

Key Concept Summary of Field Stops – 2016 River Trip

DAY 1

1-1 Natural Science Building / Class Introduction

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, 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 La Pine State Park

DAY 2

2-1 Morning Camp Discussion

Landscape analysis (landform, material, age, process), sediment coring, soil sampling, Mt. Mazama, Crater Lake History, tephra, Mazama Ash, pumiceous sediment, Mazama blast zone, regolith, lava flows, basalt, High Cascades, regional Newberry geology, cinder cone history, Teepee Draw Tuff, Newberry Caldera, fault junction (Brothers, Tumalo, Walker Rim), High Lava plains, rhyolite age progression, Basin and Range extension, bimodal volcanism.

2-2 Paulina Peak / Newberry Caldera

Overview of newberry volcano, cinder cones, big obsidian flow, history of newberry eruptions, Newberry volcanism vs. Cascade arc, overview of caldera / lakes, significance of Newberry with respect to regional tectonics, cinder cone morphology / age relations.

2-3 Paulina Lake Outlet / Paulina Falls Knickpoint Erosion

Paulina lake observations, lake terraces, wave erosion, caldera uplift, Paulina outlet knickpoint, headward erosion, catastrophic outburst floods, knickpoint processes, headward erosion, slope/gradient observations, catastrophic outburst floods, paleoflood hydrology

2-4 Paulina Creek / Ogden Group Camp / Paulina Creek Terrace Analysis / Catastrophic Flood Record

Field hydrology, discharge calculations, terraces, terrace gravels, mazama ash, catastrophic outburst floods, floodplains, high terrace, middle terrace, flood scour, soils chronology, aridisols, clay films, soil development vs. time, landform / geomorphic surfaces.

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

Regional geology of Deschutes basin, whitewater hydraulics, fluvial mechanics, sediment transport processes, formative causes of river rapids,

DAY 4

4-1 Beavertail Camp 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.

Columbia River Basalts, bedrock terrain, 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 silts.

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