

MONTHLY REPORT OF HYDROLOGIC CONDITIONS

WFO Caribou, Maine

REPORT FOR:
MONTH YEAR

June 2023

SIGNATURE

**James Sinko - Meteorologist
Hydrology Program Manager**

DATE

July 11, 2023

TO: Hydrologic Information Center, W/OS31
NOAA's National Weather Service
1325 East West Highway
Silver Spring, MD 20910-3283

When no flooding occurs, include miscellaneous river conditions below the small box, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (NWS Instruction 10-924).

An X inside this box indicates that no flooding occurred within this hydrologic service area.

June 2023

June 2023 will be mostly remembered for cloudy, cool, and rainy conditions for Northern and Eastern Maine. This was a result of the monthly average of the North Atlantic Oscillation (NAO) pattern of -0.58 standard deviation, while the Pacific North American (PNA) pattern at +0.69 standard deviation. This pattern was heavily influenced by the rapidly intensifying El Nino ENSO pattern. This typically results in lower 500mb heights over Maine given the strong positive NAO induced blocking in the North Atlantic. This is depicted below in the reanalysis of the monthly anomaly of the 500mb Geopotential Heights and the mean heights. We saw anomalous low heights for the month over much of the Northeast with persistent troughing. This typically favors above normal precipitation and below normal temperatures.

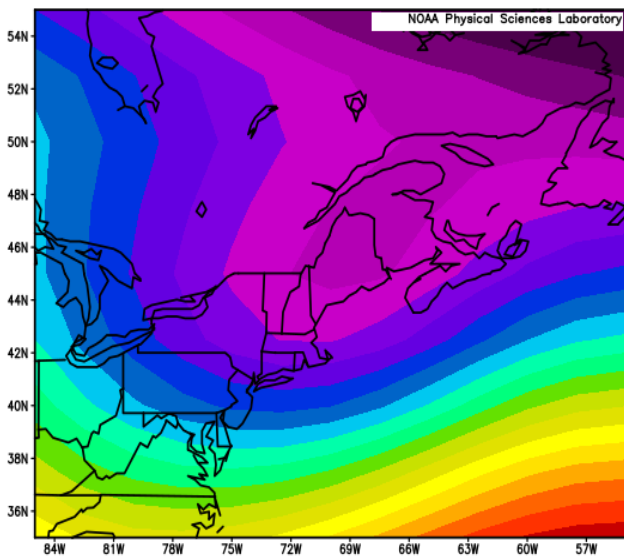


Figure 1: 500mb Geopotential Height (m) Anomalies (1991-2020 Climo) June 2023

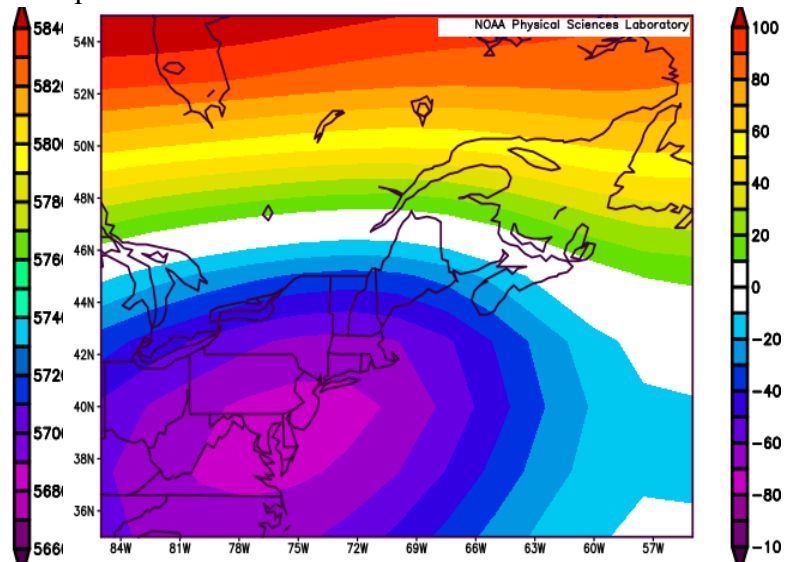


Figure 2: 500mb Geopotential Height (m) Composite Mean June 2023

Source: [NOAA Physical Sciences Laboratory](https://www.noaa.gov/physical-sciences-laboratory)

