

**MONTHLY REPORT OF HYDROLOGIC CONDITIONS**

**WFO Caribou, Maine**

REPORT FOR:  
MONTH YEAR

**March 2024**

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 12, 2024**

*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 2024**

March 2024 finished with well above average temperatures and above average to near record precipitation. A pattern shift took place in March with a North Atlantic Oscillation (NAO) monthly mean around  $-0.21SD$  as blocking took place over Greenland with significantly higher 500mb heights. This did result in the Arctic Oscillation (AO) turning significantly negative at  $-0.61SD$ . Part of this Atlantic blocking did extend into the North Atlantic over Prince Edward Island. At the same time the Pacific North American Pattern (PNA) shifted positively with a monthly mean of  $+0.45SD$ . This pattern resulted within a weakening positive El Niño-Southern Oscillation (ENSO) regime. This resulted in anomalously higher 500mb heights over Maine in the month of March as seen below. The mean 500mb trough shifted westward with generally zonal mean flow over Maine with a slight dip over the Maritimes. This favored progressive systems for the most part, however a few times storm systems tapped into the northern & southern jet stream flows to produce significant precipitation within a generally warmer pattern.

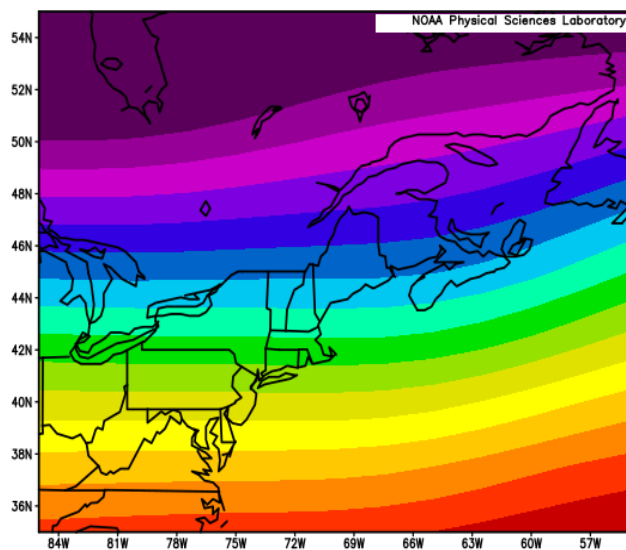


Figure 1: 500mb Geopotential Height (m) Anomalies (1991-2020 Climo) March 2024

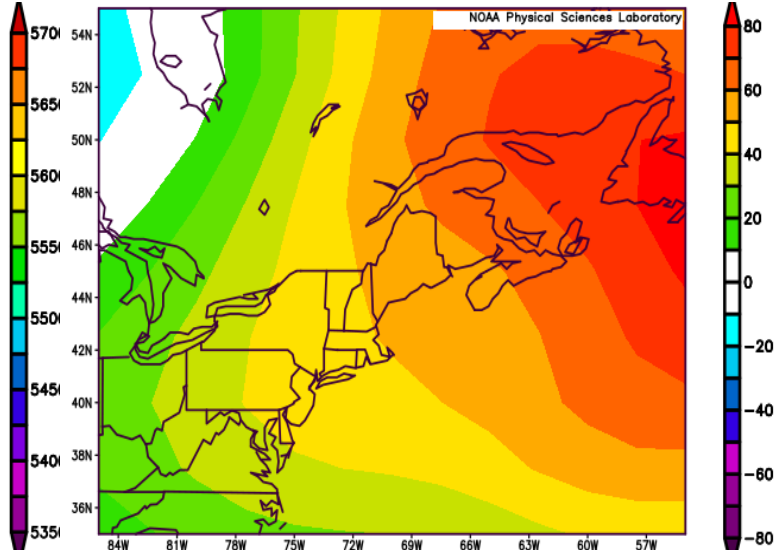


Figure 2: 500mb Geopotential Height (m) Composite Mean March 2024

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

**Precipitation Totals for Select Locations (All Units in Inches)**

Location	Total Precip	Normal Precip	Departure from Normal	% of Normal	Snowfall	Normal Snowfall	Departure from Normal	Greatest Snow Depth	Monthly Average Snow Deptp
Frenchville*	2.01	1.47	0.54	136.7%					
Fort Kent	4.36	2.75	1.61	158.5%	23.5	19.0	4.5	14	3.8
Van Buren	5.47	2.45	3.02	223.3%	15.5	17.5	-2.0	10	0.8
Caribou	5.74	2.77	2.97	207.2%	29.8	21.4	8.4	13	2.6
Houlton	5.68	2.67	3.01	212.7%					
Millinocket*	6.17	2.97	3.20	207.7%	31.0			21	3.0
Greenville*	7.71	3.19	4.52	241.7%					
Moosehead*	6.26	2.76	3.50	226.8%	32.1	18.4	13.7	22	5.4
Corinna	8.50	3.44	5.06	247.1%	13.0	13.4	-0.4	12	2.0
Bangor	8.99	3.22	5.77	279.2%	9.5	15.2	-5.7	6	0.9
Grand Lake Stream	11.45	3.98	7.47	287.7%	10.6	13.4	-2.8	5	0.5
Robbinston*	13.84	4.82	9.02	287.1%	2.7	18.9	-16.2	2	0.1
Topsfield*	10.52	4.54	5.98	231.7%	22.3	19.6	2.7	10	2.8

*\*Millinocket snowfall measured at CoOp site, not the ASOS site. \*Moosehead Site is in GYX CWA.*

