224	−13	211
14	92	−6	86	28	−2	26	148	−10	138
15	57	−6	51	24	−1	23	84	−5	79
16	37	−3	34	20	−3	17	84	−1	83
17	29	−1	28	6.9	*a*+9	16	76	−1	75
18	28	0	28	18	*a*+23	41	67	+2	69
19	24	−1	23	63	+26	89	98	0	98
20	20	−2	18	90	−17	73	62	−5	57
21	11	*a*+6	17	979	+99	1080	49	−2	47
22	8.8	*a*+8	17	1310	−37	1270	40	−1	39
23	12	*a*+14	26	918	+14	932	37	−2	35
24	36	*a*+12	48	820	−27	793	26	−1	25
25	24	*a*+4	28	416	−14	402	26	−1	25
26	11	*a*+19	30	268	−10	258	20	*a* 0	20
27	135	*a*+41	176	191	−5	186	13	*a*+12	25
28	522	−2	520	296	−4	292	6.9	*a*+14	21
29	250	−17	233	156	+24	180	14	*a*+3	17
30	135	−11	124	282	−20	262	14	0	14
31	---------	---------	---------	135	−10	125	18	+1	19

	June	July	August
Monthly mean discharge, in second-feet (observed)	73.2	214	104
Runoff, in inches (observed)	2.15	6.49	3.16
Monthly mean discharge, in second-feet (adjusted)	75.6	217	107
Runoff, in inches (adjusted)	2.22	6.58	3.25

a Includes diversion for city of Waterbury municipal supply.

SHEPAUG RIVER NEAR ROXBURY, CONN.

LOCATION.—Lat. 41°32′53″, long. 73°19′51″, at highway bridge 0.7 mile downstream from Roxbury Station, 1¼ miles southwest of Village of Roxbury, Litchfield County, and 2 miles upstream from Jacks Brook. Datum of gage is 282.07 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—133 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except period 4 p.m. July 21 to 1 a.m. July 22 when bead on float wire was caught. Graph for period of no gage-height record determined on basis of shape of graphs for previous peaks.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 3,600 second-feet 8 p.m. July 21 (gage height, 7.73 feet, from fragmentary record and shape of graphs of previous peaks).

1930 to June 1938: Discharge, 7,000 second-feet Mar. 12, 1936 (gage height, 10.77 feet).

REMARKS.—Flood discharge affected by storage in Shepaug Reservoir at Woodville (see p. 261) and in Bantam Lake (drainage area outlet, 33.2 square miles).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	130	294	542	11	164	135	1,900	21	110	1,600	248
2	120	301	533	12	666	173	1,020	22	92	2,360	218
3	150	265	448	13	446	167	660	23	88	1,940	199
4	150	228	367	14	316	132	548	24	88	1,980	175
5	135	199	294	15	234	125	467	25	108	1,280	153
6	122	173	309	16	196	108	408	26	99	970	137
7	108	143	454	17	173	89	363	27	396	774	117
8	159	125	426	18	159	120	359	28	810	1,560	103
9	143	117	416	19	145	165	351	29	520	842	99
10	113	135	332	20	122	280	290	30	359	833	95
								31		632	88
Monthly mean discharge, in second-feet									221	589	391
Runoff, in inches									1.85	5.11	3.39

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.			2.18	78					2.82	251	7.13	3,020
4	2.22	86	2.16	75	2.30	103	2.89	276	2.82	251	7.00	2,900
6			2.12	68					2.83	254	6.81	2,730
8	2.33	110	2.25	92	2.48	148	2.94	294	2.75	228	6.52	2,480
10			2.32	108					3.10	355	6.32	2,320
12 n.	2.28	99	2.23	88	2.43	135	2.91	283	3.53	538	6.22	2,240
2 p.m.			2.22	86					5.95	2,020	6.12	2,160
4	2.19	80	2.25	92	2.36	117	2.91	283	7.14	3,030	6.10	2,140
6			2.83	254					7.52	3,400	6.00	2,060
8	2.12	68	2.57	173	2.84	258	2.89	276	7.73	3,600	5.83	1,920
10			2.42	132					7.62	3,500	5.70	1,830
12 m.	2.18	78	2.39	125	2.90	279	2.82	251	7.42	3,300	5.58	1,750

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	5.46	1,660									7.03	2,930
4	5.37	1,600									6.44	2,410
6	5.29	1,540	6.23	2,240					4.12	820	6.02	2,080
8	5.21	1,490									5.70	1,830
10	5.16	1,450									5.35	1,580
12 n.	5.39	1,610	5.87	1,960	4.90	1,270	4.40	970	4.02	770	5.11	1,420
2 p.m.	5.64	1,790										
4	5.96	2,030									4.72	1,160
6	6.71	2,640	5.52	1,700					3.92	720		
8	6.78	2,700									4.52	1,040
10	6.64	2,580										
12 m.	6.52	2,480	5.26	1,520	4.58	1,080	4.20	860	3.91	715	4.37	952

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.												
4	4.25	885	4.23	875								
6					3.82	670						
8	4.17	845	4.28	900								
10												
12 n.	4.12	820	4.22	870	3.75	638						
2 p.m.												
4	4.03	775	4.10	810								
6					3.62	579						
8	4.13	825	3.99	755								
10												
12 m.	4.19	855	3.92	720	3.58	561						

Supplemental records.—July 18, 4:30 p.m., 3.03 ft., 328 sec.-ft.; July 19, 9 p.m., 3.01 ft., 320 sec.-ft.; July 23, 7 p.m., 6.90 ft., 2,810 sec.-ft.; July 28, 2:20 a.m., 7.09 ft., 2,980 sec.-ft.

POMPERAUG RIVER AT SOUTHBURY, CONN.

LOCATION.—Lat. 41°28'50", long. 73°13'30", 200 feet upstream from highway bridge, three-quarters of a mile west of Southbury, New Haven County, and 5½ miles upstream from mouth.

DRAINAGE AREA.—75.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Adjustments made for intake lag during part of day June 12, 27, 28, 8 to 9 p.m. July 19, 12 n. to 1 p.m., 4 to 12 p.m. July 21, 7 to 12 p.m. July 23, 2 to 6 a.m. July 28, Aug. 8, 9, 11.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1200 second-feet; extended to peak stage on basis of September 1938 peak flow determination at dam 2 miles below station.

MAXIMA.—July 1938: Discharge, 1,750 second-feet 9 p.m. July 21 (gage height, 7.7 feet, from floodmark).

1932 to June 1938: Discharge, 5,990 second-feet Mar. 12, 1936 (gage height, 14.13 feet, from floodmark), and 5,980 second-feet Jan. 25, 1938 (gage height, 14.12 feet, from floodmark).

REMARKS.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	64	98	216	11	108	43	1,240	21	57	672	113
2	58	92	202	12	532	73	467	22	52	1,060	104
3	87	76	165	13	298	72	284	23	50	901	96
4	78	64	149	14	196	54	222	24	48	1,030	86
5	79	57	140	15	139	63	188	25	44	514	78
6	72	50	142	16	113	48	167	26	47	360	72
7	56	44	189	17	98	41	156	27	277	283	69
8	98	43	196	18	89	133	160	28	417	792	65
9	80	41	376	19	78	230	175	29	213	401	62
10	59	48	182	20	66	362	132	30	129	409	58
								31		263	56
Monthly mean discharge, in second-feet									126	272	194
Runoff, in inches									1.86	4.16	2.97

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	3.05	44	3.00	39	4.40	276	5.45	620	4.11	209	6.72	1,210
4	3.04	43	3.00	39	4.20	229	5.11	487	4.06	199	6.56	1,130
6	3.03	42	2.99	38	4.05	196	4.82	391	4.01	188	6.80	1,250
8	3.02	41	3.00	39	3.94	175	4.72	361	3.97	180	6.96	1,130
10	3.02	41	3.03	42	3.86	160	4.69	352	3.99	184	6.88	1,290
12 n.	3.02	41	3.02	41	3.83	154	4.62	333	4.11	210	6.47	1,080
2 p.m.	3.02	41	3.01	40	3.84	156	4.54	311	4.43	284	6.16	937
4	3.01	40	3.06	44	3.87	162	4.46	291	5.90	820	6.06	892
6	3.00	39	3.16	55	3.97	180	4.37	269	7.40	1,550	5.97	852
8	3.00	39	5.15	502	4.30	250	4.32	257	7.67	1,700	6.02	874
10	3.00	39	5.12	490	4.67	350	4.25	240	7.62	1,700	5.93	834
12 m.	3.00	39	4.70	355	5.40	600	4.17	222	7.13	1,400	5.70	730

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	5.54	658	7.20	1,460	5.44	616	4.83	394	4.50	301	4.70	360
4	5.42	608	6.86	1,280	5.37	588	4.81	388	4.49	298	7.10	1,400
6	5.32	568	6.69	1,200	5.33	572	4.80	385	4.48	296.	7.22	1,450
8	5.23	532	6.60	1,150	5.27	548	4.78	379	4.48	296	6.84	1,270
10	5.26	544	6.48	1,090	5.23	532	4.76	373	4.47	294	6.30	1,000
12 n.	5.53	654	6.36	1,030	5.18	513	4.74	367	4.45	288	5.87	806
2 p.m.	5.82	784	6.18	946	5.14	498	4.72	361	4.43	284	5.62	694
4	6.30	1,000	6.00	865	5.08	476	4.68	349	4.41	278	5.42	608
6	6.74	1,220	5.86	802	5.02	456	4.64	338	4.37	269	5.26	544
8	7.18	1,450	5.72	739	4.95	432	4.58	322	4.32	257	5.14	498
10	7.48	1,600	5.61	690	4.90	416	4.55	314	4.29	250	5.08	476
12 m.	7.48	1,600	5.52	649	4.86	404	4.52	306	4.35	264	5.05	466
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	4.98	442	5.25	540	4.44	286	4.16	220	4.05	196	3.92	171
4	4.92	423	5.16	505	4.42	281	4.16	220	4.13	214	3.92	171
6	4.86	404	5.07	473	4.41	278	4.16	220	4.16	220	3.92	171
8	4.82	391	5.01	452	4.40	276	4.16	220	4.16	220	3.92	171
10	4.77	376	4.94	429	4.39	274	4.17	222	4.15	218	3.92	171
12 n.	4.73	364	4.86	404	4.38	271	4.17	222	4.13	214	3.92	171
2 p.m.	4.70	355	4.79	382	4.36	266	4.16	220	4.10	207	3.91	169
4	4.66	344	4.73	364	4.33	259	4.14	216	4.07	201	3.89	165
6	4.67	347	4.62	333	4.27	245	4.12	211	4.03	192	3.86	160
8	4.84	397	4.55	314	4.23	236	4.10	207	3.98	182	3.82	152
10	5.06	469	4.50	301	4.19	227	4.07	201	3.95	176	3.78	146
12 m.	5.22	528	4.46	291	4.17	222	4.04	194	3.93	173	3.77	144

Supplemental records.—July 18, 7 p.m., 4.45 ft., 288 sec.-ft.; 9 p.m., 5.24 ft., 536 sec.-ft.; July 20, 1 a.m., 5.55 ft., 660 sec.-ft.; July 21, 9 p.m., 7.70 ft., 1,750 sec.-ft.; July 23, 11 p.m., 7.52 ft., 1,650 sec.-ft.; July 28, 5 a.m., 7.27 ft., 1,500 sec.-ft.

NAUGATUCK RIVER NEAR THOMASTON, CONN.

LOCATION.—Lat. 41°42′11″, long. 73°03′56″, at highway bridge half a mile upstream from Leadmine Brook and 2 miles north of Thomaston, Litchfield County. Datum of gage is 389.44 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—71.9 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 5,630 second-feet 6:20 p.m. July 21 (gage height, 8.57 feet).

1930 to June 1938: Discharge, 6,830 second-feet Jan. 25, 1938 (gage height, 9.57 feet).

REMARKS.—Flood discharge slightly affected by storage in small ponds and reservoirs.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	55	99	141	11	118	64	1,090	21	33	2,210	62
2	50	102	186	12	205	146	422	22	33	1,710	56
3	68	81	128	13	211	137	199	23	34	1,070	51
4	65	66	97	14	144	81	139	24	49	962	49
5	64	58	84	15	82	64	108	25	33	483	44
6	58	50	93	16	70	52	93	26	33	320	42
7	49	40	149	17	60	46	88	27	278	239	39
8	86	38	128	18	40	48	95	28	794	212	38
9	66	36	192	19	35	129	100	29	311	227	36
10	47	56	158	20	34	259	74	30	148	301	35
								31		162	35
Monthly mean discharge, in second-feet									112	308	137
Runoff, in inches									1.74	4.93	2.20

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	1.37	43	1.42	49	2.58	366	2.06	172	5.00	2,040
4	------	-------	1.37	43	1.45	52	2.50	330	2.04	167	5.17	2,180
6	------	-------	1.37	43	1.48	56	2.39	284	2.03	164	5.25	2,240
8	------	-------	1.38	44	1.56	68	2.30	249	3.58	966	5.04	2,070
10	------	-------	1.39	45	1.54	65	2.23	224	3.71	1,060	4.77	1,860
12 n.	------	-------	1.38	44	1.61	76	2.20	214	4.07	1,310	4.53	1,660
2 p.m.	------	-------	1.40	46	1.73	97	2.17	205	6.40	3,300	4.36	1,530
4	------	-------	1.49	58	1.78	106	2.31	253	7.96	4,960	4.32	1,500
6	------	-------	1.48	56	1.90	132	2.29	246	8.54	5,600	4.17	1,380
8	------	-------	1.46	54	2.00	156	2.22	221	7.60	4,560	4.01	1,270
10	------	-------	1.42	49	2.75	450	2.17	205	6.10	3,000	3.86	1,160
12 m.	------	-------	1.42	49	2.73	440	2.12	189	5.32	2,300	3.70	1,050

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.57	959	4.09	1,320	----	------	----	------	----	------	----	------
4	3.47	889	3.98	1,250	2.96	566	2.55	352	2.31	253	2.27	238
6	3.37	819	3.88	1,180	----	------	----	------	----	------	----	------
8	3.29	764	3.76	1,090	2.89	524	2.53	344	2.30	249	2.23	224
10	3.23	728	3.64	1,010	----	------	----	------	----	------	----	------
12 n.	3.36	812	3.54	938	2.81	480	2.50	330	2.29	246	2.20	214
2 p.m.	3.56	952	3.43	861	----	------	----	------	----	------	----	------
4	3.65	1,020	3.34	798	2.73	440	2.44	305	2.22	221	2.16	202
6	3.97	1,240	3.24	734	----	------	----	------	----	------	----	------
8	4.54	1,670	3.16	686	2.64	395	2.37	276	2.20	214	2.10	183
10	4.45	1,600	3.10	650	----	------	----	------	----	------	----	------
12 m.	4.26	1,450	3.04	614	2.59	370	2.33	261	2.29	246	2.08	178

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	----	------	----	------	----	------	----	------	----	------	----	------
4	2.07	175	2.62	385	2.09	180	1.91	134	2.16	202	1.93	139
6	----	------	----	------	----	------	----	------	----	------	----	------
8	2.07	175	2.50	330	2.06	172	1.93	139	2.19	211	1.91	134
10	----	------	----	------	----	------	----	------	----	------	----	------
12 n.	2.06	172	2.41	292	2.04	167	1.94	142	2.16	202	1.90	132
2 p.m.	----	------	----	------	----	------	----	------	----	------	----	------
4	2.05	170	2.29	246	2.00	156	1.93	139	2.10	183	1.88	128
6	----	------	----	------	----	------	----	------	----	------	----	------
8	2.71	430	2.20	214	1.92	137	1.91	134	1.99	154	1.80	110
10	----	------	----	------	----	------	----	------	----	------	----	------
12 m.	2.82	486	2.13	192	1.91	134	2.08	178	1.96	146	1.76	102

Supplemental records.—July 21, 9 a.m., 3.42 ft., 854 sec.-ft.; 6:20 p.m., 8.57 ft., 5,630 sec.-ft.; July 23, 7 p.m., 4.59 ft., 1,710 sec.-ft.; July 29, 7 p.m., 2.08 ft., 178 sec.-ft.

NAUGATUCK RIVER NEAR NAUGATUCK, CONN.

LOCATION.—Lat. 41°28′15″, long. 73°03′10″, 0.2 mile upstream from Beacon Hill Brook, 1.3 miles downstream from Naugatuck, New Haven County, and 12 miles upstream from mouth. Datum of gage is 155.17 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—246 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 4,700 second-feet; extended logarithmically to peak stage on basis of records for flood of September 1938 at stations on Leadmine Brook near Thomaston and Naugatuck River near Thomaston.

MAXIMA.—July 1938: Discharge, 7,760 second-feet 9 p.m. July 21 (gage height, 7.89 feet).

1918-24, 1928 to June 1938: Gage height, 12.08 feet Apr. 7, 1924 (discharge uncertain; previously published figure probably too low).

Flood of November 1927 reached a stage of about 14 feet (discharge, about 18,300 second-feet).

REMARKS.—Discharge affected by storage in Wigwam and Morris Reservoirs (see record for Branch of Naugatuck River at outlet of Wigwam Reservoir, near Thomaston, Conn.) and diversion from Shepaug River at outlet of Shepaug Reservoir (p. 261).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	221	350	642	11	230	138	2,860	21	156	2,850	270
2	199	297	560	12	882	353	1,600	22	138	4,050	252
3	239	252	461	13	761	317	822	23	138	3,140	231
4	252	202	384	14	571	252	589	24	152	3,380	209
5	262	182	354	15	367	199	485	25	133	1,700	187
6	245	154	338	16	274	146	414	26	141	1,130	179
7	209	136	454	17	248	119	388	27	568	901	165
8	291	126	583	18	205	351	395	28	1,750	2,130	159
9	286	113	1,060	19	179	707	422	29	968	1,030	156
10	196	133	592	20	170	1,140	326	30	513	1,120	151
								31		809	151
Monthly mean discharge, in second-feet									365	900	511
Runoff, in inches									1.65	4.22	2.40

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	0.74	128	0.72	123	2.36	831	2.94	1,210	2.36	831	6.23	5,100
4	.73	126	.68	113	2.17	721	3.26	1,470	2.26	773	6.06	4,840
6	.72	123	.67	111	2.03	642	3.14	1,370	2.19	732	6.01	4,760
8	.70	118	.89	167	1.93	589	3.13	1,360	2.14	704	5.89	4,580
10	.70	118	.80	143	1.88	563	3.04	1,290	2.14	704	5.73	4,340
12 n.	.71	120	.88	165	1.77	509	2.88	1,170	2.24	761	5.50	4,000
2 p.m.	.71	120	.95	184	1.71	481	2.75	1,080	3.35	1,540	5.29	3,710
4	.69	116	.93	179	1.74	495	2.64	1,000	5.00	3,310	5.13	3,480
6	.69	116	1.72	123	2.04	648	2.54	939	6.97	6,250	4.97	3,270
8	.68	113	2.34	820	2.52	927	2.49	909	7.75	7,520	4.90	3,180
10	.68	113	2.98	1,240	2.48	903	2.54	939	7.76	7,540	4.73	2,970
12 m.	.68	113	2.75	1,080	2.70	1,040	2.46	891	6.84	6,040	4.54	2,740

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	4.35	2,520	5.98	4,720	3.90	2,060	3.00	1,260	2.53	933	3.40	1,590
4	4.18	2,340	5.69	4,280	3.80	1,960	2.96	1,230	2.50	915	5.44	3,920
6	4.02	2,180	5.51	4,020	3.71	1,870	2.93	1,200	2.48	903	5.02	3,340
8	3.96	2,120	5.38	3,830	3.65	1,820	2.91	1,190	2.48	903	4.58	2,790
10	4.69	2,920	5.20	3,580	3.59	1,760	2.90	1,180	2.48	903	4.20	2,360
12 n.	4.62	2,830	5.03	3,350	3.51	1,690	2.85	1,140	2.47	897	3.94	2,100
2 p.m.	4.71	2,940	4.83	3,090	3.43	1,620	2.81	1,120	2.43	873	3.71	1,870
4	4.98	3,280	4.65	2,870	3.37	1,560	2.76	1,080	2.40	855	3.52	1,700
6	5.50	4,000	4.47	2,660	3.27	1,480	2.71	1,050	2.34	820	3.35	1,540
8	5.69	4,280	4.30	2,470	3.20	1,420	2.66	1,010	2.29	790	3.20	1,420
10	5.94	4,660	4.14	2,300	3.13	1,360	2.61	982	2.38	843	3.09	1,330
12 m.	5.95	4,680	4.01	2,170	3.06	1,310	2.57	957	3.17	1,400	2.98	1,240

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.89	1,170										
4	2.82	1,120	3.00	1,260	2.41	861	2.08	670	1.76	504	1.71	481
6	2.76	1,080										
8	2.72	1,050	2.98	1,240	2.36	831	2.06	659	1.89	568	1.67	462
10	2.70	1,040										
12 n.	2.67	1,020	2.87	1,160	2.34	820	2.11	687	1.98	615	1.69	472
2 p.m.	2.62	988										
4	2.58	963	2.75	1,080	2.28	784	2.05	654	1.95	600	1.66	458
6	2.54	939										
8	2.60	975	2.65	1,010	2.21	744	1.88	563	1.86	553	1.60	431
10	2.57	957										
12 m.	2.62	988	2.52	927	2.14	704	1.81	528	1.78	514	1.54	405

Supplemental records.—July 18, 5 p.m., 0.98 ft., 193 sec.-ft.; 7 p.m., 1.50 ft., 388 sec.-ft.; 9 p.m., 337; ft., 1,560 sec.-ft.; July 19, 7 p.m., 2.67 ft., 1,020 sec.-ft.; July 21, 9 p.m., 7.89 ft., 7,760 sec.-ft.; July 23, 9 a.m., 4.09 ft., 2,250 sec.-ft.; 10:30 p.m., 6.00 ft., 4,750 sec.-ft.; July 28, 1 a.m., 3.02 ft., 1,280 sec.-ft.. 3 a.m., 5.10 ft., 3,440 sec.-ft.

LEADMINE BROOK NEAR THOMASTON, CONN.

Location.—Lat. 41°42′10″, long. 73°03′36″, at highway bridge half a mile upstream from mouth and 2¼ miles northeast of Thomaston, Litchfield County. Datum of gage is 401.23 feet above mean sea level, (general adjustment of 1929).

Drainage area.—24.0 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 500 second-feet; extended to peak stage on basis of logarithmic plotting and comparison with records for stations on Naugatuck River.

Maxima.—July 1938: Discharge, 2,270 second-feet 4:30 p.m. July 21 (gage height, 9.60 feet).

1930 to June 1938: Discharge, about 2,800 second-feet Sept. 17, 1934 (gage height, 11.2 feet; from floodmarks).

Remarks.—Flood discharge not affected by artificial storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	18	30	55	11	54	37	327	21	8.7	798	21
2	16	27	66	12	82	96	127	22	7.1	571	19
3	26	19	42	13	80	53	70	23	11	366	17
4	22	15	33	14	49	28	50	24	23	325	15
5	22	12	30	15	30	24	38	25	13	170	13
6	19	9.7	29	16	22	17	33	26	11	121	11
7	16	8.2	46	17	18	13	31	27	118	96	10
8	32	7.1	38	18	17	17	31	28	199	85	9.3
9	22	6.5	72	19	14	55	36	29	92	75	8.7
10	16	11	48	20	11	173	26	30	47	97	7.9
								31		59	7.1
Monthly mean discharge, in second-feet									37.2	110	44.1
Runoff, in inches									1.73	5.28	2.12

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	------	2.43	10	2.69	21	4.40	231	3.70	112	6.21	784
4	------	------	2.43	10	2.68	20	4.38	227	3.64	104	6.11	748
6	2.52	14	2.43	10	2.68	20	4.26	203	3.63	103	5.99	706
8	------	------	2.45	11	2.71	22	4.08	171	3.88	138	5.82	647
10	------	------	2.52	14	2.81	27	3.94	147	4.30	211	5.65	588
12 n.	2.51	13	2.56	15	2.83	28	3.84	132	4.74	310	5.46	521
2 p.m.	------	------	2.58	16	2.83	28	3.80	126	7.20	1,180	5.29	467
4	------	------	2.79	26	2.85	29	4.15	183	9.55	2,240	5.40	500
6	2.46	12	2.75	24	3.01	40	4.08	171	9.30	2,120	5.31	473
8	------	------	2.77	24	3.48	85	3.97	152	7.97	1,510	5.18	434
10	------	------	2.73	22	4.28	207	3.86	135	6.98	1,090	5.04	392
12 m.	2.44	11	2.71	22	4.48	248	3.77	122	6.33	832	4.92	356

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	4.81	328	------	------	------	------	------	------	3.63	103	------	------
4	4.71	302	5.14	422	------	------	------	------	3.62	102	------	------
6	4.62	280	------	------	4.18	188	3.82	129	3.61	100	3.55	93
8	4.55	264	4.96	368	------	------	------	------	3.61	100	------	------
10	4.51	254	------	------	------	------	------	------	3.60	99	------	------
12 n.	4.78	320	4.76	315	4.08	171	3.79	125	3.59	98	3.50	87
2 p.m.	5.06	398	------	------	------	------	------	------	3.55	93	------	------
4	5.11	413	4.57	268	------	------	------	------	3.51	88	------	------
6	5.21	443	------	------	3.95	149	3.68	109	3.49	86	3.40	76
8	5.32	476	4.40	231	------	------	------	------	3.46	83	------	------
10	5.38	494	------	------	------	------	------	------	3.62	102	------	------
12 m.	5.34	482	4.29	209	3.88	138	3.63	103	3.60	99	3.34	70

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	------	------	------	3.15	52	------	------	------	------
6	3.33	69	3.74	118	3.27	63	------	------	3.41	77	3.08	45
8	------	------	------	------	------	------	3.18	54	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	------	------
12 n.	3.33	69	3.59	98	3.24	60	3.19	55	3.33	69	3.05	43
2 p.m.	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	------	------	------	3.17	53	------	------	------	------
6	3.31	67	3.41	77	3.17	53	------	------	3.18	54	2.98	38
8	------	------	------	------	------	------	3.12	49	------	------	------	------
10	------	------	------	------	------	------	------	------	------	------	------	------
12 m.	3.78	123	3.30	66	3.15	52	3.45	82	3.09	46	2.93	34

Supplemental records.—July 18, 3:30 p.m., 2.84 ft., 28 sec.-ft.; July 19, 5 p.m., 2.87 ft., 30 sec.-ft.; July 20, 3 p.m., 4.12 ft., 178 sec.-ft.; July 21, 1 p.m., 5.80 ft., 640 sec.-ft.; 3 p.m., 8.40 ft., 1,700 sec.-ft.; 4:30 p.m., 9.60 ft., 2,270 sec.-ft.; 5 p.m., 9.57 ft., 2,260 sec.-ft.

BRANCH OF NAUGATUCK RIVER AT OUTLET OF WIGWAM RESERVOIR, NEAR THOMASTON, CONN.

LOCATION.—Nonrecording gage and venturi meter at dam, lat. 41°39′45″, long. 73°07′35″, 2½ miles west of Thomaston, Litchfield County, and 3 miles upstream from mouth.

DRAINAGE AREA.—18.0 square miles.

GAGE-HEIGHT RECORD.—Three reservoir gage readings daily; gage height at midnight determined from graph constructed from gage readings.

STAGE-DISCHARGE RELATION.—Observed discharge computed from flow over spillways and through venturi meter.

MAXIMA.—July 1938: Discharge observed, 2,380 second-feet 10:30 p.m. July 27.

REMARKS.—Daily and monthly mean discharges adjusted for change in contents of Wigwam and Morris Reservoirs and for diversions from Shepaug River Basin to Morris Reservoir. No corrections for evaporation from reservoir surfaces. Basic data furnished by Bureau of Engineering, City of Waterbury.

Discharge, in second-feet, and change in contents, in equivalent second-feet, 1938

Day	June			July			August		
	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted	Observed	Change in contents	Adjusted
1	15	−3	12	17	−4	13	70	−18	52
2	13	−3	10	16	−2	14	17	+34	51
3	14	+6	20	14	−2	12	14	+20	34
4	15	+1	16	11	−6	5	13	*a*+12	25
5	13	−3	10	10	−6	4	13	*a*+5	18
6	12	−3	9	12	−7	5	14	*a*+3	17
7	13	+3	16	12	*a*−8	4	35	+2	37
8	17	+10	27	12	*a*−8	4	25	+1	26
9	16	−7	9	12	*a*−10	2	36	−5	31
10	13	−5	8	11	*a*−9	2	24	0	24
11	39	+33	72	11	+8	19	458	+61	519
12	70	−6	64	17	+7	24	118	−42	76
13	59	−5	54	16	−7	9	56	−10	46
14	34	−7	27	14	−9	5	41	−7	34
15	17	−8	9	12	−6	6	30	−3	27
16	15	−4	11	13	−8	5	31	−1	30
17	14	−3	11	11	*a*−4	7	30	−1	29
18	12	−4	8	27	*a*+23	50	37	+4	41
19	11	−4	7	54	+17	71	30	−2	28
20	11	−6	5	75	−29	46	19	−3	16
21	13	*a*−7	6	513	+91	604	16	−4	12
22	13	*a*−10	3	347	−43	304	15	−3	12
23	13	*a*−5	8	344	+13	357	15	−7	8
24	12	*a*−5	7	226	−23	203	13	−5	8
25	13	*a*−10	3	128	−15	113	13	−8	5
26	11	*a*−2	9	78	−11	67	13	*a*−7	6
27	89	+58	147	361	+197	558	12	*a*−6	6
28	134	−21	113	632	−164	468	11	*a*−6	5
29	71	−18	53	142	−30	112	11	*a*−5	6
30	24	−7	17	147	−59	88	13	−7	6
31	---------	---------	---------	153	−93	60	13	−7	6

	June	July	August
Monthly mean discharge, in second-feet (observed)	27.2	111	40.5
Runoff, in inches (observed)	1.68	7.11	2.59
Monthly mean discharge, in second-feet (adjusted)	25.7	105	40.0
Runoff, in inches (adjusted)	1.60	6.72	2.56

*a*Does not include diversion from Shepaug Reservoir to Naugatuck River Basin.

SAUGATUCK RIVER BASIN

SAUGATUCK RIVER NEAR WESTPORT, CONN.

LOCATION.—Lat. 41°10′15″, long. 73°22′00″, on old Ford Road (Clinton Ave.), 400 feet downstream from West Branch of Saugatuck River, 600 feet downstream from dam of Dorr Co., and 2 miles north of Westport, Fairfield County.

DRAINAGE AREA.—77.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,700 second-feet; extended to peak stage on basis of September 1938 flood flow determination at Dorr Co's. dam.

MAXIMA.—July 1938: Discharge, 3,120 second-feet 2 a.m. July 24 (gage height, 8.77 feet).

1932 to June 1938: Discharge, 5,310 second-feet Mar. 12, 1936 (gage height, 11.30 feet).

REMARKS.—Bridgeport Hydraulic Co. occasionally diverts the flow from 17 square miles of the Aspetuck River Basin. Water for diversion is stored in Aspetuck Reservoir and diverted by canal into Hemlocks Reservoir in Mill River Basin from which it is released for water supply. Daily and monthly mean discharges not adjusted for diversions. Run-off computations are based on total drainage area above station.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	64	157	210	11	90	62	670	21	33	316	70
2	56	124	177	12	145	74	525	22	31	524	62
3	69	97	142	13	130	339	290	23	28	1,140	57
4	72	78	118	14	95	174	206	24	28	2,210	52
5	70	62	116	15	72	168	155	25	27	1,070	47
6	63	51	153	16	57	137	130	26	28	681	44
7	53	43	206	17	51	87	115	27	134	497	43
8	105	40	179	18	47	80	102	28	584	391	41
9	85	39	159	19	44	146	99	29	471	318	39
10	63	96	157	20	40	306	82	30	248	302	35
								31		253	33
Monthly mean discharge, in second-feet									103	325	146
Runoff, in inches									1.48	4.83	2.17

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.					2.88	82	3.72	260				
4					3.00	102	3.78	277	3.84	293	4.20	400
6	2.95	94	2.84	76	3.23	145	3.79	279				
8					3.23	145	3.86	299	3.78	277	4.49	499
10					3.20	139	3.92	316				
12 n.	2.91	87	2.88	82	3.18	135	3.94	322	3.75	268	4.59	536
2 p.m.					3.15	130	3.96	327				
4					3.14	128	3.97	330	3.95	324	4.70	580
6	2.87	80	2.89	84	3.36	172	3.97	330				
8					3.50	204	3.98	333	4.12	375	4.78	612
10					3.55	216	3.97	330				
12 m.	2.83	74	2.88	82	3.56	219	3.92	316	4.20	400	4.85	640

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	4.85	640	8.77	3,120								
4	4.81	624	8.61	2,990	6.16	1,280	5.14	758				
6	4.78	612	8.28	2,720					4.57	529	4.21	403
8	4.75	600	7.94	2,450	5.95	1,150	5.04	716				
10	4.81	624	7.68	2,270								
12 n.	5.13	754	7.45	2,100	5.76	1,050	4.95	680	4.49	499	4.21	403
2 p.m.	5.60	970	7.26	1,970								
4	6.09	1,230	7.10	1,860	5.58	960	4.85	640				
6	6.68	1,590	6.91	1,730					4.38	460	4.11	372
8	7.25	1,960	6.74	1,620	5.42	884	4.75	600				
10	7.85	2,380	6.58	1,530								
12 m.	8.43	2,840	6.41	1,430	5.27	816	4.68	572	4.28	426	4.03	348

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.												
4												
6	3.98	333	3.90	310								
8												
10												
12 n.	3.93	319	3.91	313								
2 p.m.												
4												
6	3.85	296	3.86	299								
8												
10												
12 m.	3.85	296	3.79	279								

HUDSON RIVER BASIN

SCHOHARIE CREEK AT PRATTSVILLE, N. Y.

LOCATION.—Lat. 42°19′25″, long. 74°26′05″, a quarter of a mile downstream from highway bridge in Prattsville, Greene County. Datum of gage is 1,130.01 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—236 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 4,600 second-feet; extended to peak stage on basis of area-velocity study.

MAXIMA.—July-August 1938: Discharge, 6,060 second-feet 2 p.m. July 23 (gage height, 6.46 feet).

1902 to June 1938: Discharge, 42,300 second-feet Nov. 16, 1926 (gage height, 19.5 feet, site and datum then in use), from records of New York City Board of Water Supply.

REMARKS.—Flood discharge not affected by storage or diversion. Records collected in cooperation with New York City Board of Water Supply.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	553	386	9	196	192	17	125	159	25	1,460	66
2	547	444	10	175	162	18	240	147	26	1,080	62
3	415	331	11	246	485	19	403	179	27	846	58
4	332	263	12	383	344	20	388	133	28	678	53
5	282	222	13	246	241	21	737	108	29	644	48
6	299	195	14	199	198	22	2,400	95	30	663	46
7	248	196	15	193	168	23	4,600	84	31	451	44
8	222	182	16	154	148	24	2,230	74			
Monthly mean discharge, in second-feet										698	178
Runoff, in inches										3.41	.87

Peak discharge.—Aug. 11, (2 p.m.) 634 sec.-ft.

SCHOHARIE CREEK AT GILBOA DAM, AT GILBOA, N. Y.

LOCATION.—Lat. 42°23′30″, long. 74°27′05″, at Gilboa Dam, 6 miles south of North Blenheim, Schoharie County.

DRAINAGE AREA.—314 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

MAXIMA.—July 1938: Discharge, 5,880 second-feet 4 p.m. July 23 (elevation, 1,131.40 feet).

August 1938: Discharge, 308 second-feet 10 a. m. Aug. 2 (elevation, 1,130.21 feet).

1927 to June 1938: Discharge, 32,000 second-feet Mar. 18, 1936 (elevation, 1,134.38 feet).

REMARKS.—Discharge of Schoharie Creek is the sum of the flow passing Gilboa Dam and the flow diverted through Shandaken Tunnel into Esopus Creek above Ashokan Reservoir for New York City municipal supply. Monthly mean discharge adjusted for change in contents of Schoharie Reservoir and diversion through Shandaken Tunnel into Esopus Creek. Records collected by New York City Department of Water Supply, Gas, and Electricity and furnished by that organization and New York City Board of Water Supply.

Mean discharge, in second-feet, 1938

Day	July		August		Day	July		August	
	Gilboa Dam	Shandaken Tunnel	Gilboa Dam	Shandaken Tunnel		Gilboa Dam	Shandaken Tunnel	Gilboa Dam	Shandaken Tunnel
1	0	589	237	0	16	0	562	15	213
2	0	589	169	209	17	0	558	0	297
3	0	589	3	297	18	0	558	0	297
4	0	588	0	297	19	0	558	0	295
5	0	585	0	297	20	0	558	0	294
6	0	582	0	295	21	0	512	0	294
7	0	580	0	295	22	444	0	0	463
8	0	577	0	295	23	4,247	0	0	579
9	0	574	0	294	24	1,819	0	0	572
10	0	569	0	294	25	1,050	0	0	568
11	0	566	31	23	26	719	0	0	258
12	0	263	150	0	27	558	0	0	0
13	0	0	94	0	28	399	0	0	0
14	0	371	70	0	29	558	0	0	0
15	0	566	46	0	30	490	0	0	0
					31	309	0	0	0
Monthly mean discharge, in second-feet						342	351	26.3	2.17

	July	August
Monthly mean discharge, in second-feet (observed)	693	243
Monthly mean discharge, in second-feet (adjusted)	298	549
Runoff, in inches (adjusted)	1.09	2.02

CATSKILL CREEK AT OAK HILL, N. Y.

LOCATION.—Lat. 42°24′20″, long. 74°09′05″, just downstream from highway bridge in southernmost part of Oak Hill, Greene County.

DRAINAGE AREA.—98 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,450 second-feet; extended to peak stage on basis of slope-area determination.

MAXIMA.—July-August 1938: Discharge, 1,390 second-feet 8:30 a.m. July 23 (gage height, 5.70 feet).

1929 to June 1938: Discharge, 8,880 second-feet Mar. 18, 1936 (gage height, 12.83 feet, from flood marks), from rating curve extended on basis of slope-area determination.

New York City Board of Water Supply reports a maximum discharge of 12,300 second-feet occurred on Nov. 9, 1913.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	40	115	9	8.5	48	17	13	41	25	208	15
2	40	104	10	8.2	46	18	62	38	26	143	12
3	32	79	11	27	170	19	102	37	27	150	9.2
4	25	64	12	64	97	20	89	29	28	116	6.9
5	21	52	13	36	66	21	116	23	29	214	6.2
6	17	41	14	25	55	22	280	18	30	228	5.8
7	13	66	15	23	46	23	740	16	31	137	5.3
8	12	56	16	18	40	24	350	15			
Monthly mean discharge, in second-feet										108	45.9
Runoff, in inches										1.27	.54

Peak discharge.—Aug. 11 (9 a.m.) 271 sec.-ft.

ESOPUS CREEK AT COLDBROOK, N. Y.

LOCATION.—Lat. 42°00′45″, long. 74°16′10″, at highway bridge at Coldbrook, Uster County and 1½ miles upstream from Ashokan Reservoir.

DRAINAGE AREA.—192 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights used to hundredths.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 7,100 second-feet; extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 8,830 second-feet 8:40 a.m. July 22 (gage height, 10.68 feet).

1914 to June 1938: Discharge, 55,000 second-feet Aug. 24, 1933 (gage height, 20.40 feet), from rating curve extended above 7,100 second-feet by logarithmic plotting.

REMARKS.—Water diverted from Schoharie Creek through Shandaken Tunnel enters Esopus Creek about 6 miles above this station. Flood peak not affected by diversion as Shandaken Tunnel was not operated during high-water periods. For information on diversion see record for Schoharie Creek at Gilboa Dam, at Gilboa, N. Y. Records collected in cooperation with New York City Board of Water Supply.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	1,080	602	9	894	742	17	707	688	25	1,520	798
2	1,060	753	10	847	655	18	713	748	26	1,140	774
3	1,020	872	11	838	2,000	19	802	692	27	854	188
4	980	808	12	849	988	20	813	635	28	752	128
5	944	755	13	297	670	21	936	594	29	859	117
6	924	702	14	208	530	22	4,250	606	30	772	107
7	903	704	15	726	439	23	5,340	848	31	594	102
8	891	763	16	714	398	24	2,850	822			
Monthly mean discharge, in second-feet (adjusted for diversion†)										812	435
Runoff, in inches (adjusted for diversion†)										4.88	2.62

†Adjusted for diversion from Schoharie Creek.
Peak discharge.—July 23 (4 p.m.) 7,100 sec.-ft.; Aug. 11 (10 a.m.) 3,160 sec.-ft.

RONDOUT CREEK NEAR LOWES CORNERS, N. Y.

LOCATION.—Lat. 41°51′55″, long. 74°29′10″, at highway bridge 1.1 miles upstream from Lowes Corners, Sullivan County and about 2¾ miles upstream from Chestnut Creek.

DRAINAGE AREA.—38.5 square miles.

GAGE-HEIGHT RECORD.—Chain gage read to hundredths twice daily and more frequently during floods. Graph based on chain gage readings used July 19-24, 26-29, August 1, 2, 6-12.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,030 second-feet; extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 7,600 second-feet 8 a.m. July 22 (gage height, 8.2 feet).

1937 to June 1938: Discharge, 5,700 second-feet Oct. 23, 1937 (gage height, 7.0 feet from graph based on gage readings).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	82	332	9	80	188	17	35	132	25	430	57
2	92	259	10	71	134	18	36	132	26	258	52
3	70	173	11	66	2,100	19	51	121	27	272	47
4	56	173	12	64	574	20	51	100	28	258	44
5	52	138	13	55	310	21	372	82	29	282	42
6	51	408	14	44	232	22	2,090	77	30	214	42
7	46	239	15	40	171	23	1,880	68	31	192	40
8	44	326	16	37	144	24	799	60			
Monthly mean discharge, in second-feet										264	226
Runoff, in inches										7.91	6.77

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
July 16						July 29			Aug. 7			Aug. 12		
6 a.m.	0.82	38				3 a.m.	2.64	351	2 a.m.	2.90	480	6 a.m.	3.50	700
7 p.m.	.80	36				6	2.56	311	4	2.42	244	12 n.	3.24	537
July 17			July 23			12 n.	2.60	331	6	2.30	192	6 p.m.	3.00	417
6 a.m.	.80	36	2 a.m.	3.15	620	7 p.m.	2.54	302	12 n.	2.26	177	12 m.	2.92	380
6 p.m.	.75	32	4	3.40	775	12 m.	2.47	268	7 p.m.	2.20	154	Aug. 13		
July 18			6	4.90	2,000	July 30			Aug. 8			7 a.m.	2.86	354
6 a.m.	.78	34	8	5.23	2,360	6 a.m.	2.40	235	6 a.m.	2.16	141	6 p.m.	2.64	265
7 p.m.	.82	38	10	5.60	2,800	6 p.m.	2.32	201	3 p.m.	2.18	148	Aug. 14		
July 19			12 n.	6.10	3,520	July 31			4	3.50	840	7 a.m.	2.64	265
7 a.m.	.88	46	2 p.m.	5.50	2,680	7 a.m.	2.30	192	5	4.20	1,360	6 p.m.	2.50	215
2 p.m.	.97	58	4	5.06	2,170	6 p.m.	2.26	177	6	3.40	775	Aug. 15		
6	.96	56	6	4.75	1,850	Aug. 1			8	2.95	508	7 a.m.	2.40	185
July 20			8	4.52	1,640	7 a.m.	2.24	169	10	2.75	405	7 p.m.	2.32	163
6 a.m.	.90	48	10	4.30	1,440	4 p.m.	2.26	177	12 m.	2.60	331	Aug. 16		
6 p.m.	.92	51	12 m.	4.13	1,300	6	2.46	263	Aug. 9			7 a.m.	2.28	152
8	1.12	82	July 24			7	3.00	535	6 a.m.	2.34	209	6 p.m.	2.22	137
12 m.	1.06	72	4 a.m.	3.82	1,060	8	4.05	1,240	12 n.	2.23	165	Aug. 17		
July 21			8	3.57	889	10	3.49	834	6 p.m.	2.20	154	6 a.m.	2.20	132
4 a.m.	1.06	72	12 n.	3.35	742	12 m.	3.03	552	12 m.	2.15	138	5 p.m.	2.16	123
6	1.50	165	4 p.m.	3.16	626	Aug. 2			Aug. 10			Aug. 18		
8	2.85	785	8	3.02	546	3 a.m.	2.56	311	6 a.m.	2.12	128	6 a.m.	2.18	128
10	2.40	515	12 m.	2.95	508	6	2.46	263	6 p.m.	2.02	102	6 p.m.	2.20	132
12 n.	2.12	381	July 25			12 n.	2.43	249	10	2.25	173	Aug. 19		
2 p.m.	1.94	308	6 a.m.	2.80	430	6 p.m.	2.38	226	12 m.	2.90	480	6 a.m.	2.20	132
4	1.88	286	7 p.m.	2.76	410	12 m.	2.32	201	Aug. 11			6 p.m.	2.10	110
6	2.00	331	July 26			Aug. 3			1 a.m.	4.00	1,080	Aug. 20		
9	2.40	515	6 a.m.	2.50	282	7 a.m.	2.26	177	2	6.00	3,360	6 a.m.	2.08	106
12 m.	2.95	855	12 n.	2.50	282	7 p.m.	2.20	154	3	6.90	4,860	6 p.m.	2.00	90
July 22			6 p.m.	2.40	235	Aug. 4			4	7.30	5,600	Aug. 21		
2 a.m.	3.60	1,370	July 27			6 a.m.	2.24	169	5	6.55	4,240	6 a.m.	2.00	90
4	3.10	960	6 a.m.	2.36	218	6 p.m.	2.22	162	6	6.20	3,680	6 p.m.	1.92	76
6	4.30	2,050	12 n.	2.36	218	Aug. 5			8	5.60	2,780	Aug. 22		
8	8.2	7,600	4 p.m.	2.75	405	6 a.m.	2.20	154	10	5.10	2,170	6 a.m.	1.94	79
10	6.60	4,320	6	2.96	513	6 p.m.	2.14	135	12 n.	4.72	1,760	6 .pm.	1.92	76
12 n.	5.60	2,800	8	2.60	331	Aug. 6			4 p.m.	4.22	1,280	......	......	......
2 p.m.	4.90	2,000	12 m.	2.47	268	6 a.m.	2.14	135	8	3.90	1,000	......	......	......
4	4.30	1,440	July 28			4 p.m.	2.12	128	12 m.	3.75	880	......	......	......
6	3.85	1,080	4 a.m.	2.52	292	6	2.30	192	......	......	......	......	......	......
8	3.46	814	7 a.m.	2.46	263	8	3.10	590	......	......	......	......	......	......
10	3.66	952	6 p.m.	2.40	235	10	4.90	2,000	......	......	......	......	......	......
12 m.	3.40	775	12 m.	2.52	292	11	5.10	2,210	......	......	......	......	......	......
......	......	......	......	......	......	12 m.	4.20	1,360	......	......	......	......	......	......

RONDOUT CREEK NEAR LACKAWACK, N. Y.

LOCATION.—Lat. 41°46'25", long. 74°23'35", half a mile downstream from highway bridge known as Wilburs Bridge and 2¾ miles southeast of Lackawack, Ulster County. Datum of gage is 587.67 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—100 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights used to hundredths.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 10,260 second-feet; extended to peak stage on basis of logarithmic plotting and slope-area determination of peak discharge.

MAXIMA.—July-August 1938: Discharge, 17,700 second-feet 9:30 a.m. July 22 (gage height, 14.00 feet).

1906 to June 1938: Discharge, 26,700 second-feet Aug. 26, 1928, from slope-area determination by engineers of New York City Board of Water Supply.

REMARKS.—Flood discharge not affected by storage or diversion. Records collected in cooperation with New York City Board of Water Supply.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	172	431	9	172	808	17	85	414	25	1,010	146
2	196	545	10	173	490	18	80	415	26	701	133
3	152	326	11	136	5,170	19	117	373	27	558	125
4	134	268	12	159	1,370	20	158	279	28	537	117
5	121	235	13	122	832	21	1,380	237	29	520	110
6	112	882	14	106	668	22	6,300	206	30	411	102
7	103	1,180	15	98	569	23	4,260	180	31	309	96
8	100	872	16	87	482	24	1,910	159			
Monthly mean discharge, in second-feet										661	588
Runoff, in inches										7.62	6.78

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
			July 22			July 27			Aug. 6			Aug. 11		
July 16			12 n.	10.30	9,870	6 p.m.	2.72	673	4 p.m.	2.04	270	6 a.m.	11.20	11,600
12 n.	1.29	90	1 p.m.	8.70	7,250	8	2.72	673	5	2.33	428	7	9.80	8,950
12 m.	1.27	85	2	7.92	6,100	12 m.	2.55	562	6	3.50	1,210	8	9.50	8,450
July 17			3	7.30	5,280	July 28			8	3.18	986	10	8.40	6,800
12 n.	1.27	85	4	6.78	4,640	4 a.m.	2.52	543	9	3.45	1,180	12 n.	7.05	4,960
12 m.	1.27	85	5	6.30	4,060	6	2.58	582	10	7.30	5,280	2 p.m.	6.10	3,820
July 18			6	5.95	3,640	12 n.	2.52	543	11	8.56	7,040	4	5.40	2,980
12 n.	1.21	70	8	5.42	3,010	8 p.m.	2.44	494	12 m.	7.25	5,210	6	5.08	2,630
12 m.	1.27	85	10	5.60	3,220	12 m.	2.46	506	Aug. 7			8	4.80	2,340
July 19			12 m.	5.50	3,100	July 29			1 a.m.	5.30	2,870	10	4.55	2,090
12 n.	1.29	90	July 23			8 a.m.	2.43	488	2	4.75	2,290	12 m.	4.40	1,950
2 p.m.	1.49	147	2 a.m.	4.96	2,500	12 n.	2.70	660	4	4.22	1,790	Aug. 12		
4	1.51	154	4	4.80	2,340	4 p.m.	2.55	562	6	3.72	1,370	6 a.m.	3.97	1,670
12 m.	1.46	137	6	5.50	3,100	6	2.42	482	8	3.43	1,160	12 n.	3.55	1,330
July 20			8	5.85	3,520	12 m.	2.46	506	10	3.22	1,010	6 p.m.	3.20	1,070
12 n.	1.40	118	10	6.50	4,300	July 30			12 n.	3.06	902	12 m.	3.02	935
4 p.m.	1.38	113	11	7.50	5,530	12 n.	2.30	410	4 p.m.	2.76	699	Aug. 13		
6	1.42	124	12 n.	8.82	7,430	12 m.	2.18	342	8	2.57	576	6 a.m.	2.92	864
8	1.89	325	1 p.m.	8.60	7,100	July 31			12 m.	2.48	518	12 n.	2.89	843
10	1.73	250	2	8.25	6,580	12 n.	2.15	326	Aug. 8			6 p.m.	2.82	794
12 m.	1.68	226	4	7.65	5,720	12 m.	2.04	270	8 a.m.	2.37	452	12 m.	2.71	722
July 21			6	7.30	5,280	Aug. 1			4 p.m.	2.28	399	Aug. 14		
4 a.m.	1.60	190	8	6.45	4,240	6 a.m.	2.05	275	5	2.35	440	12 n.	2.63	673
6	1.75	258	10	5.85	3,520	8	2.30	410	6	2.80	725	12 m.	2.52	611
7	4.75	2,340	12 m.	5.45	3,040	9	2.10	300	7	6.10	3,820	Aug. 15		
8	7.12	5,280	July 24			6 p.m.	2.06	280	8	5.05	2,600	12 n.	2.46	578
9	6.65	4,480	2 a.m.	5.15	2,700	8	2.50	530	10	4.18	1,750	12 m.	2.34	512
10	5.80	3,460	4	4.97	2,510	9	3.58	1,270	12 m.	3.72	1,370	Aug. 16		
11	5.00	2,580	6	4.75	2,290	12 m.	3.18	986	Aug. 9			12 n.	2.29	484
12 n.	4.53	2,150	8	4.54	2,080	Aug. 2			2 a.m.	3.45	1,180	12 m.	2.22	446
2 p.m.	3.88	1,590	10	4.37	1,920	4 a.m.	2.77	706	4	3.25	1,040	Aug. 17		
4	3.20	1,070	12 n.	4.22	1,790	8	2.58	582	6	3.12	944	12 n.	2.17	418
6	2.92	892	2 p.m.	4.10	1,680	12 n.	2.47	512	8	3.03	881	12 m.	2.12	391
8	2.72	772	4	3.98	1,570	4 p.m.	2.36	446	10	2.95	825	Aug. 18		
10	2.60	700	6	3.90	1,510	8	2.26	387	12 n.	2.86	764	12 n.	2.10	380
11	2.72	772	8	3.79	1,420	12 m.	2.22	364	4 p.m.	2.67	640	4 p.m.	2.22	446
12 m.	4.00	1,690	12 m.	3.60	1,280	Aug. 3			8	2.60	595	8	2.28	479
July 22			July 25			12 n.	2.17	337	12 m.	2.53	550	12 m.	2.22	446
1 a.m.	6.35	4,120	6 a.m.	3.39	1,130	6 p.m.	2.09	295	Aug. 10			Aug. 19		
2	7.00	4,900	12 n.	3.22	1,010	12 m.	2.05	275	12 n.	2.40	470	12 n.	2.08	370
3	6.65	4,480	6 p.m.	3.04	688	Aug. 4			9 p.m.	2.28	399	12 m.	1.97	316
4	6.53	4,340	12 m.	2.91	797	12 n.	2.05	275	10	2.35	440	Aug. 20		
5	6.98	4,880	July 26			12 m.	1.98	241	12 m.	3.60	1,280	12 n.	1.91	287
6	7.25	5,210	8 a.m.	2.86	764	Aug. 5			Aug. 11			12 m.	1.84	256
7	9.00	7,700	4 p.m.	2.71	666	12 n.	1.98	241	1 a.m.	5.30	2,870	Aug. 21		
8	11.25	11,700	12 m.	2.55	562	12 m.	1.92	214	2	7.10	5 020	12 n.	1.81	242
9	13.75	17,100	July 27			Aug. 6			3	8.50	6,950	12 m.	1.77	226
10	13.40	16,300	8 a.m.	2.51	536	8 a.m.	1.92	214	4	10.50	10,200	Aug. 22		
11	12.00	13,200	4 p.m.	2.46	506	3 p.m.	1.92	214	5	11.50	12,200	12 n.	1.74	214
....	......	....	....	......	....	....	......	....	....	......	....	12 m.	1.70	198

RONDOUT CREEK AT ROSENDALE, N. Y.

LOCATION.—Lat. 41°50′35″, long. 74°05′10″, 150 feet upstream from highway bridge in Rosendale, Ulster County. Datum of gage is 42.81 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—386 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights used to hundredths.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 15,000 second-feet; extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 16,400 second-feet 3 p.m. Aug. 11 (gage height, 14.53 feet).

1901-03, 1906-19, 1926 to June 1938: Discharge, 27,300 second-feet Aug. 27, 1928 (gage height, 21.9 feet).

REMARKS.—Flood discharge not affected by storage or diversion. Diurnal fluctuations during periods of low flow caused by operation of power plants above station.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	660	670	9	240	2,400	17	164	720	25	3,300	305
2	610	1,140	10	440	1,180	18	166	680	26	1,920	280
3	530	770	11	320	9,900	19	178	680	27	1,280	270
4	390	620	12	385	4,500	20	300	530	28	1,200	239
5	385	530	13	335	2,180	21	1,560	470	29	1,100	216
6	330	520	14	275	1,280	22	7,400	365	30	1,080	210
7	280	3,400	15	220	1,000	23	12,200	350	31	810	214
8	230	1,720	16	200	800	24	8,000	330			
Monthly mean discharge, in second-feet										1,500	1,241
Runoff, in inches										4.48	3.71

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
......	......	......	......	......	......	......	......	......	Aug. 7			Aug. 12		
July 16			July 23			July 31			8 p.m.	5.24	2,370	12 n.	6.95	4,150
2 a.m.	2.36	221	1 a.m.	11.86	11,600	12 n.	3.35	805	10	5.22	2,350	4 p.m.	6.51	3,660
9	2.37	226	2	11.42	10,900	12 m.	3.24	731	12 m.	5.14	2,270	8	6.09	3,210
12 n.	2.25	177	3	11.15	10,400	Aug. 1			Aug. 8			12 m.	5.71	2,830
12 m.	2.31	199	4	11.10	10,300	12 n.	2.95	550	4 a.m.	4.83	1,990	Aug. 13		
July 17			6	11.25	10,600	12 m.	3.20	705	8	4.56	1,750	4 a.m.	5.41	2,530
8 a.m.	2.33	208	8	11.42	10,900	Aug. 2			12 n.	4.36	1,580	8	5.22	2,350
2 p.m.	1.70	44	10	11.48	11,000	4 a.m.	3.25	738	6 p.m.	4.10	1,360	12 n.	5.09	2,230
4	2.28	188	12 n.	11.59	11,200	6	3.83	1,150	9	4.51	1,700	4 p.m.	4.93	2,080
12 m.	2.23	170	2 p.m.	11.85	11,600	7	4.17	1,420	12 m.	4.71	1,880	8	4.54	1,730
July 18			4	12.41	12,600	8	4.32	1,540	Aug. 9			12 m.	4.33	1,550
11 a.m.	2.23	170	6	13.14	13,900	10	4.27	1,500	1 a.m.	5.13	2,260	Aug. 14		
12 n.	2.16	147	8	13.61	14,700	12 n.	4.14	1,390	2	6.00	3,120	12 n.	4.00	1,280
12 m.	2.23	170	10	13.66	14,800	4 p.m.	3.92	1,220	3	6.54	3,690	12 m.	3.78	1,110
July 19			12 m.	13.38	14,300	8	3.75	1,090	4	6.60	3,760	Aug. 15		
12 n.	2.24	173	July 24			12 m.	3.60	980	5	6.44	3,580	12 n.	3.62	994
1 p.m.	2.33	208	2 a.m.	12.76	13,200	Aug. 3			6	6.23	3,350	12 m.	3.50	910
10	2.18	153	4	11.94	11,800	4 a.m.	3.43	861	8	5.80	2,920	Aug. 16		
July 20			6	11.00	10,200	12 n.	3.26	744	12 n.	5.20	2,330	12 n.	3.30	770
3 a.m.	2.18	153	8	10.22	8,860	7 p.m.	3.23	724	4 p.m.	4.79	1,950	12 m.	3.34	798
5	2.36	221	10	9.58	7,840	12 m.	3.18	692	8	4.48	1,680	Aug. 17		
8	2.63	361	12 n.	9.08	7,040	Aug. 4			12 m.	4.22	1,460	6 a.m.	3.26	744
12 n.	2.52	301	2 p.m.	8.65	6,380	8 a.m.	3.11	646	Aug. 10			3 p.m.	2.91	526
1 p.m.	2.61	350	4	8.29	5,870	5 p.m.	2.92	532	12 n.	3.85	1,160	7	3.30	770
12 m.	2.61	350	6	7.96	5,410	7	2.93	538	12 m.	3.66	1,020	9	3.17	686
July 21			8	7.68	5,040	9	3.09	634	Aug. 11			12 m.	3.18	692
8 a.m.	2.60	344	10	7.40	4,690	Aug. 5			2 a.m.	3.75	1,090	Aug. 18		
10	3.28	757	12 m.	7.15	4,390	6 a.m.	3.03	598	3	3.98	1,260	11 a.m.	3.16	679
11	3.55	945	July 25			10	2.57	328	4	4.60	1,780	12 n.	3.05	610
12 n.	3.62	994	4 a.m.	6.74	3,910	12 n.	2.90	520	5	5.45	2,570	4 p.m.	3.24	731
1 p.m.	3.83	1,150	8	6.42	3,560	12 m.	2.90	520	6	6.30	3,430	12 m.	3.17	686
2	4.75	1,920	12 n.	6.17	3,290	Aug. 6			7	8.25	5,810	Aug. 19		
3	5.57	2,690	4 p.m.	5.92	3,040	9 a.m.	2.88	508	8	10.25	8,910	6 a.m.	3.25	738
4	6.09	3,210	8	5.62	2,740	10	2.61	350	9	11.65	11,300	12 n.	3.21	712
6	6.25	3,380	12 m.	5.28	2,410	12 n.	2.76	436	10	12.65	13,000	12 m.	3.07	622
8	6.02	3,140	July 26			5 p.m.	2.83	478	11	13.35	14,200	Aug. 20		
10	5.52	2,640	4 a.m.	5.05	2,190	9	2.95	550	12 n.	13.90	15,200	7 a.m.	3.02	592
12 m.	5.35	2,470	8	4.90	2,050	12 m.	3.61	987	1 p.m.	14.25	15,800	11	2.48	280
July 22			12 n.	4.75	1,920	Aug. 7			2	14.47	16,200	12 n.	2.96	556
2 a.m.	5.36	2,480	4 p.m.	4.62	1,800	1 a.m.	4.11	1,370	3	14.53	16,400	6 p.m.	2.86	496
4	5.88	3,000	8	4.44	1,640	2	4.50	1,700	4	14.43	16,200	12 m.	2.89	514
5	6.19	3,310	12 m.	4.30	1,520	3	4.67	1,840	5	14.16	15,700	Aug. 21		
6	6.51	3,660	July 27			4	5.60	2,720	6	13.76	15,000	7 a.m.	2.88	508
7	7.12	4,350	12 n.	3.95	1,240	5	7.75	5,140	7	13.20	14,000	10	2.50	290
8	7.64	4,990	12 m.	3.85	1,160	6	8.67	6,420	8	12.52	12,700	11	2.79	454
9	7.91	5,340	July 28			7	8.81	6,620	9	11.74	11,400	7 p.m.	2.85	490
10	8.26	5,820	8 a.m.	3.98	1,260	8	8.52	6,190	10	11.00	10,200	9	2.75	430
12 n.	8.84	6,670	4 p.m.	3.92	1,220	9	8.04	5,520	11	10.30	8,990	Aug. 22		
2 p.m.	9.81	8,210	12 m.	3.81	1,130	10	7.52	4,840	12 m.	9.74	8,090	7 a.m.	2.75	430
4	10.64	9,550	July 29			11	7.05	4,270	Aug. 12			10	2.37	226
6	11.24	10,600	12 n.	3.72	1,060	12 n.	6.64	3,800	2 a.m.	8.85	6,680	11	2.59	339
8	11.88	11,700	10 p.m.	3.91	1,210	1 p.m.	6.29	3,420	4	8.26	5,820	12 n.	2.61	350
9	12.36	12,500	July 30			2	6.00	3,120	8	7.49	4,800	12 m.	2.61	350
10	13.26	14,100	12 n.	3.76	1,100	4	5.60	2,720	......	......	......	......	......	......
11	13.00	13,600	12 m.	3.03	598	6	5.33	2,450	......	......	......	......	......	......
12 m.	12.43	12,600	......	......	......	......	......	......	......	......	......	......	......	......

CHESTNUT CREEK ABOVE RED BROOK, AT GRAHAMSVILLE, N. Y.

LOCATION.—Lat. 41°50′45″, long. 74°32′50″, about 300 feet upstream from bridge on State Highway 42 in Grahamsville, Sullivan County, and a quarter of a mile upstream from Red Brook.

DRAINAGE AREA.—12.2 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily and more frequently during floods. Record for periods July 19-23, 28, Aug. 1, 2, 6-11 determined from graph based on gage readings.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 550 second-feet; extended to peak stage on basis of computations of discharge through contracted section and by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 2,600 second-feet 8 a.m. July 22 (gage height, 5.8 feet, observed during flood).

1937 to June 1938: Discharge, 1,250 second-feet Oct. 23, 1937 (gage height, 4.0 feet, from graph based on gage readings).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August
1	14	77
2	17	77
3	13	39
4	12	34
5	10	29
6	9.5	170
7	9	172
8	9	208

Day	July	August
9	53	126
10	22	78
11	16	656
12	15	134
13	12	75
14	12	57
15	10	47
16	10	42

Day	July	August
17	9.5	42
18	9.5	42
19	21	36
20	17	32
21	109	27
22	798	25
23	265	23
24	173	21

Day	July	August
25	95	20
26	68	20
27	58	18
28	65	17
29	74	17
30	45	16
31	37	16
Monthly mean discharge, in second-feet	67.3	77.2
Runoff, in inches	6.36	7.30

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
......	......	......	......	......	......	......	......	......	......	......	......	Aug. 11		
July 16			July 22									12 n.	2.96	468
8 a.m.	1.25	10	2 a.m.	2.50	255	July 29						2 p.m.	2.82	391
5 p.m.	1.24	10	4	3.25	628	8 a.m.	1.24	83	Aug. 7			5	2.66	308
July 17			6	4.40	1,400	5 p.m.	1.14	65	2 a.m.	2.16	366	12 m.	2.46	215
8 a.m.	1.24	10	8	5.80	2,600	July 30			4	1.90	255	Aug. 12		
5 p.m.	1.22	9	10	4.50	1,560	8 a.m.	1.06	52	8	1.62	161	8 a.m.	2.28	145
July 18			12 n.	3.55	965	5 p.m.	.96	38	12 n.	1.49	128	5 p.m.	2.14	102
8 a.m.	1.22	9	2 p.m.	2.80	600	July 31			5 p.m.	1.39	106	Aug. 13		
5 p.m.	1.24	10	4	2.25	385	8 a.m.	.96	38	12 m.	1.34	95	8 a.m.	2.06	82
12 m.	1.28	12	8	1.82	233	5 p.m.	.94	36	Aug. 8			5 p.m.	2.00	68
July 19			12 m.	1.68	185	Aug. 1			8 a.m.	1.28	83	Aug. 14		
2 a.m.	1.35	16	July 23			8 a.m.	.98	41	5 p.m.	1.26	79	8 a.m.	1.98	64
4	1.45	23	4 a.m.	1.58	167	5 p.m.	.95	37	6	3.83	1,420	5 p.m.	1.91	52
8	1.48	25	8	1.70	205	8	1.93	283	8	3.02	847	Aug. 15		
5 p.m.	1.43	21	12 n.	2.14	385	12 m.	1.62	173	10	2.56	578	8 a.m.	1.90	50
July 20			2 p.m.	2.30	468	Aug. 2			12 m.	2.28	425	5 p.m.	1.86	44
8 a.m.	1.34	15	6	1.96	304	4 a.m.	1.40	112	Aug. 9			Aug. 16		
5 p.m.	1.30	13	12 m.	1.70	205	8	1.24	79	4 a.m.	2.06	182	8 a.m.	1.85	43
8	1.68	49	July 24			5 p.m.	1.08	52	8	1.88	132	5 p.m.	1.83	40
12 m.	1.37	17	8 a.m.	1.62	179	Aug. 3			1 p.m.	1.74	102	Aug. 17		
July 21			5 p.m.	1.59	170	8 a.m.	1.04	44	5	1.69	91	8 a.m.	1.82	39
2 a.m.	1.34	15	12 m.	1.50	145	5 p.m.	.98	36	Aug. 10			5 p.m.	1.86	44
4	1.36	17	July 25			Aug. 4			8 a.m.	1.64	81	Aug. 18		
5	1.70	52	8 a.m.	1.34	108	8 a.m.	.98	36	5 p.m.	1.54	63	8 a.m.	1.84	42
6	2.70	338	5 p.m.	1.21	81	5 p.m.	.93	30	8	1.52	60	5 p.m.	1.83	40
7	2.80	385	July 26			Aug. 5			10	1.66	85	Aug. 19		
8	2.60	295	8 a.m.	1.17	74	8 a.m.	.94	31	12 m.	2.30	267	8 a.m.	1.81	37
10	2.26	173	5 p.m.	1.11	63	5 p.m.	.91	28	Aug. 11			5 p.m.	1.78	34
12 n.	2.05	119	July 27			Aug. 6			2 a.m.	3.40	715	Aug. 20		
5 p.m.	1.77	63	8 a.m.	1.11	63	8 a.m.	.91	28	4	5.00	1,880	8 a.m.	1.77	33
10	1.60	38	5 p.m.	1.06	55	2 p.m.	.94	31	5	4.90	1,800	5 p.m.	1.74	29
12 m.	2.70	338	July 28			5	1.38	104	6	4.40	1,400	Aug. 21		
......	......	......	8 a.m.	1.04	52	6	1.56	145	8	3.44	739	8 a.m.	1.74	29
......	......	......	5 p.m.	1.03	51	8	1.42	112	10	3.15	572	5 p.m.	1.71	26
......	......	......	10	1.44	130	10	3.66	1,290	......	......	......	Aug. 22		
......	......	......	......	......	......	12 m.	2.60	600	......	......	......	8 a.m.	1.70	25
......	......	......	......	......	......	......	......	......	......	......	......	5 p.m.	1.69	24

WALLKILL RIVER NEAR UNIONVILLE, N. Y.

LOCATION.—Lat. 41°15′35″, long. 74°32′55″, at bridge on Quarryville-Milton road, about 2 miles south of New York-New Jersey State line, and 3 miles south of Unionville, Orange County.

DRAINAGE.—144 square miles.

GAGE-HEIGHT RECORD.—Wire-weight gage read to hundredths twice daily.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 900 second-feet; and extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 1,050 second-feet 3 a.m. July 25 (gage height, 10.87 feet, from graph based on gage readings).

1937 to June 1938: Discharge, 1,710 second-feet Jan. 26, 1938 (gage height, 10.06 feet, from graph based on gage readings).

REMARKS.—No regulation or diversion. Natural storage occurs in small lakes and swampy areas above station.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	774	625	9	130	302	17	106	124	25	1,030	61
2	710	565	10	110	261	18	97	147	26	960	56
3	650	546	11	102	316	19	106	244	27	864	55
4	593	491	12	150	361	20	120	197	28	794	50
5	502	440	13	190	331	21	242	124	29	728	49
6	418	408	14	162	261	22	521	89	30	686	46
7	296	392	15	135	173	23	765	78	31	645	45
8	178	361	16	110	156	24	984	70			
Monthly mean discharge, in second-feet										447	239
Runoff, in inches										3.57	1.91

Peak discharge.—Aug. 12 (6:30 a.m.), 373 sec.-ft.

WALLKILL RIVER AT PELLETS ISLAND MOUNTAIN, N. Y.

LOCATION.—Lat. 41°22'50", long. 74°24'50", just downstream from highway bridge at Pellets Island Mountain, Orange County and 4½ miles south of Middletown. Datum of gage is 357.43 feet above mean sea level(general adjustment of 1912).

DRAINAGE AREA.—385 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 4,000 second-feet; extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 4,880 second-feet 5 p.m. July 24 (gage height, 13.81 feet).

1919 to June 1938: Discharge, 12,400 second-feet Mar. 14, 1936 (gage height, 20.0 feet, present site and datum), from rating curve extended above 9,000 second-feet; gage height, 25.7 feet (present datum) Mar. 16, 1920.

REMARKS.—Discharge affected by no known diversions but natural storage occurs in large swampy areas and small lakes above Pellets Island Mountain.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	2,220	1,370	9	325	796	17	219	386	25	4,500	171
2	1,960	1,700	10	258	712	18	186	425	26	3,820	151
3	1,570	1,210	11	222	1,090	19	302	485	27	2,960	146
4	1,270	954	12	295	1,060	20	302	478	28	2,510	a132
5	1,030	817	13	411	817	21	735	a353	29	2,050	a124
6	848	769	14	370	628	22	2,740	a274	30	2,000	119
7	644	718	15	311	485	23	3,620	a225	31	1,620	113
8	450	680	16	269	397	24	4,740	a194			
Monthly mean discharge, in second-feet										1,444	580
Runoff, in inches										4.32	1.74

aFragmentary gage-height record; discharge estimated.
Peak discharge.—Aug. 11 (4 p.m.) 1,300 sec.-ft.

WALLKILL RIVER AT GARDINER, N. Y.

LOCATION.—Lat. 41°41'10", long. 74°09'55", at highway bridge 500 feet downstream from Shawangunk Kill and three-quarters of a mile northwest of Gardiner, Ulster County. Datum of gage is 185.70 feet above sea level (general adjustment of 1912).

DRAINAGE AREA.—711 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 11,200 second-feet; extended logarithmically to peak stage.

MAXIMA.—July-August 1938: Discharge, 9,720 second-feet 7 p.m. July 23 (gage height, 10.75 feet).

1924 to June 1938: Discharge, 18,000 second-feet Mar. 12, 1936 (gage height, 15.16 feet), from rating curve extended logarithmically above 11,200 second-feet; gage height, 16.42 feet Mar. 12, 1936, result of ice jam.

REMARKS.—Large diurnal fluctuations during low and medium stages caused by power-plant operation. Natural storage occurs in swampy areas and small lakes above Pellets Island Mountain, and both artificial and natural storage occurs in lakes and ponds in the area between Pellets Island Mountain and station.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	2,870	2,000	9	565	1,300	17	342	649	25	6,350	328
2	2,660	2,450	10	491	1,120	18	300	671	26	5,140	295
3	2,200	2,090	11	391	6,620	19	299	784	27	4,150	253
4	1,750	1,490	12	366	3,350	20	464	776	28	3,900	256
5	1,410	1,200	13	482	1,890	21	1,070	634	29	3,120	261
6	1,160	1,050	14	528	1,300	22	7,210	527	30	2,990	213
7	944	1,070	15	463	974	23	7,950	397	31	2,610	219
8	732	1,170	16	391	761	24	8,180	374			
Monthly mean discharge, in second-feet										2,306	1,177
Runoff, in inches										3.74	1.91

Peak discharge.—Aug. 11 (1:30 p.m.) 7,920 sec.-ft.

