



U.S. Department of Transportation  
**Federal Highway Administration**

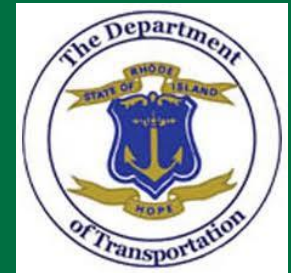
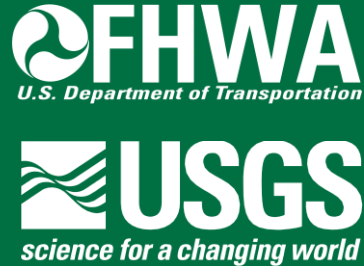
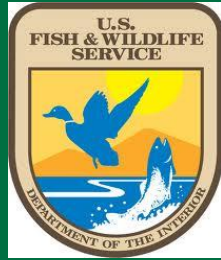
# The Stochastic Empirical Loading and Dilution Model (SELDM) for stormwater-quality risk analyses

**By Gregory E. Granato and Susan C. Jones**

U.S. Department of the Interior  
U.S. Geological Survey

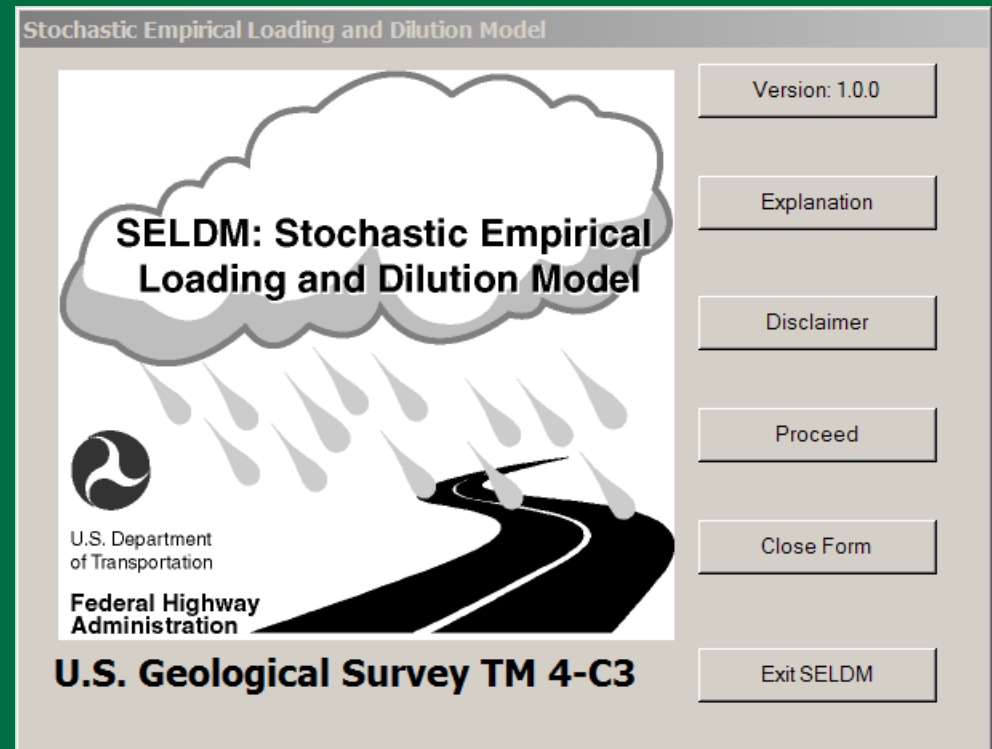
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SELDM was tested and/or reviewed by 43 professionals from USGS, USEPA, USFWS, and 16 state agencies



