Hydrologic Center Engineering

ADVANCES

in Hydrologic Engineering

Winter 2003

Director's Comments

Summary: FY 2002 was a busy and productive year for the Hydrologic Engineering Center (HEC). We fielded new versions of our flagship NexGen software products, devoted substantial resources to deploying the initial version of the Corps Water Management System with on-site installation and training activities in 40 Corps offices, and concluded a major staff restocking effort. In the past four years, nine senior engineers and three support staff retired. These people have been replaced with a mixed cadre of experienced Corps field office staff, new university graduates, and private sector hires. HEC is back at full strength. Our second full year as an organization within the 'new' Institute for Water Resources was a smooth one, with the new alignment seeming to benefit both HEC and the previous organizations within the 'old' IWR - a good match. All in all, 2002 was a busy, productive, and interesting year.

NexGen Software: The NexGen software research and development project continues to release products for Corps field offices. HEC-HMS (Version 2. 2) was released. This version of the Corps standard watershed model includes new reservoir outlets, overflow, and breeching algorithms, and several improved display and interface features. Intensive work is underway on a new Java version that will replace the user interface with newly designed and exciting functionality, and completes the transition from the proprietary user interface platform of the past. The companion GIS utility package (HEC-GeoHMS) has been updated and new features added. This utility provides substantial capability to effectively use national terrain data sets to rapidly develop HEC-HMS models. HEC-RAS (Version 3.1), was released at year end with substantial new features: dam break and levee breach analysis; lock and dam operation; hydraulic design capabilities; and new interface enhancements, background image, and floodway analysis capabilities. The companion GIS utility package (HEC-GeoRAS) has also undergone improvements and was released simultaneously with HEC-RAS Version 3.1. The major flood damage and risk analysis software package, HEC-FDA, continues to be improved, with progress made in integrating the event program HEC-FIA into the risk analysis program HEC-FDA. A significant new NexGen software package, Reservoir Operations Simulation/ Real-time Model (HEC-ResSim), is included in the Corps Water Management System (CWMS) Version 1.0 that has been in Corps offices for about eighteen months. This program is the planned successor to HEC-5. At calendar year end, the program was undergoing final testing, prior to public release as a stand-alone program early in calendar year 2003.

CWMS: The project to modernize the Water Control Data System (WCDS) software began in FY 1997 and the initial version is now completed and deployed. The CWMS is the decision support Automated Information System (AIS) that supports the Corps water management mission of real-time control of 700 reservoir and lock and dam projects. It embodies data acquisition, validation, transformation and management; forecasting, simulation and decision support analysis; and information dissemination. Deployment began in late FY 2001 and was concluded in December 2002. While deployment was being accomplished, improvements to the system were underway via a field-prioritized betterments program. The improved CWMS will be released for upgrading existing field installations early in calendar year 2003. The management and funding structure provides for a modest field-directed betterments program that will be on going throughout the life cycle of CWMS. Project documents and other information about CWMS are available on the project, Corps

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IN THIS ISSUE:

Training Program

FY 2003 Training Program *by Dunn*

The PROSPECT training program for FY2003 has begun. As shown in the table below, HEC will conduct eleven PROSPECT courses this year. While most are reported as full, for a variety of reasons, the actual number of participants does change over the year. Therefore, if you are interested in attending a class, please contact HEC or the USACE Professional Development Support Center (PDSC), Huntsville, Alabama (contact information follows) who will provide you with updated information about a class.

While classes are presented for Corps employees, others are encouraged to register when space is available. Priority is given to Federal, then State and Local agencies, and then the private sector.

Course descriptions are provided in the "Purple Book" at the PDSC website. A short description is also provided on HEC's Website. To obtain enrollment information, please contact the Corps Training Center via telephone or by writing to them. Be sure to provide the course number, name, date, and location in your request.