HACKENSACK RIVER BASIN

ORADELL RESERVOIR AT ORADELL, N. J.

LOCATION.—Lat. 40°57′24″, long. 74°01′43″, at Oradell Dam, Oradell, Bergen County. Gage heights are elevations above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—113 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph. Gage heights shown in table are at 8 a.m. readings.

REMARKS.—Capacity, 381,000,000 cubic feet. Records furnished by Hackensack Water Co.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August	
	Gage Height	Contents	Gage Height	Contents	Gage Height	Contents
1	22.67	381	22.86	387	22.11	365
2	22.68	382	22.80	385	22.20	368
3	22.73	383	22.77	384	22.53	377
4	22.66	381	22.75	384	22.83	386
5	22.67	381	22.76	384	22.87	387
6	22.67	381	22.77	384	22.88	387
7	22.69	382	22.76	384	22.87	387
8	22.70	382	22.74	383	22.87	387
9	22.51	377	22.74	383	22.76	384
10	22.58	379	22.87	387	22.72	383
11	22.65	381	22.81	385	22.80	385
12	22.57	378	22.81	385	22.00	362
13	22.71	382	22.75	384	22.00	362
14	22.68	382	22.83	386	22.06	364
15	22.57	378	22.79	385	22.05	363
16	22.55	378	22.60	379	22.19	368
17	22.55	378	22.59	379	22.41	374
18	22.77	384	22.60	379	22.56	378
19	22.83	386	22.64	380	22.71	382
20	22.79	385	22.58	379	22.74	383
21	22.77	384	22.65	381	22.74	383
22	22.75	384	22.70	382	22.73	383
23	22.71	382	21.75	355	22.74	383
24	22.70	382	21.88	359	22.72	383
25	22.77	384	21.47	347	22.69	382
26	22.75	384	22.00	362	22.70	382
27	22.71	382	22.03	363	22.71	382
28	22.79	385	22.07	364	22.71	382
29	22.52	377	22.08	364	22.71	382
30	22.88	387	22.09	365	22.71	382
31	----------	----------	22.15	366	22.69	382

	June	July	August
Change in contents, in millions of cubic feet	+6	−22	+18
Change in contents, in equivalent second-feet	+2.31	−8.21	+6.71

HACKENSACK RIVER AT NEW MILFORD, N. J.

LOCATION.—Lat. 40°56'52", long. 74°01'34", at pumping plant of Hackensack Water Co., New Milford, Bergen County, 3½ miles downstream from Dwars Kill. Datum of gage is 6.25 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—113 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,350 second-feet 11 a.m. to 2 p.m. July 24 (gage height, 4.51 feet).

1921 to June 1938: Discharge, 2,800 second-feet Mar. 12, 13, 1936 (gage height, 5.08 feet).

REMARKS.—Monthly mean discharge, and run-off, in inches, adjusted for diversions and for storage in Oradell Reservoir and Woodcliff Lake. Monthly mean diversion at West Nyack, N. Y.: June, 1.2 second-feet; July, 1.1 second-feet; August, 1.2 second-feet. Monthly mean diversion at New Milford: June, 52.3 second-feet; July, 50.7 second-feet; August, 53.8 second-feet. For daily changes in contents of reservoirs see records for Oradell Reservoir at Oradell, N. J., and Woodcliff Lake at Hillsdale, N. J. Water-stage recorder inspected by employees of Hackensack Water Co., and records of diversions and contents of reservoirs furnished by that company.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	33	407	204	11	255	63	752	21	48	466	35
2	20	360	114	12	208	96	281	22	45	1,150	33
3	98	258	36	13	290	155	120	23	38	1,900	30
4	70	172	108	14	514	181	120	24	22	2,160	26
5	65	104	120	15	224	343	78	25	60	1,010	13.5
6	37	78	129	16	154	163	12.2	26	109	656	12.0
7	59	65	124	17	65	120	15.6	27	469	580	12.9
8	411	40	210	18	78	87	15.6	28	1,110	475	14.1
9	103	37	342	19	104	180	32	29	647	383	12.8
10	36	92	137	20	78	223	36	30	431	322	10.0
								31		289	7.4
Monthly mean discharge, in second-feet (observed)									196	407	103
Monthly mean discharge, in second-feet (adjusted)									252	451	164
Runoff, in inches (adjusted)									2.49	4.60	1.67

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	1.57	145	1.47	104	1.34	59	1.54	133	1.79	248	2.77	887
4	1.56	141	1.48	108	1.33	56	1.54	133	1.79	248	2.81	918
6	1.56	141	1.48	108	1.33	56	1.54	133	1.78	243	2.81	918
8	1.56	141	1.46	100	1.33	56	1.54	133	1.79	248	2.74	863
10	1.47	104	1.43	88	1.33	56	1.54	133	1.79	248	2.75	871
12 n.	1.46	100	1.43	88	1.33	56	1.91	310	1.88	295	3.14	1,190
2 p.m.	1.46	100	1.45	96	1.36	65	1.94	327	2.53	706	3.12	1,170
4	1.48	108	1.45	96	2.12	431	1.97	344	2.50	684	3.40	1,410
6	1.49	112	1.34	59	2.12	431	1.97	344	2.51	691	3.40	1,410
8	1.49	112	1.32	53	2.12	431	1.97	344	2.51	691	3.39	1,400
10	1.49	112	1.33	56	1.89	300	1.80	253	2.50	684	3.38	1,390
12 m.	1.47	104	1.33	56	1.80	253	1.79	248	2.68	817	3.38	1,390

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.37	1,380	4.20	2,090	3.48	1,470	2.37	594	2.42	628	2.09	413
4	3.36	1,370	4.18	2,070	3.32	1,340	2.30	546	2.38	600	2.09	413
6	3.36	1,370	4.19	2,080	3.30	1,320	2.22	494	2.37	594	2.09	413
8	3.45	1,450	4.21	2,100	3.28	1,300	2.56	728	2.36	587	2.09	413
10	4.18	2,070	4.50	2,340	2.89	982	2.57	735	2.36	587	2.09	413
12 n.	4.35	2,220	4.51	2,350	2.90	990	2.57	735	2.36	587	2.09	413
2 p.m.	4.32	2,190	4.51	2,350	2.91	998	2.57	735	2.36	587	2.09	413
4	4.25	2,130	4.49	2,330	2.50	684	2.52	699	2.36	587	2.09	413
6	4.29	2,160	4.49	2,330	2.50	684	2.52	699	2.36	587	2.09	413
8	4.33	2,200	4.50	2,340	2.50	684	2.52	699	2.35	580	2.09	413
10	4.30	2,170	3.84	1,780	2.50	684	2.52	699	2.11	425	2.09	413
12 m.	4.24	2,120	3.63	1,600	2.50	684	2.52	699	2.09	413	2.10	419
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.10	419	1.94	327	1.94	327	1.77	238	1.60	158	1.30	48
4	2.10	419	1.94	327	1.95	332	1.77	238	1.60	158	1.31	50
6	2.10	419	1.93	322	1.94	327	1.76	233	1.60	158	1.28	43
8	2.09	413	1.92	316	1.93	322	1.75	228	1.58	150	1.28	43
10	2.09	413	1.93	322	1.92	316	1.75	228	1.58	150	1.18	22
12 n.	2.09	413	1.92	316	1.92	316	1.75	228	1.57	145	1.13	14.2
2 p.m.	2.08	407	1.92	316	1.93	322	1.75	228	1.49	112	1.13	14.2
4	2.07	401	1.92	316	1.77	238	1.60	158	1.36	65	1.15	17.1
6	1.93	322	1.92	316	1.77	238	1.59	154	1.27	41	1.21	28
8	1.93	322	1.93	322	1.77	238	1.59	154	1.27	41	1.25	36
10	1.93	322	1.94	327	1.77	238	1.59	154	1.21	41	1.34	59
12 m.	1.94	327	1.94	327	1.77	238	1.59	154	1.28	43	1.43	88

WOODCLIFF LAKE AT HILLSDALE, N. J.

LOCATION.—Lat. 41°00′42″, long. 74°02′55″, at Woodcliff Lake Dam in Hillsdale, Bergen County. Gage heights are elevations above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—20.2 square miles.

GAGE-HEIGHT RECORD.—Gage read twice daily to hundredths. Gage heights shown in table are readings at 8 a.m.

REMARKS.—Capacity, 112,000,000 cubic feet. Records furnished by Hackensack Water Co.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
1	94.53	113	94.63	114	94.63	114
2	94.53	113	94.63	114	94.63	114
3	94.53	113	94.63	114	94.63	114
4	94.63	114	94.63	114	94.63	114
5	94.53	113	94.53	113	94.63	114
6	94.53	113	94.53	113	94.63	114
7	94.53	113	94.53	113	94.63	114
8	94.63	114	94.53	113	94.63	114
9	94.63	114	94.53	113	94.53	113
10	94.53	113	94.53	113	94.63	114
11	94.53	113	94.53	113	94.83	115
12	94.63	114	94.53	113	94.83	115
13	94.73	114	94.83	115	94.63	114
14	94.73	114	94.73	114	94.63	114
15	94.73	114	94.63	114	94.53	113
16	94.53	113	94.63	114	94.53	113
17	94.53	113	94.53	113	94.53	113
18	94.53	113	94.53	113	94.53	113
19	94.53	113	94.53	113	94.53	113
20	94.53	113	94.63	114	94.43	112
21	94.53	113	94.83	115	94.53	113
22	94.43	112	95.33	119	94.53	113
23	94.43	112	95.03	117	94.53	113
24	94.43	112	95.63	121	94.53	113
25	94.43	112	95.03	117	94.43	112
26	94.53	113	94.83	115	94.43	112
27	94.93	116	94.73	114	94.43	112
28	95.53	120	94.73	114	94.43	112
29	95.03	117	94.73	114	94.43	112
30	94.73	114	94.83	115	94.43	112
31			94.73	114	94.43	112

	June	July	August
Change in contents, in millions of cubic feet	+1	0	−1
Change in contents, in equivalent second-feet	+0.39	0	−0.37

PASCACK BROOK AT WESTWOOD, N. J.

LOCATION.—Lat. 40°59′33″, long. 74°01′19″, 75 feet upstream from Harrington Avenue, Westwood, Bergen County, 500 feet downstream from Musquapsink Creek. Datum of gage is 28.62 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—29.6 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods June 1-10, Aug. 3-5, 15-19 when graph is based on once daily staff-gage readings and range of stage.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 500 second-feet: extended to peak stage on basis of study of run-off at stations on nearby streams.

MAXIMA.—July 1938: Discharge, 600 second-feet 9 to 10 a.m. July 24 (gage height, 4.05 feet).

1934 to June 1938: Discharge, 1,190 second-feet March 12, 1936 (gage height, 5.53 feet).

REMARKS.—Monthly mean discharge and run-off, in inches, adjusted for storage in Woodcliff Lake (see p. 284). Recorder operated and storage data furnished by Hackensack Water Co.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	20	54	56	11	49	35	116	21	23	135	24
2	18.2	46	56	12	56	54	90	22	17.0	313	32
3	42	41	49	13	74	81	51	23	20	339	24
4	44	28	43	14	81	60	39	24	20	518	26
5	35	28	46	15	57	54	29	25	18.2	209	19.4
6	28	23	47	16	32	42	32	26	36	112	23
7	24	25	41	17	32	32	28	27	142	85	17.6
8	61	20	47	18	34	28	27	28	362	74	17.0
9	51	30	54	19	32	38	33	29	172	72	22
10	32	37	47	20	24	55	24	30	82	93	17.0
								31		70	17.0

	June	July	Aug.
Monthly mean discharge, in second-feet (observed)	57.3	91.3	38.5
Monthly mean discharge, in second-feet (adjusted)	57.6	91.3	38.2
Runoff, in inches (adjusted)	2.18	3.55	1.49

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	------	-------	1.71	31	1.81	41	2.00	64	2.95	259
4	------	-------	------	-------	1.71	31	1.81	41	2.09	78	3.01	275
6	------	-------	------	-------	1.72	32	1.86	47	2.14	85	3.08	294
8	------	-------	------	-------	1.73	33	1.90	51	2.20	95	3.16	316
10	------	-------	------	-------	1.73	33	1.98	61	2.39	129	3.22	333
12 n.	------	-------	------	-------	1.74	34	2.02	67	2.47	146	3.25	342
2 p.m.	------	-------	------	-------	1.85	46	1.99	63	2.55	163	3.26	344
4	------	-------	------	-------	1.91	52	1.98	61	2.59	172	3.26	344
6	------	-------	------	-------	1.83	43	1.98	61	2.62	179	3.26	344
8	------	-------	------	-------	1.82	42	1.98	61	2.67	190	3.25	342
10	------	-------	------	-------	1.81	41	1.98	61	2.73	204	3.19	324
12 m.	------	-------	------	-------	1.81	41	1.99	63	2.83	228	3.13	307
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.03	280	3.80	513	3.13	307	2.40	131	2.19	93	2.08	76
4	2.93	254	3.90	547	3.00	272	2.37	125	2.18	92	2.06	73
6	2.86	236	3.99	578	2.89	244	2.35	122	2.17	90	2.06	73
8	2.87	238	4.04	596	2.81	224	2.33	118	2.16	89	2.06	73
10	3.10	299	4.05	600	2.74	207	2.31	114	2.15	87	2.07	74
12 n.	3.21	330	4.01	586	2.68	192	2.29	110	2.15	87	2.09	78
2 p.m.	3.27	347	3.94	561	2.61	176	2.27	107	2.14	85	2.09	78
4	3.41	389	3.81	516	2.56	165	2.26	105	2.12	82	2.08	76
6	3.55	432	3.69	477	2.53	159	2.24	102	2.11	81	2.07	74
8	3.60	448	3.55	432	2.50	152	2.22	98	2.11	81	2.06	73
10	3.62	454	3.41	389	2.46	144	2.21	97	2.10	79	2.05	72
12 m.	3.70	480	3.29	353	2.43	137	2.20	95	2.09	78	2.05	72
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.04	70	2.21	97	2.10	79	------	-------	------	-------	------	-------
4	2.04	70	2.21	97	2.09	78	------	-------	------	-------	------	-------
6	2.04	70	2.22	98	2.08	76	------	-------	------	-------	------	-------
8	2.04	70	2.23	100	2.07	74	------	-------	------	-------	------	-------
10	2.04	70	2.23	100	2.05	72	------	-------	------	-------	------	-------
12 n.	2.03	68	2.23	100	2.03	68	------	-------	------	-------	------	-------
2 p.m.	2.03	68	2.21	97	2.01	66	------	-------	------	-------	------	-------
4	2.03	68	2.18	92	2.00	64	------	-------	------	-------	------	-------
6	2.03	68	2.16	89	2.00	64	------	-------	------	-------	------	-------
8	2.10	79	2.14	85	1.99	63	------	-------	------	-------	------	-------
10	2.14	85	2.13	84	1.98	61	------	-------	------	-------	------	-------
12 m.	2.18	92	2.11	81	1.98	61	------	-------	------	-------	------	-------

PASSAIC RIVER BASIN

ROCKAWAY RIVER ABOVE RESERVOIR AT BOONTON, N. J.

LOCATION.—Lat. 40°54′06″, long. 74°24′40″, at Morris Avenue, Boonton, Morris County and 1.8 miles upstream from Boonton Reservoir dam. Datum of gage is 364.47 feet above mean sea level (New Jersey Geological Survey bench mark).

DRAINAGE AREA.—116 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements.

MAXIMA.—July 1938: Discharge, 2,120 second-feet 11 a.m. to 2 p.m. July 24 (gage height, 5.43 feet).

1937 to June 1938: Discharge, 1,900 second-feet Nov. 14, 1937, and Jan. 25, 1938 (gage height, 5.15 feet).

REMARKS.—Discharge not materially affected by storage. Monthly mean discharge and runoff in inches, adjusted for water diverted above station by trunk sewer. Monthly mean diversions were: June, 4.2 second-feet; July, 5.2 second-feet; August, 4.7 second-feet. Water-stage recorder inspected by employees of Department of Streets and Public Improvements, Bureau of Water, Jersey City.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	100	589	476	11	91	105	377	21	66	476	105
2	76	448	420	12	115	125	377	22	62	1,020	100
3	105	335	341	13	154	134	281	23	77	1,160	91
4	102	262	291	14	145	128	208	24	248	1,980	85
5	105	208	253	15	116	134	176	25	154	1,550	78
6	80	170	281	16	113	113	150	26	138	1,160	74
7	85	140	351	17	94	89	134	27	623	888	70
8	173	122	296	18	98	80	134	28	930	738	69
9	140	120	262	19	91	89	128	29	944	627	64
10	92	96	248	20	70	225	115	30	785	685	64
								31		558	66
Monthly mean discharge, in second-feet (observed)									206	469	199
Monthly mean discharge, in second-feet (adjusted)									210	475	204
Runoff, in inches (adjusted)									2.02	4.72	2.03

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.19	76	2.18	74	2.38	120	2.29	98	3.01	382	3.84	902
4	2.18	74	2.17	72	2.35	112	2.34	110	2.99	372	3.88	930
6	2.17	72	2.15	69	2.28	96	2.36	115	2.97	361	3.94	974
8	2.20	78	2.15	69	2.24	87	2.36	115	2.97	361	3.99	1,010
10	2.27	93	2.15	69	2.20	78	2.50	154	2.98	367	4.04	1,050
12 n.	2.33	108	2.16	70	2.18	74	2.59	183	3.06	409	4.06	1,060
2 p.m.	2.35	112	2.17	72	2.20	78	2.75	253	3.11	437	4.09	1,080
4	2.33	108	2.18	74	2.18	74	2.89	320	3.17	470	4.10	1,090
6	2.28	96	2.25	89	2.18	74	2.97	361	3.27	528	4.10	1,090
8	2.24	87	2.32	105	2.20	78	3.02	388	3.52	685	4.10	1,090
10	2.22	82	2.35	112	2.21	80	3.03	393	3.63	758	4.09	1,080
12 m.	2.20	78	2.38	120	2.22	82	3.02	388	3.77	853	4.08	1,080

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	4.07	1,070	4.93	1,720	5.07	1,840	4.40	1,310	3.93	967	3.70	805
4	4.06	1,060	5.11	1,870	4.97	1,760	4.35	1,280	3.91	952	3.68	792
6	4.05	1,060	5.25	1,980	4.89	1,690	4.30	1,240	3.88	930	3.67	785
8	4.05	1,060	5.37	2,080	4.81	1,630	4.26	1,210	3.86	916	3.65	772
10	4.06	1,060	5.41	2,110	4.74	1,580	4.23	1,180	3.83	895	3.63	758
12 n.	4.10	1,090	5.43	2,120	4.67	1,530	4.19	1,150	3.80	874	3.61	745
2 p.m.	4.16	1,130	5.42	2,120	4.63	1,490	4.16	1,130	3.78	860	3.59	731
4	4.27	1,220	5.37	2,080	4.55	1,430	4.13	1,110	3.76	846	3.57	718
6	4.32	1,250	5.32	2,040	4.52	1,410	4.08	1,080	3.82	888	3.53	692
8	4.40	1,310	5.26	1,990	4.50	1,390	4.04	1,050	3.78	860	3.51	679
10	4.52	1,410	5.21	1,950	4.49	1,380	4.00	1,020	3.76	846	3.49	666
12 m.	4.72	1,560	5.14	1,890	4.45	1,350	3.97	997	3.73	826	3.48	659
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.47	653	3.50	672	3.43	627	3.24	511	3.11	437	2.98	367
4	3.45	640	3.53	692	3.41	614	3.24	511	3.12	442	2.97	361
6	3.44	634	3.55	705	3.37	589	3.23	505	3.12	442	2.95	351
8	3.42	621	3.57	718	3.35	577	3.22	499	3.12	442	2.95	351
10	3.40	608	3.57	718	3.33	565	3.21	493	3.10	431	2.94	346
12 n.	3.37	589	3.57	718	3.30	546	3.19	481	3.08	420	2.93	341
2 p.m.	3.35	577	3.55	705	3.27	528	3.18	476	3.07	415	2.93	341
4	3.43	627	3.53	692	3.26	522	3.16	465	3.05	404	2.93	341
6	3.45	640	3.51	679	3.25	516	3.15	459	3.03	393	2.92	335
8	3.45	640	3.50	672	3.24	511	3.13	448	3.02	388	2.91	330
10	3.47	653	3.48	659	3.24	511	3.12	442	3.01	382	2.88	315
12 m.	3.48	659	3.46	646	3.24	511	3.11	437	3.00	377	2187	310

Supplemental records.—July 27, 5:30 p.m., 3.74 ft., 833 sec.-ft.; 5:45 p.m., 3.86 ft., 916 sec.-ft.; July 29, 3:45 p.m., 3.33 ft., 565 sec.-ft.

BOONTON RESERVOIR AT BOONTON, N. J.

LOCATION.—Lat. 40°53′35″, long. 74°23′55″, at Boonton Reservoir dam, Boonton, Morris County. Datum of gage is 305.25 feet above mean sea level (New Jersey Geological Survey bench mark).

DRAINAGE AREA.—119 square miles.

GAGE-HEIGHT RECORD.—One gage reading daily, usually about 8 a.m.

REMARKS.—Usable capacity, 870,000,000 cubic feet. Crest of spillway is at gage datum. Flash boards used on spillway. Records furnished by Department of Streets and Public Improvements, Bureau of Water, Jersey City.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
1	1.86	1,083	2.35	1,100	2.26	1,097
2	1.81	1,082	2.25	1,097	2.22	1,096
3	1.78	1,081	2.17	1,094	2.16	1,094
4	1.87	1,084	2.09	1,091	2.08	1,091
5	1.82	1,082	2.02	1,089	2.04	1,090
6	1.82	1,082	1.96	1,087	2.02	1,089
7	1.76	1,080	1.90	1,085	2.06	1,090
8	1.83	1,082	1.89	1,084	2.09	1,091
9	1.89	1,084	1.88	1,084	2.06	1,090
10	1.88	1,084	1.84	1,083	2.04	1,090
11	1.82	1,082	1.82	1,082	2.09	1,091
12	1.86	1,083	1.84	1,083	2.17	1,094
13	1.88	1,084	1.86	1,083	2.12	1,092
14	1.94	1,086	1.86	1,083	2.03	1,089
15	1.90	1,085	1.91	1,085	1.98	1,087

Gage height, in feet, and contents, in millions of cubic feet, 1938—Continued

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
16	1.84	1,083	1.88	1,084	1.93	1,086
17	1.81	1,082	1.83	1,082	1.90	1,085
18	1.84	1,083	1.80	1,081	1.87	1,084
19	1.85	1,083	1.80	1,081	1.88	1,084
20	1.80	1,081	2.11	1,092	1.87	1,084
21	1.75	1,079	1.82	1,082	1.86	1,083
22	1.68	1,077	2.45	1,104	1.84	1,083
23	1.63	1,075	2.55	1,107	1.81	1,082
24	1.75	1,079	2.95	1,121	1.78	1,081
25	1.95	1,086	3.05	1,125	1.74	1,079
26	1.87	1,084	2.74	1,114	1.66	1,076
27	2.10	1,092	2.50	1,106	1.62	1,075
28	2.41	1,102	2.42	1,103	1.59	1,074
29	2.48	1,105	2.34	1,100	1.54	1,072
30	2.41	1,102	2.36	1,101	1.47	1,070
31			2.32	1,099	1.40	1,067

	June	July	August
Change in contents, in millions of cubic feet	+17	−3	−30
Change in contents, in equivalent second-feet	+6.6	−1.1	−11.2

ROCKAWAY RIVER BELOW RESERVOIR AT BOONTON, N. J.

[Formerly Rockaway River at Boonton, N. J.]

LOCATION.—Lat. 40°53′47″, long. 74°23′36″, 1,500 feet downstream from dam of Boonton Reservoir, Boonton, Morris County. Datum of gage is 195.68 feet above mean sea level (New Jersey Geological Survey bench mark).

DRAINAGE AREA.—119 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,300 second-feet; extended to peak stage on basis of logarithmic plotting and determination of flow over Boonton Reservoir dam.

MAXIMA.—July 1938: Discharge, 1,730 second-feet 8 to 11 p.m. July 24 (gage height, 5.87 feet).

1903-4, 1906 to June 1938: Daily discharge recorded, 7,560 second-feet Oct. 10, 1903.

REMARKS.—Observed discharge represents total flow over Boonton Reservoir dam, through waste gate, and effluent from sewage-disposal plant. Monthly mean discharge and run-off in inches, adjusted for diversion from and effect of storage in Boonton Reservoir. Monthly mean diversions were: June, 80.7 second-feet; July, 79.6 second-feet; August, 86.2 second-feet. For information on storage see record for Boonton Reservoir at Boonton, N. J. Water-stage recorder inspected by employees of Department of Streets and Public Improvements, Bureau of Water, Jersey City.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	34	483	386	11	23	14.5	239	21	4.8	309	32
2	23	362	330	12	38	23	276	22	4.3	766	21
3	10.5	269	269	13	51	30	225	23	4.3	947	13.8
4	19.8	201	210	14	69	40	163	24	34	1,510	9.1
5	22	142	168	15	44	55	103	25	88	1,480	5.8
6	23	92	168	16	30	43	68	26	62	1,050	5.4
7	20	64	239	17	29	20	49	27	338	792	5.5
8	39	43	219	18	25	12.1	40	28	692	620	4.8
9	68	45	185	19	21	7.7	38	29	741	506	4.4
10	36	23	171	20	9.2	51	34	30	644	524	4.6
								31		471	4.7
Monthly mean discharge, in second-feet (observed)									108	355	119
Monthly mean discharge, in second-feet (adjusted)									196	433	194
Runoff, in inches (adjusted)									1.84	4.20	1.88

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	1.72	21	1.59	13.8	1.30	5.6	1.34	6.3	2.75	199	3.86	625
4	1.69	18.9	1.54	11.8	1.34	6.3	1.34	6.3	2.81	216	3.93	658
6	1.65	16.7	1.50	10.3	1.47	9.5	1.64	16.2	2.82	219	4.00	692
8	1.62	15.3	1.46	9.0	1.54	12.0	1.79	25	2.85	227	4.08	731
10	1.61	14.8	1.40	7.4	1.50	10.5	1.81	27	2.90	242	4.10	741
12 n.	1.78	24	1.81	27	1.37	6.9	1.85	30	3.05	288	4.19	786
2 p.m.	1.83	28	1.72	20	1.44	8.6	1.95	38	3.10	304	4.21	796
4	1.80	26	1.57	13.0	1.42	8.1	2.10	55	3.09	301	4.24	811
6	1.81	27	1.40	7.4	1.39	7.3	2.25	78	3.09	301	4.27	827
8	1.70	19.5	1.27	5.0	1.37	6.9	2.40	106	3.74	568	4.29	837
10	1.63	15.7	1.41	7.6	1.36	6.7	2.52	134	3.68	541	4.31	847
12 m.	1.61	14.8	1.34	6.1	1.34	6.3	2.64	167	3.75	573	4.32	852

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	4.32	853	4.83	1,130	5.80	1,700	4.98	1,210	4.34	864	4.06	721
4	4.33	859	4.97	1,200	5.74	1,660	4.91	1,170	4.27	828	4.03	707
6	4.33	859	5.14	1,290	5.66	1,610	4.85	1,130	4.25	812	4.01	697
8	4.35	869	5.32	1,400	5.58	1,560	4.79	1,100	4.20	792	3.95	668
10	4.47	931	5.49	1,500	5.52	1,520	4.73	1,070	4.16	772	3.90	644
12 n.	4.48	937	5.63	1,590	5.46	1,490	4.69	1,050	4.12	752	3.85	620
2 p.m.	4.50	947	5.74	1,660	5.38	1,440	4.65	1,030	4.08	732	3.81	602
4	4.61	1,000	5.82	1,710	5.30	1,390	4.61	1,010	4.05	717	3.79	592
6	4.61	1,000	5.85	1,720	5.24	1,350	4.56	980	3.99	688	3.77	583
8	4.61	1,000	5.87	1,730	5.16	1,310	4.49	943	4.33	859	3.71	556
10	4.65	1,030	5.87	1,730	5.10	1,270	4.44	917	4.20	792	3.68	542
12 m.	4.70	1,050	5.84	1,720	5.04	1,240	4.37	880	4.10	742	3.67	538

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	3.65	528	3.65	528	3.62	515	3.37	407	--	--	--	--
4	3.63	520	3.63	520	3.60	506	3.34	394	--	--	--	--
6	3.62	515	3.63	520	3.57	493	3.33	390	--	--	--	--
8	3.59	502	3.63	520	3.55	484	3.32	386	--	--	--	--
10	3.57	493	3.63	520	3.53	475	3.31	382	--	--	--	--
12 n.	3.57	493	3.64	524	3.51	466	3.31	382	--	--	--	--
2 p.m.	3.53	475	3.65	528	3.49	458	3.30	378	--	--	--	--
4	3.50	462	3.66	533	3.47	449	3.31	382	--	--	--	--
6	3.50	462	3.66	533	3.53	475	3.27	367	--	--	--	--
8	3.64	524	3.65	528	3.47	449	3.28	370	--	--	--	--
10	3.59	502	3.65	528	3.43	432	3.32	386	--	--	--	--
12 m.	3.68	542	3.63	520	3.39	415	3.28	370	--	--	--	--

SADDLE RIVER AT LODI, N. J.

Location.—Lat. 40°53′24″, long. 74°04′50″, at highway bridge 1 mile upstream from Lodi, Bergen County, and 3¼ miles upstream from mouth. Datum of gage is 22.46 feet above mean sea level (general adjustment of 1929).

Drainage area.—54.6 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 700 second-feet; extended to peak stage on basis of comparison with records for Pascack Brook at Westwood.

Maxima.—July 1938: Discharge, 1,060 second-feet 6 p.m. July 24 (gage-height, 4.75 feet).

1923 to June 1938: Discharge, 2,200 second-feet Mar. 12, 1936 (gage-height, 6.27 feet).

Remarks.—Run-off not materially affected by storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	48	100	108	11	120	49	199	21	46	189	50
2	43	91	109	12	138	78	215	22	45	395	48
3	60	78	98	13	136	92	96	23	45	801	46
4	71	65	84	14	158	76	76	24	43	917	42
5	61	56	82	15	103	82	67	25	43	616	38
6	59	52	100	16	73	73	63	26	55	257	37
7	52	46	100	17	57	61	61	27	196	155	36
8	149	42	100	18	73	52	63	28	453	134	40
9	95	42	109	19	80	74	61	29	608	116	43
10	56	65	91	20	56	110	54	30	240	149	39
								31		145	39
Monthly mean discharge, in second-feet									115	170	77.2
Runoff, in inches									2.35	3.58	1.63

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17		July 18		July 19		July 20		July 21		July 22	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	-----	-------	1.89	52	1.92	57	2.12	91	2.52	151	2.90	243
4	-----	-------	1.88	50	1.92	57	2.12	91	2.54	155	2.97	263
6	-----	-------	1.86	48	1.90	54	2.12	91	2.55	158	3.01	275
8	-----	-------	1.85	46	1.90	54	2.13	92	2.57	162	3.10	303
10	-----	-------	1.85	46	1.89	52	2.16	96	2.64	177	3.19	333
12 n.	-----	-------	1.85	46	1.90	54	2.21	103	2.72	196	3.35	388
2 p.m.	-----	-------	1.88	50	2.08	85	2.26	109	2.77	208	3.45	425
4	-----	-------	1.88	50	2.17	98	2.31	115	2.81	219	3.55	464
6	-----	-------	1.90	54	2.18	99	2.37	124	2.81	219	3.65	505
8	-----	-------	1.93	59	2.15	95	2.42	133	2.82	221	3.74	543
10	-----	-------	1.93	59	2.13	92	2.45	138	2.82	221	3.82	578
12 m.	-----	-------	1.93	59	2.12	91	2.49	145	2.86	232	3.90	614
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.95	637	4.30	808	4.45	887	3.23	346	2.63	175	2.44	136
4	3.96	642	4.26	788	4.33	824	3.16	323	2.62	173	2.43	134
6	3.97	646	4.26	788	4.20	757	3.10	303	2.59	166	2.42	133
8	4.28	798	4.30	808	4.07	694	3.05	288	2.56	160	2.41	131
10	4.30	808	4.40	860	3.95	637	2.99	269	2.55	158	2.41	131
12 n.	4.50	914	4.52	925	3.83	582	2.94	255	2.53	153	2.42	133
2 p.m.	4.46	892	4.65	1,000	3.72	535	2.87	235	2.51	149	2.44	136
4	4.47	898	4.73	1,050	3.61	488	2.82	221	2.50	147	2.43	134
6	4.52	925	4.75	1,060	3.52	452	2.78	211	2.49	145	2.44	136
8	4.46	892	4.73	1,050	3.44	421	2.72	196	2.48	143	2.44	136
10	4.40	860	4.66	1,010	3.36	392	2.69	189	2.46	140	2.43	134
12 m.	4.35	834	4.56	948	3.29	367	2.66	182	2.45	138	2.42	133

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.40	129	2.35	120	2.65	180	------	------	------	------	------	------
4	2.38	125	2.40	129	2.65	180	------	------	------	------	------	------
6	2.36	122	2.43	134	2.62	173	------	------	------	------	------	------
8	2.35	120	2.47	142	2.57	162	------	------	------	------	------	------
10	2.35	120	2.50	147	2.51	149	------	------	------	------	------	------
12 n.	2.34	119	2.52	151	2.46	140	------	------	------	------	------	------
2 p.m.	1.99	71	2.55	158	2.44	136	------	------	------	------	------	------
4	2.30	114	2.57	162	2.40	129	------	------	------	------	------	------
6	2.31	115	2.59	166	2.37	124	------	------	------	------	------	------
8	2.30	114	2.60	168	2.35	120	------	------	------	------	------	------
10	2.30	114	2.63	175	2.33	117	------	------	------	------	------	------
12 m.	2.31	115	2.64	177	2.30	114	------	------	------	------	------	------

Supplemental records.—July 29, 1 p.m., 2.10 ft., 88 sec.-ft.

ELIZABETH RIVER BASIN

ELIZABETH RIVER AT IRVINGTON, N. J.

LOCATION.—Lat. 40°44'10", long. 74°13'46", just downstream from Valley Avenue (formerly published as Orange Avenue) in Irvington, Essex County.

DRAINAGE AREA.—2.91 square miles (revised).

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 750 second-feet; extended to peak stage on basis of velocity-area studies.

MAXIMA.—July 1938: Discharge, 1,750 second-feet 8 a.m. July 23 (gage height, 12.1 feet, from floodmark).

1930 to June 1938: Discharge, about 1,460 second-feet Aug. 6, 1932 (gage height, 10.52 feet) from rating curve extended above 800 second-feet.

REMARKS.—Recorder graph good only for stages above upper intake pipe (gage height, 1.90 feet), owing to debris in channel covering lower intake pipe.

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 20		July 21		July 22		July 23		July 24		July 25	
1 a.m.	------	------	------	------	2.45	37	------	------	2.37	31	------	------
2	------	------	------	------	2.00	9.3	------	------	2.50	41	------	------
3	------	------	------	------	2.05	11.3	------	------	2.57	47	------	------
4	2.70	58	2.00	9.3	2.20	19	------	------	2.25	22	------	------
5	2.55	45	2.33	28	2.03	10.5	------	------	2.33	28	------	------
6	2.35	29	2.10	13.6	------	------	------	------	2.55	45	------	------
7	2.58	48	1.95	7.5	------	------	7.00	690	2.27	23	------	------
8	2.03	10.5	2.05	11.3	2.00	9.3	12.10	1,750	2.12	14.6	------	------
9	3.56	151	2.75	63	3.92	198	5.27	395	2.08	12.7	------	------
10	2.66	55	3.10	98	2.85	72	7.50	780	2.05	11.3	------	------
11	2.50	41	2.70	58	2.50	41	9.05	1,080	2.03	10.5	------	------
12 n.	2.08	12.7	2.30	26	2.10	13.6	4.28	248	2.04	10.9	------	------
1 p.m.	1.90	6.0	2.60	50	2.75	63	4.00	209	------	------	------	------
2	------	------	2.00	9.3	2.30	26	2.87	74	------	------	------	------
3	------	------	1.90	6.0	2.02	10.1	2.62	51	------	------	------	------
4	------	------	------	------	1.90	6.0	3.00	87	------	------	------	------
5	------	------	------	------	------	------	8.20	914	------	------	------	------
6	------	------	------	------	------	------	3.57	153	------	------	------	------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 20		July 21		July 22		July 23		July 24		July 25	
7			2.80	68			3.05	92				
8			2.10	13.6			2.57	47				
9			1.87	5.2			2.44	36				
10							2.35	29				
11							2.28	24				
12 m.			2.35	29			2.23	21				
	July 26		July 27		July 28		July 29		July 30		July 31	
1 a.m.												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12 n.												
1 p.m.												
2					2.06	11.8					1.90	6.0
3											6.02	518
4											2.30	26
5											1.95	7.5
6							2.00	9.3				
7			2.05	11.3			2.35	29				
8			2.05	11.3			2.00	9.3				
9							2.04	10.9				
10							2.20	19				
11							2.42	35				
12 m.							2.05	11.3				

Supplemental records.—July 20, 4:20 a.m., 3.26 ft., 115 sec.-ft.; 5:30 a.m., 2.24 ft., 21 sec.-ft.; 10:20 a.m. 2.76 ft., 64 sec.-ft.; July 21, 9:20 a.m., 3.57 ft., 153 sec.-ft.; 12:30 p.m., 3.47 ft., 140 sec.-ft.; July 22, 12:30 a.m., 2.78 ft., 66 sec.-ft.; 10:40 a.m., 2.32 ft., 27 sec.-ft.; July 23, 7:30 a.m., 11.12 ft., 1500 sec.-ft.; 7:40 a.m., 10.95 ft., 1,460 sec.-ft.; 9:30 a.m., 9.78 ft., 1,230 sec.-ft.; 10:40 a.m., 4.60 ft., 294 sec.-ft.; 12:30 p.m., 4.78 ft., 320 sec.-ft.; 3:30 p.m., 2.58 ft., 48 sec.-ft.; 3:40 p.m., 3.22 ft., 111 sec.-ft.; 4:30 p.m. 2.66 ft., 55 sec.-ft.; 6:30 p.m., 3.64 ft., 162 sec.-ft.; July 27, 7:30 p.m., 2.15 ft., 16.0 sec.-ft.; July 29, 6:40 p.m., 2.49 ft., 40 sec.-ft.; 8:30 p.m. 1.95 ft., 7.5 sec.-ft.

ELIZABETH RIVER AT ELIZABETH, N. J.

LOCATION.—Lat. 40°40′03″, long. 74°13′09″, just upstream from Westfield Avenue bridge, Elizabeth, Union County, and 3¼ miles upstream from mouth. Datum of gage is 5.23 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—18.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except June 18-20, 11 a.m. July 23 to 10 a.m. July 28. Staff-gage readings made on July 23 from 4:45 to 5:45 p.m.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 190 second-feet; extended to peak stage on basis of determinations of flood flow by contracted-opening method.

MAXIMA.—July 1938: Discharge, about 2,720 second-feet 1 p.m. July 23 (gage height, 13.05 feet, from floodmark).

1921 to June 1938: Discharge, about 2,640 second-feet Sept. 1, 1927, and Nov. 19, 1932 (gage height, 9.73 feet).

REMARKS.—Discharge affected by diversions for municipal supply. Records during periods of no gage-height record computed on basis of floodmark, several gage readings, and record for Rahway River at Rahway. Monthly mean discharge and run-off, in inches, adjusted for diversion. Monthly mean diversions were: June, 4.2 second-feet; July, 4.1 second-feet; August, 4.4 second-feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	6.1	17.0	27	11	18.0	71	54	21	7.9	56	7.6
2	7.1	13.1	21	12	15.5	15.3	14.0	22	7.3	77	7.6
3	16.8	10.7	17.0	13	89	10.0	11.7	23	8.2	1,000	7.9
4	7.3	8.7	15.7	14	24	18.0	10.3	24	8.0	180	7.6
5	15.7	8.2	13.6	15	10.7	30	10.0	25	6.5	60	7.1
6	10.1	7.6	41	16	10.3	10.4	10.0	26	77	45	7.9
7	26	7.3	15.1	17	9.0	30	10.7	27	97	36	7.3
8	171	7.6	83	18	58	11.8	16.8	28	222	37	6.3
9	1.9	7.6	34	19	12	13.2	10.0	29	26	34	6.5
10	7.8	15.0	26	20	9	78	8.2	30	23	31	7.1
								31		47	7.1
Monthly mean discharge, in second-feet (observed)									33.6	64.3	17.1
Monthly mean discharge, in second-feet (adjusted)									37.8	68.4	21.5
Runoff, in inches (adjusted)									2.34	4.38	1.37

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 20		July 20		July 21		July 23		July 24		July 25	
1 a.m.	2.93	14.0	2.71	6.8	3.48	49	3.18	27	------	------	------	------
2	2.90	12.7	2.71	6.8	3.73	76	3.16	26	------	------	------	------
3	2.88	12.0	2.70	6.5	3.71	73	3.15	25	------	------	------	------
4	2.87	11.7	2.72	7.1	3.56	57	3.14	24	------	------	------	------
5	3.10	22	2.73	7.3	3.46	48	3.14	24	------	------	------	------
6	3.55	56	2.73	7.3	3.42	45	3.14	24	------	------	------	------
7	4.03	116	2.73	7.3	3.39	42	4.30	161	------	------	------	------
8	3.90	97	2.73	7.3	3.34	38	5.46	486	------	------	------	------
9	3.84	89	2.75	7.9	3.70	72	5.58	528	------	------	------	------
10	4.04	117	2.77	8.5	4.65	237	6.40	880	------	------	------	------
11	5.14	376	3.60	61	4.65	237	10.30	2.250	------	------	------	------
12 n.	5.20	396	4.30	161	4.32	165	------	------	------	------	------	------
1 p.m.	4.90	303	4.31	163	4.08	123	------	------	------	------	------	------
2	4.30	161	4.32	165	3.94	103	------	------	------	------	------	------
3	3.34	38	3.98	108	3.92	100	------	------	------	------	------	------
4	2.81	9.6	3.69	71	3.76	79	------	------	------	------	------	------
5	2.72	7.1	3.48	49	3.60	61	------	*a*1,500	------	------	------	------
6	2.71	6.8	3.80	84	3.48	49	------	------	------	------	------	------
7	2.71	6.8	3.92	100	3.40	43	------	------	------	------	------	------
8	2.71	6.8	3.73	76	3.33	37	------	------	------	------	------	------
9	2.70	6.5	3.79	83	3.28	34	------	------	------	------	------	------
10	2.70	6.5	3.61	62	3.25	32	------	------	------	------	------	------
11	2.70	6.5	3.47	49	3.22	29	------	------	------	------	------	------
12 m.	2.70	6.5	3.41	44	3.20	28	------	------	------	------	------	------

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 26		July 27		July 28		July 29		July 30		July 31	
2 a.m.	------	------	------	------	------	------	3.27	33	3.57	58	3.09	22
4	------	------	------	------	------	------	3.25	32	3.42	45	3.08	21
6	------	------	------	------	------	------	3.24	31	3.28	34	3.07	20
8	------	------	------	------	------	------	3.23	30	3.21	29	3.07	20
10	------	------	------	------	3.29	34	3.23	30	3.18	27	3.07	20
12 n.	------	------	------	------	3.29	34	3.23	30	3.15	25	3.07	20
2 p.m.	------	------	------	------	3.28	34	3.25	32	3.14	24	3.10	22
4	------	------	------	------	3.28	34	3.17	26	3.12	23	3.90	97
6	------	------	------	------	3.32	37	3.25	32	3.11	23	4.32	165
8	------	------	------	------	3.46	48	3.40	43	3.10	22	3.62	63
10	------	------	------	------	3.38	41	3.55	56	3.11	23	3.35	39
12 m.	------	------	------	------	3.30	35	3.49	50	3.11	23	3.24	31

Supplemental records.—July 20, 11:30 a.m., 5.26 ft., 416 sec.-ft.; July 21, 1:30 p.m., 4.37 ft., 175 sec.-ft.; 6:30 p.m., 4.04 ft., 117 sec.-ft.; July 22, 10:30 a.m., 4.72 ft., 254 sec.-ft.; July 23, 4:45 p.m., 8.45 ft., 1,800 sec.-ft.; 5:35 p.m., 7.7 ft., 1,530 sec.-ft.; 5:45 p.m., 7.2 ft., 1,300 sec.-ft.; July 31, 3 p.m., 4.25 ft., 152 sec.-ft.; 4:30 p.m., 3.79 ft., 83 sec.-ft.; 5:30 p.m., 4.41 ft., 183 sec.-ft.

*a*Estimated mean for 13 hours.

RAHWAY RIVER BASIN

RAHWAY RIVER NEAR SPRINGFIELD, N. J.

LOCATION.—Lat. 40°41′11″, long. 74°18′44″, 50 feet downstream from State Highway 29, 100 feet downstream from Pope Brook, and 1½ miles south of Springfield, Union County. Datum of gage is 66.17 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—25.5 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 900 second-feet; extended to peak stage on basis of logarithmic plotting and determination of discharge by contracted-opening method at stage of 7.29 feet.

MAXIMA.—July 1938: Discharge, 1,940 second-feet 1:15 p.m. July 23 (gage height, 7.41 feet).

REMARKS.—Discharge affected by diversions for municipal supply. Record started July 7, 1938. Monthly mean discharge and run-off, in inches, adjusted for diversion. Monthly mean diversion for August, 14.6 second-feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	--------	--------	33	11	--------	19.6	66	21	--------	65	11.8
2	--------	--------	23	12	--------	15.4	27	22	--------	98	10.5
3	--------	--------	19.6	13	--------	11.5	18.7	23	--------	1,160	10.0
4	--------	--------	17.0	14	--------	11.8	16.2	24	--------	755	10.0
5	--------	--------	15.4	15	--------	27	15.4	25	--------	136	10.0
6	--------	--------	96	16	--------	12.2	14.0	26	--------	63	9.1
7	--------	10.0	102	17	--------	21	14.0	27	--------	53	9.5
8	--------	10.0	42	18	--------	14.2	15.4	28	--------	67	8.6
9	--------	9.5	93	19	--------	15.1	13.2	29	--------	42	8.6
10	--------	9.1	29	20	--------	35	11.1	30	--------	37	6.5
								31		40	6.5

	July	Aug.
Monthly mean discharge, in second-feet (observed)	--------	25.2
Monthly mean discharge, in second-feet (adjusted)	--------	39.8
Runoff, in inches (adjusted)	--------	1.80

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.51	10.0	1.63	18.7	1.52	10.5	1.61	17.0	1.61	17.0	2.04	73
4	1.51	10.0	1.60	16.2	1.52	10.5	1.59	15.4	1.61	17.0	2.06	76
6	1.51	10.0	1.59	15.4	1.53	11.1	1.59	15.4	1.67	22	2.07	78
8	1.51	10.0	1.61	17.0	1.56	13.2	1.77	32	1.82	39	2.04	73
10	1.53	11.1	1.60	16.2	1.58	14.7	1.97	60	1.89	48	2.13	91
12 n.	1.53	11.1	1.50	9.5	1.56	13.2	2.03	71	2.16	98	2.34	146
2 p.m.	1.51	10.0	1.58	14.7	1.54	11.8	2.03	71	2.25	122	2.35	149
4	1.55	12.5	1.54	11.8	1.53	11.1	1.85	42	2.21	111	2.38	157
6	1.88	46	1.53	11.1	1.54	11.8	1.75	30	2.09	82	2.21	111
8	2.01	67	1.53	11.1	1.75	30	1.68	23	2.07	78	2.12	89
10	1.87	45	1.52	10.5	1.73	28	1.63	18.7	2.14	94	2.02	69
12 m.	1.71	26	1.52	10.5	1.65	20	1.61	17	2.11	86	1.93	54

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	1.88	46	6.23	1,380	2.54	204	2.07	78	1.88	46	2.14	94
4	1.84	41	5.82	1,220	2.46	180	2.05	74	1.88	46	2.04	73
6	1.85	42	5.41	1,060	2.40	163	2.03	71	1.87	45	1.98	62
8	3.20	393	5.02	926	2.34	146	2.01	67	1.87	45	1.95	57
10	6.50	1,500	4.65	802	2.30	135	1.99	63	1.86	44	1.91	51
12 n.	7.33	1,900	4.26	681	2.27	127	1.98	62	1.85	42	1.89	48
2 p.m.	7.36	1,910	3.87	570	2.25	122	1.97	60	1.80	36	1.65	20
4	7.32	1,890	3.52	478	2.21	111	1.95	57	1.77	32	1.79	35
6	7.30	1,880	3.25	407	2.18	103	1.94	55	1.75	30	2.31	138
8	7.22	1,840	3.01	340	2.15	96	1.92	52	1.87	45	2.18	103
10	6.97	1,720	2.81	282	2.11	86	1.90	49	2.30	135	2.05	74
12 m.	6.64	1,560	2.65	236	2.09	82	1.89	48	2.25	122	1.96	59
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	1.91	51	1.94	55	1.70	25	1.90	49	1.74	29	1.65	20
4	1.89	48	1.92	52	1.70	25	1.84	41	1.72	27	1.65	20
6	1.87	45	1.89	48	1.70	25	1.81	37	1.70	25	1.65	20
8	1.85	42	1.85	42	1.71	26	1.80	36	1.70	25	1.67	22
10	1.85	42	1.82	39	1.71	26	1.79	35	1.70	25	1.66	21
12 n.	1.84	41	1.78	33	1.69	24	1.76	31	1.52	10.5	1.67	22
2 p.m.	1.80	36	1.76	31	1.69	24	1.74	29	1.67	22	1.63	18.7
4	1.97	60	1.74	29	1.77	32	1.72	27	1.66	21	1.64	19.6
6	1.80	36	1.73	28	1.79	35	1.70	25	1.67	22	1.68	23
8	1.78	33	1.71	26	2.17	101	1.70	25	1.61	17.0	1.63	18.7
10	1.83	40	1.70	25	2.12	89	1.70	25	1.67	22	1.62	17.9
12 m.	1.86	44	1.70	25	1.99	63	1.72	27	1.65	20	1.62	17.9

Supplemental records.—July 23, 1:15 p.m., 7.41 ft., 1,940 sec.-ft.; July 28, 1 p.m., 1.87 ft., 45 sec-ft.; July 29, 1:30 p.m., 1.68 ft., 23 sec-ft.; 3 p.m., 1.64 ft., 19.6 sec.-ft.

RAHWAY RIVER AT RAHWAY, N. J.

LOCATION.—Lat. 40°37′05″, long. 74°17′00″, 100 feet upstream from St. George Avenue Bridge in Rahway, Union County, and 1 mile upstream from Robinsons Branch of Rahway River. Datum of gage is 8.77 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—40.9 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods July 1, 8-13, July 15 to 7 a.m. July 21, Aug. 20-31.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 500 second-feet; extended to peak stage on basis of logarithmic plotting and laboratory rating of control.

MAXIMA.—July 1938: Discharge, 3,140 second-feet 1:15 a.m. July 24 (gage height, 6.35 feet).

1908-15, 1921 to June 1938: Discharge, about 1,740 second-feet Aug. 2, 1927 (gage height, 6.0 feet, site and datum then in use).

REMARKS.—Discharge affected by diversions for municipal supply. Discharge for periods of no gage-heights record computed on basis of recorded ranges in stage and record for station near Springfield. Monthly mean discharge and runoff, in inches, adjusted for diversions. Monthly mean diversions were: June, 19.9 second-feet; July, 19.3 second-feet; August, 20.0 second-feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	14.6	30	69	11	25	40	79	21	14.5	100	19
2	14.5	27	43	12	28	30	48	22	11.1	168	18
3	17.1	23	34	13	50	20	32	23	14.8	1,140	17
4	15.8	19.2	30	14	47	19.2	30	24	15.0	2,270	17
5	16.7	19.0	28	15	20	45	28	25	14	581	17
6	26	16.1	35	16	15.6	21	27	26	100	140	16
7	17.8	15.2	158	17	15.6	32	26	27	140	80	16
8	227	15	57	18	48	26	26	28	340	114	16
9	83	15	102	19	27	24	27	29	100	91	15
10	23	15	54	20	18.2	55	19	30	45	66	14
								31		46	14

	June	July	Aug.
Monthly mean discharge, in second-feet (observed)	51.5	171	36.5
Monthly mean discharge, in second-feet (adjusted)	71.4	190	56.5
Runoff, in inches (adjusted)	1.95	5.36	1.59

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	------	------	------	------	------	------	------	1.66	51	2.12	153
4	------	------	------	------	------	------	------	------	1.65	50	2.10	147
6	------	------	------	------	------	------	------	------	1.65	50	2.07	139
8	------	------	------	------	------	------	------	------	1.64	48	2.03	129
10	------	------	------	------	------	------	------	------	1.64	48	2.05	134
12 n.	------	------	------	------	------	------	------	------	1.73	64	2.23	186
2 p.m.	------	------	------	------	------	------	------	------	1.86	90	2.31	212
4	------	------	------	------	------	------	------	------	1.95	110	2.25	192
6	------	------	------	------	------	------	------	------	2.05	134	2.23	186
8	------	------	------	------	------	------	------	------	2.35	226	2.23	186
10	------	------	------	------	------	------	------	------	2.32	215	2.22	182
12 m.	------	------	------	------	------	------	------	------	2.20	176	2.20	176

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	2.14	159	6.22	3,000	3.91	1,010	2.35	226	1.85	88	2.05	134
4	2.07	139	6.24	3,020	3.72	889	2.27	198	1.84	85	2.08	142
6	2.00	121	6.15	2,930	3.54	782	2.19	173	1.82	81	2.11	150
8	1.99	119	6.02	2,790	3.38	692	2.12	153	1.80	77	2.10	147
10	2.77	390	5.82	2,590	3.22	606	2.07	139	1.80	77	2.06	137
12 n.	3.62	829	5.61	2,380	3.06	524	2.02	126	1.78	73	1.99	119
2 p.m.	4.28	1,270	5.37	2,150	2.92	457	1.99	119	1.77	71	1.92	103
4	4.56	1,470	5.12	1,940	2.80	403	1.96	112	1.76	69	1.88	94
6	5.04	1,870	4.87	1,720	2.70	360	1.93	105	1.75	68	1.87	92
8	6.01	2,780	4.60	1,500	2.62	327	1.91	100	1.79	75	1.85	88
10	6.16	2,940	4.37	1,330	2.52	288	1.89	96	1.86	90	1.83	83
12 m.	6.20	2,980	4.14	1,170	2.43	254	1.88	94	2.05	134	1.82	81

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	1.92	103	1.77	71	1.65	50	1.81	79	------	------	------	------
4	1.96	112	1.77	71	1.65	50	1.87	92	------	------	------	------
6	1.95	110	1.77	71	1.63	46	1.88	94	------	------	------	------
8	1.90	98	1.77	71	1.62	44	1.84	85	------	------	------	------
10	1.85	88	1.77	71	1.62	44	1.79	75	------	------	------	------
12 n.	1.92	103	1.77	71	1.63	46	1.75	68	------	------	------	------
2 p.m.	1.90	98	1.76	69	1.63	46	1.77	71	------	------	------	------
4	1.86	90	1.75	68	1.63	46	1.71	60	------	------	------	------
6	1.93	105	1.72	62	1.62	44	1.69	56	------	------	------	------
8	1.74	66	1.69	56	1.62	44	1.66	51	------	------	------	------
10	1.63	46	1.67	53	1.63	46	1.65	50	------	------	------	------
12 m.	1.74	66	1.66	51	1.71	60	1.64	48	------	------	------	------

Supplemental records.—July 21, 9 p.m., 2.37 ft., 232 sec.-ft.; July 24, 1:15 a.m., 6.35 ft., 3,140 sec.-ft.; 1:45 a.m., 6.20 ft., 2,980 sec.-ft.

RARITAN RIVER BASIN

SOUTH BRANCH OF RARITAN RIVER AT STANTON, N. J.

LOCATION.—Lat. 40°34'21", long. 74°52'10", at highway bridge near Stanton railroad station, Reading Township, Hunterdon County, and half a mile upstream from Prescott Brook. Datum of gage is 125.01 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—147 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except June 10, 11.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,200 second-feet; extended to peak stage on basis of slope-area measurement and computation of flow over dam.

MAXIMA.—July 1938: Discharge, 4,600 second-feet 10 p.m. July 23 (gage height, 8.51 feet).

1903-6, 1919 to June 1938: Discharge, about 8,280 second-feet July 9, 1935 (gage height, 10.80 feet).

REMARKS.—Flow not materially affected by storage. Discharge for period of no gage-height record computed on basis of record for station near High Bridge.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	107	266	387	11	130	128	324	21	121	939	148
2	99	256	387	12	148	155	256	22	109	1,310	140
3	97	216	313	13	185	150	188	23	195	1,830	132
4	109	196	279	14	275	138	185	24	199	2,180	128
5	105	174	262	15	163	155	182	25	135	896	114
6	105	155	501	16	128	145	168	26	195	653	121
7	100	152	423	17	106	121	218	27	885	560	130
8	413	135	306	18	458	152	243	28	1,200	726	94
9	177	130	259	19	182	136	174	29	526	549	116
10	120	135	234	20	132	671	152	30	332	694	107
								31		426	99
Monthly mean discharge, in second-feet									241	469	218
Runoff, in inches									1.83	3.68	1.71

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.60	130	2.77	174	2.47	101	2.64	140	3.84	593	5.24	1,510
4	2.60	130	2.73	163	2.37	81	2.70	155	3.63	486	5.17	1,460
6	2.60	130	2.69	152	2.42	90	2.84	193	3.46	409	5.07	1,390
8	2.59	128	2.66	145	2.59	128	3.31	347	3.39	379	4.96	1,310
10	2.59	128	2.64	140	2.63	138	3.70	520	3.53	440	4.77	1,180
12 n.	2.59	128	2.65	142	2.79	179	4.52	1,009	4.02	693	4.75	1,160
2 p.m.	2.60	130	2.76	171	2.81	185	4.84	1,230	5.15	1,440	4.95	1,300
4	2.54	116	2.73	163	2.79	179	4.54	1,020	5.77	1,890	5.12	1,420
6	2.43	92	2.72	160	2.74	166	4.45	962	5.18	1,470	5.00	1,340
8	2.38	82	2.62	135	2.68	150	4.55	1,030	4.90	1,270	4.73	1,150
10	2.51	109	2.60	130	2.55	118	4.42	942	4.92	1,280	4.57	1,040
12 m.	2.74	166	2.60	130	2.45	96	4.10	740	5.11	1,420	4.47	976

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.34	890	7.23	3,120	4.60	1,060	4.07	722	3.79	566	5.03	1,360
4	4.21	807	7.25	3,140	4.54	1,020	4.05	710	3.77	556	4.44	956
6	4.11	746	7.23	3,120	4.48	983	4.02	693	3.76	551	4.11	746
8	4.07	722	6.95	2,840	4.43	949	4.00	681	3.75	546	3.97	664
10	4.13	758	6.55	2,500	4.40	929	3.97	664	3.74	540	3.92	636
12 n.	4.32	877	5.94	2,020	4.32	877	3.96	659	3.73	535	3.89	620
2 p.m.	4.70	1,130	5.46	1,660	4.33	884	3.93	642	3.72	530	3.82	582
4	5.98	2,050	5.15	1,440	4.26	839	3.92	636	3.71	525	3.77	556
6	7.02	2,910	4.97	1,320	4.21	807	3.88	614	3.66	501	3.68	510
8	7.96	3,910	4.85	1,240	4.17	783	3.85	598	3.62	482	3.72	530
10	8.51	4,600	4.75	1,160	4.14	764	3.82	582	3.64	491	3.66	501
12 m.	7.99	3,950	4.67	1,110	4.10	740	3.81	576	5.35	1,580	3.57	458
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.65	496	4.38	916	3.58	463	3.43	396	3.42	392	3.27	332
4	3.70	520	4.12	752	3.56	454	3.42	392	3.43	396	3.26	328
6	3.70	520	4.11	746	3.54	444	3.42	392	3.43	396	3.24	321
8	3.68	510	4.15	770	3.52	435	3.42	392	3.45	404	3.23	317
10	3.67	506	4.08	728	3.51	431	3.43	396	3.50	426	3.22	313
12 n.	3.66	501	4.00	681	3.50	426	3.43	396	3.47	413	3.22	313
2 p.m.	3.61	477	3.91	631	3.48	417	3.41	387	3.50	426	3.21	310
4	3.59	467	3.84	593	3.47	413	3.40	383	3.44	400	3.19	303
6	3.94	647	3.76	551	3.44	400	3.37	371	3.40	383	3.17	296
8	4.20	801	3.70	520	3.34	359	3.37	371	3.35	363	3.13	282
10	4.60	1,060	3.64	491	3.42	392	3.35	363	3.32	351	3.13	282
12 m.	4.77	1,180	3.62	482	3.51	431	3.35	363	3.28	336	3.13	282

RARITAN RIVER AT MANVILLE, N. J.

LOCATION.—Lat. 40°33′18″, long. 74°35′02″, at highway bridge in Manville, Somerset County, 1¼ miles upstream from Millstone River. Datum of gage is 20.61 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—490 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 14,000 second-feet; extended to peak stage on basis of two slope-area determinations.

MAXIMA.—July 1938: Discharge, 26,000 second-feet 10 p.m. July 23 (gage height, 17.75 feet).

1903-7, 1921 to June 1938: Discharge, about 21,000 second-feet Aug. 24, 1933 (gage height, 16.22 feet).

REMARKS.—Discharges below 3,100 second-feet computed by shifting-control method on basis of three current-meter measurements and records for other stations in Raritan River Basin.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	235	908	896	11	344	276	791	21	316	3,590	296
2	235	803	860	12	498	289	724	22	282	7,980	269
3	240	660	681	13	968	336	471	23	537	14,900	246
4	269	527	577	14	872	309	384	24	803	16,600	235
5	269	443	537	15	607	416	368	25	392	4,660	218
6	258	376	1,210	16	376	425	344	26	434	2,650	203
7	229	329	2,390	17	316	309	360	27	3,340	1,700	212
8	1,840	309	896	18	1,390	712	1,010	28	4,840	2,090	212
9	649	282	692	19	660	344	425	29	2,740	1,260	184
10	352	289	567	20	400	2,870	323	30	1,300	2,240	184
								31		1,070	179
Monthly mean discharge, in second-feet									866	2,257	547
Runoff, in inches									1.98	5.32	1.29

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17		July 18		July 19		July 20		July 21		July 22	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	4.42	316	5.61	1,700	4.49	360	4.49	360	6.07	2,380	8.35	4,800
4	4.41	309	5.30	1,260	4.49	360	4.56	416	5.96	2,220	8.92	5,580
6	4.40	302	5.02	896	4.48	352	4.67	517	5.87	2,080	10.05	7,330
8	4.40	302	4.83	681	4.48	352	4.85	702	5.75	1,900	10.66	8,350
10	4.40	302	4.74	587	4.47	344	7.20	3,630	5.64	1,740	11.03	8,990
12 n.	4.40	302	4.70	547	4.47	344	8.87	5,500	5.78	1,950	11.06	9,050
2 p.m.	4.39	296	4.65	498	4.45	329	9.11	5,860	6.43	2,850	11.03	8,990
4	4.39	296	4.63	480	4.43	316	8.50	4,990	8.30	4,730	11.13	9,170
6	4.40	302	4.57	425	4.43	316	7.65	4,050	9.57	6,560	11.28	9,440
8	4.40	302	4.54	400	4.43	316	7.08	3,540	9.75	6,850	11.20	9,300
10	4.40	302	4.52	384	4.44	323	6.68	3,250	9.30	6,150	10.83	8,640
12 m.	4.95	825	4.50	368	4.44	323	6.32	2,720	8.75	5,330	10.23	7,620

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	9.54	6,510	17.27	24,400	9.75	6,850	6.63	3,210	5.68	1,900	5.56	1,720
4	8.95	5,620	16.97	23,400	9.18	5,970	6.51	3,110	5.63	1,830	5.79	2,070
6	8.60	5,120	16.55	22,100	8.75	5,330	6.42	2,920	5.60	1,780	6.10	2,530
8	9.88	7,060	15.98	20,300	8.43	4,900	6.33	2,820	5.58	1,760	6.62	3,200
10	11.65	10,100	15.27	18,300	8.15	4,560	6.25	2,720	5.56	1,720	6.40	2,900
12 n.	13.70	14,600	14.48	16,500	7.92	4,320	6.18	2,640	5.53	1,680	6.03	2,430
2 p.m.	14.95	17,400	13.73	14,700	7.70	4,100	6.08	2,500	5.47	1,590	5.75	2,010
4	16.30	21,300	13.00	13,000	7.50	3,900	6.01	2,400	5.48	1,610	5.65	1,860
6	17.27	24,400	12.35	11,600	7.27	3,690	5.94	2,300	5.44	1,550	5.56	1,720
8	17.68	25,700	11.67	10,100	7.09	3,540	5.87	2,190	5.45	1,560	5.48	1,610
10	17.75	26,000	11.04	9,010	6.93	3,430	5.80	2,080	5.46	1,580	5.41	1,510
12 m.	17.53	25,300	10.41	7,930	6.77	3,320	5.73	1,980	5.53	1,680	5.35	1,420

Hour	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	5.30	1,350	5.98	2,360	5.22	1,240	4.97	919	4.89	825	4.83	758
4	5.27	1,310	6.55	3,140	5.17	1,170	4.96	908	4.90	837	4.81	735
6	5.25	1,280	6.74	3,300	5.13	1,120	4.94	884	4.92	860	4.78	702
8	5.24	1,270	6.54	3,130	5.08	1,060	4.97	919	4.95	896	4.77	692
10	5.30	1,350	6.18	2,640	5.07	1,040	4.98	931	4.95	896	4.77	692
12 n.	5.25	1,280	5.88	2,200	5.06	1,030	4.98	931	4.95	896	4.76	681
2 p.m.	5.20	1,210	5.73	1,980	5.05	1,020	4.97	919	4.94	884	4.75	671
4	5.20	1,210	5.63	1,830	5.04	1,010	4.95	896	4.93	872	4.75	671
6	5.19	1,200	5.53	1,680	5.03	994	4.93	872	4.91	849	4.73	649
8	5.18	1,190	5.42	1,520	5.02	981	4.92	860	4.90	837	4.72	639
10	5.19	1,200	5.35	1,420	5.01	968	4.91	849	4.88	814	4.71	628
12 m.	5.35	1,420	5.27	1,310	4.98	931	4.90	837	4.87	803	4.69	607

NESHANIC RIVER AT REAVILLE, N. J.

LOCATION.—Lat. 40°28′18″, long. 74°49′42″, at highway bridge half a mile southwest of Reaville, Hunterdon County. Datum of gage is 109.46 feet above mean sea level (unadjusted).

DRAINAGE AREA.—25.7 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,700 second-feet; extended to peak stage by logarithmic plotting.

MAXIMA.—July 1938: Discharge, 2,960 second-feet 10:30 a.m. July 23 (gage height, 9.12 feet).

1930 to June 1938: Discharge, 4,370 second-feet Aug. 23, 1933 (gage height, 10.80 feet).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	3.6	31	38	11	17.7	5.4	11.4	21	8.5	329	5.7
2	3.4	26	33	12	28	7.8	8.9	22	7.5	630	5.2
3	3.4	18.5	23	13	87	5.7	7.5	23	7.8	1,500	4.6
4	3.4	13.3	19.8	14	89	7.6	6.9	24	6.6	318	4.4
5	4.1	10.9	17.3	15	27	6.0	6.6	25	5.4	129	3.8
6	4.6	8.9	18.2	16	18.5	4.9	6.3	26	6.2	82	3.8
7	5.7	7.5	18.5	17	15.0	30	49	27	110	60	4.9
8	98	6.6	15.0	18	31	24	19.7	28	214	154	6.1
9	13.9	6.3	12.8	19	13.9	8.5	8.2	29	76	133	3.8
10	8.9	5.7	10.1	20	10.1	545	6.6	30	43	102	3.4
								31		47	3.2
Monthly mean discharge, in second-feet									32.4	138	12.4
Runoff, in inches									1.41	6.19	.56

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.41	4.1	3.18	58	2.57	8.9	2.55	8.2	3.30	74	6.06	1,080
4	2.41	4.1	2.98	36	2.56	8.5	2.55	8.2	3.27	70	6.70	1,400
6	2.41	4.1	2.85	25	2.56	8.5	3.20	60	3.25	67	5.00	632
8	2.40	3.8	2.76	18.5	2.56	8.5	8.40	2,440	3.27	70	4.38	381
10	2.40	3.8	2.72	16.1	2.55	8.2	8.44	2,470	3.82	184	4.56	456
12 n.	2.40	3.8	2.70	15.0	2.54	7.8	5.28	744	6.30	1,200	5.91	1,020
2 p.m.	2.40	3.8	2.68	13.9	2.55	8.2	4.16	294	6.00	1,060	5.34	769
4	2.40	3.8	2.65	12.3	2.55	8.2	3.80	178	4.56	456	4.72	520
6	2.56	8.5	2.64	11.8	2.55	8.2	3.63	136	4.07	262	4.34	364
8	3.20	60	2.62	10.9	2.55	8.2	3.49	106	3.86	195	4.13	283
10	3.84	190	2.60	10.1	2.55	8.2	3.41	92	3.71	155	3.99	235
12 m.	3.52	112	2.58	9.3	2.55	8.2	3.35	82	4.56	456	3.89	204
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.83	187	4.58	464	3.73	160	3.43	95	3.25	67	5.08	664
4	3.81	181	4.52	439	3.70	152	3.42	94	3.24	66	3.94	219
6	3.94	219	4.63	484	3.67	145	3.41	92	3.24	66	3.60	129
8	7.80	2,040	4.46	414	3.65	140	3.40	90	3.23	64	3.46	101
10	9.00	2,870	4.27	336	3.63	136	3.39	88	3.23	64	3.39	88
12 n.	8.90	2,790	4.14	287	3.60	129	3.36	84	3.21	61	3.35	82
2 p.m.	8.66	2,620	4.05	255	3.56	121	3.33	79	3.19	59	3.32	77
4	7.59	1,910	3.96	226	3.53	114	3.31	76	3.17	56	3.26	68
6	8.22	2,310	3.88	201	3.50	108	3.28	71	3.14	53	3.19	59
8	7.02	1,570	3.84	190	3.48	104	3.27	70	3.12	50	3.17	56
10	5.33	766	3.79	175	3.46	101	3.26	68	3.10	48	3.15	54
12 m.	4.84	568	3.76	168	3.44	97	3.25	67	3.50	108	3.14	53
	July 29		July 30		July 31		August 1		August 2		August 3	
2 p.m.	3.14	53	4.00	238								
4	3.14	53	3.70	152								
6	3.13	52	3.54	116								
8	3.13	52	3.46	101								
10	3.12	50	3.41	92								
12 n.	3.11	49	3.35	82								
2 p.m.	3.10	48	3.26	68								
4	3.08	46	3.25	67								
6	3.06	44	3.19	59								
8	4.50	431	3.16	55								
10	4.78	544	3.13	52								
12 m.	4.05	255	3.12	50								

Supplemental records.—July 20, 9 a.m., 9.00 ft.; 2,870 sec.-ft.; July 21, 12:45 p.m., 6.94 ft., 1,530 sec.-ft.; July 22, 3:15 a.m., 7.24 ft., 1,700 sec.-ft.; 9 a.m., 4.32 ft., 356 sec.-ft.; July 23, 10:30 a.m., 9.12 ft., 2,960 sec.-ft.; July 28, 1 a.m., 5.76 ft., 952 sec.-ft.; July 29, 9 p.m., 5.10 ft., 672 sec.-ft.; July 30, 1:30 a.m., 4.06 ft., 258 sec.-ft.

NORTH BRANCH OF RARITAN RIVER AT MILLTOWN, N. J.

LOCATION.—Lat. 40°34′10″, long. 74°40′45″, at Milltown, Somerset County, 1½ miles upstream from confluence of North and South Branches of Raritan River. Datum of gage is 50.43 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—190 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,100 second-feet; extended to peak stage on basis of two slope-area measurements.

MAXIMA.—July 1938: Discharge, 7,900 second-feet 4 p.m. July 23 (gage height, 8.92 feet).

1923 to June 1938: Discharge, about 14,400 second-feet Jan. 3, 1936 (gage height, 11.35 feet, from floodmark).

