

**MONTHLY REPORT OF HYDROLOGIC CONDITIONS**

**WFO Caribou, Maine**

REPORT FOR:  
MONTH YEAR

**March 2023**

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

SIGNATURE

**James Sinko - Meteorologist  
Hydrology Program Manager**

DATE

**April 21, 2023**

*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.

**March 2023**

March 2023 was warmer than average compared to the 1991-2020 climate normals. It featured a lack of arctic air and temperatures were above to well above average the first half of the month and much closer to average the second half of the month. This was a result of the monthly average of the North Atlantic Oscillation (NAO) pattern of -1.11 standard deviation, while the Pacific North American (PNA) pattern at -1.61 standard deviation. This typically results in much lower 500mb heights over the North Atlantic extending westward into the Northeastern states. This is depicted below in the reanalysis of the monthly anomaly of the 500mb Geopotential Heights and the mean heights. We saw anomalous lower heights for the month over the area with strong blocking in the North Atlantic with overall troughing over the area.

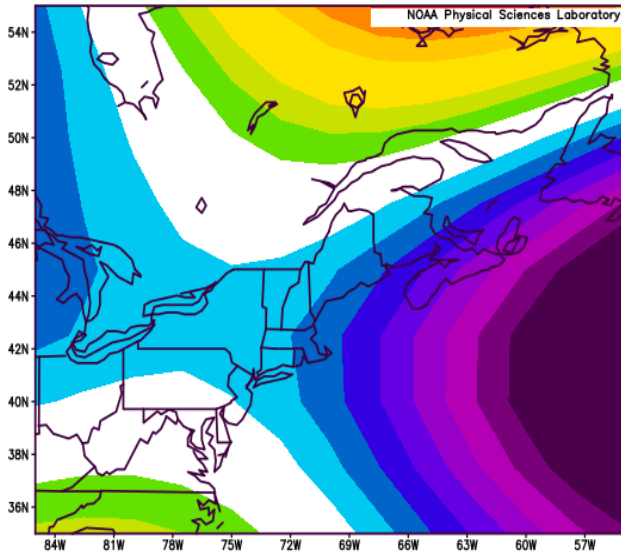


Figure 1: 500mb Geopotential Height (m) Anomalies (1991-2020 Climo) March 2023

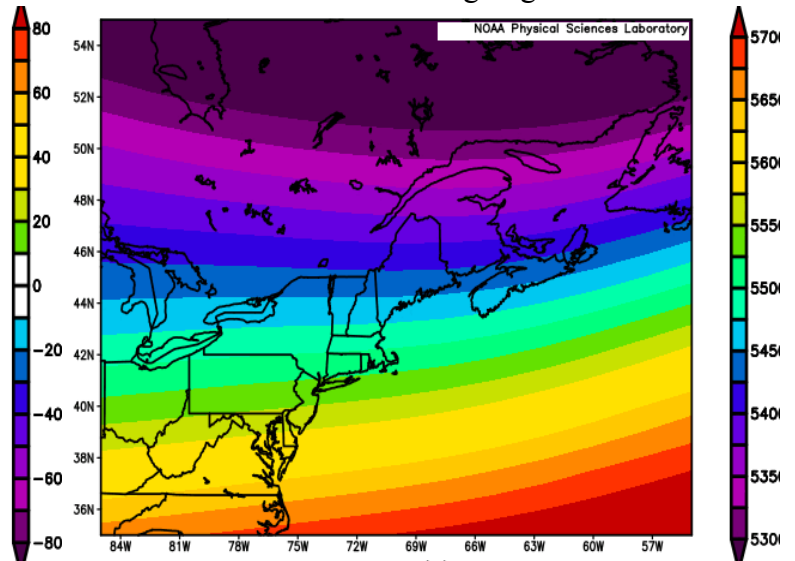


Figure 2: 500mb Geopotential Height (m) Composite Mean March 2023

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

**Temperatures** the region as a whole averaged from 2.5 to 4 degrees above the 1991-2020 averages. There was a lack of arctic air and temperatures were above to well above average the first half of the month and much closer to average the second half of the month. There was only one night with a low temperature below zero in Caribou. On average, there are 4 nights with a low below zero during the month of march in Caribou. In Bangor, the low for the entire month was 10°F on the 5th. Although not a record, typically Bangor will have a night or two with a low below zero during the month of March.

