

# Preliminary Stage and Streamflow Data at Selected U.S. Geological Survey Streamgages in New England for the Floods of April 2019

The combination of rainfall and snowmelt in northern New England and rainfall in southern New England resulted in minor to major flooding from April 15 to 24, 2019, according to stage and streamflow data collected at 63 selected U.S. Geological Survey (USGS) streamgages. A typical USGS streamgage measures and records stream stage and estimates streamflow based on a relation (rating curve) of discrete measurements of streamflow and the recorded stage. USGS hydrographers were deployed during and after these storms to measure the streamflow of the flooded rivers and confirm streamgage rating curves.

Atmospheric Administration

Smith, USGS

Photograph by Brianna



Photograph of an ice jam on the Aroostook River at Washburn, Maine, U.S. Geological Survey streamgage (station 01017000) on April 19, 2019.



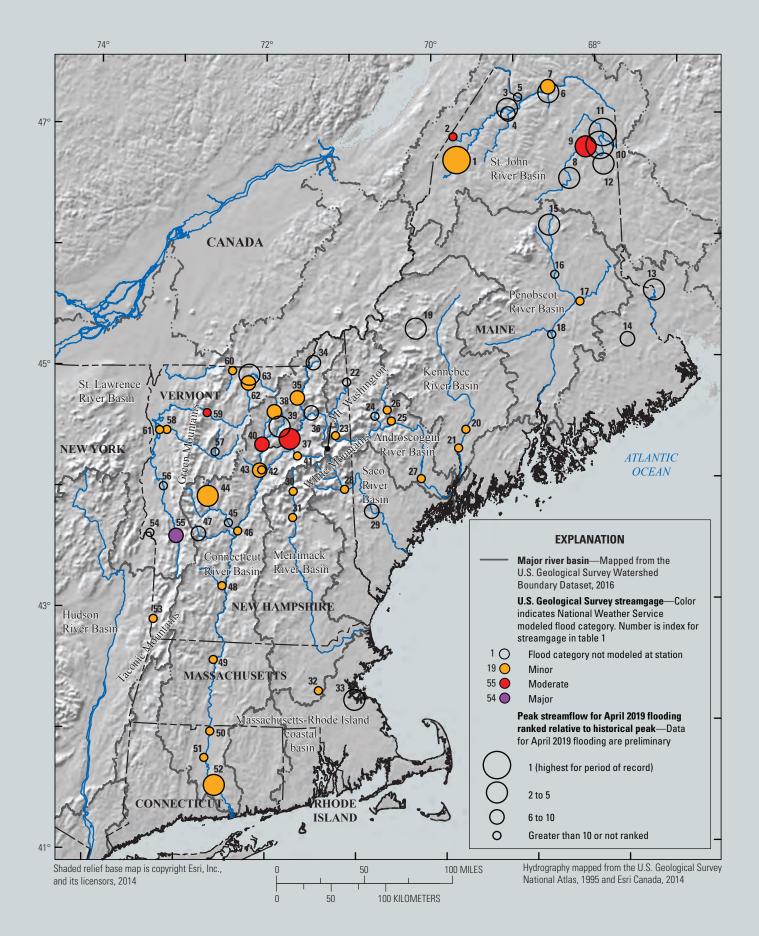
Photograph of U.S. Geological Survey (USGS) hydrographer using an acoustic Doppler current profiler to measure streamflow from a bridge at the Fish River near Fort Kent, Maine, U.S. Geological Survey streamgage (station 01013500), on April 23, 2019.

## Preliminary Data Indicate..

- The National Weather Service flood stage was reached at 36 USGS streamgages selected for monitoring; the minor flood stage category was reached at 30 streamgages, moderate flood stage category at 5 streamgages, and major flood stage category at 1 streamgage.
- Peak streamflows for the period of record occurred at three streamgages in Maine. Of these, the peak at the St. John River at Ninemile Bridge, Maine streamgage was the highest in its 67-year period of record.
- A total of 30 streamgages—15 streamgages in Maine, 9 in Vermont, 4 in New Hampshire, and 1 each in Connecticut and Massachusetts—recorded peak streamflows within the top 10 for their period of record. Two of these streamgages, the Clyde River at Newport, Vermont and the Saco River at Cornish, Maine, have periods of record greater than 100 years.
- In total, USGS hydrographers made more than 210 streamflow measurements during the April 15–24 floods in New England.

## **Study Area**

In total, 63 streamgages were selected for this report to provide context for the April 15-24 flooding. The 63 selected streamgages in New England (fig. 1) are adjacent to the Atlantic Ocean in the New England Upland, White Mountain, Green Mountain, and Taconic physiographic provinces (Olcott, 1995). Land-surface elevations of the gaged watersheds range from at mean sea level for many of the watersheds to more than 6,200 feet above mean sea level at Mount Washington in New Hampshire. Average annual precipitation in the area is in the 40- to 50-inch range, with averages greater than 50 inches in the higher elevations of the White Mountains.



**Figure 1.** Map showing locations of selected U.S. Geological Survey streamgages in New England that reached a National Weather Servicedesignated flood stage category (if available) and the rank of the preliminary peak streamflow relative to the annual peak streamflows for the period of record at each streamgage.

#### **Timeline for the Storms**

Flooding resulting from rainfall combined with snowmelt in northern New England and rainfall in southern New England occurred on numerous rivers in New England from April 15 to 24. On April 14 and 15, a low-pressure system moved through New England and produced widespread rainfall of 0.5 to 1.5 inches regionally with estimates of more than 2 inches of water-equivalent from snowmelt in northern New England (National Oceanic and Atmospheric Administration, 2019a). A second low-pressure system moved through New England on April 20-21, producing up to 2 inches of precipitation regionally (and 3.9 to 9.8 inches of snowmelt in northern New England (National Oceanic and Atmospheric Administration, 2019a). The additional rainfall and associated runoff from snowmelt caused substantial damage to infrastructure and road closures throughout northern New England. In Vermont, officials have stated that the floods caused at least \$2 million in damages to public infrastructure (Leighton, 2019). Road closures in Maine's Aroostook County were so numerous that emergency management officials activated the county's Emergency Operations Center (Whitney McKay, Maine Emergency Management Agency, written commun., April 26, 2019).

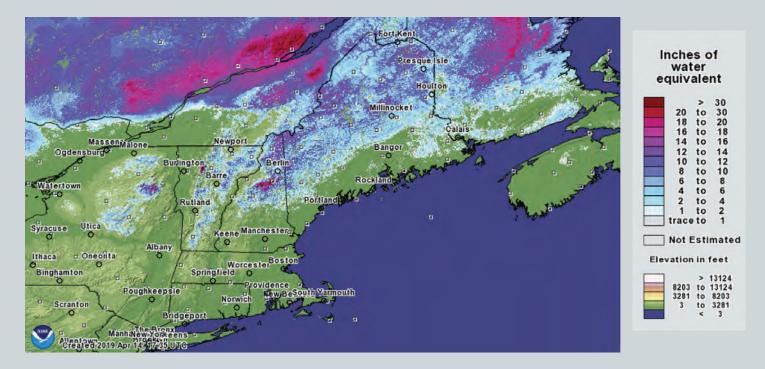
#### **Flood Monitoring**

The U.S. Geological Survey (USGS), in cooperation with Federal, State, and local agencies, collects water resources data at streamgages in New England each year. These data are valuable for developing an improved understanding of the water resources of the United States. To make these data readily available to interested parties outside the USGS, preliminary stage and streamflow data at continuous record streamgages are available in near real-time through the USGS National Water Information System (NWIS; U.S. Geological Survey, 2019). Preliminary data are provisional and subject to revision until they have been fully reviewed and received final approval. Final streamflow data are published in NWIS following further analysis of the hydraulic characteristics and the stability of those characteristics at each streamgage. Streamflow data are summarized annually by water year, which is the 12-month period October 1 through September 30 (designated by the calendar year in which it ends).

#### **General Weather Conditions**

The accumulated snow cover was a considerable further factor in the flooding from April 15 to 24. Modeled snow-water equivalent for April 14 was estimated to be more than 20 inches of water in parts of the Green and White Mountains (fig. 2).