Contact Information:

Training and Operations
USA CORPS OF ENGINEERS
ATTN CEHR-P-RG
PO BOX 1300
HUNTSVILLE AL 35807-4301

(256) 895-7421

http://pdsc.usace.army.mil

Training Schedule

Course #	Course Title	Enrollment	Tuition	Date
114	Basic HEC-RAS	28	$1,700	21-25 Oct 2002
57	Hydrologic Engineering for Planners	32	$2,060	4-8 Nov 2002
219	Hydrologic Engineering Applications for GIS	30	$1,580	2-6 Dec 2002
316	HEC-FDA with GIS	29	$1,780	13-17 Jan 2003
188	Unsteady Flow Analysis with HEC-RAS	23	$1,740	10-14 Feb 2003
155	RealTime Water Management Modeling with CWMS	31	$1,920	10-14 Mar 2003
369	Advanced HEC-HMS	22	$1,760	14-18 Apr 2003
164	Water and the Watershed	38	$1,710	12-16 May 2003
98	Reservoir System Analysis	23	$1,970	16-20 Jun 2003
178	Basic HEC-HMS	25	$1,750	18-22 Aug 2003
161	Hydrologic Analysis for Ecosystem Restoration	39	$1,850	15-19 Sep 2003

Dam Safety Workshop *by Harris*

A workshop on *Hydrologic Research Needs for Dam Safety* was held on 14-15, November 2001 at the Hydrologic Engineering Center. The workshop provided a forum for the discussion of subjects important to the computation of a Probable Maximum Flood (PMF), the uncertainty of parameters used to compute a PMF, the continued use of the PMF as the "design flood", using risk analysis procedures to develop the design flood and hydrologic risks involved with dams and dam operations.

The main focus of the workshop was to generate a list of topics that are in need of research for hydrologic problems related to dam safety. The highest priority research needs were: a database of historical extreme storms and floods, rainfall frequency analysis for return periods >1000 yrs and extreme flood frequency analysis. There was also significant need to develop regional hydrologic parameters for flood runoff analysis.

If you are interested in the workshop proceedings, please e-mail to:
ceiwr-hec@usace.army.mil

Publications

Obtaining HEC Publications *by Garcia*

Corps offices may request publications via correspondence, e-mail, fax or telephone. Our contact information is located on the last page of this newsletter. The request must include the recipient's name, office symbol, mailing address and telephone number.

Documents should be requested by their HEC number/document name.

All others may order from NTIS by writing to the National Technical Information Service (NTIS) at 5285 Port Royal Road, Springfield, VA 22161, calling their sales desk at (703) 605-6000 or by accessing their web site at: **www.ntis.gov**.

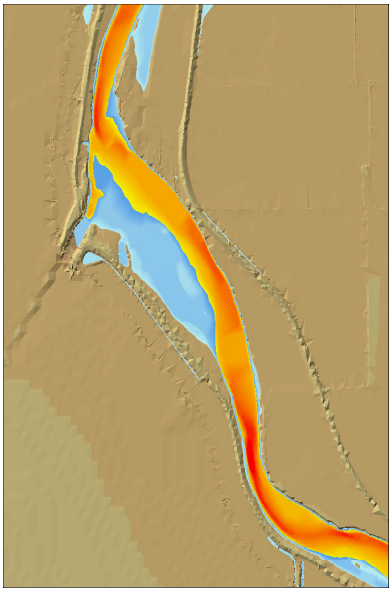
Some documents are available online and may be retrieved from our web site at: **www.hec.usace.army.mil**. These documents are available in portable document format (PDF).

Software News

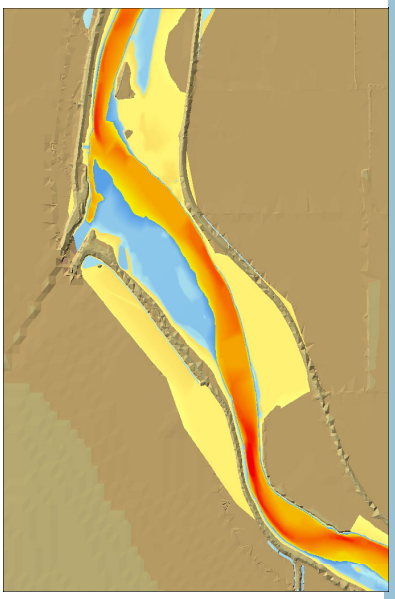
The Ecosystem Functions Model: a tool for restoration planning *by Hickey*

The Ecosystem Functions Model (EFM) is a planning tool that analyzes ecosystem response to changes in flow regime. The Hydrologic Engineering Center, in conjunction with the Sacramento and San Joaquin River Basins Comprehensive Study, is developing the EFM. Environmental planners, biologists, and engineers can use the model to help determine whether proposed alternatives (e.g., reservoir operations or levee alignments) would maintain, enhance, or diminish ecosystem health.

