571L & 571C

FLOOD FLOW (MONTHLY FLOW EXCEEDED 10 PERCENT OF TIME)

Background

- Climate change is anticipated to continue to increase the magnitude of flood flow (i.e., the monthly flow exceeded 10% of the time) at some locations and decrease it at others.[1]
- Spring peak flows are expected to arrive earlier in areas with runoff from snowmelt.[2]
- Extreme peak flows can adversely affect river ecosystems.[3]
- Higher values suggest higher vulnerability relative to other watersheds.

THIS INDICATOR MEASURES THE MONTHLY RUNOFF THAT IS EXCEEDED 10 PERCENT OF THE TIME.

Local vs. Cumulative

- Flow-based indicator values depend on where the flow originates.
- The vulnerability assessment tool uses two versions of this indicator:
  - Local (571L): Reflects flow generated within only one 4-digit hydrologic code (HUC-4) watershed.
  - Cumulative (571C): Reflects flow generated within a HUC-4 watershed and any upstream watersheds.

Data Sources

Data Source	Description	Spatial Resolution	Temporal Resolution
Coupled Model Intercomparison Project (CMIP-5) output[4]	Local runoff within HUC-4 watersheds	HUC-4 watersheds	2035-2064 and 2070-2099

This Indicator Was Used to Assess the Vulnerability of One of USACE's Eight Business Lines

Indicator	Business Line	Importance Weight (Varies from 1 to 2 for USACE)
571L	None	N/A
571C	Recreation	1

Calculation

- Use local runoff values from 47 CMIP-5 climate model traces specific to each future scenario.[5]
  - For indicator 571L, use local runoff values from each model trace.
  - For indicator 571C, use cumulative runoff values from each model trace.
- Find the monthly value of runoff that is exceeded 10 percent of the time to find the flood flow value for each model trace.
- Rank the climate model traces' flood flow values from low to high, and select the 42nd value.

[1] Arnell, N. W. 1999. Climate Change and Global Water Resources. Global Environmental Change. 14(1): 31-52.
[2] Hayhoe, K., et al. 2007. Past and Future Changes in Climate and Hydrological Indicators in the US Northeast. Climate Dynamics. 28(4): 381-407.
[3] Mantua, N., I. Tohver, and A. Hamlet. 2010. Climate Change Impacts on Streamflow Extremes and Summertime Stream Temperature and Their Possible Consequences for Freshwater Salmon Habitat in Washington State." Climatic Change. 102(1-2): 187-223.
[4] CMIP-5 output is available for download online at: http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html
[5] Indicator values were calculated for two scenarios (a wet and a dry future) and two time periods (2035-2064 and 2070-2099).

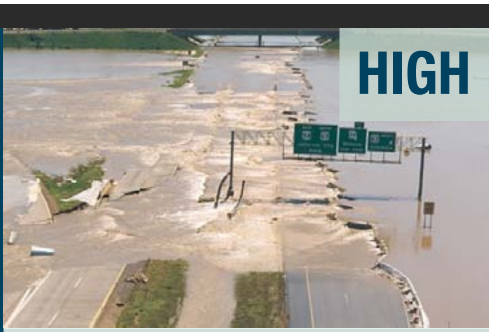
LOW

Boeing Levee, Kent, WA - Courtesy of the City of Kent

LOW INDICATOR VALUE
Areas that do not regularly experience high flow levels would have low indicator values.

HIGH INDICATOR VALUE
Extreme high flows may result in flooding and damage to property.

HIGH



Jefferson City, MO - Courtesy of MO Highway and Transportation Dept.