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U.S. Department of Transportation
Federal Highway Administration

The Stochastic Empirical Loading and Dilution Model (SELDM) provides information needed to assess risks for adverse effects of runoff on receiving waters

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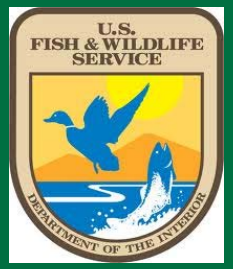
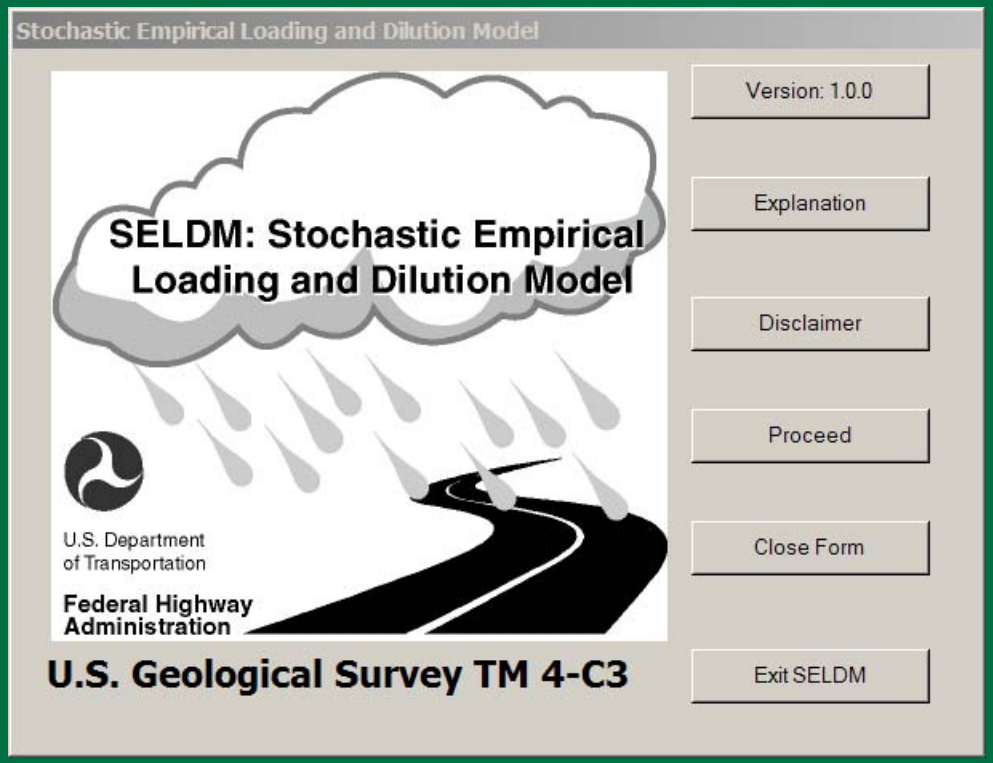
U.S. Department of Transportation
Federal Highway Administration

