Spring 2012

The Pleistocene Post

Newsletter of the Ice Age Floods Institute

ICE AGE FLOODS INSTITUTE
OREGON • WASHINGTON • IDAHO • MONTANA

President's Message

Last winter I joined a group of National Park supporters from Oregon and Washington State on a lobbying trip to Washington DC that was coordinated and paid for by the National Parks Conservation Association (NPCA). We spent a full day on Capitol Hill visiting our Congressmen and Congresswomen discussing the state of NPS funding and regional projects such as the Ice Age Floods National Geologic Trail and transferring management of Mt. St. Helens from the Forrest Service to the NPS.

With the support of the Board of Directors, the Institute has implemented several priorities I set forth when I became President in 2010. While we continue to deliver on our core mission of promoting public awareness and understanding of the full story of the Ice Age Floods, we have updated our brand and technology to better serve our members and stakeholders. This issue of the newsletter reviews these changes and provides important information about your membership and benefits.

We have many volunteers devoting countless hours to the organization. Some lead field trips, give lectures and teach classes; others work behind the scenes to ensure that the Institute is financially and administratively strong, and others develop educational materials. Some members like Rick Thompson (see his article on Floods features in the Willamette Valley, pg 6) have dedicated their lives to enhancing our understanding of the Floods and sharing their insights with the public; others have known about the Ice Age Floods and just recently discovered the Institute and like the field trips and networking opportunities it presents. Whatever your reasons for joining us, we encourage you to renew your membership if you haven't already. You can now join easily through the secure payment service Paypal found on our website. Your membership is the most important way you can help support the Institute and its mission. Membership dues and store sales make up over 90 percent of our revenue.

While the Ice Age Floods-National Geologic Trail Federal Interagency Coordination Committee continues to meet for the purpose of fulfilling the congressionally authorized Ice Age Floods National Geologic Trail, funding necessary to develop the management plan has not materialized. In part, this is due to the competing priorities of the National Park Service and Congressional gridlock.

Regardless of what Congress does or does not do, the tradition of the Institute will go on. We will continue to educate the public about the Floods through lectures, field trips, and interpretive projects. With your continued support we can accomplish this and more.

The fall field trip and membership meeting will be held over the weekend of September 14th and 15th. The membership meeting and pre-field trip lecture will be Friday evening with a full day field trip in Ellensburg, WA on Saturday. Registration and event specifics will be in our August newsletter and on our website in mid-July.

--Mark Buser

See our website for more information **www.iafi.org**

Chapter News

Cheney-Spokane Chapter – Spokane, WA

Throughout the summer and early fall, Cheney Parks and Recreation offered several opportunities to spend a day on the Channeled Scablands. The guided tours, led by Spokane field geologist, Michael Hamilton, were based on the 10 stops outlined in the "Eastern Washington Spillways of the Ice Age Floods" brochures produced by the Cheney-Spokane Chapter. The 30-seat van was filled on each tour; more guided tours are scheduled for 2012.

October 2 found 35 bikers and train enthusiasts on a field trip, by special permit, to Rock Lake, south of Cheney, Washington. The "Geology and Railroad History on Bikes" field trip was led by Dr. Gene Kiver and Dr. Charles Mutschler. Rock Lake is the deepest and most rugged of the Missoula Flood canyons in eastern Washington. The Milwaukee Railroad was the last of the transcontinental railroads completed to the Pacific Northwest. Transportation routes across the Inland Empire were shaped by the Flood formed geography. The Milwaukee Road was no different than other routes, but the advances in construction technology made the route feasible in a way that had not been possible when the first railroad crossed the Channeled Scablands. The now abandoned railbed is mostly owned by Washington State Parks and will eventually be opened to the public. The bikers explored the northern part of the rail grade for an 11-mile roundtrip on relatively easy trail.

Funded by a grant received from the City of Cheney Hotel/Motel Tax Grant Program, Ron Hall, Google expert and a member of the Cheney-Spokane Chapter updated Ice Age Floods features in their service area via Google Earth. New features and links to local websites, such as City of Cheney, Cheney Parks and Rec, and Ice Age Floods Institute were added. Individuals from all over the world have access through Google Earth to become familiar with what Cheney has to offer and how the area relates to the Ice Age Floods story.

