

MONTHLY REPORT OF HYDROLOGIC CONDITIONS

WFO Caribou, Maine

REPORT FOR:
MONTH YEAR

November 2022

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

SIGNATURE

James Sinko
Hydrology Program Manager

DATE

December 8, 2022

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.

November 2022

November 2022 started on a very mild note with unseasonably mild temperatures. The first 12 days of the month, including record warmth. It turned sharply colder for the remainder of the month, although by late in the month temperatures were seasonable. This is a direct result of the monthly average of the Pacific North American (PNA) pattern averaging at -0.73 standard deviation with a North Atlantic Oscillation (NAO) pattern monthly mean of +0.69 standard deviation. This is well depicted below in the reanalysis of the monthly anomaly of the 500mb Geopotential Heights and the mean heights. The anomaly shows the much higher heights over New England with the strong blocking shifted further into the far North Atlantic. Overall the Jet Stream was averaged mainly zonal across the area. However, we did see several cold shots that allowed for colder air to work down from Northern Canada.

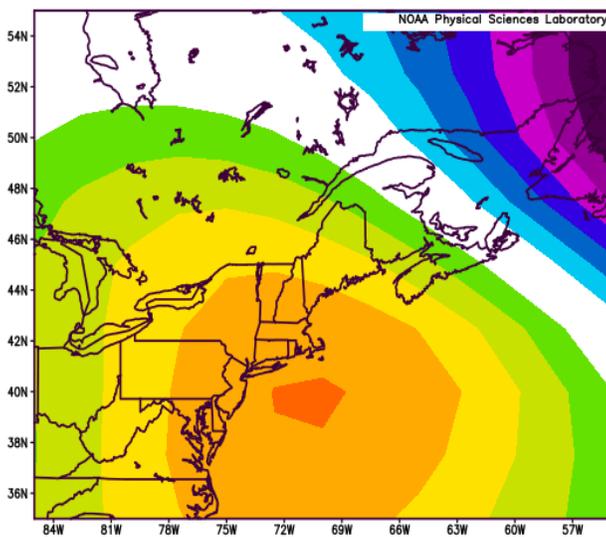


Figure 1: 500mb Geopotential Height (m) Anomalies (1991-2020 Climo) November 2022

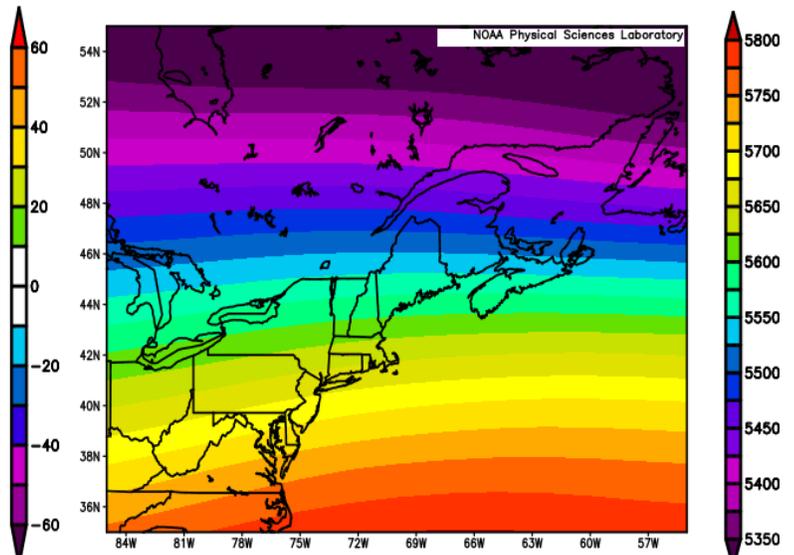


Figure 2: 500mb Geopotential Height (m) Composite Mean November 2022

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

Temperatures ranged from 1.5 to 4 degrees above average for the month as a whole. The month began with record warmth and back-to-back highs in the low 70s at Caribou on the 5th and 6th. There were only the 2nd and 3rd times on record with a high of 70°F or warmer at Caribou during the month of November. The low of 59°F on the 6th at Caribou established a new all-time record warm low temperature for the entire month of November. It smashed the previous record of 53°F back on November 2, 1966. Other monthly record low warm temperatures were established at Houlton (61°, old record 55°F), Millinocket (61°F, old record 57°F) and Bangor (62°F, old record 57°F).

