The Texas A&M University and U.S. Bureau of Reclamation Hydrologic Modeling Inventory (HMI) Questionnaire

December 19, 2009

This document is the Texas A&M University (TAMU)-U.S. Bureau of Reclamation (USBR) Hydrologic Modeling Inventory (HMI) Questionnaire. Your response to this questionnaire will provide the basis for the HMI on-line database accessed through the HMI Web page. Modelers can interactively obtain information about your model through this Web-enabled model inventory complete with search capabilities. The information you provide will hopefully foster wider interest in your model. A designated contact will be explicitly acknowledged and posted within the HMI Web page database.

Given more and more applications of GIS and remote sensing techniques to hydrologic modeling, water resources and watershed management, the Subcommittee on Hydrology has recently set up a workgroup to organize and publicize information on GIS applications in the fields of hydrology and hydraulics. This scope has been expanded to include related water quality, watershed management, and ecological sciences GIS applications. This work is intended to make information on GIS applications in hydrology and hydraulics more generally available. This questionnaire is also designed to gather limited but key information about a particular GIS application in order for a potential user to decide if the application fits his/her computer system, data requirements, and physical system to be modeled.

These applications should be public domain and supported by user documentation. Availability on the Web is not necessary if the application can be distributed on CD ROM or through e-mail requests. If a short abstract, fact sheet, or technical paper is available on the application, please attach a copy. Please respond this email before **22 January, 2010**.

Name of Model, Date, Version Number: PHABSIM for Windows V 1.20

Contact (with e-mail, web site, and/or phone number): Terry Waddle 970-226-9386

Brief Description: The PHABSIM package contains 1-dimensional flow models coupled to area aggregated aquatic habitat models. The product of a PHABSIM application is a habitat vs discharge relationship.

Model Type: 1-dimensional steady flow hydraulic simulation models, area-integrated habitat accounting models

Model Objective(s):
Provide habitat outcomes for different flows. When coupled with a flow time series, the habitat response can be related to population limiting flow events for aquatic organisms.

Model Structure or Mathematical Basis:
Manning's equation, step-backwater, and empirical estimation of depth and velocity at multiple points on transects. Translation of depth, velocity, channel index values into habitat values at each point and summation of habitat values over the study area.

Spatial Scale Employed in the Model:
Study reach. The practical limit is about 1 mile of channel. Selection of study reaches that represent greater channel lengths is an integral part of PHABSIM application.

Temporal Scale Employed in the Model:
Instantaneous. Coupling with a flow time series is performed outside of PHABSIM.

Input Data Requirement:
Hydraulics: Water surface elevation, bed profile and velocity profile data sufficient to produce a rating curve at the study site. Bed profile data for all transects in the study area. Longitudinal water surface profile for the study site. A minimum of observed conditions needed to develop a rating curve.

Habitat: Habitat Suitability Criteria (HSC) for each life stage of each target species. The HSC must be developed on-site or transferred from similar watersheds or derived from the literature.

Model Output:
Habitat index: Weighted Usable Area expressed as sq. ft. per 1000 ft. of stream or as sq. meters per 1000 m.

Input Data Format:
Via GUI.

Output Data Format:
Tabular and Graphic, unique to PHABSIM.

Parameter Estimation/Model Calibration:
Calibration parameters: manning's n, conveyance ratio exponent Beta.

Model Testing and Verification:
The step-backwater algorithm used in PHABSIM was taken from the USBR program PSEUDO. A Manning equation based conveyance ratio program was developed in-house. Limited testing of the hydraulic programs was performed. There is no reliable way to test the habitat predictions due to the large number of biotic variables not included in the model.

Model Sensitivity:
Habitat outcomes are vastly more sensitive to the form of the HSC than to reasonably calibrated hydraulic models. Thus, it is recommended that all stakeholders in a water management decision reach consensus on the HSC before studies are begun.

Model Reliability:
The model code produces the same output given the same input. However, little testing has been performed where a study site was measured and simulated by two different groups of users to determine how the users choices of measurement and modeling options would affect model outcome.

The current version has eliminated some options that were available in the DOS version of the programs.

Model Application/Case Studies:
PHABSIM has been applied in thousands of water management studies around the world. Numerous court cases have relied on PHABSIM results in support of studies regarding water management issues.

Platform/Operating System:
Windows (must run Win 95 compatibility mode for best results)

Programming language and software:
Microsoft C++. Program is distributed as an installable executable.

Web-based or desk-top application?
Desk-top

Is the application flexible to couple with external programs and user created executables?
Output is in PHABSIM native format only. Formatting of tabular output is up to the user.

Are system and user documentation available?
http://www.fort.usgs.gov/Products/Software/PHABSIM/

Are example applications available?
A set of tutorials with an example application is provided.

Is there a user group or hotline-type support? No.

Other Comments:
As of FY 2011, user support will no longer be provided due to retirement of principle investigators.