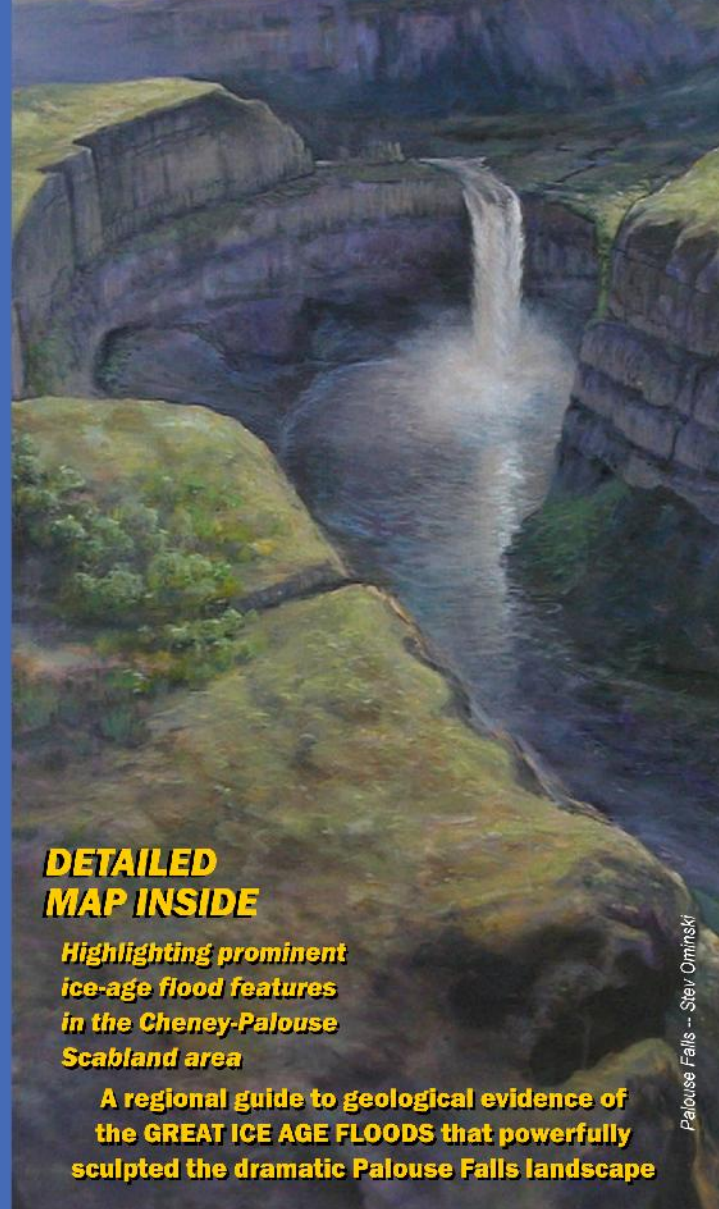


# Our Cataclysmic Floodscape



Palouse Falls -- Stev Ominski

## DETAILED MAP INSIDE

Highlighting prominent ice-age flood features in the Cheney-Palouse Scabland area

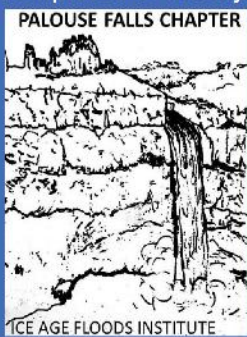
A regional guide to geological evidence of the GREAT ICE AGE FLOODS that powerfully sculpted the dramatic Palouse Falls landscape

## Palouse Falls Chapter Washtucna, Washington

The Palouse Falls Chapter is named after the 186-foot waterfall midway in the Palouse Canyon in southeast Washington. The falls is located in Palouse Falls State Park and is the official waterfall of the state of Washington.

The chapter covers the lower end of the Cheney-Palouse Scabland Tract where some of the best examples of channeled scabland topography can be found, including numerous coulees, canyons, buttes, and flood bars. Giant current ripples can be seen on many of the bars. Geologist J Harlen Bretz who first proposed the flood theory said "...features of the channeled scablands do not resemble any other type of topography anywhere in the world."