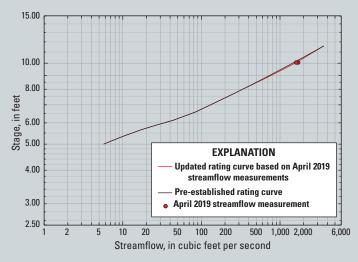
The low-pressure system that passed through New England on April 14 and 15 produced snowmelt estimates of up to 3-inches of water equivalent, based on 48-hour modeled snowmelt (National Oceanic and Atmospheric Administration, 2019b). The second low-pressure system that moved through the area on April 20 produced precipitation totals of 0.25 to 2 inches over most of New England with additional snowmelt. At the high elevations of the White Mountains in northern New Hampshire and in western Maine, modeled snowmelt totals of 3.9 to 9.8 inches were estimated for April 20 and 21 (National Oceanic and Atmospheric Administration, 2019b).

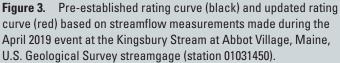


**Figure 2.** Screenshot showing the National Weather Service modeled snow-water equivalent for April 14, 2019; from National Oceanic and Atmospheric Administration (2019a).

### Methods Used To Collect Streamflow Data

The USGS currently [2019] operates 411 real-time streamgages in New England to characterize hydrologic conditions. A typical USGS streamgage measures and records stream stage at 5- to 15 minute intervals using established techniques (Rantz and others, 1982; Turnipseed and Sauer, 2010) and estimates streamflow based on a relation of discrete measurements of streamflow and the recorded stage. This stage-to-streamflow relation is referred to as the rating curve (fig. 3). The USGS routinely collects discrete measurements of streamflow (fig. 4) using established techniques (Rantz and others, 1982; Turnipseed and Sauer, 2010; Mueller and others, 2009). To continually confirm a rating curve, streamflow measurements are made over the range of observed hydrologic conditions at a streamgage each year.





#### Floods of April 15–24, 2019

During the April 15–24 floods, USGS hydrographers made more than 210 streamflow measurements in New England to verify, update, or extend existing rating curves. Flooding on April 15-17 generally affected northern New England, including parts of northwestern Maine, southwestern to northern Vermont, and the mainstem of the Connecticut River from central New Hampshire to southern Connecticut. As waters rose in northern New Hampshire and Maine, ice jams formed at three USGS streamgages. An ice jam on the St. John River at the St. John River at Ninemile Bridge, Maine streamgage caused the river stage to reach the National Weather Service (NWS) flood stage, whereas the peak stage associated with an ice jam on the Diamond River near Wentworth Location, New Hampshire, was the highest recorded in the 76-year period of record for the streamgage (table 1). Ten streamgages in New England reached the NWS minor to major flood category during this series of storms. Six of the 10 streamgages experiencing minor to major

flooding were in the Connecticut, Hudson, and Saint Lawrence Rivers Basins in Vermont (table 1). Minor flooding was experienced along the Connecticut River in West Lebanon, N.H., Montague City, Massachusetts, and Thompsonville, Hartford, and Middle Haddam, Connecticut.

Flooding on April 20–24 was widespread throughout New England based on peak streamflows at 48 streamgages (table 1). Twenty-six streamgages reached a minor to moderate NWS flood stage category in the St. John, Penobscot, Kennebec, Androscoggin, Saco, Merrimack, Connecticut, and St. Lawrence Rivers Basins (table 1).

To gain a historical perspective on the relative magnitude of the flood, peak streamflows at the 63 selected streamgages were ranked against previously recorded peaks of record (fig. 1; table 1). Forty-six of the 63 selected streamgages have more than 50 years of streamflow record, and 21 of these 46 longterm streamgages recorded preliminary streamflow peaks rank within the top 10 for their periods of record. Several of these rivers had historic streamflows during this flood. For example, the streamgage on the St. John River at Ninemile Bridge, Maine, recorded the largest streamflow in the 67 years of record, the Clyde River at Newport, Vermont streamgage recorded the fourth largest streamflow in the 101 years of record, and the St. Croix River at Vanceboro, Maine streamgage recorded the largest streamflow since 1984 and third largest in the 89 years of record (fig. 5; table 1).



**Figure 4.** Photograph of U.S. Geological Survey (USGS) hydrographer using an acoustic Doppler current profiler to measure streamflow at the Ottauquechee River near West Bridgewater, Vermont, USGS streamgage (station 01150900) on April 18, 2019. Photograph by Richard Kiah, USGS.

