AnnAGNPS Release Notes:

Contents

Explanation of version information:

The version headers below are broken down using the following as an example:

AnnAGNPS_v6.00.a.024_2024.05.23: (R0065) – Official Release – 05/23/2024

AnnAGNPS	name of the pollutant loading model
V6.00	version number of the model
a	trunk; version control repository location indicator where source code is located (typical release location)
024	revision number of code
2024.05.23	year, month, and day of code revision
(R0065)	revision number of the commit into the version control repository. *NOTE: This number is only a reference purposeful to the developers. It was reset after R8647 due to a change in the location of the repository.*
Official Release	indicator that this version is an officially released version
05/23/2024	date of the executable included in the release

Current Release:

AnnAGNPS v6.00.a.024_2024.05.23: (R0065) – Official Release – 05/23/2024

1. R8250: AnnAGNPS v6.00.a.000: Changes include: (Trunk in sync with CSV branch @ R8236.)
   1.) Separated read routines into fixed-formatted reads and csv-formatted reads. This is to ensure backward compatibility for v5.51 and older fixed-formatted datasets using fixed-length IDs.
   2.) Modified all input parameter IDs to allow variable length up to a maximum of 100 characters.
   3.) Modified code to produce most all fixed-formatted output files to csv-format allocwing for variable-length IDs.
   4.) Added RiceWQ Data section to allow for linking RiceWQ results as input to AnnAGNPS.
   5.) Added Cell_Source Data section to allow for linking other AnnAGNPS simulations as input to AnnAGNPS.
   6.) Initial add of a new dynamic gully width algorithm. Not completed.
2. R8270: AnnAGNPS v6.00.a.001: Changes include:
   1.) Renamed "cs_temp" to "cs_tmp" and "cv_temp" to "cv_tmp" in "Utilities_Sort.f90" because variables of the same name were declared in the data dictionary for gully pseudo cells..
3. R8300: AnnAGNPS v6.00.a.002: Changes include:
   1.) Created data structures for the Modflow integration.
   2.) Added a Modflow Data section including read and sort routines.
   3.) Added a new output flag in "Output Options - SIM" for Modflow.
   4.) Disassociated Modflow from the Insitu Soil Moisture - Daily output flag.
   5.) Added two new output files for input into Modflow (time series and well).
   6.) Stripped out fixed-formatted read code for Cell-Source data. The cell-source only accepts csv-formatted input.
   7.) Added a new flag in the Irrigation Application Data section for irrigation water source (surface or subsurface).
   8.) Added irrigation water source to irrigation output files.
   9.) Modified code to differentiate between surface irrigation water and subsurface irrigation water for Modflow. Only subsurface irrigation water is reported in the Modflow discharge output file.
   10.) Corrected a terminal crash if the Cell references a soil with the texture name of "Muck".
   11.) Modified the read routine for RiceWQ to reduce the amount of memory allocated for storing the cell information associated with the RiceWQ record.

12.) Modified "Read_Cell_Source_Data_CSV.f90" to read and keep effective rainfall information on records even if there is no sediment load on those records.
13.) Modified "Read_Cell_Source_Data_CSV.f90" to read and keep total streamflow information on records even if there is no sediment load on those records.
14.) Modified the event-based gaging station output format to match the hydrograph output format to facilitate comparison between the two output files.
15.) Corrected a potential units conversion error in "Read_Gully_Ephemeral_Data_CSV.f90" when input units are English and the user supplied a value for the headcut erodibility coefficient.

4. R8307: AnnAGNPS v6.00.a.003: Changes include:
   1.) Removed multiple duplicates of "linear" in the Modflow recharge and discharge output files. Linear only needs to be placed one time in the "METHODS" record.
5. R8310: AnnAGNPS v6.00.a.004: Changes include:
   1.) Modified code to distinguish precipitation that falls on "WATER" cells during freezing conditions as rainfall rather than snowfall. This corrects the rainfall, snowfall, and effective rainfall values reported in the gaging station files where these conditions are present.
6. R8323: AnnAGNPS v6.00.a.005: Changes include:
   1.) Corrected a check for the fertilizer mixing code.
   2.) Added a correction to the "Data_Prep_Strahler_Stream_Order.f90" routine. The SSO assigned to a receiving reach did not increment correctly when the upstream contributing reaches had the same SSO.
   3.) Corrected a potential terminal crash that occurs when a requested cell has no Modflow data.
   4.) Corrected the Crop Data section read-in routine to correctly read in and convert the "Yield_Units_Harvested" from English to SI. Previously, the "Yield_Units_Harvested" was read in as if units/ha even if the input units were in English units/ac. Code now matches the input specifications to allow input as English or SI.
   5.) Added a correction to the "Data_Prep_Route_Order.f90" routine using the SSO for routing order.
   6.) Added writing the reach routing order out for the Cronshey (non-SSO) and the Herring (SSO) method to the verification output file "AnnAGNPS_DPP_Reach_Routing_Order.csv" for comparison. The Herring method for reach routing order is currently being used for processing. The Cronshey method and Herring method should produce identical routing order.
7. R8373: AnnAGNPS v6.00.a.006: Changes include:
   1.) Corrected the conversion equation for [mm] to [m3] for irrigation water for MODFLOW.
   2.) Corrected the conversion equation for [mm] to [m] for percolation into the vadose zone for MODFLOW.
   3.) Modified the project file to check code against Fortran Standard 2018.
8. R8385: AnnAGNPS v6.00.a.007: Changes include:
   1.) Modified code to append "C_" to the IDs written in the Modflow recharge and discharge output files.
   2.) Modified code for the MODFLOW recharge and discharge output files to be in either SI or English based on the output units code in the "AnnAGNPS ID Data" section. Previously only reported in SI units.
9. R8400: AnnAGNPS v6.00.a.008: Changes include:
   1.) Modified code to conform to Fortran 2018 standard.
   2.) Wrapped all subroutines in MODULE containers to automatically create EXPLICIT Interfaces to conform with standard Fortran programming practices.
   3.) Explicitly added all needed "USE" statements in each routine to eliminate the need for "Module_All_Modules". This was needed because MODULES cannot recursively CALL themselves as would be the case when using "Module_All_Modules".
   4.) Changed references to ALOG, DACOS, DEXP, DLOG, and MAX0 -to- LOG, ACOS, EXP, LOG, and MAX. Specific names for intrinsic procedures are obsolescent in the Fortran 2018 standard. The argument's kind and type determine the equivalent for the specific names.
   5.) Replaced "EQUIVALENCE" statement and functionality as "EQUIVALENCE" is an obsolescent language feature in the Fortran 2018 standard.
   6.) Other code "clean-up" such as removing some old commented out code blocks and aligning to column 73 for consistency.
10. R8441: AnnAGNPS v6.00.a.009: Changes include:
   1.) Implemented a new sorting algorithm known as a "merge sort". This is a recursive sort routine that is much faster than the existing "bubble sort" algorithm.
   2.) Modified code for determining the system architecture (32 or 64-bit) and operating system (Windows or Linux).

3.) Corrected some uninitialized variables in the ELSE part of some IF/THEN/ELSE blocks.
4.) Added code to calculate irrigation interception for manual applications using irrigation codes 8 - 11 to match that of automatic applications.

11. R8457: AnnAGNPS v6.00.a.010: Changes include:
    1.) Added comments concerning compiling with a non-Intel fortran compiler such as gFortran.
    2.) Changed a loop structure in "Read_Modflow_Data.f90" to conform to both Intel and non-Intel compilers.
    3.) Corrected the allowable maximum ID length in "Utilities_Process_DS_Hdr_Modflow_CSV.f90" for variable "alpha_id".
    4.) Corrected the string length for the variable "p_fld" from 20 to 21 in "Utilities_Process_DS_Hdr_Modflow_CSV.f90".
12. R8459: AnnAGNPS v6.00.a.011: Changes include:
    1.) Added a DEALLOCATE to a temporary string variable in "Utilities_String_Clean.f90" before exiting the routine.
13. R8470: AnnAGNPS v6.00.a.012: Changes include:
    1.) Extended the allowable length of secondary climate filename from 128 to 255 characters.
    2.) Changed the WRITE statements for the certain output header lines to accommodate compiling using gFortran compiler.
14. R8509: AnnAGNPS v6.00.a.013: Changes include:
    1.) Modified/added some comment lines.
    2.) Deleted some lines of code that was commented out related to first attempt to add "cell-source" loads.
    3.) Revamped some code blocks to eliminate obsolete "GOTO" code lines.
15. R8511: AnnAGNPS v6.00.a.014: Changes include:
    1.) Corrected a read error in recent change (r.051) to climate data read-in routine.
16. R8552: AnnAGNPS v6.00.a.015: Changes include:
    1.) Added a new control file called, "ANNAGNPS.CSV" that can replace the "AnnAGNPS.fil" control file.
    2.) Corrected a potential bug that would occur when using secondary climate files with a user-entered 2_yr_24_hr_precipitation value.
    3.) Added a new flag in Global IDs, Factors, and Flags data section called, "REACH_ROUTING". Default is TRUE.
17. R8573: AnnAGNPS v6.00.a.016: Changes include:
    1.) Added a new function called, "Utilities_Binary_Search.f90". This function allows a fast search through a sorted array.
    2.) Implemented the binary search algorithm for "Management Schedule Data" array in "Data_Prep_ID_Checks.f90".
    3.) Restricted output files that contain reach-based information when reach routing is turned off via user option in Global IDs, Factors, and Flags Data section.
18. R8579: AnnAGNPS v6.00.a.017: Changes include:
    1.) Corrected the default for the reach routing flag from FALSE to TRUE.
    2.) Corrected behavior of the CCHE1D flag in "Output Options - TBL" to produce the text-formatted file called, "AnnAGNPS_TBL_CCHE1D.txt". This is the equivalent to the old filename of "AnnAGNPS.cpt".
19. R8636: AnnAGNPS v6.00.a.018: Changes include:
    1.) Increased the tolerance threshold for resolving rounding issues to 0.06 caused by inputting ephemeral gully data from PEG into AnnAGNPS. This rounding sometimes causes the drainage area to the mouth of the gully to be slightly larger than the total drainage area from the cells to the downstream end of the reach.
20. R8647: AnnAGNPS v6.00.a.017: Changes include:
    1.) Output Options Data – EV: Re-enabled the “AnnAGNPS_EV_Landscape_Yield_all_sources: flag located in field 53.
    2.) Removed, "AnnAGNPS_EV_Landscape_Runnoff_(CCHE1D).csv" from output files. CCHE1D uses yield file.
    3.) Modified behavior of the Output Options - TBL to produce, "AnnAGNPS_TBL_CCHE1D.txt" as well as the old concepts file, "AnnAGNPS.cpt" which are identical. Also produces the, "AnnAGNPS_EV_Landscape_Yield_(CCHE1D).csv" output file.
21. R0045: AnnAGNPS v6.00.a.022: Changes include:
    1.) Increased the maximum value allowed for the Units Harvested / [ha] parameter in the Crop Data Section from 100000 units/ha to 250000 units/ha.
22. R0057: AnnAGNPS v6.00.a.023: Changes include:

1.) Eliminated a couple of arrays in "CSV_Files.f90" that were allocated but never used.
2.) Moved some array allocation statements from "Read_Cell_Data_CSV.f90" to "Read_Watershed_Input_CSV.f90". Now the allocations will only be performed if necessary based on selected user options.
3.) Moved some array allocations from "Read_Cell_Data_FFD.f90" to "Read_Watershed_Input_FFD.f90". Now the allocations will only be performed if necessary based on selected user options.

23. R0065: AnnAGNPS v6.00.a.024: Changes include:
    1.) Added a new flag, "flg_ranked_ratio" to the Global IDs, Factors, and Flags Data section "globfac.csv". The optional column header is, "Ranked_Ratio". The default is TRUE, which maintains the current behavior of producing the unit area ranked ratio load output files automatically when any of the unit area load output files are requested in the "Output Options - AA" data section file "outopts_aa.csv". If the flag is set to FALSE, the ranked ratio files will not be produced.
    2.) Changed the behavior as to when the, "CSV_Output_Files" folder is created. Previously, the folders were created at the beginning of execution even if not needed. Now, the folders are created only if the user requests options from the "Output Options - CSV" data section or if ranked-ratio output is requested.

