



Lake Lewis Chapter TRI-CITIES, WASHINGTON

The **Lake Lewis Chapter** of the Ice Age Floods Institute is named for an enormous, temporary lake that formed in the Pasco Basin when Ice Age floodwaters collected behind a constriction at Wallula Gap, just southeast of the Tri-Cities area. Lake Lewis lasted only three weeks or less before all the flood waters drained through Wallula Gap. However, during its maximum flood stage, Lake Lewis rose up to 900 feet deep over the Tri-Cities area, also backflooding the Yakima and Walla Walla Valleys, and depositing thick sequences of fertile slackwater sediment, which contributes to the tremendous agricultural and wine producing success of the region.

The **Lake Lewis Chapter** is dedicated to the study of pre-historic natural events that sculpted this region, and to educating the local public to the geological wonders that surround us. We benefit from a large contingent of professional geologists, scientists, and engineers that contribute to technical presentations, field guides, and public displays. We sponsor guest speakers at bi-monthly meetings and host field trips throughout the year.

To learn more about the amazing story of the floods, or to attend a bi-monthly presentation, visit us at <https://www.facebook.com/LakeLewisChapter/> and <https://IAFI.org>



Key resources for understanding the impacts of the Ice Age Floods:
On the Trail of the Ice Age Floods
by Bruce Bjornstad and Eugene Kiver
Keokee Co. Publishing, Inc.



Drumheller Channels

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.