Temperatures overall finished with average temps 0.5° to 1.0° below 1991-2020 mean averages, except 1 to 2 degrees below average for Downeast areas. The warmest day of the month, interestingly enough, occurred on the very first day, a continuation of the warm spell from the end of May, with highs of lower to mid 90s at all lower terrain locations inland from the immediate coast, easily breaking record highs for the date. This was immediately followed up by a strong back door cold front from Labrador Canada on the 2nd and very cool and rainy weather over the area for the next week as an upper low settled over the region. At Caribou, the 7 day period from the 3rd through the 9th was the longest stretch of consecutive sub-60 degree high temps recorded in June, with the previous record being 6 days in 1945 and 1977. Also the total of 9 sub-60 degree high temps at Caribou this month was the second greatest recorded since records began in 1939 with 10 the all time record set in 1977. Another shorter cool and rainy period mostly affecting northern areas occurred from the 16th-20th. Temperatures warmed significantly afterwards across the region and were above normal from the 22nd through 25th followed by near normal temps for the remainder of the month.

<i>Town/City</i>	<i>Avg Monthly Temperature (°F)</i>	<i>Normal Monthly Temperature (°F)</i>	<i>Departure from Normal (°F)</i>
Frenchville	60.7	60.8	-0.1
Fort Kent	60.3	59.1	+1.2
Caribou	61.0	61.4	-0.4
Houlton	60.1	60.2	-0.1
Millinocket	62.0	62.6	-0.6
Greenville*	60.1	60.7	-0.6
Bangor	61.9	63.6	-1.7
Robbinston*	58.5	60.4	-1.9
Topsfield*	59.8	61.6	-1.8

**Topsfield Records date back to 2000, *Robbinston Records date back to 1994*

**Greenville data gap between 1975 and 1999*

Rainfall across the area was mostly above to well above monthly averages ranging from 130 to locally 200+ percent of average, except in the Caribou and Bar Harbor areas which received 85 to 100 percent of average. Interestingly, Caribou experienced 20 days of measurable rainfall over the course of the month, but unlike most other locations across the region, did not experience heavy rainfall on any day. Significant to heavy rainfall fell at least across portions of the region from the 3rd - 10th, 16th - 18th, and the 24th - 29th resulting in the postponement and/or cancellation of some outdoor events. A few Cooperative Observer sites in Piscataquis County reported monthly total rainfall exceeding 9 inches. Millinocket experienced the 11th wettest June on record, Houlton experienced the 6th wettest June on record and Bangor the 8th wettest. See the precipitation details below.

We saw multiple heavy rain events throughout the month prompting the issuance of flood advisories and flash flood warnings. A missed flood event was caused by discharge from the Brookfield Power Ripogenus Dam that impacted portions of Baxter State Park. On June 20th Brookfield activated their Emergency Action Plan for “high flow” as they needed to discharge water due to recent heavy rain. The flow was increased to nearly 13,000cfs by the 23-24th which caused flooding in the southwest portion of Baxter State Park near Abol Bridge (photos below). The most notable flooding event was on June 29th with slow moving back building thunderstorms across the forecast area. Flash flooding was experienced in Frenchville and Monson impacting several roads (photos below).