In November, Dr. Patrick Spencer, professor of geology at Whitman College lectured on recent work on fine grained sediment in Upper Grand Coulee. He discussed analysis of grain size distribution, sedimentary structures and radiocarbon age dates on key localities suggesting that some of the sediments accumulated in a calm-water setting, possibly in a lake behind a moraine-dam. Grand Coulee was then swept by Missoula Floods, leaving behind a record of high energy processes.

Recently, more than 400 individuals filled the Spokane Community College auditorium to hear Dr. Scott Burns, professor of geology at Portland State University, speak on "Cataclysms on the Columbia: The Great Missoula Floods." Dr. Burns' talk focused on the incredible story of discovery and development of the idea of the Floods by J Harlen Bretz and the effect of the Floods on development of the landscape of 16,000 square miles of the Pacific Northwest. This Cheney-Spokane Chapter lecture was co-sponsored by the Department of Science at Spokane Community College.

--Melanie Bell

Columbia Gorge Chapter

Due to the unpredictability and nastiness of Gorge weather in the winter we do not meet from November 15th to March 15th. For example, on January 19th we had two feet of snow covered by an inch of ice. Electricity was out for four to eight days.

-- Terry Hurd

Coeur du Déluge Chapter

The Coeur du Déluge Chapter has not been very active recently but we are hopeful that the future will be different. Unfortunately our Past President, Sylvie Amezcua White had to step down as President due to her challenging work responsibilities. Thanks for all of your hard work, Sylvie! At our Chapter meeting on September 14, 2011, Tony Lewis was elected as our new President and Julie Bishop was elected to continue to serve as Secretary/Treasurer. Gary Ford, IAFI Vice President, attended our meeting and provided valuable insights on possible future activities of the chapter.

A second chapter meeting was held on November 17, 2011 to continue the discussion on the types of activities the chapter should focus on this coming year. We are planning a field trip for later in the Summer.

-- Tony Lewis

Ellensburg Chapter – Ellensburg, WA

Our Ellensburg Chapter - hosted here at Central Washington University - continues with a popular evening lecture series and Sunday afternoon field trips. Since we are on the margin of the Channeled Scablands, we do both Floods and non-Floods field trips. Our folks don't seem to mind.

Chapter News - Cont.

We have recently offered field trips to glacial terrain near Leavenworth, landslides near Naches, and our old friend Frenchman Coulee just north of Vantage. Recent lectures have focused on a USGS Kittitas County Groundwater Study (Matt Ely), the Missoula Flood Deposits (Richard Waitt), and Great Earthquakes of the Pacific Northwest (Tim Melbourne).

-- Nick Zentner

Lake Lewis Chapter - Tri-Cities, WA

As of October 31, 2011 we had 117 active memberships (including family memberships), 87 of which were current through 2011. After contributing $3,000 to the Mid-Columbia Basin Old Natural Education Sciences (MCBONES) Research Center Foundation, and $1,000 to the Columbia River Exhibition of History, Science, and Technology (CREHST) Museum we held a financial balance of $11,125.09, in January, 2012.

Chapter events consisted of three regular chapter meetings and seminars. Our September 13th seminar featured Gary Kleinknecht, presenting "Geoscience Education and Paleoecologic Research in Late Pleistocene Flood Deposits Near Kennewick, Washington." On November 8th we hosted Roger Delinger with a presentation on computer simulation of the Missoula Floods, and on January 10th, Bruce Bjornstad treated us to a presentation titled "Exploring the Ice Age Floods Through Science and Art."

Community outreach activities included development of a Lake Lewis Chapter Facebook page. Our members also gave a number of talks, led field trips, and/or provided support to a number of community organizations including a number of local Rotary, Kiwanis, and church groups, the Kennewick Community Education, the Kennewick School District (Focus on Instruction), the CREHST Museum, and Battelle's Taste of Diversity Fair. Our members also continued to support the MCBONES Research Center Foundation, the Ridges to Rivers Open Space Network, and the Friends of Badger Mountain.

Our upcoming plans include chapter meetings on March 13 and May 8, featuring seminars by Nick Zentner and Scott Burns, respectively, a field trip to Palouse Falls, tentatively scheduled for April 14, and an evening hike on July 10.