With Project



Without Project



"Functional relationships" are central to EFM analyses. These relationships link characteristics of hydrologic and hydraulic time series (flow and stage) to elements of the ecosystem through combinations of four basic criteria– season, flow frequency, duration, and rate of stage recession. There is no limit to the number or genre of relationships that may be developed. A user interface has been constructed to facilitate entry and inventory of evaluation criteria. The pilot application of the EFM used fifteen relationships to investigate a range of ecosystem elements, including fish spawning, fish rearing, fish stranding, recruitment of large woody debris, channel migration, and riparian forest regeneration.

After relationships are developed, a statistical computations package (also managed by the interface) analyzes flow and stage time series for the specified criteria and produces a single value for each relationship. This process is repeated to assess a modified flow regime and resulting values for without and with project conditions are compared to indicate the direction of change of ecosystem health.

A strength of the EFM is its ability to assess results spatially. In addition to the statistical computations, EFM analyses

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Software News

New Release of HEC-RAS (Version 3.1) *by Brunner*

New versions of HEC-RAS (3.1) and HEC-GeoRAS (3.1) have been released with significant new features over the previous version (3.0). Version 3.1 of HEC-RAS includes several new features for unsteady flow routing, as well as some for steady flow water surface profile computations. All three of the HEC-RAS documents have also been updated, and are available to download from the HEC web page. The following is a partial list of the new features that have been added to the software.

New Unsteady Flow Routing Features:

Dam Break Analysis – The user enters information about the size and dimensions of the breach, as well as how long it will take to form. The software will then calculate a breach hydrograph and route it downstream.

Levee Breaching – This feature is very similar to the Dam Break capability described above. The breached flow from a levee can go into a storage area, or it can be connected to another river reach.

Mixed Flow Regime – HEC-RAS can now perform a mixed flow regime analysis (subcritical to supercritical, as well as hydraulic jumps) for unsteady flow. **Pump Stations** –The user can attach a pump station to a storage area or a river reach. Each pump station can have up to 10 non-identical pump groups, for which a different pump efficiency curve (head versus flow) can be entered. Each pump can have a different on and off trigger elevation. **Navigation Dams** – This feature will optimize gate settings for a navigation dam in order to maintain an upstream water surface within a specified range. **Culvert Flap Gates** – This feature allows the user to put a flap gate on a culvert that is defined as part of a lateral structure. The flap gate can be set to allow water to only flow in one direction through the culvert.

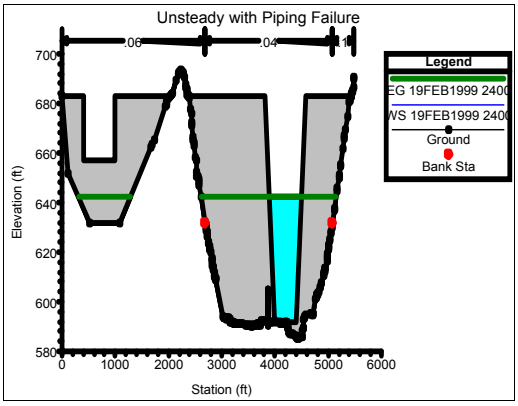
Floodway Encroachments – Floodway encroachments can now be analyzed during an unsteady flow simulation.

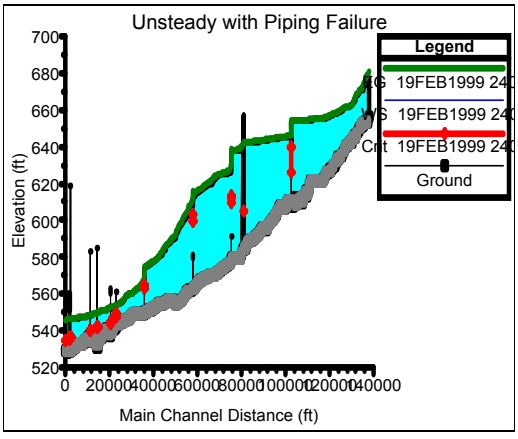
New Geometric Data Features:

Improved Background Map Viewing for River System Schematic – We have changed the background mapping and imaging capability within the geometric editor to allow for a wider range of image types. We are now using a commercial package from Environmental Systems Research Institute, Inc. (ESRI), called Map Objects Light (ESRI, 2002).