REMARKS.—Flow not materially affected by storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	102	307	342	11	201	109	596	21	133	1,230	162
2	99	274	342	12	195	119	357	22	119	2,440	154
3	106	221	268	13	330	126	256	23	325	4,810	141
4	109	185	244	14	262	116	226	24	244	2,560	133
5	102	158	232	15	175	206	211	25	133	898	126
6	102	137	1,530	16	141	157	190	26	649	658	123
7	93	123	1,110	17	123	113	275	27	1,360	555	119
8	766	119	515	18	771	123	447	28	1,770	644	116
9	209	116	388	19	222	123	211	29	640	458	113
10	146	109	314	20	158	671	175	30	380	722	109
								31		349	106
Monthly mean discharge, in second-feet									339	611	311
Runoff, in inches									1.99	3.71	1.89

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	2.84	113	2.90	133	2.83	109	2.92	141	3.31	364	4.60	1,840
4	2.83	109	2.90	133	2.83	109	2.95	154	3.25	321	5.87	3,120
6	2.82	106	2.90	133	2.83	109	3.22	300	3.22	300	6.42	3,530
8	2.82	106	2.89	130	2.84	113	3.86	921	3.19	280	5.75	3,040
10	2.82	106	2.88	126	2.84	113	3.92	989	3.19	280	4.84	2,160
12 n.	2.82	106	2.87	123	2.87	123	3.92	989	3.50	535	4.91	2,230
2 p.m.	2.82	106	2.87	123	2.90	133	4.14	1,250	5.00	2,340	5.85	3,110
4	2.82	106	2.86	119	2.91	137	4.10	1,200	6.14	3,300	5.84	3,100
6	2.82	106	2.85	116	2.92	141	3.78	831	5.68	2,990	5.10	2,450
8	2.84	113	2.85	116	2.92	141	3.68	722	4.67	1,930	4.56	1,790
10	2.88	126	2.85	116	2.92	141	3.51	545	4.20	1,330	4.27	1,420
12 m.	2.90	133	2.83	109	2.92	141	3.38	420	4.17	1,290	4.11	1,210

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	3.98	1,060	8.42	6,810	3.96	1,030	3.68	722	3.53	566	4.00	1,080
4	3.89	955	7.10	4,330	3.93	1,000	3.67	711	3.52	555	3.80	853
6	3.86	921	5.53	2,870	3.92	989	3.66	701	3.52	555	3.68	722
8	4.23	1,370	4.95	2,280	3.90	966	3.65	690	3.52	555	3.63	669
10	7.20	4,490	4.66	1,920	3.87	932	3.65	690	3.51	545	3.58	617
12 n.	8.22	6,400	4.50	1,710	3.85	910	3.64	679	3.51	545	3.55	586
2 p.m.	8.75	7,520	4.36	1,530	3.83	887	3.63	669	3.50	535	3.53	566
4	8.92	7,900	4.28	1,430	3.79	842	3.61	648	3.47	505	3.50	535
6	8.81	7,650	4.18	1,300	3.77	820	3.59	627	3.46	495	3.47	505
8	8.72	7,560	4.10	1,200	3.74	787	3.57	606	3.45	486	3.45	486
10	8.75	7,520	4.04	1,130	3.71	754	3.54	576	3.63	669	3.43	466
12 m.	8.71	7,430	3.99	1,070	3.69	732	3.54	576	3.68	722	3.42	456
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.41	446	4.16	1,280	3.33	380	3.27	335	3.33	380	3.18	274
4	3.41	446	4.10	1,200	3.32	372	3.30	356	3.33	380	3.18	274
6	3.40	436	3.93	1,000	3.31	364	3.31	364	3.32	377	3.18	274
8	3.40	436	3.78	831	3.31	364	3.30	356	3.31	364	3.18	274
10	3.39	428	3.68	722	3.31	364	3.29	349	3.30	356	3.18	274
12 n.	3.38	420	3.60	637	3.30	356	3.30	356	3.28	342	3.18	274
2 p.m.	3.37	412	3.53	566	3.30	356	3.29	349	3.28	342	3.18	274
4	3.37	412	3.48	515	3.29	349	3.28	342	3.27	335	3.18	274
6	3.37	412	3.43	466	3.28	342	3.27	335	3.25	321	3.17	268
8	3.37	412	3.38	420	3.28	342	3.27	335	3.23	307	3.16	262
10	3.48	515	3.36	404	3.27	335	3.25	321	3.21	293	3.14	250
12 m.	3.90	966	3.34	388	3.27	335	3.28	342	3.18	274	3.13	244

Supplemental records.—July 22, 3 p.m., 5.99 feet, 3,190 sec.-ft.

LAKE CARNEGIE AT PRINCETON, N. J.

LOCATION.—Lat. 40°22′10″, long. 74°37′20″, at Kingston Dam on Millstone River, 2 miles northeast of Princeton, Mercer County.

DRAINAGE AREA.—159 square miles.

GAGE-HEIGHT RECORD.—One staff gage reading daily, usually about 8 a.m.

REMARKS.—Only contents above crest of spillway are given in table. Crest of lower spillway is gage datum. Records furnished by Princeton University.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
1	0.34	3.56	0.76	7.97	0.50	5.24
2	.34	3.56	.68	7.13	.48	5.03
3	.34	3.56	.52	5.45	.42	4.40
4	.34	3156	.48	5.03	.40	4.19
5	.32	3.36	.46	4.82	.38	3.98
6	.34	3.56	.42	4.40	.38	3.98
7	.38	3.99	.42	4.40	.56	5.87
8	.89	9.33	.36	3.78	.58	6.08
9	.52	5.45	.36	3.78	.54	5.66
10	.42	4.40	.32	3.36	.54	5.66
11	.38	3.98	.32	3.36	.52	5.45
12	.42	4.40	.32	3.36	.46	4.82
13	.50	5.24	.30	3.15	.38	3.98
14	.56	5.87	.30	3.15	.38	3.98
15	.60	6.29	.50	5.24	.36	3.78
16	.56	5.87	.40	4.19	.34	3.56
17	.48	5.03	.38	3.98	.34	3.56
18	.38	3.98	.50	5.24	.58	6.08
19	.38	3.98	.40	4.19	.42	4.40

Gage height, in feet, and contents, in millions of cubic feet, 1938—Continued

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
20	.38	3.98	.82	8.60	.34	3.56
21	.36	3.78	.98	10.28	.32	3.36
22	.34	3.56	1.50	15.73	.30	3.15
23	.32	3.36	1.09	11.43	.28	2.94
24	.52	5.45	1.79	18.77	.28	2.94
25	.50	5.24	1.62	16.99	.26	2.73
26	.58	6.08	1.08	11.32	.28	2.94
27	.82	8.60	.84	8.81	.34	3.56
28	1.42	14.89	.64	6.71	.30	3.15
29	1.09	11.43	.64	6.71	.28	2.94
30	.96	10.07	.60	6.29	.28	2.94
31			.60	6.29	.26	2.73

	June	July	August
Change in contents, in millions of cubic feet	+4.41	−2.73	−2.51
Change in contents, in equivalent second-feet	+1.70	−1.02	−0.94

MILLSTONE RIVER NEAR KINGSTON, N. J.

LOCATION.—Lat. 40°23′05″, long. 74°37′29″, at Princeton sewage-disposal plant, 1 mile downstream from Heathcots Brook near Kingston, Middlesex County. Datum of gage is 38.00 feet above mean sea level. (New Jersey Geological Survey bench mark.)

DRAINAGE AREA.—171 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 6 p.m. July 23 to 10 a.m. July 29 when record was based on floodmark, shape of available recorder graph, and records for station at Blackwells Mills.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 2,100 second-feet; extended to peak stage on basis of logarithmic plotting and record for station at Blackwells Mills.

MAXIMA.—July 1938: Discharge, 8,600 second-feet about 10 p.m. July 23 (gage height, 13.37 feet, from floodmark).

1933 to June 1938: Discharge, about 4,950 second-feet Aug. 24, 1933 (gage height, 10.60 feet).

REMARKS.—Discharge below 255 second-feet computed by shifting-control method on basis of three current-meter measurements. Delaware & Raritan Canal may divert a small amount of water from the Delaware River into the Millstone River. Flow regulated slightly by storage in Lake Carnegie (see p. 303). Water-stage recorder inspected by employee of Borough of Princeton.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	144	450	255	11	176	122	242	21	135	1,850	113
2	144	312	234	12	168	125	178	22	133	3,400	112
3	132	271	224	13	238	127	149	23	211	4,300	114
4	125	231	191	14	286	279	133	24	278	6,000	110
5	127	206	187	15	321	279	124	25	233	2,700	104
6	132	178	216	16	271	185	120	26	191	1,300	108
7	130	159	330	17	216	163	155	27	747	880	106
8	541	144	294	18	174	214	334	28	1,960	640	90
9	279	135	286	19	142	232	172	29	1,740	370	112
10	208	124	286	20	136	891	140	30	894	321	114
								31		271	108
Monthly mean discharge, in second-feet									354	866	176
Runoff, in inches									2.31	5.83	1.19

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	2.12	165	2.28	200	3.72	455	5.97	1,280	9.63	3,900
4	------	-------	2.18	178	2.25	193	3.58	421	5.48	1,060	9.39	3,670
6	------	-------	2.24	191	2.23	189	3.47	396	5.25	960	9.06	3,370
8	------	-------	2.37	218	2.20	182	3.56	415	5.28	973	8.84	3,180
10	------	-------	2.57	253	2.20	182	3.62	431	5.56	1,090	8.75	3,100
12 n.	------	-------	2.52	245	2.15	172	4.45	664	6.21	1,400	8.83	3,170
2 p.m.	------	-------	2.51	243	2.13	168	5.35	1,000	6.96	1,820	8.88	3,210
4	------	-------	2.44	231	2.30	204	5.86	1,230	7.54	2,180	8.89	3,220
6	------	-------	2.30	204	2.87	282	6.18	1,390	8.00	2,510	8.96	3,280
8	------	-------	2.38	220	3.07	315	6.45	1,520	8.42	2,840	9.29	3,580
10	------	-------	2.35	214	3.22	344	6.60	1,610	9.10	3,410	9.47	3,750
12 m.	------	-------	2.32	208	3.60	426	6.46	1,530	9.57	3,840	9.28	3,570
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	8.89	3,220	------	8,200	------	3,600	------	1,700	------	840	------	820
4	8.38	2,740	------	7,700	------	3,400	------	1,600	------	800	------	780
6	7.87	2,070	------	7,200	------	3,200	------	1,500	------	760	------	740
8	7.49	2,150	------	6,800	------	3,000	------	1,500	------	730	------	700
10	7.26	2,010	------	6,300	------	2,800	------	1,400	------	720	------	660
12 n.	7.68	2,280	------	5,900	------	2,600	------	1,300	------	720	------	640
2 p.m.	9.23	3,530	------	5,400	------	2,500	------	1,200	------	760	------	600
4	10.00	4,270	------	5,000	------	2,300	------	1,100	------	1,000	------	570
6	------	6,700	------	4,600	------	2,200	------	1,100	------	1,200	------	540
8	------	8,100	------	4,300	------	2,100	------	1,000	------	1,200	------	520
10	------	8,600	------	4,000	------	2,000	------	960	------	970	------	490
12 m.	------	8,500	------	3,800	------	1,900	------	900	------	870	------	470
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	------	440	3.10	321	2.93	291	2.64	265	2.48	238	2.46	234
4	------	420	3.08	317	2.91	288	2.61	260	2.46	234	2.46	234
6	------	400	3.06	314	2.89	284	2.59	257	2.45	233	2.44	231
8	------	380	3.12	325	2.87	282	2.61	260	2.44	231	2.44	231
10	3.30	360	3.10	321	2.87	282	2.70	274	2.48	238	2.48	238
12 n.	3.29	358	3.13	327	2.85	278	2.65	266	2.53	246	2.42	227
2 p.m.	3.28	356	3.13	327	2.80	271	2.67	269	2.46	234	2.42	227
4	3.26	352	3.12	325	2.78	268	2.66	268	2.46	234	2.43	229
6	3.15	330	3.06	314	2.70	276	2.56	252	2.46	234	2.43	229
8	3.17	334	2.97	298	2.68	272	2.44	231	2.47	236	2.40	224
10	3.24	348	3.00	303	2.67	271	2.44	231	2.47	236	2.34	212
12 m.	3.10	321	2.97	298	2.65	268	2.35	214	2.36	216	2.24	191

MILLSTONE RIVER AT BLACKWELLS MILLS, N. J.

LOCATION.—Lat. 40°28'30", long. 74°34'34", at highway bridge in Blackwells Mills, Somerset County, a quarter of a mile downstream from Middlebrush Brook. Datum of gage is 26.97 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—258 square miles; 159 square miles affected by storage in Lake Carnegie.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 2:10 a.m. July 23 to 2:30 p.m. July 24 when record is based on floodmark and shape of available recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 4,000 second-feet; extended to peak stage on basis of a slope-area measurement.

MAXIMA.—July 1938: Discharge, about 12,400 second-feet 11 p.m. July 23 (gage height, 13.22 feet, from floodmark).

1921 to June 1938: Discharge, about 7,000 second-feet Oct. 18, 1927; gage height, about 11 feet Apr. 7, 1924, and Sept. 7, 1926.

REMARKS.—Delaware & Raritan Canal parallels river for some distance; there may be a small amount of water diverted to the river. Flow regulated slightly by storage in Lake Carnegie (see p. 303).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	171	819	347	11	222	160	302	21	168	2,180	153
2	171	511	307	12	213	164	213	22	153	4,710	142
3	156	388	283	13	367	164	192	23	317	8,020	145
4	149	312	245	14	394	286	168	24	497	9,260	142
5	145	273	231	15	404	439	164	25	273	4,880	128
6	156	235	258	16	342	240	153	26	235	2,600	132
7	149	209	445	17	273	217	207	27	1,270	1,390	132
8	1,050	192	399	18	273	322	472	28	2,320	1,160	135
9	460	179	367	19	204	275	231	29	2,780	621	132
10	263	164	352	20	175	1,340	179	30	1,730	505	142
								31		415	142
Monthly mean discharge, in second-feet									516	1,375	227
Runoff, in inches									2.23	6.14	1.01

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.97	204	2.25	337	2.10	263	2.68	587	5.20	1,800	7.75	3,550
4	1.97	204	2.26	342	2.08	254	2.79	663	5.22	1,810	7.98	3,780
6	1.97	204	2.27	347	2.07	249	2.99	789	5.20	1,800	8.22	4,020
8	1.96	200	2.27	347	2.04	235	3.50	1,080	5.18	1,790	8.41	4,220
10	1.95	196	2.26	342	2.04	235	4.31	1,430	5.24	1,820	8.58	4,410
12 n.	1.95	196	2.25	337	2.03	231	4.82	1,640	5.51	1,960	8.75	4,600
2 p.m.	1.94	192	2.25	337	2.02	226	5.03	1,720	5.82	2,110	9.05	4,980
4	2.00	217	2.23	327	2.02	226	5.13	1,760	6.09	2,250	9.40	5,430
6	2.04	235	2.18	302	2.05	240	5.17	1,780	6.43	2,460	9.56	5,650
8	2.10	263	2.15	288	2.18	302	5.17	1,780	6.90	2,810	9.63	5,750
10	2.16	292	2.13	278	2.42	427	5.17	1,780	7.25	3,100	9.56	5,650
12 m.	2.20	312	2.12	273	2.58	523	5.18	1,790	7.51	3,330	9.45	5,500
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	9.32	5,330	12.95	11,800	9.95	6,200	7.50	3,320	4.89	1,670	4.94	1,680
4	9.16	5,120	12.70	11,200	9.75	5,920	7.31	3,150	4.62	1,560	4.55	1,530
6	9.00	4,910	12.45	10,700	9.52	5,600	7.13	2,990	4.36	1,450	4.12	1,360
8	9.08	5,010	12.20	10,200	9.32	5,330	6.95	2,850	4.17	1,380	3.79	1,220
10	9.32	5,330	11.95	9,700	9.12	5,070	6.77	2,710	3.98	1,300	3.57	1,120
12 n.	10.00	6,270	11.70	9,200	8.92	4,810	6.58	2,570	3.84	1,250	3.47	1,060
2 p.m.	11.35	8,530	11.48	8,770	8.72	4,560	6.40	2,440	3.70	1,180	3.37	1,000
4	12.35	10,500	11.19	8,240	8.52	4,340	6.20	2,370	3.58	1,120	3.28	959
6	12.90	11,700	10.90	7,720	8.30	4,100	6.02	2,210	3.48	1,070	3.20	915
8	13.15	12,300	10.62	7,230	8.10	3,900	5.77	2,080	3.60	1,130	3.14	879
10	13.20	12,400	10.37	6,820	7.90	3,700	5.50	1,950	5.00	1,710	3.04	819
12 m.	13.15	12,300	10.15	6,480	7.70	3,500	5.20	1,800	5.30	1,850	2.93	753
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.87	716	2.60	535	2.45	445	2.32	373	------	------	------	------
4	2.83	690	2.58	523	2.44	439	2.30	362	------	------	------	------
6	2.80	670	2.58	523	2.43	433	2.29	357	------	------	------	------
8	2.78	656	2.57	517	2.42	427	2.29	357	------	------	------	------
10	2.74	628	2.56	511	2.40	415	2.28	352	------	------	------	------
12 n.	2.70	600	2.55	505	2.39	410	2.27	347	------	------	------	------
2 p.m.	2.68	587	2.55	505	2.38	404	2.27	347	------	------	------	------
4	2.65	568	2.54	499	2.37	399	2.27	347	------	------	------	------
6	2.64	561	2.53	493	2.36	394	2.27	347	------	------	------	------
8	2.62	548	2.51	481	2.36	394	2.26	342	------	------	------	------
10	2.61	542	2.48	463	2.35	388	2.24	332	------	------	------	------
12 m.	2.60	535	2.46	451	2.33	378	2.22	322	------	------	------	------

Supplemental records.—July 23, 11 p.m., 13.22 ft., 12,400 sec.-ft July 27, 7:30 p.m., 3.40 ft., 1,020 sec.-ft.

GREEN BROOK AT PLAINFIELD, N. J.

LOCATION.—Lat. 40°36′50″, long. 74°25′55″, just downstream from Sycamore Avenue, Plainfield, Union County, and 1 mile upstream from Stoney Brook. Datum of gage is 70.37 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—9.75 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 200 second-feet; extended to peak stage by averaging two contracted-opening determinations of flood flow.

MAXIMA.—July 1938: Discharge, 2,890 second-feet 11:30 a.m. July 23 (gage height, 5.82 feet).

REMARKS.—Record started May 15, 1938. Discharge affected by diversion for municipal supply. Monthly mean discharge and run-off, in inches, adjusted for diversion. Monthly mean diversions were: June, 2.53 second-feet; July, 2.45 second-feet; August, 2.53 second-feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	3.6	9.5	13.5	11	6.8	7.9	11.0	21	3.2	41	2.6
2	2.4	9.0	10.4	12	6.9	5.2	6.6	22	4.3	69	2.6
3	4.0	7.5	9.5	13	12.7	5.2	4.2	23	3.4	911	2.6
4	3.4	6.2	8.3	14	6.9	5.9	3.9	24	3.1	168	2.4
5	2.6	5.8	7.5	15	5.7	9.1	3.6	25	4.0	64	2.2
6	3.6	4.8	10.6	16	4.1	6.3	3.4	26	9.2	40	2.6
7	10.7	3.6	8.7	17	4.5	23	3.4	27	32	42	2.0
8	55	3.4	7.7	18	7.9	9.7	3.2	28	109	44	1.7
9	12.6	3.6	8.0	19	4.3	6.4	3.2	29	33	27	2.4
10	6.2	3.6	8.7	20	3.6	18.5	2.9	30	19.8	21	2.2
								31		16.4	2.3
Monthly mean discharge, in second-feet (observed)									13.0	51.5	5.29
Monthly mean discharge, in second-feet (adjusted)									15.5	54.0	7.81
Runoff, in inches (adjusted)									1.77	6.39	.92

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		Julv 19			July 17		July 18		July 19	
2 a.m.	0.89	4.2	1.17	16.4	0.94	5.8	2 p.m.	0.87	3.6	0.98	7.2	0.91	4.8
4	.88	3.9	1.13	14.0	.93	5.5	4	2.09	172	.97	6.9	1.21	19.0
6	.87	3.6	1.10	12.4	.93	5.5	6	1.53	55	.96	6.6	.99	7.5
8	.87	3.6	1.07	10.8	.92	5.2	8	1.43	41	.95	6.2	.95	6.2
10	.87	3.6	1.04	9.5	.92	5.2	10	1.32	28	.95	6.2	.95	6.2
12 n.	.87	3.6	1.01	8.3	.92	5.2	12 m.	1.23	21	.94	5.8	.98	7.2

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 20		July 21		July 22		July 23		July 24		July 25	
1 a.m.	0.98	7.2	1.08	11.3	1.40	38	1.41	39	2.46	280	1.71	86
2	.98	7.2	1.07	10.8	1.38	35	1.39	37	2.43	271	1.69	81
3	.98	7.2	1.07	10.8	1.40	38	1.38	35	2.37	252	1.68	79
4	1.54	56	1.13	14.0	1.38	35	1.36	33	2.32	237	1.67	77
5	1.20	18.3	1.14	14.6	1.38	35	1.35	32	2.28	225	1.66	76
6	1.12	13.5	1.14	14.6	1.38	35	1.40	38	2.27	222	1.65	74
7	1.27	24	1.16	15.8	1.38	35	2.60	327	2.23	211	1.64	72
8	1.11	12.9	1.20	18.3	1.43	41	3.90	937	2.20	202	1.63	70
9	1.09	11.8	1.31	27	1.98	145	4.60	1,460	2.18	197	1.62	69

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 20		July 21		July 22		July 23		July 24		July 25	
10	1.32	28	1.29	25	1.65	74	5.24	2,130	2.14	186	1.61	67
11	1.29	25	1.30	26	1.90	126	5.70	2,720	2.08	170	1.60	66
12 n.	1.27	24	1.64	72	1.87	119	5.72	2,750	2.04	160	1.58	62
1 p.m.	1.27	24	1.56	59	1.87	119	5.34	2,250	1.99	148	1.57	61
2	1.27	24	1.65	74	1.84	113	4.70	1,550	1.96	140	1.56	59
3	1.27	24	1.73	90	1.78	100	4.20	1,140	1.92	131	1.56	59
4	1.27	24	1.72	88	1.77	98	3.60	762	1.89	124	1.55	58
5	1.26	23	1.65	74	1.72	88	3.76	853	1.86	117	1.54	56
6	1.24	21	2.04	160	1.67	77	3.86	913	1.83	111	1.52	54
7	1.21	19.0	1.50	51	1.61	67	3.94	962	1.80	104	1.51	52
8	1.18	17.1	1.44	43	1.56	59	3.80	876	1.78	100	1.50	51
9	1.16	15.8	1.40	38	1.52	54	3.42	668	1.76	96	1.50	51
10	1.14	14.6	1.37	34	1.49	49	3.06	503	1.75	94	1.49	49
11	1.12	13.5	1.35	32	1.45	44	2.75	380	1.73	90	1.48	48
12 m.	1.10	12.4	1.48	48	1.43	41	2.60	327	1.72	88	1.48	48
	July 26		July 27		July 28		July 29		July 30		July 31	
2 a.m.	1.47	47	1.35	32	1.55	58	------	------	------	------	------	------
4	1.46	45	1.34	31	1.49	49	------	------	------	------	------	------
6	1.45	44	1.34	31	1.45	44	------	------	------	------	------	------
8	1.44	43	1.33	29	1.42	40	------	------	------	------	------	------
10	1.43	41	1.32	28	1.40	38	------	------	------	------	------	------
12 n.	1.42	40	1.32	28	1.38	35	------	------	------	------	------	------
2 p.m.	1.41	39	1.31	27	1.35	32	------	------	------	------	------	------
4	1.39	37	1.29	25	1.34	31	------	------	------	------	------	------
6	1.38	35	1.28	25	1.44	43	------	------	------	------	------	------
8	1.37	34	1.62	69	1.41	39	------	------	------	------	------	------
10	1.36	33	1.78	100	1.41	39	------	------	------	------	------	------
12 m.	1.35	32	1.66	76	1.41	39	------	------	------	------	------	------

Supplemental records.—July 21, 11:45 a.m., 1.94 ft., 136 sec.-ft.; 12:30 p.m., 1.50 ft., 51 sec.-ft.; July 22, 12:20 a.m., 1.50 ft., 51 sec.-ft.; July 23, 9:30 a.m., 5.44 ft., 2,370 sec.-ft.; 11:30 a.m., 5.82 ft., 2,890 sec.-ft.; 4:40 p.m., 3.92 ft., 950 sec.-ft.; July 27, 7:00 p.m., 2.10 ft., 175 sec.-ft.; 7:30 p.m., 1.52 ft., 54 sec.-ft.; July 28, 4:30 p.m., 2.07 ft., 168 sec.-ft.

RESERVOIR ON LAWRENCE BROOK AT FARRINGTON DAM, N. J.

Location.—Lat. 40°27′00″, long. 74°27′05″, on Lawrence Brook at Farrington Dam, half a mile southwest of Milltown, Middlesex County.

Drainage area.—34.4 square miles.

Gage-height record.—Water-stage recorder graph.

Remarks.—Usable capacity, 87,600,000 cubic feet. Crest of notch in dam is at gage height 24.00 feet.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
1	24.50	92.2	24.56	92.8	24.56	92.8
2	24.49	92.1	24.55	92.8	24.55	92.8
3	24.49	92.1	24.52	92.4	24.53	92.5
4	24.49	92.1	24.51	92.4	24.54	92.6
5	24.50	92.2	24.49	92.1	24.52	92.4
6	24.48	92.1	24.48	92.1	24.61	93.3
7	24.65	93.6	24.47	92	24.59	93.0
8	24.67	93.8	24.46	91.8	24.56	92.8
9	24.58	93	24.48	92.1	24.54	92.6
10	24.54	92.6	24.48	92.1	24.54	92.6
11	24.54	92.6	24.47	92	24.54	92.6
12	24.54	92.6	24.46	91.8	24.52	92.4
13	24.54	92.6	24.45	91.7	24.52	92.4
14	24.54	92.6	24.55	92.8	24.52	92.4
15	24.52	92.4	24.52	92.4	24.52	92.4
16	24.50	92.2	24.50	92.2	24.52	92.4

Gage height, in feet, and contents, in millions of cubic feet, 1938—Continued

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
17	24.50	92.2	24.50	92.2	24.52	92.4
18	24.51	92.4	24.52	92.4	24.52	92.4
19	24.50	92.2	24.53	92.5	24.52	92.4
20	24.48	92.1	24.74	94.5	24.52	92.4
21	24.48	92.1	24.94	96.4	24.50	92.2
22	24.48	92.1	24.83	95.3	24.50	92.2
23	24.48	92.1	25.35	100.7	24.49	92.1
24	24.48	92.1	24.94	96.4	24.48	92.1
25	24.46	91.8	24.76	94.6	24.48	92.1
26	24.57	92.9	24.69	94	24.49	92.1
27	24.84	95.4	24.65	93.6	24.56	92.8
28	24.78	94.9	24.65	93.6	24.52	92.4
29	24.66	93.7	24.61	93.3	24.50	92.2
30	24.59	93	24.58	93.0	24.49	92.1
31			24.57	92.9	24.48	92.1

	June	July	August
Change in contents, in millions of cubic feet	+0.6	−0.1	−0.8
Change in contents, in equivalent second-feet	+0.23	−0.04	−0.30

LAWRENCE BROOK AT FARRINGTON DAM, N. J.

Location.—Lat. 40°27′00″, long. 74°27′05″, at Farrington Dam, half a mile southwest of Milltown, Middlesex County, and 4¾ miles upstream from mouth.

Drainage area.—34.4 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 500 second-feet; extended to peak stage by weir formula.

Maxima.—July 1938: Discharge, 1,050 second-feet 7 to 9 p.m. July 23 (gage height, 25.40 feet).

1927 to June 1938: Discharge, about 1,900 second-feet July 6, 1928 (gage-height, 25.84 feet).

Remarks.—Flow affected by storage in reservoir at Farrington Dam (see p. 308). Monthly mean discharge and runoff, in inches, adjusted for storage in reservoir. Water-stage recorder inspected by employee of City of New Brunswick.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	19.4	46	41	11	29	11.5	29	21	13.1	300	17.1
2	17.1	32	32	12	25	11.5	25	22	11.5	285	15.0
3	15.0	25	29	13	25	10.0	22	23	11.5	586	15.0
4	15.0	19.4	25	14	29	21	22	24	13.1	668	13.1
5	15.0	17.1	25	15	22	29	22	25	11.5	253	13.1
6	15.0	13.1	36	16	19.4	19.4	22	26	12.6	142	13.1
7	17.8	11.5	62	17	17.1	15.0	22	27	125	94	15.4
8	142	11.5	41	18	19.4	22	22	28	241	118	25
9	68	10.0	32	19	19.4	22	22	29	134	68	17.1
10	36	13.1	29	20	15.0	93	19.4	30	68	51	17.1
								31		41	15.0
Monthly mean discharge, in second-feet (observed)									40.7	98.7	24.4
Monthly mean discharge, in second-feet (adjusted)									41.0	98.7	24.0
Runoff, in inches (adjusted)									1.33	3.31	.80

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	------	------	------	------	------	24.53	25	24.75	170	24.91	343
4	------	------	------	------	------	------	24.54	29	24.77	190	24.89	319
6	------	------	------	------	------	------	24.57	41	24.79	210	24.87	296
8	------	------	------	------	------	------	24.57	41	24.82	241	24.85	273
10	------	------	------	------	------	------	24.62	68	24.85	273	24.84	262
12 n.	------	------	------	------	------	------	24.66	94	24.90	331	24.83	252
2 p.m.	------	------	------	------	------	------	24.69	117	24.92	355	24.83	252
4	------	------	------	------	------	------	24.72	142	24.94	379	24.83	252
6	------	------	------	------	------	------	24.74	160	24.95	391	24.84	262
8	------	------	------	------	------	------	24.75	170	24.95	391	24.84	262
10	------	------	------	------	------	------	24.75	170	24.99	441	24.84	262
12 m.	------	------	------	------	------	------	24.74	160	24.94	379	24.83	252
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	24.81	231	25.30	890	24.91	343	24.75	170	24.68	109	24.67	102
4	24.79	210	25.28	860	24.89	319	24.74	160	24.68	109	24.69	117
6	24.78	200	25.25	810	24.87	296	24.74	160	24.67	102	24.72	142
8	24.77	190	25.22	765	24.85	273	24.73	151	24.67	102	24.73	151
10	24.77	190	25.20	735	24.84	262	24.72	142	24.67	102	24.73	151
12 n.	25.08	560	25.16	675	24.82	241	24.72	142	24.66	94	24.72	142
2 p.m.	25.21	750	25.13	630	24.81	231	24.71	134	24.66	94	24.70	125
4	25.32	920	25.09	575	24.79	210	24.70	125	24.65	87	24.69	117
6	25.38	1,020	25.05	520	24.79	210	24.70	125	24.64	80	24.68	109
8	25.40	1,050	25.00	454	24.78	200	24.69	117	24.64	80	24.67	102
10	25.39	1,040	24.97	416	24.77	190	24.69	117	24.65	87	24.66	94
12 m.	25.35	970	24.94	379	24.76	180	24.69	117	24.65	87	24.65	87
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	24.64	80	24.61	62	------	------	------	------	------	------	------	------
4	24.64	80	24.60	56	------	------	------	------	------	------	------	------
6	24.63	74	24.60	56	------	------	------	------	------	------	------	------
8	24.63	74	24.60	56	------	------	------	------	------	------	------	------
10	24.62	68	24.60	56	------	------	------	------	------	------	------	------
12 n.	24.62	68	24.59	51	------	------	------	------	------	------	------	------
2 p.m.	24.61	62	24.59	51	------	------	------	------	------	------	------	------
4	24.61	62	24.59	51	------	------	------	------	------	------	------	------
6	24.62	68	24.59	51	------	------	------	------	------	------	------	------
8	24.61	62	24.58	46	------	------	------	------	------	------	------	------
10	24.61	62	24.58	46	------	------	------	------	------	------	------	------
12 m.	24.61	62	24.58	46	------	------	------	------	------	------	------	------

Supplemental records.—July 21, 9:45 p.m., 24.94 ft., 379 sec.-ft.; July 22, 12:15 a.m., 24.95 ft., 391 sec.-ft.; July 23, 7 to 9 p.m., 25.40 ft., 1,050 sec.-ft.

DEEP RUN NEAR BROWNTON, N. J.

Location.—Lat. 40°22′32″, long. 74°18′08″, half a mile downstream from Middlesex-Monmouth county line and 1¾ miles south of Browntown, Middlesex County.

Drainage area.—8.07 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 400 second-feet.

Maxima.—June 1938: Discharge, 710 second-feet 11 p.m. June 27 (gage height, 7.47 feet).

July 1938: Discharge, 541 second-feet 5:30 p.m., July 20 (gage height, 6.79 feet).

1932 to May 1938: Discharge, 917 second-feet Sept. 9, 1934 (gage height, 8.27 feet).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	5.4	16.1	15.0	11	4.6	4.9	10.8	21	5.2	141	4.2
2	4.6	12.9	11.3	12	7.9	5.2	13.6	22	4.3	79	4.0
3	4.1	10.8	9.4	13	14.4	4.6	8.3	23	40	70	3.5
4	4.1	9.3	8.6	14	14.1	6.6	6.6	24	36	213	3.3
5	4.6	7.9	9.4	15	8.2	10.7	5.8	25	12.8	50	3.1
6	5.2	6.6	8.6	16	6.3	6.0	5.5	26	8.1	27	2.9
7	3.8	6.0	10.9	17	5.4	4.9	5.5	27	185	22	2.9
8	15.7	5.4	14.2	18	18.4	4.9	5.8	28	211	18.2	5.7
9	8.2	4.6	10.9	19	10.2	9.5	5.8	29	44	15.4	4.0
10	4.9	4.9	8.6	20	6.3	173	4.4	30	23	12.5	3.3
								31		12.1	3.1
Monthly mean discharge, in second-feet									24.2	31.5	7.06
Runoff, in inches									3.35	4.50	1.01

Gage-height, in feet, and discharge, in second-feet, at indicated time, June 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	1.54	4.3	3.10	71	1.85	15.6	1.68	8.6	2.11	28	6.50	474
4	1.54	4.3	2.74	54	1.84	15.2	1.68	8.6	2.43	42	5.94	360
6	1.54	4.3	2.44	42	1.83	14.7	1.68	8.6	2.78	55	5.51	288
8	1.54	4.3	2.27	36	1.82	14.2	1.68	8.6	3.38	87	5.12	237
10	1.54	4.3	2.19	32	1.81	13.8	1.68	8.6	3.64	103	4.77	198
12 n.	1.54	4.3	2.14	29	1.80	13.3	1.67	8.2	3.63	102	4.38	159
2 p.m.	2.50	44	2.09	27	1.78	12.4	1.66	7.9	3.74	110	3.96	125
4	3.90	121	2.04	25	1.76	11.6	1.65	7.5	4.10	136	3.65	104
6	3.42	89	1.99	22	1.73	10.4	1.64	7.2	4.97	220	3.43	90
8	3.23	78	1.94	20	1.71	9.6	1.63	6.9	5.65	310	3.29	81
10	3.31	83	1.90	18.0	1.70	9.3	1.63	6.9	7.38	687	3.16	74
12 m.	3.30	82	1.87	16.6	1.69	8.9	1.87	16.6	7.24	652	3.02	67
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	2.88	60	2.08	26	1.88	17.1	------	------	------	------	------	------
4	2.77	55	2.06	25	1.88	17.1	------	------	------	------	------	------
6	2.67	51	2.05	25	1.88	17.1	------	------	------	------	------	------
8	2.59	48	2.04	25	1.88	17.1	------	------	------	------	------	------
10	2.52	45	2.03	24	1.88	17.1	------	------	------	------	------	------
12 n.	2.44	42	2.02	24	1.88	17.1	------	------	------	------	------	------
2 p.m.	2.38	40	2.01	23	1.87	16.6	------	------	------	------	------	------
4	2.32	38	1.98	22	1.86	16.1	------	------	------	------	------	------
6	2.25	35	1.96	21	1.85	15.6	------	------	------	------	------	------
8	2.19	32	1.93	19.5	1.83	14.7	------	------	------	------	------	------
10	2.14	29	1.90	18.0	1.81	13.8	------	------	------	------	------	------
12 m.	2.10	27	1.89	17.5	1.81	13.8	------	------	------	------	------	------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	------	------	------	1.55	4.6	1.95	20	4.46	171	4.00	135
4	------	------	------	------	1.55	4.6	1.88	17.1	3.70	116	3.20	86
6	------	------	------	------	1.55	4.6	1.87	16.6	3.32	93	2.85	67
8	------	------	------	------	1.55	4.6	1.96	21	3.24	88	2.65	56
10	------	------	------	------	1.55	4.6	2.15	30	3.19	85	2.53	50
12 n.	------	------	------	------	1.55	4.6	3.24	78	3.18	85	2.72	60
2 p.m.	------	------	------	------	1.56	4.9	4.30	152	3.69	115	2.79	64
4	------	------	------	------	1.68	8.6	5.80	335	3.80	122	2.82	65
6	------	------	------	------	1.68	8.6	6.70	519	4.14	145	3.03	76
8	------	------	------	------	1.98	22	6.04	379	4.92	214	3.16	84
10	------	------	------	------	2.13	29	5.50	287	5.10	235	3.11	81
12 m.	------	------	------	------	2.08	26	5.03	227	4.73	195	2.93	71

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	2.73	61	4.04	138	3.04	77	2.13	30	1.98	23	1.89	19.0
4	2.58	52	4.31	159	2.83	66	2.12	30	1.98	23	1.89	19.0
6	2.48	47	4.70	192	2.69	58	2.11	29	1.97	23	1.89	19.0
8	2.40	43	5.23	251	2.58	52	2.10	29	1.97	23	1.88	18.6
10	2.42	44	5.21	248	2.50	48	2.09	28	1.97	23	1.88	18.6
12 n.	2.43	44	5.60	302	2.44	45	2.08	28	1.97	23	1.88	18.6
2 p.m.	2.85	67	5.79	333	2.38	42	2.06	27	1.96	22	1.88	18.6
4	2.95	72	5.46	281	2.33	39	2.05	26	1.96	22	1.88	18.6
6	3.00	75	5.06	230	2.28	37	2.03	25	1.94	21	1.86	17.7
8	3.63	112	4.55	178	2.23	35	2.02	25	1.93	21	1.85	17.2
10	4.03	137	3.90	128	2.19	33	2.00	24	1.91	20	1.83	16.4
12 m.	4.04	138	3.34	94	2.16	32	1.99	24	1.90	19.5	1.82	15.9

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	1.82	15.9	1.74	12.5	1.72	11.7	1.80	15.0	------	------	------	------
4	1.82	15.9	1.74	12.5	1.72	11.7	1.88	18.6	------	------	------	------
6	1.82	15.9	1.74	12.5	1.72	11.7	1.88	18.6	------	------	------	------
8	1.82	15.9	1.74	12.5	1.72	11.7	1.84	16.8	------	------	------	------
10	1.82	15.9	1.74	12.5	1.72	11.7	1.82	15.9	------	------	------	------
12 n.	1.82	15.9	1.74	12.5	1.72	11.7	1.81	15.4	------	------	------	------
2 p.m.	1.82	15.9	1.76	13.4	1.72	11.7	1.80	15.0	------	------	------	------
4	1.81	15.4	1.75	13.0	1.72	11.7	1.76	13.4	------	------	------	------
6	1.80	15.0	1.74	12.5	1.72	11.7	1.75	13.0	------	------	------	------
8	1.78	14.2	1.73	12.1	1.72	11.7	1.74	12.5	------	------	------	------
10	1.75	13.0	1.72	11.7	1.74	12.5	1.72	11.7	------	------	------	------
12 m.	1.74	12.5	1.72	11.7	1.75	13.0	1.71	11.3	------	------	------	------

Supplemental records.—June 27, 11 p.m., 7.47 ft., 710 sec.-ft.; July 20, 5:30 p.m., 6.79 ft., 541 sec.-ft.; July 21, 3:30 p.m., 3.81 ft., 123 sec.-ft.; 4:30 p.m., 3.78 ft., 121 sec.-ft.; 9:30 p.m., 5.13 ft., 239 sec.-ft.; July 22, 11 a.m., 2.49 ft., 47 sec.-ft.; July 24, 1:30 p.m., 5.83 ft., 340 sec.-ft.

COASTAL BASINS IN NEW JERSEY

TINTON FALLS RESERVOIR NEAR RED BANK, N. J.

Location.—Lat. 40°19′03″, long. 74°06′57″, on Swimming River upstream from dam of Monmouth Consolidated Water Co., 4 miles upstream from Red Bank, Monmouth County.

Drainage area.—48.5 square miles.

Gage-height record.—Water-stage recorder graph. Gage heights shown in table are those for midnight.

Remarks.—Contents above zero gage height are given in table. Spillway crest at gage height 2.36 feet.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June Gage height	June Contents	July Gage height	July Contents	August Gage height	August Contents
1	2.57	11.86	2.70	12.46	2.77	12.78
2	2.55	11.76	2.67	12.31	2.72	12.55
3	2.54	11.72	2.64	12.18	2.69	12.41
4	2.56	11.80	2.63	12.14	2.70	12.46
5	2.57	11.86	2.61	12.04	2.70	12.46
6	2.57	11.86	2.60	11.99	2.76	12.73
7	2.54	11.72	2.58	11.90	3.46	15.96
8	2.58	11.90	2.57	11.86	2.98	13.74
9	2.53	11.67	2.56	11.80	2.84	13.10
10	2.52	11.63	2.57	11.86	2.77	12.78
11	2.53	11.67	2.58	11.90	2.83	13.06
12	2.78	12.82	2.59	11.95	2.76	12.73
13	2.86	13.19	2.56	11.80	2.70	12.46
14	2.72	12.55	2.64	12.18	2.68	12.37
15	2.62	12.08	2.91	13.42	2.67	12.31
16	2.58	11.90	2.64	12.18	2.66	12.27
17	2.57	11.86	2.65	12.22	2.67	12.31

Gage height, in feet, and contents, in millions of cubic feet, 1938—Continued

Day	June		July		August	
	Gage height	Contents	Gage height	Contents	Gage height	Contents
18	2.65	12.22	2.73	12.59	2.69	12.41
19	2.57	11.86	3.17	14.62	2.66	12.27
20	2.54	11.72	4.14	19.09	2.64	12.18
21	2.53	11.67	3.82	17.83	2.62	12.08
22	2.55	11.76	3.21	14.81	2.62	12.08
23	2.54	11.72	3.66	16.88	2.60	11.99
24	2.55	11.76	3.67	16.92	2.60	11.99
25	2.52	11.63	2.99	13.80	2.59	11.95
26	2.67		2.89	13.33	2.59	11.95
27	4.18	12.31	2.84	13.10	2.59	11.95
28	3.30	19.28	2.81	12.97	2.62	12.08
29	2.88	15.23	2.77	12.78	2.60	11.99
30	2.75	13.29	2.75	12.69	2.58	11.90
31		12.69	2.73	12.59	2.59	11.95

	June	July	August
Change in contents, in millions of cubic feet	+0.79	−0.10	−0.64
Change in contents, in equivalent second-feet	+0.30	−0.04	−0.24

SWIMMING RIVER NEAR RED BANK, N. J.

Location.—Lat. 40°19′03″, long. 74°06′57″, upstream from dam of Monmouth Consolidated Water Co., 4 miles upstream from Red Bank, Monmouth County.

Drainage area.—48.5 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 500 second-feet; extended to peak stage on basis of weir formula.

Maxima.—June 1938: Discharge, 1,610 second-feet 2 to 3 a.m. June 28 (gage height, 4.60 feet).

July 1938: Discharge, 1,500 second-feet 7:30 p.m. July 20 (gage height, 4.49 feet).

1922 to May 1938: Discharge, 2,930 second-feet Sept. 9, 1934 (gage height, 5.65 feet).

Remarks.—Flow affected by storage in Tinton Falls Reservoir and includes discharge over spillway and diversion for municipal supply. Monthly mean discharge and run-off adjusted for storage in Tinton Falls Reservoir (see p. 312). Water-stage recorder inspected and record of diversion furnished by Monmouth Consolidated Water Company.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	45	94	116	11	36	52	131	21	41	613	66
2	43	82	100	12	54	52	132	22	40	466	63
3	40	75	94	13	200	49	97	23	41	358	60
4	43	66	85	14	122	53	85	24	45	908	58
5	48	61	89	15	68	138	83	25	40	359	55
6	51	58	93	16	53	117	75	26	39	190	56
7	44	53	221	17	48	60	78	27	373	156	54
8	45	54	576	18	56	97	81	28	981	137	61
9	43	50	184	19	57	132	81	29	260	120	59
10	36	49	116	20	46	887	72	30	127	113	54
								31		105	50

	June	July	Aug.
Monthly mean discharge, in second-feet (observed)	106	187	104
Monthly mean discharge, in second-feet (adjusted)	106	187	104
Runoff, in inches (adjusted)	2.44	4.45	2.47

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	------	------	------	------	------	------	2.52	37	2.71	93	4.60	1,610
4	------	------	------	------	------	------	2.52	37	2.77	110	4.54	1,540
6	------	------	------	------	------	------	2.52	37	2.87	160	4.37	1,360
8	------	------	------	------	------	------	2.51	35	3.00	225	4.16	1,150
10	------	------	------	------	------	------	2.51	35	3.09	276	4.00	995
12 n.	------	------	------	------	------	------	2.50	32	3.18	332	3.84	848
2 p.m.	------	------	------	------	------	------	2.51	35	3.26	386	3.69	717
4	------	------	------	------	------	------	2.52	37	3.36	456	3.58	626
6	------	------	------	------	------	------	2.52	37	3.44	515	3.50	562
8	------	------	------	------	------	------	2.52	37	3.58	625	3.46	532
10	------	------	------	------	------	------	2.64	69	3.69	716	3.37	464
12 m.	------	------	------	------	------	------	2.67	78	4.18	1,170	3.30	414

Hour	June 29 Feet	June 29 Sec.-ft.	June 30 Feet	June 30 Sec.-ft.	July 1 Feet	July 1 Sec.-ft.	July 2 Feet	July 2 Sec.-ft.	July 3 Feet	July 3 Sec.-ft.	July 4 Feet	July 4 Sec.-ft.
2 a.m.	3.25	380	2.87	160	2.74	104	2.70	90	2.67	78	------	------
4	3.20	346	2.85	151	2.74	104	2.70	90	2.67	78	------	------
6	3.16	320	2.84	146	2.73	100	2.70	90	2.67	78	------	------
8	3.12	296	2.82	136	2.72	98	2.69	86	2.66	75	------	------
10	3.07	266	2.80	127	2.71	94	2.68	82	2.66	75	------	------
12 n.	3.04	248	2.79	123	2.71	94	2.68	82	2.65	72	------	------
2 p.m.	3.01	232	2.78	119	2.70	90	2.67	78	2.65	72	------	------
4	2.97	210	2.78	119	2.70	90	2.67	78	2.65	72	------	------
6	2.95	200	2.77	116	2.70	90	2.67	78	2.65	72	------	------
8	2.92	184	2.77	116	2.70	90	2.67	78	2.65	72	------	------
10	2.90	174	2.75	108	2.70	90	2.67	78	2.65	72	------	------
12 m.	2.88	166	2.75	108	2.70	90	2.67	78	2.64	69	------	------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	2.63	66	2.69	85	2.73	100	3.33	436	3.96	958	3.70	725
4	2.63	66	2.71	93	2.73	100	3.47	539	3.80	812	3.58	626
6	2.61	60	2.73	100	2.73	100	3.51	570	3.65	684	3.46	532
8	2.61	60	2.73	100	2.73	100	3.52	578	3.51	570	3.36	457
10	2.60	56	2.73	100	2.72	97	3.67	700	3.40	486	3.32	428
12 n.	2.62	62	2.72	97	2.71	93	3.81	821	3.33	436	3.31	421
2 p.m.	2.61	60	2.71	93	2.70	89	3.92	921	3.27	394	3.27	394
4	2.60	56	2.70	89	2.79	123	4.14	1,130	3.23	366	3.23	366
6	2.60	56	2.72	97	2.87	160	4.44	1,430	3.20	346	3.22	360
8	2.61	60	2.74	104	2.94	194	4.48	1,480	3.50	562	3.22	360
10	2.63	66	2.73	100	3.02	236	4.33	1,320	3.82	830	3.22	360
12 m.	2.65	72	2.73	100	3.17	326	4.14	1,130	3.82	830	3.21	353

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	3.19	340	3.69	716	3.54	594	2.97	211	2.89	170	2.84	147
4	3.16	321	3.70	724	3.42	501	2.97	211	2.89	170	2.84	147
6	3.14	308	3.74	760	3.33	436	2.96	206	2.88	166	2.83	142
8	3.11	289	3.73	750	3.26	487	2.94	195	2.87	161	2.83	142
10	3.09	277	3.75	768	3.21	353	2.93	190	2.87	161	2.82	137
12 n.	3.08	272	4.02	1,010	3.16	321	2.92	185	2.86	156	2.82	137
2 p.m.	3.09	277	4.34	1,340	3.12	296	2.91	180	2.86	156	2.81	133
4	3.12	296	4.27	1,260	3.08	272	2.91	180	2.86	156	2.81	133
6	3.22	360	4.10	1,090	3.04	249	2.90	175	2.86	156	2.81	133
8	3.37	464	3.94	938	3.02	237	2.90	175	2.84	147	2.81	133
10	3.52	578	3.80	812	3.00	226	2.90	175	2.84	147	2.81	133
12 m.	3.66	692	3.67	700	2.99	221	2.89	170	2.84	147	2.81	133

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	2.80	128	2.77	117	2.75	109	2.74	104	2.77	116	------	-------
4	2.80	128	2.77	117	2.75	109	2.75	108	2.75	108	------	-------
6	2.79	124	2.77	117	2.75	109	2.77	116	2.74	104	------	-------
8	2.79	124	2.76	114	2.74	105	2.78	119	2.73	100	------	-------
10	2.78	120	2.75	109	2.74	105	2.79	123	2.72	97	------	-------
12 n.	2.78	120	2.75	109	2.73	101	2.79	123	2.72	97	------	-------
2 p.m.	2.77	117	2.75	109	2.73	101	2.79	123	2.72	97	------	-------
4	2.77	117	2.75	109	2.73	101	2.79	123	2.72	97	------	-------
6	2.77	117	2.75	109	2.73	101	2.78	119	2.72	97	------	-------
8	2.77	117	2.75	109	2.73	101	2.77	116	2.72	97	------	-------
10	2.77	117	2.75	109	2.73	101	2.77	116	2.72	97	------	-------
12 m.	2.77	117	2.75	109	2.73	101	2.77	116	2.72	97	------	-------

MANASQUAN RIVER AT SQUANKUM, N. J.

LOCATION.—Lat. 40°09'47", long. 74°09'21", at Farmingdale-Lakewood highway bridge in Squankum, Monmouth County, half a mile downstream from Marshbog Brook.

DRAINAGE AREA.—43.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 9:30 a.m. July 31 to 12:30 p.m. Aug. 16, Aug. 17-28, when recorder graph is missing.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 750 second-feet; extended to peak stage on basis of discharge determined by contracted-opening method.

MAXIMA.—June 1938: Discharge, 1,550 second-feet 8 a.m. June 28 (gage height, 10.09 feet).

July 1938: Discharge, 1,480 second-feet 9 p.m. July 20 (gage height, 9.96 feet).

1931 to May 1938: Discharge, 1,020 second-feet Jan. 3, 1936 (gage height, 9.22 feet).

REMARKS.—Flow not affected by storage. Discharge for period of no gage-height record, July 31 to Aug. 28, computed on basis of recorded range in stage and records for Swimming River near Red Bank.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	48	104	105	11	34	54	125	21	35	826	49
2	44	90	92	12	43	54	125	22	34	463	47
3	39	78	86	13	99	50	90	23	38	482	45
4	39	70	78	14	147	58	74	24	120	836	43
5	42	62	80	15	86	98	70	25	53	515	41
6	40	58	84	16	60	76	60	26	39	224	41
7	35	54	220	17	50	67	62	27	364	159	40
8	37	52	580	18	44	75	64	28	1,060	133	42
9	36	48	190	19	41	120	58	29	380	114	40
10	33	57	120	20	37	932	52	30	155	106	39
								31		100	38
Monthly mean discharge, in second-feet									110	200	92.9
Runoff, in inches									2.82	5.32	2.47

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	1.61	34	2.43	96	1.88	61	1.68	41	1.73	46	8.52	906
4	1.61	34	3.22	141	1.85	59	1.67	40	2.17	82	8.75	983
6	1.61	34	3.70	179	1.83	57	1.66	39	3.15	136	9.72	1,370
8	1.61	34	3.83	191	1.81	55	1.66	39	4.10	2.5	10.09	1,550
10	1.62	35	3.62	173	1.80	54	1.66	39	4.92	290	10.00	1,500
12 n.	1.61	34	3.24	143	1.78	52	1.66	39	5.64	357	9.75	1,380
2 p.m.	1.61	34	2.85	117	1.77	51	1.65	38	6.23	426	9.38	1,220
4	1.61	34	2.53	100	1.75	48	1.65	38	6.80	504	9.00	1,080
6	1.66	39	2.30	90	1.74	47	1.65	38	7.20	572	8.62	939
8	1.68	41	2.13	80	1.72	45	1.64	37	7.55	643	8.32	842
10	1.75	48	2.01	72	1.70	43	1.63	36	7.93	734	80.4	763
12 m.	1.88	61	1.92	65	1.69	42	1.64	37	8.26	825	7.75	689

Hour	June 29 Feet	June 29 Sec.-ft.	June 30 Feet	June 30 Sec.-ft.	July 1 Feet	July 1 Sec.-ft.	July 2 Feet	July 2 Sec.-ft.	July 3 Feet	July 3 Sec.-ft.	July 4 Feet	July 4 Sec.-ft.
2 a.m.	7.38	607	3.94	201	2.77	112	2.36	93	2.19	83	------	-------
4	7.00	537	3.80	188	2.72	110	2.35	92	2.18	83	------	-------
6	6.62	478	3.67	177	2.70	109	2.35	92	2.17	82	------	-------
8	6.27	431	3.57	169	2.67	108	2.35	92	2.17	82	------	-------
10	5.90	386	3.47	161	2.65	106	2.35	92	2.16	82	------	-------
12 n.	5.58	351	3.37	153	2.62	105	2.34	92	2.15	81	------	-------
2 p.m.	5.30	325	3.27	145	2.58	103	2.32	91	2.13	80	------	-------
4	5.02	300	3.17	138	2.55	102	2.29	89	2.10	78	------	-------
6	4.74	274	3.07	131	2.50	99	2.26	88	2.07	76	------	-------
8	4.50	251	2.98	125	2.45	97	2.24	86	2.05	74	------	-------
10	4.30	233	2.88	119	2.41	95	2.22	85	2.03	73	------	-------
12 m.	4.10	215	2.82	115	2.38	94	2.20	84	2.02	72	------	-------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	1.84	58	2.35	92	2.01	72	5.40	335	9.55	1,300	6.69	488
4	1.83	57	2.30	90	2.02	72	5.95	392	9.24	1,170	6.42	451
6	1.82	56	2.18	83	2.00	71	6.70	489	8.90	1,040	6.10	410
8	1.82	56	2.07	76	1.98	70	7.57	647	8.58	925	5.70	363
10	1.81	55	2.00	71	1.96	68	8.35	852	8.32	842	5.40	335
12 n.	1.80	54	1.96	68	1.94	66	8.90	1,040	8.06	768	5.50	352
2 p.m.	1.83	57	1.94	66	1.93	66	9.27	1,180	7.80	701	6.37	444
4	1.95	67	1.91	64	1.96	68	9.52	1,290	7.54	641	6.85	512
6	2.15	81	1.91	64	3.53	165	9.75	1,380	7.34	599	7.06	547
8	2.22	85	1.95	67	4.43	245	9.93	1,460	7.16	565	7.14	561
10	2.25	87	1.98	70	4.75	274	9.94	1,470	7.03	542	7.14	561
12 m.	2.32	91	2.00	71	5.00	298	9.80	1,410	6.87	515	7.11	556

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	7.03	542	7.82	706	8.45	883	4.74	274	3.64	174	3.19	139
4	6.90	520	7.80	701	8.14	790	4.60	261	3.61	172	3.18	139
6	6.67	485	7.87	718	7.80	701	4.48	249	3.58	169	3.16	137
8	6.40	448	8.00	752	7.35	601	4.37	239	3.55	167	3.15	136
10	6.08	408	8.10	779	6.88	517	4.30	233	3.51	164	3.14	136
12 n.	5.75	368	8.15	793	6.48	458	4.20	224	3.48	161	3.13	135
2 p.m.	5.67	360	8.22	813	6.13	414	4.11	216	3.45	159	3.10	133
4	6.04	403	8.45	883	5.82	376	4.01	207	3.41	156	3.08	132
6	6.70	489	8.87	1,030	5.55	348	3.91	198	3.36	152	3.03	128
8	7.27	585	9.08	1,100	5.33	328	3.82	190	3.30	147	3.00	126
10	7.64	663	9.00	1,080	5.14	311	3.74	183	3.26	144	2.93	122
12 m.	7.80	701	8.75	983	4.92	290	3.68	177	3.21	141	2.90	120

TOMS RIVER NEAR TOMS RIVER, N. J.

LOCATION.—Lat. 39°59′10″, long. 74°13′29″, 1 mile downstream from Union Branch and 2½ miles northwest of village of Toms River, Ocean County.

Datum of gage is 8.10 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—124 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for period 1 p.m. June 29 to 3 a.m. June 30 when record was computed on basis of shape of available recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 610 second-feet; extended to peak stage by logarithmic plotting.

MAXIMA.—June 1938: Discharge, 1,240 second-feet 4 to 5 p.m. June 29 (gage height, 11.1 feet).

July 1938: Discharge, 1,050 second-feet 2 a.m. July 26 (gage height, 10.15 feet).

1928 to May 1938: Discharge, 851 second-feet April 18, 1929 (gage height, 8.95 feet).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	210	698	317	11	157	180	472	21	186	514	204
2	198	514	287	12	180	186	363	22	158	881	192
3	192	389	282	13	210	180	317	23	156	902	186
4	174	317	270	14	282	186	282	24	186	953	180
5	174	282	270	15	351	229	253	25	222	1,010	174
6	186	247	287	16	389	241	235	26	259	989	174
7	186	222	339	17	351	265	229	27	282	771	168
8	174	204	486	18	276	328	229	28	432	587	166
9	167	192	647	19	229	339	229	29	1,080	486	162
10	158	180	572	20	210	377	216	30	1,030	416	159
								31		351	156
Monthly mean discharge, in second-feet									282	439	274
Runoff, in inches									2.53	4.08	2.55

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	3.90	157	4.05	174	4.20	192	4.69	252	4.74	258	5.48	337
4	3.89	156	4.13	184	4.23	196	4.71	254	4.76	260	5.57	347
6	3.89	156	4.18	190	4.28	202	4.72	255	4.76	260	5.65	357
8	3.88	155	4.22	194	4.35	210	4.73	257	4.78	263	5.75	370
10	3.87	154	4.23	196	4.42	219	4.74	258	4.83	268	5.85	382
12 n.	3.87	154	4.24	197	4.48	226	4.75	259	4.95	282	5.97	398
2 p.m.	3.86	153	4.23	196	4.52	231	4.75	259	5.05	292	6.13	420
4	3.85	152	4.20	192	4.57	237	4.75	259	5.07	294	6.34	450
6	3.87	154	4.18	190	4.60	241	4.75	259	5.08	295	6.56	480
8	3.89	156	4.17	188	4.63	245	4.75	259	5.15	302	6.91	529
10	3.91	158	4.17	188	4.65	247	4.75	259	5.24	311	7.41	604
12 m.	3.97	165	4.17	188	4.68	251	4.74	258	5.37	325	8.00	692
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	8.57	782	10.78	1,180	8.74	809	7.14	563	6.26	438	5.49	338
4	9.05	860	10.67	1,150	8.58	784	7.05	550	6.19	429	5.44	332
6	9.55	944	10.57	1,130	8.43	760	6.96	536	6.13	420	5.40	328
8	10.02	1,030	10.45	1,110	8.28	736	6.88	525	6.06	410	5.37	325
10	10.44	1,110	10.30	1,080	8.14	713	6.80	514	5.99	401	5.32	319
12 n.	10.70	1,160	10.10	1,040	8.00	692	6.74	506	5.92	392	5.28	315
2 p.m.	11.02	1,220	9.88	1,010	7.85	670	6.65	493	5.86	384	5.25	312
4	11.1	1,240	9.69	970	7.72	650	6.59	485	5.79	375	5.23	310
6	11.09	1,230	9.48	933	7.58	629	6.52	475	5.73	367	5.19	306
8	11.05	1,230	9.29	900	7.46	611	6.45	465	5.66	358	5.17	304
10	10.98	1,220	9.10	868	7.34	593	6.39	457	5.60	351	5.13	300
12 m.	10.88	1,200	8.94	841	7.24	578	6.32	447	5.54	344	5.10	297

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 19		July 21		July 22	
2 a.m.	4.60	241	5.18	305	5.69	362	5.42	330	6.47	468	8.16	717
4	4.60	241	5.20	307	5.65	357	5.40	328	6.52	475	8.53	776
6	4.59	240	5.23	310	5.60	351	5.46	335	6.58	483	8.80	819
8	4.58	239	5.28	315	5.56	346	5.49	338	6.63	490	9.02	854
10	4.57	237	5.33	320	5.52	341	5.51	340	6.69	499	9.18	882
12 n.	4.56	236	5.39	327	5.49	338	5.55	345	6.74	506	9.40	919
2 p.m.	4.75	259	5.45	334	5.45	334	5.84	381	6.80	514	9.55	944
4	5.10	297	5.50	339	5.42	330	6.04	408	6.96	536	9.62	957
6	5.20	307	5.61	352	5.45	334	6.19	429	7.08	554	9.65	962
8	5.21	308	5.70	363	5.48	337	6.27	440	7.20	572	9.64	960
10	5.20	307	5.73	367	5.47	336	6.34	450	7.40	602	9.60	953
12 m.	5.19	306	5.72	366	5.44	332	6.40	458	7.73	652	9.55	944

Hour	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	9.48	933	9.43	924	9.76	982	10.15	1,050	9.13	873	7.73	652
4	9.43	924	9.44	926	9.77	984	10.14	1,050	8.98	848	7.63	636
6	9.37	914	9.45	928	9.78	985	10.11	1,040	8.85	827	7.53	622
8	9.32	905	9.47	931	9.80	989	10.08	1,040	8.72	806	7.45	610
10	9.28	899	9.53	941	9.83	995	10.03	1,030	8.60	787	7.37	598
12 n.	9.26	895	9.58	950	9.86	1,000	9.95	1,020	8.46	765	7.29	586
2 p.m.	9.23	890	9.63	958	9.90	1,010	9.86	1,000	8.34	745	7.23	576
4	9.21	887	9.68	967	9.95	1,020	9.75	980	8.21	725	7.16	566
6	9.20	885	9.70	971	10.02	1,030	9.65	962	8.11	709	7.09	556
8	9.33	907	9.74	978	10.07	1,040	9.50	936	8.05	700	7.03	546
10	9.37	914	9.75	980	10.11	1,040	9.38	916	7.94	683	6.97	538
12 m.	9.40	919	9.75	980	10.14	1,050	9.25	894	7.83	666	6.91	529

CEDAR CREEK AT LANOKA HARBOR, N. J.

LOCATION.—Lat. 39°52′05″, long. 74°10′06″, at highway bridge in village of Lanoka Harbor, Ocean County. Datum of gage is at mean sea level (New Jersey Geological Survey bench mark).

DRAINAGE AREA.—56.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 350 second-feet.

MAXIMA.—June 1938: Discharge, 248 second-feet 7 to 10 p.m. June 28; gage height, 3.52 feet 1 to 2 a.m. June 29.

July 1938: Discharge, 367 second-feet 3 a.m. to 1 p.m. July 25 (gage height, 4.12 feet).

1932 to May 1938: Gage height, 6.45 feet Feb. 16, 1936 (discharge not determined).

REMARKS.—High tides cause backwater at this station for medium and high stages of the creek. During these periods the discharges are computed on basis of an effective gage-height graph determined by estimating a curve between the parts of the recorder graph which are not affected by tide. Shifting-control method was used June 7 and thereafter for discharges below 134 second-feet.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	36	182	182	11	70	70	322	21	72	340	150
2	36	139	168	12	70	82	244	22	68	352	146
3	88	108	154	13	80	85	206	23	68	352	139
4	184	99	148	14	99	85	182	24	65	341	129
5	102	88	163	15	94	88	171	25	65	362	126
6	96	82	251	16	108	94	162	26	63	311	126
7	88	78	324	17	94	88	160	27	80	284	123
8	82	91	409	18	85	94	168	28	220	244	123
9	78	99	447	19	78	148	164	29	230	206	120
10	72	75	434	20	72	203	156	30	217	189	117
								31		189	114
Monthly mean discharge, in second-feet									95.3	169	194
Runoff, in inches									1.90	3.48	3.99

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	------	-------	------	-------	------	-------	------	-------	2.44	60	2.93	177
4	------	-------	------	-------	------	-------	------	-------	2.44	60	2.97	185
6	------	-------	------	-------	------	-------	------	-------	2.44	60	3.05	194
8	------	-------	------	-------	------	-------	------	-------	2.44	60	3.17	207
10	------	-------	------	-------	------	-------	------	-------	2.46	63	3.30	219
12 n.	------	-------	------	-------	------	-------	------	-------	2.48	65	3.40	228
2 p.m.	------	-------	------	-------	------	-------	------	-------	2.50	68	3.44	236
4	------	-------	------	-------	------	-------	------	-------	2.50	75	3.45	242
6	------	-------	------	-------	------	-------	------	-------	2.52	80	3.47	246
8	------	-------	------	-------	------	-------	------	-------	2.64	114	3.48	248
10	------	-------	------	-------	------	-------	------	-------	2.73	144	3.50	248
12 m.	------	-------	------	-------	------	-------	------	-------	2.88	164	3.51	246

Hour	June 29 Feet	June 29 Sec.-ft.	June 30 Feet	June 30 Sec.-ft.	July 1 Feet	July 1 Sec.-ft.	July 2 Feet	July 2 Sec.-ft.	July 3 Feet	July 3 Sec.-ft.	July 4 Feet	July 4 Sec.-ft.
2 a.m.	3.52	244	3.35	221	3.19	199	2.89	164	2.63	111	2.60	102
4	3.45	239	3.34	221	3.13	196	2.86	158	2.63	111	2.60	102
6	3.40	235	3.31	222	3.07	193	2.79	152	2.63	111	2.60	102
8	3.38	232	3.29	222	3.02	191	2.74	146	2.63	111	2.60	102
10	3.38	230	3.30	221	3.00	188	2.71	139	2.63	111	2.59	99
12 n.	3.39	227	3.31	219	3.00	185	2.69	129	2.62	108	2.59	99
2 p.m.	3.39	224	3.30	217	3.00	182	2.67	123	2.62	108	2.58	96
4	3.34	223	3.26	215	2.96	180	2.65	117	2.62	108	2.58	96
6	3.29	221	3.22	212	2.92	177	2.64	114	2.62	108	2.58	96
8	3.27	219	3.19	209	2.89	174	2.63	111	2.61	105	2.57	94
10	3.28	219	3.19	206	2.88	171	2.63	111	2.61	105	2.57	94
12 m.	3.35	221	3.19	202	2.88	168	2.63	111	2.60	102	2.57	94

Hour	July 5 Feet	July 5 Sec.-ft.	July 6 Feet	July 6 Sec.-ft.	July 7 Feet	July 7 Sec.-ft.	July 8 Feet	July 8 Sec.-ft.	July 9 Feet	July 9 Sec.-ft.	July 10 Feet	July 10 Sec.-ft.
2 a.m.	2.56	91	2.54	85	2.52	80	2.51	78	2.65	117	------	-------
4	2.56	91	2.54	85	2.52	80	2.51	78	2.65	117	------	-------
6	2.56	91	2.53	82	2.52	80	2.52	80	2.65	117	------	-------
8	2.55	88	2.53	82	2.52	80	2.53	82	2.64	114	------	-------
10	2.55	88	2.53	82	2.52	80	2.54	85	2.62	108	------	-------
12 n.	2.54	85	2.53	82	2.52	80	2.55	88	2.59	99	------	-------
2 p.m.	2.54	85	2.53	82	2.52	80	2.57	94	2.57	94	------	-------
4	2.54	85	2.52	80	2.52	80	2.58	96	2.56	91	------	-------
6	2.54	85	2.52	80	2.51	78	2.60	102	2.55	88	------	-------
8	2.54	85	2.52	80	2.51	78	2.62	108	2.54	85	------	-------
10	2.54	85	2.52	80	2.51	78	2.63	111	2.53	82	------	-------
12 m.	2.54	85	2.52	80	2.51	78	2.64	114	2.52	80	------	-------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	2.54	85	2.70	136	2.86	170	3.69	282	4.10	362
4	------	-------	2.54	85	2.71	139	2.90	173	3.81	304	4.09	360
6	------	-------	2.54	85	2.72	141	2.93	177	3.89	319	4.08	358
8	------	-------	2.54	85	2.73	144	2.95	181	3.96	333	4.06	354
10	------	-------	2.54	85	2.74	146	2.98	185	4.01	343	4.04	349
12 n.	------	-------	2.54	85	2.76	148	3.06	196	4.03	347	4.02	345
2 p.m.	------	-------	2.54	85	2.78	150	3.28	221	4.06	354	4.02	345
4	------	-------	2.55	88	2.80	152	3.32	222	4.10	362	4.03	347
6	------	-------	2.62	108	2.80	156	3.33	226	4.11	364	4.04	349
8	------	-------	2.64	114	2.80	158	3.36	231	4.11	364	4.04	349
10	------	-------	2.66	120	2.81	160	3.44	242	4.11	364	4.05	352
12 m.	------	-------	2.68	126	2.83	164	3.56	261	4.11	364	4.05	352
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.05	352	3.99	339	4.11	364	4.03	347	3.79	295	3.60	261
4	4.07	352	3.99	339	4.12	367	4.00	341	3.79	297	3.56	256
6	4.07	349	3.99	339	4.12	367	3.96	333	3.77	297	3.51	253
8	4.07	349	3.99	339	4.12	367	3.92	325	3.76	295	3.48	248
10	4.06	347	4.00	341	4.12	367	3.86	313	3.76	295	3.48	244
12 n.	4.04	347	4.01	343	4.12	367	3.81	304	3.74	291	3.48	240
2 p.m.	4.03	345	4.01	343	4.11	364	3.77	297	3.71	286	3.44	238
4	4.02	345	4.02	345	4.10	362	3.75	293	3.68	281	3.41	235
6	4.01	343	4.04	349	4.09	360	3.75	293	3.66	277	3.36	231
8	4.02	343	4.07	356	4.08	358	3.76	295	3.64	272	3.34	227
10	4.02	341	4.09	360	4.07	356	3.78	295	3.64	267	3.34	224
12 m.	4.01	341	4.11	364	4.05	352	3.79	295	3.64	264	3.34	221

BATSTO RIVER AT BATSTO, N. J.

Location.—Lat. 39°38′33″, long. 74°39′00″, 30 feet downstream from highway bridge in Batsto, Burlington County, and 1 mile upstream from mouth.

Drainage area.—70.5 square miles.

Gage-height record.—Water-stage recorder graph except for periods June 29, 30, July 17-24, Aug. 11-16.

Stage-discharge relation.—Defined by current-meter measurements below 670 second-feet.

Maxima.—June 1938: Daily discharge, 641 second-feet June 29, 30.

July 1938: Discharge, 579 second-feet 10 p.m. July 25 (gage height, 5.27 feet).

1927 to May 1938: Daily discharge, about 824 second-feet Aug. 24, 1933.

Remarks.—Discharge for periods of no gage-height record computed on basis of records for East Branch of Wading River at Harrisville.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	80	485	190	11	80	108	280	21	83	400	105
2	86	364	178	12	84	124	240	22	87	420	104
3	94	261	128	13	100	118	200	23	83	440	104
4	99	229	138	14	130	117	170	24	101	460	105
5	102	184	137	15	172	111	150	25	113	479	101
6	103	155	137	16	166	109	130	26	104	513	98
7	100	119	155	17	148	130	123	27	130	404	91
8	94	119	130	18	124	200	118	28	316	333	90
9	87	112	245	19	105	300	113	29	641	268	87
10	83	105	296	20	94	350	106	30	641	241	86
								31		196	85
Monthly mean discharge, in second-feet									148	257	143
Runoff, in inches									2.34	4.21	2.34

EAST BRANCH OF WADING RIVER AT HARRISVILLE, N. J.

LOCATION.—Lat. 39°39′47″, long. 74°31′26″, 50 feet downstream from highway bridge in Harrisville, Burlington County, and half a mile upstream from confluence with West Branch.

DRAINAGE AREA.—64.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 435 second-feet.

MAXIMA.—June 1938: Discharge, 270 second-feet 3 p. m. June 29 to 2 a.m. June 30 (gage height, 3.98 feet).

July 1938: Discharge, 510 second-feet 2 to 4 a.m. July 21 (gage height, 5.58 feet).

