

REQUIREMENTS FOR PROCESSING UNCHARACTERISTIC SURFACE SOIL DISTURBANCE

NOTE: This documentation contains processing information for projected as well as current information. The projected data can be found in the released dataset SDEIS Landscape Variables Database (DBSLNDSV, #968).

Logic Overview

Uncharacteristic surface soil disturbance has effects outside of the normal range of effects that occurred in the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum +25% and maximum -25%. The 400 year period includes the variation that is predicted to occur within the recent and current climate without influence of Euro-American settlement influence. The historical regime accounts in general for influences of native species adaptations and soil development for the past 10-15 thousand years since the last glacial period. Some native species adaptations have evolved over the last 1-3 million years in response to changing paleo-ecological climates and disturbances.

Uncharacteristic soil surface disturbance occurs from prescribed activities that disturb vegetation, litter, and down wood cover exposing soil to erosion, or disrupt the surface soil structure, in ways differing from what occurred during the HRV. For this analysis the effects are limited to those occurring from timber harvest and prescribed fire activities that do not mimic the inherent biophysical disturbance regime. This variable does not include soil surface disturbance related to roads as roads are considered an altered type of biophysical site and thus are dealt with as a separate variable. Soil surface disturbance effects of uncharacteristic wildfire and uncharacteristic livestock grazing are acute or chronic effects respectively and require different modeling procedures. Thus they are addressed in separate variables. Uncharacteristic surface soil disturbance vulnerability also varies depending on potential vegetation group (PVG), terrestrial community group (TCG), and cumulative departure in the biophysical disturbance regime.

Processing

The following process should be used to create the Uncharacteristic Soil Disturbance variable by Alternative and Year.

- Process 1.0** – Assign Terrestrial Community Groups to Vegetation Data.
- Process 1.1** – Assign Terrestrial Community Groups to S1 Veg Year 0 / H6AMPH data. These data may be available from previous Variable work.
- Process 1.2** – Assign Terrestrial Community Groups to X1/XxVegYr / H6AMPH data. These data may be available from previous Variable work.
- Process 2.0** – Assign and Calculate H6AMPH Weighted Usoild_b Coefficient.
- Process 2.1** – Assign Usoild_b coefficient to H6AMPH/TCG strata for X1/Xx Yrs.

Use Soils lookup table (PVG/HDI/TCG combinations as key).

***** re-run from this point (5/7/99)**

- Process 2.2** – Create Usoild_b_w and Usoild_a_w coefficients (Usoild_b and Usoild_a rolled up to H6AMPH rather than H6AMPH/TCG).

[Sum of (H6amph/TCG Usoild_b * H6amph/TCG area)per H6amph] / H6amph area =
Usoild_b_w

These Usoild_b_w and Usoild_a_w coefficients give the appropriate soil disturbance

Process 3.0 – when multiplied by H6AMPH area.
Determine Rx Assignments per H6AMPH/TCG per X1/XxVegYr.

Use Rxx1v3 file to assign Rx to X1/Xx Veg Yr based on H6AMP combinations. Output files need to be at H6AMPH level.

Process 4.0 – Calculate (H6AMPHUSD) Uncharacteristic Soil Surface Disturbance value. Note that this process requires output files from Variable #11/13 and Variable #9 as input as well as the RxSim lookup table.

Note: look up table values in Usoild_b have changed (5/7/99) so need to rerun process 2.2

Formula:

$$H6AMPHUSD = (Usoild_b * 0.75) + (NetPrs * Usoild_a * (1.0 - RxSim)) + ((Hrv + Thn) * Usoild_a * (1.3 - RxSim)) + (NetPnf * Usoild_a)$$

Logic:

- 1) Usoild_b is the amount of soil disturbance from agricultural and urban land uses. Multiply by .75 for soil conservation practices.
- 2) Usoild_a is the amount of soil disturbance if an area is burned or harvested as mitigated by the prescription.
- 3) Prescribed natural fire is not mitigated by the prescription, only by the fuels and burning conditions.
- 4) Removed from equation because of inconsistency of Exotics data. Exotics are not mitigated by the prescription, but provide some soil cover so are multiplied by .8

Process 5.0 – Calculate H6 Uncharacteristic Soil Disturbance (USD) per X1/Xx Veg Yr.

$$H6 USD = [\text{Sum of (H6amph USD * H6amph area) per H6}] / H6 \text{ area}$$

Look Up Tables

1. Intermediate Surface Soil Disturbance (Iusoild) Soil Look Up Table (SOL_v22b.XLS)

Look Up Table Variables

PVG - potential vegetation group.

HDI - historical disturbance intensity regime.

TCG - terrestrial community group.

DIR - disturbance intensity regime for no action (X1) and action (Xx) alternatives all years.

Usoild_b -the amount of soil disturbance from agricultural and urban land uses.

Usoild_a - the amount of soil disturbance if an area is burned or harvested as mitigated by the prescription.

2. Prescription Management Similarity to HRV Look Up Table

Logic: This is a factor that accounts for the emphasis of the management prescription in attempting to mimic historical range of variability (HRV). HRV in this context includes all biological and physical components of the historical or native system: 1) effects of anthropogenic native Americans; 2) the diversity of native aquatic and terrestrial species and their habitats; 3) vegetation composition/structure and landscape mosaic patterns; 4) succession/disturbance regime patterns; 5) hydrologic channel, sedimentation, and flow regimes; 6) soil development and erosion regimes.