| <i>Town/City</i>   | <i>Avg Monthly Temperature (°F)</i> | <i>Normal Monthly Temperature (°F)</i> | <i>Departure from Normal (°F)</i> |
|--------------------|-------------------------------------|--|-----------------------------------|
| <b>Frenchville</b> | 27.3                                | 24.5                                   | +2.8                              |
| <b>Fort Kent</b>   | 25.0                                | 20.9                                   | +4.1                              |
| <b>Caribou</b>     | 28.3                                | 25.0                                   | +3.3                              |
| <b>Houlton</b>     | 29.2                                | 25.5                                   | +3.7                              |
| <b>Millinocket</b> | 31.3                                | 27.6                                   | +3.7                              |
| <b>Greenville*</b> | 29.5                                | 25.6                                   | +3.9                              |
| <b>Bangor</b>      | 33.6                                | 30.6                                   | +3.0                              |
| <b>Robbinston*</b> | 33.9                                | 30.8                                   | +3.1                              |
| <b>Topsfield*</b>  | 31.7                                | 27.4                                   | +4.3                              |

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

*\*Greenville data gap between 1975 and 1999*

**Precipitation** total precipitation for the month ranged from 40 to 75 percent of average, except across parts of the western Saint John Valley and North Woods where precipitation ranged from 100 to 150 percent of normal. **Snowfall** was above average across the region. In Caribou, a total of 29.6 inches was observed, which was 8.2 inches above average. In Bangor, 20.5 inches of snow was observed which was 5.3 inches above average. By the end of the month, the **Snow Depth** ranges from 18 to 44 inches across Aroostook County with the highest amounts across the higher terrain to the west of Caribou. By the end of the month Snow Depth was reported at 66 inches at Chimney Pond (~3,000ft elevation) in Baxter State Park. At the end of the month there was 3 inches of snow on the ground at Millinocket, and little to no snow was observed in Bangor and along the coast. The **Snow Water Equivalent** across northern areas ranged from 6 to 11 inches by the end of the month, with locally higher amounts across the higher terrain. See the table below for more details on exact totals.

**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*    | 0.75                | 1.47                 | -0.72                        | 51%                |                 |                        |                              |                            |                                   |
| Fort Kent       | 1.93                | 2.75                 | -0.82                        | 70.2%              | 24.0            | 19.0                   | +5.0                         | 32                         | 23.6                              |
| Caribou         | 2.26                | 2.77                 | -0.51                        | 81.6%              | 29.6            | 21.4                   | +8.2                         | 27                         | 18.7                              |
| Houlton         | 1.54                | 2.67                 | -1.13                        | 57.7%              |                 |                        |                              |                            |                                   |
| Millinocket*    | 1.93                | 2.97                 | -1.04                        | 65%                | 12.0            |                        |                              | 18                         | 10.6                              |
| Greenville*     | 2.30                | 3.19                 | -0.89                        | 72.1%              |                 |                        |                              |                            |                                   |
| Bangor          | 1.72                | 3.22                 | -1.50                        | 53.4%              | 20.5            | 15.2                   | +5.3                         | 15                         | 4.3                               |
| Robbinston*     | 3.37                | 4.82                 | -1.45                        | 69.9%              | 20.2            | 18.9                   | +1.3                         | 21                         | 11.5                              |
| Topsfield*      | 2.73                | 4.54                 | -1.81                        | 60.1%              | 22.9            | 19.6                   | +3.3                         | 25                         | 14.2                              |

*\*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*

*\*Frenchville ASOS has Known Issues Measuring Liquid Equivalent of Snowfall due to Blowing & Drifting*

**Streamflows** during the month continued to fall with much of the northern and central basins covered in ice while southern basins were melting and clearing of ice. Flows increased where ice & snow melted while flows decreased with little to no melt across the north. Overall the basins averaged normal for the entire month. The exception was the St. John at Fort Kent ranked Much Below Normal for the month at the site specifically.

