The islands can be divided into two primary physiographic zones, windward and leeward, which relate to the exposure of these areas to the northeasterly trade winds and orographic rainfall. In general, windward areas receive higher rainfall than leeward areas. For most areas in the State of Hawaii, the wet season occurs during the months of October through April and the dry season is from May through September, although exceptions to this pattern are not uncommon. Like rainfall, seasonal streamflow patterns are spatially variable. Monthly streamflow generally is higher during the wet season than the dry season. However, seasonal streamflow variations may be less pronounced in windward areas where base flow is significant and rainfall is persistent.

In areas that receive significant ground-water discharge, base flow represents a large fraction of total flow. In parts of eastern Maui, ground-outlet discharge from a vertically extensive freshwater-lens system contributes to stream base flow. In much of windward Oahu and in the windward part of west Maui, streams receive ground-water discharge from dikes-impounded ground-water bodies and base flow represents a large fraction of total flow, particularly where streams have eroded deep valleys in dikes-impounded areas. The base flow component of daily streamflow was estimated using a computerized base-flow separation model (Wahl and Wahl, 1995). Two parameters, f (turning-point test factor) and N (number of days in window), are assigned. For all streams, a value of 0.9 was used for the turning-point test factor f. The model divides the daily streamflow record into non-overlapping N-day periods and determines the minimum flow within each N-day window. If the minimum flow within a given N-day window is less than f times the adjacent minimums, then the central window is considered a turning point. The model separates the base flow from the streamflow record. The length of the N-day windows for a stream is an indicator of the time over which direct runoff occurs following a storm.