Fact Sheet

Pollutant Loading Modeling Environment– AGNPS

Agricultural Non-Point Source Pollution Modeling System – Continuous Version

United States Department of Agriculture

Natural Resources Conservation Service

Agricultural Research Service

December 2019

Developers

U. S. Department of Agriculture, Natural Resource Conservation Service and Agricultural Research Service.

National Model Leaders

Ron Bingner, Agricultural Engineer, USDA-ARS-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 AGNPS pollutant loading (PL) modeling environment is comprised of several modules enabling users to develop appropriate input parameters for evaluations of best management practices using simulations for their watershed system. AnnAGNPS is the pollutant loading modeling module designed for risk and cost/benefit analyses. AnnAGNPS is the next generation of the AGNPS 5.0 single event model developed by USDA. AnnAGNPS is a batch-process, continuous-simulation, surface-runoff, pollutant loading (PL) computer model written in standard ANSI Fortran 2015. The model was developed to simulate long-term runoff, sediment and nutrient transport from agricultural watersheds for conservation practices management planning. The basic modeling components are hydrology, sediment, nutrient, and pesticide transport. Land area (cell) geometric representations of a watershed are used to provide landscape spatial variability. Each cell homogeneously represents the landscape within the respective cell boundary, including the capability to distinguish sheet & rill erosion and ephemeral gully erosion and the impact of conservation practices, such a riparian buffers and wetlands on these processes. The physical or chemical constituents are routed from their origin within a cell and are either deposited within the stream channel system or transported out of the watershed. Pollutants can then be identified at their source and tracked as they move through the watershed system.

Uses

AGNPS can be used to evaluate the long term impact of non-point source pollution from agricultural watersheds. Effects of implementing various conservation management alternatives within the watershed can be evaluated. The loadings predicted are: (1) water; (2) sediment by particle size class & source of erosion; and (3) chemicals—nitrogen, phosphorus, organic carbon, & pesticides. PL's are generated from cells and routed through stream systems on a daily basis. Special land use components such as feedlots (nutrients), ephemeral and classic gullies (sediment and chemicals), point sources (water and nutrients), riparian buffers, and wetlands are included.

Features

- Loading, transport, and tracking of pollutants from their source to the outlet or any other location within a watershed system.
- Ephemeral gully erosion can be simulated, separate from sheet & rill erosion.
- Nutrient concentrations from feedlots and other point sources can be simulated.
- Riparian buffers, wetland and prairie pothole effects can be derived anywhere in the watershed.
- An integrated interface allowing the automatic determination of cell boundaries, flow routing, ephemeral gully and channel properties, and riparian buffer, wetland, and pothole characterizations. This program utilizes topographic analysis tools using readily available DEM's.
- A graphical input data preparation editor facilitating data input and revisions.
- Tools to rapidly evaluate the contribution of pollutants throughout the watershed.
- Capabilities to execute programs in 32-bit or 64-bit operating systems.
- Advanced channel evolution and stream corridor restoration capabilities provided through the enhanced integration with CONCEPTS.
- RUSLE2 erosion science integration.

System Requirements

AGNPS is expected to run on any PC (Pentium or higher) under Windows XP, 7, 8, or 10. Actual memory requirements are dependent upon the number of cells selected. A practical minimum memory limit would be 2GB for user data entry and AnnAGNPS execution.

Planned Developments

The following components are planned as enhancements to AGNPS:

- Lake water quality components.
- Integration of NEXRAD technology.
- Land–atmosphere exchanges needed for global climate change evaluations.
- Enhanced organic carbon components.
- Continued enhancements of ephemeral gully, buffer and wetland components.
- Enhanced snowfall, snowmelt, and soil temperature capabilities.