Precipitation Totals for Select Locations with all units in inches

<i>Location</i>	<i>Total Precip</i>	<i>Normal Precip</i>	<i>Departure from Normal</i>	<i>% of Normal</i>	<i>Snowfall</i>	<i>Normal Snowfall</i>	<i>Departure from Normal</i>	<i>Greatest Snow Depth</i>	<i>Monthly Average Snow Depth</i>
Frenchville*	5.50	4.23	+1.27	130%					
Fort Kent	6.42	4.42	+2.00	145.2%	0.0	0.0	0	0	0
Caribou	3.50	3.89	-0.39	89.9%	0.0	0.0	0	0	0
Houlton	6.07	4.04	+2.03	150.2%					
Millinocket*	7.06	3.42	-0.25	92.6%	0.0			0	0
Greenville*	8.86	4.04	+4.82	219.3%					
Bangor	5.84	3.87	+1.97	150.9%	0.0	0.0	0.0	0	0
Robbinston*	7.19	4.10	+3.09	175.3%	0.0	0.0	0.0	0	0
Topsfield*	4.89	4.23	+0.66	115.6%	0.0	0.0	0.0	0	0

**Millinocket snowfall measured at CoOp site, not the ASOS site. Departure data is not available.*

**Topsfield Records date back to 2000, *Robbinston Records date back to 1994, *Greenville data gap between 1975 and 1999*

Streamflows due to the above normal precipitation in many locations were above to much above normal. This was especially noticeable in the Piscataquis and Penobscot basins where the month average is much above normal. Across the St. John basin the western areas averaged nearly normal for the month with the eastern areas much below normal. The Aroostook was generally normal for the month and that is the same for the Mattawamkeag and Narraguagus. The St. Croix basin continued to be lacking good flow with another month averaging below normal, June 2023 ended up Much Below Normal for the St. Croix and Grand Lake Stream.

Groundwater remained normal across the area given the cooler temperatures, increased rainfall and no significant dry periods. In fact, groundwater conditions in Calais continued to be above normal, but its important to note there is only 23 years of record at this location.

In regards to **Drought** monitoring, the start of the month was continued dry coming out of the month of May that a Moderate Drought (D1) area was added on June 6th. D1 conditions were noted in the North Woods along the Quebec border from Northern Somerset into Aroostook County. The D1 conditions extended through the St. John Valley into Northeastern Aroostook County. Abnormally Dry (D0) conditions to start the month were noted across the rest of the North Woods north of Moosehead Lake & Baxter Regions with Moosehead and Baxter mostly free of drought conditions. There were abnormally dry conditions noted in portions of Hancock and Washington counties. By June 20th the D1 conditions were removed as precipitation increased across the area with prolonged wet days. By the end of the month only D0 areas existed in the far Northwest portions of Aroostook County and a small sliver of Hancock & Washington counties with increased precipitation.

Read below for specific details & maps of Streamflows, Groundwater Levels, Non-Routine Hydrologic Products issued by WFO Caribou and Drought conditions.