The Palouse Falls Chapter is comprised of mostly local farmers, ranchers, and others who make their living off this incredible land. We offer public lectures, bus tours, and hikes as well as assisting local schools in relating the amazing story of this land. Learn more, become involved and join our chapter at [IAFI.org/Palouse-Falls-Chapter](http://IAFI.org/Palouse-Falls-Chapter)



## 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 story.

## OF THE GREAT FLOODS



Learn MORE at [IAFI.org](http://IAFI.org) or [facebook.com/IceAgeFloods/](https://facebook.com/IceAgeFloods/)



# Interesting Flood Facts!

The glacial ice dam that blocked the Clark Fork River was over 2,000 feet tall, several miles wide, and it impounded over 500 cubic miles of water in Glacial Lake Missoula – a volume equal to lakes Erie and Ontario combined.

When the ice dam holding back Glacial Lake Missoula failed, the floodwaters raced out at a rate greater than 10 times the flow rate of all the rivers in the world today combined.

If you want to visit other places that look like the channeled scabland, you may want to visit the planet Mars. Satellite photos of the lower end of the Cheney-Palouse Scabland Tract and areas of Mars are almost identical.

Icebergs with huge embedded boulders floated hundreds of miles on the floodwaters before they ran aground, melted, and deposited those boulders as erratics scattered across our landscape where they're still visible today.

Floodwaters backed up behind Wallula Gap, forming temporary Lake Lewis which rose to an elevation of 1,250 feet. At its height, Washtucna and Othello would have been under 250 feet of slack 'lake' water.

An equivalent of over 200 Columbia Rivers entered the Palouse River Valley through the Cow Creek drainage at present day Hooper.

Thousands of square miles of fertile Palouse soil, in places over 200 feet deep, were stripped off these lands and deposited as far away as Oregon's Willamette Valley and the ocean floor off Oregon and northern California.

## 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 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 built a new ice dam!

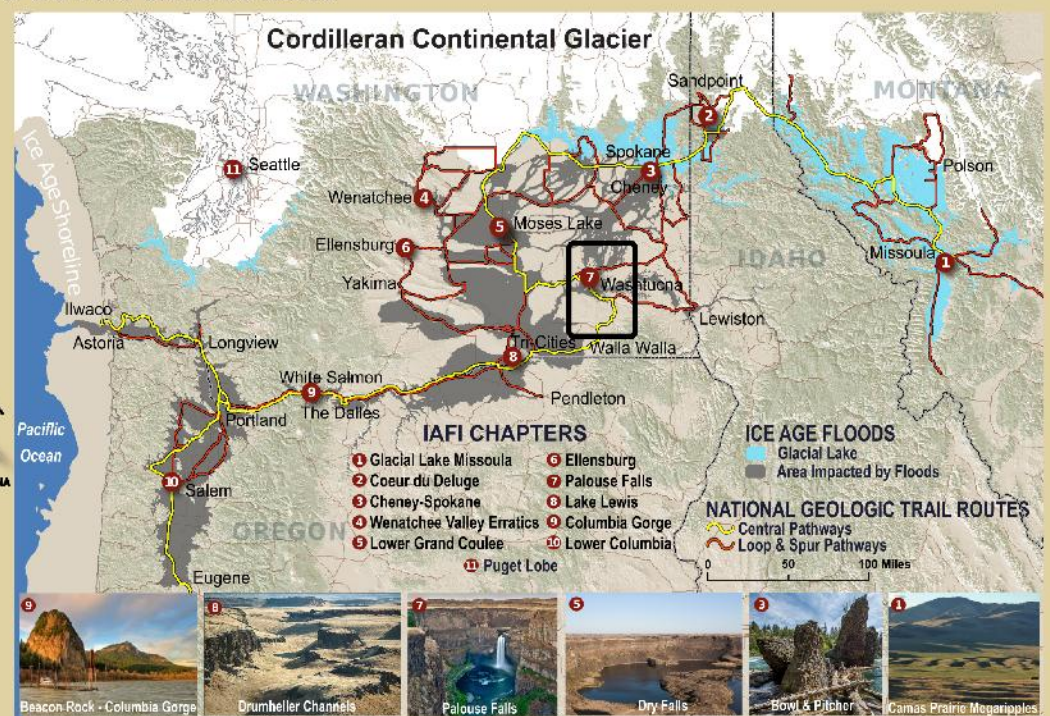


## Ice Age Floods National Geologic Trail

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.

