

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
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DISCHARGE, GAGE HEIGHT, AND ELEVATION OF  
100-YEAR FLOODS IN THE HUDSON RIVER BASIN

By Roger J. Archer

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## FACTORS FOR CONVERTING U.S. CUSTOMARY UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

| <u>Multiply U.S. Customary units</u>          | <u>By</u> | <u>To obtain SI units</u>                      |
|---|-----------|--|
| feet (ft)                                     | 0.3048    | meters (m)                                     |
| square miles (mi <sup>2</sup> )               | 2.59      | square kilometers (km <sup>2</sup> )           |
| cubic feet per second<br>(ft <sup>3</sup> /s) | .028317   | cubic meters per second<br>(m <sup>3</sup> /s) |

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ABSTRACT

The flood discharge that may be expected to be equaled or exceeded on the average of once in a 100 years (100-year flood) was computed by use of the log-Pearson Type III frequency distribution for 72 stations in the Hudson River basin. These discharges and, where available, their corresponding gage height and elevation above mean sea level, are presented in tabular form. A short explanation of computation methods is included. The data are to be used as part of a Federally funded study of the water resources and related land resources of the Hudson River basin.

INTRODUCTION

Drought during the early 1960's provided a stimulus for studies by several agencies on water-resources planning and management in New York State. From the results of these studies, the State of New York prepared a proposal for a "Level B Study of the Hudson River basin," designed to evaluate present and future water and related land resources of the Hudson River basin. That study was funded by Congress through the Water Resources Council (Hudson River Basin Study Group, written commun., Nov. 1976, p. 1). The New York State Department of Environmental Conservation was selected to provide guidance for the study.

Work groups composed of representatives from selected State and Federal agencies, including the U.S. Geological Survey, were formed to assemble needed data for the Level B study. As one phase of its part in the study, the Survey was asked to provide a summary of information on the discharge, gage height, and elevation of the "100-year flood" at all locations in the Hudson River basin for which this information could be obtained. The term 100-year flood designates the discharge that can be expected to be equaled or exceeded once in 100 years on the average, or the discharge that has a 1-percent chance of being exceeded in any given year [U.S. Water Resources Council, 1976, p. 22]. This flood information is to be used by the Flood Damage Reduction work group in their phase of the Level B study.

## Data Computation and Presentation

The 100-year flood discharge at all continuous-gaging and partial-record crest-stage stations in the Hudson River basin with at least 10 consecutive years of record through 1975 was computed by the log-Pearson Type III method of determining the frequency relationship. These data are given in table 1; locations of the stations are shown in plate 1. Also included in table 1 are gage height and elevations of the 100-year flood at the gaging stations and gage heights at the crest-stage stations.

The 100-year flood discharges were computed in accordance with "Guidelines for Determining Flood Flow Frequency," Bulletin 17 of the Hydrology Committee, U.S. Water Resources Council (1976). The guidelines allow for several options, of which the following were used in the computations: (1) Only the maximum flood peak in each water year was considered; (2) the skew coefficients used were the generalized values obtained from the skew map in U.S. Water Resources Council Bulletin 17 (1976); (3) the 100-year floods were not adjusted for expected probability; and (4) where appropriate, historic flood information was used to adjust the frequency curve.

U.S. Water Resources Council Bulletin 17 warns users of flood-frequency data to be aware that such data are only estimates from the population curves based on log Pearson Type III frequency relationship and are not exact representations. The streamflow records on which these estimates are based are only a sampling; how well the sampling will represent the total flood experience (past, present, and future) depends upon the number of years of record and representiveness of the recorded flood peaks.

The guidelines are applicable only to naturally flowing, unregulated streams. Computations for regulated streams (those receiving regulated flow from more than 20 percent of the drainage area) were based on observed station skew rather than generalized skew. Frequency relationships of regulated streams were computed only for those stations having a minimum of 25 years of record subsequent to start of regulation. Changes in operational patterns can change flood-frequency relationships downstream.

### REFERENCES CITED

Hudson River Basin Study Group, 1976, Amended plan of study, Hudson River basin water and related land resources study: New York State Department of Environmental Conservation, 39 p., 2 appendices.

U.S. Water Resources Council, Hydrology Committee, 1976, Guidelines for determining flood flow frequency: U.S. Water Resources Council, Bull. 17, 35 p., 14 appendices.