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

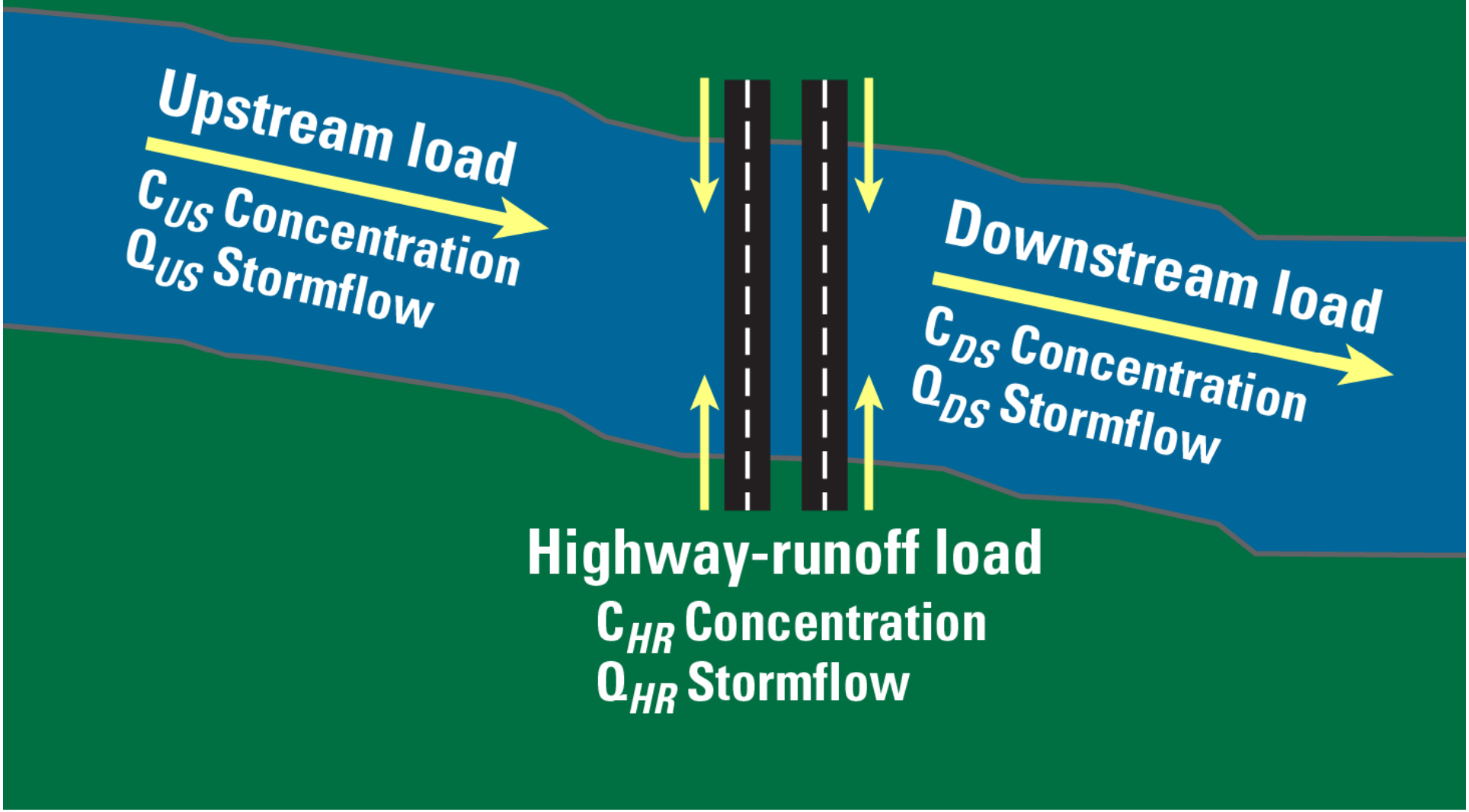


SELDM is the Stochastic Empirical Loading and Dilution Model

- **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**



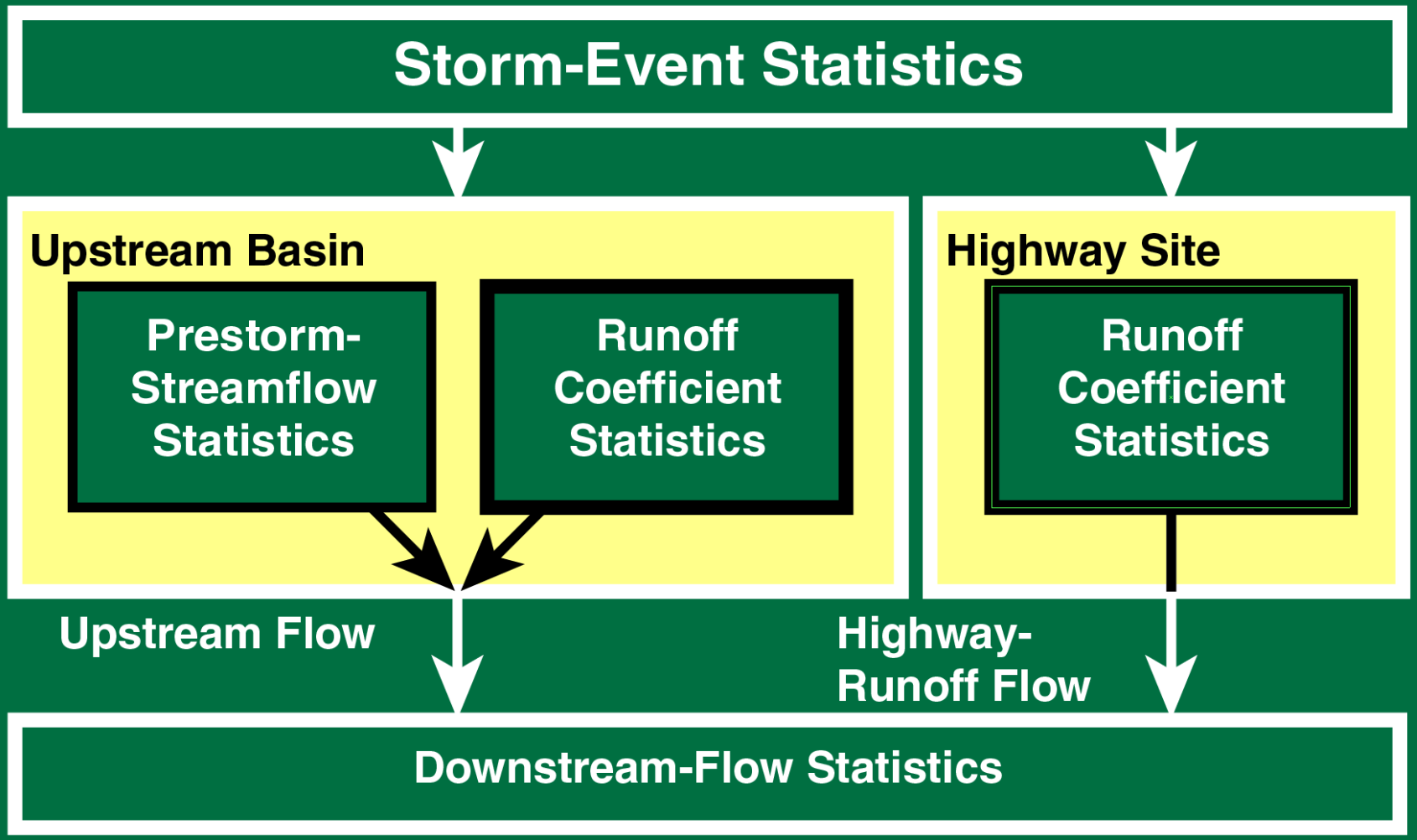
SELDM uses a simple mass balance approach to calculate flows, concentrations, and loads by storm and by year



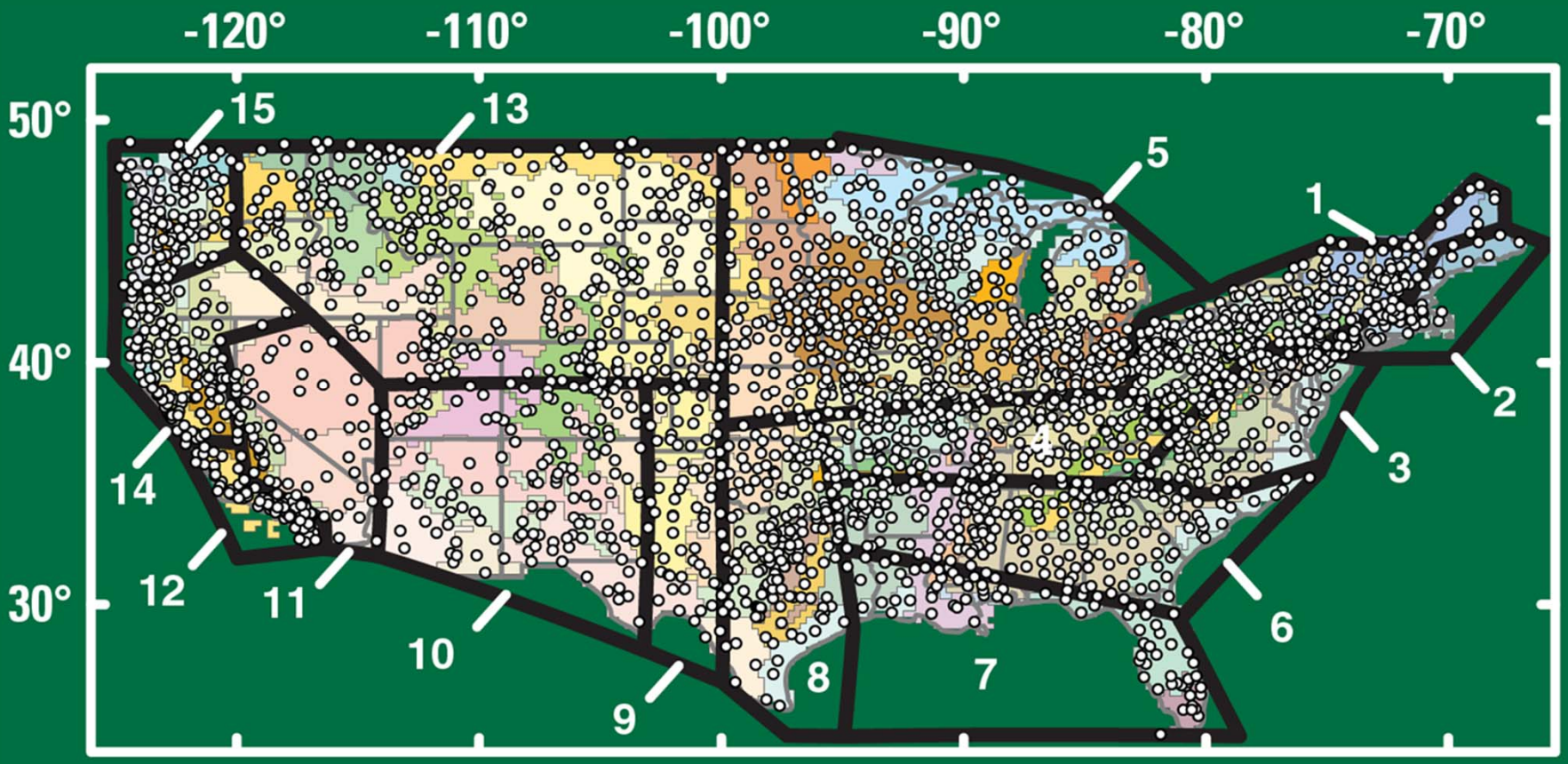
SELDM is a lumped-parameter model that can be run with a few basic input variables