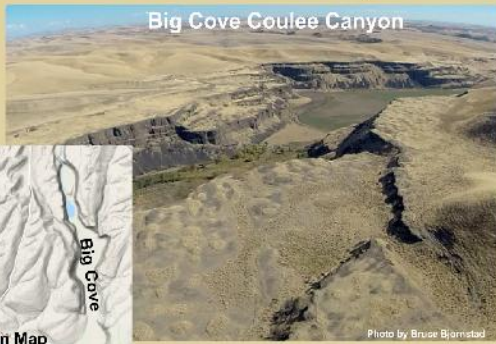
The Trail is being developed under the National Park Service on existing public lands, with no changes in jurisdiction and no threats to private property rights. The role of the National Park Service is to coordinate and manage the planning of the project and the telling of the story, without taking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



# Explore Ice Age Floods Features in the Palouse Falls Area

Discover why our region is like nowhere else. Jump into the Ice Age Floods story with a DRIVE/HIKE/LEARN day tour

## 1 Little Cove / Big Cove Paired Coulee Canyons

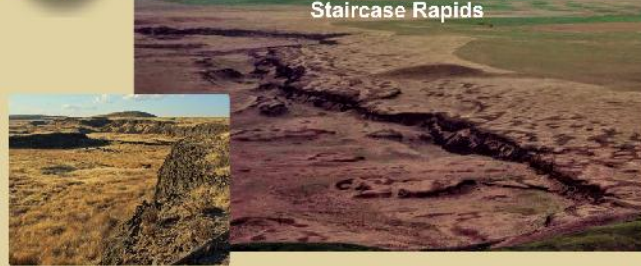


**Big Cove and Little Cove** are the easternmost points of entry of floodwaters into the Palouse River Valley. As floodwaters poured over the rim of the Palouse Valley, recessional cataracts migrated northward producing the two coves.

Little Cove Road takes you up the west side of Little Cove. The road is public but the property along it is private. Travelling north on Cherry Creek Road between the two coves, you will pass through a Palouse upland area that didn't erode away, before seeing a spectacular view of channeled scablands and the upper end of Big Cove to the east.

Floodwaters entering the Palouse River backwashed up the valley for miles. Below this point, water filled the walls of the valley to overflowing. Further downstream, additional floodwater entered the valley through Mason Draw and Rock Creek. At this point, water flooded several miles to the east of the valley.

## 2 Staircase Rapids Deltaic Bedding, Giant Ripple Marks



The name **Staircase Rapids** was given by J Harlen Bretz to the scabland feature north of Washtucna. He noted that the upper cataract and plunge pool basins on the north end, and the 2-mile long bar at the south end with deltaic bedding and giant ripple marks on top, could not be explained by processes of "normal" slow erosion and deposition over eons of time.

Staircase Rapids is a series of short, dry cataracts that descend like stairsteps between Rattlesnake Flat and Washtucna Coulee. Ice-age floodwaters spilled west from Cow Creek drainage to Rattlesnake Flats, then raced downslope at speeds up to 70 miles per hour before joining other floodwaters coming through Staley Coulee and meeting the flooded Washtucna Coulee. There the floodwaters slowed and deposited the Staircase Rapids Bar.

Traveling north from Washtucna on SR 261, you enter Staley Coulee with the Staircase Rapids Bar on your left. At Hasse Road, you are on top of the bar. Giant ripple marks can be seen looking south. SR 261 takes you along the west side of the rapids while Hasse Rd takes you along the east side. The upper cataract is 3-1/2 miles wide.