Improved Interface to GIS (GeoRAS) – The interface for reading and writing information from and to a GIS using GeoRAS has been improved. Users now have much more control over what is brought into HEC-RAS.

Improved Display of Information on The River System Schematic – We have added the ability to highlight in red the current active node (cross section, bridge, culvert, hydraulic structure, etc.). Additionally, a red circle is drawn around it in order to make it easy to find on the schematic. The active node is whichever node was the last one to be viewed in a data editor or output window.





New Hydraulic Design Functions:

In addition to the existing pier scour function, HEC-RAS can now perform uniform flow computations, stable channel design, and sediment transport capacity computations for existing geometry. **Uniform Flow Computations** – For a selected cross section, any of the parameters of Manning's equation can be computed, when the other parameters are input by the user. A number of different roughness analysis

Software News

techniques can be used, including Manning, Strickler, Keulegan, Limerinos, Brownlie, and the SCS Grass Curves. Channel width can also be solved, but in this case, an idealized cross section with up to three trapezoidal templates must be used. **Stable Channel Design** – This function can be used to determine the channel geometry and characteristics needed to achieve channel stability at a given cross section. The user has the choice of using Copeland's method, Regime method, or Tractive Force method. **Sediment Transport Capacity** – The sediment transport capacity at any existing cross section can be determined using this feature. Six transport methods are available: Ackers-White, Engelund-Hansen, Laursen, Meyer-Peter Müller, Toffaleti, and Yang.

Help System and Manuals:
New Help System – The HEC-RAS help system has been updated to reflect the new documentation and features added to the software. **New Manuals Online –** All three HEC-RAS manuals (User's, Hydraulic Reference, and Applications Guide) have been updated and put into PDF format. These manuals can now be viewed from within the HEC-RAS software by selecting one of the three manuals from the Help menu on the main HEC-RAS window.

New HEC-GeoRAS Features:
The new version of the HEC-GeoRAS software (version 3.1) includes the following new features:
XS Plot Tool – Cross sections may be previewed in ArcView using the GeoRAS XS Plot tool. The selected cross section is plotted in an ArcView Chart. The user may interactively select points in the Cross Section Plot using the Point Locator Tool. The point selected is drawn on the plan View.

Ineffective Flow Areas Theme – GeoRAS 3.1 allows the user to define ineffective flow areas at locations on the cross section that are not actively conveying flow. **Levee Alignment Theme** – GeoRAS 3.1 allows the user to incorporate existing or proposed levee features (or land forms that act similarly to levees) in the geometric data. **Storage Areas Theme** – Users can now define storage area locations. Elevation-volume data is extracted for each storage area. **Water Surface Profile Results Processing** – There is no longer a limitation on the length of the profile names. The floodplain delineation methods have been improved for computational efficiency.

For more information on HEC-RAS, please go to the HEC web page and review the file labeled "WhatsNewInRAS31.pdf"(www.hec.usace.army.mil).

HEC-HMS Development *by Scharffenberg*

Version 2.2.1 was released in November 2002. It includes new options for simulating reservoirs described by elevation-storage or elevation-area curves and outflow computed from the physical properties of up to four outlets. The outlets may be an orifice with unsupported jet, a broad-crested or ogee spillway, a level or non-level dam top overflow, and an overtopping dam breach. A new algorithm was developed in order to accommodate these outlet options and will be expanded in the future. A future version of the program will allow more than four outlets at a time, as well as new outlet types.

Development of new simulation features is currently proceeding in three different areas: snowmelt, depth-area analysis, and interior drainage. A completely new interface is also being built. The new interface, snowmelt, and depth-area analysis will be packaged as Version 3.0 and released fall 2003. The interior drainage features will be added at Version 3.1 and released summer 2004.