<i>Town/City</i>	<i>Avg Monthly Temperature (°F)</i>	<i>Normal Monthly Temperature (°F)</i>	<i>Departure from Normal (°F)</i>
Frenchville	33.6	31.8	+1.8
Fort Kent	32.6	30.3	+2.3
Caribou	34.2	32.6	+1.6
Houlton	36.6	33.1	+3.5
Millinocket	38.2	34.6	+3.6
Greenville	37.4	32.9	+4.5
Bangor	40.9	37.3	+3.6
Robbinston	38.9	37.7	+1.2
Topsfield	38.2	35.0	+3.2

Precipitation was above average at all of the long term climate sites and mostly ranged from 100 to 150 percent of normal across the region. There were some spots in Washington and Hancock counties where precipitation was a bit below average and ranged from 70 to 90 percent of normal as depicted below with Robbinston & Topsfield. In addition snowfall was below average across the Downeast region into the Penobscot Valley with only 1 inch observed at Bangor, which was 3.3 inches below average. Robbinston and Topsfield both reported below normal snowfall for the month. Snowfall was above average north of Houlton & Baxter State Park region. 14.3 inches of snow fell in Caribou, which was 3.9 inches above normal. At the end of November, the snow depth ranged from 6-10 inches to the North of the Katahdin Region with no snow on the ground from Millinocket southward to the coast. See below for specific details on rainfall and snowfall data at observation sites . Thank you to our Cooperative Observer Program (CoOp) observers providing data in Fort Kent, Robbinston and Topsfield.

Precipitation Totals for Select Locations with all units in inches

Location	Total Precip	Normal Precip	Departure from Normal	% of Normal	Snowfall	Normal Snowfall	Departure from Normal	Greatest Snow Depth
Frenchville	3.14	2.58	+0.56	121.7%				
Fort Kent	4.22	3.23	+0.99	130.6%	17.7	8.9	+8.8	14
Caribou	4.96	3.35	+1.61	148%	14.3	10.4	+3.9	8
Houlton	5.35	3.61	+1.74	148.2%				
*Millinocket	5.29	4.10	+1.19	129%	2.0			2
Greenville	5.68	3.96	+1.72	143.4%				
Bangor	5.28	3.84	+1.44	137.5%	1.0	4.3	-3.3	T
Robbinston	5.80	5.50	+0.30	105.4%	1.2	3.6	-2.4	T
Topsfield	4.54	5.29	-0.75	85.8%	4.7	8.4	-3.7	2

**Millinocket snowfall measured at CoOp site, not the ASOS site. No departure data is available.*

Streamflows: Across much of the state started the month around normal discharge but with rainfall we did see some improvements in areas that got above normal precipitation. Snowfall eventually reduced the amount of precipitation that made it into the ground. Soil temperatures were above freezing for the entire month so much of any daily melt from snow went into the ground. Across northern areas snowfall fell and began a snowpack while southern areas continued to see rainfall. Towards the end of the month warmer temperatures and rainfall began to melt the snowpack allowing for additional snowpack water releases into the rivers and streams. Several streams and rivers across the North and Central Highlands became well above normal flows while other areas like the St. John Headwaters and Downeast lacked rainfall so readings averaged much below normal. By the end of the month the St. John headwaters averaged Much Below Normal while the rest of the St. John Basin was Below Normal to Normal discharges. The Aroostook, Piscataquis and Penobscot basins were Above Normal in the 76-90th percentile. Across the Downeast much of the rivers and streams were Much Below Normal and Below Normal conditions.



