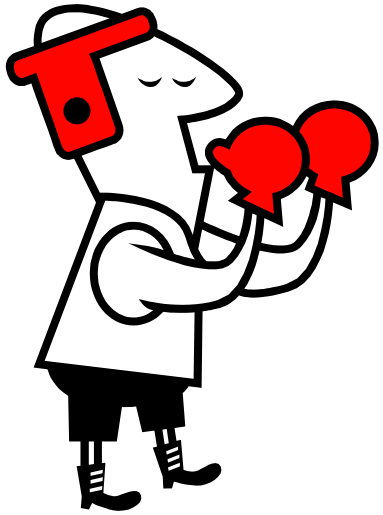
Slope Lengths & Considerations

What criteria do we use to measure slope length?

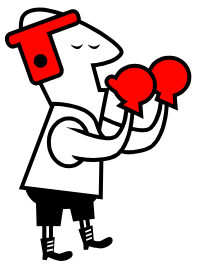
- *General Discussion*

Slope Lengths & Considerations

RUSLE (2) vs. USLE



Slope Length Discussion
USLE Definition



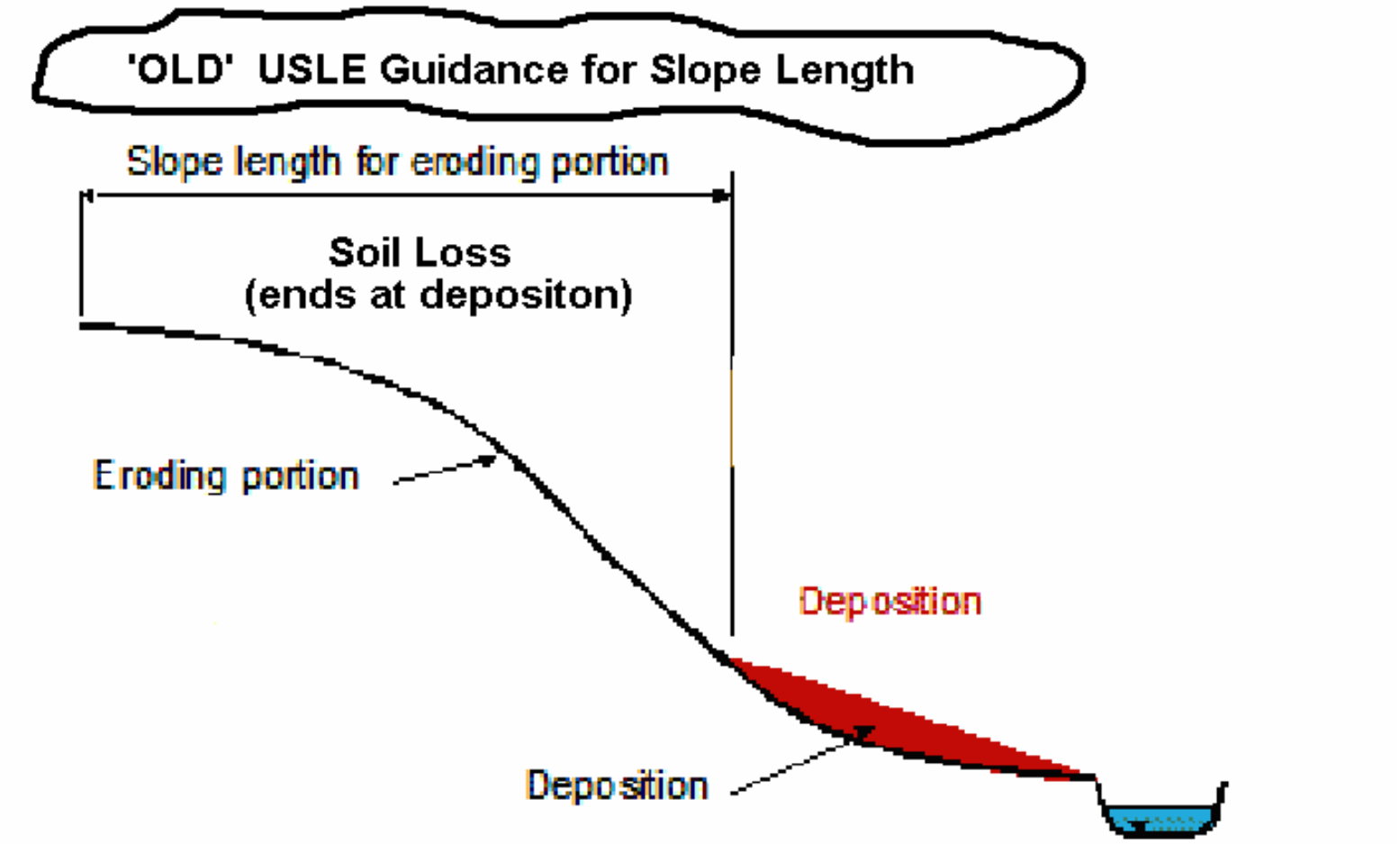
The Universal Soil Loss Equation **'USLE'** slope length definition---