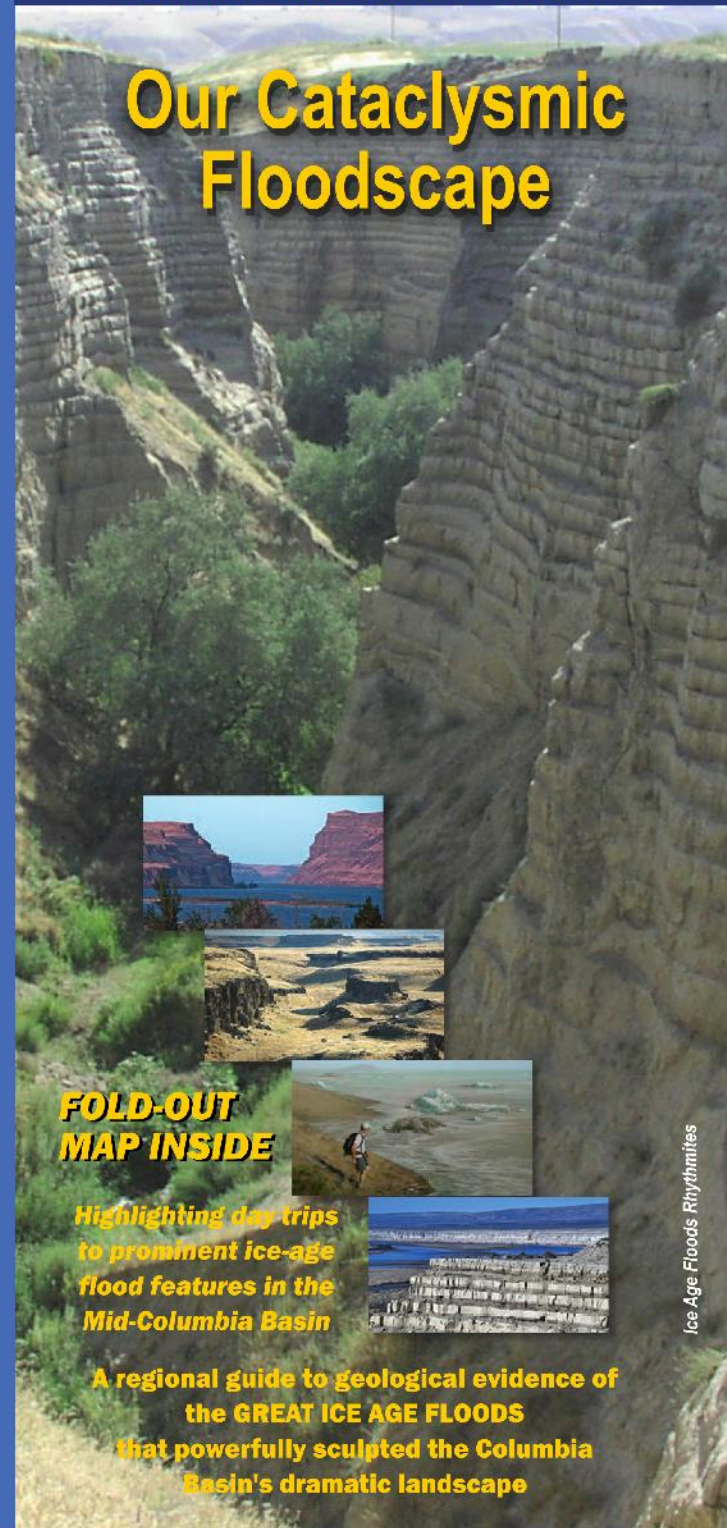
OF THE GREAT FLOODS



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

A GUIDE TO THE ICE AGE FLOODS IN THE MID-COLUMBIA BASIN

Our Cataclysmic Floodscape



FOLD-OUT MAP INSIDE

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

A regional guide to geological evidence of the GREAT ICE AGE FLOODS that powerfully sculpted the Columbia Basin's dramatic landscape

Ice Age Floods Rhythmites

These rhythmites are located along the Columbia River within the wild and scenic Hanford Reach National Monument.



Interesting Flood Facts!

The ice dams that blocked the Clark Fork River were over 2,000 feet tall and backed up Glacial Lake Missoula, which was as big in volume as Lakes Erie and Ontario combined.

The floodwaters flowed at greater than 10 times the combined rate of all current world rivers.

As those massive floodwaters tore across eastern Washington they carried away hundreds of feet of fertile 'Palouse' soils.

Stacks of floods-deposited 'rhythmites' in many locations (like White Bluffs, Cummins Bridge, Badger Coulee and Gardena Terrace) record 40 and possibly up to 100 separate floods.

Palouse sand and silt eroded by floodwaters were deposited in backwaters of Lake Lewis where they now contribute to excellent terroir that produces premium wine grapes.



Icebergs embedded with huge boulders floated hundreds of miles on the floodwaters before running aground and melting, scattering those boulders as erratics that are still visible today across our landscape.

Temporary Lake Lewis reached an elevation of 1,250 feet, placing the area of Tri-Cities under 900 feet of water.

The floodwaters filled Wallula Gap, spilling over the surrounding ridge tops and eroding coulees ABOVE the present day 800-foot-high cliffs.

The Story of the Great Ice Age Floods

During the peak of the last Ice Age, a vast Cordilleran 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 valleys of western 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 of times as the advancing continental glacier built a new ice dam!

