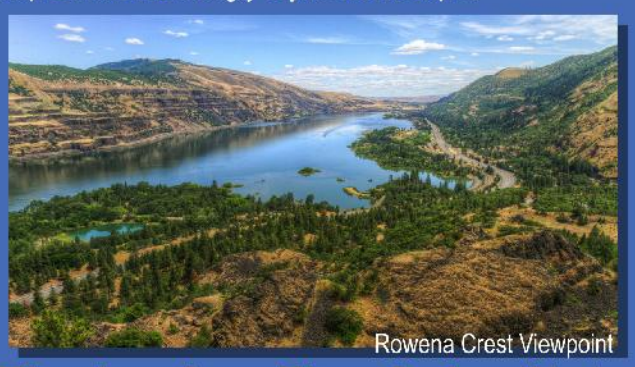
The Columbia River Gorge

The Columbia River Gorge is famous the world over for its stunning scenery, award-winning wines, and its endless outdoor and adventure sports. It also boasts an amazing array of geologic and Ice Age Floods features to delight everyone from the casual tourist to the most intensely focused researcher.

These features nestle in ecological zones ranging from alpine snow-clad volcanic peaks to conifer forests, boreal rainforests, oak woodlands, grasslands and high desert, all within a 50 mile wide swath surrounding 90 miles of the mighty Columbia River. These features provide insights to over 20 million years of tumultuous geological history that has shaped this seemingly idyllic landscape.



Rowena Crest Viewpoint

The Ice Age Floods Institute

The Ice Age Floods Institute (IAFI) is dedicated to the study of the natural prehistoric floods of basalt and water that sculpted regions of MT, ID, WA and OR; and to the education of local and visiting public about the geological wonders that surround us.

Throughout the year the **Columbia River Gorge Chapter** hosts public presentations, field trips and materials by prominent authors, speakers, scientists and engineers about the Ice Age Floods and the geology of the Columbia Gorge region for the general public, schools and other organizations.

Glacial Lake Missoula at the Ice Dam

FOLLOWING THE PATHWAY

During the last glacial cycle of the Ice Age some 80,000 to 14,000 years ago, repeated massive floods 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

ICE AGE FLOODS INSTITUTE
OREGON • WASHINGTON • IDAHO • MONTANA

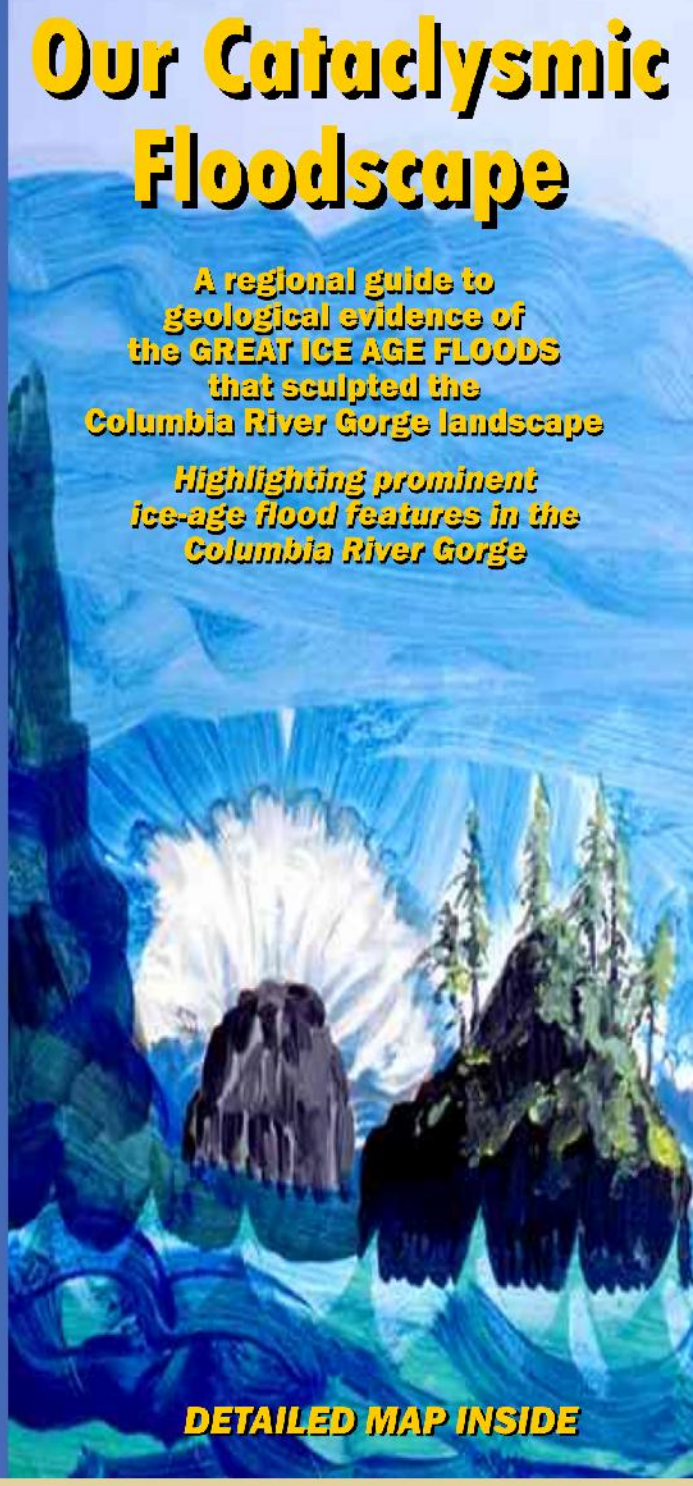
Learn **MORE** at **IAFI.org** or **facebook.com/IceAgeFloods**