**Ice:** Across southern basins we saw significant ice loss in the first couple weeks of the month becoming free and clear by late month. Central basins had significant ice cover during the beginning of the month with significant rot and decay by late month. Northern basins were nearly fully frozen during the entire month, however rot was noted with some openings by late month. By late month the Aroostook River was wide open from Scopan Stream downstream through Ashland into Castle Hill. Additional openings were noted in Presque Isle and Caribou. Across the St. John we saw openings from Fort Kent to Madawaska with significant openings from Madawaska downstream for a couple river miles.

**Groundwater:** Ground continued to thaw from the bottom up across much of the north that had deep snowpack. Given no significant melting in the north the groundwater levels didn't change too much but still resulted in Much Above Normal values in the St. John Valley, elsewhere we saw normal conditions.

In regards to **Drought** monitoring, the entire month of March featured No Drought conditions.

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

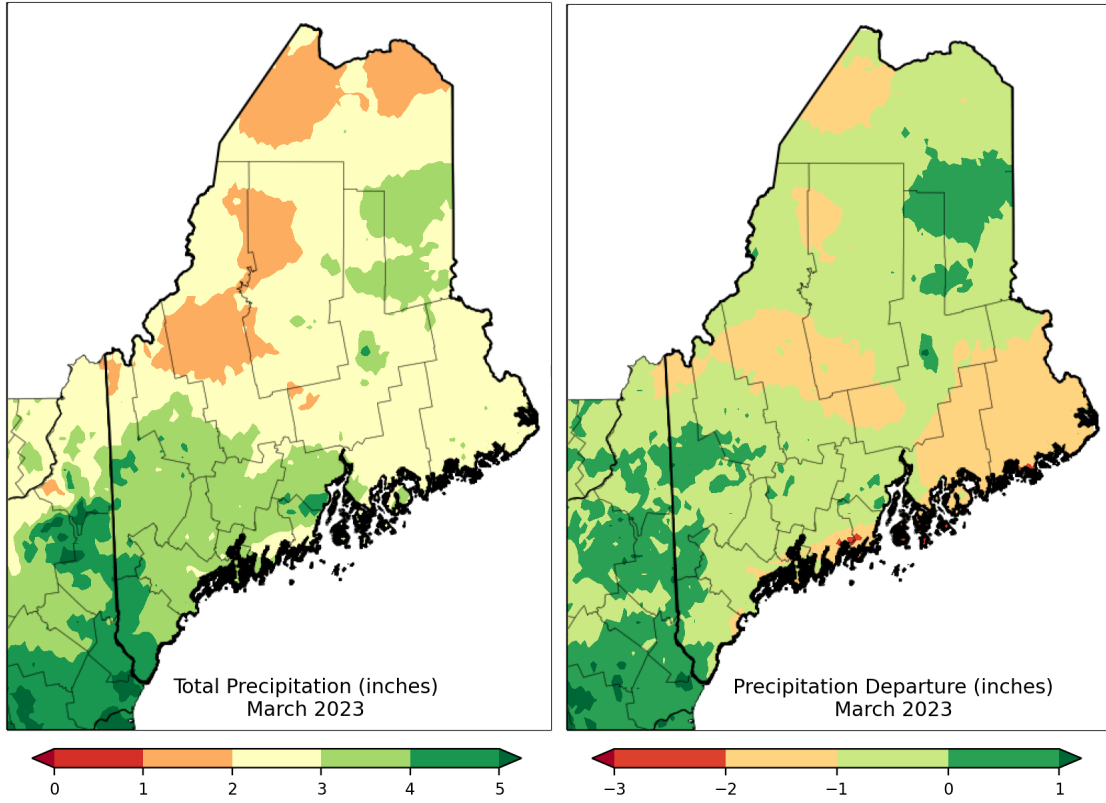


Figure 3: Monthly Precipitation Totals for March 2023

Source: [Northeast Regional Climate Center](#)

