

## For the analysis of

- channel cross-section hydraulics
- habitat-discharge relations
- streamflow data
- streamflow statistics



## What is RAP ?

The River Analysis Package (RAP) has been developed by the CRC for Catchment Hydrology in collaboration with the CRC for Freshwater Ecology. RAP helps river managers undertake:

- River condition assessments
- Environmental flow planning
- River restoration design.

The RAP R&D team plans to develop RAP into a key tool for the integration of river science into river restoration and environmental flow planning in Australia. We have released an initial version (November 2003) with two core modules:

1. Hydraulic Analysis, and
2. Time Series Analysis

We expect these tools to be of general use in a range of applications, and particularly useful for environmental flow studies. The RAP modules are briefly described below but for more information, visit the RAP home page on the Catchment Modelling Toolkit web site at [www.toolkit.net.au/rap](http://www.toolkit.net.au/rap)

Over the next two years we will also incorporate the capacity for flow-ecology modelling. We will build two additional modules within RAP for this:

(i) Rules based models of ecological response to flow (which predicts the direction of ecological response to changes in flow regime based on expert knowledge), and

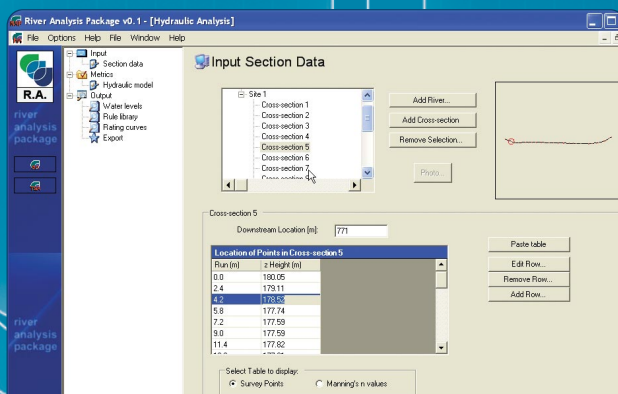
(ii) Quantitative Models of ecological response to flow.

RAP has a user-friendly interface with simple data input and output functionality along with context sensitive help.

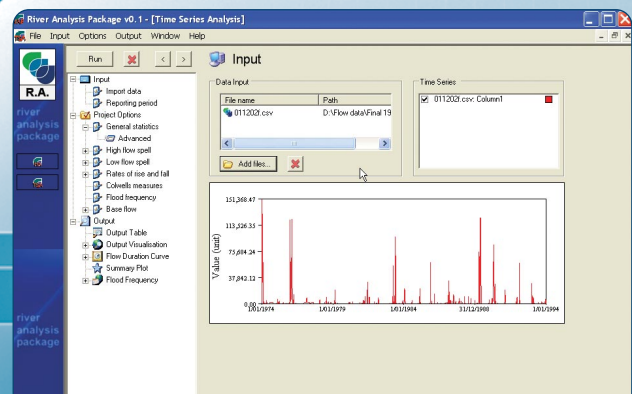
## RAP as a communication tool

In addition to providing an analytical tool, RAP is also intended as a tool for communication between technical teams and stakeholder groups. It has the flexibility to be able to explore the data and different operational scenarios during a workshop or as part of a presentation

to project stakeholders. This is likely to be useful where there are experts from a range of disciplines working on a project or where community groups want to understand the technical basis of project recommendations.



Example of the Hydraulic Analysis interface showing channel cross-section input interface.



Example of the Time Series Analysis interface showing input time series data display.

# About the Modules

1

## Hydraulic Analysis Module

The Hydraulic Analysis module uses a 1-dimensional hydraulic model for examining hydraulic characteristics of river channels. The Hydraulic Analysis module makes it easy to explore the hydraulic conditions under different discharges at channel cross-sections. The Hydraulic Analysis module can calculate the standard cross-sectional attributes such as surface width, area, hydraulic radius and wetted perimeter. Hydraulic Analysis can also be used to calculate the area of aquatic habitat based on hydraulic criteria at a range of discharges. The Hydraulic Analysis module can read HECRAS output files or users can enter their own channel geometry data.

2

## Time Series Analysis Module

The Time Series Analysis module has been designed to calculate summary metrics of daily discharge data, however it can handle other forms of time series data such as time series hydraulic data output from the Hydraulic Analysis module. The range of statistics calculated by the Time Series Analysis module has been informed by a review of the literature, focusing on hydrological statistics used in ecological studies. The Time Series Analysis module can present summary statistics based on the entire period of record, annually, seasonally, or monthly depending on the specific issue being investigated. The Time Series Analysis module includes spell analysis, rates of hydrograph rise and fall, the prediction of flood return interval (partial and annual series), baseflow, seasonality. In addition to the numeric output, the Time Series Analysis module has some useful visualisation tools for plotting flow duration curves, flood frequency curves, and baseflow.

3

## Flow-ecology Modules

Subsequent modules of RAP will provide tools for interpreting the likely biological response of alternative flow scenarios. These modules will be based on the outcomes of a joint CRC for Catchment Hydrology and CRC for Freshwater Ecology Project. The subsequent modules will utilise the underlying capability of the Time Series Analysis and Hydraulic Analysis modules to calculate hydrologic and hydraulic characteristics that have specific biological relevance.

## Further Information and Training

For further information about RAP and its application, training or to obtain a copy visit the Catchment Modelling Toolkit website [www.toolkit.net.au/rap](http://www.toolkit.net.au/rap)

Training in the RAP software is being offered as part of the Catchment Modelling School in Melbourne during 9-20 February 2004. Further details are available at [www.toolkit.net.au/school](http://www.toolkit.net.au/school) and registrations close on Friday 19 December 2003.

**rap**   
river analysis package

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