

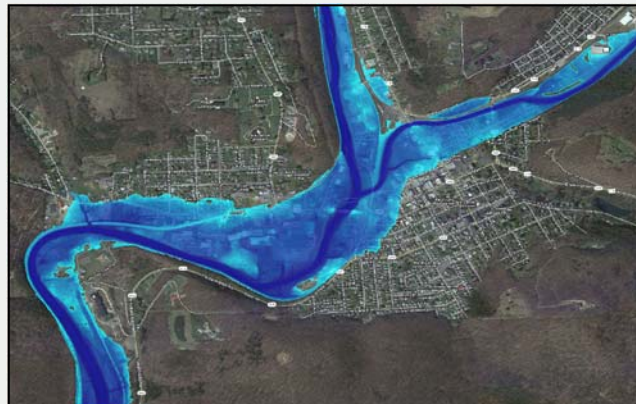


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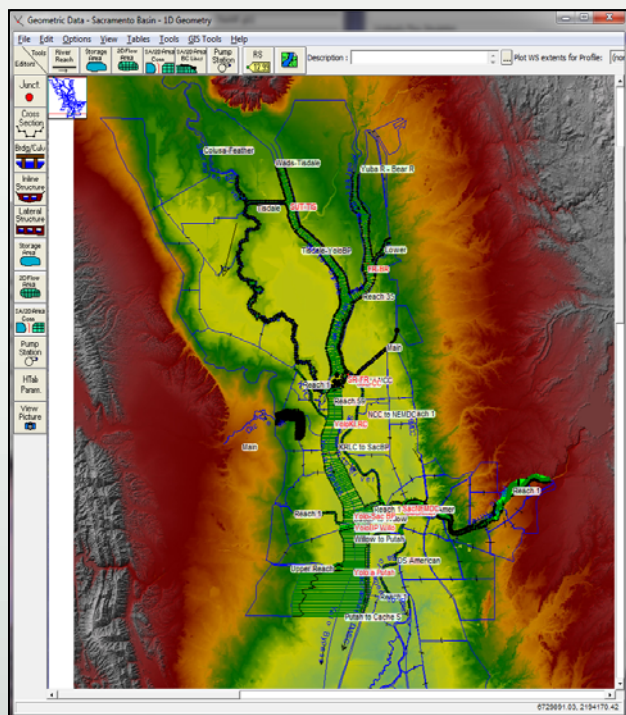
Hydrologic Engineering Center (CEIWR-HEC) River Analysis System (HEC-RAS)

Description

The U.S. Army Corps of Engineers' Hydrologic Engineering Center (CEIWR-HEC), River Analysis System (HEC-RAS) is an integrated system of software, designed for interactive use in a multitasking environment. The software allows simulation of one-dimensional steady and unsteady flow river hydraulics, water surface profile calculations and inundation mapping. HEC-RAS is comprised of a graphical user interface (GUI), separate hydraulic analysis components, data storage and management capabilities, graphics and reporting facilities.