A GUIDE TO THE ICE AGE FLOODS IN THE COLUMBIA RIVER GORGE

Our Cataclysmic Floodscape

A regional guide to geological evidence of the GREAT ICE AGE FLOODS that sculpted the Columbia River Gorge landscape

Highlighting prominent ice-age flood features in the Columbia River Gorge



DETAILED MAP INSIDE

Interesting Flood Facts!

Crown Point - Peter Marbach

Near the end of the last ice-age, 18,00-14,000 years ago, a lobe of continental glacial ice repeatedly formed 2,000' tall, miles-wide ice dams that blocked a river draining all of central Montana, and repeatedly backed up Glacial Lake Missoula. At its maximum, Glacial Lake Missoula held as much water as Lakes Erie and Ontario combined.

Rising lake waters eventually caused each successive ice dam to fail catastrophically, releasing the impounded lake waters in rampaging Ice Age Floods. The released flood waters roared away at speeds over 60 mph and at rates greater than 10 times the volume of all the world's rivers combined.

For millions of years before the Ice Age Floods began, the Columbia River had occupied a broad river valley it had cut through the rising Cascade Range. When the raging flood waters came through they swept away loose rock debris and tore away bedrock, widening the valley to produce the Gorge as we see it today.

The flood waters rose to over 1000' deep behind several progressively narrower sections of the Gorge. Generally the flood heights along the Gorge can be recognized as the upper limit of the exposed basalt palisades lining the Gorge.

The rising flood waters backflooded tributary valleys and formed temporary lakes where fertile Palouse soils stripped from central Washington were deposited. Those deposits of Palouse sand and silt in the Gorge and backwater valleys now provide excellent terroir for premium wine grapes.

Vineyard erratic sentinel

The flood waters also transported icebergs, embedded with huge boulders from the collapsed Canadian ice dam, for hundreds of miles until the icebergs ran aground, melted, and dropped the boulders as 'erratics' along the floods path.

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 ice 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 Pacific 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 rebuilt new ice dams!

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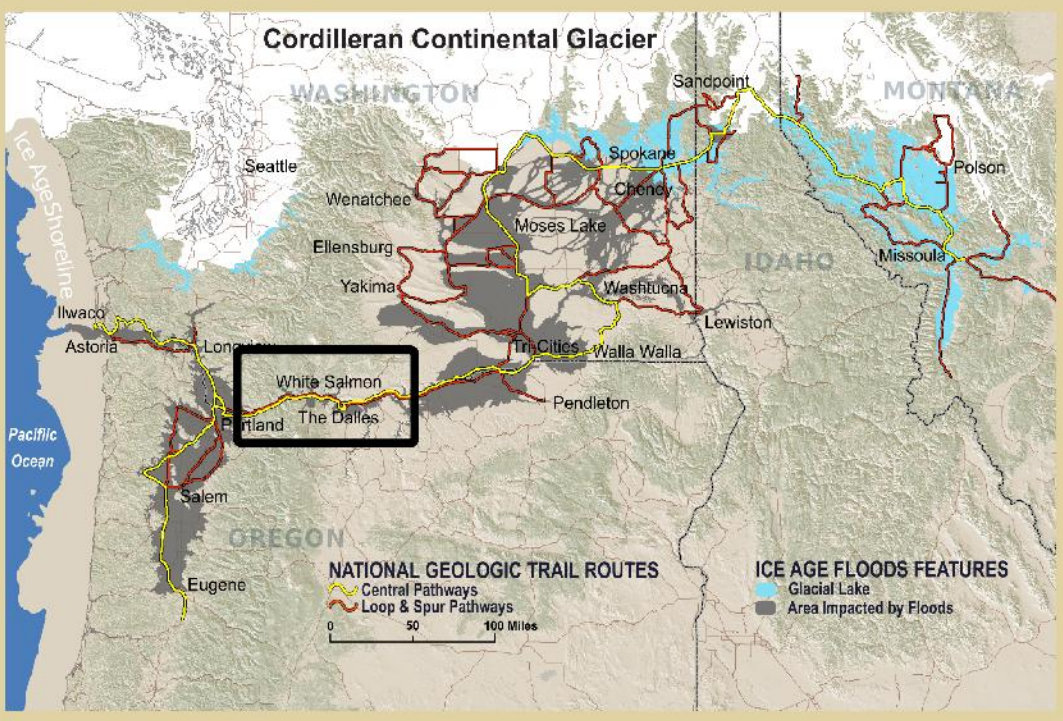
ICE AGE FLOODS
NATIONAL GEOLOGIC TRAIL