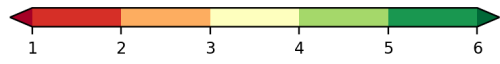
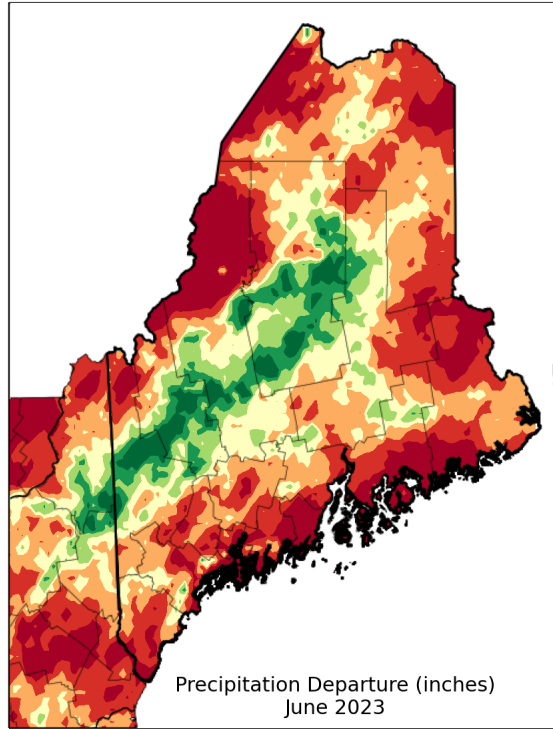
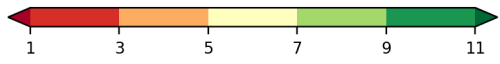
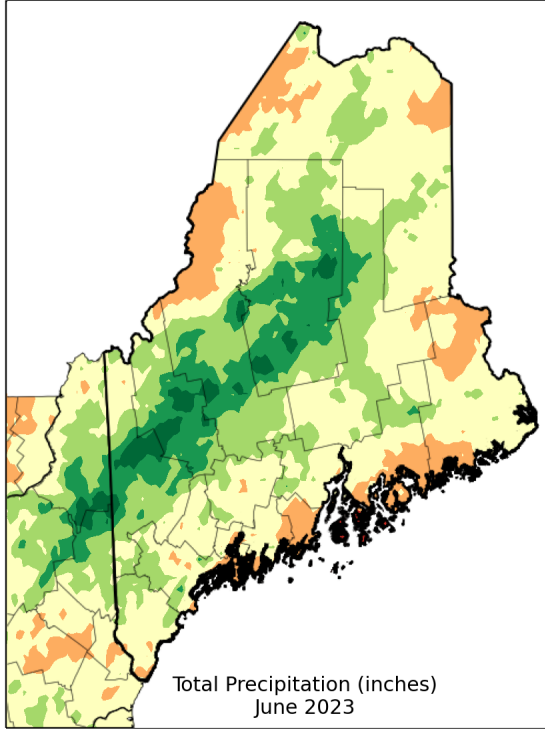


Figure 3: Monthly Precipitation Totals for May 2023

Figure 4: Monthly Precipitation Departures from Normal for May

Source: [Northeast Regional Climate Center](#)

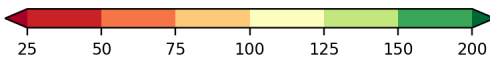
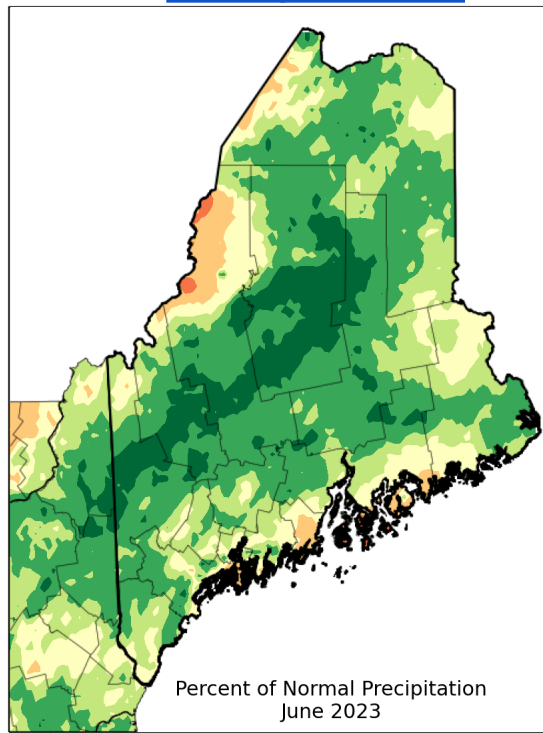