Table 1. Discharge, gage height, and elevation of  
100-year floods in the Hudson River basin

NOTES

Station number: The station number is a unique number assigned by the U.S. Geological Survey to each data-collection station. These numbers are assigned in ascending order in the downstream direction. All stations on a tributary entering a main stream upstream from a mainstream station have lower numbers than the main-stream station. Stations on a tributary that enters between two main-stream stations have a number between those of the two stations.

County Codes: County codes are the numeric codes of the Federal Information Processing Standards (FIPS)

| <u>Number</u> | <u>New York<br/>County</u> | <u>Number</u> | <u>New York<br/>County</u> | <u>Number</u> | <u>Adjacent-State<br/>County</u> |
|---------------|----------------------------|---------------|----------------------------|---------------|----------------------------------|
| 001           | Albany                     | 083           | Rensselaer                 | MA003         | Berkshire, Mass.                 |
| 021           | Columbia                   | 087           | Rockland                   | NJ037         | Sussex, N.J.                     |
| 027           | Dutchess                   | 091           | Saratoga                   | VT003         | Bennington, Vt.                  |
| 031           | Essex                      | 093           | Schenectady                |               |                                  |
| 035           | Fulton                     | 095           | Schoharie                  |               |                                  |
| 039           | Greene                     | 105           | Sullivan                   |               |                                  |
| 041           | Hamilton                   | 111           | Ulster                     |               |                                  |
| 043           | Herkimer                   | 113           | Warren                     |               |                                  |
| 057           | Montgomery                 | 115           | Washington                 |               |                                  |
| 065           | Oneida                     | 119           | Westchester                |               |                                  |
| 071           | Orange                     |               |                            |               |                                  |

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Period of record: Periods of record are the water years (October 1 to September 30), designated by the calendar years in which they end, that were used in computation of the 100-year flood discharge. Periods of record that include a break of 1 or more years are indicated by the asterisk in the period-of-record column.

Crest-stage gages: Data from crest-stage gages (stations at which only the peak stage is recorded between inspections) used in computation of the 100-year flood discharge are indicated by the letter P in the period-of-record column.

Regulation: Stations at which flow regulation can significantly affect flood levels are indicated by letter R in the 100-year flood-discharge column.

Gage height of the 100-year flood: The gage height (water-surface elevation above some arbitrary gage datum) of the 100-year flood was determined from the latest available stage/discharge rating curve. At many of the stations, the discharge of the 100-year flood would be greater than any measured discharge; therefore, an extension of the rating curve was required. Stations for which these extensions were not practical are indicated by a double asterisk (\*\*) in the gage-height column.

Elevation of the 100-year flood: The elevation of the 100-year flood is the flood level, in feet above mean sea level, determined from the computed gage height and the datum (base elevation) of the gage. Stations for which 100-year flood elevations were not computed because the datum was not available are indicated by the symbol ++ in the elevation column.

(Continued on next page)

Table 1.--Discharge, gage height, and elevation of 100-year floods in the Hudson River basin.