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

*\*Frenchville ASOS has documented issues with precipitation measurements in the winter months.*

**Precipitation** (Snow melt included) was well above average and ranged from 150-250% of normal for the month of March 2024. In Bangor it was by a long shot the all-time wettest March on record with 8.99 inches of rain (and melted snow) breaking the previous record of 7.36 inches in 1999. It ranked the 2nd wettest month on record in Bangor during the months of January through August and as the 10th wettest month on record. Caribou also observed the all-time wettest March on record with a total of 5.74 inches of rain (and melted snow), which surpassed the previous record of 5.27 inches in 2008. A new all-time record was also established in Houlton with a total of 5.68 inches of rain (and melted snow), which surpassed the 5.21 inches that was observed in March 1953. In Millinocket, the 6.17 inches of rain (and melted snow) ranked as the 4th wettest March. It should be noted that the precipitation data on the 24th was unavailable at both Houlton and Millinocket due to equipment issues. In Fort Kent, they observed a precipitation total that was 158.5% above normal and was the 9th wettest March on record with a total of 4.36 inches. Robbinston CoOp site with records dating back to 1995 smashed its March record with a total precipitation of 13.84 inches which is 287% of normal beating previous March record of 7.64 inches in 2014. Van Buren CoOp site with records dating back to 1974 beat the record wettest March on record with 5.47 inches. This beat the previous record of 4.95 inches in 2011, the 2024 record of 5.47 inches was 223% of normal.

**Snowfall** was above average in Caribou with a total of 29.8 inches for the month, which was 8.4 inches above average. In Bangor, a total of 9.5 inches of snow was observed which was 5.7 inches below average. Below average snowfall was noted at Van Buren, Corinna, Bangor, Grand Lake Stream and Robbinston. Above average snowfall was noted at Fort Kent, Caribou, Moosehead and Topsfield. Significant difference between western Maine mountains with Moosehead 13.7 inches above normal while Robbinston was 16.2 inches below normal.

The most significant event of the month occurred on the 23rd into the 24th when some locations in eastern Aroostook County south and east of Caribou observed 20-25 inches of snow. There were also 20 inches or more totals observed in parts of Piscataquis and Northern Penobscot counties. At the start of the month, the snow depth across the region ranged from zero to an inch in Bangor and along the coast. Across the Central Highlands and Northern Maine, the snow depth ranged from 2-8 inches, but with locally a foot or more across the highest terrain. At the end of the month, there was no snow along the coast and in Bangor, 2-6 inches across much of the Central Highlands as well as north into Caribou and Eastern St. John Valley. Across the North Woods and areas along and west of Route 11 in Northern Maine there was 10-20 inches across the higher elevations. On March 1st Chimney Pond (Elev ~2930ft) in Baxter State Park reported 17 inch snow depth with a seasonal total of 58 inches. By Mid March Baxter State Park reported 29 inch snow depth at Chimney Pond with a seasonal total of 82 inches. By the end of the month Chimney Pond was reporting a 43 inch snow depth with a seasonal total of 126 inches. Significant snowfall did occur at Chimney Pond on the east side of Mt. Katahdin in the latter half of March indicated by the significant increase in snow depth with snow water equivalents reaching 6-10 inches of liquid. The deepest snow depth reported by Baxter State Park in the month of March was on March 26th with a snow depth of 53 inches.

**Streamflows...**significant melting from warm temperatures and rainfall on melting snow across the Downeast into the Central Highlands created significant rises of natural flows in March. This resulted in the month means in these locations reaching the 90-95th percentile with “very much above normal” streamflows. Streamflows in this area reached 200-300% of normal for the month of March since ice out and peak flows were occurring a month ahead of schedule. Monthly mean record was set on the Narraguagus River in Cherryfield where the month mean flow was 284% above normal. Across the north despite the river ice breaking up the natural flows did rise but remained below normal to near normal for March, which was significantly lower than normal during ice out process since this was a month ahead of schedule.

In terms of **River Ice** the ice out process began very early in February 2024 and continued to break up into the first 10 days of March. This was significantly ahead of normal (by a month) and resulted in a lot of ice movement during the first ten days. By Mid March the rivers in the Downeast and Central Highlands were nearly ice free and flowing freely with just ice left on the banks rotting. On March 9th the Aroostook River began to break up that night between Crouseville and Wade with a significant break up noted in Washburn (WSHM1 Gage) which is seen in a photo below. Late afternoon on March 10th the ice let go in Wade with approximately 5 miles worth of ice flowing downstream through Washburn right before sunset. This flushing process was a month ahead of normal as noted by several longtime residents and NWS Caribou River Spotters in Washburn. This ice punched downstream through Crouseville to Presque Isle and by the next day got trapped upstream of the Caribou Dam extending approximately 7.5 miles of ice above the Caribou Dam. The river was open from below the dam downstream to near Fort Fairfield Route 1A bridge where ice was jammed behind Tinker Dam in New Brunswick. By March 19th the ice in Fort Fairfield flushed and the remaining ice that was above the Caribou Dam broke up, rotted and melted officially making it ice out. This was once again about a month ahead of schedule compared to historical accounts of Emergency Management, Spotters and Town Officials. Across the St. John River ice broke up at Nine Mile on March 7th into the 9th causing an Ice Jam that resulted in water rises at NINM1 gage but broke free and pushed ice downstream. On March 7th there was an Ice Jam that developed at the confluence of the St. John and Allagash Rivers that resulted in significant water rises at Dickey Bridge but didn't cause any flooding. This jam ended up getting stuck for the following several weeks due to low natural flows that couldn't punch the ice out. Additional ice from upstream near Nine Mile did reach this jam and added to the ice by the end of the month along with discharged ice from the Big Black River & Little Black River. By the end of March the only river with ice remaining was the St. John River from Dickey to St. John Plantation. The river was mainly open with some

secondary channel ice from Fort Kent to Lille. Ice remained in place from Van Buren to Hamlin where it was solid sheet ice rotting slowly in place but still 7-15 inches thick.