1931 to May 1938: Discharge, about 859 second-feet Aug. 24, 1933.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	55	152	119	11	45	81	164	21	53	482	67
2	60	123	107	12	46	120	147	22	52	435	64
3	98	110	97	13	60	107	132	23	52	420	61
4	75	73	91	14	100	95	109	24	50	466	57
5	72	60	93	15	93	104	92	25	47	482	54
6	66	76	98	16	79	121	81	26	45	435	53
7	56	63	95	17	71	92	75	27	58	338	52
8	51	68	135	18	64	129	76	28	124	259	42
9	48	47	188	19	58	322	76	29	244	198	35
10	46	44	188	20	54	420	72	30	241	168	47
								31		135	49
Monthly mean discharge, in second-feet									75.4	201	90.8
Runoff, in inches									1.32	3.62	1.64

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	------	------	------	------	------	------	------	------	1.90	44	2.61	107
4	------	------	------	------	------	------	------	------	1.90	44	2.65	110
6	------	------	------	------	------	------	------	------	1.90	44	2.68	113
8	------	------	------	------	------	------	------	------	1.90	44	2.70	115
10	------	------	------	------	------	------	------	------	1.92	46	2.72	117
12 n.	------	------	------	------	------	------	------	------	1.97	51	2.74	119
2 p.m.	------	------	------	------	------	------	------	------	2.02	56	2.77	122
4	------	------	------	------	------	------	------	------	2.07	62	2.81	126
6	------	------	------	------	------	------	------	------	2.08	63	2.88	133
8	------	------	------	------	------	------	------	------	2.24	77	2.98	143
10	------	------	------	------	------	------	------	------	2.39	88	3.09	155
12 m.	------	------	------	------	------	------	------	------	2.54	101	3.21	169

Hour	June 29 Feet	June 29 Sec.-ft.	June 30 Feet	June 30 Sec.-ft.	July 1 Feet	July 1 Sec.-ft.	July 2 Feet	July 2 Sec.-ft.	July 3 Feet	July 3 Sec.-ft.	July 4 Feet	July 4 Sec.-ft.
2 a.m.	3.34	185	3.98	270	3.12	158	2.92	137	2.57	103	2.28	80
4	3.50	205	3.97	269	3.10	156	2.90	135	2.54	101	2.26	79
6	3.64	223	3.95	266	3.09	155	2.87	132	2.52	99	2.25	78
8	3.79	244	3.93	263	3.09	155	2.84	129	2.50	97	2.24	77
10	3.89	258	3.91	260	3.09	155	2.81	126	2.47	95	2.22	76
12 n.	3.94	265	3.88	256	3.08	154	2.78	123	2.44	92	2.20	74
2 p.m.	3.97	269	3.84	251	3.07	153	2.74	119	2.42	91	2.18	72
4	3.98	270	3.79	244	3.05	150	2.71	116	2.39	88	2.15	70
6	3.98	270	3.62	221	3.03	148	2.68	113	2.37	87	2.14	69
8	3.98	270	3.41	193	3.01	146	2.65	110	2.34	85	2.12	67
10	3.98	270	3.25	174	2.98	143	2.62	108	2.32	83	2.10	65
12 m.	3.98	270	3.16	163	2.95	140	2.59	105	2.30	82	2.10	65

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 5		July 6		July 7		July 8		July 9		July 10	
2 a.m.	2.08	63	2.24	77	2.10	65	2.18	72	------	-------	------	-------
4	2.08	63	2.29	81	2.09	64	2.18	72	------	-------	------	-------
6	2.07	62	2.31	83	2.08	63	2.18	72	------	-------	------	-------
8	2.06	61	2.31	83	2.07	62	2.18	72	------	-------	------	-------
10	2.06	61	2.30	82	2.07	62	2.16	70	------	-------	------	-------
12 n.	2.05	60	2.27	80	2.06	61	2.14	69	------	-------	------	-------
2 p.m.	2.04	58	2.24	77	2.05	60	2.12	67	------	-------	------	-------
4	2.03	57	2.20	74	2.04	58	2.11	66	------	-------	------	-------
6	2.02	56	2.17	71	2.04	58	2.10	65	------	-------	------	-------
8	2.02	56	2.14	69	2.06	61	2.08	63	------	-------	------	-------
10	2.03	57	2.12	67	2.12	67	2.07	62	------	-------	------	-------
12 m.	2.14	69	2.11	66	2.16	70	2.06	61	------	-------	------	-------

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	2.36	86	4.24	307	4.84	396	5.58	510	5.14	441
4	------	-------	2.35	86	4.28	312	4.88	402	5.58	510	5.11	437
6	------	-------	2.34	85	4.28	312	4.90	405	5.54	503	5.08	432
8	------	-------	2.34	85	4.22	304	4.90	405	5.51	499	5.06	429
10	------	-------	2.32	83	4.17	297	4.88	402	5.44	488	5.04	426
12 n.	------	-------	2.31	83	4.14	293	4.91	406	5.40	482	5.04	426
2 p.m.	------	-------	2.30	82	4.15	294	5.01	422	5.36	476	5.06	429
4	------	-------	2.29	81	4.24	307	5.03	424	5.33	471	5.09	434
6	------	-------	3.26	175	4.46	339	5.12	438	5.30	466	5.10	435
8	------	-------	3.75	238	4.61	362	5.27	462	5.26	460	5.10	435
10	------	-------	4.00	273	4.72	378	5.44	488	5.20	451	5.10	435
12 m.	------	-------	4.14	293	4.80	390	5.55	505	5.16	445	5.08	432
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	5.06	429	4.99	418	5.55	505	5.26	460	4.72	378	4.11	288
4	5.03	424	5.02	423	5.53	502	5.24	457	4.67	370	4.06	281
6	4.99	418	5.05	428	5.50	497	5.20	451	4.62	363	4.02	276
8	4.95	412	5.29	464	5.49	496	5.17	446	4.57	356	3.97	269
10	4.92	408	5.38	479	5.47	492	5.12	438	4.52	348	3.93	263
12 n.	4.88	402	5.43	486	5.44	488	5.08	432	4.47	340	3.88	256
2 p.m.	4.86	399	5.48	494	5.43	486	5.03	424	4.42	333	3.84	251
4	4.83	394	5.52	500	5.41	484	4.97	416	4.37	326	3.80	245
6	4.88	402	5.53	502	5.38	479	4.93	410	4.31	316	3.76	239
8	4.94	411	5.54	503	5.35	474	4.87	400	4.26	309	3.72	234
10	4.97	416	5.55	505	5.32	469	4.82	393	4.20	302	3.68	228
12 m.	4.98	417	5.55	505	5.30	466	4.77	386	4.16	295	3.64	223

GREAT EGG RIVER AT FOLSOM, N. J.

LOCATION.—Lat. 39°35′42″, long. 74°51′05″, at highway bridge 1 mile south of Folsom, Atlantic County, and 2 miles upstream from Pennypot Stream.

DRAINAGE AREA.—56.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 600 second-feet.

MAXIMA.—June 1938: Discharge, 483 second-feet 12 n. to 4 p.m. June 30 (gage height, 5.72 feet).

July 1938: Discharge, 535 second-feet 10 a.m. to 5 p.m. July 25 (gage height, 5.92 feet).

1925 to May 1938: Discharge, 599 second-feet Sept. 8, 1935 (gage height, 6.18 feet).

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	69	427	130	11	42	58	330	21	47	156	85
2	58	307	121	12	43	85	245	22	44	208	80
3	53	214	114	13	62	95	182	23	46	274	72
4	50	161	104	14	77	88	141	24	50	402	68
5	50	125	125	15	82	85	116	25	44	530	66
6	49	95	141	16	82	80	97	26	42	504	63
7	47	78	136	17	77	69	85	27	70	427	60
8	46	68	152	18	66	68	82	28	215	330	60
9	46	62	176	19	57	74	83	29	427	235	57
10	44	57	318	20	51	88	86	30	478	188	56
								31		161	54
Monthly mean discharge, in second-feet									87.1	187	119
Runoff, in inches									1.73	3.83	2.43

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	------	------	------	------	------	------	------	------	3.59	42	4.08	121
4	------	------	------	------	------	------	------	------	3.61	44	4.16	136
6	------	------	------	------	------	------	------	------	3.63	47	4.25	152
8	------	------	------	------	------	------	------	------	3.73	62	4.34	169
10	------	------	------	------	------	------	------	------	3.80	72	4.42	184
12 n.	------	------	------	------	------	------	------	------	3.82	75	4.51	202
2 p.m.	------	------	------	------	------	------	------	------	3.84	78	4.62	224
4	------	------	------	------	------	------	------	------	3.86	82	4.74	250
6	------	------	------	------	------	------	------	------	3.89	86	4.88	281
8	------	------	------	------	------	------	------	------	3.93	93	5.00	307
10	------	------	------	------	------	------	------	------	3.97	101	5.11	332
12 m.	------	------	------	------	------	------	------	------	4.02	110	5.20	354

Hour	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	5.28	372	5.66	468	5.64	462	5.21	356	4.73	248	4.40	180
4	5.37	395	5.67	470	5.61	455	5.17	347	4.70	241	4.37	174
6	5.42	407	5.69	475	5.58	447	5.12	335	4.66	233	4.36	172
8	5.47	420	5.70	478	5.55	440	5.08	325	4.63	226	4.34	169
10	5.50	427	5.71	481	5.52	432	5.03	314	4.60	220	4.32	165
12 n.	5.54	437	5.72	483	5.48	422	5.00	307	4.57	214	4.30	161
2 p.m.	5.56	442	5.72	483	5.44	412	4.95	296	4.54	208	4.28	157
4	5.57	444	5.72	483	5.40	402	4.92	289	4.51	202	4.27	156
6	5.59	450	5.71	481	5.36	392	4.87	278	4.48	196	4.25	152
8	5.61	455	5.70	478	5.33	385	4.84	272	4.46	192	4.23	148
10	5.62	457	5.68	473	5.28	372	4.80	263	4.43	186	4.21	145
12 m.	5.64	462	5.66	468	5.24	364	4.76	254	4.41	182	4.18	139

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	------	------	------	------	------	3.82	75	4.16	136	4.39	178
4	------	------	------	------	------	------	3.82	75	4.21	145	4.41	182
6	------	------	------	------	------	------	3.84	78	4.24	150	4.42	184
8	------	------	------	------	------	------	3.84	78	4.25	152	4.43	186
10	------	------	------	------	------	------	3.85	80	4.27	156	4.45	190
12 n.	------	------	------	------	------	------	3.87	83	4.28	157	4.52	204
2 p.m.	------	------	------	------	------	------	3.87	83	4.30	161	4.63	226
4	------	------	------	------	------	------	3.87	83	4.31	163	4.65	230
6	------	------	------	------	------	------	3.94	95	4.32	165	4.66	233
8	------	------	------	------	------	------	4.08	121	4.34	169	4.68	237
10	------	------	------	------	------	------	4.10	125	4.35	170	4.70	241
12 m.	------	------	------	------	------	------	4.12	129	4.37	174	4.72	245

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.74	250	5.10	330	5.83	512	5.87	522	5.65	465	5.27	371
4	4.75	252	5.15	342	5.87	522	5.86	520	5.63	460	5.23	361
6	4.77	256	5.22	359	5.89	527	5.85	517	5.59	450	5.20	354
8	4.77	256	5.32	383	5.90	530	5.84	514	5.57	444	5.17	347
10	4.78	259	5.38	397	5.92	535	5.82	509	5.53	434	5.13	337
12 n.	4.79	261	5.43	410	5.92	535	5.80	504	5.51	430	5.08	325
2 p.m.	4.81	265	5.48	422	5.92	535	5.78	499	5.47	420	5.05	318
4	4.86	276	5.55	440	5.92	535	5.76	494	5.44	412	5.01	309
6	4.98	303	5.62	457	5.91	533	5.74	488	5.40	402	4.97	300
8	5.01	309	5.68	472	5.91	533	5.72	483	5.37	395	4.93	292
10	5.03	314	5.73	486	5.90	530	5.70	478	5.33	385	4.89	283
12 m.	5.05	318	5.78	499	5.88	525	5.68	473	5.30	378	4.86	276

MANANTICO CREEK NEAR MILLVILLE, N. J.

LOCATION.—Lat. 39°25'12", long. 74°58'00", at Millville-Milmay highway bridge 4 miles northeast of Millville, Cumberland County, and 7 miles upstream from the mouth. Datum of gage is 36.63 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—22.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 300 second-feet, extended to peak stage on basis of area velocity study at bridge opening.

MAXIMA.—June 1938: Discharge, 74 second-feet 9 p.m. June 28 (gage height, 2.09 feet).

July 1938: Discharge, 474 second-feet 9 to 10 p.m. July 24 (gage height, 4.46 feet).

September 1938: Discharge, 413 second-feet 7 a.m. Sept. 22 (gage height, 4.19 feet).

1931 to May 1938: Discharge, 566 second-feet Sept. 7, 1935 (gage height, 5.72 feet).

REMARKS.—Low flow slightly regulated by operation of reservoir for irrigation at State institution above station.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	24	31	91	11	23	11.1	112	21	22	95	39
2	17.5	26	86	12	23	5.6	79	22	23	145	39
3	25	18.3	72	13	24	6.0	58	23	23	163	38
4	28	23	65	14	23	19.7	53	24	12.3	397	49
5	33	24	60	15	23	27	51	25	10.8	346	38
6	28	23	56	16	23	23	48	26	22	164	35
7	25	24	62	17	23	28	45	27	28	104	34
8	23	23	98	18	22	27	43	28	55	80	34
9	23	22	182	19	22	43	43	29	50	77	34
10	23	23	187	20	22	70	42	30	42	100	37
								31		119	30
Monthly mean discharge, in second-feet									25.5	73.8	62.6
Runoff, in inches									1.27	3.82	3.24

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	------	-------	1.52	24	1.17	6.3	1.49	22	1.49	22	1.68	36
4	------	-------	1.51	23	1.17	6.3	1.49	22	1.49	22	1.66	34
6	------	-------	1.55	26	1.16	6.0	1.51	23	1.52	24	1.76	43
8	------	-------	1.30	11.8	1.16	6.0	1.50	23	1.54	25	1.83	49
10	------	-------	1.19	7.1	1.16	6.0	1.51	23	1.60	30	1.90	55
12 n.	------	-------	1.18	6.7	1.16	6.0	1.51	23	1.53	25	1.93	58
2 p.m.	------	-------	1.17	6.3	1.15	5.6	1.48	22	1.48	22	1.95	60
4	------	-------	1.17	6.3	1.15	5.6	1.48	22	1.48	22	1.97	62
6	------	-------	1.17	6.3	1.45	19.8	1.49	22	1.59	29	2.00	65
8	------	-------	1.17	6.3	1.47	21	1.48	22	1.63	32	2.08	73
10	------	-------	1.17	6.3	1.48	22	1.49	22	1.82	48	2.07	72
12 m.	------	-------	1.17	6.3	1.49	22	1.49	22	1.75	42	2.02	67
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	1.98	63	1.69	37	1.65	34	1.57	27	1.53	25	1.42	18.1
4	1.95	60	1.69	37	1.65	34	1.56	27	1.53	25	1.44	19.2
6	1.95	60	1.70	38	1.67	35	1.61	30	1.56	27	1.45	19.8
8	1.91	56	1.80	46	1.67	35	1.57	27	1.55	26	1.54	25
10	1.89	54	1.88	54	1.65	34	1.58	28	1.50	23	1.58	28
12 n.	1.88	54	1.80	46	1.61	30	1.55	26	1.30	11.8	1.55	26
2 p.m.	1.85	51	1.78	44	1.57	27	1.53	25	1.29	11.3	1.52	24
4	1.83	49	1.77	43	1.56	27	1.53	25	1.31	12.3	1.50	23
6	1.64	33	1.74	41	1.56	27	1.52	24	1.32	12.8	1.49	22
8	1.63	32	1.72	39	1.61	30	1.52	24	1.34	13.8	1.49	22
10	1.65	34	1.71	38	1.61	30	1.52	24	1.37	15.3	1.54	25
12 m.	1.67	35	1.69	37	1.59	29	1.53	25	1.40	16.9	1.53	25

Supplemental records.—June 28, 9 p.m., 2.09 ft., 74 sec.-ft.; July 4, 9 a.m., 1.65 ft., 34 sec.-ft.

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	------	-------	1.62	31	1.96	61	2.20	86	2.56	124
4	------	-------	------	-------	1.66	34	1.99	64	2.21	87	2.62	131
6	------	-------	------	-------	1.72	39	2.06	71	2.24	90	2.69	140
8	------	-------	------	-------	1.73	40	2.04	69	2.25	91	2.74	146
10	------	-------	------	-------	1.76	43	2.02	67	2.25	91	2.78	151
12 n.	------	-------	------	-------	1.76	43	2.05	70	2.25	91	2.77	150
2 p.m.	------	-------	------	-------	1.76	43	2.07	72	2.26	92	2.83	158
4	------	-------	------	-------	1.81	47	2.08	73	2.28	94	2.86	162
6	------	-------	------	-------	1.82	48	2.07	72	2.32	98	2.82	157
8	------	-------	------	-------	1.87	53	2.09	74	2.38	104	2.75	148
10	------	-------	------	-------	1.91	56	2.14	80	2.44	110	2.70	141
12 m.	------	-------	------	-------	1.94	59	2.18	84	2.50	117	2.67	137
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	2.63	133	3.58	281	4.33	456	3.18	210	2.55	123	2.17	83
4	2.59	128	3.66	297	4.30	437	3.10	197	2.52	119	2.16	82
6	2.57	125	3.78	321	4.22	418	3.04	188	2.50	117	2.16	82
8	2.56	124	3.96	359	4.12	395	2.98	179	2.48	115	2.15	81
10	2.58	127	4.17	406	4.01	370	2.92	171	2.43	109	2.15	81
12 n.	2.62	131	4.26	427	3.89	344	2.82	157	2.39	105	2.14	80
2 p.m.	2.66	136	4.27	430	3.78	321	2.75	148	2.33	99	2.13	79
4	2.84	160	4.37	454	3.67	299	2.70	141	2.28	94	2.13	79
6	3.14	203	4.43	468	3.56	277	2.67	137	2.25	91	2.13	79
8	3.39	246	4.45	473	3.44	255	2.63	133	2.23	89	2.12	78
10	3.44	255	4.46	474	3.35	239	2.60	129	2.21	87	2.12	78
12 m.	3.50	266	4.43	468	3.26	223	2.58	127	2.19	85	2.11	77

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	2.10	75	2.32	98	2.55	123	------	------	------	------	------	------
4	2.09	74	2.30	96	2.59	128	------	------	------	------	------	------
6	2.09	74	2.33	99	2.61	130	------	------	------	------	------	------
8	2.07	72	2.36	102	2.60	129	------	------	------	------	------	------
10	2.06	71	2.30	96	2.57	125	------	------	------	------	------	------
12 n.	2.04	69	2.20	86	2.54	122	------	------	------	------	------	------
2 p.m.	2.00	65	2.24	90	2.50	117	------	------	------	------	------	------
4	2.00	65	2.31	97	2.48	115	------	------	------	------	------	------
6	1.99	64	2.38	104	2.45	112	------	------	------	------	------	------
8	2.28	94	2.42	108	2.43	109	------	------	------	------	------	------
10	2.39	105	2.47	114	2.42	108	------	------	------	------	------	------
12 m.	2.36	102	2.51	118	2.40	106	------	------	------	------	------	------

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	25	65	9	23	46	17	30	39	25	77	52
2	25	61	10	33	44	18	30	38	26	57	49
3	25	52	11	36	42	19	62	37	27	54	45
4	27	38	12	31	42	20	110	38	28	55	64
5	42	36	13	32	40	21	238	43	29	54	71
6	33	44	14	31	40	22	358	44	30	45	55
7	32	48	15	30	40	23	196	43	31		56
8	28	49	16	30	39	24	101	44			
Monthly mean discharge, in second-feet										65.0	46.6
Runoff, in inches										3.25	2.41

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	September 18 Feet	September 18 Sec.-ft.	September 19 Feet	September 19 Sec.-ft.	September 20 Feet	September 20 Sec.-ft.	September 21 Feet	September 21 Sec.-ft.	September 22 Feet	September 22 Sec.-ft.	September 23 Feet	September 23 Sec.-ft.
1 a.m.	------	------	------	------	2.38	104	2.68	139	4.04	377	3.52	270
2	------	------	------	------	2.38	104	2.69	140	4.06	381	3.47	261
3	------	------	------	------	2.37	103	2.72	144	4.09	388	3.42	252
4	------	------	------	------	2.35	101	2.75	148	4.11	392	3.37	243
5	------	------	------	------	2.36	102	2.79	153	4.13	397	3.32	234
6	------	------	------	------	2.36	102	2.81	155	4.16	404	3.29	228
7	------	------	1.69	37	2.38	104	2.86	162	4.19	413	3.27	225
8	------	------	1.69	37	2.38	104	2.90	168	4.18	408	3.28	218
9	------	------	1.67	35	2.37	103	2.94	174	4.16	404	3.18	210
10	------	------	1.66	34	2.37	103	2.99	181	4.11	392	3.13	202
11	------	------	1.66	34	2.37	103	3.04	188	4.03	375	3.09	196
12 n.	------	------	1.67	35	2.37	103	3.15	205	3.95	357	3.05	190
1 p.m.	------	------	1.80	46	2.37	103	3.31	232	3.92	350	3.01	184
2	------	------	1.90	55	2.37	103	3.53	272	3.91	348	2.97	178
3	------	------	2.17	83	2.39	105	3.67	299	3.90	346	2.93	172
4	------	------	2.30	96	2.44	110	3.75	315	3.89	344	2.89	167
5	------	------	2.36	102	2.49	116	3.79	323	3.85	336	2.86	162
6	------	------	2.39	105	2.53	121	3.81	327	3.82	329	2.83	158
7	------	------	2.40	106	2.59	128	3.83	331	3.80	325	2.80	154
8	------	------	2.40	106	2.63	133	3.87	340	3.76	317	2.79	153
9	------	------	2.40	106	2.65	135	3.92	350	3.72	309	2.77	150
10	------	------	2.39	105	2.67	137	3.95	357	3.67	299	2.75	148
11	------	------	2.40	106	2.67	137	3.99	366	3.63	291	2.72	144
12 m.	------	------	2.39	105	2.67	137	4.02	372	3.57	279	2.70	141

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	September 24		September 25		September 26		September 27		September 28		September 29	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	2.65	135	------	-------	------	-------	------	-------	------	-------	------	-------
4	2.61	130	------	-------	------	-------	------	-------	------	-------	------	-------
6	2.59	128	------	-------	------	-------	------	-------	------	-------	------	-------
8	2.56	124	------	-------	------	-------	------	-------	------	-------	------	-------
10	2.42	108	------	-------	------	-------	------	-------	------	-------	------	-------
12 n.	2.20	86	------	-------	------	-------	------	-------	------	-------	------	-------
2 p.m.	2.11	77	------	-------	------	-------	------	-------	------	-------	------	-------
4	2.10	75	------	-------	------	-------	------	-------	------	-------	------	-------
6	2.10	75	------	-------	------	-------	------	-------	------	-------	------	-------
8	2.12	78	------	-------	------	-------	------	-------	------	-------	------	-------
10	2.14	80	------	-------	------	-------	------	-------	------	-------	------	-------
12 m.	2.15	81	------	-------	------	-------	------	-------	------	-------	------	-------

DELAWARE RIVER BASIN

EAST BRANCH OF DELAWARE RIVER AT MARGARETVILLE, N. Y.

LOCATION.—Lat. 42°08′40″, long. 74°39′15″, at bridge at southwest end of Margaretville, Delaware County, and 1¾ miles downstream from Bush Kill. Datum of gage is 1303.48 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—163 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 5,000 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 4,120 second-feet 11:45 a.m. July 23 (gage height, 6.23 feet).

1937 to June 1938: Discharge, 6,000 second-feet May 15, 1937 (gage height, 7.6 feet).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	362	317	9	152	198	17	108	295	25	1,300	125
2	420	310	10	160	172	18	242	350	26	920	115
3	284	237	11	152	1,640	19	310	279	27	700	108
4	252	199	12	196	760	20	222	219	28	570	100
5	255	174	13	143	510	21	960	187	29	500	93
6	193	154	14	148	394	22	2,000	171	30	413	89
7	165	187	15	143	326	23	2,850	154	31	326	84
8	143	192	16	120	284	24	1,980	138			
Monthly mean discharge, in second-feet										538	276
Runoff, in inches										3.80	1.95

Peak discharge.—Aug. 11 (8 a.m.) 2,590 sec.-ft.

EAST BRANCH OF DELAWARE RIVER AT HARVARD, N. Y.

LOCATION.—Lat. 42°01′15″, long. 75°07′05″, at highway bridge at Harvard, Delaware County, about 400 feet upstream from Baxter Brook. Datum of gage is 1,007.96 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—443 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 10,000 second-feet and extended to peak stage on basis of logarithmic plotting and a slope-area determination of peak flow of March 1936.

MAXIMA.—July-August 1938: Discharge, 14,500 second-feet 11:30 a.m. Aug. 11 (gage height, 12.67 feet).

1934 to June 1938: Discharge, 26,200 second-feet, Mar. 18, 1936 (gage height 15.58 feet), from rating curve extended above 10,000 second-feet on basis of logarithmic plotting and a slope-area determination of peak.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	960	780	9	380	1,060	17	348	1,000	25	3,000	381
2	1,060	780	10	480	790	18	370	1,080	26	2,060	336
3	840	640	11	392	9,700	19	700	970	27	1,580	308
4	688	538	12	477	4,450	20	580	760	28	1,320	277
5	607	468	13	424	2,550	21	1,160	630	29	1,160	248
6	564	460	14	360	1,840	22	3,700	550	30	1,040	230
7	473	1,100	15	520	1,400	23	5,500	497	31	870	214
8	424	820	16	408	1,120	24	5,100	433			
Monthly mean discharge, in second-feet										1,211	1,175
Runoff, in inches										3.15	3.06

Peak discharge.—July 23 (7 p.m.) 7,900 sec.-ft.

EAST BRANCH OF DELAWARE RIVER AT FISHS EDDY, N. Y.

LOCATION.—Lat. 41°58′00″, long. 75°10′50″, at railroad bridge in Fishs Eddy, Delaware County, about 4½ miles downstream from Beaver Kill. Datum of gage is 950.80 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—783 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for Aug. 18, 19, 22-25, 28.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 22,000 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 36,100 second-feet 11:30 a.m. Aug. 11, (gage height, 17.14 feet).

1912 to June 1938: Discharge, 53,300 second-feet Aug. 24, 1933 (gage height, 20.60 feet), from rating curve extended above 22,000 second-feet by logarithmic plotting.

The flood of Oct. 9, 1903, reached a stage of 23.6 feet, from reports obtained in April 1939 from local residents who had experienced the flood (discharge about 70,000 second-feet, from present rating curve extended above 22,000 second-feet by logarithmic plotting).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	1,700	1,620	9	750	3,200	17	825	1,760	25	6,000	*a*760
2	1,980	2,140	10	1,260	1,940	18	810	*a*2,060	26	4,050	674
3	1,600	1,520	11	1,000	21,200	19	1,280	*a*1,680	27	3,100	622
4	1,300	1,200	12	1,300	9,100	20	1,320	1,400	28	2,550	*a*560
5	1,140	1,040	13	1,120	4,750	21	2,900	1,180	29	2,200	502
6	1,020	924	14	960	3,250	22	17,400	*a*1,020	30	2,000	473
7	860	2,600	15	1,240	2,480	23	13,200	*a*930	31	1,680	463
8	776	1,740	16	1,000	2,040	24	10,000	*a*840			
Monthly mean discharge, in second-feet										2,849	2,441
Runoff, in inches										4.20	3.60

*a*No gage-height record; discharge computed on basis of records for East Branch of Delaware River at Harvard and Beaver Kill at Cooks Falls.

Peak discharge.—July 22 (3 a.m.) 21,400 sec.-ft.; July 23 (6 p.m.) 16,500 sec.-ft.

DELAWARE RIVER AT PORT JERVIS, N. Y.

LOCATION.—Lat. 41°22′20″, long. 74°41′50″, near highway bridge at Port Jervis, Orange County, 1½ miles upstream from Neversink River. Datum of gage is 415.35 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—3,076 square miles; 369 square miles affected by storage in Lake Wallenpaupack and Toronto and Swinging Bridge Reservoirs.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 45,000 second-feet and extended to peak stage on basis of slope-area determination at 14.95 feet and area-velocity study.

MAXIMA.—July-August 1938: Discharge, 68,300 second-feet 12:15 a.m. Aug. 12 (gage height, 12.40 feet).

1904 to June 1938: Discharge, 137,000 second-feet (revised) Mar. 18, 1936 (gage height, 17.55 feet), from rating curve extended 100,000 second-feet by logarithmic plotting.

Maximum discharge known, 205,000 second-feet (revised) Oct. 10, 1904 (gage height, 23.1 feet, reported by U. S. Weather Bureau), from rating curve extended above 70,000 second-feet by logarithmic plotting and velocity-area studies; maximum stage known, 25.5 feet Mar. 8, 1904 (ice jam).

REMARKS.—Daily discharge not adjusted for storage in Lake Wallenpaupack at Wilsonville, Pa., or in Toronto and Swinging Bridge Reservoirs on Mongaup River. Large diurnal fluctuations at medium and low stages caused by power plants on tributary streams.

COOPERATION.—Records of storage furnished by Pennsylvania Power and Light Company for Lake Wallenpaupack and by Rockland Light and Power Company for Toronto and Swinging Bridge Reservoirs.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	5,400	5,100	9	3,100	5,500	17	2,120	6,100	25	16,800	3,550
2	4,300	5,600	10	2,850	7,700	18	2,420	5,900	26	11,600	3,300
3	4,450	5,400	11	3,150	18,800	19	3,350	5,900	27	8,700	3,200
4	3,750	4,250	12	3,400	41,000	20	3,800	4,900	28	7,100	2,800
5	3,150	3,650	13	3,450	16,200	21	4,150	4,200	29	6,400	2,700
6	3,050	3,300	14	3,000	10,600	22	17,400	3,900	30	5,900	3,050
7	3,300	3,200	15	2,500	8,500	23	27,500	3,900	31	5,500	2,950
8	2,800	5,300	16	2,320	7,300	24	27,000	3,800			
Monthly mean discharge, in second-feet										6,571	6,824
Runoff, in inches										2.47	2.56
Adjustment for storage, in equivalent second-feet.†										+103	−774

Peak discharge.—July 22 (7 p.m.) 37,400 sec.-ft.
†Storage in Lake Wallenpaupack and Toronto and Swinging Bridge Reservoirs.

MILL BROOK AT ARENA, N. Y.

LOCATION.—Lat. 42°06′30″, long. 74°43′55″, 0.2 mile upstream from highway bridge, 0.6 mile southeast of Arena, Delaware County, and about 1 mile upstream from mouth.

DRAINAGE AREA.—25.0 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 1,000 second-feet and extended by logarithmic plotting on basis of area-velocity study.

MAXIMA.—July-August 1938: Discharge, about 1,110 second-feet, 8 a.m., July 23 and 7 a.m. August 11 (gage height, 4.3 feet, from graph based on gage readings).

1937 to June 1938: Discharge, 1,550 second-feet Oct. 23, 1937 (gage height, 5.0 feet, from graph based on gage readings).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	60	51	9	49	31	17	30	60	25	202	22
2	54	46	10	40	32	18	41	73	26	139	19
3	46	41	11	54	626	19	44	47	27	104	16
4	42	38	12	39	194	20	41	41	28	97	14
5	34	36	13	30	139	21	305	37	29	75	13
6	30	31	14	44	101	22	659	32	30	62	13
7	30	29	15	52	75	23	734	29	31	51	13
8	26	34	16	46	61	24	347	25			
Monthly mean discharge, in second-feet										116	65.1
Runoff, in inches										5.35	3.00

TREMPER KILL NEAR SHAVERTOWN, N. Y.

LOCATION.—Lat. 42°07′15″, long. 74°49′10″, 500 feet upstream from highway bridge, 2¼ miles northeast of Shavertown, Delaware County, and 2¼ miles upstream from mouth.

DRAINAGE AREA.—33.0 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 600 second-feet and extended to peak stage by logarithmic plotting. Stage-discharge relation affected by shifting control, July 1 to Aug. 4.

MAXIMA.—July-August 1938: Discharge, 1,420 second-feet 5:45 a.m. Aug. 11 (gage height, 4.94 feet).

1937 to June 1938: Discharge, 1,800 second-feet Oct. 23, 1937 (gage height, 4.07 feet), from rating curve extended above 600 second-feet logarithmic plotting.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	71	34	9	21	24	17	18	47	25	100	15
2	88	32	10	19	34	18	49	49	26	74	15
3	51	27	11	22	600	19	35	39	27	64	12
4	42	24	12	26	218	20	35	31	28	60	12
5	36	20	13	20	137	21	78	27	29	54	11
6	32	30	14	23	92	22	205	24	30	47	10
7	32	35	15	24	70	23	225	20	31	38	9.5
8	26	24	16	20	55	24	130	18			
Monthly mean discharge, in second-feet										56.9	57.9
Runoff, in inches										1.98	2.02

Peak discharge.—July 23 (8 a.m.) 535 sec.-ft.

TERRY CLOVE KILL NEAR PEPACTON, N. Y.

LOCATION.—Lat. 42°07′45″, long. 74°53′55″, at timber farm bridge, 1¼ miles upstream from confluence with Fall Clove Kill and 3½ miles north of Pepacton, Sullivan County.

DRAINAGE AREA.—14.1 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 350 second-feet and extended by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge 755 second-feet about 6 a.m. Aug. 11 (gage height, 4.5 feet, from graph based on gage readings).

1937 to June 1938: Discharge, 850 second-feet Jan. 25, 1938 (gage height, 4.7 feet from graph based on gage readings), from rating curve extended above 350 second-feet by logarithmic plotting.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	29	36	9	7.8	26	17	4.4	27	25	44	8.4
2	28	27	10	6.8	18	18	12	37	26	34	6.8
3	21	20	11	10	349	19	10	23	27	38	6.3
4	18	16	12	11	152	20	32	16	28	50	5.7
5	14	13	13	6.8	84	21	31	13	29	49	5.2
6	11	30	14	6.8	54	22	51	12	30	35	4.7
7	9.6	36	15	7.0	40	23	86	11	31	30	4.4
8	8.1	23	16	5.2	33	24	57	9.6			
Monthly mean discharge, in second-feet										24.6	37.0
Runoff, in inches										2.01	3.02

Peak discharge.—July 23 (9 a.m.) 152 sec.-ft.

BEAVER KILL AT CRAIGIE CLAIR, N. Y.

LOCATION.—Lat. 41°57′45″, long. 74°52′00″, 100 feet downstream from highway bridge at Craigie Clair, Sullivan County, and 2¼ miles upstream from Spring Brook. Datum of gage is 1399.69 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—82 square miles.

GAGE-HEIGHT RECORD.—Water stage recorder graph.

STAGE-DISCHARGDE RELATION.—Defined by current-meter measurements to 2,700 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 9,530 second-feet 6 a.m. Aug. 11, (gage height 10.11 feet).

1937 to June 1938: Discharge, 8,480 second-feet Oct. 23, 1937 (gage height, 9.76 feet).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	178	242	9	238	460	17	165	240	25	850	105
2	227	255	10	255	315	18	176	268	26	570	94
3	170	176	11	208	4,650	19	226	218	27	420	90
4	149	154	12	255	1,100	20	211	179	28	335	83
5	132	137	13	233	630	21	2,650	154	29	282	78
6	123	178	14	240	442	22	3,950	137	30	237	75
7	113	300	15	250	334	23	2,750	123	31	205	70
8	105	400	16	196	271	24	1,420	113			
Monthly mean discharge, in second-feet										565	389
Runoff, in inches										7.94	5.46

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
			July 22											
July 16			8 a.m.	8.42	5,100	July 28						Aug. 12		
12 n.	3.70	199	9	8.49	5,240	12 n.	4.08	334	Aug. 8			4 a.m.	5.80	1,410
12 m.	3.63	179	10	8.38	5,020	12 m.	4.01	305	10 a.m.	3.66	187	8	5.59	1,230
July 17			12 n.	7.91	4,140	July 29			3 p.m.	3.63	179	12 n.	5.34	1,050
12 n.	3.60	170	2 p.m.	7.40	3,300	12 n.	3.95	282	4	3.72	205	4 p.m.	5.15	915
12 m.	3.54	154	4	7.05	2,820	12 m.	3.90	264	5	4.15	364	8	5.03	834
July 18			6	6.73	2,410	July 30			6	5.40	1,090	12 m.	4.94	779
12 n.	3.54	154	8	6.51	2,140	12 n.	3.83	240	7	5.57	1,220	Aug. 13		
4 p.m.	3.74	211	10	6.31	1,920	12 m.	3.75	214	8	5.30	1,020	6 a.m.	4.81	701
8	3.76	218	12 m.	6.20	1,800	July 31			10	4.97	797	12 n.	4.67	624
12 m.	3.71	202	July 23			12 n.	3.72	205	12 m.	4.82	707	6 p.m.	4.54	552
July 19			3 a.m.	6.21	1,810	11 p.m.	3.66	187	Aug. 9			12 m.	4.46	510
10 a.m.	3.63	179	4	6.60	2,250	Aug. 1			6 a.m.	4.49	525	Aug. 14		
3 p.m.	3.70	199	5	7.25	3,090	4 a.m.	3.86	250	12 n.	4.31	437	12 n.	4.33	446
4	4.09	338	6	7.57	3,570	12 n.	3.75	214	6 p.m.	4.19	382	12 m.	4.18	377
6	4.02	309	7	7.65	3,700	4 p.m.	3.74	211	12 m.	4.10	342	Aug. 15		
8	3.95	282	8	7.53	3,510	8	3.94	279	Aug. 10			12 n.	4.08	334
12 m.	3.84	244	9	7.53	3,510	12 m.	4.08	334	12 n.	3.98	294	12 m.	3.97	290
July 20			10	7.59	3,600	Aug. 2			7 p.m.	3.90	264	Aug. 16		
12 n.	3.73	208	12 n.	7.41	3,320	6 a.m.	3.97	299	9	4.00	301	12 n.	3.92	271
12 m.	3.63	179	2 p.m.	7.20	3,020	12 n.	3.86	250	11	4.35	456	12 m.	3.88	257
July 21			4	7.01	2,760	6 p.m.	3.74	211	12 m.	4.85	725	Aug. 17		
5 a.m.	3.61	173	6	6.81	2,500	12 m.	3.67	190	Aug. 11			12 n.	3.82	237
6	3.76	218	8	6.64	2,300	Aug. 3			1 a.m.	6.25	1,860	10 p.m.	3.79	227
7	4.22	395	10	6.48	2,110	12 n.	3.63	179	2	8.20	4,660	12 m.	3.90	264
8	5.62	1,260	12 m.	6.36	1,980	12 m.	3.56	160	3	9.20	6,900	Aug. 18		
9	7.20	3,020	July 24			Aug. 4			4	9.95	9,050	6 a.m.	3.86	250
10	8.26	4,780	4 a.m.	6.13	1,730	12 n.	3.55	157	5	9.95	9,050	1 p.m.	3.99	297
11	8.28	4,820	8	5.95	1,550	12 m.	3.50	144	6	10.11	9,530	12 m.	3.86	250
12 n.	7.98	4,260	12 n.	5.74	1,360	Aug. 5			7	10.05	9,350	Aug. 19		
1 p.m.	7.47	3,410	4 p.m.	5.61	1,250	12 n.	3.48	139	8	9.80	8,600	12 n.	3.76	218
2	7.04	2,800	8	5.48	1,150	12 m.	3.44	130	9	9.50	7,700	12 m.	3.67	190
4	6.47	2,100	12 m.	5.36	1,060	Aug. 6			10	9.05	6,520	Aug. 20		
6	6.10	1,700	July 25			12 n.	3.44	130	11	8.58	5,420	12 n.	3.63	179
7	6.00	1,600	6 a.m.	5.20	950	6 p.m.	3.42	126	12 n.	8.27	4,800	12 m.	3.57	162
8	6.17	1,770	12 n.	5.06	854	7	3.58	165	1 p.m.	7.82	3,980	Aug. 21		
9	8.52	5,300	6 p.m.	4.88	743	8	3.82	237	2	7.50	3,460	12 n.	3.54	154
10	9.77	8,510	12 m.	4.77	678	10	4.37	466	3	7.25	3,090	12 m.	3.49	142
11	9.70	8,300	July 26			12 m.	4.32	442	4	7.03	2,790	Aug. 22		
12 m.	9.35	7,280	12 n.	4.60	585	Aug. 7			6	6.68	2,350	12 n.	3.49	142
July 22			12 m.	4.37	466	4 a.m.	4.19	382	8	6.42	2,040	12 m.	3.44	130
2 a.m.	8.91	6,180	July 27			6	4.25	409	10	6.19	1,790	......	......	......
4	8.45	5,160	12 n.	4.27	418	10	4.04	317	12 m.	6.03	1,630	......	......	......
6	8.20	4,660	12 m.	4.19	382	4 p.m.	3.83	240	......	......	......	......	......	......
......	......	......	......	......	......	12 m.	3.71	202	......	......	......	......	......	......

BEAVER KILL AT COOKS FALLS, N. Y.

LOCATION.—Lat. 41°56′50″, long. 74°58′45″, about 125 feet downstream from highway bridge in Cooks Falls, Delaware County, and 5½ miles downstream from Willowemoc Creek.

DRAINAGE AREA.—241 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 9,500 second-feet and extended to peak stage on basis of slope-area determination and logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 17,500 second-feet 9 a.m. Aug. 11 (gage height, 14.51 feet).

1913 to June 1938: Discharge, about 19,000 second-feet Aug. 24, 1933 (gage height, 17.8 feet, from flood marks at site then in use.)

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	480	740	9	390	1,760	17	388	750	25	2,200	306
2	650	1,080	10	660	920	18	390	900	26	1,460	274
3	478	620	11	540	9,300	19	500	710	27	1,100	254
4	398	475	12	630	3,100	20	540	540	28	880	231
5	352	401	13	530	1,700	21	3,100	458	29	740	214
6	314	375	14	540	1,200	22	10,600	416	30	650	208
7	278	1,560	15	570	910	23	6,600	372	31	550	203
8	260	1,080	16	459	750	24	3,700	333			
Monthly mean discharge, in second-feet										1,320	1,037
Runoff, in inches										6.32	4.96

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
July 16			July 22			July 30			Aug. 7			Aug. 12		
12 n.	2.88	463	12 n.	12.42	12,800	12 n.	3.28	651	8 p.m.	3.91	966	4 a.m.	7.18	3,910
12 m.	2.74	412	1 p.m.	12.15	12,300	12 m.	3.11	574	10	3.78	890	8	6.74	3,380
July 17			2	11.70	11,400	July 31			12 m.	3.69	845	12 n.	6.34	2,930
12 n.	2.68	391	4	10.60	9,300	12 n.	3.06	554	Aug. 8			4 p.m.	5.99	2,580
12 m.	2.57	355	6	9.65	7,590	10 p.m.	2.93	502	6 a.m.	3.47	736	8	5.69	2,300
July 18			8	8.95	6,410	Aug. 1			12 n.	3.33	674	12 m.	5.49	2,120
10 a.m.	2.55	349	10	8.42	5,610	4 a.m.	3.18	606	5 p.m.	3.26	642	Aug. 13		
2 p.m.	2.65	382	12 m.	8.03	5,050	8	3.29	656	7	3.59	795	6 a.m.	5.22	1,890
8	2.88	463	July 23			4 p.m.	3.19	610	8	4.55	1,380	12 n.	4.97	1,690
12 m.	2.87	459	3 a.m.	7.69	4,580	8	3.55	775	9	6.37	2,970	6 p.m.	4.74	1,510
July 19			5	7.93	4,910	9	3.64	820	10	6.54	3,150	12 m.	4.54	1,370
8 a.m.	2.77	422	6	8.70	6,030	10	4.70	1,480	12 m.	6.28	2,870	Aug. 14		
2 p.m.	2.78	426	7	9.53	7,380	11	5.04	1,740	Aug. 9			12 n.	4.31	1,210
5	3.01	514	8	9.95	8,130	12 m.	4.95	1,670	4 a.m.	5.75	2,360	12 m.	4.00	1,020
6	3.17	578	10	10.06	8,330	Aug. 2			8	5.28	1,930	Aug. 15		
7	3.52	719	11	10.14	8,470	6 a.m.	4.39	1,260	12 n.	4.92	1,650	12 n.	3.83	918
12 m.	3.34	646	12 n.	10.09	8,380	12 n.	4.02	1,030	4 p.m.	4.60	1,410	12 m.	3.61	805
July 20			2 p.m.	9.81	7,880	6 p.m.	3.71	855	8	4.32	1,210	Aug. 16		
6 a.m.	3.17	578	4	9.46	7,260	12 m.	3.58	790	12 m.	4.15	1,110	12 n.	3.50	750
12 n.	3.07	538	6	9.10	6,650	Aug. 3			Aug. 10			12 m.	3.38	696
6 p.m.	2.97	498	8	8.75	6,100	6 a.m.	3.31	664	6 a.m.	3.94	984	Aug. 17		
12 m.	2.86	455	10	8.44	5,640	12 n.	3.21	620	12 n.	3.81	906	12 n.	3.30	660
July 21			12 m.	8.15	5,220	6 p.m.	3.09	566	6 p.m.	3.66	830	6 p.m.	3.28	651
6 a.m.	2.77	422	July 24			12 m.	2.98	522	10	3.66	830	7	3.52	760
9	2.86	455	4 a.m.	7.68	4,560	Aug. 4			12 m.	3.92	972	8	3.98	1,010
10	3.30	630	8	7.26	4,020	12 n.	2.87	478	Aug. 11			9	4.17	1,120
11	6.75	3,390	12 n.	6.92	3,590	12 m.	2.75	431	1 a.m.	4.28	1,190	10	4.20	1,140
12 n.	7.65	4,520	4 p.m.	6.61	3,230	Aug. 5			2	5.10	1,790	12 m.	4.03	1,040
1 p.m.	7.95	4,940	8	6.35	2,940	12 n.	2.69	408	3	8.10	5,150	Aug. 18		
2	8.20	5,290	12 m.	6.12	2,710	12 m.	2.58	368	4	10.90	9,870	4 a.m.	3.84	924
3	7.80	4,730	July 25			Aug. 6			5	12.00	12,000	8	3.72	860
4	7.45	4,260	6 a.m.	5.82	2,420	12 n.	2.52	347	6	12.85	13,700	12 n.	3.76	880
6	6.82	3,470	12 n.	5.58	2,200	8 p.m.	2.54	354	7	13.70	15,400	4 p.m.	3.87	942
8	6.47	3,080	6 p.m.	5.28	1,930	10	2.80	450	8	14.30	16,900	8	3.79	895
9	6.80	3,450	12 m.	5.04	1,740	11	3.10	570	9	14.51	17,500	12 m.	3.69	845
10	9.05	6,570	July 26			12 m.	3.52	760	10	14.10	16,300	Aug. 19		
11	11.85	11,700	6 a.m.	4.84	1,580	Aug. 7			11	13.45	14,900	6 a.m.	3.53	765
12 m.	13.35	14,700	12 n.	4.70	1,480	1 a.m.	5.50	2,130	12 n.	12.65	13,300	12 n.	3.41	710
July 22			6 p.m.	4.48	1,330	2	6.20	2,790	1 p.m.	11.90	11,800	6 p.m.	3.29	656
1 a.m.	13.30	14,600	12 m.	4.32	1,210	3	6.23	2,820	2	11.23	10,500	12 m.	3.16	597
2	12.82	13,600	July 27			4	6.00	2,590	3	10.75	9,580	Aug. 20		
3	12.60	13,200	12 n.	4.14	1,100	6	5.55	2,180	4	10.10	8,400	12 n.	3.04	546
4	12.42	12,800	12 m.	3.92	972	8	5.19	1,860	5	9.70	7,680	12 m.	2.89	486
6	12.01	12,000	July 28			10	4.89	1,620	6	9.27	6,940	Aug. 21		
7	11.93	11,900	12 n.	3.78	890	12 n.	4.63	1,430	8	8.61	5,900	12 n.	2.83	462
8	12.02	12,000	12 m.	3.54	770	2 p.m.	4.50	1,340	10	8.12	5,180	12 m.	2.73	423
10	12.42	12,800	July 29			4	4.22	1,150	12 m.	7.73	4,630	Aug. 22		
11	12.49	13,000	12 n.	3.48	741	6	4.06	1,060	......	......	......	12 n.	2.72	420
......	......	......	12 m.	3.40	705	......	......	......	......	......	......	12 m.	2.66	397

WILLOWEMOC CREEK NEAR LIVINGSTON MANOR, N. Y.

LOCATION.—Lat. 41°54′15″, long. 74°48′50″, three quarters of a mile upstream from highway bridge in Livingston Manor, Sullivan County, and 1½ miles upstream from Little Beaver Kill.

DRAINAGE AREA.—63 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 5,800 second-feet and extended by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 6,200 second-feet 6:40 a.m. Aug. 11 (gage height, 7.87 feet).

1937 to June 1938: Discharge, 4,470 second-feet Oct. 23, 1937 (gage height, 6.72 feet).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	101	485	9	124	540	17	74	270	25	500	91
2	140	350	10	192	275	18	77	300	26	335	80
3	103	180	11	128	3150	19	148	217	27	258	72
4	85	135	12	135	820	20	145	160	28	206	62
5	75	114	13	108	420	21	960	132	29	180	59
6	68	144	14	99	296	22	3550	123	30	158	59
7	63	410	15	103	232	23	1660	109	31	135	64
8	59	430	16	85	195	24	880	104			
Monthly mean discharge, in second-feet										353	325
Runoff, in inches										6.46	5.95

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
			July 22											
July 16			4	5.20	2,770	July 31			......	......	......	......	......	......
12 n.	1.03	85	6	4.69	2,260	12 n.	1.28	140	......	......	......	......	......	......
12 m.	.99	77	8	4.31	1,920	12 m.	1.23	128	......	......	......	Aug. 12		
July 17			10	4.00	1,640	Aug. 1			Aug. 8			4 a.m.	3.27	1,080
12 n.	.97	74	12 m.	3.76	1,450	6 a.m.	1.31	148	6 a.m.	1.53	209	8	3.01	906
12 m.	.95	70	July 23			10	1.35	158	12 n.	1.47	191	12 n.	2.79	774
July 18			2 a.m.	3.61	1,330	2 p.m.	1.31	148	4 p.m.	1.44	183	6 p.m.	2.52	630
12 n.	.98	75	3	3.55	1,280	4	1.42	177	5	1.75	283	12 m.	2.32	530
12 m.	1.04	87	4	3.59	1,310	6	1.55	216	6	2.62	676	Aug. 13		
July 19			6	3.96	1,610	7	1.80	301	7	3.27	1,080	8 a.m.	2.14	448
6 a.m.	1.04	87	8	4.26	1,870	8	2.27	497	8	3.44	1,200	4 p.m.	1.99	386
12 n.	1.25	133	10	4.46	2,050	9	2.66	698	10	3.26	1,070	12 m.	1.87	340
2 p.m.	1.61	234	11	4.49	2,080	10	2.64	687	12 m.	3.09	958	Aug. 14		
4	1.59	228	12 n.	4.46	2,050	12 m.	2.41	565	Aug. 9			12 n.	1.75	296
8	1.50	200	2 p.m.	4.83	2,400	Aug. 2			4 a.m.	2.75	750	12 m.	1.63	257
12 m.	1.44	183	4	4.67	2,240	4 a.m.	2.16	447	8	2.50	610	Aug. 15		
July 20			6	4.01	1,650	8	1.99	375	12 n.	2.27	497	12 n.	1.55	232
12 n.	1.31	148	8	3.85	1,520	12 n.	1.90	339	4 p.m.	2.10	421	12 m.	1.46	206
12 m.	1.17	114	10	3.69	1,390	4 p.m.	1.77	290	8	1.97	367	Aug. 16		
July 21			12 m.	3.54	1,270	8	1.68	258	12 m.	1.86	324	12 n.	1.42	195
6 a.m.	1.14	108	July 24			12 m.	1.59	228	Aug. 10			12 m.	1.36	178
9	1.25	133	4 a.m.	3.30	1,100	Aug. 3			6 a.m.	1.78	294	Aug. 17		
10	2.50	610	8	3.04	926	12 n.	1.43	180	12 n.	1.70	265	12 n.	1.34	173
11	3.65	1,360	12 n.	2.90	840	12 m.	1.30	145	7 p.m.	1.59	228	2 p.m.	1.36	178
12 n.	4.14	1,770	4 p.m.	2.76	756	Aug. 4			10	1.69	262	3	1.64	260
1 p.m.	4.00	1,640	8	2.64	687	12 n.	1.27	138	12 m.	2.05	400	4	2.01	394
2	3.80	1,480	12 m.	2.53	626	12 m.	1.19	119	Aug. 11			5	1.99	386
4	3.50	1,240	July 25			Aug. 5			1 a.m.	2.50	610	6	2.35	545
6	3.12	978	6 a.m.	2.40	560	12 n.	1.19	119	2	3.70	1,400	8	2.18	465
8	2.96	876	12 n.	2.28	502	12 m.	1.13	106	3	5.15	2,720	10	2.02	398
9	3.45	1,200	6 p.m.	2.15	443	Aug. 6			4	6.60	4,410	12 m.	1.88	344
10	4.85	2,420	12 m.	2.01	383	12 n.	1.11	101	5	7.40	5,510	Aug. 18		
11	5.60	3,200	July 26			6 p.m.	1.09	97	6	7.75	6,020	6 a.m.	1.71	282
12 m.	6.30	4,020	12 n.	1.90	339	8	1.20	121	7	7.75	6,020	12 n.	1.80	314
July 22			12 m.	1.79	297	9	1.40	171	8	7.50	5,650	4 p.m.	1.80	314
1 a.m.	6.70	4,540	July 27			10	1.90	339	9	7.15	5,160	12 m.	1.66	266
2	6.90	4,810	12 n.	1.68	258	11	2.30	511	10	6.90	4,880	Aug. 19		
4	6.69	4,530	12 m.	1.58	225	12 m.	2.60	665	11	6.55	4,340	12 n.	1.50	217
6	6.56	4,360	July 28			Aug. 7			12 n.	6.12	3,800	12 m.	1.36	178
8	6.91	4,820	12 n.	1.53	209	1 a.m.	2.66	698	1 p.m.	5.75	3,360	Aug. 20		
9	7.03	4,990	12 m.	1.45	186	2	2.60	665	2	5.42	3,000	12 n.	1.30	162
10	6.99	4,940	July 29			4	2.43	575	3	5.10	2,670	12 m.	1.22	142
12 n.	6.58	4,380	12 n.	1.45	186	6	2.30	511	4	4.87	2,440	Aug. 21		
1 p.m.	6.16	3,850	12 m.	1.40	171	8	2.18	456	6	4.42	2,020	12 n.	1.19	135
2	5.82	3,440	July 30			10	2.08	413	8	4.08	1,710	12 m.	1.14	123
3	5.50	3,090	12 n.	1.37	163	12 n.	1.98	371	10	3.81	1,490	Aug. 22		
......	......	......	12 m.	1.30	145	4 p.m.	1.82	309	12	3.60	1,320	12 n.	1.14	123
......	......	......	......	......	......	8	1.70	265	......	......	......	12 m.	1.11	115
......	......	......	......	......	......	12 m.	1.61	234	......	......	......	......	......	......

LITTLE BEAVER KILL NEAR LIVINGSTON MANOR, N. Y.

LOCATION.—Lat. 41°52′20″, long. 74°47′55″, 2½ miles southeast of Livingston Manor, Sullivan County, and 3 miles upstream from Cattail Brook. Datum of gage is 1496.69 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—19.8 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily and more frequently during floods. Record for July 19, 21-23, Aug. 1, 6-12, 17, 18 taken from graph based on gage readings.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,200 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 1,620 second-feet 8 a.m. July 22 (gage height, 6.10 feet, from graph based on gage readings).

1924 to June 1938: Discharge, 2,500 second-feet Aug. 26, 1928 (gage height, 8.7 feet, from floodmarks), from rating curve extended above 470 second-feet by logarithmic plotting on basis of slope-area determination.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	25	126	9	17	222	17	9.4	66	25	120	18
2	48	137	10	17	104	18	12	65	26	76	16
3	27	54	11	42	768	19	32	47	27	58	13
4	19	39	12	31	204	20	26	35	28	43	13
5	18	31	13	15	103	21	58	30	29	42	11
6	14	112	14	11	72	22	963	26	30	32	9.9
7	10	304	15	10	54	23	375	22	31	26	10
8	10	259	16	10	43	24	201	20			
Monthly mean discharge, in second-feet										77.4	97.9
Runoff, in inches										4.50	5.70

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
July 16			......	......	......	July 31			Aug. 8			Aug. 13		
6 a.m.	1.66	10	July 23			6 a.m.	1.84	27	6 a.m.	2.46	126	7 a.m.	2.40	114
6 p.m.	1.66	10	2 a.m.	3.03	262	6 p.m.	1.82	25	4 p.m.	2.40	114	6 p.m.	2.28	92
July 17			4	3.18	307	Aug. 1			6	4.00	610	Aug. 14		
6 a.m.	1.64	9	6	3.70	494	7 a.m.	2.00	47	8	4.20	690	7 a.m.	2.20	78
5 p.m.	1.64	9	9	4.10	650	12 n.	2.25	86	12 m.	3.65	475	6 p.m.	2.12	65
July 18			12 n.	3.70	494	3 p.m.	2.57	149	Aug. 9			Aug. 15		
6 a.m.	1.66	10	3 p.m.	3.30	346	6	2.90	226	6 a.m.	3.10	282	6 a.m.	2.08	59
6 p.m.	1.70	14	6	3.00	253	9	3.07	273	12 n.	2.77	194	6 p.m.	2.02	50
July 19			9	2.92	231	12 m.	3.00	253	6 p.m.	2.56	147	Aug. 16		
6 a.m.	1.74	17	12 m.	2.88	221	Aug. 2			12 m.	2.47	128	6 a.m.	2.00	47
2 p.m.	2.03	52	July 24			6 a.m.	2.70	177	Aug. 10			6 p.m.	1.94	39
6	1.97	43	7 a.m.	2.90	226	6 p.m.	2.24	85	6 a.m.	2.40	114	Aug. 17		
12 m.	1.85	28	6 p.m.	2.70	177	Aug. 3			12 n.	2.30	95	6 a.m.	1.94	39
July 20			July 25			6 a.m.	2.10	62	6 p.m.	2.26	88	3 p.m.	1.94	39
6 a.m.	1.84	27	6 a.m.	2.52	138	6 p.m.	2.00	47	12 m.	2.65	166	4	2.20	78
6 p.m.	1.82	25	6 p.m.	2.34	103	Aug. 4			Aug. 11			6	2.50	134
July 21			July 26			6 a.m.	1.96	42	2 a.m.	4.70	920	12 m.	2.29	93
6 a.m.	1.84	27	6 a.m.	2.24	85	6 p.m.	1.92	37	4	5.80	1,470	Aug. 18		
6 p.m.	1.88	32	6 p.m.	2.14	68	Aug. 5			6	5.90	1,520	6 a.m.	2.10	62
10	2.10	62	July 27			6 a.m.	1.88	32	8	5.45	1,300	12 n.	2.12	65
12 m.	5.70	1,420	6 a.m.	2.10	62	6 p.m.	1.86	30	10	4.75	945	6 p.m.	2.14	68
July 22			6 p.m.	2.04	53	Aug. 6			12 n.	4.25	712	12 m.	2.10	62
1 a.m.	5.95	1,540	July 28			6 a.m.	1.84	27	2 p.m.	3.98	602	Aug. 19		
4	5.65	1,400	6 a.m.	2.00	47	6 p.m.	1.90	34	4	3.70	494	6 a.m.	2.04	53
7	6.00	1,570	6 p.m.	1.94	39	8	2.80	201	6	3.40	381	6 p.m.	1.96	42
8	6.10	1,620	July 29			10	3.90	571	9	3.19	310	Aug. 20		
10	5.60	1,370	6 a.m.	1.97	43	12 m.	3.94	587	12 m.	3.11	285	6 a.m.	1.94	39
12 n.	4.80	970	6 p.m.	1.94	39	Aug. 7			Aug. 12			6 p.m.	1.88	32
2 p.m.	4.20	690	July 30			6 a.m.	3.50	418	6 a.m.	3.04	265	Aug. 21		
4	3.82	540	6 a.m.	1.90	34	12 n.	3.02	259	12 n.	2.80	201	6 a.m.	1.88	32
6	3.50	418	6 p.m.	1.86	30	6 p.m.	2.70	177	3 p.m.	2.69	175	6 p.m.	1.84	27
9	3.24	326	......	......	......	12 m.	2.56	147	6	2.60	155	Aug. 22		
12 m.	3.07	273	......	......	......	......	......	......	12 m.	2.50	134	6 a.m.	1.84	27
......	......	......	......	......	......	......	......	......	......	......	......	6 p.m.	1.82	25

WEST BRANCH OF DELAWARE RIVER AT DELHI, N. Y.

LOCATION.—Lat. 42°16'15", long. 74°55'10", about 300 feet downstream from Steele Brook and about a quarter of a mile downstream from lower highway bridge in Delhi, Delaware County. Datum of gage is 1,345.97 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—142 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 3,000 second-feet.

MAXIMA.—July-August 1938: Discharge 2,170 second-feet 8 a.m. Aug. 11 (gage height, 5.23 feet).

1937 to June 1938: Discharge, 4,290 second-feet Jan. 25, 1938 (gage height, 6.82 feet), from rating curve extended above 3,000 second-feet on basis of area-velocity studies.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	225	269	9	81	226	17	61	192	25	400	86
2	275	286	10	79	200	18	198	232	26	309	79
3	178	199	11	87	1,460	19	180	188	27	335	75
4	150	166	12	126	640	20	134	144	28	248	69
5	128	139	13	81	435	21	285	123	29	465	64
6	113	118	14	72	336	22	580	115	30	550	62
7	99	176	15	72	265	23	720	104	31	300	60
8	90	202	16	66	229	24	540	92			
Monthly mean discharge, in second-feet										233	227
Runoff, in inches										1.89	1.84

Peak discharge.—July 23 (4:30 p.m.) 1,100 sec.-ft.

WEST BRANCH OF DELAWARE RIVER AT HALE EDDY, N. Y.

LOCATION.—Lat. 42°00'10", long. 75°23'15", at highway bridge in Hale Eddy, Delaware County, 9 miles upstream from confluence with East Branch of Delaware River. Datum of gage is 946.34 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—593 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 22,800 second-feet.

MAXIMA.—July-August 1938: Discharge, 19,600 second-feet 11 a.m. Aug. 11, (gage height, 13.75 feet).

1912 to June 1938: Discharge, about 26,500 second-feet Sept. 30, 1924 (gage height, 15.8 feet, from graph based on gage readings). Maximum discharge known, about 46,000 second-feet Oct. 10, 1903 (gage height, 20.3 feet).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	880	940	9	324	2,060	17	216	1,120	25	1,540	472
2	1,000	928	10	302	1,340	18	415	1,560	26	1,220	420
3	870	757	11	284	13,200	19	787	1,280	27	1,040	382
4	643	586	12	375	6,300	20	529	940	28	1,000	346
5	550	486	13	362	3,100	21	559	763	29	910	313
6	468	411	14	292	2,140	22	1,340	673	30	1,620	281
7	407	1,140	15	284	1,620	23	1,920	603	31	1,120	271
8	354	870	16	258	1,300	24	2,180	524			
Monthly mean discharge, in second-feet										777	1,520
Runoff, in inches										1.51	2.95

Peak discharge.—July 24 (12:30 a.m.) 2,580 sec.-ft.

LITTLE DELAWARE RIVER NEAR DELHI, N. Y.

LOCATION.—Lat. 42°15'10", long. 74°54'10", 20 feet downstream from highway bridge at Peck Hill, 1½ miles upstream from mouth, and 2 miles south of Delhi, Delaware County.

DRAINAGE AREA.—49.8 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 970 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 1,500 second-feet about 6 a.m. Aug. 11 (gage height, 5.7 feet from graph based on gage readings).

1937 to June 1938: Discharge, 2,180 second-feet Jan. 25, 1938 (gage height, 6.95 feet), from rating curve extended above 750 second-feet by logarithmic plotting.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	136	74	9	32	76	17	25	61	25	250	28
2	162	78	10	26	62	18	49	84	26	181	27
3	120	53	11	66	961	19	43	98	27	164	27
4	87	46	12	45	302	20	85	66	28	126	26
5	65	35	13	29	181	21	173	47	29	212	22
6	53	35	14	28	148	22	331	44	30	194	19
7	42	42	15	29	124	23	483	38	31	101	16
8	37	56	16	26	104	24	343	34			
Monthly mean discharge, in second-feet										121	97.2
Runoff, in inches										2.80	2.25

Peak discharge.—July 23 (9 a.m.) 843 sec.-ft.

NEVERSINK RIVER AT HALLS MILLS, NEAR CURRY, N. Y.

LOCATION.—Lat. 41°52'40", long. 74°36'20", 1¼ miles downstream from covered wooden bridge at Halls Mills and 1¾ miles northwest of Curry, Sullivan County.

DRAINAGE AREA.—68 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 5,100 second-feet and extended logarithmically to peak stage on basis of slope-area measurement.

MAXIMA.—July-August 1938: Discharge, 12,400 second-feet 9 a.m. July 22 (gage height, 10.05 feet).

1937 to June 1938: Discharge, 13,000 second-feet Oct. 23, 1937 (gage height, 10.37 feet, from floodmarks).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	139	410	9	140	232	17	84	218	25	620	129
2	220	470	10	166	204	18	81	280	26	425	123
3	149	279	11	136	3,600	19	300	228	27	342	117
4	121	232	12	167	720	20	226	188	28	335	108
5	114	206	13	135	405	21	1,640	172	29	375	105
6	99	206	14	106	309	22	5,900	160	30	325	99
7	91	265	15	106	257	23	3,250	147	31	246	94
8	88	236	16	99	225	24	1,340	135			
Monthly mean discharge, in second-feet										567	341
Runoff, in inches										9.62	5.78

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
....	....	....	July 22			....	....	....	....	....	....	....	....	....
....	....	....	1 a.m.	8.07	8,550	....	....	....	....	....	....	....	....	....
July 16			2	7.45	7,460	....	....	....	Aug. 5			Aug. 12		
6 a.m.	1.02	91	3	6.67	6,210	July 26			12 n.	1.12	213	2 a.m.	2.11	1,070
2 p.m.	1.02	91	4	6.45	5,880	12 n.	1.43	434	Aug. 6			4	1.98	959
3	1.14	139	5	6.34	5,710	12 m.	1.35	372	12 n.	1.08	189	6	1.86	865
5	1.09	117	6	6.55	6,020	July 27			8 p.m.	1.07	184	8	1.76	792
12 m.	1.03	95	7	7.65	7,790	12 n.	1.32	350	12 m.	1.29	328	10	1.67	730
July 17			8	9.25	10,800	12 m.	1.28	321	Aug. 7			12 n.	1.59	678
12 n.	1.00	84	9	10.05	12,400	July 28			3 a.m.	1.32	350	4 p.m.	1.42	581
12 m.	.97	76	10	9.70	11,700	8 a.m.	1.29	328	12 n.	1.18	252	8	1.29	517
July 18			11	8.30	9,360	4 p.m.	1.26	307	12 m.	1.11	206	12 m.	1.20	476
12 n.	.99	81	12 n.	6.70	6,900	8	1.38	395	Aug. 8			Aug. 13		
12 m.	1.02	91	1 p.m.	5.80	5,620	July 29			8 a.m.	1.10	200	6 a.m.	1.13	445
July 19			2	5.25	4,850	6 a.m.	1.29	328	4 p.m.	1.08	189	12 n.	1.05	411
6 a.m.	1.03	95	4	4.48	3,800	12 n.	1.40	410	6	1.37	388	6 p.m.	.93	361
8	1.12	130	6	3.90	3,060	7 p.m.	1.33	358	12 m.	1.22	279	12 m.	.87	337
10	1.51	367	8	3.49	2,570	10	1.44	442	Aug. 9			Aug. 14		
12 n.	1.88	626	10	3.23	2,260	July 30			12 n.	1.14	226	12 n.	.82	317
4 p.m.	1.62	444	12 m.	3.06	2,060	6 a.m.	1.33	358	12 m.	1.11	206	12 m.	.70	271
8	1.48	346	July 23			12 n.	1.28	321	Aug. 10			Aug. 15		
12 m.	1.38	277	4 a.m.	2.85	1,820	12 m.	1.20	265	12 n.	1.08	189	12 n.	.68	264
July 20			6	3.18	2,200	July 31			8 p.m.	1.06	178	12 m.	.58	228
6 a.m.	1.31	232	8	4.04	3,230	12 n.	1.18	252	12 m.	1.40	410	Aug. 16		
12 n.	1.27	208	10	4.76	4,170	12 m.	1.13	220	Aug. 11			12 n.	.59	232
5 p.m.	1.25	196	12 n.	5.63	5,380	Aug. 1			1 a.m.	1.75	715	12 m.	.57	225
6	1.31	232	2 p.m.	5.07	4,600	8 a.m.	1.18	252	2	2.65	1,600	Aug. 17		
12 m.	1.27	208	4	4.74	4,140	5 p.m.	1.17	246	3	4.10	3,310	12 n.	.54	215
July 21			6	4.43	3,740	7	1.50	490	4	6.10	6,040	12 m.	.52	208
5 a.m.	1.24	190	8	3.97	3,140	8	2.00	940	5	7.39	7,940	Aug. 18		
6	1.31	232	10	3.61	2,710	10	2.21	1,150	6	6.97	7,300	6 a.m.	.57	225
7	2.66	1,210	12 m.	3.31	2,350	12 m.	2.00	940	7	6.65	6,820	12 n.	.71	275
8	4.07	2,600	July 24			Aug. 2			8	6.98	7,320	4 p.m.	.94	365
9	4.57	3,200	2 a.m.	3.07	2,070	2 a.m.	1.78	742	9	6.50	6,600	12 m.	.71	275
10	4.56	3,190	4	2.86	1,840	4	1.65	625	10	5.75	5,550	Aug. 19		
11	4.18	2,740	6	2.70	1,660	6	1.55	535	11	5.15	4,710	12 n.	.58	228
12 n.	3.79	2,290	8	2.53	1,470	8	1.49	482	12 n.	4.68	4,060	12 m.	.48	195
2 p.m.	3.15	1,640	10	2.40	1,340	12 n.	1.42	426	1 p.m.	4.27	3,530	Aug. 20		
4	2.69	1,230	12 n.	2.29	1,230	6 p.m.	1.31	342	2	3.95	3,120	12 n.	.47	191
6	2.37	976	4 p.m.	2.11	1,050	12 m.	1.26	307	3	3.67	2,780	12 m.	.41	172
8	2.16	822	8	1.95	895	Aug. 3			4	3.42	2,480	Aug. 21		
10	3.73	2,220	12 m.	1.84	796	12 n.	1.23	286	5	3.20	2,220	12 n.	.42	175
11	6.35	5,720	July 25			12 m.	1.17	246	6	3.00	1,990	12 m.	.37	160
12 m.	8.00	8,420	6 a.m.	1.73	697	Aug. 4			7	2.83	1,800	Aug. 22		
....	....	....	12 n.	1.64	616	12 n.	1.17	246	8	2.68	1,640	12 n.	.48	195
....	....	....	6 p.m.	1.54	526	....	....	....	10	2.44	1,380	12 m.	.34	150
....	....	....	12 m.	1.49	482	....	....	....	12 m.	2.26	1,200	....	....	....

NEVERSINK RIVER AT WOODBOURNE, N. Y.

LOCATION.—Lat. 41°45'25", long. 72°35'55", a quarter of a mile downstream from bridge on State Highway 52 in Woodbourne, Sullivan County.

DRAINAGE AREA.—113 square miles.

GAGE-HEIGHT RECORD.—Staff gage read to hundredths twice daily and more frequently during floods. Record for July 19-23, Aug. 6-8, 10-12, determined from graph based on gage readings.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 9,000 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 12,300 second-feet 11 a.m. July 22 (gage height, 11.2 feet, from floodmarks and graph based on gage readings).

1937 to June 1938: Discharge, 11,000 second-feet Oct. 23, 1937 (gage height, 10.7 feet, from floodmarks and graph based on gage readings).

