

## MISSOULA FLOODS

Between 10,000 and 80,000 years ago, a massive sheet of ice covered much of North America, including Northern Washington State, Idaho, and Montana. Between 13,000 and 15,000 years ago, as the ice sheet melted, a giant lake was formed in Montana. At its peak it spread 200 miles East/West and contained some 500 cubic miles of water. It reached a maximum depth of 2000 feet!

These Montana valleys that were filled with glacial water were normally drained to the Pacific through the Clark Fork River. A narrow gorge in the Idaho panhandle would get blocked by huge chunks of the glacier ice and dam up the river. Periodically, the dam would break and send an enormous flood of water and ice down through central Washington to the Columbia River. The flow was some 10 times the combined flow of all the rivers in the world. The 500 cubic miles of water would drain out in about 48 hours! This cycle of fill/drain was repeated about every 55 years for about 2000 years! (From 13,000 BC to 11,000 BC...In geological time this is like 'the day before yesterday!')

This enormous high speed flow would move some 50 cubic miles of earth and rock, depositing it in the slower moving edges of the flow and in the Pacific Ocean for 'hundreds of miles' from the mouth of the Columbia. Gravel bars 400 feet high are found in Central Washington with large boulders weighing tons found as far as Harrisburg, OR.



Dry Falls, South of Grand Coulee Dam, is about 3.5 miles wide and 400 feet high. It is thought to be the world's largest water fall. But no water falls over it today. Even in its day it only had major water falls for a few hours at a time. Can you imagine a wall of water maybe 500 feet high and traveling at 65-80 MPH rushing down stream and over the falls?

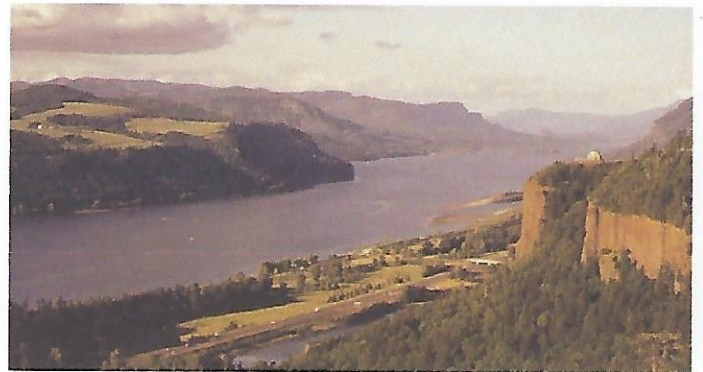
Wallula Gap, in Southern Washington near

the Oregon border, would restrict the flow and a large lake (Known as Lake Lewis...after Lewis & Clark fame) would form above this restriction to a depth of 1200 feet. It would cover the Tri-Cities



Hat Rock about 9 miles upstream from Umatilla is at 500' elevation. Under water by about 700'!

area with about 800 feet of water. This restriction along with others at The Dalles and Kalama slowed the flow enough it was able, in 2-3 weeks, to drain into the Pacific Ocean.



Crown Point...on right.

The Crown Point Gap (See Visa House on the cliff at right) is about 2 miles wide. The flood overtopped the Visa House site. The flow raced downstream at 115 feet per second, about 80 MPH. The level dropped about 300' by the time it reached Portland. This is one of the major restrictions and probably raised water levels as far upstream as Pasco, WA.

The Kalama restriction...about 40 miles down river from Portland...filled Lake Allison to a level that reversed the flow in the Willamette River for more than 100 miles to Eugene. The water in Lake Allison reached an elevation of more than 400 feet. The elevation of the City of Harrisburg is about 310...more than 90 feet of water over the City! The

Lake covered about 3000 square miles, branching off towards Hillsboro and several other drainage areas.

More than 300 known groups of erratic boulders were dropped by melting icebergs around the edges of Lake Allison. Also, the floods dropped Willamette Silt from the Polouse area in Washington. These are at a depth of 150 feet at Newberg, 70 feet at Corvallis, 20 feet at Irish bend and only a few feet deep at Eugene. These very fertile soils make the Willamette valley one of the most fertile in the US.



The Museum has a large rock that washed in on an ice sheet during one of the Missoula Floods. It was found near Harrisburg. The origin has never been determined by competent geologists. Local lore says it came from Montana. This is creditable since it appears to be granite and Montana Granite Erratics are known to be present here. Whatever, it is clearly not native to this area. It was donated to the Museum by the Dean Bowers Estate.

Several hypothesis have been presented to account for the floods. The most prominent seems to be that the dam started as the glacier moved South out of Canada and crossed the Clark Fork River, damming it up. As the water filled the lake to a depth of 2000 feet the pressure at the bottom...nearly 1000 PSI...lowered the freezing point of the water so that it was colder than the ice but still liquid. This allowed water to leak through tiny cracks in the ice. The friction of this flow began to melt the ice along the tiny crack which increased the flow which increased the friction...etc. Until finally here was a catastrophic failure of the 2000 foot high dam.

I am a bit skeptical of the glacier making the dam since it was repeated many (maybe 50-100 times) over 2000 years. For much of that 2000 years the glacier was in retreat and would not have been able to restore the dam. The dam may have been created, especially after the initial one, by ice floes

that had calved off the glacier into Glacier Lake Missoula. Whatever, it ended up about 2000 feet high.

The flow, through the catastrophically failed dam, was in the order of 10,000,000 cubic meters per second at a speed approaching 80 MPH. This scoured a major area of central Washington down to bedrock, and sometimes eroded the bedrock!



A pothole drilled in the Basalt by whirlpool like currents

The Basalt bedrock had cracked during cooling, thus allowing the enormous power of the water to tear it out of place and deposit it, often far away. The giant whirlpools, sometimes called 'water tornado's' created these potholes, some were more than a hundred feet across and 50 feet or more deep. The bedrock left is called 'Scablands' because it has had all the soil scrubbed away, leaving a surface that resembles a scar.

The internet has many articles about the floods. Some are contradictory, since the floods happened 13-15,000 years ago and geologists have only recently undertaken a serious study. Google "Missoula Floods" or specific sites like these I mention. Much of the previous information was taken from:  
[http://columbiariverimages.com/Regions/Places/missoula\\_floods.html](http://columbiariverimages.com/Regions/Places/missoula_floods.html) This site has many pictures and descriptions.

**RECALL THE PAST...  
IMAGINE THE FUTURE!**