**Groundwater** was much above normal across Downeast Maine, Central Highlands and Northeast Maine with normal conditions at Clayton Lake for the North Woods and indications of worsening by late month to below normal conditions. In Northern Maine we saw generally significant frost depth penetration thanks to little snowpack (deep snow acts as a blanket) in the beginning of the month. The depth started 12-22 inches north, 6-15 inches across the Highlands to the Downeast coast. By the end of the month we saw significant thawing beginning from the surface and below thanks to the warmer temperatures, rainfall and higher sun angle. Across the north at the end of the month frost ranged from 10-15 inches. 7-12 inches across the Central Highlands and 3-10 inches across the Downeast. Surface thawing was reported 1-3 inches across the Downeast Coast into the Central Highlands.

**Temperatures...** across the area ranged mainly from 4.5 to 6.5 degrees above 1991-2020 normals. It ranked as the 6th warmest March on record in Caribou, tied for the 9th warmest March on record in Houlton, tied for the 8th warmest March in Millinocket and tied for the 8th warmest in Bangor.

Town/City	Avg Monthly Temperature (°F)	Normal Monthly Temperature (°F)	Departure from Normal (°F)
<b>Frenchville</b>	30.1	24.5	<b>5.6</b>
<b>Fort Kent</b>	28.1	20.9	<b>7.2</b>
<b>Van Buren</b>	30.2	20.9	<b>9.3</b>
<b>Caribou</b>	31.2	25.0	<b>6.2</b>
<b>Houlton</b>	30.8	25.5	<b>5.3</b>
<b>Millinocket</b>	33.4	27.6	<b>5.8</b>
<b>Greenville*</b>	30.8	25.6	<b>5.2</b>
<b>Moosehead</b>	29.3	23.9	<b>5.4</b>
<b>Corinna</b>	34.5	29.6	<b>4.9</b>
<b>Bangor</b>	35.4	30.6	<b>4.8</b>
<b>Grand Lake Stream</b>	29.5	29.5	<b>0.0</b>
<b>Robbinston*</b>	35.4	30.8	<b>4.6</b>
<b>Topsfield*</b>	31.7	27.4	<b>4.3</b>

*\*Topsfield Records date back to 2000, \*Robbinston Records date back to 1994  
\*Greenville data gap between 1975 and 1999 \*Moosehead Site is in GYX CWA on CWA border*

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

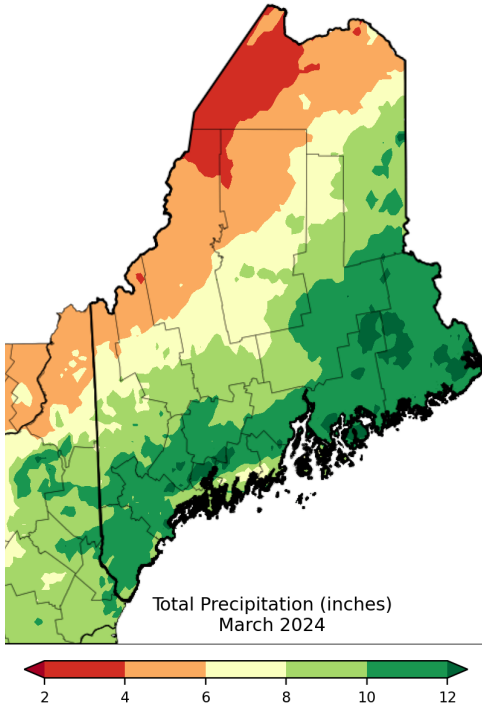


Figure 3: Total Liquid Precipitation for March

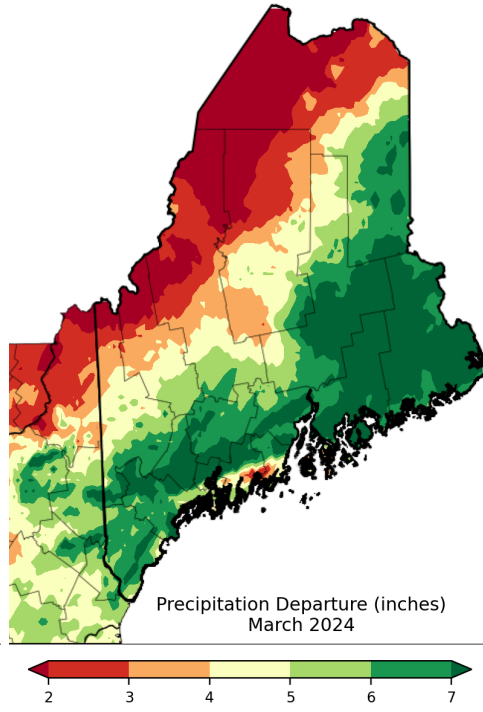


Figure 4: Liquid Precipitation Departure for March  
Source: [Northeast Regional Climate Center](#)

