

Water Resources Authority

Stream flow Bulletin – December 2024

Introduction

This stream flow bulletin examines the flows within 12 major rivers in Jamaica’s 10 Hydrologic Basins. It assesses the rivers responses to rainfall conditions , and the impact of dry and wet seasons on flow dynamics. The Bulletin uses the monthly Rainfall Summary from the Meteorological Services of Jamaica and the Caribbean Climate Outlook Forum (CariCOF) Drought Outlook and the Caribbean Climate Outlook Newsletter for predicted climatic information.

Climatic Outlook

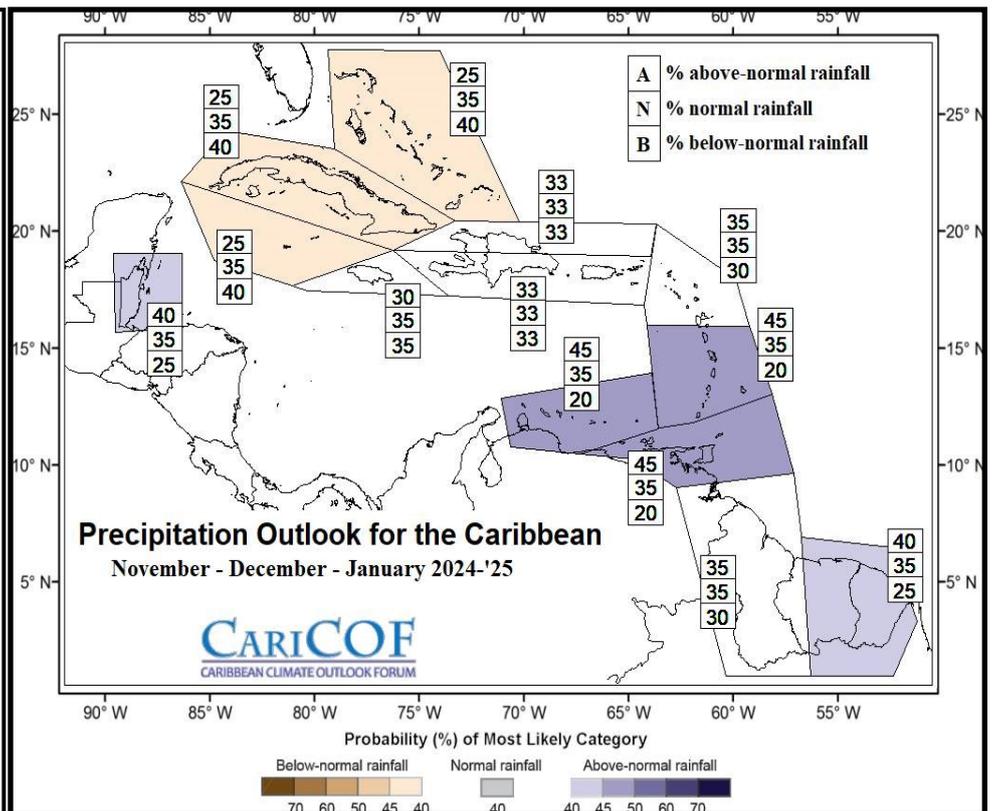
The Meteorological Service of Jamaica (MSJ) has reported that 7 parishes recorded rainfall amounts below their respective 30-year means with values ranging from 53% to 85% for December. The remaining 6 parishes recorded rainfall amounts above their 30 years monthly mean with values ranging from 106% to 160%. All parishes experienced wetness ranging from near-normal to exceptionally wet. There was no report of meteorological drought conditions for any of the parishes. The precipitation **forecasts** by the MSJ and for January 2025 is for 50-60% lower than-normal probabilities for St. Catherine, Clarendon, Manchester, and St. Thomas while sections of KSA, Portland, St. Elizabeth and Westmoreland, Hanover and St. James rainfall estimates are indeterminate.