| Station number | Station name   | Latitude | Longitude | County | Drainage area (mi <sup>2</sup> ) | Period of record | 100 Year Flood                 |                  |                                     |
|----------------|--|----------|-----------|--------|----------------------------------|------------------|--------------------------------|------------------|-------------------------------------|
|                |  |          |           |        |                                  |                  | Discharge (ft <sup>3</sup> /s) | Gage height (ft) | Elevation (ft above mean sea level) |
| 01312000       | Hudson River below Newcomb                           | 43 58 1  | 74 07 48  | 051    | 192                              | 1926-75          | 7700                           | 12.5             | 1562.7                              |
| 01313500       | Cedar River below Chain Lakes near Indian Lake       | 43 51 20 | 74 14 20  | 041    | 199                              | 1931-61          | 9200                           | 13.7             | 1553.7                              |
| 01314000       | Hudson River at Gooley near Indian Lake              | 43 49 55 | 74 11 45  | 011    | 119                              | 1917-68          | 16000                          | **               | --                                  |
| 01315000       | Indian River near Indian Lake                        | 43 45 30 | 74 16 55  | 041    | 132                              | 1917-75          | 83400                          | 7.7              | 1611.9                              |
| 01315500       | Hudson River at North Creek                          | 43 12 03 | 73 59 02  | 113    | 92                               | 1908-75          | R20000                         | 12.5             | 1000.0                              |
| 01317000       | Schroon River at Riverbank                           | 43 36 34 | 73 14 17  | 115    | 527                              | 1908-70          | R11000                         | 14.3             | 713.6                               |
| 01318000       | Hudson River at Thurman                              | 43 28 47 | 73 49 30  | 113    | 1533                             | 1908-20          | 37000                          | **               | --                                  |
| 01318500       | Hudson River at Hadley                               | 43 19 08 | 73 50 41  | 091    | 1664                             | 1922-75          | 42000                          | 26.9             | 584.9                               |
| 01319000       | East Branch Sacandaga River at Griffin               | 43 28 12 | 74 13 12  | 041    | 114                              | 1934-75          | 11000                          | 14.4             | 1268.7                              |
| 01319800       | West Branch Sacandaga River at Arietta               | 43 15 03 | 74 31 06  | 041    | 28.9                             | P1963-75         | 3400                           | **               | --                                  |
| 01319950       | Sand Lake Outlet near Pisece                         | 43 22 15 | 74 32 47  | 041    | 7.16                             | P1962-75         | 400                            | 4.2              | 1691.6                              |
| 01321000       | Sacandaga River near Hope                            | 43 21 00 | 74 16 12  | 011    | 191                              | 1912-75          | 32000                          | 10.7             | 802.0                               |
| 01325000       | Sacandaga River near Hadley                          | 43 18 41 | 73 52 04  | 091    | 1055                             | 1908-20          | 35000                          | **               | --                                  |
| 01328000       | bond Creek at Dunham Basin                           | 43 18 36 | 73 33 00  | 115    | 14.7                             | 1948-75*         | 1700                           | 9.1              | 149.4                               |
| 01328900       | Fanner Brook near Sunderland, Vt.                    | 43 07 52 | 73 05 42  | VT003  | 2.60                             | P1964-74         | 130                            | **               | --                                  |
| 01329000       | Batten Kill at Arlington, Vt.                        | 43 04 38 | 73 09 22  | VT003  | 152                              | 1929-75          | 9500                           | 11.2             | 608.0                               |
| 01329500       | Batten Kill at Battenville                           | 43 00 00 | 73 25 48  | 115    | 394                              | 1923-68          | 21000                          | 17.7             | 368.8                               |
| 01330000       | Cloweege Creek at West Milton                        | 43 01 48 | 73 55 48  | 091    | 26.0                             | 1949-63          | 2700                           | 7.9              | 415.5                               |
| 01330500       | Kaydrosseras Creek near West Milton                  | 43 02 24 | 73 51 36  | 091    | 90.1                             | 1927-75          | 4400                           | 10.4             | 368.5                               |
| 01331400       | Drv Brook near Adams, Ma.                            | 42 35 20 | 73 06 48  | MA003  | 7.53                             | 1963-75          | 1200                           | 5.8              | **                                  |
| 01331500       | Hoosic River at Adams, Ma.                           | 42 36 37 | 73 07 32  | MA003  | 46.3                             | 1932-75          | 4200                           | 9.1              | 837.1                               |
| 01332000       | North Branch Hoosic River at North Adams, Ma.        | 42 42 00 | 73 05 24  | MA003  | 39.0                             | 1932-75          | 11000                          | 13.0             | 833.5                               |
