**C:\data\modular\_datasets\_rev60.5\documentation\SWAT+\_Outputs.docx**

**The following output files print the same variables for all time steps (day, mon, yr and aa) for the following:**

**WB = Water Balance**

**BASIN\_WB\_\*.TXT (Basin)**

**LSUNIT\_WB\_\*.TXT (Landscape Units)**

**HRU\_WB\_\*.TXT (HRU)**

**HRU-LTE\_WB\_\*.TXT (HRU lite; SWAT Deg)**

real :: precip = 0. !mm H2O |prec falling on they HRU during timestep

real :: snofall = 0. !mm H2O |amt of prec falling as snow, sleet or freezing rain during timestep

real :: snomlt = 0. !mm H2O |amt of snow or ice melting during timestep

real :: surq\_gen = 0. !mm H2O |amt of surf runoff to main channel

real :: latq = 0. !mm H2O |amt of lat flow contrib to main channel during HRU during mon

real :: wateryld = 0. !mm H2O |water yld (tot amt of water entering main channel) from HRU during mon

real :: perc = 0. !mm H2O |amt of water perc out of the soil profile & into the vadose zone in HRU during mon

real :: et = 0. !mm H2O |actual ET in HRU during mon

real :: tloss = 0. !mm H2O |amt of trans losses from trib channels in HRU for mon

real :: eplant = 0. !mm H2O |actual amt of transpiration that occurs during mon in HRU

real :: esoil = 0. !mm H2O |actual amt of evap (from soil) that occurs during mon in HRU

real :: surq\_cont = 0. !mm H2O |amt of surf runoff gen during mon in HRU

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

real :: sw\_300 = 0. !mm H2O |soil water content of upper 300 mm

real :: snopack = 0. !mm |snow pack

real :: pet = 0. !mm H2O |pot et on current day in HRU

real :: qtile = 0. !mm H2O |drainage tile flow contrib to main channel from HRU in mon

real :: irr = 0. !mm H2O |amount of water applied to HRU

real :: surq\_runon = 0. !mm H2O |surface runoff from upland landscape units

real :: latq\_runon = 0. !mm H2O |lateral soil flow from upland landscape units

real :: overbank = 0. !mm H2O |overbank flooding from channels

real :: surq\_cha = 0. !mm H2O |surface runoff flowing into channels

real :: surq\_res = 0. !mm H2O |surface runoff flowing into reservoirs

real :: surq\_ls = 0. !mm H2O |surface runoff flowing into a landscape element

real :: latq\_cha = 0. !mm H2O |lateral soil flow into channels

real :: latq\_res = 0. !mm H2O |lateral soil flow into reservoirs

real :: latq\_ls = 0. !mm H2O |lateral soil flow into a landscape element

**The following output files print the same variables for all time steps (day, mon, yr and aa) for the following:**

**NB = Nutrient balance**

**BASIN\_NB\_\*.TXT (Basin)**

**LSUNIT\_NB\_\*.TXT (Landscape Units)**

**HRU\_NB\_\*.TXT (HRU)**

real :: grazn = 0. !kg N/ha |amt of nit added to soil in grazing on the day in HRU

real :: grazp = 0. !kg P/ha |amt of phos added to soil in grazing on the day in HRU

real :: lab\_min\_p = 0. !kg P/ha |amt of phos moving from the labile min pool to the active min pool

in the soil profile on the current day in the HRU

real :: act\_sta\_p = 0. !kg P/ha |amt of phos moving from the active min pool to the stable min pool

in the soil profile on the current day in the HRU

real :: fertn = 0. !kg N/ha |tot amt of nit applied to soil in HRU on day

real :: fertp = 0. !kg P/ha |tot amt of phos applied to soil in HRU on day

real :: fixn = 0. !kg N/ha |amt of nit added to plant biomass via fixation on the day in HRU

real :: denit = 0. !kg N/ha |amt of nit lost from nitrate pool by denit in soil profile

on current day in HRU

real :: act\_nit\_n = 0. !kg N/ha |amt of nit moving from active org to nitrate pool in soil profile

