Notes on IWFM Version 3.0

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This version of IWFM includes major modifications to IWFM version 2.4, mainly object-oriented programming to a certain extend, modified input/output interface and time tracking capability.

1. **(12/13/2005)** New variables are added to Simulation Main input file for the beginning and ending of simulation time, time tracking etc.
2. **(12/13/2005)** The variable NSPW (stress period for small watersheds) is deleted from the boundary conditions data file in Simulation.
3. **(1/5/2006)** The initial conditions file is changed. For initial interbed thickness and preconsolidation head, a factor of zero is required to be entered to skip the reading of the overwriting values. The code in CONFILE.for is changed accordingly.
4. **(1/10/2006)** The pumping specifications file (Unit 23) is converted to a non-time-series data file. Accordingly, NPUSP and ITPUSP variables are deleted from file. The source code is changed accordingly (SPCFILE, TSDFILE and GETTSD). Reading of the pumping spec file is moved to the SPEC.for subroutine and a new variable FRACSKRAW is introduced. In GETTSD.for when the land use areas (variable ALAND) changed, FRACSK is updated based on the raw fraction values (FRACKSKRAW) and the KPUMPDR variable.
5. **(2/06/2006)** The implementation of time tracking option using text files has been completed. The code and relevant input files have been modified.
6. **(2/09/2006)** The output options (frequency of printing, etc) for printing groundwater head values at all nodes are discarded in the Simulation main input file. Now the values will be

printed at every time step if a file name is given for it. The format of the print-out is also modified. The 10-value per line format is no longer used. Instead, all values at a layer are printed out in a single line.

7. **(2/17/2006)** A new variable (CACHE) for cache size for the time series output data is included in the main input file in Simulation. The variable is added right after KDEB. It specifies the minimum number of values to be stored in memory for each time series output file before flushing the results into hard drive.
8. **(2/17/2006)** A new output file for the listing of the characteristics of virtual crop for each subregion is added to Simulation.
9. **(4/19/2006)** The soil moisture routing in the root zone is modified. In the previous version, the infiltrated water was added to the available soil moisture, and any amount above the total porosity was immediately converted into return flow and runoff. This limited the deep percolation to the amount of moisture between the total porosity and field capacity, regardless of the amount of precipitation and applied water. In the modified method, the computation of return flow and deep percolation is done almost simultaneously. ET is computed based on the available moisture, infiltration of rainfall and the entire amount of applied water. Then, the soil moisture, after taking ET out, above the field capacity is computed. This moisture is distributed among deep percolation and return flow by using the equation $K_s\left(\frac{\theta}{\eta_T}\right)^4$ for deep percolation and leaving the rest of the moisture to return flow.
10. **(6/15/2006)** An error in computing face flows for ZBudget in the presence of small watersheds has been corrected. When the groundwater nodes into which surface flow from

small watersheds percolate into lie on the model boundary, the face flows were computed incorrectly. This error is fixed.

11. **(8/1/2006)** Introduced a new flag, KUSAGE, to soil moisture routing parameters. If this flag is set to zero than the values entered for K is used as fraction of soil moisture above field capacity that will become deep percolation. If set to 1, K values represent saturated hydraulic conductivity.
12. **(8/1/2006)** The output for Tecplot is made part of the output files in the main input file. Accordingly a new module is developed to print out the file.
13. **(1/31/2007)** Fixed a conceptual error in the recoverable and non-recoverable losses from imported diversions. Even if the user was allowed to specify recoverable and non-recoverable losses from the imported diversions, these values were set to zero internally. Although this didn't create any mass balance problems user couldn't get the intended behavior from IWFM; that is these recoverable losses never ended up in the groundwater system if that was the intention. This is fixed in this version.
14. **(2/1/2007)** If a stream node interacted with an aquifer layer that is not the top layer, a mass balance error occurred in previous version of IWFM. This situation can occur when one or more top aquifer layers are inactive. The error that caused the mass balance problem is fixed.
15. **(2/1/2007)** An indexing problem in identifying the bed thickness when computing the stream bed conductance is fixed.
16. **(2/23/2007)** A reporting error in the groundwater budget table is fixed. The data listed in the groundwater budget table columns were treated as volumetric rates even though they were stored as volumes. This created a reporting problem when simulation time step was

not equal to 1.0. This error is fixed by modifying the code in Outbud.for subroutine in Simulation.