Ellensburg Chapter

ELLENSBURG, WASHINGTON

The **Ellensburg Chapter** is based in Ellensburg, Washington. Ellensburg lies in a unique geologic, climatic, and topographic setting. It is situated near the western edge of the Columbia River Basalts. Older sedimentary, igneous, and metamorphic rocks lie to the west and north. Climatically, it is located in the semi-arid foothills of the Cascades with wetter conditions to the west and drier to the east. Geology and climate combine to create a topographic setting that is conducive to great field tripping! Within a one hour drive, we can see all of the major rock groups, be exposed to climates ranging from subalpine to desert, and see landscapes shaped by volcanism, tectonics, weathering, landslides, rivers, glaciers, and wind.

Chapter activities include field trips and a speaker series. We offer four carpool field trips each year, typically in September, November, April, and June, to sites within and outside the floods-impacted area. We host five on-campus speaker presentations each year, typically in October, December, February, April, and June, focused on a variety of geology and physical geography topics. Field trips and presentations are free-of-charge and open to all.

To learn more about the amazing story of the floods, or to attend our field trips or presentations, visit us at **nickzentner.com/ellensburg-chapter-iafi cwu.edu/geography/karl-lillquist-field-guides or IAFI.org/Ellensburg, or watch our amazing collection of entertaining and educational videos:**

2-Minute Geology – IAFI.org/Ellensburg/2-minute-geology
Nick On The Rocks – IAFI.org/Ellensburg/Nick-on-the-Rocks
Roadside Geology – IAFI.org/Ellensburg/Roadside-Geology
Downtown Geology – IAFI.org/Ellensburg/Downtown-Geology

FOLLOWING THE PATHWAY

During the last glacial cycle of the Ice Age some 80,000 to 14,000 years ago, massive floods repeatedly carved many of the distinguishing features of the interior Northwest's unique landscape.

This is your guide to the dramatic evidence of these historic floods, from spectacular canyons and cliffs to waterfalls and vast, flood-eroded scablands, that can be witnessed with a short road trip.

It is our hope that you will use this guide to explore the fascinating geological flood features in our region, and want to learn more about the dramatic Ice Age Floods.

OF THE GREAT FLOODS

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Learn **MORE** at **IAFI.org** or **facebook.com/IceAgeFloods/**

A GUIDE TO GEOLOGY AND THE ICE AGE FLOODS IN THE COLUMBIA BASIN

Our Cataclysmic Floodscape

FEATURES, DESCRIPTIONS, and MAP INSIDE

Highlighting day trips to prominent geologic and ice-age flood features in the Columbia Basin

A regional guide to the geology and evidence of the GREAT ICE AGE FLOODS that formed the Columbia Basin's dramatic landscape

Photo by Karl Lillquist

Interesting Landscape Facts!

The ridges forming the Kittitas Basin are part of the Yakima Fold and Thrust Belt that began to rise about 10 million years ago.

The hills and ridges of the Kittitas Basin floor are remnants of a once-continuous cover of sediments. Because of folding and faulting, those sediments range up to 5,000 feet in thickness. The City of Ellensburg is built around one such hill, and US 97 follows several of the remnant ridges north of Ellensburg.

Alpine glaciers from the Cascade Range nearly reached the present-day location of Thorp in the western Kittitas Basin.

Ice Age floods did not reach the Kittitas Basin. They did, however, fill Ryegrass Coulee (followed by I-90) and Schnebley Coulee (includes Vantage Highway) up to about ~1,260 feet elevation.

Two main highways lead out of the basin to the south. I-82 passes over the upfolds (anticlines) and downfolds (synclines) of the Yakima Fold and Thrust Belt. WA 821 (Canyon Road) follows the meandering path of the Yakima River through the folds.

The Yakima River originates near the crest of the Cascade Range. It enters the basin from the northwest followed closely by WA 10. The river flows along the basin floor until entering the Yakima River Canyon.

The Story of the Great Ice Age Floods

During the peak of the last Ice Age, a vast Cordilleran continental ice sheet covered southwestern Canada and the northern parts of Washington, Idaho and Montana. An eastern Purcell lobe of the ice sheet descended into the Idaho panhandle, blocking the Clark Fork River with an ice dam thousands of feet thick.

