



## Stream flow Bulletin – August 2023

### Introduction

This stream flow bulletin examines the flows within the 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.

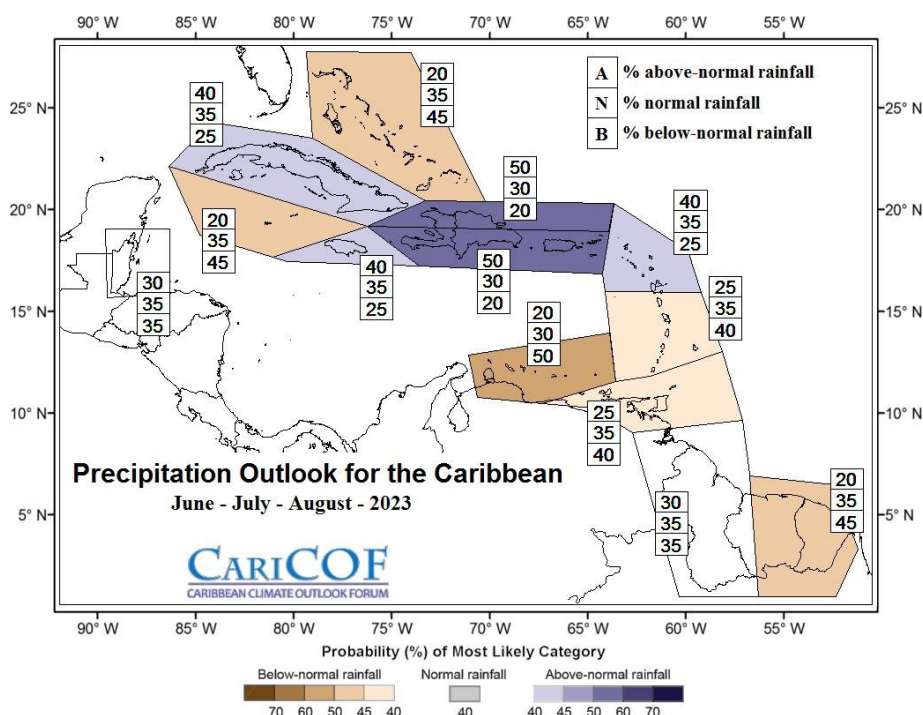
### Climatic Outlook

The Meteorological Services of Jamaica (MSJ) reported that 9 parishes recorded below-normal rainfall amounts ranging from 48% to 86% of their respective 30-year means (below-normal) for August 2023. It further reported that 11 parishes experienced varying level of dryness ranging from near-normal dry to severely dry. One parish, namely St. James, experienced meteorological drought conditions in August. The parishes that recorded dry conditions were St. Thomas, Westmoreland, St. Mary, Hanover, Clarendon, Manchester, St. Catherine, St. Ann, St. Elizabeth and KSA. The forecasts by the MSJ and CariCOF for September is that 33% to 40% probability of above-normal rainfall.

### Rainfall patterns June—August 2023

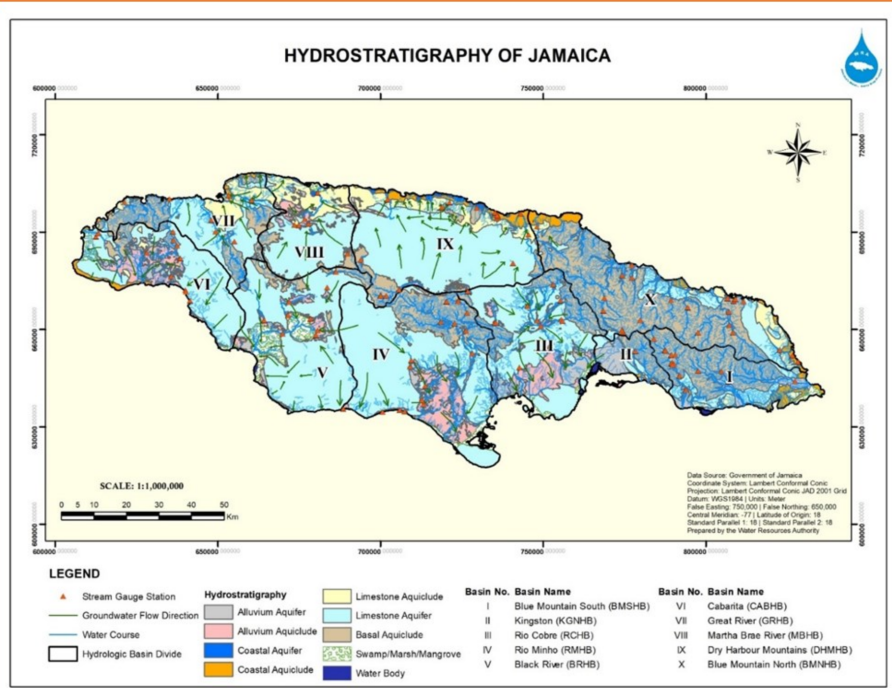
The diagram shows the June to August precipitation outlook for the Caribbean. The forecast is for Jamaica to receive above-normal rainfall amounts for the period.