--George Last

Lower Columbia Chapter - Portland, OR

Lots of excitement has been swirling around the Lower Columbia Chapter lately. It has to do with our partnership with the City of Tualatin, Oregon, and the Tualatin Historical Society. They have really jumped on board with making the area's Ice Age history an identity aspect of their city and a tourist draw. Last February they hosted a symposium featuring: Yvonne Addington presenting "Finding the mastodon bones"; Danny Gilmore presenting "Digging and dating ancient bones"; David Ellingson taking students on a dig of ancient bones; Scott Burns presenting "How the Ice Age looked: The "movie"; Larry McClure presenting "The Ice-Age Tourism grant, plans for Ice-Age Heritage Trails"; and Rick Thompson presenting "The Floods' effect on Northwest topography."

This entire event was videotaped and has been shown several times on local television where it was seen by farmer Douglas Ott in the Chehalem Valley of NW Oregon. When he heard about glacial erratics, he knew exactly what they were and where some of them were. In fact, he had one on his property! He asked Yvonne Addington and Rick Thompson to come and identify them. We did and they are now proudly on display at the Tualatin Heritage Center along with several others and in addition to parts of some Ice Age mega-fauna found in the area. It was an heroic effort involving donated trucks, cranes, and a lot of man-hours, but well worth it to help promote the whole Ice Age Floods story.

Since that symposium, we have had monthly meetings with speakers as diverse as Fish and Wildlife Experts, archaeologists, an underwater paleontologist, a researcher on Tanner Creek (a local waterway), an Indian historian, a glacial erratic hunter and a speaker on the PNWER (Pacific Northwest Economic Region) meeting in Portland, and others.

We are in the planning stages for a field trip in May, to the eastern Willamette Valley, an area not generally thought of in relation to the Lake Missoula Floods, but one that felt the full impact of 400-foot deep water and many hundreds of tons of sediment. It should be fun and informative.

-- Rick Thompson

Membership Joining And Renewal Available Online At New IAFI Website

To date, more than 37% of IAFI members have renewed their memberships online for 2012. These members easily accessed the Application & Renewal Form on the IAFI website and selected a membership level/ fee and selected a chapter. They paid using their Visa, MasterCard, American Express, Discover Card or PayPal account and used the secure PayPal system for processing credit card payments. They could make a donation and designate their donation to IAFI or to a specific chapter. The PayPal process allows individuals to pay for membership or donate by credit card without being a member of PayPal and offers ultimate security and convenience. Users receive a receipt immediately and the IAFI treasurer receives immediate notice of new or renewed memberships. The funds collected via PayPal are deposited to the IAFI bank account immediately.

If an individual prefers to fill out a membership form manually and mail it in, he/she simply prints out the paper version off the IAFI website and follows the directions for preparing a check and mailing via US Postal Service. This process is not as secure as PayPal, takes longer to show up on the membership record and requires extensive hand processing by IAFI volunteers. The next time you renew your membership, try the online membership process; it is easy and quick.

Idaho 4th And 5th Graders Make The Case For Funding The Ice Age Floods National Geologic Trail

Fifth and sixth graders in Kathryn Bonzo's classroom in Moscow, Idaho embarked on an adventure into the Channeled Scablands with local geologists and came back with a collection of "letters from the land" that were mailed to the Idaho Congressional delegation. Here is one of many letters that were written:

It was a scorching hot day in the land of the rock and sage. Coyote was very thirsty. He had been traveling for many days over the craggy landscape. Exhausted, he stopped in the shadow of a large rock to rest. "Where are you going young one" inquired the rock. Startled, Coyote jumped back. "Y-you can talk?" stammered Coyote. "Yes, where are you going"? "East" said Coyote still suspicious "more food and water". The rock sighed, "Long ago, this entire valley was covered in water." And, the rock began its story.

"*Long ago this entire land was covered in rolling hills and fertile windblown soil (Loess). *Beavers as big as Grizzly Bears and Mastodons roamed those hills. Farther north a glacier had blocked the Clark Fork River and *2000 feet of water backed up behind it. *A 500 foot wall of seething muddy water ripped the soil off my back and bounced me along the river bed along with other rocks of all shapes and sizes. The raging torrent stripped the hillsides of soil. There used to be many trees here, but there is no longer enough soil for them to grow. And, as for you young Coyote, you cannot stay because there is not enough food for the animals you eat. So you must go east. Goodbye and good luck."*

"Goodbye" said Coyote. He started to walk off. Then he turned, and looked at the rock once more. "The heat must getting to me" he thought and began his long trek.