The meteorologic model has been expanded to have a snowmelt component in addition to the existing precipitation and evapotranspiration components. Testing is currently underway on the first snowmelt simulation option, a temperature index method based on the algorithm in the Streamflow Synthesis and Reservoir Regulation (SSARR) model. The method provides for a cold content and saturation criteria for the snow pack, in addition to the temperature index method of computing the melt amount. Both a "lumped" method with elevation bands and a "gridded" method will be available. A depth-area analysis

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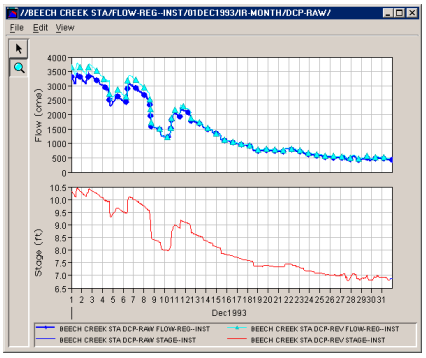
Software News

HEC-DSSVue *by Charley*

HEC-DSSVue, the new graphical user interface for the HEC Data Storage System, has been released and is available on HEC's Web site. HEC-DSSVue is a Java-based visual utilities program that allows users to plot, tabulate, edit, and manipulate data in a HEC-DSS database file. The graphics produced by HEC-DSSVue are highly customizable and can be saved in various formats, including "jpeg" and "png" (portable network graphics), or for printing or copying to the clipboard for inclusion in reports. HEC-DSSVue incorporates over fifty mathematical functions that were available in the DSSMATH program. Along with these functions, HEC-DSSVue provides several utility functions that allow you to enter data sets into a database, rename data set names, copy data sets to other HEC-DSS database files, and delete data sets.

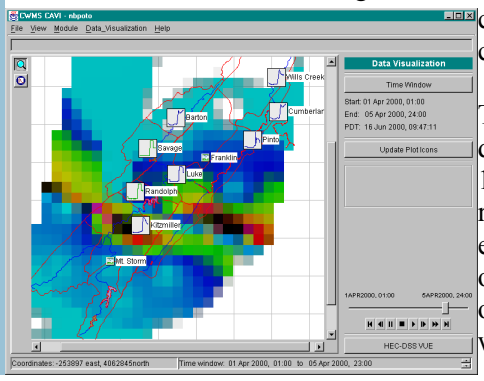


Data sets are selected from a sorted / filtered list of pathnames in a HEC-DSS database file using a mouse. HEC-DSSVue also incorporates the "Jython" standard scripting language, which allows you to specify a routine sequence of steps in a text format, and then execute the sequence from a user-defined button or from a "batch" process.

HEC-DSSVue was written using the Java programming language, which allows it to be run under a variety of different operating systems. Fully supported systems include Microsoft Windows 98 / ME / NT / 2000 / XP, and Sun Solaris (Unix). The Solaris version is distributed with the CWMS software package. The Windows version can be obtained from HEC's Web site at http://www.hec.usace.army.mil.

CWMS Update *by Charley*

The initial deployment of the Corps Water Management System, CWMS, to 40 field water control offices, was completed in December 2002. CWMS is the information management system that supports the Corps in its day-to-day water management mission of regulating more than 700 reservoir and lock and dam projects. The CWMS software is an integrated suite of programs that performs the following tasks: acquires, transforms, and validates observed data; stores and manages data; allows for data visualization and dissemination; and provides real-time hydrologic modeling support for the decision making process. CWMS is an active system in that it operates continuously, monitors the water management system as well as its software and data components, and can be scripted to perform its functions on a scheduled basis. The software architecture is client-server, wherein data and modeling functions are performed on server workstations, and users access and control CWMS via PC-based clients.



The nationwide initial deployment was completed in 18 months. The process required about 6 months for each individual water control office. For deployment, each office selected a deployment watershed and built hydrologic and hydraulic models for that watershed. Deployment also included installing the CWMS software and configuring observed data feeds for CWMS. Each water control office will continue to develop and configure CWMS models for the remainder of the watersheds in their jurisdiction.

The second version of CWMS, version 1.1, was completed in December 2002. Major version 1.1 modifications include substantial enhancements to the reservoir operations modeling program, HEC-ResSim, enhanced visualization and graphics capabilities, complete scripting control via an implementation of the "Jython" scripting language, as well as many other improvements. This version will be installed at all of the field offices during the months of February and March

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Other News

HEC Staff Changes *by Garcia/Dunn*

Recently, HEC has undergone a major changeover in staff. Ten permanent staff have retired in the past two years and we have welcomed another ten aboard.

