



Stream flow Bulletin – June 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.

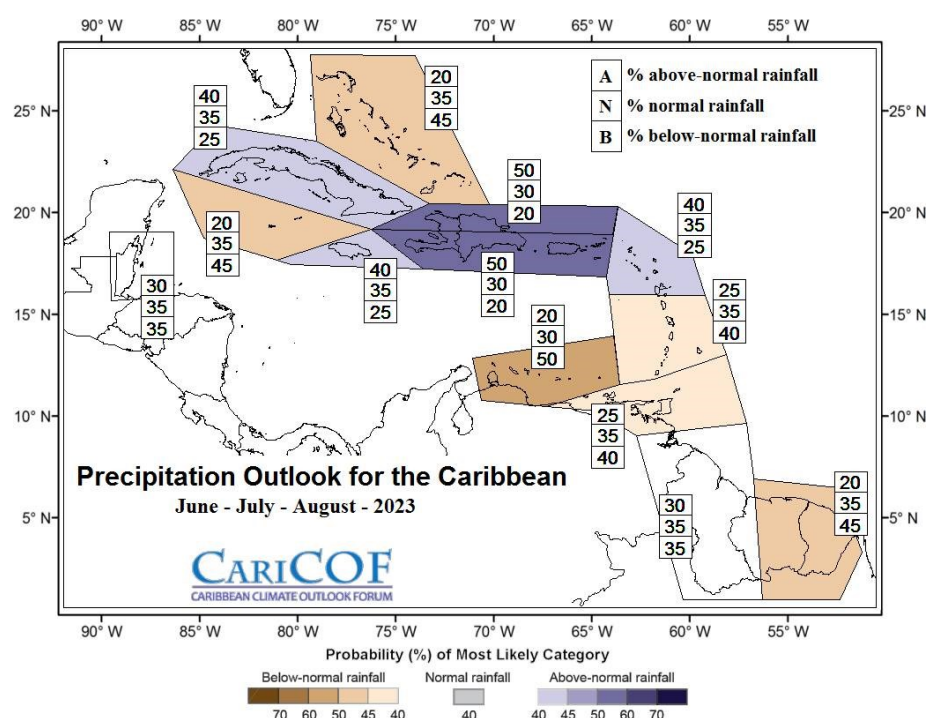
Climatic Outlook

The Meteorological Services of Jamaica (MSJ) reported that 7 parishes recorded normal to above normal-rainfall amounts ranging from 100% to 203% of their respective 30-year means (below-normal) for June 2023. It further reported that 6 parishes received below-normal rainfall, less 100%, and ranging from near-normal dry to moderately dry. There was no meteorological drought conditions in June. The parishes that recorded dry conditions were St. Thomas, Portland, Westmoreland, St. Mary Hanover. The forecasts by the MSJ and CariCOF are that the country have a 40% probability of receiving above-normal rainfall in July.

Rainfall patterns June—August 2023

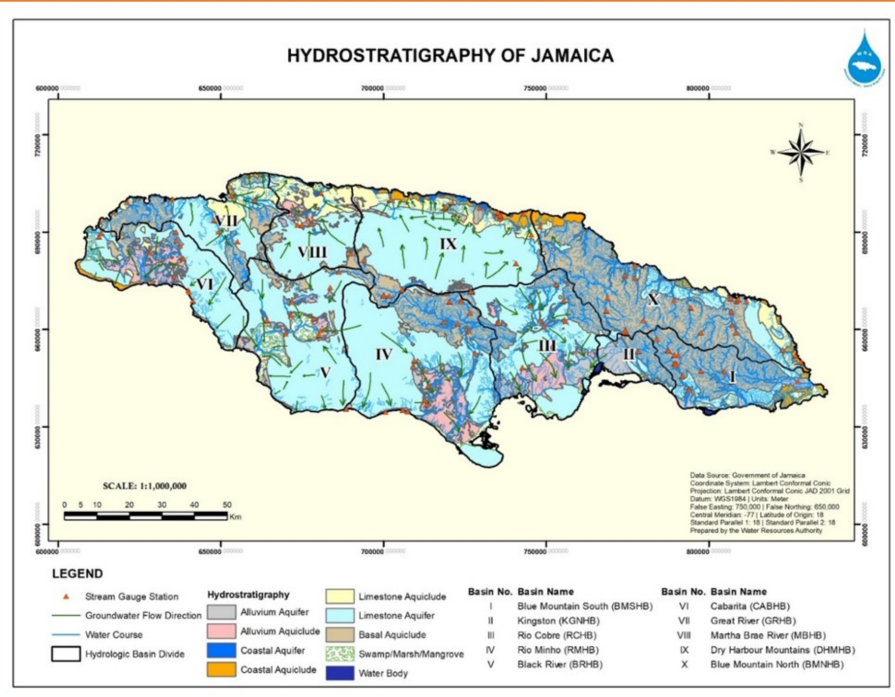
The diagram shows the June to August precipitation outlook for the Caribbean. The forecast is for Jamaica to receive above-normal rainfall amounts for the period.