Written by Milo

Sentences marked with an asterisk are quotes from *Glacial Lake Missoula and Its Humongous Floods* by David Alt

Book Review

Washington's Channeled Scablands Guide
By John Soennichsen

When I opened my copy of Washington's Channeled Scablands Guide, I knew instantly that I was going to like it. The book is written in a style that is easy to read and it has great photos; many have only been seen by the author, until now. I found myself wanting to know more about the "big picture" sequence of events of the Ice Age Floods story as I read about the Floods features and I pictured myself with one or more of my 11 grandchildren trekking through the places identified in the guide that includes clearly identified directions on how to get there.

Washington's Channeled Scablands Guide is a guidebook with several twists. First, the Contents page is a smorgasbord of Ice Age Floods features and then you turn the page and there is a detailed map with all the features numbered so you can easily plan a hike, a bike tour, car or RV adventure, kayak, canoe, or backpack vacation. There are additional maps throughout the guide presenting a closer view of an area that is written about in that section. Second, features are specialized, yes all 46 of them, focusing on geologic wonders along the way, culture and history of a place, practical information, and on "Getting There" that includes detailed directions and regulations. You might think this guide could be boring, but it is not at all. Did you know there is a UFO Reporting Center located between the towns of Davenport and Harrington, Washington?

Throughout the guide, sidebars provide interesting notes and information. There are reminders to take precautions when traveling in these remote regions, to check the weather and road conditions before heading out on your adventure, and above all, watch out for rattlesnakes! At the back of the guide you will find a list of recommended reading on the Channeled Scablands; this is, by all means, not all of them but it encourages you to want to seek out more references online to drill down into or spend time in a bookstore or library.

This guidebook has accomplished what other Ice Age Floods publications are lacking in that the author comprehensively describes his travel experiences and observations of Floods features, then enhances his narrative with humor. School-aged children, senior citizens, and those of all ages in between can read this book easily and understand it. I am sure that this book will be a great resource for armchair "floodies" who can use it for a snapshot of Ice Age Floods features and also plan a destination around a particular area.

-- Melanie Bell

Enhanced Ice Age Floods Website

www.iafi.org

The core aims of the newly designed Ice Age Floods Institute's website were to provide easily accessible information on the Ice Age Floods story, offer points of access to online activities and bring new functionality that ultimately would change how people use the site. The website features a gorgeous visual design change by Steve Carr of Etherjazz. With new graphics, intuitive browsing, and improved user-friendliness, it is our hope that the website will provide individuals with a better experience to pursue their interest in the Ice Age Floods.

Happy Browsing!

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.

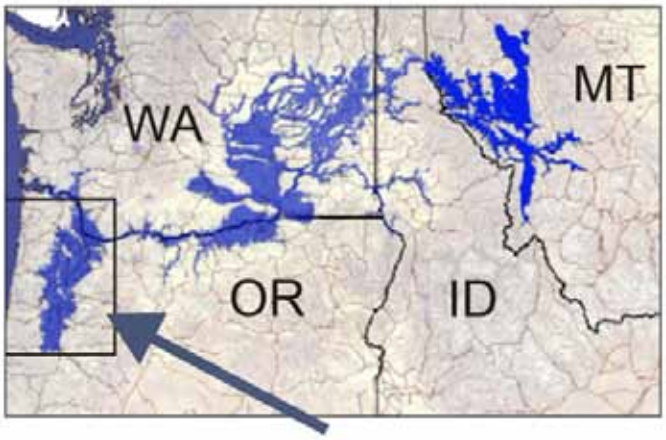

Figure 1. Location of the Tualatin, Yamhill and Willamette Valleys

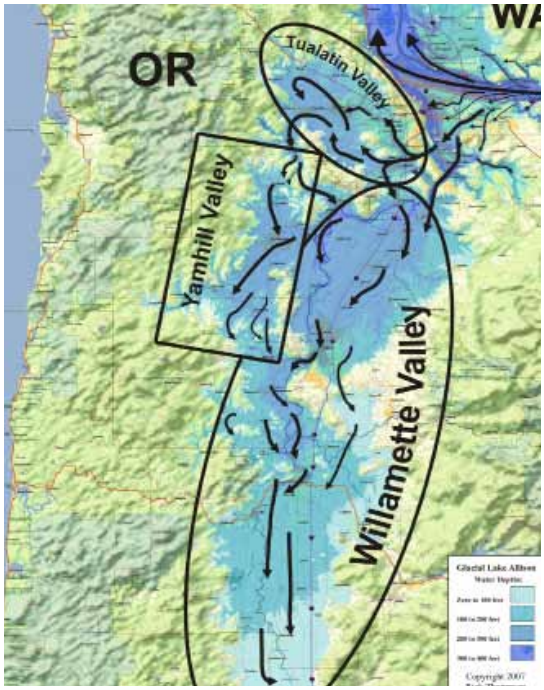

Figure 2. Arrows depicting the Lake Missoula floodwaters as they crossed Portland (upper right), cut through Lake Oswego (upper center) and filled the Tualatin Valley (upper left) before exiting into the Yamhill (far left) and Willamette Valleys (south).