Figure 5: Percent of Normal Precipitation May 2023

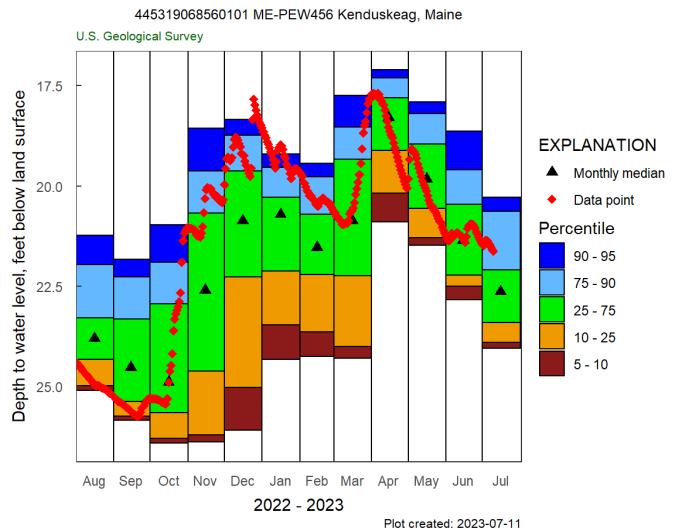
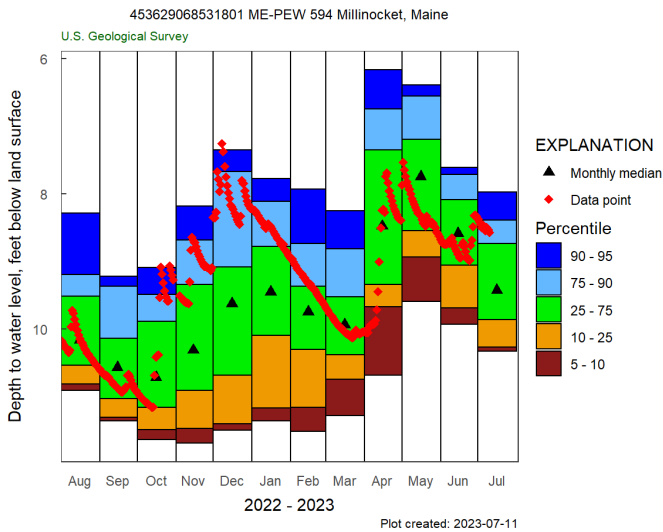
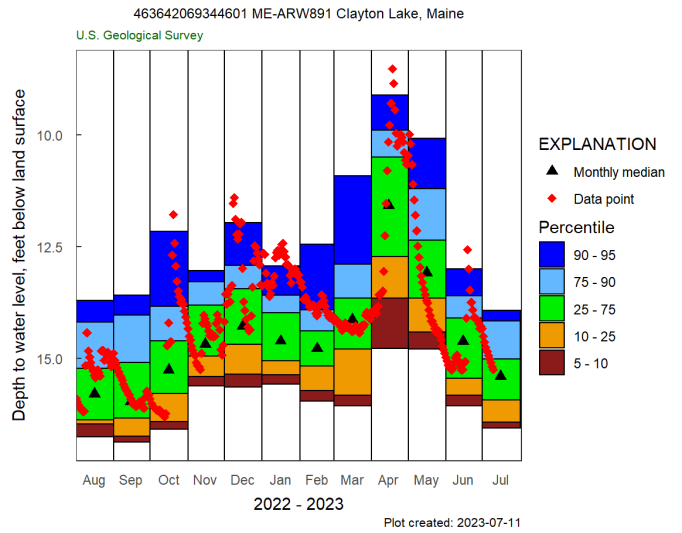
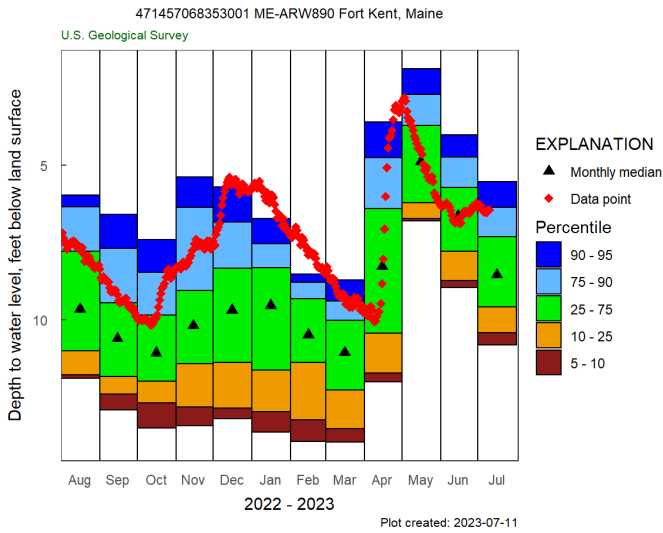
Source: [Northeast Regional Climate Center](#)

