

HYDROLOGIC MODELING OF STREAMFLOW METRICS

BACKGROUND

Flow regime is fundamentally important to determine the physical and ecological characteristics of streams, but actual measurements of streamflow are available for only a small minority of stream segments, and usually only large rivers. Flows for all other streams must be extrapolated or modeled. Modeling is necessary to estimate flow regimes under future climate conditions. There are few databases of modeled stream flows that are broad in coverage, fine in resolution, and available for both historical and future climate conditions.

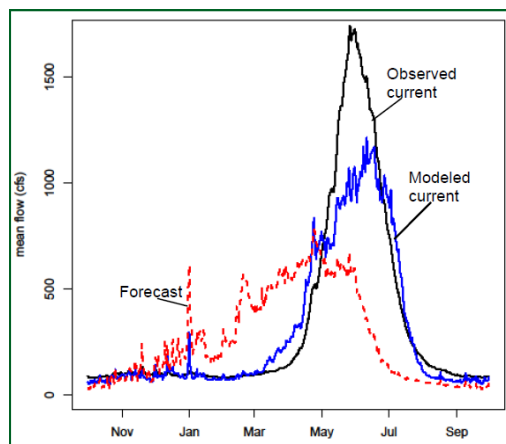
RESEARCH

Research Activity: Modeled streamflow metrics are based on daily simulations of the Variable Infiltration Capacity (VIC) macroscale hydrologic model produced by the University of Washington [Climate Impacts Group](#). Model outputs were used to calculate a set of summary flow metrics to describe key attributes of the flow regime for each stream segment in the 1:100,000 scale National Hydrography Dataset ([NHDPlusV2](#)).

Benefits to Resource Managers: Stream hydrology strongly affects the structure of aquatic communities. Water resource planners and land managers need tools to assess climatic effects so that limited resources can be directed to high priority conservation areas. Streamflow prediction tools provide this essential information to resource managers. Despite some limitations, the VIC model sufficiently represents several ecologically relevant hydrologic characteristics in streams, making it useful for understanding the effects of hydrology in delimiting species distributions and predicting the potential effects of climate shifts on aquatic organisms.



RMRS researchers developed a database of modeled streamflow metrics for streams in major river basins across the country. Streamflow metrics were modeled under historical conditions and include future climate change scenarios as well.



Hydrograph displaying observed historical flow (black), modeled historical conditions (blue), and forecasted climatic conditions (red) for Johnson Creek, Idaho.

KEY POINTS

- Climate change is projected to alter the flow regimes of streams and rivers, with consequences for physical processes and aquatic organisms.
- The stream flow metric dataset makes it possible to study the effects of droughts, changes in snowpack, water resource impacts, and other hydrologic changes for historical and future climate change scenarios.
- Datasets are available for historical conditions (1978-2006) and for future climate change scenarios associated with global climate models.

MORE INFORMATION

Flow metrics and climate scenarios are available for free download at the [Stream Flow Metric Dataset website](#). For additional information and important caveats on data accuracy and appropriate use, please contact **Charlie Luce**, USFS Research Hydrologist, (208)373-4382 or charles.luce@usda.gov.