The Tualatin And Yamhill Valleys In Northwest Oregon

by Rick Thompson

As the largest of the Lake Missoula Floods burst out of the Columbia River Gorge, it filled up the Portland basin and spilled out into the Clackamas (southeast of Portland), Tualatin (west of Portland), Yamhill (southwest of Portland), and Willamette (south of Portland) Valleys. The floodwaters filled each of these valleys to almost 400 feet above today's sea level.

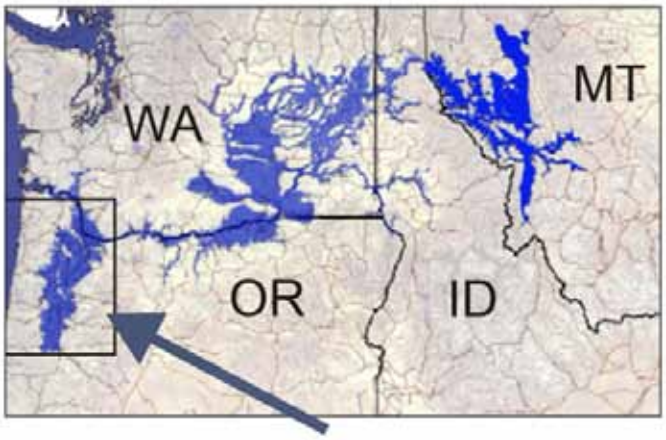

Figure 1. Location of the Tualatin, Yamhill and Willamette Valleys

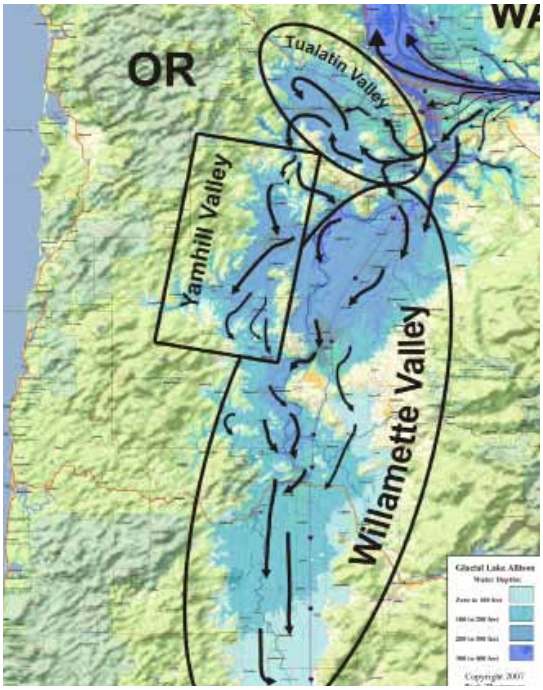

Figure 2. Arrows depicting the Lake Missoula floodwaters as they crossed Portland (upper right), cut through Lake Oswego (upper center) and filled the Tualatin Valley (upper left) before exiting into the Yamhill (far left) and Willamette Valleys (south).

The massive force of water enlarged the existing stream channels forming the Carver, Lake Oswego, and the Oregon City gaps. Eventually the Oregon City Gap, where the Willamette River runs became the main channel for the flood as it filled the Willamette Valley, but it would take a while to enlarge the nearly sixmile long channel enough to handle the flow. The Lake Oswego Gap is almost a direct shot from the mouth of the Columbia River Gorge with few obstacles in its way. The Oregon City Gap is two miles farther from the gorge and has obstacles that would slow the rampaging waters before reaching it. Also, it is narrower and longer than the Lake Oswego Gap further restricting the flow out of the Portland basin. This meant at least at the beginning, the Lake Oswego Gap carried more water than the Oregon City Gap.

Figure 3. Oregon City Gap from the north

Squeezing through the Lake Oswego Gap it sped up, similar to the way water from of a garden hose speeds up as you close down the nozzle, eroding the sides and bottom of the channel. The erosion worked backwards in the east to west water flow and actually started eroding at the west end of the channel, near today's Bridgeport Shopping Center, thus removing any obstacles and opening up the ancestral Tualatin River Valley.

As the force of the water ripped rocks out of their place, it weakened the upstream rocks allowing them to be removed, creating a channel similar to the way a receding waterfall is formed. It eventually opened up this area to nearly half a mile wide and over 350 feet deep leaving a basin for today's Lake Oswego.

Once into the Tualatin Valley the water slowed down dropping millions of tons of rock in an alluvial fan at the west end of Lake Oswego ranging from huge boulders down to gravel and then sand and silt.

Figure 4. Lake Oswego from the northeast looking in the direction of the floodwaters.