Rank         Number of water years         Nater year           1         67         1974           NA         36         1987           4         71         2008           5         93         2008           6         91         2008           6         91         2008           6         91         2008           6         91         2008           6         91         2008           13         65         2008           6         91         2008           13         65         2008           13         65         2008           14         9         2014           13         115         1923           14         116         1923           15         115         1923           16         105         1923           17         32         1987           18         115         1923           1936         115         1923           1937         1936         1936           21         89         1936           21         94         1936						Pr	eliminary	peaks for Ap	Preliminary peaks for April 15–24, 2019		Historical	(period o	Historical (period of record) peak
Sintent         Sintent <t< th=""><th>Mon</th><th></th><th></th><th></th><th></th><th>Peak s</th><th>tage</th><th>Pe</th><th>ak streamflow</th><th></th><th></th><th></th><th></th></t<>	Mon					Peak s	tage	Pe	ak streamflow				
St. Join Rise Statistics         Join Join Rise Statistics         Join Join Rise Statistics         Join Rise Statistics         Join Join Rise Statistics         Join Rise Rise Rise Rise Rise Rise Rise Rise	num- ber	_	Station name	Drainage area (mi <sup>2</sup> )	NWS flood stage (ft)	Date	Stage (ft)	Date	Streamflow (ft³/s)	Rank <sup>a</sup>	Number of water years	Water year	Streamflow (ft³/s)
010000         Stand Reserve Dave Min. Min.         1:41         1:00         4:20:01         4:70:01         1:7				St. John	River Basir								
001000         Bala River near Aligesh, Maine         17         100         201 $305$ $3$	_	01010000	St. John River at Ninemile Bridge, Maine	1,341	15.00		19.10 <sup>b</sup>	4/22/2019	47,700	1	67	1974	44,400
001000         Nilh Bire ar Dise, Maine         266         50         432,010         55,000         45,000	7	01010070	Big Black River near Depot Mtn, Maine	171	12.00	4/21/2019	$14.03^{b}$	NA	NA	NA	36	1987	8,680
	3	01010500	St. John River at Dickey, Maine	2,680	25.00	4/15/2019	20.55 <sup>b</sup>	4/23/2019	85,900	4	71	2008	104,000
0101500         St. Fransis Riven and Founds, Maine         533         IA         423:2019         133         423:2019         133         423:2019         133         433         001          0101300         St. Honk Reven and Founds, Maine         533         110         423:2019         133         423:2019         133         433	4	01011000	Allagash River near Allagash, Maine	1,478	15.00	4/23/2019	11.91	4/23/2019	26,400	~	86	2008	40,900
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5	01011500	St. Francis River near Connors, New Brunswick	524	NA	4/24/2019	11.52	4/24/2019	9,850	13	65	2008	18,700
0101000         S1. Only Store Weights, friend Kant, Maine         520         235         422.2019         513         413         422.2019         513         513         6         52.201         513         513         6         52.201         513         6         2000         5	9	01013500	Fish River near Fort Kent, Maine	873	11.00	4/23/2019	10.94	4/23/2019	13,700	5	93	2008	18,300
	7	01014000	St. John River below Fish R, nr Fort Kent, Maine	5,929	22.50	4/23/2019	23.39	4/23/2019	137,000	9	91	2008	183,000
	~	01015800	Aroostook River near Masardis, Maine	892	17.00	4/22/2019	16.22	4/22/2019	21,900	4	60	2008	29,500
	6	01017000	Aroostook River at Washburn, Maine	1,654	14.00	4/20/2019	19.66	4/22/2019	40,900	5	87	2008	49,500
	10	01017060	Hardwood Brook below Glidden Brk nr Caribou. Maine	5.7	NA	4/20/2019	4.89	4/20/2019	544		6	2010	506
	11	01017290	Little Madawaska River at Caribou. Maine	234	NA	4/22/2019	10.14	4/22/2019	7.050	-	6	2012	5.940
St. Crick River Basin         St. Crick River Basin         St. Crick River Basin         St. Crick River Basin         St. A 232/2019         Kies         St. B 2020         St. B 20200	12	01017550	Williams Brook at Phair Maine	3 82	NA	4/20/2019	4 96	4/20/2019	189	"	18	2014	364
				St. Croix	River Basi								
	13	01018500	St Croix River at Vancehoro Maine	413	NA		11 05	4/23/2019	6 630	c	89	1984	6 730
Penobscet River Basin         Penobscet River River River River River River River River Riser         Penobscet River River River River River River River Riser         Penobscet River River River River River River River Riser         Penopscet River Ri	14	01019000	Grand Lake Stream at Grand Lake Stream. Maine	228.3	NA	4/23/2019	5.51	4/23/2019	2.080	10	89	2005	3.990
				Penohsco	River Bas	.5							
0103950         East Branch Penobscot River at Grindstone, Maine         837         13.00         4722010         17.10         17.00         16         99         1923           01030500         Matavamiceag River near Matawamicea, Maine $(442)$ $13.50$ $4722010$ $15.78$ $4722010$ $25.90$ $23.90$ $13$ $112$ $292$ 0103450         Penobscot River at West Enfeld, Maine $93$ $NA$ $4222010$ $55.79$ $24.2001$ $55.700$ $24.400$ $17$ $32.90$ $34$ $100$ $17$ $32.90$ $34.00$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $34.86$ $100$ $17$ $32.90$ $32.86$ $100$ $17$ $32.90$ $129$ $100$ $100$ $100$ $100$ $100$ $100$ $100$ $100$ $100$ $100$ <td< td=""><td>15</td><td>01029200</td><td>- Seboeis River near Shin Pond. Maine</td><td>173</td><td>NA</td><td>4/22/2019</td><td>10.86</td><td>4/22/2019</td><td>4.050</td><td>4</td><td>20</td><td>2008</td><td>6.350</td></td<>	15	01029200	- Seboeis River near Shin Pond. Maine	173	NA	4/22/2019	10.86	4/22/2019	4.050	4	20	2008	6.350
	16	01029500	East Branch Penobscot River at Grindstone. Maine	837	13.00	4/22/2019	12.22	4/22/2019	21,100	16	66	1923	37,000
01034500         Fenobsoct River at West Enfield, Maine $6,422$ $18,00$ $4,22,2019$ $86,100$ $24$ $116$ $192$ Kennebse River at West Enfield, Maine $6,422$ $18,00$ $4,22,2019$ $86,100$ $24$ $116$ $923$ 1004456         Spencer Stream rear Grand Falls, Maine $123$ $17,00$ $4,22/2019$ $64,00$ $17$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $187$ $32$ $323$ $130$ $421/2019$ $417$ $175$ $421/2019$ $117$ $32$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$ $320$	17	01030500	Mattawamkeag River near Mattawamkeag, Maine	1,418	13.50	4/24/2019	15.78	4/24/2019	23,900	13	115	1923	46,600
Kennebec River Basin           01044550         Spencer Stream near Grand Falls, Maine         193         NA         4/22/2019         8,75         4/22/2019         6,350         3         18         2008           010449265         Kennebec River at North Sidney, Maine         170         4/21/2019         17,16         4/21/2019         6,4,00         17         32         193           01049326         Kennebec River at North Sidney, Maine         5513         12.00         4/21/2019         17,16         17         32         193           01055200         Diamond River near Wentworth Location, NH         135         NA         4/21/2019         14,16         NA         NA         NA           01055300         Androscogin River at Routh Maine         1,361         8.00         4/21/2019         1,11         4/21/2019         1,14         1/2         193           01055000         Swift River near Gorham, NH         1,361         8.00         4/21/2019         1,11         4/21/2019         1,11         4/21/2019         1,11         4/21/2019         1,11         4/21/2019         1,11         4/21/2019         1,13         1,120         1,936           01055000         Swift River near Roxbury, Maine         56.00         4/2	18	01034500	Penobscot River at West Enfield, Maine	6,422	18.00	4/22/2019	17.11	4/22/2019	86,100	24	116	1923	153,000
				Kennebec	River Bas	.u							
	19	01044550	Spencer Stream near Grand Falls, Maine	193	NA	4/22/2019	8.75	4/22/2019	6,350	3	18	2008	7,470
01049320         Kemebec River at Calumet Bridge at Augusta, Maine         5513         12.00 $421/2019$ 14.16         NA         NA         NA         NA         NA           1052500         Diamond River near Wentworth Location, NH         152         NA $415/2019$ 12.15 <sup>6</sup> $421/2019$ 7,490         11         76         1938           01053500         Androscoggin River near Gorham, NH         1,361         8.00 $422/2019$ 15,400         19         105         1935           01053500         Swift River near Gorham, Maine         1,361         8.00 $422/2019$ 15,400         19         105         1935           01053600         Swift River near Robury, Maine         3,563         13.00 $422/2019$ 14,700         14         125         1935           01053600         Swift River near Robury, Maine         3,563         13.00 $422/2019$ 14,700         14         125         1935           01053600         Swift River near Robury, Maine         3,563         13.00 $422/2019$ 14,700         14         125         1935           01054500         Saco River near Robury, Maine         3,563         13.00 $422/2019$ </td <td>20</td> <td>01049265</td> <td>Kennebec River at North Sidney, Maine</td> <td>5403</td> <td>17.00</td> <td>4/21/2019</td> <td>17.50</td> <td>4/21/2019</td> <td>64,400</td> <td>17</td> <td>32</td> <td>1987</td> <td>232,000</td>	20	01049265	Kennebec River at North Sidney, Maine	5403	17.00	4/21/2019	17.50	4/21/2019	64,400	17	32	1987	232,000
Androscoggin River Basin           01055500         Diamond River near Wertworth Location, NH         152         NA $415/2019$ 7,490         11         76           010554000         Androscoggin River near Gorham, NH         1,361 $8.00$ $4/21/2019$ 1,5400         19         105           01054000         Androscoggin River are Gorham, NH         1,30 $NA$ $4/21/2019$ 1,490         11         76           01054000         Satif River near Gorham, Maine         2,068         15,00 $4/21/2019$ 1,700         14         125           01055000         Swift River near Rowbury, Maine         2,068         15,00 $4/21/2019$ 4,1700         14         125           01055000         Swift River near Rowbury, Maine         2,068         15,00 $4/21/2019$ 4,1700         14         125           01056000         Saco River near Roway, NH         3,263         13.00 $4/21/2019$ 14,7100         14         125           01066000         Saco River near Conway, NH         3,85         9,00 $4/21/2019$ 10,90         10         101           01066000         Saco River near Convay, NH         1,293	21	01049320	Kennebec River at Calumet Bridge at Augusta, Maine	5513	12.00	4/21/2019	14.16	NA	NA	NA	NA	NA	NA
01052500Diamond River near Wentworth Location, NH152NA $4/15/2019$ $12.15^{h}$ $4/21/2019$ $7,490$ 117601054000Androscogin River near Gorham, NH1,361 $8.00$ $4/22/2019$ $8.83$ $4/22/2019$ $15,400$ $19$ $105$ 01054300Ellis River at South Andover, Maine1,30 $NA$ $4/21/2019$ $17.11$ $4/21/2019$ $4,700$ $14$ $125$ 01054500Swift River near Roxbury, Maine2,068 $15.00$ $4/21/2019$ $4,1700$ $4,930$ $14$ $125$ 01055000Swift River near Roxbury, Maine $3,263$ $13.00$ $4/22/2019$ $4,1700$ $4,930$ $21$ $86$ 01055000Swift River near Roxbury, Maine $3,263$ $13.00$ $4/22/2019$ $4,9300$ $21$ $86$ 01055000Soco River near Conway, NH $385$ $9.00$ $4/21/2019$ $11,11$ $4/21/2019$ $21,700$ $31$ $94$ 01066000Saco River near Conway, MH $1,23$ $1,21/2019$ $11,13$ $4/21/2019$ $21,700$ $31$ $94$ 01056000Saco River near Convay, MH $1,23$ $1,20/2019$ $12,96$ $10,01$ $10$ $10,01$ $10,01$ $11,13$ $4/21/2019$ $21,700$ $11$ $11,01$ 01066000Saco River near Convay, NH $1,23$ $12,2019$ $12,96$ $10,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ $11,01$ <td< td=""><td></td><td></td><td></td><td>Androscogg</td><td>in River Ba</td><td>asin</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>				Androscogg	in River Ba	asin							
01054000Androscoggin River area Gorham, NH1,3618.00 $4/22/2019$ 8.83 $4/22/2019$ 15,4001910501054500Ellis River at South Andover, Maine130NA $4/21/2019$ $1/711$ $4/21/2019$ $4/330$ 153601055000Swift River near Roxbury, Maine2,068 $15.00$ $4/21/2019$ $4/300$ 438801055000Swift River near Roxbury, Maine3,263 $13.00$ $4/21/2019$ $4/20/2019$ $4/300$ 438801059000Androscoggin River near Auburn, Maine $3,263$ $13.00$ $4/21/2019$ $4/20/2019$ $4/300$ 218901059000Saco River near Conway, NH $3,263$ $13.00$ $4/21/2019$ $11.13$ $4/21/2019$ $21,700$ 319401066000Saco River near Conway, NH $1,293$ NA $4/24/2019$ $12.96$ $4/24/2019$ $21,700$ 319401066000Saco River at Cornish, Maine $1,293$ NA $4/24/2019$ $12.96$ $4/24/2019$ $21,700$ 319401066000Saco River at Cornish, Maine $1,293$ NA $4/24/2019$ $12.96$ $4/24/2019$ $21,700$ $10$ $10$ 01066000Saco River at VIVER AT WOODSTOCK, NH $193$ $9.00$ $4/21/2019$ $12,2019$ $10,700$ $10$ $10$ $10$ 01076500PeMIGEWASSET RIVER AT PLYMOUTH, NH $193$ $9.00$ $4/21/2019$ $10,60$ $10$ $10$ $10,60$ $10,61$ $10,60$ $10,61$	22	01052500	Diamond River near Wentworth Location, NH	152	NA	4/15/2019	$12.15^{b}$	4/21/2019	7,490	11	76	1998	12,800
	23	01054000	Androscoggin River near Gorham, NH	1,361	8.00	4/22/2019	8.83	4/22/2019	15,400	19	105	1923	21,900
	24	01054300	Ellis River at South Andover, Maine	130	NA	4/21/2019	17.11	4/21/2019	4,930	15	36	2003	7,830
	25	01054500	Androscoggin River at Rumford, Maine	2,068	15.00	4/21/2019	16.00	4/21/2019	41,700	14	125	1936	74,000
01059000         Androscoggin River near Auburn, Maine         3,263         13.00         4/22/2019         4/9,300         21         89           Saco River Saco         Saco River Basin         Saco River Basin         Saco River Basin         Saco River Basin         1.00         4/21/2019         1.13         4/21/2019         21,700         31         94           01066000         Saco River at Connish, Maine         1,293         NA         4/24/2019         11.13         4/21/2019         20,600         10         101           01066000         Saco River at Connish, Maine         1,293         NA         4/24/2019         12.96         4/24/2019         10         10         101           01075000         PeMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/21/2019         18,200         18,200         18,200         18,200         10         10           01075500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         18,200         18,200         18,200         18,200         18,200         18,200         18,200         10         10         10         10         10         10         10         10         10         10         10         10         10         10 <td>26</td> <td>01055000</td> <td>Swift River near Roxbury, Maine</td> <td>96.9</td> <td>7.00</td> <td>4/20/2019</td> <td>8.67</td> <td>4/20/2019</td> <td>6,810</td> <td>43</td> <td>88</td> <td>1959</td> <td>16,800</td>	26	01055000	Swift River near Roxbury, Maine	96.9	7.00	4/20/2019	8.67	4/20/2019	6,810	43	88	1959	16,800
Saco River Basin           01064500         Saco River near Conway, NH         385         9.00         4/21/2019         11.13         4/21/2019         21,700         31         94           01066000         Saco River at Cornish, Maine         1,293         NA         4/24/2019         12.96         4/24/2019         20,600         10         101           01076000         Saco River at Cornish, Maine         Merrimack River Basin         Merrimack River Basin         2         2         13.00         4/21/2019         18,200         18,200         18         73           01076500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         18,200         18         73           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         10,00         190         14         31         14	27	01059000	Androscoggin River near Auburn, Maine	3,263	13.00	4/22/2019	14.07	4/22/2019	49,300	21	89	1936	135,000
01064500         Saco River near Conway, NH         385         9.00         4/21/2019         11.13         4/21/2019         21,700         31         94           01066000         Saco River at Cornish, Maine         1,293         NA         4/24/2019         12.96         4/24/2019         20,600         10         101         101           01076000         Benifewasser River AT WOODSTOCK, NH         1,293         NA         4/24/2019         12.96         4/24/2019         20,600         10         101           01076500         PEMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/20/2019         18,200         18,200         18         73           01076500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         18,200         18         73           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         1,090         19         14         38				Saco Ri	ver Basin								
01066000         Sace River at Cornish, Maine         1,293         NA         4/24/2019         12.96         4/24/2019         20,600         10         101           01075000         PEMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/20/2019         11.30         4/20/2019         18,200         18         73           01075500         PEMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/20/2019         11.30         4/20/2019         18,200         18         73           01075500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         16,42         4/21/2019         26,200         30         114           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         1,090         14         38	28	01064500	Saco River near Conway, NH	385	9.00	4/21/2019	11.13	4/21/2019	21,700	31	94	2011	58,200
Merrimack River Basin           01075000         PEMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/20/2019         18,200         18         73           01076500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         193         9.00         4/20/2019         18,200         18         73           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         1,090         14         38	29	01066000	Saco River at Cornish, Maine	1,293	NA	4/24/2019	12.96	4/24/2019	20,600	10	101	1936	46,600
01075000         PEMIGEWASSET RIVER AT WOODSTOCK, NH         193         9.00         4/20/2019         18,200         18         73           01076500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         16,42         4/21/2019         26,200         30         114           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         1,090         14         38				Merrimach	River Bas	in							
01076500         PEMIGEWASSET RIVER AT PLYMOUTH, NH         622         13.00         4/21/2019         16.42         4/21/2019         26,200         30         114           01098530         SUDBURY RIVER AT SAXONVILLE, MA         106         10.00         4/23/2019         1,090         14         38	30	01075000	PEMIGEWASSET RIVER AT WOODSTOCK, NH	193	9.00	4/20/2019	11.30	4/20/2019	18,200	18	73	2011	53,700
01098530 SUDBURY RIVER AT SAXONVILLE, MA 106 10.00 4/23/2019 10.67 4/23/2019 1,090 14 38	31	01076500	PEMIGEWASSET RIVER AT PLYMOUTH, NH	622	13.00	4/21/2019	16.42	4/21/2019	26,200	30	114	1936	65,400
	32	01098530	SUDBURY RIVER AT SAXONVILLE, MA	106	10.00	4/23/2019	10.67	4/23/2019	1,090	14	38	2010	2,570