Picture 1: Aroostook River, Washburn, ME (Courtesy: James Sinko)



Picture 2: St. John River, Dickey, ME (Courtesy: Maine DOT)



Picture 3: Aroostook River, Presque Isle, ME (Courtesy: James Sinko)

Ice: We did begin to see ice develop after the cold snap in mid November with the St. John and Aroostook River basin rivers by late month around Thanksgiving, streams and creeks developing frazil ice. Here is a photo taken of the Aroostook River in Washburn on the morning of November 27th (Picture 1). It features mostly frazil ice staying on the left side of the river near the left bank on the upstream side of the Castle Hill Road. You can also see the Frazil Ice on this camera from Maine Department of Transportation in Dickey along the St. John River on November 22 (Picture 2). Ice by November 30th turned into thin sheet ice along the banks with a mix of Frazil and Pan Ice in the channels as seen here in this picture taken from the Route 1 bridge in Presque Isle over the Aroostook River.

Groundwater: Across the North Woods based on the Clayton Lake groundwater levels showed a month starting out Below Normal but did improve into the Normal levels by late month. This allowed for an average around normal which was an improvement over the previous month. Across the St. John Valley into the Aroostook River Basin groundwater levels were Above Normal given the above normal precipitation. The groundwater station in Millinocket gives us a great look at conditions across the Baxter Region into the Moosehead Region. The Millinocket groundwater started the month on the high end Normal side but ended up finishing well into the Above Normal category from mid month to the end of the month which means it averaged Above Normal (75-90th percentile). Across the Greater Bangor area into the Downeast we saw Above Normal to Much Above Normal readings for the month. The Calais gage which has 41 years of records for the month of December had several days above daily record levels allowing for a monthly average >90th percentile.

In regards to **Drought** monitoring, the entire month of November 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.

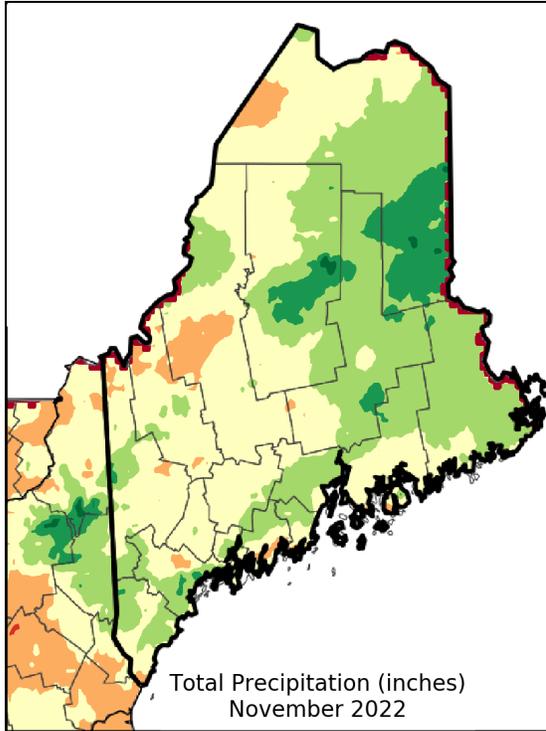


Figure 3: Monthly Precipitation Totals for November 2022

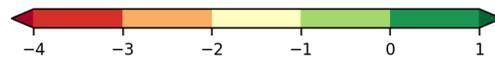
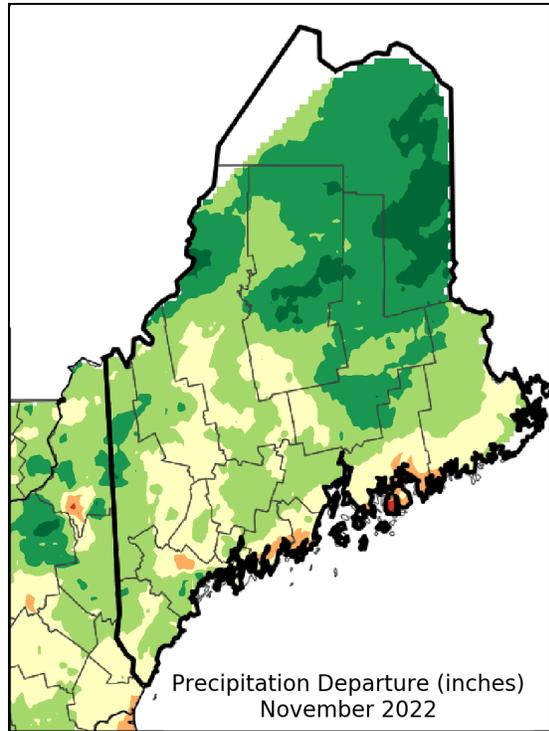


