

**HEC-EFM 3.0 and 3.0.NET**  
**January 2013**  
**Release Notes**

Versions 3.0 and 3.0.NET supersede version 2.0, which was released in November 2009. Installing version 3.0 and/or 3.0.NET will not overwrite any previous software versions. Also, the new versions are backward compatible, which means that any HEC-EFM project files created with previous versions are fine and ready for use with version 3.0 and/or 3.0.NET.

During numerical testing performed at HEC, versions 3.0 and 3.0.NET exactly reproduced quantitative results generated with version 2.0, but users are encouraged to verify this for their existing applications.

Version 3.0 is programmed in Visual Basic 6. Version 3.0.NET is programmed in Visual Basic .NET. The two programs have identical capabilities and have been thoroughly tested. Modelers are encouraged to use 3.0.NET as future coding for EFM, including new features, is planned for implementation in .NET. Version 3.0 is being released because, in addition to 3.0 testing, EFM's Visual Basic 6 code underwent thousands of hours of testing during development of versions 1.0 and 2.0.

Versions 3.0 and 3.0.NET includes new features, improved software behaviors, and bug fixes for issues that were not detected prior to release of version 2.0. The Quick Start Guide has also been updated and is currently the most complete and comprehensive source of information about the software. Changes incorporated in the new versions follow:

**New Features**

- Added the ability to handle missing data. In previous versions, HEC-EFM would simply halt computations and return a warning message when missing data values were encountered. New versions offer an option to “Handle missing data”. When active, EFM will review the user-defined season for each water year and each pairing of flow regime and relationship. If any missing data are encountered, EFM will simply bypass that entire season in its calculations. Blank and non-number values will automatically be recognized as missing data. New versions also offer an interface where users can identify specific numeric values (e.g., -901) that should be treated as missing values. Please note that use of this feature requires EFM to perform several data checking and handling processes. When it is active, compute times are significantly increased.
- Additional reports for data availability. A new output called the Data Summary Report is now generated by EFM and is available in versions 3.0 and 3.0.NET via the “File – Data Summary” menu option. It lists the period of record, water year range, water years omitted due to missing data, and the number of valid years for

each pairing of flow regime and relationship. The arrays output generated in XML format has also been updated to report any missing data.

- Expansion of the Indices Manager. In previous versions, users were limited to a maximum of 5 indices per application of EFM. An interface was added in the new versions that allow creation and management of at least 1000 indices. This feature was added per the suggestion of users interested in using EFM as both an ecological assessment tool and as a calculator for other water related performance measures such as percent time meeting hydropower or flood risk management criteria.
- Expansion of ecological value (ecovalue) output. Previous versions of EFM computed a single ecovalue as a measure of how an individual aspect of the ecosystem performed over the course of an entire flow regime. This capability was expanded in the new versions to also include seasonal output such that ecovalues would be output for individual water years. Seasonal ecovalues allow users to compare the percent change in ecovalue between multiple water management or ecosystem restoration scenarios, year by year. “Ecovalue” output is generated for each pairing of flow regime and relationship. “Ecovalue Shift” output, expressed as a percent change in ecovalue, provides a comparison between ecovalues generated by the reference flow regime and each other flow regime considered. Time series and frequency curves are output (to DSS only) for both “Ecovalue” and “Ecovalue Shift”. Future versions of EFM Plotter (1.1+) will provide display options for this output.
- Addition of date information. Most output generated by the EFM process investigates the directional change in magnitude of habitat provided by different flow regimes and restoration scenarios. Timing of habitat availability is also a critically important consideration in ecosystem analyses. New versions include additional output for “Date” and “Date Shift”. “Date” marks the calendar day on which the statistical criteria defining an EFM relationship were met for each water year. “Date Shift” provides a comparison between the habitat dates generated by the reference flow regime and each other flow regime considered. Time series and frequency curves are output (to DSS only) for both “Date” and “Date Shift”. Future versions of EFM Plotter (1.1+) will provide display options for this output.

### **Improved Behaviors**

- A previous limitation in EFM, which prevented computation of the percentage of time or years in which water shortages (negative flows) occurred, has been corrected.
- Minor improvements have been made regarding the sizing and appearance of pop-up windows and the handling of style sheets that render EFM output.

## **Documentation**

- A section was added to the “HEC-EFM Math” chapter that details the new ecovalue and date output.