- Location (latitude and longitude)
- Precipitation statistics (from location)
- Prestorm streamflow statistics (from location)
- Drainage area
- Imperviousness
- Main-channel length
- Main-channel slope
- Representative stormwater-quality statistics
- BMP performance statistics

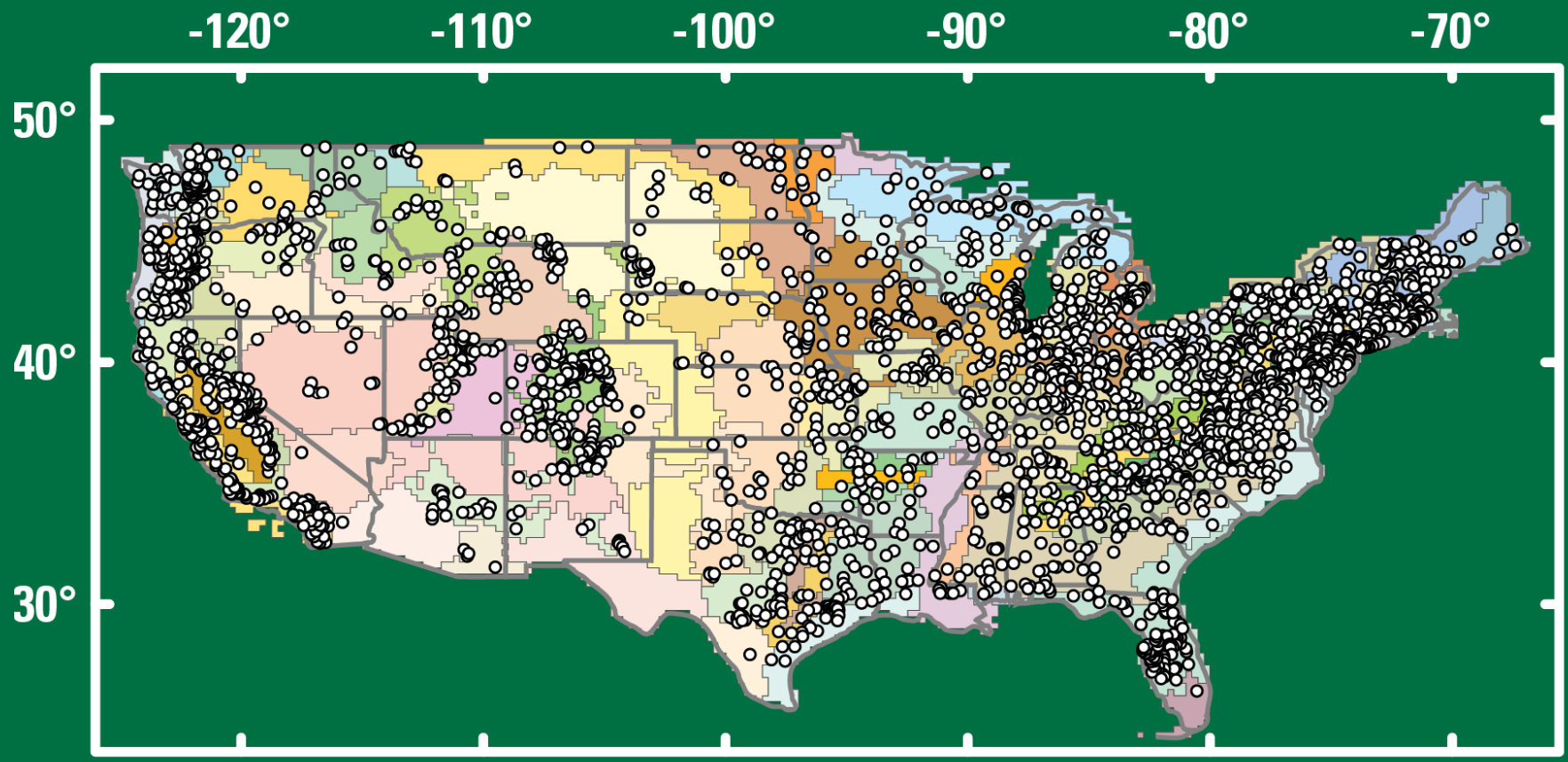
Basin properties determine precipitation events, prestorm flows and runoff coefficients



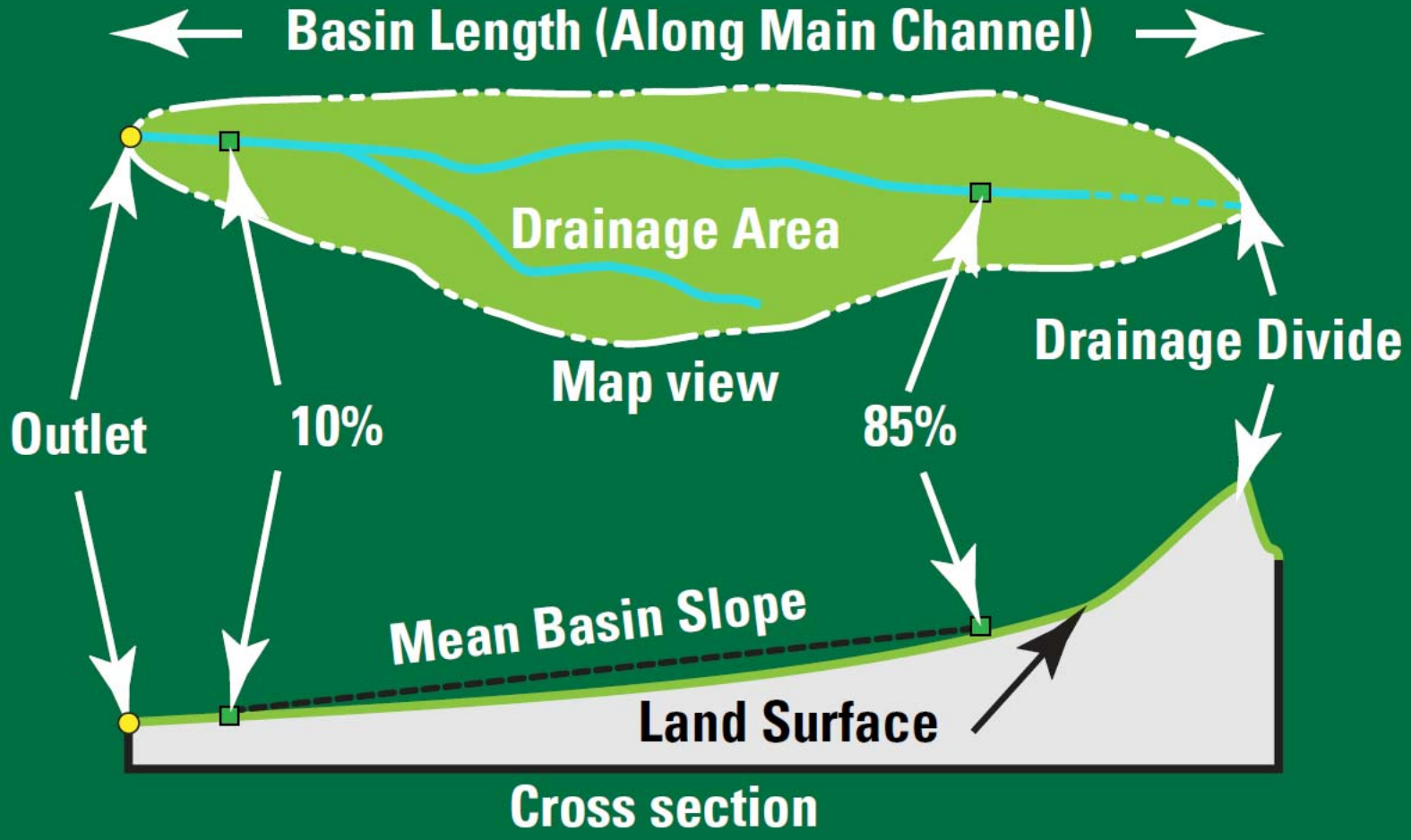
You can select precipitation statistics by region or by using values from one or more of the 2,610 hourly-precipitation data stations that are preloaded into SELDM