was that deposition ended the slope length.

**However, if the overland flow continued across the depositional area, the slope length for the lower portion of the hillslope did not begin where deposition ended but began at the top of the hillslope where runoff began.

(Question: Was the second half of this definition typically practiced in VT regarding USLE ??)

‘OLD’ USLE Slope Length Guidance (1980s vintage)



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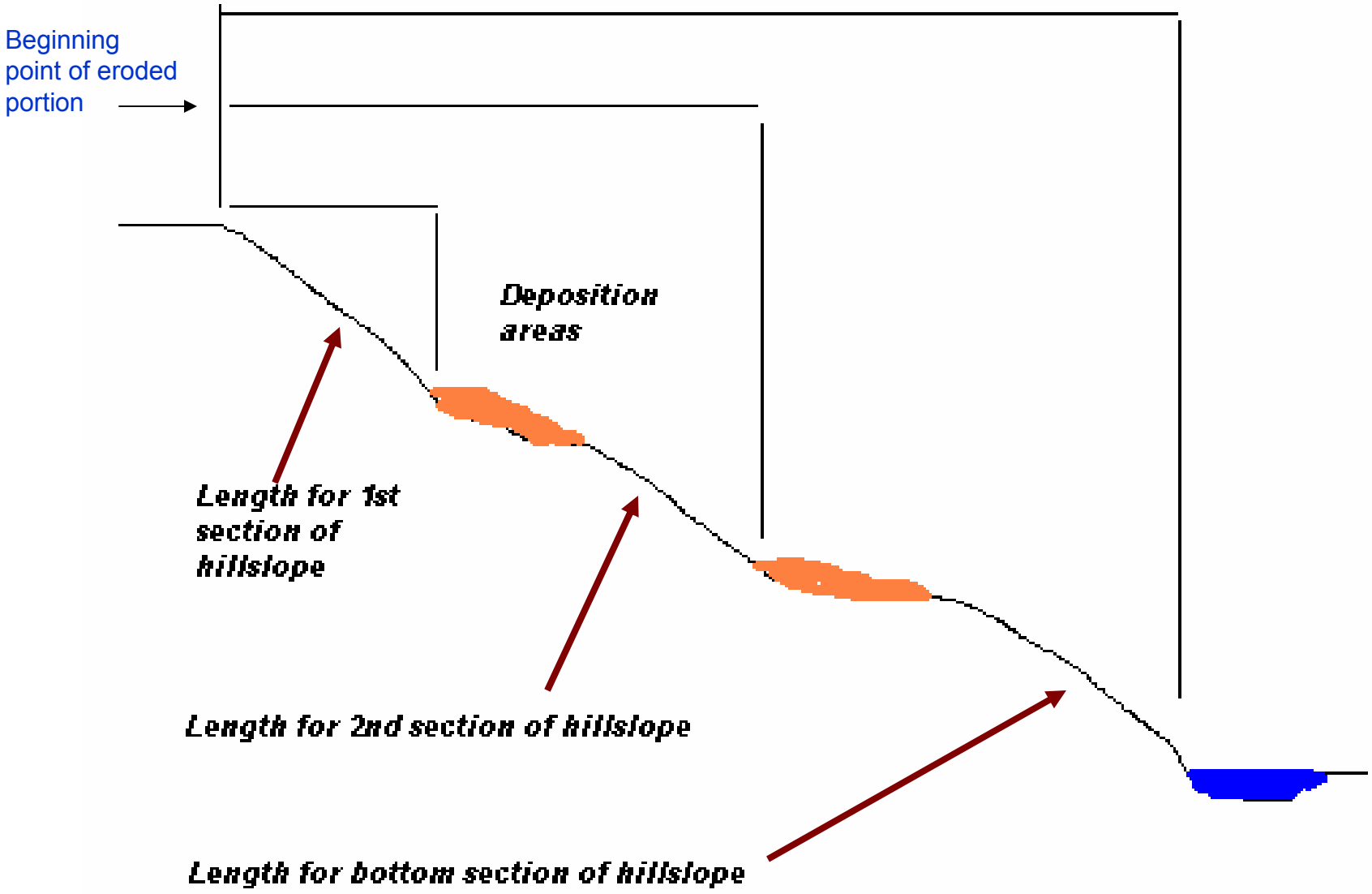
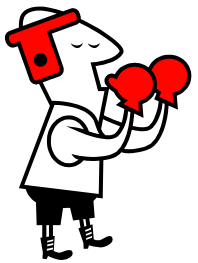