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 six-mile 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 I-5 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.

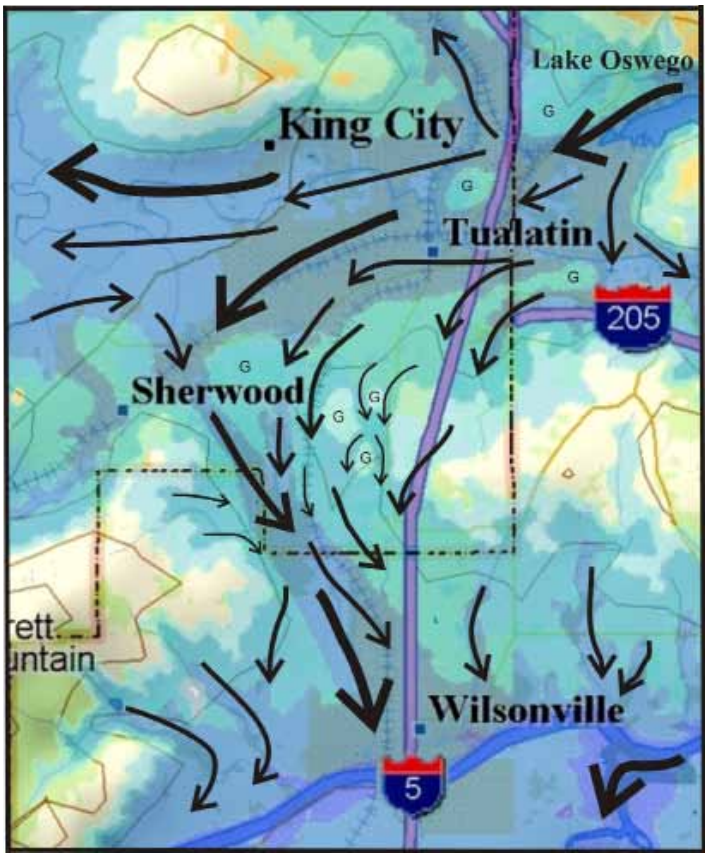

Figure 7. Map with water depths indicated by shades of blue (the darkest being the deepest). Arrows show the direction of the water flow through Tualatin and the Tonquin Scablands. ("G" indicates gravel deposits)

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 200-foot 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 nickel-iron 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,

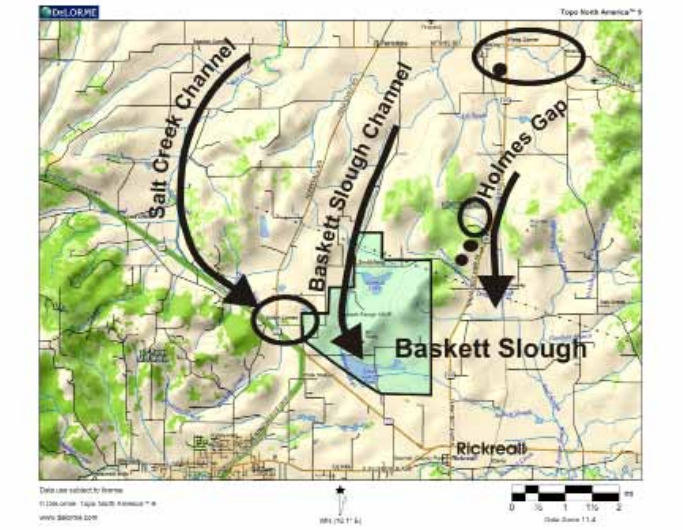

Figure 22. The three channels that allowed water to flow from the Yamhill Valley into the Willamette Valley west of Salem. Ovals mark giant current ripples. Dots indicate locations where erratics have been found. Green box is the wildlife refuge.