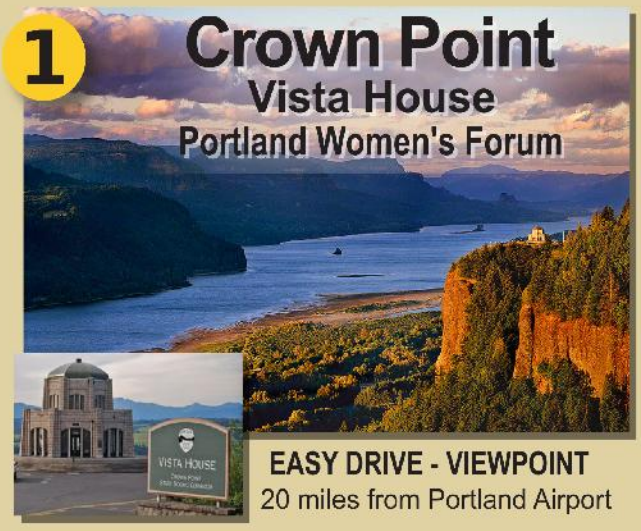
Ice Age Floods National Geologic Trail

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.





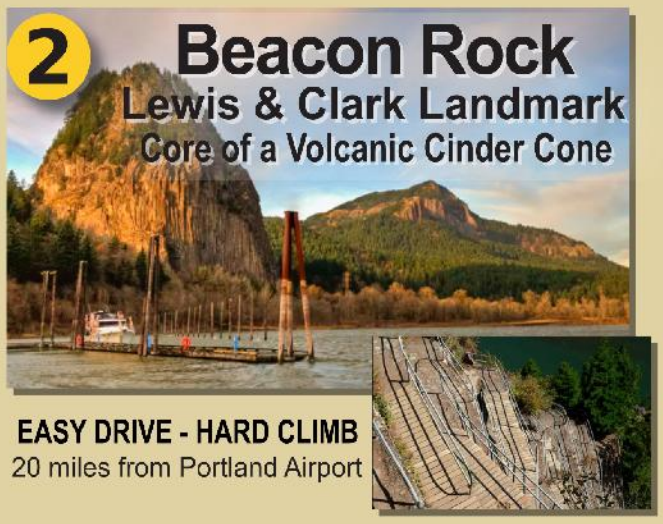
EASY DRIVE - VIEWPOINT
20 miles from Portland Airport

Crown Point is a basalt promontory with a cliff top viewpoint 733 feet above the Columbia River on the south side of the Columbia River Gorge. The underlying basalts are part of a lava flow that filled an old Columbia River channel 14.5 million years ago.

From this scenic viewpoint it is easy to imagine the Ice Age Floods roaring out of the Gorge into the Portland Basin, depositing massive gravel bars that form the major islands in the river below.

Vista House museum at Crown Point serves as a memorial to Oregon pioneers and as a comfort station for travelers on the Historic Columbia River Highway. With its high-grade marble interior and brass fixtures, some Oregonians derided it as the "$100,000 Outhouse" during its construction.

The absolutely breathtaking view from the Portland Women's Forum, about 2 miles west of Vista House along the Historic Highway, is one of the best spots to soak in the magnificent Columbia River Gorge. This area is a perfect starting place to a fun-filled day of adventure and discovery, exploring the waterfalls, scenery, gorgeous views and incredible workmanship and engineering all along the beautiful 100+ year old Historic Columbia River Gorge Highway.