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	193	464	9	150	795	17	132	310	25	1,200	162
2	252	960	10	240	503	18	127	390	26	803	158
3	200	537	11	170	4,560	19	200	366	27	610	150
4	165	418	12	245	1,050	20	275	256	28	550	139
5	155	372	13	201	522	21	1,340	233	29	580	132
6	140	813	14	168	494	22	7,700	214	30	550	126
7	130	1,280	15	162	394	23	4,820	188	31	418	115
8	125	546	16	141	330	24	2,080	175			
Monthly mean discharge, in second-feet										781	553
Runoff, in inches										7.97	5.64

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
....	......	....		......	....		......	......	Aug. 7			Aug. 12		
....	......	....	July 22			July 30			2 a.m.	5.90	2,740	8 a.m.	4.10	1,180
July 16			12 n.	11.15	12,200	8 a.m.	3.22	562	4	5.10	1,970	6 p.m.	3.50	745
7 a.m.	1.65	138	2 p.m.	10.30	10,500	6 p.m.	3.15	522	6	4.45	1,440	Aug. 13		
5 p.m.	1.68	145	4	8.80	7,720	July 31			8	4.12	1,200	7 a.m.	3.13	511
July 17			8	7.30	5,240	8 a.m.	2.98	432	4 p.m.	3.50	745	4 p.m.	3.14	516
9 a.m.	1.65	138	12 m.	6.80	4,460	5 p.m.	2.93	408	Aug. 8			Aug. 14		
6 p.m.	1.60	127	July 23			Aug. 1			7 a.m.	3.14	516	8 a.m.	3.15	522
July 18			8 a.m.	6.23	3,660	8 a.m.	2.93	408	6 p.m.	3.07	478	5 p.m.	3.09	489
8 a.m.	1.58	123	12 n.	7.50	5,560	6 p.m.	3.01	447	8	3.13	511	Aug. 15		
4 p.m.	1.62	132	2 p.m.	8.25	6,760	Aug. 2			10	3.50	745	8 a.m.	2.94	413
July 19			4	8.10	6,520	2 a.m.	4.22	1,270	12 m.	4.00	1,100	5 p.m.	2.83	363
8 a.m.	1.68	145	8	7.10	4,920	7	3.98	1,090	Aug. 9			Aug. 16		
12 n.	1.90	201	12 m.	6.35	3,830	3 p.m.	3.69	878	8 a.m.	3.68	871	8 a.m.	2.78	342
2 p.m.	2.23	302	July 24			Aug. 3			4 p.m.	3.39	668	6 p.m.	2.75	330
6	2.04	241	8 a.m.	5.40	2,240	8 a.m.	3.20	550	Aug. 10			Aug. 17		
July 20			5 p.m.	4.80	1,720	6 p.m.	3.09	489	7 a.m.	3.12	505	8 a.m.	2.70	310
2 a.m.	2.03	238	July 25			Aug. 4			3 p.m.	3.04	463	5 p.m.	2.74	326
8	2.15	275	7 a.m.	4.25	1,290	8 a.m.	2.97	428	12 m.	3.40	675	Aug. 18		
8 p.m.	2.17	281	4 p.m.	4.00	1,100	4 p.m.	2.95	418	Aug. 11			8 a.m.	2.78	342
July 21			July 26			Aug. 5			2 a.m.	5.00	1,880	4 p.m.	2.97	428
6 a.m.	2.80	540	7 a.m.	3.67	864	8 a.m.	2.85	372	4	7.20	4,300	Aug. 19		
8	4.10	1,330	7 p.m.	3.46	717	4 p.m.	2.83	363	6	9.20	7,320	9 a.m.	2.85	372
10	5.40	2,600	July 27			Aug. 6			8	10.00	8,660	5 p.m.	2.77	338
12 n.	6.20	3,620	8 a.m.	3.35	642	7 a.m.	2.75	330	10	9.80	8,320	Aug. 20		
2 p.m.	5.27	2,460	4 p.m.	3.27	592	4 p.m.	2.87	381	12 n.	9.00	7,000	8 a.m.	2.59	270
6	3.75	1,080	July 28			8	2.95	418	2 p.m.	7.55	4,790	8 p.m.	2.54	253
10	3.32	812	8 a.m.	3.21	556	9	3.05	468	4	6.60	3,520	Aug. 21		
12 m.	4.50	1,670	5 p.m.	3.15	522	10	5.00	1,880	6	6.00	2,840	9 a.m.	2.48	233
July 22			July 29			11	9.00	7,000	8	5.60	2,440	5 p.m.	2.47	230
3 a.m.	9.10	8,260	8 a.m.	3.25	580	12 m.	7.20	4,300	10	5.30	2,150	Aug. 22		
6	7.40	5,400	5 p.m.	3.29	604	......	......	......	12 m.	5.00	1,880	9 a.m.	2.41	211
8	10.20	10,300	....	......	....	......	......	......	....	......	......	4 p.m.	2.42	214

NEVERSINK RIVER AT OAKLAND VALLEY, N. Y.

LOCATION.—Lat. 41°29′45″, long. 74°38′45″, 250 feet downstream from highway bridge known as Paradise Bridge, Orange County, and three-quarters of a mile south of Oakland Valley, Sullivan County. Datum of gage is 632.00 feet above mean sea level (general adjustment of 1912).

DRAINAGE AREA.—222 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 7,500 second-feet and extended to peak stage by logarithmic plotting.

MAXIMA.—July-August 1938: Discharge, 14,500 second-feet 2 p.m. July 22 (gage height, 10.70 feet).

1928 to June 1938: Discharge, 20,000 second-feet Aug. 24, 1933 (gage height, 12.61 feet), from rating curve extended above 4,100 second-feet by logarithmic plotting.

REMARKS.—Flood discharge not affected by storage or diversion.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	332	489	9	179	1,020	17	179	464	25	1,680	225
2	345	1,140	10	410	560	18	176	519	26	1,120	209
3	305	620	11	250	5,500	19	240	550	27	830	205
4	246	494	12	355	2,240	20	520	409	28	714	200
5	235	414	13	271	1,140	21	1,280	349	29	720	188
6	219	369	14	235	792	22	9,500	311	30	780	176
7	206	1,560	15	206	645	23	5,600	283	31	540	162
8	203	600	16	197	529	24	3,350	252			
Monthly mean discharge, in second-feet										1014	729
Runoff, in inches										5.27	3.78

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
....	......	....	July 22			....	....	......	Aug. 7			Aug. 11		
July 16			3 p.m.	10.62	14,300	July 27			8 a.m.	4.42	1,770	11 p.m.	5.96	3,740
12 n.	2.07	194	4	10.45	13,800	12 n.	3.33	826	10	4.11	1,470	12 m.	5.82	3,530
July 17			5	10.20	13,100	6 p.m.	3.27	786	12 n.	3.91	1,290	Aug. 12		
8 a.m.	2.00	173	6	9.80	11,900	9	3.30	805	2 p.m.	3.74	1,140	2 a.m.	5.68	3,320
12 n.	2.05	188	7	9.25	10,500	July 28			4	3.59	1,020	4	5.42	2,960
12 m.	2.00	173	8	8.90	9,620	12 n.	3.14	701	6	3.49	942	6	5.20	2,670
July 18			9	8.55	8,780	6 p.m.	3.14	701	8	3.37	854	8	5.02	2,440
2 a.m.	2.06	191	10	8.25	8,090	July 29			10	3.29	798	10	4.88	2,280
12 n.	2.01	176	11	8.00	7,540	4 a.m.	3.03	633	12 m.	3.21	746	12 n.	4.84	2,230
July 19			12 m.	7.70	6,900	7	3.15	708	Aug. 8			4 p.m.	4.49	1,840
2 a.m.	2.02	179	July 23			12 n.	3.10	675	6 a.m.	3.04	639	8	4.26	1,610
12 n.	2.03	182	1 a.m.	7.45	6,400	3 p.m.	3.17	720	2 p.m.	2.90	560	12 m.	4.05	1,420
4 p.m.	2.06	191	2	7.25	6,000	6	3.19	734	4	2.94	582	Aug. 13		
8	2.22	242	3	7.05	5,620	10	3.36	847	11	2.87	545	4 a.m.	3.88	1,260
10	2.40	310	4	6.85	5,240	July 30			12 m.	4.45	1,800	8	3.76	1,160
11	3.25	772	5	6.68	4,930	2 a.m.	3.38	861	Aug. 9			10	3.69	1,100
12 m.	3.23	760	6	6.51	4,640	12 n.	3.29	798	1 a.m.	4.57	1,930	12 n.	3.79	1,180
July 20			7	6.30	4,280	12 m.	2.99	610	2	4.46	1,810	4 p.m.	3.69	1,100
2 a.m.	3.13	694	8	6.22	4,150	July 31			3	4.26	1,610	8	3.58	1,010
6	2.94	582	9	5.90	3,650	12 n.	2.85	534	4	4.11	1,470	12 m.	3.42	890
10	2.80	505	10	5.95	3,720	12 m.	2.77	494	5	3.97	1,340	Aug. 14		
2 p.m.	2.69	447	11	6.07	3,910	Aug. 1			6	3.85	1,240	12 n.	3.26	779
6	2.62	412	12 n.	6.35	4,360	12 n.	2.71	464	7	3.76	1,160	7 p.m.	3.19	734
8	2.77	489	1 p.m.	6.65	4,880	12 m.	2.78	499	8	3.68	1,090	9	3.25	772
10	2.72	463	2	6.95	5,420	Aug. 2			10	3.55	990	Aug. 15		
12 m.	2.92	571	3	7.45	6,400	1 a.m.	2.83	524	12 n.	3.45	912	12 n.	3.03	633
July 21			4	7.75	7,000	2	3.80	1,190	2 p.m.	3.38	861	12 m.	2.93	576
2 a.m.	2.95	588	5	7.95	7,430	3	4.09	1,450	4	3.30	805	Aug. 16		
4	2.92	571	6	8.02	7,580	4	4.20	1,550	6	3.25	772	12 n.	2.82	519
6	2.81	510	7	7.95	7,430	5	4.31	1,660	8	3.17	720	12 m.	2.77	494
8	2.83	522	8	7.80	7,100	6	4.32	1,670	10	3.11	682	Aug. 17		
10	2.90	560	9	7.55	6,600	8	4.17	1,520	12 m.	3.04	639	8 a.m.	2.70	459
12 n.	2.86	538	10	7.38	6,260	10	3.98	1,350	Aug. 10			4 p.m.	2.71	464
2 p.m.	2.82	516	11	7.23	5,960	12 n.	3.82	1,210	6 a.m.	2.94	582	12 m.	2.71	464
3	5.50	3,070	12 m.	7.10	5,710	4 p.m.	3.57	1,010	12 n.	2.88	550	Aug. 18		
4	5.70	3,350	July 24			8	3.40	875	6 p.m.	2.83	524	3 a.m.	2.71	464
5	5.55	3,140	2 a.m.	6.71	4,990	12 m.	3.25	772	12 m.	2.85	534	5	2.91	566
6	5.31	2,810	4	6.39	4,430	Aug. 3			Aug. 11			2 p.m.	2.81	514
7	5.07	2,500	6	6.14	4,020	6 a.m.	3.07	657	1 a.m.	2.90	560	6	2.80	509
8	4.90	2,300	8	5.91	3,660	12 n.	2.97	598	2	3.00	615	12 m.	2.91	566
9	4.70	2,070	10	5.72	3,380	6 p.m.	2.90	560	3	3.12	688	Aug. 19		
10	4.56	1,920	12 n.	5.55	3,140	10	2.92	571	4	3.35	840	5 a.m.	3.10	621
11	4.43	1,780	2 p.m.	5.42	2,960	Aug. 4			5	3.90	1,280	12 n.	2.87	545
12 m.	4.35	1,700	4	5.28	2,770	12 n.	2.75	484	6	5.10	2,540	Aug. 20		
July 22			6	5.15	2,600	12 m.	2.69	454	7	6.70	4,970	12 n.	2.60	409
1 a.m.	4.31	1,660	8	5.03	2,460	Aug. 5			8	7.50	6,500	Aug. 21		
2	4.38	1,730	10	4.90	2,300	12 n.	2.60	409	9	8.30	8,200	12 n.	2.48	349
3	4.80	2,180	12 m.	4.79	2,170	Aug. 6			10	8.72	9,190	Aug. 22		
4	7.00	5,520	July 25			12 n.	2.50	359	11	9.00	9,860	12 n.	2.39	306
5	8.10	7,760	4 a.m.	4.60	1,960	4 p.m.	2.49	354	12 n.	9.03	9,930	....	......	......
6	8.75	9,260	8	4.44	1,790	7	2.54	379	1 p.m.	8.93	9,690	....	......	......
7	9.15	10,200	12 n.	4.30	1,650	12 m.	2.57	394	2	8.77	9,310	....	......	......
8	9.35	10,800	4 p.m.	4.17	1,520	Aug. 7			3	8.45	8,540	....	......	......
9	9.48	11,100	8	4.07	1,430	1 a.m.	2.68	449	4	8.03	7,610	....	......	......
10	9.72	11,700	12 m.	3.94	1,320	2	6.98	5,480	5	7.60	6,700	....	......	......
11	10.05	12,600	July 26			3	6.81	5,170	6	7.15	5,800	....	......	......
12 n.	10.30	13,300	12 n.	3.68	1,090	4	6.01	3,820	7	6.80	5,150	....	......	......
1 p.m.	10.50	13,900	12 m.	3.48	935	5	5.47	3,030	8	6.60	4,790	....	......	......
2	10.70	14,500	....	......	....	6	4.91	2,310	9	6.33	4,330	....	......	......
....	......	....	....	......	....	7	4.68	2,050	10	6.14	4,020	....	......	......

NEVERSINK RIVER AT GODEFFROY, N. Y.

Location.—Lat. 41°26′30″, long. 74°36′10″, at county highway bridge, half a mile downstream from Brasher Kill, three quarters of a mile southeast of Godeffroy, Orange County, and 8½ miles upstream from mouth.

Drainage area.—302 square miles.

Gage-height record.—Water-stage recorder graph.

Stage-discharge relation.—Defined by current-meter measurements below 8,100 second-feet and extended to peak stage by logarithmic plotting.

Maxima.—July-August 1938: Discharge, 16,100 second-feet 4:30 p.m. July 22 (gage height, 10.73 feet).

1903, 1909-14, 1937 to June 1938: Discharge, 12,800 second-feet Mar. 27, 1913 (gage height, 7.3 feet, present datum).

Flood of Oct. 9, 1903, reached a stage of about 10.5 feet, present datum (discharge not determined).

Remarks.—Flood discharge not affected by storage or diversion. Low and medium stages affected by operation of power plant above station.

Mean discharge, in second-feet, 1938

Day	July	August	Day	July	August	Day	July	August	Day	July	August
1	540	707	9	255	1,140	17	214	620	25	2,180	295
2	500	1,320	10	480	680	18	206	670	26	1,580	274
3	475	840	11	325	5,400	19	240	674	27	1,250	265
4	355	666	12	425	2,650	20	590	508	28	1,080	260
5	340	544	13	345	1,420	21	1,220	430	29	1,030	246
6	310	485	14	295	1,050	22	9,700	382	30	1,110	232
7	275	1,740	15	250	888	23	6,300	354	31	816	214
8	270	760	16	232	724	24	4,000	332			
Monthly mean discharge, in second-feet										1,200	864
Runoff, in inches										4.58	3.30

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.	Hour	Feet	Sec.-ft.
			July 23						Aug. 7			Aug. 11		
July 18			3 p.m.	7.85	6,730				12 n.	5.07	1,620	6 p.m.	8.30	7,960
12 n.	3.28	207	4	8.17	7,600				2 p.m.	4.87	1,400	7	7.92	6,910
July 19			5	8.36	8,130				4	4.78	1,300	8	7.62	6,130
12 n.	3.30	214	6	8.50	8,540	Aug. 1			6	4.67	1,180	10	7.16	5,030
5 p.m.	3.31	218	7	8.52	8,600	4 a.m.	4.18	724	8	4.58	1,090	12 m.	6.86	4,380
7	3.64	374	8	8.36	8,130	8	4.12	674	12 m.	4.44	953	Aug. 12		
12 m.	3.42	264	10	8.11	7,430	9	4.17	715	Aug. 8			2 a.m.	6.57	3,810
July 20			12 m.	7.85	6,730	10	4.12	674	6 a.m.	4.27	800	4	6.35	3,420
4 a.m.	4.22	782	July 24			5 p.m.	4.12	674	3 p.m.	4.13	683	6	6.16	3,120
12 n.	4.00	602	2 a.m.	7.53	5,910	6	4.17	715	4	3.88	495	8	6.00	2,870
11 p.m.	3.82	481	4	7.23	5,190	12 m.	4.21	748	5	4.29	816	12 n.	5.75	2,500
July 21			6	7.00	4,680	Aug. 2			6	4.18	724	4 p.m.	5.51	2,160
5 a.m.	4.14	714	8	6.83	4,320	3 a.m.	4.21	748	9	4.17	715	8	5.28	1,870
10	4.04	633	10	6.66	3,980	4	5.01	1,550	10	4.36	879	12 m.	5.12	1,670
12 n.	4.11	688	12 n.	6.52	3,720	5	5.15	1,710	11	4.02	596	Aug. 13		
5 p.m.	4.07	657	2 p.m.	6.33	3,390	6	5.25	1,830	12 m.	4.08	642	8 a.m.	4.89	1,420
6	6.10	3,020	4	6.26	3,280	9	5.24	1,820	Aug. 9			10	4.97	1,510
8	5.96	2,810	6	6.16	3,120	12 n.	5.00	1,540	2 a.m.	4.09	650	12 n.	4.82	1,340
10	5.66	2,370	8	6.06	2,960	4 p.m.	4.83	1,350	3	5.28	1,870	2 p.m.	4.88	1,410
12 m.	5.45	2,080	10	5.97	2,820	8	4.68	1,190	4	5.23	1,810	12 m.	4.69	1,200
July 22			12 m.	5.89	2,700	12 m.	4.54	1,050	6	5.03	1,570	Aug. 14		
2 a.m.	5.29	1,880	July 25			Aug. 3			8	4.88	1,410	6 a.m.	4.58	1,090
4	5.50	2,150	6 a.m.	5.67	2,390	6 a.m.	4.37	888	10	4.73	1,240	12 n.	4.56	1,070
5	7.50	5,840	12 n.	5.51	2,160	12 n.	4.27	800	12 n.	4.63	1,140	6 p.m.	4.47	982
6	8.35	8,100	6 p.m.	5.35	1,960	12 m.	4.22	757	5 p.m.	4.44	953	12 m.	4.49	1,000
7	8.90	9,740	12 m.	5.23	1,810	Aug. 4			6	4.46	972	Aug. 15		
8	9.23	10,800	July 26			12 n.	4.08	642	8	4.38	897	8 a.m.	4.38	897
9	9.43	11,400	12 n.	5.06	1,610	12 m.	4.05	619	12 m.	4.28	808	10	4.45	962
10	9.60	12,000	12 m.	4.87	1,400	Aug. 5			Aug. 10			12 n.	4.42	934
11	9.80	12,700	July 27			12 n.	3.96	551	8 a.m.	4.14	691	3 p.m.	4.30	825
12 n.	10.10	13,800	12 n.	4.72	1,230	12 m.	3.92	522	10	4.14	691	7	4.34	861
1 p.m.	10.27	14,400	12 m.	4.66	1,170	Aug. 6			12 n.	4.03	603	12 m.	4.26	791
2	10.50	15,200	July 28			8 a.m.	3.90	508	1 p.m.	4.14	691	Aug. 16		
3	10.60	15,600	12 n.	4.57	1,080	10	3.78	430	6	4.08	642	12 n.	4.17	715
4	10.70	16,000	12 m.	4.49	1,000	12 n.	3.86	482	12 m.	4.10	658	12 m.	4.11	666
5	10.70	16,000	July 29			2 p.m.	3.90	508	Aug. 11			Aug. 17		
6	10.53	15,300	6 a.m.	4.44	953	4	3.89	501	2 a.m.	4.16	707	12 n.	4.01	588
7	10.10	13,800	12 n.	4.49	1,000	6	3.81	449	4	4.22	757	3 p.m.	4.04	611
8	9.50	11,700	4 p.m.	4.60	1,110	10	3.80	442	6	4.44	953	4	4.16	707
9	8.88	9,680	5	4.70	1,210	12 m.	3.94	537	7	4.70	1,210	6	4.10	658
10	8.45	8,390	6	4.60	1,110	Aug. 7			8	5.50	2,150	8	4.02	596
11	8.10	7,400	12 m.	4.65	1,160	3 a.m.	3.89	501	9	6.95	4,570	Aug. 18		
12 m.	7.87	6,780	July 30			4	7.14	4,990	10	7.90	6,860	4 a.m.	4.02	596
July 23			12 n.	4.64	1,150	5	6.90	4,460	11	8.50	8,540	6	4.17	715
2 a.m.	7.55	5,960	8 p.m.	4.50	1,010	6	6.42	3,540	12 n.	9.15	10,500	12 n.	4.14	691
4	7.33	5,430	9	4.55	1,060	7	5.93	2,760	1 p.m.	9.33	11,100	8 p.m.	4.10	658
6	7.15	5,010	10	4.44	953	8	5.65	2,360	2	9.32	11,100	Aug. 19		
8	6.98	4,640	July 31			9	5.43	2,060	3	9.25	10,900	6 a.m.	4.23	766
10	6.91	4,480	6 a.m.	4.33	852	10	5.28	1,870	4	9.05	10,200	12 n.	4.14	691
12 n.	7.08	4,860	2 p.m.	4.26	791				5	8.75	9,290	12 m.	4.02	596
1 p.m.	7.28	5,310	8	4.22	757							Aug. 20		
2	7.51	5,860	9	4.35	870							12 n.	3.91	515
			10	4.21	748							Aug. 21		
												12 n.	3.76	418
												Aug. 22		
												12 n.	3.72	394

FLAT BROOK NEAR FLATBROOKVILLE, N. J.

LOCATION.—Lat. 41°06′24″, long. 74°57′09″, 1 mile upstream from Flatbrookville, Sussex County, and 1½ miles upstream from mouth. Datum of gage is 347.73 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—65.1 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 700 second-feet; extended to peak stage on basis of slope-area determination at gage height 6.5 feet.

MAXIMA.—June 1938: Discharge, 1,560 second-feet 9 a.m. June 28 (gage height, 5.22 feet).

July 1938: Discharge, 2,400 second-feet 2 a.m. July 24 (gage height, 6.14 feet).

September 1938: Discharge, 3,390 second-feet 3 a.m. Sept. 22 (gage height, 7.03 feet.

1923 to May 1938: Discharge, 3,470 second-feet Apr. 7, 1924, and Feb. 11, 1925 (gage height, 7.1 feet, from floodmarks), from rating curve extended above 700 second-feet on basis of slope-area measurement at gage height 6.5 feet.

REMARKS.—Flood discharge not materially affected by storage.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	56	211	161	11	40	70	228	21	47	102	107
2	51	180	460	12	40	110	166	22	43	626	93
3	65	145	230	13	87	88	112	23	54	1,010	84
4	61	123	158	14	272	70	95	24	65	1,520	76
5	54	107	151	15	158	70	86	25	50	616	68
6	50	88	178	16	90	61	78	26	62	352	65
7	45	80	128	17	70	53	98	27	303	257	61
8	51	74	117	18	74	50	215	28	1,210	222	60
9	54	68	112	19	61	72	215	29	617	177	54
10	44	80	115	20	51	72	131	30	315	194	53
								31		164	51
Monthly mean discharge, in second-feet									141	229	129
Runoff, in inches									2.42	4.06	2.28

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	2.13	41	2.36	80	2.22	54	2.16	45	2.56	128	4.22	912
4	2.13	41	2.34	76	2.21	53	2.16	45	2.57	131	4.48	1,070
6	2.13	41	2.32	72	2.21	53	2.16	45	2.59	136	4.91	1,350
8	2.13	41	2.31	70	2.20	51	2.16	45	2.60	139	5.19	1,550
10	2.13	41	2.30	68	2.19	50	2.16	45	2.63	148	5.19	1,550
12 n.	2.13	41	2.28	65	2.19	50	2.16	45	2.65	154	5.09	1,470
2 p.m.	2.19	50	2.28	65	2.18	48	2.24	58	2.70	170	4.93	1,360
4	2.27	63	2.27	63	2.18	48	2.30	68	2.85	222	4.74	1,230
6	2.27	63	2.26	61	2.18	48	2.34	76	3.23	386	4.57	1,120
8	2.35	78	2.25	60	2.17	47	2.43	95	3.79	714	4.39	1,010
10	2.39	86	2.23	56	2.17	47	2.48	107	4.04	820	4.26	936
12 m.	2.38	84	2.22	54	2.16	45	2.52	117	4.12	860	4.13	865
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	4.00	800	3.24	391	2.89	237	2.76	190	2.66	158	2.56	128
4	3.89	756	3.21	376	2.87	230	2.76	190	2.65	154	2.56	128
6	3.81	724	3.16	352	2.86	226	2.75	187	2.64	151	2.55	126
8	3.74	685	3.14	343	2.84	219	2.75	187	2.64	151	2.55	126
10	3.67	642	3.11	329	2.83	215	2.75	187	2.63	148	2.54	123
12 n.	3.60	597	3.08	315	2.82	211	2.74	184	2.63	148	2.54	123
2 p.m.	3.54	560	3.06	307	2.81	208	2.73	180	2.62	145	2.54	123
4	3.48	523	3.03	294	2.79	201	2.72	177	2.61	142	2.53	120
6	3.43	494	3.00	281	2.79	201	2.71	173	2.60	139	2.52	117
8	3.38	466	2.96	265	2.78	197	2.69	167	2.59	136	2.52	117
10	3.33	438	2.93	253	2.78	197	2.68	164	2.58	134	2.51	115
12 m.	3.28	412	2.91	245	2.77	194	2.67	161	2.57	131	2.50	112

Gage-height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	------	------	------	2.22	54	2.33	74	2.33	74	2.83	215
4	------	------	------	------	2.22	54	2.32	72	2.32	72	2.93	253
6	------	------	------	------	2.25	60	2.31	70	2.31	70	3.10	324
8	------	------	------	------	2.27	63	2.31	70	2.32	72	3.27	407
10	------	------	------	------	2.31	70	2.31	70	2.38	84	3.52	547
12 n.	------	------	------	------	2.38	84	2.30	68	2.38	84	3.85	740
2 p.m.	------	------	------	------	2.40	88	2.31	70	2.40	88	4.10	850
4	------	------	------	------	2.40	88	2.32	72	2.45	100	4.21	906
6	------	------	------	------	2.38	84	2.33	74	2.53	120	4.24	924
8	------	------	------	------	2.37	82	2.38	84	2.63	148	4.23	918
10	------	------	------	------	2.36	80	2.38	84	2.70	170	4.22	912
12 m.	------	------	------	------	2.35	78	2.36	80	2.78	197	4.21	906
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.16	880	6.14	2,400	3.92	768	3.32	433	3.00	281	2.90	241
4	4.10	850	6.06	2,320	3.84	736	3.28	412	2.99	277	2.89	237
6	4.03	815	5.83	2,100	3.76	697	3.24	391	2.98	273	2.87	230
8	3.93	772	5.55	1,840	3.71	668	3.20	371	2.97	269	2.86	226
10	3.92	768	5.31	1,650	3.64	623	3.18	362	2.95	261	2.85	222
12 n.	3.86	744	5.00	1,410	3.59	591	3.15	348	2.93	253	2.84	219
2 p.m.	4.18	890	4.72	1,210	3.54	560	3.12	333	2.92	249	2.83	215
4	4.32	972	4.55	1,110	3.49	529	3.10	324	2.91	245	2.82	211
6	4.41	1,030	4.39	1,010	3.46	512	3.08	315	2.90	241	2.81	208
8	4.62	1,150	4.24	924	3.42	489	3.06	307	2.90	241	2.82	211
10	5.28	1,620	4.12	860	3.38	466	3.03	294	2.90	241	2.82	211
12 m.	5.91	2,170	4.02	810	3.34	444	3.01	285	2.90	241	2.80	204
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.76	190	2.73	180	2.74	184	2.62	145	3.31	428	3.02	290
4	2.74	184	2.76	190	2.73	180	2.62	145	3.48	523	2.98	273
6	2.73	180	2.77	194	2.72	177	2.62	145	3.56	572	2.94	257
8	2.73	180	2.78	197	2.71	173	2.62	145	3.57	578	2.91	245
10	2.72	177	2.78	197	2.70	170	2.62	145	3.53	554	2.88	234
12 n.	2.71	173	2.78	197	2.68	164	2.62	145	3.49	529	2.86	226
2 p.m.	2.71	173	2.78	197	2.67	161	2.62	145	3.43	494	2.84	219
4	2.70	170	2.78	197	2.66	158	2.61	142	3.35	450	2.82	211
6	2.70	170	2.78	197	2.65	154	2.65	154	3.29	417	2.80	204
8	2.69	167	2.77	194	2.64	151	2.69	167	3.24	391	2.77	194
10	2.69	167	2.76	190	2.62	145	2.86	226	3.16	352	2.75	187
12 m.	2.70	170	2.75	187	2.62	145	3.12	333	3.09	320	2.73	180

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	65	115	9	38	76	17	44	56	25	253	224
2	58	102	10	36	72	18	41	54	26	197	136
3	51	93	11	35	68	19	76	54	27	167	112
4	53	88	12	34	66	20	439	58	28	148	102
5	48	84	13	36	63	21	1,000	182	29	131	100
6	44	86	14	36	61	22	2,050	110	30	120	95
7	41	100	15	46	61	23	670	84	31		86
8	43	84	16	60	60	24	376	112			
Monthly mean discharge, in second-feet										215	91.7
Runoff, in inches										3.68	1.63

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	September 18		September 19		September 20		September 21		September 22		September 23	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.	------	-------	2.13	41	2.73	180	3.59	591	6.77	3,080	4.17	885
2	------	-------	2.13	41	2.79	201	3.60	597	6.96	3,300	4.12	860
3	------	-------	2.13	41	2.87	230	3.63	616	7.03	3,390	4.07	835
4	------	-------	2.13	41	2.90	241	3.66	636	7.00	3,350	4.02	810
5	------	-------	2.13	41	2.98	273	3.71	668	6.92	3,250	3.98	792
6	------	-------	2.13	41	3.05	302	3.76	697	6.77	3,080	3.94	776
7	------	-------	2.14	43	3.12	333	3.80	720	6.57	2,860	3.89	756
8	------	-------	2.16	45	3.17	357	3.84	736	6.34	2,600	3.85	740
9	------	-------	2.21	53	3.23	386	3.87	748	6.14	2,400	3.82	728
10	------	-------	2.31	70	3.28	412	3.91	764	5.93	2,190	3.77	703
11	------	-------	2.34	76	3.34	444	3.94	776	5.71	1,990	3.74	685
12 n.	------	-------	2.36	80	3.38	466	3.97	788	5.53	1,830	3.71	668
1 p.m.	------	-------	2.38	84	3.43	494	4.03	815	5.37	1,700	3.67	642
2	------	-------	2.41	90	3.48	523	4.09	845	5.21	1,570	3.65	630
3	------	-------	2.37	82	3.52	547	4.28	948	5.05	1,440	3.62	610
4	------	-------	2.38	84	3.55	566	4.47	1,060	4.94	1,370	3.58	585
5	------	-------	2.39	86	3.56	572	4.60	1,140	4.81	1,280	3.56	572
6	------	-------	2.42	93	3.57	578	4.69	1,190	4.69	1,190	3.53	554
7	------	-------	2.44	98	3.57	578	4.76	1,240	4.59	1,130	3.51	541
8	------	-------	2.48	107	3.58	585	4.86	1,310	4.51	1,090	3.49	529
9	------	-------	2.51	115	3.57	578	5.06	1,450	4.44	1,040	3.46	512
10	------	-------	2.58	134	3.59	591	5.46	1,770	4.35	990	3.44	500
11	------	-------	2.63	148	3.58	585	5.96	2,220	4.28	948	3.42	489
12 m.	------	-------	2.68	164	3.59	591	6.37	2,640	4.23	918	3.40	477
	September 24		September 25		September 26		September 27		September 28		September 29	
2 a.m.	3.36	455	3.02	290	------	-------	------	-------	------	-------	------	-------
4	3.33	438	3.00	281	------	-------	------	-------	------	-------	------	-------
6	3.29	417	2.99	277	------	-------	------	-------	------	-------	------	-------
8	3.26	402	2.97	269	------	-------	------	-------	------	-------	------	-------
10	3.24	391	2.94	257	------	-------	------	-------	------	-------	------	-------
12 n.	3.21	376	2.93	253	------	-------	------	-------	------	-------	------	-------
2 p.m.	3.18	362	2.92	249	------	-------	------	-------	------	-------	------	-------
4	3.15	348	2.90	241	------	-------	------	-------	------	-------	------	-------
6	3.13	338	2.89	237	------	-------	------	-------	------	-------	------	-------
8	3.10	324	2.86	226	------	-------	------	-------	------	-------	------	-------
10	3.07	311	2.84	219	------	-------	------	-------	------	-------	------	-------
12 m.	3.05	302	2.83	215	------	-------	------	-------	------	-------	------	-------

PAULINS KILL AT BLAIRSTOWN, N. J.

LOCATION.—Lat. 40°58′44″, long. 74°57′15″, 1,200 feet upstream from highway bridge in Blairstown, Warren County, 1,400 feet upstream from Blairs Creek, and 10 miles upstream from mouth. Datum of gage is 335.86 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—126 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except 2:30 p.m. July 31 to 4:30 p.m. Aug. 9, and Aug. 15-22, and 2 a.m. Sept. 23 to 5 p.m. Sept. 29, for which periods recorder chart is missing.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,500 second-feet; extended to peak stage on basis of determination of discharge gage height 6.92 feet by weir formula and slope-area method.

MAXIMA.—June 1938: Discharge, 3,700 second-feet 8 a.m. June 28 (gage height, 7.08 feet).

July 1938: Discharge, 2,540 second-feet 2 a.m. July 24 (gage height, 6.16 feet).

September 1938: Discharge, 4,480 second-feet 3 a.m. Sept. 22 (gage height, 7.56 feet).

1921 to May 1938: Discharge, 3,480 second-feet Mar. 12, 1936 (gage height, 6.92 feet).

REMARKS.—Discharge for periods of no gage-height record computed on basis of records for Pequest River at Pequest. Flow affected by natural storage in Culver Lake, Lake Owassa, and Swartswood Lake.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	75	790	380	11	73	156	559	21	66	540	210
2	68	598	400	12	82	265	440	22	61	1,050	190
3	76	430	350	13	86	241	310	23	191	1,510	169
4	79	337	300	14	164	194	233	24	232	2,040	150
5	70	280	300	15	166	173	200	25	144	1,270	136
6	66	222	400	16	117	148	190	26	220	910	123
7	62	212	350	17	92	130	220	27	901	673	114
8	84	186	280	18	103	118	470	28	2,880	544	109
9	83	169	260	19	106	161	500	29	1,770	457	100
10	70	165	224	20	81	173	320	30	1,180	474	96
								31		400	98
Monthly mean discharge, in second-feet									315	484	264
Runoff, in inches									2.79	4.43	2.42

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	1.33	58	2.05	327	1.65	169	1.53	122	2.72	551	6.12	2,490
4	1.33	58	1.94	288	1.68	182	1.60	148	2.76	566	6.48	2,910
6	1.37	70	1.88	265	1.58	141	1.56	133	2.88	610	6.88	3,420
8	1.36	67	1.83	245	1.62	156	1.64	165	3.00	654	7.08	3,700
10	1.34	61	1.80	233	1.56	133	1.61	152	3.26	754	6.95	3,520
12 n.	1.34	61	1.77	220	1.64	165	1.56	133	3.20	731	6.78	3,280
2 p.m.	1.35	64	1.76	216	1.58	141	1.55	130	3.42	818	6.61	3,060
4	1.32	56	1.73	203	1.54	126	1.68	182	3.56	874	6.44	2,860
6	2.24	388	1.73	203	1.50	111	1.69	186	4.08	1,080	6.30	2,690
8	2.90	617	1.70	190	1.53	122	2.20	375	4.67	1,360	6.15	2,520
10	2.70	544	1.64	165	1.53	122	2.56	495	5.05	1,600	5.99	2,360
12 m.	2.27	397	1.65	169	1.53	122	2.72	551	5.53	1,940	5.86	2,230

	June 29		June 30		Juy 1		July 2		July 3		July 4	
2 a.m.	5.75	2,140	4.70	1,380	3.66	914	3.12	700	2.55	492	2.17	366
4	5.66	2,050	4.64	1,340	3.62	898	3.10	692	2.52	481	2.19	372
6	5.58	1,980	4.53	1,280	3.52	858	3.02	662	2.42	447	2.13	353
8	5.48	1,900	4.44	1,240	3.44	826	2.95	636	2.44	454	2.06	330
10	5.41	1,850	4.36	1,200	3.42	818	2.92	624	2.40	440	2.14	356
12 n.	5.33	1,790	4.26	1,150	3.32	778	2.84	595	2.34	420	2.10	344
2 p.m.	5.24	1,730	4.17	1,120	3.24	747	2.87	606	2.32	414	2.05	327
4	5.14	1,660	4.08	1,080	3.15	712	2.73	555	2.32	414	2.07	334
6	5.08	1,620	4.01	1,050	3.10	692	2.76	566	2.28	401	2.00	310
8	4.97	1,540	3.89	1,010	3.07	681	2.62	516	2.25	391	1.98	303
10	4.89	1,490	3.81	974	3.14	708	2.62	516	2.20	375	1.98	303
12 m.	4.80	1,440	3.74	946	3.17	719	2.60	509	2.20	375	1.99	306

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 5		July 6		July 7		July 8		July 9		July 10	
2 a.m.	1.97	299	1.87	261	1.76	216	1.70	190	1.66	173	1.64	165
4	1.98	303	1.89	269	1.80	233	1.70	190	1.66	173	1.70	190
6	1.96	295	1.90	273	1.77	220	1.72	199	1.68	182	1.66	173
8	1.89	269	1.84	249	1.77	220	1.71	194	1.67	177	1.66	173
10	1.94	288	1.78	224	1.76	216	1.70	190	1.67	177	1.65	169
12 n.	1.88	265	1.88	265	1.73	203	1.70	190	1.60	148	1.59	144
2 p.m.	1.93	284	1.40	78	1.76	216	1.70	190	1.66	173	1.59	144
4	1.89	269	1.69	186	1.70	190	1.64	165	1.64	165	1.62	156
6	1.92	280	1.82	241	1.76	216	1.70	190	1.68	182	1.68	182
8	1.88	265	1.82	241	1.74	207	1.65	169	1.57	137	1.63	161
10	1.87	261	1.76	216	1.70	190	1.63	161	1.62	156	1.59	144
12 m.	1.86	257	1.76	216	1.70	190	1.65	169	1.63	161	1.60	148

Supplemental records.—June 25, 3 p.m., 1.51 ft., 115 sec.-ft.; 5 p.m., 1.60 ft., 148 sec.-ft.; June 26, 6:30 a.m., 1.51 ft., 115 sec.-ft.; 5 p.m., 2.03 ft., 320 sec.-ft.; June 27, 7 a.m., 3.09 ft., 688 sec.-ft.; 9 a.m. 2.92 ft., 624 sec.-ft.; 7 p.m., 4.73 ft., 1,400 sec.-ft.; July 5, 6:30 a.m., 2.10 ft., 344 sec.-ft.; 7 a.m., 1.87 ft., 261 sec.-ft.; 10:30 p.m., 1.83 ft., 245 sec.-ft.; July 6, 5:30 a.m., 1.98 ft., 303 sec.-ft.; 9:30 a.m., 1.47 ft., 101 sec.-ft.; 3 p.m., 1.28 ft., 45 sec.-ft.; July 7, 12:30 p.m., 1.80 ft., 233 sec.-ft.; July 8, 5 p.m., 1.72 ft., 199 sec.-ft.; July 9, 5 a.m., 1.72 ft., 199 sec.-ft.; 4:30 p.m., 1.58 ft., 141 sec.-ft.; July 10, 6:30 a.m., 1.60 ft., 148 sec.-ft.; 12:30 p.m., 1.68 ft., 182 sec.-ft.

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.56	133	1.52	118	1.61	152	1.60	148	1.66	175	3.55	870
4	1.62	156	1.52	118	1.63	161	1.64	165	1.69	186	3.53	862
6	1.58	141	1.55	130	1.68	182	1.61	152	1.69	186	3.52	858
8	1.60	148	1.51	115	1.67	177	1.62	156	1.65	169	3.54	866
10	1.57	137	1.51	115	1.66	173	1.67	177	2.62	516	3.65	910
12 n.	1.50	111	1.47	101	1.64	165	1.73	203	2.85	598	3.97	1,040
2 p.m.	1.57	137	1.53	122	1.64	165	1.71	194	3.28	762	4.16	1,110
4	1.55	130	1.45	94	1.58	141	1.69	186	3.51	854	4.31	1,180
6	1.51	115	1.56	133	1.66	173	1.71	194	3.44	826	4.80	1,440
8	1.55	130	1.51	115	1.63	161	1.69	186	3.45	830	4.46	1,250
10	1.51	115	1.51	115	1.62	156	1.65	169	3.49	846	4.46	1,250
12 m.	1.52	118	1.55	130	1.60	148	1.66	173	3.55	870	4.53	1,280
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	4.57	1,300	6.16	2,540	4.92	1,510	3.97	1,040	3.24	746	2.89	613
4	4.60	1,320	6.09	2,460	4.83	1,460	3.91	1,010	3.21	735	2.88	610
6	4.57	1,300	5.97	2,340	4.75	1,410	3.83	982	3.13	703	2.80	580
8	4.54	1,290	5.84	2,220	4.66	1,360	3.76	954	3.09	688	2.78	573
10	4.49	1,260	5.69	2,080	4.57	1,300	3.66	914	3.01	658	2.69	540
12 n.	4.55	1,300	5.60	2,000	4.50	1,270	3.63	902	3.01	658	2.70	544
2 p.m.	4.75	1,410	5.49	1,910	4.40	1,220	3.52	858	2.90	617	2.61	512
4	4.98	1,550	5.40	1,840	4.33	1,180	3.51	854	2.99	650	2.62	516
6	5.28	1,760	5.28	1,760	4.25	1,150	3.43	822	2.94	632	2.59	506
8	5.54	1,950	5.16	1,670	4.15	1,110	3.34	786	3.03	665	2.53	484
10	5.67	2,060	5.09	1,620	4.09	1,090	3.34	786	3.07	681	2.54	488
12 m.	5.94	2,310	5.00	1,560	4.03	1,060	3.29	766	2.98	647	2.52	481
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	2.50	474	2.58	502	------	------	------	------	------	------	------	------
4	2.52	481	2.54	488	------	------	------	------	------	------	------	------
6	2.42	447	2.54	488	------	------	------	------	------	------	------	------
8	2.40	440	2.55	492	------	------	------	------	------	------	------	------
10	2.41	443	2.53	484	------	------	------	------	------	------	------	------
12 n.	2.40	440	2.56	495	------	------	------	------	------	------	------	------
2 p.m.	2.31	410	2.47	464	------	------	------	------	------	------	------	------
4	2.36	427	2.49	471	------	------	------	------	------	------	------	------
6	2.37	430	2.43	450	------	------	------	------	------	------	------	------
8	2.62	516	2.36	427	------	------	------	------	------	------	------	------
10	2.67	534	2.35	424	------	------	------	------	------	------	------	------
12 m.	2.61	512	2.34	420	------	------	------	------	------	------	------	------

Supplemental records.—July 21, 6:45 p.m., 3.81 ft., 974 sec.-ft.; July 22, 6:15 p.m., 4.95 ft., 1,530 sec.-ft.

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	126	280	9	90	187	17	110	123	25	800	305
2	117	249	10	74	169	18	99	115	26	700	244
3	98	229	11	69	143	19	146	109	27	550	207
4	93	207	12	66	148	20	701	122	28	450	190
5	92	194	13	68	142	21	1,750	251	29	350	177
6	83	200	14	70	137	22	3,140	220	30	313	161
7	78	230	15	110	133	23	1,800	179	31		144
8	86	208	16	135	126	24	1,000	202			
Monthly mean discharge, in second-feet										445	185
Runoff, in inches										3.94	1.70

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	September 18		September 19		September 20		September 21		September 22		September 23	
1 a.m.	------	-------	1.49	108	1.91	277	4.00	1,050	7.42	4,200	------	-------
2	------	-------	1.49	108	2.06	330	4.06	1,070	7.52	4,350	------	-------
3	------	-------	1.49	108	2.23	385	4.12	1,100	7.56	4,480	------	-------
4	------	-------	1.49	108	2.46	460	4.15	1,110	7.54	4,380	------	-------
5	------	-------	1.57	137	2.74	558	4.20	1,130	7.44	4,230	------	-------
6	------	-------	1.54	126	2.74	558	4.16	1,110	7.32	4,050	------	-------
7	------	-------	1.52	118	2.86	602	4.15	1,110	7.20	3,870	------	-------
8	------	-------	1.52	118	2.97	643	4.17	1,120	7.06	3,670	------	-------
9	------	-------	1.52	118	3.41	814	4.23	1,140	6.92	3,480	------	-------
10	------	-------	1.51	115	3.23	743	4.31	1,180	6.80	3,310	------	-------
11	------	-------	1.50	111	3.21	735	5.07	1,610	6.67	3,140	------	-------
12 n.	------	-------	1.56	133	3.22	739	4.70	1,380	6.54	2,980	------	-------
1 p.m.	------	-------	1.58	141	3.24	747	4.76	1,420	6.44	2,860	------	-------
2	------	-------	1.57	137	3.30	770	4.96	1,540	6.32	2,710	------	-------
3	------	-------	1.57	137	3.44	826	5.16	1,670	6.22	2,600	------	-------
4	------	-------	1.58	141	3.36	794	5.36	1,810	6.15	2,520	------	-------
5	------	-------	1.66	173	3.40	810	5.57	1,980	6.09	2,460	------	-------
6	------	-------	1.70	190	3.48	842	5.75	2,140	6.00	2,370	------	-------
7	------	-------	1.69	186	3.49	846	5.97	2,340	5.94	2,310	------	-------
8	------	-------	1.70	190	3.54	866	6.30	2,690	5.89	2,260	------	-------
9	------	-------	1.74	207	3.63	902	6.66	3,130	5.84	2,220	------	-------
10	------	-------	1.75	212	3.72	938	6.95	3,520	5.80	2,180	------	-------
11	------	-------	1.78	224	3.83	982	7.12	3,760	5.75	2,140	------	-------
12 m.	------	-------	1.84	249	3.93	1,020	7.27	3,980	5.71	2,100	------	-------

Supplemental records.—Sept. 19, 11:30 a.m., 1.45 ft., 94 sec.-ft.; 3:30 p.m., 1.55 ft., 130 sec.-ft.; 7:30 p.m., 1.66 ft., 173 sec.-ft.; Sept. 29, 7 p.m., 2.11 ft., 347 sec.-ft.

LAKE HOPATCONG AT LANDING, N. J.

Location.—Lat. 40°55′00″, long. 74°39′50″, on Musconetcong River at Lake Hopatcong Dam, Landing, Morris County. Datum of gage is 914.57 feet above mean sea level (New Jersey Geological Survey bench mark).

Drainage area.—25.6 square miles.

Gage-height record.—Water-stage recorder graph except for period July 16-21. Gage heights at midnight shown in table.

Remarks.—Capacity above sill of lowest gate (gage height, —3.1 feet) is about 800,000,000 cubic feet. Crest of spillway is at gage height 8.89 feet. Table gives storage above gage height 4.12 feet. Recorder operated by employee of Morris Canal & Banking Co.

Gage height, in feet, and contents, in millions of cubic feet, 1938

Day	June		July		August		September		October	
	Gage height	Contents	Gage height	Contents	Gage height	Contents	Gage height	Contents	Gage height	Contents
1	9.12	482	9.54	528	9.50	523	9.00	469	9.25	496
2	9.10	480	9.48	521	9.47	520	8.97	466	9.19	490
3	9.15	486	9.42	515	9.43	516	8.95	464	9.14	485
4	9.13	483	9.37	509	9.39	512	8.92	461	9.09	479
5	9.13	483	9.32	504	9.37	509	8.91	460	9.05	475
6	9.11	481	9.30	502	9.40	513	8.88	457	9.04	474
7	9.14	485	9.27	499	9.38	510	8.88	457	9.02	472
8	9.16	487	9.23	494	9.35	507	8.81	450	9.00	469
9	9.14	485	9.21	492	9.33	505	8.76	444	8.95	464
10	9.12	482	9.20	491	9.35	507	8.74	442	8.92	461
11	9.13	483	9.27	499	9.38	510	8.70	438	8.89	458
12	9.18	489	9.29	501	9.34	506	8.65	433	8.86	455
13	9.18	489	9.28	500	9.30	502	8.67	435	8.80	449
14	9.19	490	9.26	498	9.27	499	8.62	430	8.78	447
15	9.18	489	9.25	496	9.25	496	8.66	434	8.73	441
16	9.15	486	--------	--------	9.23	494	8.63	431	8.69	437
17	9.13	483	--------	--------	9.22	493	8.60	428	8.66	434
18	9.14	485	--------	--------	9.20	491	8.59	427	8.60	428
19	9.12	482	--------	--------	9.18	489	8.77	446	8.56	424
20	9.11	481	--------	--------	9.17	488	9.06	476	8.63	431
21	9.10	480	--------	--------	9.14	485	9.60	534	8.62	430
22	9.08	478	9.72	547	9.13	483	9.76	551	8.60	428
23	9.08	478	9.93	570	9.09	479	9.77	553	8.60	428
24	9.07	477	9.98	575	9.07	477	9.68	543	8.65	433
25	9.02	472	9.93	570	9.05	475	9.61	535	8.65	433
26	9.30	502	9.83	559	9.02	472	9.53	527	8.61	429
27	9.58	532	9.75	550	9.01	471	9.47	520	8.61	429
28	9.72	547	9.68	543	9.00	469	9.42	515	8.60	428
29	9.71	546	9.65	540	8.98	467	9.39	512	8.55	423
30	9.63	537	9.60	534	8.97	466	9.31	503	8.52	420
31			9.54	528	8.97	466			8.48	415

	June	July	August	Sept.	Oct.
Change in contents, in millions of cubic feet	+51	−9	−62	+37	−88
Change in contents, in equivalent second-feet	+19.7	−3.4	−23.2	+14.3	−32.9

MUSCONETCONG RIVER NEAR BLOOMSBURY, N. J.

LOCATION.—Lat. 40°40′20″, long. 75°03′40″, at highway bridge 1½ miles upstream from Bloomsbury, Hunterdon County, and 9½ miles upstream from mouth. Datum of gage is 274.83 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—143 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except periods 8:30 p.m. July 10 to 12 n. July 16, Oct. 16-21 when recorder graph is missing.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,700 second-feet.

MAXIMA.—June 1938: Discharge, 904 second-feet 8 p.m. June 27 (gage height, 3.36 feet).

July 1938: Discharge, 1,900 second-feet 11 to 11:30 p.m. July 23 (gage height, 5.12 feet).

September 1938: Discharge, 1,910 second-feet 11 to 12 p.m. Sept. 21 (gage height, 5.14 feet).

1903-07, 1921 to May 1938: Daily discharge, 2,780 second-feet Oct. 10, 1903. Stage known, 8.0 feet, former datum, Oct. 10 or 11, 1903 (discharge not determined).

REMARKS.—Discharge for periods of no gage-height record computed on basis of records for station near Hackettstown. Discharge affected by storage in Lake Hopatcong, Lake Musconetcong, Cranbury Lake, and a number of small ponds. Monthly mean discharge and runoff, in inches, adjusted for storage in Lake Hopatcong.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	142	622	501	11	128	200	342	21	118	637	169
2	142	560	473	12	138	250	329	22	105	900	171
3	125	468	401	13	162	240	291	23	189	1,240	149
4	116	368	355	14	187	230	268	24	130	1,440	150
5	116	280	316	15	172	210	249	25	108	1,120	137
6	118	242	509	16	146	200	227	26	148	923	131
7	119	207	478	17	139	177	220	27	465	788	132
8	171	190	396	18	226	171	212	28	810	684	125
9	151	171	355	19	141	158	196	29	854	622	127
10	128	170	316	20	134	368	175	30	726	643	122
								31		569	122
Monthly mean discharge, in second-feet (observed)									218	485	263
Monthly mean discharge, in second-feet (adjusted)									238	482	240
Runoff, in inches (adjusted)									1.85	3.88	1.94

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	1.55	146	1.61	164	1.46	119	1.40	103	2.30	440	3.29	872
4	1.57	152	1.58	155	1.46	119	1.40	103	2.19	386	3.24	849
6	1.53	139	1.55	146	1.45	116	1.42	108	2.10	346	3.10	788
8	1.50	130	1.50	130	1.38	98	1.43	111	2.11	350	3.11	792
10	1.48	125	1.59	158	1.48	125	1.43	111	2.06	329	3.09	784
12 n.	1.48	125	1.57	152	1.46	119	1.43	111	1.99	299	3.10	788
2 p.m.	1.83	238	1.45	116	1.43	111	1.43	111	1.99	299	3.11	792
4	2.02	312	1.24	66	1.31	81	1.44	114	2.28	430	3.15	810
6	1.89	260	1.44	114	1.33	86	1.70	193	2.94	721	3.18	822
8	1.81	231	1.48	125	1.43	111	1.71	196	3.36	904	3.21	836
10	1.75	210	1.48	125	1.43	111	1.93	276	3.30	876	3.21	836
12 m.	1.68	187	1.48	125	1.43	111	2.09	342	3.29	872	3.23	844

Hour	June 29 Feet	June 29 Sec.-ft.	June 30 Feet	June 30 Sec.-ft.	July 1 Feet	July 1 Sec.-ft.	July 2 Feet	July 2 Sec.-ft.	July 3 Feet	July 3 Sec.-ft.	July 4 Feet	July 4 Sec.-ft.
2 a.m.	3.27	862	3.07	775	2.79	660	2.66	604	2.43	501	2.27	425
4	3.28	867	3.05	767	2.77	651	2.65	600	2.42	496	2.25	416
6	3.29	872	3.02	754	2.76	647	2.63	591	2.41	492	2.23	406
8	3.31	881	3.00	746	2.74	639	2.58	569	2.40	487	2.21	396
10	3.29	872	3.00	746	2.74	639	2.59	574	2.38	478	2.18	382
12 n.	3.26	858	2.96	730	2.73	635	2.58	569	2.37	473	2.15	368
2 p.m.	3.24	849	2.93	717	2.73	635	2.54	551	2.32	449	2.07	333
4	3.22	840	2.91	709	2.72	630	2.53	546	2.33	454	2.09	342
6	3.17	818	2.83	676	2.70	622	2.51	538	2.32	449	2.09	342
8	3.16	814	2.82	672	2.66	604	2.49	528	2.30	440	2.06	329
10	3.13	801	2.80	664	2.65	600	2.47	519	2.28	430	2.05	324
12 m.	3.10	788	2.79	660	2.66	604	2.45	510	2.27	425	2.03	316

Hour	July 5 Feet	July 5 Sec.-ft.	July 6 Feet	July 6 Sec.-ft.	July 7 Feet	July 7 Sec.-ft.	July 8 Feet	July 8 Sec.-ft.	July 9 Feet	July 9 Sec.-ft.		
2 a.m.	2.01	307	1.86	249	1.76	213	1.70	193	1.67	183	------	-------
4	1.98	295	1.85	246	1.76	213	1.67	183	1.65	177	------	-------
6	1.97	291	1.85	246	1.68	187	1.68	187	1.65	177	------	-------
8	1.97	291	1.86	249	1.79	224	1.69	190	1.63	171	------	-------
10	2.01	307	1.85	246	1.73	203	1.70	193	1.66	180	------	-------
12 n.	1.95	284	1.82	234	1.73	203	1.68	187	1.63	171	------	-------
2 p.m.	1.93	276	1.91	268	1.71	196	1.71	196	1.62	167	------	-------
4	1.87	253	1.86	249	1.74	207	1.73	203	1.61	164	------	-------
6	1.91	268	1.83	238	1.75	210	1.66	180	1.51	133	------	-------
8	1.83	238	1.77	217	1.69	190	1.61	164	1.65	177	------	-------
10	1.87	253	1.80	227	1.72	200	1.68	187	------	170	------	-------
12 m.	1.87	253	1.79	224	1.72	200	1.68	187	------	170	------	-------

Supplemental records.—June 23, 3 p.m., 2.15 ft., 368 sec.-ft.; 4:30 p.m., 2.43 ft., 501 sec.-ft.; 7:30 p.m., 1.68 ft., 187 sec.-ft.; June 24, 5 p.m., 1.13 ft., 45 sec.-ft.; June 25, 9 a.m., 1.21 ft., 60 sec.-ft.; June 26, 7 p.m., 1.78 ft., 220 sec.-ft.; 8:30 p.m., 1.67 ft., 183 sec.-ft.; June 27, 1:30 p.m., 1.91 ft., 268 sec.-ft.; July 2, 7 a.m., 2.54 ft., 551 sec.-ft.; July 5, 5 p.m., 1.98 ft., 295 sec.-ft.; 7 p.m., 1.76 ft., 213 sec.-ft.; July 6, 10:30 p.m., 1.75 ft., 210 sec.-ft.

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	1.67	183	1.62	167	1.57	152	1.61	164	1.93	276	3.07	775
4	1.67	183	1.62	167	1.55	146	1.65	177	1.96	287	3.12	797
6	1.67	183	1.62	167	1.53	139	1.68	187	1.99	299	3.21	836
8	1.67	183	1.73	203	1.55	146	1.95	284	2.08	337	3.29	872
10	1.67	183	1.67	183	1.63	171	2.30	440	2.40	487	3.35	900
12 n.	1.66	180	1.68	187	1.63	171	2.45	510	3.06	771	3.43	938
2 p.m.	1.65	177	1.56	149	1.59	158	2.82	672	3.25	854	3.43	938
4	1.63	171	1.65	177	1.55	146	2.65	600	3.43	938	3.47	957
6	1.65	177	1.57	152	1.68	187	2.38	478	3.52	982	3.57	1,010
8	1.60	161	1.65	177	1.61	164	2.15	368	3.63	1,040	3.59	1,020
10	1.63	171	1.64	174	1.57	152	2.03	316	3.33	890	3.56	1,000
12 m.	1.63	171	1.51	133	1.61	164	1.96	287	3.10	788	3.52	982

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	3.48	962	4.91	1,780	4.01	1,240	3.52	982	3.17	818	2.95	726
4	3.47	957	4.64	1,610	3.96	1,210	3.50	972	3.16	814	2.95	726
6	3.46	952	4.40	1,470	3.92	1,190	3.49	967	3.14	805	2.92	713
8	3.47	957	4.27	1,390	3.93	1,200	3.47	957	3.12	798	2.91	709
10	3.49	967	4.21	1,360	3.83	1,140	3.42	933	3.11	792	2.90	705
12 n.	3.51	977	4.20	1,350	3.78	1,110	3.40	923	3.09	784	2.90	705
2 p.m.	3.70	1,070	4.20	1,350	3.73	1,080	3.35	900	3.08	780	2.87	693
4	4.37	1,450	4.20	1,350	3.68	1,060	3.31	881	3.06	771	2.88	697
6	4.54	1,550	4.20	1,350	3.61	1,020	3.25	854	3.02	754	2.87	693
8	4.77	1,690	4.15	1,320	3.60	1,020	3.22	840	2.97	734	2.78	656
10	5.08	1,880	4.11	1,300	3.57	1,010	3.19	827	2.95	726	2.77	651
12 m.	5.11	1,890	4.06	1,270	3.53	986	3.17	818	2.96	730	2.75	643

Hour	July 29 Feet	July 29 Sec.-ft.	July 30 Feet	July 30 Sec.-ft.	July 31 Feet	July 31 Sec.-ft.	August 1 Feet	August 1 Sec.-ft.	August 2 Feet	August 2 Sec.-ft.	August 3 Feet	August 3 Sec.-ft.
2 a.m.	2.73	635	2.95	726	2.63	591	2.49	528	2.47	519	2.24	411
4	2.72	630	2.90	705	2.63	591	2.47	519	2.47	519	2.25	416
6	2.71	626	2.80	664	2.62	587	2.45	510	2.43	501	2.25	414
8	2.70	622	2.75	643	2.61	582	2.44	505	2.40	487	2.25	416
10	2.66	604	2.75	643	2.60	578	2.44	505	2.38	478	2.28	430
12 n.	2.63	591	2.75	643	2.58	569	2.41	492	2.38	478	2.25	416
2 p.m.	2.63	591	2.73	635	2.57	564	2.41	492	2.36	468	2.15	368
4	2.61	582	2.72	630	2.55	556	2.40	487	2.37	473	2.23	406
6	2.72	630	2.67	609	2.55	556	2.35	464	2.32	449	2.21	396
8	2.73	635	2.66	604	2.53	546	2.38	478	2.30	440	2.16	373
10	2.77	651	2.65	600	2.51	538	2.38	478	2.29	435	2.10	346
12 m.	2.90	705	2.64	596	2.50	533	2.43	501	2.25	416	2.15	368

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	161	337	9	126	246	17	133	190	25	705	324
2	139	316	10	119.	246	18	127	180	26	600	287
3	125	303	11	121	234	19	167	170	27	515	268
4	116	276	12	131	224	20	586	200	28	445	265
5	122	260	13	128	217	21	1,190	320	29	396	256
6	116	276	14	133	213	22	1,530	257	30	373	246
7	112	320	15	139	207	23	1,200	253	31		245
8	119	268	16	142	200	24	900	326			
Monthly mean discharge, in second-feet (observed)										364	256
Monthly mean discharge, in second-feet (adjusted)										378	223
Runoff, in inches (adjusted)										2.94	1.80

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	September 18		September 19		September 20		September 21		September 22		September 23	
1 a.m.	------	-------	1.50	130	2.03	316	3.09	784	5.10	1,890	4.23	1,370
2	------	-------	1.54	142	2.05	324	3.10	788	5.02	1,840	4.20	1,350
3	------	-------	1.57	152	2.25	416	3.09	784	4.95	1,800	4.17	1,330
4	------	-------	1.54	142	2.43	501	3.07	775	4.81	1,720	4.14	1,310
5	------	-------	1.49	127	2.62	587	3.04	763	4.65	1,620	4.13	1,310
6	------	-------	1.46	119	2.85	684	3.00	746	4.50	1,530	4.11	1,300
7	------	-------	1.48	125	3.01	750	2.95	726	4.34	1,430	4.08	1,280
8	------	-------	1.64	174	3.03	759	2.88	697	4.24	1,370	4.06	1,270
9	------	-------	1.55	146	3.01	750	2.79	660	4.20	1,350	4.03	1,250
10	------	-------	1.64	174	2.98	738	2.78	656	4.20	1,350	3.99	1,220
11	------	-------	1.61	164	2.89	701	2.83	676	4.20	1,350	3.98	1,220
12 n.	------	-------	1.64	174	2.79	660	2.99	742	4.24	1,370	3.95	1,200
1 p.m.	------	-------	1.62	167	2.69	618	3.31	881	4.29	1,400	3.93	1,200
2	------	-------	1.60	161	2.61	582	3.82	1,130	4.35	1,440	3.90	1,180
3	------	-------	1.66	180	2.55	556	4.41	1,480	4.43	1,490	3.89	1,170
4	------	-------	1.56	149	2.49	528	4.87	1,750	4.45	1,500	3.85	1,150
5	------	-------	1.66	180	2.44	505	5.00	1,830	4.47	1,510	3.83	1,140
6	------	-------	1.66	180	2.41	492	5.00	1,830	4.46	1,510	3.78	1,110
7	------	-------	1.63	171	2.41	492	4.98	1,820	4.45	1,500	3.75	1,100
8	------	-------	1.71	196	2.46	515	5.00	1,830	4.44	1,490	3.74	1,090
9	------	-------	1.70	193	2.60	578	5.09	1,880	4.43	1,490	3.70	1,070
10	------	-------	1.78	220	2.80	664	5.12	1,900	4.39	1,460	3.68	1,060
11	------	-------	1.86	249	2.99	742	5.14	1,910	4.34	1,430	3.65	1,040
12 m.	------	-------	1.83	238	3.09	784	5.14	1,910	4.29	1,400	3.63	1,040

Hour	September 24		September 25		September 26		September 27		September 28		September 29	
2 a.m.	3.58	1,010	3.05	767	------	-------	------	-------	------	-------	------	-------
4	3.53	986	3.02	754	------	-------	------	-------	------	-------	------	-------
6	3.48	962	2.99	742	------	-------	------	-------	------	-------	------	-------
8	3.42	933	2.95	726	------	-------	------	-------	------	-------	------	-------
10	3.39	918	2.94	721	------	-------	------	-------	------	-------	------	-------
12 n.	3.34	895	2.93	717	------	-------	------	-------	------	-------	------	-------
2 p.m.	3.29	872	2.90	705	------	-------	------	-------	------	-------	------	-------
4	3.17	818	2.86	689	------	-------	------	-------	------	-------	------	-------
6	3.17	818	2.84	680	------	-------	------	-------	------	-------	------	-------
8	3.13	801	2.81	668	------	-------	------	-------	------	-------	------	-------
10	3.09	784	2.79	660	------	-------	------	-------	------	-------	------	-------
12 m.	3.07	775	2.78	656	------	-------	------	-------	------	-------	------	-------

Supplemental records.—Sept. 19, 6:30 p.m., 1.71 ft., 196 sec.-ft.; Sept. 26, 9 a.m., 2.76 ft., 647 sec.-ft.

ASSUNPINK CREEK AT TRENTON, N. J.

LOCATION.—Lat. 40°13′29″, long. 74°45′02″, at Chambers Street Bridge in Trenton, Mercer County, 1½ miles upstream from mouth. Datum of gage is 24.76 feet above mean sea level (New Jersey Geological Survey bench mark).

DRAINAGE AREA.—89.4 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods 10 p.m. July 1 to 4 p.m. July 21 and 10:30 a.m. July 27 to 8 a.m. Aug. 1 when recorder graph is missing.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 1,300 second-feet.

MAXIMA.—June 1938: Discharge, 1,420 second-feet 7:30 to 10 p.m. June 28 (gage height, 6.86 feet).

July 1938: Discharge, 2,370 second-feet 10:30 p.m. July 23 (gage height 8.90 feet).

September 1938: Discharge, 3,320 second-feet 2:45 to 3:30 a.m. Sept. 22 (gage height, 10.74 feet).

1923 to May 1938: Discharge, 2,400 second-feet Apr. 7, 1924 (gage height, 7.85 feet).

REMARKS.—Flow not materially affected by storage. Discharge for periods of no gage-height records, July 1-21, 27-31, Aug. 1, computed on basis of range in stage and records for North Branch of Rancocas Creek at Pemberton.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	49	426	137	11	64	55	106	21	57	970	57
2	42	280	124	12	105	52	92	22	53	1,520	52
3	39	190	110	13	215	62	78	23	87	1,490	48
4	37	130	107	14	356	140	67	24	131	1,840	46
5	37	90	96	15	282	250	61	25	85	1,440	42
6	36	80	148	16	231	150	56	26	124	900	41
7	50	70	263	17	186	110	94	27	860	567	39
8	195	62	211	18	133	90	105	28	1,230	383	39
9	133	60	144	19	85	100	90	29	1,130	278	38
10	88	58	119	20	70	500	67	30	711	209	36
								31		164	40
Monthly mean discharge, in second-feet									230	410	88.8
Runoff, in inches									2.87	5.29	1.14

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23 Feet	June 23 Sec.-ft.	June 24 Feet	June 24 Sec.-ft.	June 25 Feet	June 25 Sec.-ft.	June 26 Feet	June 26 Sec.-ft.	June 27 Feet	June 27 Sec.-ft.	June 28 Feet	June 28 Sec.-ft.
2 a.m.	2.31	54	2.75	124	2.63	103	2.41	68	3.85	370	5.92	1,050
4	2.30	53	2.81	135	2.60	98	2.39	66	4.02	417	5.95	1,060
6	2.30	53	2.84	140	2.57	93	2.38	64	4.87	701	6.00	1,080
8	2.29	52	2.85	142	2.55	90	2.37	63	5.25	822	6.12	1,120
10	2.30	53	2.86	144	2.53	87	2.36	61	5.68	963	6.27	1,180
12 n.	2.30	53	2.86	144	2.52	85	2.35	60	5.93	1,050	6.45	1,250
2 p.m.	2.30	53	2.83	138	2.49	80	2.34	59	5.87	1,030	6.60	1,310
4	3.07	184	2.78	129	2.47	78	2.33	57	5.75	985	6.72	1,370
6	2.78	129	2.75	124	2.45	74	2.32	56	6.38	1,220	6.80	1,400
8	2.68	112	2.73	120	2.44	73	3.45	268	5.86	1,020	6.86	1,420
10	2.68	112	2.70	115	2.43	72	4.15	455	5.80	1,000	6.86	1,420
12 m.	2.70	115	2.66	108	2.42	70	3.73	338	5.90	1,040	6.80	1,400

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	6.72	1,370	5.37	860	4.37	523	------	-------	------	-------	------	-------
4	6.64	1,330	5.27	829	4.30	501	------	-------	------	-------	------	-------
6	6.51	1,270	5.17	798	4.25	486	------	-------	------	-------	------	-------
8	6.39	1,230	5.09	773	4.17	461	------	-------	------	-------	------	-------
10	6.26	1,170	5.00	744	4.12	446	------	-------	------	-------	------	-------
12 n.	6.13	1,120	4.90	711	4.04	423	------	-------	------	-------	------	-------
2 p.m.	5.98	1,070	4.82	684	3.99	408	------	-------	------	-------	------	-------
4	5.84	1,020	4.74	654	3.92	389	------	-------	------	-------	------	-------
6	5.75	985	4.66	624	3.87	375	------	-------	------	-------	------	-------
8	5.68	963	4.59	598	3.82	361	------	-------	------	-------	------	-------
10	5.56	921	4.51	570	3.77	348	------	-------	------	-------	------	-------
12 m.	5.47	891	4.44	547	------	-------	------	-------	------	-------	------	-------

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	------	-------	------	-------	------	-------	------	-------	------	-------	7.03	1,490
4	------	-------	------	-------	------	-------	------	-------	------	-------	7.12	1,530
6	------	-------	------	-------	------	-------	------	-------	------	-------	7.18	1,560
8	------	-------	------	-------	------	-------	------	-------	------	-------	7.21	1,570
10	------	-------	------	-------	------	-------	------	-------	------	-------	7.37	1,640
12 n.	------	-------	------	-------	------	-------	------	-------	------	-------	7.13	1,540
2 p.m.	------	-------	------	-------	------	-------	------	-------	------	-------	7.02	1,490
4	------	-------	------	-------	------	-------	------	-------	5.93	1,050	6.97	1,470
6	------	-------	------	-------	------	-------	------	-------	6.11	1,110	6.96	1,460
8	------	-------	------	-------	------	-------	------	-------	6.33	1,200	7.00	1,480
10	------	-------	------	-------	------	-------	------	-------	6.61	1,320	6.99	1,480
12 m.	------	-------	------	-------	------	-------	------	-------	6.93	1,450	6.84	1,420
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	6.61	1,320	8.38	2,110	7.43	1,670	6.00	1,080	4.80	677	------	-------
4	6.36	1,210	8.09	1,980	7.38	1,650	5.90	1,040	4.72	647	------	-------
6	6.14	1,130	7.72	1,800	7.30	1,610	5.78	994	4.64	617	------	-------
8	6.01	1,080	7.49	1,700	7.18	1,560	5.68	963	4.57	592	------	-------
10	5.84	1,020	7.46	1,680	7.06	1,500	5.57	924	4.51	570	------	-------
12 n.	6.10	1,110	7.55	1,720	6.90	1,440	5.46	888	------	-------	------	-------
2 p.m.	6.65	1,340	7.68	1,780	6.75	1,380	5.36	857	------	-------	------	-------
4	6.89	1,440	7.73	1,800	6.60	1,310	5.26	826	------	-------	------	-------
6	7.85	1,860	7.73	1,800	6.47	1,260	5.16	795	------	-------	------	-------
8	8.50	2,170	7.65	1,770	6.33	1,200	5.07	766	------	-------	------	-------
10	8.89	2,360	7.57	1,740	6.21	1,150	4.97	734	------	-------	------	-------
12 m.	8.73	2,280	7.50	1,700	6.10	1,110	4.88	704	------	-------	------	-------

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	57	106	9	34	126	17	46	66	25	397	96
2	48	100	10	32	115	18	54	67	26	258	88
3	42	95	11	31	108	19	182	66	27	190	85
4	39	88	12	32	98	20	686	70	28	153	95
5	38	82	13	34	84	21	1,590	80	29	144	129
6	36	101	14	36	79	22	2,830	76	30	119	128
7	37	146	15	50	72	23	1,750	70	31		124
8	36	133	16	42	70	24	787	85			
Monthly mean discharge, in second-feet										327	94.5
Runoff, in inches										4.08	1.22

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	September 18		September 19		September 20		September 21		September 22		September 23	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
1 a.m.	2.23	45	2.33	57	4.08	434	5.40	869	10.63	3,280	8.87	2,360
2	2.23	45	2.32	56	4.11	443	5.50	900	10.71	3,310	8.80	2,320
3	2.23	45	2.31	54	4.10	440	5.60	935	10.74	3,320	8.67	2,260
4	2.24	46	2.31	54	4.17	461	5.74	982	10.71	3,310	8.56	2,200
5	2.24	46	2.31	54	4.45	550	5.88	1,030	10.60	3,260	8.44	2,140
6	2.24	46	2.37	63	4.38	527	5.98	1,070	10.47	3,190	8.34	2,100
7	2.24	46	2.34	59	4.48	560	6.05	1,100	10.34	3,120	8.22	2,040
8	2.24	46	2.35	60	4.45	550	6.14	1,130	10.22	3,050	8.12	1,990
9	2.24	46	2.37	63	4.54	581	6.16	1,130	10.12	3,000	8.01	1,940
10	2.24	46	2.36	61	4.65	620	6.26	1,170	10.01	2,940	7.86	1,860
11	2.35	60	2.36	61	4.80	677	6.46	1,250	9.88	2,870	7.74	1,810
12 n.	2.44	73	3.10	190	4.93	721	6.48	1,260	9.70	2,780	7.61	1,750
1 p.m.	2.37	63	3.95	397	5.08	770	6.65	1,340	9.56	2,710	7.49	1,700
2	2.33	57	3.50	280	5.19	804	7.07	1,510	9.51	2,680	7.36	1,640
3	2.31	54	3.28	230	5.28	832	7.39	1,660	9.44	2,640	7.24	1,590
4	2.30	53	3.27	226	5.29	835	7.71	1,800	9.42	2,630	7.12	1,530
5	2.29	52	3.23	218	5.29	835	7.96	1,910	9.35	2,600	7.00	1,480
6	2.29	52	3.29	231	5.27	829	8.27	2,060	9.34	2,590	6.87	1,430
7	2.28	51	3.37	249	5.36	857	8.60	2,220	9.28	2,560	6.75	1,380
8	2.36	61	3.48	275	5.41	872	9.12	2,480	9.23	2,540	6.62	1,320
9	2.48	79	3.63	312	5.46	888	9.48	2,670	9.21	2,520	6.50	1,270
10	2.39	66	3.80	356	5.41	872	9.88	2,870	9.13	2,480	6.37	1,220
11	2.35	60	3.97	403	5.33	847	10.14	3,010	9.09	2,460	6.26	1,170
12 m.	2.33	57	4.02	417	5.34	850	10.43	3,170	8.98	2,410	6.14	1,130

Hour	September 24		September 25		September 26		September 27		September 28		September 29	
2 a.m.	5.91	1,040	4.31	504	3.58	300	------	------	------	------	------	------
4	5.72	976	4.23	479	3.53	288	------	------	------	------	------	------
6	5.53	910	4.14	452	3.49	278	------	------	------	------	------	------
8	5.37	860	4.08	434	3.46	270	------	------	------	------	------	------
10	5.22	813	4.00	411	3.43	263	------	------	------	------	------	------
12 n.	5.08	770	3.95	397	3.40	256	------	------	------	------	------	------
2 p.m.	4.96	731	3.88	378	3.37	249	------	------	------	------	------	------
4	4.83	687	3.83	364	3.34	242	------	------	------	------	------	------
6	4.72	647	3.77	348	3.30	233	------	------	------	------	------	------
8	4.60	602	3.72	335	3.28	229	------	------	------	------	------	------
10	4.50	567	3.67	322	3.25	222	------	------	------	------	------	------
12 m.	4.40	533	3.63	312	3.23	218	------	------	------	------	------	------

Supplemental records.—Sept. 18, 11:30 a.m., 2.62 ft., 101 sec.-ft.; Sept. 19, 12:30 p.m., 4.40 ft., 533 sec.-ft.; 3:30 p.m., 3.44 ft., 266 sec.-ft.; Sept. 20, 5:20 a.m., 4.54 ft., 581 sec.-ft.; 6:30 a.m., 4.56 ft., 588 sec.-ft.; Sept. 22, 2:45 a.m., 10.74 ft., 3,320 sec.-ft.; 3:30 a.m., 10.74 ft., 3,320 sec.-ft.