Slope Length Discussion RUSLE (2) Definition

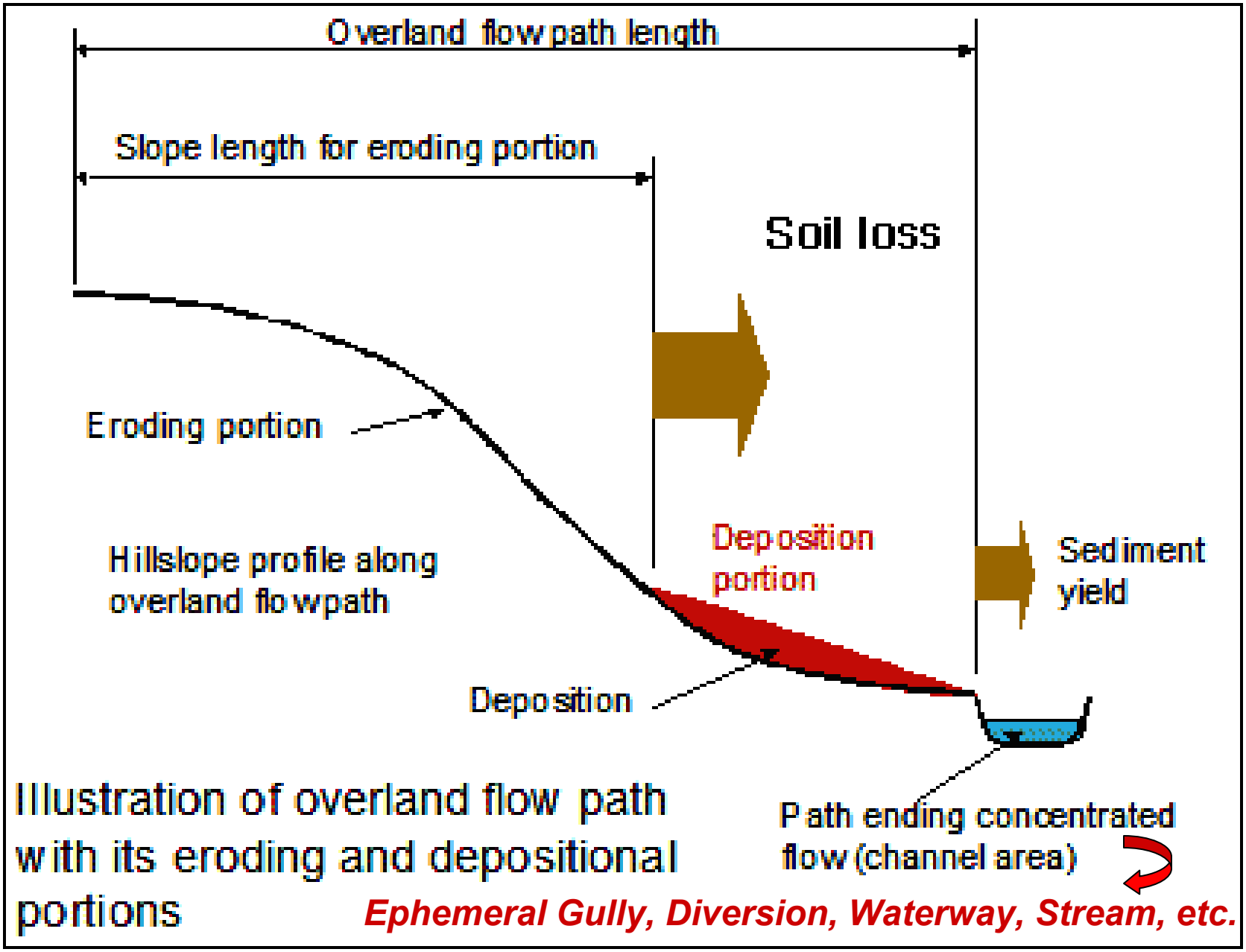


Rather than use the traditional USLE slope-length definition, **RUSLE2** uses an overland-flow path-length definition.