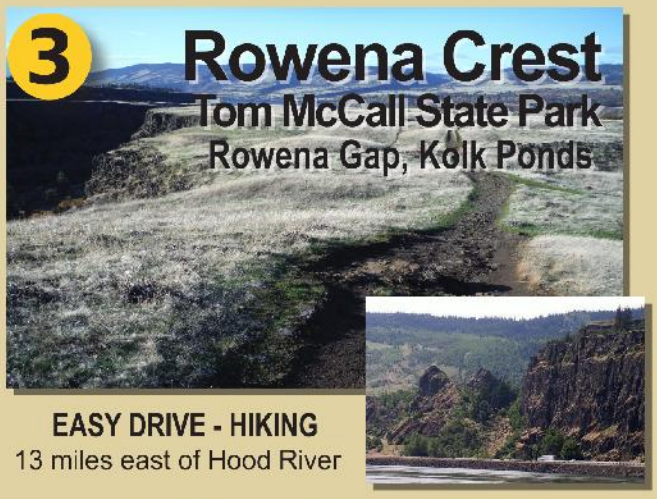
EASY DRIVE - HARD CLIMB
20 miles from Portland Airport

Beacon Rock is one of the most prominent and distinctive geological features in the Columbia River Gorge, an 848-foot landmark that was once the basalt core of a ancient volcanic cinder cone on the north bank of the Columbia River. Its Native American name, "Che-Che-op-tin", which translates to "the navel of the world", isn't far off since it once formed the belly of a volcano.

Between 18,000 and 14,000 years ago, raging flood waters and icebergs in 40 to 120 Ice Age Floods tore away at the exterior cone, leaving Beacon Rock as a basalt monolith sticking out of the north bank of the Columbia River.

Lewis and Clark camped here in 1805 on their way to the Pacific, and it was at Beacon Rock that they first noticed the ocean tides affecting water levels in the Columbia River, more than 120 miles from the mouth. This team of explorers also gave the rock its modern name, though they initially referred to it as Beaten Rock, then later as Beacon Rock.

A dizzying mile-long switchback trail takes hikers to a tip-top experience where there are lofty vantage points for eagle-eye views of a breathtaking section of the Columbia River Gorge that marks the border between Washington and Oregon. It's definitely worth the climb.



EASY DRIVE - HIKING
13 miles east of Hood River

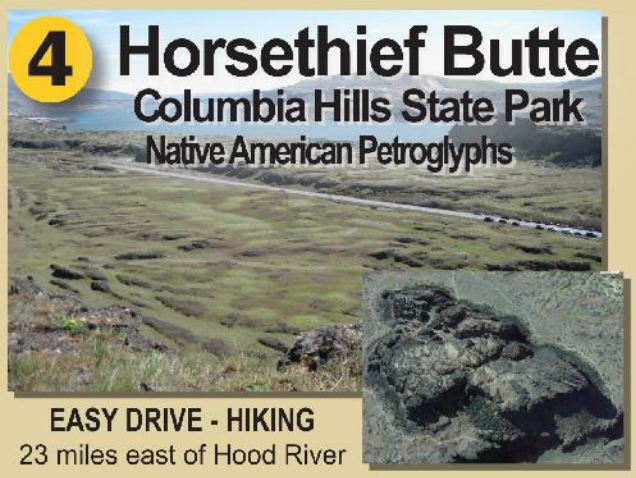
Rowena Crest lies nearly 700 feet above the Columbia River at the upstream end of Rowena Plateau, a miles-long promontory that protrudes into the path of the river. The river flows around this promontory through a relatively narrow section of the Gorge known as the Rowena Gap.

As the onrushing Ice Age Floods waters entered Rowena Gap and crashed against the Rowena promontory they were blocked and diverted northward. That created a major chokepoint in the path of the floods and backed up a temporary lake into The Dalles basin as the floods made their way through the Columbia Gorge.

As the flood waters hit the Rowena promontory they built to nearly 1000 feet deep and flowed over the promontory. They also undercut the face, producing the chaotic landslide blocks below the viewpoint to the east. The diverted floodwaters also deposited a huge eddy gravel bar that blocked the Klickitat River and still underlies the entire town of Lyle across the river.

It is estimated that each of the 40-120 Ice Age Floods may have taken up to a month to pass completely through the system to the Pacific Ocean, but the duration of the flood waters at any point along the path probably lasted less than a couple of weeks.