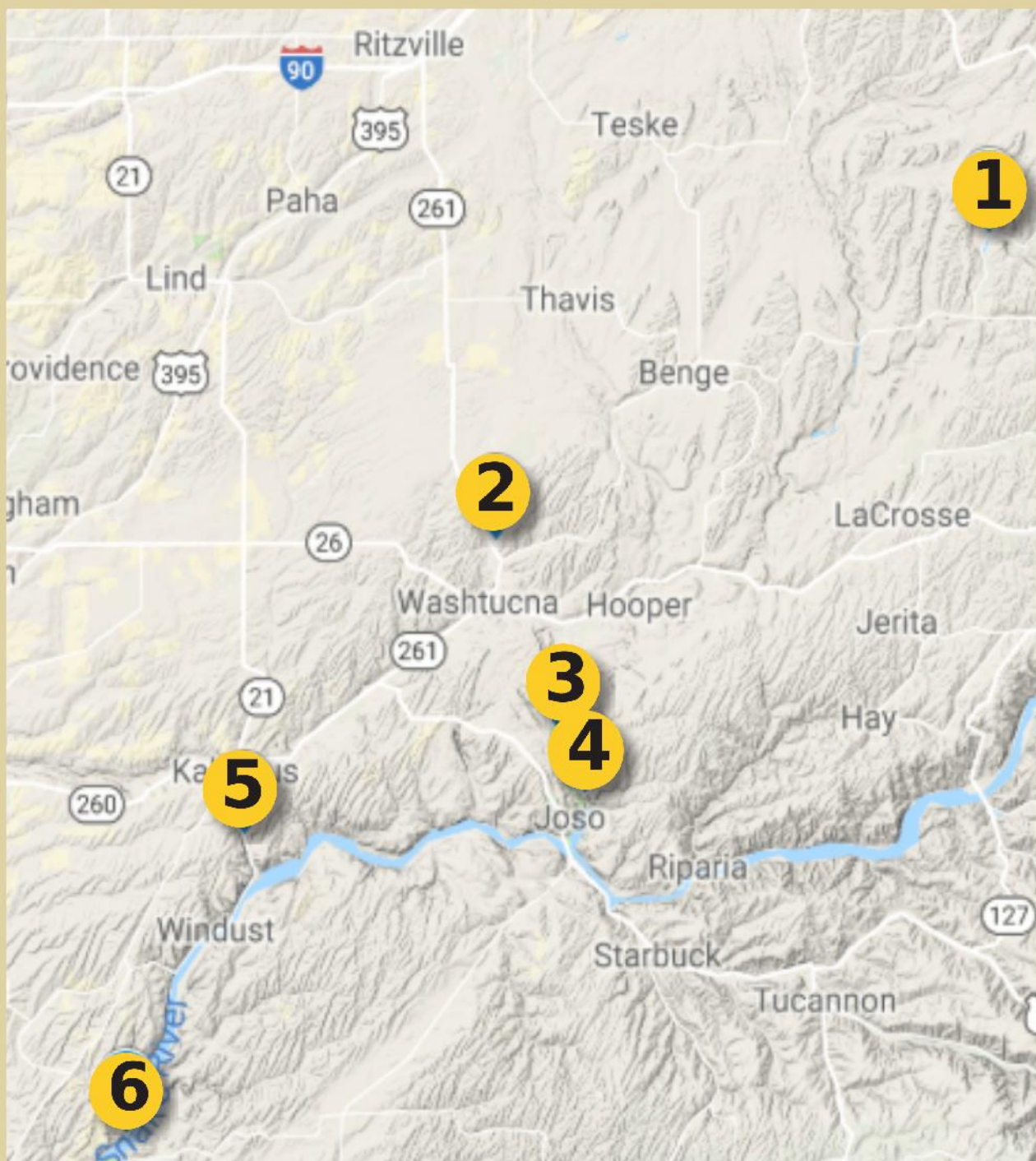
## 3 Iconic Palouse Falls Recessional Cataract Waterfall



**Palouse Falls** is centrally located on the spillway between Washtucna Coulee and the Snake River in the middle of the Palouse Canyon. As floodwaters crossed the divide, numerous canyons were scoured out of the fractured basalt rock. A waterfall started when the water spilled over the north rim of the Snake River. The waterfall receded hundreds of yards upstream with each flood, leaving a recessional cataract, whose current location was "frozen" in place after the last flood, and its downstream coulee canyon.

