APPENDIX K
MODELING EROSION AND MASS WASTING

MODIFIED SOIL LOSS EQUATION (MSLE)

Many assumptions have been built into this model to predict soil loss by the action of surface erosion. Using these assumptions may overemphasize potential soil loss. However, such conservative modeling can be adjusted through later field verification.

The outcome of this model is a set of maps, presented by subwatershed, depicting areas of erosion and the degree of erosion from very low to high (See Maps A.26a, A.27a, A.28a, A.29a, A.30a, and A.31a). Impacts of past land management are reflected in the maps, as lands harvested in recent years show higher levels of erosion than those on which vegetation has regrown for a decade or so.

The following list and discussion of the assumptions used for the MSLE model is provided for individuals interested in the physical parameters that may or may not apply to sediment delivery and surface erosion in the analysis area.

- Soil loss, the end result of the model, is the amount of soil removed in tons/ac/yr. This number is then compared to the allowable loss as shown in the *Coos County Soil Survey* (USDA 1989) Table 13, “Physical and Chemical Properties of the Soils”. When the amount of soil eroded exceeds the allowable amount, the resources are undergoing degradation.

- Rainfall intensity (amount of precipitation) is held constant across the entire watershed. The actual number is taken from Figure 25 ‘Isopluvials of 2-yr 24-hour Precipitation for Oregon’ (Miller *et al.* 1973). A value of 55 was used in the model and this is 10% higher than the upper end of the range (35 -50) for the Coos County area. No rain on snow events were considered in the model. No adjustments for the west to east gradient were made.

- Stand age classes of the existing vegetation were determined from aerial photos. The decade in which the ground was harvested was determined and a birthdate assigned, in the Grid analysis process. Both private and federally managed stand ages were dated in this fashion.

- The model assumes that the land will have the same characteristics as those following a moderate-level broadcast burn. This burn level will leave scattered roughness components in the form of medium- and large-sized woody material. All of the land surface will be burned and no vegetation will remain. It is much more intensive than the pile and burn method used on federal land to decrease burn intensity, and only leaves a ¼ inch of duff material unburned.

- In Riparian areas, the model assumes a fire will go out as it reaches a draw and the trees and vegetation will escape unharmed. A distance of 220 feet or more is left untouched and the stand age of the present stand is what is used to calculate root strength.

- No modeling of thinned areas is available. These treated stands do not have surface erosion as a normal function of the landscape. No surface erosion occurs as the canopy protects the land surface from above. Litter and infiltration are high in these stands.

- Land treatments assume that all lands are replanted with conifer and that these are growing from the time they are planted. No failures are modeled.

- The K and T erosion factors are a weighted average based on the percentage of the individual upper horizon soils in the complex or association. K and T factors are found in Table 13 of the County Soil Survey and actual erosion rates could be higher than the weighted average. All soil factors are joined together in a Relate Table in Arc and the model extracts the value.

INFINITE SLOPE EQUATION (ISE)

One criteria for determining Riparian Reserve widths on intermittent streams includes the extent of unstable or potentially unstable areas. The control of sediment into, and the ecological function of, the channel is the focus of this determination, while needs of terrestrial animals and birds for dispersion or cover are not considered in this model.

The ISE model determines a site-specific “factor of safety” based on criteria presented below. A ratio value is computed that compares forces of resistance to movement (soil stability) to those of movement pressure (soil failure). When the calculated ratio is greater than a predefined level, the area is described as stable, whereas values lower than the predefined level are classed as unstable. The outcome of this model is a set of maps, presented by sub-watershed, depicting potential for mass wasting from very low to very high (See Maps A.26b, A.27b, A.28b, A.29b, A.30b, and A.31b).

Failures are predicted based on the “factor of safety” generated under the following set of assumptions:

1. The entire watershed was regeneration harvested eight years ago. Only roots and stumps remain.
2. All streams in the District RMP database (or those corrected through data editing) are protected with interim widths of 220 ft. or 440 ft., depending on fish presence.
3. Rain has been falling for two months and the soil is fully saturated. Then an additional 2 inches of precipitation is received in a 24 hour time frame.

The mapping values were assigned by the Myrtlewood Resource Area soil scientist. These values have been corrected from assumptions in Watershed Analyses written prior to 1997. Probability of failure values are classified as follows:

Very Low	> 2.0
Low	1.4 - 2.0
Moderate	1.2 - 1.4
High	1.1 - 1.2
Very High	**#**1.0

Ratios were calculated for each soil type. Then, the lowest ratio (most conservative stability measure) was used for any soil map unit where more than one soil type is present. Thus, if three different soils types make up a soil map unit, then the one having the lowest ratio is used as the slope stability value.