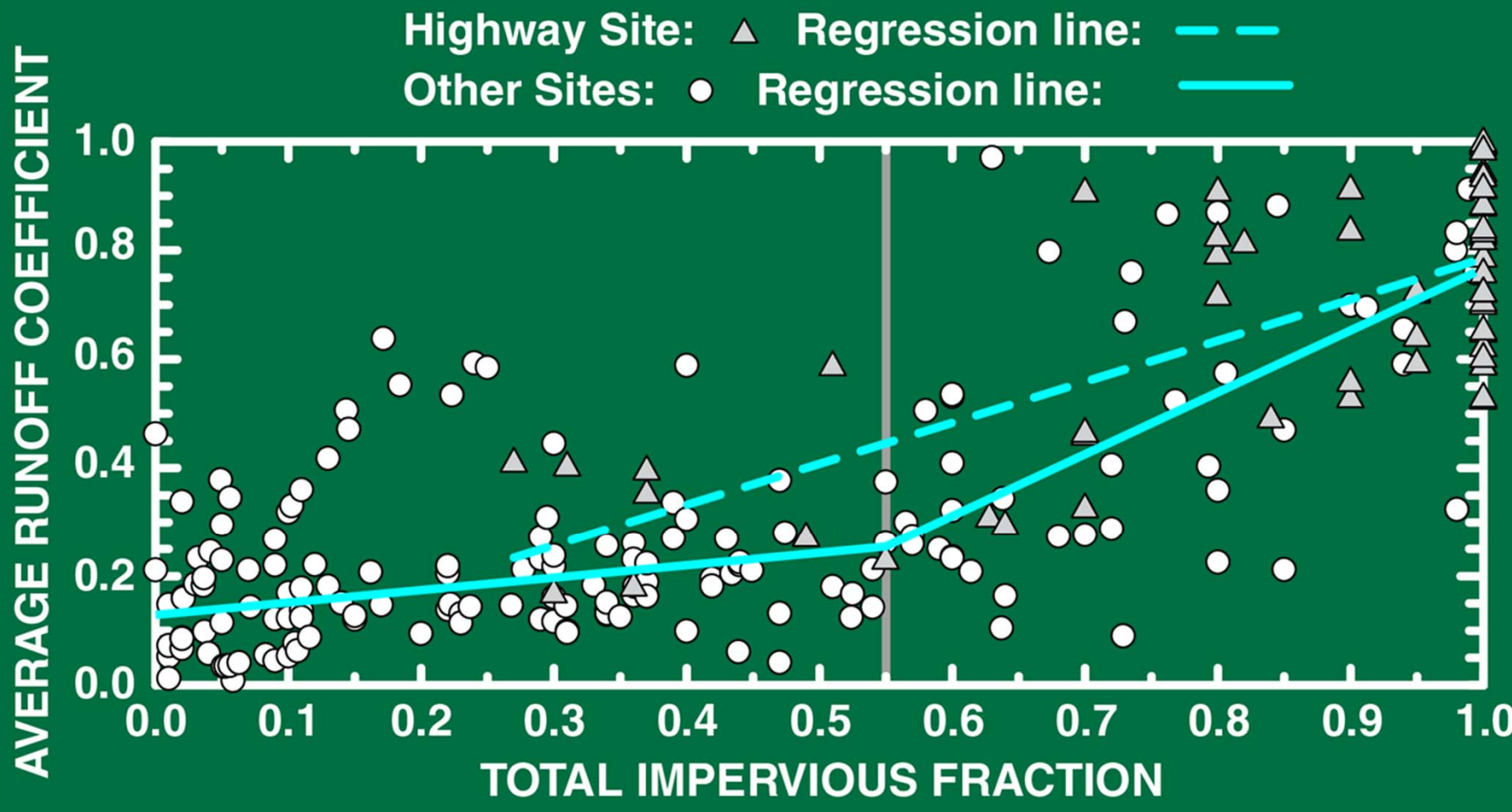
You can select streamflow statistics by region or by using values from one or more of the 2,783 streamgages that are preloaded into SELDM



