

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

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Name of Model, Date, Version Number:

LOADEST (LOAD ESTimator), 2004 release

Contact (with e-mail, web site, and/or phone number):

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<http://water.usgs.gov/software/loadest>

Brief Description:

LOAD ESTimator (LOADEST) is a FORTRAN program for estimating constituent loads in streams and rivers. Given a time series of streamflow, additional data variables, and constituent concentration, LOADEST assists the user in developing a regression model for the estimation of constituent load (calibration). Explanatory variables within the regression model include various functions of streamflow, decimal time, and additional user-specified data variables. The formulated regression model then is used to estimate loads over a user-specified time interval (estimation). Mean load estimates, standard errors, and 95 percent confidence intervals are developed on a monthly and(or) seasonal basis.

The calibration and estimation procedures within LOADEST are based on three statistical estimation methods. The first two methods, Adjusted Maximum Likelihood Estimation (AMLE) and Maximum Likelihood Estimation (MLE), are appropriate when the calibration model errors (residuals) are normally distributed. Of the two, AMLE is the method of choice when the calibration data set (time series of streamflow, additional data variables, and concentration) contains censored data. The third method, Least Absolute Deviation (LAD), is an alternative to maximum likelihood estimation when the residuals are not normally distributed. LOADEST output includes diagnostic tests and warnings to assist the user in determining the appropriate estimation method and in interpreting the estimated loads.

Model Type:

Water quality / Regression

Model Objective(s):

Develop a regression model that is in turn used to estimate constituent load as a function of streamflow, time and/or additional user-defined variables (e.g. temperature, specific conductance).

Model Structure or Mathematical Basis:

Regression model development (calibration) and load determination using Adjusted Maximum Likelihood Estimation (AMLE).

Spatial Scale Employed in the Model:

A time series of constituent load is determined for a single spatial location.

Temporal Scale Employed in the Model:

user defined

Input Data Requirement:

calibration data set that includes an observed time series of streamflow and constituent concentration.

Model Output:

Time series of constituent load and summary statistics (mean loads, standard errors, and 95% confidence intervals).

Input Data Format:

flat ASCII files

Output Data Format:

flat ASCII files

Parameter Estimation/Model Calibration:

software assists the user in the development of the regression model.

Model Testing and Verification:

see model documentation and references at <http://water.usgs.gov/software/loadest/apps/>

Model Sensitivity:

Model Reliability:

Model Application/Case Studies:

<http://water.usgs.gov/software/loadest/apps/>

Platform/Operating System:

Window, Linux, Solaris

Programming language and software:

Fortran 77

Web-based or desk-top application?

Desktop

Is the application flexible to couple with external programs and user created executables?

Are system and user documentation available? (Web site)

<http://water.usgs.gov/software/loadest/doc/>

Are example applications available? (Web site)

see model documentation and references at <http://water.usgs.gov/software/loadest/apps/>

Is there a user group or hotline-type support? (Website)