NORTH BRANCH OF RANCOCAS CREEK AT PEMBERTON, N. J.

LOCATION.—Lat. 39°58′13″, long. 74°41′15″, 600 feet downstream from highway bridge at Pemberton, Burlington County, and 12 miles upstream from confluence with South Branch. Datum of gage is 24.65 feet above mean sea level (general adjustment of 1929).

DRAINAGE AREA.—111 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph except for periods 9 a.m. July 24 to 4 p.m. July 25, 1 p.m. Sept. 21 to 10 a.m. Sept. 24, 9 p.m. Sept 24 to 3:25 p.m. Sept. 26, and 9 p.m. Sept. 26 to 2:50 p.m. Oct. 12, when graph was computed on basis of floodmarks and shape of recorder graph before and after periods of no record.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements to 1,400 second-feet.

MAXIMA.—June 1938: Discharge, 1,300 second-feet 2 to 5 p.m. June 29 (gage height, 8.78 feet).

July 1938: Discharge, 1,360 second-feet 5 to 9 p.m. July 24 (gage height, 9.08 feet from floodmark).

September 1938: Discharge, 1,680 second-feet 6 to 10 p.m. Sept. 22 (gage height, 10.56 feet, from floodmark).

1921 to May 1938: Daily discharge, 1,310 second-feet Oct. 20, 1927.

REMARKS.—Discharge for periods of no gage-height record computed on basis of estimated gage-height graph and records for Assunpink Creek at Trenton. Diurnal fluctuation caused by operation of gristmill just above station.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	142	653	215	11	92	142	328	21	95	776	143
2	129	347	213	12	109	96	309	22	108	921	129
3	166	321	172	13	139	101	216	23	167	1,020	123
4	148	250	196	14	191	122	205	24	120	1,280	117
5	102	216	256	15	228	156	183	25	120	1,300	108
6	113	188	378	16	215	142	154	26	97	1,070	105
7	104	163	477	17	167	148	166	27	478	653	108
8	111	147	477	18	159	189	150	28	1,210	303	102
9	106	124	477	19	134	235	143	29	1,280	337	99
10	98	122	401	20	122	359	146	30	1,050	293	96
								31		262	99
Monthly mean discharge, in second-feet									250	401	209
Runoff, in inches									2.51	4.16	2.17

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	June 23		June 24		June 25		June 26		June 27		June 28	
2 a.m.	1.52	124	2.10	166	1.55	126	1.24	107	1.39	116	8.02	1,120
4	1.51	124	1.97	156	1.56	127	1.23	107	1.53	125	8.08	1,140
6	1.53	125	1.88	149	1.55	126	1.21	106	1.72	137	8.14	1,150
8	.88	86	1.04	95	1.53	125	1.20	105	2.62	211	8.22	1,170
10	.80	81	.90	87	1.51	124	.82	82	3.59	309	8.32	1,190
12 n.	1.02	94	.98	92	1.63	131	.57	67	4.03	357	8.42	1,210
2 p.m.	1.37	115	1.10	99	1.44	119	.62	70	5.21	506	8.48	1,230
4	3.43	291	1.22	106	1.35	114	.74	77	5.81	600	8.54	1,240
6	3.58	308	1.33	113	1.31	112	1.18	104	6.75	801	8.57	1,250
8	3.12	259	1.42	118	1.29	110	1.20	105	7.17	913	8.60	1,260
10	2.67	216	1.48	122	1.27	109	1.27	109	7.61	1,020	8.64	1,270
12 m.	2.33	186	1.52	124	1.26	108	1.35	114	7.91	1,100	8.67	1,270
	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	8.68	1,280	8.31	1,190	6.95	854	5.04	483	3.80	332	3.49	298
4	8.71	1,280	8.16	1,160	6.83	822	4.87	459	3.76	328	3.44	292
6	8.74	1,290	8.03	1,130	6.72	793	4.72	440	3.73	324	3.39	287
8	8.75	1,290	7.90	1,100	6.61	766	4.07	362	3.70	321	3.25	272
10	8.76	1,290	7.78	1,070	6.40	716	3.34	281	3.67	318	2.87	234
12 n.	8.77	1,290	7.69	1,050	6.04	642	3.15	262	3.75	326	2.80	228
2 p.m.	8.78	1,300	7.58	1,020	5.72	584	3.25	272	3.74	325	2.57	207
4	8.78	1,300	7.49	1,000	5.52	553	3.40	288	3.73	324	2.62	212
6	8.76	1,290	7.39	974	5.49	548	3.48	297	3.70	321	2.70	219
8	8.73	1,290	7.30	949	5.43	540	3.52	301	3.65	316	2.85	232
10	8.64	1,270	7.19	918	5.32	523	3.75	329	3.60	310	3.14	261
12 m.	8.50	1,230	7.06	883	5.19	504	3.84	336	3.54	303	3.13	260

Gage height in feet, and discharge, in second-feet, at indicated time, 1938—Continued

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 5		July 6		July 7		July 8		July 9		July 10	
2 a.m.	3.00	247	2.38	190	2.23	177	1.90	150	1.72	137	1.24	107
4	2.91	238	2.42	194	2.21	175	1.90	150	1.68	135	1.30	111
6	2.85	232	2.43	195	2.20	174	1.90	150	1.67	134	1.36	115
8	2.82	230	2.43	195	2.23	177	1.91	151	1.65	132	1.41	118
10	2.82	230	2.41	193	2.10	166	1.91	151	1.75	140	1.35	114
12 n.	2.77	225	2.39	191	2.02	160	1.95	154	1.67	134	1.35	114
2 p.m.	2.73	222	2.36	188	2.03	160	1.85	146	1.71	137	1.35	114
4	2.86	233	2.34	187	2.00	158	1.83	145	1.32	112	1.36	115
6	2.50	201	2.32	185	1.91	151	1.82	144	1.11	100	1.38	116
8	2.03	160	2.28	181	1.90	150	1.80	143	1.09	98	1.41	118
10	2.14	169	2.26	179	1.90	150	1.76	140	1.12	100	1.44	119
12 m.	2.28	181	2.24	178	1.90	150	1.74	139	1.17	103	2.83	231

Supplemental records.—June 23, 5:20 p.m., 3.67 ft., 318 sec.-ft.

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	July 17		July 18		July 19		July 20		July 21		July 22	
2 a.m.	1.73	138	1.93	152	3.15	262	3.46	295	5.54	556	7.18	916
4	1.73	138	1.93	152	2.99	246	3.35	282	5.85	607	7.17	913
6	1.72	137	1.93	152	2.45	196	2.90	237	6.13	659	7.13	902
8	1.72	137	2.12	168	1.52	124	2.29	182	6.34	703	7.10	894
10	1.70	136	2.10	166	1.45	120	2.29	182	6.55	751	7.08	889
12 n.	1.76	140	1.98	156	2.26	179	3.90	343	6.70	788	7.11	897
2 p.m.	1.94	153	1.96	155	3.00	247	4.48	410	6.90	840	7.21	924
4	2.02	160	1.76	140	3.25	272	4.68	434	7.25	935	7.30	949
6	2.11	167	1.83	145	3.18	265	4.84	455	7.24	932	7.38	971
8	2.06	163	3.70	321	3.53	302	5.18	502	7.20	921	7.45	988
10	1.99	157	3.80	332	3.69	320	5.26	514	7.19	918	7.48	995
12 m.	1.95	154	3.45	294	3.60	310	5.36	529	7.18	916	7.53	1,010
	July 23		July 24		July 25		July 26		July 27		July 28	
2 a.m.	7.57	1,010	7.89	1,100	9.02	1,340	8.43	1,220	7.07	886	4.61	425
4	7.58	1,020	8.05	1,130	9.00	1,340	8.34	1,200	6.98	862	4.44	405
6	7.59	1,020	8.38	1,210	8.97	1,330	8.24	1,180	6.87	832	4.30	388
8	7.59	1,020	8.67	1,270	8.93	1,330	8.13	1,150	6.72	793	2.39	191
10	7.59	1,020	8.87	1,310	8.89	1,320	7.98	1,120	6.35	705	2.51	210
12 n.	7.60	1,020	8.98	1,340	8.86	1,310	7.80	1,070	5.90	616	2.95	242
2 p.m.	7.59	1,020	9.04	1,350	8.82	1,300	7.64	1,030	5.67	576	3.25	272
4	7.58	1,020	9.07	1,350	8.77	1,290	7.51	1,000	5.60	565	2.62	312
6	7.62	1,030	9.08	1,360	8.72	1,280	7.39	974	5.49	548	3.68	319
8	7.70	1,050	9.08	1,360	8.66	1,270	7.28	943	5.33	524	3.60	310
10	7.78	1,070	9.07	1,350	8.60	1,260	7.22	927	5.10	491	3.55	304
12 m.	7.84	1,080	9.05	1,350	8.52	1,240	7.15	908	4.83	454	3.53	302
	July 29		July 30		July 31		August 1		August 2		August 3	
2 a.m.	3.56	306	3.85	338	2.95	242	3.13	260	2.63	213	2.52	203
4	3.60	310	3.79	331	2.95	242	3.10	257	2.67	216	2.51	202
6	3.67	318	3.75	326	2.98	245	3.07	254	2.69	218	2.37	189
8	3.52	301	2.94	241	3.01	248	2.55	206	2.70	219	2.50	201
10	3.75	326	3.16	263	3.11	258	2.69	218	2.76	224	2.34	187
12 n.	4.17	373	3.28	275	3.28	275	2.61	211	2.70	219	1.99	157
2 p.m.	4.22	378	3.72	323	3.37	285	2.48	199	2.67	216	1.72	137
4	4.25	382	3.73	324	3.37	285	2.47	198	2.58	208	1.83	145
6	4.21	377	3.45	294	3.31	278	2.33	186	2.53	204	1.88	149
8	4.08	363	3.21	268	3.25	272	2.30	183	2.52	203	1.92	152
10	4.00	354	3.04	251	3.21	268	2.40	192	2.52	203	2.05	162
12 m.	3.91	344	2.96	243	3.17	264	2.53	204	2.52	203	2.20	174

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	111	210	9	68	280	17	93	152	25	750	179
2	114	200	10	73	260	18	86	159	26	500	190
3	91	190	11	75	240	19	149	158	27	350	188
4	75	180	12	84	229	20	363	156	28	300	247
5	102	170	13	85	208	21	1,050	173	29	270	273
6	113	190	14	100	184	22	1,640	164	30	230	301
7	103	230	15	77	144	23	1,580	159	31		263
8	78	300	16	83	137	24	1,260	183			
Monthly mean discharge, in second-feet										335	203
Runoff, in inches										3.37	2.11

Gage height, in feet, and discharge, in second-feet, at indicated time, September 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	September 18		September 19		September 20		September 21		September 22		September 23	
1 a.m.	1.58	128	.74	77	2.32	185	5.90	616	9.91	1,540	10.54	1,670
2	1.53	125	.75	78	2.56	206	6.00	634	9.98	1,560	10.52	1,670
3	1.47	121	.77	79	2.84	232	6.08	649	10.07	1,570	10.49	1,670
4	1.43	119	.78	80	3.00	247	6.15	663	10.12	1,580	10.47	1,660
5	1.38	116	.81	82	3.25	272	6.20	673	10.17	1,590	10.45	1,660
6	1.33	113	.84	83	3.51	300	6.38	712	10.21	1,600	10.42	1,650
7	1.30	111	.88	86	3.72	323	7.03	875	10.27	1,610	10.38	1,640
8	.92	88	.99	92	4.16	372	6.98	862	10.32	1,620	10.36	1,630
9	.76	79	1.08	98	4.32	390	6.98	862	10.35	1,630	10.32	1,620
10	.69	74	1.28	110	4.38	398	7.02	872	10.39	1,640	10.28	1,620
11	.66	73	1.27	109	4.40	400	7.08	889	10.43	1,650	10.22	1,600
12 n.	.65	72	1.29	110	4.38	398	7.23	929	10.46	1,650	10.18	1,600
1 p.m.	.64	71	1.58	128	4.30	388	7.54	1,010	10.49	1,670	10.14	1,590
2	.64	71	1.94	153	4.20	376	8.06	1,130	10.52	1,670	10.09	1,580
3	.64	71	2.06	163	4.11	366	8.72	1,280	10.54	1,670	10.04	1,570
4	.64	71	3.25	272	4.08	363	8.99	1,340	10.54	1,670	9.98	1,560
5	.64	71	3.30	277	4.12	367	9.16	1,380	10.54	1,670	9.93	1,550
6	.65	72	3.17	263	4.27	384	9.29	1,410	10.56	1,680	9.87	1,530
7	.65	72	2.99	246	4.47	408	9.39	1,430	10.56	1,680	9.81	1,510
8	.67	73	2.79	227	4.69	436	9.50	1,450	10.56	1,680	9.75	1,500
9	.68	74	2.58	208	4.97	473	9.60	1,470	10.56	1,680	9.68	1,490
10	.70	75	2.44	196	5.27	516	9.69	1,490	10.56	1,680	9.64	1,480
11	.71	76	2.38	190	5.52	553	9.76	1,500	10.54	1,670	9.57	1,460
12 m.	.73	77	2.33	186	5.75	590	9.84	1,520	10.54	1,670	9.49	1,450

Supplemental records.—Sept. 19, 10:15 a.m., 1.33 ft., 113 sec.-ft.; 11:30 a.m., 1.25 ft., 108 sec.-ft.; 4:30 p.m., 3.35 ft., 282 sec.-ft.

OLDMANS CREEK NEAR WOODSTOWN, N. J.

LOCATION.—Lat. 39°41'27", long. 75°19'09", at Woodstown-Swedesboro highway bridge, 2 miles north of Woodstown, Salem County, and 16 miles upstream from mouth.

DRAINAGE AREA.—19.3 square miles.

GAGE-HEIGHT RECORD.—Water-stage recorder graph.

STAGE-DISCHARGE RELATION.—Defined by current-meter measurements below 400 second-feet.

MAXIMA.—June 1938: Discharge, 1,190 second-feet 4 p.m. June 27 (gage height, 9.08 feet).

July 1938: Discharge, 222 second-feet 10 a.m. July 24 (gage height, 4.47 feet).

September 1938: Discharge, 756 second-feet 8 a.m. Sept. 20 (gage height, 6.71 feet).

1931 to May 1938: Discharge, 362 second-feet Aug. 27, 1937; gage height, 8.22 feet Aug. 23, 1933.

Mean discharge, in second-feet, 1938

Day	June	July	Aug.	Day	June	July	Aug.	Day	June	July	Aug.
1	14.0	40	21	11	11.3	15.1	28	21	11.3	55	16.9
2	13.4	42	25	12	12.0	34	23	22	11.3	36	15.1
3	12.9	28	23	13	14.6	24	20	23	12.3	51	15.1
4	13.4	26	43	14	12.3	16.3	18.8	24	11.8	176	14
5	13.4	23	40	15	11.3	18.8	17.6	25	9.3	63	13.4
6	12.3	21	33	16	10.3	17.6	16.9	26	13.1	42	13.4
7	11.3	18.8	26	17	10.8	15.7	16.9	27	570	35	13.4
8	16.1	17.6	71	18	10.8	16.9	31	28	387	28	12.9
9	14.6	16.3	51	19	9.8	21	20	29	95	26	12.3
10	12.3	15.7	35	20	8.8	25	20	30	43	26	12.3
								31		23	12.9
Monthly mean discharge, in second-feet									47.0	32.7	23.6
Runoff, in inches									2.72	1.95	1.41

Gage height, in feet, and discharge, in second-feet, at indicated time, 1938

Hour	June 23		June 24		June 25		June 26		June 27		June 28	
	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
2 a.m.	------	------	------	------	------	------	1.35	8.0	2.65	70	7.03	684
4	------	------	------	------	------	------	1.35	8.0	2.94	85	6.57	581
6	------	------	------	------	------	------	1.35	8.0	3.72	143	6.20	503
8	------	------	------	------	------	------	1.35	8.0	4.09	178	5.86	436
10	------	------	------	------	------	------	1.35	8.0	5.20	321	5.56	382
12 n.	------	------	------	------	------	------	1.35	8.0	5.95	454	5.26	331
2 p.m.	------	------	------	------	------	------	1.35	8.0	8.60	1,070	5.02	294
4	------	------	------	------	------	------	1.35	8.0	9.08	1,190	4.88	274
6	------	------	------	------	------	------	1.34	7.5	8.80	1,120	4.70	251
8	------	------	------	------	------	------	1.39	9.8	8.27	982	4.47	222
10	------	------	------	------	------	------	2.03	48	7.72	845	4.22	192
12 m.	------	------	------	------	------	------	1.91	43	7.43	776	3.86	155

Hour	June 29		June 30		July 1		July 2		July 3		July 4	
2 a.m.	3.49	123	2.02	48	1.85	39	1.93	44	------	------	------	------
4	3.42	118	2.00	47	1.86	40	2.00	47	------	------	------	------
6	3.46	121	1.97	46	1.87	41	2.05	49	------	------	------	------
8	3.49	123	1.95	45	1.88	41	2.06	50	------	------	------	------
10	3.46	121	1.94	44	1.89	42	2.05	49	------	------	------	------
12 n.	3.34	112	1.91	43	1.88	41	2.01	48	------	------	------	------
2 p.m.	3.00	89	1.89	42	1.86	40	1.92	43	------	------	------	------
4	2.58	67	1.86	40	1.84	39	1.84	39	------	------	------	------
6	2.33	58	1.85	39	1.83	38	1.78	35	------	------	------	------
8	2.17	53	1.84	39	1.83	38	1.73	31	------	------	------	------
10	2.10	51	1.84	39	1.84	39	1.72	31	------	------	------	------
12 m.	2.04	49	1.84	39	1.87	41	1.72	31	------	------	------	------

Gage-height, in feet, and discharge, in second-feet, at indicated time, July 1938

Hour	July 17 Feet	July 17 Sec.-ft.	July 18 Feet	July 18 Sec.-ft.	July 19 Feet	July 19 Sec.-ft.	July 20 Feet	July 20 Sec.-ft.	July 21 Feet	July 21 Sec.-ft.	July 22 Feet	July 22 Sec.-ft.
2 a.m.	------	-------	1.49	15.1	1.62	23	1.52	16.9	1.77	34	1.91	43
4	------	-------	1.51	16.3	1.63	24	1.52	16.9	2.04	49	1.83	38
6	------	-------	1.51	16.3	1.63	24	1.53	17.6	2.32	58	1.79	36
8	------	-------	1.51	16.3	1.63	24	1.53	17.6	2.34	58	1.76	34
10	------	-------	1.52	16.9	1.63	24	1.71	30	2.41	60	1.75	33
12 n.	------	-------	1.52	16.9	1.62	23	1.75	33	2.71	74	1.75	33
2 p.m.	------	-------	1.52	16.9	1.60	22	1.67	27	2.60	68	1.75	33
4	------	-------	1.52	16.9	1.58	21	1.63	24	2.31	57	1.75	33
6	------	-------	1.52	16.9	1.56	19.5	1.73	31	2.19	54	1.76	34
8	------	-------	1.53	17.6	1.54	18.2	1.72	31	2.17	53	1.77	34
10	------	-------	1.57	20	1.53	17.6	1.72	31	2.11	51	1.77	34
12 m.	------	-------	1.60	22	1.52	16.9	1.72	31	2.02	48	1.74	32

Hour	July 23 Feet	July 23 Sec.-ft.	July 24 Feet	July 24 Sec.-ft.	July 25 Feet	July 25 Sec.-ft.	July 26 Feet	July 26 Sec.-ft.	July 27 Feet	July 27 Sec.-ft.	July 28 Feet	July 28 Sec.-ft.
2 a.m.	1.71	30	3.45	120	3.07	93	1.93	44	1.81	37	------	-------
4	1.69	28	3.99	168	2.84	80	1.92	43	1.81	37	------	-------
6	1.69	28	4.38	212	2.66	71	1.92	43	1.80	36	------	-------
8	1.78	35	4.45	220	2.52	65	1.91	43	1.82	37	------	-------
10	1.83	38	4.47	222	2.41	60	1.88	41	1.83	38	------	-------
12 n.	1.98	46	4.42	216	2.31	57	1.87	41	1.84	39	------	-------
2 p.m.	2.19	54	4.37	210	2.22	55	1.87	41	1.80	36	------	-------
4	2.40	60	4.26	197	2.14	52	1.89	42	1.76	34	------	-------
6	2.56	66	4.10	179	2.07	50	1.88	41	1.73	31	------	-------
8	2.85	80	3.92	161	2.03	48	1.85	39	1.71	30	------	-------
10	2.91	84	3.68	139	1.99	47	1.83	38	1.70	29	------	-------
12 m.	2.87	82	3.38	115	1.96	46	1.82	37	1.70	29	------	-------

Mean discharge, in second-feet, 1938

Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.	Day	Sept.	Oct.
1	25	51	9	11.3	30	17	15.1	26	25	40	42
2	18.2	39	10	11.3	28	18	19.5	25	26	36	31
3	14.6	34	11	11.8	28	19	63	24	27	35	28
4	26	32	12	12.3	27	20	482	32	28	49	40
5	17.3	30	13	12.3	27	21	521	52	29	69	57
6	15.1	39	14	12.3	26	22	254	32	30	102	40
7	14.0	46	15	14.6	26	23	64	28	31		32
8	11.8	34	16	14.0	26	24	49	38			
Monthly mean discharge, in second-feet										68.0	33.9
Runoff, in inches										3.93	2.03

Gage height, in feet, and discharge, in second-feet, at indicated time, September 1938

Hour	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.	Feet	Sec.-ft.
	September 18		September 19		September 20		September 21		September 22		September 23	
1 a.m.	------	-------	1.52	16.9	3.00	174	5.32	511	5.06	468	2.13	81
2	------	-------	1.51	16.3	3.25	204	5.41	527	4.90	442	2.12	80
3	------	-------	1.51	16.3	3.56	243	5.42	528	4.74	416	2.09	76
4	------	-------	1.51	16.3	4.60	394	5.34	515	4.58	391	2.08	74
5	------	-------	1.50	15.7	5.46	535	5.24	498	4.43	368	2.06	71
6	------	-------	1.50	15.7	6.06	641	5.10	474	4.28	345	2.06	71
7	------	-------	1.50	15.7	6.57	733	4.96	452	4.14	324	2.05	70
8	------	-------	1.50	15.7	6.71	756	4.93	447	4.02	306	2.04	69
9	------	-------	1.50	15.7	6.63	743	4.74	416	3.89	288	2.04	69
10	------	-------	1.50	15.7	6.40	702	4.73	415	3.77	271	2.02	66
11	------	-------	1.54	18.2	6.10	648	4.76	420	3.67	257	2.02	66
12 n.	------	-------	1.83	43	5.83	599	4.87	437	3.57	244	2.01	64
1 p.m.	------	-------	2.24	95	5.56	552	5.08	471	3.46	230	2.01	64
2	------	-------	2.34	106	5.30	508	5.36	518	3.35	216	1.99	62
3	------	-------	2.42	114	5.08	471	5.68	573	3.23	202	1.98	61
4	------	-------	2.46	118	4.88	439	5.96	623	3.06	181	1.98	61
5	------	-------	2.46	118	4.72	413	6.11	650	2.86	159	1.96	58
6	------	-------	2.45	117	4.62	397	6.19	664	2.66	138	1.95	57
7	------	-------	2.39	111	4.60	394	6.15	657	2.50	122	1.94	56
8	------	-------	2.35	107	4.69	408	6.01	632	2.40	112	1.93	55
9	------	-------	2.33	105	4.82	429	5.81	596	2.30	102	1.93	55
10	------	-------	2.34	106	4.94	448	5.61	561	2.24	95	1.92	53
11	------	-------	2.42	114	5.04	464	5.41	527	2.19	89	1.92	53
12 m.	------	-------	2.63	135	5.17	486	5.23	496	2.16	85	1.92	53

SUMMARY OF FLOOD DISCHARGES

The results of the determinations of maximum flood flows at existing stream-gaging stations and other places (a total of 149 determinations) on streams affected by the storm of July 17–25 in New Jersey, New York, Connecticut, and Massachusetts are summarized in table 24. The time of day given in this table is eastern standard time. The map reference numbers conform to those given in Water-Supply Paper 847[27] and have been plotted on plate 12 to aid in indentifying the location of the determinations. Several separate determinations have been given the same reference number because of their proximity to one another and their almost identical drainage areas.

[27] Williams, G. R., and Crawford, L. C., Maximum discharges at stream-measurement stations through December 31, 1937: U. S. Geol. Survey Water-Supply Paper 847, 272 pp., 1940.

TABLE 24.—*Maximum discharges during flood of July 1938*

No. on pl. 12	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum discharge prior to July 1938		Maximum discharge during flood of July 1938			
				Date	Second-feet	Time	Second-feet	Second-feet per square mile	Method of determination
	Merrimack River Basin								
210	Concord River below River Meadow Brook at Lowell, Mass.	[1]405	1936–38	Dec. 23, 1936	1,900	July 29, 6 a.m. and 4:45 p.m.	3,790		Stage-discharge relation.
	Ipswich River Basin								
212.5	Ipswich River at South Middleton, Mass.	43.4	1938			July 24, 8 to 12 p.m.	608	14.0	Do.
213	Ipswich River near Ipswich, Mass.[2]	124	1930–38	Mar. 15, 1936	2,610	July 26, 6 to 8 a.m.	1,700	13.7	Do.
	Charles River Basin								
216	Charles River at Charles River Village, Mass.[2]	184	1937–38	March 1936	3,170	July 27, 3 p.m.	3,110	16.9	Do.
218	Charles River at Waltham, Mass.[2]	[3]227	1931–38	Mar. 19, 1936	2,540	July 26, 1 p.m.	2,180		Do.
218.5	Mother Brook at Dedham, Mass.	([4])	do.	do.	900	July 28, 29	909		Do.
	Taunton River Basin								
222	Taunton River at State Farm, Mass.	260	1929–38	Apr. 14, 1935	3,050	July 25, 4 to 8 p.m.	2,480	9.5	Do.
223	Wading River near Norton, Mass.	42.4	1925–38	Mar. 12, 13, 1936.	1,030	July 25, 2 to 3 a.m.	714	16.8	Do.
	Providence River Basin								
225	Blackstone River at Worcester, Mass.[2]	31.3	1923–38	Mar. 18, 1936	2,520	July 24, 8 to 10 a.m.	728	23.3	Do.
230	Blackstone River at Woonsocket, R. I.[2]	416	1929–38	Mar. 19, 1936	15,000	July 24, 2 p.m.	15,100	36.3	Do.
	Thames River Basin								
264	Willimantic River near South Coventry, Conn.	121	1931–38	Mar. 12, 1936	7,880	July 23, 2:30 p.m.	2,950	24.4	Do.
267	Shetucket River near Willimantic, Conn.	401	1904–05 1933–38	do.	23,900	July 24, 4 a.m.	15,300	38.2	Do.
272	Hop River near Columbia, Conn.	76.2	1932–38	do.	3,300	July 23, 8 p.m.	2,530	33.2	Do.
275	Natchaug River at Willimantic, Conn.	169	1930–38	Mar. 18, 1936	14,200	July 23, 11:30 p.m.	9,740	57.6	Do.
282	Quinebaug River at Quinebaug, Conn.	157	1931–38	do.	10,500	July 23, 6:10 p.m.	4,390	28.0	Do.
284	Quinebaug River at Putnam, Conn.	331	1929–38	Mar. 19, 1936	17,200	July 24, 2 a.m.	10,000	30.2	Do.
286	Quinebaug River at Dyer Dam, below Danielson, Conn.	465				July 24, 11 a.m.	13,400	28.8	Dam.
289	Quinebaug River at Jewett City, Conn.	711	1918–38	Mar. 19, 1936	29,200	July 24, 5 p.m.	25,000	35.2	Stage-discharge relation.

294	French River at North Grosvenordale, Conn.	98.5				July 24, 3 p.m.	3,110	31.6	Dam.
295	Muddy Brook at Harrisville, Conn.	36.4				July 24	[5]1,300	35.7	Do.
295.5	Five Mile River at Killingly, Conn.	58.2	1937–38	Nov. 29, 1937	730	July 24, 2 p.m.	2,480	42.6	Stage-discharge relation.
298	Moosup River at Moosup, Conn.	83.5	1932–38	Mar. 12, 1936	4,260	July 24, 7:20 p.m.	4,160	49.8	Do.
299	Pachaug River at Jewett City, Conn.	59.0				July 24	[5]1,000	16.9	Dam.
301	Yantic River at Yantic, Conn.	88.6	1930–38	Mar. 12, 1936	6,300	July 24, 1:20 a.m.	6,980	78.8	Stage-discharge relation.
	Connecticut River Basin								
318	Connecticut River at Hartford, Conn.	10,480		Mar. 21, 1936	[6]37.6	July 25, 2:30 a.m.	[7]11.2		
413	Scantic River at Broad Brook, Conn.	98.4	1928–38	Mar. 13, 1936	1,820	July 24, 2 to 4 p.m.	962	9.8	Stage-discharge relation.
415	Farmington River near New Boston, Mass.[8]	92.0	1913–38	Mar. 18, 1936	9,080	July 29, 10 to 11 p.m.	[9]1,680	18.3	Do.
416	Farmington River at Riverton, Conn.[8]	216	1929–38	do	19,900	July 22, 6 to 7 a.m.	2,610	12.1	Do.
418	Farmington River at Collinsville, Conn.[2]	354				July 21, 7:45 p.m.	6,210	17.5	Dam.
419	Farmington River at Tariffville, Conn.[2]	578	1928–38	Mar. 19, 1936	26,900	July 22, 12 p.m.	6,020	10.4	Stage-discharge relation.
420	Farmington River at Rainbow, Conn.[2 10]	590				July 23, 9 a.m.	6,200	10.5	Dam.
423	Burlington Brook near Burlington, Conn.	4.1	1931–38	Mar. 12, 1936	503	July 21, 5:30 p.m.	357	87.1	Stage-discharge relation.
427	South Branch of Park River at Hartford, Conn.	40.6	1936–38	Jan. 25, 1938	2,860	July 24, 2 to 4 a.m.	800	19.7	Do.
428	Park River at Hartford, Conn.	74.0	do	do	5,650	July 24, 8 a.m.	1,320	17.8	Do.
429	North Branch of Park River at Hartford, Conn.	25.3	do	do	1,640	July 20, 3:30 p.m.	623	24.6	Do.
431	Hockanum River near East Hartford, Conn.[8]	74.5	1919–21 1928–38	do	2,140	July 24, 1 to 2 a.m.	781	10.5	Do.
432	Salmon River near East Hampton, Conn.	105	1905–06 1928–38	Mar. 12, 1936	6,250	July 23, 8 p.m.	6,300	60.0	Do.
433.3	East Branch of Eightmile River near North Lyme, Conn.	22.0	1937–38	Nov. 29, 1937	1,010	July 24, 12 n.	897	40.8	Do.
433.7	West Branch of Eightmile River near North Lyme, Conn.	19.2	do	do	1,020	July 24, 8 a.m.	785	40.9	Do.
	Quinnipiac River Basin								
435	Quinnipiac River at Wallingford, Conn.	109	1930–38	Mar. 12, 1936	3,240	July 24, 9 p.m.	1,460	13.4	Do.
	Housatonic River Basin								
438	Housatonic River at Coltsville, Mass.	57.1	1936–38	Mar. 18, 1936	6,000	July 23, 4 p.m.	2,060	36.1	Do.
445	Housatonic River near Great Barrington, Mass.	280	1913–38	Mar. 19, 1936	8,990	July 25, 2 to 6 a.m.	3,420	12.2	Do.
446	Housatonic River at Falls Village, Conn.	632	1912–38	Mar. 20, 1936	14,500	July 25, 6 p.m.	4,580	7.2	Do.
446.5	Housatonic River at Bulls Bridge, Conn.[11]	782				July 21, 7 p.m.	7,020	9.0	Dam.
450	Housatonic River at Stevenson, Conn.[8]	1,545	1928–38	Mar. 12, 1936	69,500	July 24, 6 a.m.	18,700	12.1	Stage-discharge relation.
451	Housatonic River at Derby, Conn.[8]	1,581				do	18,600	11.8	Dam.
453	Tenmile River near Gaylordsville, Conn.	204	1929–38	Mar. 12, 1936	10,200	July 22, 9 a.m.	5,660	27.7	Stage-discharge relation.
455	Still River near Lanesville, Conn.	68.5	1931–38	do	3,930	July 24, 10 to 12 p.m.	920	13.4	Do.
456	Shepaug River at outlet of Shepaug Reservoir, at Woodville, Conn.[8 12]	38.0	1935–38	Jan. 25, 1938	[13]4,100	July 21, about 8 p.m.	[13]2,400	63.2	Dam.
458	Shepaug River near Roxbury, Conn.[8]	133	1930–38	Mar. 12, 1936	7,000	July 21, 8 p.m.	3,600	27.1	Stage-discharge relation.
459	Pomperaug River at Southbury, Conn.	75.3	1932–38	do	5,990	July 21, 9 p.m.	1,750	23.2	Do.
462	Naugatuck River near Thomaston, Conn.	71.9	1930–38	Jan. 25, 1938	6,830	July 21, 6:20 p.m.	5,630	78.3	Do.
463	Naugatuck River near Naugatuck, Conn.[8]	246	1918–24 1928–38	Nov. 1927	18,300	July 21, 9 p.m.	7,760	31.5	Do.
464	Leadmine Brook near Thomaston, Conn.	24.0	1930–38	Sept. 17, 1934	2,800	July 21, 4:30 p.m.	2,270	94.6	Do.

TABLE 24.—*Maximum discharges during flood of July 1938*—Continued

No. on pl. 12	Stream and place of determination	Drainage area square miles	Period of record	Maximum discharge prior to July 1938		Maximum discharge during flood of July 1938			
				Date	Second-feet	Time	Second-feet	Second-feet per square mile	Method of determination
	Saugatuck River Basin								
466	Saugatuck River near Westport, Conn.	77.5	1932–38	Mar. 12, 1936	5,310	July 24, 2 a.m.	3,120	40.3	Do.
	Hudson River Basin								
538	Schoharie Creek at Prattsville, N. Y.	236	1902–38	Nov. 16, 1926	[14]42,300	July 23, 2 p.m.	6,060	25.7	Do.
539	Schoharie Creek at Gilboa Dam, at Gilboa, N. Y.[8, 14]	314	1927–38	Mar. 18, 1936	32,000	July 23, 4 p.m.	5,880	18.7	Do.
540	Schoharie Creek at Middleburg, N. Y.[8, 15]	532	1906–38	do	47,800	July 23, 6 p.m.	[13]8,800	16.5	Do.
550	Catskill Creek at Oak Hill, N. Y.[16]	98	1910–38	Nov. 9, 1913	[14]12,300	July 23, 8:30 a.m.	1,390	14.2	Do.
553	Esopus Creek at Coldbrook, N. Y.	192	1914–38	Aug. 24, 1933	[14]55,000	July 22, 8:40 a.m.	8,830	46.0	Do.
560	Rondout Creek near Lowes Corners, N. Y.	38.5	1937–38	Oct. 23, 1937	[13]5,700	July 22, 8 a.m.	7,600	197	Do.
561	Rondout Creek near Lackawack, N. Y.	100	1906–38	Aug. 26, 1928	[14]26,700	July 22, 9:30 a.m.	17,700	177	Do.
562	Rondout Creek at Rosendale, N. Y.	386	1901–03 1906–19 1926–38	Aug. 27, 1928	27,300	July 23, 9 p.m.	14,900	38.6	Do.
563	Chestnut Creek above Red Brook, at Grahamsville, N. Y.	12.2	1937–38	Oct. 23, 1937	[13]1,250	July 22, 8 a.m.	[13]2,600	213	Do.
563.5	Wallkill River near Unionville, N. Y.	144	do	Jan. 26, 1938	1,710	July 25, 3 a.m.	[13]1,050	7.3	Do.
564	Wallkill River at Pellets Island Mountain, N. Y.	385	1919–38	Mar. 14, 1936	12,400	July 24, 5 p.m.	4,880	12.7	Do.
566	Wallkill River at Gardiner, N. Y.	711	1924–38	Mar. 12, 1936	18,000	July 23, 7 p.m.	9,720	13.7	Do.
567.3	Pochuck Creek at Newport, near Pine Island, N. Y.	98.0	1937–38	Jan. 26, 1938	1,150	July 25, 7 a.m.	1,180	12.0	Do.
567.7	Quaker Creek at Florida, N. Y.	9.74	do	Jan. 25, 1938	387	July 23, 6 p.m.	[5]360	37.0	Do.
	Hackensack River Basin								
575	Hackensack River at New Milford, N. J.[2]	113	1921–38	Mar. 12, 13, 1936.	2,800	July 24, 11 a.m. to 2 p.m.	2,350	20.8	Do.
576	Pascack Brook at Westwood, N. J.[8]	29.6	1934–38	Mar. 12, 1936	1,190	July 24, 9 to 10 a.m.	600	20.3	Do.
	Passaic River Basin								
577	Passaic River near Millington, N. J.	55.4	1903–06 1921–38	Mar. 8, 1904	2,000	July 24, 7 a.m. to 3 p.m.	719	13.0	Do.
579	Passaic River near Chatham, N. J.	100	1903–11 1937–38	Jan. 9, 1905	2,990	July 23, 1 p.m.	1,840	18.4	Do.
581	Passaic River at Little Falls, N. J.[2]	761				July 25	7,000	9.2	Do.
582	Passaic River at Paterson, N. J.[2]	785	1898–1938	Oct. 10, 1903	[17]28,000	July 25, 6 a.m. to 6 p.m.	7,030	9.0	Stage-discharge and power output-discharge relations.

583.5	Rockaway River above reservoir at Boonton, N. J.	116	1937–38	Nov. 14, 1937, Jan. 25, 1938	1,900	July 24, 11 a.m. to 2 p.m.	2,120	13.3	Stage-discharge relation.
584	Rockaway River below reservoir at Boonton, N. J.[2]	119	1903–04, 1906–38	Oct. 10, 1903	[17]7,560	July 24, 8 to 11 p.m.	1,730	14.5	Do.
585	Beaver Brook at outlet of Splitrock Pond, N. J.[8]	5.50	1925–38	Mar. 12, 1936	126	July 24, 12 n. to 4 p.m.	95	17.3	Do.
593	Ramapo River near Mahwah, N. J.	118	1903–06, 1922–38	Oct. 9, 1903	12,400	July 23, 11 p.m.	2,580	21.9	Do.
595	Ramapo River at Pompton Lakes, N. J.	160	1921–38	Mar. 12, 1936	12,300	July 23–24, 11 p.m. to 6 a.m.	2,820	17.6	Do.
596	Wanaque River at Greenwood Lake, N. J.[8]	27.1	1919–38	do	914	July 23–24, 9 p.m. to 3 a.m.	486	17.9	Do.
597	Wanaque River at Monks, N. J.[8]	40.4	1935–38	do	1,920	July 23, 7 to 8 p.m.	900	22.3	Do.
598	Wanaque River at Wanaque, N. J.[2]	90.4	1903–05, 1912–15, 1919–38	Apr. 7, 1924	[18]5,050	July 24, 2 a.m.	1,730	19.1	Do.
604	Pequannock River at Macopin intake dam, N. J.[2]	63.7	1892–38	Oct. 10, 1903	6,100	July 23	[17]1,030	16.2	Do.
606	Saddle River at Lodi, N. J.	54.6	1923–38	Mar. 12, 1936	2,200	July 24, 6 p.m.	1,060	19.4	Do.
606.2	Second River at Brighton Avenue, East Orange, N. J.	5.03				July 23	[19]1,800	358	Backwater-curve method.
606.4	Second River at Bloomfield Avenue, Bloomfield, N. J.	10.14				do	[19]2,800	276	Contracted opening.
606.6	Second River, 310 feet downstream from Hendricks Brook, Belleville, N. J.	11.61				July 23, 11 a.m.	[19]3,000	258	
606.8	Second River at Newark pipe line, Belleville, N. J.	14.49				July 23	[19]3,300	228	Critical-depth method.
	Elizabeth River Basin								
607	Elizabeth River at Irvington, N. J.	[20]2.91	1930–38	Aug. 6, 1932	1,460	July 23, 8 a.m.	1,750	601	Stage-discharge relation.
607.3	Elizabeth River at Nye Avenue, Irvington, N. J.	3.83				July 23	[19]1,945	508	Slope-area method.
607.3	Elizabeth River above Lyons Avenue, Irvington, N. J.	3.87				do	[19]1,910	494	Do.
607.7	Elizabeth River at Yale Avenue, Irvington, N. J.	5.02				do	[19]2,200	438	Do.
607.7	Elizabeth River at Chancellor Avenue, Irvington, N. J.	5.14				do	[19]2,300	447	Contracted opening method.
608	Elizabeth River at Elizabeth, N. J.	[20]18.0	1921–38	Sept. 1, 1927, Nov. 19, 1932	[2]2,640	July 23, 1 p.m.	[21]2,720	151	Stage-discharge relation.
	Rahway River Basin								
608.5	Rahway River near Springfield, N. J.[21]	25.5	1938			July 23, 1:15 p.m.	1,940	76.1	Do.
609	Rahway River at Rahway, N. J.[21]	40.9	1908–15, 1921–38	Aug. 2, 1927	1,740	July 24, 1:15 a.m.	3,140	76.8	Do.
609.5	West Branch of Rahway River at Diamond Mill Dam, Millburn, N. J.	7.1				July 23	[22]965	136	Weir.
	Raritan River Basin								
611	South Branch of Raritan River near High Bridge, N. J.	65.3	1919–38	Feb. 2, 1922	3,600	July 24, 1 a.m.	2,120	32.5	Stage-discharge relation.
614	South Branch of Raritan River at Stanton, N. J.	147	1903–06, 1919–38	July 9, 1935	8,280	July 23, 10 p.m.	4,600	31.3	Do.
616	Raritan River at Manville, N. J.	490	1903–07, 1921–38	Aug. 24, 1933	21,000	do	26,000	53.1	Do.

TABLE 24.—*Maximum discharges during flood of July 1938*—Continued

No. on pl. 12	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum discharge prior to July 1938		Maximum discharge during flood of July 1938			
				Date	Second-feet	Time	Second-feet	Second-feet per square mile	Method of determination
619	Neshanic River at Reaville, N. J.	25.7	1930–38	Aug. 23, 1933	4,370	July 23, 10:30 a.m.	2,960	115	Do.
620	North Branch of Raritan River near Far Hills, N. J.	26.2	1922–38	July 23, 1919	7,000	July 23, 7 p.m.	938	35.8	Do.
622	North Branch of Raritan River at Milltown, N. J.	190	1923–38	Jan. 3, 1936	14,400	July 23, 4 p.m.	7,900	41.6	Do.
623	Black River near Pottersville, N. J.	32.8	1921–38	Nov. 17, 1927	1,600	July 23, 5 p.m.	370	11.3	Do.
624	Millstone River near Kingston, N. J.[8]	171	1933–38	Aug. 24, 1933	4,950	July 23, about 10 p.m.	8,600	50.3	Do.
625	Millstone River at Blackwells Mills, N. J.[8]	258	1903–04 1921–38	Oct. 18, 1927	7,000	July 23, 11 p.m.	12,400	48.1	Do.
625.5	Green Brook at Plainfield, N. J.	9.75	1938			July 23, 11:30 a.m.	2,890	296	Do.
628	Lawrence Brook at Farrington Dam, N. J.[8]	34.4	1927–38	July 6, 1928	1,900	July 23, 7 to 9 p.m.	1,050	30.5	Do.
629	Deep Run near Browntown, N. J.	8.07	1932–38	Sept. 9, 1934	917	July 20, 5:30 p.m.	541	67.0	Do.
630	Tennent Brook near Browntown, N. J.	5.25	do	Sept. 8, 1934	166	July 23, 9 p.m.	92	17.5	Do.
	Coastal Basins								
632	Swimming River near Red Bank, N. J.[2]	48.5	1922–38	Sept. 9, 1934	2,930	July 20, 7:30 p.m.	1,500	30.9	Do.
633	Manasquan River at Squankum, N. J.	43.4	1931–38	June 28, 1938	1,550	July 20, 9 p.m.	1,480	34.1	Do.
634	Toms River near Toms River, N. J.	124	1928–38	June 29, 1938	1,240	July 25, 12 p.m. to July 26, 4 a.m.	1,050	8.47	Do.
635	Cedar Creek at Lanoka Harbor, N. J.	56.0	1932–38	Feb. 16, 1936	(not determined)	July 25, 3 a.m. to 1 p.m.	367	6.55	Do.
636	Batsto River at Batsto, N. J.	70.5	1927–38	Aug. 24, 1933	[17]824	July 25, 10 p.m.	579	8.21	Do.
637	East Branch of Wading River at Harrisville, N. J.	64.0	1931–38	do	859	July 21, 2 to 4 a.m.	510	7.97	Do.
						July 24, 9 p.m. to July 25, 2 a.m.	505	7.89	Do.
639	Great Egg River at Folsom, N. J.	56.3	1925–38	Sept. 8, 1935	599	July 25, 10 a.m. to 5 p.m.	535	9.50	Do.
641	Manantico Creek near Millville, N. J.	22.3	1931–38	Sept. 7, 1935	566	July 24, 9 to 10 p.m.	474	21.3	Do.
	Delaware River Basin								
642	East Branch of Delaware River at Margaretville, N. Y.	163	1937–38	May 15, 1937	6,000	July 23, 11:45 a.m.	4,120	25.3	Do.
643	East Branch of Delaware River at Harvard, N. Y.	443	1934–38	Mar. 18, 1936	26,200	July 23, 7 p.m.	7,900	17.8	Do.
644	East Branch of Delaware River at Fishs Eddy, N. Y.	783	1912–38	Oct. 9, 1903	[23]70,000	July 22, 3 a.m.	21,400	27.3	Do.
646	Delaware River at Port Jervis, N. Y.	3,076	1904–38	Oct. 10, 1903	[23]155,000	July 22, 7 p.m.	[8]37,400	12.2	Do.
647	Delaware River at Belvidere, N. J.	4,542	1922–38	do	220,000	July 23, 6 a.m.	[8]53,500	11.8	Do.
648	Delaware River at Riegelsville, N. J.	6,344	1906–38	do	275,000	July 23, 11 a.m.	[8]65,600	10.3	Do.
649	Delaware River at Trenton, N. J.[8]	6,796	1913–38	Mar. 19, 1936	227,000	July 23, 8 to 10 p.m.	81,500	12.0	Do.
650	Mill Brook at Arena, N. Y.	25.0	1937–38	Oct. 23, 1937	[13]1,550	July 23, 8 a.m.	[13]1,110	44.4	Do.

651	Tremper Kill near Shavertown, N. Y.	33.0	do	do	1,800	do	535	16.2	Do.
652	Terry Clove Kill near Pepacton, N. Y.	14.1	do	Jan. 25, 1938	[13]850	July 23, 9 a.m.	[5]152	10.8	Do.
653	Beaver Kill at Craigie Clair, N. Y.	82	do	Oct. 23, 1937	8,480	July 21, 10 p.m.	8,510	104	Do.
654	Beaver Kill at Cooks Falls, N. Y.	241	1913–38	Aug. 24, 1933	19,000	July 22, 12:30 a.m.	14,900	61.8	Do.
655	Willowemoc Creek near Livingston Manor, N. Y.	63	1937–38	Oct. 23, 1937	4,470	July 22, 9:15 a.m.	5,090	80.8	Do.
656	Little Beaver Kill near Livingston Manor, N. Y.	19.8	1924–38	Aug. 26, 1928	2,500	July 22, 8 a.m.	[13]1,620	81.8	Do.
657	West Branch of Delaware River at Delhi, N. Y.	142	1937–38	Jan. 25, 1938	4,290	July 23, 4:30 p.m.	1,100	7.7	Do.
658	West Branch of Delaware River at Hale Eddy, N. Y.	593	1912–38	Oct. 10, 1903	[23]46,000	July 24, 12:30 a.m.	2,580	4.4	Do.
662.5	Little Delaware River near Delhi, N. Y.	49.8	1937–38	Jan. 25, 1938	[13]2,180	July 23, 9 a.m.	[13]843	16.9	Do.
667.3	Neversink River at Halls Mills, near Curry, N. Y.	68	do	Oct. 23, 1937	13,000	July 22, 9 a.m.	12,400	182	Do.
667.7	Neversink River at Woodbourne, N. Y.	113	do	do	[13]11,000	July 22, 11 a.m.	[13]12,300	109	Do.
668	Neversink River at Oakland Valley, N. Y.	222	1928–38	Aug. 24, 1933	20,000	July 22, 2 p.m.	14,500	65.3	Do.
669	Neversink River at Godeffroy, N. Y.	302	1903, 1909–14, 1937–38	Mar. 27, 1913	[24]12,800	July 22, 4:30 p.m.	16,100	53.3	Do.
671	Flat Brook near Flatbrookville, N. J.	65.1	1923–38	Apr. 7, 1924 Feb. 11, 1925	3,470	July 24, 2 a.m.	2,400	36.9	Do.
673	Paulins Kill at Blairstown, N. J.	126	1921–38	June 28, 1938	3,700	do	2,540	20.2	Do.
674	Pequest River at Pequest, N. J.	108	do	Mar. 14, 1936	1,810	July 22, 2 a.m.; July 23, 12 p.m. to July 24, 5 a.m.	703	6.51	Do.
675	Beaver Brook near Belvidere, N. J.	36.2	1922–38	Mar. 12, 1936	1,510	July 23, 3 p.m.	371	10.2	Do.
678	Musconetcong River at outlet of Lake Hopatcong, N. J.[8]	25.6	1928–38	Mar. 19, 1936	534	July 24, 6 a.m.	326	12.7	Do.
679	Musconetcong River near Hackettstown, N. J.[8]	70.0	1921–38	Mar. 12, 1936	1,430	July 24, 8 a.m. to 12 m.	924	13.2	Do.
680	Musconetcong River near Bloomsbury, N. J.[8]	143	1903–07, 1921–38	Oct. 10, 1903	[17]2,780	July 23, 11 to 11:30 p.m.	1,900	13.3	Do.
683	Assunpink Creek at Trenton, N. J.	89.4	1923–38	Apr. 7, 1924	2,400	July 23, 10:30 p.m.	2,370	26.5	Do.
686	North Branch of Rancocas Creek at Pemberton, N. J.	111	1921–38	Oct. 20, 1927	[17]1,310	July 24, 5 to 9 p.m.	1,360	12.3	Do.
698	Oldmans Creek near Woodstown, N. J.	19.3	1931–38	June 27, 1938	1,190	July 24, 10 a.m.	222	11.5	Do.

[1]Total area. Entire flow except wastage diverted from 92.6 square miles.
[2]Affected by storage and diversion.
[3]Does not include area drained by Stony Brook.
[4]Entire flow diverted from Charles River.
[5]Maximum observed.
[6]Maximum stage known since 1639; maximum discharge, 313,000 second-feet Mar. 20, 1936.
[7]Gage height, in feet, furnished by U. S. Weather Bureau; discharge, about 40,000 second-feet.
[8]Affected by storage.
[9]Maximum discharge from storm of July 17–25, 838 second-feet, 8 to 9 p.m., July 23.
[10]Record furnished by Stanley Works, New Britain, Conn.
[11]Record furnished by Connecticut Light & Power Co.
[12]Basic data furnished by Bureau of Engineering, city of Waterbury, Conn.
[13]From graph based on gage readings.
[14]Record furnished by New York City Board of Water Supply.
[15]Records of New York State Engineer and Surveyor, 1906–27.
[16]Records of New York City Board of Water Supply, 1910–29.
[17]Daily mean discharge.
[18]Maximum stage occurred June 1919, discharge not determined.
[19]Determined by Essex County Engineer.
[20]Revised.
[21]Affected by diversion.
[22]Determined by state Water Policy Commission.
[23]Estimated.
[24]Greater stage occurred October 1903; discharge not determined.

A study of the rates of flood discharge given in table 24 in relation to the corresponding drainage area is presented in figure 35. Size of drainage area is only one, though a major, factor influencing magnitude of flood discharge. The comparative influences of basic characteristics, such as slope, shape, and swamps, are not brought out in figure 35. Moreover, the effect of artificial storage is not segregated. The figure provides a convenient method for comparing flood discharges from drainage areas of widely varying sizes, but, in using it, influences other than drainage area should be kept in mind. Figure 35 shows that the greatest intensities of discharge were experienced in drainage areas in New Jersey and New York. Streams in metropolitan New Jersey discharged at especially high rates—one stream at the rate of 601 second-feet per square mile. In New York the discharge of 177 second-feet per square mile from Rondout Creek at Lacawack (100 square miles) is noteworthy. This discharge was exceeded, however, during August 1928. In Connecticut the discharge of the Quinebaug River at Jewett City (711 square miles, 35.2 second-feet per square mile) appears to rank highest, the size of drainage area considered. It should be noted that the Quinebaug River exceeded its discharge of July 1938 during the flood of March 1936.

In general the floods of July 1938 were exceeded by the widespread catastrophic floods of September 1938, 2 months later. In a sense, the floods were related. Both were nearly coincident with respect to geographic location, and the large amount of retention after the July storm doubtless diminished the retentive capacity of the ground during the September storm.

STORAGE RESERVOIRS

Basic data for most of the important storage reservoirs have been given in the section on "Stages and discharges at stream-gaging stations." The section herewith is limited to a brief discussion of some of the examples of storage regulation.

The effect of storage in the many small ponds and lakes has been discussed in the study of the "Flood of January 1938 in Connecticut."

The larger reservoirs, having appreciable storage capacity below the level of the spillway, have a marked effect on flood flow. Records for several reservoirs, presented on page 108, disclose some interesting facts. As during the flood of January 1938, the discharge gates at Otis Reservoir, at Cold Spring, Mass., were closed at the start of the flood and all the flow from 17.2 square miles of Farmington River drainage was retained from the evening of July 18 to July 26. Shenipsit Lake at Rockville, Conn., near the

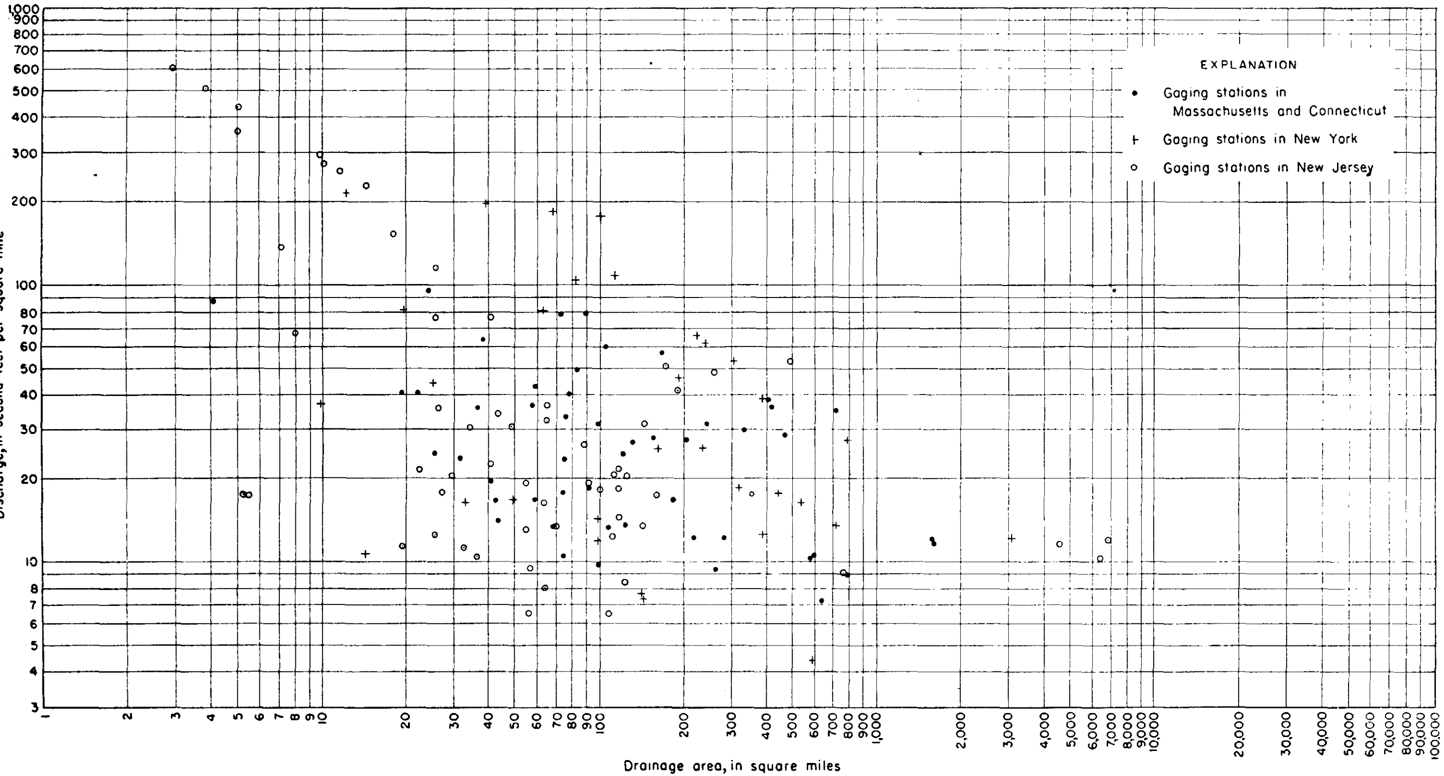

FIGURE 35.—Chart showing maximum discharges during flood of July 1938, in second-feet per square mile, in relation to drainage area.

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source of the Hockanum River, began to spill water over the dam on July 22, and on July 23, the day of maximum natural runoff, the lake contents above the spillway increased the equivalent of 152 second-feet. From July 17 to 30 Candlewood Lake on Rocky River near New Milford, Conn., increased in contents the equivalent of 3.14 inches of water over its drainage area of 40.4 square miles.

The manner in which several reservoirs operated during the flood period of July 1938 can be illustrated by constructing hydrographs of observed and adjusted natural flow from the data given in the section "Stages and discharges at stream-gaging stations."

FLOOD-CREST STAGES

Immediately after the flood of July 1938 the Stream and Waterways Survey of the Works Project Administration, in cooperation with the Water Policy Commission of the State of New Jersey, began to identify and mark crest stages reached by the rivers in New Jersey in the flood area. Field parties were dispatched to obtain essential information with regard to these floodmarks and to refer them to mean sea-level datum. Their relative positions were identified by distances from the mouths of the respective rivers, based on comprehensive river surveys of the Stream and Waterways Survey.

Table 25 presents records of flood-crest stages for the major river systems in New Jersey during the flood of July 1938. The records are of special interest in the planning of future developments along the rivers. Flood-crest stages in New Jersey during other major floods are also published in Water-Supply Papers 799[28] and 867.[29]

[28] Grover, N. C., and others, The floods of March 1936, pt. 2, Hudson River to Susquehanna River region: U. S. Geol. Survey Water-Supply Paper 799, table 11, pp. 343–350, 1937.

[29] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, table 19, pp. 510–517, 1940.

TABLE 25.—*Flood-crest stages, July 1938*

(U. S. Coast and Geodetic Survey datum except as noted)

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Hackensack River Basin			
Hackensack River:			
Rivervale, N. J., at upstream side of Poplar Road Bridge	32.1	July 23 or 24	37.0
Old Tappan, N. J., at upstream side of Harrington Avenue Bridge	27.8	do	26.1
Oradell, N. J., on right bank above Oradell Dam	22.6	July 24	[1]21.88
New Milford, N. J., Geological Survey gage above dams at plant of Hackensack Water Co.	21.8	July 24, 11 a.m. to 2 p.m.	10.76
Pascack Brook:			
Hillsdale, N. J., above Woodcliff Lake Dam	6.6	July 24	[1]95.63
Westwood, N. J., at upstream side of Broadway Bridge	5.2	do	[2]50.03
Westwood, N. J., Geological Survey gage on right bank 75 feet upstream from Harrington Avenue Bridge and downstream from Musquapsink Creek.	3.2	July 24, 9 to 10 a.m.	32.67
Passaic River Basin			
Passaic River:			
Millington, N. J., Geological Survey gage on right bank 150 feet downstream from Davis Bridge	76.4	July 24, 7 a.m. to 3 p.m.	[2]222.81
Gillette, N. J., at Woodland Avenue Bridge (Mountain Avenue)	68.4	July 23 or 24	211.55
Gillette, N. J., at Springfield Avenue Bridge just downstream from Delaware, Lackawanna & Western R.R. bridge	67.2	do	211.5
Berkeley Heights, N. J., at Snyder Avenue Bridge	66.0	do	211.0
New Providence, N. J., at Central Avenue Bridge (Fairmount Avenue)	64.9	do	210.5
New Providence, N. J., at Passaic Avenue Bridge	63.5	do	209.0
Chatham, N. J., at Mount Vernon Avenue Bridge and upstream from Chatham	62.3	July 23	202.9
Chatham, N. J., Geological Survey gage on left bank 150 feet downstream from Stanley Avenue Bridge	61.8	July 23, 1 p.m.	200.02
Chatham, N. J., at Watchung Avenue Bridge	61.2	July 23	195.8
Chatham, N. J., at Morris Avenue Bridge	59.9	July 23 or 24	178.4
Little Falls, N. J., on left bank upstream from Beattie Dam	30.4	July 25, 8 a.m., 12 m.	[2]160.90
Little Falls, N. J., on left bank at tailrace of plant of Passaic Valley Water Commission	30.0	July 25, 12 m.	[2]128.20
Paterson, N. J., Geological Survey gage on right bank just upstream from Spruce Street Bridge	26.1	July 25, 6 a.m. to 6 p.m.	[2]118.44
Clifton, N. J., on Dundee Dam	18.1	July 25, 6:30 p.m.	[2] [3]28.2
Rockaway River:			
Dover, N. J., at Bergen Street Bridge	21.6	July 23	[2]558.2
Boonton, N. J., Geological Survey gage on right bank at Morris Avenue Bridge	9.0	July 24, 11 a.m. to 2 p.m.	[2]369.90
Boonton, N. J., on Boonton Reservoir at dam	7.2	July 25	[1] [2]308.30
Boonton, N. J., Geological Survey gage on right bank 1,500 feet downstream from Boonton Reservoir Dam	6.8	July 24, 8 to 11 p.m.	[2]201.55
Ramapo River:			
Mahwah, N. J., Geological Survey gage on left bank 150 feet downstream from bridge on State Highway 2 and 1 mile west of Mahwah.	12.4	July 23, 11 p.m.	260.93
Pompton Lakes, N. J., Geological Survey gage on right upstream abutment of Pompton Lakes Dam	1.3	July 23–24, 11 p.m. to 6 a.m.	202.84
Wanaque River:			
The Glens, N. J., Geological Survey gage at left end of right spillway of Greenwood Lake Dam.	16.8	July 23 and 24	[2]620.08
Greenwood Lake, N. J., Geological Survey gage on right bank 600 feet downstream from Greenwood Lake Dam	16.7	July 23–24, 9 p.m. to 3 a.m.	[2]604.65
Monks, N. J., Geological Survey gage on left bank above weir just upstream from Wanaque Reservoir	10.7	July 23, 7 to 8 p.m.	[2]305.27
Wanaque, N. J., on Wanaque Reservoir at Raymond Dam	4.4	July 24	[1] [2]302.27
Wanaque, N. J., Geological Survey gage 50 feet upstream from highway bridge	4.4	July 24, 2 a.m.	[2]215.66
Saddle River:			
Lodi, N. J., Geological Survey gage on left bank just upstream from Outwater Lane	3.3	July 24, 6 p.m.	27.21
Weasel Brook:			
Clifton, N. J., Geological Survey gage above dam at Jewett Avenue	2.6	July 23, 11:30 a.m. to 12 m.	70.85
Third River:			
Nutley, N. J., at upstream side of Chestnut Street Bridge	3.1	July 23	60.84

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Nutley, N. J., at upstream side of Rutger Street and Passaic Avenue Bridge	2.3	do	46.09
Nutley, N. J., at downstream side of Rutger Street and Passaic Avenue Bridge	2.3	do	45.29
Nutley, N. J., on Kingsland Park Dam	1.9	do	43.0
Clifton, N. J., upstream from River Road on Yantacaw Pond Dam	.7	do	16.8
Second River:			
Orange, N. J., at upstream side of North Day Street Bridge	4.9	do	149.8
East Orange, N. J., at upstream side of North Park Street Bridge	4.6	do	144.45
East Orange, N. J., at upstream side of Midland Avenue Bridge	4.3	do	136.94
Bloomfield, N. J., at Glenwood Avenue Bridge	3.5	do	118.63
Bloomfield, N. J., on front of Walter Kidde plant upstream from West Street Bridge	2.7	do	109.62
Belleville, N. J., Geological Survey gage 360 feet downstream from Franklin Avenue extension	1.4	July 23, 11 a.m.	69.7
Belleville, N. J., at upstream side of bridge on State Highway 21 (Main Street)	.1	July 23	10.60
Nishayne Brook:			
Orange, N. J., at downstream side of Orange Road Bridge	.6	do	248.50
Orange, N. J., southeast corner of Essex County Highway Garage property at Thomas Street upstream from Dodd Street	.5	do	194.69
Orange, N. J., at upstream side of East Day Street Bridge	.0	do	145.6
Elizabeth River Basin			
Elizabeth River:			
Irvington, N. J., Geological Survey gage 200 feet downstream from Valley Avenue (Orange Avenue)	9.7	July 23, 8 a.m.	[4]12.1
Irvington, N. J., at upstream side of Lyons Avenue Bridge	8.7	July 23	116.0
Irvington, N. J., at upstream side of Yale Avenue Bridge	8.4	do	109.67
Irvington, N. J., 100 feet downstream from Yale Avenue	8.4	do	108.89
Irvington, N. J., at upstream side of Chancellor Avenue twin pipes	8.1	do	109.3
Irvington, N. J., at downstream side of Chancellor Avenue twin pipes	8.1	do	100.4
Irvington, N. J., 100 feet upstream from Mill Road Bridge	7.7	do	80.53
Hillside, N. J., at upstream side of Mill Road Bridge	7.7	July 23, 1 p.m.	[2]79.8
Hillside, N. J., at upstream side of Union Avenue Bridge	7.3	July 23	[2]62.4
Union, N. J., at upstream side of bridge on State Highway 29	6.5	do	[2]45.3
Union, N. J., above dam upstream from Salem Road	5.5	do	[2]37.5
Union, N. J., at upstream side of Salem Road Bridge	5.5	do	[2]35.5
Union, N. J., at downstream side of Lehigh Valley R.R. Bridge	5.2	do	[2]30.8
Union, N. J., on left bank at culvert 400 feet downstream from Lehigh Valley R.R. bridge	5.1	do	[2]30.7
Union, N. J., at upstream side of North Avenue Bridge	4.2	do	[2]27.7
Elizabeth, N. J., above Ursino Lake Dam and upstream from Trotters Lane Bridge	3.9	do	[2]25.1
Elizabeth, N. J., below Ursino Lake Dam	3.9	do	[2]18.5
Elizabeth, N. J., at upstream side of Trotters Lane Bridge	3.9	do	[2]23.3
Elizabeth, N. J., at downstream side of Irvington Avenue Bridge	3.6	do	[2]20.0
Elizabeth, N. J., Geological Survey gage above dam and just upstream from Westfield Avenue Bridge	3.3	July 23, 1 p.m.	18.28
Elizabeth, N. J., on right bank 150 feet downstream from Westfield Avenue Bridge	3.3	July 23	18.1
Elizabeth, N. J., at upstream side of Crane Street Bridge	3.3	do	17.6
Elizabeth, N. J., at upstream end of Mulford Coal & Lumber Co's building and downstream from Central R.R. of New Jersey Bridge	3.2	do	15.7
Elizabeth, N. J., at upstream side of West Grand Street Bridge	3.2	do	15.5
Elizabeth, N. J., on left bank 100 feet downstream from West Grand Street	3.1	do	14.6

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
West Branch of Elizabeth River:			
Union, N. J., at upstream side of Chestnut Street Bridge	2.0	do	[2]56.4
Union, N. J., at downstream side of Self Master Parkway Bridge	1.8	do	55.2
Union, N. J., at downstream side of Morris Avenue Bridge	1.1	do	[2]54.4
Union, N. J., at upstream side of Sayre Road Bridge	.6	do	[2]53.7
Rahway River Basin			
East Branch of Rahway River (head of Rahway River):			
South Orange, N. J., at upstream side of Montrose Avenue Bridge	22.6	do	148.06
South Orange, N. J., at downstream side of Montrose Avenue Bridge	22.6	do	147.46
South Orange, N. J., on right bank 100 feet upstream from South Orange Avenue	21.7	do	140.94
Maplewood, N. J., at upstream side of Millburn Avenue Bridge	19.4	do	98.89
Maplewood, N. J., at downstream side of Millburn Avenue Bridge	19.4	do	97.42
Springfield, N. J., at downstream side of Springfield Avenue Bridge	18.8	do	86.3
Rahway River:			
Springfield, N. J., at upstream side of Morris Avenue Bridge	18.3	do	86.6
Springfield, N. J., at upstream side of Rahway Valley R.R. bridge	17.5	do	79.7
Springfield, N. J., at downstream side of Milltown Road Bridge	16.7	do	77.6
Springfield, N. J., Geological Survey gage on left bank 50 feet downstream from State Highway 29	16.1	July 23, 1:15 p.m.	73.58
Cranford, N. J., at downstream side of Kenilworth Boulevard Bridge	14.5	July 23	69.0
Cranford, N. J., at upstream side of north bridge on Springfield Avenue	13.2	July 23, 8:20 p.m.	66.4
Cranford, N. J., at downstream side of south bridge on Eastman Street	12.8	July 23	66.0
Cranford, N. J., at upstream side of south bridge on Springfield Avenue	12.5	do	65.2
Cranford, N. J., above Hansel Dam	12.3	do	63.3
Cranford, N. J., at upstream side of Union Avenue Bridge	12.3	do	63.1
Cranford, N. J., at upstream side of North Avenue Bridge	12.1	do	61.8
Cranford, N. J., at upstream side of South Avenue Bridge	12.0	do	61.7
Cranford, N. J., above Droescher Dam	11.7	do	59.3
Cranford, N. J., at upstream side of High Street Bridge	11.7	do	59.7
Cranford, N. J., at downstream side of Lehigh Valley R.R. bridge	10.8	do	52.5
Cranford, N. J., at upstream side of Raritan Road Bridge	10.2	do	47.4
Clark Township, N. J., above Sperry Dam	9.7	July 23-24	46.9
Clark Township, N. J., below Sperry Dam	9.7	do	43.5
Clark Township, N. J., above Bloodgood Dam	8.7	do	37.4
Clark Township, N. J., below Bloodgood Dam	8.7	do	33.8
Clark Township, N. J., above Jackson Dam	7.0	do	28.0
Clark Township, N. J., below Jackson Dam	7.0	do	23.7
Rahway, N. J., Geological Survey gage on left bank 100 feet upstream from St. George Avenue	6.2	July 24, 1:15 a.m.	15.12
Rahway, N. J., at upstream side of Church Street Bridge	5.9	July 24	13.7
Rahway, N. J., at upstream side of Whittier Street Bridge	5.7	do	10.9
Rahway, N. J., at upstream side of Grand Street Bridge	5.3	do	6.7
Rahway, N. J., at upstream side of Elizabeth Avenue Bridge	5.2	do	6.6
West Branch of Rahway River:			
West Orange, N. J., on Orange Reservoir spillway and just upstream from West Orange-South Orange village line	4.6	July 23	330.9
Millburn, N. J., above Diamond Mill Dam	1.9	do	176.1
Millburn, N. J., at upstream side of Glen Avenue Bridge	1.7	do	157.31
Millburn, N. J., at downstream side of Glen Avenue Bridge	1.7	do	154.56