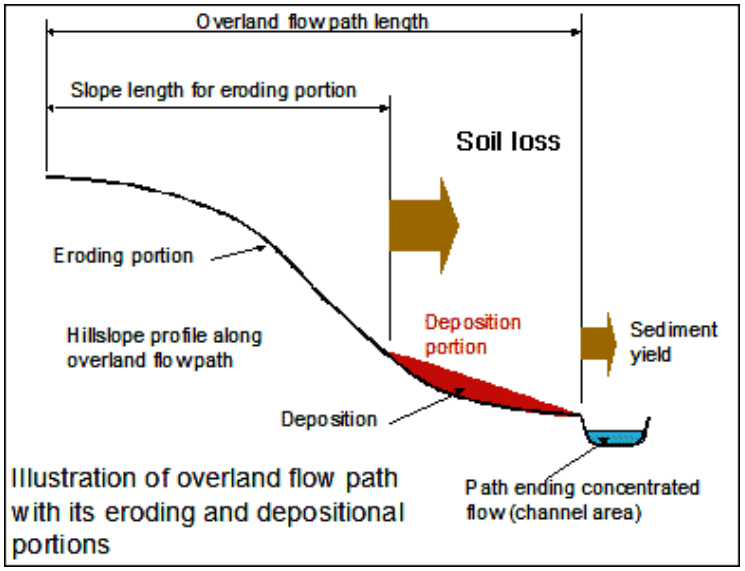
- The **RUSLE2** overland flow path length is the distance from the origin of overland flow to where the flow enters a concentrated flow area like an ephemeral gully, waterway, diversion, or stream.

- This slope length used when the analysis requires that the entire slope length be considered. i.e. complex slopes

RUSLE(2) Slope Length Ends at Concentrated Flow



RUSLE(2) Slopes



When measuring slope length, remember:

- **Ensure we are not using sedimentation as the end of slope,**
- **Slope Length Ends at Concentrated Flow**
- **Slope lengths may be longer using RUSLE (unless you are already using the appropriate slope length definition)**

Slope Steepness

- Single most influential factor in RUSLE
- Measuring devise (clinometer) must be accurate
- Measure both up and down slope for increased accuracy

A Couple Of Quick Points About RUSLE2

Question 1:

A question which is often asked….

What type (s) of Erosion Does RUSLE(2) measure?

What type(s) of Erosion Does **RUSLE(2)** measure?

RUSLE2 estimates rates of:

rill and interrill (sometimes referred to as **sheet erosion)** caused by **rainfall** and its associated **overland flow**.

Rill Erosion

- **Rill erosion** is the removal of soil by concentrated water running through little streamlets. As detachment continues or flow increases, rills will become wider and deeper.

- Rill erosion is one of the most common forms of erosion. **The rill channels can temporarily be obliterated by tillage.** Tillage loosens the soil making it more susceptible to rill erosion. Thus, every time they are destroyed - the rills can reform, resulting in much more soil lost.

Interrill Erosion

- Erosion on the areas between the rills, the *interrill areas*, is called interrill erosion.

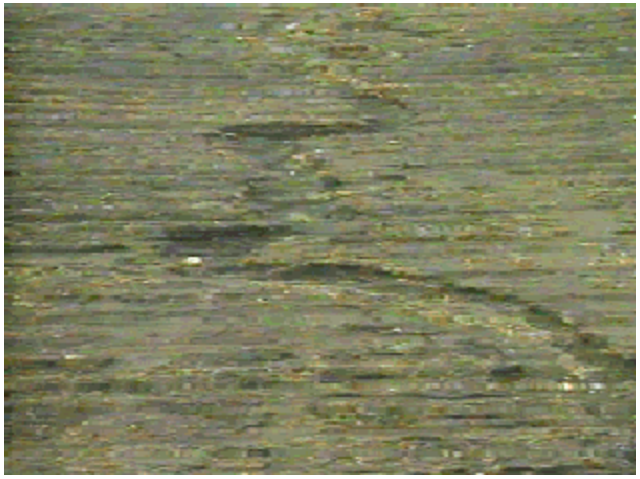
Sheet Erosion

- **Sheet erosion** is the uniform removal of soil in thin layers by the forces of raindrops and overland flow. It can be a very effective erosive process because it can cover large areas of sloping land and go unnoticed for quite some time.
- **Sheet erosion** can be recognized by soil deposition at the bottom of a slope.
- If left unattended, sheet erosion will gradually remove the nutrients and organic matter which are important to agriculture and eventually lead to unproductive soil.