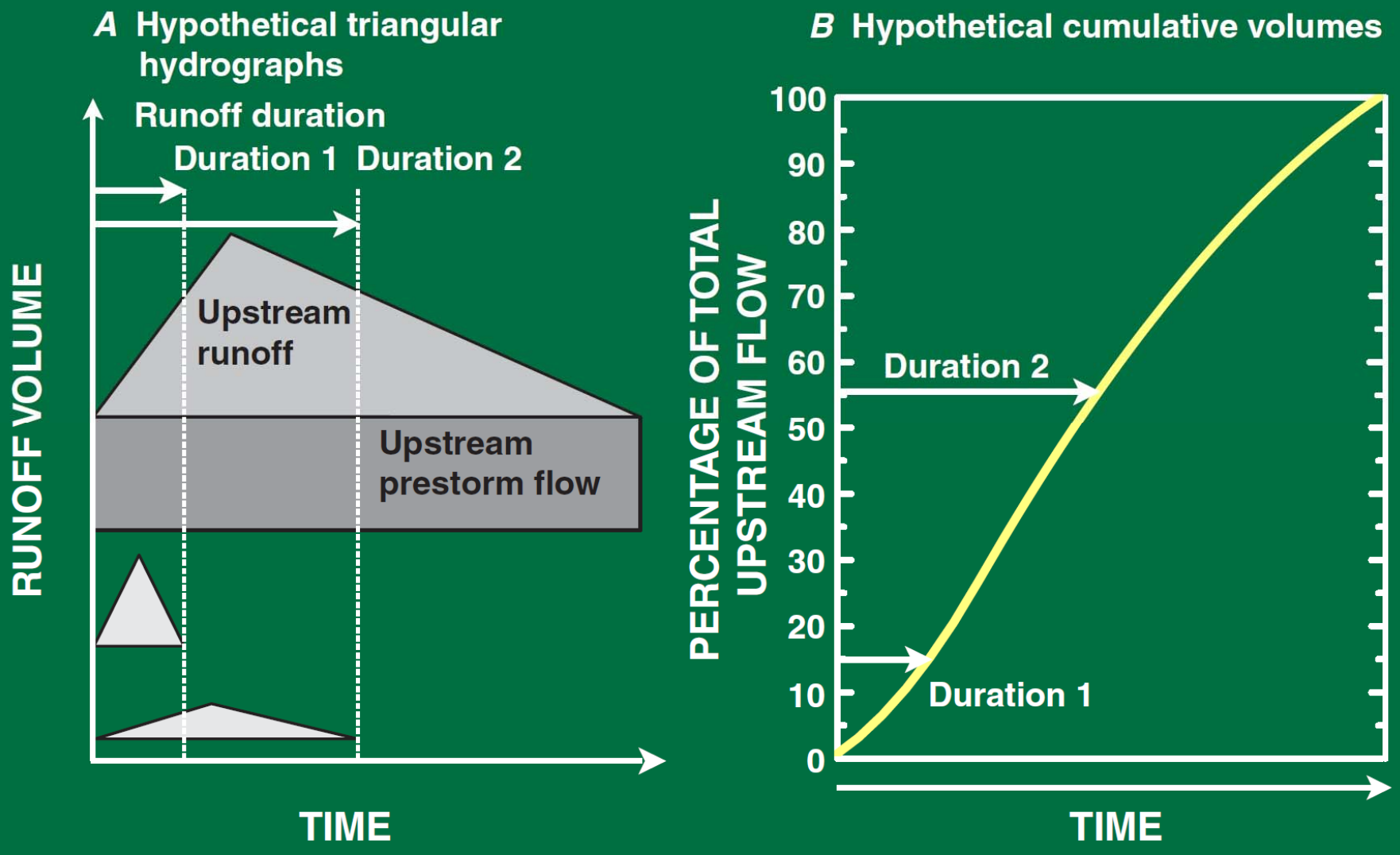
The drainage area, basin length, and mean basin slope affect the volume and timing of runoff



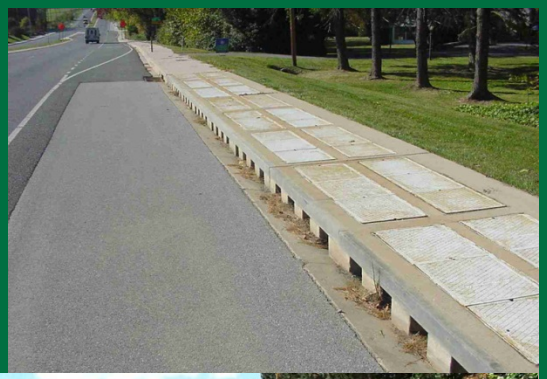
The total impervious fraction affects the volume and timing of runoff

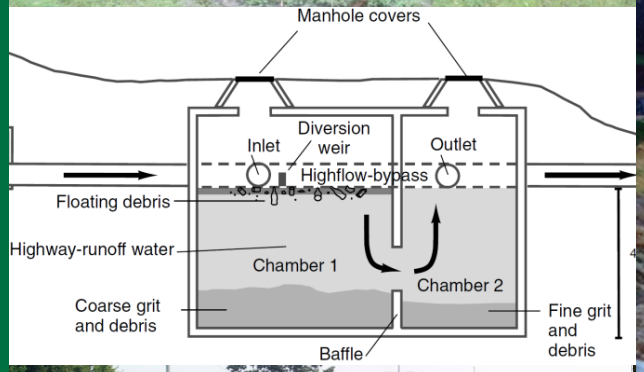


Basin properties also determine the proportion of upstream stormflow available for mixing