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Millburn, N. J., at upstream side of Holmes Street Bridge	1.3	do	133.98
Millburn, N. J., at rear of F. W. Woolworth Building on Millburn Avenue	1.2	do	131.68
Millburn, N. J., at upstream side of Ridgewood Road Bridge	1.0	do	112.2
Millburn, N. J., at Fandango Mill Pond	.8	do	107.2
Millburn, N. J., below dam of Fandango Mill Pond	.7	do	97.2
Millburn, N. J., opposite river lane	.6	do	90.3
Springfield, N. J., at upstream side of Springfield Avenue Bridge	.3	do	86.5
Van Winkle Creek:			
Springfield, N. J., at downstream side of Rahway Valley R.R. bridge	.3	do	[2]82.7
Robinsons Branch of Rahway River:			
Clark Township, N. J., at upstream side of Raritan Road Bridge	3.8	do	[2]46.7
Clark Township, N. J., above dam upstream from Madison Hill Road	2.3	do	[2]46.5
Clark Township, N. J., at upstream side of Madison Hill Road	2.2	do	[2]29.4
Rahway, N. J., at upstream side of Maple Avenue Bridge	1.3	do	[2]16.7
Rahway, N. J., at upstream side of Jefferson Avenue Bridge	1.1	do	[2]15.0
Rahway, N. J., at upstream side of Central Avenue Bridge	.9	do	[2]12.9
Rahway, N. J., at upstream side of New Church Street Bridge	.5	do	[2]13.2
Rahway, N. J., at upstream side of Hamilton Street Bridge	.2	do	[2] 9.6
Raritan River Basin			
South Branch of Raritan River:			
High Bridge, N. J., Geological Survey gage 200 feet upstream from Lake Solitude and 1 mile upstream from High Bridge	27.8	July 24, 1 a.m.	[2]291.79
Stanton, N. J., Geological Survey gage just downstream from highway bridge near Stanton railroad station.	16.5	July 23, 10 p.m.	133.52
Neshanic Station, N. J., at highway bridge	5.3	July 23	68.40
South Branch, N. J., at highway bridge	.8	do	60.32
Raritan River:			
Raritan, N. J., at waterworks	26.8	do	42.20
Somerville, N. J.	25.5	do	41.80
Manville, N. J., Geological Survey gage on left bank just downstream from Manville-Finderne highway bridge	23.2	July 23, 10 p.m.	38.36
Manville, N. J., on left bank just upstream from Millstone River	21.5	July 23, 11 p.m.	35.90
Bound Brook, N. J., on left bank at Calco Chemical Co. plant and 1 mile west of Bound Brook	20.5	July 23, 10 p.m.	32.21
Bound Brook, N. J., at Main Street opposite Queens Bridge to South Bound Brook	19.3	July 23	28.77
Fieldville, N. J., above dam	17.7	do	25.21
Neshanic River:			
Reaville, N. J., Geological Survey gage at highway bridge to Muirhead and half a mile southwest of Reaville	6.4	July 20, 9 a.m. July 23, 10:30 a.m.	118.46 118.58
Walnut Brook:			
Flemington, N. J., Geological Survey gage 1¼ miles northwest of Flemington	3.1	July 20, 6 a.m. July 23, 1 p.m.	269.58 269.72
North Branch of Raritan River:			
Far Hills, N. J., Geological Survey gage above Ravine Lake Dam, 2 miles north of Far Hills	15.0	July 23, 7 p.m.	[2]228.18
Far Hills, N. J., at Moores Bridge on State Highway 31 and 1½ miles south of Far Hills	10.1	July 23	[2]108.00
North Branch, N. J., at highway bridge	3.7	do	[2] 62.26
Milltown, N. J., Geological Survey gage 400 feet upstream from State Highway 29	1.4	July 23, 4 p.m.	59.35
Black River (head of Lamington River):			
Pottersville, N. J., Geological Survey gage 1 mile upstream from Pottersville	11.4	July 23, 5 p.m.	[2]287.26
Lamington River:			
Lamington, N. J., at arch bridge	6.3	July 23	125.80
Lamington, N. J., at Rattlesnake Bridge, 2 miles south of Lamington	1.8	do	86.40
Burnt Mills, N. J., at highway bridge	.3	do	79.5

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Millstone River:			
Princeton, N. J., above Kingston Dam of Lake Carnegie	16.2	do	55.54
Princeton, N. J., below Kingston Dam of Lake Carnegie	16.2	do	54.50
Kingston, N. J., Geological Survey gage 1 mile downstream from Heathcots Brook	15.1	July 23, about 10 p.m.	[2]51.37
Rocky Hill, N. J., at highway bridge	14.1	July 23	47.00
Griggstown, N. J., at highway bridge	9.9	do	42.50
Blackwells Mills, N. J., Geological Survey gage just downstream from highway bridge	6.2	July 23, 11 p.m.	40.19
Millstone, N. J., at highway bridge	4.2	July 23	39.70
Weston, N. J., at mouth of Royces Branch	1.5	do	36.60
Green Brook:			
Scotch Plains, N. J., above Seely's lower dam	11.8	do	[2]196.5
Scotch Plains, N. J., above dam upstream from Union Avenue	11.1	do	[2]162.8
Scotch Plains, N. J., at upstream side of Union Avenue Bridge	11.1	do	[2]161.3
Scotch Plains, N. J., at upstream side of Park Avenue Bridge	11.0	do	[2]156.1
Scotch Plains, N. J., at downstream side of Mountain Avenue Bridge	10.5	do	[2]142.9
Plainfield, N. J., at downstream side of Terrill Road Bridge	10.2	do	[2]135.8
Plainfield, N. J., at upstream side of Raymond Avenue Bridge	9.8	do	[2]128.1
Plainfield, N. J., at upstream side of Leland Avenue Bridge	9.5	do	[2]122.0
Plainfield, N. J., at upstream side of Farragut Road Bridge	9.0	do	[2]115.0
Plainfield, N. J., at upstream side of Norwood Avenue Bridge	8.5	do	[2]106.7
Plainfield, N. J., at upstream side of Westervelt Avenue Bridge	8.3	do	[2]102.5
Plainfield, N. J., at upstream side of Watchung Avenue Bridge	8.1	do	[2]94.0
Plainfield, N. J., at Somerset Street Bridge	7.9	do	[2]94.0
Plainfield, N. J., at upstream side of Washington Avenue Bridge	7.6	do	[2]81.2
Plainfield, N. J., Geological Survey gage 200 feet downstream from Sycamore Avenue	7.5	July 23, 11:30 a.m.	76.19
Plainfield, N. J., at upstream side of Geraud Avenue Bridge	7.3	July 23	[2]75.6
Plainfield, N. J., at upstream side of Clinton Avenue Bridge	6.2	do	[2]61.0
Blue Brook:			
Borough of Mountainside, N. J., on Lake Surprise Dam	1.8	do	[2]281.2
Borough of Mountainside, N. J., at upstream side of New Providence Road Bridge	1.6	do	[2]267.8
Stony Brook:			
North Plainfield, N. J., at bridge on State Highway 29	2.2	do	[2]100.5
North Plainfield, N. J., at Grove Street Bridge	2.1	do	[2]92.9
North Plainfield, N. J., at Green Brook Road Bridge	1.8	do	[2]81.6
Cedar Brook:			
Plainfield, N. J., at Randolph Road Bridge	2.3	do	[2]80.9
Ambrose Brook:			
East Bound Brook, N. J., at Union and Raritan Avenues	.6	do	30.45
Lawrence Brook:			
Milltown, N. J., Geological Survey gage on left bank above Farrington Dam and half a mile southwest of Milltown	4.8	July 23, 7 to 9 p.m.	[4]25.40
Deep Run:			
Browntown, N. J., Geological Survey gage at Spring Valley Road Bridge and 1¾ miles south of Browntown	5.0	July 20, 5:30 p.m. July 24, 1:30 p.m.	[4]6.79 [4]5.83
Tennent Brook:			
Browntown, N. J., Geological Survey gage 1¼ miles northeast of Browntown	2.4	July 23, 9 p.m. July 24, 11 a.m.	[2]19.18 [2]19.15
Coastal basins			
Swimming River:			
Red Bank, N. J., Geological Survey gage on right bank above dam of Monmouth Consolidated Water Co. and 4 miles upstream from Red Bank	4.0	July 20, 7:30 p.m. July 24, 2 to 3 p.m.	[4]4.49 [4]4.34

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Manasquan River:			
Squankum, N. J., Geological Survey gage on right bank just upstream from Farmingdale-Lakewood road bridge	10.5	July 20, 9 p.m.	[4]9.96
		July 24, 8 p.m.	[4]9.08
Toms River:			
Toms River, N. J., Geological Survey gage on left bank 1 mile downstream from Union Branch and 2½ miles northwest of Toms River	9.0	July 22, 6 to 7 p.m.	17.75
		July 25–26, 12 p.m. to 4 a.m.	18.25
Cedar Creek:			
Lanoka Harbor, N. J., Geological Survey gage on right bank upstream from highway bridge	2.2	July 21, 6 to 12 p.m.	[2]4.11
		July 25, 3 a.m. to 1 p.m.	[2]4.12
Batsto River:			
Batsto, N. J., Geological Survey gage just downstream from highway bridge	1.0	July 25, 10 p.m.	[4]5.27
East Branch of Wading River:			
Harrisville, N. J., Geological Survey gage on right bank just downstream from Jenkins-New Gretna road bridge	.5	July 21, 2 to 4 a.m.	[4]5.58
		July 24–25, 9 p.m. to 2 a.m.	[4]5.55
Great Egg River:			
Folsom, N. J., Geological Survey gage on right bank just upstream from highway bridge and 1 mile south of Folsom	29.0	July 25, 10 a.m. to 5 p.m.	[4]5.92
Maurice River:			
Norma, N. J., Geological Survey gage at Almond Road Bridge	31.4	July 25, 2 to 4 a.m.	51.47
Manantico Creek:			
Millville, N. J., Geological Survey gage at Millville-Milmay road bridge and 4 miles northeast of Millville	7.0	July 24, 9 to 10 p.m.	41.09
Delaware River Basin			
Delaware River:			
Milford, Pa., Geological Survey gage on highway bridge	212.4	July 22, 9 p.m.	[3]385.48
		July 24, 7 to 9 a.m.	[3]383.33
Dingmans Ferry, Pa., U. S. Weather Bureau gage on highway bridge	203.7	July 22, 11 to 12 p.m.	367.02
		July 23, 12 p.m.	365.31
Portland, Pa., Geological Survey gage on highway bridge	173.1	July 23, 6 to 7 a.m.	278.67
		July 24, 6 to 11 a.m.	277.85
Delaware, N. J., Geological Survey gage on highway bridge	170.9	July 23, 6 to 7 a.m.	[5]268.16
		July 24, 10 a.m. to 12 n.	[5]267.36
Belvidere, N. J., Geological Survey gage on left bank just downstream from Pequest River	163.4	July 23, 6 a.m.	239.43
		July 24, 9 a.m. to 12 n.	238.88
Easton, Pa., Geological Survey gage on highway bridge	149.5	July 23, 10 a.m.	169.76
		July 24, 9 to 11 a.m.	169.49
Riegelsville, N. J., Geological Survey gage on left bank just upstream from suspension bridge	140.6	July 23, 11 a.m.	140.64
		July 24, 9 to 10 a.m.	140.62
Milford, N. J., Geological Survey gage on highway bridge	133.6	July 23, 12 n. to 1 p.m.	119.96
		July 24, 11 a.m.	119.86
Frenchtown, N. J., Geological Survey gage on highway bridge	130.4	July 23, 1 to 2 p.m. and 6 p.m.	110.65
		July 24, 1 p.m.	110.59
Point Pleasant, Pa., Geological Survey gage on highway bridge	123.2	July 23, 8 to 9 p.m.	[3]85.15
Lumberville, Pa., Geological Survey gage on highway bridge	121.5	July 23, 5 p.m.	78.47
Stockton, N. J., Geological Survey gage on highway bridge	118.0	do	[3]66.74
Lambertville, N. J., Geological Survey gage on highway bridge	114.9	July 23, 7 p.m.	57.14
Washington Crossing, N. J., Geological Survey gage on highway bridge	108.0	July 23, 2 p.m.	36.69
Yardley, Pa., Geological Survey gage on highway bridge	104.1	do	26.80
Trenton, N. J., Geological Survey gage on left bank, 200 feet upstream from Calhoun Street	100.6	July 23, 8 to 10 p.m.	16.50
Flat Brook:			
Flatbrookville, N. J., Geological Survey gage 1 mile upstream from Flatbrookville	1.2	July 24, 2 a.m.	353.87
Paulins Kill:			
Blairstown, N. J., Geological Survey gage 1,200 feet upstream from bridge on State Highway 8	9.8	do	342.02
Pequest River:			
Pequest, N. J., Geological Survey gage 100 feet upstream from Lehigh & Hudson River Ry. bridge	6.6	July 22, 2 a.m.	402.12
		July 23–24, 12 p.m. to 5 a.m.	402.12
Beaver Brook:			
Belvidere, N. J., Geological Survey gage 2,000 feet upstream from mouth and 2 miles east of Belvidere	.4	July 23, 3 p.m.	306.68

TABLE 25.—*Flood-crest stages, July 1938*—Continued

Stream and location	Miles above mouth	Date and time	Altitude (feet)
Musconetcong River:			
Landing, N. J., Geological Survey gage just above dam at Lake Hopatcong	42.4	July 24–25, 7 p.m. to 5 a.m.	[2]924.54
Landing, N. J., Geological Survey gage just upstream from highway bridge and 300 feet downstream from Lake Hopatcong	42.3	July 24, 6 a.m.	[2]907.45
Hackettstown, N. J., Geological Survey gage above Saxon Falls Dam and 3 miles northeast of Hackettstown	33.1	July 24, 8 a.m. to 12 n.	[2]633.55
Hackettstown, N. J., on left bank 500 feet upstream frrom Delaware, Lackawanna & Western R.R. bridge and 3 miles northeast of Hackettstown	32.7	do	[2]608.87
Bloomsbury, N. J., Geological Survey gage just downstream from highway bridge and 1½ miles upstream from Bloomsbury	9.4	July 23, 11 to 11:30 p.m.	279.95
Assunpink Creek:			
Trenton, N. J., Geological Survey gage at Chambers Street Bridge	1.5	July 23, 10:30 p.m.	[2]33.66
North Branch of Rancocas Creek:			
Pemberton, N. J., Geological Survey gage 600 feet downstream from highway bridge	12.0	July 24, 5 to 9 p.m.	33.73
Oldmans Creek:			
Woodstown, N. J., Geological Survey gage just upstream from Woodstown-Swedesboro highway bridge and 2 miles north of Woodstown	16.0	July 24, 10 a.m.	[4]4.47

[1]Reading at 8 a.m., peak stage may have been higher.
[2]New Jersey Geological Survey datum.
[3]Highest stage observed; peak stage may have been higher.
[4]Assumed datum.
[5]Pennsylvania Railroad bench mark.

Table 26—*Altitude, in feet, at indicated places in the Elizabeth River Basin for floods in which the peak discharge was 1,200 second-feet or more at Westfield Avenue, Elizabeth, N. J.*

Date	Elizabeth River													West Branch of Elizabeth River				
	Irvington	Hillside		Union						Elizabeth				Union				
	Valley Avenue[1] [2]	Mill Road	Union Avenue	State Highway 29	Cornell Place	Above Salem Road Dam	Salem Road	Lehigh Valley R.R.	North Avenue	Above Ursino Lake Dam	Below Ursino Lake Dam	Irvington Avenue[3]	Above dam at Westfield Avenue[2] [4]	Chestnut Street	Morris Avenue[3]	Sayre Road	Above dam at Vauxhall Road	Vauxhall Road[3]
Distance above mouth, in miles	9.7	7.7	7.3	6.5	6.2	5.5	5.5	5.2	4.2	3.9	3.9	3.6	3.3	2.0	1.1	0.6	0.3	0.3
1924, Apr. 6, 7	------	------	------	------	------	------	------	------	------	------	------	------	13.38	------	------	------	------	------
1924, July 8	------	------	------	------	------	------	------	------	------	------	------	------	13.39	------	------	------	------	------
1925, July 31	------	------	------	------	------	------	------	------	------	------	------	------	13.41	------	------	------	------	------
1926, Sept. 6	------	------	------	------	------	------	------	------	------	------	------	------	13.29	------	------	------	------	------
1927, Aug. 1	------	76.0	62.3	44.7	42.6	36.4	35.0	27.9	24.9	24.6	17.6	14.2	14.53	54.2	50.7	49.8	49.9	41.3
1927, Aug. 8, 9	------	73.4	60.7	43.6	42.3	35.4	33.0	[3]25.6	23.0	22.7	15.0	12.3	13.99	------	51.3	50.4	50.0	41.6
1927, Sept. 1, 2	------	73.9	61.8	45.4	41.9	37.4	35.4	29.6	25.4	24.5	18.1	15.5	14.94	54.7	51.2	50.5	50.2	41.9
1928, Feb. 22, 23	------	73.6	58.5	44.4	41.0	36.6	33.8	27.1	24.0	22.9	15.5	13.5	13.29	54.4	51.8	50.3	50.0	41.6
1928, July 5, 6	------	75.3	61.9	------	41.6	36.6	34.4	29.4	24.7	23.5	16.7	14.1	14.05	54.2	50.2	49.6	47.6	41.6
1929, Feb. 7	------	74.6	60.2	------	41.6	35.5	31.7	26.8	23.9	23.5	------	13.8	13.34	55.2	50.5	48.6	45.5	40.9
1932, Nov. 19	7.58	75.1	62.7	45.8	42.3	37.6	35.5	29.3	24.4	23.7	15.6	13.7	14.96	55.0	51.8	49.8	------	------
1934, Sept. 8	8.57	------	------	------	------	------	------	------	------	------	------	------	12.44	------	------	------	------	------
1938, July 23	12.1	79.8	62.4	45.3	------	37.5	35.5	[3]30.8	27.7	25.1	18.5	20.0	18.28	56.4	54.4	53.7	------	------

[1]Arbitrary datum.
[2]Stream-measurement station.
[3]Downstream side of bridge.
[4]U. S. Coast and Geodetic Survey datum.
Note.—Observations made at upstream side of bridge except as noted. Altitudes refer to New Jersey Geological Survey datum except as noted.

The Essex County Park Commission has furnished tabulations of flood-crest stages based on floodmarks and staff-gage readings at several places in the Elizabeth River, Rahway River, and Green Brook basins during major floods antedating the flood of July 1938. This information is furnished in tables 26–28.

TABLE 27.—*Altitude, in feet, at indicated places in the Rahway River Basin for floods*

Date	East Branch of Rahway River			Rahway River														
	South Orange			Springfield			Cranford											
	Montrose Avenue	100 feet above South Orange Avenue	Springfield Avenue[1]	Morris Avenue[1]	Rahway Valley R.R.	Milltown Road[1]	State Highway 29	Kenilworth Boulevard[1]	North bridge on Springfield Avenue	South bridge on Eastman Street[1]	Above Hansel Dam	Union Avenue	North Avenue	South Avenue	Above Droescher Dam	High Street	Lehigh Valley R.R.[1]	Above Sperry Dam
Distance above mouth, in miles	22.6	21.7	18.8	18.3	17.5	16.7	16.1	14.5	13.2	12.8	12.3	12.3	12.1	12.0	11.7	11.7	10.8	9.7
1924, Apr. 7				83.6	78.6	75.7	73.6		64.7			61.5			58.7	55.9	52.2	45.8
1924, July 9																		
1925, Feb. 12			84.4	81.9	77.7	73.7	71.7		62.8	62.7	61.3	59.5	58.9	58.5	57.9	54.6	49.4	44.7
1926, Sept. 7				81.0		72.3	70.8		62.4	61.6	62.0	59.7		58.5		54.2		44.7
1927, Aug. 1, 2	150.0	141.9	85.8	84.8	80.9	77.2		67.1	64.4	63.3	62.5	61.7	60.1	60.0	59.5	55.9	50.9	45.9
1927, Aug. 9			83.8	82.1	79.1	74.5	71.7	66.4	63.4	62.6	62.0	60.9	59.5	59.0	58.2	55.2	50.1	45.3
1927, Oct. 18, 19			83.8	82.0	77.9	74.0	70.6	65.8	62.8	62.0	61.7	60.6	59.3	58.8	56.3	54.8	49.7	45.4
1928, July 6			84.7	83.5	79.8	75.6	72.4	67.0	64.1	63.2	62.4	61.7	60.3	59.6	58.3	56.1	50.4	45.7
1932, Nov. 10			85.6	83.3	80.8	76.1	72.1	66.2	63.4	62.3	61.9	60.4	59.1	58.8	57.7	55.0	50.1	45.2
1932, Nov. 19-20			86.1	83.7	81.1	76.3	73.1	66.4	63.8	63.1	62.6	61.4	59.4	59.3	58.1	55.4	50.8	45.6
1933, Sept. 15, 16	145.35	136.6		84.2		75.4	72.4	67.0	64.6			61.7	60.4			56.5		46.0
1936, Mar. 11, 12			84.4		77.5	73.0	70.0	65.6	63.4	62.4	61.9	60.5	59.2	58.8	58.0	55.1	50.2	45.3
1938, July 23, 24	148.06	140.94	86.3	86.6	±79.7	77.6	[4]73.58	69.0	66.4	66.0	63.3	63.1	61.8	61.7	59.3	59.7	52.5	46.9

[1]Downstream side of bridge.
[2]Altitude referred to New Jersey Geological Survey datum.
[3]Stream-measurement station.

TABLE 28.—*Altitude, in feet, at indicated places for several previous*

Date	New Providence		Scotch Plains				
	Valley Road	Mountain Road	Above Seely's lower dam	Below Seely's lower dam	Above Henderson's Dam	Union Avenue	Park Avenue
Distance above mouth, in miles	12.2	12.0	11.8	11.8	11.1	11.1	11.0
1927, Aug 1	202.9	195.9	192.9	179.2	159.8	157.0	153.7
1927, August 9	203.4	196.0	192.5	178.4	159.3	156.8	153.6
1927, Oct. 18							
1928, July 6							
1932, Nov. 10						156.6	151.9
1932, Nov. 19		196.4	192.0	177.7	157.8	156.4	151.4
1933, Sept. 15		195.4		177.0	158.7	155.9	151.9
1936, Mar. 11, 12		195.4				156.5	153.3
1938, July 23			196.5		162.8	161.3	156.1

[1]Downstream side of bridge.
[2]U. S. Coast and Geodetic Survey datum.
[3]Stream-measurement station.

which the altitude was 10.0 feet or higher at Church Street, Rahway, N. J.

										West Branch of Rahway River	Van Winkle Creek			Robinsons Branch of Rahway River							
...r Township				Rahway						West Orange	Springfield			Clark Township			Rahway				
Above Bloodgood Dam	Below Bloodgood Dam	Above Jackson Dam	Below Jackson Dam	Above waterworks	St. George Avenue	Church Street[1]	Whittier Street	Grand Street	Elizabeth Avenue	On Orange Reservoir Dam	Flemmer Avenue[1,2]	Rahway Valley R.R.[1,2]	Meisel Avenue[2]	Raritan Road[2]	Above dam at Madison Hill Road[2]	Madison Hill Road[2]	Maple Avenue[2]	Jefferson Avenue[2]	St. George Avenue[2]	New Church Street	Hamilton Street[2]
.7	8.7	7.0	7.0	6.5	6.2	5.9	5.7	5.3	5.2	4.6	0.6	0.3	0.1	3.8	2.3	2.2	1.3	1.1	0.8	0.5	0.2
[illegible]	32.9	25.4	22.6	20.5	14.2	[2,3]10.76	----	6.2	---	------	----	----	----	----	----	----	----	----	----	----	---
	----	----	----		------	[2,3]11.0	----	---	---	331.6	----	----	----	----	----	----	----	----	----	----	---
[illegible]	----	24.3	20.8	19.4	13.2	[2,3]10.11	8.0	5.5	3.9	------	----	----	----	----	----	----	----	----	----	----	---
--	----	----	21.1	18.1	12.8	[2,3]10.08	----	---	---	------	----	----	----	----	----	----	----	----	----	----	---
[illegible]	33.2	27.6	22.2	19.0	14.6	[2,3]11.86	9.6	5.6	---	------	----	----	----	----	----	----	----	----	----	----	---
.1	32.2	27.3	21.6	18.7	13.9	[2,3]10.96	9.0	5.3	---	------	----	----	----	----	----	----	----	----	----	----	---
.1	31.8	27.2	21.5	18.5	13.8	[2,3]10.28	9.2	6.4	5.8	------	----	81.2	77.4	----	----	----	----	----	----	----	---
[illegible]	32.6	27.7	22.0	18.7	14.2	[2,3]10.91	9.4	6.2	5.2	------	85.3	81.5	78.8	----	----	----	----	----	----	----	---
[illegible]	31.8	27.1	21.3	18.9	13.2	[2,3]10.01	10.3	7.6	5.4	------	84.8	81.4	78.8	46.1	----	27.6	16.7	15.5	13.9	10.9	8.2
[illegible]	32.6	27.8	22.3	19.3	14.8	[2,3]10.91	10.5	7.2	5.0	------	85.4	81.8	79.1	46.4	----	28.6	17.5	15.7	13.6	10.3	7.7
[illegible]	32.1	27.8	22.3	----	14.5	[2,3]11.5	9.4	---	---	------	----	----	----	46.3	----	27.8	----	----	----	----	---
.1	31.4	27.3	21.6	18.9	[3]12.89	[3]10.1	9.3	5.1	4.6	------	----	----	----	45.8	45.4	26.8	15.6	13.9	9.7	8.0	6.0
[illegible]	33.8	28.0	23.7	----	[3]15.12	13.7	10.9	6.7	6.6	330.9	----	82.7	----	46.7	46.5	29.4	16.7	15.0	----	13.2	9.6

tream-measurement station below bridge.

ote.—Observations made at upstream side of bridge except as noted. Altitudes refer to U. S. Coast Geodetic Survey datum except as noted.

s on Green Brook, in the Raritan River Bason, N. J.

Plainfield														
Terrill Road[1]	Raymond Avenue	Leland Avenue	Netherwood Avenue	Farragut Road	Norwood Avenue	Westervelt Avenue	Watchung Avenue	Madison Avenue	Washington Avenue	Sycamore Avenue	Sycamore Avenue, 20 feet downstream	Geraud Avenue	West End Avenue	Clinton Avenue
10.2	9.8	9.5	9.4	9.0	8.5	8.3	8.1	7.8	7.6	7.5	7.5	7.3	7.0	6.2
134.1	126.1	121.6	118.4	113.5	102.3	99.5	91.0	83.3	78.8	74.8		72.5	65.1	58.0
134.2	126.0	121.5	118.0	113.3	102.1	99.1	91.0	83.1	78.7	74.5	-------	72.2	65.0	56.9
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-------	-----	64.3	56.4
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-------	-----	62.8	55.8
133.8	125.6	121.1	118.7	112.0	101.4	98.3	90.8	82.6	78.1	73.6	-------	71.5	63.8	57.0
133.8	125.6	121.1	119.0	112.9	102.0	98.4	91.6	-----	78.8	74.2	-------	71.8	64.4	57.1
133.1	-----	120.0	118.1	112.0	101.2	97.8	-----	82.6	77.6	-----	-------	71.0	63.2	56.5
133.5	126.1	121.3	118.0	113.1	102.6	-----	91.7	84.1	79.3	74.8	-------	72.1	63.4	56.0
135.8	128.1	122.0	-----	115.0	106.7	102.5	94.0	-----	81.2	77.6	[2,3]76.19	75.6	-----	61.0

te.—Observations made at upstream side of bridge except as noted. Altitudes refer to New Jersey gical Survey datum except as noted.

RAINFALL AND RUNOFF STUDIES

The depths of mean areal precipitation on each drainage basin were computed from the isohyetal map for the storm of July 1938 reproduced as plate 11. The results are shown in column 5 of table 29. The values of direct flood runoff resulting from this rain are shown in column 6. Computations were based on records of discharge at the gaging stations published in this report and were computed by the following procedure:

TABLE 29.—*Precipitation and associated direct runoff for flood of July 1938*

[Mean depth in inches over drainage area]

No. on pl. 12	Stream	Location	Drainage area (square miles)	Precipitation	Runoff	Difference
	Merrimac River Basin					
210	Concord River	Below River Meadow Brook, at Lowell, Mass.	[1]312	8.0	2.85	5.15
	Ipswich River Basin					
212.5	Ipswich River	South Middleton, Mass	43.4	8.3	3.9	4.4
213	Do	Ipswich, Mass	124	8.15	4.05	4.1
	Charles River Basin					
216	Charles River	Charles River Village, Mass	184	10.4	4.75	5.65
218	Do	Waltham, Mass	[2]251	10.1	------	------
	Taunton River Basin					
222	Taunton River	State Farm, Mass	260	5.1	2.1	3.0
223	Wading River	Norton, Mass	42.4	7.7	3.25	4.45
	Providence River Basin					
225	Blackstone River	Worcester, Mass	31.3	7.0	3.4	3.6
230	Do	Woonsocket, R. I	416	9.5	4.75	4.75
	Thames River Basin					
264	Willimantic River	South Coventry, Conn	121	7.35	2.4	4.95
267	Shetucket River	Willimantic, Conn	401	8.9	3.6	5.3
272	Hop River	Columbia, Conn	76.2	8.35	3.25	5.1
275	Natchaug River	Willimantic, Conn	169	10.0	4.65	5.35
282	Quinebaug River	Quinebaug, Conn	157	8.05	2.75	5.3
284	Do	Putnam, Conn	331	8.35	3.85	4.5
289	Do	Jewett City, Conn	711	9.1	4.3	4.8
295.5	Five Mile River	Killingly, Conn	58.2	11.0	5.1	5.9
298	Moosup River	Moosup, Conn	83.5	9.3	5.3	4.0
301	Yantic River	Yantic, Conn	88.6	10.0	5.6	4.4
	Connecticut River Basin					
413	Scantic River	Broad Brook, Conn	98.4	4.5	1.55	2.95
415	Farmington River	New Boston, Mass	92.0	4.4	1.2	3.2
416	Do	Riverton, Conn	216	4.8	1.55	3.25
419	Do	Tariffville, Conn	578	5.75	1.95	3.8
423	Burlington Brook	Burlington, Conn	4.1	6.8	2.55	4.25
427	South Branch of Park River	Hartford, Conn	40.6	6.3	2.55	3.75
428	Park River	Do	74.0	6.5	2.5	4.0
429	North Branch of Park River	Do	25.3	6.3	2.9	3.4
431	Hockanum River	East Hartford, Conn	74.5	6.45	1.5	4.95
432	Salmon River	East Hampton, Conn	105	8.9	3.0	5.9
433.3	East Branch of Eightmile River	North Lyme, Conn	22.0	8.95	3.2	5.75
433.7	West Branch of Eightmile River	Do	19.2	9.2	3.5	5.7
	Quinnipiac River Basin					
435	Quinnipiac River	Wallingford, Conn	109	6.4	1.6	4.8

TABLE 29.—*Precipitation and associated direct runoff for flood of July 1938*—Continued

No. on pl. 12	Stream	Location	Drainage area (square miles)	Precipitation	Runoff	Difference
	Housatonic River Basin					
438	Housatonic River	Coltsville, Mass	57.1	5.1	2.55	2.55
445	Do	Great Barrington, Mass	280	5.4	2.0	3.4
446	Do	Falls Village, Conn	632	4.85	1.35	3.5
450	Do	Stevenson, Conn	1,545	6.1	1.8	4.3
453	Tenmile River	Gaylordsville, Conn	204	6.75	3.25	3.5
455	Still River	Lanesville, Conn	68.5	7.05	2.1	4.95
458	Shepaug River	Roxbury, Conn	133	7.5	2.65	4.85
459	Pomperaug River	Southbury, Conn	75.3	7.7	2.35	5.35
462	Naugatuck River	Thomaston, Conn	71.9	7.5	3.5	4.0
463	Do	Naugatuck, Conn	246	7.5	2.55	4.95
464	Leadmine Brook	Thomaston, Conn	24.0	7.6	3.65	3.95
	Saugatuck River Basin					
466	Saugatuck River	Westport, Conn	77.5	6.55	2.9	3.65
	Hudson River Basin					
538	Schoharie Creek	Prattsville, N. Y	236	4.9	1.65	3.25
550	Catskill Creek	Oak Hill, N. Y	98	3.4	.65	2.75
553	Esopus Creek	Coldbrook, N. Y	192	6.1	2.5	3.6
560	Rondout Creek	Lowes Corners, N. Y	38.5	9.15	4.95	4.20
561	Do	Lackawack, N. Y	100	9.3	5.1	4.2
562	Do	Rosendale, N. Y	386	6.95	3.0	3.95
563	Chestnut Creek	Above Red Brook at Grahamsville, N. Y.	12.2	9.8	3.9	5.9
563.5	Wallkill River	Unionville, N. Y	144	5.65	1.35	4.30
564	Do	Pellets Island Mountain, N. Y	385	5.7	2.25	3.45
566	Do	Gardiner, N. Y	711	5.9	2.1	3.8
	Hackensack River Basin					
575	Hackensack River	New Milford, N. J	113	5.8	2.5	3.3
576	Pascack Brook	Westwood, N. J	29.6	5.5	1.95	3.55
	Passaic River Basin					
583.5	Rockaway River	Above reservoir at Boonton, N. J.	116	7.15	3.0	4.15
606	Saddle River	Lodi, N. J	54.6	5.7	2.1	3.6
	Elizabeth River Basin					
608	Elizabeth River	Elizabeth, N. J	18.0	6.0	3.05	2.95
	Raritan River Basin					
608.5	Rahway River	Springfield, N. J	25.5	6.6	3.2	3.4
609	Do	Rahway, N. J	40.9	7.4	4.0	3.4
614	South Branch of Raritan River	Stanton, N. J	147	6.5	2.1	4.4
616	Raritan River	Manville, N. J	490	6.6	4.10	2.50
619	Neshanic River	Reaville, N. J	25.7	7.5	4.95	2.55
622	North Branch of Raritan River	Milltown, N. J	190	6.2	2.5	3.7
624	Millstone River	Kingston, N. J	171	7.6	4.35	3.25
625	Do	Blackwells Mills, N. J	258	7.9	4.75	3.15
625.5	Green Brook	Plainfield, N. J	9.75	10.0	4.85	5.15
628	Lawrence Brook	Farrington Dam, N. J	34.4	6.4	2.4	4.0
629	Deep Run	Browntown, N. J	8.07	7.8	3.15	4.65
	Coastal basins					
632	Swimming River	Red Bank, N. J	48.5	8.5	2.75	5.75
633	Manasquan River	Squankum, N. J	43.4	7.75	3.25	4.50
634	Toms River	Toms River, N. J	124	7.6	1.85	5.75
635	Cedar River	Lanoka Harbor, N. J	56.0	7.2	1.55	5.65
639	Great Egg River	Folsom, N. J	56.3	7.5	1.9	5.6
641	Manantico Creek	Millville, N. J	22.3	9.3	2.15	7.15
	Delaware River Basin					
642	East Branch of Delaware River	Margaretville, N. Y	163	5.3	2.0	3.3
643	Do	Harvard, N. Y	443	4.6	1.55	3.05
644	Do	Fishs Eddy, N. Y	783	5.3	2.3	3.0
646	Delaware River	Port Jervis, N. Y	3,076	4.4	1.15	3.25
650	Mill Brook	Arena, N. Y	25.0	6.7	3.3	3.4

TABLE 29.—*Precipitation and associated direct runoff for flood of July 1938*—Continued

No. on pl. 12	Stream	Location	Drainage area (square miles)	Precipitation	Runoff	Difference
651	Tremper Kill	Shavertown, N. Y	33.0	3.3	.75	2.55
652	Terry Clove Kill	Pepacton, N. Y	14.1	3.1	.70	2.40
653	Beaver Kill	Craigie Clair, N. Y	82	7.3	4.55	2.75
654	Do	Cooks Falls, N. Y	241	7.0	3.75	3.25
655	Willowemoc Creek	Livingston Manor, N. Y.	63	7.9	4.3	3.6
656	Little Beaver Kill	Do	19.8	7.4	3.2	4.2
657	West Branch of Delaware River	Delhi, N. Y	142	4.0	.65	3.35
658	Do	Hale Eddy, N. Y	593	3.3	.40	2.90
662.5	Little Delaware River	Delhi, N. Y	49.8	4.75	1.2	3.55
667.3	Neversink River	At Halls Mills, near Curry, N. Y.	68	9.3	6.75	2.55
667.7	Neversink River	Woodbourne, N. Y	113	8.85	5.3	3.55
668	Do	Oakland Valley, N. Y	222	7.3	3.45	3.85
669	Do	Godeffroy, N. Y	302	6.8	2.7	4.1
671	Flat Brook	Flatbrookville, N. J	65.1	5.9	2.55	3.35
673	Paulins Kill	Blairstown, N. J	126	5.75	2.15	3.60
680	Musconetcong River	Bloomsbury, N. J	143	6.95	2.25	4.70
683	Assunpink Creek	Trenton, N. J	89.4	7.25	3.7	3.55
686	North Branch of Rancocas Creek	Pemberton, N. J	111	7.15	2.3	4.85
698	Oldmans Creek	Woodstown, N. J	19.3	6.1	.70	5.40

[1]Does not include 92.6 square miles in Sudbury and Lake Cochituate Basins, from which water is diverted by Metropolitan Water District of Boston.
[2]Includes area drained by Stony Brook.

A discharge hydrograph for parts of July and August was constructed for each gaging-station record to be analyzed, similar to the part of the hydrograph for the Naugatuck River near Thomaston, Conn., presented in figure 36 to illustrate the method of analysis. The graph outlined by letters *A-B-C-D-E-F* is the observed discharge past the gaging station. The hydrographs of other streams differed radically from this hydrograph (as shown by figs. 25–28) because of erratic distribution and intensity of rainfall. The marked rise at *E*, for example, did not occur in streams east of the Connecticut River, and the hydrographs were thereby much simplified. But at all streams analyzed the flow at point *A* consisted of ground-water flow. Subsequent rains caused a rise in stream flow and increased or steadied the ground-water flow. At *B* the stream discharge again consisted largely of ground-water flow with possibly some subsurface water that was still draining off after the rains.

If no subsequent rain had accurred the stream flow would have continued approximately as from *B* to *H*. However, the flood-producing storms began on the morning of July 18 and occurred intermittently thereafter until about July 24, raising the streams to successive peaks of varying heights depending on the rainfall distribution in the various basins. Rains occurring after July 25 are not treated in this report, and the line *D-G-F* represents the approximate stream discharge that would have occurred if there had been no rain after July 25.

The total area under the discharge hydrograph *B-C-D-G-F* represents the runoff that reached the stream channels during the period, both as surface and as ground-water runoff resulting from rainfall during the period July 17–25 plus the runoff under *B-H*

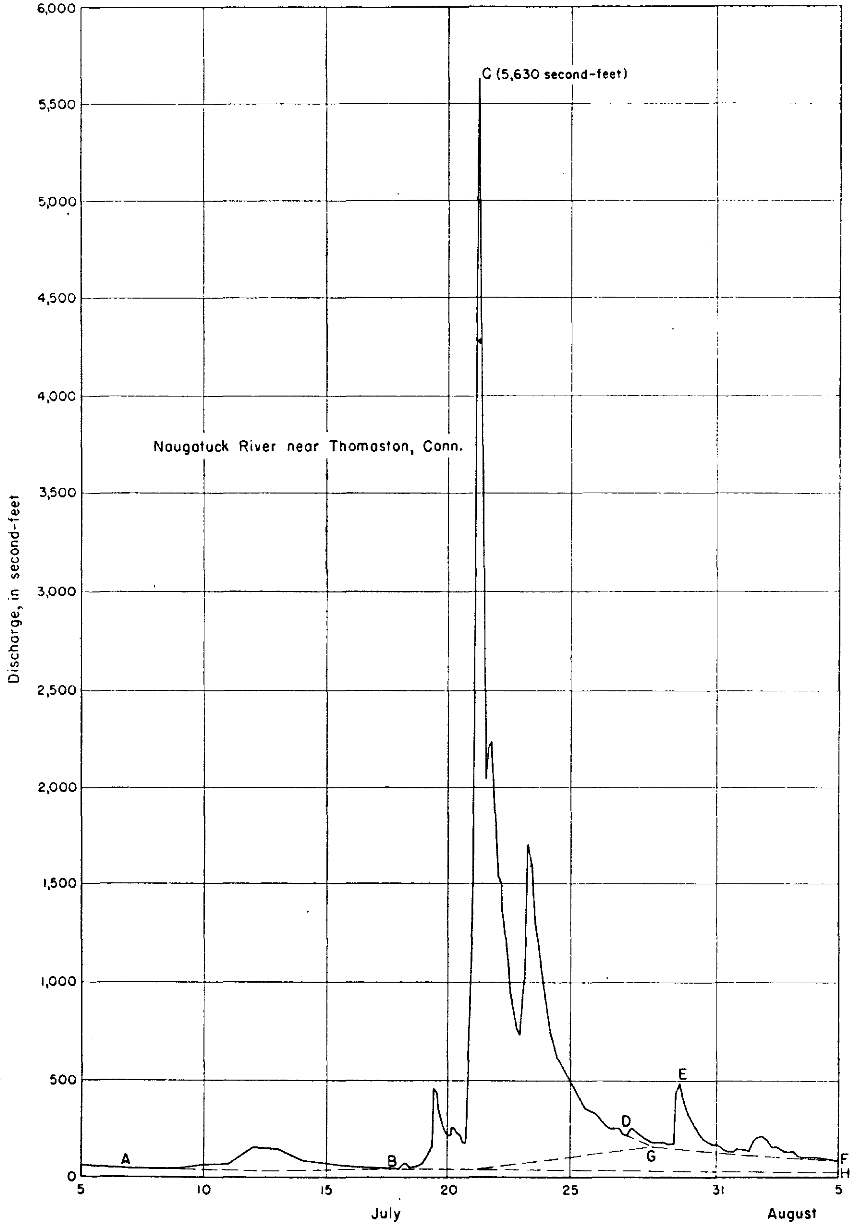

Figure 36.—Hydrograph of discharge of Naugatuck River near Thomaston, Conn., showing method of analysis used in determining the direct runoff associated with the flood of July 1938.

that would have been maintained if there had been no increment of supply after July 17. The area under *B-G* represents the estimate of ground-water flow during the period, and the area between this line and *B-C-D-G* probably includes essentially all the direct surface runoff resulting from the storm precipitation and may include some ground water that was discharged into stream channels with a promptness approaching that of surface runoff.

For most streams, point *G* was close to or coincident with the observed discharge hydrograph, but for some it was necessary to estimate the short recession curve *D-G*. Also for some streams it was necessary to draw recession curves at point *B*. Other investigators might make other estimates of direct runoff by drawing the various separation curves differently. But, in general, differences in estimates would be relatively small in relation to the magnitude of direct runoff.

Volumes of direct runoff, as reported in table 29, are based on records of observed stream flow, adjusted where necessary for changes of contents in reservoirs, where records of such changes are available to compute the runoff under natural conditions. Retarding basins other than those for which records are included in this report probably affect the flow, but no records were available for determining their effect. During periods of low flow many streams were affected by diurnal fluctuations caused by the operation of relatively small millponds upstream. The storage capacity of these ponds is generally limited to less than 1 or 2 days' supply of normal low flow, and the plotted discharge hydrographs were adjusted during the periods of low flow to balance the diurnal fluctuations and thus improve accuracy in determining the trend and amount of ground-water flow.

If the records of precipitation and values of direct runoff are substantially correct, as shown in table 29, then the difference shown in column 7 represents the basin retention or the amount of water that was retained in the basin as surface and ground storage and soil-moisture accretion or that was transpired and evaporated during the flood period. Considering the erratic distribution of rainfall, these values seem reasonably consistent.

The results of the rainfall and runoff studies have been partly summarized in table 29 for each of the regular river-measurement stations. Index numbers to the left of the station names refer to their plotted locations on plate 12, and figures in column 4 show their respective drainage areas. The values of direct flood runoff shown in column 6 are the result of the 7 days of intermittent rainfall from July 17 to 25, listed in column 5. Direct runoff should be less than the rainfall by the amount of evaporation, transpiration, change in soil moisture, and accretion to the ground-water table. Total values of this retention or abstraction are shown in column 7.

The data compiled in table 29 afford an appraisal of the runoff and retention characteristics of the basins and the accuracy and adequacy of the basic information used to evaluate them. As the direct runoff generally is believed to be accurate within 10 percent, large inconsistencies may indicate deficiencies in other basic data or limitations in methods of analysis of the data. The geographic distribution of the flood-producing storms was variable and therefore probably not well defined, particularly in those areas deficient in rainfall records. Figures 37–39 present graphical comparisons of the total storm rainfall with direct runoff. They illustrate that runoff generally increased with the rainfall. On figures 37 and 38, applicable to Massachusetts and Connecticut areas and to New York areas, respectively, the plotted points are sufficiently consistent to define an indicated trend. It should be noted that the slopes of the upper parts of these trends approach 45°, indicating the influence of a high degree of soil saturation as rainfall increased. The limit of retention associated with this condition seemed to be about 5 inches in Massachusetts and Connecticut and about 3.5 inches in New York (Catskill Mountain Region). However, for the basins in Connecticut it has been computed that about 40 percent of the retention reappeared as stream flow in the form of ground-water or base runoff during but mainly, subsequent to the storm. The remainder became an increment to soil moisture and was available for evaporation and transpiration.

In New Jersey the points scatter (see fig. 39), and no approach to uniform amount of retention is noted. However, an appreciable difference is indicated in the behavior of basins in the southern part of that State and those in the northern part with respect to volumes of direct runoff from similar rainfall. For the southern part this reflects a greater absorptive capacity of the soil and probably also the greater ground-water and surface swamp storage that seems characteristic of the region. It is significant that the total annual runoff does not vary greatly over the State, except as accountable by differences in precipitation or temperature.

The amount of rainfall retained from direct runoff consists essentially of transpiration, evaporation, change in soil moisture, and accretion to the ground-water table. These factors have been analyzed in the Park River Basin in Connecticut, wherein precipitation is defined as accurately as in any drainage area studied in this report. For the period July 18–31, 1938, the following factors were determined: Average precipitation over the basin

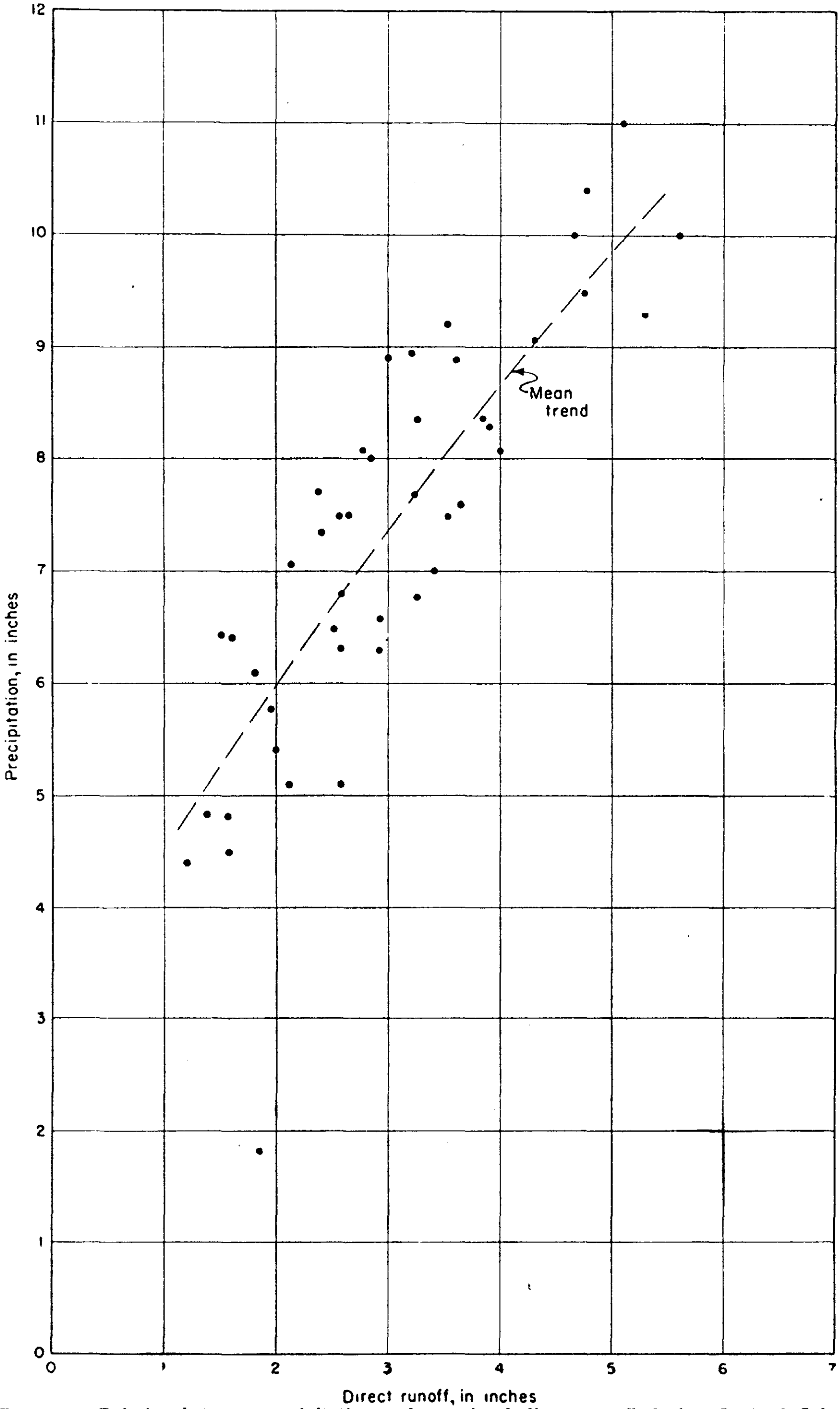

FIGURE 37.—Relation between precipitation and associated direct runoff during flood of July 17-25, 1938, for basins in Massachusetts and Connecticut.

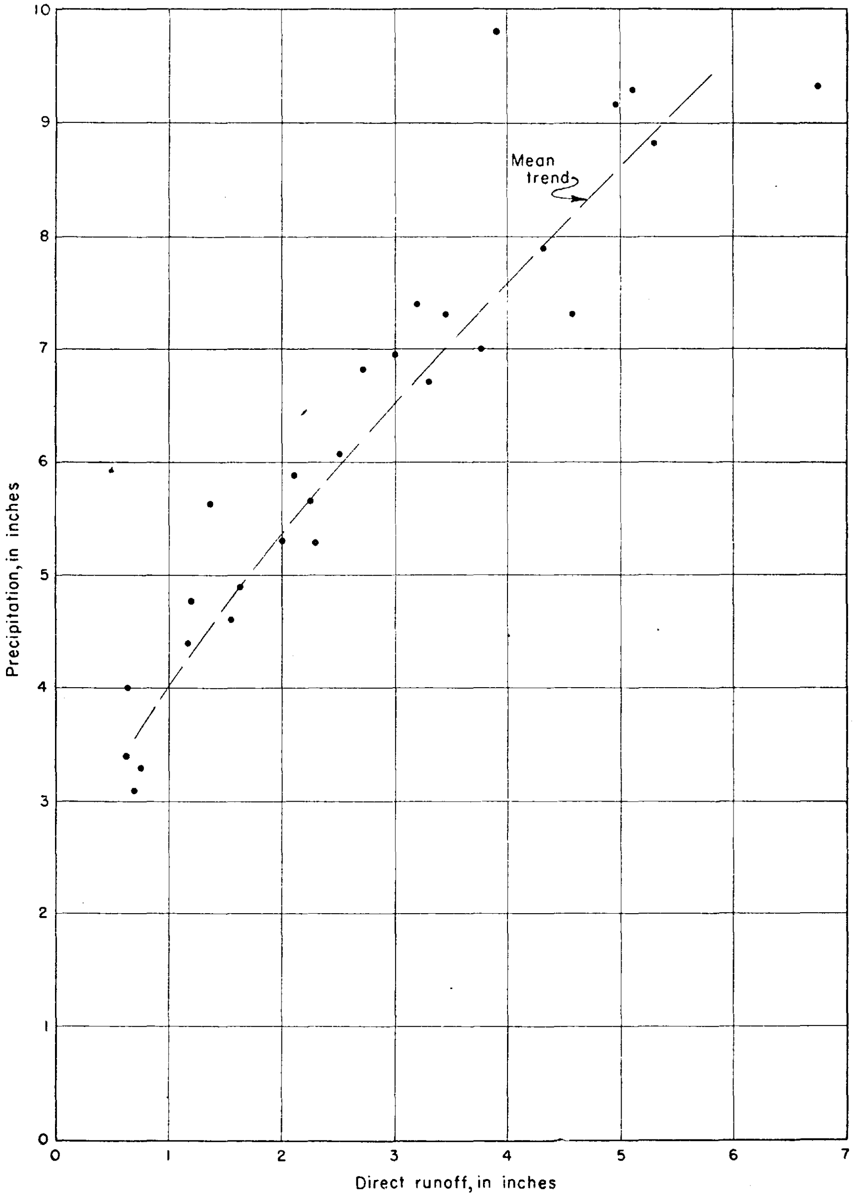

FIGURE 38.—Relation between precipitation and associated direct runoff during flood of July 17-25, 1938, for basins in New York.

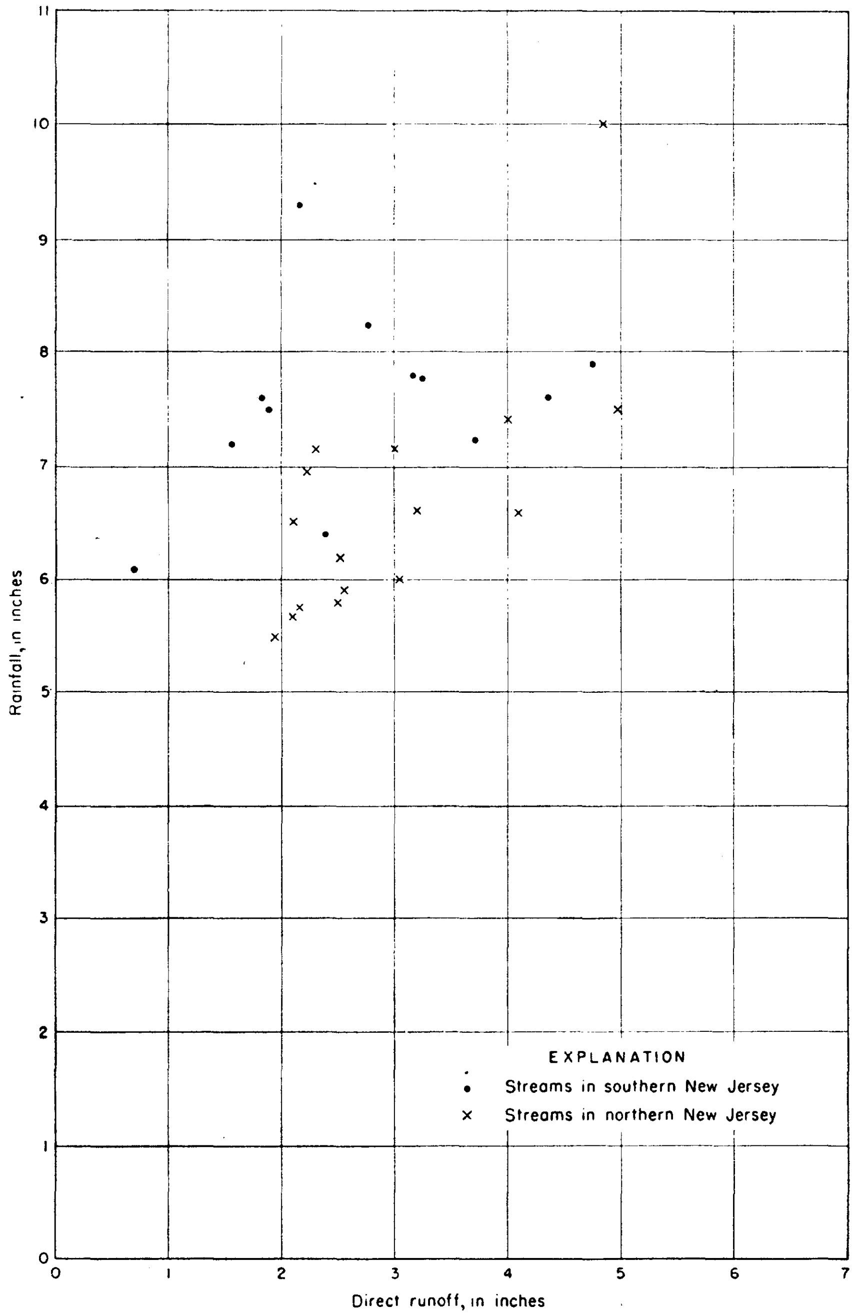

FIGURE 39.—Relation between precipitation and associated direct runoff during flood of July 17-25, 1938, for basins in New Jersey.

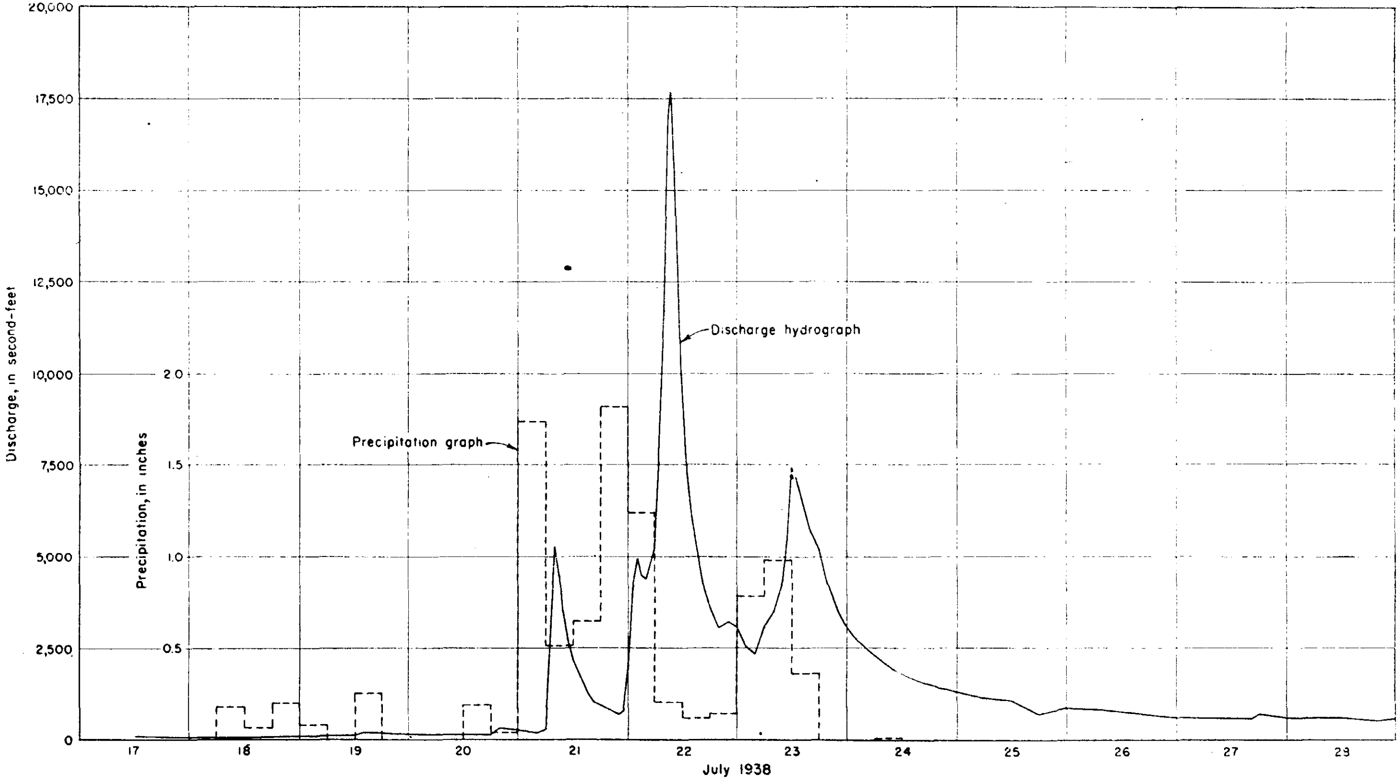

FIGURE 40.—Graph of mean areal precipitation and hydrograph of discharge of Rondout Creek near Lackawack, N. Y., for the storm period July 17-25, 1938.

was 7.05 inches; average temperature at Hartford was 75°F.; and direct surface runoff and accretion to ground-water storage (computed similarly to methods previously described)[30] were 2.65 inches and 1.0 inch, respectively. Thus, about 3.4 inches of water remained, which was accounted for by transpiration, evaporation, and change in soil moisture. Using graphs developed by Meyer,[31] adjusted on the basis of a year's record to make them applicable to the Park River Basin and adjusted also for the unusual conditions from July 18 to 31, it may be roughly estimated that transpiration and evaporation amounted to 2.4 inches in the basin and that the soil moisture accordingly increased about 1.0 inch. It should be understood that these latter figures are estimates, presented only to indicate possible distribution of the rainfall. Figure 32 also portrays the changes in soil moisture from April 1 to September 30, 1938, in the Park River Basin.

To illustrate stream-flow behavior in the Catskill Mountain region, figure 40 shows rainfall and runoff for Rondout Creek near Lackawack, N. Y., during the storm and flood. The graph of the 6-hour rainfall shown on figure 40 is based on records of rainfall read once daily at seven nearby stations, supplemented by information of rainfall distribution at three recording rain gages adjoining the Catskill Mountain region. On July 17 there was no rain. In the period July 18–20 about 1.0 inch fell without any appreciable effect on river discharge. After these initial rains, rainfall during July 21, 22, and 23 resulted in large increments to stream flow. The flood crest occurred on July 22 following the intense rains that began over this basin about 6 p.m. on July 21 and that continued to 6 a.m. on July 22. (See table 30.)

TABLE 30.—*Approximate volumes of rainfall and runoff, in inches, of Rondout Creek, near Lackawack Basin during the storm of July 17-25, 1938*

	Rainfall over basin (inches)	Direct runoff (inches)
July 17-20	1.0	0.0
July 20, 12. m., to July 21, 6 p.m	2.7	.5
July 21, 6 p.m., to July 22, midnight	3.6	2.9
July 22, midnight, to July 23, 6 p.m	2.1	1.7
Total	9.4	5.1

Table 30 indicates a significant increase in the part of the rainfall converted into runoff as the storm continued. The difference between total precipitation and direct runoff is 4.3 inches. How-

[30] Langbein, W. B., and others, Maximum winter and nonwinter floods in selected basins in New York and Pennsylvania: U. S. Geol. Survey Water-Supply Paper 915.

[31] Meyer, A. F., Elements of hydrology, 2d ed. (revised), figs. 164 and 272, pp. 263 and 457, New York, John Wiley & Sons, 1928.

ever, about 2.5 inches of the retention is accounted for by groundwater runoff during the storm and subsequent thereto, leaving about 1.8 inches as increment to soil moisture, evaporation, and transpiration.

The infiltration index for a particular basin and flood has been defined as a rate of rainfall so selected that the accumulated volume of rainfall received in excess of that rate will equal the volume of direct storm runoff. The method of computation was described by Langbein.[32] For the drainage basins above each of the following gaging stations the index, in inches per hour, was determined as indicated:

	Infiltration index (inch per hour)
Wading River near Norton, Mass.	0.18
Scantic River at Broad Brook, Conn.	.10
Burlington Brook near Burlington, Conn.	.17
Park River at Hartford, Conn.	.12
Shepaug River near Roxbury, Conn.	.17
Rockaway River above reservoir at Boonton, N. J.	.15
Rahway River at Rahway, N. J.	.09
Deep Run near Brownton, N. J.	.21

Unfortunately, because of the variations in rainfall, accurate computations could not be made for areas that lacked recording rain-gage records, as in the Catskill Mountain region. The rates shown above are within the range defined for basins in the same areas by Water-Supply Paper 867[33] during the hurrican floods of September 1938.

FLOOD OF AUGUST 1938 IN THE CATSKILL MOUNTAIN REGION, NEW YORK

By C. C. McDonald and W. B. Langbein

INTRODUCTION AND GENERAL FEATURES

The flood of August 1938 in the Catskill Mountain region was the result of a heavy rainstorm that had a maximum of more than 8 inches at the center and that was located over almost exactly the same area as the flood of July 17–25. Although the rainfall during the July storm was greater, the retention during that storm so diminished the absorptive capacity of the ground that the volumes of runoff in the subsequent flood were of comparable magnitudes in most basins. The total damage reported during the July flood exceeded that of the storm and flood of August 1938, but river stages on some rivers, particularly in the Delaware River drainage basin, exceeded those reached in July.

[32] Langbein, W. B., and others, op. cit.

[33] Paulsen, C. G., and others, Hurricane floods of September 1938: U. S. Geol. Survey Water-Supply Paper 867, pp. 440–442, 1940.

There were three separate rainstorms in the period August 6–11. The first rain fell during the night of August 6 and reached a maximum of 3.21 inches at Grahamsville. As shown on figures 41–43, this storm produced a sharp peak in runoff near midnight August 6. Light rainfall during the night of August 8–9 produced a rise in stream flow that was crested lower than the first peak. Maximum rain recorded during this period was 1.91 inches at Sundown.

The third rainstorm, on August 10 and 11, was the immediate cause of the flood of August 1938. Not only was it the heaviest of the three, but it fell on ground the absorptive capacity of which had been materially reduced by the preceding two rains. The maximum recorded rainfall for this storm was 4.90 inches, as measured at Balsam Lake on the morning of August 11, but more than 3 inches of rain fell on an area of more than 3,000 square miles in the Catskill Mountain region. Hydrographs of stream flow at selected gaging stations are shown on figures 41–43.

Large though not record-breaking floods occurred on August 11 in Rondout Creek, East and West Branches of the Delaware River, and Neversink River, draining a total area of about 1,600 square miles in the east, south, and west sections of the Catskill Mountains.

The location of these streams and of other places in the region are shown on figure 44. The Catskill Mountains, which reach as high as 4,204 feet at Slide Mountain, are rugged with steep land and stream slopes. In the East Branch of the Delaware River Basin above Fishs Eddy, for example, the average slope of the land is about 1,200 feet per mile (23 percent), and the tributary streams have a mean gradient of 122 feet per mile (2.3 percent). The upper part of the Wallkill River Basin is located south of the Catskill Mountains, and its valley above Pellets Island Mountain contains much swamp land and associated storage in natural channels. Otherwise there are relatively few large lakes or ponds that would provide natural storage for the reduction of flood discharges.

The discharge at five river-measurement stations exceeded 100 second-feet per square mile, and the greatest rate per square mile was 154 second-feet, recorded on Chestnut Creek above Red Brook, at Grahamsville, with a drainage area of 12.2 square miles. None of these five stations had areas in excess of 100 square miles. A study of discharge with respect to size of drainage area indicates that discharge was greatest on East Branch of Delaware River at Fishs Eddy, where the discharge from 783 square miles was 36,100 second-feet; on Rondout Creek near Lackawack (100 square

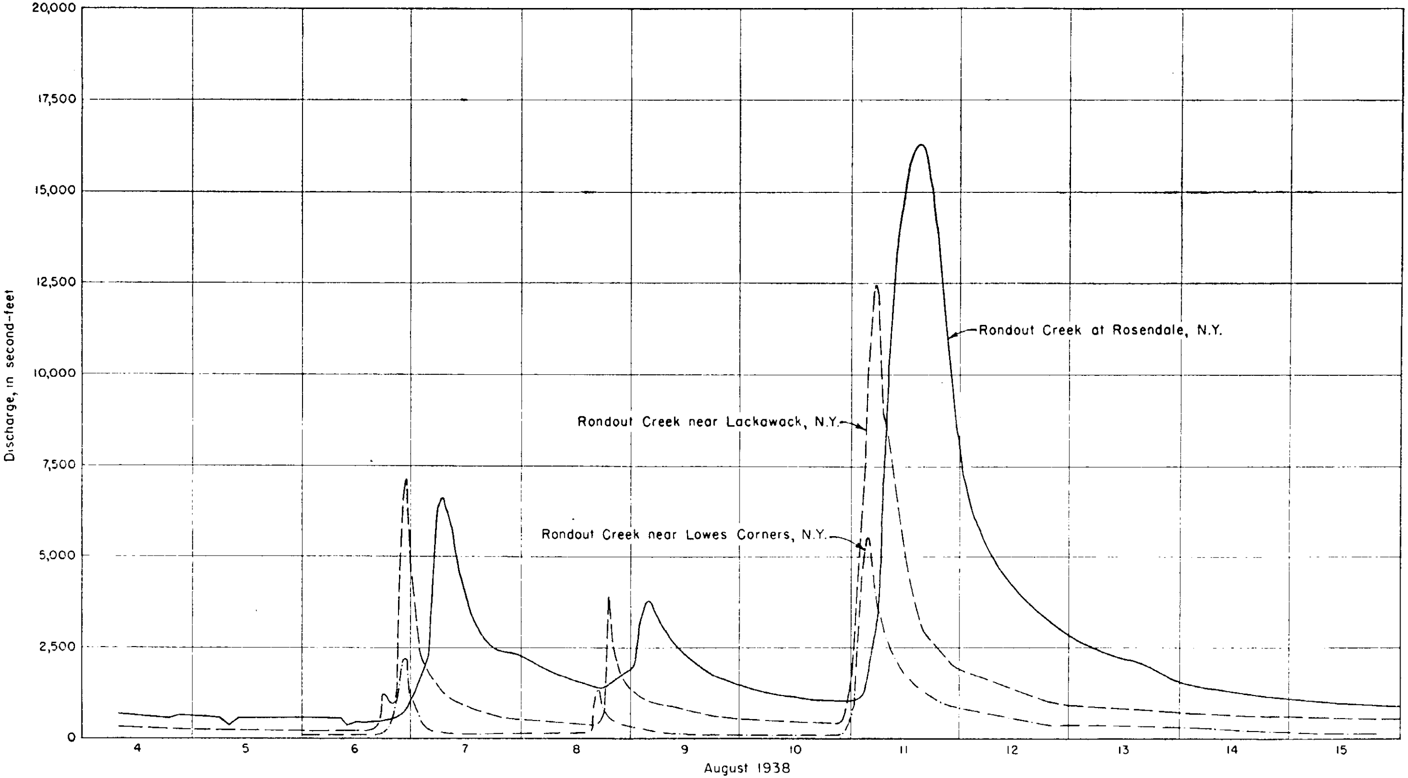

FIGURE 41.—Hydrographs of discharge at stream-gaging stations on Rondout Creek during the flood of August 1938.