What Doesn't RUSLE2 Measure?

Gullies

Ephemeral gullies, **can be plowed in and tilled across** depending upon their depth and width. Ephemeral gullies will reform in the same location in a field where flow from upslope regions concentrates. Creation of a grass waterway where an ephemeral gully forms can often control this type of erosion.



Classical gullies are an advanced stage of channel erosion. They are formed when channel development has progressed to the point where the gully is **too wide and too deep to be tilled across**. These channels carry large amounts of water after rains and deposit eroded material at the foot of the gully. They disfigure landscape and make land unfit for growing crops.

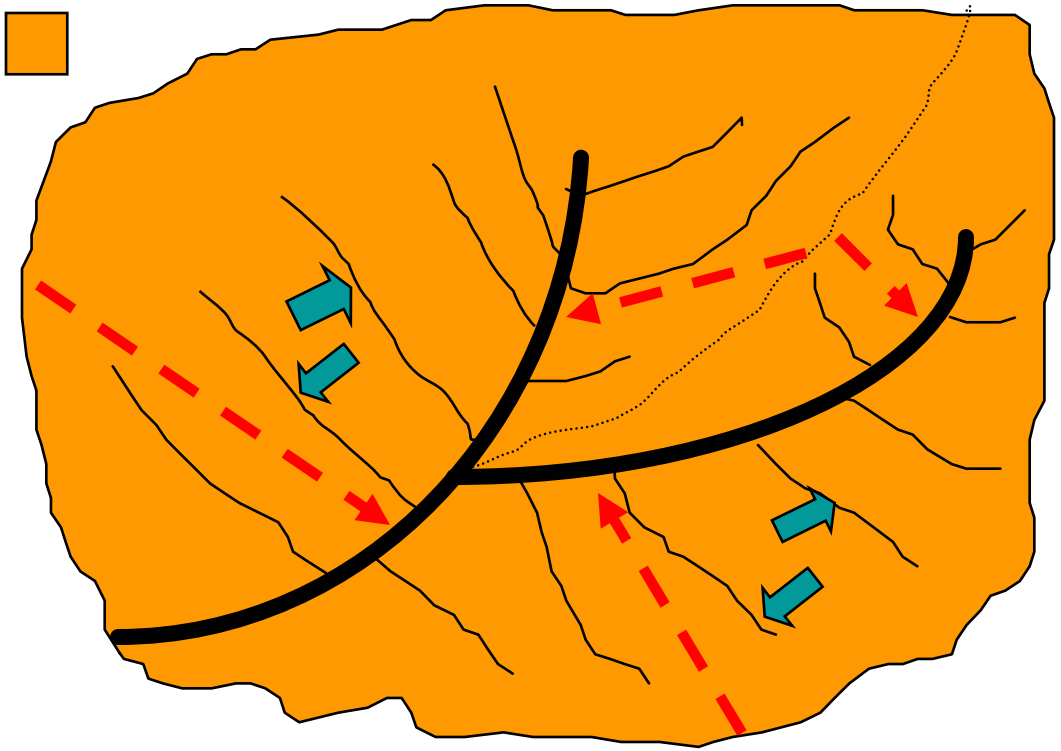
Landscape

Overland flow

Interrill

Rill

Ephemeral Gully (Concentrated flow)



Erosion Types

Rusle2 slope Length

Critical Slope Lengths

- Critical Slope Length is a determining factor for the Stripcropping-585 Standard.

- At long slope lengths, contouring (contour farming, row arrangement, etc) loses its effectiveness. Critical slope lengths are those beyond which contouring is assumed to lose much of its effectiveness.

- Critical slope length increases based on residue cover (typically above 50%)

- Critical slope length is affected by soil hydrologic group (based on shear stress exerted by the runoff on the soil).

- To Find Critical Slope Length in Rusle2: Must have **Contouring** specified. Find Critical Slope in the **PROFILE** view.

RUSLE2 Profile View