SWAT

Chapter 1

SWAT

An updated SWAT 2012 revision 670 code

Objectives

- Standard indentation and translation to Fortran 90 by using `findent`. See the translate-fortran90.pl perl script file (:heavy_check_mark:)

- Exhaustive use of the "implicit none" directive to detect bad variable usage (:heavy_check_mark:)

- Generate a GNU `Make` makefile and compile with GNU `GFortran`. See the gernerate-makefile.pl perl script file (:heavy_check_mark:)

- Remove non-used variables and format labels (:heavy_check_mark:)

- Detect and solve all uninitialized variables (:heavy_check_mark: :construction:, some proposed solutions could be incorrect)

- Remove unneeded variable initializations (:heavy_check_mark:) as:

  ```
  j=0 !  this line is not necessary

  j=ihru
  ```

- Remove redundant code (:heavy_check_mark:)

- Exhaustive use of the "parameter" directive on constants (:heavy_check_mark:)

- Generate a detailed list of issues detected in the original code (:heavy_check_mark:, see at the end of this README)

- Remove obsolete commented code (:x:)

- Update variable descriptions in comments (:construction:, a lot of work)

- Standardize comments by using Doxygen style in order to generate documentation. See at latex/refman.pdf (:construction:, a lot of work)

Required tools

- `GFortran` (to compile the source code)

- `Make` (to build the executable file)

- `Perl` (optional: to execute the perl scripts to update the makefile or to translate original files to Fortran 90)

- `Findent` (optional: to translate original files to Fortran 90 with a standard indentation)

- `Doxygen` (optional: to generate a reference programming manual from source code)

- `TeX Live` or `MiKTeX` (optional: to generate a reference programming manual from source code)

- On Microsoft Windows systems you have to install `MSYS2` and the required utilities (`GFortran` and `Make`). You can follow detailed instructions in `install-unix`

Instructions to generate Fortran 90 style code from original code

In order to generate Fortran 90 style code with standard indentation from original code you have to type on a UNIX type terminal (you need `Perl` and `Findent`):

    $ perl translate-fortran90.pl

Instructions to generate an initial GNU make Makefile

Type on the UNIX type terminal, when translated the original code to Fortran 90 style (you need `Perl`):

    $ perl generate-makefile.pl

Instructions to generate an executable to test

Type on the UNIX type terminal (you need `GFortran` and `Make`)

- In UNIX type operative systems:

      $ make

- In a `MSYS2` terminal in Microsoft Windows:

      $ EXE=".exe" LDFLAGS="-static" make

- Cross-compiling a 32 bits Microsoft Windows executable in a UNIX type operative system:

      $ prefix="i686-w64-mingw32-" EXE=".exe" LDFLAGS="-static" make

- Cross-compiling a 64 bits Microsoft Windows executable in a UNIX type operative system:

      $ prefix="x86_64-w64-mingw32-" EXE=".exe" LDFLAGS="-static" make

Instructions to generate an optimized executable file

Type on the UNIX type terminal (you need GFortran and Make)

- In UNIX type operative systems:

    $ CFLAGS="-march=native -flto" LDFLAGS="-flto" make strip

- In a MSYS2 terminal in Microsoft Windows:

    $ EXE=".exe" CFLAGS="-flto" LDFLAGS="-flto -static" make strip

- Cross-compiling a 32 bits Microsoft Windows executable in a UNIX type operative system:

    $ prefix="i686-w64-mingw32-" EXE=".exe" CFLAGS="-flto" LDFLAGS="-flto -static" make strip

- Cross-compiling a 64 bits Microsoft Windows executable in a UNIX type operative system:

    $ prefix="x86_64-w64-mingw32-" EXE=".exe" CFLAGS="-flto" LDFLAGS="-flto -static" make strip

Instructions to generate a reference programming manual from source code

Type on the UNIX type terminal (you need Doxygen and TeX Live or MiKTeX):

    $ doxygen
    $ cd latex
    $ make

The reference programming manual file latex/refman.pdf is generated from source code in PDF format

Issues in the original source code

This is a list of possible issues detected in the original source code. These issues have been mostly detected by the GFortran compiler warnings. Some of them could not arise because the logic of the variables is not possible.

- In biofilm.f:
    - "dcoef" is used but not initialized. `dcoef=3` as in watqual.f? Then, I propose at beginning: `real*8, parameter :: dcoef = 3.`
- In bmp_ri_pond.f:
    - "qseep" and "qet" could be used not initialized at lines 133 and 134. However the problem only arises for `nstep<1`
- In bmp_sand_filter.f:
    - "sed_removed" at line 342 could be used not initialized if `sfsedstdev<=0`
- In bpm_sed_pond.f:
    - `bmp_sed _pond` seems to be `bmp_sed_pond` at line 186

- In bmp_wet_pond.f:

  - "hvol" could be used not initialized in "ext_dpth" subroutine at line 267 in first bucle iteration

- In clicon.f:

  - "tmxbsb", "tmnbsb", "rbsb", "rstpbsb", "rhdbsb", "rabsb", "rmxbsb", "daylbsb", "fradbsb" and "u10bsb" could be used not initialized at 186-207 lines

- In conapply.f:

  - "k" and "kk" could be used not initialized at 121-122 lines if `iday_pest(j)/=ipst_freq(j)` and `curyr>nyskip`

- In confert.f:

  - "ifrt" seems to be "it" at line 214

- In curno.f:

  - "smxold" could be used not initialized if `cn1(h)<=1.e-6` and `curyr/=0` at line 96

- In drains.f:

  - "nlayer" could be used not initialized at line 23. However, the problem only arises if it is not set in the previous bucle (`mlyr<=1` or `sol_z(j1,j)<=0`)

- In etact.f:

  - "sev" could be used not initialized at line 286 if `dep>=esd` and `ly==2`

- In filter.f:

  - "remove21" seems to be "remove2" at line 316

- In grass_wway.f:

  - "sf_depth" and "sf_sed" could be used not initialized at lines 133 and 137 if `sf_area>0` and `sf_↵area<=1.e-6`

- In hhnoqual.f:

  - "algon" seems to be "algcon" at line 190

- In hhwatqual.f

  - "orgnpin" seems to be "orgpin" at line 278
  - `thour=1.0` at line 377 overwrites previous "thour" calculation. It is wrong

- In hmeas.f:

  - "rhdbsb" could be used not initialized at line 84

- In killop.f:

  - "ff1" and "ff2" are used but not initialized at lines 167 and 267. They are set in harvkillop.f file (lines 257-258). They have to be included in modparm.f to share harvkillop.f values? or they have to be redefined as in harvkillop.f?

- In NCsed_leach.f90:

  - "perc_clyr" could be used not initialized at line 221 if `sol_nly(j)<2`

- In nrain.f:

  - "no2pcp" seems to be "no3pcp" at line 72

- In pmeas.f:

- "rbsb" could be used not initialized at line 143
- "flag" could be used not initialized if 'a=='`at line 210`
- "rainsb" could be used not initialized, however only if`nstep<=0`

- In pminrl2.f:

  - at line 95 a comma is necessary between "base" and "vara"
  - "ssp" could be used not initialized at line 196 if `xx<=1.e-6`

- In pothole.f:

  - "solp_tileo" could be used not initialized at line 593 if `pot_vol(j)<=1.e-6` or `potvol_↵ tile<=1.e-6`

- In potholehr.f:

  - "potflow" seems to be "potflwo" at line 447

- In readatmodep.f:

  - `momax=12*nbyr` is defined at line 65 but not used. It has to be "mo_max"? but then, it overwrites the file read

- In readops.f:

  - `year = 0.` seems to be `iyear = 0` at line 98
  - "mg13" seems to be "mgt13" at line 206

- In readpnd.f:

  - "vselsetlpnd" seems to be "velsetlpnd" at line 279

- In readru.f:

  - "tck" is used but not initialized at line 79

- In readsepticbz.f:

  - at line 135 `4.  e-8` seems to be `4.e-8`

- In rewind_init.f:

  - "orig_tnylda" is used but not initialized at line 174

- In routels.f:

  - "dstor" is used but not initialized at line 134. It has to be calculated as in watbal.f? or as in the commented line 109?
  - "latqout" and "gwqout" could be used not initialized at lines 142-143

- In rtbact.f:

  - "netwtr" could be used not initialized at line 124, however only if `nstep<1`

- In rthpest.f:

  - `thour=1.0` at line 183 overwrites previous "thour" calculation. It is wrong
  - "frsol" and "frsrb" could be used not initialized at lines 289-290 if `hrtwtr(ii)>0.001` and `hrtwtr(ii)/(idt*60)<=0.01`

- In rtpest.f:

  - `tday=1.0` at line 180 overwrites previous "tday" calculation. It is wrong

- In sched_mgt.f:

  - `< =` seems to be `<=` at 202 line

- – "husc" and "igrow" at lines 264-265 are used but not initialized. "husc" has to be `phu_op(iop,ihru)` has in readmgt.f? "igrow" has to be `igro(ihru)` has in readmgt.f?

- In smeas.f:

  - – "rabsb" could be used not initialized at line 86

- In sweep.f:

  - – "fr_curb" is used but not initialized at line 56. It has to be added to modparm.f to share result with sched_mgt.f? or it has to be `mgt5op(nop(ihru),ihru)` as in sched_mgt.f?

- In tmeas.f:

  - – "tmxbsb" and "tmnbsb" could be used not initialized at lines 109-110

- In transfer.f:

  - – "ratio", "xx" and "ratio1" could be used not initialized at lines 236, 239 and 241 if `ihout==2`

- In wmeas.f:

  - – "u10bsb" could be used not initialized at line 85

- In zero0.f:

  - – "sol_sumn03" seems to be "sol_sumno3" at line 508

- In zero_urbn.f:

  - – "stp_stagdis" seems to be "dtp_stagdis" at line 84
  - – "subdr_kg" seems to be "subdr_km" at line 149
  - – "spl_eros" is not defined at line 21, it could be "eros_spl"?

Chapter 2

Modules Index

2.1 Modules List

Here is a list of all documented modules with brief descriptions:

Chapter 3

Data Type Index

3.1 Data Types List

Here are the data types with brief descriptions:

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 5

Module Documentation

5.1 parm Module Reference

main module containing the global variables

Data Types

- interface ascrv
- interface atri
- interface aunif
- interface dstn1
- interface ee
- interface expo
- interface fcgd
- interface HQDAV
- interface layersplit
- interface ndenit
- interface qman
- interface regres
- interface rsedaa
- interface tair
- interface theta
- interface vbl

Variables

- integer, parameter mvaro = 33

    max number of variables routed through the reach
- integer, parameter mhruo = 79

    max number of variables in output.hru
- integer, parameter mrcho = 62

    max number of variables in reach file
- integer, parameter msubo = 24

    max number of variables in output.sub
- integer, parameter mstdo = 113

max number of variables summarized in output.std

- integer, parameter **motot** = 600
- integer **icalen**
- real ∗8 prf_bsn

  Basinwide peak rate adjustment factor for sediment routing in the channel. Allows impact of peak flow rate on sediment routing and channel reshaping to be taken into account.

- real ∗8 **co2_x2**
- real ∗8 **co2_x**
- real ∗8, dimension(:), allocatable **alph_e**
- real ∗8, dimension(:), allocatable cdn

  denitrification exponential rate coefficient

- real ∗8, dimension(:), allocatable nperco

  nitrate percolation coefficient (0-1)
  0:concentration of nitrate in surface runoff is zero
  1:percolate has same concentration of nitrate as surface runoff

- real ∗8, dimension(:), allocatable surlag

  Surface runoff lag time. This parameter is needed in subbasins where the time of concentration is greater than 1 day. SURLAG is used to create a "storage" for surface runoff to allow the runoff to take longer than 1 day to reach the subbasin outlet (days)

- real ∗8, dimension(:), allocatable **co_p**
- real ∗8, dimension(:), allocatable cmn

  rate factor for humus mineralization on active organic N

- real ∗8, dimension(:), allocatable phoskd

  Phosphorus soil partitioning coefficient. Ratio of soluble phosphorus in surface layer to soluble phosphorus in runoff.

- real ∗8, dimension(:), allocatable psp

  Phosphorus availibility index. The fraction of fertilizer P remaining in labile pool after initial rapid phase of P sorption.

- real ∗8, dimension(:), allocatable sdnco

  denitrification threshold: fraction of field capacity triggering denitrification

- real ∗8 r2adj_bsn

  basinwide retention parameter adjustment factor (greater than 1)

- real ∗8 **yield**
- real ∗8 **burn_frlb**
- real ∗8 **pst_kg**
- real ∗8 **yieldgrn**
- real ∗8 **yieldbms**
- real ∗8 **yieldtbr**
- real ∗8 **yieldn**
- real ∗8 **yieldp**
- real ∗8 **hi_bms**
- real ∗8 **hi_rsd**
- real ∗8 **yieldrsd**
- real ∗8, dimension(:), allocatable **l_k1**
- real ∗8, dimension(:), allocatable **l_k2**
- real ∗8, dimension(:), allocatable **l_lambda**
- real ∗8, dimension(:), allocatable **l_beta**
- real ∗8, dimension(:), allocatable **l_gama**
- real ∗8, dimension(:), allocatable **l_harea**
- real ∗8, dimension(:), allocatable **l_vleng**
- real ∗8, dimension(:), allocatable **l_vslope**
- real ∗8, dimension(:), allocatable **l_ktc**
- real ∗8, dimension(:), allocatable **biofilm_mumax**
- real ∗8, dimension(:), allocatable **biofilm_kinv**
- real ∗8, dimension(:), allocatable **biofilm_klw**
- real ∗8, dimension(:), allocatable **biofilm_kla**

- real ∗8, dimension(:), allocatable **biofilm_cdet**
- real ∗8, dimension(:), allocatable **biofilm_bm**
- real ∗8, dimension(:,:), allocatable **hru_rufr**
- real ∗8, dimension(:,:), allocatable **daru_km**
- real ∗8, dimension(:,:), allocatable **ru_k**
- real ∗8, dimension(:,:), allocatable **ru_c**
- real ∗8, dimension(:,:), allocatable **ru_eiq**
- real ∗8, dimension(:,:), allocatable **ru_ovsl**
- real ∗8, dimension(:,:), allocatable **ru_a**
- real ∗8, dimension(:,:), allocatable **ru_ovs**
- real ∗8, dimension(:,:), allocatable **ru_ktc**
- real ∗8, dimension(:), allocatable **gwq_ru**
- real ∗8, dimension(:), allocatable **qdayout**
- integer, dimension(:), allocatable **ils2**
- integer, dimension(:), allocatable **ils2flag**
- integer **iru**
- integer **mru**
- integer **irch**
- integer **isub**
- integer **idum**
- integer **mhyd_bsn**
- integer **ipest**
- integer **ils_nofig**
- integer **mhru1**
- integer, dimension(:), allocatable **mhyd1**
- integer, dimension(:), allocatable **irtun**
- real ∗8 **wshd_sepno3**
- real ∗8 **wshd_sepnh3**
- real ∗8 **wshd_seporgn**
- real ∗8 **wshd_sepfon**
- real ∗8 **wshd_seporgp**
- real ∗8 **wshd_sepfop**
- real ∗8 **wshd_sepsolp**
- real ∗8 **wshd_sepbod**
- real ∗8 **wshd_sepmm**
- integer, dimension(:), allocatable **isep_hru**
- real ∗8 fixco

    nitrogen fixation coefficient

- real ∗8 nfixmx

    maximum daily n-fixation (kg/ha)

- real ∗8 res_stlr_co

    reservoir sediment settling coefficient

- real ∗8 rsd_covco

    residue cover factor for computing frac of cover

- real ∗8 vcrit

    critical velocity

- real ∗8 **wshd_sw**
- real ∗8 **wshd_snob**
- real ∗8 **wshd_pndfr**
- real ∗8 **wshd_pndv**
- real ∗8 **wshd_pndsed**
- real ∗8 percop

pesticide percolation coefficient (0-1)
0: concentration of pesticide in surface runoff is zero
1: percolate has same concentration of pesticide as surface runoff

- real ∗8 **wshd_wetfr**
- real ∗8 **wshd_resfr**
- real ∗8 **wshd_resha**
- real ∗8 **wshd_pndha**
- real ∗8 **wshd_fminp**
- real ∗8 **wshd_ftotn**
- real ∗8 **wshd_fnh3**
- real ∗8 **wshd_fno3**
- real ∗8 **wshd_forgn**
- real ∗8 **wshd_forgp**
- real ∗8 **wshd_ftotp**
- real ∗8 **wshd_yldn**
- real ∗8 **wshd_yldp**
- real ∗8 **wshd_fixn**
- real ∗8 **wshd_pup**
- real ∗8 **wshd_wstrs**
- real ∗8 **wshd_nstrs**
- real ∗8 **wshd_pstrs**
- real ∗8 **wshd_tstrs**
- real ∗8 **wshd_astrs**
- real ∗8 ffcb

    initial soil water content expressed as a fraction of field capacity

- real ∗8 **wshd_hmn**
- real ∗8 **wshd_rwn**
- real ∗8 **wshd_hmp**
- real ∗8 **wshd_rmn**
- real ∗8 **wshd_dnit**
- real ∗8 wdpq

    die-off factor for persistent bacteria in soil solution (1/day)

- real ∗8 **wshd_rmp**
- real ∗8 **wshd_voln**
- real ∗8 **wshd_nitn**
- real ∗8 **wshd_pas**
- real ∗8 **wshd_pal**
- real ∗8 wof_p

    wash off fraction for persistent bacteria on foliage during a rainfall event

- real ∗8 **wshd_plch**
- real ∗8 **wshd_raino3**
- real ∗8 **ressedc**
- real ∗8 **basno3f**
- real ∗8 **basorgnf**
- real ∗8 **wshd_pinlet**
- real ∗8 **wshd_ptile**
- real ∗8 sftmp

    Snowfall temperature (deg C)

- real ∗8 smfmn

    Minimum melt rate for snow during year (Dec. 21) where deg C refers to the air temperature. (mm/deg C/day)

- real ∗8 smfmx

    Maximum melt rate for snow during year (June 21) where deg C refers to the air temperature. SMFMX and SM↩ FMN allow the rate of snow melt to vary through the year. These parameters are accounting for the impact of soil temperature on snow melt. (mm/deg C/day)

- real ∗8 smtmp

    Snow melt base temperature. Mean air temperature at which snow melt will occur. (deg C)

- real ∗8 wgpq

    growth factor for persistent bacteria in soil solution (1/day)

- real ∗8 **basminpf**
- real ∗8 **basorgpf**
- real ∗8 wdlpq

    die-off factor for less persistent bacteria in soil solution (1/day)

- real ∗8 **wshd_resv**
- real ∗8 **wshd_ressed**
- real ∗8 **basno3i**
- real ∗8 **basorgni**
- real ∗8 **basminpi**
- real ∗8 wdps

    die-off factor for persistent bacteria adsorbed to soil particles (1/day)

- real ∗8 wglpq

    growth factor for less persistent bacteria in soil solution (1/day)

- real ∗8 **basorgpi**
- real ∗8 **peakr**
- real ∗8 **pndsedin**
- real ∗8 **sw_excess**
- real ∗8 **albday**
- real ∗8 timp

    Snow pack temperature lag factor (0-1)
    1 = no lag (snow pack temp=current day air temp) as the lag factor goes to zero, the snow pack's temperature will be less influenced by the current day's air temperature.

- real ∗8 **wtabelo**
- real ∗8 **tilep**
- real ∗8 **wt_shall**
- real ∗8 **sq_rto**
- real ∗8 **tloss**
- real ∗8 **inflpcp**
- real ∗8 **snomlt**
- real ∗8 **snofall**
- real ∗8 **fixn**
- real ∗8 **qtile**
- real ∗8 **crk**
- real ∗8 **latlyr**
- real ∗8 **pndloss**
- real ∗8 **wetloss**
- real ∗8 **potloss**
- real ∗8 **lpndloss**
- real ∗8 **lwetloss**
- real ∗8 **sedrch**
- real ∗8 **fertn**
- real ∗8 **sol_rd**
- real ∗8 **cfertn**
- real ∗8 **cfertp**
- real ∗8 **sepday**
- real ∗8 **bioday**
- real ∗8 **sepcrk**
- real ∗8 **sepcrktot**
- real ∗8 **fertno3**
- real ∗8 **fertnh3**

- real ∗8 **fertorgn**
- real ∗8 **fertsolp**
- real ∗8 **fertorgp**
- real ∗8 wgps

  growth factor for persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 **fertp**
- real ∗8 **grazn**
- real ∗8 **grazp**
- real ∗8 **soxy**
- real ∗8 **qdfr**
- real ∗8 **sdti**
- real ∗8 **rtwtr**
- real ∗8 **ressa**
- real ∗8 wdlps

  die-off factor for less persistent bacteria absorbed to soil particles (1/day)
- real ∗8 wglps

  growth factor for less persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 da_km

  area of the watershed in square kilometers (km^2)
- real ∗8 **rttime**
- real ∗8 **rchdep**
- real ∗8 **rtevp**
- real ∗8 **rttlc**
- real ∗8 **resflwi**
- real ∗8 wdprch

  die-off factor for persistent bacteria in streams (1/day)
- real ∗8 **resflwo**
- real ∗8 **respcp**
- real ∗8 **resev**
- real ∗8 **ressep**
- real ∗8 **ressedi**
- real ∗8 **ressedo**
- real ∗8 **dtot**
- real ∗8 pperco_bsn

  phosphorus percolation coefficient. Ratio of soluble phosphorus in surface to soluble phosphorus in percolate
- real ∗8 nperco_bsn

  basin nitrate percolation coefficient (0-1)
  0:concentration of nitrate in surface runoff is zero
  1:percolate has same concentration of nitrate as surface runoff
- real ∗8 rsdco

  residue decomposition coefficient. The fraction of residue which will decompose in a day assuming optimal moisture, temperature, C:N ratio, and C:P ratio
- real ∗8 **phoskd_bsn**
- real ∗8 **voltot**
- real ∗8 msk_x

  weighting factor controling relative importance of inflow rate and outflow rate in determining storage on reach
- real ∗8 **volcrmin**
- real ∗8 bactkdq

  bacteria soil partitioning coefficient. Ratio of solution bacteria in surface layer to solution bacteria in runoff soluble and sorbed phase in surface runoff.
- real ∗8 wdpf

  die-off factor for persistent bacteria on foliage (1/day)
- real ∗8 **uno3d**

- real ∗8 **canev**
- real ∗8 **usle**
- real ∗8 **rcn**
- real ∗8 **surlag_bsn**
- real ∗8 **precipday**
- real ∗8 thbact

    temperature adjustment factor for bacteria die-off/growth
- real ∗8 wlpq20

    overall rate change for less persistent bacteria in soil solution (1/day)
- real ∗8 wlps20

    overall rate change for less persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 wpq20

    overall rate change for persistent bacteria in soil solution (1/day)
- real ∗8 wps20

    overall rate change for persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 **bactrop**
- real ∗8 **bactsedp**
- real ∗8 wgpf

    growth factor for persistent bacteria on foliage (1/day)
- real ∗8 **bactlchp**
- real ∗8 **bactlchlp**
- real ∗8 **enratio**
- real ∗8 **wetpcp**
- real ∗8 **pndpcp**
- real ∗8 **wetsep**
- real ∗8 **pndsep**
- real ∗8 **wetev**
- real ∗8 **pndev**
- real ∗8 **pndsedo**
- real ∗8 **wetsedo**
- real ∗8 **pndflwi**
- real ∗8 **wetflwi**
- real ∗8 **pndflwo**
- real ∗8 **wetflwo**
- real ∗8 **wetsedi**
- real ∗8 **da_ha**
- real ∗8 **vpd**
- real ∗8 evlai

    leaf area index at which no evaporation occurs. This variable is used in ponded HRUs where evaporation from the water surface is restricted by the plant canopy cover. Evaporation from the water surface equals potential ET when LAI = 0 and decreased linearly to O when LAI = EVLAI
- real ∗8 evrch

    Reach evaporation adjustment factor. Evaporation from the reach is multiplied by EVRCH. This variable was created to limit the evaporation predicted in arid regions.
- real ∗8 wdlpf

    die-off factor for less persistent bacteria on foliage (1/day)
- real ∗8 **bactrolp**
- real ∗8 **bactsedlp**
- real ∗8 **pet_day**
- real ∗8 **ep_day**
- real ∗8 adj_pkr

    peak rate adjustment factor in the subbasin. Used in the MUSLE equation to account for impact of peak flow on erosion.
- real ∗8 n_updis

    nitrogen uptake distribution parameter. This parameter controls the amount of nitrogen removed from the different soil layer layers by the plant. In particular, this parameter allows the amount of nitrogen removed from the surface layer via plant uptake to be controlled. While the relationship between UBN and N removed from the surface layer is affected by the depth of the soil profile, in general, as UBN increases the amount of N removed from the surface layer relative to the amount removed from the entire profile increases

- real ∗8 nactfr

    nitrogen active pool fraction. The fraction of organic nitrogen in the active pool.

- real ∗8 p_updis

    phosphorus uptake distribution parameter This parameter controls the amount of phosphorus removed from the different soil layers by the plant. In particular, this parameter allows the amount of phosphorus removed from the surface layer via plant uptake to be controlled. While the relationship between UBP and P uptake from the surface layer is affected by the depth of the soil profile, in general, as UBP increases the amount of P removed from the surface layer relative to the amount removed from the entire profile increases

- real ∗8 **snoev**
- real ∗8 **sno3up**
- real ∗8 **reactw**
- real ∗8 **sdiegropq**
- real ∗8 **sdiegrolpq**
- real ∗8 **sdiegrops**
- real ∗8 **sdiegrolps**
- real ∗8 **es_day**
- real ∗8 wof_lp

    wash off fraction for less persistent bacteria on foliage during a rainfall event

- real ∗8 **sbactrop**
- real ∗8 **sbactrolp**
- real ∗8 **sbactsedp**
- real ∗8 **sbactsedlp**
- real ∗8 **ep_max**
- real ∗8 **sbactlchp**
- real ∗8 **sbactlchlp**
- real ∗8 **psp_bsn**
- real ∗8 **rchwtr**
- real ∗8 **resuspst**
- real ∗8 **setlpst**
- real ∗8 **bsprev**
- real ∗8 **bssprev**
- real ∗8 **spadyo**
- real ∗8 **spadyev**
- real ∗8 **spadysp**
- real ∗8 **spadyrfv**
- real ∗8 **spadyosp**
- real ∗8 **qday**
- real ∗8 **usle_ei**
- real ∗8 **al5**
- real ∗8 **pndsedc**
- real ∗8 **no3pcp**
- real ∗8 **rcharea**
- real ∗8 **volatpst**
- real ∗8 ubw

    water uptake distribution parameter. This parameter controls the amount of water removed from the different soil layers by the plant. In particular, this parameter allows the amount of water removed from the surface layer via plant uptake to be controlled. While the relationship between UBW and H2O removed from the surface layer is affected by the depth of the soil profile, in general, as UBW increases the amount of water removed from the surface layer relative to the amount removed from the entire profile increases

- real ∗8 uobn

nitrogen uptake normalization parameter. This variable normalizes the nitrogen uptake so that the model can easily verify that upake from the different soil layers sums to 1.0

- real ∗8 uobp

    phosphorus uptake normalization parameter. This variable normalizes the phosphorus uptake so that the model can easily verify that uptake from the different soil layers sums to 1.0

- real ∗8 uobw

    water uptake normalization parameter. This variable normalizes the water uptake so that the model can easily verify that uptake from the different soil layers sums to 1.0

- real ∗8 wglpf

    growth factor for less persistent bacteria on foliage (1/day)

- real ∗8 **wetsedc**
- real ∗8 **respesti**
- real ∗8 rcor

    correction coefficient for generated rainfall to ensure that the annual means for generated and observed values are comparable (needed only if IDIST=1)

- real ∗8 rexp

    value of exponent for mixed exponential rainfall distribution (needed only if IDIST=1)

- real ∗8 snocov1

    1st shape parameter for snow cover equation. This parameter is determined by solving the equation for 50% snow cover

- real ∗8 snocov2

    2nd shape parameter for snow cover equation. This parameter is determined by solving the equation for 95% snow cover

- real ∗8 snocovmx

    Minimum snow water content that corresponds to 100% snow cover. If the snow water content is less than SNOC↩ OVMX, then a certain percentage of the ground will be bare (mm H2O)

- real ∗8 **lyrtile**
- real ∗8 **lyrtilex**
- real ∗8 sno50cov

    Fraction of SNOCOVMX that corresponds to 50% snow cover. SWAT assumes a nonlinear relationship between snow water and snow cover.

- real ∗8 ai0

    ratio of chlorophyll-a to algal biomass (ug chla/mg alg)

- real ∗8 ai1

    fraction of algal biomass that is nitrogen (mg N/mg alg)

- real ∗8 ai2

    fraction of algal biomass that is phosphorus (mg P/mg alg)

- real ∗8 ai3

    the rate of oxygen production per unit of algal photosynthesis (mg O2/mg alg)

- real ∗8 ai4

    the rate of oxygen uptake per unit of algae respiration (mg O2/mg alg)

- real ∗8 ai5

    the rate of oxygen uptake per unit of NH3 nitrogen oxidation (mg O2/mg N)

- real ∗8 ai6

    the rate of oxygen uptake per unit of NO2 nitrogen oxidation (mg O2/mg N)

- real ∗8 rhoq

    algal respiration rate (1/day or 1/hr)

- real ∗8 tfact

    fraction of solar radiation computed in the temperature heat balance that is photosynthetically active

- real ∗8 k_l

    half-saturation coefficient for light (MJ/(m2∗hr))

- real ∗8 k_n

    michaelis-menton half-saturation constant for nitrogen (mg N/L)

- real ∗8 k_p

  michaelis-menton half saturation constant for phosphorus (mg P/L)
- real ∗8 lambda0

  non-algal portion of the light extinction coefficient (1/m)
- real ∗8 lambda1

  linear algal self-shading coefficient (1/(m∗ug chla/L))
- real ∗8 lambda2

  nonlinear algal self-shading coefficient ((1/m)(ug chla/L)∗∗(-2/3))
- real ∗8 mumax

  maximum specific algal growth rate (1/day or 1/hr)
- real ∗8 p_n

  algal preference factor for ammonia
- real ∗8 **rnum1**
- real ∗8 **autop**
- real ∗8 **auton**
- real ∗8 **etday**
- real ∗8 **hmntl**
- real ∗8 **rwntl**
- real ∗8 **hmptl**
- real ∗8 **rmn2tl**
- real ∗8 **rmptl**
- real ∗8 **wdntl**
- real ∗8 **cmn_bsn**
- real ∗8 **rmp1tl**
- real ∗8 **roctl**
- real ∗8 **gwseep**
- real ∗8 **revapday**
- real ∗8 **reswtr**
- real ∗8 wdlprch

  die-off factor for less persistent bacteria in streams (1/day)
- real ∗8 wdpres

  die-off factor for persistent bacteria in reservoirs (1/day)
- real ∗8 **bury**
- real ∗8 **difus**
- real ∗8 **reactb**
- real ∗8 **solpesto**
- real ∗8 **petmeas**
- real ∗8 wdlpres

  die-off factor for less persistent bacteria in reservoirs (1/day)
- real ∗8 **sorpesto**
- real ∗8 **spcon_bsn**
- real ∗8 **spexp_bsn**
- real ∗8 **solpesti**
- real ∗8 **sorpesti**
- real ∗8 msk_co1

  calibration coefficient to control impact of the storage time constant for the reach at bankfull depth (phi(10,:) upon the storage time constant for the reach used in the Muskingum flow method
- real ∗8 msk_co2

  calibration coefficient to control impact of the storage time constant for the reach at 0.1 bankfull depth (phi(13,:) upon the storage time constant for the reach used in the Muskingum flow method
- real ∗8 **snoprev**
- real ∗8 **swprev**
- real ∗8 **shallstp**

- real ∗8 **deepstp**
- real ∗8 **ressolpo**
- real ∗8 **resorgno**
- real ∗8 **resorgpo**
- real ∗8 **resno3o**
- real ∗8 **reschlao**
- real ∗8 **resno2o**
- real ∗8 **resnh3o**
- real ∗8 **qdbank**
- real ∗8 **potpcpmm**
- real ∗8 **potevmm**
- real ∗8 **potsepmm**
- real ∗8 **potflwo**
- real ∗8 bactminlp

    Threshold detection level for less persistent bacteria. When bacteria levels drop to this amount the model considers bacteria in the soil to be insignificant and sets the levels to zero (cfu/m$^\wedge$2)

- real ∗8 bactminp

    Threshold detection level for persistent bacteria. When bacteria levels drop to this amount the model considers bacteria in the soil to be insignificant and sets the levels to zero (cfu/m$^\wedge$2)

- real ∗8 trnsrch

    fraction of transmission losses from main channel that enter deep aquifer

- real ∗8 wp20p_plt

    overall rate change for persistent bacteria on foliage (1/day)

- real ∗8 **potsedo**
- real ∗8 **pest_sol**
- real ∗8 bact_swf

    fraction of manure containing active colony forming units (cfu)

- real ∗8 bactmx

    bacteria percolation coefficient. Ratio of solution bacteria in surface layer to solution bacteria in percolate

- real ∗8 cncoef

    plant ET curve number coefficient

- real ∗8 wp20lp_plt

    overall rate change for less persistent bacteria on foliage (1/day)

- real ∗8 **cdn_bsn**
- real ∗8 **sdnco_bsn**
- real ∗8 **bactmin**
- real ∗8 cn_froz

    drainge coefficient (mm day -1)

- real ∗8 dorm_hr

    time threshold used to define dormant (hours)

- real ∗8 smxco

    adjustment factor for max curve number s factor (0-1)

- real ∗8 tb_adj

    adjustment factor for subdaily unit hydrograph basetime

- real ∗8 chla_subco

    regional adjustment on sub chla_a loading (fraction)

- real ∗8 depimp_bsn

    depth to impervious layer. Used to model perched water tables in all HRUs in watershed (mm)

- real ∗8 ddrain_bsn

    depth to the sub-surface drain (mm)

- real ∗8 tdrain_bsn

    time to drain soil to field capacity (hours)

- real ∗8 **gdrain_bsn**
- real ∗8 **rch_san**
- real ∗8 **rch_sil**
- real ∗8 **rch_cla**
- real ∗8 **rch_sag**
- real ∗8 **rch_lag**
- real ∗8 **rch_gra**
- real ∗8 hlife_ngw_bsn

    Half-life of nitrogen in groundwater? (days)

- real ∗8 **ch_opco_bsn**
- real ∗8 **ch_onco_bsn**
- real ∗8 decr_min

    Minimum daily residue decay.

- real ∗8 rcn_sub_bsn

    Concentration of nitrogen in the rainfall (mg/kg)

- real ∗8 **bc1_bsn**
- real ∗8 **bc2_bsn**
- real ∗8 **bc3_bsn**
- real ∗8 **bc4_bsn**
- real ∗8 **anion_excl_bsn**
- real ∗8, dimension(:), allocatable **wat_tbl**
- real ∗8, dimension(:), allocatable **sol_swpwt**
- real ∗8, dimension(:,:), allocatable **vwt**
- real ∗8 re_bsn

    Effective radius of drains (range 3.0 - 40.0) (mm)

- real ∗8 sdrain_bsn

    Distance bewtween two drain or tile tubes (range 7600.0 - 30000.0) (mm)

- real ∗8 **sstmaxd_bsn**
- real ∗8 drain_co_bsn

    Drainage coeffcient (range 10.0 - 51.0) (mm-day-1)

- real ∗8 latksatf_bsn

    Multiplication factor to determine lateral ksat from SWAT ksat input value for HRU (range 0.01 - 4.0)

- real ∗8 pc_bsn

    Pump capacity (def val = 1.042 mm h-1 or 25 mm day-1) (mm h-1)

- integer **i_subhw**
- integer **imgt**
- integer **idlast**
- integer **iwtr**
- integer **ifrttyp**
- integer **mo_atmo**
- integer **mo_atmo1**
- integer **ifirstatmo**
- integer **iyr_atmo**
- integer **iyr_atmo1**
- integer **matmo**
- integer mch

    maximum number of channels

- integer mcr

    maximum number of crops grown per year

- integer mcrdb

    maximum number of crops/landcover in database file (crop.dat)

- integer mfcst

    maximum number of forecast stations

- integer mfdb

    max number of fertilizers in fert.dat
- integer mhru

    maximum number of HRUs in watershed
- integer mhyd

    maximum number of hydrograph nodes
- integer mpdb

    max number of pesticides in pest.dat
- integer mrg

    max number of rainfall/temp gages
- integer mcut

    maximum number of cuttings per year
- integer mgr

    maximum number of grazings per year
- integer mnr

    max number of years of rotation
- integer myr

    max number of years of simulation
- integer isubwq

    subbasin water quality code
    0 do not calculate algae/CBOD 1 calculate algae/CBOD drainmod tile equations
- integer **ffcst**
- integer isproj

    special project code: 1 test rewind (run simulation twice)
- integer nbyr

    number of calendar years simulated
- integer irte

    water routing method:
    0 variable storage method
    1 Muskingum method

- integer nrch

    number of reaches in watershed (none)
- integer nres

    number of reservoirs in watershed (none)
- integer **nhru**
- integer **mo**
- integer **immo**
- integer **i_mo**
- integer wndsim

    wind speed input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin
- integer ihru

    HRU number (none)
- integer **icode**
- integer **ihout**
- integer **inum1**
- integer **inum2**
- integer **inum3**
- integer **inum4**
- integer icfac

icfac = 0 for C-factor calculation using Cmin (as described in manual)
= 1 for new C-factor calculation from RUSLE (no minimum needed)

- integer **inum5**
- integer **inum6**
- integer **inum7**
- integer **inum8**
- integer mrech

    maximum number of rechour files

- integer nrgage

    number of raingage files

- integer nrgfil

    number of rain gages per file

- integer nrtot

    total number of rain gages

- integer ntgage

    number of temperature gage files

- integer ntgfil

    number of temperature gages per file

- integer nttot

    total number of temperature gages

- integer tmpsim

    temperature input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin

- integer icrk

    crack flow code
    1: compute flow in cracks

- integer irtpest

    number of pesticide to be routed through the watershed

- integer igropt

    Qual2E option for calculating the local specific growth rate of algae
    1: multiplicative.

- integer lao

    Qual2E light averaging option. Qual2E defines four light averaging options. The only option currently available in SWAT is #2.