Figure 4: Monthly Precipitation Departures from Normal for November

Source: [Northeast Regional Climate Center](#)

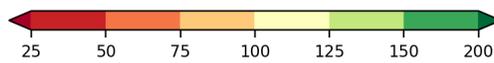
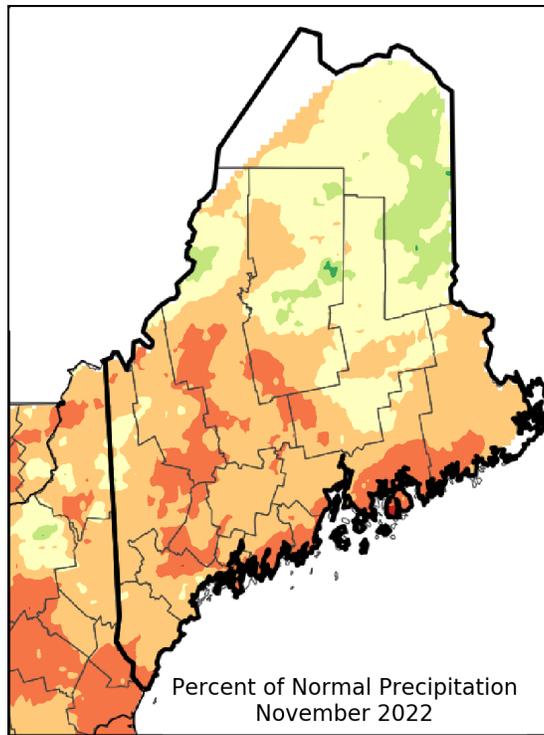


Figure 5: Percent of Normal Precipitation November 2022

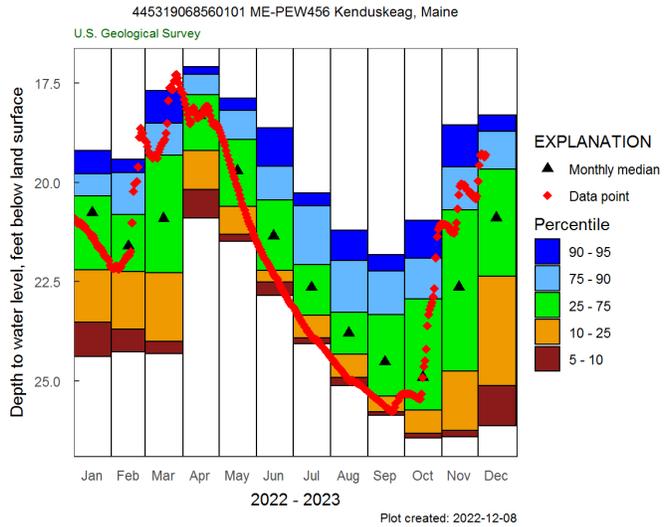
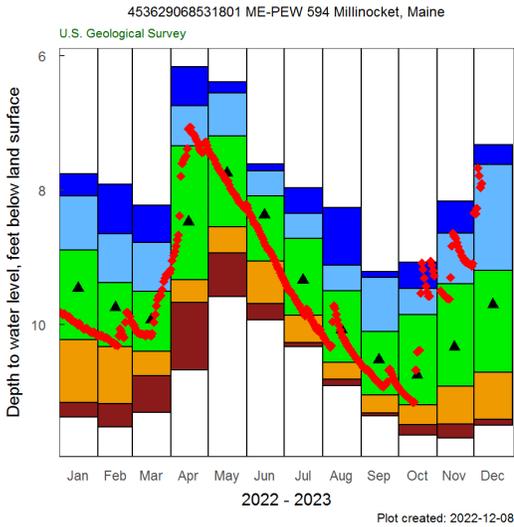
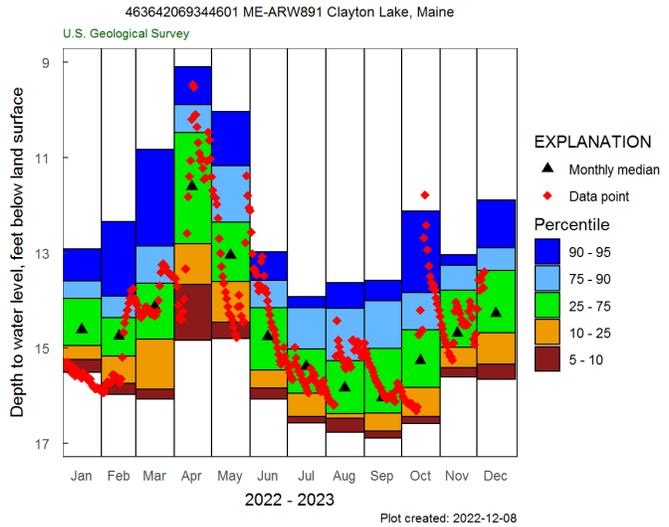
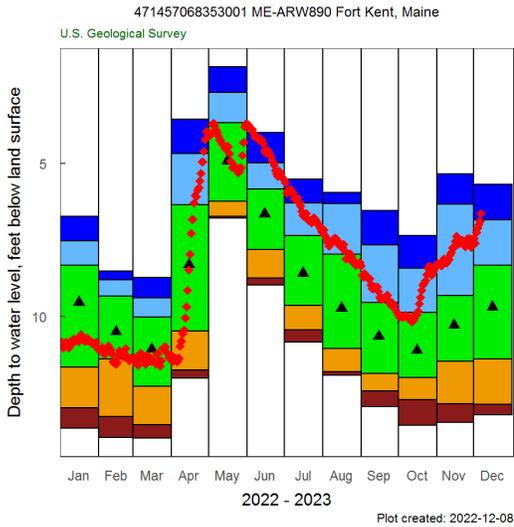
Source: [Northeast Regional Climate Center](#)