on current day in HRU

real :: act\_sta\_n = 0. !kg N/ha |amt of nit moving from active org to stable org pool in soil

profile on current day in HRU

real :: org\_lab\_p = 0. !kg P/ha |amt of phos moving from the org to labile pool in soil profile

on current day in HRU

real :: rsd\_nitorg\_n = 0. !kg N/ha |amt of nit moving from the fresh org (residue) to the nitrate(80%)

and active org(20%) pools in soil profile on current day in HRU

real :: rsd\_laborg\_p = 0. !kg P/ha |amt of phos moving from the fresh org (residue) to the labile(80%)

and org(20%) pools in soil profile on current day in HRU

real :: no3atmo = 0. !kg N/ha |nitrate added to the soil from atmospheric deposition (rainfall+dry)

real :: nh4atmo = 0. !kg N/ha |ammonia added to the soil from atmospheric deposition (rainfall+dry)

**The following output files print the same variables for all time steps (day, mon, yr and aa) for the following:**

**LS = Losses**

**BASIN\_LS\_\*.TXT (Basin)**

**LSUNIT\_LS\_\*.TXT (Landscape Units)**

**HRU\_LS\_\*.TXT (HRU)**

**HRU-LTE\_\*.TXT (HRU lite; SWAT Deg)**

real :: sedyld = 0. !metric tons | daily soil loss caused by water erosion

real :: sedorgn = 0. !kg N/ha | amt of org nit in surf runoff in HRU for the day

real :: sedorgp = 0. !kg P/ha | amt of org phos in surf runoff in HRU for the day

real :: surqno3 = 0. !kg N/ha | amt of NO3-N in surf runoff in HRU for the day

real :: latno3 = 0. !kg N/ha | amt of NO3-N in lat flow in HRU for the day

real :: surqsolp = 0. !kg P/ha | amt of soluble phos in surf runoff in HRU for the day

real :: usle = 0. !metric tons/ha | daily soil loss predicted with USLE equation

real :: sedmin = 0. !

real :: tileno3 = 0. !kg N/ha | NO3 in tile flow

**The following output files print the same variables for all time steps (day, mon, yr and aa) for the following:**

**PW = Plant weather**

**BASIN\_PW\_\*.TXT (Basin)**

**LSUNIT\_PW\_\*.TXT (Landscape Units)**

**HRU\_PW\_\*.TXT (HRU)**

**HRU-LTE\_PW\_\*.TXT (HRU lite; SWAT Deg)**

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

real :: bioms = 0. !kg/ha |land cover/crop biomass

real :: yield = 0. !kg/ha |yield (dry weight) by crop type

real :: residue = 0. !kga/ha |initial residue cover

real :: sol\_tmp = 0. !deg C |daily average temperature of soil layer

real :: strsw = 0. !0-1 |water (drought) stress

real :: strsa = 0. !0-1 |water (aeration) stress

real :: strstmp = 0. !0-1 |temperature stress

real :: strsn = 0. !0-1 |nitrogen stress

real :: strsp = 0. !0-1 |phosphorus stress

real :: nplnt = 0. !kg N/ha |plant uptake of nit in HRU for the day

real :: percn = 0. !kg N/ha |NO3-N leached from soil profile

real :: pplnt = 0. !kg P/ha |plant uptake of phos in HRU for the day

real :: tmx = 0. !deg C |maximum temperature for the day in HRU

real :: tmn = 0. !deg C |minimum temperature for the day in HRU

real :: tmpav = 0. !deg C |average air temperature on current day in HRU

real :: solrad = 0. !MJ/m^2 |solar radiation for the day in HRU

real :: wndspd = 0. !m/s |windspeed

real :: rhum = 0. !none |relative humidity

real :: phubase0 = 0. !deg c |base zero potential heat units

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_AQU\_\*.TXT (Basin Aquifer)**