| 01332500       | Hoosic River near Williamstown, Ma.                  | 42 42 21 | 73 10 50  | MA003  | 132                              | 1941-75          | 14000                          | 14.2             | **                                  |
| 01333000       | Green River at Williamstown, Ma.                     | 42 41 32 | 73 11 50  | MA003  | 42.6                             | 1950-75          | 5400                           | 6.2              | **                                  |
| 01333500       | Little Hoosic River at Petersburg                    | 42 45 36 | 73 20 24  | 083    | 56.1                             | 1952-75          | 8200                           | 11.4             | 598.8                               |
| 01333800       | South Stream near Bennington, Vt.                    | 42 49 53 | 73 10 04  | VT003  | 7.70                             | P1963-74         | 200                            | **               | --                                  |
| 01333900       | Paran Creek near South Shaftsbury, Vt.               | 42 58 13 | 73 11 19  | VT003  | 2.38                             | P1964-75         | 340                            | 17               | **                                  |
| 01334000       | Wallonsac River near North Bennington, Vt.           | 42 54 47 | 73 15 25  | VT003  | 111                              | 1932-75          | 11000                          | 13.0             | **                                  |
| 01334500       | Hoosic River near Eagle Bridge                       | 42 56 24 | 73 22 48  | 083    | 510                              | 1911-75          | 43000                          | 18.8             | 374.2                               |
| 01336000       | Mohawk River below Belle Dam, near Fome              | 43 15 52 | 73 26 12  | 065    | 150                              | 1928-75          | R8600                          | 11.5             | 485.5                               |
| 01342800       | West Canada Creek at Nobleboro                       | 43 23 47 | 74 51 34  | 043    | 192                              | 1958-75          | 14300                          | 11.4             | 1400.6                              |
| 01346000       | West Canada Creek at East Bridge                     | 43 04 08 | 74 59 26  | 043    | 556                              | 1921-75          | R19000                         | 7.8              | 446.8                               |
| 01347000       | Mchawk River at Little Falls                         | 43 00 52 | 74 46 45  | 043    | 1348                             | 1928-75          | R28000                         | 19.0             | 327.8                               |
| 01347500       | East Canada Creek at Dolgeville                      | 43 06 04 | 74 46 13  | 043    | 261                              | 1899-46          | 16000                          | 14.3             | 764.3                               |
| 01348000       | East Canada Creek at East Creek                      | 43 01 12 | 74 44 24  | 043    | 291                              | 1946-75          | 18000                          | 8.4              | 344.1                               |
| 01349000       | Otsuago Creek at Fort Plain                          | 42 55 48 | 74 37 48  | 057    | 59.2                             | 1959-75          | 15000                          | 11.4             | 314.6                               |
| 01350000       | Schoharie Creek at Prattsville                       | 42 19 12 | 74 26 24  | 039    | 236                              | 1908-75*         | 74000                          | **               | --                                  |
| 01351000       | Fox Creek at West Berne                              | 42 37 42 | 74 11 08  | 001    | 73.0                             | 1924-68*         | 7200                           | 9.0              | 921.5                               |
| 01351500       | Schoharie Creek at Burtonsville                      | 42 48 00 | 74 15 48  | 057    | 883                              | 1940-75          | R43000                         | 8.8              | 516.8                               |
| 01354300       | Plotter Kill at Rynex Corners                        | 42 49 16 | 74 04 20  | 093    | 3.70                             | P1958-74*        | 820                            | 7.7              | **                                  |
| 01357500       | Mohawk River at Cohoes                               | 42 47 07 | 73 42 29  | 001    | 3456                             | 1918-75          | R160000                        | 23.6             | 73.5                                |
| 01358000       | Hudson River at Green Island                         | 42 45 08 | 73 41 22  | 001    | 8090                             | 1946-75          | R220000                        | 29.8             | 30.1                                |
| 01358500       | Poesten Kill near Troy                               | 42 43 48 | 73 37 48  | 083    | 89.4                             | 1924-68          | 11000                          | 12.6             | 334.1                               |
| 01359750       | Moordener Kill at Castleton-on Hudson                | 42 32 02 | 73 44 15  | 083    | 32.6                             | 1958-75          | 1900                           | 4.1              | 102.8                               |
| 01361000       | Kinderhook Creek at Rossman                          | 42 19 48 | 73 44 24  | 021    | 329                              | 1929-68          | 29000                          | 19.3             | 45.1                                |
| 01361200       | Claverack Creek at Claverack                         | 42 12 54 | 73 43 46  | 041    | 60.6                             | 1961-68          | 7200                           | **               | --                                  |
| 01361500       | Catskill Creek at Oak Hill                           | 42 21 00 | 74 09 00  | 051    | 98                               | 1911-75          | 16000                          | **               | --                                  |