Precipitation Outlook

November 2024 — January 2025

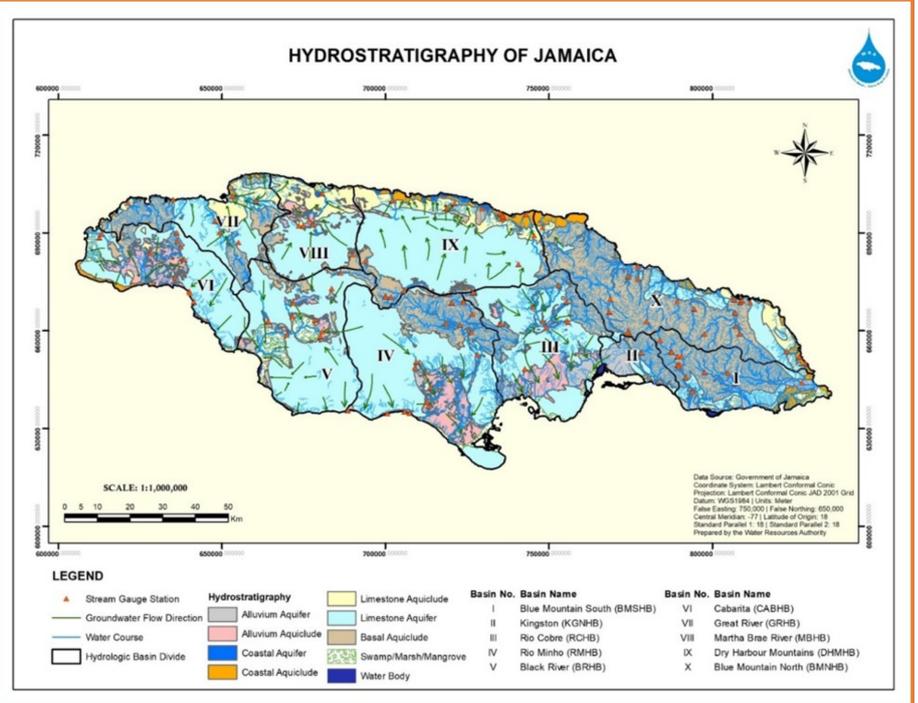
The diagram shows the November 2024 to January 2025 precipitation outlook for the Caribbean . The forecast is for Jamaica to receive below – normal rainfall amounts for the period.

