Name | Trends and Shifts in Streamflow in Hawaii, 1913-2008  
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**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.

Lead Agencies

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Partnering Agencies

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