**AQUIFER\_\*.TXT (Aquifer)**

real :: flo = 0. !mm |flow from aquifer in current time step

real :: dep\_wt = 0. !m |depth to water table

real :: stor = 0. !mm |total water storage in aquifer

real :: rchrg = 0. !mm |recharge

real :: seep = 0. !kg N/ha |seepage to next object

real :: revap = 0. !mm |revap

real :: no3 = 0. !ppm NO3-N |nitrate-N concentration in aquifer

real :: minp = 0. !kg |mineral phosphorus from aquifer on current timestep

real :: cbn = 0. !percent |organic carbon in aquifer (initial)

real :: orgn = 0. !kg/ha |organic nitrogen

real :: rchrg\_n = 0. ! |amount of nitrate getting to the shallow aquifer

real :: nloss = 0. !kg/ha |nitrogen loss

real :: no3gw !kg N/ha |nitrate loading to reach in groundwater

real :: seepno3 = 0. !kg |seepage of no3 to next object

real :: flo\_cha = 0. !mm H2O |surface runoff flowing into channels

real :: flo\_res = 0. !mm H2O |surface runoff flowing into reservoirs

real :: flo\_ls = 0. !mm H2O |surface runoff flowing into a landscape element

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_RES\_\*.TXT ( Basin Reservoir)**