# SELDM is the Stochastic Empirical Loading and Dilution Model

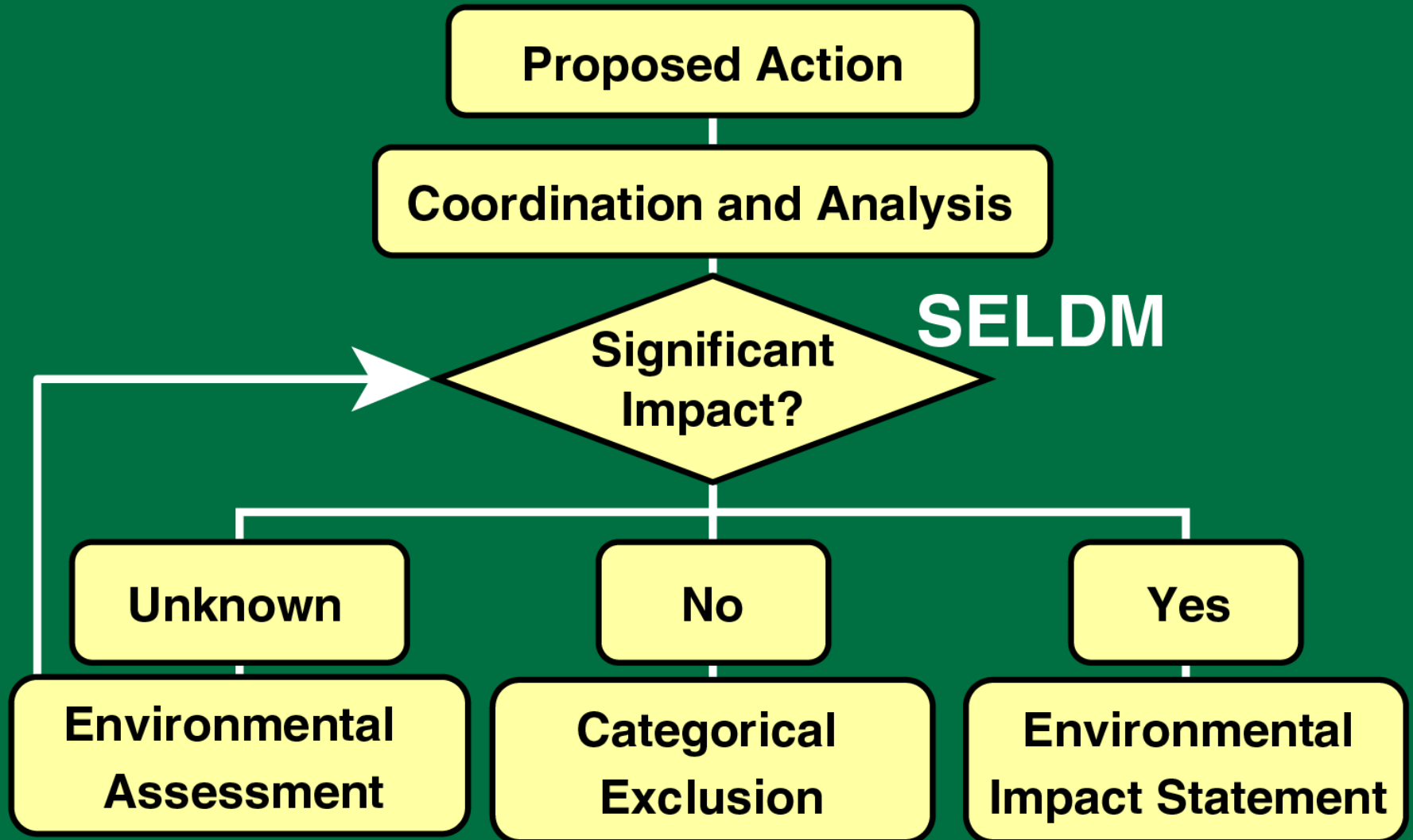
- **Stochastic**—Uses Monte Carlo methods to create a sample of events representing combinations of flows concentrations and loads
- **Empirical**—Based on data and statistics rather than pure theory
- **Loading**—Provides storm and annual loads
- **Dilution**—Mixing of upstream and highway indicates chance of exceeding a target value