Figure 4: Monthly Precipitation Departures from Normal for March 2023

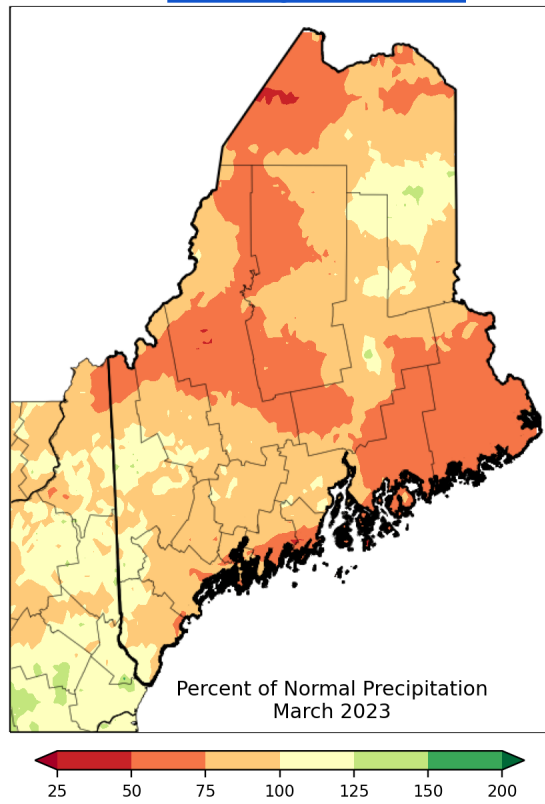


Figure 5: Percent of Normal Precipitation March 2023

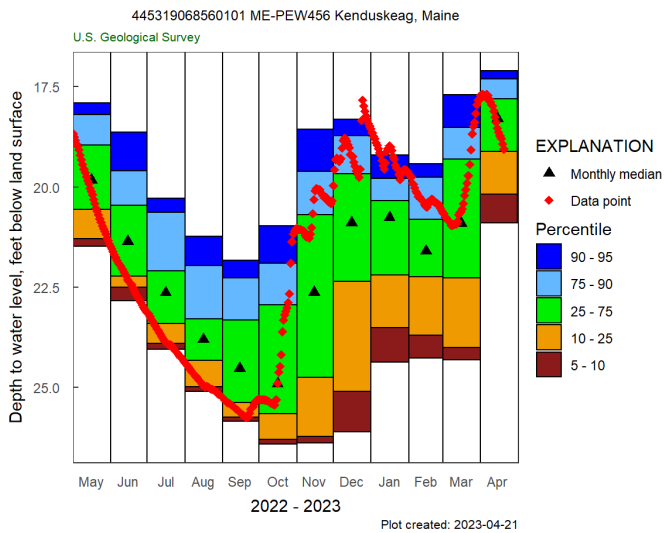
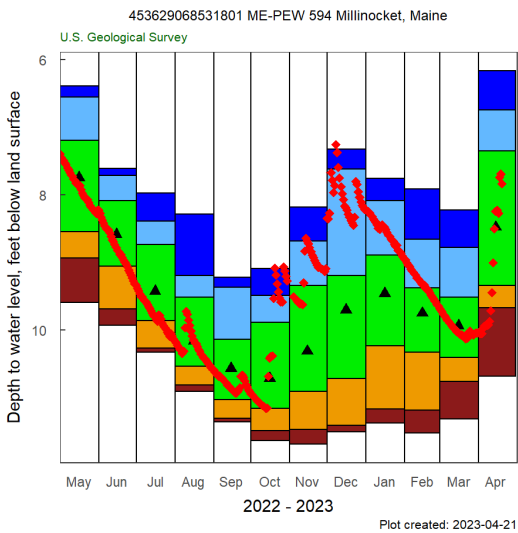
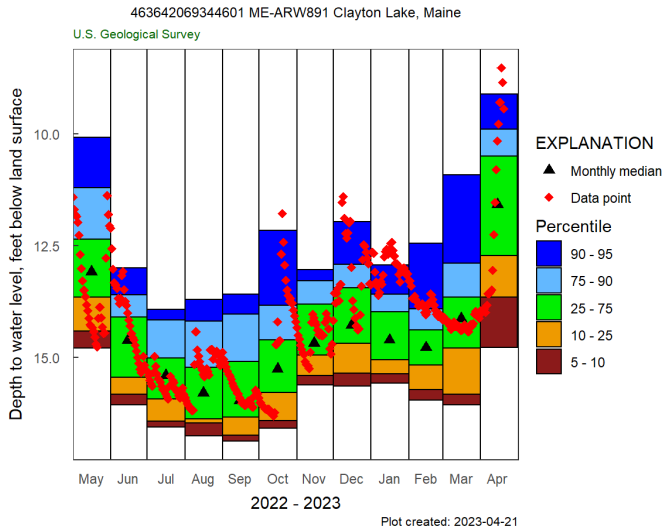
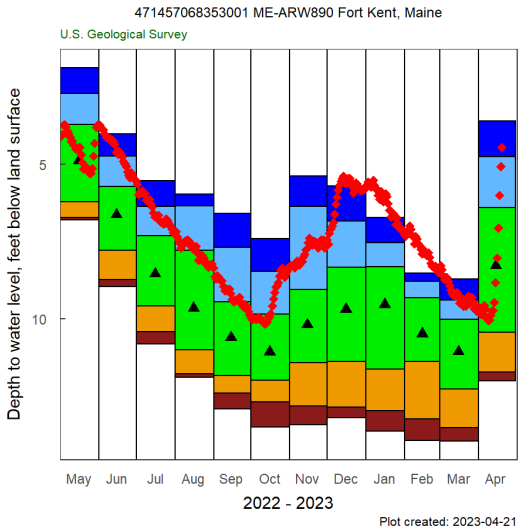
Source: [Northeast Regional Climate Center](#)