Figure 5. The west end of Lake Oswego (now mostly shopping centers) where the water broke through the West Hills and spread out to form a delta of sand and gravel.

Figure 6. Mark Buser, president of the Ice Age Floods Institute, stands next to a boulder torn out of Lake Oswego and dropped in what is now a residential area just west of the lake.

(Photo by Charles Hall)

Further west there are huge gravel mounds, some of which have been mined for scores of decades. The largest of the rock pits was in the Durham area and now is the home of the Bridgeport Village Shopping Center. All of this flood debris was too much for the Tualatin River to eat its way back into its former bed so at the end of the flood the Tualatin River found its current path through West Linn to the Willamette River.

The heavy load of gravel began to fill up the channel directly to the west of Lake Oswego causing the water to divert into three smaller channels. One went north through Tigard and Beaverton into the Tualatin Valley while the second went straight west through Durham and passed King City. The third channel cut southward through the Nyberg Greenway and into downtown Tualatin.

At some point the water was high enough to overtop a divide separating the Willamette Valley from the Tualatin Valley. This happened near where the I5 freeway Boone Bridge passes over the Willamette River at the town of Wilsonville. Once over the top the water sped up again and cut channels in what is now known as the Tonquin Geologic Area or the Tonquin Scablands.

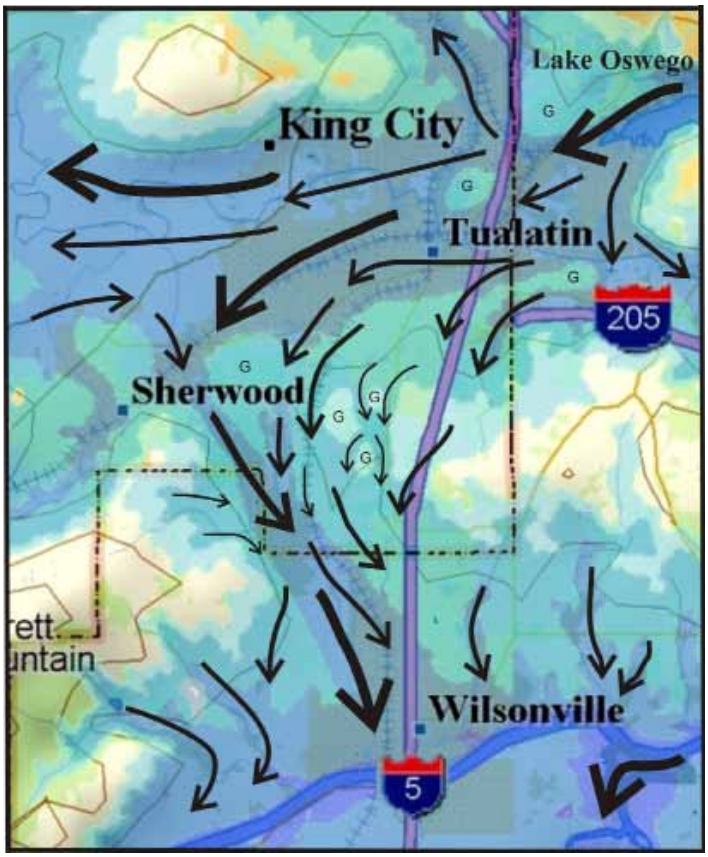

Figure 7. Map with water depths indicated by shades of blue (the darkest being the deepest). Arrows show the direction of the water flow through Tualatin and the Tonquin Scablands. ("G" indicates gravel deposits)

The Tonquin Scabland Channels flood story is very interesting. This area exhibits interwoven channels and divides, kolk lakes, ponds, erosional remnant basalt knobs, and gravel beds all of which illustrate the force of the water rushing from one valley to the next.

The majority of the Tonquin Geologic Area is in private ownership and inaccessible to the public. However, a topographical map or a space photograph tells us, aside from the several rock mining operations, that it is also a rugged area of scabland channels, kolk ponds and basalt knobs just like the parts of it that are accessible. As the water kept filling the Tualatin Valley to almost

Figure 8. Rough outline of the Tonquin Geologic Area.

400 feet above sea level it found three more low areas at the west end where it could cut channels into the Yamhill and Willamette Valleys.

The Yamhill Valley, watered by two branches of the Yamhill River, was interred by the Lake Missoula Flood waters from the northeast near Dayton, flowing from the Tonquin channels and the Oregon City Channel. On the northwest it received water through the Yamhill Channel north of McMinnville.