- integer npmx

    number of different pesticides used in the simulation (none)

- integer **curyr**
- integer **iihru**
- integer itdrn

    tile drainage equations flag/code
    1 simulate tile flow using subroutine drains(wt_shall)
    0 simulate tile flow using subroutine origtile(wt_shall,d)

- integer iwtdn

    water table depth algorithms flag/code
    1 simulate wt_shall using subroutine new water table depth routine
    0 simulate wt_shall using subroutine original water table depth routine

- integer ismax

    maximum depressional storage selection flag/code
    0 = static depressional storage
    1 = dynamic storage based on tillage and cumulative rainfall

- integer iroutunit

    not being implemented in this version drainmod tile equations

- integer **ires_nut**

- integer iclb

    auto-calibration flag

- integer mrecc

    maximum number of reccnst files

- integer mrecd

    maximum number of recday files

- integer mrecm

    maximum number of recmon files

- integer mtil

    max number of tillage types in till.dat

- integer mudb

    maximum number of urban land types in urban.dat

- integer idist

    rainfall distribution code
    0 for skewed normal dist
    1 for mixed exponential distribution

- integer mrecy

    maximum number of recyear files

- integer nyskip

    number of years to not print output

- integer slrsim

    solar radiation input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin

- integer ideg

    channel degredation code
    1: compute channel degredation (downcutting and widening)

- integer ievent

    rainfall/runoff code
    0 daily rainfall/curve number technique 1 sub-daily rainfall/Green&Ampt/hourly routing 3 sub-daily rainfall/←
    Green&Ampt/hourly routing

- integer ipet

    code for potential ET method
    0 Priestley-Taylor method
    1 Penman/Monteith method
    2 Hargreaves method
    3 read in daily potential ET data

- integer **iopera**
- integer idaf

    beginning day of simulation (julian date)

- integer idal

    ending day of simulation (julian date)

- integer rhsim

    relative humidity input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin

- integer **id1**
- integer **leapyr**
- integer **mo_chk**
- integer nhtot

    number of relative humidity records in file

- integer nstot

    number of solar radiation records in file

- integer nwtot

     number of wind speed records in file
- integer **ifirsts**
- integer **ifirsth**
- integer **ifirstw**
- integer **icst**
- integer ilog

     streamflow print code
- integer itotr

     number of output variables printed (output.rch)
- integer iyr

     beginning year of simulation (year)
- integer iwq

     stream water quality code
     0 do not model stream water quality
     1 model stream water quality (QUAL2E & pesticide transformations)
- integer i

     forecast region number or subbasin number (none)
- integer **iskip**
- integer **ifirstpet**
- integer iprp

     print code for output.pst file
     0 do not print pesticide output
     1 print pesticide output
- integer itotb

     number of output variables printed (output.sub)
- integer itots

     number of output variables printed (output.hru)
- integer itoth

     number of HRUs printed (output.hru/output.wtr)
- integer pcpsim

     rainfall input code
     1 measured data read for each subbasin
     2 data simulated for each subbasin
- integer **nd_30**
- integer **iops**
- integer **iphr**
- integer **isto**
- integer **isol**
- integer fcstcycles

     number of times forecast period is simulated (using different weather generator seeds each time)
- integer fcstday

     beginning date of forecast period (julian date)
- integer fcstyr

     beginning year of forecast period
- integer iscen

     scenarios counter
- integer subtot

     number of subbasins in watershed (none)
- integer **ogen**
- integer mapp

     maximum number of applications
- integer mlyr

     maximum number of soil layers

- integer mpst

     max number of pesticides used in wshed

- integer mres

     maximum number of reservoirs

- integer msub

     maximum number of subbasins

- integer igen

     random number generator code:
     0: use default numbers
     1: generate new numbers in every simulation

- integer iprint

     print code: 0=monthly, 1=daily, 2=annual

- integer **iida**

- integer icn

     CN method flag (for testing alternative method):
     0 use traditional SWAT method which bases CN on soil moisture
     1 use alternative method which bases CN on plant ET.

- integer ised_det

     max half-hour rainfall fraction calc option:
     0 generate max half-hour rainfall fraction from triangular distribution
     1 use monthly mean max half-hour rainfall fraction

- integer **fcstcnt**
- integer **mtran**
- integer **idtill**
- integer, dimension(100) **ida_lup**
- integer, dimension(100) **iyr_lup**
- integer **no_lup**
- integer **no_up**
- integer **nostep**
- character(len=8) date

     date simulation is performed where leftmost eight characters are set to a value of yyyymmdd, where yyyy is the year, mm is the month and dd is the day

- character(len=10) time

     time simulation is performed where leftmost ten characters are set to a value of hhmmss.sss, where hh is the hour, mm is the minutes and ss.sss is the seconds and milliseconds

- character(len=5) zone

     time difference with respect to Coordinated Universal Time (ie Greenwich Mean Time)

- character(len=80) prog

     SWAT program header string.

- character(len=13) calfile

     name of file containing calibration parameters

- character(len=13) rhfile

     relative humidity file name (.hmd)

- character(len=13) slrfile

     solar radiation file name (.slr)

- character(len=13) wndfile

     wind speed file name (.wnd)

- character(len=13) petfile

     potential ET file name (.pet)

- character(len=13) **atmofile**
- character(len=13) **lucfile**
- character(len=13) septdb

     name of septic tank database file (septwq1.dat)

- character(len=13) **dpd_file**
- character(len=13) **wpd_file**
- character(len=13) **rib_file**
- character(len=13) **sfb_file**
- character(len=13) **lid_file**
- integer, dimension(9) idg

    array location of random number seed used for a given process
- integer, dimension(:), allocatable **ifirstr**
- integer, dimension(:), allocatable **ifirsthr**
- integer, dimension(8) values

    values(1): year simulation is performed
    values(2): month simulation is performed
    values(3): day in month simulation is performed
    values(4): time difference with respect to Coordinated Universal Time (ie Greenwich Mean Time)
    values(5): hour simulation is performed
    values(6): minute simulation is performed
    values(7): second simulation is performed
    values(8): millisecond simulation is performed
- integer, dimension(13) ndays

    julian date for last day of preceding month (where the array location is the number of the month) The dates are for leap years (julian date)
- integer, dimension(13) **ndays_noleap**
- integer, dimension(13) **ndays_leap**
- integer **mapex**
- real ∗8, dimension(:), allocatable **flodaya**
- real ∗8, dimension(:), allocatable **seddaya**
- real ∗8, dimension(:), allocatable **orgndaya**
- real ∗8, dimension(:), allocatable **orgpdaya**
- real ∗8, dimension(:), allocatable **no3daya**
- real ∗8, dimension(:), allocatable **minpdaya**
- real ∗8, dimension(:), allocatable hi_targ

    index target of cover defined at planting
- real ∗8, dimension(:), allocatable **bio_targ**
- real ∗8, dimension(:), allocatable **tnyld**
- integer, dimension(:), allocatable **idapa**
- integer, dimension(:), allocatable **iypa**
- integer, dimension(:), allocatable **ifirsta**
- integer, dimension(100) **mo_transb**
- integer, dimension(100) **mo_transe**
- integer, dimension(100) **ih_tran**
- integer **msdb**
- integer **iseptic**
- real ∗8, dimension(:), allocatable **sptqs**
- real ∗8, dimension(:), allocatable **percp**
- real ∗8, dimension(:), allocatable **sptbodconcs**
- real ∗8, dimension(:), allocatable **spttssconcs**
- real ∗8, dimension(:), allocatable **spttnconcs**
- real ∗8, dimension(:), allocatable **sptnh4concs**
- real ∗8, dimension(:), allocatable **sptno3concs**
- real ∗8, dimension(:), allocatable **sptno2concs**
- real ∗8, dimension(:), allocatable **sptorgnconcs**
- real ∗8, dimension(:), allocatable **spttpconcs**
- real ∗8, dimension(:), allocatable **sptminps**
- real ∗8, dimension(:), allocatable **sptorgps**
- real ∗8, dimension(:), allocatable **sptfcolis**

- real ∗8, dimension(:), allocatable **failyr**
- real ∗8, dimension(:), allocatable **qstemm**
- real ∗8, dimension(:), allocatable **bio_amn**
- real ∗8, dimension(:), allocatable **bio_bod**
- real ∗8, dimension(:), allocatable **biom**
- real ∗8, dimension(:), allocatable **rbiom**
- real ∗8, dimension(:), allocatable **fcoli**
- real ∗8, dimension(:), allocatable **bio_ntr**
- real ∗8, dimension(:), allocatable **bz_perc**
- real ∗8, dimension(:), allocatable sep_cap

    number of permanent residents in the hourse (none)
- real ∗8, dimension(:), allocatable **plqm**
- real ∗8, dimension(:), allocatable **bz_area**
- real ∗8, dimension(:), allocatable bz_z

    Depth of biozone layer(mm)
- real ∗8, dimension(:), allocatable bz_thk

    thickness of biozone (mm)
- real ∗8, dimension(:), allocatable bio_bd

    density of biomass (kg/m^3) carbon outputs for .hru file
- real ∗8, dimension(:), allocatable **cmup_kgh**
- real ∗8, dimension(:), allocatable **cmtot_kgh**
- real ∗8, dimension(:), allocatable coeff_denitr

    denitrification rate coefficient (none)
- real ∗8, dimension(:), allocatable coeff_bod_dc

    BOD decay rate coefficient (m^3/day)
- real ∗8, dimension(:), allocatable coeff_bod_conv

    BOD to live bacteria biomass conversion factor (none)
- real ∗8, dimension(:), allocatable coeff_fc1

    field capacity calibration parameter 1 (none)
- real ∗8, dimension(:), allocatable coeff_fc2

    field capacity calibration parameter 2 (none)
- real ∗8, dimension(:), allocatable coeff_fecal

    fecal coliform bacteria decay rate coefficient (m^3/day)
- real ∗8, dimension(:), allocatable coeff_mrt

    mortality rate coefficient (none)
- real ∗8, dimension(:), allocatable coeff_nitr

    nitrification rate coefficient (none)
- real ∗8, dimension(:), allocatable coeff_plq

    conversion factor for plaque from TDS (none)
- real ∗8, dimension(:), allocatable coeff_rsp

    respiration rate coefficient (none)
- real ∗8, dimension(:), allocatable coeff_slg1

    slough-off calibration parameter (none)
- real ∗8, dimension(:), allocatable coeff_slg2

    slough-off calibration parameter (none)
- real ∗8, dimension(:), allocatable **coeff_pdistrb**
- real ∗8, dimension(:), allocatable **coeff_solpslp**
- real ∗8, dimension(:), allocatable **coeff_solpintc**
- real ∗8, dimension(:), allocatable **coeff_psorpmax**
- integer, dimension(:), allocatable isep_typ

    septic system type (none)
- integer, dimension(:), allocatable **i_sep**

- integer, dimension(:), allocatable isep_opt

    septic system operation flag (1=active, 2=failing, 3=not operated) (none)
- integer, dimension(:), allocatable **sep_tsincefail**
- integer, dimension(:), allocatable **isep_tfail**
- integer, dimension(:), allocatable **isep_iyr**
- integer, dimension(:), allocatable **sep_strm_dist**
- integer, dimension(:), allocatable **sep_den**
- real ∗8, dimension(:), allocatable **sol_sumno3**
- real ∗8, dimension(:), allocatable **sol_sumsolp**
- real ∗8, dimension(:), allocatable **strsw_sum**
- real ∗8, dimension(:), allocatable **strstmp_sum**
- real ∗8, dimension(:), allocatable **strsn_sum**
- real ∗8, dimension(:), allocatable **strsp_sum**
- real ∗8, dimension(:), allocatable **strsa_sum**
- real ∗8, dimension(:), allocatable **spill_hru**
- real ∗8, dimension(:), allocatable **tile_out**
- real ∗8, dimension(:), allocatable **hru_in**
- real ∗8, dimension(:), allocatable **spill_precip**
- real ∗8, dimension(:), allocatable **pot_seep**
- real ∗8, dimension(:), allocatable **pot_evap**
- real ∗8, dimension(:), allocatable **pot_sedin**
- real ∗8, dimension(:), allocatable **pot_solp**
- real ∗8, dimension(:), allocatable **pot_solpi**
- real ∗8, dimension(:), allocatable **pot_orgp**
- real ∗8, dimension(:), allocatable **pot_orgpi**
- real ∗8, dimension(:), allocatable **pot_orgn**
- real ∗8, dimension(:), allocatable **pot_orgni**
- real ∗8, dimension(:), allocatable **pot_mps**
- real ∗8, dimension(:), allocatable **pot_mpsi**
- real ∗8, dimension(:), allocatable **pot_mpa**
- real ∗8, dimension(:), allocatable **pot_mpai**
- real ∗8, dimension(:), allocatable **pot_no3i**
- real ∗8, dimension(:), allocatable **precip_in**
- real ∗8, dimension(:), allocatable **tile_sedo**
- real ∗8, dimension(:), allocatable **tile_no3o**
- real ∗8, dimension(:), allocatable **tile_solpo**
- real ∗8, dimension(:), allocatable **tile_orgno**
- real ∗8, dimension(:), allocatable **tile_orgpo**
- real ∗8, dimension(:), allocatable **tile_minpso**
- real ∗8, dimension(:), allocatable **tile_minpao**
- integer **ia_b**
- integer **ihumus**
- integer **itemp**
- integer **isnow**
- integer, dimension(41) **icolrsv**
- integer, dimension(mhruo) **icols**
- integer, dimension(mrcho) **icolr**
- integer, dimension(msubo) **icolb**
- integer, dimension(46) ipdvar

    output variable codes for output.rch file
- integer, dimension(mhruo) ipdvas

    output varaible codes for output.hru file
- integer, dimension(msubo) ipdvab

    output variable codes for output.sub file

- integer, dimension(:), allocatable ipdhru

    HRUs whose output information will be printed to the output.hru and output.wtr files.
- real *8, dimension(mstdo) **wshddayo**
- real *8, dimension(mstdo) **wshdmono**
- real *8, dimension(mstdo) **wshdyro**
- real *8, dimension(16) **fcstaao**
- real *8, dimension(mstdo) **wshdaao**
- real *8, dimension(:,:), allocatable **wpstdayo**
- real *8, dimension(:,:), allocatable **wpstmono**
- real *8, dimension(:,:), allocatable **wpstyro**
- real *8, dimension(:,:), allocatable **yldkg**
- real *8, dimension(:,:), allocatable **bio_hv**
- real *8, dimension(:,:), allocatable **wpstaao**
- real *8, dimension(:,:), allocatable **rchmono**
- real *8, dimension(:,:), allocatable **rchyro**
- real *8, dimension(:,:), allocatable **rchaao**
- real *8, dimension(:,:), allocatable **rchdy**
- real *8, dimension(:,:), allocatable **hrumono**
- real *8, dimension(:,:), allocatable **hruyro**
- real *8, dimension(:,:), allocatable **hruaao**
- real *8, dimension(:,:), allocatable **submono**
- real *8, dimension(:,:), allocatable **subyro**
- real *8, dimension(:,:), allocatable **subaao**
- real *8, dimension(:,:), allocatable **resoutm**
- real *8, dimension(:,:), allocatable **resouty**
- real *8, dimension(:,:), allocatable **resouta**
- real *8, dimension(12, 8) **wshd_aamon**
- real *8, dimension(:,:), allocatable **wtrmon**
- real *8, dimension(:,:), allocatable **wtryr**
- real *8, dimension(:,:), allocatable **wtraa**
- real *8, dimension(:,:), allocatable sub_smfmx

    max melt rate for snow during year (June 21) for subbasin(:) where deg C refers to the air temperature. SUB_SMFMX and SMFMN allow the rate of snow melt to vary through the year. These parameters are accounting for the impact of soil temperature on snow melt (range: -5.0/5.0) (mm/deg C/day)
- real *8, dimension(:,:), allocatable sub_smfmn

    min melt rate for snow during year (Dec 21) for subbasin(:) (range: -5.0/5.0) where deg C refers to the air temperature (mm/deg C/day)
- real *8, dimension(:,:,:), allocatable **hrupstd**
- real *8, dimension(:,:,:), allocatable **hrupsta**
- real *8, dimension(:,:,:), allocatable **hrupstm**
- real *8, dimension(:,:,:), allocatable **hrupsty**
- integer, dimension(:), allocatable **ifirstt**
- integer, dimension(:), allocatable **ifirstpcp**
- integer, dimension(:), allocatable **elevp**
- integer, dimension(:), allocatable **elevt**
- real *8, dimension(:,:), allocatable ftmpmn

    avg monthly minimum air temperature (deg C)
- real *8, dimension(:,:), allocatable ftmpmx

    avg monthly maximum air temperature (deg C)
- real *8, dimension(:,:), allocatable ftmpstdmn

    standard deviation for avg monthly minimum air temperature (deg C)
- real *8, dimension(:,:), allocatable ftmpstdmx

    standard deviation for avg monthly maximum air temperature (deg C)
- real *8, dimension(:,:,:), allocatable fpcp_stat

fpcp_stat(:,1,:): average amount of precipitation falling in one day for the month (mm/day)
fpcp_stat(:,2,:): standard deviation for the average daily precipitation (mm/day)
fpcp_stat(:,3,:): skew coefficient for the average daily precipitationa (none)

- real *8, dimension(:,:), allocatable fpr_w1

  probability of wet day after dry day in month (none)
- real *8, dimension(:,:), allocatable fpr_w2

  probability of wet day after wet day in month (none)
- real *8, dimension(:,:), allocatable fpr_w3

  proportion of wet days in the month (none)
- real *8, dimension(:), allocatable **flwin**
- real *8, dimension(:), allocatable **flwout**
- real *8, dimension(:), allocatable **bankst**
- real *8, dimension(:), allocatable **ch_wi**
- real *8, dimension(:), allocatable **ch_d**
- real *8, dimension(:), allocatable ch_onco

  channel organic n concentration (ppm)
- real *8, dimension(:), allocatable ch_opco

  channel organic p concentration (ppm)
- real *8, dimension(:), allocatable **ch_orgn**
- real *8, dimension(:), allocatable **ch_orgp**
- real *8, dimension(:), allocatable **drift**
- real *8, dimension(:), allocatable **rch_dox**
- real *8, dimension(:), allocatable **rch_bactp**
- real *8, dimension(:), allocatable **alpha_bnk**
- real *8, dimension(:), allocatable **alpha_bnke**
- real *8, dimension(:), allocatable **disolvp**
- real *8, dimension(:), allocatable **algae**
- real *8, dimension(:), allocatable **sedst**
- real *8, dimension(:), allocatable **rchstor**
- real *8, dimension(:), allocatable **organicn**
- real *8, dimension(:), allocatable **organicp**
- real *8, dimension(:), allocatable **chlora**
- real *8, dimension(:), allocatable **nitraten**
- real *8, dimension(:), allocatable **nitriten**
- real *8, dimension(:), allocatable **ch_li**
- real *8, dimension(:), allocatable **ch_si**
- real *8, dimension(:), allocatable **ch_bnk_san**
- real *8, dimension(:), allocatable **ch_bnk_sil**
- real *8, dimension(:), allocatable **ch_bnk_cla**
- real *8, dimension(:), allocatable **ch_bnk_gra**
- real *8, dimension(:), allocatable **ch_bed_san**
- real *8, dimension(:), allocatable **ch_bed_sil**
- real *8, dimension(:), allocatable **ch_bed_cla**
- real *8, dimension(:), allocatable **ch_bed_gra**
- real *8, dimension(:), allocatable **depfp**
- real *8, dimension(:), allocatable **depsanfp**
- real *8, dimension(:), allocatable **depsilfp**
- real *8, dimension(:), allocatable **depclafp**
- real *8, dimension(:), allocatable **depsagfp**
- real *8, dimension(:), allocatable **deplagfp**
- real *8, dimension(:), allocatable **depch**
- real *8, dimension(:), allocatable **depsanch**
- real *8, dimension(:), allocatable **depsilch**
- real *8, dimension(:), allocatable **depclach**

- real ∗8, dimension(:), allocatable **depsagch**
- real ∗8, dimension(:), allocatable **deplagch**
- real ∗8, dimension(:), allocatable **depgrach**
- real ∗8, dimension(:), allocatable **depgrafp**
- real ∗8, dimension(:), allocatable **grast**
- real ∗8, dimension(:), allocatable **depprch**
- real ∗8, dimension(:), allocatable **depprfp**
- real ∗8, dimension(:), allocatable **prf**
- real ∗8, dimension(:), allocatable **r2adj**
- real ∗8, dimension(:), allocatable spcon

  linear parameter for calculating sediment reentrained in channel sediment routing
- real ∗8, dimension(:), allocatable spexp

  exponent parameter for calculating sediment reentrained in channel sediment routing
- real ∗8, dimension(:), allocatable **sanst**
- real ∗8, dimension(:), allocatable **silst**
- real ∗8, dimension(:), allocatable **clast**
- real ∗8, dimension(:), allocatable **sagst**
- real ∗8, dimension(:), allocatable **lagst**
- real ∗8, dimension(:), allocatable **pot_san**
- real ∗8, dimension(:), allocatable **pot_sil**
- real ∗8, dimension(:), allocatable **pot_cla**
- real ∗8, dimension(:), allocatable **pot_sag**
- real ∗8, dimension(:), allocatable **pot_lag**
- real ∗8, dimension(:), allocatable **potsani**
- real ∗8, dimension(:), allocatable **potsili**
- real ∗8, dimension(:), allocatable **potclai**
- real ∗8, dimension(:), allocatable **potsagi**
- real ∗8, dimension(:), allocatable **potlagi**
- real ∗8, dimension(:), allocatable **sanyld**
- real ∗8, dimension(:), allocatable **silyld**
- real ∗8, dimension(:), allocatable **clayld**
- real ∗8, dimension(:), allocatable **sagyld**
- real ∗8, dimension(:), allocatable **lagyld**
- real ∗8, dimension(:), allocatable **grayld**
- real ∗8, dimension(:), allocatable **res_san**
- real ∗8, dimension(:), allocatable **res_sil**
- real ∗8, dimension(:), allocatable **res_cla**
- real ∗8, dimension(:), allocatable **res_sag**
- real ∗8, dimension(:), allocatable **res_lag**
- real ∗8, dimension(:), allocatable **res_gra**
- real ∗8, dimension(:), allocatable **pnd_san**
- real ∗8, dimension(:), allocatable **pnd_sil**
- real ∗8, dimension(:), allocatable **pnd_cla**
- real ∗8, dimension(:), allocatable **pnd_sag**
- real ∗8, dimension(:), allocatable **pnd_lag**
- real ∗8, dimension(:), allocatable **wet_san**
- real ∗8, dimension(:), allocatable **wet_sil**
- real ∗8, dimension(:), allocatable **wet_cla**
- real ∗8, dimension(:), allocatable **wet_lag**
- real ∗8, dimension(:), allocatable **wet_sag**
- real ∗8 **ressano**
- real ∗8 **ressilo**
- real ∗8 **resclao**
- real ∗8 **ressago**

- real ∗8 **reslago**
- real ∗8 **resgrao**
- real ∗8 **ressani**
- real ∗8 **ressili**
- real ∗8 **resclai**
- real ∗8 **ressagi**
- real ∗8 **reslagi**
- real ∗8 **resgrai**
- real ∗8 **potsano**
- real ∗8 **potsilo**
- real ∗8 **potclao**
- real ∗8 **potsago**
- real ∗8 **potlago**
- real ∗8 **pndsanin**
- real ∗8 **pndsilin**
- real ∗8 **pndclain**
- real ∗8 **pndsagin**
- real ∗8 **pndlagin**
- real ∗8 **pndsano**
- real ∗8 **pndsilo**
- real ∗8 **pndclao**
- real ∗8 **pndsago**
- real ∗8 **pndlago**
- real ∗8, dimension(:), allocatable **ch_di**
- real ∗8, dimension(:), allocatable **ch_erod**
- real ∗8, dimension(:), allocatable **ch_l2**
- real ∗8, dimension(:), allocatable **ch_cov**
- real ∗8, dimension(:), allocatable **ch_cov1**
- real ∗8, dimension(:), allocatable **ch_cov2**
- real ∗8, dimension(:), allocatable **ch_bnk_bd**
- real ∗8, dimension(:), allocatable **ch_bed_bd**
- real ∗8, dimension(:), allocatable **ch_bnk_kd**
- real ∗8, dimension(:), allocatable **ch_bed_kd**
- real ∗8, dimension(:), allocatable **ch_bnk_d50**
- real ∗8, dimension(:), allocatable **ch_bed_d50**
- real ∗8, dimension(:), allocatable **tc_bed**
- real ∗8, dimension(:), allocatable **tc_bnk**
- integer, dimension(:), allocatable **ch_eqn**
- real ∗8, dimension(:), allocatable **chpst_conc**
- real ∗8, dimension(:), allocatable **chpst_rea**
- real ∗8, dimension(:), allocatable **chpst_vol**
- real ∗8, dimension(:), allocatable **chpst_koc**
- real ∗8, dimension(:), allocatable **chpst_stl**
- real ∗8, dimension(:), allocatable **chpst_rsp**
- real ∗8, dimension(:), allocatable **chpst_mix**
- real ∗8, dimension(:), allocatable **sedpst_conc**
- real ∗8, dimension(:), allocatable **ch_wdr**
- real ∗8, dimension(:), allocatable **sedpst_rea**
- real ∗8, dimension(:), allocatable **sedpst_bry**
- real ∗8, dimension(:), allocatable **sedpst_act**
- real ∗8, dimension(:), allocatable **rch_cbod**
- real ∗8, dimension(:), allocatable **rch_bactlp**
- real ∗8, dimension(:), allocatable **chside**
- real ∗8, dimension(:), allocatable **rs1**
- real ∗8, dimension(:), allocatable **rs2**

- real ∗8, dimension(:), allocatable **rs3**
- real ∗8, dimension(:), allocatable **rs4**
- real ∗8, dimension(:), allocatable **rs5**
- real ∗8, dimension(:), allocatable **rs6**
- real ∗8, dimension(:), allocatable **rs7**
- real ∗8, dimension(:), allocatable **rk1**
- real ∗8, dimension(:), allocatable **rk2**
- real ∗8, dimension(:), allocatable **rk3**
- real ∗8, dimension(:), allocatable **rk4**
- real ∗8, dimension(:), allocatable **rk5**
- real ∗8, dimension(:), allocatable bc1

    rate constant for biological oxidation of NH3 to NO2 in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable bc2

    rate constant for biological oxidation of NO2 to NO3 in reach at 20 deg C (1/hr)
- real ∗8, dimension(:), allocatable bc3

    rate constant for hydrolysis of organic N to ammonia in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable bc4

    rate constant for the decay of organic P to dissolved P in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable **rk6**
- real ∗8, dimension(:), allocatable **ammonian**
- real ∗8, dimension(:), allocatable **orig_sedpstconc**
- real ∗8, dimension(:,:), allocatable **wurch**
- integer, dimension(:), allocatable **icanal**
- integer, dimension(:), allocatable **itb**
- real ∗8, dimension(:), allocatable **ch_revap**
- real ∗8, dimension(:), allocatable **dep_chan**
- real ∗8, dimension(:), allocatable harg_petco

    coefficient related to radiation used in hargreaves eq (range: 0.0019 - 0.0032)
- real ∗8, dimension(:), allocatable **subfr_nowtr**
- real ∗8, dimension(:), allocatable cncoef_sub

    soil water depletion coefficient used in the new (modified curve number method) same as soil index coeff used in APEX range: 0.5 - 2.0
- real ∗8, dimension(:), allocatable **dr_sub**
- real ∗8, dimension(:), allocatable **wcklsp**
- real ∗8, dimension(:), allocatable **sub_fr**
- real ∗8, dimension(:), allocatable **sub_minp**
- real ∗8, dimension(:), allocatable **sub_sw**
- real ∗8, dimension(:), allocatable **sub_sumfc**
- real ∗8, dimension(:), allocatable **sub_gwno3**
- real ∗8, dimension(:), allocatable **sub_gwsolp**
- real ∗8, dimension(:), allocatable co2

    CO2 concentration (ppmv)
- real ∗8, dimension(:), allocatable sub_km

    area of subbasin in square kilometers (km^2)
- real ∗8, dimension(:), allocatable **sub_tc**
- real ∗8, dimension(:), allocatable **wlat**
- real ∗8, dimension(:), allocatable **sub_pet**
- real ∗8, dimension(:), allocatable **welev**
- real ∗8, dimension(:), allocatable **sub_orgn**
- real ∗8, dimension(:), allocatable **sub_orgp**
- real ∗8, dimension(:), allocatable **sub_bd**

- real ∗8, dimension(:), allocatable **sub_wtmp**
- real ∗8, dimension(:), allocatable **sub_sedpa**
- real ∗8, dimension(:), allocatable **sub_sedps**
- real ∗8, dimension(:), allocatable **sub_minpa**
- real ∗8, dimension(:), allocatable **sub_minps**
- real ∗8, dimension(:), allocatable **daylmn**
- real ∗8, dimension(:), allocatable **latcos**
- real ∗8, dimension(:), allocatable **latsin**
- real ∗8, dimension(:), allocatable **phutot**
- real ∗8, dimension(:), allocatable plaps

    precipitation lapse rate: precipitation change due to change in elevation (mm H2O/km)
- real ∗8, dimension(:), allocatable tlaps

    temperature lapse rate: temperature change due to change in elevation (deg C/km)
- real ∗8, dimension(:), allocatable **tmp_an**
- real ∗8, dimension(:), allocatable **sub_precip**
- real ∗8, dimension(:), allocatable **pcpdays**
- real ∗8, dimension(:), allocatable **rcn_sub**
- real ∗8, dimension(:), allocatable **rammo_sub**
- real ∗8, dimension(:), allocatable **atmo_day**
- real ∗8, dimension(:), allocatable **sub_snom**
- real ∗8, dimension(:), allocatable **sub_qd**
- real ∗8, dimension(:), allocatable **sub_sedy**
- real ∗8, dimension(:), allocatable **sub_tran**
- real ∗8, dimension(:), allocatable **sub_no3**
- real ∗8, dimension(:), allocatable **sub_latno3**
- real ∗8, dimension(:,:), allocatable sub_sftmp

    snowfall temperature for subbasin(:). Mean air temperature at which precip is equally likely to be rain as snow/freezing rain (range: -5.0/5.0) (deg C)
- real ∗8, dimension(:,:), allocatable sub_smtmp

    snow melt base temperature for subbasin(:) mean air temperature at which snow melt will occur (range: -5.0/5.0) (deg C)
- real ∗8, dimension(:,:), allocatable sub_timp

    snow pack temperature lag factor (0-1) (none)
- real ∗8, dimension(:), allocatable **sub_tileno3**
- real ∗8, dimension(:), allocatable **sub_solp**
- real ∗8, dimension(:), allocatable **sub_subp**
- real ∗8, dimension(:), allocatable **sub_etday**
- real ∗8, dimension(:), allocatable sub_elev

    average elevation of subbasin (m)
- real ∗8, dimension(:), allocatable **sub_wyld**
- real ∗8, dimension(:), allocatable **sub_surfq**
- real ∗8, dimension(:), allocatable **qird**
- real ∗8, dimension(:), allocatable **sub_gwq**
- real ∗8, dimension(:), allocatable **sub_sep**
- real ∗8, dimension(:), allocatable **sub_chl**
- real ∗8, dimension(:), allocatable **sub_cbod**
- real ∗8, dimension(:), allocatable **sub_dox**
- real ∗8, dimension(:), allocatable **sub_solpst**
- real ∗8, dimension(:), allocatable **sub_sorpst**
- real ∗8, dimension(:), allocatable **sub_yorgn**
- real ∗8, dimension(:), allocatable **sub_yorgp**
- real ∗8, dimension(:), allocatable sub_lat

    latitude of subbasin (degrees)
- real ∗8, dimension(:), allocatable **sub_bactp**

- real ∗8, dimension(:), allocatable **sub_bactlp**
- real ∗8, dimension(:), allocatable **sub_latq**
- real ∗8, dimension(:), allocatable **sub_gwq_d**
- real ∗8, dimension(:), allocatable **sub_tileq**
- real ∗8, dimension(:), allocatable **sub_vaptile**
- real ∗8, dimension(:), allocatable **sub_dsan**
- real ∗8, dimension(:), allocatable **sub_dsil**
- real ∗8, dimension(:), allocatable **sub_dcla**
- real ∗8, dimension(:), allocatable **sub_dsag**
- real ∗8, dimension(:), allocatable **sub_dlag**
- real ∗8 **vap_tile**
- real ∗8, dimension(:), allocatable **wnan**
- real ∗8, dimension(:,:), allocatable **sol_stpwt**
- real ∗8, dimension(:,:), allocatable **sub_pst**
- real ∗8, dimension(:,:), allocatable **sub_hhqd**
- real ∗8, dimension(:,:), allocatable **sub_hhwtmp**
- real ∗8, dimension(:,:), allocatable huminc

    monthly humidity adjustment. Daily values for relative humidity within the month are rasied or lowered by the specified amount (used in climate change studies) (none)
- real ∗8, dimension(:,:), allocatable radinc

    monthly solar radiation adjustment. Daily radiation within the month is raised or lowered by the specified amount. (used in climate change studies) (MJ/m$^\wedge$2)
- real ∗8, dimension(:,:), allocatable rfinc

    monthly rainfall adjustment. Daily rainfall within the month is adjusted to the specified percentage of the original value (used in climate change studies)(%)
- real ∗8, dimension(:,:), allocatable tmpinc

    monthly temperature adjustment. Daily maximum and minimum temperatures within the month are raised or lowered by the specified amount (used in climate change studies) (deg C)
- real ∗8, dimension(:), allocatable ch_k1

    effective hydraulic conductivity of tributary channel alluvium (mm/hr)
- real ∗8, dimension(:), allocatable **ch_k2**
- real ∗8, dimension(:,:), allocatable elevb

    elevation at the center of the band (m)
- real ∗8, dimension(:,:), allocatable elevb_fr

    fraction of subbasin area within elevation band (the same fractions should be listed for all HRUs within the subbasin) (none)
- real ∗8, dimension(:,:), allocatable **wndav**
- real ∗8, dimension(:), allocatable ch_n1

    Manning's "n" value for the tributary channels (none)
- real ∗8, dimension(:), allocatable **ch_n2**
- real ∗8, dimension(:), allocatable ch_s1

    average slope of tributary channels (m/m)
- real ∗8, dimension(:), allocatable **ch_s2**
- real ∗8, dimension(:), allocatable ch_w1

    average width of tributary channels (m)
- real ∗8, dimension(:), allocatable **ch_w2**
- real ∗8, dimension(:,:), allocatable **dewpt**
- real ∗8, dimension(:,:), allocatable **amp_r**
- real ∗8, dimension(:,:), allocatable **solarav**
- real ∗8, dimension(:,:), allocatable **tmpstdmx**
- real ∗8, dimension(:,:), allocatable **tmpstdmn**
- real ∗8, dimension(:,:), allocatable **pcf**
- real ∗8, dimension(:,:), allocatable **tmpmn**
- real ∗8, dimension(:,:), allocatable **tmpmx**

- real ∗8, dimension(:,:), allocatable **otmpstdmn**
- real ∗8, dimension(:,:), allocatable **otmpmn**
- real ∗8, dimension(:,:), allocatable **otmpmx**
- real ∗8, dimension(:,:), allocatable **otmpstdmx**
- real ∗8, dimension(:,:), allocatable **ch_erodmo**
- real ∗8, dimension(:,:), allocatable **uh**
- real ∗8, dimension(:,:), allocatable **hqdsave**
- real ∗8, dimension(:,:), allocatable **hsdsave**
- real ∗8, dimension(:,:), allocatable **pr_w1**
- real ∗8, dimension(:,:), allocatable **pr_w2**
- real ∗8, dimension(:,:), allocatable **pr_w3**
- real ∗8, dimension(:,:,:), allocatable **pcp_stat**
- real ∗8, dimension(:,:), allocatable **opr_w1**
- real ∗8, dimension(:,:), allocatable **opr_w2**
- real ∗8, dimension(:,:), allocatable **opr_w3**
- real ∗8, dimension(:,:,:), allocatable **opcp_stat**
- integer, dimension(:), allocatable **hrutot**
- integer, dimension(:), allocatable **hru1**
- integer, dimension(:), allocatable **ireg**
- integer, dimension(:), allocatable ihgage

    subbasin relative humidity data code (none)
- integer, dimension(:), allocatable isgage

    subbasin radiation gage data code (none)
- integer, dimension(:), allocatable iwgage

    subbasin wind speed gage data code (none)
- integer, dimension(:), allocatable subgis

    GIS code printed to output files (output.sub) (none.
- integer, dimension(:), allocatable irgage

    subbasin rain gage data code (none)
- integer, dimension(:), allocatable itgage

    subbasin temp gage data code (none)
- integer, dimension(:), allocatable **fcst_reg**
- integer, dimension(:), allocatable **irelh**
- real ∗8, dimension(:,:), allocatable **sol_aorgn**
- real ∗8, dimension(:,:), allocatable **sol_tmp**
- real ∗8, dimension(:,:), allocatable **sol_fon**
- real ∗8, dimension(:,:), allocatable **sol_awc**
- real ∗8, dimension(:,:), allocatable **sol_prk**
- real ∗8, dimension(:,:), allocatable **volcr**
- real ∗8, dimension(:,:), allocatable pperco_sub

    subbasin phosphorus percolation coefficient. Ratio of soluble phosphorus in surface to soluble phosphorus in percolate
- real ∗8, dimension(:,:), allocatable **sol_actp**
- real ∗8, dimension(:,:), allocatable **sol_stap**
- real ∗8, dimension(:,:), allocatable **conv_wt**
- real ∗8, dimension(:,:), allocatable sol_solp

    soluble P concentration in top soil layer (mg P/kg soil)
- real ∗8, dimension(:,:), allocatable **sol_ul**
- real ∗8, dimension(:,:), allocatable **sol_fc**
- real ∗8, dimension(:,:), allocatable **crdep**
- real ∗8, dimension(:,:), allocatable **sol_z**
- real ∗8, dimension(:,:), allocatable **sol_up**
- real ∗8, dimension(:,:), allocatable **sol_bd**

- real ∗8, dimension(:,:), allocatable **sol_st**
- real ∗8, dimension(:,:), allocatable **flat**
- real ∗8, dimension(:,:), allocatable **sol_nh3**
- real ∗8, dimension(:,:), allocatable **sol_hk**
- real ∗8, dimension(:,:), allocatable **sol_clay**
- real ∗8, dimension(:,:), allocatable **sol_ec**
- real ∗8, dimension(:,:), allocatable sol_orgn

    organic N concentration in top soil layer (mg N/kg soil)
- real ∗8, dimension(:,:), allocatable **sol_por**
- real ∗8, dimension(:,:), allocatable **sol_wp**
- real ∗8, dimension(:,:), allocatable sol_orgp

    organic P concentration in top soil layer (mg P/kg soil)
- real ∗8, dimension(:,:), allocatable **sol_hum**
- real ∗8, dimension(:,:), allocatable **sol_wpmm**
- real ∗8, dimension(:,:), allocatable sol_no3

    concentration of nitrate in soil layer (mg N/kg)
- real ∗8, dimension(:,:), allocatable **sol_k**
- real ∗8, dimension(:,:), allocatable **sol_cbn**
- real ∗8, dimension(:,:), allocatable **sol_rsd**
- real ∗8, dimension(:,:), allocatable **sol_fop**
- real ∗8, dimension(:,:), allocatable **sol_silt**
- real ∗8, dimension(:,:), allocatable **sol_sand**
- real ∗8, dimension(:,:), allocatable **sol_rock**
- real ∗8, dimension(:,:), allocatable **orig_solno3**
- real ∗8, dimension(:,:), allocatable **orig_solorgn**
- real ∗8, dimension(:,:), allocatable **orig_solsolp**
- real ∗8, dimension(:,:), allocatable **orig_solorgp**
- real ∗8, dimension(:,:), allocatable **orig_soltmp**
- real ∗8, dimension(:,:), allocatable **orig_solrsd**
- real ∗8, dimension(:,:), allocatable **orig_solfop**
- real ∗8, dimension(:,:), allocatable **orig_solfon**
- real ∗8, dimension(:,:), allocatable **orig_solaorgn**
- real ∗8, dimension(:,:), allocatable **orig_solst**
- real ∗8, dimension(:,:), allocatable **orig_solactp**
- real ∗8, dimension(:,:), allocatable **orig_solstap**
- real ∗8, dimension(:,:), allocatable **orig_volcr**
- real ∗8, dimension(:,:), allocatable **conk**
- real ∗8, dimension(:,:,:), allocatable sol_pst

    sol_pst(:,:,1) pesticide concentration in soil (mg/kg)
- real ∗8, dimension(:,:,:), allocatable **sol_kp**
- real ∗8, dimension(:,:,:), allocatable **orig_solpst**
- real ∗8, dimension(:), allocatable **velsetlr**
- real ∗8, dimension(:), allocatable **velsetlp**
- real ∗8, dimension(:), allocatable **br1**
- real ∗8, dimension(:), allocatable **res_k**
- real ∗8, dimension(:), allocatable **lkpst_conc**
- real ∗8, dimension(:), allocatable **evrsv**
- real ∗8, dimension(:), allocatable **res_evol**
- real ∗8, dimension(:), allocatable **res_pvol**
- real ∗8, dimension(:), allocatable **res_vol**
- real ∗8, dimension(:), allocatable **res_psa**
- real ∗8, dimension(:), allocatable **lkpst_rea**
- real ∗8, dimension(:), allocatable **lkpst_vol**
- real ∗8, dimension(:), allocatable **br2**