Water rising behind the dam flooded the valleys of Montana creating Glacial Lake Missoula – a great inland lake stretching over 200 miles to the east with a volume of water greater than Lake Erie and Lake Ontario combined.

The rising lake waters periodically caused the ice dam to fail, resulting in sudden, cataclysmic floods that rushed across northern Idaho and the Channeled Scablands of eastern and central Washington, through the Columbia River Gorge, and into Oregon's Willamette Valley, before emptying into the Pacifc Ocean at the ancient mouth of the Columbia River. Glacial Lake Missoula would have drained in just a few days as a volume of floodwaters greater than all the rivers of the world combined roared across the landscape at up to 60+ mph.

Now imagine this happening not once but dozens, perhaps even hundreds of times as the advancing continental glacier built a new ice dam!

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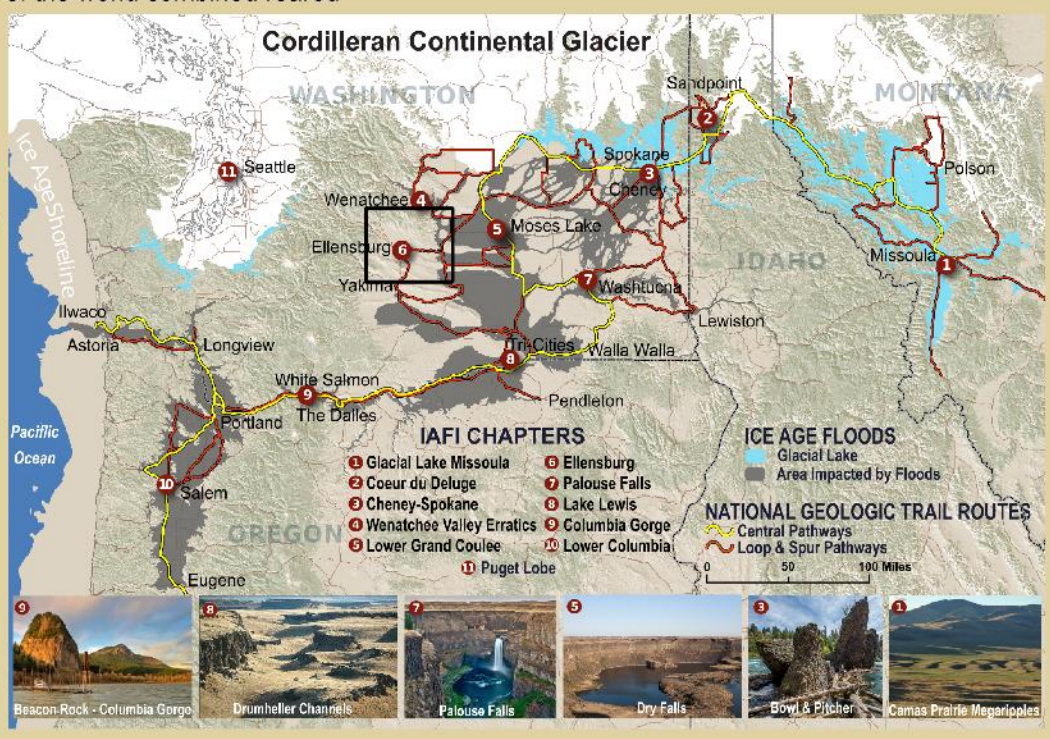
NATIONAL GEOLOGIC TRAIL

