

Forestry Estimator for Runoff and Nutrients (FERN)

The **Forestry Estimator for Runoff and Nutrients (FERN)** was created by Houston Engineering, Inc (HEI) with funding support from the Upper Mississippi-Grand Rapids Watershed partnership planning effort. The purpose of FERN is estimating water quality benefits from select forestry best management practices (BMPs). FERN is intended to be a statewide forest implementation decision support tool. Prior to the development of FERN simple models, tools, or estimators for estimating reasonable sediment, phosphorus, and nitrogen load reductions at receiving waterbodies from BMPs implemented within forested lands did not exist. FERN is a tool that can help fill that space.



FERN was created within Microsoft Excel and estimates existing sediment, phosphorus, and nitrogen loads along with BMP-driven load reductions using static datasets of landscape sediment and nutrient yields.

Existing loads of sediment, total phosphorus, and total nitrogen calculated within FERN are based on data from the United States Geological Survey (USGS) Spatially Referenced Regressions on Watershed attributes (SPARROW) model for the Midwest United States (Robertson and Saad, 2019). Once the final existing sediment and nutrient load values are calculated, the expected load reduction from an implemented BMP is calculated based on the assumed load reduction efficiency of a selected BMP and the area across which that BMP is being applied.

The FERN tool, along with the tech memo, has been posted on the BWSR Water Quality Tools and Models webpage with the other pollution reduction tools and is available for estimating and reporting measurable environmental outcomes for water quality projects funded through BWSR and agency partners.

Fig. 1: BMP example on FERN.

FORESTRY ESTIMATOR for RUNOFF and NUTRIENTS | Version 1.0

Enter values or use the dropdown lists in the blue boxes to select inputs.

Location Information

Enter the County of the managed area
Beltrami

Enter the HUC12 of the managed area
070101010103 Optional

Area of managed location or BMP (acres)
10

Landscape Characteristics

Forest type
Coniferous Optional

Approximate average slope of the managed area
2 - 6% Optional

Approximate soil type (Hydrologic soil group)
C (Poorly drained - sandy clay) Optional

Management or BMP info

Management or BMP type (NRCS code)
Forest Riparian Management Zones

Water travel info

Approximate distance from managed area or BMP to receiving waterbody (miles)
0 Optional

Estimated Existing Load to Receiving Waterbody

Sediment (tons/yr)	0.13
Phosphorus (lbs/yr)	0.73
Nitrogen (lbs/yr)	16.7

ENTER THIS DATA ON eLINK INDICATORS TAB

Estimated Load Reduction at Receiving Waterbody

Sediment (tons/yr)	0.09
Phosphorus (lbs/yr)	0.51
Nitrogen (lbs/yr)	11.7

FORESTRY ESTIMATOR TOOL

FORESTRY TECHNICAL MEMORANDUM

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