Previous Releases:

AnnAGNPS v5.51.a.008_2019.12.11: (R8134) – Official Release – 12/11/2019

1. R7934: AnnAGNPS v5.51.a.000: Changes include:
    1.) Reformed some information, warning, and error messages.
    2.) Corrected a character length field from 10 to 40 for sorting RUSLE2 IDs.
    3.) Modified slope check for water cell to produce a warning rather than error when slope > 0.1. Reset the value to 0.1 in these cases.
    4.) Corrected an issue in "RUSLE_Operation_Effects.f90" that prematurely exited the effect code loop when an effect code of "1" was encountered even if there were other effect codes afterwards that should be processed.
    5.) Changed "NO OPERATION-default" to "NO OPERATION" in the code so as to match the input specs for the "Management Operation ID" in the "Management Schedule Data" section.
    6.) Modified the code to recognize a soil texture of "MUCK".
        a.) The soil layers for a muck soil are not read in due to incomplete layer parameters.
        b.) Any given cell whose soil ID assignment has a texture of "muck", the cell's associated management field ID is changed to "Water".
    7.) Added code to pre-check secondary climate file daily data. This is to catch and report data errors before entering the actual simulation period time loop.
    8.) Added code to internally create pseudo-cells for gullies that have a management field specified but no cell uses that management.
    9.) Added code to report reach-located gully information.
        a.) Added code to add reach-located gully yield to the downstream end of the reach.
        b.) Added code to separate reach-located gully information from cell-located gully information for reporting purposes.
        c.) Added new columns in the gaging station files to report reach-located gullies.
    10.) Added a new output file called "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Monthly_Summaries.csv" that is automatically created when the "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Annual_Summaries.csv" output file is requested.
    11.) Added a new column for the number of processing days to both the annual and monthly output files called "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Monthly_Summaries.csv" and "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Annual_Summaries.csv" output file is requested.
    12.) Corrected the average annual rainfall value in the annual output file.
2. R7952: AnnAGNPS v5.51.a.001: Changes include:
    1.) Rewrote the sorting algorithm in the ranked-ratio routines due to some difference in behavior in the updated Fortran compiler causing wrong results when running in release mode.
3. R7984: AnnAGNPS v5.51.a.002: Changes include:

1.) Corrected equation in "Initial_Cell_Parameters.f90" calculating "lyr_C_org_nd" from organic matter [nd].
2.) Corrected equation in "Initial_Management_Operation.f90" resetting "lyr_C_org_nd" when applying fertilizer on non-crops.

4. R8020: AnnAGNPS v5.51.a.003: Changes include:
   1.) Added a check for crop growth records > max allowable 24.
   2.) Changed an INTEGER declaration to REAL in the "RUSLE_C_Max_Num_Soil_Layers.f90" routine for maximum tillage depth used in calculating the number of soil layers needed for residue incorporation.
   3.) Added an error check in the "RUSLE_C_Max_Num_Soil_Layers.f90" routine to produce an error in there is not sufficient soil tillage depth to calculate the minimum number of soil layers needed for residue incorporation.
5. R8027: AnnAGNPS v5.51.a.004: Changes include:
   1.) Modified the lowest allowable limit for impervious depth from 50.8 [mm] to 50.9 [mm] to prevent an error in the RUSLE_C_Factor calculations..
6. R8034: AnnAGNPS v5.51.a.005: Changes include:
   1.) Corrected a wrong conversion factor variable used in reporting the water load mass in "AnnAGNPS_EV_Water_load_(mass).csv" output file.
7. R8063: AnnAGNPS v5.51.a.006: Changes include:
   1.) Minor changes in the csv-formatted gaging station output file.
   2.) Added a new output file called "AnnAGNPS_SIM_Ephemeral_Gully_Summary.csv"
8. R8127: AnnAGNPS v5.51.a.007: Changes include:
   1.) Corrected units in "carbon_to_clay_ratio" equation. Was [kg-C]/[Mg-clay]; should be [Mg-C]/[Mg-clay].
   2.) Corrected variables used in calculating the total pesticide at the downstream end of the reach used in the equilibration equation.
9. R8134: AnnAGNPS v5.51.a.008: Changes include:
   1.) Corrected potential memory allocation shortfall for the accumulation of ET parameters per cell per month for reporting purposes. Memory allocation could be miscalculated if the ending simulation period falls on January 1 of a given year.

AnnAGNPS v5.50.a.013_2018.08.21: (R7797) – Official Release – 08/21/2018

1. R7371: AnnAGNPS v5.46.a.000: Changes include:
   2.) Added a new global input parameter for Critical Shear Stress in the Global IDs, Factors, and Flags Data section.
   3.) Change AnnAGNPS watershed, climate, and storm type version stamps from v5.45 to v5.46.
2. R7412: AnnAGNPS v5.46.a.001: Changes include:
   1.) Added a programmer's flag called "flg_Windows" that can be set prior to compilation to control the "CALL" used to create csv-formatted output files. This flag is typically set to true to indicate the code is compiled on a Windows system. However, this flag may be left to true if using the INTEL Fortran compiler on a Linux based operating system. This flag might need to be set to false if using another Fortran compiler on a Linux system. Previously, blocks of code would have to be commented out while other blocks un-commented to switch between Windows and UNIX/Linux. Now all related code is un-commented and the "flg_Windows" used to control which block is executed.
3. R7502: AnnAGNPS v5.46.a.002: Changes include:
   1.) Revamped "Utilities_Build_Record_From_CSV_String.f90" to read and utilize the header information in the csv-formatted input files.
   2.) Modified/added code to read, parse, and check the column headers in each csv-formatted input file. An error message is written for any missing required header columns. Missing header columns for data that is optional will continue to process using the defaults specified within AnnAGNPS.
   3.) Modified code to improve and make more consistent any error, warning, and informational messages that occur when reading input data.
   4.) Added check to produce an error for duplicate entries in the csv master list file.
   5.) Corrected an issue where a fort.xxxxx file was created realted to irrigation applications.
   6.) Added a message at the end of the error and log files wherever there was a "STOP" in the code due to an error. This should ensure that a termination message is included as the last record in the error and log file when errors have been encountered during execution.

7.) Added a log message in "AnnAGNPS_Main.f90" at the end of the execution indicating a successful execution.

4. R7513: AnnAGNPS v5.46.a.003: Changes include:
   1.) Added code to report when an optional keyword encountered in the input data is no longer used by AnnAGNPS.
   2.) Corrected a flag controlling log messages.
5. R7517: AnnAGNPS v5.46.a.004: Changes include:
   1.) Made a couple of corrections related to reporting csv-header keywords.
6. R7526: AnnAGNPS v5.46.a.005: Changes include:
   1.) Added 2 new columns in the "AnnAGNPS_SIM_Wetland_Effects.csv" output file; "Water Discharge" and "Water Duration".
   2.) Streamlined and cleaned up "AnnAGNPS_Main.f90" by extracting code blocks that could or should be located either in new or existing callable routines.
7. R7537: AnnAGNPS v5.46.a.006: Changes include:
   1.) Added a routine to generate a Strahler stream order based on the routing order of the reach network. This new information is not currently used by AnnAGNPS.
   2.) Corrected a global flag "flg_wtlnd_evt". This flag was erroneously set according to the last wetland processed each day rather than based on all wetlands processed each day.
   3.) Modified some error & warning messages related to management schedule and operations.
   4.) Corrected a units issue when reading EI values from the daily climate file. Conversion was not applied correctly.
8. R7561: AnnAGNPS v5.46.a.007: Changes include:
   1.) Reformed some error messages.
9. R7566: AnnAGNPS v5.46.a.008: Changes include:
   1.) Corrected an issue where EI values contained in secondary climate files was not being used.
   2.) Correct a related units conversion error related to EI values in secondary climate files.
10. R7574: AnnAGNPS v5.50.a.000: Changes include:
    1.) Changed version stamp from v5.46 to v5.50.
    2.) Added new feature to all csv-formatted RUSLE2 erosion input files to be used directly within AnnAGNPS.
    3.) Added “RUSLE2 Data” section.
    4.) Added RUSLE2 related parameters within the “Global Ids, Factors, and Flags Data”, “Cell Data”, “Output Options – DPP”, and “Output Options – NPT” sections.
    5.) Added a new SIM child output file "AnnAGNPS_SIM_EI_Daily_Values.csv" to report daily EI during the simulation period for requested cells.
    6.) Added the EI units [MJ-mm/ha-hr] to the header of the "AnnAGNPS_SIM_Sheet_and_Rill_Erosion.csv" output file.
11. R7594: AnnAGNPS v5.50.a.001: Changes include:
    1.) Added a DPP child file called "AnnAGNPS_DPP_Reach_Routing_Strahler_Stream_Order.csv.
12. R7597: AnnAGNPS v5.50.a.002: Changes include:
    1.) Modified code to accept "5.5" as a valid version stamp as well as '5.50'.
    2.) Reformed an error message concerning the difference in the number of columns read in from the header record of a data section compared to the number of columns read in from a data record within that data section.
13. R7606: AnnAGNPS v5.50.a.003: Changes include:
    1.) Corrected an error message referring to Landuse ID in the Management Schedule Data when it should have been Non-Crop ID.
14. R7612: AnnAGNPS v5.50.a.004: Changes include:
    1.) Modified code to allow for 4 default non-crop RCN sets (PASTURE, RANGELAND, FOREST, AND URBAN) rather than just one generic NON-CROP set.
    2.) Added a warning message when reading the Management Field Data section to report if there is more than one management field using the same management schedule but with differing landuse types.
15. R7646: AnnAGNPS v5.50.a.005: Changes include:
    1.) Corrected a subscript issue in the sorting routine for the Geology Data section. The crash occurred when all of the user-specified geology IDs happen to be integer but the internally defined default set is alpha-numeric "geol_set_1".

2.) Corrected an incorrect call for Pesticide Initial Data section. The call was to read "Soil Initial Data" section rather than "Pesticide Initial Data" section resulting in an error condition on reading data parameters.
3.) Corrected the maximum length of character strings in defining the allowable column headers in "Utilities_Process_DS_Hdr_OO_Glbl.f90" and in "Utilities_Process_DS_Hdr_OO_AA.f90".
4.) Added a check to CYCLE the read loop in "Read_Watershed_CSV_Input.f90" for 'SOIL LAYER DATA'. The soil layer filename is read in from the master list but is opened and read within the Soil Data read routine.
5.) Corrects the incorrect date reported with an error message in the climate data. The date reported was from a previous information message and was not updated to the current date for the error message.
6.) Corrects the incorrect record number reported in the same climate message above #5.
7.) Corrected a potential terminal crash related to the "Global Error and Warning Limits Data" section.
8.) Corrected a wrong variable name used as a subscript resulting in a subscript out of range error in automatic irrigation sprinkler apps. Only affected the successful creation of the child output file "AnnAGNPS_SIM_Irrigation_Cycle_Parameters_(Automatic).csv".
9.) Allows real numbers to be allowed in integer fields. The "INT" function is performed converting the real number to an integer. Effectively, this truncates the decimal portion.
10.) Comments out the call to the new Strahler Stream Order subroutine. The information from this routine is not currently used elsewhere in AnnAGNPS.
11.) "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" file was showing negative rainfall where snowfall was the only precip.
12.) Eliminated an extremely vague and unnecessary error message when there is a duplicate data section name in the csv master list.
13.) Corrected the record number reported when there is a duplicate data section name in the csv master list.

16. R7682: AnnAGNPS v5.50.a.006: Changes include:
    1.) Recoded many write routines to produce csv-formatted output files rather than fixed-format.
    2.) Changed "SCAN" to "INDEX" in the csv-input read routines to properly look for the occurrence of "RESERVED" in the data section headers.
    3.) Changed code in the csv-input read routines to internally replace any user-inputted values with blanks for parameters that are not used by AnnAGNPS - according to the input specifications.
    4.) Modified climate read-in routines to allow user-inputted standard storm types to be case insensitive.
17. R7688: AnnAGNPS v5.50.a.007: Changes include:
    1.) Clarified an error message when the primary climate files contains no values greater than 0.0 and the user did not specify a 2-yr,24 hr precip value in the primary climate station input file.
    2.) Modified the csv-formatted "AnnAGNPS_EV_Landscape_Runoff" output files to only report events within the simulation period and only for requested cells.
    3.) Modified the fixed-formatted "AnnAGNPS_SIM_Landscape_Runoff" output files to remove dashed lines between dates.
18. R7697: AnnAGNPS v5.50.a.008: Changes include:
    1.) Recoded more write routines to produce csv-formatted output files rather than fixed-format.
    2.) Separated the irrigation from the precip in order to calculate a peak discharge for precip and irrigation separately.
    3.) Revamped the "AnnAGNPS_EV_Landscape_Runoff_...." output files.
    4.) Modified code to no longer produce "AnnAGNPS_EV_Landscape_Yield_...." output files. Also no longer produce "AnnAGNPS_SIM_Landscape_Runoff_...." nor "AnnAGNPS_SIM_Landscape_Yield_...." output files.
    5.) Added gully yield to mouth and peak discharge to landscape runoff output files.
    6.) Took irrigation out of the snr delivery ratio calculation for precip and then stored and used the snr delivery ratio from the greater of precip or irrigation.
    7.) Corrected issue of double-counting point-source water in the total stream flow amount reported in the gaging station file.
    8.) Corrected a date-check routine when padding leading "0"s in the beginning and ending date strings when reading the csv-formstted climate station input data.
19. R7712: AnnAGNPS v5.50.a.009: Changes include:
    1.) Corrected code to allow for 40 character riparian buffer IDs according to the input specifications.
20. R7728: AnnAGNPS v5.50.a.010: Changes include:

1.) Corrected code for reading management schedule data. Erroneous error message written when 2 back-to-back schedules had the same event date back-to-back.