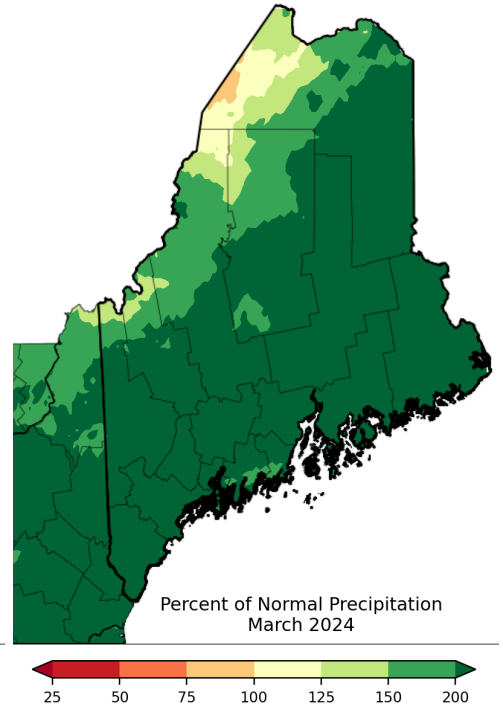


Figure 5: Percent of Normal Precipitation for March

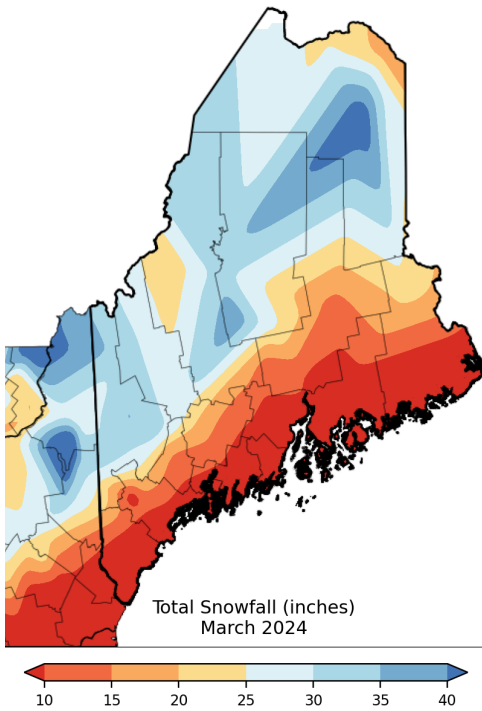


Figure 6: Total Snowfall for March

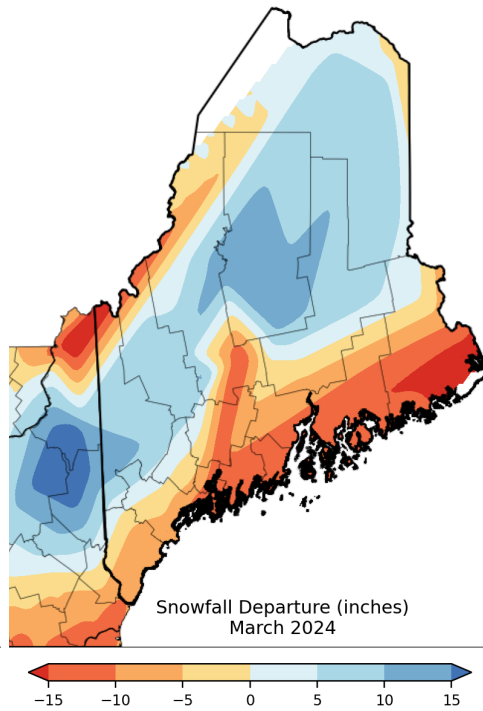


Figure 7: Total Snowfall Departure for March  
Source: [Northeast Regional Climate Center](#)

