

**Texas A & M University and U.S. Bureau of Reclamation**  
**Hydrologic Modeling Inventory**  
**Model Description Form**  
**July 18, 2007**

**Name of Model:** Large Basin Runoff Model (LBRM)

**Model Type:** Analytical mass balance of tank cascade

**Model Objective(s):** Simulate watershed surface & subsurface moisture storages and outflows

**Agency and Office:** Great Lakes Environmental Research Laboratory, NOAA, USDOC

**Technical Contact and Address:** Tim Hunter, GLERL, 2205 Commonwealth Blvd., Ann Arbor, MI 48105-2945

**Model Structure or Mathematical Basis:** Analytical mass balance of tank cascade

**Model Parameters:** Area, start & stop dates, base temperature for computation of heat index, linear reservoir coefficients percolation, interflow, deep percolation, groundwater flow, and surface flow, partial linear reservoir coefficients for upper, lower, groundwater, and surface evaporation/evapotranspiration, melt factor for degree-day snowmelt, and proportionality constant for heat available for evaporation.

**Spatial Scale Employed in the Model:** Lumped model for entire watershed.

**Temporal Scale Employed in the Model:** Daily.

**Input Data Requirements:** Daily precipitation volume in hundredths of millimeters over the watershed and daily maximum and minimum air temperature in hundredths of Degrees Celsius.

**Computer Requirements:** Desktop/Laptop PC

**Model Output:** Daily snow pack moisture (cm/100), surface storage (cm/100), groundwater storage (cm/100), lower soil zone storage (cm/100), upper soil zone storage (cm/100), and watershed runoff (cm/100).

**Parameter Estimation / Model Calibration:** Systematic modified gradient search of parameter space to minimize root mean square error watershed outflow.

**Model Testing and Verification:** Calibrated and verified on all 121 Great Lakes

Please see the HMI web page: <http://www.usbr.gov/hmi>  
Forms are available in Text file, HTML, MS Word and WordPerfect formats  
This effort is being conducted by River Systems & Meteorology Group: <http://www.usbr.gov/rsmg>

watersheds; used in GLERL's Advanced Hydrologic Prediction System.

**Model Sensitivity:**

**Model Reliability:**

**Model Application / Case Studies:** Calibrated and verified on all 121 Great Lakes watersheds; used in GLERL's Advanced Hydrologic Prediction System.

**Documentation:** 1) CROLEY, T. E. II. Large basin runoff model. Chapter 17. In *Mathematical Models of Large Watershed Hydrology*, V. Singh, D. Frevert and S. Meyer Eds., Water Resources Publications, Highlands Ranch, CO, pp. 717-770 (2002).

2) <http://www.glerl.noaa.gov/wr/lbrmexamples.html>

**Other Comments:**