November Streamflows for Rivers

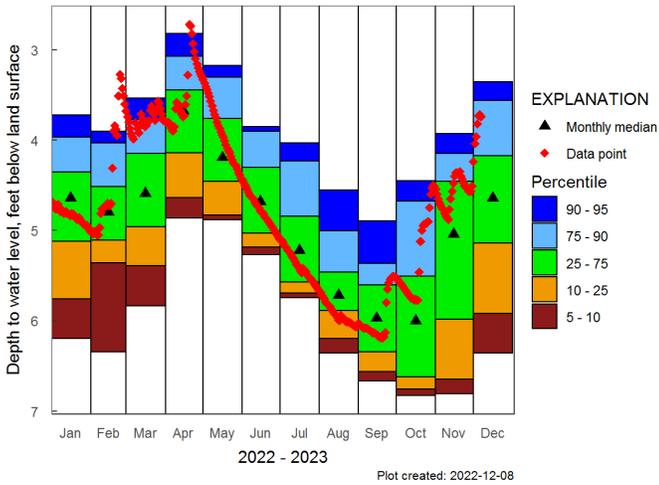
River	Monthly Mean Flow (cfs)	% Normal (mean)	Percentile Class	Drainage (mi ²)	Years of Record
Big Black River near Depot Mtn	189.33	55.66	Much Below Normal	171	38
St. John River at Nine Mile Bridge	N/A	N/A	Ice Affected	1341	72
Allagash River near Allagash	1918.08	113.16%	Normal	1478	92
St. John River at Dickey	3427.06	77.92%	Normal	2680	77
St. John River at Fort Kent	3981.52	44.24%	Below Normal	5929	95
Fish River near Fort Kent	979.81	74.05%	Normal	873	92
Aroostook River near Masardis	2150.95	138.21%	Above Normal	892	64
Aroostook River at Washburn	4007.37	148.08%	Above Normal	1654	91
St. Croix River at Vanceboro	165.77	34.85%	Much Below Normal	413	94
St. Croix River at Baring	1238.78	50.54%	Below Normal	1374	63
Grand Lake Stream at Grand Lake Stream	62.03	29.95%	Much Below Normal	228.3	94
Narraguagus River at Cherryfield	602.53	101.05%	Normal	227	73
East Branch Penobscot River at Grindstone	2458.33	130.13%	Above Normal	837	100
Mattawamkeag near Mattawamkeag	4359.33	145.77%	Above Normal	1418	87
Piscataquis River near Dover-Foxcroft	721.03	102.69%	Above Normal	298	119
Sebec River at Sebec	1020.77	169.95%	Above Normal	326	67
Piscataquis River at Medford	3067	110.46%	Normal	1162	90
Penobscot River at West Enfield	16358	132.55%	Above Normal	6422	119