June Streamflows for Rivers

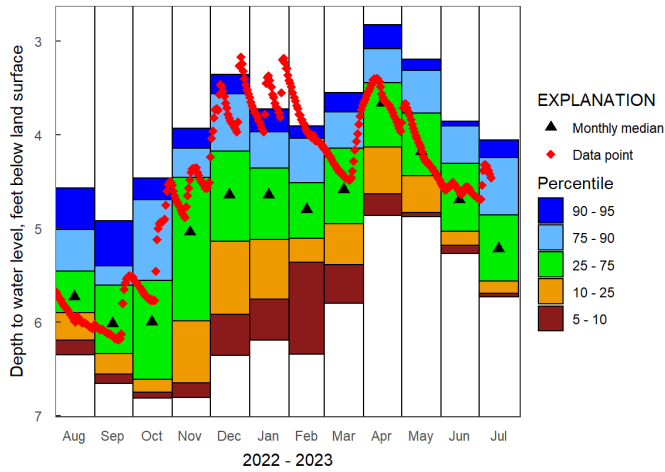
River	Monthly Mean Flow (cfs)	% Normal (mean)	Percentile Class	Drainage (mi ²)	Years of Record
Big Black River near Depot Mtn	210.43	79.87%	Normal	171	38
St. John River at Nine Mile Bridge	2599.27	125.52%	Normal	1341	71
Allagash River near Allagash	1699.17	80.28%	Normal	1478	91
St. John River at Dickey	3754.80	87.35%	Normal	2680	76
St. John River at Fort Kent	4182.52	41.10%	Much Below Normal	5929	95
Fish River near Fort Kent	858.98	49.82%	Much Below Normal	873	92
Aroostook River near Masardis	1633.50	128.15%	Normal	892	64
Aroostook River at Washburn	2973.67	123.53%	Normal	1654	91
St. Croix River at Vanceboro	396.13	47.40%	Much Below Normal	413	93
St. Croix River at Baring	1001.84	44.80%	Much Below Normal	1374	62
Grand Lake Stream at Grand Lake Stream	146.95	33.49%	Much Below Normal	228.3	93
Narraguagus River at Cherryfield	402.03	114.01%	Normal	227	74
East Branch Penobscot River at Grindstone	3779.33	169.90%	Much Above Normal	837	100
Mattawamkeag near Mattawamkeag	2435	122.72%	Normal	1418	87
Piscataquis River near Dover-Foxcroft	1405.67	295.99%	Much Above Normal	298	119
Sebec River at Sebec	1146.77	221.95%	Much Above Normal	326	67
Piscataquis River at Medford	4117.67	218.69%	Much Above Normal	1162	90
Penobscot River at West Enfield	18601.67	160.56%	Above Normal	6422	119

June Average Groundwater Levels

Station	Percentile Class	Years of Record
Hadley Lakes	Normal	37
Kenduskeag	Normal	45
Calais	Above Normal	23
Millinocket	Normal	29
Clayton Lake	Normal	44
Fort Kent	Normal	45