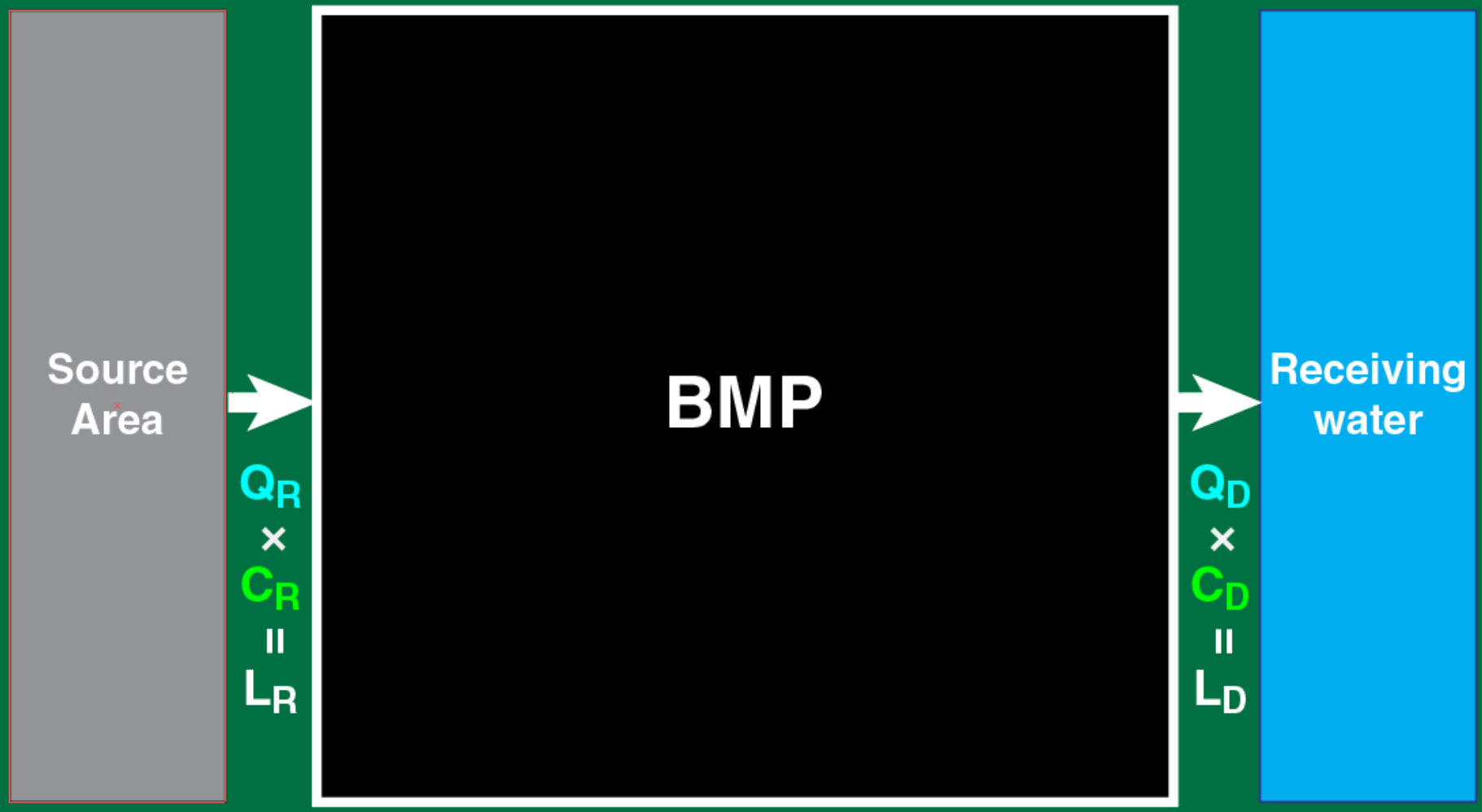


There are many different treatment processes and BMPs and they can be used in series





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



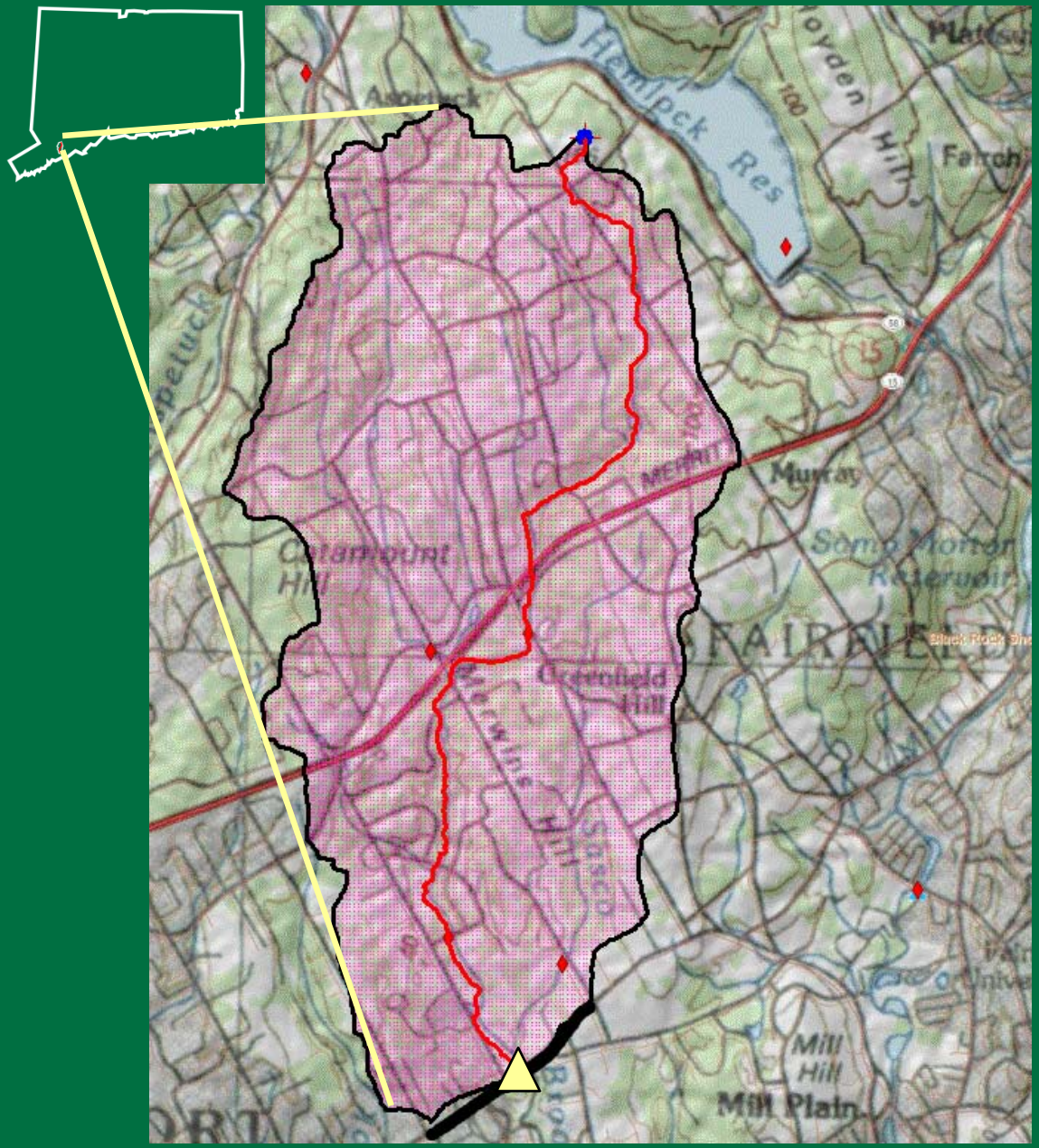
Case Study

USGS Streamgage
01208950 Sasco Brook
near Southport, CT:

