

Key Concept Summary of Field Stops – 2015 River Trip

DAY 1

1-1 Natural Science Building

Tectonic setting of western Oregon, Juan de Fuca Plate, North American Plate, Coast Range accretion, Cascade Volcanic Arc, Willamette Valley, Earth Energy sources (gravity, geothermal, solar), watersheds, trip itinerary/overview; introductory video clips: Plate Dynamics, Oregon Field Guide Missoula Floods, Oregon Field Guide Cascadia Seismic Hazards, 1996 Oregon Flood Event, Kayaking Sucks Landslide Video

1-2 North Santiam River State Recreation Area

Tectonic setting of western Oregon, Juan de Fuca Plate, North American Plate, Coast Range accretion, Cascade Volcanic Arc, Earth Energy sources (gravity, geothermal, solar), watersheds, trip itinerary/overview. Geomorphic mapping criteria (landform, material, age, process), bedrock vs. regolith, colluvium alluvium, force, work, mass, gravity, weight, bedload, suspended load, dissolved load, climate history, glacial history of western Cascades, geologic history of western Cascades

1-3 Detroit Dam / Santiam

Dams, anthropogenic, reservoirs, energy vs. load, downstream scour, upstream sedimentation, salmonid habitat, dam census of Pacific Northwest, significance of dams, social factors of dams, dam building history, reasons for dams (flood control, reservoirs, water resources), more on western Cascades geologic history

1-4 Suttle Lake / Mount Washington Overview

Mt. Washington vs. Black Butte, high cascades volcanic arc, history of cascades/high cascades, climate change, glacial vs. interglacial, glacial erosion, roadcut with diamicton, Suttle lake, moraine-dammed lake, glacial valley, soils chronology

Night 1 – Camp at Trout Creek

DAY 2

2-1 Morning Camp Discussion / Trout Creek Road Cut

Stratigraphic layering and analysis, geomorphic mapping, floodplains, hillslopes, terraces, colluvium, alluvium, diamicton, sediment sorting, clast roundness, pumice layers, Mt. Jefferson eruptive history, soils development, soils chronology, lacustrine deposition, hillslope vs. valley bottoms, bedrock geology and history of middle Deschutes River, Clarno Formation, John Day Formation, Columbia River Basalts, landslides, terraces, canyon rim

2-2 Ogden / Smith Rocks State Park / Crooked River Caldera

Overview of Crooked River history, Crooked river caldera, Clarno Formation, John Day Formation, Eocene-Oligocene stratigraphy, Smith Rock, pyroclastic flow, volcanoclastic rocks, ash flow tuff, welded tuff, the tuff of smith rock, caldera-margin ring fractures, structural dip, ring faults, basalt and andesite, rhyolite, Newberry Volcano, intracanyon basalt flow, Deschutes formation, rock age vs. permeability vs. groundwater flow rates, hydrothermal alteration.

Night 2 – Camp at Beavertail / Meet River Guides

DAY 3

3-1 Beavertail Camp (Deschutes hydrology/lecture)

Ground water, hydrogeology, regional geology of Deschutes basin, influence of groundwater on Deschutes River discharge, flood history of Deschutes river, regional hydrologic analysis, climatology, water resources, river hydrology, river discharge, fluvial landforms (active channel, floodplain, terraces, hillslopes).

3-2 Lunch Stop (entrance to Clarno Fm landscape)

Regional geology of Deschutes basin, whitewater hydraulics, fluvial mechanics, sediment transport processes.

DAY 4

4-1 Beavertail Cam Morning Discussion + Lunch Stop (cont.)

Flood recurrence intervals, flood history, regional flood geography, statistical analysis of historic hydrologic data, hydrometeorology, rain-on-snow history. Deschutes flood history, flood records, landscape analysis, paleoflood hydrology, depositional vs. erosional landscape records, carbon dating, flood chronology, landslide dams, catastrophic outburst floods, geology vs. meteorologic flood processes.

Night 4 – Camp at Deschutes River State Recreation Area / The Dalles

DAY 5

5-1 Morning Camp Discussion / Drive from Heritage Landing

Columbia River Basalts, bedrock terrain, hummocky topography, hillslope gradients, formative causes of river rapids, overview of Missoula Floods, Palouse Loess, last glacial advance, Montana Ice Dam Lakes, Clark Fork Idaho Ice Dams, Dam Burst Floods, channeled scablands, slackwater deposits, flood scour landscapes; Missoula flood silts, Missoula flood gravels; colluvium, rock fall processes.

5-2 Fairbanks Divide (Missoula Flood overflow notch)

Missoula floods, gravel bars, flood deltas, spill-over deltas, pebble imbrication, flood gravels, cross-stratification, foresets, paleocurrents, deposition vs. erosion evidence of flooding

5-3 Fairbanks Bar (spill-over delta)

Missoula floods, gravel bars, flood deltas, spill-over deltas, pebble imbrication, flood gravels, cross-stratification, foresets, paleocurrents, deposition vs. erosion evidence of flooding

Drive back to WOU / Monmouth / fare-thee-well...