Those who have recently retired are: Vern Bonner, Richard Hayes, Harry Dotson, Bill Johnson, Mike Burnham, Alfredo Montalvo, Art Pabst, Eileen Haramoto, Doug Foster and Adela Pucci.

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Anacostia River Basin HMS Model Development

by Harris

HEC was contracted by Baltimore District to develop an HMS model for the Anacostia River. The Anacostia River is just north of Washington DC. It consists of a Northwest and Northeast branches that join to form the Anacostia River, which flows into the Potomac River. Both branches have long-term USGS stream gaging stations on them. The data from these gages were used for model calibration and verification. Three levels of subbasin and river reach discretization were developed for HMS. First, a "large basin" 3-subbasin model was developed for calibration of historical storms at the gages. The area above each gage was delineated into a subbasin and area below the two gages resulted in the third subbasin. Three historical storm and flood events were used to develop the basin parameters. The optimal and most reasonable parameters were adopted for each gaged basin and event. Using those results for the three flood events, one set of best-estimate values was developed for each basin. A regional relationship for T_c as a function of a "basin factor" (stream slope, stream length and stream length to centroid) was generated. That regional relationship together with an equation for R as a function of T_c, allowed computation of T_c and R values for any size subbasin.

In order to get better definition of runoff values at intermediate locations within the basin, a "medium basin" 12-subbasin HMS model was constructed. The HEC-GeoHMS software was used to delineate the subbasins and generate the basin characteristics. The northwest branch above the gage was broken into four subbasins and the area above the gage on the northeast branch was broken into five subbasins. The area below the two gages was delineated into three subbasins. Using the relationships developed form the large basin model, the basin characteristics for the medium basin model were generated. Since the medium basin model consisted of more subbasins,

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Other News

Anacostia River Basin HMS Model Development — *Continued*

it was then necessary to generate routing criteria between basins. The study sponsor, Prince George's County, Maryland, provided HEC-2 models for the Prince George's County portion of the basin. These HEC-2 models were imported into HEC-RAS and a representative cross-section was selected from each reach and entered into HMS in the form of an 8-point Muskingum-Cunge routing. The model was then calibrated using historic data. The sponsor was also interested in additional detail in the basin model. It was determined that this could be provided by generating the third, and aptly named, "small basin" model. Once again, the HEC-GeoHMS software was used to delineate the subbasins and generate basin characteristics. The northwest branch went from four basins to 20 subbasins and the northeast branch went from five to 32 subbasins. The area below the gages went from three to 4 subbasins. Of course, more subbasins means more routing reaches. Initially, the 8-point Muskingum-Cunge routing parameters from the medium model were adapted to the small basin model. However, during the calibration process, it was determined that this method generated incorrect travel times in the reaches. To remedy this, the HEC-RAS model was used to generate storage-outflow (modified puls) relationships for each reach in the small basin model within Prince George's County. The storage-outflow relationships accounted for changes in channel slope and shape.

In the end, it was determined that the medium basin model provided results that were reliable and fit the needs of the study. Therefore, the medium basin model was used to generate synthetic flows for both existing and future conditions within the basin. Currently, the study is ongoing. Detailed HEC-RAS models are being developed for lower reaches of both branches. These models will be used for project alternative analysis.

Testing the Ability of the Willamette Basin Reservoir System to meet Proposed Fish Flows *by Hickey*

In July 2000, the National Marine Fisheries Service (NMFS) drafted a biological opinion for the Upper Willamette Basin, which is home to several threatened species, including spring Chinook and winter Steelhead. While most suggestions in the biological opinion focused on hatchery mitigation to enhance and protect native fish, NMFS also recommended that the U.S. Army Corps of Engineers (USACE) develop contingency plans regarding flow release strategies in case hatchery measures are insufficient in benefiting natural populations.

In cooperation and coordination with NMFS, Bonneville Power Administration (BPA), U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service (USFWS), and the State of Oregon, USACE scripted target flow criteria for abundant, moderate, and low storage water years at locations on the Willamette mainstem. These new target flows are currently treated as interim operational requirements by the Portland District (NWP) of the USACE and have been in effect since 1999.