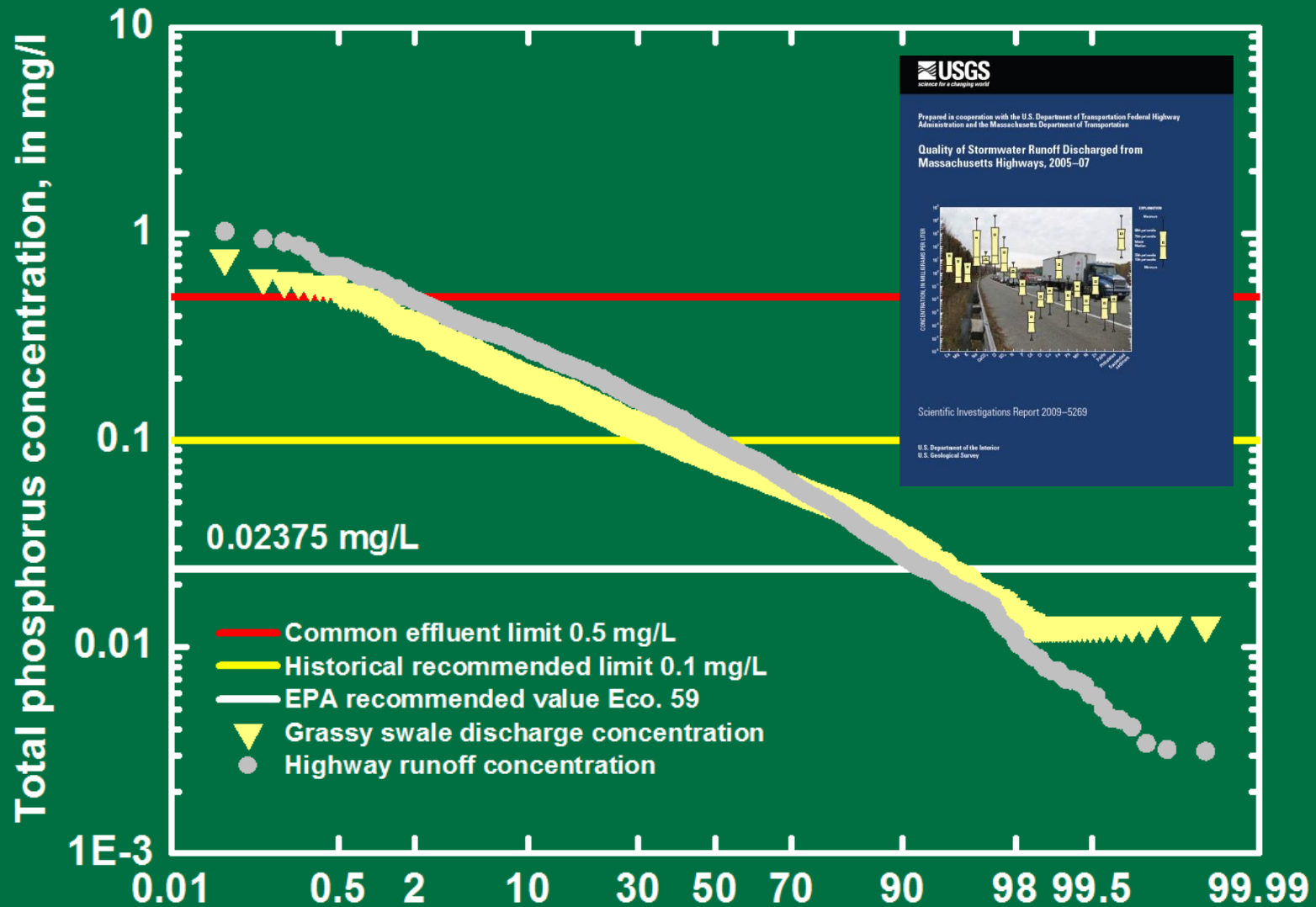
SELDM uses a simple mass balance approach to calculate flows, concentrations, and loads by storm and by year