Source: Caribbean Climate Outlook Forum



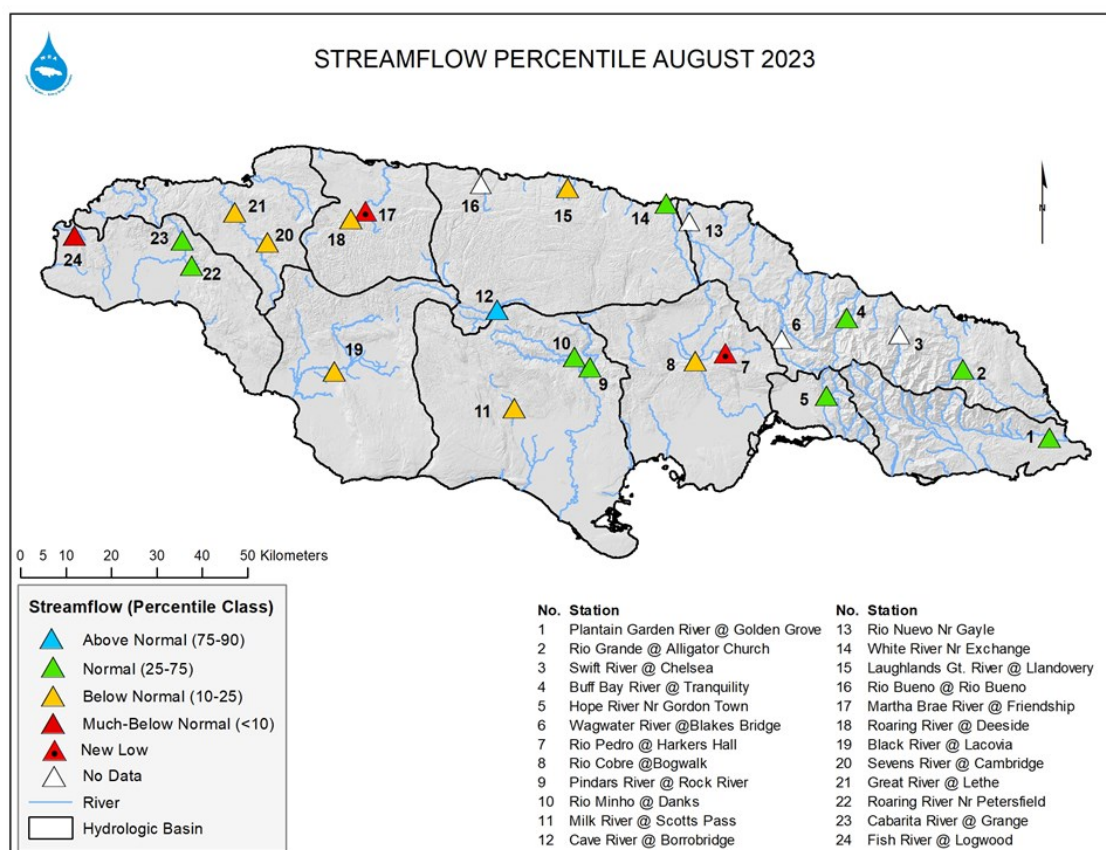
## Jamaica Hydrologic Basins and Hydrostratigraphy

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

For the month of August, the Martha Brae River at Friendship and the Rio Pedro at Harkers Hall in the Martha Brae River and the Rio Cobre Hydrologic Basins respectively, recorded the lowest average flows (new low) on record for the month of August. In addition to the two aforementioned rivers, several others in the western and central Hydrologic Basins recorded average flows ranging from normal to much-below normal percentiles (see diagram below). Based on the data, the impact of the below-normal rainfall on flows in some rivers within the watersheds is evident by the below normal to much-below normal flows. Some rivers that are in areas which recorded below normal rainfalls were however not impacted.