In the spring, winter runoff from the river's source in the Idaho mountains creates a roaring waterfall. By late summer and early fall, the flow is reduced to a trickle. After several weeks of below freezing temperatures in the winter, the falls and plunge pool basin become coated with ice creating an entire new look.

The deep channel at the falls provides an excellent look at different layers of basalt rock which were deposited millions of years before. These huge eruptions of lava creating the Columbia River Basalts were ejected from long fissures in the earth's surface beginning in northeast Oregon with some of the last ones erupting near here.



## 4 Palouse Canyon Fault-Controlled Floods Path Cutoff



Prior to the Missoula Floods, the Palouse River flowed through the current towns of Washtucna, Kahlotus, Connell, Mesa and Eltopia before entering the Columbia River at the Tri-Cities. Most of the flood water travelling down the Cheney-Palouse Scabland Tract merged together in the Palouse River Valley at present day Hooper. That valley couldn't contain the floodwaters, so flooding crossed the divide to the Snake River Valley twelve miles to the south.

After ripping off over 100 square miles of loess soil up to 200 feet deep, the floods cut numerous canyons in the fractured basalt rock. During one of the floods, the **Palouse Canyon** between present day Hooper and Washtucna was cut deeper than the Palouse River Valley, redirecting the Palouse River course through the canyon, making the river some 50 miles shorter, and leaving Washtucna Coulee as a reminder of the river's past history.

Marmes Rock Shelter in the lower Palouse Canyon is one of the earliest known human habitation sites in the Mid-Columbia Basin. Excavations at the site revealed evidence of an 8,000 year period of human occupation, and that the area was home to humans as long ago as 11,230 years ago. Human remains found there in 1965 were the oldest in North America at the time of their discovery.

## 5 Devil's Canyon & Monument Floods Spillway, Unique Basalt Columns



**Devil's Canyon** is another location floodwaters spilled over the divide between the original Palouse River and Snake River valleys, cutting out this spectacular 5-mile long linear canyon in the fractured basalt. It is located just south of Kahlotus with state highway 263 traversing the length of the canyon.

About 1 mile from the mouth of the canyon, you can see **Devil's Monument** on both walls of the canyon. It is identified by the basalt columns laying more horizontally rather than the normal vertical position. Millions of years ago, the ancestral Salmon-Clearwater River carved out this feature which was then filled by a later basalt flow. It cooled from the sides and top rather than the bottom and the top which led to the unusual positioning of the columns.

### Useful Terms

**Recessional Cataract** - a waterfall that recedes upstream through erosion and removal of rock underlying the waterfall.

**Coulee** - a valley or canyon that may have sloping or stair-stepped sides that is an abandoned ice-age flood channel, often marking the erosional path of a recessional cataract.

**Bar** - A bar in a river system is an elevated sedimentary feature, typically sand or gravel, deposited in areas of slower water flow.

**Rythmites** - a stack of similar sediment layers deposited under conditions that tend to recur regularly, such as seasonally.

## 6 Lake Sacajawea Bar Huge Floods-Deposited Gravel Bar



**Lake Sacajawea Bar** is one of the largest depositional features left behind by the great Ice-Age Floods. The bar rises abruptly to 400 feet above the river, making it one of the tallest ice-age flood bars.

Lake Sacajawea Bar is divided into two segments. A taller bar lies just downstream of a basalt spur and is classified as a longitudinal-pendant bar. The largest floods, which came off the Channeled Scabland from the northeast, formed this pendant bar.

Downstream, the bar narrows and hugs the northwest side of the valley to form a longitudinal-eddy bar. Its upper surface lies 140 feet lower than the pendant bar.

Near the top of the eddy bar is a sequence of slackwater flood rythmites containing the Mount St. Helens "S" ash layer, dated at 15,000 calendar years B.P. Flow-direction indicators (arrow) again suggest these deposits were laid down as the last of the Ice-Age Floods swirled around in a large eddy at this location.

Lake Sacajawea Bar has undergone considerable environmental degradation from railroad construction and gravel mining since the early part of the 20th century. Fortunately for geologists, these activities created several good exposures of the interior of the bar from which we can interpret some of the history and dynamics of ice-age flooding.



Find an interactive map and additional details about these and other Ice Age features online at <https://iafi.org/floodscapes>