Source: Caribbean Climate Outlook Forum



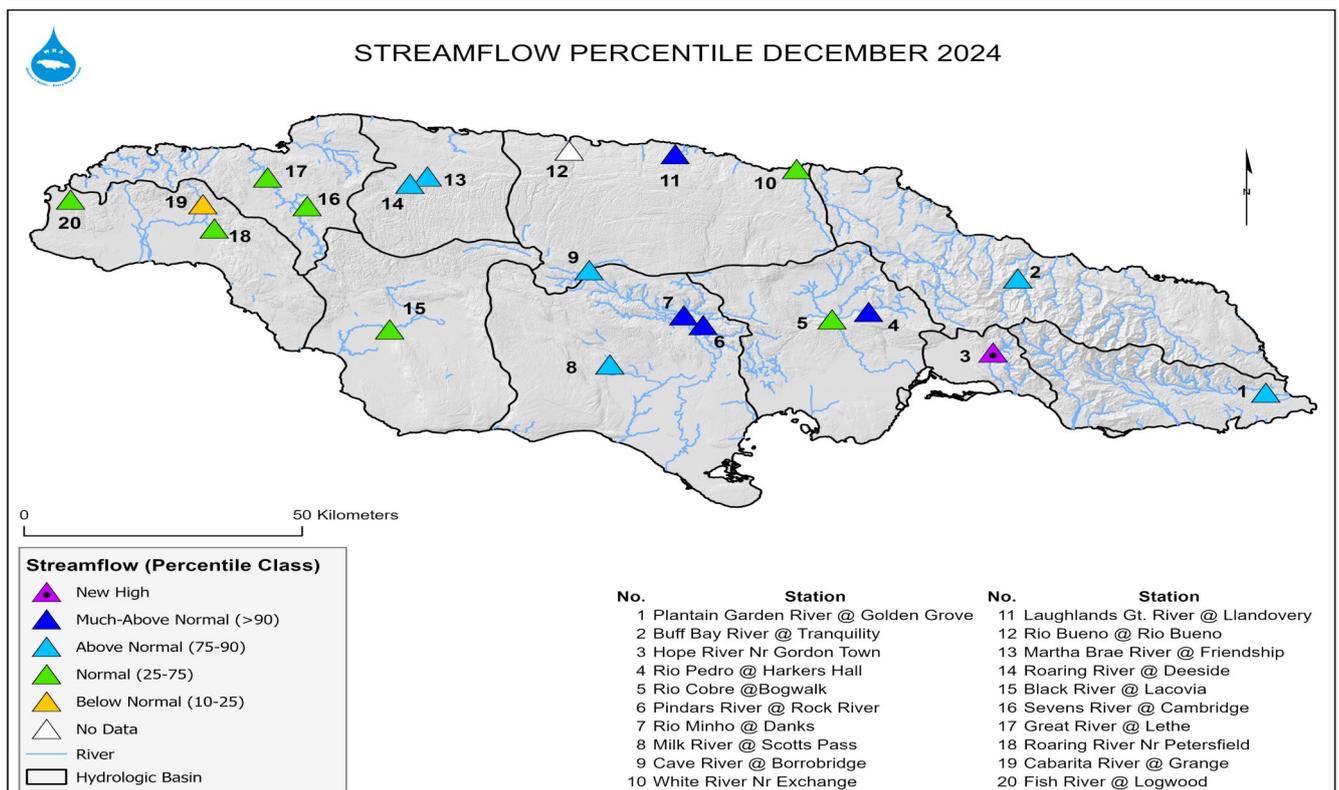
Jamaica Hydrologic Basins and Hydrostratigraphy

The map shows Jamaica Hydrologic Basins and Hydrogeologic Units (Hydrostratigraphy). Basins X, II, I and the Central Inliers which straddle both Basins IX and IV consist of Volcanoclastic rocks which comprise the Basal Aquicludes, while Basins IX, IV, III, VIII, VII and VI are predominantly limestone aquifers.



Situation analysis

The hydrological conditions for December indicates stream flow averages for the 10 Hydrologic Basins ranging from normal percentiles to new highs (the highest flow averages recorded for November). The Hope River near Gordon Town recorded new high for the second consecutive month, while the Rio Minho at Danks, Pindars River at Rock River, Rio Pedro at Harkers and the Laughlands Great River at Llandoverly recorded flows greater than the 90 percentile or much-above normal. These higher than normal flows are likely as a result of increased baseflow as a consequence of rainfall associated with tropical storm Rafael and other events recharging the aquifers in November. The higher-than-normal rainfall in some parishes (based on the MSJ report) also contributed to increased runoff to rivers. (Please see the diagram below)