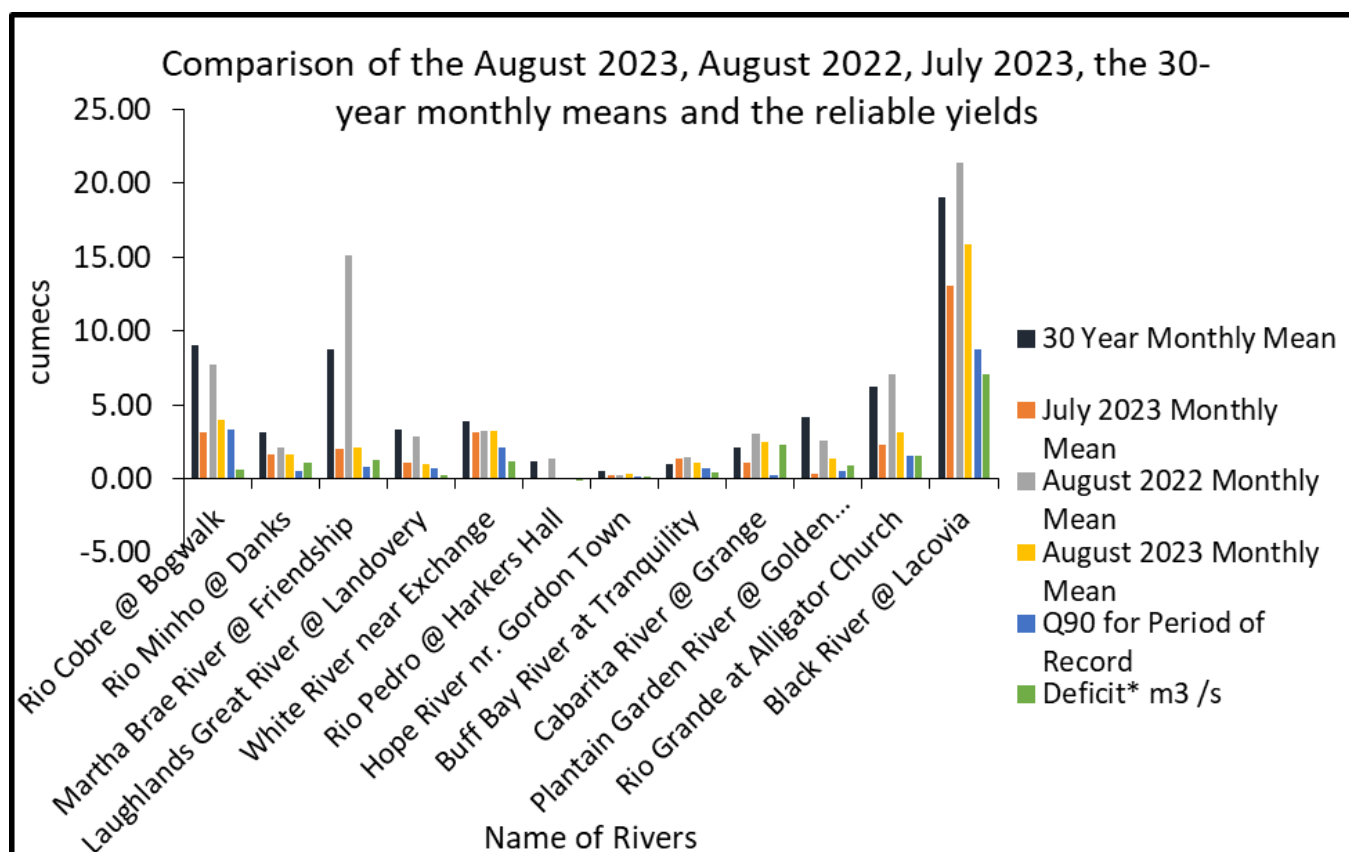


## Further Analysis

Ten rivers recorded average flows for August 2023 which ranged from 0% to 82% of the August 2022 average flows, with two river namely the Hope River and the White River, recording greater flows 109% and 101% respectively. When compared with July 2023 average flows, 9 rivers recorded greater discharge in August ranging in volume from 0.01 m<sup>3</sup>/s to 2.807 m<sup>3</sup>/s (228,245 gallons/day to 64,068,270gallons/day). This could be alluded to higher groundwater storage contributing increase baseflows to the rivers. The average flows for 9 of the 12 rivers ranged from 0% to 94% of their respective 30—year means for August. The average flows for August were greater than the Q90s of 11 rivers, the Rio Pedro at Harkers Hall, Plantain Garden River and the Rio Cobre recorded flow deficits.

Name of River	Parish	30 Year Monthly Mean	July 2023 Monthly Mean	August 2022 Monthly Mean	August 2023 Monthly Mean	Q90 for Period of Record	Deficit* m <sup>3</sup> /s
Rio Cobre @ Bogwalk	St. Catherine	9.010	3.126	7.77	3.99	3.371	0.619
Rio Minho @ Danks	Clarendon	3.110	1.62	2.10	1.63	0.518	1.112
Martha Brae River @ Friendship	Trelawny	8.770	2.037	15.121	2.149	0.835	1.314
Laughlands Great River @ Landoverly	St. Ann	3.346	1.121	2.902	0.975	0.732	0.243
White River near Exchange	St. Ann	3.888	3.139	3.251	3.279	2.089	1.19
Rio Pedro @ Harkers Hall	St. Catherine	1.188	0	1.32	0	0.093	-0.093
Hope River nr. Gordon Town	Kingston	0.520	0.212	0.287	0.312	0.171	0.141
Buff Bay River at Tranquility	Portland	1.026	1.35	1.49	1.087	0.703	0.384
Cabarita River @ Grange	Westmoreland	2.160	1.119	3.048	2.486	0.21	2.276
Plantain Garden River @ Golden Grove	St. Thomas	4.181	0.368	2.582	1.342	0.477	0.865
Rio Grande at Alligator Church	Portland	6.260	2.341	7.1	3.129	1.547	1.582