KNOW BEFORE YOU GO - Use this guide map for general reference. Be aware that many remote locations have poor cell coverage. Download and save specifc details about these and other Ice Age Floods sites at https://www.IAFI.org



EASY DRIVE - HIKING
23 miles east of Hood River

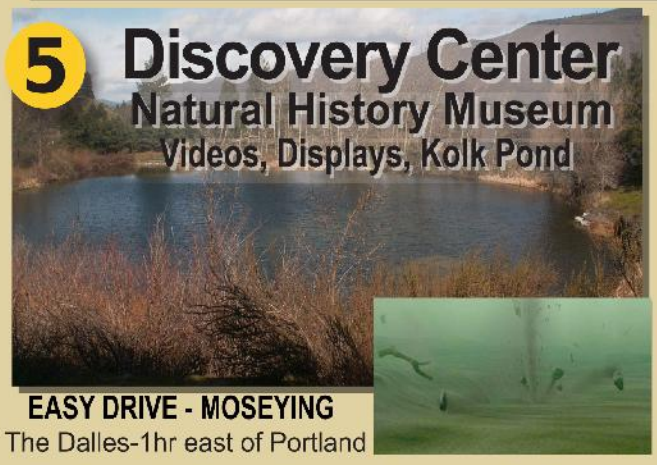
With Mount Hood standing starkly to the west, rugged Horsethief Butte dominates the skyline over Horsethief Lake like an ancient castle. It looms above the waters of Celilo Lake, a now becalmed stretch of the Columbia River flooded into existence by the construction of The Dalles Dam. This nearly two miles of shoreline on the Columbia River made it a perfect stopping point for the Lewis and Clark expedition on their way to the coast.

The butte is composed of columnar Wanapum basalt flows about 15 million years old. The butte was scoured, cleansed of most of its soil, and ripped into a streamlined teardrop shape by the Ice Age Floods about 18-14,000 years ago.

The butte is part of Washington's expansive Columbia Hills State Park, a 3,300-acre camping park in the long, rolling hills of the Columbia River Gorge. It is located on the site of a former Native American village and there are Native American pictographs and petroglyhs on display.

Lupine and balsamroot bloom in mid-April, making spectacular fields of purple and gold. Songbirds flit about, while larger birds of prey -- like eagles and falcons -- soar on air currents high above your head as you wander in the gullies and scramble to the Butte's windy summit.

Find an interactive map and additional details about these and other ice-age floodscape features online at:
https://iafi.org/floodscapes



EASY DRIVE - MOSEYING
The Dalles-1hr east of Portland

The Columbia Gorge Discovery Center in The Dalles, OR, hosts amazing educational displays about the Ice Age Floods, including a life-size model of a Columbian Mammoth. Videos and displays will introduce you to major concepts about the floods and the general geology of the Columbia River Gorge and the Pacific NW. It also has great coverage of the history of local native-American tribes, settlers, and even more recent historical people, events and industries.

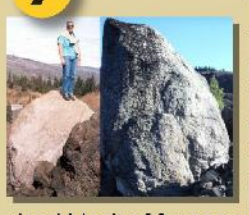
Peer out the expansive windows at the end of the main hall at the round Kolk pond that was drilled into bedrock by whirlpools that formed as the flood waters filling The Dalles basin rushed into the Rowena Gap on their path through the Gorge. Also note the 3-4 faint benches cut into the slope across the river by the onrushing flood waters.

You will also enjoy the Wasco County Museum housed in the same building, as well as special displays and daily raptor shows that fascinate both young and old.

6 Hoodoo Scablands

The scablands just upstream of the John Day Dam include unusual low-standing hummocks and spires (hoodoos) of remnant, floods-battered basalt. These Hoodoo Scablands are easily overlooked when passing by on this desolate stretch of WA- SR14, but once noticed a curious observer can't help but wonder how those small rock spires survived the repeated pounding of the Ice Age Floods through here. It's a hoodoo mystery.

7 Mosier Erratic



The Mark Hatfield east Twin Tunnels trailhead overlooks the bowels of an immense gravel pit, where the eye is immediately caught by a huge white boulder standing alone in a sea of much smaller-sized chunks of black basalt. This is the Mosier Erratic, a car-sized block of far-removed granodiorite, standing out like a beacon inviting the curious onlooker to wonder how it got there.

8 Bonneville Landslide

The **Bonneville landslide** crashed down across the Columbia River nearly 600 years ago. It dammed the river far upstream for many months, gave rise to the Native American "Bridge of the Gods" legend, and formed the Cascade Rapids that later impeded Lewis and Clark. It is part of a larger complex of over 200 landslides, some of which may have been triggered by the Ice Age Floods that swept down the Columbia River 18,000-14,000 years ago.