

## **REVISION 60.5.1**

- I.      **NEW\_INPUT\_FILES**  
Contains a list of new input files that are being tested.
- II.     **NEW\_OUTPUT\_FILES**  
Contains a list of new output files being review.
- III.    **Existing output files**  
List of changes in output files
- IV.    **Existing input files**  
List of changes in input files
- V.      **Other**  
Other files that were modified in this revision.

### **I.      NEW INPUT FILES**

### **II.     NEW OUTPUT FILES**

### **III.    EXISTING OUTPUT FILES**

### **IV.    EXISTING INPUT FILES**

- plants.plt file – Winter wheat days to maturity too low; updated in all directories.

### **V.      OTHER**

- There was an error in leaf senescence causing LAI to decline too rapidly;
- Added SWAT+ Flowchart to documentation directory;

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### I. NEW INPUT FILES

### II. NEW OUTPUT FILES

- Added new water allocation output file (water\_allo\_\*.txt); (still testing; it is not set up in print.prt todote);

### III. EXISTING OUTPUT FILES

- Added pesticide metabolic columns to files the listed below; Hendrik is testing

### IV. EXISTING INPUT FILES

- 1) In the lum decision table, the LIM\_VAR input for plant\_gro can either be a '1', for plant growing (original code) OR the plant name (e.g., CORN)

```
plant_gro hru    0 corn - - - =
year_rot  hru    0 null - 1 = =
```

(Notes from Jeff):

if "corn" is growing, then the condition is met. Much better than the old way of saying if plant "1" in pcomdb is "y".

- 2) Added CN\_UPDATE to the lum.dtl file; allows users to update the curve number with the decision table (not currently being used in example datasets but updated file is included in database files directory);

Example:

```
cn_update hru    0 corn_update abschg 3 0 null y n
```

Notes from Jeff: The cn\_update action adds 3 (abschg) to the current cn2 value. All of the change options will work (absval, abschg, pctchg, relchg) but if you use the absval and you change cn2 at the start of the simulation using the calibration.cal file, the absval will override the change in the calibration.cal file. We should tell users not to use absval option.

## **V. OTHER**

NEW subroutines added to this revision:

- proc\_hru.f90
- calsoft\_hyd\_bfr.f90
- calsoft\_hyd\_bfr\_et.f90
- calsoft\_hyd\_bfr\_latq.f90
- calsoft\_hyd\_bfr\_surq.f90
- calsoft\_hyd\_bfr\_perc.f90
- cn2\_init.f90
- gwflow\_module.f90
- gwflow\_read.f90
- gwflow\_simulate.f90
- pest\_metabolite\_read.f90
- pl\_write\_parms\_cal.f90
- plant\_transplant\_read.f90
- mgt\_transplant.f90
- rls\_routeaqu.f90
- sd\_channel\_sediment.f90
- header\_water\_allocation.f90
- water\_allocation.f90
- water\_allocation\_module.f90
- water\_allocation\_read.f90
- water\_allocation\_output.f90

## REVISION 60.4 – June 15, 2020

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### **I. NEW INPUT FILES**

### **II. NEW OUTPUT FILES**

### **III. EXISTING OUTPUT FILES**

- ALL water balance WB output files:  
added: SNO\_INIT and SNO\_FINAL columns
- OBJECT.PRT file: now has the option to print soil storage value (by soil layer) output file  
(See the ceap\_connectivity\_test data for example)
- SD\_CHANNEL output files:  
This file now produces output for FLO\_IN/AQU\_IN/FLO\_OUT in m3^s and mm

### **IV. EXISTING INPUT FILES**

- HYD-SED-LTE.CHA file:  
HC\_COV input (head cut cover factor) now named WD\_RTO (width depth ratio)

### **V. OTHER**

- WB\_PARMS.SFT – file updated in .../databases  
K\_LO variable( k (lowest layer) adjustment or at limit) renamed to PETCO
- CAL\_PARMS.CAL – updated
- Deleted these routines: sim\_inityr.f90/ru\_allo.f90/proc\_allo.f90  
/flow\_hyd\_hru\_ru.f90/readtime\_read.f90
- Added: proc\_aqu.f90/time\_read.f90/unit\_hyd\_ru\_hru.f90

## REVISION 60.3 – April 6, 2020

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### I. NEW INPUT FILES

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### III. EXISTING OUTPUT FILES

- Added two outputs to the WB (waterbal) files entered after the CN variable shown below in **bold**:
 

real :: cn = 0.	!none	CN values during mon in HRU
real :: sw_init = 0.	!mm H2O	initial soil water content of entire profile
real :: sw_final = 0.	!mm H2O	final soil water content of entire profile
real :: sw = 0.	!mm H2O	average soil water content of entire profile