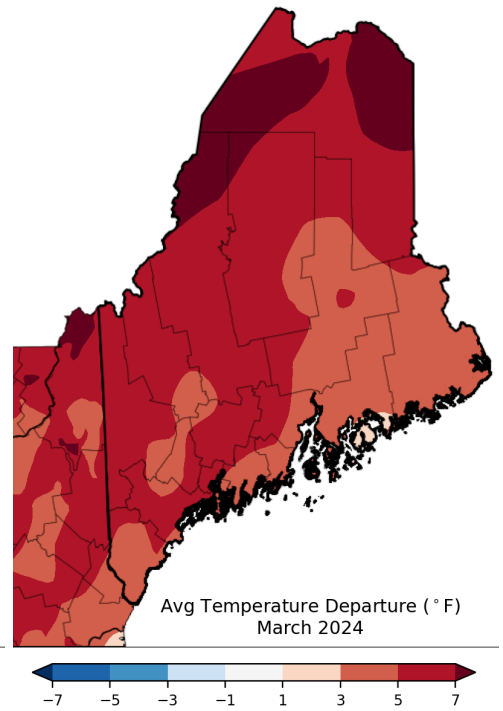


Figure 8: Average Temperature Departure for March

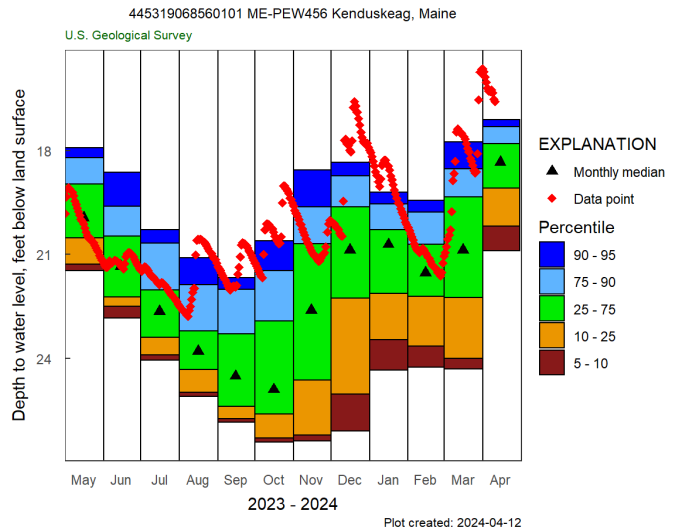
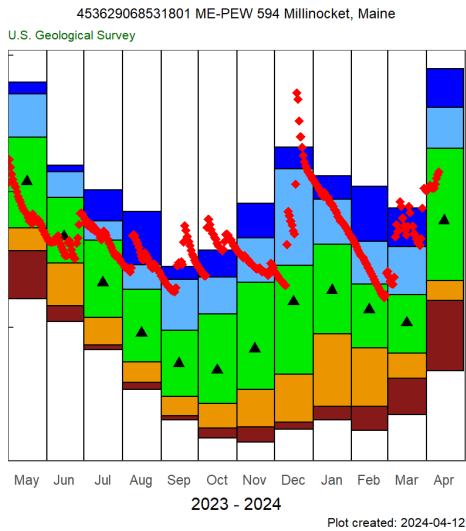
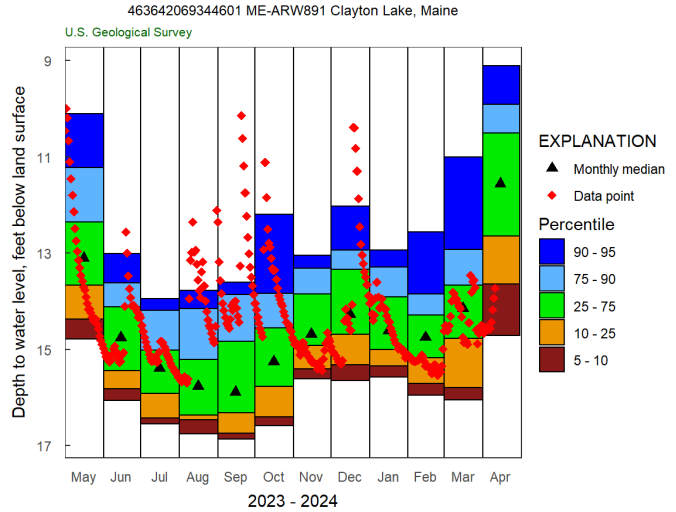
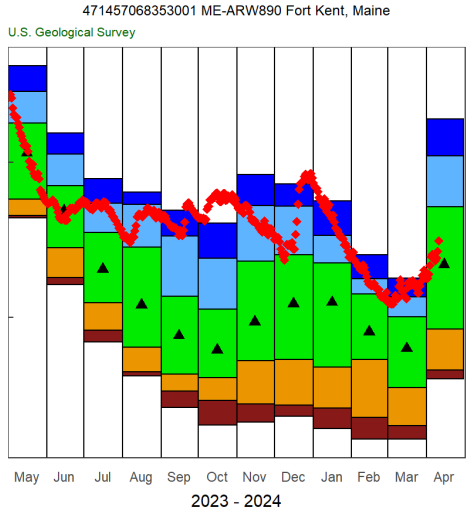
### March Streamflows for Rivers

\*Data provided by the U.S. Geological Survey\*

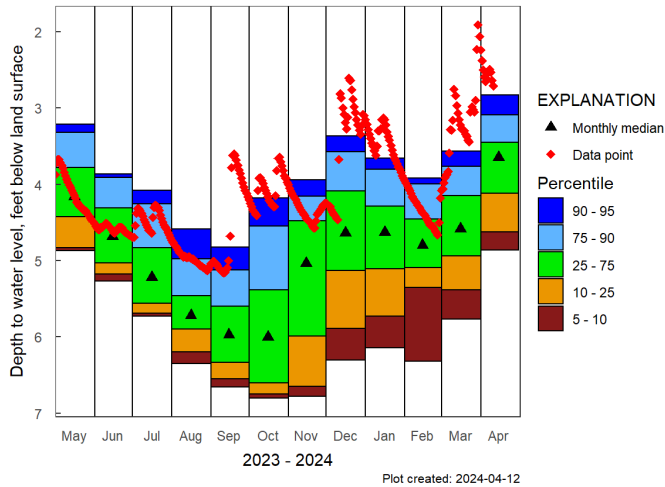
River	Monthly Mean Flow (cfs)	% Normal (mean)	Percentile Class	Drainage (mi <sup>2</sup> )	Years of Record
Big Black River near Depot Mtn	NA	NA	Ice Impacted	171	39
St. John River at Nine Mile Bridge	NA	NA	Ice Impacted	1341	72
Allagash River near Allagash	NA	NA	Ice Impacted	1478	93
St. John River at Dickey	NA	NA	Ice Impacted	2680	76
St. John River at Fort Kent	2297.45	56.93%	Normal	5929	96
Fish River near Fort Kent	662.62	103.54%	Normal	873	93
Aroostook River near Masardis	NA	NA	Ice Impacted	892	65
Aroostook River at Washburn	NA	NA	Ice Impacted	1654	92
St. Croix River at Vanceboro	522.84	70.65%	Normal	413	94
St. Croix River at Baring	3455.81	108.10%	Normal	1374	63
Grand Lake Stream at Grand Lake Stream	370.04	75.49%	Normal	228.3	94
Narraguagus River at Cherryfield	2092.16	284.10%	High	227	75
East Branch Penobscot River at Grindstone	4362.63	278.60%	Much Above Normal	837	101
Mattawamkeag near Mattawamkeag	7419.35	310.57%	Much Above Normal	1418	88
Piscataquis River near Dover-Foxcroft	1934.87	316.91%	Much Above Normal	298	120
Sebec River at Sebec	1707.03	279.65%	Much Above Normal	326	68
Piscataquis River at Medford	7178.89	307.36%	Much Above Normal	1162	91
Penobscot River at West Enfield	26173.33	229.88%	Much Above Normal	6422	120

