

OpenNSPECT Data Requirements

Nonpoint Source Pollution and Erosion Comparison Tool (OpenNSPECT)

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Introduction

OpenNSPECT uses spatial elevation data to calculate flow direction and flow accumulation throughout a watershed. To do this, land cover, precipitation, and soils data are processed to estimate runoff volume at both the local and watershed levels. Coefficients representing the contribution of each land cover class to the expected pollutant load are also applied to land cover data to approximate total pollutant loads. These coefficients are taken from published sources or can be derived from local water quality studies. The output layers display estimates of runoff volume, pollutant loads, pollutant concentration, and total sediment yield.

Land Cover Data

Land cover is the basis of the OpenNSPECT tool's functionality. Land cover is used to estimate pollutant loads by applying coefficients for each pollutant to each land cover class. An excellent source for land cover is NOAA's Coastal Services Center Coastal Change Analysis Program (C-CAP). Data are available at 30-meter resolution for the nation's coastal areas. Inland land cover data at 30-meter resolution are available from the National Land Cover Database (NLCD). OpenNSPECT contains default pollutant coefficients for both products.

- [NOAA's Coastal Change Analysis Program Land Cover](#)
- [National Land Cover Database](#)
- [U.S. Geological Survey \(USGS\) Land Cover Institute](#)
- [USGS National Gap Analysis Program](#)

Elevation

Elevation data, or digital elevation models, determine flow direction, slope, and other parameters. These derived data products are created automatically and are used in the runoff and erosion algorithms.

- [NOAA Digital Coast](#)
- [USGS National Elevation Dataset](#)

Soil

Two characteristics of soils are needed to run OpenNSPECT: infiltration capacity and erodibility. Infiltration capacity data are typically summarized in four hydrologic soil groups and are used to pick specific curve numbers for a given land use and land cover (LULC) class. Soil erodibility data, often referred to as soil K-factor data, are used as scaling factors in the erosion algorithms. Both hydrologic soil groups and K-factors are attributes in the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey database.

- [USDA NRCS Web Soil Survey](#)

Rainfall Factor

The rainfall-runoff erosivity factor (R-factor) quantifies the effects of raindrop impacts and reflects the amount and rate of runoff associated with the rain. The R-factor is one of the parameters used by the Revised Universal Soil Loss Equation to estimate annual rates of erosion. When including erosion prediction in OpenNSPECT analysis, the R-factor can be input as a raster file or a constant value. R-factor raster data for the coterminous United States and six of the main Hawaiian Islands are available from the NOAA Coastal Services Center. For areas not covered by these data, a method to calculate R-factor is described in chapter 2 of the USDA Handbook Number 703 (Wischmeier and Smith, 1978).

- [NOAA Coastal Services Center R-factor](#)
- [USDA Handbook Number 703 \(PDF, 21.36 MB\)](#)
- [USDA NRCS Electronic Field Office Technical Guide \(eFOTG\)](#)

Precipitation

Precipitation data are used in the Soil Conservation Service (SCS) runoff algorithm. OpenNSPECT calculates both event and annual runoff scenarios. For annual runoff scenarios, users must also estimate the number of days that yielded surface runoff within a year.

- [NOAA National Weather Service Hydrometeorological Design Studies Center](#)
- [Oregon Climate Service PRISM Group](#)
- [NOAA National Climatic Data Center](#)

Coefficients

Runoff curve numbers are empirical parameters used to calculate direct runoff from rainfall excess. The default curve numbers provided with OpenNSPECT were derived from published studies and are related to the NOAA C-CAP land cover data. Pollutant export coefficients are used to calculate pollutant loads from each LULC class in a study area. The default coefficients provided with OpenNSPECT were derived from published studies and local water quality sampling data and are tied to the NOAA C-CAP land cover data.

- [PLOAD User's Manual \(Appendix 4\): Review of Published Export Coefficient and Event Mean Concentration \(EMC\) Data \(PDF, 1.35 MB\)](#)