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 catch-basin for icebergs and that the water was still deep, fast-moving, 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 self-guided auto-tours contact the Tualatin Historical Society at www.tualatinhistoricalsociety.org or the author, Rick Thompson, at rick@gigaflood.com or www.GigaFlood.com

IAFI Fall 2011 Field Trip

The Cheney-Spokane Chapter hosted the fall board meeting, annual membership meeting and the field trip on October 7-8, 2011 in Cheney, Washington. The annual membership meeting and pre-field trip lecture were held at the John F. Kennedy Library Auditorium on the campus of Eastern Washington University (EWU). More than 150 attended and heard Mark Kreilkamp sing "Wall of Thunder", a song he wrote about the Ice Age Floods that is available on www.IceAgeFloodsEWA.org, under Educate Me tab. They also heard Dr. Linda B. McCollum, professor of geology at EWU, discuss many of the features that would be visited on the Saturday field trip, "Glacial Outburst Flood Features From the Mouth of Spokane Valley to Reardan".

Saturday's field trip was attended by 105 individuals that traveled on two deluxe buses while listening to lectures by field trip leaders, Dr. Linda McCollum and Michael McCollum, research associate at EWU. They have been studying and mapping flood and bedrock geologic features on the West Plains in Spokane County for two decades.

The all day field excursion began and ended on the EWU campus, located on the northwest flank of the Cheney Palouse Scabland Tract. The trip was aimed at viewing the Ice Age Flood features just outboard of 700 foot high tsunami of water and ice from glacial Lake Missoula that exited the Spokane Valley and spread laterally outward to form the extensive scabland topography. The Spokane West Plains were scoured of their loess deposits while sand and gravel filled in the existing drainages. A relatively thin but extensive flood gravel layer covers much of the basalt in and around the Spokane International Airport. Current megaripples are well developed in the vicinity of Airway Heights and extend northward to the Spokane River. Sand pediments formed and the lee side of granitic hills while sand and gravel deltas formed to the west. Loess hills were sculpted and even undercut by the flood waters, causing large landslides near Medical Lake. Stops included hilltop overviews of the flood scoured West Plains, cliff top views of the mouth of Spokane Valley, visiting active quarries exposing the sand and gravel fills within flood filled paleochannels, driving through the largest sand current megaripples known and eating lunch on the shore of a flood scoured bedrock lake. Discussions ranged from the cultural influence of this flood scoured terrain to the local economy to why J Harlen Bretz only belatedly realized that this region had been scoured by flood waters. Also included was the latest scientific research by the authors on how the outburst floods affected the geomorphology of this region, plus a discussion on the formation of the local lakes and the aquifer system beneath the West Plains.

The field guide prepared by leaders Linda and Michael McCollum are for sale through the Cheney-Spokane Chapter for $20 including shipping cost. Contact Linda Long at lindakl@centurytel.net, or 509.235.4251.

Moon Rock Pit - An active gravel pit showing two major flood gravels sitting directly on basalt. Excavation face (about 30 fee tall) in the Moon Rock pit showing two high-energy flood gravel deposits with foreset bedding separated by a horizontal bedded course sand deposit.

At the north end of Medical Lake, field trip participants consider the distribution and size of the most aesthetically pleasing flood features—the lakes, as Michael McCollum lectures.. There are half a dozen moderately large lakes up to several miles in length between the towns of Four Lakes, WA and Medical Lake, WA. These larger lakes are formed by floors scouring out the weakest basement available, mainly the contact between granite and basalt. (McCollum and McCollum, 2009)
(Photo Courtesy of Melanie Bell)

more field trip photos on page 14

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www.iafi.org/store

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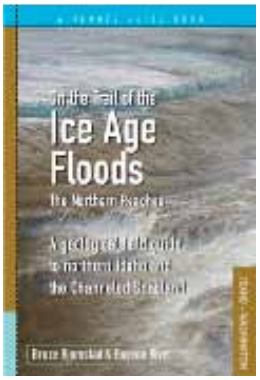
On the Trail of the Ice Age Floods Volume 2: The Northern Reaches

by Bruce Bjornstad and Eugene Kiver



Following up on his 2006 book On the Trail of the Ice Age Floods, geologist Bruce Bjornstad joined forces with Emeritus Professor Eugene Kiver to guide readers upstream – The Northern Reaches – in Volume 2 to be released this Spring

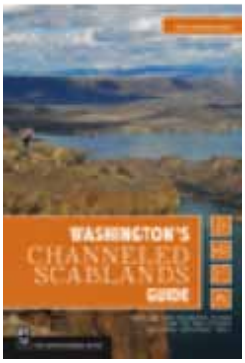
In Volume 2, The Northern Reaches, Bjornstad and Kiver focus on the Channeled Scabland, where the evidence for megafloods is most striking and dramatic. It was in the Channeled Scabland early in the 20th century where rebel geologist J Harlen Bretz first saw most clearly, and described most eloquently, the evidence for these Ice Age cataclysms that so violently transformed the region.