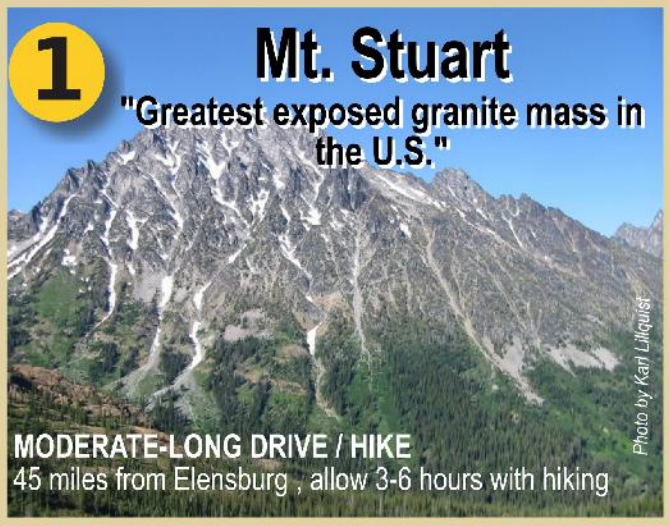
Ice Age Floods National Geologic Trail

Since the 1990's the Ice Age Floods Institute (IAFI) has worked to create and to build support for the Ice Age Floods National Geologic Trail.

The Ice Age Floods National Geologic Trail is essentially a network of marked touring routes extending across parts of Montana, Idaho, Washington, and Oregon, with several special interpretive centers located across the region. Many interested parties are being brought together in a collaborative and effective interpretive program at a remarkably low cost, despite the extraordinary size of the region.

The Trail is being developed under the National Park Service on existing public lands, with no changes in jurisdiction and no threats to private property rights. The role of the National Park Service is to coordinate and manage the planning of the project and the telling of the story, without taking custodianship of public and private lands.





Iconic **Mt. Stuart** is visible from most places in the Kittitas Basin. At 9,415 feet elevation, it caps the Stuart Range, an outlier of the Cascades, north of Ellensburg. Legendary mountain climber Fred Beckey describes it as the "single greatest mass of (exposed) granite in the United States". Mt. Stuart originated as a batholith (i.e., an intrusion of magma that cooled beneath the Earth's surface) approx. 93 million years ago. Because it is so much older than the surrounding Cascades (~40 million years old) and because of its paleomagnetism, it is thought to have originated to the south and shifted to its present position as an "exotic terrane" via the movement of tectonic plates.

Mt. Stuart's form, and that of the rest of the Stuart Range, is jagged primarily because of alpine glaciation in the more recent geologic past. Alpine glaciers formed on, and eroded into, Mt. Stuart to create its "horn" shape. Those glaciers went on to shape the valleys radiating from the mountain including those of Ingalls, Jack, Icicle, and Mountaineer creeks. Small glaciers are now only present on the north side of Mt. Stuart. Seasonal snowfields typically mantle the south facing slopes of the mountain into August.

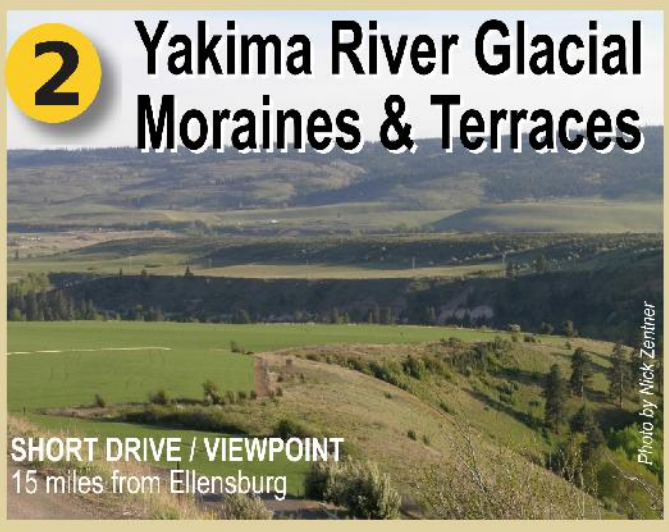
Ginkgo State Park is home to the **Ginkgo Petrified Forest**. The park stretches from Vantage on the Columbia River several miles west into lower Schnebley Coulee where it is bisected by the old Vantage Highway.

Approximately 16 million years ago, when the Pacific Northwest was under a warmer, wetter climate, Cascade Range forests included more diverse species than today. Volcanic debris flows from the Cascades uprooted and transported many of these trees to the Vantage area where they were deposited.