November Groundwater Levels

Station	Percentile Class	Years of Record
Hadley Lakes	Normal	37
Kenduskeag	Above Normal	42
Calais	Above Normal	41
Millinocket	Above Normal	28
Clayton Lake	Normal	33
Fort Kent	Above Normal	46



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



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

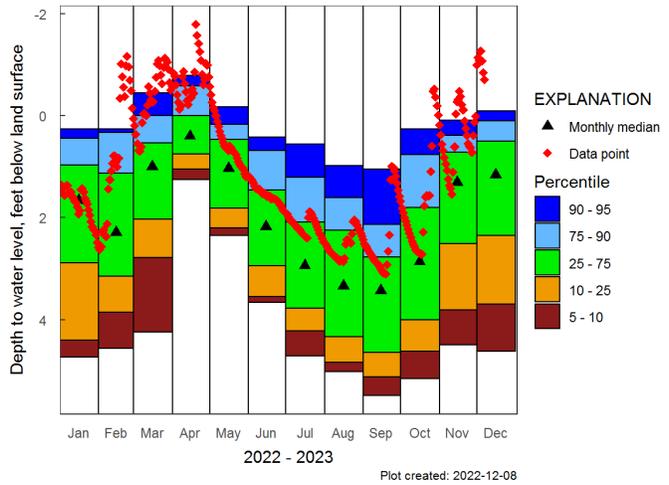


Figure 6-11: Groundwater Level Yearly Plots to Current
Source: [United States Geological Survey](https://www.usgs.gov/)

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.

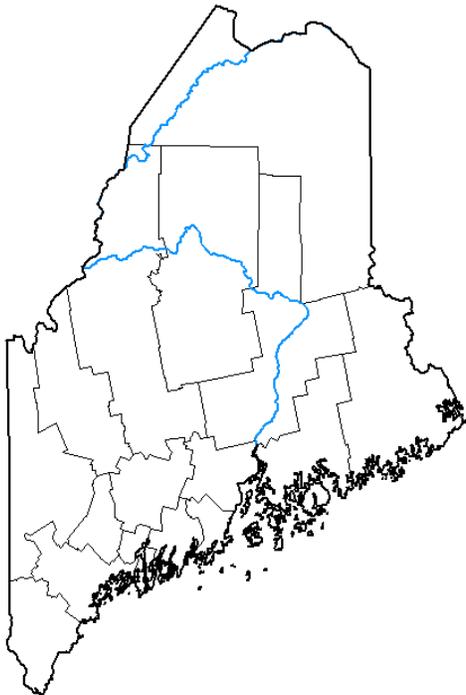
**Non-Routine Hydrologic Products
November 2022
WFO Caribou, ME**

Product	How Many Issued	Reason for Issuance
Flash Flood Warning	1	Excessive Rainfall
Flood Advisory	2	Excessive Rainfall

Drought Conditions for November 2022

U.S. Drought Monitor Maine

November 1, 2022
(Released Thursday, Nov. 3, 2022)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 10-25-2022	99.85	0.15	0.00	0.00	0.00	0.00
3 Months Ago 08-02-2022	34.22	65.78	39.85	8.14	0.00	0.00
Start of Calendar Year 01-04-2022	72.42	27.58	11.82	5.32	0.00	0.00
Start of Water Year 09-27-2022	88.92	11.08	3.23	0.00	0.00	0.00
One Year Ago 11-02-2021	72.42	27.58	11.82	6.56	0.00	0.00

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:

