# WEPP FuME Analysis for a North Idaho Site

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## Introduction

A computer interface has been developed to assist with analyzing soil erosion rates associated with fuel management activities. This interface uses the Water Erosion Prediction Project (WEPP) model to predict sediment yields from hillslopes and road segments to the stream network. The simple interface has a large database of climates, vegetation files and forest soil properties to support this and other interfaces, including Disturbed WEPP for forests and WEPP:Road for road segment analyses. The soil databases for roads and disturbed forested hillslopes are based on rainfall simulation and natural rainfall studies.

The WEPP FuME interface carries out erosion prediction runs for six forest conditions:

1. Undisturbed mature forest
2. Wildfire
3. Prescribed fire
4. Thinning
5. Low traffic roads
6. High traffic roads

The climate, soil texture, topography, road density, wildfire return interval, prescribed fire cycle and thinning cycle are specified by the user.

The WEPP FuME interface can be used anywhere within the United States using the existing climate database. The interface is intended to provide an overview of the sources of sediment on a given fuel management site. Sediment predictions from WEPP FuME are for surface erosion only.

## Hillslope Method and Parameters

The example in this paper is an area within the Yellowpine timber sale in northern Idaho (fig. 1). The watershed hillslope boundaries were delineated using GeoWEPP (a geo-spatial interface tool for WEPP) (fig. 2). Each hillslope from the example watershed was examined using the FuME model. Only one hillslope can be run at a time and in this instance, hillslope number 22 is displayed (fig. 2).

FuME was run for an individual hillslope (number 22, fig. 2). The conditions of the model were sandy loam soil texture, hillslope length of 708 feet, hillslope gradient starting with the top of the hill 25, 36, and 20 percent, a 40 ft buffer length and the default road density, fire and thinning cycles.