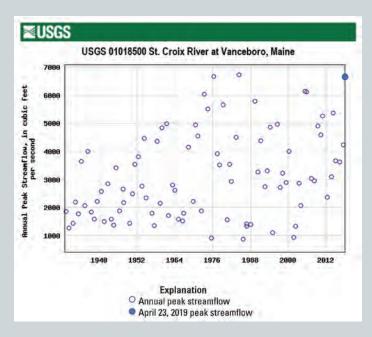
Table 1. Preliminary peak stage and streamflow data collected at select streamgages in New England for the floods of April 15–24, 2019.

Table 1. Preliminary peak stage and streamflow data collected at select streamgages in New England for the floods of April 15–24, 2019.—Continued

[Orange shading indicates streamgages where the peak stage was greater than the National Weather Service (NWS)-established flood stage; red shading indicates streamgages where the peak stage was greater than the NWS-established major flood stage. mi<sup>2</sup>, square mile; ft, foot; ft<sup>3</sup>/s, cubic foot per second; NA, not applicable; Mtn, Mountain; R, River; nr, near; Brk, Brook; NH, New Hampshire; Vt, Vermont; MA, Massachusetts; CT, Connecticut]

International multiplication multinatent multiplication multiplication multiplication mu					A	Pr	eliminary	peaks for Ap	Preliminary peaks for April 15-24, 2019		Historica	l (period of	Historical (period of record) peak
Bill         Contraction						Peak S	tage	Pei	ak Streamflow				
m.         Statuto         St	Map			Drainage	NWS						Number		
Massechneris Prindi Iand Casafi Isani         Massechneris Prindi Iand Casafi Isani         Massechneris Prindi Iand Casafi Isani           0115555         TONNETTICTI RIVER MAINR         211         Massechneris Prindi Iand Casafi Isani         212         201         213         201	-uun- ber	_	Station name	area (mi²)	stage (ft)	Date	Stage (ft)	Date	Streamflow (ft³/s)	Rank <sup>a</sup>	of water years	Water year	Streamflow (ft³/s)
0110535         TOWN BLOCK AT QUINCY MA         411         M         4222019         558         4222019         356         4222019         356         4212019         356         41119         4212019         356         41119         41111         4111			Massa	chusetts-Rhoo	le Island C	oastal Basin							
Connectical filter Basin         Connectical filter Basin           0132900         PTTSBIRG, NII           0132900         PTTSBIRG, NII           0132900         PTTSBIRG, NII           0132900         UPERAMING, NII           0132900         UPERAMING, NII           0132900         UPERAMING, NII           0132900         UPERAMING, NII           013300         EAST BANCH, TRAVIR NAR (ROVELON, NII           013300         EAST BANCH, TRAVIR NAR, MALS (ROVELON, NII           013300         EAST BANCH, TRAVIR NAR, MALS (ROVELON, NII           013300         EAST BANCH, TRAVIR NAR, MALS (ROVELON, NII           013300         MERIA (ROVEL)           01330	33	01105585	TOWN BROOK AT QUINCY, MA	4.11	NA	4/22/2019	6.50	4/22/2019	398	4	33	2013	469
013200         0FILTSBURG, MI         254         MA         420209         719         4202019         456         7         61         2011           0132900         0FNRECTUCT RELEWERT NORTH STREEMUR         79         13.0         4212019         13.6         4212019         27.00         7         61         2011           013200         UPPERAMONOSIC RAVENTRA ROVETON, MI         73.0         42.20019         23.4         42.2019         23.00         7         61         2013         23.00         8         7         10.93				Connecticu	t River Bas	sin							
0132300         0132300         0132300         0132300         0132300         013000         0144         013000         01300 </td <td></td> <td></td> <td>CONNECTICUT R BELOW INDIAN STREAM NR</td> <td></td>			CONNECTICUT R BELOW INDIAN STREAM NR										
1013000         CONNECTICUT RIVER A MONCH STATION, MI         79         31.0         4212019         33.6         4212019         33.6         73.00         7         7         1098         33           0113000         UPERA AMONOSSIC RIVER NER (ROVER), MH         23.4         4212019         13.4         7.0         47.2         47.2         9         9.9         3         9<	34	01129200	PITTSBURG, NH	254	NA	4/20/2019	7.19	4/20/2019	4,650	2	61	2011	6,550
0113000         UPER AMMONOSCIC RVER KRA (GOVETON MH         232         NA         421/2019         8.4         42/2019         8.20         8.7         1936         6           0113500         EXST RAYARY TORKYT         3.5         4.70/2019         2.3.5         4.22/2019         3.7.0         5         9.7         9.93         1	35	01129500	$\cap$	66L	13.00	4/21/2019	13.36	4/21/2019	22,700	7	87	1998	32,300
0133500         CONNECTICTI RVER NEAR IMJUN NH         [514]         170         4222019         53.4222019         53.10         5         71         7973         11           01134700         MONDORS RVER AN IMJUN NH         75.3         6.0         4202019         53.10         5         71         7973         71         717         71         7172019         71	36	01130000	UPPER AMMONOOSUC RIVER NEAR GROVETON, NH	232	NA	4/21/2019	8.48	4/21/2019	8,250	8	71	1969	24,100
013500         EXT BAACH PASSINARSIC RIVER NIAR EAST HAVEN VT         53.8         6.0         4.202019         12.0         7         9         973         1           0113500         MONDSE RIVER AT PASSINARSIC RIVER AT PASSINARSIC WITTER         55.2         N.A         4202019         1.20         7         9         1         973         973 <td>37</td> <td>01131500</td> <td>CONNECTICUT RIVER NEAR DALTON, NH</td> <td>1,514</td> <td>17.00</td> <td>4/22/2019</td> <td>22.35</td> <td>4/22/2019</td> <td>37,300</td> <td>5</td> <td>60</td> <td>1936</td> <td>48,300</td>	37	01131500	CONNECTICUT RIVER NEAR DALTON, NH	1,514	17.00	4/22/2019	22.35	4/22/2019	37,300	5	60	1936	48,300
0134500         MOOSE RIVER AT VICTORY, VI         75.2         NA         421/2019         0.55         10         973         1         1973           01135500         MMONOSUE RIVER AT BETHLEHM JUNCTON, NH         37.6         4.00         4.20         3.10         5.1         973         973         1         973         1         973         1         973         971	38	01133000	EAST BRANCH PASSUMPSIC RIVER NEAR EAST HAVEN, VT	53.8	6.50	4/20/2019	8.20	4/20/2019	2,240	8	58	1973	4,450
013550         MMONOSIC RVER AT PASIMPSIC VT MONOSIC RATE MASIMPSIC VT 013550         013550         AMONOSIC RATE MASIMPSIC VT MONOSIC RATE MASIMPSIC VT 013500         435         0125         4112010         1220         4152019         320         8         77         993         17           013550         CONNECTICUT RIVER AT WELLS RIVER, VT 013500         WELLS RIVER AT WELLS RIVER, VT MONOSOUS CONNECTICUT RIVER AT WELLS RIVER, VT 013500         330         44152019         553         4152019         550         17         1973         5           013500         WELLS RIVER AT WEST BRIDGE MARINON WH         874         600         4152019         553         4152019         553         77         1973         5           0113900         OTTOQUECHER RIVER NEAR WEST REDOCENVIER, VT 0113600         113600         171         1043         15501         5530         17         1927         137           0113600         OTTOQUECHER RIVER NEAR WEST REDOCENVIER, VT 0113600         200         17         1043         155201         55300         17         1927         137         137         137         137         137         137         137         137         137         137         137         137         137         137         137         137         137         137 <t< td=""><td>39</td><td>01134500</td><td>MOOSE RIVER AT VICTORY, VT</td><td>75.2</td><td>NA</td><td>4/21/2019</td><td>10.76</td><td>4/21/2019</td><td>3,510</td><td>5</td><td>71</td><td>1973</td><td>4,940</td></t<>	39	01134500	MOOSE RIVER AT VICTORY, VT	75.2	NA	4/21/2019	10.76	4/21/2019	3,510	5	71	1973	4,940
013750         AMONOSOUC RVIE AI BEINLIFIEM INCTION.NH         37         8         04         420         33         78         1995         1           0113500         CONNECTICTI RIVER AT WELLS RIVER, VT         2644         110         4252019         33         78         1935         5           0113900         WELLS RIVER AT WELLS RIVER, VT         305         8.00         4155019         555         4152019         530         17         1937         5           0113900         WELLS RIVER AT WELLS RIVER, VT         305         8.00         4155019         553         4152019         5500         17         1937         101           0114500         COTTAUQUECHE RIVER AT MONTAGUE CITY MA         305         8.00         4152019         5530         17         1937         101           0114500         COTTAUQUECHE RIVER AT MONTAGUE CITY MA         306         15.00         4152019         55.00         17         102         1027         12           01136500         CONNECTICT RIVER AT MONTAGUE CITY MA         366         15.00         4172019         5.60         13         0.01         102         1027         12           01136500         CONNECTICT RIVER AT MONTAGUE CITY MA         3660         15.00	40	01135500	PASSUMPSIC RIVER AT PASSUMPSIC, VT	436	14.00	4/21/2019	17.25	4/21/2019	12,200	7	90	1973	18,200
013880         CONNECTICUT RIVER AT WELLS RIVER, VT         2644         110         423,2019         12.7         422,2019         41,100         15         68         1973         5           0113900         WELLS RIVER AT WEST HARTPORT, VT         393         80         41/52019         53.00         17         102         1277         197 <td>41</td> <td>01137500</td> <td>AMMONOOSUC RIVER AT BETHLEHEM JUNCTION, NH</td> <td>87.6</td> <td>8.00</td> <td>4/20/2019</td> <td>8.07</td> <td>4/20/2019</td> <td>4,420</td> <td>33</td> <td>78</td> <td>1995</td> <td>11,300</td>	41	01137500	AMMONOOSUC RIVER AT BETHLEHEM JUNCTION, NH	87.6	8.00	4/20/2019	8.07	4/20/2019	4,420	33	78	1995	11,300
0113900         WELLS RIVER, AT WELLS, RIVER, VT $884$ $600$ $4152019$ $532$ $4152019$ $532$ $4152019$ $53$ $71$ $1977$ $101$ 01142500         OTHERS NOGK AT RANDOLPH, VT $305$ $800$ $4152019$ $556$ $17$ $1027$ $101$ $101$ $1027$ $101$ $1027$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $101$ $1012$ $1011250$ $10117$ $1012$ $1011250$ $1011250$ $1011250$ $1011250$ $1011250$ $1011250$ $1011250$ $1011250$ $101250$ $10112500$ $10112500$ $101112500$	42	01138500	CONNECTICUT RIVER AT WELLS RIVER, VT	2,644	11.00	4/23/2019	12.27	4/23/2019	41,100	15	68	1973	57,100
