

## **Saco River - White Mountains Field Trip: A Geomorphic System**

### **Objectives:**

The overall objective of this trip is to give you a crash course in geomorphic processes and landforms that will serve as a partial background motivation for this class – we will introduce you to the range of problems and types of questions to which we will seek answers during the course. In addition, we will get an overview of a geomorphic system – the Saco drainage basin – from its headwaters as a trickle on the upper slopes of Mt. Washington to its mouth. On day 1 we will tour the Saco river from its mouth to where the Swift River (tributary to the Saco) runs through a narrow bedrock gorge in the White Mountains along Rt 112, the Kancamagus Highway. On day 2 we will hike up Mt. Washington into Tuckerman’s Ravine above Pinkham Notch. During this hike we will discuss hillslope weathering and transport processes. You will take notes to develop a “process zone” map, which you will complete in lab with the help of a digital elevation map and stereo aerial photographs.

During the hike on day 2, the general objective is to gain a good qualitative understanding of the processes contributing to erosion and transport of material off the peaks of the Presidential range in the White Mountains in order to address questions such as: (1) what controls the height of the peaks?; (2) what controls hillslope morphologies in this area?; (3) which processes are most important to the downwearing of the White Mountains (i.e. a qualitative sediment budget)?; (4) how often and under what conditions do mass wasting events occur on these high slopes?; (5) how does the material from these slides reach the streams? We will hike a several-mile loop around the headwall of Tuckerman ravine with the goal of identifying the active processes, their relative rates, and their mutual interactions. This will provide the field observations for the exercise. After combining these observations with a perusal of stereo aerial photographs and brief analysis of digital topographic data, you will write a brief report on your observations. It is expected that this report will mostly highlight questions you have developed about aspects of the geomorphology of the Mt Washington field area that you would like to learn more about. We are mostly interested in seeing what you got out of the field trip, how this stirs your curiosity, and how well you can express this in writing.

### **Materials Available for the Exercise:**

Topographic maps (paper and digital), aerial photographs, geological maps, drainage basin maps, and hydrographic data at various positions within the basin will all be made available to you (much of this was handed out as a packet during lab).

### **Day two: Active Processes and Qualitative Sediment Budget**

#### **Tasks:**

Identify active processes and map their spatial distribution. Include both weathering and transport processes. Attempt to determine (qualitatively) the relative rates of the various processes and the nature of their interactions. Look for evidence of older landslides predating the two fresh scars (dating to 1995) we will see in Tuckerman's Ravine. Also, when we reach the top of the ridge on the south wall of Tuckerman's Ravine we will split into small groups to survey topographic profiles of the ridge crest. You will be expected to work up these survey data and discuss them in the context of your observations of the spatial distribution of active processes.

**Questions to think about:**

What weathering processes are active? Is this a weathering limited or transport limited landscape? What determines the rock outcrop patterns? How was the Alpine Garden bench above the Lion head escarpment formed? (is this an uplifted erosion surface? a structural bench? something else?) How was the Tuckerman Ravine formed? (was it carved out by the Cutler River? under the current climate?) How is sediment mobilized on the steep slopes of the ravine headwall? What controls the transport rates? What sets the slopes of the walls of the Tuckerman Ravine? How is the sediment transported across the valley floor to the Cutler River? What downstream changes occur along the length of the Cutler River? How have human impacts affected hillslope hydrology and sediment transport processes?

**Hand in:**

1. Interpretive map of process zones focused on Tuckerman Ravine, Mt. Washington, but extending down slope to Pinkham notch.
2. Your report. ~3-4 page, double spaced, typed. Discuss your process zone map and outline the questions about landforms, processes and landscape evolution that your field and aerial photograph observations have evoked.
3. Your field notebook.