They were then buried by the Ginkgo lava flow, an ~15.5 million year old member of the Wanapum Basalts. With burial, cellulose of the wood was replaced with silica thereby petrifying the logs.

More than 35 different trees have been found here including pine, fir, spruce, and sequoia that are present today in western coniferous forests. More intriguing are the other species--oak, maple, elm, cypress, beech, and ginkgo representative of southeastern US or southeastern Asia native forests.

Subsequent Ice Age floods through the area exposed some of the logs so we can see them today.

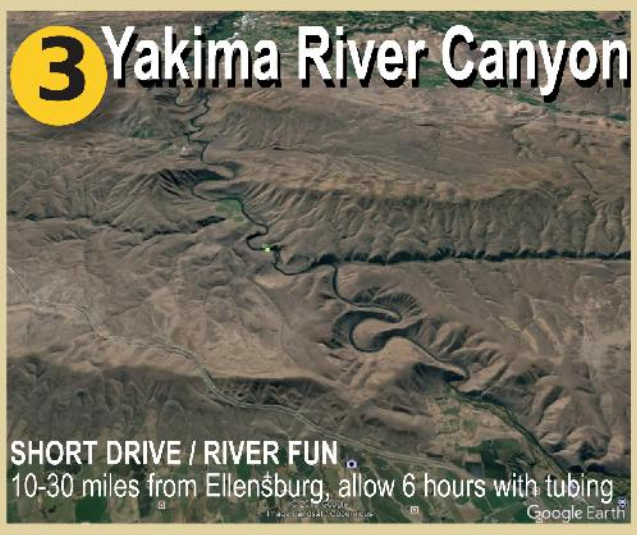


Several times in the recent geologic past, alpine glaciers formed at high elevations in the Upper Yakima River Basin. Persistent cold and snowy climates caused these glaciers to flow far downvalley.

The largest of these glaciers terminated, and deposited large piles of debris (i.e., moraine), at Thorp Prairie (also known as Elk Heights and crossed by I-90) and Swauk Prairie (crossed by WA 970) more than 500,000 years ago. This glacier was more than 40 miles long!

Glacial meltwater left thick deposits of gravel and sand that was later partially eroded by the Yakima River. This partial erosion left relatively flat terraces downstream nearly to Ellensburg.