### IV. EXISTING INPUT FILES

- **HYDROLOGY.WET** file (check to ensure the order of the values of these columns are correct; psa/pdep values only switched in Mike's CEAP datasets; headers and spreadsheet correct; The order is:  
 psa/pdep/esa/edep/k/evrsv/acoef/bcoef/ccoeff/frac ←type  
 hru\_ps/dp\_ps/hru\_es/dp\_es/k/evap/vol\_area\_co/vol\_dp\_a/vol\_dp\_b/hru\_frac ←modular sheet

- PLANT\_PARMS.SFT
- PLANT\_GRO.SFT
- WATER\_BALANCE. SFT file

Additional inputs added or removed in each of these files (spreadsheet updated and examples are in the database directory)

### V. OTHER

NOTE: Edited the subroutine 'structure\_set\_parms.f90' in the case for filter strips. Case was labelled incorrect as 'filter' when it should have been 'fstrip'.

NEW SUBROUTINES:      soil\_text\_init.f90  
                              soil\_awc\_init.f90  
                              water\_rights\_read.f90

Added two 'sections' to the documentation on:

- Water Allocation
- Output files and variable definitions

## REVISION 60.2 – February 25, 2020

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### I. NEW INPUT FILES

### II. NEW OUTPUT FILES

### III. EXISTING OUTPUT FILES

- BASIN\_SD\_CHANNEL and SD\_CHANNEL output files restructured  
FLO units in this file changed to  $m^3/s$
- BASIN\_WB\_\*.TXT – added SW\_INIT and SW\_FINAL;
- New columns (**SW\_INIT** and **SW\_FINAL**) added to these output files:
  - 1) Basin water balance
  - 2) HRU water balance
  - 3) HRU LTE water balance
  - 4) RU water balance
- **NOTE:** if the channel length is < 1 meter, there will be not routing and the output for these channels will be printed as 0.0

### IV. EXISTING INPUT FILES

#### -- PLANTS.PLT --

- 1) Added 2 plants from Mike's CEAP runs (urban\_cool and urban\_warm)
- 2) Removed BARR and WATR from the file (barren and water)
- 3) CORN50 was added
- 4) The 'plnt\_typ' column for the following crops are now typed as 'tuber'
  - carrt (carrot)
  - pnut (peanut)
  - pota (potato)
  - radi (radish)
  - sgbt (sugar beets)
  - spot (sweet potato)

- **CODES.BSN** – SOIL\_P (Soil P Model input) column should be changed to '0'
- **PARAMETERS.BSN** – N\_PERC column should be changed to '0.1'
- **HARV.OPS** – tuber plants updated in this file (updated in /databases);

tuber	tuber	1.10000	0.95000	0.00000
peanuts	tuber	1.10000	0.95000	0.00000

**CAL\_PARMS.CAL** – added two aquifer calibration parameters to this file (updated in directories)

deep_seep	aqu	0.00100	0.40000	m/m
sp_yld	aqu	0.00000	0.50000	fraction

Also added cha variables to the **CAL\_PARMS.CAL** file:

Renamed existing:

- w (rte) → chw (cha)
- d (rte) → chd (cha)
- s (rte) → chs (cha)
- l (rte) → chl (cha)
- n (rte) → chn (cha)

Added:

cov	cha	0.00000	1.00000	fraction
cherod	cha	0.00000	1.00000	fraction
shear_bnk	cha	0.00000	1.00000	fraction
hc_erod	cha	0.00000	1.00000	fraction
hc_co	cha	0.00000	5.00000	m/m
hc_len	cha	0.00000	100.00000	m
hc_hgt	cha	0.00000	3.00000	m

Removed: rte variables from this file;

Changed SURLAG from OBJ\_TYP BSN to HRU (It is still input in the .bsn file)

surlag	hru	0.05000	24.00000	days
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**HYD-SED-LTE.CHA** - CHK column changed to mm/day (originally mm/hr)

## V. OTHER

Removed the following routines: calsoft\_init.f90  
basin\_water\_init.f90

Added the following routine: basin\_sw\_init.f90

## REVISION 60.1 – October 11, 2019

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- BASIN CROP YIELD FILES ADDED (no code included in the 'print.prt' file;  
always prints when HRU spatial objects > 0)  
basin\_crop\_yld\_yr.txt  
basin\_crop\_yld\_aa.txt