21. R7738: AnnAGNPS v5.50.a.011: Changes include:
    1.) Modified the csv parsing routine to strip leading and trailing blanks from the csv-formatted input files before processing them in the read-in routines.
    2.) Modified code to write additional water columns (SnR, Irrigation, Point Source, Feedlot, and Pond) to the gaging station output files.
22. R7746: AnnAGNPS v5.50.a.012: Changes include:
    1.) Increased the upper error limit from 40000 to 100000 for "Yield Units Harvested" in Crop Data section.
    2.) Increased the upper error limit from 10 to 1000 for "Residue Mass Ratio" in Crop Data section.
    3.) Modified read-in code to allow 0.0 or blank for "Added Surface Residue" when using effect code 4 in Management Operation Data section. A warning message is produced but no longer an error. Default = 0.0 which means no added residue is applied.
    4.) Modified read-in code to allow 0.0 or blank for "Surface Decomposition" when using effect code 4 in Management Operation Data section. A warning message is produced but no longer an error. Default = 0.016; Same as specified in Crop Data section.
    5.) Modified read-in code to allow 0.0 or blank for "Sub-Surface Decomposition" when using effect code 4 in Management Operation Data section. A warning message is produced but no longer an error. Default = 0.016; Same as specified in Crop Data section.
23. R7797: AnnAGNPS v5.50.a.013: Changes include:
    1.) Decreased the lower error limit from -300 to -1000 for "Minimum Elevation" used in Cell Data, Climate Data, and Reach Data sections.
    2.) Modified code to default the surface residue for non-crops at 30% to 0.01 rather than producing an error when all residue fields are blank or 0.0
    3.) Corrected code to report all operation input errors and then terminate rather than terminating after each error.

AnnAGNPS v5.45.a.005_2016.12.21: (R7305) – Official Release – 12/21/2016

1. R7305: AnnAGNPS v5.45.a.005: Changes include:
    1.) Corrected a header label in the hydrograph-based gaging station output file.

AnnAGNPS v5.45.a.004_2016.11.07: (R7181) – Official Release – 11/07/2016

1. R6920: AnnAGNPS v5.44.a.009: Changes include:
    1.) Corrected the incremental lapse time for closing all files in "AnnAGNPS_Main.f90".
    2.) Added a new csv-formatted output child file called "AnnAGNPS_SIM_Sheet_and_Rill_Erosion.csv".
    3.) Changed "_n_" to "and" in some output filenames.
    4.) Added new csv-formatted output child files for EI reporting called: 'AnnAGNPS_SIM_EI_AA_Totals.csv', 'AnnAGNPS_SIM_EI_AA_Monthly_Totals.csv', 'AnnAGNPS_SIM_EI_Monthly_Totals.csv'.
    5.) Added a warning message when RCN calibration is performed and there is subsurface flow.
    6.) Added an error message when RCN calibration is performed and the available surface water (precip - subsurface flow) is not sufficient to reach the user-specified target load.
    7.) Added a new event-based csv-formatted output file called "AnnAGNPS_EV_Gullies_(erosion).csv" to report gully erosion (classic & ephemeral) for events.
    8.) Modified "Convert_Real" and "Convert_Double" to optimize performance. Primarily effects read-in routines.
    9.) Revamped the "Real_to_Character" and "Double_to_Character" routines to minimize execution overhead anytime the "Convert_Real" or "Convert_Double" routines are called. "F" and "E" format strings are now stored in a table in "DD_Housekeeping.f90" and subscripts are used to retrieve the requested string rather than building the requested format string every time the call is made to "Real_to_Character" or "Double_to_Character".
    10.) Modified an error message to report the cell ID rather than cell index when the cell is a water cell and the average land slope is > .10
    11.) Added code to produce ranked-ratio files for total sheet & rill ("SnR").
    12.) Modified code to -not- produce the “old-style” csv output files unless there is data that is greater than 0.

2. R6958: AnnAGNPS v5.44.a.010: Changes include:
   1.) Revamped the source code to add additional information to the irrigation input verification output file.
   2.) Changed the output format and extension to csv and changed the filename to "AnnAGNPS_NPT_Irrigation_Application.csv".
   3.) Created a parallel child file for "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" called "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data_ht-H2O.csv".
   4.) Reformed some messages related to storm type in the climate routines.
   5.) Changed the behavior of Output Options request so that if the user selects specific IDs (such as a specific cell IDs) then only those IDs are reported. Previously, had to select IDs AND set the global flag to .FALSE. to restrict reporting.
   6.) Added code to implement usage of primary and secondary climate global storm type defaults.
   7.) Added new column in "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" and "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data_ht-H2O.csv" to show (available soil moisture / (field capacity - wilting point). This is to aid monitoring when irrigation is triggered on and off.

3. R6981: AnnAGNPS v5.44.a.011: Changes include:
   1.) Added code to allow users to input EI in the daily climate file. The EI value on any daily climate record will be used rather than being internally calculated. ***NOTE: The climate input version code must be "5.45" or an error message will be produced.
   2.) Revamped irrigation code for sprinkler applications.
   3.) Added units conversion factor for new EI input fields in the primary and secondary climate input files.
4. R6987: AnnAGNPS v5.45.a.000: Changes include:
   1.) Changed the version stamp of watershed and storm type to v5.45. Climate version was changed in t.028 (R6962).
   2.) Reformed a couple of error messages related to reading climate data in csv-format.
   3.) Changed the version stamp of AnnAGNPS from v5.44 to v5.45.
5. R7008: AnnAGNPS v5.45.a.001: Changes include:
   1.) Corrected the placement of a line of code calculating irrigation water to be applied.
   2.) Modified code related to irrigation codes 1, 2, and 5.
   3.) Renamed "AnnAGNPS_SIM_Irrigation_Cycle_Parameters.csv" to "AnnAGNPS_SIM_Irrigation_Cycle_Parameters_(Automatic).csv".
   4.) Added code to produce a new file called "AnnAGNPS_SIM_Irrigation_Cycle_Parameters_(Manual).csv".
   5.) Modified the "Utilities_Input_Version_Codes.f90" routines to allow for version inputs where the trailing "0"s may have been truncated by a program such as Excel. For example, '5.00', '5', '5.', and '5.0' are all now acceptable version inputs. This applies to the watershed data, climate data, and storm type data.
6. R7026: AnnAGNPS v5.45.a.002: Changes include:
   1.) Removed the precipitation water from the wetlands.
   2.) Renamed the variables "eqv_rnfl_mm" to "eff_rnfl_mm" and "eqv_prcp_mm" to "eff_prcp_mm".
   3.) Modified related comments from equivalent to effective.
   4.) Started tracking the amount of water trapped by the wetland in the variable "ws_wet_H2O_rdctn_EV". This is the difference in the amount of inflow water into the wetland and the outflow water from the wetland.
   5.) Corrected a wrong subscript in "Initialize_Data_V3_Output.f90" which causes a terminal crash when the number of cells is less than the number of reaches.
   6.) Corrected a problem in "Process_Wetland_Reach.f90" in determining the potential ET and infiltration rate. Reach IDs were not matching because of case sensitivity.
   7.) Added a "Wetland Reduction" column in "EV_Outlet_Load_Mass" and "EV_Outlet_Load_Unit_Area" routines producing "AnnAGNPS_EV_Outlet_Water_load_(mass).txt" and "AnnAGNPS_EV_Outlet_Water_load_(unit-area).txt" output files.
   8.) Added new variables to store wetland outflow and wetland outflow ratio to total inflow into the wetland.
7. R7099: AnnAGNPS v5.45.a.003: Changes include:
   1.) Corrected a potential terminal crash due to a subscript going out of bounds when the simulation period is specified to be greater than one year but ends in less than a whole year. Example 1/1/2006 - 5/31/2007.
8. R7181: AnnAGNPS v5.45.a.004: Changes include:

1.) Added new variables to track the amount of rainfall that fell on a snow pack as well as the amount of snow pack at the beginning and end of each day. This information is reported in new columns in the gaging station output files.
2.) Corrected an issue where the units code in the csv-formatted climate station file would override the units code for the records in the csv-formatted daily climate files. This would show up if the units code in the station file was different than the units code in the daily climate.
3.) Corrected an issue calculating the RUSLE EI when snowmelt occurred. There was a "double-counting" of the amount of precip on those days.

AnnAGNPS v5.44.a.008_2016.04.28: (R6776) – Official Release – 04/29/2016

1. R6031: AnnAGNPS v5.43.a.021: Changes include: Added a subroutine in "Utilities_Build_Record_From_CSV_String.f90" to check the length of input parameter strings in the csv input files. If the fields are longer than allowed in the input specs, then an error message is produced. This will prevent the truncation of variables such as IDs that would cause other problems in execution.
2. R6032: AnnAGNPS v5.43.a.022: Changes include:
   1.) Reformed the error message in "Utilities_Build_Record_From_CSV_String.f90" to include the id, where associated, with the string length check.
   2.) Corrected a subscript in "Read_Crop_Data.f90" that prevented an error check from occurring when a crop growth parameter ID was not found in the Crop Data section.
   3.) Changed the error in #2 to a warning message and ignore any crop growth records that are not listed in the Crop Data section.
3. R6033: AnnAGNPS v5.43.a.023: Changes include: Removed the error check in "Utilities_Build_Record_From_CSV_String.f90" for most numeric fields where truncation would not be a problem.
4. R6034: AnnAGNPS v5.43.a.024: Added a check in "RUSLE_C_Compute_Res_Coef.f90" to prevent a divide by 0.0 from occurring. This occurred when all crop growth records for a given crop is 0.0.
5. R6122: AnnAGNPS v5.43.a.025:
   1.) Modified code to allow the climate station's beginning and ending dates to be left blank. This includes the primary and secondary climate files in either fixed-format or csv-format. If the beginning date is blank, then the first date in the associated daily climate file is used as the beginning date. If the ending date is blank, then the last date in the associated daily climate file is used as the ending date.
   2.) Corrected a terminal crash that occurred when a secondary climate file was not successfully opened. A status variable "io_err_msg" was not included, and therefore not defined, in the call to "OPEN" the file and then the "WRITE" statement within "File_Operation_Errors" referenced it causing the error condition.
   3.) Added an additional message when a secondary climate file was not successfully opened as to the requirements of using csv-formatted or fixed-formatted climate files.
   4.) Added code to strip blanks out of the ranked-ratio csv-formatted output files.
   5.) Modified ranked-ratio output files to avoid special characters that cause a problem when "joining" within ArcGis.
   6.) Corrected the units in the header record of the ranked-ratio output files for water & sediment.
   7.) Corrected units & header for water load.
   8.) Corrected equation for water load for "Load_Unit_Area_Ranking_Ratio"
   9.) Modified the equations to now use (except for water): Load_Unit_Area_Ranking_Ratio = Cell_Load_by_Unit_Area_Mg_per_ha_per_year / (Total_Load_by_Mass_Mg_per_yr / total drainage area) - Rather than - Load_Unit_Area_Ranking_Ratio = Cell_Load_by_Unit_Area_Mg_per_ha_per_year / Total_Load_by_Mass_Mg_per_yr * total drainage area.
   10.) Added ranked-ratio output files for sediment yield and for gully total load & yield.
   11.) Added ranked-ratio output files for sediment erosion and nutrient yields.
   12.) Cleaning up code related to ranked-ratio output files; eliminating file index variables that are no longer used since the filenames are built within the code rather than through the normal filename array in "DD_Output_Files.f90".
   13.) Added ranked-ratio output files for total water yield.
6. R6161: AnnAGNPS v5.43.a.026:
   1.) Added an error check to secondary climate file read-in routine to produce an error message if the daily climate records do not span the range of dates as specified in the climate's station file.

2.) Reformed the error message in the error check to secondary climate file read-in routine to produce an error message if the daily climate records do not span the range of dates as specified in the climate's station file.
3.) Split the read-in routine for soil data into 2 routines; one for fixed-formmatted data and the other for csv-formatted data.
4.) Revamped the code so that the soil layers can be in any order in the soil layers csv input file. Before separating the routines, all layers had to be in the same order as the soils in the soil data csv input file.
5.) Added an additional check for "end-of-file" condition when reading the soil layer information from the csv-formatted input file.

7. R6195: AnnAGNPS v5.44.a.000:
   1.) Changed version code to 5.44.
   2.) Added simulation begin and end date to gaging station files.
8. R6208: AnnAGNPS v5.44.a.001: Reformed error messages related to soil and soil layer data related to depth, wilting point, and field capacity.
9. R6475: AnnAGNPS v5.44.a.002:
   1.) Added 'Simulation begins on "sim_beg_date".'
   2.) Added 'All days prior to simulation are initialization days.'
   3.) Added 'Beginning Initialization Period' and 'Beginning Simulation Period' on the "and day:" screen status messages.
   4.) Modified an error message string for crop growth data.
   5.) Reformed an error message string for non-crop data.
   6.) Modified an error message string for all input data; eliminated the "on record #" from the error message.
   7.) Corrected a format bug in an error message in the Read_Watershed_CSV_Input.f90 file.
   8.) Added code to report the sediment yield before disaggregation & buffer, after buffer, and after disaggregation from the various sources.
10. R6571: AnnAGNPS v5.44.a.003: Corrected a line of code in Utilities_Build_Record_From_CSV_String.f90 that has an incorrect version number related to csv-formatted ephemeral gully input with 5.40 datasets.
11. R6573: AnnAGNPS v5.44.a.003: Changed 2 source code filename extensions from "F90" to "f90" for consistency. No code change therefore no change in version number.
12. R6685: AnnAGNPS v5.44.a.004: Corrected an English units label for the event-based gaging station file.
13. R6746: AnnAGNPS v5.44.a.005:
   1.) Added code to allow a new management keyword of "WETLAND" that behaves similar to 'BUFFER'.
   2.) If an ephemeral gully has a management keyword of 'WETLAND' then that gully is not allowed to erode
   3.) Modified code to produce the event-based gaging station file based on precipitation events (rainfall, snowfall, snowmelt, and irrigation) rather than just runoff events.
14. R6753: AnnAGNPS v5.44.a.006:
   1.) Lowered the acceptable lower limit for weir height to be 0.001 [m].
   2.) Added the wetland ID to the message string for errors and warnings
15. R6774: AnnAGNPS v5.44.a.007:
   1.) Removed file size restriction on the "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" output file.
   2.) Added a new table to report the actual ET average annual monthly totals the "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Annual_Summaries.csv" output file
   3.) Modified code to separate average annual summaries into separate files. Newly create filenames are:
      a.) "AnnAGNPS_SIM_Insitu_Soil_Moisture_AET_AA_Monthly_Totals.csv"
      b.) "AnnAGNPS_SIM_Insitu_Soil_Moisture_AET_AA_Totals.csv"
      c.) "AnnAGNPS_SIM_Insitu_Soil_Moisture_AET_Monthly_Totals.csv”
   4.) Commented out more "Verification_Termination" calls to eliminate restricting output file sizes for insitu routines.
   5.) Separated the insitu soil moisture's daily and monthly output flags to behave independently. Previously, the daily flag controlled the monthly output even though there was an independent monthly flag.
   6.) Corrected a terminal crash that occurred when trying to access the actual ET arrays during initialization period.
16. R6774: AnnAGNPS v5.44.a.008:
   1.) Separated the event-based gaging station output routine out of "Reach_Routing_Loadings.f90" to be an independent callable routine.