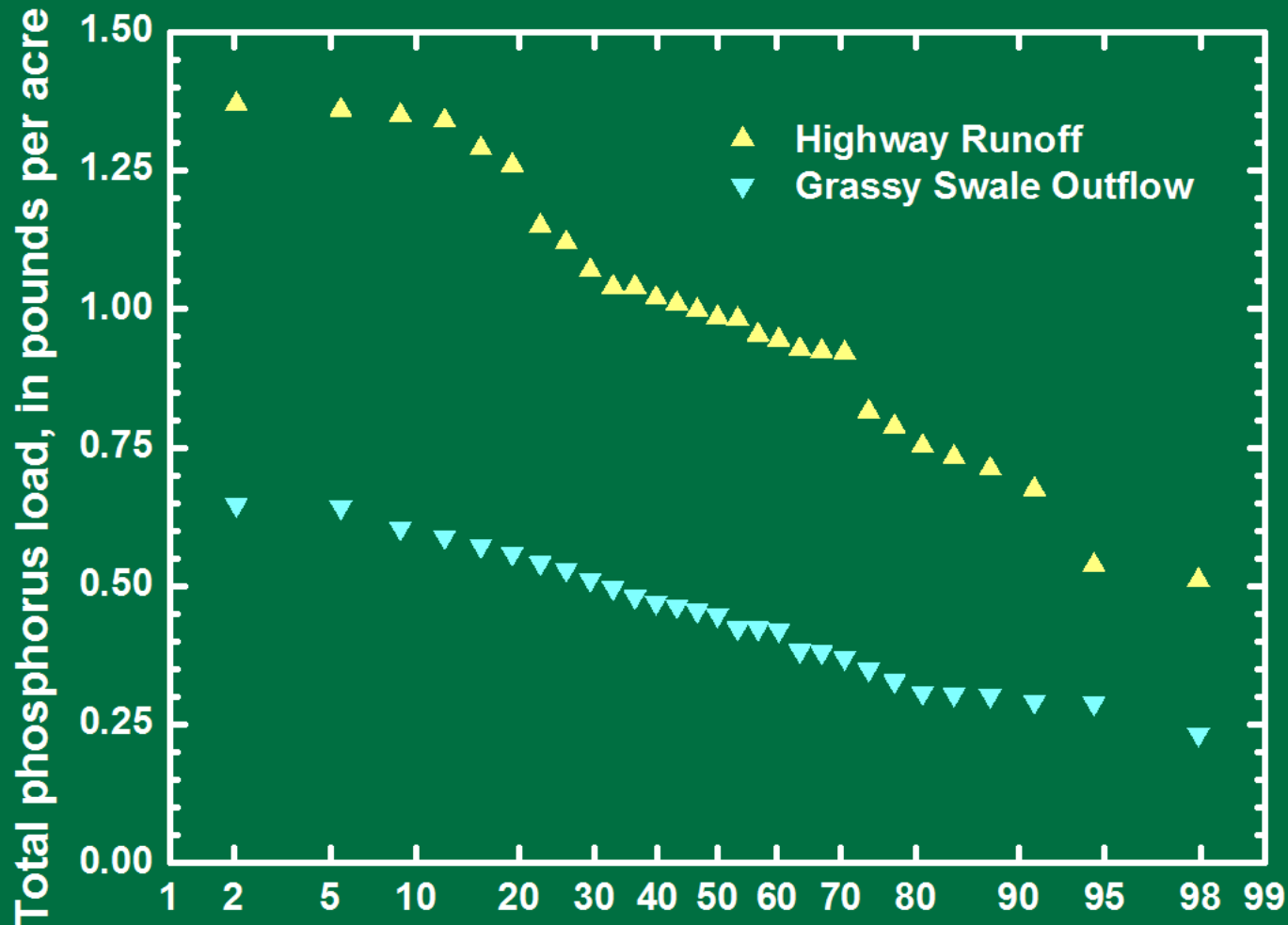
# SELDM is designed to facilitate the NEPA process