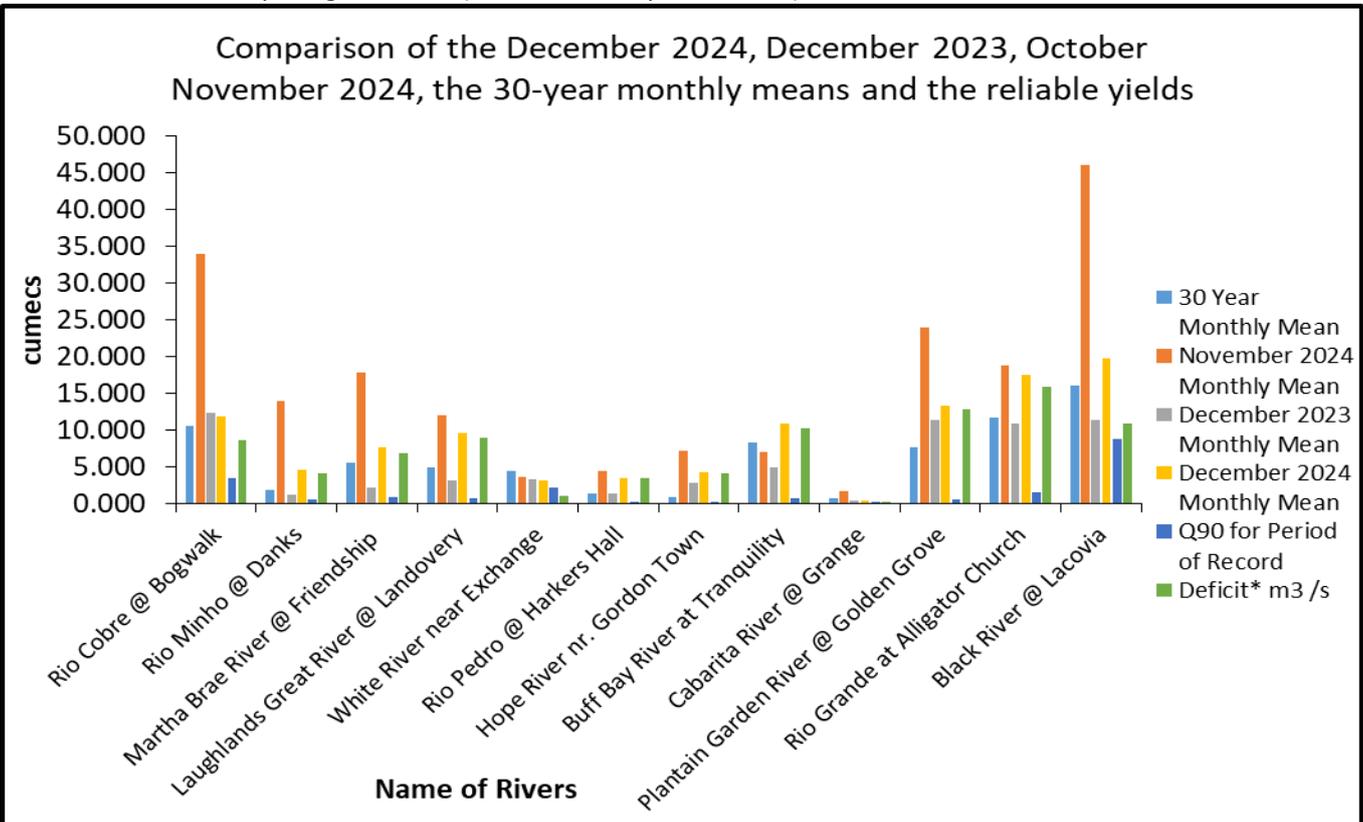
Further Analysis

Flow averages recorded for December 2024 were greater in 9 of the 12 rivers which were analysed when compared with November 2023 ranging from 118% (Plantain Garden River at Golden Grove) to 367% (Rio Minho at Danks). When compared with November 2024 averages, eleven rivers recorded less flow averages in December ranging from 0.574m³/s or 13,101,240 gal/dy (White River near Exchange) to 26.28m³/s or 5.998269 x 10⁸ gal/dy (Black River at Lacovia) more flows. Ten rivers recorded greater average flows in December ranging from 113% (Rio Cobre at Bog Walk) to 535% (Hope River near Gordon Town) when compared to the respective 30—year monthly means. There was no record of flow deficit in November.

The table below show flows by volume in cubic metres per second.