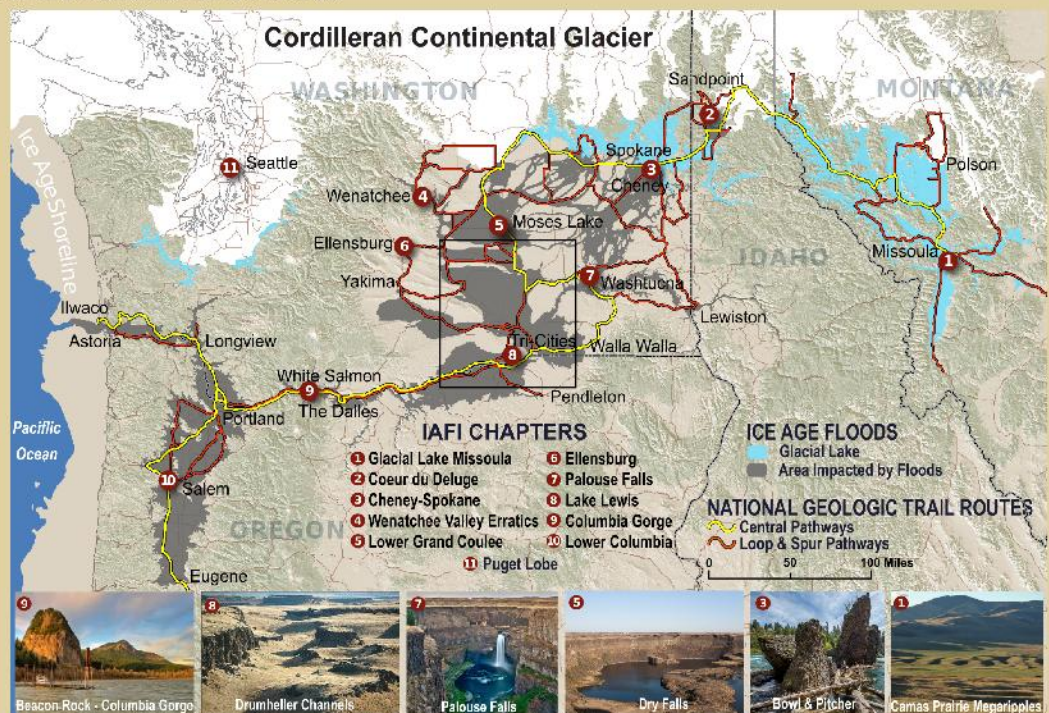


Ice Age Floods National Geologic Trail

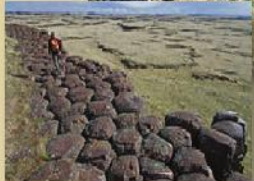
Since the 1990's the Ice Age Floods Institute (IAFI) has worked to create and to build support for the Ice Age Floods National Geologic Trail.

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.



1 Drumheller Channels National Natural Landmark Butte-and-Basin Scabland



LONG DRIVE/ HIKE
120 miles R/T from Pasco
Allow 5-6 hours with hiking
(bring food & water)

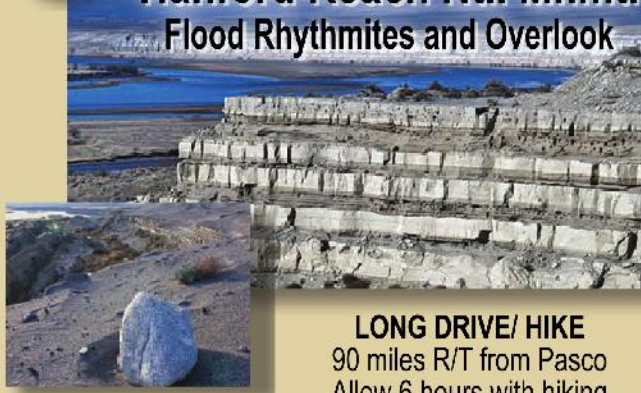
Drumheller Channels, designated by the National Park Service in 1986 as a **National Natural Landmark**, are a dramatic example of butte-and-basin topography (powerfully flood-eroded scabland).

This 12-mile-wide gash across the eastern Frenchman Hills is characterized by hundreds of isolated, steep-sided hills (buttes) surrounded by a braided network of channels, some of them today occupied by lakes and ponds. Powerful floodwaters scoured this basin sucking up all loose materials, including gigantic basalt columns as well as grinding out huge circular potholes. The potholes were literally drilled out of the basalt by violent swirling flood vortices.

The Channeled Scabland is such an other-worldly landscape, that the National Aeronautics and Space Administration (NASA) has studied it extensively since the 1970s in preparation for Mars exploration.

Today the Drumheller Channels present an intricate labyrinth of channelled and streamlined basalt mesas and buttes, revealing some of the best examples of columnar basalt cliff faces anywhere in the world.

2 White Bluffs Hanford Reach Ntl. Mnmt. Flood Rhythmites and Overlook



LONG DRIVE/ HIKE
90 miles R/T from Pasco
Allow 6 hours with hiking
(bring food & water)

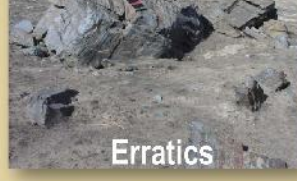
White Bluffs is the name given to 30 miles of visually stunning cliffs (geologists refer to as an erosional escarpment) running along the last free-flowing stretch of the Columbia River upriver of Richland.

The bluffs are ancient river/lake deposits, predating the Ice Age floods, but there is an exception near Locke Island where the cliffs were breached and refilled with much younger flood deposits. This **rhytmite-filled paleochannel** is nearly as tall as the bluffs themselves and contains 17 distinct slackwater rhytmites, representing 17 separate cataclysmic flood events. Above the rhytmites are some of the best examples of active sand dunes in the region.

This geological showcase abounds in shrub-steppe flora and fauna and is one of the most important wildlife and ecological refuges in eastern Washington - under protection since 2000 as the Hanford Reach National Monument.