2.) Modified to make code more logically efficient when the "Reach_Routing_Gaging_Station_Event.f90" routine is called.

AnnAGNPS v5.43.a.020_2015.03.18: (R5903) – Official Release – 03/18/2015

1. R5732: AnnAGNPS v5.42.a.045: Changes include: Modified error message to more clearly state that a management field ID specified in the Cell Data section was not found in the Management Field Data section.
2. R5734: AnnAGNPS v5.42.a.046: Changes include:
   1.) There was an error limit set to 1000; removed the limit check.
   2.) Revised content of error messages produced when an error occurs while reading the riparian buffer data; now includes the riparian buffer ID.
   3.) Found and corrected the reason that the Output Options was producing an error message when using only 1 csv output options file.
3. R5738: AnnAGNPS v5.42.a.047: Changes include: Removed references to "Watershed.inp" and "Climate.inp" from error messages pertaining to the watershed and climate input files.
4. R5771: AnnAGNPS v5.42.a.048: Changes include:
   1.) Removed 'Event's total erosion within all ephemeral gullies at the watershed outlet' in the "AnnAGNPS_SIM_Ephemeral_Gully_Erosion.csv" output file.
   2.) Corrected formatting problem in "AnnAGNPS_SIM_Ephemeral_Gully_Nickpoint.csv" when "No nickpoint development this event!" appears.
5. R5772: AnnAGNPS v5.42.a.049: Changes include: Reworded error message that occurs when a cell ID referenced in the Riparian Buffer Data section does not exist in the Cell Data section.
6. R5773: AnnAGNPS v5.42.a.050: Changes include: Corrected ephemeral gully slope min & max slope values trap by resetting the global values to .00001 (Min) and 3.0 (Max). The Global values were .000000001 (Min) and 999999999. (Max). Slope values for input parameters are most typically .00001 (Min) and 3.0 (Max). Exceptions to these values are reach slope max = 10.0 and contour furrow slope max = 1.0.
7. R5774: AnnAGNPS v5.42.a.051: Changes include: Added initialization to some gully variables.
8. R5775: AnnAGNPS v5.42.a.052: Changes include: Added slope to the ephemeral gully sections output file.
9. R5776: AnnAGNPS v5.42.a.053: Changes include: Added sctn_wdth_up & _down to "eph" array to properly track the section widths of multiple gullies over several events. Corrected initializations of "tgm_sctn" array.
10. R5777: AnnAGNPS v5.43.a.000: Changes include: Changed the version code stamp to v5.43.
11. R5778: AnnAGNPS v5.43.a.001: Changes include:
    1.) Initialized a couple of flag variables that caused landscape runoff SIM files from being written to output.
    2.) Changed the output format and extension from fixed "txt" to "csv" for "AnnAGNPS_AA_Gullies_(erosion).csv" & "AnnAGNPS_SIM_Ephemeral_Gully_Erosion.csv".
    3.) Restricting writing "Event's total erosion...." between events in csv output files.
12. R5779: AnnAGNPS v5.43.a.002: Changes include:
    Modified ephemeral gully code in "Complete_Some_Default_Fields" to choose a default soil ID and management field management ID according to the following:
    1.) The first cell encountered in the list of sorted cells that has the same reach ID as the ephemeral gully's reach ID as specified in the ephemeral gully data section.
    2.) The first cell encountered in the list of sorted cells, if no cells specify the same reach ID as the ephemeral gully's reach ID as specified in the ephemeral gully data section.
13. R5779: AnnAGNPS v5.43.a.003: Changes include: Adding code to produce a new "AnnAGNPS_DPP_Ephemeral_Gully_Information.csv" output file. More work to be done.
14. R5783: AnnAGNPS v5.43.a.004: Changes include: Added code to produce a new "AnnAGNPS_DPP_Ephemeral_Gully_Information.csv" output file. Completed.
15. R5802: AnnAGNPS v5.43.a.005: Changes include:
    1.) Added code to produce the preferred section width key code to the "AnnAGNPS_SIM_Ephemeral_Gully_Sections.csv" output file.
    2.) Initialized "eph(:)%sctn_dpth_avg(:)" in "Read_Gully_Ephemeral_Data".
    3.) Corrected an issue in "TIEGEM_Ephemeral_Gully" that occurred for "tgm_sctn(:)%hdct_dpth_avg" & "tgm_sctn(:)%hdct_wdth_avg" when headcut migration did not occur. These variables were not reset and therefore contained the values for whatever gully was last processed.
16. R5803: AnnAGNPS v5.43.a.006: Changes include:

1.) Added code to report the management schedule ID in "AnnAGNPS_DPP_Ephemeral_Gully_Information.csv" for all gullies.
2.) Corrected an invalid pointer issue in "Field_Mgmt_Pointer_Set" that occurred when setting the "mf(f)%pt_schd" pointer to the management scheduled events array "mse(msq(j)%evn_ndx_beg:msq(k)%evn_ndx_end)".

17. R5809: AnnAGNPS v5.43.a.007: Changes include: Corrected gully output flag issue that prevented output from selected gullies only.
18. R5813: AnnAGNPS v5.43.a.008: Changes include:
    1.) Corrected a file access error when requesting "AnnAGNPS_DPP_Ephemeral_Gully_Information.csv" output file.
    2.) Reformed error message when an invalid character is entered for the width algorithm fields.
    3.) Corrected a version check error in "Utilities_Build_Record_From_CSV_String.f90".
19. R5814: AnnAGNPS v5.43.a.009: Changes include:
    1.) Revamped gully form code:
    NC=Not allowable-cropland landuse type but surface area disturbed did not meet 50%;
    NN=Not allowable-non-cropland landuse type;
    AT=Tillage-Defined max headcut erosion depth;
    AU=User-Defined max headcut erosion depth.
    2.) Modified code to clarify an error message in subroutine "Err_Pass_A3".
20. R5815: AnnAGNPS v5.43.a.010: Changes include: More revisions in the gully form code: NB=Not allowable-Management field ID of "BUFFER".
21. R5819: AnnAGNPS v5.43.a.011: Changes include:
    1.) Corrected a reporting error in the csv-formatted hydrograph gaging station file for reach ids.
    2.) Corrected an issue in output options where selected output was not produced for the last output options name in the master list.
    3.) Corrected a climate version stamp input sting from "v5.43" to "5.43"; removing the "v" which is not to be included in the string.
22. R5820: AnnAGNPS v5.43.a.012: Changes include:
    1.) Corrected an issue of output files not being produced when the global flag is true but the individual line/file is not present in the fixed/csv inputs.
    2.) Modified the header line in the csv-formatted version of the hydrograph based gaging station output file.
23. R5821: AnnAGNPS v5.43.a.013: Changes include: Modified code to process blank "AA 01", "CSV 01", "DPP 01", "NPT 01", "SIM 01", AND "TBL 01" records if they were not included in the Output Options Data section(s) of the fixed-formatted input -or- the master list for csv-formatted files. This ensures that default output files will be produced properly.
24. R5835: AnnAGNPS v5.43.a.014: Changes include: Corrected an error that occurred when the CCHE1D flag is selected but no SIM record/csv file exists and is, therefore, not processed. Whenever the CCHE1D output flag is selected, the landscape SIM output files are set to be produced but the corresponding filenames were not associated since the SIM record/file was not processed.
25. R5837: AnnAGNPS v5.43.a.015: Changes include:
    1.) Changed the potential ET used in processing wetlands to be the potential ET value before any adjustment is made based on crop coefficient.
    2.) Added additional column to the "AnnAGNPS_SIM_Wetland_Effects.csv" output file to indicate the source of potential daily infiltration input as from 1. User-input; 2. Cell: *cell_id*; or 3. Watershed average.
26. R5848: AnnAGNPS v5.43.a.016: Changes include:
    1.) Added a weir exponent input parameter to the Wetland Data section.
    2.) Addition weir exponent column to the "AnnAGNPS_SIM_Wetland_Effects.csv" output file.
27. R5849: AnnAGNPS v5.43.a.017: Changes include: Modified range of acceptable values for weir width to be (0.01 - 100000.0 [m]) in the Wetland Data section.
28. R5901: AnnAGNPS v5.43.a.018: Changes include:
    1.) Corrected reporting of the average air temperature when water temperature is not supplied in the input data.
    2.) Modified the content included in the wetland SIM output file; added Gregorian day, header changes, additional concentration column.
29. R5902: AnnAGNPS v5.43.a.019: Changes include:
    1.) Added code to re-calculate the N concentration after the N balance and water depth are adjusted.
30. R5903: AnnAGNPS v5.43.a.020: Changes include: Wetland code changes

1.) Modified some comments.
2.) Rearranged a couple of columns in the output file and modified some column headers.

AnnAGNPS v5.42.a.044_2014.12.11: (R5703) – Official Release – 12/11/2014

1. R5068: AnnAGNPS v5.41.a.019: Changes include:
   1.) Revised code to allow a blank for watershed lat-long; set default values to -999.0
   2.) Updated input specs for fixed & csv to indicate that blanks are allowed for watershed lat-long. Also, that lat-long coordinates are expressed as:
   Latitude: + North; - South
   Longitude: + East; - West
2. R5071: AnnAGNPS v5.41.a.020: Changes include:
   1.) Revised code to allow a blank for watershed name and description
   2.) Updated input specs for fixed & csv to indicate that blanks are allowed for watershed name and description.
   3.) R5071: AnnAGNPS v5.41.a.020: Changes include:
   4.) Revised code to allow a blank for watershed name and description
3. R5081: AnnAGNPS v5.41.a.021: Changes include:
   1.) Eliminated the checksum check when reading the annagnps master list csv file. This allows the user to add descriptive information in columns 3 - n.
4. R5099: AnnAGNPS v5.41.a.022: Changes include:
   1.) Extended the "CHARACTER FUNCTION Convert_Lowercase" from 80 character string max - to 1000 character string max.
   2.) Extended the max length of path & filename from 130 to 255.
5. R5115: AnnAGNPS v5.41.a.023: Changes include:
   1.) Modified code to add a decimal point to any real number being read in that does not have one rather than produce an error message.
   2.) Corrected the lower limit of the allowable impervious depth from 0.0[mm] to 50.8[mm].
   3.) Corrected a potential file unit number assignment error that would occur with csv inputs and when an error message was written related to #2 above.
   4.) Corrected the record number being displayed when errors were encountered related to #2 above.
6. R5122: AnnAGNPS v5.41.a.024: Changes include:
   1.) Added new csv-formatted output files for error, log, information, and warnings.
   2.) Searched and modified many messages to remove commas "," which are a field delimiter in csv files.
7. R5128: AnnAGNPS v5.41.a.025: Changes include:
   1.) Added code to report the ephemeral gully width algorithm flags to the input verification file "AnnAGNPS_NPT_Ephemeral_Gully.npt".
   2.) Added related note (7) to explain; and a "See Note:" line for easier referral on several columns in the output.
   3.) Disabled the new output files added in "a.024" for error, log, information, and warnings until more work can be done.
8. R5137: AnnAGNPS v5.41.a.026: Changes include: re-enabled the new output message csv files for error, log, information, and warnings.
9. R5148: AnnAGNPS v5.42.a.000: Changed the version stamp to v5.42.a.000
10. R5163: AnnAGNPS v5.42.a.001: Changed the KIND of a local variable from REAL to REAL(4) to prevent a potential terminal error due to precision when executing 64-bit.
11. R5204: AnnAGNPS v5.42.a.002: Changes include:
    1.) Modified warning/error messages related to "Watershed.inp" and "Climate.inp".
    2.) Modified the "Read_Output_Options_Data.f90" to properly set defaults for "Min/Max" records when using the csv file option but the associated csv file doesn't exist.
12. R5209: AnnAGNPS v5.42.a.003: Changes include: Modified code to repeat same information for gullies Cell/Reach Location, Index, and ID in "AnnAGNPS_NPT_Ephemeral_Gully.npt".
13. R5217: AnnAGNPS v5.42.a.004: Changes include: Modified code to repeat same information for gullies Cell/Reach Location, Index, and ID in Ephemeral Gully output .sim files.
14. R5219: AnnAGNPS v5.42.a.005: Changes include: Changed code to set the default ephemeral gully width algorithm to Wells' equation rather than hydraulic geometry.
15. R5228: AnnAGNPS v5.42.a.006: Changes include:

1.) Converted fixed-formatted ephemeral gully SIM files to csv-formatted.
2.) Changed default to TRUE for ephemeral gully hydrograph and cross sections so that they get produced when ephemeral gullies are present.