Source: Caribbean Climate Outlook Forum



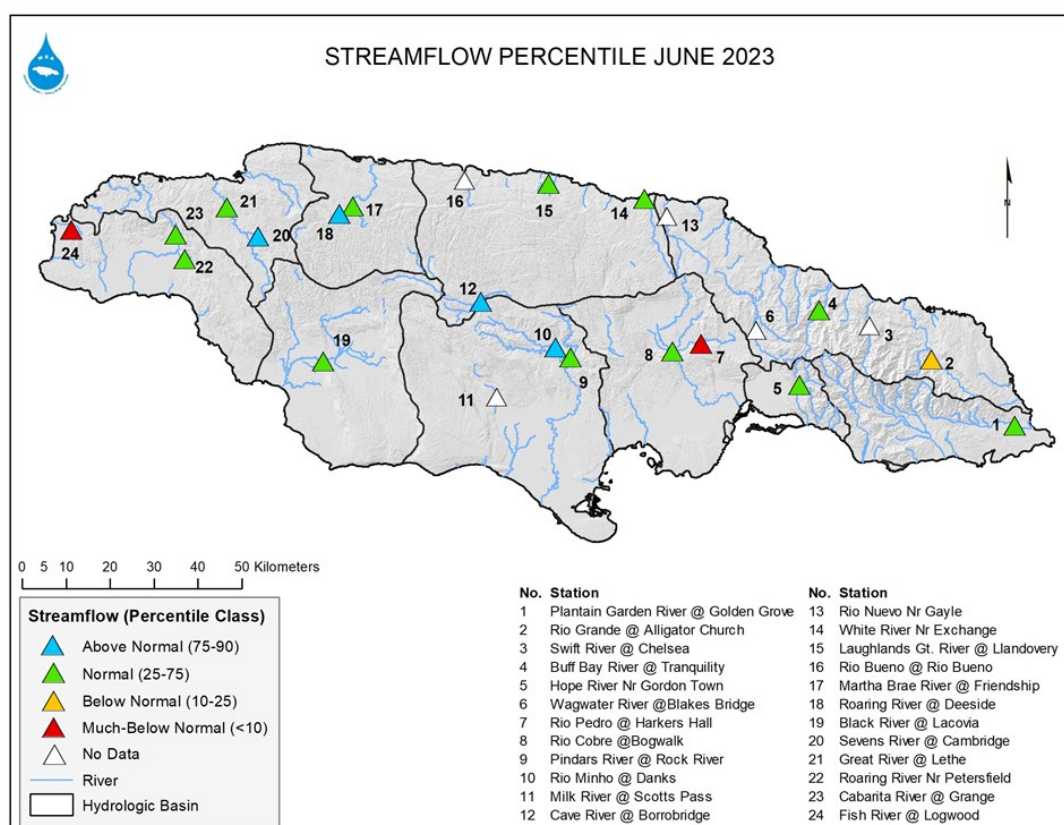
Jamaica Hydrologic Basins and Hydrostratigraphy

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

The majority of rivers in the 10 Hydrologic Basins recorded flows that were within the normal percentile class i.e. 25-75. Four rivers, namely; the Sevens River at Cambridge, Roaring River at Deeside, Cave River at Borrobridge and the Rio Minho at Danks, recorded flows within the 75-90 percentile, that is above normal. The Fish River at Logwood and the Rio Pedro at Harkers Hall recorded much-below normal flows while the Rio Grande at Alligator Church recorded below normal flow. (See figure below). The flow volumes recorded are in keeping with the report by the MSJ and CariCOF as rivers in the Great River, Martha Brae, Dry Harbour and Rio Minho Hydrologic Basins indicate responses to increase rainfall. (See figure above)