### III. EXISTING OUTPUT FILES

- Added new output variables to:  
basin\_aqu\_pest\*.txt  
aquifer\_pest\_\*.txt  
(sol\_flo/sor\_flo/sol\_perc/stor\_ave/stor\_init/stor\_final)
- Rename 'crop\_yld\_aa.out' to 'crop\_yld\_aa.txt'
- Adjusted the headers in channel\_sd\*.txt and basin\_sd\_cha\*.\* txt files  
(moved the following up one line to be included in the 'area.....precip....evap' line)  
jday mon day yr unit gis\_id name

### IV. EXISTING INPUT FILES

- Updated 'PLANTS.PLT' with changes in:  
CORN/CORN50/CORN100/CORN110/CORN120/CORN90  
SOYB/SOYB100/SOYB105/SOYB110/SOYB115/SOYB120  
  
Values in the following columns changed:  
bm\_e/harv\_idx/lai\_max1/hu\_lai\_decl/frac\_n\_yld/frac\_p\_yld/frac\_n\_em/frac\_n\_50/frac\_n\_mat/  
frac\_p\_em/frac\_p\_50/frac\_p\_mat  
(all example input datasets updated with this file)
- UPDATED 'FERTILIZER.FRT' file with "p" added for CEAP simulation runs  
(all example input datasets updated with this file)
- Deleted Treynor\_Iowa from the example datasets (...data)
- Added 'tropic\_dataset' and '07120002\_Iroquois\_IL' to the example datasets
- PARAMETERS.BSN – SCOEf inserted in 'openvar1' spot (all example datasets changed)



- HYDROLOGY.HYD – added column named LATQ\_CO – plant ET curve number coefficient (formerly CNCOEF)
- WATER\_BALANCE.SFT
  - PET (ave annual potential et) column added after TFR
  - ORGN removed
- CAL\_PARM.SCAL (updated in ...\\databases directory)
  - added PETCO and LATQ\_CO as soft calibration variables
  - updated cn2, cn3\_swf, slope ABS\_MIN and ABS\_MAX values

## V. OTHER

- Removed the following subroutines: **wattable.f90/smp\_filtw.f90/calsoft\_init.f90**
- Added new subroutine: **cli\_precip\_control.f90**
- **LS\_UNIT.ELE** – BSN\_FRAC column carried to 3 significant digits (Ryan Bailey excessive rainfall issue)
 

**NOTE:** (Jaclyn has fixed this problem in the editor (updated 59.3) to read this column in an exponential format)

## REVISION 60 – August 19, 2019

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### II. NEW OUTPUT FILES

Pesticide output files added:

(basin_aquifer)	basin_aqu_pest_*.txt
(basin channel)	basin_ch_pest_*.txt
(basin_reservoir)	basin_res_pest_*.txt
(basin landscape units)	basin_ls_pest_*.txt
(aquifer)	aquifer_pest_*.txt
(channel)	channel_pest_*.txt
(reservoir)	reservoir_pest_*.txt
(hru)	hru_pest_*.txt

(Note: The PRINT.PRT file, PEST section triggers the outputs for all the files above)

### III. EXISTING OUTPUT FILES

### IV. EXISTING INPUT FILES

- OVN\_TABLE.LUM file – the inputs for ‘urban\_asphalt’ should be .011 instead of .110 (all example datasets updated)

PLANTS.PLT (all example input datasets updated with updated file)

- Removed Water (WATR) from this database; User will use one of the wetland plants (wehb, wetf, wetl, wetn, wewo)
- Removed Barren (BARR) from this database;  
(the interface will include ‘null’ in the LU\_MGT column in HRU-DATA.HRU which indicates no landuse)
- Edit input for BLAI in rngb (originally == 2.0) and rngc (originally == 2.5) - both changed == 4.0

**AQUIFER.AQU file:**

- GW\_FLO is initial groundwater flow in mm units

The definition of the next two variables in this file that were not being used are now:

- 'orgn' - this column renamed to 'carbon' (default == 0.5)
- 'orgp' – this column renamed to 'flo\_dist' (default == 50.0)

**CODES.BSN**

- Added an option in the NOSTRESS column (option ==2)  
nostress =           0 (all stresses applied)  
                  1 (turn off all plant stress)  
                  **2 (turn off nutrient plant stress only)**
- **CALIBRATION FILES UPDATES** (files in ../database\_files)  
cal\_parms.cal  
wb\_parms.sft

**V. OTHER**

The following new subroutines were added:

aqu\_pesticide\_module.f90  
basin\_aqu\_pest\_output.f90  
aqu\_pesticide\_output.f90