Projects and ActivitiesThu Mar 28 22:18:55 HST 2024

Name	Trends and Shifts in Streamflow in Hawaii, 1913-2008
Capability Area: Variability/Changes	- Understanding Climate Variability and Change - Historical Observations (hindcasts/climatologies)
ECV	- (e.g., surface water, glaciers and ice caps, land cover, biomass)
Timeframe	- Intra-annual to Decadal
Capability Area: Impacts/Adaptations	- Understanding Climate Impacts and Informing Adaptation - Climate Impacts - Historical Observations (hindcasts/climatologies)
Sectors	- Fresh Water Resources - Agriculture and Fisheries - Recreation and Tourism - Ecosystems
Status	- Completed
Focus Area	- Fresh Water Resources and Drought
Regions	- Central North Pacific - State Of Hawaii
Description	This study addresses a need to document changes in streamflow and base flow in Hawaii during the past century. Hydrological Processes, 27: 1484 - 1500.

Objectives/Outcomes	Statistically significant long-term (1913-2008) downward trends were detected (using the nonparametric Mann-Kendall test) in low-streamflow and base-flow records. These long-term downward trends are likely related to a statistically significant downward shift around 1943 detected (using the nonparametric Pettitt test) in index records of streamflow and base flow. The downward shift corresponds to a decrease of 22% in median streamflow and a decrease of 23% in median base flow between the periods 1913-1943 and 1943-2008. The shift coincides with other local and regional factors, including a change from a positive to a negative phase in the Pacific Decadal Oscillation, shifts in the direction of the trade winds over Hawai'i, and a reforestation programme. The detected shift and long-term trends reflect region-wide changes in climatic and land-cover factors. A weak pattern of downward trends in base flows during the period 1943-2008 may indicate a continued decrease in base flows after the 1943 shift. Downward trends were detected more commonly in base-flow records than in high-streamflow, peak-flow, and rainfall records. The decrease in base flow is likely related to a decrease in groundwater storage and recharge and therefore is a valuable indicator of decreasing water availability and watershed vulnerability to hydrologic changes. Whether the downward trends will continue is largely uncertain given the uncertainty in climate-change projections and watershed responses to changes.
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Url	http://pubs.er.usgs.gov/publication/70040116