White Bluffs Overlook offers panoramic views of the flood ravaged Gable Mountain, Gable Mountain flood bar and the Hanford Site.

3 Erratics/Bergmounds Rattlesnake Mountain Ice-Rafted Exotic Rocks



Bergmound
LONG DRIVE/ HIKE
70 miles R/T from Pasco
Allow 6 hours with hiking
(bring food & water)

Ice-rafted **erratics** (rocks not native to an area) are common in slackwater areas along the 700 mile route of the Ice Age Floods. A high concentration of erratics and **bergmounds** (piles of erratic debris) exists at Rattlesnake Slope Wildlife Area midway along the floods' path. These granite, quartzite, argillite, gneiss, diorite, schist and gabbro boulders stand in stark contrast to dark Columbia River basalt bedrock of the region. These exotics were all plucked from areas to the north by the Cordilleran Ice Sheet, then transported in icebergs by floodwaters from the breakup of ice-dammed glacial lakes.

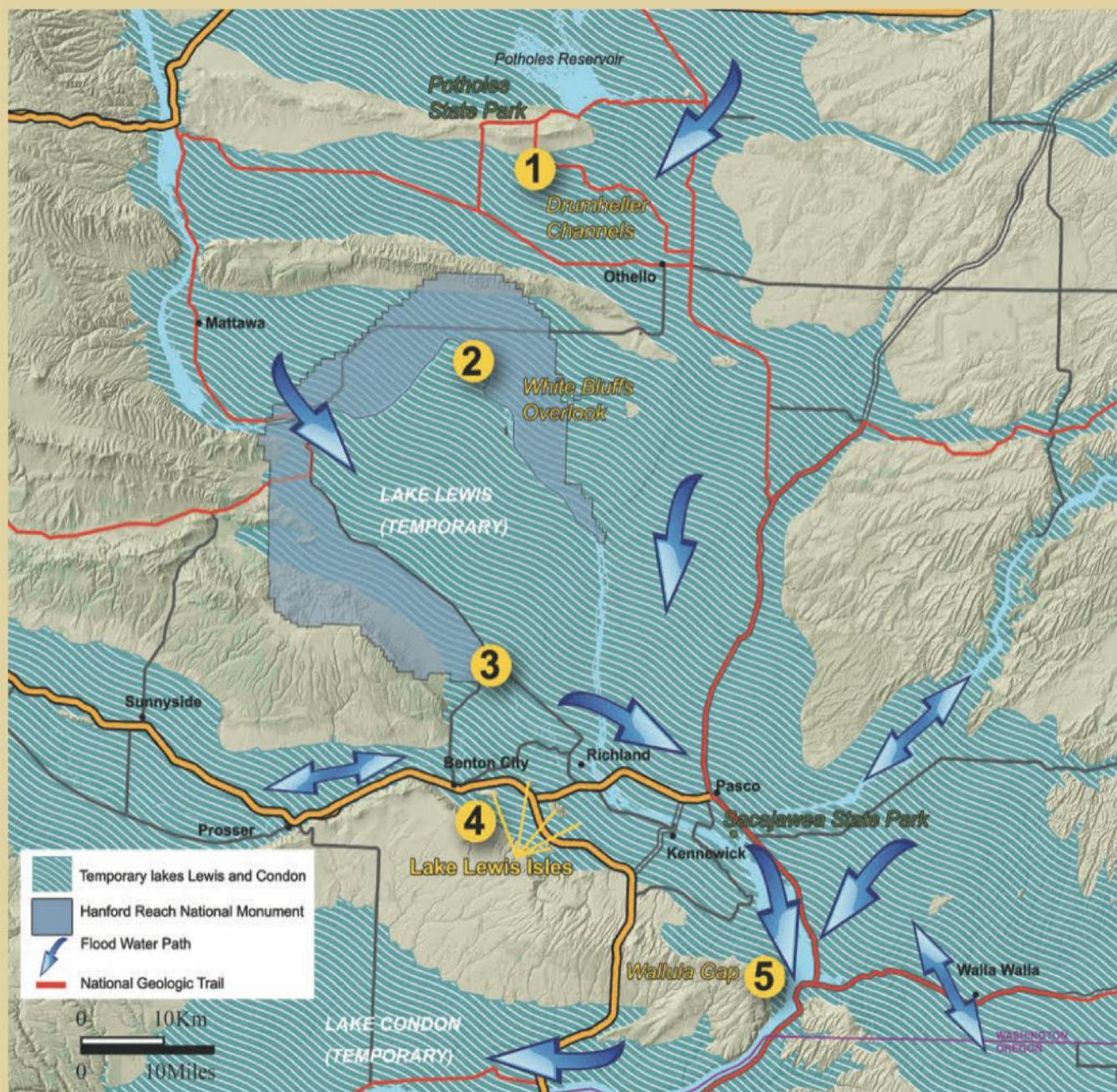
The floodwaters temporarily backed up behind the constriction at Wallula Gap, forming short-lived Lake Lewis up to 1250 ft elevation. The erratics and bergmounds were dropped here as icebergs grounded and melted. Most ice-rafted debris is concentrated between 600 and 1000 ft, with far fewer erratics and bergmounds above that because there were many less-than-maximum floods, and because larger deep-rooted icebergs grounded farther away from Lake Lewis shorelines.