### March Streamflows for Rivers

| River                                     | Monthly Mean Flow (cfs) | % Normal (mean) | Percentile Class  | Drainage (mi <sup>2</sup> ) | Years of Record |
|---|-------------------------|-----------------|-------------------|-----------------------------|-----------------|
| Big Black River near Depot Mtn            | NA                      | NA              | Ice Affected      | 171                         | 38              |
| St. John River at Nine Mile Bridge        | NA                      | N/A             | Ice Affected      | 1341                        | 71              |
| Allagash River near Allagash              | NA                      | NA              | Ice Affected      | 1478                        | 90              |
| St. John River at Dickey                  | NA                      | NA              | Ice Affected      | 2680                        | 75              |
| St. John River at Fort Kent               | 1178.75                 | 29.33%          | Much Below Normal | 5929                        | 95              |
| Fish River near Fort Kent                 | NA                      | NA              | Ice Affected      | 873                         | 92              |
| Aroostook River near Masardis             | 653.19                  | 72.02%          | Normal            | 892                         | 64              |
| Aroostook River at Washburn               | NA                      | NA              | Ice Affected      | 1654                        | 91              |
| St. Croix River at Vanceboro              | 637.89                  | 86.62%          | Normal            | 413                         | 93              |
| St. Croix River at Baring                 | 1419.92                 | 44.82%          | Much Below Normal | 1374                        | 62              |
| Grand Lake Stream at Grand Lake Stream    | 209.70                  | 43.16%          | Below Normal      | 228.3                       | 93              |
| Narraguagus River at Cherryfield          | 551.52                  | 75.16%          | Normal            | 227                         | 74              |
| East Branch Penobscot River at Grindstone | 4128.57                 | NA              | Ice Affected      | 837                         | 100             |
| Mattawamkeag near Mattawamkeag            | 1662.52                 | 70.63%          | Normal            | 1418                        | 87              |
| Piscataquis River near Dover-Foxcroft     | 434.00                  | 71.53%          | Normal            | 298                         | 119             |
| Sebec River at Sebec                      | 445.90                  | 73.68%          | Normal            | 326                         | 67              |
| Piscataquis River at Medford              | 4184.29                 | NA              | Ice Affected      | 1162                        | 90              |
| Penobscot River at West Enfield           | 20742.86                | NA              | Ice Affected      | 6422                        | 119             |