# SELDM generated 1,648 storms in 29 years

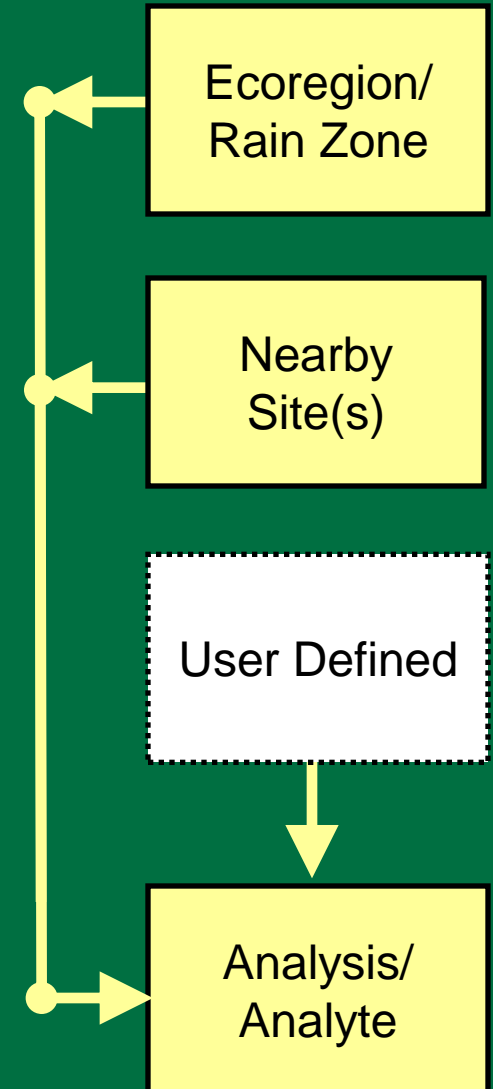


# SELDM can be used to estimate annual loads with and without BMPs for a site or by acre



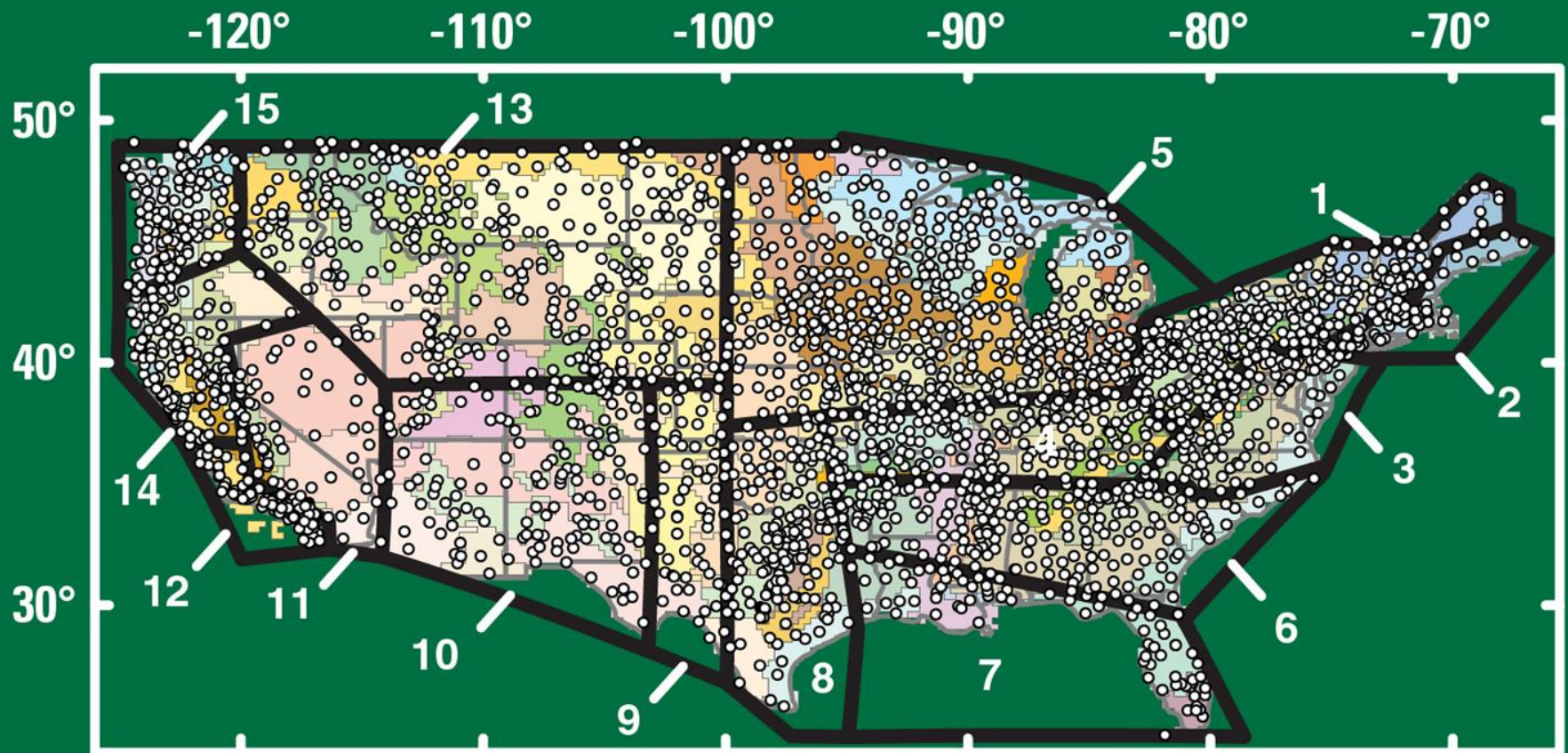
# Supports the Environmental Decision-Making Process