4 Lake Lewis Isles Badger Mt. Preserve Skyline Trail (from Dallas Rd. Trailhead)

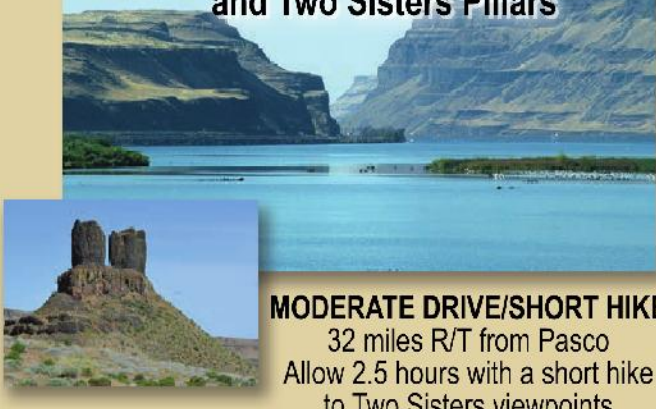


SHORT DRIVE/MODERATE HIKE
14 miles R/T from Pasco
Allow 2-3 hours with hiking

Lake Lewis Isles is the name given to several basalt hills, south and west of the Tri-Cities, whose peaks rose above the maximum flood level (1,250 feet above mean sea level) of short-lived Lake Lewis, making them temporary islands in a flooded landscape. Icebergs and other floating debris (including mammoth carcasses) drifted into quieter waters and ran aground along the shorelines of these islands, leaving behind boulders of exotic rock types (erratics) from hundreds of miles away. A drive on I-182 west of Richland and/or a moderate hike along the Skyline Trail of Badger Mountain Centennial Preserve (leaving from the Dallas Road Trailhead) offer spectacular views of the Lake Lewis Isles, lined up like rattles on the tip of Rattlesnake Mountain's tail. With a sharp eye, hikers can pick out ice-rafted erratics along the trail below an elevation of about 1,100 feet. The large expanse of vineyards attests to the region's success in producing world-class wine, influenced in large measure by effects of the Ice Age Floods.



5 Wallula Gap National Natural Landmark and Two Sisters Pillars



MODERATE DRIVE/SHORT HIKE
32 miles R/T from Pasco
Allow 2.5 hours with a short hike
to Two Sisters viewpoints

Wallula Gap is one of the Pacific Northwest's signature Ice Age floods features. This spectacular canyon, designated by the National Park Service in 1980 as a National Natural Landmark, was originally cut by the Columbia River then dramatically sculpted by the great Ice Age floods. Floodwaters raced southward across the broad Columbia Plateau at speeds up to 65 miles per hour and squeezed through this narrow, mile-wide passageway. Huge volumes of water backed up behind the constriction, rising up to 1,250 feet above sea level and forming an enormous, temporary Lake Lewis. Peak Ice Age water flow through the gap has been estimated at ten times the combined flow of all the rivers in the world.

Two Sisters (also referred to as the Twin Sisters) is a local landmark on the east side of Wallula Gap. It is comprised of two closely spaced basalt pillars (two sisters) that are the subject of local Native American folklore. These two erosional remnants owe their present form to the tremendous power of the Ice Age floods.

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