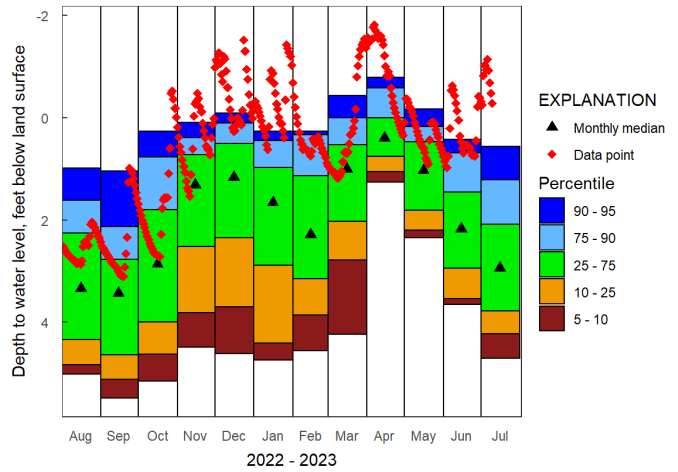


445227067520101 ME-WW797 Township T24MD BPP (Hadley Lakes)
U.S. Geological Survey



Plot created: 2023-07-11

450713067162801 ME-WW796 Calais, Maine
U.S. Geological Survey



Plot created: 2023-07-11

Figure 6-11: Groundwater Level Yearly Plots to Current
Source: [United States Geological Survey](https://www.usgs.gov/)

Flow or Water Level	Percentile Range	Explanation
Low	0 th	The monthly mean streamflow or median water level during this month is the lowest ever recorded during the period of record for this site.
Much below normal	0 th to 10 th	The monthly mean streamflow or median water level during this month is less than the 10 th percentile when compared to all of the months during the period of record for this site.
Below normal	10 th to 25 th	The monthly mean streamflow or median water level during this month is between the 10 th and 25 th percentiles when compared to all of the months during the period of record for this site.
Normal	25 th to 75 th	The monthly mean streamflow or median water level during this month is between the 25 th and 75 th percentiles when compared to all of the months during the period of record for this site.
Above normal	75 th to 90 th	The monthly mean streamflow or median water level during this month is between the 75 th and 90 th percentiles when compared to all of the months during the period of record for this site.
Much above normal	90 th to 100 th	The monthly mean streamflow or median water level during this month is greater than the 90 th percentile when compared to all of the months during the period of record for this site.
High	100 th	The monthly mean streamflow or median water level during this month is the highest ever recorded during the period of record for this site.

**Non-Routine Hydrologic Products
June 2023
WFO Caribou, ME**

Product	How Many Issued	Reason for Issuance
Flash Flood Warning	4	Excessive Rainfall due to Thunderstorms
Flood Advisory	9	Excessive Rainfall

June Flooding Photos



**Flash Flooding on Church St
in Frenchville on June 29th.
Photo courtesy: Gail Johnson**

**Flash Flooding on Church St
in Frenchville on June 29th.
Photo courtesy: Gail Johnson**





**Flash Flooding on Route 1
in Frenchville on June 29th.
Photo courtesy: Sara Schlicher**

**Flash Flooding on Route 1
in Frenchville on June 29th
Photo courtesy: Sara Schlicher**



**Flash Flooding on Route 1
in Frenchville on June 29th.
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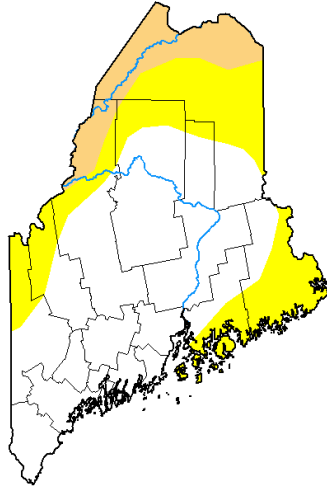


Left (3) Photos Courtesy of Thomas Brann at the Abol Bridge Campground. Ripogenus Dam discharge of ~13,000cfs caused minor flooding along the West Branch of the Penobscot River. Right photo is Courtesy of Baxter State Park of the flooding on the Appalachian Trail for approximately 3 miles.