- **First Level: Regional Inputs**
  - Hydrologic Similarity
  - Ecoregions: pre-storm flow, precipitation, QW
  - Rain Zones: precipitation
- **Second Level: Nearby Sites**
  - Hydrologic Similarity
  - Proximity
- **Third Level: User-Defined Statistics from Data Collected On Site**
  - Expensive
  - Delays: one or more years of data collection

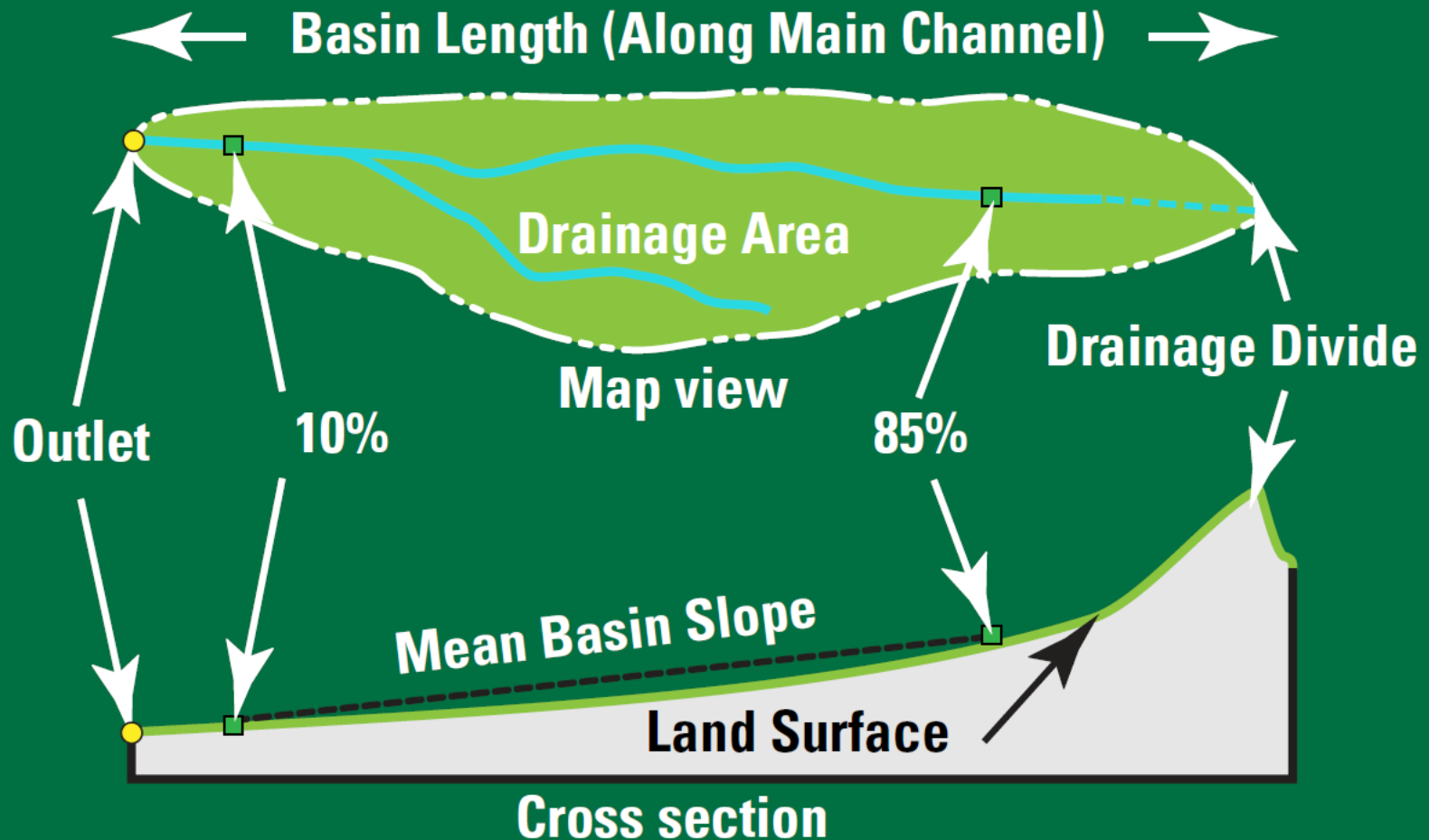




**SELDM uses pre-loaded precipitation, upstream flow, and water-quality data. Values can be selected by region or by proximity to your site of interest**