Black River @ Lacovia	St. Elizabeth	19.069	13.04	21.404	15.847	8.76	7.087

\* 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 August 2023 showed less flows in 83% of rivers which were analysed, when compared with the same period of 2022. Additionally, flows recorded in August 2023 were greater in 75% of the rivers when compared with July 2023. Regarding the 30—year mean flows, 9 of the 12 rivers recorded were less flows than the respective 30—year means. The Rio Pedro continues to be in a flow deficit, this having been the case since January 2023.

The flows trends corresponds with the forecasts from the Meteorological Service of Jamaica and the Caribbean Climate Outlook of below to above-normal rainfall conditions across Jamaica for August 2023.

According to CariCOF Drought Outlook and the Caribbean Climate Outlook, precipitation forecast for August 2023, Jamaica may experience normal to above rainfall conditions. The MSJ also predicts mid-summer dry period in below normal to above-normal conditions for September 2023 . Thus, the average flows for rivers in the 10 Hydrologic Basins are expected to be greater than the respective reliable yields in most instance, but may be less than respective 30 years monthly-means in September 2023 in most cases.

## 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 90<sup>th</sup> 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 m<sup>3</sup>/s to gal/day:** -  $\text{m}^3/\text{s} \times 86400 \text{ s/day} \times 264.1721 \text{ gals}$  (where m<sup>3</sup> = cubic meters, s = seconds and gal = U.S. gallons).

Prepared by the

Resource Collection and Data Monitoring Section

Water Resources Authority

P.O. Box 91, Hope Gardens, Kingston 7

Email: [info@wra.gov.jm](mailto:info@wra.gov.jm), Website: [wra.gov.jm](http://wra.gov.jm) Twitter: @wragovja

July 2023