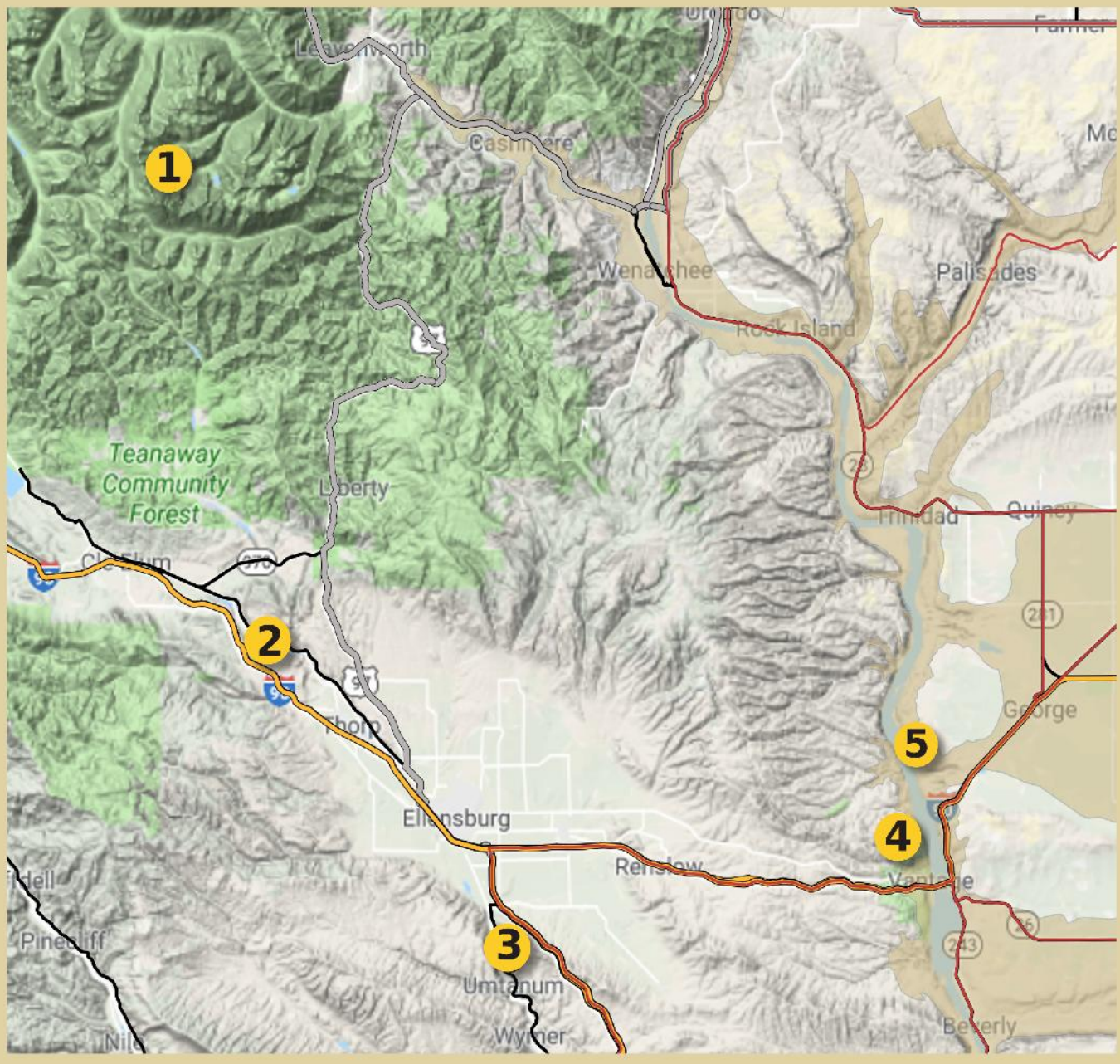
Subsequent glacial advances deposited moraines further upvalley and terraces nested below the prominent ancient ones. The most prominent of these moraines are those that impound lakes Cle Elum, Kachess, and Keechelus.



The **Yakima River Canyon** is one of Central Washington's landform "gems" and is located just south of Ellensburg and the Kittitas Basin. The spectacular canyon formed from the incision of the Yakima River through resistant Columbia River Basalts.

Because the river flows perpendicular to the dominant folds of the Yakima Fold and Thrust Belt, it is thought to be antecedent–i.e., the river eroded downward as the folded ridges rose. And it continues to do so! The sinuous path of the river through the hard rocks forms "entrenched meanders".

The steep walls of these meanders show evidence of prehistoric to recent rockfall, landsliding, and debris flows. Over the past 25 years, WA 821 has been closed several times for extended periods by debris flow events driven by thunderstorms. The most recent debris flow-related closure occurred in August 2019..



Frenchman Coulee is an erosional feature left behind by the great Ice Age Floods, a spectacular dual coulee and recessional-cataract complex in the western Quincy Basin.

In the Pacific Northwest, "coulee" refers to steep-sided, flat-floored, straight channels eroded in basalt bedrock by Ice Age floods. Frenchman Coulee is actually two parallel coulees–old US 10 follows the northern coulee while roadless"Echo Basin" is the southern branch.

Frenchman Coulee formed when Ice Age floodwaters flowed down the Grand Coulee and across the Quincy Basin. It is one of four main outlets for floodwaters in the Quincy Basin–Crater Coulee and Potholes Coulee lie to the north while the Drumheller Channels lie to the southeast.

Floodwaters exiting the basin through Frenchman Coulee dropped over 600 feet to the Columbia River Valley creating a significant waterfall. The coulee formed as floodwaters spilled over, and eroded, the Columbia River Valley wall. Over time, this waterfall receded headwardly approximately 2 miles to its present position. "Plunge pools" lie at the foot of each of the falls at each coulee head marking the final positions of the waterfalls. A linear mesa separates the two coulees while flood bars and dunes cover the coulee floors.

Additional details on these features and associated road tours and trails are online at ***https://iafi.org/***