16. R5233: AnnAGNPS v5.42.a.007: Changes include:
    1.) Expanded the information contained in the Ephemeral Gully Sections output to contain barrier information and more descriptive headers. The output file is called "AnnAGNPS_SIM_Ephemeral_Gully_Sections.csv".
17. R5246: AnnAGNPS v5.42.a.008: Changes include:
    1.) Modified the error message for a blank field encountered for "Soil ID" within the CELL DATA section.
    2.) Corrected a value reported in "AnnAGNPS_SIM_Ephemeral_Gully_Nickpoint.csv" for the column labeled "Time t2 [hr]". The values previously reported here were incorrect due to an incorrect declaration of "hdct_t_beg" within routine "TIEGEM_Verification".
18. R5249: AnnAGNPS v5.42.a.009: Changes include: Corrected a improperly initialized value "hdct_t_beg" within routine "TIEGEM_Ephemeral_Gully"; there were cases in which the variable was not initialized.
19. R5252: AnnAGNPS v5.42.a.010: Changes include:
    1.) Modified code to eliminate using "dflt_dbl" temporary variables and start using the intrinsic function "DBLE" instead.
20. R5255: AnnAGNPS v5.42.a.011: Changes include: This version produces "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" and "AnnAGNPS_SIM_Insitu_Soil_Moisture_Watershed_Annual_Summaries.csv" in csv-format.
21. R5260: AnnAGNPS v5.42.a.012: Changes include:
    1.) Working on correcting reporting error in ephemeral gully erosion.
    2.) Changed references from Wells' (2011) to Wells' (2013) equation 9.
22. R5261: AnnAGNPS v5.42.a.013: Changes include:
    1.) Added CREAMS gully width equation and set as the default.
    2.) Still working on correcting bug in ephemeral gully erosion.
    3.) Eliminated writing the "Watershed totals" to the "AnnAGNPS_SIM_Insitu_Soil_Moisture_Daily_Cell_Data.csv" file.
    4.) Incremented the "wshd_npt_vrs_code" to 22 in order to add new gully width flag while maintaining backward compatibility.
    5.) Prevented writing extremely small (+/-) numbers to "AnnAGNPS_SIM_Ephemeral_Gully_Sections.csv" for erosion volume & mass due to REAL(8).
23. R5262: AnnAGNPS v5.42.a.014: Changes include:
    1.) Still working on correcting bug in ephemeral gully erosion.
    2.) corrected the "TIEGEM_Headcut_Migration" routine to properly stop migrating when hitting the barrier.
24. R5265: AnnAGNPS v5.42.a.015: Changes include:
    1.) Commented out call to "Adjust_Headcut_Distance" in the "TIEGEM_Headcut_Migration" routine until further investigation on its effect is made.
    2.) Added CSV-format option for CREAMS and other reserved gully width flag fields.
25. R5266: AnnAGNPS v5.42.a.016: Changes include:
    1.) The CREAMS Gully width equation is now termed Wells' (2013) Equation 8.
    2.) The 'Wells' (2013) Equation 9' is now termed 'Modified Wells' (2013) Equation 9'.
    3.) Modified the equation for 'Modified Wells' (2013) Equation 9'.
26. R5270: AnnAGNPS v5.42.a.017: Changes include:
    1.) Added Gregorian day and separate month, day, and year columns to the ephemeral gully output files.
    2.) Added peak discharge to the ephemeral gully sections file.
    3.) Modified the event totals and simulation totals messages within the ephemeral gully output files.
27. R5274: AnnAGNPS v5.42.a.018: Changes include:
    1.) Added 2 allocatable arrays "a_et_lyr1" & "a_et_lyr2" to accumulate and store actual ET monthly per cell per year of simulation.
    2.) Modified Insitu-Soil Moisture code to report ET monthly values and average annual values.
28. R5275: AnnAGNPS v5.42.a.019: Changes include: Modified code to report actual ET monthly values and average annual even if there is only one year of simulation.
29. R5276: AnnAGNPS v5.42.a.020: Changes include: Modified the warning message for ephemeral gullies that do not have a width algorithm selected.
30. R5295: AnnAGNPS v5.42.a.021: Changes include: Re-enabled code (and modified) to produce the hydrograph-based gaging station data in csv-format.

31. R5296: AnnAGNPS v5.42.a.022: Changes include: Modified code to output riparian buffer simulation data in csv-format.
32. R5317: AnnAGNPS v5.42.a.023: Changes include: This version adds the execution information to the csv-formatted error, warning, and information output files.
33. R5329: AnnAGNPS v5.42.a.024: Changes include:
    1.) Modified an error message to include the ephemeral gully ID.
    2.) Changed the slope check in the Riparian Buffer Data section to comply with the input specs. That is, the check was modified to produce an error message if the slope lower limit is below 0.00001. Currently, the buffer slope check is such that it produces an error message if the slope < 0.00001; produces a warning message if the slope > 3.0 & < 10.0; and an error message if the slope > 10.0.
34. R5335: AnnAGNPS v5.42.a.025: Changes include:
    1.) Modified an error message that occurs when an ephemeral gully is located in a water cell thereby having no associated soil ID.
    2.) Changed the slope check in the Riparian Buffer Data section to comply with the other data sections that have slope parameters (cell, ephemeral gully, reach, etc...). The slope warning limits can be changed in the "Global Errors and Warnings Limits Data" section.
35. R5340: AnnAGNPS v5.42.a.026: Changes include:
    1.) Modified code to allow single digit month, day, and year values in the climate csv input files (station and daily). Programs such as EXCEL would strip leading "0"s leaving only single digit month, day, and year. "m/d/y" is acceptable in the csv-formatted input climate files. For example, if the date string is "1/1/1", AnnAGNPS will convert it to "01/01/0001".
36. R5364: AnnAGNPS v5.42.a.027: Changes include:
    1.) Modified output format for all ranked ratio csv output files to have only 1 header line.
    2.) Added a new first column that is a description of the contents of that file.
    3.) Revamped the code for all ranked ratio csv output files. The code is written so as to create multiple output files for water, sediment, and nutrients. A unique filename is built internally that contains three parts:
        a.) Base containing the source (examples: "AnnAGNPS_AA_Nitrogen_load_UA_RR_" and "AnnAGNPS_AA_Sediment_load_UA_RR_Clay_");
        b.) Reach ID and location (examples: "1_Up" and "1_Down" where "1" is the reach ID);
        c.) Extension ".csv"

    Examples of whole filenames created by AnnAGNPS:
        "38" = Reach ID
        "AnnAGNPS_AA_Water_load_UA_RR_Total_38_Down.csv";
        "AnnAGNPS_AA_Water_load_UA_RR_Total_38_Up.csv";
        "AnnAGNPS_AA_Water_load_UA_RR_Total_OUTLET.csv"
    4.) Changed name of csv output folder from "CSV_Files" to "CSV_Output_Files"
    5.) If ranked-ratio files are requested then the subfolder "UA_RR_Output" is created under "CSV_Output_Files" and ranked ratio files are written in the folder.
37. R5374: AnnAGNPS v5.42.a.028: Changes include: Added a "Units" record to the gaging station files at line 8 to indicate if the output is SI or English.
38. R5383: AnnAGNPS v5.42.a.029: Changes include: Corrected an error that occurred when processing the csv-formatted output options. If the second record was blank (eof) in any given csv-formatted output options input file, the loop to process all of the output options was terminated even if there were more csv-formatted output options input files to be read.
39. R5388: AnnAGNPS v5.42.a.030: Changes include:
    1.) Changed the initialization of the "eph(:)%flg_gly_rpr" from .TRUE. to .FALSE.
    2.) Changed the initialization of the "eph(:)%re_plnt" from 0 to -9999.
    3.) Changed the default supplied when a blank is encountered for "eph(:)%re_plnt" to -9999.
    4.) Separated the annual repair flag in the 'Global Ids, Factors, and Flags Data' section so that it is a separate check from that of RUSLE based on tillage.
    5.) Changed the behavior of blanks for CROPLAND annual repair date so that blanks for mm/dd/yyyy are the same as if the user entered '00/00/0000'.
    6.) Disabled the line of code that set the gully repair flag to .TRUE. for management effect code 7 (plant - begin new growth).

7.) Set the "tgm_sctn(:)%wdth_dn = sctn_wdth(:)" in the "TIEGEM_Hydro_Sctn_Development.f90" routine. "sctn_wdth" is the calculated average width.
8.) Modified the sections output to include the downstream and upstream widths.
9.) Modified the knick point output to report discharge in 'cms' units rather than unit area.
10.) Modified the csv-input code to properly handle annual repair dates.
11.) Modified code to set the repair flag based on the following order:
a.) The repair flag is set to .TRUE. for all gullies on the initial pass of processing except for 'CROPLAND'.
b.) Next, if the landuse is 'CROPLAND' then the flag is determined by management operations (tillage, replanting, etc...)
c.) Lastly, if the user specified an annual repair date in the Global IDs, Factors, and Flags Data section.

40. R5389: AnnAGNPS v5.42.a.031: Changes include: Initialized the gully actual upstream and downstream section widths to 0.0 when the gully is repaired.
41. R5394: AnnAGNPS v5.42.a.032: Changes include:
1.) Corrected error where the particle size ratios were applied twice to the gully runoff variables.
2.) Disaggregated the nickpoint erosion into nickpoint yield for the gully yield related output.
3.) Added "Headcut Migration" to the gully section volume and erosion headings in the gully sections output file.
4.) Added code to initialize the nickpoint erosion volume variable where appropriate.
42. R5396: AnnAGNPS v5.42.a.033: Changes include: Revamped the gully sections output file to include a nickpoint section and reduced the number of columns related to nickpoint.
43. R5397: AnnAGNPS v5.42.a.034: Changes include:
1.) More modifications to the gully sections output file.
2.) Commented out 3 lines of code that forced nickpoint erosion to be as if the previous scour had been filled in resulting in higher nickpoint erosion values. Now the nickpoint erosion is based on the new volume minus the previous volume.
44. R5410: AnnAGNPS v5.42.a.035: Changes include: Modified code to produce the hydrograph gaging station output file unless the user specifically enters an "F" for the output flag; blank defaults to .TRUE.
45. R5413: AnnAGNPS v5.42.a.036: Changes include: Modified Wells' gully width equation "!Code 7--(h) Wells' (2013) gully width equation 8".
46. R5427: AnnAGNPS v5.42.a.037: Changes include: Expanded an error message that occurs when a hydraulic geometry is specified in the "Global IDs, Factors, and Flags Data" section but is not found and defined in the "Hydraulic Geometry Data" section.
47. R5430: AnnAGNPS v5.42.a.038: Changes include:
1.) Corrected a bug that caused the premature termination of a loop while reading the last output options csv file specified in the master list.
2.) Changed an error message, which occurred when a reach ID was requested for output in the Output Options Data section but did not exist in the Reach Data section, to a warning message and reworded.
3.) Changed a warning message to an information message and reworded the message when no gully width algorithms are selected or all are set to false by the user.
48. R5440: AnnAGNPS v5.42.a.039: Changes include: Added nickpoint erodibility and critical sheer stress values to nickpoint output file.
49. R5441: AnnAGNPS v5.42.a.040: Changes include: Corrected the spelling of 'Sheer' to 'Shear' in a column heading for nickpoint output file.
50. R5652: AnnAGNPS v5.42.a.041: Changes include: Corrected a bug in AnnAGNPS in the Runoff Curve Number read-in routine. Problem: There is a check to see if all IDs within a data section can be sorted as integer or must be sorted as character. If all user-entered curve number IDs are integer then a flag is set to perform an integer sort. However, there are 2 internally defined curve number sets called 'Default Crop CN' and 'Default Non-Crop CN' that were not considered in the check. Therefore, the sort must be a character sort; not integer. Solution: Changed subscript beginning position in sort routine to 3 to skip the 2 internally defined curve number sets and start with the first user-entered curve number set. Therefore, if all user-entered curve number IDs are integer then an integer sort can be performed; otherwise, a character sort is performed.
51. R5654: AnnAGNPS v5.42.a.042: Changes include: Added error-handling code in the "Initialize_Data_V3_Output.f90" routine to catch allocation errors such as "insufficient virtual memory" that caused a terminal crash of AnnAGNPS. Now an error message is produced and execution is terminated.
52. R5690: AnnAGNPS v5.42.a.043: Changes include:

1.) Changed the primary climate file base unit number from 10000 to 5000 to avoid a conflict with the output files base unit number.
2.) Deleted the duplicate and unused subroutines "Utilities_Close_All_File_Units" and "Close_Individual_File_Units" from the "Read_Climate_Input.f90".
3.) Changed the "Close_Individual_File_Units" routine to keep or delete files based on file size (delete if file size <=0) rather than the record pointer (pos = 'REWIND').

53. R5703: AnnAGNPS v5.42.a.044: Changes include:
1.) Added log traces when opening the climate files.
2.) Added error trap in "Utilities_Build_Record_From_CSV_String" when csv climate station files are being used and contain incorrectly formatted beginning and ending date strings.
3.) Modified the routine "Close_Individual_File_Units" to only delete files that are 0 in size.