## March Average Groundwater Levels

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



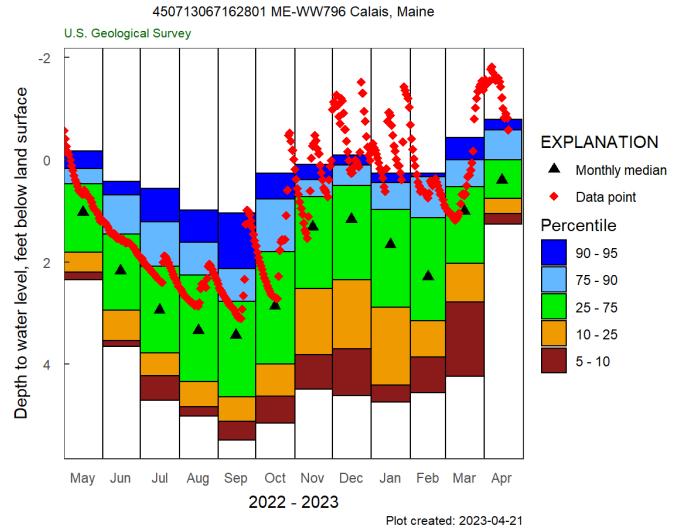
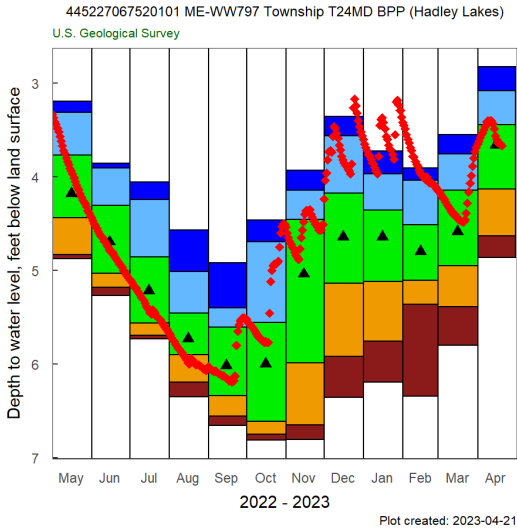


Figure 6-11: Groundwater Level Yearly Plots to Current  
Source: [United States Geological Survey](https://www.usgs.gov/)

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

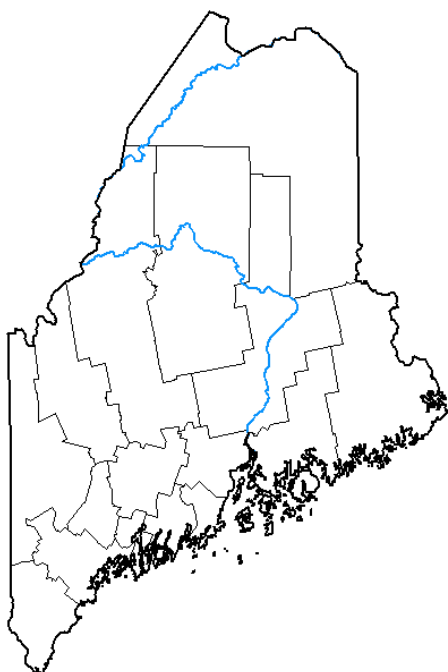
**Non-Routine Hydrologic Products  
March 2023  
WFO Caribou, ME**

**No Non-Routine Products were issued in March 2023**







**Drought Conditions for March 2023**

**U.S. Drought Monitor  
Maine**

**March 7, 2023**  
*(Released Thursday, Mar. 9, 2023)*  
Valid 7 a.m. EST



**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:**

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National Drought Mitigation Center