Comparison of monthly mean of December 2024 to the 30 year monthly mean and the Q90							
Name of River	Parish	30 Year Monthly Mean	November 2024 Monthly Mean	December 2023 Monthly Mean	December 2024 Monthly Mean	Q90 for Period of Record	Deficit* m ³ /s
Rio Cobre @ Bogwalk	St. Catherine	10.580	33.907	12.25	11.9	3.371	8.529
Rio Minho @ Danks	Clarendon	1.890	13.96	1.26	4.63	0.518	4.116
Martha Brae River @ Friendship	Trelawny	5.570	17.852	2.192	7.595	0.835	6.76
Laughlands Great River @ Landoverly	St. Ann	4.890	11.985	3.078	9.589	0.732	8.857
White River near Exchange	St. Ann	4.390	3.668	3.349	3.094	2.089	1.005
Rio Pedro @ Harkers Hall	St. Catherine	1.390	4.489	1.41	3.487	0.093	3.394
Hope River nr. Gordon Town	Kingston	0.810	7.115	2.826	4.332	0.171	4.161
Buff Bay River at Tranquillity	Portland	8.330	7	4.849	10.924	0.703	10.221
Cabarita River @ Grange	Westmoreland	0.640	1.65	0.387	0.3773	0.21	0.1673
Plantain Garden River @ Golden Grove	St. Thomas	7.661	23.991	11.299	13.33	0.477	12.853
Rio Grande at Alligator Church	Portland	11.620	18.83	10.802	17.484	1.547	15.937
Black River @ Lacovia	St. Elizabeth	16.075	45.958	11.281	19.678	8.76	10.918

* Deficits are denoted by a negative value (Deficit = Monthly Mean - Q90)



Graphical representation of the comparisons shown in the table.

Discussion

Analysis of the hydrologic data for December 2024 showed greater flow volumes in 75% of rivers which were analysed, when compared with the same period of 2023. However, eleven rivers recorded less flow than the November 2024 averages. Regarding the 30—year monthly mean flows, 10 of the 12 rivers recorded greater flow averages than their respective 30—year normal. The figure on page 2 shows that 4 rivers recorded much-above normal average flows (greater 90 percentile) while 1 river recorded the highest average for the December. There was no record of flow deficit in November 2024.

The flow trends corresponds with increased groundwater discharge to rivers arising from the recently-ended wet season which was very active. Additionally, the above-normal rainfall recorded in some areas for December contributed to increase flows. The number of rivers reporting greater average flows than their 30 year normal in December 2024 when compared to the corresponding period in 2023 increase to 10 from 4 (a 150% increase).

According to the Caribbean Climate Outlook and the MSJ, Jamaica may experience lower than usual rainfall probabilities of 50%-60% in some parishes for January, along with mildly higher temperatures. Based on these forecasts, it is expected that rivers in the 10 Hydrologic Basins will experience normal flow conditions in January, and greater than the respective reliable yields in most, if not all instances. It is expected that average flows for January 2025 will be less than the respective 30—years monthly means in the majority rivers and comparable to those of December 2024 averages.

Definition of Terms

Hydrological Drought—This is a hydrological extreme that manifests in abnormally low stream flows, levels in ponds and lakes, reservoirs and groundwater. Hydrological droughts occurs after many months of meteorological drought, that is, extended period of below normal rainfall.

Q90—Q90 or reliable yield, is a statistical low flow index that represents flows that either exceeds or occur 90% of the time. It assists in determining the resource availability during periods of drought.

Percentile—A percentile is a value on a scale of 100 that indicates the percent sample distribution (in this case a particular flow) that is equal to or below it. For example, stream flows in this calendar month at the 90th percentile are equal to or greater than 90 percent of the stream flows which have been recorded in the calendar month for the extent of the station.

Percentiles above 90 are considered Much-Above Normal,

Percentiles between 75 and 90 are considered Above Normal,

Percentiles between 25 and 75 are considered Normal,

Percentiles between 10 and 25 are considered Below Normal, and

Percentiles below 10 are considered Much-Below Normal.

Stream gauging station— Gauging stations are facilities use to automatically monitor streams, or other water bodies.

To convert from m³/s to gal/day: - $m^3/s \times 86400 \text{ s/day} \times 264.1721 \text{ gals}$ (where m³ = cubic meters, s = seconds and gal = U.S. gallons).

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