The Portland District contacted HEC for technical assistance with a reservoir analysis designed to answer one fundamental question: *Based on historical hydrology, could the Willamette Basin Reservoir System have released enough water to meet the new fisheries requirements (which called for flows and volumes as much as triple the original requirements)?*

An HEC-5 model, originally developed by NWP as a monthly simulation model to investigate water conservation, was modified to a daily time step and calibrated for use in this study. To answer such a fundamental question, a complex model with 10 storage reservoirs operating to meet high- and low-flow criteria at multiple downstream points over a 64-year period of record was deemed necessary. Considering only the ability of system storage to meet

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Director's Comments

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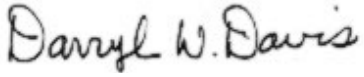
accessible only, Website: (https://www.hec.usace.army.mil/cwms). We can better manage public access through this address.

Training: We continued the training program rebound by presenting thirteen week-long PROSPECT courses and eleven field workshops of 2 to 5 days each. The courses covered several hydrologic engineering and planning analysis topics including HEC-RAS, HEC-HMS, GIS applications, watershed/river and wetlands restoration courses, and advanced courses in unsteady flow and HMS applications. Attendance averaged about 25 students per course. The several, on-site workshops mostly focused on HEC software such as HEC-RAS, HEC-HMS, and HEC-FDA. On-site training was included with the CWMS deployment activities, with attendance for each limited to a division/regional office.

Technical Assistance/Reimbursable Projects: Reimbursable project work was undertaken for 17 Corps field offices as well as HQUSACE Civil Works Planning and Engineering, ERDC/CHL and Environmental Labs, the Federal Emergency Management Agency, the National Institute for Building Sciences, and the US Bureau of Reclamation. Projects include watershed and reservoir system modeling, water quality, risk analysis, river hydraulics, wetlands hydrology, water control management, regional statistical analysis, flood damage analysis, GIS applications in hydrology and hydraulics, groundwater modeling, and water supply in support of the CALFED investigations. For several years, HEC has managed a project to update the hydraulic model geometry for the Mississippi Basin Model System (MBMS) to reflect more recent mapping and to develop an inundation-mapping component based on the new mapping. The significant work included cutting the new river section geometry, integrating these new digital map-based geometry sections into the UNET models, re-calibrating the models, and preparing final reports. Work was essentially completed early in FY 2002. HEC continued support in modeling the Sacramento and San Joaquin River Basins for flood control operations with a task to adapt the HEC-5 models to the new HEC-ResSim - good progress was made. The GIS-based package coined 'Ecosystem Functions Model,' developed for the Sacramento Comprehensive Study, to assist in regional-scale environmental evaluation of alternatives, continues to be developed by HEC for applications elsewhere. Some work continued on application of reservoir optimization models to study reservoir storage utilization in support of improved flood operation for the American River below Folsom Dam. Groundwater modeling work was undertaken in the Lake Tahoe Basin, Ft. Huachuca, Arizona, and Santa Claus, Alaska. Reimbursable funding paid for improvements to HEC-RAS (internal boundary condition for MVP), and HEC-HMS (dam safety for FEMA). The total reimbursable project program was about $1.0 million with individual projects ranging from a few thousand dollars to upwards of $150,000.

Outlook FY2003: The HEC program for FY2003 will continue FY2002 efforts as reflected at the end of the year. We will continue developing and fielding new versions of the NexGen software packages HEC-RAS, HEC-HMS, and HEC-FDA and companion GIS utility software. The successor to HEC-5, the new HEC-ResSim program, will finally be publicly released. Version 1.1 of CWMS will be released to Corps offices and work is expected to be near complete on a Version 1.2 release by year's end. PROSPECT training is expected to remain high, continuing at about the same rate as FY 2002. We are concerned that Civil Works Research and Development funding, the base funding for improvement in methods that enhance the NexGen software family, will continue to decline - not a good trend. Software maintenance and support will stay the same to slightly increase. CWMS modernization maintenance and funding will decline to about half what it was at its peak two years ago. Reimbursable technical assistance and special projects will need to be about $1.5 million. On balance, with the Federal budget uncertain for FY 2003, the coming year may be a challenge for HEC to maintain continuity in work programs.

With the CWMS software development and deployment winding down, and other large project commitments wrapping up, HEC is in a position to undertake new reimbursable work this year. We are interested and eager to assist with applying new methods and tools to Corps and others water resource problems, and in developing new or adapted tools as would be helpful in project studies and water control management.