AnnAGNPS v5.41.a.018_2014.02.06: (R4966) – Official Release – 02/06/2014

1. R4652: AnnAGNPS v5.40.a.038: Changes include:
1.) Corrected a situation where the variable 'cly_yld_nd' could be used without first being defined in certain circumstances.
2. R4653: AnnAGNPS v5.40.a.039: Changes include:
1.) Corrected a bug that chopped off the "E" portion of the data values being written to the CSV output files resulting in the decimal being in the wrong place.
2.) Added code to allow Storm Type Data in csv format to be read-in directly into AnnAGNPS.
3.) Added code to allow Climate Data in csv format to be read-in directly into AnnAGNPS.
4.) Checked and changed code to ensure coding convention consistency; "&" line continuation character in column 73.
3. R4655: AnnAGNPS v5.40.a.040: Changes include: Added a couple of spaces in a header line in Verify_Cell_Initialization.f90 to correct spacing in the soil moisture units header line.
4. R4665: AnnAGNPS v5.40.a.041: Changes include: Corrected unit headings from [Mg] to [kg] for loads in the nutrient ranked-ratio output files.
5. R4678: AnnAGNPS v5.40.a.042: Changes include:
1.) Process_Riparian_Buffer_Reach.f90: Set the trapping efficiency "rv(rv_ndx)%bffr_TE_ps(ps)" to 0. for small and large aggregates since aggregates are not tracked in the reach.
2.) Process_Riparian_Buffer_Cell.f90: Put a check to prevent a divide-by-zero condition if "src_yld_bfr(ps)" = 0. Also, set the actual trapping efficiency "cv(c)%bffr_TE_act(ps)" to 0. if such a condition is encountered.
6. R4680: AnnAGNPS v5.40.a.043: Changes include: Process_Riparian_Buffer_Cell.f90:
1.) Modified cell-buffer code to remove yield adjustment for the clay particle size if the user did not enter an actual trapping efficiency.
2.) Modified cell-buffer code to set the actual trapping efficiency to 0.0 for clay particle size
7. R4698: AnnAGNPS v5.40.a.044: Changes include: Added average annual monthly output files for nitrogen and phosphorus.
8. R4699: AnnAGNPS v5.40.a.045: Changes include: Turned off the average annual monthly output files for nitrogen and phosphorus; commented out but kept all related code.
9. R4700: AnnAGNPS v5.40.a.046: Changes include:
1.) Added a csv-formatted version of the hydrograph-based gaging station output file. Disabled the csv-formatted version of the hydrograph-based gaging station output file. Related code commented out.
2.) Restricted the output in "AnnAGNPS_TBL_CCHE1D.txt" to report only 'CELL' information which is the accumulation from all sources except irrigation.
10. R4741: AnnAGNPS v5.41.a.000: Changes include:
1.) Added code to process new trapping efficiency feature for ephemeral gullies.
2.) Changed version number to v5.41 to accommodate new feature.
11. R4755: AnnAGNPS v5.41.a.001: Changes include:
1.) Modified peak discharge equations for ephemeral gullies going through a buffer.
2.) Modified the flow path width along the buffer and the Q_flow_rate in Process_Riparian_Buffer_Cell.f90 for ephemeral gullies using the "cell's drainage subcell" area.
3.) Corrected the equation reducing the amount of gully sediment yield based on the maximum buffer trapping efficiency
4.) Added code to add the new "Maximum Buffer Trapping Efficiency" parameter to the csv read-in routines.

12. R4814: AnnAGNPS v5.41.a.002: Changes include: Corrected a spelling error in an error message.
13. R4817: AnnAGNPS v5.41.a.003: Changes include:
    1.) Corrected a wrong variable used for the beginning processing date in the cell initial tile drain verification output file.
    2.) Added 'cell_time_to_peak' column to CCHE1D yield & runoff output files.
    3.) Corrected the potential access to an uninitialized variable in the impoundment routing.
14. R4819: AnnAGNPS v5.41.a.004: Changes include:
    1.) Added code to accept v5.41 as an acceptable version for climate & storm type input files.
    2.) Modified input specs to reflect v5.41 as acceptable for climate and storm type input data files
15. R4838: AnnAGNPS v5.41.a.005: Changes include:
    1.) Corrected a wrong variable used in reading Ephemeral Gully request flags in the Output Options.
16. R4842: AnnAGNPS v5.41.a.006: Changes include:
    1.) Changed the equations for the calculation of the flow path width along the buffer and the flow rate for cells and the flow rate for reaches when processing riparian buffers.
17. R4875: AnnAGNPS v5.41.a.007: Changes include: Modified code so that if the CCHE1D flag is selected in the Output Options Data section then the .cpt file, and landscape yield & runoff files will automatically be produced.
18. R4887: AnnAGNPS v5.41.a.008: Changes include:
    1.) Added code to check for errors when opening files. If an error occurs then a message is produced rather than a terminal crash of the program.
    2.) Added an error check to see if the user-specified csv master list file specified in the AnnAGNPS.fil exists. If not, produce an error message and terminate execution.
19. R4890: AnnAGNPS v5.41.a.009: Changes include: Corrected calculation of "cell_rnof_dur_hr" in "RUSLE_S_and_R_Delivery_Ratio.f90". Mismatched units in variables used in the equation.
20. R4891: AnnAGNPS v5.41.a.010: Changes include: Added a water column to the landscape yield & runoff .SIM & .CSV output files with [hm^3] units for quick verification against the AnnAGNPS.cpt file.
21. R4892: AnnAGNPS v5.41.a.011: Changes include:
    1.) Modified the climate read-in to pad '0' for ' ' in daily clinmate records. " 1/ 1/ 1" becomes '01/01/0001". This avoids an erroneous error check in the code.
    2.) Changed code to match input specs to allow a blank in the "STRIP CROP DATA" section of input data for the delivery ratio.
    3.) Changed an error message to a warning message when older data sets containing strip crop data are encountered. Execution will now continue but defaults will be used.
    4.) Modified code to properly set the "vrsn_watershed" for older data sets.
    5.) Corrected a potential terminal crash caused by a variable mismatch on a WRITE statement dealing with strip crops.
22. R4893: AnnAGNPS v5.41.a.012: Changes include: Modified some of the Real_to_Character routines to force an 'E' format when values are < .001.
23. R4896: AnnAGNPS v5.41.a.013: Changes include:
    1.) Reorganizing blocks of SUBROUTINES & FUNCTIONS into common MODULEs to reduce the number of MODULEs and overall number of .f90 files. Included are "Calendar", "Convert", "Deallocate", "Error", "Input Versions", & "Programmer's Verification" routines.
    2.) Starting to replace and eliminate some older error message routines.
24. R4900: AnnAGNPS v5.41.a.014: Changes include:
    1.) Revamped the csv input routines for Management Schedule & related pesticide IDs. Removed the requirement that there be a "mansched_pests.csv" csv input file by adding the pesicide application IDs directly into the "mansched.csv" csv input file.
    2.) Set a hard-coded limit of 5 pesticide application IDs per management event in both the fixed-format and csv-format input files.
    3.) Removed the "Landuse Type ID" from the "SOIL INITIAL CONDITIONS DATA" section.
    4.) Modified the code to apply user-entered values in the "SOIL INITIAL CONDITIONS DATA" section to both crop and non-crop landuse types.
25. R4928: AnnAGNPS v5.41.a.015: Changes include:
    Changed the Real_to_Character_11, Real_to_Character_12, Double_to_Character_11, and Double_to_Character_12 routines to write very small numbers using an 'E20.2' format instead of 'E20.4'.
26. R4930: AnnAGNPS v5.41.a.016: Changes include:

Disabled the 'Previous estimate of water load' parameter in Read_RCN_Calibration_Data.f90.

27. R4961: AnnAGNPS v5.41.a.017: Changes include:
    1.) Added more checks for gullies with 'BUFFER' as the management field ID; corrected access violation error.
    2.) Modified the read-in routine for non-crop data that will allow blank entries for average canopy cover and average rain fall height under certain circumstances.
28. R4966: AnnAGNPS v5.41.a.018: Changes include: Modified a few error messages in read routines for crop and management operation.

AnnAGNPS v5.40.a.037_2013.05.16: (R4626) – Official Release – 05/16/2013

1. R4308: Commented out a block of code in RCN_Retention_Factor.f90 that produced a bad error message.
2. R4311: Created a new output file for Sediment load by reach called "AnnAGNPS_TXT_AA_Sediment_load_reach_(mass).txt"
3. R4311: Added Strip Crop Data section to allow the user to specify an associated p-factor and sediment delivery ratio.
4. R4311: Modified format and content in RUSLE p-factor output tables.
5. R4311: Disallowed Clay and Valley Clay Scour code from having an effect in results.
6. R4311: Defaults for concentrated flow slope & sheet flow slope were changed to the cell's slope.
7. R4319: Significant revision of the Output Options Data section. New structure implemented.
8. R4345: Modified code to allow the user to enter a USLE C-factor in the CROP DATA section, if desired, and use that value rather than the calculated C-factor value.
9. R4347: Renamed the source code folder from "Insitu_Routines" to "Insitu_Soil_Moisture".
10. R4348: Modified the contents of the project file “AnnAGNPS.vfproj” to accommodate the folder rename from "Insitu_Routines" to "Insitu_Soil_Moisture".
11. R4349: Extracted ISM top & bottom layer routines from "ISM_Control_Volumes.f90" and separated into individual routines called “ISM_Control_Volume_Top_Layer.f90” & “ISM_Control_Volume_Bottom_Layer.f90”.
12. R4350: Replaced the hard-coded number of soil composite layers currently (2) with a variable "max_sc_lyr" also currently (2) that will allow the number of soil composite layers to be increased later, if desired. (R4350)
13. R4351: Renamed a data structure (Calibrated_RCNs to Watershed_RCNs) and related pointers (ccn to wcn) to follow Fred's naming convention.
14. R4351: Reinstated the USLE C-factor in the CROP DATA section. Modified code to allow the user to enter a USLE C-factor in the CROP DATA section, if desired, and use that value rather than the calculated C-factor value.
15. R4355:
    1.) Made clay & valley clay scour codes in Reach Data section active again ('T' is allowed).
    2.) Increased maximum number of gullies to 1,000,000. Code appeared to have max warning and max error values reversed in the check for the number of gullies in the "Read_Gully_" routines.
    3.) Corrected code that was producing fort.12127 & fort.11428 output files in the RUSLE_P_Contour.f90 source code file.
16. R4370: Corrected code to properly initialize an uninitialized variable "hdct_dpth_max" that erroneously caused gully erosion to be calculated when it should not have been.
17. R4374:
    1.) Removed scour amounts from point source totals in Reach_Routing/Reach_Routing_Sediment.f90.
    2.) Added code to report sediment by source (gully, pond, and sheet & rill) to the gaging station output file.
18. R4375: Corrected wrong variable names being used in the new code for gullies, ponds, and sheet & rill.
19. R4377:
    1.) Completed removing scour amounts from point source totals in Reach_Routing/Reach_Routing_Sediment.f90.
    2.) Added code to report sediment by source (reaches) to the hydrograph-based gaging station output file.
20. R4378: Corrected a subscript error that caused bed & bank to route incorrectly.
21. R4379: Modified/corrected the output reporting in the reach accumulation output file.
22. R4386: Modified the crop-coefficient defaults for the Crop Data section: 0.15 (initial & senescence); 1.15 (mature)
23. R4395:
    1.) Corrected/Modified the "AnnAGNPS.evn" output file to report correctly for sources.

2.) Added headers & units to the output

24. R4400:
    1.) Added code to report sediment by sources to the event-based gaging station output file.
    2.) Reversed the reporting sequence of "up" and "down" in the hydro-based gaging station file.
25. R4409:
    1.) Modified/corrected the average annual discharge equation in the hydro-based gaging station file.
    2.) Modified related column headings in the hydro-based gaging station file.
    3.) Changed "B&B" to "BnB" in the event-based gaging station file.
26. R4415:
    1.) Made Clay and Valley Clay scour codes inactive again in Read_Reach_Data.f90.
    2.) Updated documentation. Changed default values on crop-coefficient parameters in the CROP DATA section.
27. R4422: Modified auto-creation of v1 & v2 standard output filenames (.acc, .evn, _AA.dat, & _EV.dat) to use default filenames for csv input rather than building them based on the input filename within the AnnAGNPS.fil control file.
28. R4436: AnnAGNPS v5.40.a.014: Changes include:
    1.) Modified code to allow a blank RCN ID on the first event of a new management schedule. If blank then an internal crop or non-crop RCN ID will be used as a default based on a determination of the first scheduled event as to if it is a crop or non-crop schedule.
    2.) Added 2 new parameters in the "GLOBAL IDS, FACTORS, AND FLAGS DATA" section for global IDs. One for crop RCN ID and one for non-crop RCN ID.
    3.) Made the "RUNOFF CURVE NUMBER DATA" section optional. If this section is not present, then internally defined curve number sets will be used as defaults.
    4.) Modified code to check for a user-entered global RCN ID default. The user-entered will be used, if present, otherwise an internal crop or non-crop RCN ID will be used.
    5.) Modified the read-routines to handle new parameters and associated checks.
    6.) Modified the output warning messages for the runoff curve number sets.
29. R4454: AnnAGNPS v5.40.s.021: Modified/corrected wetland-related processes coding
30. R4455: AnnAGNPS v5.40.a.022: Corrected divide by 0 error in Process_Wetland.f90.
31. R4459: AnnAGNPS v5.40.a.023: Modifying determination of effective rainfall for wetlands.
32. R4461: AnnAGNPS v5.40.a.024: Changes include:
    1.) Changed range limits in Wetland Data section for Daily Infiltration and Weir Width
    2.) Changed hydrograph-based gaging station output filename (added _Hyd)
    3.) Changed location and filename of the event-based gaging station file (added _Evt; move to TBL section of Output Options)
33. R4483: AnnAGNPS v5.40.a.025: Changes include:
    1.) Removed point source flow from uniform flow; now keep track of point source flow separately.
    2.) Modified the calculation of the peak discharge into two equations; a.) peak discharge from non-point source flow; b.) peak discharge from point source
    3.) Modified the Process_Wetland routine to reapportion the outflow of water between runoff volume and point source flow. The code finds the ratio of point source to the total volume of inflow water and applies that ratio to the outflow of water.
    4.) Modified code to calculate clay-sediment delivery ratio to be based on total clay-content from all related particle size classes (clay, small aggregates, and large aggregates). Changes made to Sheet & Rill, Classic & Ephemeral Gullies, and Pond.
    5.) Corrected wrong variable name used in floodplain related code in Reach_Routing_Sediment.f90.
    6.) Removed a tolerance limit check that resulted in the miscalculation and mis-routing of sediment within a floodplain.
    7.) Added point source to some output files.
    8.) Working on the CCHE1D routine to clean it up and verify the output.
    9.) Corrected the subscript for the reach in reporting the Landscape runoff and yield.
    10.) Tweaked the log message for the input filename from the AnnAGNPS.fil file.
34. R4483: AnnAGNPS v5.40.a.026: Changes include:
    1.) Revamping the Landscape Yield and Runoff routines to include more information.
    2.) Added point source, irrigation, and pesticides to output.
    3.) Reporting Phosphorus into its inorganic and organic attached sediment components.