- real ∗8, dimension(:), allocatable **res_rr**
- real ∗8, dimension(:), allocatable **res_sed**
- real ∗8, dimension(:), allocatable **lkpst_koc**
- real ∗8, dimension(:), allocatable **lkpst_stl**
- real ∗8, dimension(:), allocatable **lkpst_rsp**
- real ∗8, dimension(:), allocatable **lkpst_mix**
- real ∗8, dimension(:), allocatable **lkspst_conc**
- real ∗8, dimension(:), allocatable **lkspst_rea**
- real ∗8, dimension(:), allocatable **theta_n**
- real ∗8, dimension(:), allocatable **theta_p**
- real ∗8, dimension(:), allocatable **con_nirr**
- real ∗8, dimension(:), allocatable **con_pirr**
- real ∗8, dimension(:), allocatable **lkspst_bry**
- real ∗8, dimension(:), allocatable **lkspst_act**
- real ∗8, dimension(:), allocatable **sed_stlr**
- real ∗8, dimension(7) **resdata**
- real ∗8, dimension(:), allocatable **wurtnf**
- real ∗8, dimension(:), allocatable **res_nsed**
- real ∗8, dimension(:), allocatable **chlar**
- real ∗8, dimension(:), allocatable **res_orgn**
- real ∗8, dimension(:), allocatable **res_orgp**
- real ∗8, dimension(:), allocatable **res_no3**
- real ∗8, dimension(:), allocatable **res_solp**
- real ∗8, dimension(:), allocatable **res_chla**
- real ∗8, dimension(:), allocatable **res_seci**
- real ∗8, dimension(:), allocatable **res_esa**
- real ∗8, dimension(:), allocatable **seccir**
- real ∗8, dimension(:), allocatable **res_no2**
- real ∗8, dimension(:), allocatable **res_nh3**
- real ∗8, dimension(:), allocatable **res_bactp**
- real ∗8, dimension(:), allocatable **res_bactlp**
- real ∗8, dimension(:), allocatable **oflowmn_fps**
- real ∗8, dimension(:), allocatable **starg_fps**
- real ∗8, dimension(:), allocatable **weirc**
- real ∗8, dimension(:), allocatable **weirk**
- real ∗8, dimension(:), allocatable **weirw**
- real ∗8, dimension(:), allocatable **acoef**
- real ∗8, dimension(:), allocatable **bcoef**
- real ∗8, dimension(:), allocatable **ccoef**
- real ∗8, dimension(:), allocatable **orig_resvol**
- real ∗8, dimension(:), allocatable **orig_ressed**
- real ∗8, dimension(:), allocatable **orig_lkpstconc**
- real ∗8, dimension(:), allocatable **orig_lkspstconc**
- real ∗8, dimension(:), allocatable **orig_ressolp**
- real ∗8, dimension(:), allocatable **orig_resorgp**
- real ∗8, dimension(:), allocatable **orig_resno3**
- real ∗8, dimension(:), allocatable **orig_resno2**
- real ∗8, dimension(:), allocatable **orig_resnh3**
- real ∗8, dimension(:), allocatable **orig_resorgn**
- real ∗8, dimension(:,:), allocatable **starg**
- real ∗8, dimension(:,:), allocatable **oflowmx**
- real ∗8, dimension(:,:), allocatable **oflowmn**
- real ∗8, dimension(:,:), allocatable **psetlr**
- real ∗8, dimension(:,:), allocatable **nsetlr**
- real ∗8, dimension(:,:), allocatable **wuresn**

- real *8, dimension(:,:,:), allocatable **res_out**
- integer, dimension(:), allocatable **ires1**
- integer, dimension(:), allocatable **ires2**
- integer, dimension(:), allocatable **res_sub**
- integer, dimension(:), allocatable **iresco**
- integer, dimension(:), allocatable **mores**
- integer, dimension(:), allocatable **iyres**
- integer, dimension(:), allocatable **iflod1r**
- integer, dimension(:), allocatable **iflod2r**
- integer, dimension(:), allocatable **ndtargr**
- real *8, dimension(:), allocatable ap_ef

    application efficiency (0-1) (none)
- real *8, dimension(:), allocatable decay_f

    exponential of the rate constant for degradation of the pesticide on foliage (none)
- real *8, dimension(:), allocatable skoc

    soil adsorption coefficient normalized for soil organic carbon content ((mg/kg)/(mg/L))
- real *8, dimension(:), allocatable decay_s

    exponential of the rate constant for degradation of the pesticide in soil (none)
- real *8, dimension(:), allocatable hlife_f

    half-life of pesticide on foliage (days)
- real *8, dimension(:), allocatable hlife_s

    half-life of pesticide in soil (days)
- real *8, dimension(:), allocatable pst_wof

    fraction of pesticide on foliage which is washed-off by a rainfall event (none)
- real *8, dimension(:), allocatable pst_wsol

    solubility of chemical in water (mg/L (ppm))
- real *8, dimension(:), allocatable **irramt**
- real *8, dimension(:), allocatable **phusw**
- real *8, dimension(:), allocatable **phusw_nocrop**
- integer, dimension(:), allocatable pstflg

    flag for types of pesticide used in watershed array location is pesticide ID number
    0: pesticide not used
    1: pesticide used
- integer, dimension(:), allocatable nope

    sequence number of pesticide in NPNO(:) (none)
- integer, dimension(:), allocatable **nop**
- integer, dimension(:), allocatable **yr_skip**
- integer, dimension(:), allocatable **isweep**
- integer, dimension(:), allocatable **icrmx**
- integer, dimension(:), allocatable **nopmx**
- integer, dimension(:,:), allocatable **mgtop**
- integer, dimension(:,:), allocatable **idop**
- integer, dimension(:,:), allocatable **mgt1iop**
- integer, dimension(:,:), allocatable **mgt2iop**
- integer, dimension(:,:), allocatable **mgt3iop**
- real *8, dimension(:,:), allocatable **mgt4op**
- real *8, dimension(:,:), allocatable **mgt5op**
- real *8, dimension(:,:), allocatable **mgt6op**
- real *8, dimension(:,:), allocatable **mgt7op**
- real *8, dimension(:,:), allocatable **mgt8op**
- real *8, dimension(:,:), allocatable **mgt9op**
- real *8, dimension(:,:), allocatable **mgt10iop**
- real *8, dimension(:,:), allocatable **phu_op**

- real *8, dimension(:), allocatable cnyld

  fraction of nitrogen in yield (kg N/kg yield)

- real *8, dimension(:), allocatable rsdco_pl

  plant residue decomposition coefficient. The fraction of residue which will decompose in a day assuming optimal moisture, temperature, C:N ratio, and C:P ratio (none)

- real *8, dimension(:), allocatable wac21

  1st shape parameter for radiation use efficiency equation (none)

- real *8, dimension(:), allocatable wac22

  2nd shape parameter for radiation use efficiency equation (none)

- real *8, dimension(:), allocatable alai_min

  minimum LAI during winter dormant period (m^2/m^2)

- real *8, dimension(:), allocatable leaf1

  1st shape parameter for leaf area development equation (none)

- real *8, dimension(:), allocatable leaf2

  2nd shape parameter for leaf area development equation (none)

- real *8, dimension(:), allocatable wsyf

  Value of harvest index between 0 and HVSTI which represents the lowest value expected due to water stress ((kg/ha)/(kg/ha))

- real *8, dimension(:), allocatable bio_e

  *biomass-energy ratio. The potential (unstressed) growth rate per unit of intercepted photosynthetically active radiation.((kg/ha)/(MJ/m**2))*

- real *8, dimension(:), allocatable hvsti

  harvest index: crop yield/aboveground biomass ((kg/ha)/(kg/ha))

- real *8, dimension(:), allocatable t_base

  minimum temperature for plant growth (deg C)

- real *8, dimension(:), allocatable t_opt

  optimal temperature for plant growth (deg C)

- real *8, dimension(:), allocatable chtmx

  maximum canopy height (m)

- real *8, dimension(:), allocatable cvm

  natural log of USLE_C (none)

- real *8, dimension(:), allocatable gsi

  maximum stomatal conductance (m/s)

- real *8, dimension(:), allocatable vpd2

  rate of decline in stomatal conductance per unit increase in vapor pressure deficit ((m/s)(1/kPa))*

- real *8, dimension(:), allocatable wavp

  rate of decline in radiation use efficiency as a function of vapor pressure deficit (none)

- real *8, dimension(:), allocatable bio_leaf

  fraction of leaf/needle biomass that drops during dormancy (for trees only) (none)

- real *8, dimension(:), allocatable blai

  maximum (potential) leaf area index (none)

- real *8, dimension(:), allocatable cpyld

  fraction of phosphorus in yield (kg P/kg yield)

- real *8, dimension(:), allocatable dlai

  fraction of growing season when leaf area declines (none)

- real *8, dimension(:), allocatable rdmx

  maximum root depth (m)

- real *8, dimension(:), allocatable bio_n1

  1st shape parameter for plant N uptake equation (none)

- real *8, dimension(:), allocatable bio_n2

  2nd shape parameter for plant N uptake equation (none)

- real ∗8, dimension(:), allocatable bio_p1

  1st shape parameter for plant P uptake equation (none)
- real ∗8, dimension(:), allocatable bio_p2

  2st shape parameter for plant P uptake equation (none)
- real ∗8, dimension(:), allocatable bm_dieoff

  fraction above ground biomass that dies off at dormancy (fraction)
- real ∗8, dimension(:), allocatable **bmx_trees**
- real ∗8, dimension(:), allocatable **ext_coef**
- real ∗8, dimension(:), allocatable rsr1

  initial root to shoot ratio at the beg of growing season
- real ∗8, dimension(:), allocatable rsr2

  root to shoot ratio at the end of the growing season
- real ∗8, dimension(:), allocatable pltnfr1

  nitrogen uptake parameter #1: normal fraction of N in crop biomass at emergence (kg N/kg biomass)
- real ∗8, dimension(:), allocatable pltnfr2

  nitrogen uptake parameter #2: normal fraction of N in crop biomass at 0.5 maturity (kg N/kg biomass)
- real ∗8, dimension(:), allocatable pltnfr3

  nitrogen uptake parameter #3: normal fraction of N in crop biomass at maturity (kg N/kg biomass)
- real ∗8, dimension(:), allocatable pltpfr1

  phosphorus uptake parameter #1: normal fraction of P in crop biomass at emergence (kg P/kg biomass)

- real ∗8, dimension(:), allocatable pltpfr2

  phosphorus uptake parameter #2: normal fraction of P in crop biomass at 0.5 maturity (kg P/kg biomass)
- real ∗8, dimension(:), allocatable pltpfr3

  phosphorus uptake parameter #3: normal fraction of P in crop biomass at maturity (kg P/kg biomass)
- integer, dimension(:), allocatable idc

  crop/landcover category:
  1 warm season annual legume
  2 cold season annual legume
  3 perennial legume
  4 warm season annual
  5 cold season annual
  6 perennial
  7 trees
- integer, dimension(:), allocatable **mat_yrs**
- real ∗8, dimension(:), allocatable bactpdb

  concentration of persistent bacteria in manure (fertilizer) (cfu/g manure)
- real ∗8, dimension(:), allocatable fminn

  fraction of mineral N (NO3 + NH3) (kg minN/kg fert)
- real ∗8, dimension(:), allocatable forgn

  fraction of organic N (kg orgN/kg fert)
- real ∗8, dimension(:), allocatable forgp

  fraction of organic P (kg orgP/kg fert)
- real ∗8, dimension(:), allocatable bactkddb

  bacteria partition coefficient (none):
  1: all bacteria in solution
  0: all bacteria sorbed to soil particles
- real ∗8, dimension(:), allocatable bactlpdb

  concentration of less persistent bacteria in manure (fertilizer) (cfu/g manure)
- real ∗8, dimension(:), allocatable fminp

  fraction of mineral P (kg minP/kg fert)
- real ∗8, dimension(:), allocatable fnh3n

  fraction of NH3-N in mineral N (kg NH3-N/kg minN)

- character(len=8), dimension(200) fertnm

    name of fertilizer
- real ∗8, dimension(:), allocatable curbden

    curb length density in HRU (km/ha)
- real ∗8, dimension(:), allocatable dirtmx

    maximum amount of solids allowed to build up on impervious surfaces (kg/curb km)
- real ∗8, dimension(:), allocatable fimp

    fraction of HRU area that is impervious (both directly and indirectly connected)(fraction)
- real ∗8, dimension(:), allocatable urbcoef

    wash-off coefficient for removal of constituents from an impervious surface (1/mm)
- real ∗8, dimension(:), allocatable thalf

    time for the amount of solids on impervious areas to build up to 1/2 the maximum level (days)
- real ∗8, dimension(:), allocatable tnconc

    concentration of total nitrogen in suspended solid load from impervious areas (mg N/kg sed)
- real ∗8, dimension(:), allocatable tno3conc

    concentration of NO3-N in suspended solid load from impervious areas (mg NO3-N/kg sed)
- real ∗8, dimension(:), allocatable tpconc

    concentration of total phosphorus in suspended solid load from impervious areas (mg P/kg sed)
- real ∗8, dimension(:), allocatable fcimp

    fraction of HRU area that is classified as directly connected impervious (fraction)
- real ∗8, dimension(:), allocatable urbcn2

    SCS curve number for moisture condition II in impervious areas (none)
- real ∗8 **sweepeff**
- real ∗8 **frt_kg**
- real ∗8 **pst_dep**
- real ∗8 **fr_curb**
- real ∗8, dimension(:), allocatable **ranrns_hru**
- integer, dimension(:), allocatable **itill**
- real ∗8, dimension(:), allocatable deptil

    depth of mixing caused by operation (mm)
- real ∗8, dimension(:), allocatable effmix

    mixing efficiency of operation (none)
- real ∗8, dimension(:), allocatable ranrns

    random roughness of a given tillage operation (mm)
- character(len=8), dimension(550) tillnm

    8-character name for the tillage operation
- real ∗8, dimension(:), allocatable rnum1s

    For ICODES equal to (none)
    0,1,3,5,9: not used
    2: Fraction of flow in channel
    4: amount of water transferred (as defined by INUM4S)
    7,8,10,11: drainage area in square kilometers associated with the record file.
- real ∗8, dimension(:), allocatable **hyd_dakm**
- real ∗8, dimension(:,:), allocatable **varoute**
- real ∗8, dimension(:,:), allocatable **shyd**
- real ∗8, dimension(:,:), allocatable **vartran**
- real ∗8, dimension(:,:,:), allocatable **hhvaroute**
- integer, dimension(:), allocatable icodes

routing command code (none):
0 = finish
1 = subbasin
2 = route
3 = routres
4 = transfer
5 = add
6 = rechour
7 = recmon
8 = recyear
9 = save
10 = recday
11 = reccnst
12 = structure
13 = apex
14 = saveconc
15 =

- integer, dimension(:), allocatable ihouts

   For ICODES equal to (none)
   0: not used
   1,2,3,5,7,8,10,11: hydrograph storage location number
   4: departure type (1=reach, 2=reservoir)
   9: hydrograph storage location of data to be printed to event file
   14:hydrograph storage location of data to be printed to saveconc file.

- integer, dimension(:), allocatable inum1s

   For ICODES equal to (none)
   0: not used
   1: subbasin number
   2: reach number
   3: reservoir number
   4: reach or res # flow is diverted from
   5: hydrograph storage location of 1st dataset to be added
   7,8,9,10,11,14: file number.

- integer, dimension(:), allocatable inum2s

   For ICODES equal to (none)
   0,1,7,8,10,11: not used
   2,3: inflow hydrograph storage location
   4: destination type (1=reach, 2=reservoir)
   5: hydrograph storage location of 2nd dataset to be added
   9,14:print frequency (0=daily, 1=hourly)

- integer, dimension(:), allocatable inum3s

   For ICODES equal to (none)
   0,1,2,3,5,7,8,10,11: not used
   4: destination number. Reach or reservoir receiving water
   9: print format (0=normal, fixed format; 1=txt format for AV interface, recday)

- integer, dimension(:), allocatable inum4s

   For ICODES equal to (none)
   0,2,3,5,7,8,9,10,11: not used
   1: GIS code printed to output file (optional)
   4: rule code governing transfer of water (1=fraction transferred out, 2=min volume or flow left, 3=exact amount trans-
   ferred)

- integer, dimension(:), allocatable **inum5s**
- integer, dimension(:), allocatable **inum6s**
- integer, dimension(:), allocatable **inum7s**
- integer, dimension(:), allocatable **inum8s**
- integer, dimension(:), allocatable **subed**
- character(len=10), dimension(:), allocatable **recmonps**
- character(len=10), dimension(:), allocatable **reccnstps**
- character(len=5), dimension(:), allocatable **subnum**
- character(len=4), dimension(:), allocatable **hruno**

- real ∗8, dimension(:), allocatable **grwat_n**
- real ∗8, dimension(:), allocatable **grwat_i**
- real ∗8, dimension(:), allocatable **grwat_l**
- real ∗8, dimension(:), allocatable **grwat_w**
- real ∗8, dimension(:), allocatable **grwat_d**
- real ∗8, dimension(:), allocatable **grwat_s**
- real ∗8, dimension(:), allocatable **grwat_spcon**
- real ∗8, dimension(:), allocatable **tc_gwat**
- real ∗8, dimension(:), allocatable **pot_volmm**
- real ∗8, dimension(:), allocatable **pot_tilemm**
- real ∗8, dimension(:), allocatable **pot_volxmm**
- real ∗8, dimension(:), allocatable **pot_fr**
- real ∗8, dimension(:), allocatable **pot_tile**
- real ∗8, dimension(:), allocatable **pot_vol**
- real ∗8, dimension(:), allocatable **potsa**
- real ∗8, dimension(:), allocatable **pot_volx**
- real ∗8, dimension(:), allocatable **potflwi**
- real ∗8, dimension(:), allocatable **potsedi**
- real ∗8, dimension(:), allocatable **wfsh**
- real ∗8, dimension(:), allocatable **pot_nsed**
- real ∗8, dimension(:), allocatable **pot_no3l**
- real ∗8, dimension(:), allocatable **newrti**
- real ∗8, dimension(:), allocatable **gwno3**
- real ∗8, dimension(:), allocatable **pot_sed**
- real ∗8, dimension(:), allocatable **pot_no3**
- real ∗8, dimension(:), allocatable **fsred**
- real ∗8, dimension(:), allocatable **tmpavp**
- real ∗8, dimension(:), allocatable **evpot**
- real ∗8, dimension(:), allocatable **dis_stream**
- real ∗8, dimension(:), allocatable **pot_solpl**
- real ∗8, dimension(:), allocatable **sed_con**
- real ∗8, dimension(:), allocatable **orgn_con**
- real ∗8, dimension(:), allocatable **orgp_con**
- real ∗8, dimension(:), allocatable **soln_con**
- real ∗8, dimension(:), allocatable **solp_con**
- real ∗8, dimension(:), allocatable **pot_k**
- real ∗8, dimension(:), allocatable **n_reduc**
- real ∗8, dimension(:), allocatable **n_lag**
- real ∗8, dimension(:), allocatable **n_ln**
- real ∗8, dimension(:), allocatable **n_lnco**
- integer, dimension(:), allocatable **ioper**
- integer, dimension(:), allocatable **ngrwat**
- real ∗8, dimension(:), allocatable **filterw**
- real ∗8, dimension(:), allocatable **sumix**
- real ∗8, dimension(:), allocatable **usle_ls**
- real ∗8, dimension(:), allocatable **phuacc**
- real ∗8, dimension(:), allocatable epco

    plant water uptake compensation factor (0-1)
- real ∗8, dimension(:), allocatable esco

    soil evaporation compensation factor (0-1)
- real ∗8, dimension(:), allocatable **slsubbsn**
- real ∗8, dimension(:), allocatable **hru_slp**
- real ∗8, dimension(:), allocatable **erorgn**
- real ∗8, dimension(:), allocatable **erorgp**

- real ∗8, dimension(:), allocatable **biomix**
- real ∗8, dimension(:), allocatable **pnd_seci**
- real ∗8, dimension(:), allocatable **flowmin**
- real ∗8, dimension(:), allocatable **divmax**
- real ∗8, dimension(:), allocatable **canmx**
- real ∗8, dimension(:), allocatable **usle_p**
- real ∗8, dimension(:), allocatable **lat_sed**
- real ∗8, dimension(:), allocatable **rch_dakm**
- real ∗8, dimension(:), allocatable **pnd_no3s**
- real ∗8, dimension(:), allocatable **cn1**
- real ∗8, dimension(:), allocatable **cn2**
- real ∗8, dimension(:), allocatable **lat_ttime**
- real ∗8, dimension(:), allocatable **flowfr**
- real ∗8, dimension(:), allocatable **sol_zmx**
- real ∗8, dimension(:), allocatable **tile_ttime**
- real ∗8, dimension(:), allocatable **slsoil**
- real ∗8, dimension(:), allocatable **sed_stl**
- real ∗8, dimension(:), allocatable **gwminp**
- real ∗8, dimension(:), allocatable **sol_cov**
- real ∗8, dimension(:), allocatable **yldanu**
- real ∗8, dimension(:), allocatable **pnd_solp**
- real ∗8, dimension(:), allocatable **pnd_no3**
- real ∗8, dimension(:), allocatable **ov_n**
- real ∗8, dimension(:), allocatable driftco

    coefficient for pesticide drift directly onto stream (none)
- real ∗8, dimension(:), allocatable **pnd_orgp**
- real ∗8, dimension(:), allocatable **pnd_orgn**
- real ∗8, dimension(:), allocatable **cn3**
- real ∗8, dimension(:), allocatable **twlpnd**
- real ∗8, dimension(:), allocatable **twlwet**
- real ∗8, dimension(:), allocatable **sol_sumul**
- real ∗8, dimension(:), allocatable **pnd_chla**
- real ∗8, dimension(:), allocatable **hru_fr**
- real ∗8, dimension(:), allocatable hru_km

    area of HRU in square kilometers (km^2)
- real ∗8, dimension(:), allocatable **bio_ms**
- real ∗8, dimension(:), allocatable **sol_alb**
- real ∗8, dimension(:), allocatable **strsw**
- real ∗8, dimension(:), allocatable **pnd_fr**
- real ∗8, dimension(:), allocatable **pnd_psa**
- real ∗8, dimension(:), allocatable **pnd_pvol**
- real ∗8, dimension(:), allocatable **pnd_k**
- real ∗8, dimension(:), allocatable **pnd_esa**
- real ∗8, dimension(:), allocatable **pnd_evol**
- real ∗8, dimension(:), allocatable **pnd_vol**
- real ∗8, dimension(:), allocatable **yldaa**
- real ∗8, dimension(:), allocatable **pnd_sed**
- real ∗8, dimension(:), allocatable **pnd_nsed**
- real ∗8, dimension(:), allocatable **strsa**
- real ∗8, dimension(:), allocatable **dep_imp**
- real ∗8, dimension(:), allocatable **evpnd**
- real ∗8, dimension(:), allocatable **evwet**
- real ∗8, dimension(:), allocatable **wet_fr**
- real ∗8, dimension(:), allocatable **wet_nsa**

- real ∗8, dimension(:), allocatable **wet_nvol**
- real ∗8, dimension(:), allocatable **wet_k**
- integer, dimension(:), allocatable **iwetgw**
- integer, dimension(:), allocatable **iwetile**
- real ∗8, dimension(:), allocatable **wet_mxsa**
- real ∗8, dimension(:), allocatable **wet_mxvol**
- real ∗8, dimension(:), allocatable **wet_vol**
- real ∗8, dimension(:), allocatable **wet_sed**
- real ∗8, dimension(:), allocatable **wet_nsed**
- real ∗8, dimension(:), allocatable **smx**
- real ∗8, dimension(:), allocatable **sci**
- real ∗8, dimension(:), allocatable **bp1**
- real ∗8, dimension(:), allocatable **bp2**
- real ∗8, dimension(:), allocatable **bw1**
- real ∗8, dimension(:), allocatable **bw2**
- real ∗8, dimension(:), allocatable **bactpq**
- real ∗8, dimension(:), allocatable **bactp_plt**
- real ∗8, dimension(:), allocatable **bactlp_plt**
- real ∗8, dimension(:), allocatable **cnday**
- real ∗8, dimension(:), allocatable **bactlpq**
- real ∗8, dimension(:), allocatable **auto_eff**
- real ∗8, dimension(:), allocatable **sol_sw**
- real ∗8, dimension(:), allocatable **secciw**
- real ∗8, dimension(:), allocatable **bactps**
- real ∗8, dimension(:), allocatable **bactlps**
- real ∗8, dimension(:), allocatable **tmpav**
- real ∗8, dimension(:), allocatable **chlaw**
- real ∗8, dimension(:), allocatable sno_hru

    amount of water stored as snow (mm H2O)
- real ∗8, dimension(:), allocatable **subp**
- real ∗8, dimension(:), allocatable **hru_ra**
- real ∗8, dimension(:), allocatable **wet_orgn**
- real ∗8, dimension(:), allocatable **tmx**
- real ∗8, dimension(:), allocatable **tmn**
- real ∗8, dimension(:), allocatable **rsdin**
- real ∗8, dimension(:), allocatable **tmp_hi**
- real ∗8, dimension(:), allocatable **tmp_lo**
- real ∗8, dimension(:), allocatable **rwt**
- real ∗8, dimension(:), allocatable **olai**
- real ∗8, dimension(:), allocatable **usle_k**
- real ∗8, dimension(:), allocatable **tconc**
- real ∗8, dimension(:), allocatable **hru_rmx**
- real ∗8, dimension(:), allocatable **usle_cfac**
- real ∗8, dimension(:), allocatable **usle_eifac**
- real ∗8, dimension(:), allocatable **anano3**
- real ∗8, dimension(:), allocatable **aird**
- real ∗8, dimension(:), allocatable **t_ov**
- real ∗8, dimension(:), allocatable **sol_sumfc**
- real ∗8, dimension(:), allocatable **sol_avpor**
- real ∗8, dimension(:), allocatable **usle_mult**
- real ∗8, dimension(:), allocatable **wet_orgp**
- real ∗8, dimension(:), allocatable **aairr**
- real ∗8, dimension(:), allocatable **cht**
- real ∗8, dimension(:), allocatable **u10**

- real *8, dimension(:), allocatable **rhd**
- real *8, dimension(:), allocatable **shallirr**
- real *8, dimension(:), allocatable **deepirr**
- real *8, dimension(:), allocatable **lai_aamx**
- real *8, dimension(:), allocatable ch_l1

  longest tributary channel length in subbasin (km)
- real *8, dimension(:), allocatable **canstor**
- real *8, dimension(:), allocatable **ovrlnd**
- real *8, dimension(:), allocatable **wet_no3**
- real *8, dimension(:), allocatable **irr_mx**
- real *8, dimension(:), allocatable **auto_wstr**
- real *8, dimension(:), allocatable **cfrt_id**
- real *8, dimension(:), allocatable **cfrt_kg**
- real *8, dimension(:), allocatable **cpst_id**
- real *8, dimension(:), allocatable **cpst_kg**
- real *8, dimension(:), allocatable **irr_asq**
- real *8, dimension(:), allocatable **irr_eff**
- real *8, dimension(:), allocatable **irrsq**
- real *8, dimension(:), allocatable **irrefm**
- real *8, dimension(:), allocatable **irrsalt**
- real *8, dimension(:), allocatable **bio_eat**
- real *8, dimension(:), allocatable **bio_trmp**
- integer, dimension(:), allocatable **ifrt_freq**
- integer, dimension(:), allocatable **ipst_freq**
- integer, dimension(:), allocatable **irr_noa**
- integer, dimension(:), allocatable **irr_sc**
- integer, dimension(:), allocatable **irr_no**
- integer, dimension(:), allocatable **imp_trig**
- integer, dimension(:), allocatable **fert_days**
- integer, dimension(:), allocatable **irr_sca**
- integer, dimension(:), allocatable **pest_days**
- integer, dimension(:), allocatable **idplt**
- integer, dimension(:), allocatable **wstrs_id**
- real *8, dimension(:,:), allocatable **bio_aahv**
- real *8, dimension(:), allocatable **cumei**
- real *8, dimension(:), allocatable **cumeira**
- real *8, dimension(:), allocatable **cumrt**
- real *8, dimension(:), allocatable **cumrai**
- real *8, dimension(:), allocatable **wet_solp**
- real *8, dimension(:), allocatable **wet_no3s**
- real *8, dimension(:), allocatable **wet_chla**
- real *8, dimension(:), allocatable **wet_seci**
- real *8, dimension(:), allocatable **pnd_no3g**
- real *8, dimension(:), allocatable **pstsol**
- real *8, dimension(:), allocatable **gwht**
- real *8, dimension(:), allocatable **delay**
- real *8, dimension(:), allocatable **gw_q**
- real *8, dimension(:), allocatable **pnd_solpg**
- real *8, dimension(:), allocatable **alpha_bf**
- real *8, dimension(:), allocatable **alpha_bfe**
- real *8, dimension(:), allocatable **gw_spyld**
- real *8, dimension(:), allocatable **alpha_bf_d**
- real *8, dimension(:), allocatable **alpha_bfe_d**
- real *8, dimension(:), allocatable **gw_qdeep**

- real ∗8, dimension(:), allocatable **gw_delaye**
- real ∗8, dimension(:), allocatable **gw_revap**
- real ∗8, dimension(:), allocatable **rchrg_dp**
- real ∗8, dimension(:), allocatable anion_excl

    fraction of porosity from which anions are excluded
- real ∗8, dimension(:), allocatable **revapmn**
- real ∗8, dimension(:), allocatable **rchrg**
- real ∗8, dimension(:), allocatable **ffc**
- real ∗8, dimension(:), allocatable **bio_min**
- real ∗8, dimension(:), allocatable **surqsolp**
- real ∗8, dimension(:), allocatable **cklsp**
- real ∗8, dimension(:), allocatable **deepst**
- real ∗8, dimension(:), allocatable **shallst**
- real ∗8, dimension(:), allocatable **wet_solpg**
- real ∗8, dimension(:), allocatable **rchrg_src**
- real ∗8, dimension(:), allocatable **wet_no3g**
- real ∗8, dimension(:), allocatable **sol_avbd**
- real ∗8, dimension(:), allocatable **trapeff**
- real ∗8, dimension(:), allocatable **gwqmn**
- real ∗8, dimension(:), allocatable **tdrain**
- real ∗8, dimension(:), allocatable **pplnt**
- real ∗8, dimension(:), allocatable **snotmp**
- real ∗8, dimension(:), allocatable gdrain

    drain tile lag time (hours)
- real ∗8, dimension(:), allocatable **ddrain**
- real ∗8, dimension(:), allocatable **sol_crk**
- real ∗8, dimension(:), allocatable **dayl**
- real ∗8, dimension(:), allocatable **brt**
- real ∗8, dimension(:), allocatable sstmaxd

    static maximum depressional storage; read from .sdr (mm)
- real ∗8, dimension(:), allocatable re

    effective radius of drains (mm)
- real ∗8, dimension(:), allocatable sdrain

    distance between two drain tubes or tiles (mm)
- real ∗8, dimension(:), allocatable **ddrain_hru**
- real ∗8, dimension(:), allocatable drain_co

    drainage coefficient (mm/day)
- real ∗8, dimension(:), allocatable latksatf

    multiplication factor to determine conk(j1,j) from sol_k(j1,j) for HRU (none)
- real ∗8, dimension(:), allocatable pc

    pump capacity (default pump capacity = 1.042mm/hr or 25mm/day) (mm/hr)
- real ∗8, dimension(:), allocatable **stmaxd**
- real ∗8, dimension(:), allocatable **twash**
- real ∗8, dimension(:), allocatable **rnd2**
- real ∗8, dimension(:), allocatable **rnd3**
- real ∗8, dimension(:), allocatable **sol_cnsw**
- real ∗8, dimension(:), allocatable **doxq**
- real ∗8, dimension(:), allocatable **rnd8**
- real ∗8, dimension(:), allocatable **rnd9**
- real ∗8, dimension(:), allocatable **percn**
- real ∗8, dimension(:), allocatable **sol_sumwp**
- real ∗8, dimension(:), allocatable **tauton**
- real ∗8, dimension(:), allocatable **tautop**

- real ∗8, dimension(:), allocatable **cbodu**
- real ∗8, dimension(:), allocatable **chl_a**
- real ∗8, dimension(:), allocatable **qdr**
- real ∗8, dimension(:), allocatable **tfertn**
- real ∗8, dimension(:), allocatable **tfertp**
- real ∗8, dimension(:), allocatable **tgrazn**
- real ∗8, dimension(:), allocatable **tgrazp**
- real ∗8, dimension(:), allocatable **latno3**
- real ∗8, dimension(:), allocatable **latq**
- real ∗8, dimension(:), allocatable **minpgw**
- real ∗8, dimension(:), allocatable **no3gw**
- real ∗8, dimension(:), allocatable **nplnt**
- real ∗8, dimension(:), allocatable **tileq**
- real ∗8, dimension(:), allocatable **tileno3**
- real ∗8, dimension(:), allocatable **sedminpa**
- real ∗8, dimension(:), allocatable **sedminps**
- real ∗8, dimension(:), allocatable **sedorgn**
- real ∗8, dimension(:), allocatable **sedorgp**
- real ∗8, dimension(:), allocatable **sedyld**
- real ∗8, dimension(:), allocatable **sepbtm**
- real ∗8, dimension(:), allocatable **strsn**
- real ∗8, dimension(:), allocatable **strsp**
- real ∗8, dimension(:), allocatable **strstmp**
- real ∗8, dimension(:), allocatable **surfq**
- real ∗8, dimension(:), allocatable **surqno3**
- real ∗8, dimension(:), allocatable **tcfrtn**
- real ∗8, dimension(:), allocatable **tcfrtp**
- real ∗8, dimension(:), allocatable **hru_ha**
- real ∗8, dimension(:), allocatable **hru_dafr**
- real ∗8, dimension(:), allocatable **drydep_no3**
- real ∗8, dimension(:), allocatable **drydep_nh4**
- real ∗8, dimension(:), allocatable **phubase**
- real ∗8, dimension(:), allocatable **bio_yrms**
- real ∗8, dimension(:), allocatable **hvstiadj**
- real ∗8, dimension(:), allocatable **laimxfr**
- real ∗8, dimension(:), allocatable **laiday**
- real ∗8, dimension(:), allocatable **chlap**
- real ∗8, dimension(:), allocatable **pnd_psed**
- real ∗8, dimension(:), allocatable **wet_psed**
- real ∗8, dimension(:), allocatable **seccip**
- real ∗8, dimension(:), allocatable **plantn**
- real ∗8, dimension(:), allocatable **plt_et**
- real ∗8, dimension(:), allocatable **plt_pet**
- real ∗8, dimension(:), allocatable **plantp**
- real ∗8, dimension(:), allocatable **bio_aams**
- real ∗8, dimension(:), allocatable **bio_aamx**
- real ∗8, dimension(:), allocatable **lai_yrmx**
- real ∗8, dimension(:), allocatable **dormhr**
- real ∗8, dimension(:), allocatable **lat_pst**
- real ∗8, dimension(:), allocatable **orig_snohru**
- real ∗8, dimension(:), allocatable **orig_potvol**
- real ∗8, dimension(:), allocatable **fld_fr**
- real ∗8, dimension(:), allocatable **orig_alai**
- real ∗8, dimension(:), allocatable **orig_bioms**
- real ∗8, dimension(:), allocatable **pltfr_n**

- real ∗8, dimension(:), allocatable **orig_phuacc**
- real ∗8, dimension(:), allocatable **orig_sumix**
- real ∗8, dimension(:), allocatable **pltfr_p**
- real ∗8, dimension(:), allocatable **orig_phu**
- real ∗8, dimension(:), allocatable **phu_plt**
- real ∗8, dimension(:), allocatable **orig_shallst**
- real ∗8, dimension(:), allocatable **orig_deepst**
- real ∗8, dimension(:), allocatable **orig_pndvol**
- real ∗8, dimension(:), allocatable **orig_pndsed**
- real ∗8, dimension(:), allocatable **rip_fr**
- real ∗8, dimension(:), allocatable **orig_pndno3**
- real ∗8, dimension(:), allocatable **orig_pndsolp**
- real ∗8, dimension(:), allocatable **orig_pndorgn**
- real ∗8, dimension(:), allocatable **orig_pndorgp**
- real ∗8, dimension(:), allocatable **orig_wetvol**
- real ∗8, dimension(:), allocatable **orig_wetsed**
- real ∗8, dimension(:), allocatable **orig_wetno3**
- real ∗8, dimension(:), allocatable **orig_wetsolp**
- real ∗8, dimension(:), allocatable **orig_wetorgn**
- real ∗8, dimension(:), allocatable **orig_wetorgp**
- real ∗8, dimension(:), allocatable **orig_solcov**
- real ∗8, dimension(:), allocatable **orig_solsw**
- real ∗8, dimension(:), allocatable **orig_potno3**
- real ∗8, dimension(:), allocatable **orig_potsed**
- real ∗8, dimension(:), allocatable **wtab**
- real ∗8, dimension(:), allocatable **wtab_mn**
- real ∗8, dimension(:), allocatable **wtab_mx**
- real ∗8, dimension(:), allocatable **shallst_n**
- real ∗8, dimension(:), allocatable **gw_nloss**
- real ∗8, dimension(:), allocatable **rchrg_n**
- real ∗8, dimension(:), allocatable **det_san**
- real ∗8, dimension(:), allocatable **det_sil**
- real ∗8, dimension(:), allocatable **det_cla**
- real ∗8, dimension(:), allocatable **det_sag**
- real ∗8, dimension(:), allocatable **det_lag**
- real ∗8, dimension(:), allocatable **tnylda**
- real ∗8, dimension(:), allocatable **afrt_surface**
- real ∗8 **frt_surface**
- real ∗8, dimension(:), allocatable **auto_nyr**
- real ∗8, dimension(:), allocatable **auto_napp**
- real ∗8, dimension(:), allocatable **manure_kg**
- real ∗8, dimension(:), allocatable **auto_nstrs**
- real ∗8, dimension(:,:), allocatable **rcn_mo**
- real ∗8, dimension(:,:), allocatable **rammo_mo**
- real ∗8, dimension(:,:), allocatable **drydep_no3_mo**
- real ∗8, dimension(:,:), allocatable **drydep_nh4_mo**
- real ∗8, dimension(:), allocatable **rcn_d**
- real ∗8, dimension(:), allocatable **rammo_d**
- real ∗8, dimension(:), allocatable **drydep_no3_d**
- real ∗8, dimension(:), allocatable **drydep_nh4_d**
- real ∗8, dimension(:,:), allocatable **yldn**
- real ∗8, dimension(:,:), allocatable **gwati**
- real ∗8, dimension(:,:), allocatable **gwatn**
- real ∗8, dimension(:,:), allocatable **gwatl**
- real ∗8, dimension(:,:), allocatable **gwatw**