Rx	RxSim
A1	.95

Rx	RxSim
A2	.75
A3	.8
C1	.7
C2	.4
C3	.3
N1	.9
N2	.6
N3	.5
N4	.7
N5	.6
N6	.75
N7	.6
N8	.5
P1	.65
P2	.3
P3	.2

CLASS INTERPRETATIONS -UNCHARACTERISTIC SOIL DISTURBANCE DEFINITION AND CLASSIFICATION

For modeling purposes it may be necessary to classify the weighted average coefficients in the deliverable dbf files. The following suggestions are provided for determining class breaks for each coefficient for this particular variable.

Time Period Definitions

Current (CUR) - Current time period generally reflects the current year (1999) plus or minus 5 years (i.e. 1994 - 2004). Developed from data and models using administrative unit data from the past 10 years as one input. Reflects the disturbance from 1988 to 1997 (10 year average) .

Uncharacteristic Soil Disturbance, Planned Disturbance

Subwatershed current year statistics:

Average current year non-zero values:

Standard deviation current year non-zero values:

Minimum current year non-zero values:

Maximum current year non-zero values:

Number current year zeros:

Current year distribution shape: **j-shape with long tail and spike**

Definition: annual area coefficient for relative probability of prescribed activities (timber harvest, prescribed fire, prescribed natural fire, agriculture) that can cause potential surface soil disturbance and a lack of vegetation/litter cover that could result in uncharacteristic soil disturbance effects within the subwatershed. Occurrence of actual soil surface disturbance and erosion is dependent on the combination of this type of soil disturbance with sensitive soil and watershed type conditions and the associated cumulative effects over time. In order to determine actual risk of soil disturbance effects these effects could be combined with a soil type and watershed type sensitivity variable and the cumulative effects summed through time in a ratio with recovery rate.

These soil disturbance effects purposely exclude soil disturbance effects caused by roads, uncharacteristic wildfire or livestock grazing since they are predicted in other variables (H6Rds, UWF, ULG). Current levels of uncharacteristic soil disturbance are based on administrative unit 10 year average (1988-1997) of planned activities as one input and correlation of broad-scale proxy variables with plot data ground cover and surface soil disturbance summaries.

Uncharacteristic soil disturbance effects have a probability of causing a change of more than 20% dissimilarity compared to native (historical) effects of disturbance to soil vegetation/litter cover and surface characteristics. These effects are outside the normal range of the historical (natural) system. The normal range is considered to be within the 400 year historic range of variability minimum + 25% and maximum - 25%. Uncharacteristic effects of these types could reduce vegetation/litter cover, root binding capability, and increase probability of erosion, compaction and stream bank erosion/failure. The use of management prescriptions as an input accounts for general differences in effects resulting from use of low impact harvest techniques and prescribed fire techniques that attempt to mimic effects of native (natural) disturbance.

The cumulative effects of surface soil disturbance over time vary depending on frequency and intensity of impact. For this broad-scale variable the breakpoints for classes were applied at levels that generally correlate with frequencies of soil surface disturbance in relation to general recovery rates.

Classification method: j-shape distribution with long tail and spike split into classes of low, moderate,

high, and very high, excluding the zeros (none class).

Class	Low	High	Interpretation
None	0	.000000001	Almost no probability of uncharacteristic soil disturbance in the subwatershed. Spatial distribution is rare in current.
Very Low	.000000000 2	< .005	Very Low probability of uncharacteristic soil disturbance in the subwatershed - It is unlikely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates would usually return soil surface to normal conditions in a relatively short time, except where woodland encroachment is the causal effect. This class is generally associated with infrequent, low impact effects resulting from prescribed fire or prescribed natural fire, or from soil erosion in low to moderate woodland encroachment types that shade out understory plant cover. Primarily correlated with the cold forest, moist forest, cool shrub, and dry shrub PVGs in current.
Low	>= .005	< .095	Low probability of uncharacteristic soil disturbance in the subwatershed - It is unlikely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates would usually return soil surface to normal conditions in a relatively short time, except where woodland encroachment is the causal effect. This class is generally associated with the moderate, but infrequent impact effects resulting from the combination of prescribed fire and timber harvest, or from soil erosion in moderate to high woodland encroachment types that shade out understory plant cover. Primarily correlated with the dry forest, moist forest, cool shrub, and the dry shrub PVGs in current.
Moderate	>= .095	< .245	Moderate probability of uncharacteristic soil disturbance effects in the subwatershed - It is likely that this level of soil disturbance would cause cumulative effects. Recovery rates in high impact areas may not return soil surface to normal conditions before the next prescribed activity that causes soil disturbance. This class is generally associated with moderate to high and frequent to infrequent impact effects resulting from the combination of prescribed fire and traditional timber harvest techniques, or from extensive soil erosion in high woodland encroachment types that shade out understory plant cover. Some of these subwatersheds contain small areas of agriculture cultivation that result in annual soil surface disturbance. Primarily correlated with the dry forest, moist forest, cool shrub, and the dry shrub PVGs in current.

Class	Low	High	Interpretation
High	>= .245	> .495	High probability of extensive uncharacteristic soil disturbance effects in the subwatershed - It is likely that this level of soil disturbance would cause extensive cumulative effects. Recovery rates in high impact areas would not return soil surface to normal conditions before the next prescribed activity that causes soil disturbance. This class is generally associated with frequent, moderate to high impact effects of traditional timber harvest techniques mixed with effects of agricultural cultivation and rural or urban activities. These subwatersheds often are located on the periphery of agricultural and urban subwatersheds and have connected effects. Primarily correlated with the dry forest, agriculture, and urban PVGs in current.
Very High	> .495	1.0	Very High probability of extensive uncharacteristic soil disturbance in the subwatershed - Spatial distribution highly correlated with a history of agricultural tillage and urbanization with some timber harvest. Primarily correlated with agriculture and urban PVGs in current.