4.) Added 4 new output files that contain Landscape Yield & Runoff event totals in fixed-format and csv format.
5.) Corrected a possibility of trying to access an unallocated variable.
6.) Revamped output formatted for CCHE1D.
7.) Made a correction that prevents a terminal crash in the verifications routines related to CCHE1D when RCN calibration is being used.
8.) Corrected subscripts for deposition and scour tracking.
9.) Corrected subscript for reach-located riparian buffers.
10.) Added the reach ID in the "Reach_Vary" arrays to make it easier to verify the link between the "Reach_Static" and "Reach_Vary" structures.
11.) Worked through water, sediment, and nutrient effects of adding point source.
12.) Correction to equilibration of Phosphorus code.
13.) Added a check to prevent "-0.00" from being written to the "AnnAGNPS_AA_Sediment_load_by_reach_(mass).txt" output file in the "Added" column.

35. R4551: AnnAGNPS v5.40.a.027: Changes include:
    1.) Cleaned up, reworded, and expanded -some- error messages on numeric fields during read-in of the watershed input file including the actual line number of the offending record.
    2.) Added a total record count read in from the watershed input file to be reported for the fixed-formatted input files.
    3.) Eliminated an unused variable from the Reach_Routing_Sediment.f90 code.
36. R4578: AnnAGNPS v5.40.a.028: Changes include: Corrected flag issue where the CCHE1d/cpt output file would not be produced unless the landscape yield from all sources was requested.
37. R4579: AnnAGNPS v5.40.a.029: Changes include: Corrected Output Options internal conversion of "1st *.txt" and "2nd *.txt" to the appropriate "AA 01", "EV 01", and "TBL 01" records.
38. R4580: AnnAGNPS v5.40.a.030: Changes include:
    Modified code to allow for two individual output files; AnnAGNPS.cpt & AnnAGNPS_TBL_CCHE1D.txt. Previously, a flag for AnnAGNPS_TBL_CCHE1D.txt would override the flag for AnnAGNPS.cpt.
39. R4589: AnnAGNPS v5.40.a.031: Changes include:
    1.) Corrected a potential divide by zero error in Process_Wetland.f90.
    2.) Added a csv verification output routine to Process_Wetland.f90 to produce the output file in csv format.
40. R4590: AnnAGNPS v5.40.a.032: Changes include:
    1.) Changed/corrected an issue in the FAO Potential ET adjustment routine that failed to properly determine the current growth stage under certain circumstances.
41. R4591: AnnAGNPS v5.40.a.033: Changes include:
    1.) Corrected a wrong variable name for transferring feedlot water yield from cell to receiving reach.
    2.) Added check to prevent feedlots from being processed with snowfall.
    3.) Added check to only produce wetlands output for reaches requested in Output Options. Will later add a "Wetland" request record in the Output Options Data section and use that rather than the reach output request record.
    4.) Changed/corrected an issue in the FAO Potential ET adjustment routine that failed to properly determine the current growth stage under certain circumstances. Correction in R4590 (a.032) was not a proper correction.
42. R4592: AnnAGNPS v5.40.a.034: Changes include:
    1.) General cleanup of the "AnnAGNPS_Main.f90" file. There should be no resulting numerical differences in the output as to that of a.033.
43. R4613: AnnAGNPS v5.40.a.035: Changes include:
    1.) Modified code to allow for a "Wetland ID" request record in the Output Options Data section using either fixed-formatted or csv-formatted inputs.
    2.) Added code to report the starting record number to the screen & log file of each data section when using fixed-formatted inputs.
    3.) Corrected the record count when a "BACKSPACE" was encountered while reading fixed-formatted input.
44. R4617: AnnAGNPS v5.40.a.036: Changes include:
    1.) Changed the name of the source code file from Process_Wetland.f90 to Process_Wetland_Reach.f90.
    2.) Changed source code routine and calls from "Process_Wetland" to "Process_Wetland_Reach"
    3.) Changed lowercase from "reading wetland data" to uppercase "reading WETLAND DATA" in Read_Watershed_Input.f90 for consistency.
45. R4626: AnnAGNPS v5.40.a.037: Changes include:

1.) Added code to produce ranked-ratio file for water load.
2.) Improved error message for "Cell Area" in Read_Cell_Data.f90

AnnAGNPS v5.30.s.024_2012.07.26: (R4177) – Official Release – 09/11/2012

1. Modified code to correctly transfer downstream end of contributing reach to outlet to the upstream end of the outlet.
2. Added a new output file for AA sediment load by reach including channel erosion (bed & bank).
3. Added channel erosion (bed & bank scour and deposition) into AnnAGNPS.

AnnAGNPS v5.30.a.004_2012.06.22: (R4119) – Official Release – 06/22/2012

1. Added Riparian Buffer Data section and modified code to allow cell-located and reach-located riparian buffers.
2. Added a check to make sure the trapping efficiency for each particle size does not fall negative when processing riparian buffers.
3. Modified sediment yield and actual trapping efficiency calculations in the process routine for cell-located riparian buffers.
4. Adding code to produce multiple ranked-ratio files for sediment & nutrients.
5. Added an error check in reading soil & soil layer information.
6. Corrected a couple of bugs related to the Output Options:
    a. The 64-bit release version produced a different number of output files than other 32-bit and 64-bit configurations; caused by an uninitialized flag.
    b. There was a possible conflict in output file indexes when aqua pond release and aqua pond yield verification files were requested as well as sediment load by source files were requested.
7. Corrected initialization inconsistency in read_rcn_calibration_data.f90 that caused baseflow to be calculated when it should not have been.
8. Corrected omission of adding nutrients from tile drain flow to yield.
9. Corrected a bug when reading in climate data. A conversion factor to SI was being applied to the station elevation even if it were already in SI units.
10. Made a correction in Initial_Management_Operation.f90 related to the amount of pesticide contained in the bottom layer.
11. Correcting some warnings generated by the gfortran compiler under linux os.
12. Initializing variables contained in the Data Dictionaries so that upon ALLOCATION the variables will contain known default values. This is in an effort to synchronize output from different platforms (32 & 64 bit), configurations (Debug & Release), and operating systems (WINDOWS & UNIX).
13. Modified code to report the gully location designation "C" or "R" and the cell ID for all events in the gully nickpoint and yield to mouth output files.
14. Added unit-area ranked-ratio output files for sediment and nutrients.

AnnAGNPS v5.20.a.029_2012.01.26: (R3760) – Official Release – 01/26/2012

1. Implemented Wells (2011) width algorithm.
2. Implemented FAO ET enhancement for adjusting potential ET for v5.20and newer watershed datasets
3. Added Wetland Data section.

AnnAGNPS v5.10.a.000_2011.07.28: (R3387) – Official Release – 07/29/2011

1. Corrected an error in the erodibility/detachment related code. A conversion could occur twice under a certain condition.
2. Corrected the depth calculation of the portion of the soil layer that is within the first 8".
3. Modified the default behavior that occurs for organic matter and nutrients in the "Soil Data" section and "Soil Initial Conditions Data" section.
4. Corrected an incorrect read-in value for ephemeral gully headcut depth.
5. Modifications to setting a tolerance limit for the local drainage area in ephemeral & classic gullies.
6. Corrected an issue with interception & available soil moisture variables related to water cells.
7. Added cell drainage areas to insitu-soil moisture daily table.
8. Corrected an issue of incorrect effective rainfall accumulation when water cells exist in the watershed data as defined by a management field ID of 'Water'.

9. Breaks out the precipitation/rainfall sources for reporting in the gaging station output files.
10. Also corrects the reporting for precipitation/rainfall sources in the insitu soil moisture output tables. Snowfall & snow melt was not being reported properly.
11. Corrected feedlot errors for leap-year and first event operation being skipped when initialization years are present.
12. Removed maximum limit of 5 gaging stations (4 + outlet) reported in the hydrograph-based gaging station output file.
13. Corrected terminal crash that occurs when a user does not enter a required RCN ID on first date of a new management schedule.
14. Reworked global Cropland & non-Cropland initialization and defaults as well as Soil Data local initialization and defaults.
15. Corrected the residue equation in the Insitu_Nitrogen_Organic.f90 routine.

AnnAGNPS v5.00.a.035: (R2322) – Official Release – 11/19/2009

1. Added reach-located gullies.
2. Sprinkler irrigation corrected
3. Corrected calendar subprograms for BC
4. Added traps for water cells.
5. Corrected snowmelt problem
6. Adjusted headcut migration barrier to better represent the smaller drainage areas
7. Minor adjustment for sheet & rill algorithm
8. Added upstream gully feature; revised "AnnAGNPS_SIM_Ephemeral_Gully_Sections.sim" tp show actual headcut depths & widths in each section.
9. Added upstream gullies, revising gully's hydraulic geometry to allow for defaults.
10. Revised tillage default to 200 [mm] when soil is disturbed and hydraulic geometry's valley width fields allow defaults.
11. Changes to the width algorithm selections in the ephemeral gully.
12. Corrected units in the RCN functions.
13. Corrected the quadratic equation solution within the RCN functions.
14. Improvements to the tile drain feature.
15. Correction to the TIEGEM_Ephemeral_Gully_Yield_to_Mouth.f90 routine.
16. Modified Yld_from_Cell_to_Rec_Rch.f90 to report upstream and downstream contributions from the cell to the cell's receiving reach.
17. Completed corrections to Read_Management_Schedule_Data.f90 calculation of indices & sort routine error traps.
18. Corrected an issue with the routing of nutrients.

AnnAGNPS v4.00.a.019: (R0355) – Official Release – 08/07/2007

1. Corrected the calculation for the 2yr 24hr precip value.

AnnAGNPS v4.00.a.018: (R0314) – Official Release – 07/11/2007

1. Modified the routine to select the highest precip values based on Active Series rather than Partial Distribution Series.
2. Corrected bug encountered when converting climate data from SI to English units.
3. Resolved multiple gully integration and multiple feedlots integration.
4. Correcting gaging station file.
5. Corrected insitu phosphorus to allow dissolved phosphorus when there is no erosion
6. Correct feedlot accumulations.
7. Enhanced growth days algorithm.
8. Improved management error trapping.
9. Corrected days from planting to harvest which affected the residue decay resulting in less nitrogen yield, etc.
10. Revised the inorganic phosphorus routine. (Replaced initialization for inorganic P fertilizer added before second loop.)
11. Enhanced scheduled operations verification output
12. Corrected and implemented code to sort the Management Schedule data.

13. Added a check to prevent a potential XML command conflict from occurring in the watershed header data.
14. Corrected major errors in insitu nitrogen verification output.
15. Corrected minor error in the nickpoint routine for ephemeral gullies.
16. Corrected error in output of the insitu organic nitrogen verification file
17. Corrected channel elevation from bank elevation to bed.
18. Finished verifying & correcting minor errors involving the reach routing simulation output files.
19. Corrected ephemeral gully nickpoint development routine and the verifcation output routine for the water load
20. Corrected gully tc from mouth to receiving stream
21. Corrected double counting of Gaging_Station_Output.f90
22. Correcting nickpoint & headcut migration erosion.
23. Corrected gully yied to mouth for ephemeral gullies.
24. Worked on sediment routing; isolated problem to multiple gullies in same cell.
25. Added attached & dissolved to nutrient gaging station output
26. Corrected gaging station output
27. Corrected USLE verification file to write only when RCN calibration is not active.
28. Corrected a bug that causes an access violation in the event that an aquaculture pond management schedule ID is requested in the Aquaculture Pond Data section but there is no corresponding Aquaculture Pond Management Schedule Data section or there is no match for the requested ID in the management schedule list of IDs.
29. Added code to prevent a program crash in the event the user specifies a secondary climate file that contains dates entirely before or after those within the primary climate file. A warning is generated and the primary climate file is used instead of the secondary climate file.
30. Allow the user to specify up to 32767 secondary climate files.
31. Increased the number of decimals in the "AnnAGNPS_TXT_EV_Outlet_Water_load_(unit area).txt" output file.
32. Includes ephemeral gully components.
33. Provides runoff auto-calibration via the RCN.
34. Allows the user to enter storm type distributions by event, season, or simulation.
35. Includes many corrections to wording and bug fixes.