Beginning where the floods originated at the Idaho-Montana border and following them through Washington's Channeled Scabland, coauthors Bjornstad and Kiver explore dozens of flood features, many found nowhere else on Earth. They present dozens of trails and tours directing readers to experience, firsthand, the striking aftermath of the cataclysmic Ice Age floods.

Check the store web site iafi.org/store starting in April 2012

Washington's Channeled Scablands Guide

By John Soennichsen
(Author of *Bretz's Flood*)



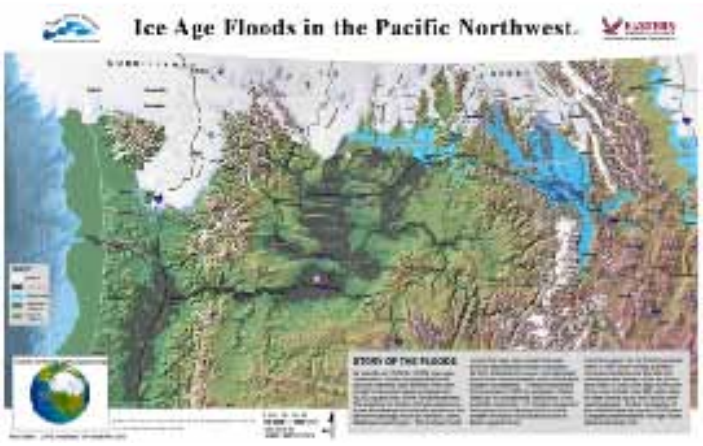
Guidebook and travel narrative come together in the Washington's Channeled Scablands Guide. From Walla Walla to Spokane and Quincy to Pullman, now travelers can explore Washington's canyons of Ice Age wonder with a brand new guidebook. The guide offers a comprehensive and intimately knowledgeable tour of this one-of-a-kind region. Local writer and historian John Soennichsen is your guide to fascinating lore; snapshots of the unique towns connected by this singular landscape; descriptions of the unique geology; advice on how to explore whether by auto, horseback, canoe, bike, or on foot; and essential info like where to fuel up and stop for dinner. If you're seeking adventure and intrigue just off the beaten path, you'll find the keys to a whole new world of exploration with Washington's Channeled Scablands Guide. Explore and Recreate along the Ice Age Floods National Geologic Trail.Published by The Mountaineers; 224 pages $18.00

NOW AVAILABLE---THE IAFI MAP IN A SMALLER SIZE!

THE ICE AGE FLOODS OF THE PACIFIC NORTHWEST Map is now available in 11" x 17" size. This map, like the 24" x 36" size, shows the locations of the glaciers during the last glacial cycle, Glacial Lake Missoula and Glacial Lake Columbia, the area inundated during the megafloods of the Ice Age, and the location of the greatly reduced sea level during the glacial maximum. Considerable detail of topography, roads, and numerous towns and cities are also shown on the map.

This beautiful color map is now available in 2 sizes: 24" x 36" and 11" x 17". You can also get the 11" x 17" map laminated. All are shipped in a sturdy cardboard tube.

24" x 36"	$20.00
11" x 17"	$12.00
11" x 17" Laminated	$14.00



Ice Age Floods Institute
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Richland, WA 99352

IAFI Fall 2011 Field Trip Photos

Field trip leader, Michael Hamilton, lectures on the SR 231 roadcut showing cross-bedded granule sand deposit overlain by riverine boulders. (Photo Courtesy of Melanie Bell)

Field trippers heading to the Audubon Lake Refuge on Euclid Road on the outskirts of Reardan, WA. The Audubon Lakes north of Reardan, WA are the headwaters for Crab, Deep and Spring creeks. This low lying triple drainage divide occurs in a flood scabland channel which crosses the top of an ancient mountain range. Granitic bedrock occurs in the divide separating the two lakes and a large gravel deposit topped by current ripples separate Audubon lakes from the Spring Creek drainage to the north. (Photo Courtesy of Melanie Bell)