- real ∗8, dimension(:,:), allocatable **gwatd**
- real ∗8, dimension(:,:), allocatable **gwatveg**
- real ∗8, dimension(:,:), allocatable **gwata**
- real ∗8, dimension(:,:), allocatable **gwats**
- real ∗8, dimension(:,:), allocatable **gwatspcon**
- real ∗8, dimension(:,:), allocatable **rfqeo_30d**
- real ∗8, dimension(:,:), allocatable **eo_30d**
- real ∗8, dimension(:,:), allocatable **wgncur**
- real ∗8, dimension(:,:), allocatable **wgnold**
- real ∗8, dimension(:,:), allocatable **wrt**
- real ∗8, dimension(:,:), allocatable **psetlp**
- real ∗8, dimension(:,:), allocatable pst_enr

    pesticide enrichment ratio (none)
- real ∗8, dimension(:,:), allocatable **zdb**
- real ∗8, dimension(:,:), allocatable **pst_surq**
- real ∗8, dimension(:,:), allocatable plt_pst

    pesticide on plant foliage (kg/ha)
- real ∗8, dimension(:,:), allocatable **pst_sed**
- real ∗8, dimension(:,:), allocatable **psetlw**
- real ∗8, dimension(:,:), allocatable **pcpband**
- real ∗8, dimension(:,:), allocatable **wupnd**
- real ∗8, dimension(:,:), allocatable **tavband**
- real ∗8, dimension(:,:), allocatable **phi**
- real ∗8, dimension(:,:), allocatable **wat_phi**
- real ∗8, dimension(:,:), allocatable snoeb

    initial snow water content in elevation band (mm H2O)
- real ∗8, dimension(:,:), allocatable **wushal**
- real ∗8, dimension(:,:), allocatable **wudeep**
- real ∗8, dimension(:,:), allocatable **tmnband**
- real ∗8, dimension(:), allocatable **bss1**
- real ∗8, dimension(:), allocatable **bss2**
- real ∗8, dimension(:), allocatable **bss3**
- real ∗8, dimension(:), allocatable **bss4**
- real ∗8, dimension(:,:), allocatable **nsetlw**
- real ∗8, dimension(:,:), allocatable **snotmpeb**
- real ∗8, dimension(:,:), allocatable **surf_bs**
- real ∗8, dimension(:,:), allocatable **tmxband**
- real ∗8, dimension(:,:), allocatable **nsetlp**
- real ∗8, dimension(:,:), allocatable **rainsub**
- real ∗8, dimension(:,:), allocatable **frad**
- real ∗8, dimension(:), allocatable **rstpbsb**
- real ∗8, dimension(:,:), allocatable **orig_snoeb**
- real ∗8, dimension(:,:), allocatable **orig_pltpst**
- real ∗8, dimension(:,:), allocatable **terr_p**
- real ∗8, dimension(:,:), allocatable **terr_cn**
- real ∗8, dimension(:,:), allocatable **terr_sl**
- real ∗8, dimension(:,:), allocatable **drain_d**
- real ∗8, dimension(:,:), allocatable **drain_t**
- real ∗8, dimension(:,:), allocatable **drain_g**
- real ∗8, dimension(:,:), allocatable **drain_idep**
- real ∗8, dimension(:,:), allocatable **cont_cn**
- real ∗8, dimension(:,:), allocatable **cont_p**
- real ∗8, dimension(:,:), allocatable **filt_w**
- real ∗8, dimension(:,:), allocatable **strip_n**

- real ∗8, dimension(:,:), allocatable **strip_cn**
- real ∗8, dimension(:,:), allocatable **strip_c**
- real ∗8, dimension(:,:), allocatable **strip_p**
- real ∗8, dimension(:,:), allocatable **fire_cn**
- real ∗8, dimension(:,:), allocatable **cropno_upd**
- real ∗8, dimension(:,:), allocatable **hi_upd**
- real ∗8, dimension(:,:), allocatable **laimx_upd**
- real ∗8, dimension(:,:,:), allocatable **pst_lag**
- real ∗8, dimension(:,:,:), allocatable **phug**
- integer, dimension(:), allocatable hrupest

    pesticide use flag (none)
    0: no pesticides used in HRU
    1: pesticides used in HRU
- integer, dimension(:), allocatable **nrelease**
- integer, dimension(:), allocatable **swtrg**
- integer, dimension(:), allocatable **nro**
- integer, dimension(:), allocatable **nrot**
- integer, dimension(:), allocatable **nfert**
- integer, dimension(:), allocatable **igro**
- integer, dimension(:), allocatable **nair**
- integer, dimension(:), allocatable **ipnd1**
- integer, dimension(:), allocatable **ipnd2**
- integer, dimension(:), allocatable **nirr**
- integer, dimension(:), allocatable **iflod1**
- integer, dimension(:), allocatable **iflod2**
- integer, dimension(:), allocatable **ndtarg**
- integer, dimension(:), allocatable **iafrttyp**
- integer, dimension(:), allocatable **nstress**
- integer, dimension(:), allocatable **igrotree**
- integer, dimension(:), allocatable **grz_days**
- integer, dimension(:), allocatable **nmgt**
- integer, dimension(:), allocatable **icr**
- integer, dimension(:), allocatable **ncut**
- integer, dimension(:), allocatable **nsweep**
- integer, dimension(:), allocatable **nafert**
- integer, dimension(:), allocatable **irn**
- integer, dimension(:), allocatable **irrno**
- integer, dimension(:), allocatable **sol_nly**
- integer, dimension(:), allocatable **npcp**
- integer, dimension(:), allocatable **igrz**
- integer, dimension(:), allocatable **ndeat**
- integer, dimension(:), allocatable **ngr**
- integer, dimension(:), allocatable **ncf**
- integer, dimension(:), allocatable hru_sub

    subbasin in which HRU is located (none)
- integer, dimension(:), allocatable **idorm**
- integer, dimension(:), allocatable **urblu**
- integer, dimension(:), allocatable **ldrain**
- integer, dimension(:), allocatable **hru_seq**
- integer, dimension(:), allocatable **iurban**
- integer, dimension(:), allocatable **iday_fert**
- integer, dimension(:), allocatable **icfrt**
- integer, dimension(:), allocatable ifld

    number of HRU (in subbasin) that is a floodplain (none)

- integer, dimension(:), allocatable irip

    number of HRU (in subbasin) that is a riparian zone (none)
- integer, dimension(:), allocatable **ndcfrt**
- integer, dimension(:), allocatable **hrugis**
- integer, dimension(:), allocatable **orig_igro**
- integer, dimension(:), allocatable **ntil**
- integer, dimension(:), allocatable **irrsc**
- integer, dimension(:), allocatable **iwatable**
- integer, dimension(:), allocatable **curyr_mat**
- integer, dimension(:), allocatable **ncpest**
- integer, dimension(:), allocatable **icpst**
- integer, dimension(:), allocatable **ndcpst**
- integer, dimension(:), allocatable **iday_pest**
- integer, dimension(:), allocatable **irr_flag**
- integer, dimension(:), allocatable **irra_flag**
- integer, dimension(:,:), allocatable rndseed

    random number generator seed. The seeds in the array are used to generate random numbers for the following purposes:
    (1) wet/dry day probability
    (2) solar radiation
    (3) precipitation
    (4) USLE rainfall erosion index
    (5) wind speed
    (6) 0.5 hr rainfall fraction
    (7) relative humidity
    (8) maximum temperature
    (9) minimum temperature
    (10) generate new random numbers
- integer, dimension(:,:), allocatable **iterr**
- integer, dimension(:,:), allocatable **iyterr**
- integer, dimension(:,:), allocatable **itdrain**
- integer, dimension(:,:), allocatable **iydrain**
- integer, dimension(:,:), allocatable **ncrops**
- integer, dimension(:), allocatable **manure_id**
- integer, dimension(:,:), allocatable **mgt_sdr**
- integer, dimension(:,:), allocatable **idplrot**
- integer, dimension(:,:), allocatable **icont**
- integer, dimension(:,:), allocatable **iycont**
- integer, dimension(:,:), allocatable **ifilt**
- integer, dimension(:,:), allocatable **iyfilt**
- integer, dimension(:,:), allocatable **istrip**
- integer, dimension(:,:), allocatable **iystrip**
- integer, dimension(:,:), allocatable **iopday**
- integer, dimension(:,:), allocatable **iopyr**
- integer, dimension(:,:), allocatable **mgt_ops**
- real *8, dimension(:), allocatable **wshd_pstap**
- real *8, dimension(:), allocatable **wshd_pstdg**
- integer, dimension(12) **ndmo**
- integer, dimension(:), allocatable npno

    array of unique pesticides used in watershed (none)
- integer, dimension(:), allocatable **mcrhru**
- character(len=13), dimension(18) rfile

    rainfall file names (.pcp)
- character(len=13), dimension(18) tfile

    temperature file names (.tmp)

- character(len=4), dimension(1000) urbname

    name of urban land use
- character(len=1), dimension(:), allocatable **hydgrp**
- character(len=1), dimension(:), allocatable **kirr**
- character(len=16), dimension(:), allocatable **snam**
- character(len=17), dimension(300) pname

    name of pesticide/toxin adding qtile to output.hru write 3/2/2010 gsm increased heds(70) to heds(71)
- character(len=13), dimension(79) **heds**
- character(len=13), dimension(24) **hedb**
- character(len=13), dimension(46) **hedr**
- character(len=13), dimension(41) **hedrsv**
- character(len=13), dimension(40) **hedwtr**
- character(len=4), dimension(60) title

    description lines in file.cio (1st 3 lines)
- character(len=4), dimension(5000) cpnm

    four character code to represent crop name
- character(len=17), dimension(50) **fname**
- real ∗8, dimension(:,:,:), allocatable **flomon**
- real ∗8, dimension(:,:,:), allocatable **solpstmon**
- real ∗8, dimension(:,:,:), allocatable **srbpstmon**
- real ∗8, dimension(:,:,:), allocatable **sedmon**
- real ∗8, dimension(:,:,:), allocatable **orgnmon**
- real ∗8, dimension(:,:,:), allocatable **orgpmon**
- real ∗8, dimension(:,:,:), allocatable **no3mon**
- real ∗8, dimension(:,:,:), allocatable **minpmon**
- real ∗8, dimension(:,:,:), allocatable **nh3mon**
- real ∗8, dimension(:,:,:), allocatable **no2mon**
- real ∗8, dimension(:,:,:), allocatable **bactpmon**
- real ∗8, dimension(:,:,:), allocatable **bactlpmon**
- real ∗8, dimension(:,:,:), allocatable **cmtl1mon**
- real ∗8, dimension(:,:,:), allocatable **cmtl2mon**
- real ∗8, dimension(:,:,:), allocatable **cmtl3mon**
- real ∗8, dimension(:,:,:), allocatable **chlamon**
- real ∗8, dimension(:,:,:), allocatable **disoxmon**
- real ∗8, dimension(:,:,:), allocatable **cbodmon**
- real ∗8, dimension(:,:), allocatable **floyr**
- real ∗8, dimension(:,:), allocatable **sedyr**
- real ∗8, dimension(:,:), allocatable **orgnyr**
- real ∗8, dimension(:,:), allocatable **orgpyr**
- real ∗8, dimension(:,:), allocatable **no3yr**
- real ∗8, dimension(:,:), allocatable **minpyr**
- real ∗8, dimension(:,:), allocatable **nh3yr**
- real ∗8, dimension(:,:), allocatable **no2yr**
- real ∗8, dimension(:,:), allocatable **bactpyr**
- real ∗8, dimension(:,:), allocatable **bactlpyr**
- real ∗8, dimension(:,:), allocatable **cmtl1yr**
- real ∗8, dimension(:,:), allocatable **cmtl2yr**
- real ∗8, dimension(:,:), allocatable **cmtl3yr**
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- real ∗8, dimension(:,:), allocatable **disoxyr**
- real ∗8, dimension(:,:), allocatable **cbodyr**
- real ∗8, dimension(:,:), allocatable **solpstyr**
- real ∗8, dimension(:,:), allocatable **srbpstyr**
- real ∗8, dimension(:,:), allocatable **sol_mc**

- real ∗8, dimension(:,:), allocatable **sol_mn**
- real ∗8, dimension(:,:), allocatable **sol_mp**
- real ∗8, dimension(:), allocatable **flocnst**
- real ∗8, dimension(:), allocatable **sedcnst**
- real ∗8, dimension(:), allocatable **orgncnst**
- real ∗8, dimension(:), allocatable **orgpcnst**
- real ∗8, dimension(:), allocatable **no3cnst**
- real ∗8, dimension(:), allocatable **minpcnst**
- real ∗8, dimension(:), allocatable **nh3cnst**
- real ∗8, dimension(:), allocatable **no2cnst**
- real ∗8, dimension(:), allocatable **bactpcnst**
- real ∗8, dimension(:), allocatable **cmtl1cnst**
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- real ∗8, dimension(:), allocatable **disoxcnst**
- real ∗8, dimension(:), allocatable **cbodcnst**
- real ∗8, dimension(:), allocatable **solpstcnst**
- real ∗8, dimension(:), allocatable **srbpstcnst**
- integer [nstep](#)

    max number of time steps per day
- integer [idt](#)

    length of time step used to report precipitation data for sub-daily modeling (minutes)
- real ∗8, dimension(:), allocatable **hrtwtr**
- real ∗8, dimension(:), allocatable **hhstor**
- real ∗8, dimension(:), allocatable **hdepth**
- real ∗8, dimension(:), allocatable **hsdti**
- real ∗8, dimension(:), allocatable **hrchwtr**
- real ∗8, dimension(:), allocatable **halgae**
- real ∗8, dimension(:), allocatable **horgn**
- real ∗8, dimension(:), allocatable **hnh4**
- real ∗8, dimension(:), allocatable **hno2**
- real ∗8, dimension(:), allocatable **hno3**
- real ∗8, dimension(:), allocatable **horgp**
- real ∗8, dimension(:), allocatable **hsolp**
- real ∗8, dimension(:), allocatable **hbod**
- real ∗8, dimension(:), allocatable **hdisox**
- real ∗8, dimension(:), allocatable **hchla**
- real ∗8, dimension(:), allocatable **hsedyld**
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- real ∗8, dimension(:), allocatable **hharea**
- real ∗8, dimension(:), allocatable **hsolpst**
- real ∗8, dimension(:), allocatable **hsorpst**
- real ∗8, dimension(:), allocatable **hhqday**
- real ∗8, dimension(:), allocatable **precipdt**
- real ∗8, dimension(:), allocatable **hhtime**
- real ∗8, dimension(:), allocatable **hbactp**
- real ∗8, dimension(:), allocatable **hbactlp**
- integer, dimension(10) **ivar_orig**
- real ∗8, dimension(10) **rvar_orig**
- integer [nsave](#)

    number of save commands in .fig file
- integer **nauto**

- integer **iatmodep**
- real ∗8, dimension(:), allocatable **wattemp**
- real ∗8, dimension(:), allocatable **lkpst_mass**
- real ∗8, dimension(:), allocatable **lkspst_mass**
- real ∗8, dimension(:), allocatable **vel_chan**
- real ∗8, dimension(:), allocatable **vfscon**
- real ∗8, dimension(:), allocatable **vfsratio**
- real ∗8, dimension(:), allocatable **vfsch**
- real ∗8, dimension(:), allocatable **vfsi**
- real ∗8, dimension(:,:), allocatable **filter_i**
- real ∗8, dimension(:,:), allocatable **filter_ratio**
- real ∗8, dimension(:,:), allocatable **filter_con**
- real ∗8, dimension(:,:), allocatable **filter_ch**
- real ∗8, dimension(:,:), allocatable **sol_n**
- integer cswat

    = 0 Static soil carbon (old mineralization routines)
    = 1 C-FARM one carbon pool model
    = 2 Century model
- real ∗8, dimension(:,:), allocatable **sol_bdp**
- real ∗8, dimension(:,:), allocatable **tillagef**
- real ∗8, dimension(:), allocatable **rtfr**
- real ∗8, dimension(:), allocatable **stsol_rd**
- integer **urban_flag**
- integer **dorm_flag**
- real ∗8 **bf_flg**
- real ∗8 **iabstr**
- real ∗8, dimension(:), allocatable **ubnrunoff**
- real ∗8, dimension(:), allocatable **ubntss**
- real ∗8, dimension(:,:), allocatable **sub_ubnrunoff**
- real ∗8, dimension(:,:), allocatable **sub_ubntss**
- real ∗8, dimension(:,:), allocatable **ovrlnd_dt**
- real ∗8, dimension(:,:,:), allocatable **hhsurf_bs**
- integer iuh

    unit hydrograph method: 1=triangular UH; 2=gamma funtion UH;
- integer sed_ch

    channel routing for HOURLY; 0=Bagnold; 2=Brownlie; 3=Yang;
- real ∗8 eros_expo

    an exponent in the overland flow erosion equation ranges 1.5-3.0
- real ∗8 eros_spl

    coefficient of splash erosion varing 0.9-3.1
- real ∗8 rill_mult

    Multiplier to USLE_K for soil susceptible to rill erosion, range 0.5-2.0.
- real ∗8 **sedprev**
- real ∗8 **c_factor**
- real ∗8 ch_d50

    median particle diameter of channel bed (mm)
- real ∗8 sig_g

    geometric standard deviation of particle sizes for the main channel. Mean air temperature at which precipitation is equally likely to be rain as snow/freezing rain.
- real ∗8 uhalpha

    alpha coefficient for estimating unit hydrograph using a gamma function (∗.bsn)
- real ∗8 **abstinit**
- real ∗8 **abstmax**
- real ∗8, dimension(:,:), allocatable **hhsedy**

- real ∗8, dimension(:,:), allocatable **sub_subp_dt**
- real ∗8, dimension(:,:), allocatable **sub_hhsedy**
- real ∗8, dimension(:,:), allocatable **sub_atmp**
- real ∗8, dimension(:), allocatable **rhy**
- real ∗8, dimension(:), allocatable **init_abstrc**
- real ∗8, dimension(:), allocatable **dratio**
- real ∗8, dimension(:), allocatable **hrtevp**
- real ∗8, dimension(:), allocatable **hrttlc**
- real ∗8, dimension(:,:,:), allocatable **rchhr**
- real ∗8, dimension(:), allocatable **hhresflwi**
- real ∗8, dimension(:), allocatable **hhresflwo**
- real ∗8, dimension(:), allocatable **hhressedi**
- real ∗8, dimension(:), allocatable **hhressedo**
- character(len=4), dimension(:), allocatable **lu_nodrain**
- integer, dimension(:), allocatable **bmpdrain**
- real ∗8, dimension(:), allocatable **sub_cn2**
- real ∗8, dimension(:), allocatable **sub_ha_urb**
- real ∗8, dimension(:), allocatable **bmp_recharge**
- real ∗8, dimension(:), allocatable **sub_ha_imp**
- real ∗8, dimension(:), allocatable **subdr_km**
- real ∗8, dimension(:), allocatable **subdr_ickm**
- real ∗8, dimension(:,:), allocatable **sf_im**
- real ∗8, dimension(:,:), allocatable **sf_iy**
- real ∗8, dimension(:,:), allocatable **sp_sa**
- real ∗8, dimension(:,:), allocatable **sp_pvol**
- real ∗8, dimension(:,:), allocatable **sp_pd**
- real ∗8, dimension(:,:), allocatable **sp_sedi**
- real ∗8, dimension(:,:), allocatable **sp_sede**
- real ∗8, dimension(:,:), allocatable **ft_sa**
- real ∗8, dimension(:,:), allocatable **ft_fsa**
- real ∗8, dimension(:,:), allocatable **ft_dep**
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- real ∗8, dimension(:,:), allocatable **ft_pd**
- real ∗8, dimension(:,:), allocatable **ft_k**
- real ∗8, dimension(:,:), allocatable **ft_dp**
- real ∗8, dimension(:,:), allocatable **ft_dc**
- real ∗8, dimension(:,:), allocatable **ft_por**
- real ∗8, dimension(:,:), allocatable **tss_den**
- real ∗8, dimension(:,:), allocatable **ft_alp**
- real ∗8, dimension(:,:), allocatable **sf_fr**
- real ∗8, dimension(:,:), allocatable **sp_qi**
- real ∗8, dimension(:,:), allocatable **sp_k**
- real ∗8, dimension(:,:), allocatable **ft_qpnd**
- real ∗8, dimension(:,:), allocatable **sp_dp**
- real ∗8, dimension(:,:), allocatable **ft_qsw**
- real ∗8, dimension(:,:), allocatable **ft_qin**
- real ∗8, dimension(:,:), allocatable **ft_qout**
- real ∗8, dimension(:,:), allocatable **ft_sedpnd**
- real ∗8, dimension(:,:), allocatable **sp_bpw**
- real ∗8, dimension(:,:), allocatable **ft_bpw**
- real ∗8, dimension(:,:), allocatable **ft_sed_cumul**
- real ∗8, dimension(:,:), allocatable **sp_sed_cumul**
- integer, dimension(:), allocatable **num_sf**
- integer, dimension(:,:), allocatable **sf_typ**
- integer, dimension(:,:), allocatable **sf_dim**

- integer, dimension(:,:), allocatable **ft_qfg**
- integer, dimension(:,:), allocatable **sp_qfg**
- integer, dimension(:,:), allocatable **sf_ptp**
- integer, dimension(:,:), allocatable **ft_fc**
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- real ∗8 **sfsedstdev**
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- integer, dimension(:), allocatable **dtp_iyr**
- integer, dimension(:), allocatable **dtp_numweir**
- integer, dimension(:), allocatable **dtp_numstage**
- integer, dimension(:), allocatable **dtp_stagdis**
- integer, dimension(:), allocatable **dtp_reltype**
- integer, dimension(:), allocatable **dtp_onoff**
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- real ∗8, dimension(:), allocatable **cfh**
- real ∗8, dimension(:), allocatable **cfdec**
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- real ∗8, dimension(:), allocatable **lat_orgp**
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- real ∗8, dimension(:), allocatable **dtp_evap_sa**
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- integer, dimension(:,:), allocatable **ro_bmp_flag**
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- real ∗8, dimension(:,:), allocatable **sol_solp_pre**
- real ∗8, dimension(:,:), allocatable **psp_store**
- real ∗8, dimension(:,:), allocatable **ssp_store**

- real ∗8, dimension(:,:), allocatable **so_res**
- real ∗8, dimension(:,:), allocatable **sol_cal**
- real ∗8, dimension(:,:), allocatable **sol_ph**
- integer **sol_p_model**
- integer, dimension(:,:), allocatable **a_days**
- integer, dimension(:,:), allocatable **b_days**
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- real ∗8, dimension(:,:), allocatable **ro_bmp_pps**
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- real ∗8, dimension(:,:), allocatable **dtp_retperd**
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- real ∗8, dimension(:,:), allocatable **ri_sa**
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- real ∗8, dimension(:), allocatable **wtp_qi**
- real ∗8 **bio_init**
- real ∗8 **lai_init**
- real ∗8 **cnop**
- real ∗8 **hi_ovr**
- real ∗8 **harveff**
- real ∗8 **frac_harvk**
- real ∗8 **lid_vgcl**
- real ∗8 **lid_vgcm**
- real ∗8 **lid_qsurf_total**
- real ∗8 **lid_farea_sum**
- real ∗8, dimension(:,:), allocatable **lid_cuminf_last**
- real ∗8, dimension(:,:), allocatable **lid_sw_last**
- real ∗8, dimension(:,:), allocatable **interval_last**
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- real ∗8, dimension(:,:), allocatable **rg_wp**
- real ∗8, dimension(:,:), allocatable **rg_ksat**
- real ∗8, dimension(:,:), allocatable **rg_por**
- real ∗8, dimension(:,:), allocatable **rg_hydeff**

- real ∗8, dimension(:,:), allocatable **rg_soldpt**
- real ∗8, dimension(:,:), allocatable **rg_dimop**
- real ∗8, dimension(:,:), allocatable **rg_sarea**
- real ∗8, dimension(:,:), allocatable **rg_vol**
- real ∗8, dimension(:,:), allocatable **rg_sth**
- real ∗8, dimension(:,:), allocatable **rg_sdia**
- real ∗8, dimension(:,:), allocatable **rg_bdia**
- real ∗8, dimension(:,:), allocatable **rg_sts**
- real ∗8, dimension(:,:), allocatable **rg_orifice**
- real ∗8, dimension(:,:), allocatable **rg_oheight**
- real ∗8, dimension(:,:), allocatable **rg_odia**
- real ∗8, dimension(:,:), allocatable **rg_dummy1**
- real ∗8, dimension(:,:), allocatable **rg_dummy2**
- real ∗8, dimension(:,:), allocatable **rg_dummy3**
- real ∗8, dimension(:,:), allocatable **rg_dummy4**
- real ∗8, dimension(:,:), allocatable **rg_dummy5**
- integer, dimension(:,:), allocatable **cs_onoff**
- integer, dimension(:,:), allocatable **cs_imo**
- integer, dimension(:,:), allocatable **cs_iyr**
- integer, dimension(:,:), allocatable **cs_grcon**
- real ∗8, dimension(:,:), allocatable **cs_farea**
- real ∗8, dimension(:,:), allocatable **cs_vol**
- real ∗8, dimension(:,:), allocatable **cs_rdepth**
- real ∗8, dimension(:,:), allocatable **cs_dummy1**
- real ∗8, dimension(:,:), allocatable **cs_dummy2**
- real ∗8, dimension(:,:), allocatable **cs_dummy3**
- real ∗8, dimension(:,:), allocatable **cs_dummy4**
- real ∗8, dimension(:,:), allocatable **cs_dummy5**
- integer, dimension(:,:), allocatable **pv_onoff**
- integer, dimension(:,:), allocatable **pv_imo**
- integer, dimension(:,:), allocatable **pv_iyr**
- integer, dimension(:,:), allocatable **pv_solop**
- real ∗8, dimension(:,:), allocatable **pv_grvdep**
- real ∗8, dimension(:,:), allocatable **pv_grvpor**
- real ∗8, dimension(:,:), allocatable **pv_farea**
- real ∗8, dimension(:,:), allocatable **pv_drcoef**
- real ∗8, dimension(:,:), allocatable **pv_fc**
- real ∗8, dimension(:,:), allocatable **pv_wp**
- real ∗8, dimension(:,:), allocatable **pv_ksat**
- real ∗8, dimension(:,:), allocatable **pv_por**
- real ∗8, dimension(:,:), allocatable **pv_hydeff**
- real ∗8, dimension(:,:), allocatable **pv_soldpt**
- real ∗8, dimension(:,:), allocatable **pv_dummy1**
- real ∗8, dimension(:,:), allocatable **pv_dummy2**
- real ∗8, dimension(:,:), allocatable **pv_dummy3**
- real ∗8, dimension(:,:), allocatable **pv_dummy4**
- real ∗8, dimension(:,:), allocatable **pv_dummy5**
- integer, dimension(:,:), allocatable **lid_onoff**
- real ∗8, dimension(:,:), allocatable **sol_bmc**
- real ∗8, dimension(:,:), allocatable **sol_bmn**
- real ∗8, dimension(:,:), allocatable **sol_hsc**
- real ∗8, dimension(:,:), allocatable **sol_hsn**
- real ∗8, dimension(:,:), allocatable **sol_hpc**
- real ∗8, dimension(:,:), allocatable **sol_hpn**
- real ∗8, dimension(:,:), allocatable **sol_lm**

- real ∗8, dimension(:,:), allocatable **sol_lmc**
- real ∗8, dimension(:,:), allocatable **sol_lmn**
- real ∗8, dimension(:,:), allocatable **sol_ls**
- real ∗8, dimension(:,:), allocatable **sol_lsl**
- real ∗8, dimension(:,:), allocatable **sol_lsc**
- real ∗8, dimension(:,:), allocatable **sol_lsn**
- real ∗8, dimension(:,:), allocatable **sol_rnmn**
- real ∗8, dimension(:,:), allocatable **sol_lslc**
- real ∗8, dimension(:,:), allocatable **sol_lslnc**
- real ∗8, dimension(:,:), allocatable **sol_rspc**
- real ∗8, dimension(:,:), allocatable **sol_woc**
- real ∗8, dimension(:,:), allocatable **sol_won**
- real ∗8, dimension(:,:), allocatable **sol_hp**
- real ∗8, dimension(:,:), allocatable **sol_hs**
- real ∗8, dimension(:,:), allocatable **sol_bm**
- real ∗8, dimension(:,:), allocatable **sol_cac**
- real ∗8, dimension(:,:), allocatable **sol_cec**
- real ∗8, dimension(:,:), allocatable **sol_percc**
- real ∗8, dimension(:,:), allocatable **sol_latc**
- real ∗8, dimension(:), allocatable **sedc_d**
- real ∗8, dimension(:), allocatable **surfqc_d**
- real ∗8, dimension(:), allocatable **latc_d**
- real ∗8, dimension(:), allocatable **percc_d**
- real ∗8, dimension(:), allocatable **foc_d**
- real ∗8, dimension(:), allocatable **nppc_d**
- real ∗8, dimension(:), allocatable **rsdc_d**
- real ∗8, dimension(:), allocatable **grainc_d**
- real ∗8, dimension(:), allocatable **stoverc_d**
- real ∗8, dimension(:), allocatable **soc_d**
- real ∗8, dimension(:), allocatable **rspc_d**
- real ∗8, dimension(:), allocatable **emitc_d**
- real ∗8, dimension(:), allocatable **sub_sedc_d**
- real ∗8, dimension(:), allocatable **sub_surfqc_d**
- real ∗8, dimension(:), allocatable **sub_latc_d**
- real ∗8, dimension(:), allocatable **sub_percc_d**
- real ∗8, dimension(:), allocatable **sub_foc_d**
- real ∗8, dimension(:), allocatable **sub_nppc_d**
- real ∗8, dimension(:), allocatable **sub_rsdc_d**
- real ∗8, dimension(:), allocatable **sub_grainc_d**
- real ∗8, dimension(:), allocatable **sub_stoverc_d**
- real ∗8, dimension(:), allocatable **sub_emitc_d**
- real ∗8, dimension(:), allocatable **sub_soc_d**
- real ∗8, dimension(:), allocatable **sub_rspc_d**
- real ∗8, dimension(:), allocatable **sedc_m**
- real ∗8, dimension(:), allocatable **surfqc_m**
- real ∗8, dimension(:), allocatable **latc_m**
- real ∗8, dimension(:), allocatable **percc_m**
- real ∗8, dimension(:), allocatable **foc_m**
- real ∗8, dimension(:), allocatable **nppc_m**
- real ∗8, dimension(:), allocatable **rsdc_m**
- real ∗8, dimension(:), allocatable **grainc_m**
- real ∗8, dimension(:), allocatable **stoverc_m**
- real ∗8, dimension(:), allocatable **emitc_m**
- real ∗8, dimension(:), allocatable **soc_m**
- real ∗8, dimension(:), allocatable **rspc_m**

- real *8, dimension(:), allocatable **sedc_a**
- real *8, dimension(:), allocatable **surfqc_a**
- real *8, dimension(:), allocatable **latc_a**
- real *8, dimension(:), allocatable **percc_a**
- real *8, dimension(:), allocatable **foc_a**
- real *8, dimension(:), allocatable **nppc_a**
- real *8, dimension(:), allocatable **rsdc_a**
- real *8, dimension(:), allocatable **grainc_a**
- real *8, dimension(:), allocatable **stoverc_a**
- real *8, dimension(:), allocatable **emitc_a**
- real *8, dimension(:), allocatable **soc_a**
- real *8, dimension(:), allocatable **rspc_a**
- integer, dimension(:), allocatable **tillage_switch**
- real *8, dimension(:), allocatable **tillage_depth**
- integer, dimension(:), allocatable **tillage_days**
- real *8, dimension(:), allocatable **tillage_factor**
- real *8 dthy
    time interval for subdaily routing
- integer, dimension(4) **ihx**
- integer, dimension(:), allocatable **nhy**
- real *8, dimension(:), allocatable **rchx**
- real *8, dimension(:), allocatable **rcss**
- real *8, dimension(:), allocatable **qcap**
- real *8, dimension(:), allocatable **chxa**
- real *8, dimension(:), allocatable **chxp**
- real *8, dimension(:,:,:), allocatable **qhy**
- real *8 **ff1**
- real *8 **ff2**

5.1.1 Detailed Description

main module containing the global variables

5.1.2 Variable Documentation

5.1.2.1 igropt

```
integer parm::igropt
```

Qual2E option for calculating the local specific growth rate of algae
1: multiplicative.

$$u = mumax\,fll\,fnn\,fpp$$

2: limiting nutrient

$$u = mumax\,fll\,\min(fnn,\,fpp)$$

3: harmonic mean

$$u = mumax\,fll\,\frac{2}{\frac{1}{fnn} + \frac{1}{fpp}}$$

Chapter 6

Data Type Documentation

6.1 parm::ascrv Interface Reference

Public Member Functions

- subroutine **ascrv** (x1, x2, x3, x4, x5, x6)

The documentation for this interface was generated from the following file:

- modparm.f90

6.2 parm::atri Interface Reference

Public Member Functions

- real ∗8 function **atri** (at1, at2, at3, at4i)

The documentation for this interface was generated from the following file:

- modparm.f90

6.3 parm::aunif Interface Reference

Public Member Functions

- real ∗8 function **aunif** (x1)

The documentation for this interface was generated from the following file:

- modparm.f90

6.4 parm::dstn1 Interface Reference

Public Member Functions

- real ∗8 function **dstn1** (rn1, rn2)

The documentation for this interface was generated from the following file:

- modparm.f90

6.5 parm::ee Interface Reference

Public Member Functions

- real ∗8 function **ee** (tk)

The documentation for this interface was generated from the following file:

- modparm.f90

6.6 parm::expo Interface Reference

Public Member Functions

- real ∗8 function **expo** (xx)

The documentation for this interface was generated from the following file:

- modparm.f90

6.7 parm::fcgd Interface Reference

Public Member Functions

- real ∗8 function **fcgd** (xx)

The documentation for this interface was generated from the following file:

- modparm.f90

6.8 parm::HQDAV Interface Reference

Public Member Functions

- subroutine **hqdav** (A, CBW, QQ, SSS, ZCH, ZX, CHW, FPW, jrch)

The documentation for this interface was generated from the following file:

- modparm.f90

6.9 parm::layersplit Interface Reference

Public Member Functions

- subroutine **layersplit** (dep_new)

The documentation for this interface was generated from the following file:

- modparm.f90

6.10 parm::ndenit Interface Reference

Public Member Functions

- subroutine **ndenit** (k, j, cdg, wdn, void)

The documentation for this interface was generated from the following file:

- modparm.f90

6.11 parm::qman Interface Reference

Public Member Functions

- real ∗8 function **qman** (x1, x2, x3, x4)

The documentation for this interface was generated from the following file:

- modparm.f90

6.12 parm::regres Interface Reference

Public Member Functions

- real ∗8 function **regres** (k)

The documentation for this interface was generated from the following file:

- modparm.f90

6.13 parm::rsedaa Interface Reference

Public Member Functions

- subroutine **rsedaa** (years)

The documentation for this interface was generated from the following file:

- modparm.f90

6.14 parm::tair Interface Reference

Public Member Functions

- real ∗8 function **tair** (hr, jj)

The documentation for this interface was generated from the following file:

- modparm.f90

6.15 parm::theta Interface Reference

Public Member Functions

- real ∗8 function **theta** (r20, thk, tmp)

The documentation for this interface was generated from the following file:

- modparm.f90

6.16 parm::vbl Interface Reference

Public Member Functions

- subroutine **vbl** (evx, spx, pp, qin, ox, vx1, vy, yi, yo, ysx, vf, vyf, aha)

The documentation for this interface was generated from the following file:

- modparm.f90

Chapter 7

File Documentation

7.1 allocate_parms.f90 File Reference

Functions/Subroutines

- subroutine allocate_parms

    this subroutine allocates array sizes

7.1.1 Detailed Description

this subroutine allocates array sizes

Author

modified by Javier Burguete

7.2 ascrv.f90 File Reference

Functions/Subroutines

- subroutine ascrv (x1, x2, x3, x4, x5, x6)

    this subroutine computes shape parameters x5 and x6 for the S curve equation

7.2.1 Detailed Description

file containing the subroutine ascrv

Author

modified by Javier Burguete

7.2.2 Function/Subroutine Documentation

7.2.2.1 ascrv()

```
subroutine ascrv (
            real*8, intent(in) x1,
            real*8, intent(in) x2,
            real*8, intent(in) x3,
            real*8, intent(in) x4,
            real*8, intent(out) x5,
            real*8, intent(out) x6 )
```

this subroutine computes shape parameters x5 and x6 for the S curve equation

$$x = \frac{y}{y + \exp(x5 + x6\,y)}$$

given 2 (x,y) points along the curve. x5 is determined by solving the equation with x and y values measured around the midpoint of the curve (approx. 50% of the maximum value for x) and x6 is determined by solving the equation with x and y values measured close to one of the endpoints of the curve (100% of the maximum value for x). This subroutine is called from readbsn.f90 and readplant.f90

Parameters

in	x1	value for x in the above equation for first datapoint, x1 should be close to 0.5 (the midpoint of the curve)
in	x2	value for x in the above equation for second datapoint, x2 should be close to 0.0 or 1.0
in	x3	value for y in the above equation corresponding to x1
in	x4	value for y in the above equation corresponding to x2
out	x5	1st shape parameter for S curve equation characterizing the midpoint of the curve
out	x6	2nd shape parameter for S curve equation characterizing the regions close to the endpoints of the curve

7.3 aunif.f90 File Reference

Functions/Subroutines

- real ∗8 function aunif (x1)

  This function generates random numbers ranging from 0.0 to 1.0. In the process of calculating the random number, the seed (x1) is set to a new value. This function implements the prime-modulus generator.

7.3.1 Detailed Description

file containing the function aunif

Author

modified by Javier Burguete

7.3.2 Function/Subroutine Documentation

7.3.2.1 aunif()

```
real*8 function aunif (
            integer, intent(inout) x1 )
```

This function generates random numbers ranging from 0.0 to 1.0. In the process of calculating the random number, the seed (x1) is set to a new value. This function implements the prime-modulus generator.

$$xi = 16807\,xi\,\mathrm{mod}\,(2^{31} - 1)$$

using code which ensures that no intermediate result uses more than 31 bits. The theory behind the code is summarized in [1]

Parameters

x1	random number generator seed (integer) where $0 < x1 < 2147483647$

Returns

random number ranging from 0.0 to 1.0

7.4 caps.f90 File Reference

Functions/Subroutines

- subroutine caps (file_name)

  this subroutine reads the input and output names given in file.cio and converts all capital letters to lowercase letters.

7.4.1 Detailed Description

file containing the subroutine caps

Author

modified by Javier Burguete

7.4.2 Function/Subroutine Documentation

7.4.2.1 caps()

```
subroutine caps (
            character (len=*) file_name )
```

this subroutine reads the input and output names given in file.cio and converts all capital letters to lowercase letters.

Parameters

file_name	dummy argument, file name character string

7.5   gcycl.f90 File Reference

Functions/Subroutines

- subroutine gcycl

    This subroutine initializes the random number seeds. If the user desires a different set of random numbers for each simulation run, the random number generator is used to reset the values of the seeds.

7.5.1   Detailed Description

file containing the subroutine gcycl

Author

modified by Javier Burguete

7.6   getallo.f90 File Reference

Functions/Subroutines

- subroutine getallo

    This subroutine calculates the number of HRUs, subbasins, etc. in the simulation. These values are used to allocate array sizes.

7.6.1   Detailed Description

file containing the subroutine getallo

Author

modified by Javier Burguete

7.7   jdt.f90 File Reference

Functions/Subroutines

- integer function jdt (numdays, i, m)

    this function computes the julian date given the month and the day of the month

7.7.1 Detailed Description

file containing the function jdt

Author

> modified by Javier Burguete

7.7.2 Function/Subroutine Documentation

7.7.2.1 jdt()

```
integer function jdt (
          integer, dimension (13), intent(in) numdays,
          integer, intent(in) i,
          integer, intent(in) m )
```

this function computes the julian date given the month and the day of the month

Parameters

in	*numdays*	julian date for last day of preceding month (where the array location is the number of the month). The dates are for leap years (numdays=ndays) (julian date)
in	*i*	day
in	*m*	month

7.8 main.f90 File Reference

Functions/Subroutines

- program main

  this is the main program that reads input, calls the main simulation model, and writes output

7.8.1 Detailed Description

file containing the main program that reads input, calls the main simulation model, and writes output.