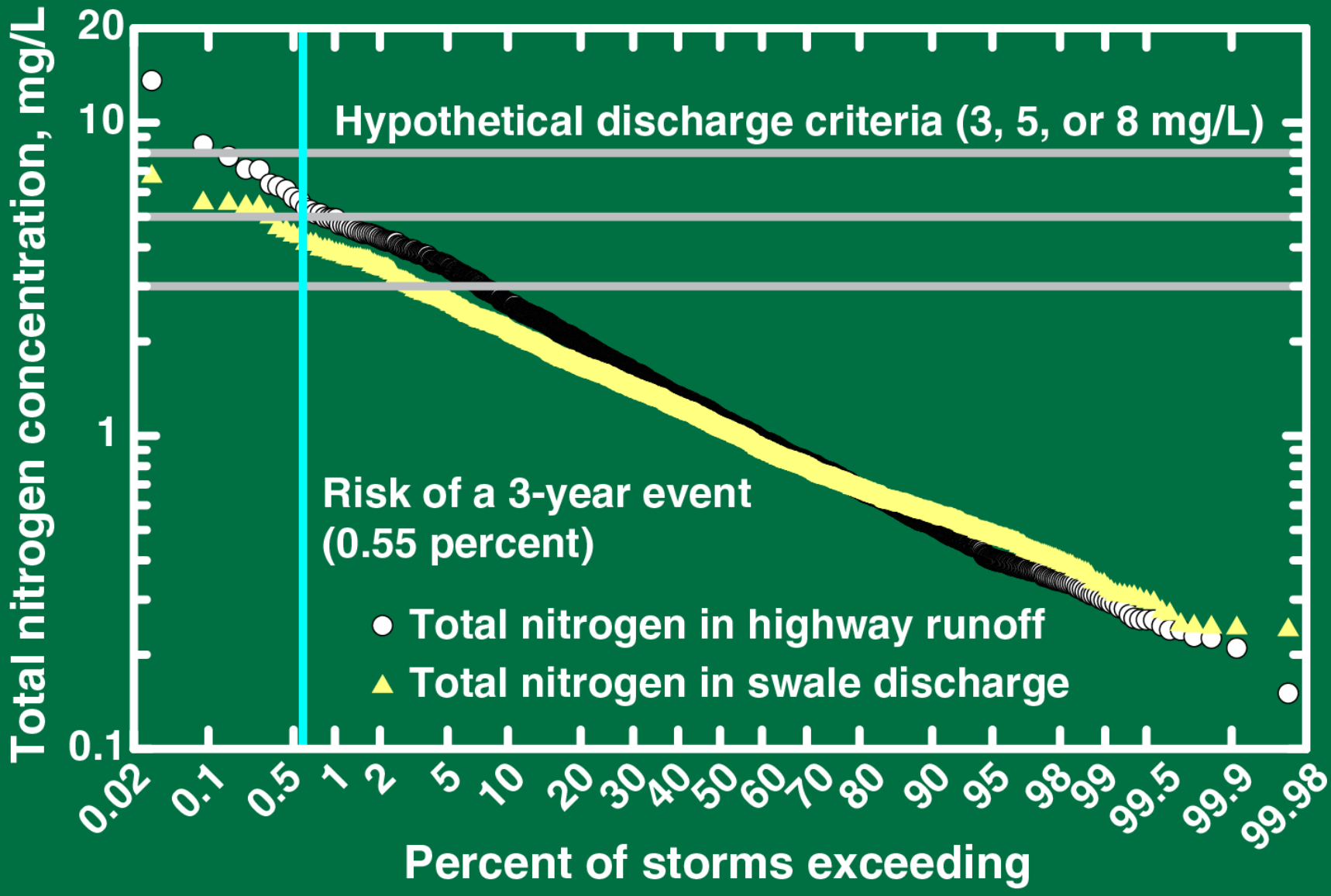
Latitude:	**41.15287**
Longitude:	**-73.30595**
Area:	**7.38 mi²**
Length:	**27,984 ft**
Slope:	**53.3 ft/mi**
TIA:	**5.5%**

Hypothetical Highway:

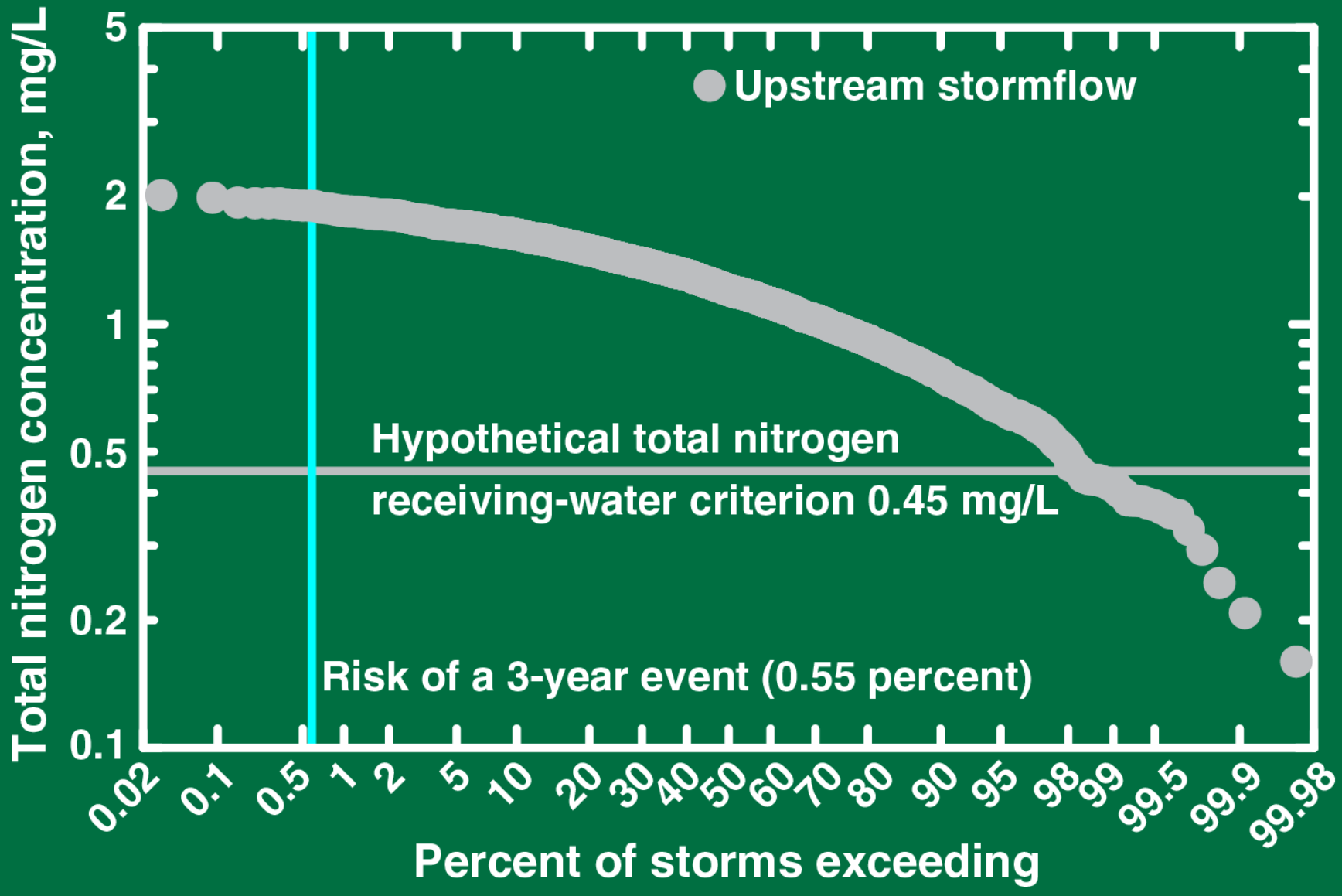
Area:	**2.26 Ac**
Length:	**957 ft**
Slope:	**191 ft/mi**
TIA:	**100%**