### March Average Groundwater Levels

Station	Percentile Class	Years of Record
Hadley Lakes	Much Above Normal	38
Kenduskeag	Much Above Normal	45
Calais	Much Above Normal	24
Millinocket	Much Above Normal	29
Clayton Lake	Normal	45
Fort Kent	Much Above Normal	45



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



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

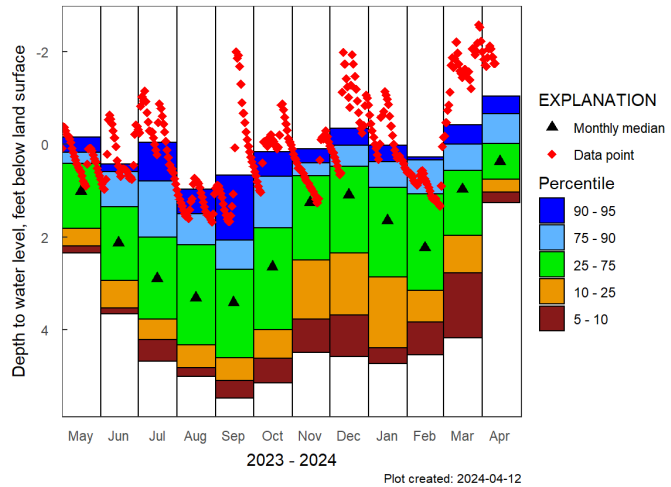


Figure 9-14: Groundwater Level Yearly Plots to Current  
Source: [United States Geological Survey](https://www.usgs.gov/)

Flow or Water Level	Percentile Range	Explanation
Ice Impacted	NA	Ice impacted resulting in No Data available
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 from WFO Caribou, ME March 2024