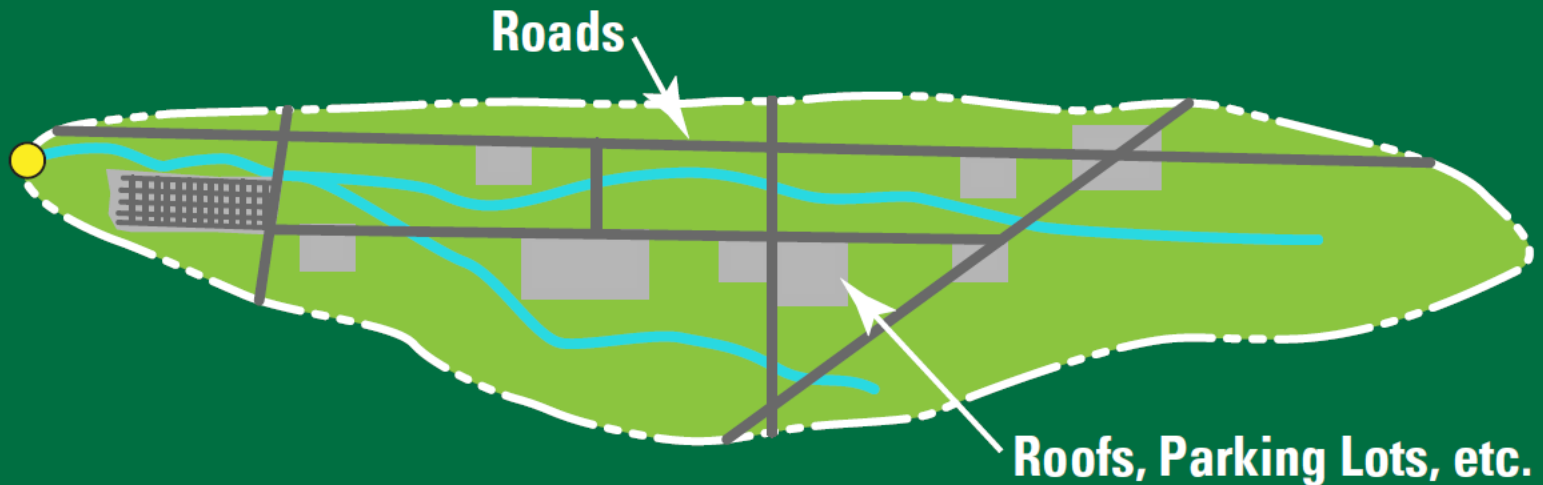


**The drainage area, basin length, and mean basin slope are physiographic basin properties**



The total impervious area (TIA), which is the fraction or percentage of anthropogenic impervious surfaces in a basin, is the primary anthropogenic basin property

### Total Impervious Area (TIA)

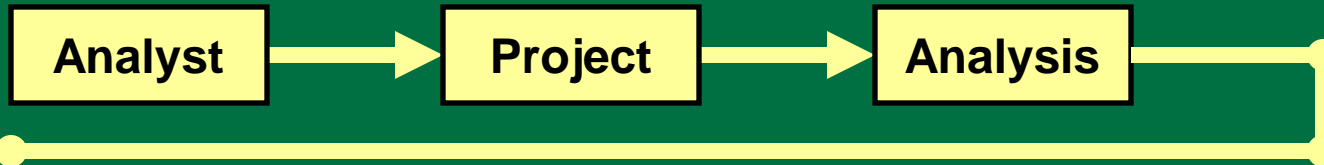


**SELDM uses a “Black Box” approach to model flow reduction, hydrograph extension and concentration