Author

> modified by Javier Burguete Tolosa

7.9 modparm.f90 File Reference

Data Types

- interface parm::atri
- interface parm::aunif
- interface parm::dstn1
- interface parm::ee
- interface parm::expo
- interface parm::fcgd
- interface parm::qman
- interface parm::regres
- interface parm::tair
- interface parm::theta
- interface parm::ascrv
- interface parm::HQDAV
- interface parm::layersplit
- interface parm::ndenit
- interface parm::rsedaa
- interface parm::vbl

Modules

- module parm

    main module containing the global variables

Variables

- integer, parameter parm::mvaro = 33

    max number of variables routed through the reach

- integer, parameter parm::mhruo = 79

    max number of variables in output.hru

- integer, parameter parm::mrcho = 62

    max number of variables in reach file

- integer, parameter parm::msubo = 24

    max number of variables in output.sub

- integer, parameter parm::mstdo = 113

    max number of variables summarized in output.std

- integer, parameter **parm::motot** = 600
- integer **parm::icalen**
- real ∗8 parm::prf_bsn

    Basinwide peak rate adjustment factor for sediment routing in the channel. Allows impact of peak flow rate on sediment routing and channel reshaping to be taken into account.

- real ∗8 **parm::co2_x2**
- real ∗8 **parm::co2_x**
- real ∗8, dimension(:), allocatable **parm::alph_e**
- real ∗8, dimension(:), allocatable parm::cdn

    denitrification exponential rate coefficient

- real ∗8, dimension(:), allocatable parm::nperco

nitrate percolation coefficient (0-1)
0:concentration of nitrate in surface runoff is zero
1:percolate has same concentration of nitrate as surface runoff

- real *8, dimension(:), allocatable parm::surlag

  Surface runoff lag time. This parameter is needed in subbasins where the time of concentration is greater than 1 day. SURLAG is used to create a "storage" for surface runoff to allow the runoff to take longer than 1 day to reach the subbasin outlet (days)

- real *8, dimension(:), allocatable **parm::co_p**
- real *8, dimension(:), allocatable parm::cmn

  rate factor for humus mineralization on active organic N

- real *8, dimension(:), allocatable parm::phoskd

  Phosphorus soil partitioning coefficient. Ratio of soluble phosphorus in surface layer to soluble phosphorus in runoff.

- real *8, dimension(:), allocatable parm::psp

  Phosphorus availibility index. The fraction of fertilizer P remaining in labile pool after initial rapid phase of P sorption.

- real *8, dimension(:), allocatable parm::sdnco

  denitrification threshold: fraction of field capacity triggering denitrification

- real *8 parm::r2adj_bsn

  basinwide retention parameter adjustment factor (greater than 1)

- real *8 **parm::yield**
- real *8 **parm::burn_frlb**
- real *8 **parm::pst_kg**
- real *8 **parm::yieldgrn**
- real *8 **parm::yieldbms**
- real *8 **parm::yieldtbr**
- real *8 **parm::yieldn**
- real *8 **parm::yieldp**
- real *8 **parm::hi_bms**
- real *8 **parm::hi_rsd**
- real *8 **parm::yieldrsd**
- real *8, dimension(:), allocatable **parm::l_k1**
- real *8, dimension(:), allocatable **parm::l_k2**
- real *8, dimension(:), allocatable **parm::l_lambda**
- real *8, dimension(:), allocatable **parm::l_beta**
- real *8, dimension(:), allocatable **parm::l_gama**
- real *8, dimension(:), allocatable **parm::l_harea**
- real *8, dimension(:), allocatable **parm::l_vleng**
- real *8, dimension(:), allocatable **parm::l_vslope**
- real *8, dimension(:), allocatable **parm::l_ktc**
- real *8, dimension(:), allocatable **parm::biofilm_mumax**
- real *8, dimension(:), allocatable **parm::biofilm_kinv**
- real *8, dimension(:), allocatable **parm::biofilm_klw**
- real *8, dimension(:), allocatable **parm::biofilm_kla**
- real *8, dimension(:), allocatable **parm::biofilm_cdet**
- real *8, dimension(:), allocatable **parm::biofilm_bm**
- real *8, dimension(:,:), allocatable **parm::hru_rufr**
- real *8, dimension(:,:), allocatable **parm::daru_km**
- real *8, dimension(:,:), allocatable **parm::ru_k**
- real *8, dimension(:,:), allocatable **parm::ru_c**
- real *8, dimension(:,:), allocatable **parm::ru_eiq**
- real *8, dimension(:,:), allocatable **parm::ru_ovsl**
- real *8, dimension(:,:), allocatable **parm::ru_a**
- real *8, dimension(:,:), allocatable **parm::ru_ovs**
- real *8, dimension(:,:), allocatable **parm::ru_ktc**
- real *8, dimension(:), allocatable **parm::gwq_ru**

- real ∗8, dimension(:), allocatable **parm::qdayout**
- integer, dimension(:), allocatable **parm::ils2**
- integer, dimension(:), allocatable **parm::ils2flag**
- integer **parm::iru**
- integer **parm::mru**
- integer **parm::irch**
- integer **parm::isub**
- integer **parm::idum**
- integer **parm::mhyd_bsn**
- integer **parm::ipest**
- integer **parm::ils_nofig**
- integer **parm::mhru1**
- integer, dimension(:), allocatable **parm::mhyd1**
- integer, dimension(:), allocatable **parm::irtun**
- real ∗8 **parm::wshd_sepno3**
- real ∗8 **parm::wshd_sepnh3**
- real ∗8 **parm::wshd_seporgn**
- real ∗8 **parm::wshd_sepfon**
- real ∗8 **parm::wshd_seporgp**
- real ∗8 **parm::wshd_sepfop**
- real ∗8 **parm::wshd_sepsolp**
- real ∗8 **parm::wshd_sepbod**
- real ∗8 **parm::wshd_sepmm**
- integer, dimension(:), allocatable **parm::isep_hru**
- real ∗8 parm::fixco

    nitrogen fixation coefficient
- real ∗8 parm::nfixmx

    maximum daily n-fixation (kg/ha)
- real ∗8 parm::res_stlr_co

    reservoir sediment settling coefficient
- real ∗8 parm::rsd_covco

    residue cover factor for computing frac of cover
- real ∗8 parm::vcrit

    critical velocity
- real ∗8 **parm::wshd_sw**
- real ∗8 **parm::wshd_snob**
- real ∗8 **parm::wshd_pndfr**
- real ∗8 **parm::wshd_pndv**
- real ∗8 **parm::wshd_pndsed**
- real ∗8 parm::percop

    pesticide percolation coefficient (0-1)
    0: concentration of pesticide in surface runoff is zero
    1: percolate has same concentration of pesticide as surface runoff
- real ∗8 **parm::wshd_wetfr**
- real ∗8 **parm::wshd_resfr**
- real ∗8 **parm::wshd_resha**
- real ∗8 **parm::wshd_pndha**
- real ∗8 **parm::wshd_fminp**
- real ∗8 **parm::wshd_ftotn**
- real ∗8 **parm::wshd_fnh3**
- real ∗8 **parm::wshd_fno3**
- real ∗8 **parm::wshd_forgn**
- real ∗8 **parm::wshd_forgp**
- real ∗8 **parm::wshd_ftotp**

- real ∗8 **parm::wshd_yldn**
- real ∗8 **parm::wshd_yldp**
- real ∗8 **parm::wshd_fixn**
- real ∗8 **parm::wshd_pup**
- real ∗8 **parm::wshd_wstrs**
- real ∗8 **parm::wshd_nstrs**
- real ∗8 **parm::wshd_pstrs**
- real ∗8 **parm::wshd_tstrs**
- real ∗8 **parm::wshd_astrs**
- real ∗8 [parm::ffcb](#)

    initial soil water content expressed as a fraction of field capacity
- real ∗8 **parm::wshd_hmn**
- real ∗8 **parm::wshd_rwn**
- real ∗8 **parm::wshd_hmp**
- real ∗8 **parm::wshd_rmn**
- real ∗8 **parm::wshd_dnit**
- real ∗8 [parm::wdpq](#)

    die-off factor for persistent bacteria in soil solution (1/day)
- real ∗8 **parm::wshd_rmp**
- real ∗8 **parm::wshd_voln**
- real ∗8 **parm::wshd_nitn**
- real ∗8 **parm::wshd_pas**
- real ∗8 **parm::wshd_pal**
- real ∗8 [parm::wof_p](#)

    wash off fraction for persistent bacteria on foliage during a rainfall event
- real ∗8 **parm::wshd_plch**
- real ∗8 **parm::wshd_raino3**
- real ∗8 **parm::ressedc**
- real ∗8 **parm::basno3f**
- real ∗8 **parm::basorgnf**
- real ∗8 **parm::wshd_pinlet**
- real ∗8 **parm::wshd_ptile**
- real ∗8 [parm::sftmp](#)

    Snowfall temperature (deg C)
- real ∗8 [parm::smfmn](#)

    Minimum melt rate for snow during year (Dec. 21) where deg C refers to the air temperature. (mm/deg C/day)
- real ∗8 [parm::smfmx](#)

    Maximum melt rate for snow during year (June 21) where deg C refers to the air temperature. SMFMX and SM←
    FMN allow the rate of snow melt to vary through the year. These parameters are accounting for the impact of soil
    temperature on snow melt. (mm/deg C/day)
- real ∗8 [parm::smtmp](#)

    Snow melt base temperature. Mean air temperature at which snow melt will occur. (deg C)
- real ∗8 [parm::wgpq](#)

    growth factor for persistent bacteria in soil solution (1/day)
- real ∗8 **parm::basminpf**
- real ∗8 **parm::basorgpf**
- real ∗8 [parm::wdlpq](#)

    die-off factor for less persistent bacteria in soil solution (1/day)
- real ∗8 **parm::wshd_resv**
- real ∗8 **parm::wshd_ressed**
- real ∗8 **parm::basno3i**
- real ∗8 **parm::basorgni**
- real ∗8 **parm::basminpi**

- real ∗8 parm::wdps

    die-off factor for persistent bacteria adsorbed to soil particles (1/day)

- real ∗8 parm::wglpq

    growth factor for less persistent bacteria in soil solution (1/day)

- real ∗8 **parm::basorgpi**
- real ∗8 **parm::peakr**
- real ∗8 **parm::pndsedin**
- real ∗8 **parm::sw_excess**
- real ∗8 **parm::albday**
- real ∗8 parm::timp

    Snow pack temperature lag factor (0-1)
    1 = no lag (snow pack temp=current day air temp) as the lag factor goes to zero, the snow pack's temperature will be less influenced by the current day's air temperature.

- real ∗8 **parm::wtabelo**
- real ∗8 **parm::tilep**
- real ∗8 **parm::wt_shall**
- real ∗8 **parm::sq_rto**
- real ∗8 **parm::tloss**
- real ∗8 **parm::inflpcp**
- real ∗8 **parm::snomlt**
- real ∗8 **parm::snofall**
- real ∗8 **parm::fixn**
- real ∗8 **parm::qtile**
- real ∗8 **parm::crk**
- real ∗8 **parm::latlyr**
- real ∗8 **parm::pndloss**
- real ∗8 **parm::wetloss**
- real ∗8 **parm::potloss**
- real ∗8 **parm::lpndloss**
- real ∗8 **parm::lwetloss**
- real ∗8 **parm::sedrch**
- real ∗8 **parm::fertn**
- real ∗8 **parm::sol_rd**
- real ∗8 **parm::cfertn**
- real ∗8 **parm::cfertp**
- real ∗8 **parm::sepday**
- real ∗8 **parm::bioday**
- real ∗8 **parm::sepcrk**
- real ∗8 **parm::sepcrktot**
- real ∗8 **parm::fertno3**
- real ∗8 **parm::fertnh3**
- real ∗8 **parm::fertorgn**
- real ∗8 **parm::fertsolp**
- real ∗8 **parm::fertorgp**
- real ∗8 parm::wgps

    growth factor for persistent bacteria adsorbed to soil particles (1/day)

- real ∗8 **parm::fertp**
- real ∗8 **parm::grazn**
- real ∗8 **parm::grazp**
- real ∗8 **parm::soxy**
- real ∗8 **parm::qdfr**
- real ∗8 **parm::sdti**
- real ∗8 **parm::rtwtr**
- real ∗8 **parm::ressa**

- real ∗8 parm::wdlps

  die-off factor for less persistent bacteria absorbed to soil particles (1/day)
- real ∗8 parm::wglps

  growth factor for less persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 parm::da_km

  area of the watershed in square kilometers (km^2)
- real ∗8 **parm::rttime**
- real ∗8 **parm::rchdep**
- real ∗8 **parm::rtevp**
- real ∗8 **parm::rttlc**
- real ∗8 **parm::resflwi**
- real ∗8 parm::wdprch

  die-off factor for persistent bacteria in streams (1/day)
- real ∗8 **parm::resflwo**
- real ∗8 **parm::respcp**
- real ∗8 **parm::resev**
- real ∗8 **parm::ressep**
- real ∗8 **parm::ressedi**
- real ∗8 **parm::ressedo**
- real ∗8 **parm::dtot**
- real ∗8 parm::pperco_bsn

  phosphorus percolation coefficient. Ratio of soluble phosphorus in surface to soluble phosphorus in percolate
- real ∗8 parm::nperco_bsn

  basin nitrate percolation coefficient (0-1)
  0:concentration of nitrate in surface runoff is zero
  1:percolate has same concentration of nitrate as surface runoff
- real ∗8 parm::rsdco

  residue decomposition coefficient. The fraction of residue which will decompose in a day assuming optimal moisture, temperature, C:N ratio, and C:P ratio
- real ∗8 **parm::phoskd_bsn**
- real ∗8 **parm::voltot**
- real ∗8 parm::msk_x

  weighting factor controling relative importance of inflow rate and outflow rate in determining storage on reach
- real ∗8 **parm::volcrmin**
- real ∗8 parm::bactkdq

  bacteria soil partitioning coefficient. Ratio of solution bacteria in surface layer to solution bacteria in runoff soluble and sorbed phase in surface runoff.
- real ∗8 parm::wdpf

  die-off factor for persistent bacteria on foliage (1/day)
- real ∗8 **parm::uno3d**
- real ∗8 **parm::canev**
- real ∗8 **parm::usle**
- real ∗8 **parm::rcn**
- real ∗8 **parm::surlag_bsn**
- real ∗8 **parm::precipday**
- real ∗8 parm::thbact

  temperature adjustment factor for bacteria die-off/growth
- real ∗8 parm::wlpq20

  overall rate change for less persistent bacteria in soil solution (1/day)
- real ∗8 parm::wlps20

  overall rate change for less persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 parm::wpq20

  overall rate change for persistent bacteria in soil solution (1/day)

- real ∗8 parm::wps20

  overall rate change for persistent bacteria adsorbed to soil particles (1/day)
- real ∗8 **parm::bactrop**
- real ∗8 **parm::bactsedp**
- real ∗8 parm::wgpf

  growth factor for persistent bacteria on foliage (1/day)
- real ∗8 **parm::bactlchp**
- real ∗8 **parm::bactlchlp**
- real ∗8 **parm::enratio**
- real ∗8 **parm::wetpcp**
- real ∗8 **parm::pndpcp**
- real ∗8 **parm::wetsep**
- real ∗8 **parm::pndsep**
- real ∗8 **parm::wetev**
- real ∗8 **parm::pndev**
- real ∗8 **parm::pndsedo**
- real ∗8 **parm::wetsedo**
- real ∗8 **parm::pndflwi**
- real ∗8 **parm::wetflwi**
- real ∗8 **parm::pndflwo**
- real ∗8 **parm::wetflwo**
- real ∗8 **parm::wetsedi**
- real ∗8 **parm::da_ha**
- real ∗8 **parm::vpd**
- real ∗8 parm::evlai

  leaf area index at which no evaporation occurs. This variable is used in ponded HRUs where evaporation from the water surface is restricted by the plant canopy cover. Evaporation from the water surface equals potential ET when LAI = 0 and decreased linearly to O when LAI = EVLAI
- real ∗8 parm::evrch

  Reach evaporation adjustment factor. Evaporation from the reach is multiplied by EVRCH. This variable was created to limit the evaporation predicted in arid regions.
- real ∗8 parm::wdlpf

  die-off factor for less persistent bacteria on foliage (1/day)
- real ∗8 **parm::bactrolp**
- real ∗8 **parm::bactsedlp**
- real ∗8 **parm::pet_day**
- real ∗8 **parm::ep_day**
- real ∗8 parm::adj_pkr

  peak rate adjustment factor in the subbasin. Used in the MUSLE equation to account for impact of peak flow on erosion.
- real ∗8 parm::n_updis

  nitrogen uptake distribution parameter. This parameter controls the amount of nitrogen removed from the different soil layer layers by the plant. In particular, this parameter allows the amount of nitrogen removed from the surface layer via plant uptake to be controlled. While the relationship between UBN and N removed from the surface layer is affected by the depth of the soil profile, in general, as UBN increases the amount of N removed from the surface layer relative to the amount removed from the entire profile increases
- real ∗8 parm::nactfr

  nitrogen active pool fraction. The fraction of organic nitrogen in the active pool.
- real ∗8 parm::p_updis

  phosphorus uptake distribution parameter This parameter controls the amount of phosphorus removed from the different soil layers by the plant. In particular, this parameter allows the amount of phosphorus removed from the surface layer via plant uptake to be controlled. While the relationship between UBP and P uptake from the surface layer is affected by the depth of the soil profile, in general, as UBP increases the amount of P removed from the surface layer relative to the amount removed from the entire profile increases
- real ∗8 **parm::snoev**

- real ∗8 **parm::sno3up**
- real ∗8 **parm::reactw**
- real ∗8 **parm::sdiegropq**
- real ∗8 **parm::sdiegrolpq**
- real ∗8 **parm::sdiegrops**
- real ∗8 **parm::sdiegrolps**
- real ∗8 **parm::es_day**
- real ∗8 parm::wof_lp

  wash off fraction for less persistent bacteria on foliage during a rainfall event
- real ∗8 **parm::sbactrop**
- real ∗8 **parm::sbactrolp**
- real ∗8 **parm::sbactsedp**
- real ∗8 **parm::sbactsedlp**
- real ∗8 **parm::ep_max**
- real ∗8 **parm::sbactlchp**
- real ∗8 **parm::sbactlchlp**
- real ∗8 **parm::psp_bsn**
- real ∗8 **parm::rchwtr**
- real ∗8 **parm::resuspst**
- real ∗8 **parm::setlpst**
- real ∗8 **parm::bsprev**
- real ∗8 **parm::bssprev**
- real ∗8 **parm::spadyo**
- real ∗8 **parm::spadyev**
- real ∗8 **parm::spadysp**
- real ∗8 **parm::spadyrfv**
- real ∗8 **parm::spadyosp**
- real ∗8 **parm::qday**
- real ∗8 **parm::usle_ei**
- real ∗8 **parm::al5**
- real ∗8 **parm::pndsedc**
- real ∗8 **parm::no3pcp**
- real ∗8 **parm::rcharea**
- real ∗8 **parm::volatpst**
- real ∗8 parm::ubw

  water uptake distribution parameter. This parameter controls the amount of water removed from the different soil layers by the plant. In particular, this parameter allows the amount of water removed from the surface layer via plant uptake to be controlled. While the relationship between UBW and H2O removed from the surface layer is affected by the depth of the soil profile, in general, as UBW increases the amount of water removed from the surface layer relative to the amount removed from the entire profile increases
- real ∗8 parm::uobn

  nitrogen uptake normalization parameter. This variable normalizes the nitrogen uptake so that the model can easily verify that upake from the different soil layers sums to 1.0
- real ∗8 parm::uobp

  phosphorus uptake normalization parameter. This variable normalizes the phosphorus uptake so that the model can easily verify that uptake from the different soil layers sums to 1.0
- real ∗8 parm::uobw

  water uptake normalization parameter. This variable normalizes the water uptake so that the model can easily verify that uptake from the different soil layers sums to 1.0
- real ∗8 parm::wglpf

  growth factor for less persistent bacteria on foliage (1/day)
- real ∗8 **parm::wetsedc**
- real ∗8 **parm::respesti**
- real ∗8 parm::rcor

correction coefficient for generated rainfall to ensure that the annual means for generated and observed values are comparable (needed only if IDIST=1)

- real *8 parm::rexp

value of exponent for mixed exponential rainfall distribution (needed only if IDIST=1)

- real *8 parm::snocov1

1st shape parameter for snow cover equation. This parameter is determined by solving the equation for 50% snow cover

- real *8 parm::snocov2

2nd shape parameter for snow cover equation. This parameter is determined by solving the equation for 95% snow cover

- real *8 parm::snocovmx

Minimum snow water content that corresponds to 100% snow cover. If the snow water content is less than SNOC↩ OVMX, then a certain percentage of the ground will be bare (mm H2O)

- real *8 **parm::lyrtile**
- real *8 **parm::lyrtilex**
- real *8 parm::sno50cov

Fraction of SNOCOVMX that corresponds to 50% snow cover. SWAT assumes a nonlinear relationship between snow water and snow cover.

- real *8 parm::ai0

ratio of chlorophyll-a to algal biomass (ug chla/mg alg)

- real *8 parm::ai1

fraction of algal biomass that is nitrogen (mg N/mg alg)

- real *8 parm::ai2

fraction of algal biomass that is phosphorus (mg P/mg alg)

- real *8 parm::ai3

the rate of oxygen production per unit of algal photosynthesis (mg O2/mg alg)

- real *8 parm::ai4

the rate of oxygen uptake per unit of algae respiration (mg O2/mg alg)

- real *8 parm::ai5

the rate of oxygen uptake per unit of NH3 nitrogen oxidation (mg O2/mg N)

- real *8 parm::ai6

the rate of oxygen uptake per unit of NO2 nitrogen oxidation (mg O2/mg N)

- real *8 parm::rhoq

algal respiration rate (1/day or 1/hr)

- real *8 parm::tfact

fraction of solar radiation computed in the temperature heat balance that is photosynthetically active

- real *8 parm::k_l

half-saturation coefficient for light (MJ/(m2∗hr))

- real *8 parm::k_n

michaelis-menton half-saturation constant for nitrogen (mg N/L)

- real *8 parm::k_p

michaelis-menton half saturation constant for phosphorus (mg P/L)

- real *8 parm::lambda0

non-algal portion of the light extinction coefficient (1/m)

- real *8 parm::lambda1

linear algal self-shading coefficient (1/(m∗ug chla/L))

- real *8 parm::lambda2

nonlinear algal self-shading coefficient ((1/m)(ug chla/L)∗∗(-2/3))

- real *8 parm::mumax

maximum specific algal growth rate (1/day or 1/hr)

- real *8 parm::p_n

algal preference factor for ammonia

- real ∗8 **parm::rnum1**
- real ∗8 **parm::autop**
- real ∗8 **parm::auton**
- real ∗8 **parm::etday**
- real ∗8 **parm::hmntl**
- real ∗8 **parm::rwntl**
- real ∗8 **parm::hmptl**
- real ∗8 **parm::rmn2tl**
- real ∗8 **parm::rmptl**
- real ∗8 **parm::wdntl**
- real ∗8 **parm::cmn_bsn**
- real ∗8 **parm::rmp1tl**
- real ∗8 **parm::roctl**
- real ∗8 **parm::gwseep**
- real ∗8 **parm::revapday**
- real ∗8 **parm::reswtr**
- real ∗8 [parm::wdlprch](#)

  die-off factor for less persistent bacteria in streams (1/day)
- real ∗8 [parm::wdpres](#)

  die-off factor for persistent bacteria in reservoirs (1/day)
- real ∗8 **parm::bury**
- real ∗8 **parm::difus**
- real ∗8 **parm::reactb**
- real ∗8 **parm::solpesto**
- real ∗8 **parm::petmeas**
- real ∗8 [parm::wdlpres](#)

  die-off factor for less persistent bacteria in reservoirs (1/day)
- real ∗8 **parm::sorpesto**
- real ∗8 **parm::spcon_bsn**
- real ∗8 **parm::spexp_bsn**
- real ∗8 **parm::solpesti**
- real ∗8 **parm::sorpesti**
- real ∗8 [parm::msk_co1](#)

  calibration coefficient to control impact of the storage time constant for the reach at bankfull depth (phi(10,:) upon the storage time constant for the reach used in the Muskingum flow method
- real ∗8 [parm::msk_co2](#)

  calibration coefficient to control impact of the storage time constant for the reach at 0.1 bankfull depth (phi(13,:) upon the storage time constant for the reach used in the Muskingum flow method
- real ∗8 **parm::snoprev**
- real ∗8 **parm::swprev**
- real ∗8 **parm::shallstp**
- real ∗8 **parm::deepstp**
- real ∗8 **parm::ressolpo**
- real ∗8 **parm::resorgno**
- real ∗8 **parm::resorgpo**
- real ∗8 **parm::resno3o**
- real ∗8 **parm::reschlao**
- real ∗8 **parm::resno2o**
- real ∗8 **parm::resnh3o**
- real ∗8 **parm::qdbank**
- real ∗8 **parm::potpcpmm**
- real ∗8 **parm::potevmm**
- real ∗8 **parm::potsepmm**
- real ∗8 **parm::potflwo**

- real ∗8 parm::bactminlp

  Threshold detection level for less persistent bacteria. When bacteria levels drop to this amount the model considers bacteria in the soil to be insignificant and sets the levels to zero (cfu/m^2)

- real ∗8 parm::bactminp

  Threshold detection level for persistent bacteria. When bacteria levels drop to this amount the model considers bacteria in the soil to be insignificant and sets the levels to zero (cfu/m^2)

- real ∗8 parm::trnsrch

  fraction of transmission losses from main channel that enter deep aquifer

- real ∗8 parm::wp20p_plt

  overall rate change for persistent bacteria on foliage (1/day)

- real ∗8 **parm::potsedo**
- real ∗8 **parm::pest_sol**
- real ∗8 parm::bact_swf

  fraction of manure containing active colony forming units (cfu)

- real ∗8 parm::bactmx

  bacteria percolation coefficient. Ratio of solution bacteria in surface layer to solution bacteria in percolate

- real ∗8 parm::cncoef

  plant ET curve number coefficient

- real ∗8 parm::wp20lp_plt

  overall rate change for less persistent bacteria on foliage (1/day)

- real ∗8 **parm::cdn_bsn**
- real ∗8 **parm::sdnco_bsn**
- real ∗8 **parm::bactmin**
- real ∗8 parm::cn_froz

  drainge coefficient (mm day -1)

- real ∗8 parm::dorm_hr

  time threshold used to define dormant (hours)

- real ∗8 parm::smxco

  adjustment factor for max curve number s factor (0-1)

- real ∗8 parm::tb_adj

  adjustment factor for subdaily unit hydrograph basetime

- real ∗8 parm::chla_subco

  regional adjustment on sub chla_a loading (fraction)

- real ∗8 parm::depimp_bsn

  depth to impervious layer. Used to model perched water tables in all HRUs in watershed (mm)

- real ∗8 parm::ddrain_bsn

  depth to the sub-surface drain (mm)

- real ∗8 parm::tdrain_bsn

  time to drain soil to field capacity (hours)

- real ∗8 **parm::gdrain_bsn**
- real ∗8 **parm::rch_san**
- real ∗8 **parm::rch_sil**
- real ∗8 **parm::rch_cla**
- real ∗8 **parm::rch_sag**
- real ∗8 **parm::rch_lag**
- real ∗8 **parm::rch_gra**
- real ∗8 parm::hlife_ngw_bsn

  Half-life of nitrogen in groundwater? (days)

- real ∗8 **parm::ch_opco_bsn**
- real ∗8 **parm::ch_onco_bsn**
- real ∗8 parm::decr_min

  Minimum daily residue decay.

- real ∗8 parm::rcn_sub_bsn

  Concentration of nitrogen in the rainfall (mg/kg)
- real ∗8 **parm::bc1_bsn**
- real ∗8 **parm::bc2_bsn**
- real ∗8 **parm::bc3_bsn**
- real ∗8 **parm::bc4_bsn**
- real ∗8 **parm::anion_excl_bsn**
- real ∗8, dimension(:), allocatable **parm::wat_tbl**
- real ∗8, dimension(:), allocatable **parm::sol_swpwt**
- real ∗8, dimension(:,:), allocatable **parm::vwt**
- real ∗8 parm::re_bsn

  Effective radius of drains (range 3.0 - 40.0) (mm)
- real ∗8 parm::sdrain_bsn

  Distance bewtween two drain or tile tubes (range 7600.0 - 30000.0) (mm)
- real ∗8 **parm::sstmaxd_bsn**
- real ∗8 parm::drain_co_bsn

  Drainage coeffcient (range 10.0 - 51.0) (mm-day-1)
- real ∗8 parm::latksatf_bsn

  Multiplication factor to determine lateral ksat from SWAT ksat input value for HRU (range 0.01 - 4.0)
- real ∗8 parm::pc_bsn

  Pump capacity (def val = 1.042 mm h-1 or 25 mm day-1) (mm h-1)
- integer **parm::i_subhw**
- integer **parm::imgt**
- integer **parm::idlast**
- integer **parm::iwtr**
- integer **parm::ifrttyp**
- integer **parm::mo_atmo**
- integer **parm::mo_atmo1**
- integer **parm::ifirstatmo**
- integer **parm::iyr_atmo**
- integer **parm::iyr_atmo1**
- integer **parm::matmo**
- integer parm::mch

  maximum number of channels
- integer parm::mcr

  maximum number of crops grown per year
- integer parm::mcrdb

  maximum number of crops/landcover in database file (crop.dat)
- integer parm::mfcst

  maximum number of forecast stations
- integer parm::mfdb

  max number of fertilizers in fert.dat
- integer parm::mhru

  maximum number of HRUs in watershed
- integer parm::mhyd

  maximum number of hydrograph nodes
- integer parm::mpdb

  max number of pesticides in pest.dat
- integer parm::mrg

  max number of rainfall/temp gages
- integer parm::mcut

  maximum number of cuttings per year

- integer [parm::mgr](#)

  maximum number of grazings per year
- integer [parm::mnr](#)

  max number of years of rotation
- integer [parm::myr](#)

  max number of years of simulation
- integer [parm::isubwq](#)

  subbasin water quality code
  0 do not calculate algae/CBOD 1 calculate algae/CBOD drainmod tile equations
- integer **parm::ffcst**
- integer [parm::isproj](#)

  special project code: 1 test rewind (run simulation twice)
- integer [parm::nbyr](#)

  number of calendar years simulated
- integer [parm::irte](#)

  water routing method:
  0 variable storage method
  1 Muskingum method

- integer [parm::nrch](#)

  number of reaches in watershed (none)
- integer [parm::nres](#)

  number of reservoirs in watershed (none)
- integer **parm::nhru**
- integer **parm::mo**
- integer **parm::immo**
- integer **parm::i_mo**
- integer [parm::wndsim](#)

  wind speed input code
  1 measured data read for each subbasin
  2 data simulated for each subbasin
- integer [parm::ihru](#)

  HRU number (none)
- integer **parm::icode**
- integer **parm::ihout**
- integer **parm::inum1**
- integer **parm::inum2**
- integer **parm::inum3**
- integer **parm::inum4**
- integer [parm::icfac](#)

  icfac = 0 for C-factor calculation using Cmin (as described in manual)
  = 1 for new C-factor calculation from RUSLE (no minimum needed)
- integer **parm::inum5**
- integer **parm::inum6**
- integer **parm::inum7**
- integer **parm::inum8**
- integer [parm::mrech](#)

  maximum number of rechour files
- integer [parm::nrgage](#)

  number of raingage files
- integer [parm::nrgfil](#)

  number of rain gages per file
- integer [parm::nrtot](#)

total number of rain gages

- integer parm::ntgage

  number of temperature gage files

- integer parm::ntgfil

  number of temperature gages per file

- integer parm::nttot

  total number of temperature gages

- integer parm::tmpsim

  temperature input code
  1 measured data read for each subbasin
  2 data simulated for each subbasin

- integer parm::icrk

  crack flow code
  1: compute flow in cracks

- integer parm::irtpest

  number of pesticide to be routed through the watershed

- integer parm::igropt

  Qual2E option for calculating the local specific growth rate of algae
  1: multiplicative.

- integer parm::lao

  Qual2E light averaging option. Qual2E defines four light averaging options. The only option currently available in SWAT is #2.

- integer parm::npmx

  number of different pesticides used in the simulation (none)

- integer **parm::curyr**
- integer **parm::iihru**
- integer parm::itdrn

  tile drainage equations flag/code
  1 simulate tile flow using subroutine drains(wt_shall)
  0 simulate tile flow using subroutine origtile(wt_shall,d)

- integer parm::iwtdn

  water table depth algorithms flag/code
  1 simulate wt_shall using subroutine new water table depth routine
  0 simulate wt_shall using subroutine original water table depth routine

- integer parm::ismax

  maximum depressional storage selection flag/code
  0 = static depressional storage
  1 = dynamic storage based on tillage and cumulative rainfall

- integer parm::iroutunit

  not being implemented in this version drainmod tile equations

- integer **parm::ires_nut**
- integer parm::iclb

  auto-calibration flag

- integer parm::mrecc

  maximum number of reccnst files

- integer parm::mrecd

  maximum number of recday files

- integer parm::mrecm

  maximum number of recmon files

- integer parm::mtil

  max number of tillage types in till.dat

- integer parm::mudb

  maximum number of urban land types in urban.dat

- integer parm::idist

    rainfall distribution code
    0 for skewed normal dist
    1 for mixed exponential distribution

- integer parm::mrecy

    maximum number of recyear files

- integer parm::nyskip

    number of years to not print output

- integer parm::slrsim

    solar radiation input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin

- integer parm::ideg

    channel degredation code
    1: compute channel degredation (downcutting and widening)

- integer parm::ievent

    rainfall/runoff code
    0 daily rainfall/curve number technique 1 sub-daily rainfall/Green&Ampt/hourly routing 3 sub-daily rainfall/↩
    Green&Ampt/hourly routing

- integer parm::ipet

    code for potential ET method
    0 Priestley-Taylor method
    1 Penman/Monteith method
    2 Hargreaves method
    3 read in daily potential ET data

- integer **parm::iopera**
- integer parm::idaf

    beginning day of simulation (julian date)

- integer parm::idal

    ending day of simulation (julian date)

- integer parm::rhsim

    relative humidity input code
    1 measured data read for each subbasin
    2 data simulated for each subbasin

- integer **parm::id1**
- integer **parm::leapyr**
- integer **parm::mo_chk**
- integer parm::nhtot

    number of relative humidity records in file

- integer parm::nstot

    number of solar radiation records in file

- integer parm::nwtot

    number of wind speed records in file

- integer **parm::ifirsts**
- integer **parm::ifirsth**
- integer **parm::ifirstw**
- integer **parm::icst**
- integer parm::ilog

    streamflow print code

- integer parm::itotr

    number of output variables printed (output.rch)

- integer parm::iyr

    beginning year of simulation (year)

- integer parm::iwq

stream water quality code
0 do not model stream water quality
1 model stream water quality (QUAL2E & pesticide transformations)

- integer parm::i

  forecast region number or subbasin number (none)

- integer **parm::iskip**
- integer **parm::ifirstpet**
- integer parm::iprp

  print code for output.pst file
  0 do not print pesticide output
  1 print pesticide output

- integer parm::itotb

  number of output variables printed (output.sub)

- integer parm::itots

  number of output variables printed (output.hru)

- integer parm::itoth

  number of HRUs printed (output.hru/output.wtr)

- integer parm::pcpsim

  rainfall input code
  1 measured data read for each subbasin
  2 data simulated for each subbasin

- integer **parm::nd_30**
- integer **parm::iops**
- integer **parm::iphr**
- integer **parm::isto**
- integer **parm::isol**
- integer parm::fcstcycles

  number of times forecast period is simulated (using different weather generator seeds each time)

- integer parm::fcstday

  beginning date of forecast period (julian date)

- integer parm::fcstyr

  beginning year of forecast period

- integer parm::iscen

  scenarios counter

- integer parm::subtot

  number of subbasins in watershed (none)

- integer **parm::ogen**
- integer parm::mapp

  maximum number of applications

- integer parm::mlyr

  maximum number of soil layers

- integer parm::mpst

  max number of pesticides used in wshed

- integer parm::mres

  maximum number of reservoirs

- integer parm::msub

  maximum number of subbasins

- integer parm::igen

  random number generator code:
  0: use default numbers
  1: generate new numbers in every simulation

- integer parm::iprint

  print code: 0=monthly, 1=daily, 2=annual

- integer **parm::iida**
- integer parm::icn

    CN method flag (for testing alternative method):
    0 use traditional SWAT method which bases CN on soil moisture
    1 use alternative method which bases CN on plant ET.

- integer parm::ised_det

    max half-hour rainfall fraction calc option:
    0 generate max half-hour rainfall fraction from triangular distribution
    1 use monthly mean max half-hour rainfall fraction

- integer **parm::fcstcnt**
- integer **parm::mtran**
- integer **parm::idtill**
- integer, dimension(100) **parm::ida_lup**
- integer, dimension(100) **parm::iyr_lup**
- integer **parm::no_lup**
- integer **parm::no_up**
- integer **parm::nostep**
- character(len=8) parm::date

    date simulation is performed where leftmost eight characters are set to a value of yyyymmdd, where yyyy is the year,
    mm is the month and dd is the day

- character(len=10) parm::time

    time simulation is performed where leftmost ten characters are set to a value of hhmmss.sss, where hh is the hour,
    mm is the minutes and ss.sss is the seconds and milliseconds

- character(len=5) parm::zone

    time difference with respect to Coordinated Universal Time (ie Greenwich Mean Time)

- character(len=80) parm::prog

    SWAT program header string.