Drought Conditions for June 2023

U.S. Drought Monitor Maine

June 6, 2023
(Released Thursday, Jun. 8, 2023)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

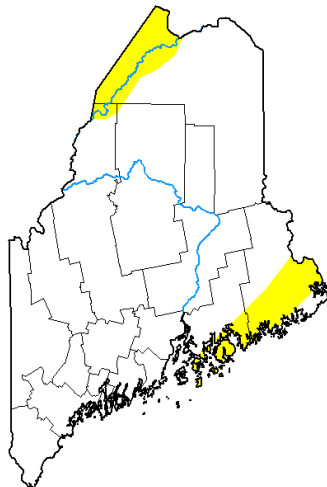
Lindsay Johnson
National Drought Mitigation Center



droughtmonitor.unl.edu

U.S. Drought Monitor Maine

June 27, 2023
(Released Thursday, Jun. 29, 2023)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Curtis Riganti
National Drought Mitigation Center



droughtmonitor.unl.edu

Drought Classification (Cumulative Percent Area %)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
6/6/2023	60.79	39.21	10.87	0.00	0.00	0.00	50
6/27/2023	90.27	9.73	0.00	0.00	0.00	0.00	10
Change	29.48	-29.48	-10.87	0.00	0.00	0.00	-40

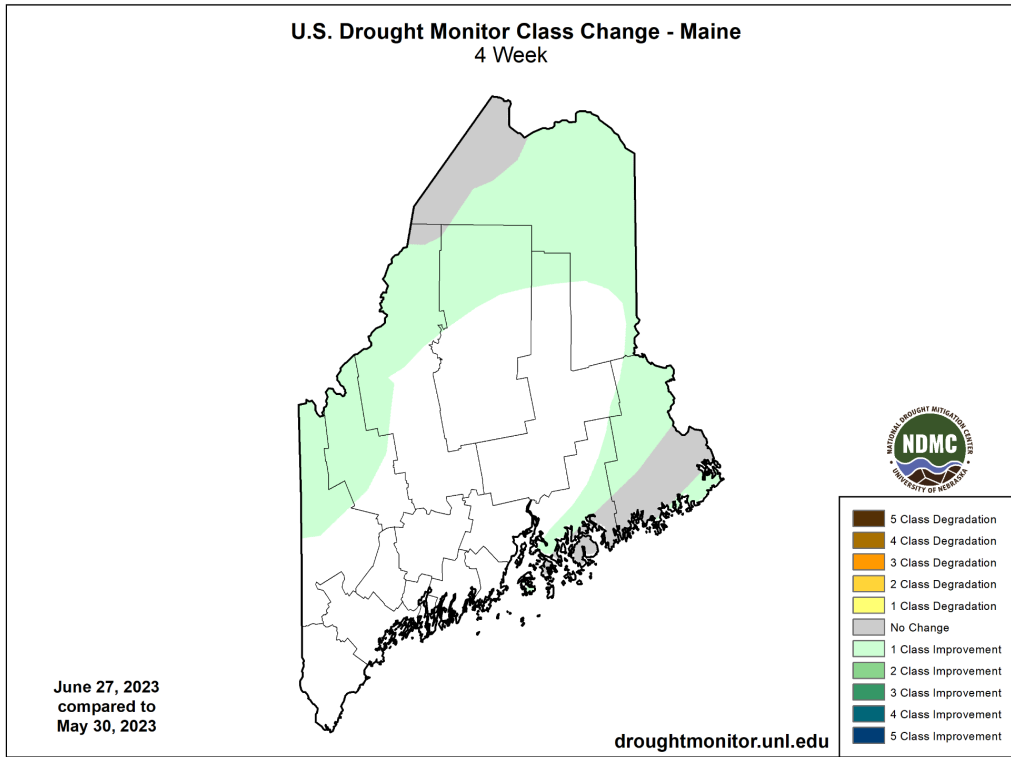


Figure 12-14: U.S. Drought Monitor Drought Classification & Statistics for May
Source: [U.S. Drought Monitor](https://droughtmonitor.unl.edu)