c:\modular\_datasets\_rev60\_5\_1\revision\_notes\Rev60\_5\_3.docx

**REVISION 60.5.3**

1. NEW\_INPUT\_FILES

Contains a list of new input files that are being tested.

1. NEW\_OUTPUT\_FILES

Contains a list of new output files being review.

1. Existing output files

List of changes in output files

1. Existing input files

List of changes in input files

1. Other

Files modified in this revision including brief explanation;

1. **NEW INPUT FILES**

Standard decision tables added to the \database\ directory: (lu\_std\_files.zip)

* scen\_lu.dtl.txt (lu\_scenario\_standard\_tables\_new.docx)
* lum\_std.dtl.txt (lum\_standard\_tables\_new.docs)

1. **NEW OUTPUT FILES**

New output files added:

- HRU\_NCYCLE\_\*.TXT - This file is printed when the HRU\_NB time steps are chosen in the ‘print.prt’ file;

- HRU\_NUT\_CARB\_GL\_\*.TXT – This file is printed when the HRU\_LS time steps are chosen in the ‘print.prt’ file;

-Output files in progress (not complete):

SOIL\_NUT\_CARB\_OUT.TXT

LU\_CHANGE\_OUT.TXT

1. **EXISTING OUTPUT FILES**

* Added these variables to the end of PW output files

        real :: lai\_max = 0.  !m\*\*2/m\*\*2     |maximum leaf area index during timestep

        real :: bm\_max = 0.   !kg/ha         |maximum total plant biomass during timestep

        real :: bm\_grow = 0.  !kg/ha         |total plant biomass growth during timestep

        real :: c\_gro = 0.    !kg/ha         |total plant carbon growth during timestep

- aquifer output files (aquifer\_\*\*.txt/basin\_a)qu\_\*.txt, the units for  
 FLO\_CHA/FLO\_RES/FLO\_LS all are mm

1. **EXISTING INPUT FILES**

* **FILE.CIO** – File MODFLOW.CON renamed to GWFLOW.CON
* **OBJECT.CNT** – Header MODFLOW (mfl) renamed to GWFLOW (gwfl)
* **PLANTS.PLT** – Added longer description at the end of each plant;
* **HARV.OPS –** This file updated for tuber plants
* **CODES.BSN**   
  - **BF\_FLG** (baseflo) is replaced with **LAPSE**:  
  integer :: lapse = 0 !! precip and temperature lapse rate control

!! 0 = do not adjust for elevation

!! 1 = adjust for elevation

- **UHYD** change of option codes:

integer :: uhyd = 1 !! Unit hydrograph method:

!! 0 = triangular UH

!! 1 = gamma function UH

* The last column in **codes.bsn** named **HEADWATER** is now **I\_FPWET**. I\_FPWET is the code for the new flood routing model that is a work in progress;   
  where:

I\_FPWET == 0 calls SD\_CHANNEL\_CONTROL;   
 == 1 calls SD\_CHANNEL\_CONTROL2;

Default == 0;

* **NUTRIENTS.SOL –** Descriptions for the new variables included in the code type; **BOLDED** are new variables; updated in data directories;

**character(len=16) :: name = "default"**

real :: exp\_co = .001 ! |depth coefficient to adjust concentrations for depth

**real :: lab\_p = 5. !ppm |labile P in soil surface**

**real :: nitrate = 7. !ppm |nitrate N in soil surface**

**real :: fr\_hum\_act = .02 !0-1 |fraction of soil humus that is active**

**real :: hum\_c\_n = 10. !0-1 |humus C:N ratio**

**real :: hum\_c\_p = 80. !0-1 |humus C:P ratio**

real :: inorgp = 3.5 !ppm |inorganic P in soil surface - not currently used

real :: watersol\_p = .15 !ppm |water soluble P in soil surface - not currently used

real :: h3a\_p = .25 !ppm |h3a P in soil surface - not currently used

real :: mehlich\_p = 1.2 !ppm |Mehlich P in soil surface - not currently used

real :: bray\_strong\_p = .85 !ppm |Bray P in soil surface - not currently used

* **PARAMETERS.BSN** variables changed;

real :: plaps = 0. !! mm/km |precipitation lapse rate: mm per km of elevation difference **(formerly OPENVAR2) (range = -25.0 to 25.0)**

real :: tlaps = 0.0 !! deg C/km |temperature lapse rate: deg C per km of elevation difference **(formerly N\_FIX) (range = 3.0 – 8.0)**

real :: petco\_pmpt = 1.0 !! PET adjustment (%) for Penman-Montieth and Priestley-Taylor methods **(formerly RES\_SETLR\_CO)**

integer :: day\_lag\_mx = 0. !! max days to lag hydrographs for hru, ru and channels

!! non-draining soils **(formerly OPENVAR3) (range = 0-3)**

integer :: igen = 0 !! random generator code:

!! 0 = use default numbers

!! 1 = generate new numbers in every simulation (**only changed range for this variable in the modular spreadsheet)**

* **PEST\_HRU.INI –** the format of this file has changed and an example is in \database\_files; consult with developers when using this option;
* These variables were added in conditions.f90 routine for the decision table. (see Decision\_table\_conds\_acts\_new.xlsx in \database\_files\).