01142500         ATBR BROCK AT RANDOLPH, VT         30.5         8.00         4/15/2019         5.5         4/15/2019         5.6         9.01         7         9         2011           01144000         WITHE RIVER AT WEST HARTPORD, VT         0.01         143000         0171         0.02         12.0         17         10.2         19.27         13           01145000         OTTAUQUECHEE RIVER NEWST REDRON, MH         4002         23.0         4/15/2019         5.5, 900         17         102         19.27         13           01159500         OTTAUQUECHEE RIVER NEWST ROCKINGHAMUT         112         8.00         4/15/2019         5.6, 900         17         102         19.27         13         201         27         13         201         27         13         201         27         13         201         21         20         201         27         13         201         27         13         201         27         13         201         27         13         201         27         21         23         201         27         21         201         27         21         201         27         21         27         21         201         27         21         23         21<	43	01139000	WELLS RIVER AT WELLS RIVER, VT	98.4	6.00	4/15/2019	7.21	4/15/2019	3,320	8	<i>LT</i>	1973	5,970
0114400         WHTE RIVER AT WEST HARTFORD, VT         690         18.00         415/2019         56,900         17         102         1927         13           01130900         OTTAUQUECHER RIVER AT WEST BARDGEWATER, VT         23.4         A15/2019         55,000         17         104         1927         13           01130900         OTTAUQUECHER RIVER AT WEST BARDGEWATER, VT         23.4         A15/2019         87.9         415/2019         55.00         17         104         1927         13           01130900         OTNAUCUECHER RIVER AT MONTAGUE CITY, MA         7,860         38.0         416/2019         87.9         417/2019         51.00         65.300         17         103         2011         2           01130500         CONNECTICUT RIVER AT IMDME HADDAM, CT         10.397         10.01         7.0         424/2019         95.66         417/2019         95.00         4         7         2011         2           0139600         CONNECTICUT RIVER AT IMDME HADDAM, CT         10.397         10.417/2019         95.30         4         7         2011         2         7         2         417/2019         95.00         4         7         2011         2         2         2         215/2019         36.00         4 </td <td>44</td> <td>01142500</td> <td>AYERS BROOK AT RANDOLPH, VT</td> <td>30.5</td> <td>8.00</td> <td>4/15/2019</td> <td>9.55</td> <td>4/15/2019</td> <td>2,010</td> <td>5</td> <td>62</td> <td>2011</td> <td>3,920</td>	44	01142500	AYERS BROOK AT RANDOLPH, VT	30.5	8.00	4/15/2019	9.55	4/15/2019	2,010	5	62	2011	3,920
0114450         CONNECTICUT RIVER AT WEST LEBANON, NH         4,092         22.00         4/15/2019         65.300         17         104         1927         13           0113550         01114300         OTTAUQUECHEE RIVER NEAR WEST BRIDGEWATER, VT         2.3.4         NA         4/15/2019         8.13         4/15/2019         65.300         17         104         1927         13           01135500         OTTAUQUECHEE RIVER AT MONTAGUE CITY, MA         7.860         15.00         4/15/2019         8.13         4/15/2019         56.00         21         4         1936         23         2011           0119300         CONNECTICUT RIVER AT HADRPONVILLE, CT         0,660         15.00         4/17/2019         95.00         51         89         4/17/2019         96.700         51         89         1936         23         2011         23         21         23         2011         23         2011         23         2011         21 <td< td=""><td>45</td><td>01144000</td><td>WHITE RIVER AT WEST HARTFORD, VT</td><td>069</td><td>18.00</td><td>4/15/2019</td><td>15.66</td><td>4/15/2019</td><td>26,900</td><td>17</td><td>102</td><td>1927</td><td>120,000</td></td<>	45	01144000	WHITE RIVER AT WEST HARTFORD, VT	069	18.00	4/15/2019	15.66	4/15/2019	26,900	17	102	1927	120,000
01150900         0TTAUQUECHEE RIVER NEAR WEST BRIDGEWATER, VT         23.4         N.A         4/15/2019         15,400         6         33         2011           01155550         WILLAMS RIVER NEAR MONTAGUE CITY, MA         7,800         28.03         4/15/2019         8,16         14         1936         23         2011         21         20         2011         21         20         2011         21         20         2011         21         20         2011         21         20         2011         21         20         2011         21         20         2011         21         20         2011         21         21         21         21         21         21         21         21         21         21         21	46	01144500	CONNECTICUT RIVER AT WEST LEBANON, NH	4,092	22.00	4/15/2019	22.22	4/15/2019	65,300	17	104	1927	136,000
01153550         WILLIAMS RIVER NEAR ROCKINGHAM VT         112         8.00         4/15/2019         8.18         4/15/2019         5,060         21         30         2011         2           01170500         CONNECTICUT RIVER AT MONTAGUE CITY MA         7,860         28.00         4/16/2019         8.18         4/15/2019         5,54         4/17/2019         5,54         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         5,15         4/17/2019         1,1         1	47	01150900	OTTAUQUECHEE RIVER NEAR WEST BRIDGEWATER, VT	23.4	NA	4/15/2019	8.79	4/15/2019	1,540	9	33	2011	9,070
01170500         CONNECTICUT RIVER AT MONTAGUE CITY, MA         7,860         28.00         4/16/2019         81,700         64         114         1936         23           01190070         CONNECTICUT RIVER AT HOMPSONVILLE, CT         9,660         15.00         4/17/2019         15.54         4/17/2019         90,700         51         89         1936         28           01190070         CONNECTICUT RIVER AT HIMRTFORD, CT         10,487         16,00         4/24/2019         9.55         4/23/2019         9.56         4/23/2019         9.56         4/15/2019         9.56         4/15/2019         1.1         1         2011         12           01334000         WALLOOMSAC RIVER NEAR NORTH BENNINGTON, VT         111         7.00         4/45/2019         9.42         20         4/15/2019         9.41         7         2011         12           01334000         WALLOOMSAC RIVER NEAR NORTH BENNINGTON, VT         111         7.00         4/15/2019         9.41         4/15/2019         9.41         7         2011         12           0428000         POLE         REREK AT MIDDLE HADDAM, VT         111         7.00         4/15/2019         7.32         4/15/2019         9.42         86         2011         12         2         4/15/2019	48	01153550	WILLIAMS RIVER NEAR ROCKINGHAM VT	112	8.00	4/15/2019	8.18	4/15/2019	5,060	21	30	2011	21,300
01184000         CONNECTICUT RIVER AT THOMPSONVILLE, CT         9,660         15,00         417/2019         55.4         417/2019         90,700         51         89         1936         23           01190070         CONNECTICUT RIVER AT HARTFORD, CT         10,487         16.00         424/2019         9.55         4/23/2019         93500         4         7         2011         12           01190070         CONNECTICUT RIVER AT MIDDLE HADDAM, CT         10,487         16.00         424/2019         9.55         4/23/2019         93500         4         7         2011         12           01334000         WALLOOMSAC RIVER NEAR NORTH BENNINGTON, VT         111         7.00         4/15/2019         7.32         4/15/2019         3,430         42         86         2011         12           01334000         POULTNEY RIVER BELOW FAIR HAVEN, VT         111         7.00         4/15/2019         7.32         4/15/2019         3,430         42         7         2011         12           04285000         OTTER CREEK AT MIDDLEBURY, VT         87.0         4/15/2019         7.32         4/15/2019         9,730         1945         1         1           04285500         OTTER CREEK AT MIDDLEBURY, VT         6.23         8.00         4/15/2019	49	01170500	CONNECTICUT RIVER AT MONTAGUE CITY, MA	7,860	28.00	4/16/2019	28.52	4/16/2019	81,700	64	114	1936	236,000
01190070         CONNECTICUT RIVER AT HARTFORD, CT         10,487         16.00         4/24/2019         9.58         N.A         N.	50	01184000	CONNECTICUT RIVER AT THOMPSONVILLE, CT	9,660	15.00	4/17/2019	15.54	4/17/2019	90,700	51	89	1936	282,000
01193050         CONNECTICUT RIVER AT MIDDLE HADDAM, CT         10,897         7.00         4/23/2019         9.55         4/23/2019         9.3500         4         7         2011         12           01334000         WALLOOMSAC RIVER NEAR NORTH BENNINGTON, VT         111         7.00         4/15/2019         7.32         4/15/2019         3,430         42         86         2011         12           01334000         WALLOOMSAC RIVER NEAR NORTH BENNINGTON, VT         811         7.00         4/15/2019         7.32         4/15/2019         3,430         42         86         2011           04282000         POULTNEY RIVER BELOW FAIR HAVEN, VT         8.00         4/15/2019         12.34         4/15/2019         9,41         4/15/2019         9,41         2/17         11         1	51	01190070	CONNECTICUT RIVER AT HARTFORD, CT	10,487	16.00	4/24/2019	19.58	NA	NA	NA	NA	NA	NA
Hudson River Basin         Hudson River Basin         Hudson River Basin         Accord for the form River Basin         Accord for the Riv	52	01193050			7.00	4/24/2019	9.65	4/23/2019	93500	4	7	2011	120,000