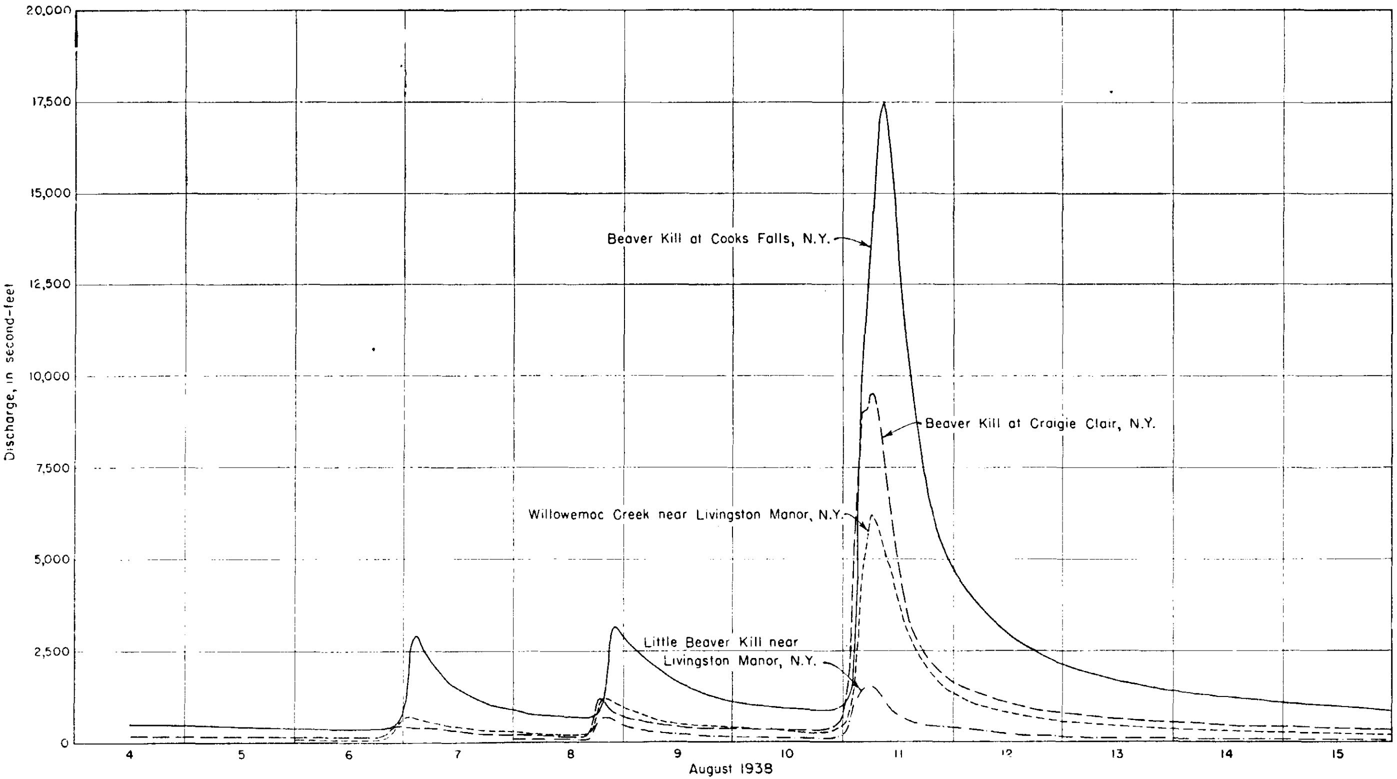

Figure 42.—Hydrographs of discharge at stream-gaging stations in the Beaver Kill Basin during the flood of August 1938.

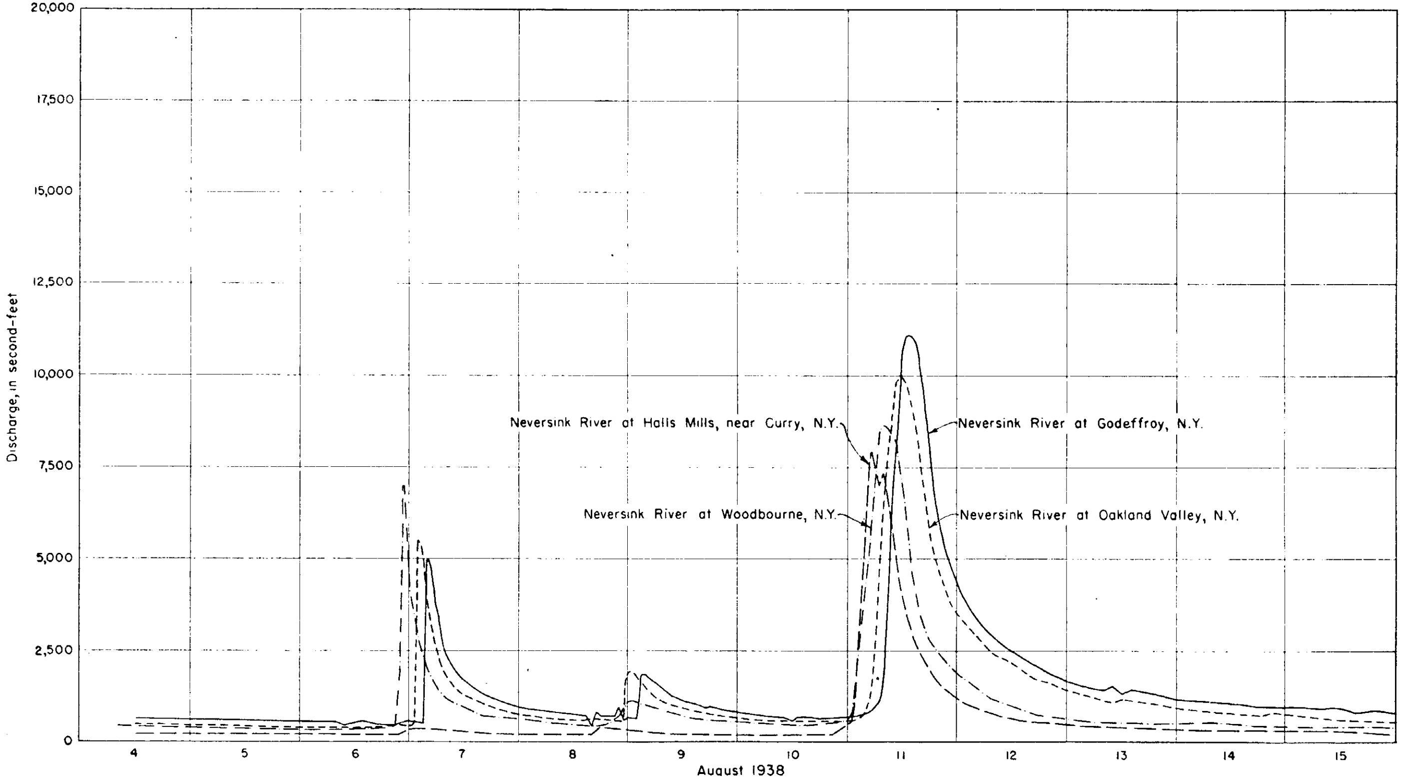

FIGURE 43.—Hydrographs of discharge at stream-gaging stations on Neversink River during the flood of August 1938.

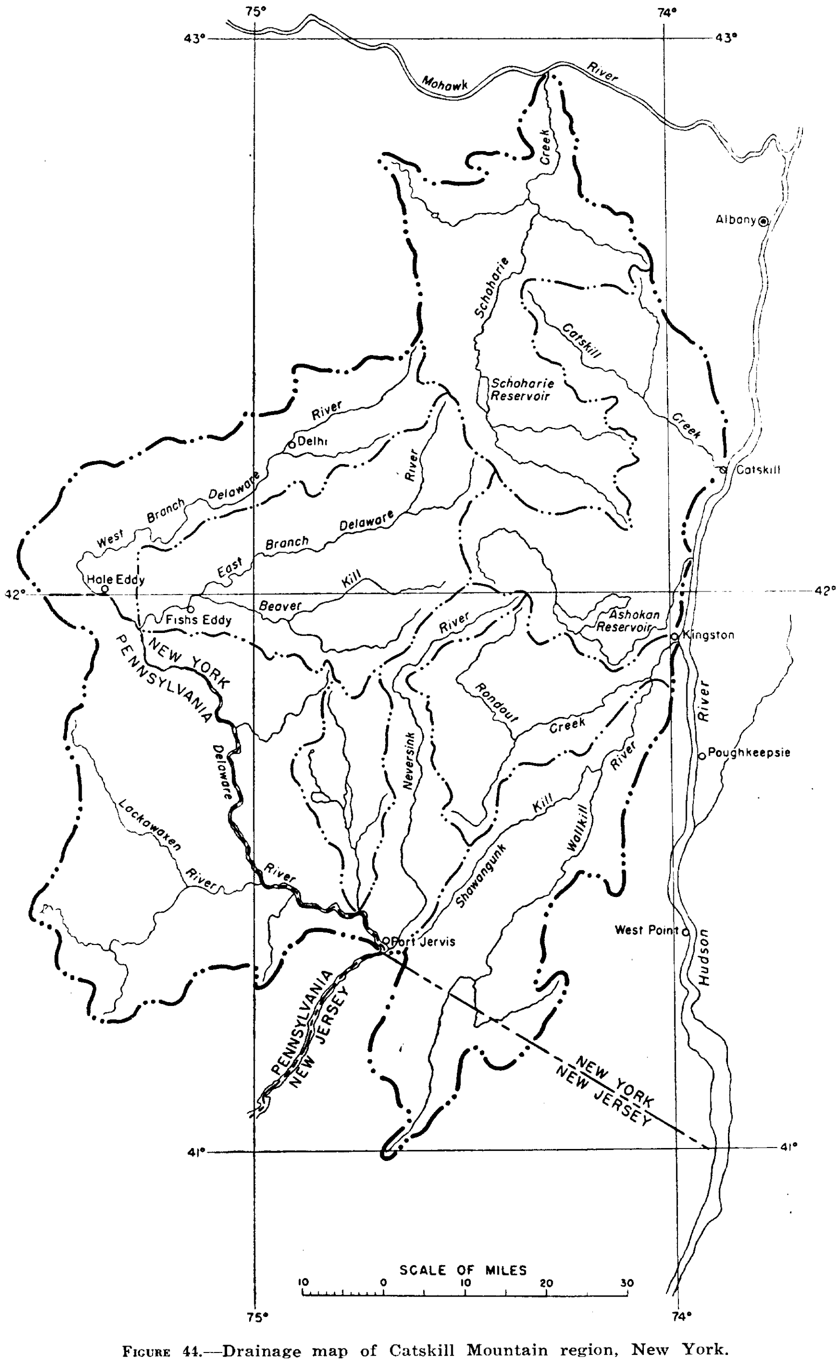

FIGURE 44.—Drainage map of Catskill Mountain region, New York.

miles), where the discharge was 12,400 second-feet; on Rondout Creek near Lowes Corners (38.5 square miles) with a discharge of 5,600 second-feet; and Chestnut Creek above Red Brook, at Grahamsville (12.2 square miles), where the discharge was 1,880 second-feet. Comparisons of flood discharge on the basis of area alone, however, disregard the flood-producing characteristics of individual basins and the areal distribution of the precipitation.

Although the floods were widespread throughout the region and there was considerable interference with normal routine, very little information is available concerning monetary damages suffered. The streets of Livingston Manor were submerged during the flood of both July and August, as shown in plate 13, **A.** Electric service was interrupted in Roscoe and several nearby villages. Low-lying residences suffered, as shown in plate 13, **B,** and the tracks of the New York, Ontario and Western Railway were washed out at several points along Little Beaver Kill between Youngs Gap and Parksville. Seven bridges over Neversink River and Willowemoc Creek were destroyed, and State highways near Liberty, N. Y., and Cuddebackville, N. Y., were overflowed during the August flood. (See pl. 14.) Damage in Rondout Creek Basin and parts of Wallkill River Basin, resulting from the July flood, and in Upper Beaver Kill Basin, resulting from the August flood, was reported to be the greatest since the floods of August 1928. No loss of life was reported.

The floods in the Catskill Mountain region during these periods were not generally record breaking and were outshadowed by the great floods of September 1938,[34] especially in the larger streams. They were, nevertheless, floods of greater than average intensity. It is believed that the information herein presented will serve to complete the hydrologic history of 1938 in the region and thus assist in an understanding of the flood characteristics of the Catskill Mountain region so necessary for formulating sound and effective measures for flood protection. This report contains information with respect to the outstanding flood of August 1938 similar in form and purpose to previous reports by the Geological Survey on the widespread inundations of March 1936 and the catastrophic floods of September 1938, both of which also affected the Catskill Mountain region to a serious extent.

ANTECEDENT CONDITIONS

The summer of 1938 in this region was unique in having three notable floods. In almost every stream one of these floods was the greatest of record. A study of maximum annual floods of Rondout

[34] Paulsen, C. G., and others, op. cit., 562 pp.

Creek near Lackawack and Delaware River at Port Jervis summarized in table 31 discloses the following monthly distribution of floods during the period of record previous to 1938 at these places:

More than half the floods occurred during the three "break-up" months of late winter and early spring—February to April. Less than a fifth occurred from June to August. Considering that annual precipitation is relatively evenly distributed during the year, hydrologic conditions in summer apparently do not favor the production of great floods in this region and suggest that the three notable floods of the summer season of 1938 were events of rare occurrence indicative of a combination of unusual conditions. A heavy rainstorm, by increasing the soil moisture, lays the basis for a second flood; the effect of two heavy storms on the runoff from a third, all occurring at comparatively close intervals, is even more marked.

TABLE 31.—*Monthly distribution of annual floods at two river-measurement stations in the Catskill Mountain region*

Month	Rondout Creek near Lackawack	Delaware River at Port Jervis
January		
February	4	5
March	8	16
April	6	5
May	1	
June	1	
July	1	
August	2	1
September	1	
October	1	4
November	4	2
December	3	2
Years of record	32	35

TABLE 32.—*Monthly precipitation and temperature at Jeffersonville, N. Y., during the spring and summer of 1938*

Month	Precipitation, in inches			Temperature, in degrees Fahrenheit	
	Total	Departure from normal	Cumulative departure from normal	Mean	Departure from normal
April	3.96	+0.76	+0.76	47.0	+2.4
May	3.86	+.62	+1.38	52.6	−2.8
June	3.65	−.14	+1.24	63.6	+.2
July	7.58	+2.94	+4.18	68.4	+.5
August	5.39	+.77	+4.95	68.8	+2.9
September	7.99	+4.33	+9.28	56.0	−4.0

NOTE.—Based on data furnished by U. S. Weather Bureau.

TABLE 33.—*Daily precipitation, in inches, Aug. 5–12, 1938, at stations in and near the Catskill Mountain region, New York*

[Measured in the afternoon except as noted]

No. on pl. 11	Station	Latitude	Longitude	Altitude (feet)	August 5	August 6	August 7	August 8	August 9	August 10	August 11	August 12	Total, Aug. 6–11
	Hudson River Basin												
259	Big Indian, N. Y.[1,2]	42°06′	74°27′	1,225	--------	0.13	--------	0.79	0.07	2.25	0.04	--------	3.28
262	Brown Station[1,2]	41°57′	74°12′	540	--------	.28	--------	.51	.04	2.67	--------	--------	3.50
263	Cairo	42°19′	74°01′	340	--------	--------	--------	.05	.73	--------	.72	--------	1.50
266	Coldbrook[2,3]	42°01′	74°16′	645	--------	.67	--------	.06	.15	2.43	.03	--------	3.34
272	East Jewett[1,2]	42°15′	74°11′	1,860	--------	.14	--------	.26	.01	1.00	.10	--------	1.51
273	Edgewood[1,2]	42°08′	74°13′	1,660	--------	.09	--------	.65	.01	1.59	--------	--------	2.34
274	Elka Park[1,2]	42°09′	74°09′	2,250	--------	.05	0.17	.36	.03	1.67	.02	--------	2.30
280	Grahamsville[2,3]	41°51′	74°33′	900	--------	3.21	--------	1.53	.03	3.44	--------	--------	8.21
281	Grand Gorge[1,2]	42°22′	74°30′	1,460	--------	.57	--------	.15	.20	1.15	.01	--------	2.08
283	High Falls	41°50′	74°07′	140	--------	.49	.18	.24	.02	--------	2.50	--------	3.43
286	Hong Falls	41°45′	74°23′	430	--------	.47	.02	.27	.15	.25	1.52	--------	2.68
294	Kingston[4,5]	41°56′	74°00′	--------	--------	.28	--------	.03	--------	.50	1.80	--------	2.61
295	Lackawack[2,3]	41°46′	74°23′	700	--------	2.30	.14	.54	.04	2.42	--------	--------	5.44
296	Lake Hill[1,2]	42°04′	74°11′	1,120	--------	.13	--------	.57	.01	2.10	--------	--------	2.81
297	Lexington[1,2]	42°14′	74°21′	1,520	--------	.17	--------	.05	.09	1.17	--------	--------	1.48
300	Manor Kill[1,2]	42°23′	74°19′	1,515	--------	.15	--------	.05	.01	1.04	--------	--------	1.25
302	Mohonk Lake	41°45′	74°09′	1,245	--------	1.03	.89	.66	.08	--------	1.85	--------	4.51
307	North Settlement[1,2]	42°21′	74°16′	2,000	--------	.29	.01	.03	.02	1.22	.01	--------	1.58
309	Oak Hill[2,3]	42°24′	74°09′	660	--------	.40	--------	.23	.10	1.05	--------	--------	1.78
311	Peekamoose[2,3]	41°56′	74°23′	1,425	--------	.56	--------	.75	.08	2.70	--------	--------	4.09
312	Phoenicia[1,2]	42°05′	74°19′	840	--------	.10	--------	1.25	.13	2.12	.01	--------	3.61
313	Pine Hill[1,2]	42°08′	74°29′	1,600	--------	.33	--------	.52	.04	1.93	--------	--------	2.82
315	Prattsville[1,2]	42°19′	74°26′	1,164	--------	.64	--------	.07	.15	1.33	--------	--------	2.19
316	Preston Hollow[2,3]	42°27′	74°12′	900	--------	.19	--------	.12	.15	1.05	--------	--------	1.51
317	Rifton	41°49′	74°03′	190	--------	1.37	--------	.10	.04	.54	2.22	--------	4.27
326	Slide Mountain[1,2]	42°02′	74°27′	1,700	--------	.71	--------	.15	.11	2.86	--------	--------	3.83
332	Sundown[2,3]	41°53′	74°28′	1,000	--------	1.48	--------	1.82	.09	4.34	--------	--------	7.73
333	Tannersville[1,2]	42°11′	74°09′	1,800	--------	.10	.01	.09	.01	1.07	.01	--------	1.29
338	Walden	41°34′	74°10′	400	--------	.01	.29	.94	.02	.62	2.26	--------	4.14

TABLE 33.—*Daily precipitation, in inches, Aug. 5–12, 1938, at stations in and near the Catskill Mountain region, New York*—Continued

No. on pl. 11	Station	Latitude	Longitude	Altitude (feet)	August 5	6	7	8	9	10	11	12	Total, Aug. 6–11
341	Warwick	41°15′	74°22′	540	0.04	Tr.	Tr.	1.32	Tr.	.98	--------	--------	2.30
342	Westerlo[2 3]	42°31′	74°03′	1,160	--------	.40		.38	--------	.98	--------	--------	1.76
343	West Hurley[1 2]	42°00′	74°06′	625	--------	1.73	--------	.11	.01	2.15	--------	--------	4.00
344	West Kill[1 2]	42°12′	74°23′	1,465	--------	.11	--------	.63	.13	1.66	.02	--------	2.55
345	West Point	41°23′	73°58′	386	--------	.47	--------	.16	--------	.61	1.51	--------	2.75
346	West Shokan[1 2]	41°57′	74°19′	900	--------	1.05	--------	.12	.01	3.65	.04	--------	4.87
347	Windham[1 2]	42°18′	74°15′	1,520	--------	.14	--------	.40	.02	1.15	.02	--------	1.73
757	Sussex, N. J.	41°13′	74°36′	480	1.00	.12	.01	(7)	(7)	(7)	(7)	(7)	--------
	Passaic River Basin												
349	Southfields, N. Y.[5 6]	41°14′	74°11′	450	--------	.30	--------	.80	.07	.45	.70	--------	2.32
356	Charlotteburg, N. J.[8]	41°02′	74°25′	719	--------	.75	--------	.55	--------	--------	1.09	--------	2.39
	Delaware River Basin												
391	Andes[2 3]	42°12′	74°47′	1,800	--------	.42	--------	.20	.05	2.97	.03	--------	3.67
392	Arena[2 3]	42°07′	74°44′	1,260	--------	.51	--------	.40	.41	3.00	--------	--------	4.32
393	Arkville[2 3]	42°08′	74°37′	1,380	--------	.47	--------	.50	.35	1.75	--------	--------	3.07
394	Balsam Lake[2 3]	42°02′	74°36′	2,600	--------	1.20	--------	.54	.11	4.90	--------	--------	6.75
396	Bovina[2 3]	42°17′	74°44′	1,880	--------	.36	--------	.56	.21	2.25	.02	--------	3.40
397	Butternut Brook[2 3]	41°56′	74°39′	1,840	--------	1.90	--------	1.20	.04	3.42	--------	--------	6.56
398	China (Cold Spring Brook)[5 9]	42°10′	75°24′	1,520	--------	.59	1.60	.02	.14	1.30	2.36	--------	6.01
399	Claryville[2 3]	41°53′	74°36′	1,560	--------	1.80	--------	1.66	.06	4.14	--------	--------	7.66
400	Craigie Clair[2 3]	41°59′	74°52′	1,680	--------	1.34	--------	.02	--------	4.32	.05	--------	5.73
401	Delhi	42°16′	74°55′	1,460	--------	--------	.11	.24	--------	.72	--------	1.50	1.07
402	Downsville[2 3]	42°06′	75°00′	1,640	--------	2.85	.07	1.26	.05	3.92	.05	--------	8.20
403	East Delhi[2 3]	42°17′	74°54′	1,370	--------	.32	--------	.58	.06	2.43	.01	--------	3.40
404	Frost Valley[2 3]	41°59′	74°31′	1,950	--------	.78	--------	.20	.02	4.52	--------	--------	5.52
405	Halcott Center[2 3]	42°13′	74°30′	2,200	--------	.06	--------	.83	.07	2.05	--------	--------	3.01
407	Harvard[3 5]	42°01′	75°07′	1,075	--------	.03	.09	1.16	.18	1.64	2.02	--------	5.12
408	Jeffersonville	41°47′	74°56′	1,240	--------	.64	--------	.30	.02	--------	2.57	--------	3.53
409	Kortright Station[2 3]	42°24′	74°48′	1,900	--------	.31	--------	.42	.37	1.55	--------	--------	2.65
410	Lake Delaware[2 3]	42°15′	74°54′	1,460	--------	.95	--------	.55	.17	1.96	--------	--------	3.63
411	Lewbeach[2 3]	42°04′	74°43′	2,400	--------	.92	--------	1.99	--------	4.02	.05	--------	6.98
412	Mary Smith[2 3]	42°03′	74°49′	1,520	--------	1.37	--------	1.00	--------	3.86	--------	--------	6.23

414	New Kingston[2 3]	42°13′	74°41′	1,780	--------	.35	--------	1.05	.20	2.46	.04	--------	4.10
415	Oakland Valley[5 10]	41°30′	74°39′	654	--------	--------	--------	.42	.08	.79	1.31	--------	2.60
416	Parkston[2 3]	41°54′	74°49′	1,500	--------	.99	--------	1.04	--------	2.92	.04	--------	4.99
417	Port Jervis	41°22′	74°42′	550	--------	.03	.01	.18	.02	.31	1.03	--------	1.58
418	Relay[2 3]	42°19′	74°38′	2,080	--------	1.50	--------	.48	.20	1.86	.18	--------	4.22
419	Roxbury[2 3]	42°17′	74°35′	1,494	--------	.35	--------	.03	.08	1.95	.10	--------	2.51
421	Seager[2 3]	42°04′	74°33′	2,100	--------	.30	--------	1.18	--------	2.10	--------	--------	3.58
423	Stamford[2 3]	42°24′	74°37′	1,827	--------	.40	--------	.02	.42	1.28	--------	--------	2.12
424	Terry Clove[2 3]	42°08′	74°54′	1,380	--------	1.32	--------	--------	--------	3.60	--------	--------	4.92
762	Woodbourne[2 3]	41°45′	74°36′	1,260	--------	.25	--------	.20	--------	2.70	--------	--------	3.15
430	Culvers Lake	41°09′	74°47′	760	--------	.56	--------	--------	.12	--------	1.14	--------	1.82
432	Layton	41°14′	74°51′	480	.14	.02	Tr.	--------	.06	--------	1.05	--------	1.13
434	Newton	41°03′	74°46′	769	.20	.40	.01	--------	.05	--------	1.40	--------	1.86
---	Matamoras	--------	--------	--------	--------	--------	--------	--------	.20	.06	1.39	--------	1.65
	Susquehanna River Basin												
440	Bainbridge	42°18′	75°29′	1,006	--------	--------	.08	--------	.06	.02	3.06	--------	3.22
443	Binghamton[5]	42°06′	75°55′	871	Tr.	--------	.10	.01	--------	.94	1.09	Tr.	2.14
466	Oneonta	42°27′	75°04′	1,112	--------	.06	.06	.15	.08	.38	1.40	Tr.	2.13

[1]New York City Department of Water Supply, Gas, and Electricity.
[2]Measured in morning after day indicated.
[3]New York City Board of Water Supply.
[4]City of Kingston.
[5]Measured at midnight.
[6]By Corps of Engineers, U. S. Army.
[7]Record missing.
[8]City of Newark, Department of Public Affairs.
[9]U. S. Geological Survey.
[10]Federal-State Flood Forcasting Service of Pennsylvania, Harrisburg, Pa.

Table 32 lists monthly rainfall at Jeffersonville, N. Y., in the Catskill Mountain region, during the spring and summer of 1938. It shows that during each month except June there was a surplus of precipitation, the cumulated excess above normal at the end of July being 4.18 inches. Temperatures from April to July averaged about normal.

PRECIPITATION

Table 33 lists the daily amounts of precipitation measured during the rainstorm at 71 stations within or adjacent to the Catskill Mountain region maintained by the Weather Bureau, the city of New York, and other agencies as credited. The maximum for the period August 6–11 was 8.21 inches at Grahamsville, N. Y., in the upper Rondout Creek Basin, where the storm of July 1938 also was a maximum. The total rainfall for the storm period at the stations listed in table 33 has been plotted at their proper location on a map, and lines of equal rainfall have been drawn. (See fig. 45.) The isohyetal map shows a well-marked axis of maximum rainfall extending northwestward across the mountain region. There were two centers, each with more than 8 inches precipitation at the "eye."

The areas encompassed by the several isohyetal lines shown on figure 45 were measured by the planimeter, with results as given in table 34.

TABLE 34.—*Areas enclosed within indicated isohyets for storm of August 6-11, 1938*

Isohyet	Area, in square miles	
	East center	West center
Over 8 inches	4	4
Over 7 inches	62	66
Over 6 inches	230	210
Over 5 inches	950	
Over 4 inches	1,730	
Over 3 inches	3,080	
Over 2 inches	4,500	
Total area in Catskill Mountain region affected by storm	6,400	

These data were used to compute the mean areal precipitation within the isohyetal lines and then to prepare an enveloping curve relating mean areal precipitation to the corresponding area. From this enveloping curve the following points showing mean precipitation over indicated areas for the storm of August 6–11, 1938, were taken in order to aid comparison of the storm with others in the region:

A. PEARL STREET, LIVINGSTON MANOR, N. Y.

B. SUMMER RESIDENCE NEAR GODEFFREY, N. Y.

FLOOD SCENES, AUGUST 1938.

Photos by Middletown (N. Y.) Times-Herald.

A. STATE HIGHWAY 52 NEAR LIBERTY, N. Y., AFTER BEING OVERFLOWED BY MONGAUP RIVER.

B. STATE HIGHWAY 211 NEAR CUDDEBACKVILLE, N. Y., OVERFLOWED BY NEVERSINK RIVER.

HIGHWAY SCENES, FLOOD OF AUGUST 1938.

Photos by Middletown (N. Y.) Times-Herald.

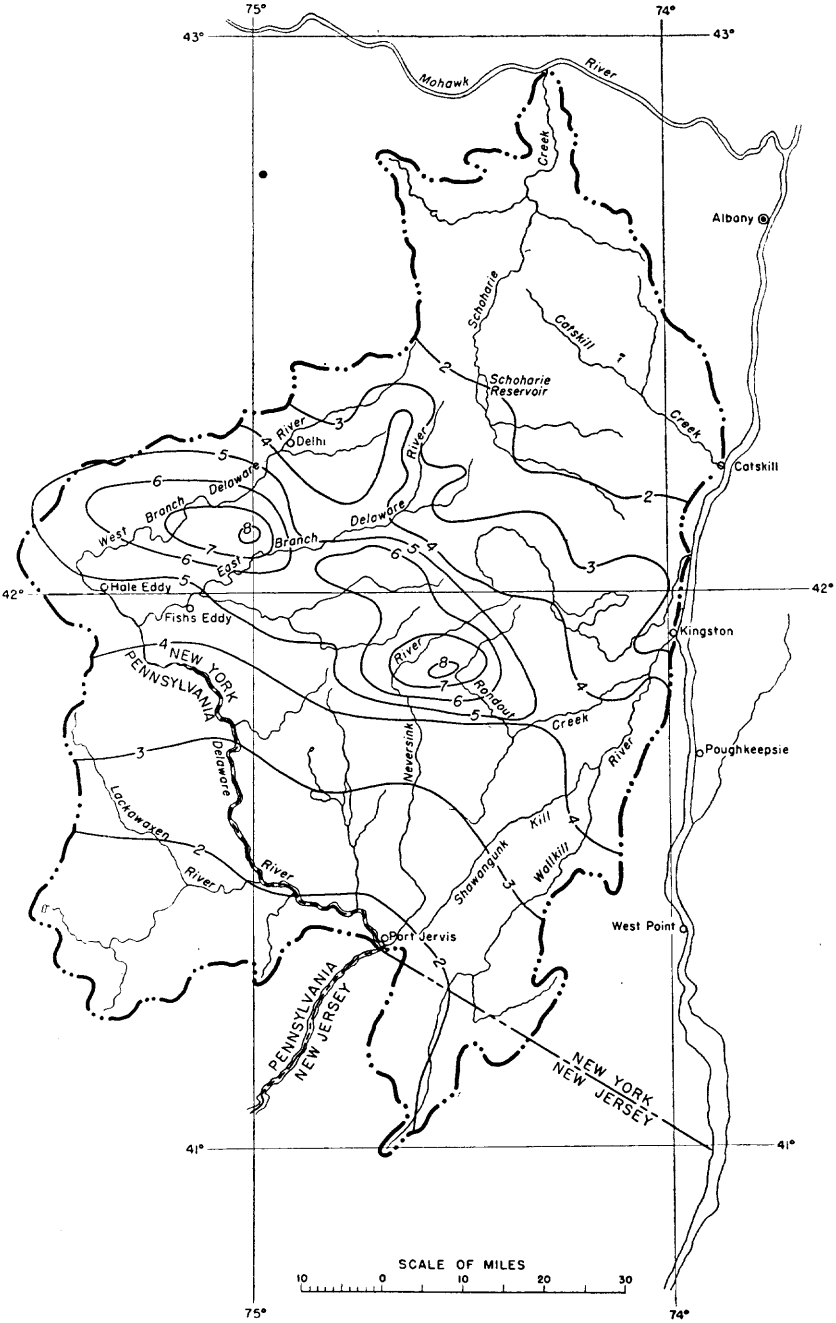

FIGURE 45.—Map of Catskill Mountain region showing lines of equal precipitation, August 6-11, 1938.

Area (square mile)	Mean precipitation (inches)
1	[1] 8.21
100	7.3
500	6.5
1,000	6.0
[2] 6,400 (entire area)	3.2

[1] Total storm precipitation recorded at Grahamsville.
[2] Total area in Catskill Mountain region affected by storm.

The mean precipitation on 500 square miles and less in the foregoing table correctly evaluates the area-depth relations in the storm centered in the Catskill Mountain region. As shown on figure 45, the 5-inch isohyetal, enclosing an area of 950 square miles, is nearly closed within the outlines of the region being considered. Isohyetals of less amounts extend beyond the boundaries, and the areas here reported within those isohyetals include only the part within the boundaries shown on figure 45. As a result, the computed mean areal precipitation over areas greater than 950 square miles given in table 34 are not necessarily the greatest values associated with the storm of August 6–11.

On the basis of data given in the table above, the storm had less precipitation over the indicated areas than any listed by the Miami Conservancy District[35] for 5-day periods.

The precipitation, however, as shown on figure 45, was not uniform during the period, most of it having fallen during the night of August 10. This rainfall produced the maximum stages and discharges that marked the flood.

As indicated by the recording rainfall records listed in table 35 and shown graphically on figure 46, rain began falling between 6 and 9 p.m. on August 10 and continued until about 8 a.m. to noon August 11, the duration varying between 12 and 19 hours. None of the recording gages were in the central storm area, so observations of maximum hourly rainfall are not available. However, the hourly records available indicate that about a fifth of the total rainfall occurred in the maximum hour, and accordingly it may be estimated that about 1.0 inch of rain fell in 1 hour at Balsam Lake, where a total of 4.90 inches of rain was measured.

Figure 47 shows isohyetal lines of precipitation on the night of August 10, based on records of daily rainfall in table 33. For those rain gages read on the morning of August 11 but recorded as of August 10, the map is based on the entry August 10. For those rain gages read during the evening and recorded as of the day read, the total of the measurements made on August 10 and 11 is used.

[35] Storm rainfall of eastern United States: Miami Conservancy District, Tech. Repts., pt. 5 (revised), table 6, pp. 278–279, 1936.

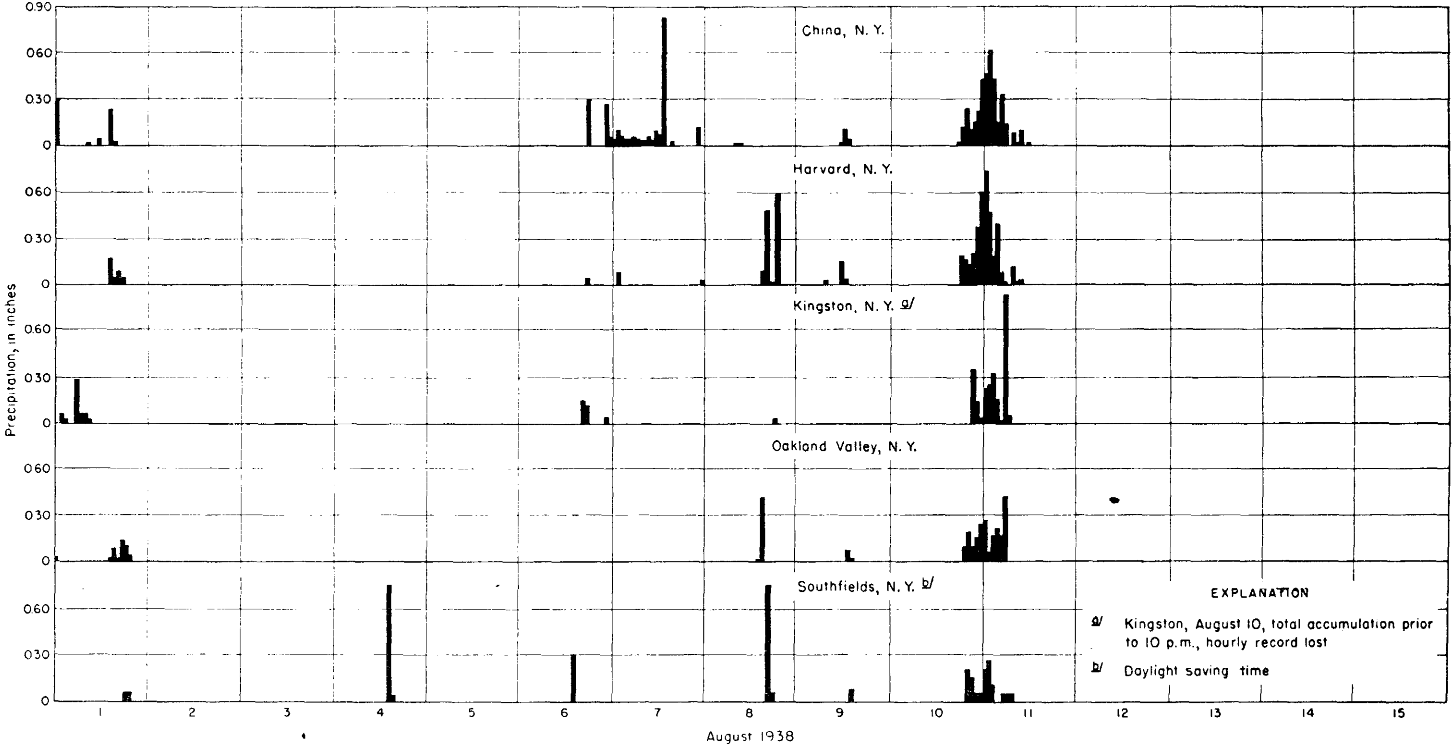

FIGURE 46.—Hourly precipitation, in inches, August 1-15, 1938, at recording rain gages in or near the Catskill Mountain region.

TABLE 35.—*Precipitation, in inches, for period*

No. on pl. 11	Station	Day	1	2	3	4	5	6
294	Kingston, N. Y.	6	----	----	----	----	----	----
	City engineer, Kingston, N. Y.	7	----	----	----	----	----	----
		8	----	----	----	----	----	----
		9	----	----	----	----	----	----
		10	----	----	----	----	----	----
		11	0.22	0.24	0.31	0.15	0.01	0.83
349	Southfields, N. Y.	6	----	----	----	----	----	----
	Corps of Engineers, U. S. Army	7	----	----	----	----	----	----
		8	----	----	----	----	----	----
		9	----	----	----	----	----	----
		10	----	----	----	----	----	----
		11	.25	.10	----	----	.05	.05
398	China, N. Y.	6	----	----	----	----	----	----
	U. S. Geological Survey	7	.04	.09	.06	.04	.04	.05
		8	----	----	----	----	----	----
		9	----	----	----	----	----	----
		10	----	----	----	----	----	----
		11	.46	.62	.43	.15	.34	.14
407	Harvard, N. Y.	6	----	----	----	----	----	----
	New York City Board of Water Supply	7	----	.07	----	----	----	----
		8	----	----	----	----	----	----
		9	----	----	----	----	----	----
		10	----	----	----	----	----	----
		11	.72	.46	.18	.40	.08	.01
415	Oakland Valley, N. Y.	6	----	----	----	----	----	----
	Federal-State Flood Forecasting Service of Pennsylvania,	7	----	----	----	----	----	----
	Harrisburg, Pa.	8	----	----	----	----	----	----
		9	----	----	----	----	----	----
		10	----	----	----	----	----	----
		11	.27	.06	.17	.22	.17	.42

The area of greatest precipitation during this period was generally coincident with the belt of maximum precipitation shown on the isohyetal map of total precipitation for the period August 6–11. The area-depth relation computed in a manner similar to that used for the total storm period is given below for the storm of August 10, 1938.

Area (square mile)	*Mean precipitation (inches)*
1	[1] 4.90
100	4.5
500	4.0
1,000	3.6
[2] 6,400	2.1

[1] Recorded at Balsam Lake.
[2] Total area in Catskill Mountain region affected by storm.

The precipitation during the night of August 10 was less for equal areas than any other 1-day storm reported by the Miami Conservancy District[36].

As an isolated storm event the rain during the night of August 10 would probably have passed without much effect, but the ex-

[36] Op. cit. (Storm rainfall of eastern United States), p. 278.

ending at indicated time, August 1938

a.m.						p.m.												Total
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
										0.14	0.11					0.03		0.28
												0.03						.03
															[1]0.34	.13	0.03	.50
0.04																		1.80
							0.30											.30
										.75	.05							.80
							.07											.07
													0.20	0.15	.05	.05	.20	.65
.05																		.50
											.29					.26	.04	.59
.04	0.03	0.03	0.05	0.03	0.08	0.06	.82		0.03							.11		1.60
		.01	.01															.02
					.01	.10	.03											.14
											.03	.12	.24	.11	.15	.22	.43	1.30
	.08	.02	.10	.01	.01													2.36
											.03							.03
																	.02	.09
									.08	.48	.01	.01	.58					1.16
	.02				.14	.02												.18
											.02	.18	.16	.12	.20	.36	.60	1.64
	.12	.02	.03															2.02
								0.01	.41									.42
							.06	.02										.08
													.10	.20	.09	.15	.25	.79
																		1.31

[1]Total prior to 10 p.m.

cessive rainfall that preceded it, as previously pointed out, decreased the absorptive capacity of the ground to the extent that an unusually large part of the storm rainfall appeared as direct runoff in stream channels.

STAGES AND DISCHARGES AT RIVER-MEASUREMENT STATIONS

Records of stage and discharge at 28 stations in the region affected by the floods are included in the section on "Floods of July 1938 in the northeastern States."

In general, the data presented for each stream-gaging station comprise a description of the station, a table showing mean daily discharges for July and August 1938, and a table showing the stage and corresponding discharge at indicated times during the flood period in sufficient detail for reasonably reliable delineation of hydrographs. The latter table is presented only for those stations in the areas experiencing the most severe floods. These tables are discussed fully on pages 8 to 11.

Hydrographs of discharge at stream-gaging stations on several selected streams in the region during the August flood, as plotted from data given in this report, are shown on figures 41–43.

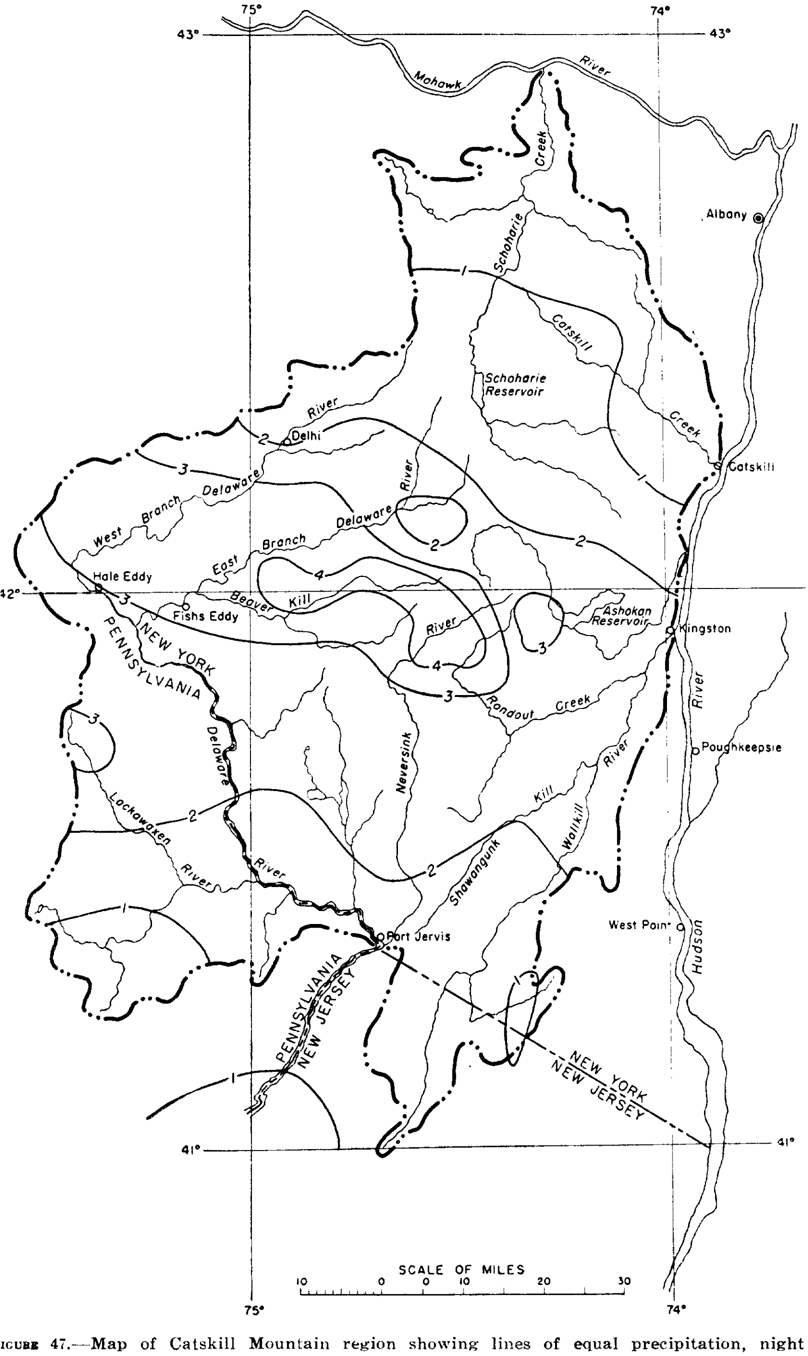

Figure 47.—Map of Catskill Mountain region showing lines of equal precipitation, night of August 10, 1938.

STORAGE

The principal reservoirs in the Catskill Mountain region, as shown on figure 44, are Schoharie Reservoir on Schoharie Creek, Ashokan Reservoir on Esopus Creek, and Swinging Bridge and Toronto Reservoirs in the Mongaup River Basin. The impounding of the floodwaters in these reservoirs contributed materially to the attenuation of flood discharges in the lower reaches of these streams. For example, the crest discharge of Schoharie Creek at Prattsville, N. Y., on August 11 was 634 second-feet, whereas downstream the discharge over Gilboa Dam, which impounds Schoharie Creek in Schoharie Reservoir, did not exceed 150 second-feet.

SUMMARY OF FLOOD STAGES AND DISCHARGES

The maximum flood discharges at the stream-gaging stations in the Catskill Mountain region during the flood of August 1938 are summarized in table 36. The numbers assigned to each gaging station in the table conform to those given in Water-Supply Paper 847[37] and refer to its location, as shown on plate 12 and in the section on the flood of July 1938.

Comparisons of flood discharge during August with that of the preceding July indicate that the August flood was the greater in the basins of the East and West Branches of the Delaware River, an area of about 1,400 square miles. In the Beaver Kill Basin, tributary to the East Branch of the Delaware River, the August flood was also greater than that of September 1938. At Cooks Falls, where there were 25 years of continuous record, the crest discharge was 17,500 second-feet in comparison with the maximum of record of 19,000 second-feet reached in August 1933. At no other station with more than 2 years of record did the flood discharge of August so closely approach the maximum of record.

In order to define more completely the range of flood discharges in three of the principal streams draining the Catskill Mountain region, table 37 summarizes the annual maximum discharges in second-feet, with the date of occurence, at five selected stream-gaging stations. Figure 48 presents graphically these annual maximum discharges, together with the maximum discharges that occurred during the floods of July, August, and September 1938. This graph vividly portrays the relative magnitude of the July and August floods and the hurricane flood of September, which, by its magnitude and great areal extent, tended to obscure the July and August floods, which might otherwise have been considered major floods in their respective localities.

[37] Williams, G. R., and Crawford, L. C., Maximum discharges at stream-measurement stations through December 31, 1937; U. S. Geol. Survey Water-Supply Paper 847, 272 pp., 1940.

Table 36.—*Maximum discharges during flood of August 1938 in the Catskill Mountain region.*

No. on pl. 12	Stream and place of determination	Drainage area (square miles)	Period of record	Maximum discharge prior to August 1938		Maximum discharge during flood of August 1938		
				Date	Second-feet	Time	Second-feet	Second-feet per square mile
	Hudson River Basin							
538	Schoharie Creek at Prattsville	236	1902–38	Nov. 16, 1926	[1]42,300	Aug. 11, 2 p.m.	634	2.7
539	Schoharie Creek at Gilboa Dam, at Gilboa[1] [2]	314	1927–38	Mar. 18, 1936	32,000	Aug. 2, 10 a.m.	308	1.0
540	Schoharie Creek at Middleburg[2] [3]	532	1906–38	do	47,800	Aug. 11, 8 p.m.	[4]535	1.0
550	Catskill Creek at Oak Hill[5]	98	1910–38	Nov. 9, 1913	[1]12,300	Aug. 11, 9 a.m.	271	2.8
553	Esopus Creek at Coldbrook	192	1914–38	Aug. 24, 1933	[1]55,000	Aug. 11, 10 a.m.	3,160	16.4
560	Rondout Creek near Lowes Corners	38.5	1937–38	July 22, 1938	[6]7,600	Aug. 11, 4 a.m.	[4]5,600	145
561	Rondout Creek near Lackawack	100	1906–38	Aug. 26, 1928	[1]26,700	Aug. 11, 5:30 a.m.	12,400	124
562	Rondout Creek at Rosendale	386	1901–03 1906–19 1926–38	Aug. 27, 1928	27,300	Aug. 11, 2:45 p.m.	16,400	42.5
563	Chestnut Creek above Red Brook, at Grahamsville	12.2	1937–38	July 22, 1938	[4]2,600	Aug. 11, 4 a.m.	[4]1,880	154
563.5	Wallkill River near Unionville	144	do	Jan. 26, 1938	[6]1,710	Aug. 12, 6:30 a.m.	[4]373	2.6
564	Wallkill River at Pellets Island Mountain	385	1919–38	Mar. 14, 1936	12,400	Aug. 11, 4 p.m.	1,300	3.4
566	Wallkill River at Gardiner	711	1924–38	Mar. 12, 1936	18,000	Aug. 11, 1:30 p.m.	7,920	11.1
567.3	Pochuck Creek at Newport, near Pine Island	98.0	1937–38	July 25, 1938	1,180	Aug. 10, 6 a.m.	226	2.3
567.7	Quaker Creek at Florida	9.74	do	Jan. 25, 1938	387	Aug. 11, 9 a.m.	[4]52	5.3
	Delaware River Basin							
642	East Branch of Delaware River at Margaretville	163	do	May 15, 1937	6,000	Aug. 11, 8 a.m.	2,590	15.9
643	East Branch of Delaware River at Harvard	443	1934–38	Mar. 18, 1936	26,200	Aug. 11, 11:30 a.m.	14,500	32.7
644	East Branch of Delaware River at Fishs Eddy	783	1912–38	Oct. 9, 1903	[7]70,000	do	36,100	46.1
646	Delaware River at Port Jervis	3,076	1904–38	Oct. 10, 11, 1903.	[7]155,000	Aug. 12, 12:15 a.m.	[2]68,300	22.2
650	Mill Brook at Arena	25.0	1937–38	Oct. 23, 1937	[4]1,550	Aug. 11, 7 a.m.	[4]1,110	44.4
651	Tremper Kill near Shavertown	33.0	do	do	1,800	Aug. 11, 5:45 a.m.	1,420	43.0
652	Terry Clove Kill near Pepacton	14.1	do	Jan. 25, 1938	[4]850	Aug. 11, about 6 a.m.	[4]755	53.5
653	Beaver Kill at Craigie Clair	82	do	July 21, 1938	8,510	Aug. 11, 6 a.m.	9,530	116
654	Beaver Kill at Cooks Falls	241	1913–38	Aug. 24, 1933	19,000	Aug. 11, 9 a.m.	17,500	72.6
655	Willowemoc Creek near Livingston Manor	63	1937–38	July 22, 1938	5,090	Aug. 11, 6:40 a.m.	6,200	98.7
656	Little Beaver Kill near Livingston Manor	19.8	1924–38	Aug. 26, 1928	2,500	Aug. 11, about 5 a.m.	[4]1,570	79.3
657	West Branch of Delaware River at Delhi	142	1937–38	Jan. 25, 1938	4,290	Aug. 11, 8 a.m.	2,170	15.3
658	West Branch of Delaware River at Hale Eddy	593	1912–38	Oct. 10, 1903	[7]46,000	Aug. 11, 11 a.m.	19,600	33.1
662.5	Little Delaware River near Delhi	49.8	1937–38	Jan. 25, 1938	[4]2,180	Aug. 11, about 6 a.m.	[4]1,500	30.1
663	Cold Spring Brook at China	(8)	1934–38	Oct. 30, 1935	335	Aug. 11, 1:30 a.m.	144	----

667.3	Neversink River at Halls Mills, near Curry	68	1937–38	Oct. 23, 1937	13,000	Aug. 11, 5 a.m.	7,940	117
667.7	Neversink River at Woodbourne	113	...do....	July 22, 1938	[4]12,300	Aug. 11, about 8 a.m.	[4]8,660	76.6
668	Neversink River at Oakland Valley	222	1928–38	Aug. 24, 1933	20,000	Aug. 11, 11:30 a.m.	9,960	44.9
669	Neversink River at Godeffroy	302	1903, 1909–14 1937–38	July 22, 1938	16,100	Aug. 11, 1:30 p.m.	11,200	37.1

[1]Records furnished by New York City Board of Water Supply.
[2]Affected by storage.
[3]Records of New York State engineer and surveyor, 1906–27.
[4]From graph based on gage readings.
[5]Records of New York Board of Water Supply, 1910–29.
[6]Observed maximum.
[7]Estimated.
[8]Not determined.

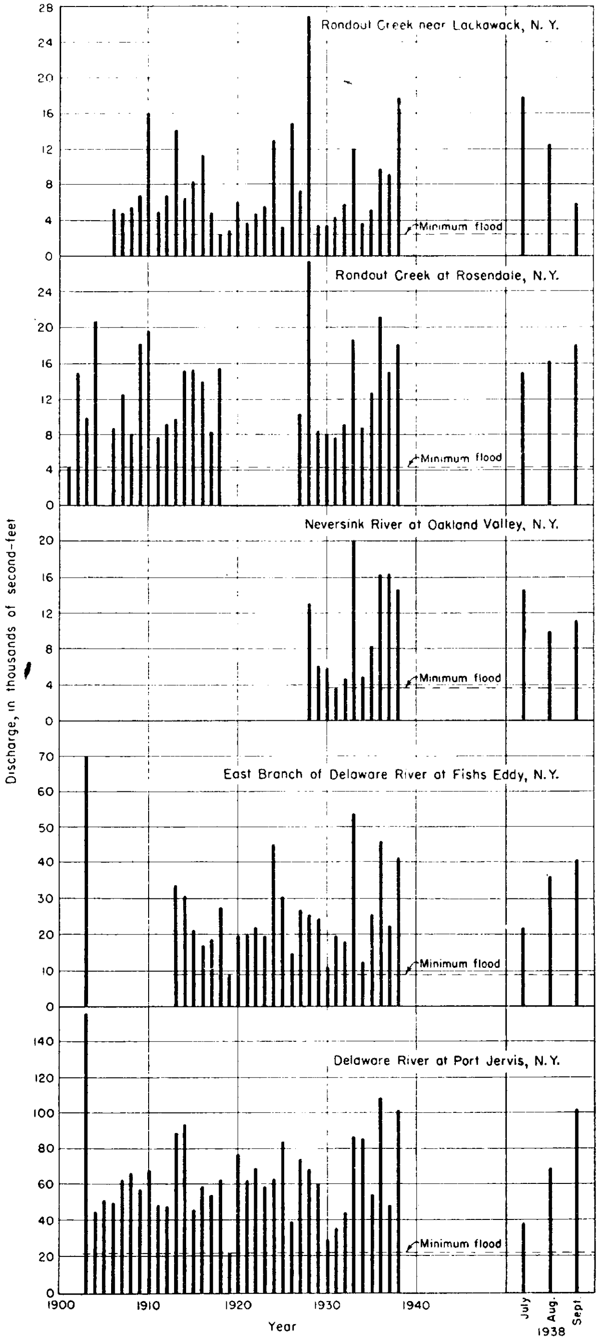

FIGURE 48.—Graph of annual floods at five selected stream-gaging stations in the Catskill Mountain region.

TABLE 37.—*Annual floods at five selected stream-gaging stations in the Catskill Mountain region*

Water year ending Sept. 30	Rondout Creek near Lackawack		Rondout Creek at Rosendale		East Branch of Delaware River at Fishs Eddy		Delaware River at Port Jeris		Neversink River at Oakland Valley	
	Date	Second-feet	Date	Second-feet	Date	Second-feet	Date	Second-feet	Date	Second-feet
1901			Aug. 24	[1] 4,550						
1902			Dec. 15	[1]15,000						
1903			Feb. 28 Aug. 29	[1] 9,950						
1904			Oct. 9	[1]20,700			Oct. 10	[2]155,000		
1905							Mar. 26	[3]50,900		
1906	Apr. 15	[1] 5,060	Apr. 15	[1] 8,860			Apr. 16	[3]49,400		
1907	Nov. 7	[1] 4,800	Nov. 7	[1] [3]12,600			Jan. 1	[3]32,100		
1908	Feb. 15	[1] 5,480	Feb. 15	[1] [3] [4] 8,000			Feb. 16	[3]65,700		
1909	Feb. 20	[1] 6,630	Feb. 20	[1] [3]18,300			Feb. 21	[3]56,600		
1910	Apr. 26	[1]16,000	Apr. 26	[1] [3]19,500			Mar. 1	[3]67,300		
1911	Mar. 27	[1] 4,800	Oct. 19	[1] [3] 7,700			Mar. 28	[3]48,400		
1912	Mar. 15	[1] 6,740	Mar. 13	[1] [3] 9,200			Mar. 30	[3]47,600		
1913	Nov. 9	[1]14,000	Mar. 27	[1] [3] 9,810	Mar. 27	[2]33,500	Mar. 28	[3]88,400		
1914	Apr. 8	[1] 6,310	Mar. 28	[1] [3]15,200	Mar. 28	[2]30,000	—do—	[3]92,700		
1915	Dec. 18	[1] 8,200	Aug. 4	[1]15,200	Jan. 19	[2]20,800	Feb. 25	45,200		
1916	July 26	[1]11,400	July 27	[1]14,000	Apr. 2	[2]16,600	Apr. 1	59,100		
1917	Mar. 27	[1] 4,800	Mar. 28	[1] 8,200	Mar. 28	[2]18,100	Mar. 28	53,400		
1918	Dec. 23	[1] 2,260	Feb. 20	[1]15,500	Oct. 30	27,400	Oct. 31	61,600		
1919	Mar. 1	[1] 2,710			Apr. 12	8,390	Mar. 10	21,300		
1920	Apr. 5	[1] 6,000			Mar. 13	[3]19,500	Mar. 13	75,500		
1921	Mar. 9	[1] 3,700			Mar. 9	19,600	Mar. 10	61,600		
1922	Mar. 7	[1] 4,580			Nov. 29	22,000	Nov. 29	68,100		
1923	Apr. 5	[1] 5,500			Apr. 6	19,000	Mar. 24	57,900		
1924	Apr. 7	[1]13,000			Sept. 30	[2]45,000	Apr. 7	62,500		
1925	Feb. 12	[1] 3,190			Oct. 1	30,300	Feb. 12	83,100		
1926	Nov. 16	[1]14,800			Nov. 16	14,400	Apr. 10	38,700		
1927	Nov. 7	[1] 7,200	Nov. 17	10,400	Nov. 17	26,700	Nov. 17	73,900		
1928	Aug. 26	[1]26,700	Aug. 27	27,300	Dec. 8	25,200	Oct. 20	68,300	Aug. 26	13,000
1929	Mar. 14	[1] 3,500	Mar. 15	8,360	Mar. 14	24,200	Mar. 15	59,700	Mar. 15	6,240
1930	June 10	[1] 3,350	Mar. 8	8,010	Feb. 26	10,500	Mar. 9	29,400	June 10	5,840
1931	May 10	[1] 4,230	Mar. 29	7,760	July 11	19,000	Mar. 30	35,100	Mar. 29	3,760
1932	Oct. 6	[1] 5,700	Apr. 1	9,130	Apr. 1	17,500	Apr. 1	44,300	Apr. 1	4,610
1933	Aug. 24	12,000	Aug. 24	18,700	Aug. 24	[2]53,300	Aug. 25	85,600	Aug. 24	20,000
1934	Sept. 17	3,510	Sept. 17	8,840	Mar. 5	12,000	Mar. 6	84,800	Sept. 17	4,790
1935	Dec. 1	5,080	July 8	12,600	Dec. 1	25,500	Dec. 2	53,500	Dec. 1	8,020
1936	Mar. 18	9,600	Mar. 12	21,100	Mar. 18	46,000	Mar. 18	108,000	Mar. 18	16,200
1937	Feb. 22	9,070	Feb. 22	15,000	Feb. 22	22,200	Feb. 22	46,500	Feb. 22	16,300
1938	July 22	17,700	Sept. 22	18,100	Sept. 22	41,000	Sept. 22	101,000	July 22	14,500

[1]Based on calendar year.
[2]About.
[3]Maximum calendar-day discharge.
[4]Estimated.

NOTE.—Records for Rondout Creek near Lackawack for 1906–32 and Rondout Creek at Rosendale for 1907–18 furnished by New York City Board of Water Supply.

RAINFALL AND RUNOFF STUDIES

The mean depths of precipitation over the several basins were computed from the isohyetal map shown on figure 45. The results, in inches, are listed in table 38. The direct runoff is given in this table in terms of mean depth, in inches, over the contributing drainage basin for ready comparison with rainfall. The method used for computing the volume of direct runoff, by using the records of stream flow included in this report, is illustrated on figure 49, where a hydrograph of discharge of Rondout Creek near Lackawack has been divided into direct runoff and base-flow components, as follows. During the morning and early afternoon of August 6 the river flow consisted of ground-water effluent seepage, generally termed base flow. The average flow, at point *A* on

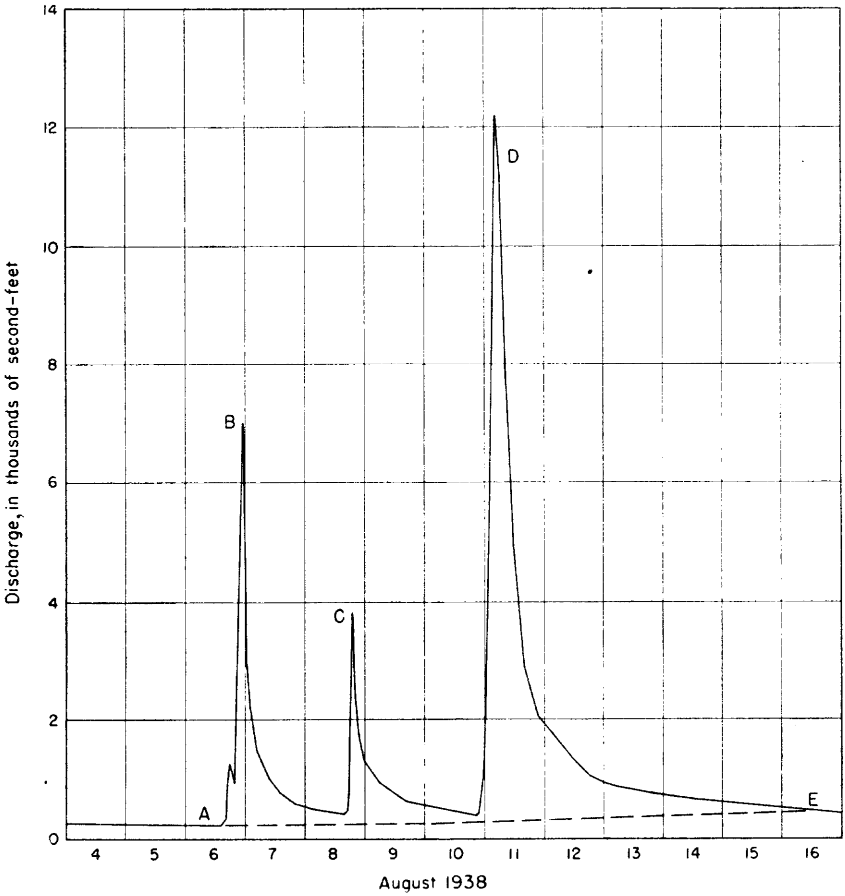

FIGURE 49.—Hydrograph of discharge of Rondout Creek near Lackawack, N. Y., showing method of analysis used in determining direct runoff associated with the flood of August 1938.

figure 49, at the several gaging stations was 1.67 second-feet per square mile. During the afternoon of August 6 stream flow rose sharply in response to rainfall and reached a peak, *B*, within a few hours. After cessation of rainfall, stream flow again receded until the afternoon of August 8, when additional rainfall for a few hours produced a second isolated rise to a peak, *C*, on figure 49, which in most streams was the lowest of the three. Stream flow again receded almost to base-flow level until the late afternoon of

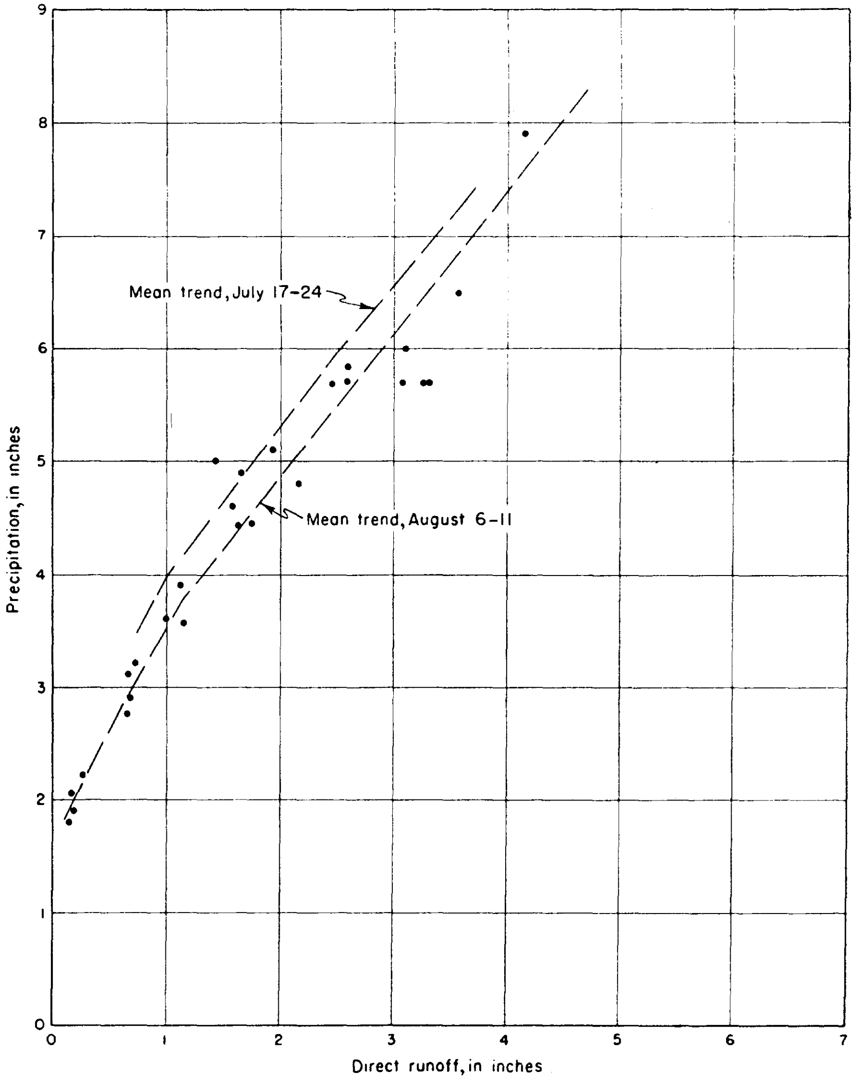

FIGURE 50.—Relation between precipitation and associated direct runoff during flood of August 1938.

August 10, when the heavy rainfall shown on figure 47 produced a maximum flood discharge during the storm period shown as point *D* on figure 49. Rainfall generally ended before noon on August 11, and flow receded until light rainfall on August 17 and 18 produced a small rise not shown on figure 49. However, it was believed that stream flow on August 16, identified by point *E* on figure 49, consisted largely of base flow. The average rate of flow at the several gaging stations at this time was 2.10 second-feet per square mile. A line was drawn between points *A* and *E* to represent the rate of base flow during the flood period. The area within the hydrograph and above this line represents the volume of direct runoff associated with the meteorologic events of August 6–11, and was computed in terms of second-foot-days and then converted into inches over the contributary drainage basin.

TABLE 38.—*Precipitation and associated direct runoff of flood of August 1938*

[Mean depth, in inches, over drainage areas]

No. on pl. 12	Stream	Location	Drainage area (square miles)	Precipitation	Runoff	Difference
	Hudson River Basin					
538	Schoharie Creek	Prattsville, N. Y.	236	2.05	0.15	1.90
550	Catskill Creek	Oak Hill, N. Y.	98	1.8	.13	1.67
553	Esopus Creek	Coldbrook, N. Y.	192	3.2	.72	2.48
560	Rondout Creek	Lowes Corners, N. Y.	38.5	5.7	3.29	2.41
561	Do	Lackawack, N. Y.	100	6.5	3.58	2.92
562	Do	Rosendale, N. Y.	386	4.8	2.13	2.67
563	Chestnut Creek	Above Red Brook, at Grahamsville, N. Y.	12.2	7.9	4.14	3.76
563.5	Wallkill River	Unionville, N. Y.	144	1.9	.19	1.71
564	Do	Pellets Island Mountain, N. Y.	385	2.2	.27	1.93
566	Do	Gardiner, N. Y.	711	2.75	.66	2.09
	Delaware River Basin					
642	East Branch of Delaware River	Margaretville, N. Y.	163	3.1	.65	2.45
643	Do	Harvard, N. Y.	443	4.6	1.59	3.01
644	Do	Fishs Eddy, N. Y.	783	5.1	1.93	3.17
646	Delaware River	Port Jervis, N. Y.	3,076	3.6	1.00	2.60
650	Mill Brook	Arena, N. Y.	25.0	5.0	1.42	3.58
651	Tremper Kill	Shavertown, N. Y.	33.0	3.9	1.12	2.78
652	Terry Clove Kill	Pepacton, N. Y.	14.1	4.9	1.66	3.24
653	Beaver Kill	Craigie Clair, N. Y.	82	6.0	3.10	2.90
654	Do	Cooks Falls, N. Y.	241	5.7	2.56	3.14
655	Willowemoc Creek	Livingston Manor, N. Y.	63	5.7	3.08	2.62
656	Little Beaver Kill	Do	19.8	5.7	3.27	2.43
657	West Branch of Delaware River	Delhi, N. Y.	142	2.9	.68	2.22
658	Do	Hale Eddy, N. Y.	593	4.45	1.65	2.80
662.5	Little Delaware River	Delhi, N. Y.	49.8	3.55	1.13	2.42
667.3	Neversink River	At Halls Mills near Curry, N. Y.	68	5.7	2.45	3.25
667.7	Do	Woodbourne, N. Y.	113	5.85	2.57	3.28
668	Do	Oakland Valley, N. Y.	222	4.45	1.76	2.69
669	Do	Godeffroy, N. Y.	302	4.05	1.35	2.70

The results of these computations are given in table 38 and are shown graphically in relation to the corresponding rainfall on figure 50. The graph indicates that only total storm rainfall in excess of 2 inches was effective in producing significant direct runoff and that approximately two-thirds of the rainfall above 2 inches was converted into direct runoff. Above 6 inches rainfall, the data seem to define a retention of about 3.5 inches.

Many factors influence the proportion of rainfall that is converted into runoff. Among these, the principal ones are volume, intensity, and distribution of precipitation, and antecedent soil-moisture conditions. The influence of the volume of precipitation, as shown by figure 50, has been mentioned. The plotting of the points with respect to the mean trend suggests a general uniformity of conditions over the area with respect to central soil moisture and rainfall distribution. However, as the area covered by the storm of July 17–24 nearly coincided with that of August 6–11, the basins of low precipitation during the latter storm were also those of low precipitation during the former, and consequently there may have been a chance variation in antecedent soil moisture between the several basins which associated with precipitation in such a manner as to produce the curve shown on figure 50.

TABLE 39.—*Precipitation and direct runoff associated with the several peaks during the flood of August 1938*

[Mean depth in inches over drainage area]

Stream and point of measurement	Drainage area (square miles)	August 6–7		August 8		August 10–11			August 6–11	
		Precipitation	Runoff	Precipitation	Runoff	Precipitation	Runoff	Infiltration index (inches per hour)	Precipitation	Runoff
Rondout Creek near Lackawack, N. Y.	100.0	2.1	0.66	1.1	0.43	3.3	2.48	0.07	6.5	3.58
Chestnut Creek above Red Brook, at Grahamsville, N. Y.	12.2	2.75	1.10	1.6	.75	3.55	2.29	.09	7.9	4.14
Terry Clove Kill near Pepacton, N. Y.	14.1	1.25	.15	.15	.02	3.5	1.49	.19	4.90	1.66

The curve showing mean trend for the storm and floods of July 17–24 is also shown on figure 50. For equal rainfall there was about 0.35 inch more of runoff under the hydrologic conditions existing during the storm of August 6–11 than for those existing during the storm of July 17–24.

The relation shown on figure 50 **applies** only to the conditions pertaining to the total storm. For example, the first 2 inches out of the total 6.5 inches of precipitation in Rondout Creek Basin above Lackawack, owing to differences in distribution, would not necessarily produce the same amount of runoff as the upper Wallkill River Basin, where the total 4-day rainfall was about 2 inches.

The rainfall-runoff conditions existing during each of the three separate rises in flood between August 6 and 11 are given in table 39, which lists the volume of rainfall and direct runoff associated with each rise for three streams in the central storm area. Examination of the amounts of rainfall and runoff during each of the separate periods indicates a progressive tendency for an increase in the part of rainfall appearing as direct runoff.

The infiltration index for the third period was computed by the method explained in the section on the flood of July 1938. The erratic distribution of the rainfall during the first two periods and the lack of sufficient recording gages for defining the hourly rainfall over broad areas under these conditions prevented the determining of the infiltration index during the first two periods. Rainfall during the last period, however, was more general and uniform with respect to timing so that a computation of the infiltration index was possible. The results for the three basins thus subdivided, as shown above, varied from 0.07 and 0.09 inch per hour in the two basins with the greatest antecedent rainfall to 0.19 inch per hour in Terry Clove Kill Basin, which had the least antecedent rainfall.

INDEX

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