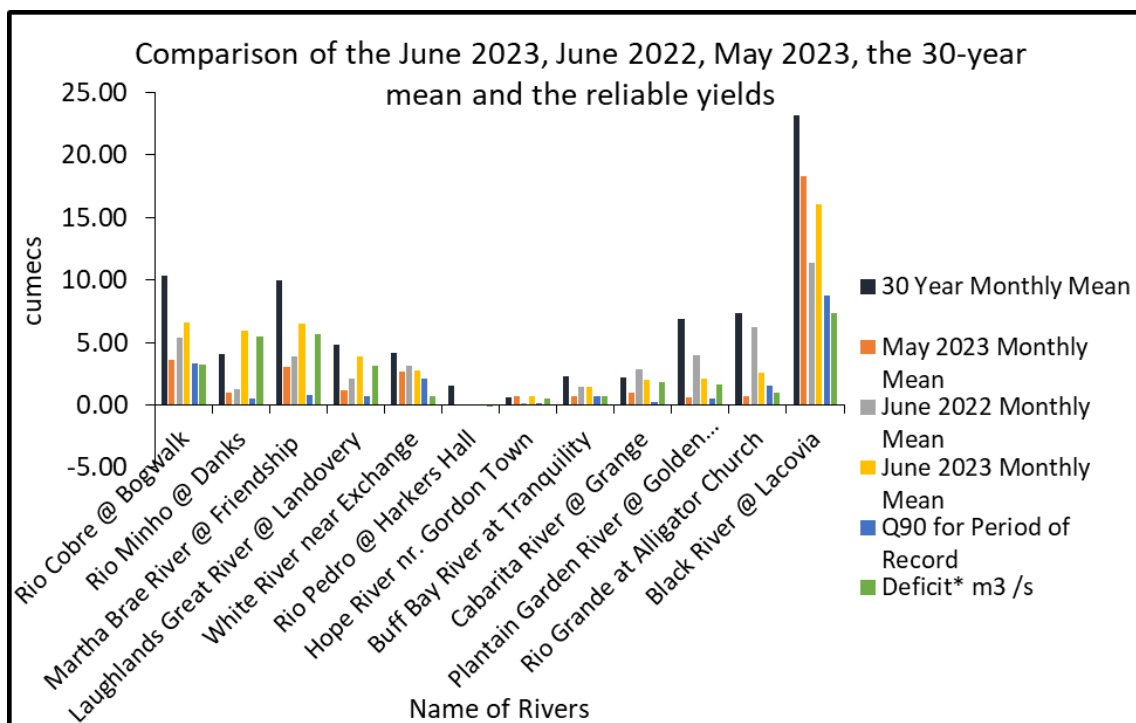
Further Analysis

Average flows for June 2023 ranged from 476% to 0% of the June 2022 average flows with greater flows in 6 the 12 rivers analysed. The river that recorded the greatest reduction in flow for June 2023 was the Rio Pedro at Harkers Hall (0 m³/s). When compared with May, the average flows were greater in all but two rivers, namely; the Black River at Lacovia and Hope River near Gordon Town. When compared with the respective 30—year means for June, the average flows ranged from 0% to 146%, with only two rivers; the Rio Minho, 146% and the Hope River, 124%, averaging greater flows. Rio Minho at Danks was the only river to record flow greater than its 30—year monthly mean (123%). The average flows for June were greater than the Q90s of all rivers except the Rio Pedro at Harkers Hall which recorded a flow deficit.

Comparison of monthly mean of June 2023 to the 30 year monthly mean and the Q90

Name of River	Parish	30 Year Monthly Mean	May 2023 Monthly Mean	June 2022 Monthly Mean	June 2023 Monthly Mean	Q90 for Period of Record	Deficit* m ³ /s
Rio Cobre @ Bogwalk	St. Catherine	10.317	3.65	5.39	6.57	3.371	3.199
Rio Minho @ Danks	Clarendon	4.090	1.02	1.26	6.00	0.518	5.482
Martha Brae River @ Friendship	Trelawny	9.991	3.073	3.891	6.552	0.835	5.717
Laughlands Great River @ Landoverly	St. Ann	4.822	1.19	2.08	3.92	0.732	3.188
White River near Exchange	St. Ann	4.214	2.694	3.124	2.796	2.089	0.707
Rio Pedro @ Harkers Hall	St. Catherine	1.596	0	0.0467	0	0.093	-0.093
Hope River nr. Gordon Town	Kingston	0.591	0.744	0.174	0.733	0.171	0.562
Buff Bay River at Tranquility	Portland	2.283	0.734	1.47	1.44	0.703	0.737
Cabarita River @ Grange	Westmoreland	2.200	1.031	2.832	2.004	0.21	1.794
Plantain Garden River @ Golden Grove	St. Thomas	6.914	0.597	3.968	2.091	0.477	1.614
Rio Grande at Alligator Church	Portland	7.399	0.736	6.28	2.57	1.547	1.023
Black River @ Lacovia	St. Elizabeth	23.209	18.333	11.39	16.09	8.76	7.33

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



Graphical representation of the comparisons shown. All the other rivers recorded greater flows than the Reliable Yields.

Discussion

Analysis of the hydrologic data for June 2023 showed greater flows in 50% of rivers which were analysed, when compared with the same period of 2022. Additionally, flows were greater in 84% of the rivers when compared with May 2023, this as Jamaica begin to experience increase precipitation in sections of the island especially after what appears to be a lengthy dry season. However, 10 of the 12 rivers recorded significantly less flows than the respective 30—year means. The Rio Pedro was the only river that recorded a flow deficit for June 2023, and this has been the trend since January 2023, all the other rivers recorded mean flows which were greater than their respective Reliable Yields.

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

According to CariCOF Drought Outlook and the Caribbean Climate Outlook, precipitation forecast for July 2023, Jamaica may experience normal to above rainfall conditions. The MSJ also predicts mid-summer dry period in July. 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 not be comparable with the respective 30 years monthly-means in July 2023.

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

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June 2023