**RESERVOIR\_\*.TXT (Resevoir)**

real :: area\_ha = 0. ! ha |water body surface area

real :: precip = 0. ! ha-m |precip on the water body

real :: evap = 0. ! ha-m |evaporation from the water surface

real :: seep = 0. ! ha-m |seepage from bottom of water body

real :: flo\_stor = 0. ! m^3 |volume of water storage

real :: sed\_stor = 0. ! metric tons |sediment in

real :: orgn\_stor = 0. ! kg N |organic N storage

real :: sedp\_stor = 0. ! kg P |organic P storage

real :: no3\_stor = 0. ! kg N |NO3-N storage

real :: solp\_stor = 0. ! kg P |mineral (soluble P) storage

real :: chla\_stor = 0. ! kg |chlorophyll-a storage

real :: nh3\_stor = 0. ! kg N |NH3 storage

real :: no2\_stor = 0. ! kg N |NO2 storage

real :: cbod\_stor = 0. ! kg |carbonaceous biological oxygen demand storage

real :: dox\_stor = 0. ! kg |dissolved oxygen storage

real :: san\_stor = 0. ! tons |detached sand storage

real :: sil\_stor = 0. ! tons |detached silt storage

real :: cla\_stor = 0. ! tons |detached clay storage

real :: sag\_stor = 0. ! tons |detached small ag storage

real :: lag\_stor = 0. ! tons |detached large ag storage

real :: grv\_stor = 0. ! tons |gravel storage

real :: temp\_stor = 0. ! deg c |temperature storage

real :: flo\_in = 0. ! m^3 |volume of water in

real :: sed\_in = 0. ! metric tons |sediment in

real :: orgn\_in = 0. ! kg N |organic N in

real :: sedp\_in = 0. ! kg P |organic P in

real :: no3\_in = 0. ! kg N |NO3-N in

real :: solp\_in = 0. ! kg P |mineral (soluble P) in

real :: chla\_in = 0. ! kg |chlorophyll-a in

real :: nh3\_in = 0. ! kg N |NH3 in

real :: no2\_in = 0. ! kg N |NO2 in

real :: cbod\_in = 0. ! kg |carbonaceous biological oxygen demand in

real :: dox\_in = 0. ! kg |dissolved oxygen in

real :: san\_in = 0. ! tons |detached sand in

real :: sil\_in = 0. ! tons |detached silt in

real :: cla\_in = 0. ! tons |detached clay in

real :: sag\_in = 0. ! tons |detached small ag in

real :: lag\_in = 0. ! tons |detached large ag in

real :: grv\_in = 0. ! tons |gravel in

real :: temp\_in = 0. ! deg c |temperature in

real :: flo\_out = 0. ! m^3 |volume of water out

real :: sed\_out = 0. ! metric tons |sediment out

real :: orgn\_out = 0. ! kg N |organic N out

real :: sedp\_out = 0. ! kg P |organic P out

real :: no3\_out = 0. ! kg N |NO3-N out

real :: solp\_out = 0. ! kg P |mineral (soluble P) out

real :: chla\_out = 0. ! kg |chlorophyll-a out

real :: nh3\_out = 0. ! kg N |NH3 out

real :: no2\_out = 0. ! kg N |NO2 out

real :: cbod\_out = 0. ! kg |carbonaceous biological oxygen demand out

real :: dox\_out = 0. ! kg |dissolved oxygen out

real :: san\_out = 0. ! tons |detached sand out

real :: sil\_out = 0. ! tons |detached silt out

real :: cla\_out = 0. ! tons |detached clay out

real :: sag\_out = 0. ! tons |detached small ag out

real :: lag\_out = 0. ! tons |detached large ag out

real :: grv\_out = 0. ! tons |gravel out

real :: temp\_out = 0. ! deg c |temperature out

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_CHA\_\*.TXT (Basin Channel)**

**CHANNEL\_\*.TXT (Channel)**

real :: flo\_in = 0. ! (ha-m) |streamflow into reach during time step

real :: flo\_out = 0. ! (ha-m) |streamflow out of reach during time step

real :: evap = 0. ! (m^3/s) |daily rate of water loss from reach by evaporation

real :: tloss = 0. ! (m^3/s) |rate of water loss from reach by transmission through the streambed

real :: sed\_in = 0. ! (tons) |sediment transported with water into reach

real :: sed\_out = 0. ! (tons) |sediment transported with water out of reach

real :: sed\_conc = 0. ! (mg/L) |concentration of sediment in reach

real :: orgn\_in = 0. ! (kg N) |organic nitrogen transported with water into reach

real :: orgn\_out = 0. ! (kg N) |organic nitrogen transported with water out of reach

real :: orgp\_in = 0. ! (kg P) |organic phosphorus transported with water into reach

real :: orgp\_out = 0. ! (kg P) |organic phosphorus transported with water out of reach

real :: no3\_in = 0. ! (kg N) |nitrate transported with water into reach

real :: no3\_out = 0. ! (kg N) |nitrate transported with water out of reach

real :: nh4\_in = 0. ! (kg) |ammonium transported with water into reach

real :: nh4\_out = 0. ! (kg) |ammonium transported with water out of reach

real :: no2\_in = 0. ! (kg) |nitrite transported with water into reach

real :: no2\_out = 0. ! (kg) |nitrite transported with water out of reach

real :: solp\_in = 0. ! (kg P) |soluble pesticide transported with water into reach

real :: solp\_out = 0. ! (kg P) |soluble pesticide transported with water out of reach

real :: chla\_in = 0. ! (kg) |amount of chlorophyll a transported into reach

real :: chla\_out = 0. ! (kg) |amount of chlorophyll a transported out of reach

real :: cbod\_in = 0. ! (kg) |carbonaceous biochemical oxygen demand of material transported into reach

real :: cbod\_out = 0. ! (kg) |carbonaceous biochemical oxygen demand of material transported out of reach

real :: dis\_in = 0. ! (kg) |amount of dissolved oxygen transported into reach

real :: dis\_out = 0. ! (kg) |amount of dissolved oxygen transported out of reach

real :: solpst\_in = 0. ! (mg pst) |soluble pesticide transported with water into reach

real :: solpst\_out = 0. ! (mg pst) |soluble pesticide transported with water out of reach

real :: sorbpst\_in = 0. ! (mg pst) |pesticide sorbed to sediment transported with water into reach

real :: sorbpst\_out = 0. ! (mg pst) |pesticide sorbed to sediment transported with water out of reach

real :: react = 0. ! (mg pst) |loss of pesticide from water from reaction

real :: volat = 0. ! (mg) |loss of pesticide from water by volatilization

real :: setlpst = 0. ! (mg pst) |transfer of pesticide from water to river bed sediment by settling

real :: resuspst = 0. ! (mg) |transfer of pesticide from river bed sediment to water by resuspension

real :: difus = 0. ! mg |transfer of pesticide from water to river bed sediment by diffusion