AnnAGNPS v3.52.t.00: – Official Release

AnnAGNPS v3.51.t.19: – Official Release

AnnAGNPS v3.51.t.16: – Official Release

AnnAGNPS v3.32.a.35 – Official Release– 02/28/2004

1. Many minor revisions were made to make the code “clear, concise, & complete”.
2. The program structure was revise to group related physical processes together in separate subdirectories, contain certain subroutines, and modularize lengthy code. Within these subdirectories, the files contain subprograms which are structured with the main subprogram containing various called subroutines. Name changes were done to reflect the new grouping in order to make navigating between subprograms and their subroutines simpler.
3. Subprogram name changed from ”Nutrients_Insitu” to “ Insitu_Nutrients”.
4. Minor format revisions to bring the code into strict agreement with the code conventions such as: (1) including subroutines with its major subprogram via CONTAIN statements when there are calls from only from within its parent subprogram; (2) using two & only two indents; and (3) listing all subprograms in alphabetic order.

AnnAGNPS v3.32.a.03 – Official Release– 09/19/2003

1. Minor corrections to wording and bug fixes.

AnnAGNPS v3.32.a.03 – Official Release– 09/04/2003

1. Many enhancements have been added that are needed for the nutrient and gully.
2. The Management Schedule Data section was also improved to better account for rotations.

AnnAGNPS v3.30 – Official Release– 05/08/2003

1. Many enhancements have been added that are needed for the management data sections.

AnnAGNPS v3.20 – Official Release– 10/17/2002

1. Many enhancements have been added that are needed for subsurface lateral flow.
2. Climate datasets can now be identified by AnnAGNPS cell.

AnnAGNPS v2.01.c – Official Release– 02/01/2001

1. Many enhancements have been added that are needed for the determination of the time of concentration, elimination of the cell profile data section, sediment yield from a cell, along with numerous bug fixes and output generation.

AnnAGNPS v1.10 – Official Release– 06/08/1999

1. Corrected bug in source-accounting
2. Corrected handling of pesticides from point sources
3. Corrected gully drainage area default
4. Added write to screen to inform user of program progress
5. Corrected error messages for Operations Reference checks
6. Reach sediment transport calculations modified.
7. EI lookup table added.
8. AnnAGNPS RUSLE code modified: including minor corrections and making the C, K and P factors dependent on cell elevation, allowing C, K and P to change with climate.
9. Add error checks in data checking routines.
10. Add determination of spatial variablility of precipitation according to difference in altitude.
11. Solar radiation calculations changed
12. Non-unique variable names changed in RUSLE routines
13. Change default input value of Reach Vegetation Code to 1.
14. Added input option of user-entered EI Distribution values.

AnnAGNPS v1.08 – Official Release– 02/10/1999

1. Add variable for 2 Yr 24 Hr Precipitation to Read_Climate
2. Change allowable input for Precipitation Nitrogen to accept blank as input.
3. Change allowable inputs for Reach Nutrient Half-Life parameters to allow zero as an acceptable value.
4. Change default value of Reach Nutrient Half-Life parameters to 730.0
5. Change allowable inputs for Reach Geometry parameters to allow a greater range of values.
6. Change calculation of Tc and method of determining default hydraulic geometry coefficients and exponents
7. Change erosion routine so that soil loss in a cell is not calculated when there is no runoff

AnnAGNPS v1.07 – Official Release– 11/10/1998

Input changes:

1. Accept blank for Reach Infiltration rate (Reach Data) as variable is currently not used.
2. USLE C-Factor (Landuse Reference Data) must be blank for AnnAGNPS mode. Only used in AGNPS mode.
3. “Mixed” Field Landuse identifier (Field Data) only applies in AGNPS mode.
4. Clarify that if Elevation Difference (1), Elevation Rain Factor (1), Elevation Difference (2), or Elevation Rain Factor (2) (Daily Climate Data) is blank, then all of these must be blank.
5. Rename Find Sand Ratio (Soil Data) as Very Fine Sand Ratio and change particle size definition.

Program changes:

1. Display output file names in AnnAGNPS window when model processing is done.
2. Use scour code flag check before adding any bed & bank sediment to reach. (Previously small amounts of bed & bank sediment could have appeared due to numerical accuracy in the reach sediment routing, when scour codes were not on)
3. Skip parameter initialization if any errors have been detected during reading input or data preparation. Job will not run if any errors are detected so initialization is unnecessary. (Eliminates system runtime for certain types of errors that were detected.)
4. Convert reach geometry identifiers and source accounting identifiers to uppercase when making identifier comparisons using either of there variables.
5. Accept blanks for Reach Infiltration Rate (Reach Data) and Residue Adjust (Crop Data) as variables are currently not used.
6. USLE C-Factor (Landuse Reference data) must be blank for AnnAGNPS mode.
7. Change criteria to pesticide applications > 0 for saving reach accumulation pesticide data to be used in source accounting. Previous criteria failed when only reach components were specified for source accounting output.
8. Set internal water temperature variable to a constant 20 degrees C. Currently water temperature is only used in nutrient and pesticide decay during reach routing.

AnnAGNPS v1.06 – Official Release– 09/28/1998

Input changes:

1. Change units for Annual Rainfall Height in Landuse Reference Data to feet or meters from inches or millimeters. Make consistent with Rainfall Height in Crop Data (Change listed for Version 1.02 - apparently not made at that time.)
2. Expand use of Reach Outlet Specification to identify additional Source Accounting File “base locations”
3. Qualify interaction (acceptable/unacceptable combinations) of Irrigation Application variables
4. Allow blank and zero as acceptable entries for Number Pesticide Applications (Operations Data)

Output changes:

1. Revise Source accounting ouput file to reflect the addition of “base locations” other then watershed outlet.

Program changes:

1. Correct array subscript for source accounting pesticide accumulation (Eliminate run time error M6101:MATH - floating-point error: invalid).
2. Use Reach Event file reaches as additional “base locations” for source accounting information written to source accounting file. The addition will provides reference locations for source accounting ratios at intermediate points in the watershed (along with the watershed outlet.)
3. Correct velocity equation used in determining reach travel time (Changes all reach travel times)
4. Reformat and label verification output during simulation period.
5. Add additional checks for interaction among Irrigation Application input variables.
6. Set small percolation rates to zero for pesticide computations (Eliminate underflow error)
7. Set small time step hydraulic conductivity values to zero for soil moisture computations (Eliminate underflow error)
8. Initialize average free freeze period for growing season (effects RUSLE K-factor to vary over growing season)
9. Initialize available soil moisture for automatic irrigation determination (effects amount of automatic irrigation applied)
10. Eliminate pesticide (out of) balance warning message when pesticide amount is so small it is set to zero.
11. Initialize cell humidity and ground solar radiation to values based on climate data (Both had been set to zero.).
12. Allow zero as acceptable entry for Number Pesticide Applications (Operations Data) (Previously, blank defaulted to zero but a zero entry was not acceptable)
13. Correct units conversion for Saturated Conductivity (Soils Data) (Affects all soil moisture calculations)
14. Correct parenthesis groupings in cloud attenuation equation used for ground solar radiation calculation.
15. Add drainage area size to sediment yield calculations from cells (Affects all sediment calculations)
16. Add check for runoff curve number of 100 and bypass division by zero (Eliminate floating point error)

AnnAGNPS v1.05 – Official Release– 06/15/1998

Input changes:

1. English and SI units added for K factor in Soil Data
2. Add Impoundment Verification Code to Verification Data

Program changes:

1. Correct units for cell runoff variable when in AGNPS mode (Requires re-running all AGNPS mode data sets).
2. USLE/RUSLE K factor changed from dimensionless to dimensioned units. Converted to SI as data is read in.
3. Impoundment process added.

AnnAGNPS v1.04 – Official Release– 05/15/1998

Input changes:

1. Revise Impoundment Data variables to coincide with impending impoundment code requirements.
2. Set minimum limit for all Manning's n variables to 0.005 (previously lower limits varied for the different inputs in Cell Data, Operations Data, Reach Data, and Simulation Period Data)
3. Revise variable range limits for power curve coefficients and/ or exponents (Gully Data, Impoundment Data and Reach Geometry Coefficients)

Output changes:

1. Expand cell event file (used as input to CONCEPTS portion of AGNPS 98) to include other non-reach components (gullies, feedlots and point sources).

Program changes:

1. Bypass time of concentration calculations for WATER cells.
2. Correct pesticide array subscripts (pesticide output may have had wrong pesticide name in previous versions)
3. Correct initialization of Cropland/non-cropland pesticides entered with Simulation Period Data (previous versions were not picking these up)
4. Revise units conversion for pesticide data transferred to Gully processing (impacts all gully pesticides)
5. Add units conversion factor for upstream peak flow (Event File) when English units were requested.
6. Implement input changes for Impoundment Data
7. Consistently revise lower limits for Manning's n in accord with input change.
8. Implement no screen output when Screen Output code is activated (Code was added to AnnAGNPS header record in version 1.03.)
9. Implement output changes for CONCEPTS file
10. Revise when non cropland nutrient parameters are set to precede any initialization years included before start of simulation period.
11. Cell nutrient computations revised for shallow (<200 mm) soil depths.
12. Pesticide computations revised to accommodate soils with impervious layer depth at surface
13. Revise small aggregate fall velocity value used in Reach Sediment.

AnnAGNPS v1.03 – Official Release– 03/26/1998

Input changes:

1. Clarification on Erosion Model Code in Simulation Period Data
2. Add optional input fields for future enhancements to AnnAGNPS header record

Output changes:

1. Add cell event file to be used as input to CONCEPTS portion of AGNPS 98 (The cell event file is still under development).

Program changes:

1. Correct check for complete year climate data when starting and ending climate dates are within a calendar year
2. Correct reach location that gully pesticides are added to.
3. Assign last complete month read in for a specific calendar month if average precipitation for that calendar month over climate record is zero. (Previously the average calendar month was undefined when average monthly precipitation was zero.)
4. Revise upper bound of cell runoff curve number (AMC III) to coincide with field capacity instead of saturation.
5. Add Error message for AGNPS mode with RUSLE erosion code selected and AnnAGNPS mode with USLE erosion code selected
6. Cutoff residue daily decomposition at small value(10.E-10) .(Eliminate system floating point underflow error
7. Correct values output in Source Accounting file for sediment by size total ratios. (1st value was actually large aggregate followed by four zero values)
8. Add cell output file for use with CONCEPTS.

AnnAGNPS v1.02 – Official Release– 03/12/1998

Input changes:

1. Change units for Annual Rainfall Height in Landuse Reference Data to feet or meters from inches or millimeters. Make consistent with Rainfall Height in Crop Data
2. Add code for verifying Source Accounting Data to Verification Data header section
3. Revise code values for Annual Crop Code in Crop Data section
4. Delete statement that Field Manage Identifier could be blank if landuse was other than Cropland.

User Document changes:

1. Update the Error message Appendix

Program changes:

1. Add check (and error message) for RUSLE P- sub factors not entered (when RUSLE erosion code is 0) in Field Data section. (Conform to input specification)
2. Revise reading of Verification Data section such that only records with data entered are required. (Conform to input specification)
3. Correct decision making logic for pesticides when Pesticide Reference data and Pesticide Application data entered but no operation contains a Operation Pesticide Application Identifier. (Eliminate system run time error.)
4. Correct accumulation of sediment for source accounting (Sediment had been all zeros in output.)
5. Correct out of bank flow calculation in reach routing (Caused erroneous sediment quantities for out of bank flow conditions)
6. Correct RUSLE C-factor for multi-year rotation on non-cropland (Impact on cell sediment and subsequent sediment routing)

AnnAGNPS v1.01 – Official Release– ??/??/1998

1. Add error check for Field Manage Identifier entered with Field Data but no corresponding File Management Identifier in File Management Data found.(Eliminate version 1.00 run time system error.)
2. Correct internal data setup for situation where no Field Management Identifier is entered with Field Data for a non cropland field. (Eliminate version 1.00 run time system error.)
3. Correct internal setting of initial organic Carbon in cell soil layers (Eliminate Run Time 1000 error message.)
4. Revise source accounting output file to agree with formats identified for Outlet Accumulation Data and Source Accounting Output Ratio Table in Output Specifications
5. Use event and source accounting file names optionally entered as part of GLOBAL OUTPUT DATA: (Version 1.00 used only AnnAGNPS.evn and AnnAGNPS.evn or xxx.evn and xxx.src based on input file name (xxx.inp) contained in AnnAGNPS.fil file.)
6. Correct adding gully output to appropriate reach (Version 1.00 was not adding gully output if gully was not selected for source accounting output).

AnnAGNPS v1.00 – Official Release– 02/19/1998

First release of pollutant loading software. Software runs in two modes RUSLE based continuous simulation and USLE single event (using data converted from AGNPS5.0). Functions not operational in model include: winter routines and impoundments. No documentation of data contained in xxx.dbg file (which is generated from selections in Verification Data input). All documentation files are dated February 19, 1998. The 16-bit executable is not available at this time.