

2016 WEPS Release Update

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The Wind Erosion Prediction System (WEPS) is a simulation model for predicting creep, saltation, and suspension sediment losses due to wind erosion on agricultural croplands. WEPS was developed by the USDA-Agricultural Research Service (ARS) over the past 25+ years in response to customer requests for improved prediction technology to replace the predominately empirical Wind Erosion Equation (WEQ). WEPS simulates the important physical processes responsible for soil erosion by wind such as soil detachment by saltation abrasion and wind shear stress, particulate transport and deposition when the friction velocity at the surface generated by the wind exceeds the surface threshold friction velocity. WEPS also simulates surface crusting, soil aggregation and roughness changes due to weather events, plant growth, and residue decomposition as well as soil disturbance by tillage and other management operations. Effects of field orientation, tillage row direction, surface roughness, and edge-of-field wind barriers are also simulated. USDA-Natural Resources Conservation Service (NRCS) first implemented WEPS in October, 2010, now using it for all wind erosion assessment needs within their Agency.

There have been several WEPS updates to NRCS since the original 1.0 release in 2010 (October 2011, April 2012, October 2013). Each of the previous updates included science model fixes, and WEPS interface feature enhancements, including bug fixes and database updates. This new release (1.5) also addresses specific bug fixes, minor interface improvements and tweaking of database records. The complete list of changes for this release update are provided and discussed in this report.

The primary science model improvement was modifying WEPS precipitation runoff to align with that of the Water Erosion Prediction Project (WEPP) model. Interface changes include additional crop and cover crop reports, access to additional hydrologic water balance data and incorporation of a revised definition for “crop interval” that NRCS uses in their evaluation of the effectiveness of individual crop rotations. Range checking has been incorporated into the “WEPS database editor” and the “Management and Crop Rotation Editor in WEPS” (MCREW) so that invalid operation and crop values cannot be entered into either the database records or within the management/crop rotation files used in WEPS. Likewise, in addition to addressing specific operation and crop record updates for NRCS compatibility with other models, an additional “developer notes” field was added to those records to allow developer specific notes to be separated from general user information regarding the individual records. Enhancements to the WEPS “Quick Plot” feature now allows multiple Y-axes for plotting and displaying of variables as well as the ability to view individual rotation years as well as the entire rotation on separate plot pages. In addition, the storage location for WEPS log and configuration information were changed to accommodate NRCS IT practices that now include redirection of users’ home directories. Third party Java library packages used in WEPS have been updated to the most current releases and the code modified to compile cleanly and run under Java 8. The WEPS User’s Guide and online help have also been revised to bring them up to date with the most recent changes in WEPS.

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