Brian Fuchs
National Drought Mitigation Center



droughtmonitor.unl.edu

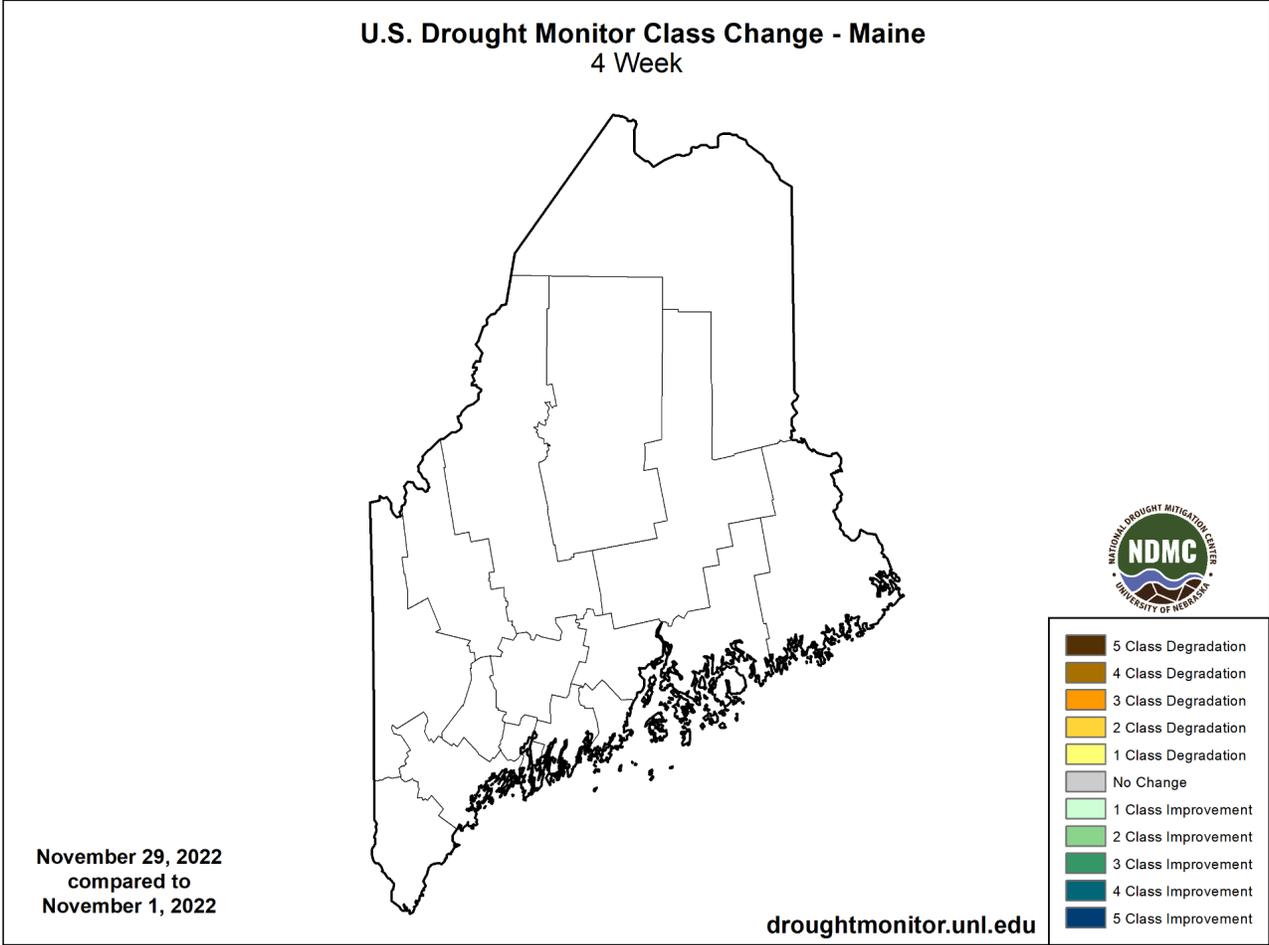


Figure 12-14: U.S. Drought Monitor Drought Classification & Statistics for November
 Source: [U.S. Drought Monitor](https://droughtmonitor.unl.edu)