Fact Sheet

Watershed-Scale Pollutant Loading Model—AnnAGNPS v6.0

Annualized AGricultural Non-Point Source Pollutant Loading Model, version 6.0

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Developers	USDA Agriculture Research Service, National Sedimentation Laboratory, Oxford, MS USDA Natural Resources Conservation Service, National Water and Climate Center, Beltsville, MD
National Model Leader	**Ron Bingner**, ARS Lead Scientist, National Sedimentation Laboratory, 598 McElroy Dr., Oxford, Mississippi 38655. Information requests, copies of the model, and model documentation can be directed to the AGNPS WEB site at: http://www.ars.usda.gov/Research/docs.htm?docid=5199 or contact Ron at 662-232-2966 (email: Ron.Bingner@usda.gov)
Description	The Annualized Agricultural Non-Point Source Pollution Model (AnnAGNPS) is a continuous simulation watershed-scale program. The model is an expansion of the capabilities developed in the single event model AGNPS and is the pollutant loading model in the suite of models for the next generation of the suite of AGNPS modeling components. To use AnnAGNPS, the watershed is subdivided into homogenous land areas with respect to soil type, land use, land management, and climate. Areas can be of any shape including hydrologically-based or square grid (as was used in the single-event AGNPS). AnnAGNPS simulates quantities of surface water, sediment, nutrients, and pesticides leaving the land areas (cells) and their subsequent travel through the watershed. Some of the sediment, nutrients, and pesticides will reach the watershed outlet while the remainder will be deposited in the stream system. Calculations are done on a daily time step. Runoff quantities are based on runoff curve number while sheet & rill sediment is determined using RUSLE. Special components are included to handle concentrated sources of nutrients (feedlots and point sources), ephemeral gully sources, concentrated sediment sources (classical gullies), added water (irrigation), and the impacts of riparian buffers and wetlands. Output is expressed on an event basis for selected stream reaches and as source tracking (contribution to outlet or any other point in the watershed) from land or reach components over the simulation period.
Uses	AnnAGNPS can be used to evaluate non-point source pollution from agricultural watersheds and to compare the effects of implementing various conservation alternatives over time within the watershed. Cropping and tillage systems for sheet & rill and ephemeral gully erosion, fertilizer, pesticide, and irrigation application rates, point source loads, feedlot management, controlled drainage, riparian buffer and wetland management can be evaluated. The model partitions soluble nutrients and pesticides between surface runoff and infiltration. Soluble nutrients from feedlots are also transported with runoff. Sediment-transported nutrients and pesticides are also determined. The sediment determined for the land areas and gullies is subdivided into particle size classes (clay, silt, sand, small aggregate, and large aggregate) before being added to the stream system. Particle sizes are routed separately in the stream reaches. Output parameters (water, sediment, nutrients, and pesticides) are selected by the user for the desired watershed source locations (specific cells, reaches, feedlots, point sources, and gullies) for simulation period source tracking. Source tracking indicates the fraction of a pollutant loading at the watershed outlet (or to any other point) that came from the user identified watershed source location. Multiple watershed source locations can be identified, each with its own set of output parameters. User-selected pollutant loadings can be determined at desired stream reach locations for each runoff event.

USDA

Features

A Windows-based input editor assists in generating or modifying AnnAGNPS input data. Included is a GIS Interface that provides capabilities to subdivide the watershed into hydrologically-derived cells and provide basic land & stream system information such as drainage areas, slopes, elevations, reach lengths, & other parameters. Ephemeral gully locations & properties can be also be characterized, as well as buffers, wetlands, and prairie potholes.

Input or output can be in either all English or all metric units.

No preset limit on the number of cells, reaches, or length of simulation period. Available computer memory will determine the complexity of a simulation that can be run.

Flexible input allows for data to be entered using comma-delimited files associated with each data section that can be created within commercial spreadsheet programs and imported into the input editor or used directly to execute AnnAGNPS.

Separate input files for watershed data (AnnAGNPS input) and simulation period climate data (daily climate data) allows for the creation of multiple climate data files associated with climate stations.

Utilizes FAO crop evapotranspiration components and guidelines.

Capability to import RUSLE2 data files into the Input Editor or use RUSLE2 erosion science.

Extensive data checks (with appropriate error messages) are performed as data is read and, to a lesser extent, after all data is read.

Use of identifier names for most section head data types allows for reuse of data for several cells (or reaches) in the watershed.

Limitations

All runoff and associated sediment, nutrient, and pesticide loads for a single daily event are routed to the watershed outlet before the next day simulation.

There is no tracking of nutrients and pesticides attached to sediment deposited in stream reaches from one event to the next event.

Point sources are limited to constant loading rates (water and nutrients) for entire simulation period.

System Requirements

AnnAGNPS is available as a 32-bit version for Windows 7, 8, and 10 and as a 64-bit version for Windows 7, 8, 10, and 11. AnnAGNPS could also be used on other platforms that have a compiler for ANSI standard Fortran 2015, such as Linux. A personal computer with a minimum of 2 GB of memory is recommended because of Windows requirements. There is no memory limitation for AnnAGNPS because it includes a memory manager with virtual memory capabilities. Additional disk storage considerations should include input file and output file needs (and virtual memory if used).

Planned Development

Complete the implementation of the winter routines.

Enhance the SCS CN technique for soil moisture and runoff accounting.

Continue to enhance the impoundment, ephemeral gully, riparian buffer and wetland routines.