P\_STRESS

P\_FACTOR

K\_FACTOR

HYD\_SOIL\_GROUP

SOIL\_CARBON

TILE\_DRAINED

TILLAGE

PLANT

* These variables were added in the actions.f90 routine for decision table;

P\_FACTOR

CONTOUR

STRIPCROP

TERRACE

TILE\_INSTALL

SEPTIC\_INSTALL

FSTRIP\_INSTALL

GRASSWW\_INSTALL

USER\_DEF\_B

* **CAL\_PARMS.CAL**
* RTE Variables named CLAY and BD are renamed to:

CH\_CLAY

CH\_BD

* FLO\_MIN and REVAP\_MIN are both meters (m) and the range is 0-50.0

* **RECALL files** – The formatting of the recall files changed in 60.4, but never reported.

case (0) !! subdaily

case (1) !! daily

case (2) !! monthly

case (3) !! annual

* **HYD-SED-LTE.CHA** file inputs changed

real :: fps ! m/m |flood plain slope **(formerly TC\_CONC)** (range=0-10)

real :: fpn ! |flood plain Manning's n **(formerly SHEAR\_BNK)** (range 0.01-0.50)

**NEW Variables in same file added at the end; (HYD-SED-LTE.CHA)**

real :: n\_conc = 0. !mg/kg |nitrogen concentration in channel bank (range 0-50) (formerly HC\_EROD)

real :: p\_conc = 0. !mg/kg |phosphorus concentration in channel bank (range 0-10)

(formerly HC\_HT)

real :: p\_bio = 0. !frac |fraction of p in bank that is bioavailable (range 0.0.2)

(formerly HC\_LEN)

* **CONDITIONAL.UPD** is renamed to **SCEN\_DTL.UPD** (this file is currently hardcoded and not included in file.cio or modular database). Example file in \database\_files;

Description of file:

Line 1 title line;

line 2 NUM\_HITS;

line 3 header;   
line 4 MAX\_HITS/NAME/COND;

integer :: num\_hits = 0 !! current number of times the table will be executed

integer :: max\_hits = 0 !! maximum number of times the table will be executed

character(len=25) :: name !! name of update schedule

character(len=25) :: cond !! points to ruleset in conditional.ctl for scheduling the update

1. **OTHER**

* **TIME\_CONTROL.F90** – This routine was changed to account for the leap year problem we had with one user running the model for hundreds of years.

The calendar omits three leap days every 400 years, which is the length of its leap cycle. This is done by omitting Feb 29 in the three century years (multiples of 100) that not multiples of 400. if you run a simulation for hundreds of years, every 400 years there is a leap year on the even years – for example; 1600 and 2000 are leap years, but 1700, 1800, 1900, and 2100 are not.

* **Steps for printing soil water content for each soil layer using the OBJECT.PRT file.**

1. **Add OBJECT.PRT name to file.cio**

SIMULATION             time.sim            print.prt              **object.prt**           object.cnt      null

1. **Edit the OBJECT.PRT file:**

object.prt

        NUMB       OBTYP     OBTYPNO      HYDTYP    FILENAME

           1                hru                       0              sol     soils\_st.out

Where:                 NUMB is a sequential number;

                                OBTYP (data is from the HRU)

                                OBTYPNO If ‘0’ input, it will print the information for all HRU’s;

                                Note:  if you want a specific HRU, type the number of it for OBTYPNO;

                                HYDTYP == sol

                                FILENAME: output file name for the new file; (soils\_st.out);

* Code changes for harvesting tuber crops
* Code changes in computing heat units to maturity. Instead of starting summing of heat units with a dormancy threshold, I use 0.15\*phubase0. This gives more reasonable hu and harvest dates. And increased winter wheat yields to more reasonable levels
* Corrected errors in aquifer\_1d\_control routine that were miscalculating seepage through the aquifer.
* QTILE simulations become zero when certain soil parameters were included in the ‘calibration.cal’ file. Changes were made to zero the variables when the subroutine was called to update the soil variables in:

**soil\_awc\_init.f90**:

        !! compute drainable porosity and variable water table factor

        drpor = soil(isol)%phys(ly)%por - soil(isol)%phys(ly)%up

        soil(isol)%ly(ly)%vwt = (437.13\*drpor\*\*2)-(95.08 \* drpor)+8.257

      end do

      !! initialize water/drainage coefs for each soil layer

      depth\_prev = 0.

      sumpor = 0.

      soil(isol)%sumfc = 0.

      soil(isol)%sumul = 0.

      soil(isol)%sw = 0.

      soil(isol)%sumwp = 0.

* AWC and other soil calibration parameters by layer were fixed
* These subroutines were added:

HRU\_LUM\_INIT\_ALL.F90  
AQU\_PEST\_OUTPUT\_INIT.F90  
CLI\_LAPSE.F90  
CN2\_INIT\_ALL.F90  
HEADER\_LU\_CHANGE.F90  
HRU\_LUM\_INIT\_ALL.F90  
SD\_RATING\_CURVE.F90

COND\_INTEGER.F90

COND\_REAL.F90

RCURV\_INTERP\_DEP.F90

RCURV\_INTERP\_FLO.F90

SD\_CHANNEL\_CONTROL2.F90

* These subroutines were deleted:

PROC\_ALLO.F90  
READTIME\_READ.F90SIM\_INITYR.F90  
WATER\_HRU.F90  
RU\_ALLO.F90

SOILTEST\_ALL\_INIT.F90

SOILTEST\_INIT.F90