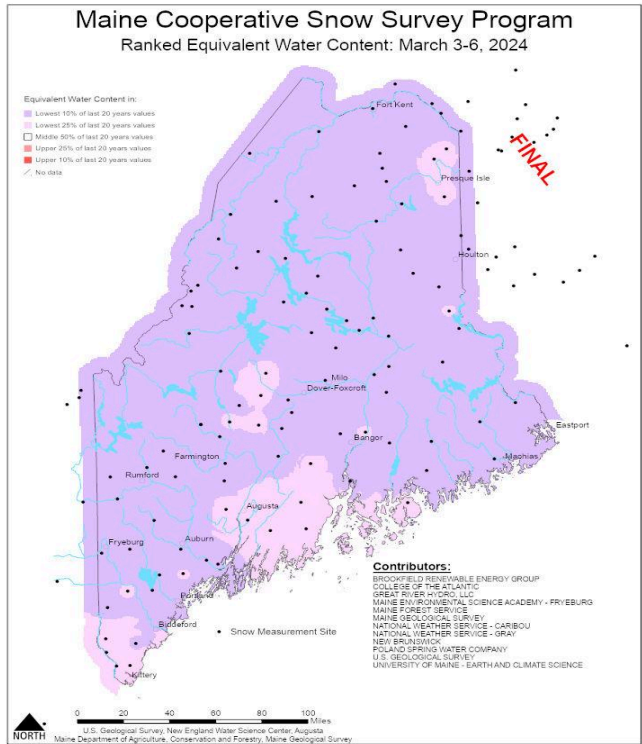
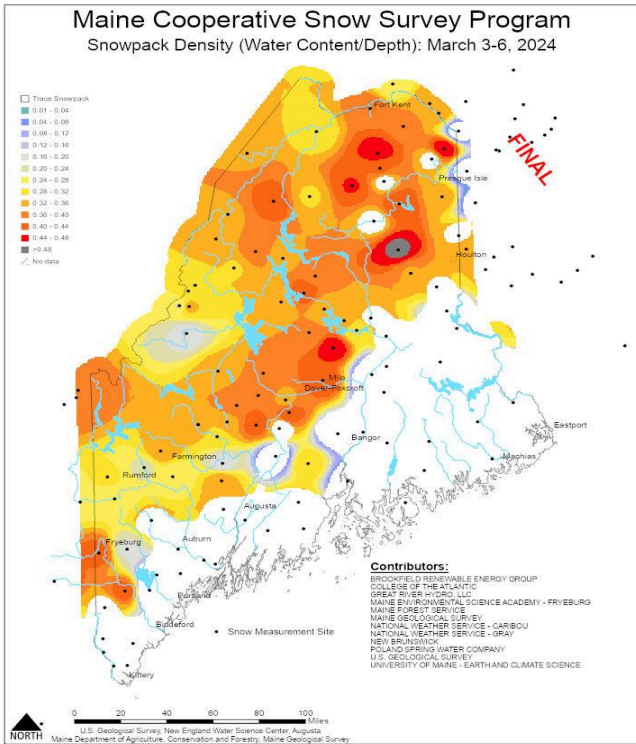
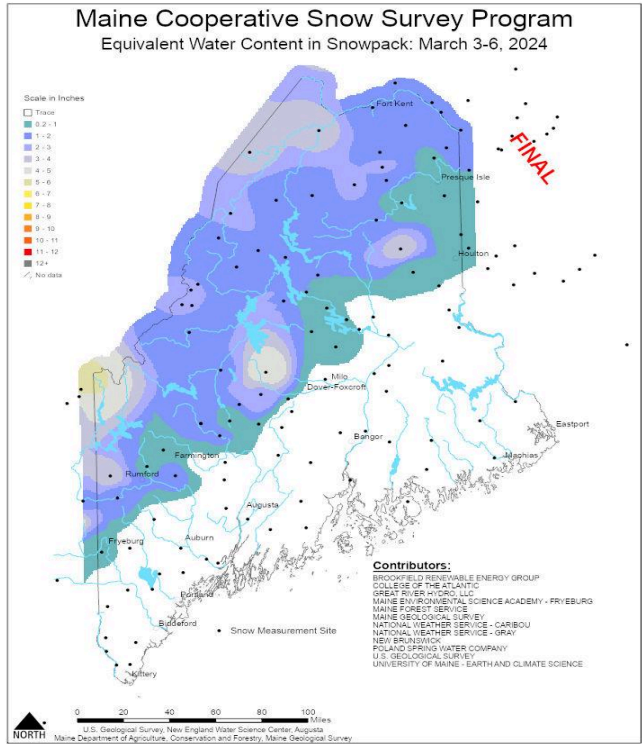
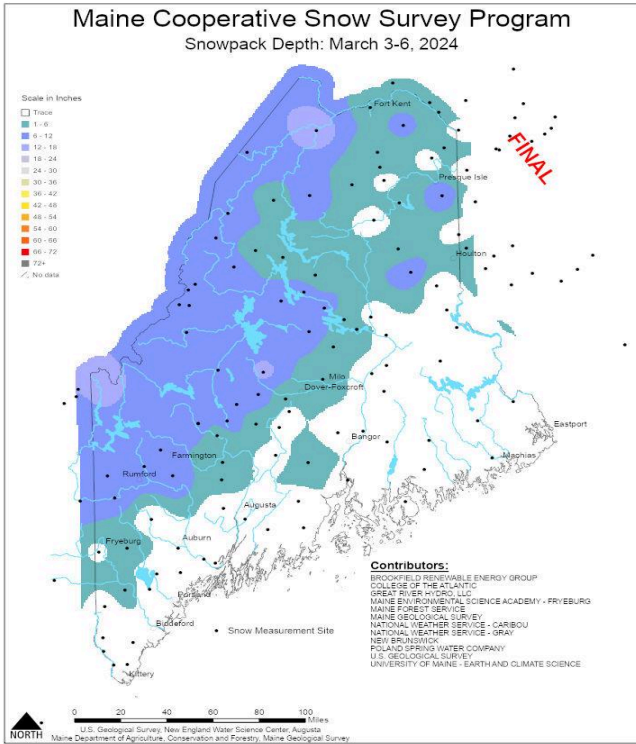
Product	How Many Issued	Reason for Issuance
Flood Watch	2	Heavy Rain / Rain & Snowmelt
Flood Advisories	5	Excessive Rainfall, Snowmelt & St. Croix River Flooding
Flood Warning	2	River Flooding @ Forecast Points