- character(len=13) parm::calfile

    name of file containing calibration parameters

- character(len=13) parm::rhfile

    relative humidity file name (.hmd)

- character(len=13) parm::slrfile

    solar radiation file name (.slr)

- character(len=13) parm::wndfile

    wind speed file name (.wnd)

- character(len=13) parm::petfile

    potential ET file name (.pet)

- character(len=13) **parm::atmofile**
- character(len=13) **parm::lucfile**
- character(len=13) parm::septdb

    name of septic tank database file (septwq1.dat)

- character(len=13) **parm::dpd_file**
- character(len=13) **parm::wpd_file**
- character(len=13) **parm::rib_file**
- character(len=13) **parm::sfb_file**
- character(len=13) **parm::lid_file**
- integer, dimension(9) parm::idg

    array location of random number seed used for a given process

- integer, dimension(:), allocatable **parm::ifirstr**
- integer, dimension(:), allocatable **parm::ifirsthr**
- integer, dimension(8) parm::values

> *values(1): year simulation is performed*
> *values(2): month simulation is performed*
> *values(3): day in month simulation is performed*
> *values(4): time difference with respect to Coordinated Universal Time (ie Greenwich Mean Time)*
> *values(5): hour simulation is performed*
> *values(6): minute simulation is performed*
> *values(7): second simulation is performed*
> *values(8): millisecond simulation is performed*

- integer, dimension(13) parm::ndays

  julian date for last day of preceding month (where the array location is the number of the month) The dates are for leap years (julian date)

- integer, dimension(13) **parm::ndays_noleap**
- integer, dimension(13) **parm::ndays_leap**
- integer **parm::mapex**
- real ∗8, dimension(:), allocatable **parm::flodaya**
- real ∗8, dimension(:), allocatable **parm::seddaya**
- real ∗8, dimension(:), allocatable **parm::orgndaya**
- real ∗8, dimension(:), allocatable **parm::orgpdaya**
- real ∗8, dimension(:), allocatable **parm::no3daya**
- real ∗8, dimension(:), allocatable **parm::minpdaya**
- real ∗8, dimension(:), allocatable parm::hi_targ

  index target of cover defined at planting

- real ∗8, dimension(:), allocatable **parm::bio_targ**
- real ∗8, dimension(:), allocatable **parm::tnyld**
- integer, dimension(:), allocatable **parm::idapa**
- integer, dimension(:), allocatable **parm::iypa**
- integer, dimension(:), allocatable **parm::ifirsta**
- integer, dimension(100) **parm::mo_transb**
- integer, dimension(100) **parm::mo_transe**
- integer, dimension(100) **parm::ih_tran**
- integer **parm::msdb**
- integer **parm::iseptic**
- real ∗8, dimension(:), allocatable **parm::sptqs**
- real ∗8, dimension(:), allocatable **parm::percp**
- real ∗8, dimension(:), allocatable **parm::sptbodconcs**
- real ∗8, dimension(:), allocatable **parm::spttssconcs**
- real ∗8, dimension(:), allocatable **parm::spttnconcs**
- real ∗8, dimension(:), allocatable **parm::sptnh4concs**
- real ∗8, dimension(:), allocatable **parm::sptno3concs**
- real ∗8, dimension(:), allocatable **parm::sptno2concs**
- real ∗8, dimension(:), allocatable **parm::sptorgnconcs**
- real ∗8, dimension(:), allocatable **parm::spttpconcs**
- real ∗8, dimension(:), allocatable **parm::sptminps**
- real ∗8, dimension(:), allocatable **parm::sptorgps**
- real ∗8, dimension(:), allocatable **parm::sptfcolis**
- real ∗8, dimension(:), allocatable **parm::failyr**
- real ∗8, dimension(:), allocatable **parm::qstemm**
- real ∗8, dimension(:), allocatable **parm::bio_amn**
- real ∗8, dimension(:), allocatable **parm::bio_bod**
- real ∗8, dimension(:), allocatable **parm::biom**
- real ∗8, dimension(:), allocatable **parm::rbiom**
- real ∗8, dimension(:), allocatable **parm::fcoli**
- real ∗8, dimension(:), allocatable **parm::bio_ntr**
- real ∗8, dimension(:), allocatable **parm::bz_perc**
- real ∗8, dimension(:), allocatable parm::sep_cap

number of permanent residents in the hourse (none)

- real ∗8, dimension(:), allocatable **parm::plqm**
- real ∗8, dimension(:), allocatable **parm::bz_area**
- real ∗8, dimension(:), allocatable parm::bz_z

    Depth of biozone layer(mm)
- real ∗8, dimension(:), allocatable parm::bz_thk

    thickness of biozone (mm)
- real ∗8, dimension(:), allocatable parm::bio_bd

    density of biomass (kg/m$^\wedge$3) carbon outputs for .hru file
- real ∗8, dimension(:), allocatable **parm::cmup_kgh**
- real ∗8, dimension(:), allocatable **parm::cmtot_kgh**
- real ∗8, dimension(:), allocatable parm::coeff_denitr

    denitrification rate coefficient (none)
- real ∗8, dimension(:), allocatable parm::coeff_bod_dc

    BOD decay rate coefficient (m$^\wedge$3/day)
- real ∗8, dimension(:), allocatable parm::coeff_bod_conv

    BOD to live bacteria biomass conversion factor (none)
- real ∗8, dimension(:), allocatable parm::coeff_fc1

    field capacity calibration parameter 1 (none)
- real ∗8, dimension(:), allocatable parm::coeff_fc2

    field capacity calibration parameter 2 (none)
- real ∗8, dimension(:), allocatable parm::coeff_fecal

    fecal coliform bacteria decay rate coefficient (m$^\wedge$3/day)
- real ∗8, dimension(:), allocatable parm::coeff_mrt

    mortality rate coefficient (none)
- real ∗8, dimension(:), allocatable parm::coeff_nitr

    nitrification rate coefficient (none)
- real ∗8, dimension(:), allocatable parm::coeff_plq

    conversion factor for plaque from TDS (none)
- real ∗8, dimension(:), allocatable parm::coeff_rsp

    respiration rate coefficient (none)
- real ∗8, dimension(:), allocatable parm::coeff_slg1

    slough-off calibration parameter (none)
- real ∗8, dimension(:), allocatable parm::coeff_slg2

    slough-off calibration parameter (none)
- real ∗8, dimension(:), allocatable **parm::coeff_pdistrb**
- real ∗8, dimension(:), allocatable **parm::coeff_solpslp**
- real ∗8, dimension(:), allocatable **parm::coeff_solpintc**
- real ∗8, dimension(:), allocatable **parm::coeff_psorpmax**
- integer, dimension(:), allocatable parm::isep_typ

    septic system type (none)
- integer, dimension(:), allocatable **parm::i_sep**
- integer, dimension(:), allocatable parm::isep_opt

    septic system operation flag (1=active, 2=failing, 3=not operated) (none)
- integer, dimension(:), allocatable **parm::sep_tsincefail**
- integer, dimension(:), allocatable **parm::isep_tfail**
- integer, dimension(:), allocatable **parm::isep_iyr**
- integer, dimension(:), allocatable **parm::sep_strm_dist**
- integer, dimension(:), allocatable **parm::sep_den**
- real ∗8, dimension(:), allocatable **parm::sol_sumno3**
- real ∗8, dimension(:), allocatable **parm::sol_sumsolp**
- real ∗8, dimension(:), allocatable **parm::strsw_sum**

- real ∗8, dimension(:), allocatable **parm::strstmp_sum**
- real ∗8, dimension(:), allocatable **parm::strsn_sum**
- real ∗8, dimension(:), allocatable **parm::strsp_sum**
- real ∗8, dimension(:), allocatable **parm::strsa_sum**
- real ∗8, dimension(:), allocatable **parm::spill_hru**
- real ∗8, dimension(:), allocatable **parm::tile_out**
- real ∗8, dimension(:), allocatable **parm::hru_in**
- real ∗8, dimension(:), allocatable **parm::spill_precip**
- real ∗8, dimension(:), allocatable **parm::pot_seep**
- real ∗8, dimension(:), allocatable **parm::pot_evap**
- real ∗8, dimension(:), allocatable **parm::pot_sedin**
- real ∗8, dimension(:), allocatable **parm::pot_solp**
- real ∗8, dimension(:), allocatable **parm::pot_solpi**
- real ∗8, dimension(:), allocatable **parm::pot_orgp**
- real ∗8, dimension(:), allocatable **parm::pot_orgpi**
- real ∗8, dimension(:), allocatable **parm::pot_orgn**
- real ∗8, dimension(:), allocatable **parm::pot_orgni**
- real ∗8, dimension(:), allocatable **parm::pot_mps**
- real ∗8, dimension(:), allocatable **parm::pot_mpsi**
- real ∗8, dimension(:), allocatable **parm::pot_mpa**
- real ∗8, dimension(:), allocatable **parm::pot_mpai**
- real ∗8, dimension(:), allocatable **parm::pot_no3i**
- real ∗8, dimension(:), allocatable **parm::precip_in**
- real ∗8, dimension(:), allocatable **parm::tile_sedo**
- real ∗8, dimension(:), allocatable **parm::tile_no3o**
- real ∗8, dimension(:), allocatable **parm::tile_solpo**
- real ∗8, dimension(:), allocatable **parm::tile_orgno**
- real ∗8, dimension(:), allocatable **parm::tile_orgpo**
- real ∗8, dimension(:), allocatable **parm::tile_minpso**
- real ∗8, dimension(:), allocatable **parm::tile_minpao**
- integer **parm::ia_b**
- integer **parm::ihumus**
- integer **parm::itemp**
- integer **parm::isnow**
- integer, dimension(41) **parm::icolrsv**
- integer, dimension(mhruo) **parm::icols**
- integer, dimension(mrcho) **parm::icolr**
- integer, dimension(msubo) **parm::icolb**
- integer, dimension(46) parm::ipdvar

    output variable codes for output.rch file
- integer, dimension(mhruo) parm::ipdvas

    output varaible codes for output.hru file
- integer, dimension(msubo) parm::ipdvab

    output variable codes for output.sub file
- integer, dimension(:), allocatable parm::ipdhru

    HRUs whose output information will be printed to the output.hru and output.wtr files.
- real ∗8, dimension(mstdo) **parm::wshddayo**
- real ∗8, dimension(mstdo) **parm::wshdmono**
- real ∗8, dimension(mstdo) **parm::wshdyro**
- real ∗8, dimension(16) **parm::fcstaao**
- real ∗8, dimension(mstdo) **parm::wshdaao**
- real ∗8, dimension(:,:), allocatable **parm::wpstdayo**
- real ∗8, dimension(:,:), allocatable **parm::wpstmono**
- real ∗8, dimension(:,:), allocatable **parm::wpstyro**

- real ∗8, dimension(:,:), allocatable **parm::yldkg**
- real ∗8, dimension(:,:), allocatable **parm::bio_hv**
- real ∗8, dimension(:,:), allocatable **parm::wpstaao**
- real ∗8, dimension(:,:), allocatable **parm::rchmono**
- real ∗8, dimension(:,:), allocatable **parm::rchyro**
- real ∗8, dimension(:,:), allocatable **parm::rchaao**
- real ∗8, dimension(:,:), allocatable **parm::rchdy**
- real ∗8, dimension(:,:), allocatable **parm::hrumono**
- real ∗8, dimension(:,:), allocatable **parm::hruyro**
- real ∗8, dimension(:,:), allocatable **parm::hruaao**
- real ∗8, dimension(:,:), allocatable **parm::submono**
- real ∗8, dimension(:,:), allocatable **parm::subyro**
- real ∗8, dimension(:,:), allocatable **parm::subaao**
- real ∗8, dimension(:,:), allocatable **parm::resoutm**
- real ∗8, dimension(:,:), allocatable **parm::resouty**
- real ∗8, dimension(:,:), allocatable **parm::resouta**
- real ∗8, dimension(12, 8) **parm::wshd_aamon**
- real ∗8, dimension(:,:), allocatable **parm::wtrmon**
- real ∗8, dimension(:,:), allocatable **parm::wtryr**
- real ∗8, dimension(:,:), allocatable **parm::wtraa**
- real ∗8, dimension(:,:), allocatable parm::sub_smfmx

    max melt rate for snow during year (June 21) for subbasin(:) where deg C refers to the air temperature. SUB_SMFMX and SMFMN allow the rate of snow melt to vary through the year. These parameters are accounting for the impact of soil temperature on snow melt (range: -5.0/5.0) (mm/deg C/day)
- real ∗8, dimension(:,:), allocatable parm::sub_smfmn

    min melt rate for snow during year (Dec 21) for subbasin(:) (range: -5.0/5.0) where deg C refers to the air temperature (mm/deg C/day)
- real ∗8, dimension(:,:,:), allocatable **parm::hrupstd**
- real ∗8, dimension(:,:,:), allocatable **parm::hrupsta**
- real ∗8, dimension(:,:,:), allocatable **parm::hrupstm**
- real ∗8, dimension(:,:,:), allocatable **parm::hrupsty**
- integer, dimension(:), allocatable **parm::ifirstt**
- integer, dimension(:), allocatable **parm::ifirstpcp**
- integer, dimension(:), allocatable **parm::elevp**
- integer, dimension(:), allocatable **parm::elevt**
- real ∗8, dimension(:,:), allocatable parm::ftmpmn

    avg monthly minimum air temperature (deg C)
- real ∗8, dimension(:,:), allocatable parm::ftmpmx

    avg monthly maximum air temperature (deg C)
- real ∗8, dimension(:,:), allocatable parm::ftmpstdmn

    standard deviation for avg monthly minimum air temperature (deg C)
- real ∗8, dimension(:,:), allocatable parm::ftmpstdmx

    standard deviation for avg monthly maximum air temperature (deg C)
- real ∗8, dimension(:,:,:), allocatable parm::fpcp_stat

    fpcp_stat(:,1,:): average amount of precipitation falling in one day for the month (mm/day)
    fpcp_stat(:,2,:): standard deviation for the average daily precipitation (mm/day)
    fpcp_stat(:,3,:): skew coefficient for the average daily precipitationa (none)
- real ∗8, dimension(:,:), allocatable parm::fpr_w1

    probability of wet day after dry day in month (none)
- real ∗8, dimension(:,:), allocatable parm::fpr_w2

    probability of wet day after wet day in month (none)
- real ∗8, dimension(:,:), allocatable parm::fpr_w3

    proportion of wet days in the month (none)
- real ∗8, dimension(:), allocatable **parm::flwin**

- real *8, dimension(:), allocatable **parm::flwout**
- real *8, dimension(:), allocatable **parm::bankst**
- real *8, dimension(:), allocatable **parm::ch_wi**
- real *8, dimension(:), allocatable **parm::ch_d**
- real *8, dimension(:), allocatable parm::ch_onco

    channel organic n concentration (ppm)
- real *8, dimension(:), allocatable parm::ch_opco

    channel organic p concentration (ppm)
- real *8, dimension(:), allocatable **parm::ch_orgn**
- real *8, dimension(:), allocatable **parm::ch_orgp**
- real *8, dimension(:), allocatable **parm::drift**
- real *8, dimension(:), allocatable **parm::rch_dox**
- real *8, dimension(:), allocatable **parm::rch_bactp**
- real *8, dimension(:), allocatable **parm::alpha_bnk**
- real *8, dimension(:), allocatable **parm::alpha_bnke**
- real *8, dimension(:), allocatable **parm::disolvp**
- real *8, dimension(:), allocatable **parm::algae**
- real *8, dimension(:), allocatable **parm::sedst**
- real *8, dimension(:), allocatable **parm::rchstor**
- real *8, dimension(:), allocatable **parm::organicn**
- real *8, dimension(:), allocatable **parm::organicp**
- real *8, dimension(:), allocatable **parm::chlora**
- real *8, dimension(:), allocatable **parm::nitraten**
- real *8, dimension(:), allocatable **parm::nitriten**
- real *8, dimension(:), allocatable **parm::ch_li**
- real *8, dimension(:), allocatable **parm::ch_si**
- real *8, dimension(:), allocatable **parm::ch_bnk_san**
- real *8, dimension(:), allocatable **parm::ch_bnk_sil**
- real *8, dimension(:), allocatable **parm::ch_bnk_cla**
- real *8, dimension(:), allocatable **parm::ch_bnk_gra**
- real *8, dimension(:), allocatable **parm::ch_bed_san**
- real *8, dimension(:), allocatable **parm::ch_bed_sil**
- real *8, dimension(:), allocatable **parm::ch_bed_cla**
- real *8, dimension(:), allocatable **parm::ch_bed_gra**
- real *8, dimension(:), allocatable **parm::depfp**
- real *8, dimension(:), allocatable **parm::depsanfp**
- real *8, dimension(:), allocatable **parm::depsilfp**
- real *8, dimension(:), allocatable **parm::depclafp**
- real *8, dimension(:), allocatable **parm::depsagfp**
- real *8, dimension(:), allocatable **parm::deplagfp**
- real *8, dimension(:), allocatable **parm::depch**
- real *8, dimension(:), allocatable **parm::depsanch**
- real *8, dimension(:), allocatable **parm::depsilch**
- real *8, dimension(:), allocatable **parm::depclach**
- real *8, dimension(:), allocatable **parm::depsagch**
- real *8, dimension(:), allocatable **parm::deplagch**
- real *8, dimension(:), allocatable **parm::depgrach**
- real *8, dimension(:), allocatable **parm::depgrafp**
- real *8, dimension(:), allocatable **parm::grast**
- real *8, dimension(:), allocatable **parm::depprch**
- real *8, dimension(:), allocatable **parm::depprfp**
- real *8, dimension(:), allocatable **parm::prf**
- real *8, dimension(:), allocatable **parm::r2adj**
- real *8, dimension(:), allocatable parm::spcon

  linear parameter for calculating sediment reentrained in channel sediment routing

- real ∗8, dimension(:), allocatable parm::spexp

  exponent parameter for calculating sediment reentrained in channel sediment routing

- real ∗8, dimension(:), allocatable **parm::sanst**
- real ∗8, dimension(:), allocatable **parm::silst**
- real ∗8, dimension(:), allocatable **parm::clast**
- real ∗8, dimension(:), allocatable **parm::sagst**
- real ∗8, dimension(:), allocatable **parm::lagst**
- real ∗8, dimension(:), allocatable **parm::pot_san**
- real ∗8, dimension(:), allocatable **parm::pot_sil**
- real ∗8, dimension(:), allocatable **parm::pot_cla**
- real ∗8, dimension(:), allocatable **parm::pot_sag**
- real ∗8, dimension(:), allocatable **parm::pot_lag**
- real ∗8, dimension(:), allocatable **parm::potsani**
- real ∗8, dimension(:), allocatable **parm::potsili**
- real ∗8, dimension(:), allocatable **parm::potclai**
- real ∗8, dimension(:), allocatable **parm::potsagi**
- real ∗8, dimension(:), allocatable **parm::potlagi**
- real ∗8, dimension(:), allocatable **parm::sanyld**
- real ∗8, dimension(:), allocatable **parm::silyld**
- real ∗8, dimension(:), allocatable **parm::clayld**
- real ∗8, dimension(:), allocatable **parm::sagyld**
- real ∗8, dimension(:), allocatable **parm::lagyld**
- real ∗8, dimension(:), allocatable **parm::grayld**
- real ∗8, dimension(:), allocatable **parm::res_san**
- real ∗8, dimension(:), allocatable **parm::res_sil**
- real ∗8, dimension(:), allocatable **parm::res_cla**
- real ∗8, dimension(:), allocatable **parm::res_sag**
- real ∗8, dimension(:), allocatable **parm::res_lag**
- real ∗8, dimension(:), allocatable **parm::res_gra**
- real ∗8, dimension(:), allocatable **parm::pnd_san**
- real ∗8, dimension(:), allocatable **parm::pnd_sil**
- real ∗8, dimension(:), allocatable **parm::pnd_cla**
- real ∗8, dimension(:), allocatable **parm::pnd_sag**
- real ∗8, dimension(:), allocatable **parm::pnd_lag**
- real ∗8, dimension(:), allocatable **parm::wet_san**
- real ∗8, dimension(:), allocatable **parm::wet_sil**
- real ∗8, dimension(:), allocatable **parm::wet_cla**
- real ∗8, dimension(:), allocatable **parm::wet_lag**
- real ∗8, dimension(:), allocatable **parm::wet_sag**
- real ∗8 **parm::ressano**
- real ∗8 **parm::ressilo**
- real ∗8 **parm::resclao**
- real ∗8 **parm::ressago**
- real ∗8 **parm::reslago**
- real ∗8 **parm::resgrao**
- real ∗8 **parm::ressani**
- real ∗8 **parm::ressili**
- real ∗8 **parm::resclai**
- real ∗8 **parm::ressagi**
- real ∗8 **parm::reslagi**
- real ∗8 **parm::resgrai**
- real ∗8 **parm::potsano**
- real ∗8 **parm::potsilo**

- real ∗8 **parm::potclao**
- real ∗8 **parm::potsago**
- real ∗8 **parm::potlago**
- real ∗8 **parm::pndsanin**
- real ∗8 **parm::pndsilin**
- real ∗8 **parm::pndclain**
- real ∗8 **parm::pndsagin**
- real ∗8 **parm::pndlagin**
- real ∗8 **parm::pndsano**
- real ∗8 **parm::pndsilo**
- real ∗8 **parm::pndclao**
- real ∗8 **parm::pndsago**
- real ∗8 **parm::pndlago**
- real ∗8, dimension(:), allocatable **parm::ch_di**
- real ∗8, dimension(:), allocatable **parm::ch_erod**
- real ∗8, dimension(:), allocatable **parm::ch_l2**
- real ∗8, dimension(:), allocatable **parm::ch_cov**
- real ∗8, dimension(:), allocatable **parm::ch_cov1**
- real ∗8, dimension(:), allocatable **parm::ch_cov2**
- real ∗8, dimension(:), allocatable **parm::ch_bnk_bd**
- real ∗8, dimension(:), allocatable **parm::ch_bed_bd**
- real ∗8, dimension(:), allocatable **parm::ch_bnk_kd**
- real ∗8, dimension(:), allocatable **parm::ch_bed_kd**
- real ∗8, dimension(:), allocatable **parm::ch_bnk_d50**
- real ∗8, dimension(:), allocatable **parm::ch_bed_d50**
- real ∗8, dimension(:), allocatable **parm::tc_bed**
- real ∗8, dimension(:), allocatable **parm::tc_bnk**
- integer, dimension(:), allocatable **parm::ch_eqn**
- real ∗8, dimension(:), allocatable **parm::chpst_conc**
- real ∗8, dimension(:), allocatable **parm::chpst_rea**
- real ∗8, dimension(:), allocatable **parm::chpst_vol**
- real ∗8, dimension(:), allocatable **parm::chpst_koc**
- real ∗8, dimension(:), allocatable **parm::chpst_stl**
- real ∗8, dimension(:), allocatable **parm::chpst_rsp**
- real ∗8, dimension(:), allocatable **parm::chpst_mix**
- real ∗8, dimension(:), allocatable **parm::sedpst_conc**
- real ∗8, dimension(:), allocatable **parm::ch_wdr**
- real ∗8, dimension(:), allocatable **parm::sedpst_rea**
- real ∗8, dimension(:), allocatable **parm::sedpst_bry**
- real ∗8, dimension(:), allocatable **parm::sedpst_act**
- real ∗8, dimension(:), allocatable **parm::rch_cbod**
- real ∗8, dimension(:), allocatable **parm::rch_bactlp**
- real ∗8, dimension(:), allocatable **parm::chside**
- real ∗8, dimension(:), allocatable **parm::rs1**
- real ∗8, dimension(:), allocatable **parm::rs2**
- real ∗8, dimension(:), allocatable **parm::rs3**
- real ∗8, dimension(:), allocatable **parm::rs4**
- real ∗8, dimension(:), allocatable **parm::rs5**
- real ∗8, dimension(:), allocatable **parm::rs6**
- real ∗8, dimension(:), allocatable **parm::rs7**
- real ∗8, dimension(:), allocatable **parm::rk1**
- real ∗8, dimension(:), allocatable **parm::rk2**
- real ∗8, dimension(:), allocatable **parm::rk3**
- real ∗8, dimension(:), allocatable **parm::rk4**
- real ∗8, dimension(:), allocatable **parm::rk5**

- real ∗8, dimension(:), allocatable parm::bc1

    rate constant for biological oxidation of NH3 to NO2 in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable parm::bc2

    rate constant for biological oxidation of NO2 to NO3 in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable parm::bc3

    rate constant for hydrolysis of organic N to ammonia in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable parm::bc4

    rate constant for the decay of organic P to dissolved P in reach at 20 deg C (1/hr)

- real ∗8, dimension(:), allocatable **parm::rk6**
- real ∗8, dimension(:), allocatable **parm::ammonian**
- real ∗8, dimension(:), allocatable **parm::orig_sedpstconc**
- real ∗8, dimension(:,:), allocatable **parm::wurch**
- integer, dimension(:), allocatable **parm::icanal**
- integer, dimension(:), allocatable **parm::itb**
- real ∗8, dimension(:), allocatable **parm::ch_revap**
- real ∗8, dimension(:), allocatable **parm::dep_chan**
- real ∗8, dimension(:), allocatable parm::harg_petco

    coefficient related to radiation used in hargreaves eq (range: 0.0019 - 0.0032)

- real ∗8, dimension(:), allocatable **parm::subfr_nowtr**
- real ∗8, dimension(:), allocatable parm::cncoef_sub

    soil water depletion coefficient used in the new (modified curve number method) same as soil index coeff used in APEX range: 0.5 - 2.0

- real ∗8, dimension(:), allocatable **parm::dr_sub**
- real ∗8, dimension(:), allocatable **parm::wcklsp**
- real ∗8, dimension(:), allocatable **parm::sub_fr**
- real ∗8, dimension(:), allocatable **parm::sub_minp**
- real ∗8, dimension(:), allocatable **parm::sub_sw**
- real ∗8, dimension(:), allocatable **parm::sub_sumfc**
- real ∗8, dimension(:), allocatable **parm::sub_gwno3**
- real ∗8, dimension(:), allocatable **parm::sub_gwsolp**
- real ∗8, dimension(:), allocatable parm::co2

    CO2 concentration (ppmv)

- real ∗8, dimension(:), allocatable parm::sub_km

    area of subbasin in square kilometers (km^2)

- real ∗8, dimension(:), allocatable **parm::sub_tc**
- real ∗8, dimension(:), allocatable **parm::wlat**
- real ∗8, dimension(:), allocatable **parm::sub_pet**
- real ∗8, dimension(:), allocatable **parm::welev**
- real ∗8, dimension(:), allocatable **parm::sub_orgn**
- real ∗8, dimension(:), allocatable **parm::sub_orgp**
- real ∗8, dimension(:), allocatable **parm::sub_bd**
- real ∗8, dimension(:), allocatable **parm::sub_wtmp**
- real ∗8, dimension(:), allocatable **parm::sub_sedpa**
- real ∗8, dimension(:), allocatable **parm::sub_sedps**
- real ∗8, dimension(:), allocatable **parm::sub_minpa**
- real ∗8, dimension(:), allocatable **parm::sub_minps**
- real ∗8, dimension(:), allocatable **parm::daylmn**
- real ∗8, dimension(:), allocatable **parm::latcos**
- real ∗8, dimension(:), allocatable **parm::latsin**
- real ∗8, dimension(:), allocatable **parm::phutot**
- real ∗8, dimension(:), allocatable parm::plaps

precipitation lapse rate: precipitation change due to change in elevation (mm H2O/km)

- real ∗8, dimension(:), allocatable parm::tlaps

  temperature lapse rate: temperature change due to change in elevation (deg C/km)
- real ∗8, dimension(:), allocatable **parm::tmp_an**
- real ∗8, dimension(:), allocatable **parm::sub_precip**
- real ∗8, dimension(:), allocatable **parm::pcpdays**
- real ∗8, dimension(:), allocatable **parm::rcn_sub**
- real ∗8, dimension(:), allocatable **parm::rammo_sub**
- real ∗8, dimension(:), allocatable **parm::atmo_day**
- real ∗8, dimension(:), allocatable **parm::sub_snom**
- real ∗8, dimension(:), allocatable **parm::sub_qd**
- real ∗8, dimension(:), allocatable **parm::sub_sedy**
- real ∗8, dimension(:), allocatable **parm::sub_tran**
- real ∗8, dimension(:), allocatable **parm::sub_no3**
- real ∗8, dimension(:), allocatable **parm::sub_latno3**
- real ∗8, dimension(:,:), allocatable parm::sub_sftmp

  snowfall temperature for subbasin(:). Mean air temperature at which precip is equally likely to be rain as snow/freezing rain (range: -5.0/5.0) (deg C)
- real ∗8, dimension(:,:), allocatable parm::sub_smtmp

  snow melt base temperature for subbasin(:) mean air temperature at which snow melt will occur (range: -5.0/5.0) (deg C)
- real ∗8, dimension(:,:), allocatable parm::sub_timp

  snow pack temperature lag factor (0-1) (none)
- real ∗8, dimension(:), allocatable **parm::sub_tileno3**
- real ∗8, dimension(:), allocatable **parm::sub_solp**
- real ∗8, dimension(:), allocatable **parm::sub_subp**
- real ∗8, dimension(:), allocatable **parm::sub_etday**
- real ∗8, dimension(:), allocatable parm::sub_elev

  average elevation of subbasin (m)
- real ∗8, dimension(:), allocatable **parm::sub_wyld**
- real ∗8, dimension(:), allocatable **parm::sub_surfq**
- real ∗8, dimension(:), allocatable **parm::qird**
- real ∗8, dimension(:), allocatable **parm::sub_gwq**
- real ∗8, dimension(:), allocatable **parm::sub_sep**
- real ∗8, dimension(:), allocatable **parm::sub_chl**
- real ∗8, dimension(:), allocatable **parm::sub_cbod**
- real ∗8, dimension(:), allocatable **parm::sub_dox**
- real ∗8, dimension(:), allocatable **parm::sub_solpst**
- real ∗8, dimension(:), allocatable **parm::sub_sorpst**
- real ∗8, dimension(:), allocatable **parm::sub_yorgn**
- real ∗8, dimension(:), allocatable **parm::sub_yorgp**
- real ∗8, dimension(:), allocatable parm::sub_lat

  latitude of subbasin (degrees)
- real ∗8, dimension(:), allocatable **parm::sub_bactp**
- real ∗8, dimension(:), allocatable **parm::sub_bactlp**
- real ∗8, dimension(:), allocatable **parm::sub_latq**
- real ∗8, dimension(:), allocatable **parm::sub_gwq_d**
- real ∗8, dimension(:), allocatable **parm::sub_tileq**
- real ∗8, dimension(:), allocatable **parm::sub_vaptile**
- real ∗8, dimension(:), allocatable **parm::sub_dsan**
- real ∗8, dimension(:), allocatable **parm::sub_dsil**
- real ∗8, dimension(:), allocatable **parm::sub_dcla**
- real ∗8, dimension(:), allocatable **parm::sub_dsag**
- real ∗8, dimension(:), allocatable **parm::sub_dlag**

- real ∗8 **parm::vap_tile**
- real ∗8, dimension(:), allocatable **parm::wnan**
- real ∗8, dimension(:,:), allocatable **parm::sol_stpwt**
- real ∗8, dimension(:,:), allocatable **parm::sub_pst**
- real ∗8, dimension(:,:), allocatable **parm::sub_hhqd**
- real ∗8, dimension(:,:), allocatable **parm::sub_hhwtmp**
- real ∗8, dimension(:,:), allocatable parm::huminc

    monthly humidity adjustment. Daily values for relative humidity within the month are rasied or lowered by the specified amount (used in climate change studies) (none)
- real ∗8, dimension(:,:), allocatable parm::radinc

    monthly solar radiation adjustment. Daily radiation within the month is raised or lowered by the specified amount. (used in climate change studies) (MJ/m^2)
- real ∗8, dimension(:,:), allocatable parm::rfinc

    monthly rainfall adjustment. Daily rainfall within the month is adjusted to the specified percentage of the original value (used in climate change studies)(%)
- real ∗8, dimension(:,:), allocatable parm::tmpinc

    monthly temperature adjustment. Daily maximum and minimum temperatures within the month are raised or lowered by the specified amount (used in climate change studies) (deg C)
- real ∗8, dimension(:), allocatable parm::ch_k1

    effective hydraulic conductivity of tributary channel alluvium (mm/hr)
- real ∗8, dimension(:), allocatable **parm::ch_k2**
- real ∗8, dimension(:,:), allocatable parm::elevb

    elevation at the center of the band (m)
- real ∗8, dimension(:,:), allocatable parm::elevb_fr

    fraction of subbasin area within elevation band (the same fractions should be listed for all HRUs within the subbasin) (none)
- real ∗8, dimension(:,:), allocatable **parm::wndav**
- real ∗8, dimension(:), allocatable parm::ch_n1

    Manning's "n" value for the tributary channels (none)
- real ∗8, dimension(:), allocatable **parm::ch_n2**
- real ∗8, dimension(:), allocatable parm::ch_s1

    average slope of tributary channels (m/m)
- real ∗8, dimension(:), allocatable **parm::ch_s2**
- real ∗8, dimension(:), allocatable parm::ch_w1

    average width of tributary channels (m)
- real ∗8, dimension(:), allocatable **parm::ch_w2**
- real ∗8, dimension(:,:), allocatable **parm::dewpt**
- real ∗8, dimension(:,:), allocatable **parm::amp_r**
- real ∗8, dimension(:,:), allocatable **parm::solarav**
- real ∗8, dimension(:,:), allocatable **parm::tmpstdmx**
- real ∗8, dimension(:,:), allocatable **parm::tmpstdmn**
- real ∗8, dimension(:,:), allocatable **parm::pcf**
- real ∗8, dimension(:,:), allocatable **parm::tmpmn**
- real ∗8, dimension(:,:), allocatable **parm::tmpmx**
- real ∗8, dimension(:,:), allocatable **parm::otmpstdmn**
- real ∗8, dimension(:,:), allocatable **parm::otmpmn**
- real ∗8, dimension(:,:), allocatable **parm::otmpmx**
- real ∗8, dimension(:,:), allocatable **parm::otmpstdmx**
- real ∗8, dimension(:,:), allocatable **parm::ch_erodmo**
- real ∗8, dimension(:,:), allocatable **parm::uh**
- real ∗8, dimension(:,:), allocatable **parm::hqdsave**
- real ∗8, dimension(:,:), allocatable **parm::hsdsave**
- real ∗8, dimension(:,:), allocatable **parm::pr_w1**
- real ∗8, dimension(:,:), allocatable **parm::pr_w2**

- real ∗8, dimension(:,:), allocatable **parm::pr_w3**
- real ∗8, dimension(:,:,:), allocatable **parm::pcp_stat**
- real ∗8, dimension(:,:), allocatable **parm::opr_w1**
- real ∗8, dimension(:,:), allocatable **parm::opr_w2**
- real ∗8, dimension(:,:), allocatable **parm::opr_w3**
- real ∗8, dimension(:,:,:), allocatable **parm::opcp_stat**
- integer, dimension(:), allocatable **parm::hrutot**
- integer, dimension(:), allocatable **parm::hru1**
- integer, dimension(:), allocatable **parm::ireg**
- integer, dimension(:), allocatable parm::ihgage

    subbasin relative humidity data code (none)
- integer, dimension(:), allocatable parm::isgage

    subbasin radiation gage data code (none)
- integer, dimension(:), allocatable parm::iwgage

    subbasin wind speed gage data code (none)
- integer, dimension(:), allocatable parm::subgis

    GIS code printed to output files (output.sub) (none.
- integer, dimension(:), allocatable parm::irgage

    subbasin rain gage data code (none)
- integer, dimension(:), allocatable parm::itgage

    subbasin temp gage data code (none)
- integer, dimension(:), allocatable **parm::fcst_reg**
- integer, dimension(:), allocatable **parm::irelh**
- real ∗8, dimension(:,:), allocatable **parm::sol_aorgn**
- real ∗8, dimension(:,:), allocatable **parm::sol_tmp**
- real ∗8, dimension(:,:), allocatable **parm::sol_fon**
- real ∗8, dimension(:,:), allocatable **parm::sol_awc**
- real ∗8, dimension(:,:), allocatable **parm::sol_prk**
- real ∗8, dimension(:,:), allocatable **parm::volcr**
- real ∗8, dimension(:,:), allocatable parm::pperco_sub

    subbasin phosphorus percolation coefficient. Ratio of soluble phosphorus in surface to soluble phosphorus in perco-late
- real ∗8, dimension(:,:), allocatable **parm::sol_actp**
- real ∗8, dimension(:,:), allocatable **parm::sol_stap**
- real ∗8, dimension(:,:), allocatable **parm::conv_wt**
- real ∗8, dimension(:,:), allocatable parm::sol_solp

    soluble P concentration in top soil layer (mg P/kg soil)
- real ∗8, dimension(:,:), allocatable **parm::sol_ul**
- real ∗8, dimension(:,:), allocatable **parm::sol_fc**
- real ∗8, dimension(:,:), allocatable **parm::crdep**
- real ∗8, dimension(:,:), allocatable **parm::sol_z**
- real ∗8, dimension(:,:), allocatable **parm::sol_up**
- real ∗8, dimension(:,:), allocatable **parm::sol_bd**
- real ∗8, dimension(:,:), allocatable **parm::sol_st**
- real ∗8, dimension(:,:), allocatable **parm::flat**
- real ∗8, dimension(:,:), allocatable **parm::sol_nh3**
- real ∗8, dimension(:,:), allocatable **parm::sol_hk**
- real ∗8, dimension(:,:), allocatable **parm::sol_clay**
- real ∗8, dimension(:,:), allocatable **parm::sol_ec**
- real ∗8, dimension(:,:), allocatable parm::sol_orgn

    organic N concentration in top soil layer (mg N/kg soil)
- real ∗8, dimension(:,:), allocatable **parm::sol_por**
- real ∗8, dimension(:,:), allocatable **parm::sol_wp**

- real ∗8, dimension(:,:), allocatable parm::sol_orgp

    organic P concentration in top soil layer (mg P/kg soil)
- real ∗8, dimension(:,:), allocatable **parm::sol_hum**
- real ∗8, dimension(:,:), allocatable **parm::sol_wpmm**
- real ∗8, dimension(:,:), allocatable parm::sol_no3

    concentration of nitrate in soil layer (mg N/kg)
- real ∗8, dimension(:,:), allocatable **parm::sol_k**
- real ∗8, dimension(:,:), allocatable **parm::sol_cbn**
- real ∗8, dimension(:,:), allocatable **parm::sol_rsd**
- real ∗8, dimension(:,:), allocatable **parm::sol_fop**
- real ∗8, dimension(:,:), allocatable **parm::sol_silt**
- real ∗8, dimension(:,:), allocatable **parm::sol_sand**
- real ∗8, dimension(:,:), allocatable **parm::sol_rock**
- real ∗8, dimension(:,:), allocatable **parm::orig_solno3**
- real ∗8, dimension(:,:), allocatable **parm::orig_solorgn**
- real ∗8, dimension(:,:), allocatable **parm::orig_solsolp**
- real ∗8, dimension(:,:), allocatable **parm::orig_solorgp**
- real ∗8, dimension(:,:), allocatable **parm::orig_soltmp**
- real ∗8, dimension(:,:), allocatable **parm::orig_solrsd**
- real ∗8, dimension(:,:), allocatable **parm::orig_solfop**
- real ∗8, dimension(:,:), allocatable **parm::orig_solfon**
- real ∗8, dimension(:,:), allocatable **parm::orig_solaorgn**
- real ∗8, dimension(:,:), allocatable **parm::orig_solst**
- real ∗8, dimension(:,:), allocatable **parm::orig_solactp**
- real ∗8, dimension(:,:), allocatable **parm::orig_solstap**
- real ∗8, dimension(:,:), allocatable **parm::orig_volcr**
- real ∗8, dimension(:,:), allocatable **parm::conk**
- real ∗8, dimension(:,:,:), allocatable parm::sol_pst

    sol_pst(:,:,1) pesticide concentration in soil (mg/kg)
- real ∗8, dimension(:,:,:), allocatable **parm::sol_kp**
- real ∗8, dimension(:,:,:), allocatable **parm::orig_solpst**
- real ∗8, dimension(:), allocatable **parm::velsetlr**
- real ∗8, dimension(:), allocatable **parm::velsetlp**
- real ∗8, dimension(:), allocatable **parm::br1**
- real ∗8, dimension(:), allocatable **parm::res_k**
- real ∗8, dimension(:), allocatable **parm::lkpst_conc**
- real ∗8, dimension(:), allocatable **parm::evrsv**
- real ∗8, dimension(:), allocatable **parm::res_evol**
- real ∗8, dimension(:), allocatable **parm::res_pvol**
- real ∗8, dimension(:), allocatable **parm::res_vol**
- real ∗8, dimension(:), allocatable **parm::res_psa**
- real ∗8, dimension(:), allocatable **parm::lkpst_rea**
- real ∗8, dimension(:), allocatable **parm::lkpst_vol**
- real ∗8, dimension(:), allocatable **parm::br2**
- real ∗8, dimension(:), allocatable **parm::res_rr**
- real ∗8, dimension(:), allocatable **parm::res_sed**
- real ∗8, dimension(:), allocatable **parm::lkpst_koc**
- real ∗8, dimension(:), allocatable **parm::lkpst_stl**
- real ∗8, dimension(:), allocatable **parm::lkpst_rsp**
- real ∗8, dimension(:), allocatable **parm::lkpst_mix**
- real ∗8, dimension(:), allocatable **parm::lkspst_conc**
- real ∗8, dimension(:), allocatable **parm::lkspst_rea**
- real ∗8, dimension(:), allocatable **parm::theta_n**
- real ∗8, dimension(:), allocatable **parm::theta_p**