| 01362100       | Roeliff Jansen Kill near Hill Dale                   | 42 09 13 | 73 31 19  | 021    | 27.5                             | 1958-75          | 3900                           | 11               | **                                  |
| 01362198       | Esonus Creek at Shundaken                            | 42 06 59 | 74 23 20  | 111    | 59.5                             | 1964-75          | 20000                          | **               | --                                  |
| 01362500       | Esonus Creek at Coldbrook                            | 42 00 51 | 74 16 16  | 111    | 192                              | 1932-75          | 82000                          | **               | --                                  |
| 01365000       | Rondout Creek near Lowes Corners                     | 41 52 12 | 74 39 24  | 105    | 38.5                             | 1937-75          | 11000                          | **               | --                                  |
| 01365500       | Chestnut Creek at Grahamsville                       | 41 50 24 | 74 32 24  | 105    | 20.9                             | 1939-75          | 8400                           | 5.7              | 886.7                               |
| 01366500       | Rondout Creek near Lackawanna                        | 41 46 32 | 74 23 09  | 111    | 100                              | 1937-50          | 27000                          | 15.5             | **                                  |
| 01366650       | Sandburg Creek at Ellenville                         | 41 42 54 | 74 33 21  | 111    | 56.7                             | 195-75           | 9100                           | 11.0             | 314.2                               |
| 01367500       | Rondout Creek at Rosevale                            | 41 50 24 | 74 05 24  | 111    | 346                              | 1928-50          | 32000                          | **               | --                                  |
| 01368000       | Walkkill River near Unionville                       | 41 15 36 | 74 53 00  | VT037  | 140                              | 1938-75          | 5700                           | **               | --                                  |
| 01368500       | Rutgers Creek at Gardnerville                        | 41 29 24 | 74 29 21  | 071    | 59.7                             | 1944-68          | 7800                           | 12.0             | 416.5                               |
| 01369000       | Pochuck Creek near Pine Island                       | 41 16 12 | 74 28 12  | 071    | 98.0                             | 1938-75          | 3900                           | 9.4              | 391.8                               |
| 01369500       | Quaker Creek at Florida                              | 41 20 24 | 74 21 36  | 071    | 9.74                             | 1938-75          | 1400                           | 7.0              | 397.0                               |
| 01370000       | Walkkill River at Pellets Island Mountain            | 41 22 48 | 74 24 36  | 071    | 385                              | 1926-68          | 12000                          | 24.5             | 381.9                               |
| 01370500       | Walkkill River near Hillsburg                        | 41 26 00 | 74 22 20  | 071    | 419                              | 1937-59          | 11000                          | 12.4             | 365.0                               |
| 01371000       | Shawangunk Kill at Pine Bush                         | 41 37 12 | 74 17 21  | 071    | 192                              | 1924-75*         | 16000                          | 18.1             | 323.1                               |
| 01371500       | Walkkill River at Gardiner                           | 41 41 24 | 74 19 12  | 071    | 711                              | 1925-75*         | 31000                          | 18.5             | 204.2                               |
| 01372040       | Crum Elbow Creek at Hyde Park                        | 41 47 24 | 73 55 53  | 027    | 18.6                             | 1960-62          | 940                            | **               | --                                  |
| 01372200       | Wappinger Creek near Clinton Corners                 | 41 48 57 | 73 45 50  | 027    | 92.4                             | 1956-75          | 8200                           | 16.0             | 250.1                               |
| 01372300       | Little Wappinger Creek at Salt Point                 | 41 48 24 | 73 47 38  | 027    | 52.0                             | 1956-75          | 2500                           | 8.4              | **                                  |
| 01372500       | Wappinger Creek near Wappingers Falls                | 41 39 0  | 73 52 12  | 027    | 182                              | 1929-75          | 20000                          | 20.4             | 134.8                               |
| 01372800       | Fishkill Creek at Hopesell Junction                  | 41 34 22 | 73 48 25  | 027    | 57.7                             | 1964-75          | 4600                           | 10.4             | 239.9                               |
| 01373500       | Fishkill Creek at Beacon                             | 41 30 36 | 73 57 00  | 027    | 186                              | 1945-68          | 13000                          | 15.0             | 146.2                               |
| 01374460       | South Branch Minisceonge Creek at Letchworth Village | 41 12 15 | 73 01 54  | 067    | 5.83                             | P1960-75         | 610                            | **               | --                                  |
| 01376500       | Saw Mill River at Yonkers                            | 40 56 11 | 73 53 12  | 119    | 25.6                             | 1945-75          | 1100                           | 7.6              | 98.6                                |