real :: reactb = 0. ! (mg) |loss of pesticide from river bed sediment by reaction

real :: bury = 0. ! (mg) |loss of pesticide from river bed sediment by burial

real :: sedpest = 0. ! mg |pesticide in river bed sediment

real :: bacp = 0. ! # cfu/100mL |number of persistent bacteria transported out of reach

real :: baclp = 0. ! # cfu/100mL |number of less persistent bacteria transported out of reach

real :: met1 = 0. ! kg |conservative metal #1 transported out of reach

real :: met2 = 0. ! kg |conservative metal #2 transported out of reach

real :: met3 = 0. ! kg |conservative metal #3 transported out of reach

real :: sand\_in = 0. ! tons |sand in

real :: sand\_out = 0. ! tons |sand out

real :: silt\_in = 0. ! tons |silt\_in

real :: silt\_out = 0. ! tons |silt\_out

real :: clay\_in = 0. ! tons |clay\_in

real :: clay\_out = 0. ! tons |clay\_out

real :: smag\_in = 0. ! tons |small aggregates transported into reach

real :: smag\_out = 0. ! tons |small aggregates transported out of reach

real :: lag\_in = 0. ! tons |large aggregates transported into reachlg ag in

real :: lag\_out = 0. ! tons |large aggregates transported out of reach

real :: grvl\_in = 0. ! tons |gravel in

real :: grvl\_out = 0. ! tons |gravel out

real :: bnk\_ero = 0. ! tons |bank erosion

real :: ch\_deg = 0. ! tons |channel degradation

real :: ch\_dep = 0. ! tons |channel deposition

real :: fp\_dep = 0. ! tons |flood deposition

real :: tot\_ssed = 0. ! mg/L |total suspended sediments

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_SD\_CHA\_\*.TXT (Basin SWAT Deg Channel)**

**CHANNEL\_SD\_\*.TXT (SWAT Deg Channel)**

real :: area\_ha = 0. ! ha |water body surface area

real :: precip = 0. ! ha-m |precip on the water body

real :: evap = 0. ! ha-m |evaporation from the water surface

real :: seep = 0. ! ha-m |seepage from bottom of water body

real :: flo\_in = 0. ! m^3 |volume of water in

real :: sed\_in = 0. ! metric tons |sediment in

real :: orgn\_in = 0. ! kg N |organic N in

real :: sedp\_in = 0. ! kg P |organic P in

real :: no3\_in = 0. ! kg N |NO3-N in

real :: solp\_in = 0. ! kg P |mineral (soluble P) in

real :: chla\_in = 0. ! kg |chlorophyll-a in

real :: nh3\_in = 0. ! kg N |NH3 in

real :: no2\_in = 0. ! kg N |NO2 in

real :: cbod\_in = 0. ! kg |carbonaceous biological oxygen demand in

real :: dox\_in = 0. ! kg |dissolved oxygen in

real :: san\_in = 0. ! tons |detached sand in

real :: sil\_in = 0. ! tons |detached silt in

real :: cla\_in = 0. ! tons |detached clay in

real :: sag\_in = 0. ! tons |detached small ag in

real :: lag\_in = 0. ! tons |detached large ag in

real :: grv\_in = 0. ! tons |gravel in

real :: temp\_in = 0. ! deg c |temperature in

real :: flo\_out = 0. ! m^3 |volume of water out

real :: sed\_out = 0. ! metric tons |sediment out

real :: orgn\_out = 0. ! kg N |organic N out

real :: sedp\_out = 0. ! kg P |organic P out

real :: no3\_out = 0. ! kg N |NO3-N out

real :: solp\_out = 0. ! kg P |mineral (soluble P) out

real :: chla\_out = 0. ! kg |chlorophyll-a out

real :: nh3\_out = 0. ! kg N |NH3 out

real :: no2\_out = 0. ! kg N |NO2 out

real :: cbod\_out = 0. ! kg |carbonaceous biological oxygen demand out

real :: dox\_out = 0. ! kg |dissolved oxygen out

real :: san\_out = 0. ! tons |detached sand out

real :: sil\_out = 0. ! tons |detached silt out

real :: cla\_out = 0. ! tons |detached clay out

real :: sag\_out = 0. ! tons |detached small ag out

real :: lag\_out = 0. ! tons |detached large ag out

real :: grv\_out = 0. ! tons |gravel out

real :: temp\_out = 0. ! deg c |temperature out

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_SD\_CHAMORPH\_\*.TXT (Basin SWAT Deg Channel Morphology)**