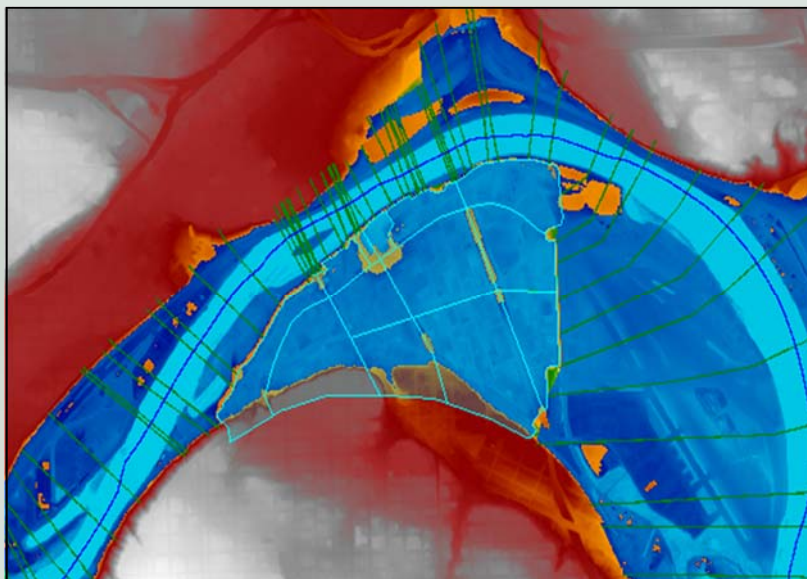
Existing Capabilities



- **Analysis Features** - steady flow water-surface profiles; one- & two-dimensional unsteady flow hydrodynamic simulations; movable boundary sediment transport computations; and water quality analysis (temperature modeling and constituent transport utilizing the Nutrient Sub-Module (NSM) library). Additionally, options are available for: detailed hydraulic structure modeling (spillways, gates, weirs, bridges, culverts, and pump stations); dam & levee breaching, navigation dam operations; U.S. Federal Emergency Management Agency (FEMA) floodway encroachments; split flow optimization; sediment transport capacity & bridge scour; channel modifications; mixed flow regime; sediment budget analysis; ice cover & ice jams; and, model calibration features.
- **Geometric Features** - bridge hydraulics; extensive culvert hydraulics (nine types of culverts); multiple opening analysis (bridges & culverts); inline structures (spillways, gates & weirs); lateral structures (gates, weirs, culverts, & rating curves); two-dimensional flow areas; storage/ponding areas; hydraulic

connections between two-dimensional flow & storage areas; pumping stations; floating ice; levees; extensive data import and export; and, geographic information system (GIS) connections.

- **Graphical Output** - water surface profile plots; cross sections; rating curves; stage and flow hydrographs; generalized profile plot of any variable (i.e., velocity); three-dimensional view of river system; and, graphical animations. Inundation mapping & spatial displays of model output are available directly from within HEC-RAS using the RAS-Mapper tool (since Version 4.1).
- **Tabular Output** - detailed output tables for cross sections & all structures, summary output tables, and user defined output.





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Applications

HEC-RAS users include: all USACE District & Division Offices; USDA Natural Resources Conservation Service (NRCS) & Federal Highway Administration (FHWA) which has adopted use in one-dimensional river hydraulics analysis; other Federal agencies including FEMA, U.S. Geological Survey (USGS), U.S. Bureau of Reclamation (USBR), National Weather Service (NWS), Fish & Wildlife; state & local governments; private industry; environmental organizations, universities, and engineers worldwide.



Projects

- **Ohio & Mississippi Rivers** - model of the entire Ohio River System, a portion of the Mississippi River, and most major tributaries. The model has been developed for real-time river forecasting & is jointly used with the NWS. HEC-RAS modeling provided direct support for the Ohio/Mississippi river flooding that occurred in 2011.
- **Red River of the North** - HEC-RAS models have been developed for the entire Red River of the North for planning analysis studies. The models were also used this year during the spring snow melt runoff, for decision support.
- **Columbia River & Tributaries** - general flood damage reduction analysis & real-time forecasting. HEC-RAS is currently being used for real-time forecasting of the Spring flood runoff on the Columbia River.
- **Mississippi River** - one-dimensional unsteady flow models by all Districts along the river
- **Susquehanna River, PA** - flood warning system & FEMA mapping
- **Truckee River, NV** - flood damage reduction analysis & ecosystems evaluation
- **Anacostia River, MD** - flood damage reduction
- **Jefferson Parish, LA** - highly urban interconnected canals & pump systems
- **East Branch of the California State Water Project (SWP)** - being used in study on enlarging the SWP
- **New Orleans Interior Flooding Analysis - Hurricane Katrina Study**
- **Joseph Sayers Dam, PA** - Dam Safety Study
- **State of Hawaii Dam Safety Analyses** - Dam break simulation & mapping



Technology Transfer

- Documentation includes HEC-RAS User's Manual, HEC-RAS Hydraulic Reference Guide, HEC-RAS Applications Guide, HEC-RAS Two-Dimensional User's Manual
- The HEC-RAS software comes with over fifty example data sets; each example data set is intended to teach the user about a specific aspect of the HEC-RAS software. Most of the example data sets are documented in great detail within the HEC-RAS Applications Guide.
- CEIWR-HEC now has six different PROPSECT training classes that center around the use of HEC-RAS for some type of hydraulic analyses. HEC-RAS training classes and seminars are also given around the country at District office locations.
- Conference presentations & publications