- real ∗8, dimension(:), allocatable **parm::con_nirr**
- real ∗8, dimension(:), allocatable **parm::con_pirr**
- real ∗8, dimension(:), allocatable **parm::lkspst_bry**
- real ∗8, dimension(:), allocatable **parm::lkspst_act**
- real ∗8, dimension(:), allocatable **parm::sed_stlr**
- real ∗8, dimension(7) **parm::resdata**
- real ∗8, dimension(:), allocatable **parm::wurtnf**
- real ∗8, dimension(:), allocatable **parm::res_nsed**
- real ∗8, dimension(:), allocatable **parm::chlar**
- real ∗8, dimension(:), allocatable **parm::res_orgn**
- real ∗8, dimension(:), allocatable **parm::res_orgp**
- real ∗8, dimension(:), allocatable **parm::res_no3**
- real ∗8, dimension(:), allocatable **parm::res_solp**
- real ∗8, dimension(:), allocatable **parm::res_chla**
- real ∗8, dimension(:), allocatable **parm::res_seci**
- real ∗8, dimension(:), allocatable **parm::res_esa**
- real ∗8, dimension(:), allocatable **parm::seccir**
- real ∗8, dimension(:), allocatable **parm::res_no2**
- real ∗8, dimension(:), allocatable **parm::res_nh3**
- real ∗8, dimension(:), allocatable **parm::res_bactp**
- real ∗8, dimension(:), allocatable **parm::res_bactlp**
- real ∗8, dimension(:), allocatable **parm::oflowmn_fps**
- real ∗8, dimension(:), allocatable **parm::starg_fps**
- real ∗8, dimension(:), allocatable **parm::weirc**
- real ∗8, dimension(:), allocatable **parm::weirk**
- real ∗8, dimension(:), allocatable **parm::weirw**
- real ∗8, dimension(:), allocatable **parm::acoef**
- real ∗8, dimension(:), allocatable **parm::bcoef**
- real ∗8, dimension(:), allocatable **parm::ccoef**
- real ∗8, dimension(:), allocatable **parm::orig_resvol**
- real ∗8, dimension(:), allocatable **parm::orig_ressed**
- real ∗8, dimension(:), allocatable **parm::orig_lkpstconc**
- real ∗8, dimension(:), allocatable **parm::orig_lkspstconc**
- real ∗8, dimension(:), allocatable **parm::orig_ressolp**
- real ∗8, dimension(:), allocatable **parm::orig_resorgp**
- real ∗8, dimension(:), allocatable **parm::orig_resno3**
- real ∗8, dimension(:), allocatable **parm::orig_resno2**
- real ∗8, dimension(:), allocatable **parm::orig_resnh3**
- real ∗8, dimension(:), allocatable **parm::orig_resorgn**
- real ∗8, dimension(:,:), allocatable **parm::starg**
- real ∗8, dimension(:,:), allocatable **parm::oflowmx**
- real ∗8, dimension(:,:), allocatable **parm::oflowmn**
- real ∗8, dimension(:,:), allocatable **parm::psetlr**
- real ∗8, dimension(:,:), allocatable **parm::nsetlr**
- real ∗8, dimension(:,:), allocatable **parm::wuresn**
- real ∗8, dimension(:,:,:), allocatable **parm::res_out**
- integer, dimension(:), allocatable **parm::ires1**
- integer, dimension(:), allocatable **parm::ires2**
- integer, dimension(:), allocatable **parm::res_sub**
- integer, dimension(:), allocatable **parm::iresco**
- integer, dimension(:), allocatable **parm::mores**
- integer, dimension(:), allocatable **parm::iyres**
- integer, dimension(:), allocatable **parm::iflod1r**
- integer, dimension(:), allocatable **parm::iflod2r**
- integer, dimension(:), allocatable **parm::ndtargr**

- real ∗8, dimension(:), allocatable parm::ap_ef

    application efficiency (0-1) (none)
- real ∗8, dimension(:), allocatable parm::decay_f

    exponential of the rate constant for degradation of the pesticide on foliage (none)
- real ∗8, dimension(:), allocatable parm::skoc

    soil adsorption coefficient normalized for soil organic carbon content ((mg/kg)/(mg/L))
- real ∗8, dimension(:), allocatable parm::decay_s

    exponential of the rate constant for degradation of the pesticide in soil (none)
- real ∗8, dimension(:), allocatable parm::hlife_f

    half-life of pesticide on foliage (days)
- real ∗8, dimension(:), allocatable parm::hlife_s

    half-life of pesticide in soil (days)
- real ∗8, dimension(:), allocatable parm::pst_wof

    fraction of pesticide on foliage which is washed-off by a rainfall event (none)
- real ∗8, dimension(:), allocatable parm::pst_wsol

    solubility of chemical in water (mg/L (ppm))
- real ∗8, dimension(:), allocatable **parm::irramt**
- real ∗8, dimension(:), allocatable **parm::phusw**
- real ∗8, dimension(:), allocatable **parm::phusw_nocrop**
- integer, dimension(:), allocatable parm::pstflg

    flag for types of pesticide used in watershed array location is pesticide ID number
    0: pesticide not used
    1: pesticide used
- integer, dimension(:), allocatable parm::nope

    sequence number of pesticide in NPNO(:) (none)
- integer, dimension(:), allocatable **parm::nop**
- integer, dimension(:), allocatable **parm::yr_skip**
- integer, dimension(:), allocatable **parm::isweep**
- integer, dimension(:), allocatable **parm::icrmx**
- integer, dimension(:), allocatable **parm::nopmx**
- integer, dimension(:,:), allocatable **parm::mgtop**
- integer, dimension(:,:), allocatable **parm::idop**
- integer, dimension(:,:), allocatable **parm::mgt1iop**
- integer, dimension(:,:), allocatable **parm::mgt2iop**
- integer, dimension(:,:), allocatable **parm::mgt3iop**
- real ∗8, dimension(:,:), allocatable **parm::mgt4op**
- real ∗8, dimension(:,:), allocatable **parm::mgt5op**
- real ∗8, dimension(:,:), allocatable **parm::mgt6op**
- real ∗8, dimension(:,:), allocatable **parm::mgt7op**
- real ∗8, dimension(:,:), allocatable **parm::mgt8op**
- real ∗8, dimension(:,:), allocatable **parm::mgt9op**
- real ∗8, dimension(:,:), allocatable **parm::mgt10iop**
- real ∗8, dimension(:,:), allocatable **parm::phu_op**
- real ∗8, dimension(:), allocatable parm::cnyld

    fraction of nitrogen in yield (kg N/kg yield)
- real ∗8, dimension(:), allocatable parm::rsdco_pl

    plant residue decomposition coefficient. The fraction of residue which will decompose in a day assuming optimal moisture, temperature, C:N ratio, and C:P ratio (none)
- real ∗8, dimension(:), allocatable parm::wac21

    1st shape parameter for radiation use efficiency equation (none)
- real ∗8, dimension(:), allocatable parm::wac22

    2nd shape parameter for radiation use efficiency equation (none)
- real ∗8, dimension(:), allocatable parm::alai_min

minimum LAI during winter dormant period (m^2/m^2)
- real ∗8, dimension(:), allocatable parm::leaf1

    1st shape parameter for leaf area development equation (none)
- real ∗8, dimension(:), allocatable parm::leaf2

    2nd shape parameter for leaf area development equation (none)
- real ∗8, dimension(:), allocatable parm::wsyf

    Value of harvest index between 0 and HVSTI which represents the lowest value expected due to water stress ((kg/ha)/(kg/ha))
- real ∗8, dimension(:), allocatable parm::bio_e

    biomass-energy ratio. The potential (unstressed) growth rate per unit of intercepted photosynthetically active radiation.((kg/ha)/(MJ/m∗∗2))
- real ∗8, dimension(:), allocatable parm::hvsti

    harvest index: crop yield/aboveground biomass ((kg/ha)/(kg/ha))
- real ∗8, dimension(:), allocatable parm::t_base

    minimum temperature for plant growth (deg C)
- real ∗8, dimension(:), allocatable parm::t_opt

    optimal temperature for plant growth (deg C)
- real ∗8, dimension(:), allocatable parm::chtmx

    maximum canopy height (m)
- real ∗8, dimension(:), allocatable parm::cvm

    natural log of USLE_C (none)
- real ∗8, dimension(:), allocatable parm::gsi

    maximum stomatal conductance (m/s)
- real ∗8, dimension(:), allocatable parm::vpd2

    rate of decline in stomatal conductance per unit increase in vapor pressure deficit ((m/s)∗(1/kPa))
- real ∗8, dimension(:), allocatable parm::wavp

    rate of decline in radiation use efficiency as a function of vapor pressure deficit (none)
- real ∗8, dimension(:), allocatable parm::bio_leaf

    fraction of leaf/needle biomass that drops during dormancy (for trees only) (none)
- real ∗8, dimension(:), allocatable parm::blai

    maximum (potential) leaf area index (none)
- real ∗8, dimension(:), allocatable parm::cpyld

    fraction of phosphorus in yield (kg P/kg yield)
- real ∗8, dimension(:), allocatable parm::dlai

    fraction of growing season when leaf area declines (none)
- real ∗8, dimension(:), allocatable parm::rdmx

    maximum root depth (m)
- real ∗8, dimension(:), allocatable parm::bio_n1

    1st shape parameter for plant N uptake equation (none)
- real ∗8, dimension(:), allocatable parm::bio_n2

    2nd shape parameter for plant N uptake equation (none)
- real ∗8, dimension(:), allocatable parm::bio_p1

    1st shape parameter for plant P uptake equation (none)
- real ∗8, dimension(:), allocatable parm::bio_p2

    2st shape parameter for plant P uptake equation (none)
- real ∗8, dimension(:), allocatable parm::bm_dieoff

    fraction above ground biomass that dies off at dormancy (fraction)
- real ∗8, dimension(:), allocatable **parm::bmx_trees**
- real ∗8, dimension(:), allocatable **parm::ext_coef**
- real ∗8, dimension(:), allocatable parm::rsr1

    initial root to shoot ratio at the beg of growing season

- real ∗8, dimension(:), allocatable parm::rsr2

    root to shoot ratio at the end of the growing season
- real ∗8, dimension(:), allocatable parm::pltnfr1

    nitrogen uptake parameter #1: normal fraction of N in crop biomass at emergence (kg N/kg biomass)
- real ∗8, dimension(:), allocatable parm::pltnfr2

    nitrogen uptake parameter #2: normal fraction of N in crop biomass at 0.5 maturity (kg N/kg biomass)
- real ∗8, dimension(:), allocatable parm::pltnfr3

    nitrogen uptake parameter #3: normal fraction of N in crop biomass at maturity (kg N/kg biomass)
- real ∗8, dimension(:), allocatable parm::pltpfr1

    phosphorus uptake parameter #1: normal fraction of P in crop biomass at emergence (kg P/kg biomass)

- real ∗8, dimension(:), allocatable parm::pltpfr2

    phosphorus uptake parameter #2: normal fraction of P in crop biomass at 0.5 maturity (kg P/kg biomass)
- real ∗8, dimension(:), allocatable parm::pltpfr3

    phosphorus uptake parameter #3: normal fraction of P in crop biomass at maturity (kg P/kg biomass)
- integer, dimension(:), allocatable parm::idc

    crop/landcover category:
    1 warm season annual legume
    2 cold season annual legume
    3 perennial legume
    4 warm season annual
    5 cold season annual
    6 perennial
    7 trees
- integer, dimension(:), allocatable **parm::mat_yrs**
- real ∗8, dimension(:), allocatable parm::bactpdb

    concentration of persistent bacteria in manure (fertilizer) (cfu/g manure)
- real ∗8, dimension(:), allocatable parm::fminn

    fraction of mineral N (NO3 + NH3) (kg minN/kg fert)
- real ∗8, dimension(:), allocatable parm::forgn

    fraction of organic N (kg orgN/kg fert)
- real ∗8, dimension(:), allocatable parm::forgp

    fraction of organic P (kg orgP/kg fert)
- real ∗8, dimension(:), allocatable parm::bactkddb

    bacteria partition coefficient (none):
    1: all bacteria in solution
    0: all bacteria sorbed to soil particles
- real ∗8, dimension(:), allocatable parm::bactlpdb

    concentration of less persistent bacteria in manure (fertilizer) (cfu/g manure)
- real ∗8, dimension(:), allocatable parm::fminp

    fraction of mineral P (kg minP/kg fert)
- real ∗8, dimension(:), allocatable parm::fnh3n

    fraction of NH3-N in mineral N (kg NH3-N/kg minN)
- character(len=8), dimension(200) parm::fertnm

    name of fertilizer
- real ∗8, dimension(:), allocatable parm::curbden

    curb length density in HRU (km/ha)
- real ∗8, dimension(:), allocatable parm::dirtmx

    maximum amount of solids allowed to build up on impervious surfaces (kg/curb km)
- real ∗8, dimension(:), allocatable parm::fimp

    fraction of HRU area that is impervious (both directly and indirectly connected)(fraction)
- real ∗8, dimension(:), allocatable parm::urbcoef

    wash-off coefficient for removal of constituents from an impervious surface (1/mm)

- real ∗8, dimension(:), allocatable parm::thalf

    time for the amount of solids on impervious areas to build up to 1/2 the maximum level (days)
- real ∗8, dimension(:), allocatable parm::tnconc

    concentration of total nitrogen in suspended solid load from impervious areas (mg N/kg sed)
- real ∗8, dimension(:), allocatable parm::tno3conc

    concentration of NO3-N in suspended solid load from impervious areas (mg NO3-N/kg sed)
- real ∗8, dimension(:), allocatable parm::tpconc

    concentration of total phosphorus in suspended solid load from impervious areas (mg P/kg sed)
- real ∗8, dimension(:), allocatable parm::fcimp

    fraction of HRU area that is classified as directly connected impervious (fraction)
- real ∗8, dimension(:), allocatable parm::urbcn2

    SCS curve number for moisture condition II in impervious areas (none)
- real ∗8 **parm::sweepeff**
- real ∗8 **parm::frt_kg**
- real ∗8 **parm::pst_dep**
- real ∗8 **parm::fr_curb**
- real ∗8, dimension(:), allocatable **parm::ranrns_hru**
- integer, dimension(:), allocatable **parm::itill**
- real ∗8, dimension(:), allocatable parm::deptil

    depth of mixing caused by operation (mm)
- real ∗8, dimension(:), allocatable parm::effmix

    mixing efficiency of operation (none)
- real ∗8, dimension(:), allocatable parm::ranrns

    random roughness of a given tillage operation (mm)
- character(len=8), dimension(550) parm::tillnm

    8-character name for the tillage operation
- real ∗8, dimension(:), allocatable parm::rnum1s

    For ICODES equal to (none)
    0,1,3,5,9: not used
    2: Fraction of flow in channel
    4: amount of water transferred (as defined by INUM4S)
    7,8,10,11: drainage area in square kilometers associated with the record file.
- real ∗8, dimension(:), allocatable **parm::hyd_dakm**
- real ∗8, dimension(:,:), allocatable **parm::varoute**
- real ∗8, dimension(:,:), allocatable **parm::shyd**
- real ∗8, dimension(:,:), allocatable **parm::vartran**
- real ∗8, dimension(:,:,:), allocatable **parm::hhvaroute**
- integer, dimension(:), allocatable parm::icodes

    routing command code (none):
    0 = finish
    1 = subbasin
    2 = route
    3 = routres
    4 = transfer
    5 = add
    6 = rechour
    7 = recmon
    8 = recyear
    9 = save
    10 = recday
    11 = reccnst
    12 = structure
    13 = apex
    14 = saveconc
    15 =

- integer, dimension(:), allocatable parm::ihouts

  For ICODES equal to (none)
  0: not used
  1,2,3,5,7,8,10,11: hydrograph storage location number
  4: departure type (1=reach, 2=reservoir)
  9: hydrograph storage location of data to be printed to event file
  14:hydrograph storage location of data to be printed to saveconc file.

- integer, dimension(:), allocatable parm::inum1s

  For ICODES equal to (none)
  0: not used
  1: subbasin number
  2: reach number
  3: reservoir number
  4: reach or res # flow is diverted from
  5: hydrograph storage location of 1st dataset to be added
  7,8,9,10,11,14: file number.

- integer, dimension(:), allocatable parm::inum2s

  For ICODES equal to (none)
  0,1,7,8,10,11: not used
  2,3: inflow hydrograph storage location
  4: destination type (1=reach, 2=reservoir)
  5: hydrograph storage location of 2nd dataset to be added
  9,14:print frequency (0=daily, 1=hourly)

- integer, dimension(:), allocatable parm::inum3s

  For ICODES equal to (none)
  0,1,2,3,5,7,8,10,11: not used
  4: destination number. Reach or reservoir receiving water
  9: print format (0=normal, fixed format; 1=txt format for AV interface, recday)

- integer, dimension(:), allocatable parm::inum4s

  For ICODES equal to (none)
  0,2,3,5,7,8,9,10,11: not used
  1: GIS code printed to output file (optional)
  4: rule code governing transfer of water (1=fraction transferred out, 2=min volume or flow left, 3=exact amount transferred)

- integer, dimension(:), allocatable **parm::inum5s**
- integer, dimension(:), allocatable **parm::inum6s**
- integer, dimension(:), allocatable **parm::inum7s**
- integer, dimension(:), allocatable **parm::inum8s**
- integer, dimension(:), allocatable **parm::subed**
- character(len=10), dimension(:), allocatable **parm::recmonps**
- character(len=10), dimension(:), allocatable **parm::reccnstps**
- character(len=5), dimension(:), allocatable **parm::subnum**
- character(len=4), dimension(:), allocatable **parm::hruno**
- real ∗8, dimension(:), allocatable **parm::grwat_n**
- real ∗8, dimension(:), allocatable **parm::grwat_i**
- real ∗8, dimension(:), allocatable **parm::grwat_l**
- real ∗8, dimension(:), allocatable **parm::grwat_w**
- real ∗8, dimension(:), allocatable **parm::grwat_d**
- real ∗8, dimension(:), allocatable **parm::grwat_s**
- real ∗8, dimension(:), allocatable **parm::grwat_spcon**
- real ∗8, dimension(:), allocatable **parm::tc_gwat**
- real ∗8, dimension(:), allocatable **parm::pot_volmm**
- real ∗8, dimension(:), allocatable **parm::pot_tilemm**
- real ∗8, dimension(:), allocatable **parm::pot_volxmm**
- real ∗8, dimension(:), allocatable **parm::pot_fr**
- real ∗8, dimension(:), allocatable **parm::pot_tile**
- real ∗8, dimension(:), allocatable **parm::pot_vol**

- real *8, dimension(:), allocatable **parm::potsa**
- real *8, dimension(:), allocatable **parm::pot_volx**
- real *8, dimension(:), allocatable **parm::potflwi**
- real *8, dimension(:), allocatable **parm::potsedi**
- real *8, dimension(:), allocatable **parm::wfsh**
- real *8, dimension(:), allocatable **parm::pot_nsed**
- real *8, dimension(:), allocatable **parm::pot_no3l**
- real *8, dimension(:), allocatable **parm::newrti**
- real *8, dimension(:), allocatable **parm::gwno3**
- real *8, dimension(:), allocatable **parm::pot_sed**
- real *8, dimension(:), allocatable **parm::pot_no3**
- real *8, dimension(:), allocatable **parm::fsred**
- real *8, dimension(:), allocatable **parm::tmpavp**
- real *8, dimension(:), allocatable **parm::evpot**
- real *8, dimension(:), allocatable **parm::dis_stream**
- real *8, dimension(:), allocatable **parm::pot_solpl**
- real *8, dimension(:), allocatable **parm::sed_con**
- real *8, dimension(:), allocatable **parm::orgn_con**
- real *8, dimension(:), allocatable **parm::orgp_con**
- real *8, dimension(:), allocatable **parm::soln_con**
- real *8, dimension(:), allocatable **parm::solp_con**
- real *8, dimension(:), allocatable **parm::pot_k**
- real *8, dimension(:), allocatable **parm::n_reduc**
- real *8, dimension(:), allocatable **parm::n_lag**
- real *8, dimension(:), allocatable **parm::n_ln**
- real *8, dimension(:), allocatable **parm::n_lnco**
- integer, dimension(:), allocatable **parm::ioper**
- integer, dimension(:), allocatable **parm::ngrwat**
- real *8, dimension(:), allocatable **parm::filterw**
- real *8, dimension(:), allocatable **parm::sumix**
- real *8, dimension(:), allocatable **parm::usle_ls**
- real *8, dimension(:), allocatable **parm::phuacc**
- real *8, dimension(:), allocatable parm::epco

    plant water uptake compensation factor (0-1)
- real *8, dimension(:), allocatable parm::esco

    soil evaporation compensation factor (0-1)
- real *8, dimension(:), allocatable **parm::slsubbsn**
- real *8, dimension(:), allocatable **parm::hru_slp**
- real *8, dimension(:), allocatable **parm::erorgn**
- real *8, dimension(:), allocatable **parm::erorgp**
- real *8, dimension(:), allocatable **parm::biomix**
- real *8, dimension(:), allocatable **parm::pnd_seci**
- real *8, dimension(:), allocatable **parm::flowmin**
- real *8, dimension(:), allocatable **parm::divmax**
- real *8, dimension(:), allocatable **parm::canmx**
- real *8, dimension(:), allocatable **parm::usle_p**
- real *8, dimension(:), allocatable **parm::lat_sed**
- real *8, dimension(:), allocatable **parm::rch_dakm**
- real *8, dimension(:), allocatable **parm::pnd_no3s**
- real *8, dimension(:), allocatable **parm::cn1**
- real *8, dimension(:), allocatable **parm::cn2**
- real *8, dimension(:), allocatable **parm::lat_ttime**
- real *8, dimension(:), allocatable **parm::flowfr**
- real *8, dimension(:), allocatable **parm::sol_zmx**

- real ∗8, dimension(:), allocatable **parm::tile_ttime**
- real ∗8, dimension(:), allocatable **parm::slsoil**
- real ∗8, dimension(:), allocatable **parm::sed_stl**
- real ∗8, dimension(:), allocatable **parm::gwminp**
- real ∗8, dimension(:), allocatable **parm::sol_cov**
- real ∗8, dimension(:), allocatable **parm::yldanu**
- real ∗8, dimension(:), allocatable **parm::pnd_solp**
- real ∗8, dimension(:), allocatable **parm::pnd_no3**
- real ∗8, dimension(:), allocatable **parm::ov_n**
- real ∗8, dimension(:), allocatable parm::driftco

  coefficient for pesticide drift directly onto stream (none)
- real ∗8, dimension(:), allocatable **parm::pnd_orgp**
- real ∗8, dimension(:), allocatable **parm::pnd_orgn**
- real ∗8, dimension(:), allocatable **parm::cn3**
- real ∗8, dimension(:), allocatable **parm::twlpnd**
- real ∗8, dimension(:), allocatable **parm::twlwet**
- real ∗8, dimension(:), allocatable **parm::sol_sumul**
- real ∗8, dimension(:), allocatable **parm::pnd_chla**
- real ∗8, dimension(:), allocatable **parm::hru_fr**
- real ∗8, dimension(:), allocatable parm::hru_km

  area of HRU in square kilometers (km^2)
- real ∗8, dimension(:), allocatable **parm::bio_ms**
- real ∗8, dimension(:), allocatable **parm::sol_alb**
- real ∗8, dimension(:), allocatable **parm::strsw**
- real ∗8, dimension(:), allocatable **parm::pnd_fr**
- real ∗8, dimension(:), allocatable **parm::pnd_psa**
- real ∗8, dimension(:), allocatable **parm::pnd_pvol**
- real ∗8, dimension(:), allocatable **parm::pnd_k**
- real ∗8, dimension(:), allocatable **parm::pnd_esa**
- real ∗8, dimension(:), allocatable **parm::pnd_evol**
- real ∗8, dimension(:), allocatable **parm::pnd_vol**
- real ∗8, dimension(:), allocatable **parm::yldaa**
- real ∗8, dimension(:), allocatable **parm::pnd_sed**
- real ∗8, dimension(:), allocatable **parm::pnd_nsed**
- real ∗8, dimension(:), allocatable **parm::strsa**
- real ∗8, dimension(:), allocatable **parm::dep_imp**
- real ∗8, dimension(:), allocatable **parm::evpnd**
- real ∗8, dimension(:), allocatable **parm::evwet**
- real ∗8, dimension(:), allocatable **parm::wet_fr**
- real ∗8, dimension(:), allocatable **parm::wet_nsa**
- real ∗8, dimension(:), allocatable **parm::wet_nvol**
- real ∗8, dimension(:), allocatable **parm::wet_k**
- integer, dimension(:), allocatable **parm::iwetgw**
- integer, dimension(:), allocatable **parm::iwetile**
- real ∗8, dimension(:), allocatable **parm::wet_mxsa**
- real ∗8, dimension(:), allocatable **parm::wet_mxvol**
- real ∗8, dimension(:), allocatable **parm::wet_vol**
- real ∗8, dimension(:), allocatable **parm::wet_sed**
- real ∗8, dimension(:), allocatable **parm::wet_nsed**
- real ∗8, dimension(:), allocatable **parm::smx**
- real ∗8, dimension(:), allocatable **parm::sci**
- real ∗8, dimension(:), allocatable **parm::bp1**
- real ∗8, dimension(:), allocatable **parm::bp2**
- real ∗8, dimension(:), allocatable **parm::bw1**

- real ∗8, dimension(:), allocatable **parm::bw2**
- real ∗8, dimension(:), allocatable **parm::bactpq**
- real ∗8, dimension(:), allocatable **parm::bactp_plt**
- real ∗8, dimension(:), allocatable **parm::bactlp_plt**
- real ∗8, dimension(:), allocatable **parm::cnday**
- real ∗8, dimension(:), allocatable **parm::bactlpq**
- real ∗8, dimension(:), allocatable **parm::auto_eff**
- real ∗8, dimension(:), allocatable **parm::sol_sw**
- real ∗8, dimension(:), allocatable **parm::secciw**
- real ∗8, dimension(:), allocatable **parm::bactps**
- real ∗8, dimension(:), allocatable **parm::bactlps**
- real ∗8, dimension(:), allocatable **parm::tmpav**
- real ∗8, dimension(:), allocatable **parm::chlaw**
- real ∗8, dimension(:), allocatable [parm::sno_hru](#)

    amount of water stored as snow (mm H2O)
- real ∗8, dimension(:), allocatable **parm::subp**
- real ∗8, dimension(:), allocatable **parm::hru_ra**
- real ∗8, dimension(:), allocatable **parm::wet_orgn**
- real ∗8, dimension(:), allocatable **parm::tmx**
- real ∗8, dimension(:), allocatable **parm::tmn**
- real ∗8, dimension(:), allocatable **parm::rsdin**
- real ∗8, dimension(:), allocatable **parm::tmp_hi**
- real ∗8, dimension(:), allocatable **parm::tmp_lo**
- real ∗8, dimension(:), allocatable **parm::rwt**
- real ∗8, dimension(:), allocatable **parm::olai**
- real ∗8, dimension(:), allocatable **parm::usle_k**
- real ∗8, dimension(:), allocatable **parm::tconc**
- real ∗8, dimension(:), allocatable **parm::hru_rmx**
- real ∗8, dimension(:), allocatable **parm::usle_cfac**
- real ∗8, dimension(:), allocatable **parm::usle_eifac**
- real ∗8, dimension(:), allocatable **parm::anano3**
- real ∗8, dimension(:), allocatable **parm::aird**
- real ∗8, dimension(:), allocatable **parm::t_ov**
- real ∗8, dimension(:), allocatable **parm::sol_sumfc**
- real ∗8, dimension(:), allocatable **parm::sol_avpor**
- real ∗8, dimension(:), allocatable **parm::usle_mult**
- real ∗8, dimension(:), allocatable **parm::wet_orgp**
- real ∗8, dimension(:), allocatable **parm::aairr**
- real ∗8, dimension(:), allocatable **parm::cht**
- real ∗8, dimension(:), allocatable **parm::u10**
- real ∗8, dimension(:), allocatable **parm::rhd**
- real ∗8, dimension(:), allocatable **parm::shallirr**
- real ∗8, dimension(:), allocatable **parm::deepirr**
- real ∗8, dimension(:), allocatable **parm::lai_aamx**
- real ∗8, dimension(:), allocatable [parm::ch_l1](#)

    longest tributary channel length in subbasin (km)
- real ∗8, dimension(:), allocatable **parm::canstor**
- real ∗8, dimension(:), allocatable **parm::ovrlnd**
- real ∗8, dimension(:), allocatable **parm::wet_no3**
- real ∗8, dimension(:), allocatable **parm::irr_mx**
- real ∗8, dimension(:), allocatable **parm::auto_wstr**
- real ∗8, dimension(:), allocatable **parm::cfrt_id**
- real ∗8, dimension(:), allocatable **parm::cfrt_kg**
- real ∗8, dimension(:), allocatable **parm::cpst_id**

- real ∗8, dimension(:), allocatable **parm::cpst_kg**
- real ∗8, dimension(:), allocatable **parm::irr_asq**
- real ∗8, dimension(:), allocatable **parm::irr_eff**
- real ∗8, dimension(:), allocatable **parm::irrsq**
- real ∗8, dimension(:), allocatable **parm::irrefm**
- real ∗8, dimension(:), allocatable **parm::irrsalt**
- real ∗8, dimension(:), allocatable **parm::bio_eat**
- real ∗8, dimension(:), allocatable **parm::bio_trmp**
- integer, dimension(:), allocatable **parm::ifrt_freq**
- integer, dimension(:), allocatable **parm::ipst_freq**
- integer, dimension(:), allocatable **parm::irr_noa**
- integer, dimension(:), allocatable **parm::irr_sc**
- integer, dimension(:), allocatable **parm::irr_no**
- integer, dimension(:), allocatable **parm::imp_trig**
- integer, dimension(:), allocatable **parm::fert_days**
- integer, dimension(:), allocatable **parm::irr_sca**
- integer, dimension(:), allocatable **parm::pest_days**
- integer, dimension(:), allocatable **parm::idplt**
- integer, dimension(:), allocatable **parm::wstrs_id**
- real ∗8, dimension(:,:), allocatable **parm::bio_aahv**
- real ∗8, dimension(:), allocatable **parm::cumei**
- real ∗8, dimension(:), allocatable **parm::cumeira**
- real ∗8, dimension(:), allocatable **parm::cumrt**
- real ∗8, dimension(:), allocatable **parm::cumrai**
- real ∗8, dimension(:), allocatable **parm::wet_solp**
- real ∗8, dimension(:), allocatable **parm::wet_no3s**
- real ∗8, dimension(:), allocatable **parm::wet_chla**
- real ∗8, dimension(:), allocatable **parm::wet_seci**
- real ∗8, dimension(:), allocatable **parm::pnd_no3g**
- real ∗8, dimension(:), allocatable **parm::pstsol**
- real ∗8, dimension(:), allocatable **parm::gwht**
- real ∗8, dimension(:), allocatable **parm::delay**
- real ∗8, dimension(:), allocatable **parm::gw_q**
- real ∗8, dimension(:), allocatable **parm::pnd_solpg**
- real ∗8, dimension(:), allocatable **parm::alpha_bf**
- real ∗8, dimension(:), allocatable **parm::alpha_bfe**
- real ∗8, dimension(:), allocatable **parm::gw_spyld**
- real ∗8, dimension(:), allocatable **parm::alpha_bf_d**
- real ∗8, dimension(:), allocatable **parm::alpha_bfe_d**
- real ∗8, dimension(:), allocatable **parm::gw_qdeep**
- real ∗8, dimension(:), allocatable **parm::gw_delaye**
- real ∗8, dimension(:), allocatable **parm::gw_revap**
- real ∗8, dimension(:), allocatable **parm::rchrg_dp**
- real ∗8, dimension(:), allocatable parm::anion_excl

    fraction of porosity from which anions are excluded
- real ∗8, dimension(:), allocatable **parm::revapmn**
- real ∗8, dimension(:), allocatable **parm::rchrg**
- real ∗8, dimension(:), allocatable **parm::ffc**
- real ∗8, dimension(:), allocatable **parm::bio_min**
- real ∗8, dimension(:), allocatable **parm::surqsolp**
- real ∗8, dimension(:), allocatable **parm::cklsp**
- real ∗8, dimension(:), allocatable **parm::deepst**
- real ∗8, dimension(:), allocatable **parm::shallst**
- real ∗8, dimension(:), allocatable **parm::wet_solpg**

- real *8, dimension(:), allocatable **parm::rchrg_src**
- real *8, dimension(:), allocatable **parm::wet_no3g**
- real *8, dimension(:), allocatable **parm::sol_avbd**
- real *8, dimension(:), allocatable **parm::trapeff**
- real *8, dimension(:), allocatable **parm::gwqmn**
- real *8, dimension(:), allocatable **parm::tdrain**
- real *8, dimension(:), allocatable **parm::pplnt**
- real *8, dimension(:), allocatable **parm::snotmp**
- real *8, dimension(:), allocatable parm::gdrain

    drain tile lag time (hours)
- real *8, dimension(:), allocatable **parm::ddrain**
- real *8, dimension(:), allocatable **parm::sol_crk**
- real *8, dimension(:), allocatable **parm::dayl**
- real *8, dimension(:), allocatable **parm::brt**
- real *8, dimension(:), allocatable parm::sstmaxd

    static maximum depressional storage; read from .sdr (mm)
- real *8, dimension(:), allocatable parm::re

    effective radius of drains (mm)
- real *8, dimension(:), allocatable parm::sdrain

    distance between two drain tubes or tiles (mm)
- real *8, dimension(:), allocatable **parm::ddrain_hru**
- real *8, dimension(:), allocatable parm::drain_co

    drainage coefficient (mm/day)
- real *8, dimension(:), allocatable parm::latksatf

    multiplication factor to determine conk(j1,j) from sol_k(j1,j) for HRU (none)
- real *8, dimension(:), allocatable parm::pc

    pump capacity (default pump capacity = 1.042mm/hr or 25mm/day) (mm/hr)
- real *8, dimension(:), allocatable **parm::stmaxd**
- real *8, dimension(:), allocatable **parm::twash**
- real *8, dimension(:), allocatable **parm::rnd2**
- real *8, dimension(:), allocatable **parm::rnd3**
- real *8, dimension(:), allocatable **parm::sol_cnsw**
- real *8, dimension(:), allocatable **parm::doxq**
- real *8, dimension(:), allocatable **parm::rnd8**
- real *8, dimension(:), allocatable **parm::rnd9**
- real *8, dimension(:), allocatable **parm::percn**
- real *8, dimension(:), allocatable **parm::sol_sumwp**
- real *8, dimension(:), allocatable **parm::tauton**
- real *8, dimension(:), allocatable **parm::tautop**
- real *8, dimension(:), allocatable **parm::cbodu**
- real *8, dimension(:), allocatable **parm::chl_a**
- real *8, dimension(:), allocatable **parm::qdr**
- real *8, dimension(:), allocatable **parm::tfertn**
- real *8, dimension(:), allocatable **parm::tfertp**
- real *8, dimension(:), allocatable **parm::tgrazn**
- real *8, dimension(:), allocatable **parm::tgrazp**
- real *8, dimension(:), allocatable **parm::latno3**
- real *8, dimension(:), allocatable **parm::latq**
- real *8, dimension(:), allocatable **parm::minpgw**
- real *8, dimension(:), allocatable **parm::no3gw**
- real *8, dimension(:), allocatable **parm::nplnt**
- real *8, dimension(:), allocatable **parm::tileq**
- real *8, dimension(:), allocatable **parm::tileno3**

- real *8, dimension(:), allocatable **parm::sedminpa**
- real *8, dimension(:), allocatable **parm::sedminps**
- real *8, dimension(:), allocatable **parm::sedorgn**
- real *8, dimension(:), allocatable **parm::sedorgp**
- real *8, dimension(:), allocatable **parm::sedyld**
- real *8, dimension(:), allocatable **parm::sepbtm**
- real *8, dimension(:), allocatable **parm::strsn**
- real *8, dimension(:), allocatable **parm::strsp**
- real *8, dimension(:), allocatable **parm::strstmp**
- real *8, dimension(:), allocatable **parm::surfq**
- real *8, dimension(:), allocatable **parm::surqno3**
- real *8, dimension(:), allocatable **parm::tcfrtn**
- real *8, dimension(:), allocatable **parm::tcfrtp**
- real *8, dimension(:), allocatable **parm::hru_ha**
- real *8, dimension(:), allocatable **parm::hru_dafr**
- real *8, dimension(:), allocatable **parm::drydep_no3**
- real *8, dimension(:), allocatable **parm::drydep_nh4**
- real *8, dimension(:), allocatable **parm::phubase**
- real *8, dimension(:), allocatable **parm::bio_yrms**
- real *8, dimension(:), allocatable **parm::hvstiadj**
- real *8, dimension(:), allocatable **parm::laimxfr**
- real *8, dimension(:), allocatable **parm::laiday**
- real *8, dimension(:), allocatable **parm::chlap**
- real *8, dimension(:), allocatable **parm::pnd_psed**
- real *8, dimension(:), allocatable **parm::wet_psed**
- real *8, dimension(:), allocatable **parm::seccip**
- real *8, dimension(:), allocatable **parm::plantn**
- real *8, dimension(:), allocatable **parm::plt_et**
- real *8, dimension(:), allocatable **parm::plt_pet**
- real *8, dimension(:), allocatable **parm::plantp**
- real *8, dimension(:), allocatable **parm::bio_aams**
- real *8, dimension(:), allocatable **parm::bio_aamx**
- real *8, dimension(:), allocatable **parm::lai_yrmx**
- real *8, dimension(:), allocatable **parm::dormhr**
- real *8, dimension(:), allocatable **parm::lat_pst**
- real *8, dimension(:), allocatable **parm::orig_snohru**
- real *8, dimension(:), allocatable **parm::orig_potvol**
- real *8, dimension(:), allocatable **parm::fld_fr**
- real *8, dimension(:), allocatable **parm::orig_alai**
- real *8, dimension(:), allocatable **parm::orig_bioms**
- real *8, dimension(:), allocatable **parm::pltfr_n**
- real *8, dimension(:), allocatable **parm::orig_phuacc**
- real *8, dimension(:), allocatable **parm::orig_sumix**
- real *8, dimension(:), allocatable **parm::pltfr_p**
- real *8, dimension(:), allocatable **parm::orig_phu**
- real *8, dimension(:), allocatable **parm::phu_plt**
- real *8, dimension(:), allocatable **parm::orig_shallst**
- real *8, dimension(:), allocatable **parm::orig_deepst**
- real *8, dimension(:), allocatable **parm::orig_pndvol**
- real *8, dimension(:), allocatable **parm::orig_pndsed**
- real *8, dimension(:), allocatable **parm::rip_fr**
- real *8, dimension(:), allocatable **parm::orig_pndno3**
- real *8, dimension(:), allocatable **parm::orig_pndsolp**
- real *8, dimension(:), allocatable **parm::orig_pndorgn**
- real *8, dimension(:), allocatable **parm::orig_pndorgp**