DARRYL W. DAVIS, P. E.
Director

Software News

The Ecosystem Functions Model: a tool for restoration planning — *Continued*

typically involve hydraulic modeling, which translates statistical results to water surface profiles and spatial coverages of water depth, velocity, and inundated area. GIS programs display these generated coverages as well as other relevant spatial data (e.g., soils, vegetation, and land-use maps).

Hydraulic modeling and GIS improve EFM applications by helping project teams to visualize existing ecologic conditions and highlight promising restoration sites (see figure on Page 3). Depth and velocity data can be used as criteria to further define relationships. Through GIS, inundated areas for individual relationships can be compared and ranked as a measure of the relative enhancement (or decline) of that ecosystem element for any number of alternatives.

Spatial functions of the EFM are being programmed as extensions for ArcGIS software. The goal of this effort is to package a few commonly used functions in an easy to use interface for users who are not GIS specialists.

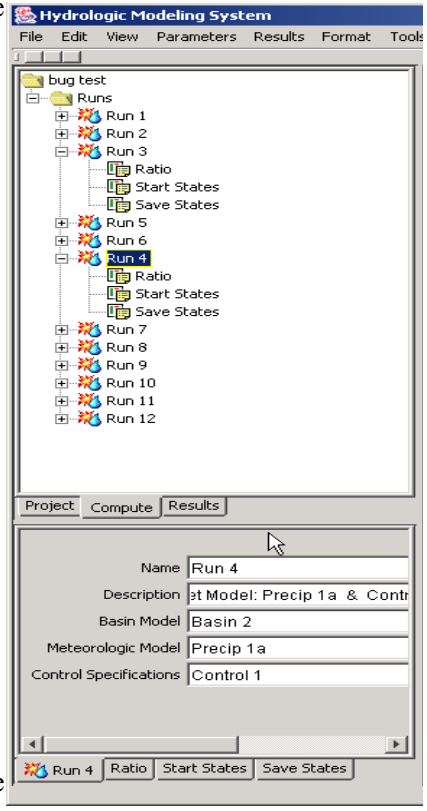
The EFM is applicable to a wide range of ecotypes and Corps' projects. A beta version of the software is now available. For more information send e-mail to: ceiwr-hec@usace.army.mil.

HEC-HMS Development — *Continued*

tool has been designed to simplify the processing for computing runoff from a frequency-based storm at many locations within a watershed. Done properly, a different storm must be generated for each location to account for differing area-reduction factors. The tool automatically generates and applies the proper storm for evaluation locations selected by the program user. The results of the different storms are combined to produce a single report showing the flow at the selected locations. Testing of the analysis tool will begin as soon as the testing of the new snow features is finished.

Initial design is underway on simulation features needed for analyzing interior drainage projects. These projects typically include a collection pond against a levee that parallels a large river. Water in the collection pond enters the river through culverts when the river stage is low. At high river stages, water in the collection pond is pumped over the levee. New features will be added to the reservoir element and eliminate the need for the legacy HEC-IFH program.

The program interface is currently undergoing major redevelopment at the same time new simulation features are developed. For various reasons it was necessary to replace the entire existing interface. A brand new interface has been designed and is being coded in the Java programming language. The new interface provides similar features to the existing interface, but has been designed with much more flexibility and is easier to use. It provides new visualization capabilities so that graphs and tables can be quickly created to evaluate any computed result, at any element, in any run. A new map window will replace the old basin model schematic and provide a wealth of new options in background maps. Facilities for exporting and moving projects between computers will be greatly enhanced.



A portion of the new interface for selecting a run and specifying its properties.

Software News

CWMS Update ... — *Continued*

2003. Development for CWMS version 1.2, which is scheduled for release in the first quarter of 2004, has begun. Version 1.2 enhancements currently include capabilities for visualization scaling, improvements for use on a wide-area-network, and activating new features in models such as L&D in RAS, snowmelt in HMS, etc. The CWMS configuration control board is currently in the selection process for other CWMS betterments.

Other News

Testing the Ability of the Willamette Basin Reservoir System to meet Proposed Fish Flows —*Continued*

the new flow requirements, simulation results and statistical analyses indicated that the Willamette Reservoir System is capable of meeting the new requirements in all but the driest years.

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