The two larger channels are the Yamhill Channel, flowing from the Tualatin Valley into the Yamhill Valley, and the Chehalem Channel flowing from the Tualatin Valley into the Willamette Valley. The smaller one (Middle Channel) was only of short duration and about 80 feet deep when the water was at its highest. Today there are two creeks in this cut, one flowing to the north and the other flowing to the southwest with a small divide between them. The upper creek flows north before turning SE to go through the Chehalem Channel. The south flowing perennial stream meets Stag Hollow Creek and flows west into the Yamhill River.

These three channels are much smaller than the Tonquin Channels because less water flushed through them and had lost much of its energy. SR 47 West now traverses the furthest west channel (Yamhill Channel) between the towns of Gaston and Yamhill. About two miles east is the larger Chehalem Channel with Chehalem Creek flowing through it. Where this channel funnels between hills on the north end there are giant current ripples caused by the 200foot deep water rushing from the Tualatin into the Willamette Valley.

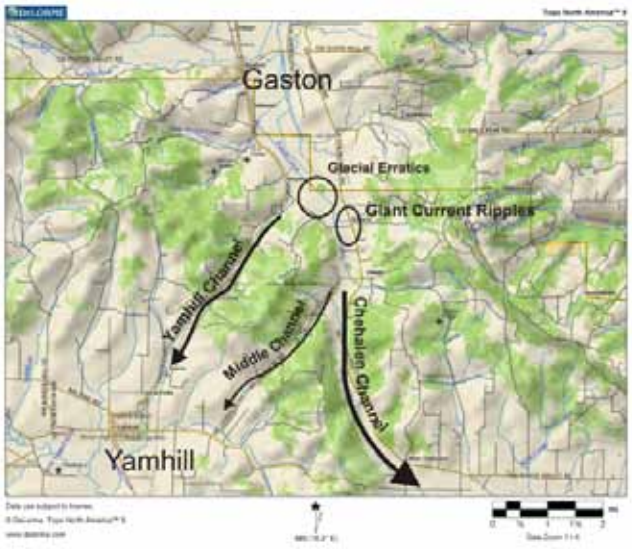

Figure 9. Map of the west end of the Tualatin Valley showing the Yamhill and Chehalem channels. (Circle indicated where the Gaston erratics were found. Oval shows location of ripple marks).

Figure 10. Looking north at the outflow of the Chehalem Channel.

In December of 2011, two large glacial erratic boulders were identified on farmland near Gaston at the upper end of the Yamhill and Chehalem channels. Early in January 2012 the 5,500 lb. quartz and 20,000 lb granite erratics joined several others already at the Tualatin Heritage Center where they will be featured as part of the Tualatin Ice Age display.

Figure 11. View north of some of the current ripples at beginning of the Chehalem Channel.

Figure 12. Side view of 4 current ripples at the north end of the Chehalem channel (note farm buildings on left for size).

Figure 13. Google Earth photo showing the Chehalem ripples being crossed by NE Springhill Road southeast of Gaston.

The City of Tualatin has decided to develop its tourism plan by emphasizing its ice age history and flood features which include flood channels, kolk lakes, basalt knobs, giant current ripples, glacial erratics, and bones from ice age creatures found in the area including a mastodon, Harlan Ground Sloth and a bison. The Tualatin Heritage Center, meeting site for the Lower Columbia Chapter of Ice Age Floods Institute (IAFI), is the focal point for many of these displays. The sacrum of the ground sloth, and the tusk and molar of the mastodon are on display at the Heritage Center and the other recovered parts of the mastodon skeleton are on display at the Tualatin Public Library a few blocks away.

The partnership of the City of Tualatin, Tualatin Historical Society and the Lower Columbia Chapter of IAFI in order to make the most of their ice age history is a great example of how local areas can benefit from the Ice Age Floods Natioonal Geologic Trail even before anything is done on the federal level.

Figure 14. A 20,000 pound granite and a 5,500 pound quartz erratic found near Gaston are now on display

Figure 15. The 20,000 pound granite boulder at the Tualatin Heritage Center.

Figure 16. The 5,500 pound quartz erratic in place at the Tualatin Heritage Center.

Figure 17. The Bellevue Erratic at the Erratic Rock State Natural Site off Hwy 18 just six miles west of McMinnville.

Many glacial erratic boulders were rafted in on icebergs that survived the trip from Idaho. The largest in the Willamette Valley is the Bellevue Erratic at the Erratic Rock State Natural Site off Hwy 18 just six miles west of McMinnville, in the Yamhill Valley. It is still where it came to rest on a hillside 130 feet above the valley floor at 306' above sea level. It is roughly 90 tons of a Canadian metamorphosed mudstone called argillite. It is said that this is the only substantial piece of argillite outside of Canada. Many erratics show some rounding and a few show scratches from glacial movement, but this is very angular because it is such a brittle mudstone.