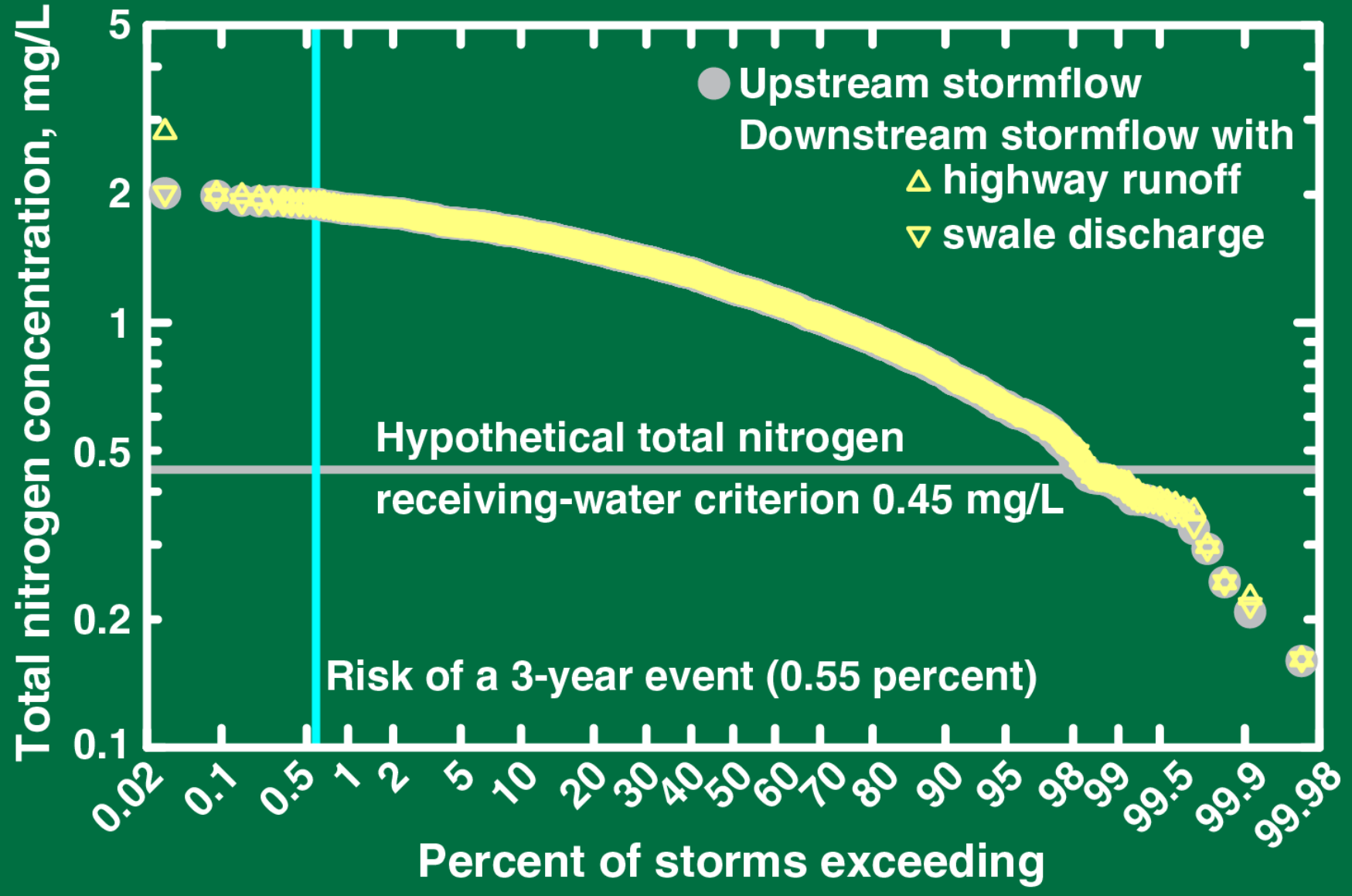
SELDM indicates the risk of exceedance



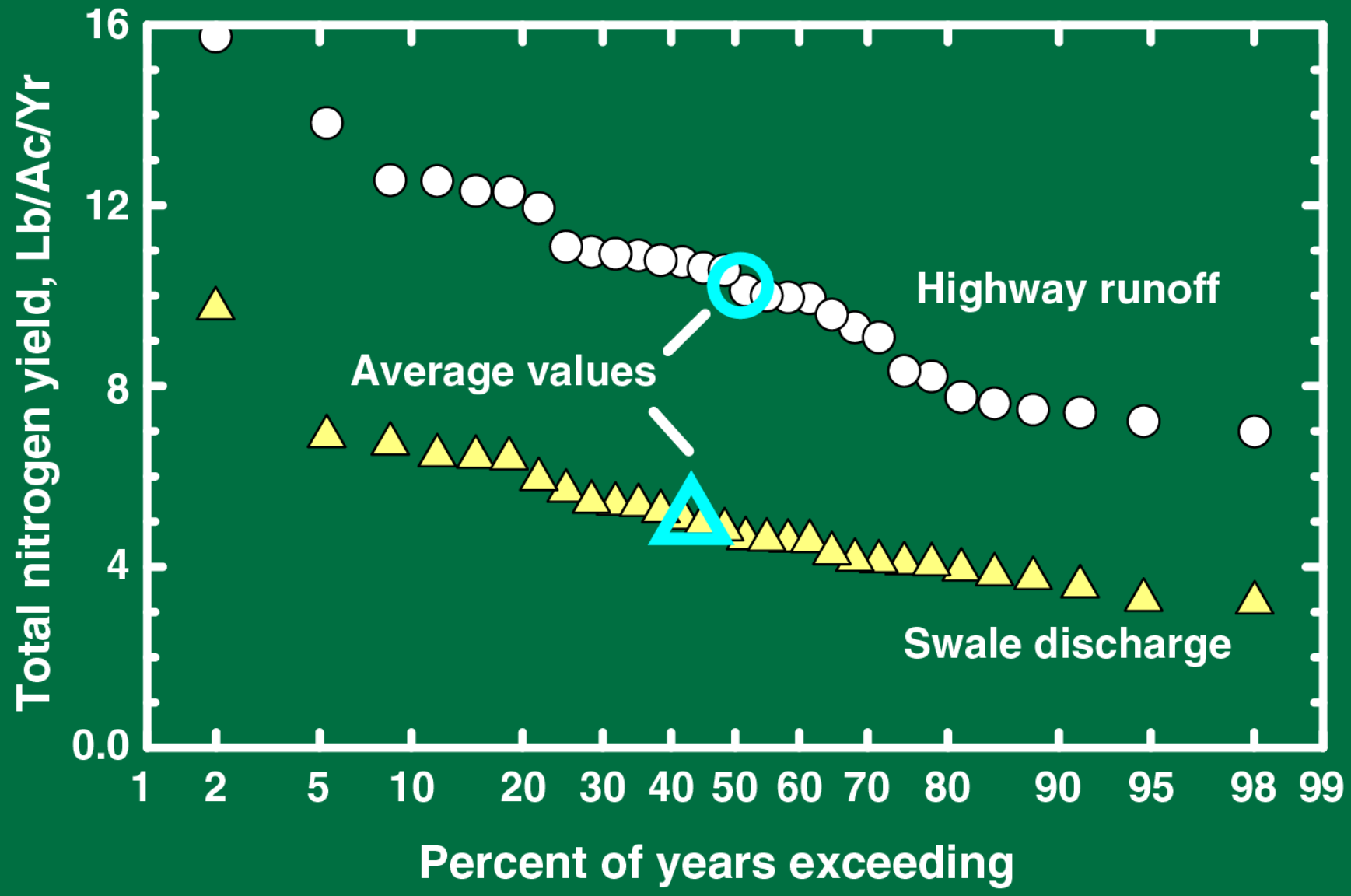
Background water-quality exceeds receiving-water criterion in about 98% of runoff events



The effect of highway runoff (and swale discharge) is small even in a small basin



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



The web site has links to reports, software, and SELDM version 1.0.1 Google “SELDM highway”