**droughtmonitor.unl.edu**





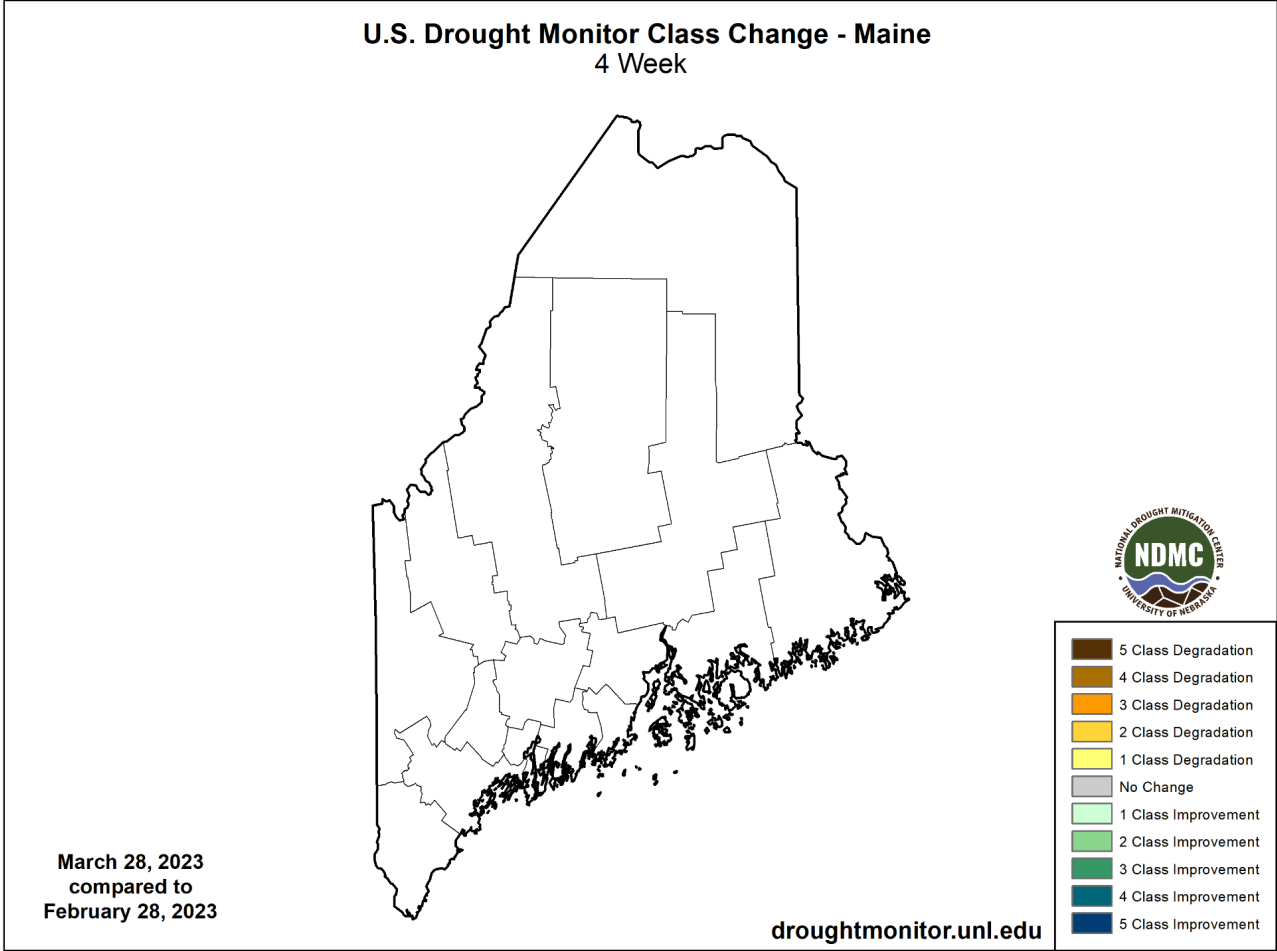


Figure 12-14: U.S. Drought Monitor Drought Classification & Statistics for March  
 Source: [U.S. Drought Monitor](https://droughtmonitor.unl.edu)