The second largest found in western Oregon came through Lake Oswego and grounded in the Tualatin Valley just east of the City of Tualatin. It is now holding court on the campus of Clackamas Community College in Oregon City with a brass plaque giving its provenance. Both of these came to rest on hillsides, the perfect spot for an iceberg to be snagged and held firm until it melted and divested itself of whatever treasures it had captured on its way down the Purcell trench in Idaho.

Figure 18. The Clackamas erratic (actually found in Tualatin).

Two more very large erratics were found just west of downtown Tualatin and now reside at Fields Bridge Park in West Linn. They were not found on a hillside but on a fairly flat low area. Since the two were found together they were most likely in the same iceberg when it grounded, but who knows why it stopped where it did. Perhaps it was late in arriving, just as the water was waning or perhaps the iceberg turned over and the rocks dropped off.

Figure 19. The Tualatin erratics now in West Linn's Fields Bridge Park.

The most famous Oregon erratic is now in the Hayden Planetarium of the Natural History Museum in New York City. It is the Willamette Meteorite found in West Linn in 1902. The 15.5 ton nickeliron meteorite is the largest found in the United States and sixth largest in the world. There is evidence to show that it probably fell in Canada or northern Idaho during the ice age and rode an iceberg to Oregon during one of the largest Lake Missoula floods.

Figure 20. The Willamette Meteorite on display in the Hayden Planetarium in New York

Figure 21. A 1/5th scale model of the Willamette Meteorite in West Linn's Fields Bridge Park

As the Lake Missoula floodwaters rose, the whole Yamhill Valley acted as a conduit for waters entering from the north and exiting into the Willamette Valley in the south through three channels west of Salem: the Salt Creek Channel, the Baskett Slough Channel and Holmes Gap, just four miles north of the town of Rickreal. Holmes Gap is the deepest of the three areas and shows evidence of the most erosion. Just south and west of Holmes Gap is the Baskett Slough National Wildlife Refuge. It is a permanent wetland, no doubt,

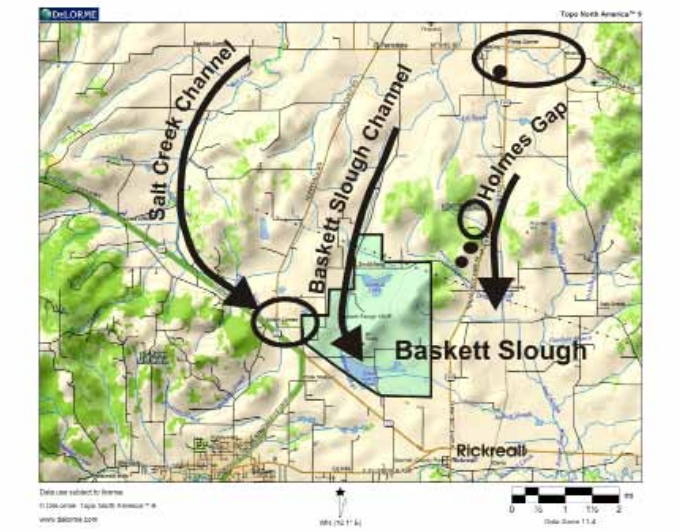

Figure 22. The three channels that allowed water to flow from the Yamhill Valley into the Willamette Valley west of Salem. Ovals mark giant current ripples. Dots indicate locations where erratics have been found. Green box is the wildlife refuge.

formed, at least in part, by the Lake Missoula Floods. There are many glacial erratics and giant current ripples in this area, which indicates it was a good catchbasin for icebergs and that the water was still deep, fastmoving, and carrying a lot of soil.

Figure 23. Bethel Road Current Ripples north of Holmes Gap

Figure 24. Erratic hunter,Jeff Murray, and Sylvia Thompson rest on an erratic boulder found in the Yamhill Valley near Baskett Slough

Figure 25. Sylvia Thompson next to the largest of 23 erratics found on the grounds of Left Coast Cellars near Holmes Gap

Though the flood evidence in these valleys is not as obvious or dramatic as southeastern Washington, nevertheless, once revealed, the remnants and sculpting effect of the ice age floods is clearly seen and deserves further study.

For more information on the Tualatin, Yamhill and Willamette Valley flood evidences, or for selfguided autotours contact the Tualatin Historical Society at www.tualatinhistoricalsociety.org or the author, Rick Thompson, at rick@gigaflood.com or www.GigaFlood.com