01334000         WALLOOMSAC RIVER NAR NORTH BENNINGTON, VT         111         7.00         4/15/2019         7.32         4/15/2019         3,430         42         86         2011           0428000         POULTNEY RIVER BELOW FAIR HAVEN, VT         St. Lawrence River Basin         20.00         4/15/2019         1/5/2019         5,470         12         89         1945         1           0428000         OTTER CREEK AT CENTER RUTLAND, VT         307         8.00         4/15/2019         1/5/2019         6,720         12         89         1945         1           0428500         OTTER CREEK AT MIDDLEBURY, VT         69.2         NA         4/21/2019         7.17         4/15/2019         9,040         9         89         2011         1         1         1         1         1         1         1         1         2         1				Hudson F	liver Basin								
St. Lawrence River Basin         04280000       POULTNEY RIVER BELOW FAIR HAVEN, VT       187       20.00       4/15/2019       6,720       12       89       1945       1         04282500       OTTER CREEK AT CENTER RUTLAND, VT       307       8.00       4/15/2019       15,2019       6,720       12       89       2011       1         04282500       OTTER CREEK AT MIDDLEBURY, VT       69.2       NA       4/21/2019       5,950       16       102       1927       1         04285500       OTTER CREEK AT MIDDLEBURY, VT       69.2       NA       4/21/2019       7,17       4/15/2019       9,040       9       89       2011       1         04285500       NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT       69.2       NA       4/20/2019       13.74       4/16/2019       5,950       16       102       1927       11         04295000       MINOOSKI RIVER NEAR ESEX JUNCTION, VT       1,044       12.00       4/16/2019       13.74       4/16/2019       5,950       16       102       1995       1         04295000       MINOOSKI RIVER NEAR NORTH TROY, VT       1,044       12.00       4/16/2019       5,920       17       91       1995       1       1995       1	53	01334000	-	111	7.00	4/15/2019	7.32	4/15/2019	3,430	42	86	2011	9420
0428000       POULTNEY RIVER BELOW FAIR HAVEN, VT       187       20.00       4/15/2019       6,720       12       89       1945       1         04282000       OTTER CREEK AT CENTER RUTLAND, VT       307       8.00       4/15/2019       15,2019       6,720       12       89       1945       1         04282500       OTTER CREEK AT MIDDLEBURY, VT       628       NA       4/2/2019       7.17       4/15/2019       5,950       16       102       1927       1         04285500       NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT       69.2       NA       4/2/2019       13.74       4/15/2019       5,950       16       102       1927       1         04295500       WINDOSKI RIVER NEAR ESEX JUNCTION, VT       69.2       NA       4/20/2019       13.74       4/16/2019       29,090       45       90       1927       11         04295000       LAMOILLE RIVER AT JOHNSON, VT       1,044       12.00       4/16/2019       13.74       4/16/2019       2,900       17       91       1995       1         04292000       LAMOILLE RIVER AT JOHNSON, VT       1310       13.00       4/20/2019       10,000       45       90       1995       1       1995       1       1995       1				St. Lawrenc	e River Ba	sin							
04282000         OTTER CREEK AT CENTER RUTLAND, VT         307         8.00         4/15/2019         12.34         4/15/2019         9,040         9         89         2011         1           04282500         OTTER CREEK AT MIDDLEBURY, VT         628         NA         4/21/2019         7.17         4/21/2019         5,950         16         102         1927         1           04285500         NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT         622         NA         4/21/2019         7.17         4/21/2019         5,950         16         102         1927         1           04285500         NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT         692         NA         4/20/2019         1.71         4/21/2019         5,950         16         102         1927         1           0429500         WINOOSKI RIVER NEAR ESEX JUNCTION, VT         310         13.00         4/20/2019         14,16/2019         2,0900         45         90         1927         1           04295000         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/20/2019         14,16/2019         5,300         17         91         1995         1           0429500         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00	54	04280000	POULTNEY RIVER BELOW FAIR HAVEN, VT	187	20.00	4/15/2019	18.20	4/15/2019	6,720	12	89	1945	14,800
04282500       OTTER CREEK AT MIDDLEBURY, VT       628       NA       4/21/2019       7.17       4/21/2019       5,950       16       102       1927       1         04285500       NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT       69.2       NA       4/20/2019       4/20/2019       971       22       85       1927       1         04285500       NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT       69.2       NA       4/20/2019       13.00       4/20/2019       971       22       85       1927       1         04295000       MINOOSKI RIVER NEAR ESSEX JUNCTION, VT       310       13.00       4/20/2019       14.14       4/20/2019       971       22       85       1927       11         04292000       LAMOILLE RIVER AT JOHNSON, VT       310       13.00       4/20/2019       10.21       4/20/2019       9,300       17       91       1995       1         04295000       MISSISQUOI RIVER NEAR NORTH TROY, VT       131       9.00       4/20/2019       6,140       16       86       2002       1       1995       1         04295280       MISSISQUOI RIVER NEAR NORTH TROY, VT       131       9.00       4/20/2019       6,140       16       86       2002       1       1       <	55	04282000	OTTER CREEK AT CENTER RUTLAND, VT	307	8.00	4/15/2019	12.34	4/15/2019	9,040	6	89	2011	15,700
04285500         NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT         69.2         NA         4/20/2019         4/20/2019         971         22         85         1927         1           04290500         WINOOSKI RIVER NEAR ESSEX JUNCTION, VT         1,044         12.00         4/16/2019         13.74         4/16/2019         20,900         45         90         1927         11           04290500         LAMOILLE RIVER AT JOHNSON, VT         310         13.00         4/20/2019         14.14         4/20/2019         9,300         17         91         1995         1           04293000         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/20/2019         10.21         4/20/2019         6,140         16         86         2002         1           04294500         MISSISQUOI RIVER NEAR NORTH TROY, VT         15         8.00         4/20/2019         10.062         NA	56	04282500	OTTER CREEK AT MIDDLEBURY, VT	628	NA	4/21/2019	7.17	4/21/2019	5,950	16	102	1927	13,600
04290500         WINOOSKI RIVER NEAR ESSEX JUNCTION, VT         1,044         12.00         4/16/2019         13.74         4/16/2019         20,900         45         90         1927         11           04292000         LAMOILLE RIVER AT JOHNSON, VT         310         13.00         4/20/2019         14.14         4/20/2019         9,300         17         91         1995         1           04293000         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/20/2019         10.21         4/20/2019         6,140         16         86         2002         1           04294500         LAKE CHAMPLAIN AT BURLINGTON, VT         155         8.00         4/20/2019         10.0.62         NA         20	57	04285500	NORTH BRANCH WINOOSKI RIVER AT WRIGHTSVILLE, VT	69.2	NA	4/20/2019	4.20	4/20/2019	971	22	85	1927	$17,\!200$
04292000         LAMOILLE RIVER AT JOHNSON, VT         310         13.00         4/20/2019         14.14         4/20/2019         9,300         17         91         1995         1           04293000         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/20/2019         10.21         4/20/2019         6,140         16         86         2002         1           04294500         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/24/2019         100.16         6,140         16         86         2002         1           04294500         LAKE CHAMPLAIN AT BURLINGTON, VT         155         8.00         4/20/2019         100.62         NA         2011         2011         2012019	58	04290500	WINOOSKI RIVER NEAR ESSEX JUNCTION, VT	1,044	12.00	4/16/2019	13.74	4/16/2019	20,900	45	60	1927	113,000
04293000         MISSISQUOI RIVER NEAR NORTH TROY, VT         131         9.00         4/20/2019         10.21         4/20/2019         6,140         16         86         2002         1           04294500         LAKE CHAMPLAIN AT BURLINGTON, VT         100.00         4/24/2019         100.62         NA         2011         9:09         4/20/2019         2,900         6         7         2011         9:01         0:025019         2,990         7 <td>59</td> <td>04292000</td> <td>LAMOILLE RIVER AT JOHNSON, VT</td> <td>310</td> <td>13.00</td> <td>4/20/2019</td> <td>14.14</td> <td>4/20/2019</td> <td>9,300</td> <td>17</td> <td>91</td> <td>1995</td> <td>19,000</td>	59	04292000	LAMOILLE RIVER AT JOHNSON, VT	310	13.00	4/20/2019	14.14	4/20/2019	9,300	17	91	1995	19,000
04294500         LAKE CHAMPLAIN AT BURLINGTON, VT         100.00         4/24/2019         100.62         NA         NA <thna< th="">         NA         NA</thna<>	60	04293000	MISSISQUOI RIVER NEAR NORTH TROY, VT	131	9.00	4/20/2019	10.21	4/20/2019	6,140	16	86	2002	11,500
04296280         BARTON RIVER NEAR COVENTRY, VT         155         8.00         4/20/2019         2,500         6         7         2011           04296500         CLYDE RIVER AT NEWPORT, VT         142         NA         4/23/2019         8.81         4/23/2019         2,990         4         101         1936	61	04294500	LAKE CHAMPLAIN AT BURLINGTON, VT		100.00	4/24/2019	100.62	NA	NA	NA	NA	NA	
04296500 CLYDE RIVER AT NEWPORT, VT 142 NA 4/23/2019 8.81 4/23/2019 2,990 4 101 1936	62	04296280	BARTON RIVER NEAR COVENTRY, VT	155	8.00	4/20/2019	9.09	4/20/2019	2,500	9	7	2011	6,070
	63	04296500	CLYDE RIVER AT NEWPORT, VT	142	NA	4/23/2019	8.81	4/23/2019	2,990	4	101	1936	3,900