**CHANNEL\_SDMORPH\_\*.TXT (SWAT Deg Channel Morphology)**

        real :: flo\_in = 0.             ! (m^3/s)       !ave daily inflow rate - for all time steps

        real :: aqu\_in = 0.             ! (m^3/s)       !ave daily aquifer inflow rate - for all time steps

        real :: flo = 0.                ! (m^3/s)       !ave daily outflow rate - for all time steps

        real :: peakr = 0.              ! (m^3/s)       |peak runoff rate

        real :: sed\_in = 0.             ! (tons)        !total sed in

        real :: sed\_out = 0.            ! (tons)        !total sed out

        real :: washld = 0.             ! (tons)        !wash load

        real :: bedld = 0.              ! (tons)        !bed load

        real :: dep = 0.                ! (tons)        !deposition

        real :: deg\_btm = 0.            ! (tons)        !bottom erosion

        real :: deg\_bank = 0.           ! (tons)        !bank erosion

        real :: hc\_sed = 0.             ! (tons)        !headcut erosion

        real :: width = 0.              !

        real :: depth = 0.              !

        real :: slope = 0.              !

        real :: deg\_btm\_m = 0.          ! (m)           !downcutting

        real :: deg\_bank\_m = 0.         ! (m)           !widening

        real :: hc\_m = 0.               ! (m)           !headcut retreat

        real :: flo\_in\_mm = 0.          ! (mm)          !ave inflow rate - sum for each time step

        real :: aqu\_in\_mm = 0.          ! (mm)          !ave aquifer inflow rate - sum for each time step

        real :: flo\_mm = 0.             ! (mm)          !ave outflow rate - sum for each time step

**The following output file prints the same variables for all time steps (day, mon, yr and aa) for the following:**

**BASIN\_PSC\_\*.TXT (Basin Point Source)**

**RECALL\_\*.TXT (Recall)**

real :: flo = 0. !! m^3 |volume of water

real :: sed = 0. !! metric tons |sediment

real :: orgn = 0. !! kg N |organic N

real :: sedp = 0. !! kg P |organic P

real :: no3 = 0. !! kg N |NO3-N

real :: solp = 0. !! kg P |mineral (soluble P)

real :: chla = 0. !! kg |chlorophyll-a

real :: nh3 = 0. !! kg N |NH3

real :: no2 = 0. !! kg N |NO2

real :: cbod = 0. !! kg |carbonaceous biological oxygen demand

real :: dox = 0. !! kg |dissolved oxygen

real :: san = 0. !! tons |detached sand

real :: sil = 0. !! tons |detached silt

real :: cla = 0. !! tons |detached clay

real :: sag = 0. !! tons |detached small ag

real :: lag = 0. !! tons |detached large ag

real :: grv = 0. !! tons |gravel

real :: temp = 0. !! deg c |temperature

**The following outputs are generated from the OBJECT.PRT file and are user specified. (An example is in the CEAP\_CONNECTIVITY\_TEST dataset):**

**FOR SINGLE HRU’s:**

object.prt:

NUMB OBTYP OBTYPNO HYDTYP FILENAME

1 hru **1**  sol **soils\_st.out**

Where: OBTYPNO == 1 Outputs soil storage for each soil layer for HRU #1 only to a FILENAME: soils\_st.out

**FOR ALL HRU’S**:

object.prt:

NUMB OBTYP OBTYPNO HYDTYP FILENAME

1 hru **0**  sol **soils\_st\_all.out**

Where: If OBTYPNO == 0 Prints all soil storage for each soil layer for ALL HRU’s to a FILENAME: soils\_st\_all.out