- real ∗8, dimension(:), allocatable **parm::orig_wetvol**
- real ∗8, dimension(:), allocatable **parm::orig_wetsed**
- real ∗8, dimension(:), allocatable **parm::orig_wetno3**
- real ∗8, dimension(:), allocatable **parm::orig_wetsolp**
- real ∗8, dimension(:), allocatable **parm::orig_wetorgn**
- real ∗8, dimension(:), allocatable **parm::orig_wetorgp**
- real ∗8, dimension(:), allocatable **parm::orig_solcov**
- real ∗8, dimension(:), allocatable **parm::orig_solsw**
- real ∗8, dimension(:), allocatable **parm::orig_potno3**
- real ∗8, dimension(:), allocatable **parm::orig_potsed**
- real ∗8, dimension(:), allocatable **parm::wtab**
- real ∗8, dimension(:), allocatable **parm::wtab_mn**
- real ∗8, dimension(:), allocatable **parm::wtab_mx**
- real ∗8, dimension(:), allocatable **parm::shallst_n**
- real ∗8, dimension(:), allocatable **parm::gw_nloss**
- real ∗8, dimension(:), allocatable **parm::rchrg_n**
- real ∗8, dimension(:), allocatable **parm::det_san**
- real ∗8, dimension(:), allocatable **parm::det_sil**
- real ∗8, dimension(:), allocatable **parm::det_cla**
- real ∗8, dimension(:), allocatable **parm::det_sag**
- real ∗8, dimension(:), allocatable **parm::det_lag**
- real ∗8, dimension(:), allocatable **parm::tnylda**
- real ∗8, dimension(:), allocatable **parm::afrt_surface**
- real ∗8 **parm::frt_surface**
- real ∗8, dimension(:), allocatable **parm::auto_nyr**
- real ∗8, dimension(:), allocatable **parm::auto_napp**
- real ∗8, dimension(:), allocatable **parm::manure_kg**
- real ∗8, dimension(:), allocatable **parm::auto_nstrs**
- real ∗8, dimension(:,:), allocatable **parm::rcn_mo**
- real ∗8, dimension(:,:), allocatable **parm::rammo_mo**
- real ∗8, dimension(:,:), allocatable **parm::drydep_no3_mo**
- real ∗8, dimension(:,:), allocatable **parm::drydep_nh4_mo**
- real ∗8, dimension(:), allocatable **parm::rcn_d**
- real ∗8, dimension(:), allocatable **parm::rammo_d**
- real ∗8, dimension(:), allocatable **parm::drydep_no3_d**
- real ∗8, dimension(:), allocatable **parm::drydep_nh4_d**
- real ∗8, dimension(:,:), allocatable **parm::yldn**
- real ∗8, dimension(:,:), allocatable **parm::gwati**
- real ∗8, dimension(:,:), allocatable **parm::gwatn**
- real ∗8, dimension(:,:), allocatable **parm::gwatl**
- real ∗8, dimension(:,:), allocatable **parm::gwatw**
- real ∗8, dimension(:,:), allocatable **parm::gwatd**
- real ∗8, dimension(:,:), allocatable **parm::gwatveg**
- real ∗8, dimension(:,:), allocatable **parm::gwata**
- real ∗8, dimension(:,:), allocatable **parm::gwats**
- real ∗8, dimension(:,:), allocatable **parm::gwatspcon**
- real ∗8, dimension(:,:), allocatable **parm::rfqeo_30d**
- real ∗8, dimension(:,:), allocatable **parm::eo_30d**
- real ∗8, dimension(:,:), allocatable **parm::wgncur**
- real ∗8, dimension(:,:), allocatable **parm::wgnold**
- real ∗8, dimension(:,:), allocatable **parm::wrt**
- real ∗8, dimension(:,:), allocatable **parm::psetlp**
- real ∗8, dimension(:,:), allocatable parm::pst_enr

    pesticide enrichment ratio (none)

- real ∗8, dimension(:,:), allocatable **parm::zdb**
- real ∗8, dimension(:,:), allocatable **parm::pst_surq**
- real ∗8, dimension(:,:), allocatable parm::plt_pst

    pesticide on plant foliage (kg/ha)
- real ∗8, dimension(:,:), allocatable **parm::pst_sed**
- real ∗8, dimension(:,:), allocatable **parm::psetlw**
- real ∗8, dimension(:,:), allocatable **parm::pcpband**
- real ∗8, dimension(:,:), allocatable **parm::wupnd**
- real ∗8, dimension(:,:), allocatable **parm::tavband**
- real ∗8, dimension(:,:), allocatable **parm::phi**
- real ∗8, dimension(:,:), allocatable **parm::wat_phi**
- real ∗8, dimension(:,:), allocatable parm::snoeb

    initial snow water content in elevation band (mm H2O)
- real ∗8, dimension(:,:), allocatable **parm::wushal**
- real ∗8, dimension(:,:), allocatable **parm::wudeep**
- real ∗8, dimension(:,:), allocatable **parm::tmnband**
- real ∗8, dimension(:), allocatable **parm::bss1**
- real ∗8, dimension(:), allocatable **parm::bss2**
- real ∗8, dimension(:), allocatable **parm::bss3**
- real ∗8, dimension(:), allocatable **parm::bss4**
- real ∗8, dimension(:,:), allocatable **parm::nsetlw**
- real ∗8, dimension(:,:), allocatable **parm::snotmpeb**
- real ∗8, dimension(:,:), allocatable **parm::surf_bs**
- real ∗8, dimension(:,:), allocatable **parm::tmxband**
- real ∗8, dimension(:,:), allocatable **parm::nsetlp**
- real ∗8, dimension(:,:), allocatable **parm::rainsub**
- real ∗8, dimension(:,:), allocatable **parm::frad**
- real ∗8, dimension(:), allocatable **parm::rstpbsb**
- real ∗8, dimension(:,:), allocatable **parm::orig_snoeb**
- real ∗8, dimension(:,:), allocatable **parm::orig_pltpst**
- real ∗8, dimension(:,:), allocatable **parm::terr_p**
- real ∗8, dimension(:,:), allocatable **parm::terr_cn**
- real ∗8, dimension(:,:), allocatable **parm::terr_sl**
- real ∗8, dimension(:,:), allocatable **parm::drain_d**
- real ∗8, dimension(:,:), allocatable **parm::drain_t**
- real ∗8, dimension(:,:), allocatable **parm::drain_g**
- real ∗8, dimension(:,:), allocatable **parm::drain_idep**
- real ∗8, dimension(:,:), allocatable **parm::cont_cn**
- real ∗8, dimension(:,:), allocatable **parm::cont_p**
- real ∗8, dimension(:,:), allocatable **parm::filt_w**
- real ∗8, dimension(:,:), allocatable **parm::strip_n**
- real ∗8, dimension(:,:), allocatable **parm::strip_cn**
- real ∗8, dimension(:,:), allocatable **parm::strip_c**
- real ∗8, dimension(:,:), allocatable **parm::strip_p**
- real ∗8, dimension(:,:), allocatable **parm::fire_cn**
- real ∗8, dimension(:,:), allocatable **parm::cropno_upd**
- real ∗8, dimension(:,:), allocatable **parm::hi_upd**
- real ∗8, dimension(:,:), allocatable **parm::laimx_upd**
- real ∗8, dimension(:,:,:), allocatable **parm::pst_lag**
- real ∗8, dimension(:,:,:), allocatable **parm::phug**
- integer, dimension(:), allocatable parm::hrupest

    pesticide use flag (none)
    0: no pesticides used in HRU
    1: pesticides used in HRU

- integer, dimension(:), allocatable **parm::nrelease**
- integer, dimension(:), allocatable **parm::swtrg**
- integer, dimension(:), allocatable **parm::nro**
- integer, dimension(:), allocatable **parm::nrot**
- integer, dimension(:), allocatable **parm::nfert**
- integer, dimension(:), allocatable **parm::igro**
- integer, dimension(:), allocatable **parm::nair**
- integer, dimension(:), allocatable **parm::ipnd1**
- integer, dimension(:), allocatable **parm::ipnd2**
- integer, dimension(:), allocatable **parm::nirr**
- integer, dimension(:), allocatable **parm::iflod1**
- integer, dimension(:), allocatable **parm::iflod2**
- integer, dimension(:), allocatable **parm::ndtarg**
- integer, dimension(:), allocatable **parm::iafrttyp**
- integer, dimension(:), allocatable **parm::nstress**
- integer, dimension(:), allocatable **parm::igrotree**
- integer, dimension(:), allocatable **parm::grz_days**
- integer, dimension(:), allocatable **parm::nmgt**
- integer, dimension(:), allocatable **parm::icr**
- integer, dimension(:), allocatable **parm::ncut**
- integer, dimension(:), allocatable **parm::nsweep**
- integer, dimension(:), allocatable **parm::nafert**
- integer, dimension(:), allocatable **parm::irn**
- integer, dimension(:), allocatable **parm::irrno**
- integer, dimension(:), allocatable **parm::sol_nly**
- integer, dimension(:), allocatable **parm::npcp**
- integer, dimension(:), allocatable **parm::igrz**
- integer, dimension(:), allocatable **parm::ndeat**
- integer, dimension(:), allocatable **parm::ngr**
- integer, dimension(:), allocatable **parm::ncf**
- integer, dimension(:), allocatable parm::hru_sub

  subbasin in which HRU is located (none)
- integer, dimension(:), allocatable **parm::idorm**
- integer, dimension(:), allocatable **parm::urblu**
- integer, dimension(:), allocatable **parm::ldrain**
- integer, dimension(:), allocatable **parm::hru_seq**
- integer, dimension(:), allocatable **parm::iurban**
- integer, dimension(:), allocatable **parm::iday_fert**
- integer, dimension(:), allocatable **parm::icfrt**
- integer, dimension(:), allocatable parm::ifld

  number of HRU (in subbasin) that is a floodplain (none)
- integer, dimension(:), allocatable parm::irip

  number of HRU (in subbasin) that is a riparian zone (none)
- integer, dimension(:), allocatable **parm::ndcfrt**
- integer, dimension(:), allocatable **parm::hrugis**
- integer, dimension(:), allocatable **parm::orig_igro**
- integer, dimension(:), allocatable **parm::ntil**
- integer, dimension(:), allocatable **parm::irrsc**
- integer, dimension(:), allocatable **parm::iwatable**
- integer, dimension(:), allocatable **parm::curyr_mat**
- integer, dimension(:), allocatable **parm::ncpest**
- integer, dimension(:), allocatable **parm::icpst**
- integer, dimension(:), allocatable **parm::ndcpst**
- integer, dimension(:), allocatable **parm::iday_pest**

- integer, dimension(:), allocatable **parm::irr_flag**
- integer, dimension(:), allocatable **parm::irra_flag**
- integer, dimension(:,:), allocatable parm::rndseed

    random number generator seed. The seeds in the array are used to generate random numbers for the following purposes:
    (1) wet/dry day probability
    (2) solar radiation
    (3) precipitation
    (4) USLE rainfall erosion index
    (5) wind speed
    (6) 0.5 hr rainfall fraction
    (7) relative humidity
    (8) maximum temperature
    (9) minimum temperature
    (10) generate new random numbers

- integer, dimension(:,:), allocatable **parm::iterr**
- integer, dimension(:,:), allocatable **parm::iyterr**
- integer, dimension(:,:), allocatable **parm::itdrain**
- integer, dimension(:,:), allocatable **parm::iydrain**
- integer, dimension(:,:), allocatable **parm::ncrops**
- integer, dimension(:), allocatable **parm::manure_id**
- integer, dimension(:,:), allocatable **parm::mgt_sdr**
- integer, dimension(:,:), allocatable **parm::idplrot**
- integer, dimension(:,:), allocatable **parm::icont**
- integer, dimension(:,:), allocatable **parm::iycont**
- integer, dimension(:,:), allocatable **parm::ifilt**
- integer, dimension(:,:), allocatable **parm::iyfilt**
- integer, dimension(:,:), allocatable **parm::istrip**
- integer, dimension(:,:), allocatable **parm::iystrip**
- integer, dimension(:,:), allocatable **parm::iopday**
- integer, dimension(:,:), allocatable **parm::iopyr**
- integer, dimension(:,:), allocatable **parm::mgt_ops**
- real ∗8, dimension(:), allocatable **parm::wshd_pstap**
- real ∗8, dimension(:), allocatable **parm::wshd_pstdg**
- integer, dimension(12) **parm::ndmo**
- integer, dimension(:), allocatable parm::npno

    array of unique pesticides used in watershed (none)

- integer, dimension(:), allocatable **parm::mcrhru**
- character(len=13), dimension(18) parm::rfile

    rainfall file names (.pcp)

- character(len=13), dimension(18) parm::tfile

    temperature file names (.tmp)

- character(len=4), dimension(1000) parm::urbname

    name of urban land use

- character(len=1), dimension(:), allocatable **parm::hydgrp**
- character(len=1), dimension(:), allocatable **parm::kirr**
- character(len=16), dimension(:), allocatable **parm::snam**
- character(len=17), dimension(300) parm::pname

    name of pesticide/toxin adding qtile to output.hru write 3/2/2010 gsm increased heds(70) to heds(71)

- character(len=13), dimension(79) **parm::heds**
- character(len=13), dimension(24) **parm::hedb**
- character(len=13), dimension(46) **parm::hedr**
- character(len=13), dimension(41) **parm::hedrsv**
- character(len=13), dimension(40) **parm::hedwtr**
- character(len=4), dimension(60) parm::title

> *description lines in file.cio (1st 3 lines)*

- character(len=4), dimension(5000) [parm::cpnm](#)

  > *four character code to represent crop name*

- character(len=17), dimension(50) **parm::fname**
- real *8, dimension(:,:,:), allocatable **parm::flomon**
- real *8, dimension(:,:,:), allocatable **parm::solpstmon**
- real *8, dimension(:,:,:), allocatable **parm::srbpstmon**
- real *8, dimension(:,:,:), allocatable **parm::sedmon**
- real *8, dimension(:,:,:), allocatable **parm::orgnmon**
- real *8, dimension(:,:,:), allocatable **parm::orgpmon**
- real *8, dimension(:,:,:), allocatable **parm::no3mon**
- real *8, dimension(:,:,:), allocatable **parm::minpmon**
- real *8, dimension(:,:,:), allocatable **parm::nh3mon**
- real *8, dimension(:,:,:), allocatable **parm::no2mon**
- real *8, dimension(:,:,:), allocatable **parm::bactpmon**
- real *8, dimension(:,:,:), allocatable **parm::bactlpmon**
- real *8, dimension(:,:,:), allocatable **parm::cmtl1mon**
- real *8, dimension(:,:,:), allocatable **parm::cmtl2mon**
- real *8, dimension(:,:,:), allocatable **parm::cmtl3mon**
- real *8, dimension(:,:,:), allocatable **parm::chlamon**
- real *8, dimension(:,:,:), allocatable **parm::disoxmon**
- real *8, dimension(:,:,:), allocatable **parm::cbodmon**
- real *8, dimension(:,:), allocatable **parm::floyr**
- real *8, dimension(:,:), allocatable **parm::sedyr**
- real *8, dimension(:,:), allocatable **parm::orgnyr**
- real *8, dimension(:,:), allocatable **parm::orgpyr**
- real *8, dimension(:,:), allocatable **parm::no3yr**
- real *8, dimension(:,:), allocatable **parm::minpyr**
- real *8, dimension(:,:), allocatable **parm::nh3yr**
- real *8, dimension(:,:), allocatable **parm::no2yr**
- real *8, dimension(:,:), allocatable **parm::bactpyr**
- real *8, dimension(:,:), allocatable **parm::bactlpyr**
- real *8, dimension(:,:), allocatable **parm::cmtl1yr**
- real *8, dimension(:,:), allocatable **parm::cmtl2yr**
- real *8, dimension(:,:), allocatable **parm::cmtl3yr**
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- real *8, dimension(:,:), allocatable **parm::disoxyr**
- real *8, dimension(:,:), allocatable **parm::cbodyr**
- real *8, dimension(:,:), allocatable **parm::solpstyr**
- real *8, dimension(:,:), allocatable **parm::srbpstyr**
- real *8, dimension(:,:), allocatable **parm::sol_mc**
- real *8, dimension(:,:), allocatable **parm::sol_mn**
- real *8, dimension(:,:), allocatable **parm::sol_mp**
- real *8, dimension(:), allocatable **parm::flocnst**
- real *8, dimension(:), allocatable **parm::sedcnst**
- real *8, dimension(:), allocatable **parm::orgncnst**
- real *8, dimension(:), allocatable **parm::orgpcnst**
- real *8, dimension(:), allocatable **parm::no3cnst**
- real *8, dimension(:), allocatable **parm::minpcnst**
- real *8, dimension(:), allocatable **parm::nh3cnst**
- real *8, dimension(:), allocatable **parm::no2cnst**
- real *8, dimension(:), allocatable **parm::bactpcnst**
- real *8, dimension(:), allocatable **parm::cmtl1cnst**
- real *8, dimension(:), allocatable **parm::cmtl2cnst**

- real ∗8, dimension(:), allocatable **parm::bactlpcnst**
- real ∗8, dimension(:), allocatable **parm::cmtl3cnst**
- real ∗8, dimension(:), allocatable **parm::chlacnst**
- real ∗8, dimension(:), allocatable **parm::disoxcnst**
- real ∗8, dimension(:), allocatable **parm::cbodcnst**
- real ∗8, dimension(:), allocatable **parm::solpstcnst**
- real ∗8, dimension(:), allocatable **parm::srbpstcnst**
- integer parm::nstep

    max number of time steps per day
- integer parm::idt

    length of time step used to report precipitation data for sub-daily modeling (minutes)
- real ∗8, dimension(:), allocatable **parm::hrtwtr**
- real ∗8, dimension(:), allocatable **parm::hhstor**
- real ∗8, dimension(:), allocatable **parm::hdepth**
- real ∗8, dimension(:), allocatable **parm::hsdti**
- real ∗8, dimension(:), allocatable **parm::hrchwtr**
- real ∗8, dimension(:), allocatable **parm::halgae**
- real ∗8, dimension(:), allocatable **parm::horgn**
- real ∗8, dimension(:), allocatable **parm::hnh4**
- real ∗8, dimension(:), allocatable **parm::hno2**
- real ∗8, dimension(:), allocatable **parm::hno3**
- real ∗8, dimension(:), allocatable **parm::horgp**
- real ∗8, dimension(:), allocatable **parm::hsolp**
- real ∗8, dimension(:), allocatable **parm::hbod**
- real ∗8, dimension(:), allocatable **parm::hdisox**
- real ∗8, dimension(:), allocatable **parm::hchla**
- real ∗8, dimension(:), allocatable **parm::hsedyld**
- real ∗8, dimension(:), allocatable **parm::hsedst**
- real ∗8, dimension(:), allocatable **parm::hharea**
- real ∗8, dimension(:), allocatable **parm::hsolpst**
- real ∗8, dimension(:), allocatable **parm::hsorpst**
- real ∗8, dimension(:), allocatable **parm::hhqday**
- real ∗8, dimension(:), allocatable **parm::precipdt**
- real ∗8, dimension(:), allocatable **parm::hhtime**
- real ∗8, dimension(:), allocatable **parm::hbactp**
- real ∗8, dimension(:), allocatable **parm::hbactlp**
- integer, dimension(10) **parm::ivar_orig**
- real ∗8, dimension(10) **parm::rvar_orig**
- integer parm::nsave

    number of save commands in .fig file
- integer **parm::nauto**
- integer **parm::iatmodep**
- real ∗8, dimension(:), allocatable **parm::wattemp**
- real ∗8, dimension(:), allocatable **parm::lkpst_mass**
- real ∗8, dimension(:), allocatable **parm::lkspst_mass**
- real ∗8, dimension(:), allocatable **parm::vel_chan**
- real ∗8, dimension(:), allocatable **parm::vfscon**
- real ∗8, dimension(:), allocatable **parm::vfsratio**
- real ∗8, dimension(:), allocatable **parm::vfsch**
- real ∗8, dimension(:), allocatable **parm::vfsi**
- real ∗8, dimension(:,:), allocatable **parm::filter_i**
- real ∗8, dimension(:,:), allocatable **parm::filter_ratio**
- real ∗8, dimension(:,:), allocatable **parm::filter_con**
- real ∗8, dimension(:,:), allocatable **parm::filter_ch**

- real *8, dimension(:,:), allocatable **parm::sol_n**
- integer parm::cswat

    = 0 Static soil carbon (old mineralization routines)
    = 1 C-FARM one carbon pool model
    = 2 Century model

- real *8, dimension(:,:), allocatable **parm::sol_bdp**
- real *8, dimension(:,:), allocatable **parm::tillagef**
- real *8, dimension(:), allocatable **parm::rtfr**
- real *8, dimension(:), allocatable **parm::stsol_rd**
- integer **parm::urban_flag**
- integer **parm::dorm_flag**
- real *8 **parm::bf_flg**
- real *8 **parm::iabstr**
- real *8, dimension(:), allocatable **parm::ubnrunoff**
- real *8, dimension(:), allocatable **parm::ubntss**
- real *8, dimension(:,:), allocatable **parm::sub_ubnrunoff**
- real *8, dimension(:,:), allocatable **parm::sub_ubntss**
- real *8, dimension(:,:), allocatable **parm::ovrlnd_dt**
- real *8, dimension(:,:,:), allocatable **parm::hhsurf_bs**
- integer parm::iuh

    unit hydrograph method: 1=triangular UH; 2=gamma funtion UH;

- integer parm::sed_ch

    channel routing for HOURLY; 0=Bagnold; 2=Brownlie; 3=Yang;

- real *8 parm::eros_expo

    an exponent in the overland flow erosion equation ranges 1.5-3.0

- real *8 parm::eros_spl

    coefficient of splash erosion varing 0.9-3.1

- real *8 parm::rill_mult

    Multiplier to USLE_K for soil susceptible to rill erosion, range 0.5-2.0.

- real *8 **parm::sedprev**
- real *8 **parm::c_factor**
- real *8 parm::ch_d50

    median particle diameter of channel bed (mm)

- real *8 parm::sig_g

    geometric standard deviation of particle sizes for the main channel. Mean air temperature at which precipitation is equally likely to be rain as snow/freezing rain.

- real *8 parm::uhalpha

    alpha coefficient for estimating unit hydrograph using a gamma function (∗.bsn)

- real *8 **parm::abstinit**
- real *8 **parm::abstmax**
- real *8, dimension(:,:), allocatable **parm::hhsedy**
- real *8, dimension(:,:), allocatable **parm::sub_subp_dt**
- real *8, dimension(:,:), allocatable **parm::sub_hhsedy**
- real *8, dimension(:,:), allocatable **parm::sub_atmp**
- real *8, dimension(:), allocatable **parm::rhy**
- real *8, dimension(:), allocatable **parm::init_abstrc**
- real *8, dimension(:), allocatable **parm::dratio**
- real *8, dimension(:), allocatable **parm::hrtevp**
- real *8, dimension(:), allocatable **parm::hrttlc**
- real *8, dimension(:,:,:), allocatable **parm::rchhr**
- real *8, dimension(:), allocatable **parm::hhresflwi**
- real *8, dimension(:), allocatable **parm::hhresflwo**
- real *8, dimension(:), allocatable **parm::hhressedi**
- real *8, dimension(:), allocatable **parm::hhressedo**

- character(len=4), dimension(:), allocatable **parm::lu_nodrain**
- integer, dimension(:), allocatable **parm::bmpdrain**
- real ∗8, dimension(:), allocatable **parm::sub_cn2**
- real ∗8, dimension(:), allocatable **parm::sub_ha_urb**
- real ∗8, dimension(:), allocatable **parm::bmp_recharge**
- real ∗8, dimension(:), allocatable **parm::sub_ha_imp**
- real ∗8, dimension(:), allocatable **parm::subdr_km**
- real ∗8, dimension(:), allocatable **parm::subdr_ickm**
- real ∗8, dimension(:,:), allocatable **parm::sf_im**
- real ∗8, dimension(:,:), allocatable **parm::sf_iy**
- real ∗8, dimension(:,:), allocatable **parm::sp_sa**
- real ∗8, dimension(:,:), allocatable **parm::sp_pvol**
- real ∗8, dimension(:,:), allocatable **parm::sp_pd**
- real ∗8, dimension(:,:), allocatable **parm::sp_sedi**
- real ∗8, dimension(:,:), allocatable **parm::sp_sede**
- real ∗8, dimension(:,:), allocatable **parm::ft_sa**
- real ∗8, dimension(:,:), allocatable **parm::ft_fsa**
- real ∗8, dimension(:,:), allocatable **parm::ft_dep**
- real ∗8, dimension(:,:), allocatable **parm::ft_h**
- real ∗8, dimension(:,:), allocatable **parm::ft_pd**
- real ∗8, dimension(:,:), allocatable **parm::ft_k**
- real ∗8, dimension(:,:), allocatable **parm::ft_dp**
- real ∗8, dimension(:,:), allocatable **parm::ft_dc**
- real ∗8, dimension(:,:), allocatable **parm::ft_por**
- real ∗8, dimension(:,:), allocatable **parm::tss_den**
- real ∗8, dimension(:,:), allocatable **parm::ft_alp**
- real ∗8, dimension(:,:), allocatable **parm::sf_fr**
- real ∗8, dimension(:,:), allocatable **parm::sp_qi**
- real ∗8, dimension(:,:), allocatable **parm::sp_k**
- real ∗8, dimension(:,:), allocatable **parm::ft_qpnd**
- real ∗8, dimension(:,:), allocatable **parm::sp_dp**
- real ∗8, dimension(:,:), allocatable **parm::ft_qsw**
- real ∗8, dimension(:,:), allocatable **parm::ft_qin**
- real ∗8, dimension(:,:), allocatable **parm::ft_qout**
- real ∗8, dimension(:,:), allocatable **parm::ft_sedpnd**
- real ∗8, dimension(:,:), allocatable **parm::sp_bpw**
- real ∗8, dimension(:,:), allocatable **parm::ft_bpw**
- real ∗8, dimension(:,:), allocatable **parm::ft_sed_cumul**
- real ∗8, dimension(:,:), allocatable **parm::sp_sed_cumul**
- integer, dimension(:), allocatable **parm::num_sf**
- integer, dimension(:,:), allocatable **parm::sf_typ**
- integer, dimension(:,:), allocatable **parm::sf_dim**
- integer, dimension(:,:), allocatable **parm::ft_qfg**
- integer, dimension(:,:), allocatable **parm::sp_qfg**
- integer, dimension(:,:), allocatable **parm::sf_ptp**
- integer, dimension(:,:), allocatable **parm::ft_fc**
- real ∗8 **parm::sfsedmean**
- real ∗8 **parm::sfsedstdev**
- integer, dimension(:), allocatable **parm::dtp_subnum**
- integer, dimension(:), allocatable **parm::dtp_imo**
- integer, dimension(:), allocatable **parm::dtp_iyr**
- integer, dimension(:), allocatable **parm::dtp_numweir**
- integer, dimension(:), allocatable **parm::dtp_numstage**
- integer, dimension(:), allocatable **parm::dtp_stagdis**
- integer, dimension(:), allocatable **parm::dtp_reltype**

- integer, dimension(:), allocatable **parm::dtp_onoff**
- real *8, dimension(:), allocatable **parm::cf**
- real *8, dimension(:), allocatable **parm::cfh**
- real *8, dimension(:), allocatable **parm::cfdec**
- real *8, dimension(:), allocatable **parm::lat_orgn**
- real *8, dimension(:), allocatable **parm::lat_orgp**
- integer, dimension(:,:), allocatable **parm::dtp_weirtype**
- integer, dimension(:,:), allocatable **parm::dtp_weirdim**
- real *8, dimension(:), allocatable **parm::dtp_evrsv**
- real *8, dimension(:), allocatable **parm::dtp_inflvol**
- real *8, dimension(:), allocatable **parm::dtp_totwrwid**
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- real *8, dimension(:), allocatable **parm::dtp_wdep**
- real *8, dimension(:), allocatable **parm::dtp_totdep**
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- real *8, dimension(:), allocatable **parm::dtp_ised**
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- integer, dimension(:,:), allocatable **parm::ro_bmp_flag**
- real *8, dimension(:,:), allocatable **parm::sol_watp**
- real *8, dimension(:,:), allocatable **parm::sol_solp_pre**
- real *8, dimension(:,:), allocatable **parm::psp_store**
- real *8, dimension(:,:), allocatable **parm::ssp_store**
- real *8, dimension(:,:), allocatable **parm::so_res**
- real *8, dimension(:,:), allocatable **parm::sol_cal**
- real *8, dimension(:,:), allocatable **parm::sol_ph**
- integer **parm::sol_p_model**
- integer, dimension(:,:), allocatable **parm::a_days**
- integer, dimension(:,:), allocatable **parm::b_days**
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- real *8, dimension(:), allocatable **parm::fstap**
- real *8, dimension(:), allocatable **parm::min_res**
- real *8, dimension(:,:), allocatable **parm::ro_bmp_flo**
- real *8, dimension(:,:), allocatable **parm::ro_bmp_sed**
- real *8, dimension(:,:), allocatable **parm::ro_bmp_bac**
- real *8, dimension(:,:), allocatable **parm::ro_bmp_pp**

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- real *8, dimension(:,:), allocatable **parm::ro_bmp_pps**
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- real *8, dimension(:), allocatable **parm::bmp_bacs**
- real *8, dimension(:), allocatable **parm::bmp_pps**
- real *8, dimension(:), allocatable **parm::bmp_sps**
- real *8, dimension(:), allocatable **parm::bmp_pns**
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- real *8, dimension(:), allocatable **parm::bmp_ppt**
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- real *8, dimension(:), allocatable **parm::bmp_snt**
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- real *8, dimension(:,:), allocatable **parm::dtp_depweir**
- real *8, dimension(:,:), allocatable **parm::dtp_diaweir**
- real *8, dimension(:,:), allocatable **parm::dtp_retperd**
- real *8, dimension(:,:), allocatable **parm::dtp_pcpret**
- real *8, dimension(:,:), allocatable **parm::dtp_cdis**
- real *8, dimension(:,:), allocatable **parm::dtp_flowrate**
- real *8, dimension(:,:), allocatable **parm::dtp_wrwid**
- real *8, dimension(:,:), allocatable **parm::dtp_addon**
- real *8, dimension(:), allocatable **parm::ri_subkm**
- real *8, dimension(:), allocatable **parm::ri_totpvol**
- real *8, dimension(:), allocatable **parm::irmmdt**
- real *8, dimension(:,:), allocatable **parm::ri_sed**
- real *8, dimension(:,:), allocatable **parm::ri_fr**
- real *8, dimension(:,:), allocatable **parm::ri_dim**
- real *8, dimension(:,:), allocatable **parm::ri_im**

- real *8, dimension(:,:), allocatable **parm::ri_iy**
- real *8, dimension(:,:), allocatable **parm::ri_sa**
- real *8, dimension(:,:), allocatable **parm::ri_vol**
- real *8, dimension(:,:), allocatable **parm::ri_qi**
- real *8, dimension(:,:), allocatable **parm::ri_k**
- real *8, dimension(:,:), allocatable **parm::ri_dd**
- real *8, dimension(:,:), allocatable **parm::ri_evrsv**
- real *8, dimension(:,:), allocatable **parm::ri_dep**
- real *8, dimension(:,:), allocatable **parm::ri_ndt**
- real *8, dimension(:,:), allocatable **parm::ri_pmpvol**
- real *8, dimension(:,:), allocatable **parm::ri_sed_cumul**
- real *8, dimension(:,:), allocatable **parm::hrnopcp**
- real *8, dimension(:,:), allocatable **parm::ri_qloss**
- real *8, dimension(:,:), allocatable **parm::ri_pumpv**
- real *8, dimension(:,:), allocatable **parm::ri_sedi**
- character(len=4), dimension(:,:), allocatable **parm::ri_nirr**
- integer, dimension(:), allocatable **parm::num_ri**
- integer, dimension(:), allocatable **parm::ri_luflg**
- integer, dimension(:), allocatable **parm::num_noirr**
- integer, dimension(:), allocatable **parm::wtp_subnum**
- integer, dimension(:), allocatable **parm::wtp_onoff**
- integer, dimension(:), allocatable **parm::wtp_imo**
- integer, dimension(:), allocatable **parm::wtp_iyr**
- integer, dimension(:), allocatable **parm::wtp_dim**
- integer, dimension(:), allocatable **parm::wtp_stagdis**
- integer, dimension(:), allocatable **parm::wtp_sdtype**
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- real *8, dimension(:), allocatable **parm::wtp_sdc2**
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- real *8, dimension(:), allocatable **parm::wtp_pdia**
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- real *8, dimension(:), allocatable **parm::wtp_sede**
- real *8, dimension(:), allocatable **parm::wtp_qi**
- real *8 **parm::bio_init**
- real *8 **parm::lai_init**
- real *8 **parm::cnop**
- real *8 **parm::hi_ovr**
- real *8 **parm::harveff**
- real *8 **parm::frac_harvk**
- real *8 **parm::lid_vgcl**
- real *8 **parm::lid_vgcm**

- real ∗8 **parm::lid_qsurf_total**
- real ∗8 **parm::lid_farea_sum**
- real ∗8, dimension(:,:), allocatable **parm::lid_cuminf_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_sw_last**
- real ∗8, dimension(:,:), allocatable **parm::interval_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_f_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_cumr_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_str_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_farea**
- real ∗8, dimension(:,:), allocatable **parm::lid_qsurf**
- real ∗8, dimension(:,:), allocatable **parm::lid_sw_add**
- real ∗8, dimension(:,:), allocatable **parm::lid_cumqperc_last**
- real ∗8, dimension(:,:), allocatable **parm::lid_cumirr_last**
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- integer, dimension(:,:), allocatable **parm::gr_imo**
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- integer, dimension(:,:), allocatable **parm::cs_onoff**
- integer, dimension(:,:), allocatable **parm::cs_imo**
- integer, dimension(:,:), allocatable **parm::cs_iyr**
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- real ∗8, dimension(:,:), allocatable **parm::cs_farea**
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- real ∗8, dimension(:,:), allocatable **parm::sol_hsc**
- real ∗8, dimension(:,:), allocatable **parm::sol_hsn**
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- real *8, dimension(:), allocatable **parm::sub_latc_d**
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- real *8, dimension(:), allocatable **parm::sub_foc_d**
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- real *8, dimension(:), allocatable **parm::surfqc_m**
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- real *8, dimension(:), allocatable **parm::foc_m**
- real *8, dimension(:), allocatable **parm::nppc_m**
- real *8, dimension(:), allocatable **parm::rsdc_m**
- real *8, dimension(:), allocatable **parm::grainc_m**
- real *8, dimension(:), allocatable **parm::stoverc_m**
- real *8, dimension(:), allocatable **parm::emitc_m**
- real *8, dimension(:), allocatable **parm::soc_m**
- real *8, dimension(:), allocatable **parm::rspc_m**
- real *8, dimension(:), allocatable **parm::sedc_a**
- real *8, dimension(:), allocatable **parm::surfqc_a**
- real *8, dimension(:), allocatable **parm::latc_a**
- real *8, dimension(:), allocatable **parm::percc_a**
- real *8, dimension(:), allocatable **parm::foc_a**
- real *8, dimension(:), allocatable **parm::nppc_a**
- real *8, dimension(:), allocatable **parm::rsdc_a**
- real *8, dimension(:), allocatable **parm::grainc_a**
- real *8, dimension(:), allocatable **parm::stoverc_a**
- real *8, dimension(:), allocatable **parm::emitc_a**
- real *8, dimension(:), allocatable **parm::soc_a**
- real *8, dimension(:), allocatable **parm::rspc_a**
- integer, dimension(:), allocatable **parm::tillage_switch**

- real ∗8, dimension(:), allocatable **parm::tillage_depth**
- integer, dimension(:), allocatable **parm::tillage_days**
- real ∗8, dimension(:), allocatable **parm::tillage_factor**
- real ∗8 parm::dthy

    time interval for subdaily routing
- integer, dimension(4) **parm::ihx**
- integer, dimension(:), allocatable **parm::nhy**
- real ∗8, dimension(:), allocatable **parm::rchx**
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- real ∗8, dimension(:), allocatable **parm::chxp**
- real ∗8, dimension(:,:,:), allocatable **parm::qhy**
- real ∗8 **parm::ff1**
- real ∗8 **parm::ff2**

7.9.1 Detailed Description

file containing the module parm

Author

   modified by Javier Burguete Tolosa

7.10 readbsn.f90 File Reference

Functions/Subroutines

- subroutine readbsn

    this subroutine reads data from the basin input file (.bsn). This file contains information related to processes modeled or defined at the watershed level

7.10.1 Detailed Description

file containing the suborutine readbsn

Author

   modified by Javier Burguete

7.11 readchm.f90 File Reference

Functions/Subroutines

- subroutine readchm

    This subroutine reads data from the HRU/subbasin soil chemical input file (.chm). This file contains initial amounts of pesticides/nutrients in the first soil layer. (Specifics about the first soil layer are given in the .sol file.) All data in the .chm file is optional input.

7.11.1 Detailed Description

file containing the subroutine readchm

Author

modified by Javier Burguete

7.12 readfcst.f90 File Reference

Functions/Subroutines

- subroutine readfcst

   this subroutine reads the HRU forecast weather generator parameters from the .cst file

7.12.1 Detailed Description

file containing the subroutine readfcst

Author

modified by Javier Burguete

7.13 readfert.f90 File Reference

Functions/Subroutines

- subroutine readfert

   this subroutine reads input parameters from the fertilizer/manure (i.e. nutrient) database (fert.dat)

7.13.1 Detailed Description

file containing the subroutine readfert

Author

modified by Javier Burguete

7.14 readfig.f90 File Reference

Functions/Subroutines

- subroutine readfig

   reads in the routing information from the watershed configuration input file (.fig) and calculates the number of sub-basins, reaches, and reservoirs

7.14.1 Detailed Description

file containing the subroutine readfig

Author

> modified by Javier Burguete

7.15 readfile.f90 File Reference

Functions/Subroutines

- subroutine readfile

  this subroutine opens the main input and output files and reads watershed information from the file.cio

7.15.1 Detailed Description

file containing the subroutine readfile

Author

> modified by Javier Burguete

7.16 readhru.f90 File Reference

Functions/Subroutines

- subroutine readhru

  this subroutine reads data from the HRU general input file (.hru). This file contains data related to general processes modeled at the HRU level.

7.16.1 Detailed Description

file containing the subroutine readhru

Author

> modified by Javier Burguete

7.17 readlup.f90 File Reference

Functions/Subroutines

- subroutine readlup

  this subroutine reads data from the HRU/subbasin management input file (.mgt). This file contains data related to management practices used in the HRU/subbasin.

7.17.1 Detailed Description

file containing the subroutine readlup

Author

modified by Javier Burguete

7.18 readpest.f90 File Reference

Functions/Subroutines

- subroutine readpest

    this subroutine reads parameters from the toxin/pesticide database (pest.dat)

7.18.1 Detailed Description

file containing the subroutine readpest

Author

modified by Javier Burguete

7.19 readplant.f90 File Reference

Functions/Subroutines

- subroutine readplant

    this subroutine reads input parameters from the landuse/landcover database (plant.dat)

7.19.1 Detailed Description

file containing the subroutine readplant

Author

modified by Javier Burguete

7.20 readsdr.f90 File Reference

Functions/Subroutines

- subroutine readsdr

    this subroutine reads data from the HRU/subbasin management input file (.mgt). This file contains data related to management practices used in the HRU/subbasin.

7.20.1 Detailed Description

file containing the subroutine readsdr

Author

modified by Javier Burguete

7.21 readsepticbz.f90 File Reference

Functions/Subroutines

- subroutine readsepticbz

  this subroutine reads data from the septic input file (.sep). This file contains information related to septic tanks modeled or defined at the watershed level

7.21.1 Detailed Description

file containing the subroutine readsepticbz

Author

modified by Javier Burguete

7.22 readsno.f90 File Reference

Functions/Subroutines

- subroutine readsno

  this subroutine reads snow data from the HRU/subbasin soil chemical input

7.22.1 Detailed Description

file containing the subroutine readsno

Author

modified by Javier Burguete

7.23 readtill.f90 File Reference

Functions/Subroutines

- subroutine readtill

  this subroutine reads input data from tillage database (till.dat)

7.23.1 Detailed Description

file containing the subroutine readtill

Author

> modified by Javier Burguete

7.24 readurban.f90 File Reference

Functions/Subroutines

- subroutine readurban

  this subroutine reads input parameters from the urban database (urban.dat). Information from this database is used only if the urban buildup/washoff routines are selected for the modeling of urban areas

7.24.1 Detailed Description

file containing the subroutine readurban

Author

> modified by Javier Burguete

7.25 readwwq.f90 File Reference

Functions/Subroutines

- subroutine readwwq

  this subroutine reads the watershed stream water quality input data (.wwq file) and initializes the QUAL2E variables which apply to the entire watershed

7.25.1 Detailed Description

file containing the subroutine readwwq

Author

> modified by Javier Burguete

7.26 simulate.f90 File Reference

Functions/Subroutines

- subroutine simulate

  this subroutine contains the loops governing the modeling of processes in the watershed

7.26.1 Detailed Description

file containing the subroutine simulate

Author

> modified by Javier Burguete

Bibliography

[1] P Bratley, B L Fox, and L E Schrage. *A Guide to Simulation.* Springer-Verlag, New York, USA, 1983. 75

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