# Maine Cooperative Snow Survey Program Comparison

## March 6, 2024 Report

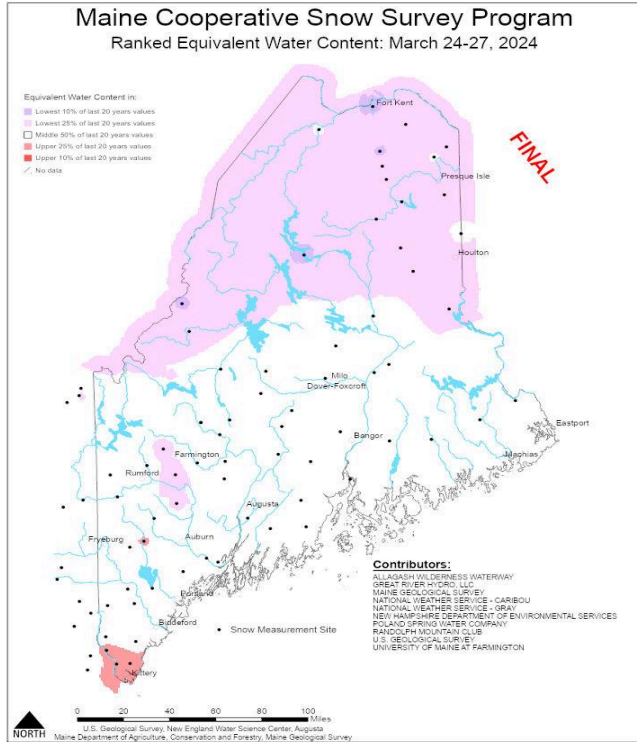
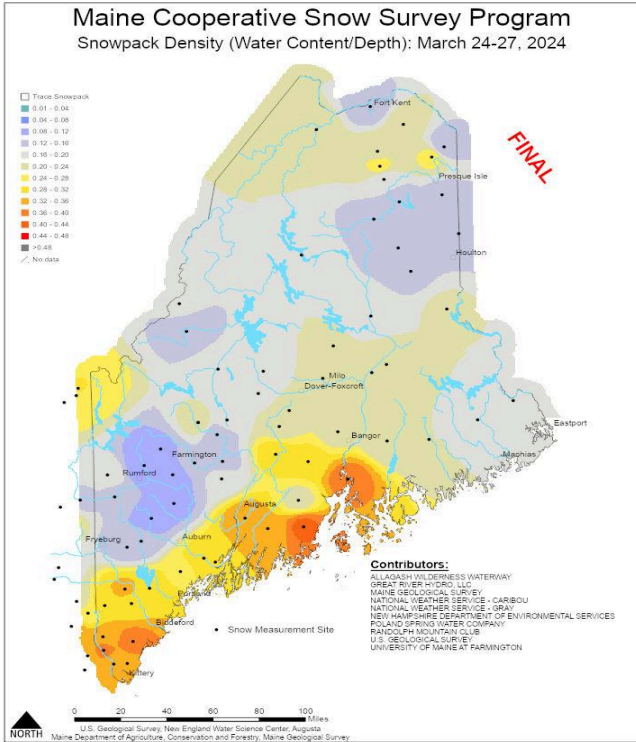
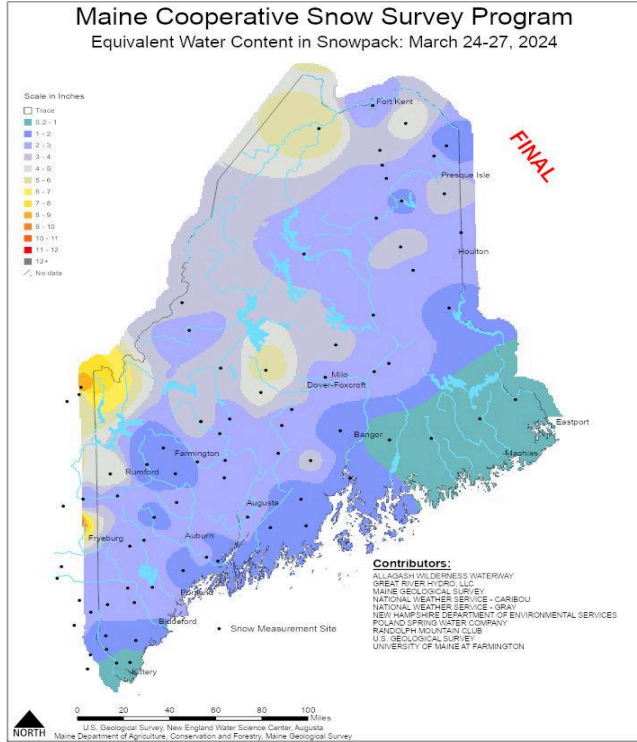
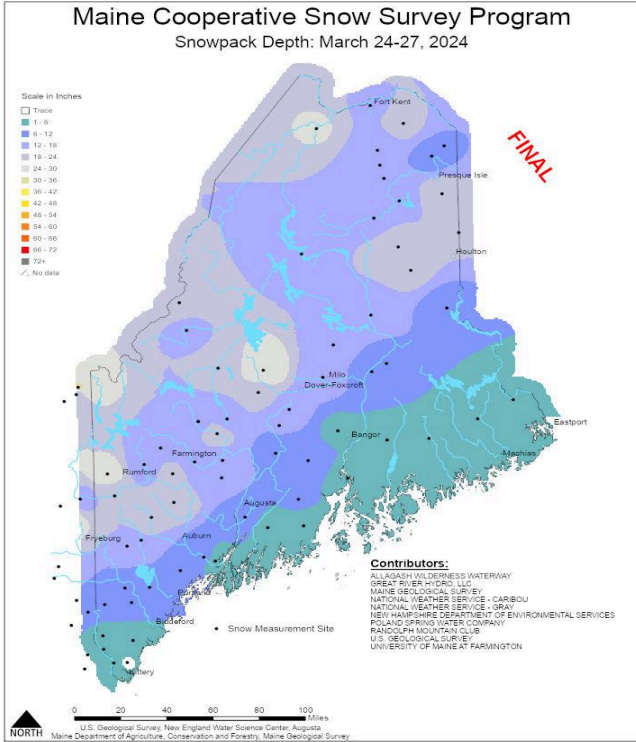
### Snowpack Depth, SWE, Density, SWE Ranking



# Maine Cooperative Snow Survey Program Comparison

## March 27, 2024 Report

### Snowpack Depth, SWE, Density, SWE Ranking



**General River Ice Pictures for March 2024**

March 13th, Ice Jam near Allagash River Gage (ALLM1)



March 9th, Ice Out Beginning Phase, Washburn near Aroostook River Gage (WSHM1)



March 6th, Ice Break Up & Jam, Little Madawaska River near Caribou, Courtesy: Skywarn Spotter AR242



March 15th, Remaining Sheet Ice on Aroostook River in Oxbow, Maine



March 28th, Ice Jam on St. John River near Dickey Bridge, Courtesy: Maine DOT

MeDOT Dickey Bridge, St. John River  
Thu Mar 28 14:11:42 2024 ; 37 95.9



Thursday, March 28, 2024 2:12:48 PM

March 15th, Ice Slab left on Banks after flushing, Aroostook River @ Masardis River Gage (MASM1)



March 9th, Rotting Sheet Ice above Caribou Dam



March 11th, Parkhurst Siding Road in Presque Isle  
Ice from Wade Jam broke & rammed into Caribou Dam ice. This was approx 7.5 miles of ice above the Caribou Dam.