reduction from BMP(s)**



# SELDM has a GUI with a series of forms

## Documentation



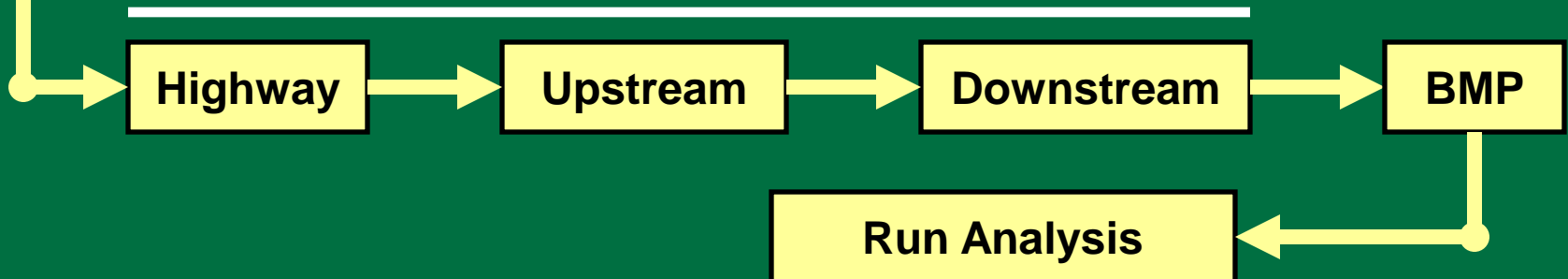
## Site and Region



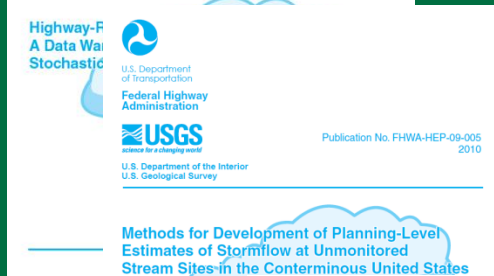
## Hydrology



## Water Quality



The web site has links to reports, software, and SELDM version 1.0.1 at <http://webdmamrl.er.usgs.gov/g1/fhwa/SELDM.htm>



Methods for Development of Planning-Level  
Estimates of Stormflow at Unmonitored  
Stream Sites in the Conterminous United States