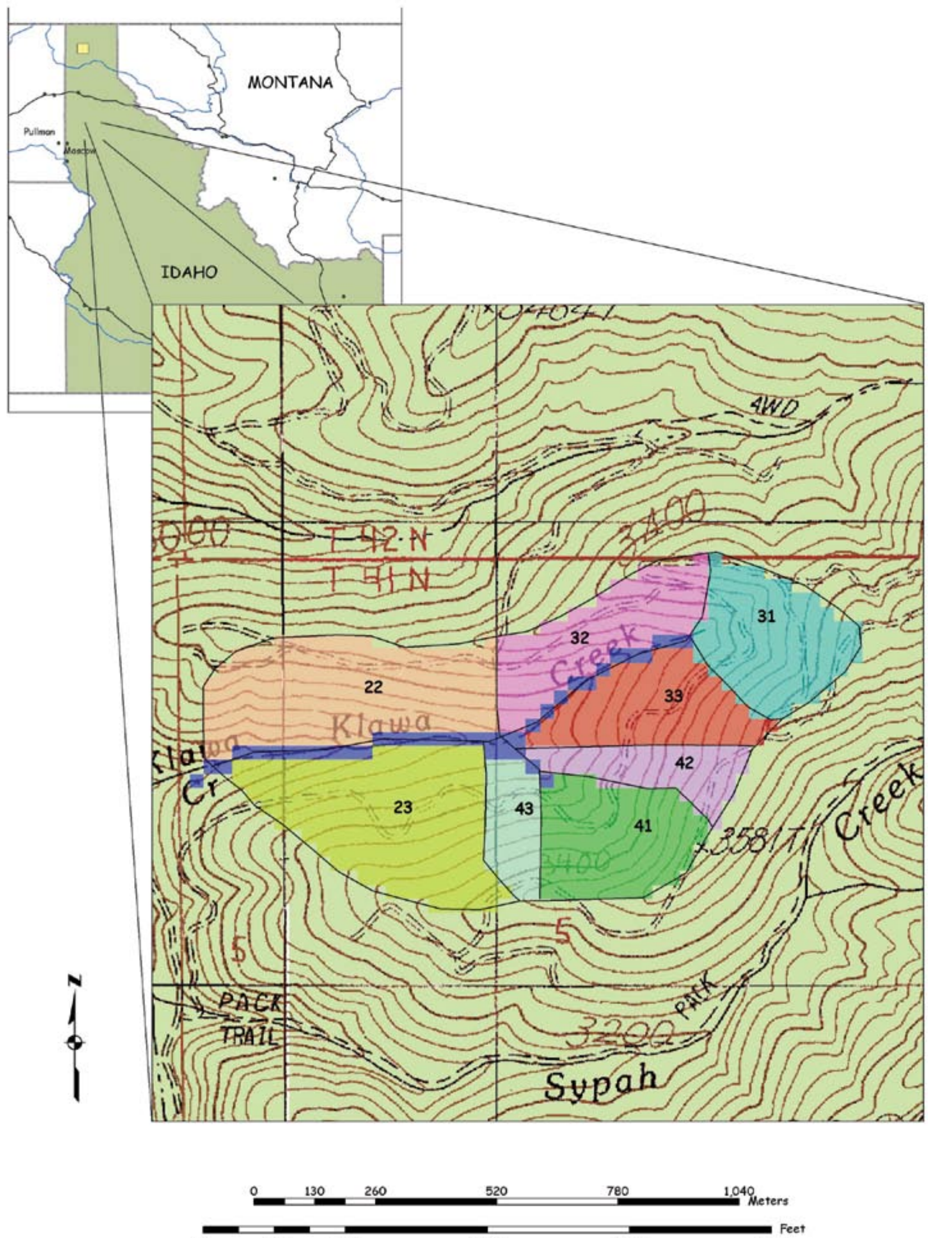


**Figure 1**—Unit 4 of the Yellowpine timber sale in northern Idaho.

**Figure 2**—The WEPP-FuME model windows for hillslope 22.

## Cumulative Watershed Results

All hillslopes from the example watershed were analyzed with WEPP FuME. The summarized results and weighted averages for the example watershed are displayed in table 1 below.

From the table we can observe that if a moderate fire scenario occurs every 40 years for the watershed, in combination with the prescribed fire and thinning management activities, including erosion from roads, there is a 65 percent decrease of erosion occurring when compared to the background rate. In the event of a high severity fire, in combination with the prescribed fire and thinning management activities including the erosion from roads, the total watershed results in a 6 percent increase of predicted erosion. For both examples, the background rate includes low impact roads and the high severity fire scenario.

**Table 1**—WEPP FuME summarized results and weighted averages.

| Hill slope | Background sedimentation | Thinning effects | Rx Fire effects | Thinning + Rx fire w/high severity fire | Thinning + Rx fire w/moderate severity fire |
|---|---|---|---|---|---|
| | - - - - - - - - - - - - - *(ton/mi$^2$)* | - - - - - - - - - - - | | *(ton/mi$^2$)** | *(ton/mi$^2$)*** |
| 22 | 139 | 141.6 | 152.1 | 155.6 | 52.92 |
| 23 | 97.2 | 98.2 | 99.1 | 100.2 | 30.52 |
| 31 | 92.2 | 92.8 | 93.2 | 93.8 | 28.48 |
| 32 | 120.8 | 122.8 | 126.6 | 129.7 | 55.94 |
| 33 | 118.3 | 119.6 | 120.2 | 121.6 | 39.46 |
| 41 | 104.1 | 105.1 | 105.1 | 106.2 | 31.38 |
| 42 | 144.3 | 145.6 | 144.3 | 145.9 | 48.32 |
| 43 | 93.3 | 94.3 | 94.6 | 106.1 | 29.02 |
| Weighted averages for the example watershed | 113.7 | 115.2 | 117.9 | 120.3 | 39.9 |

* The projected background rate in this column assumes fuel management activities did not reduce the fire hazard by removing excess fuel. The estimated background rate for this column was calculated with a high severity fire value.
** The projected background rate in this column assumes fuel management activities reduce the fire hazard by removing excess fuel. Therefore, the estimated background rate for this column was calculated with a moderate severity fire value.

Note: All sedimentation estimates displayed above are calculated from the low end erosion rates of the road network. The high severity fire value was used in the background sedimentation rate calculation unless stated otherwise.

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