bIce jam.



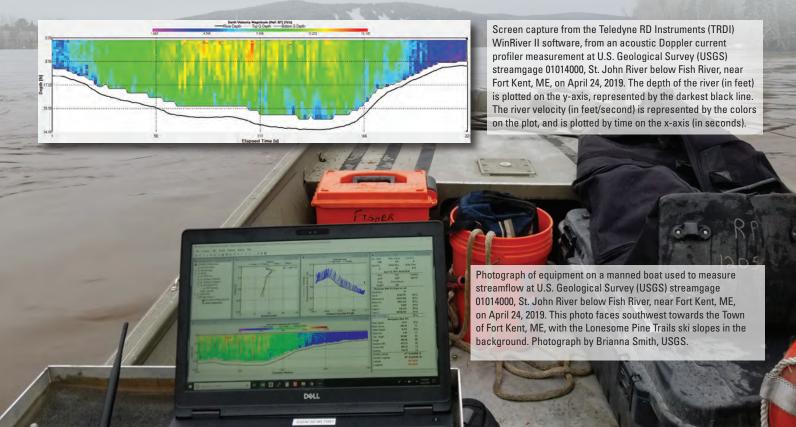
**Figure 5.** Screenshot of annual peak streamflow at the St. Croix River at Vanceboro, Maine, U.S. Geological Survey (USGS) streamgage (station 01018500) for water years 1929 to 2017 and preliminary peak streamflow for April 23, 2019, from the USGS National Water Information System (U.S. Geological Survey, 2019).

