R2Cross Program

eRAMS

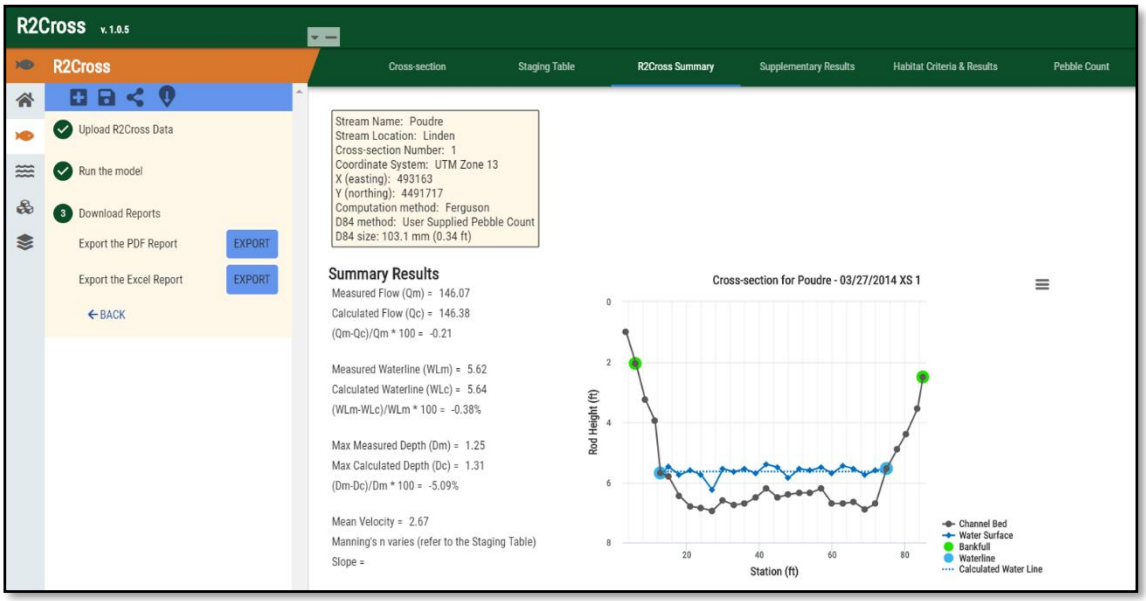
The **Environmental Resource Assessment and Management System (eRAMS)** is an open source technology that provides cloud-based software solutions as online services and a platform for development and deployment of online tools.

Version control and platform requirements are often barriers to widespread adoption of new technologies.

We develop platform independent software to access analytical and "big" data management systems. eRAMS streamlines access to publicly available databases and simplifies workflows.

Our software holistically integrates data and models to comprehensively assess water, land, energy and other linked systems.

Our services are used to assist with strategic and tactical decision making for sustainable management of land, water, energy and other connected resources.



The R2Cross Program was created to assist the Colorado Water Conservation Board (CWCB) determine instream flow recommendations for maintaining minimum flows between specific points on a stream to preserve or improve the natural environment.

Standardized field and office procedures help to ensure that instream flow recommendations reflect the amount of water required to preserve the aquatic habitat in riverine environments. The R2Cross method is one of the standard techniques employed by state and federal agencies to model instream hydraulic parameters and develop instream flow recommendations in Colorado.

The R2Cross method is based on a hydraulic model and uses field data collected in a stream riffle. Riffles are most easily visualized as the stream habitat types that would dry up first should streamflow cease. The required field data includes streamflow measurements, surveys of channel geometry at a transect, the longitudinal slope of the water surface, and pebble counts to determine the grainsize distribution (templates available for download in the web-tool).

The field data is used to model three hydraulic parameters: average depth, average velocity, and percent wetted perimeter. Recommendations are then based in meeting a combination of hydraulic habitat criteria (depth, velocity, percent wetted perimeter).

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Catena Analytics provides powerful platforms for building accessible and scalable analytical tools and simulation models that can be accessed via desktop or mobile devices.

Our **Environmental Resource Assessment and Management System (eRAMS)** and **Cloud Services Integration Platform (CSIP)** present several options for developing collaborative projects and integrating geospatial data, analytics, and modeling engines.

ACCESSIBLE

Your documents, data and tools can be accessed from commonly used web-browsers on mobile or desktop devices.

SCALABLE

Our sophisticated distributed storage and computing techniques provide the scalability and availability necessary to serve a broad range of needs.

SECURE

We provide state-of-the-art data protection solutions and instant access to digital resources using a secure user account.

Key Features

The updated R2Cross program is hosted using the novel eRAMS technology, an open platform supporting development of geospatially-enabled web applications for sustainable management of land, water, and energy resources. eRAMS harnesses open source technologies to provide geospatial data analysis, presentation, processing, and visualization to build custom analytical tools that incorporate model and data services. The R2Cross Program provides a user-friendly, open-access interface for CWCB and stakeholders to use the R2Cross method and provide instream flow recommendations in the state of Colorado.

COMPONENTS

The R2Cross program includes four main components:

1. **R2Cross Tool** can be used to determine instream flows based on field measurements input by the user.
2. **Discharge Calculator** a stand-alone component that can be used to determine the discharge at a cross-section other than the one used in R2Cross.
3. **Particle Size Calculator** a stand-alone component that can be used to determine statistical distributions of sediment sizes based on size classifications.
4. **Geographic Interface** includes data layers and mapping tools to locate the cross-section and display information related to hydrography, stream gages, water right structures and other coverages.

RESULTS

The R2Cross Program graphically summarizes user supplied data to assist the Colorado Water Conservation Board (CWCB) and decision makers determine instream flow recommendations. The program itself does not provide the recommendations, rather it summarizes the model outputs into the following categories:

- **Staging Table** – provides a table of hydraulic variables for incremental stream stages
- **R2Cross Summary** – compares measured (field data) and model calculated values
- **Supplmentary Results** – displays (1) measured data collected in the field; and (2) accompanying hydraulic variables calculated using the field surveyed data
- **Habitat Criteria Results -** contains a summary table of the three biological flow criteria and three dynamic graphs showing the relationship between these criteria and discharge
- **Discharge Results** – displays the results of the Discharge Calculator
- **Pebble Count Results** – displays the results of the Particle Size Calculator

All results can be exported as a PDF or Excel file. Additionally, histograms and graphs can be exported invidually as png or jpg files to create customized reports and other materials.

System Requirements

A modern web-browser is required to connect and run the web-tool. Browser options include: Google Chrome v.69, Mozilla Firefox v.62, Safari v.11.1, and Microsoft Edge v.17.

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