#### **Summary**

Rainfall combined with snowmelt in northern New England and rainfall in southern New England resulted in minor to major flooding from April 15 to 24, 2019. On April 15, a low- pressure system moved into New England. The resulting storm produced as much as 2.5 inches of rainfall in New England and 3 inches of snowmelt in the Green and White Mountains. A second low-pressure system passed through New England on April 20 and produced as much as 2 inches of rainfall in New England and upwards of 9.8 inches of snowmelt in the Green and White Mountains. These storms led to flooding in the St. John, St. Croix, Penobscot, Kennebec, Androscoggin, Saco, Connecticut, Merrimack, Hudson, and St. Lawrence Rivers Basins, as was determined by characterizations at 63 selected U.S. Geological Survey (USGS) streamgages in those drainage areas.

The April 15–17 flood primarily affected northern New England as indicated by 15 streamgages that recorded a peak stage or streamflow during this event. The April 20–24 flood was more widespread throughout New England with 48 streamgages across northern and southern New England recording a peak streamflow during this period. During the April 15–17 and 20–24 floods, the rivers at 10 and 26 streamgages, respectively, reached the National Weather Service (NWS) minor flood stage. Rivers at 30 of the 36 USGS streamgages reached the NWS minor flood stage category, 5 reached the moderate flood stage category, and 1 reached the major flood stage category during these two floods.

Three streamgages in Maine recorded their period-of-record peak streamflow during these floods, of which the St. John River at Ninemile Bridge, Maine was the largest in its 67-year record; the other two streamgages where record peak streamflow was recorded had less than 10 years of record. Thirty of the 63 streamgages recorded preliminary peak streamflows in the top 10 for their periods of record: 15 in Maine, 9 in Vermont, 4 in New Hampshire, 1 in Connecticut. Twenty-one of 46 streamgages with long-term records (greater than 50 years) recorded preliminary peak streamflows ranked in the top 10 for their periods of record. In addition to the St. John River at Ninemile Bridge, Maine, streamgage, which recorded the largest peak streamflow in the 67 years of record, the Clyde River at Newport, Vermont, produced the fourth largest streamflow in the 101 years of record, and the St. Croix River at Vanceboro, Maine, produced the largest streamflow since 1984 and third largest in the 89 years of record.



#### **References Cited**

- Leighton, Matt, 2019, FEMA assess flooding damage in Vermont: NBC5 news video, April 24, accessed April 25, 2019, at https://www.mynbc5.com/article/fema-assess-floodingdamage-in-vermont/27260634.
- Mueller, D.S., Wagner, C.R., Rehmel, M.S., Oberg, K.A., and Rainville, Francois, 2009, Measuring discharge with acoustic Doppler current profilers from a moving boat (ver. 2.0, March 2014): U.S. Geological Survey Techniques and Methods, book 3, chap. A22, 95 p. [Also available at https://doi.org/10.3133/ tm3A22.]
- National Oceanic and Atmospheric Administration, 2019a, QPE—Quantitative precipitation estimates: National Oceanic and Atmospheric Administration, National Weather Service national observations web page, accessed April 23, 2019, at https://water.weather.gov/precip/.
- National Oceanic and Atmospheric Administration, 2019b, Modeled snow water equivalent forecasted for 2019 April 24, 13:00 UTC: National Oceanic and Atmospheric Administration National Operational Hydrologic Remote Sensing Center interactive snow information web page, accessed April 23, 2019, at https://www.nohrsc.noaa.gov/interactive/html/ map.html

- Olcott, P.G., 1995, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, chap. M of Ground water atlas of the United States: U.S. Geological Survey Hydrologic Investigations Atlas 730–M, 28 p. [Also available at http://pubs.usgs.gov/ha/ha730/ch\_m/index.html.]
- Rantz, S.E., and others, 1982, Measurement of stage and discharge, v. I of Measurement and computation of streamflow: U.S. Geological Survey Water-Supply Paper 2175, 284
  p. [Also available at https://pubs.er.usgs.gov/publication/wsp2175\_vol1.]
- Sauer, V.B., and Turnipseed, D.P., 2010, Stage measurement at gaging stations: U.S. Geological Survey Techniques and Methods, book 3, chap. A7, 45 p. [Also available at https://pubs.er.usgs.gov/publication/tm3A7.]
- Turnipseed, D.P., and Sauer, V.B., 2010, Discharge measurements at gaging stations: U.S. Geological Survey Techniques and Methods, book 3, chap. A8, 87 p. [Also available at https://pubs.er.usgs.gov/publication/tm3A8.
- U.S. Geological Survey, 2019, USGS water data for the nation: U.S. Geological Survey National Water Information System data release, accessed April 23, 2019 at https://doi.org/10.5066/F7P55KJN.

By Richard G. Kiah, Brianna A. Smith, and Nicholas W. Stasulis

For more information about this report, contact: Director, New England Water Science Center U.S. Geological Survey 331 Commerce Way, Suite 2 Pembroke, NH 03275 dc\_nweng@usgs.gov or visit our website at https://newengland.water.usgs.gov

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Photograph of an ice jam on the Aroostook River at Washburn, Maine, U.S. Geological Survey streamgage (station 01017000) on April 19, 2019. Photograph by Donald Dumont, National Oceanic and Atmospheric Administration.