

THE PLEISTOCENE POST

Newsletter of the Ice Age Floods Institute



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WHERE IS THIS FLOODS' SITE AND WHY IS IT IMPORTANT?

Each newsletter will have a photograph of an Ice Age Floods site. You will be asked to determine its location and see if you can determine why it is important. The answer will be found later in the newsletter. We hope you have some fun with this.

Here is the photo for this issue (courtesy of Gene Kiver). It is of Rock Lake. See if you can determine where Rock Lake is and why it is an important part of the Floods' story. Hint: Rock Lake is the deepest lake (400 feet) in eastern Washington on the Columbia Plateau. The answer can be found on page 17.

--Gary Ford



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PRESIDENT'S MESSAGE

Hello Everyone. Here is your Spring 2016 IAFI Newsletter. We hope you find it interesting.

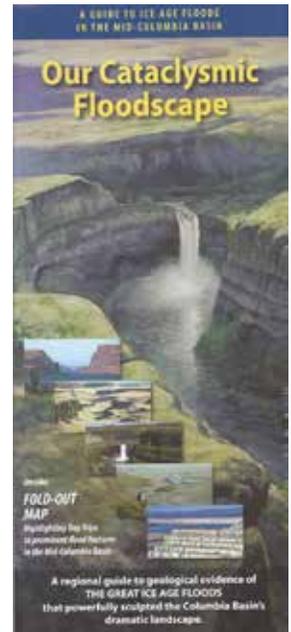
September 24, 2016 Institute Field Trip in western Montana - This year's fall IAFI field trip is sponsored by the Glacial Lake Missoula Chapter. See the [IAFI website](#) to download registration and liability forms for this field trip. The IAFI events page also has information on the field trip as does the Glacial Lake Missoula Chapter report found later in the newsletter. September 23 will be the fall Board of Directors meeting with an evening membership meeting and pre-field trip lecture. More details on these events will be provided in the summer newsletter.

New IAFI Chapter - In 2015, Lloyd Stoess, a long-time member of the IAFI, expressed interest in establishing a new chapter in Washington that would cover the general area of Adams County, western Whitman County and northern Franklin County. He wanted to know what the process was to create a new chapter. I sent him several documents that outlined that process. Lloyd began immediately to talk to potential members and to complete the application. He took his show on the road to a variety of events within the proposed chapter area. He found a great deal of interest in starting a chapter. He recruited new members, filled officer positions and completed work on chapter bylaws and liability documents. Then he submitted a proposal to the IAFI Board of Directors to become a provisional chapter and a few months later a proposal to become a fully chartered chapter. The IAFI is pleased to welcome our 11th Chapter: *The Palouse Falls Chapter*. See their chapter report in this newsletter for more details.

If other people are interested in starting a chapter, please contact me at president@iafi.org and I will be happy to help you learn how you could also start a new IAFI Chapter.

IAFI begins work on new Chapter brochures - At an IAFI Board Meeting in 2014, Brent Cunderla, Wenatchee Valley Erratics Chapter President, proposed that the Institute develop brochures for

each chapter area. The Lake Lewis Chapter, under the leadership of George Last from the Pacific Northwest National Laboratory (PNNL) Team Battelle, agreed to go first and develop a prototype that the other chapters could follow. Working with George were several other people from Team Battelle including Kyle Larson and John Serkowski. Also part of the team were Gary Kleinknecht (chapter president and IAFI Vice President), Chris Barnes (Graphics West), Bruce Bjornstad (IAFI member and Chapter Technical Advisor) and Skip Novakovich (Esprit Graphics). I want to thank George for his great enthusiasm and strong leadership with this project as well as the other people who contributed their time, energy and great ideas.



The general format of the brochure is that one side highlights some of the major flood features in the area while the other side has a map showing the location of those features as well as other features found in the area.

Some of the other chapters have started working on brochures for their area. They are following the template developed by the Lake Lewis chapter. You will learn more about the development of your chapter's brochure at your chapter meetings.

Have you ever wondered what happened when the Ice Age Floods reached the Pacific Ocean? We have a short article in this newsletter, courtesy of Dr. Scott Burns, to provide some answers to that question.

Institute Activities - Our eleven chapters offer a wide variety of member oriented activities. We hope you enjoy reading about their many recent interesting and enjoyable activities. Consult the [IAFI website](#) periodically to find out about

PRESIDENT'S MESSAGE CONTINUED

upcoming events offered by our chapters.

A Message from the National Park Service - Dan Foster, the Ice Age Floods National Geologic Trail Superintendent, again provides the latest information on the Trail. He also brings to our attention that this year marks the centennial of the National Park Service. I am sure we will hear more about this celebration as the year continues.

Thank you to IAFI Supporters – We want to again thank all of you for continuing your memberships and for the donations you make to the Institute. We couldn't do any of this without you!

Volunteers Needed – All of the work that is done by our chapters is done by volunteers. We are always looking for new volunteers to help with both small tasks and large events. If you have some time and interest we would be pleased to have your help. Please see any of your chapter officers or board members to learn about local volunteer opportunities.

My thanks to Signe White, our newsletter editor, for preparing another fine issue of the Pleistocene Post.

--Gary Ford

CHAPTER NEWS

Cheney – Spokane Chapter

Inland Northwest Land Trust Walk and Talk - On June 27, 2015, Dave Daugharty led hikers through the Deep Creek Preserve discussing Floods features. While the walk and talk went well, the temperature was 102 degrees. However, hikers were very interested in the information Daugharty provided them in spite of the heat.

Cheney Rodeo Days - In downtown Cheney on July 11, the first cool day after a hot weather streak, Linda Long, Ivy Green, Dave Daugharty, John Taves, and Dan Lewis worked the Chapter booth. Many individuals stopped by and 76 browsed materials on the table and asked questions about the Floods.

EWU Neighbor Fest – Eastern Washington University (EWU) Neighbor Fest was held on the EWU campus September 25 and brought 84 interested floodies by the Chapter booth to look over materials and discuss the Floods. Many others in the walkway near the booth discussed the Floods, or, perhaps they were checking out how nice the booth looked.

“Symphony of the Soil” - On September 23 and 26, the film “Symphony of the Soil,” sponsored

by the Spokane Master Gardeners and IAFI Cheney-Spokane Chapter, was shown at Gonzaga University and The Center Place in Spokane, WA. Gary Ford, president of IAFI Cheney-Spokane Chapter, and Jim Fox, vice president, attended the film showing at Gonzaga University along with 180 other attendees.

Friends of Little Pend Oreille National Wildlife Refuge, Colville, WA. Melanie Bell gave a Floods presentation to 30 Friends on Saturday, September 26. There was a lively Q&A session followed by lunch and a tour of the Refuge. This is a beautiful Refuge east of Colville in Stevens County.

Rock Lake Bike Tour - “Geology and Railroad History on Bikes” was led by Gene Kiver, EWU Emeritus of Geology, and Charlie Mutschler, EWU Archivist, around Rock Lake. Burlington Northern Santa Fe Railroad and Cheney Bicycle Time co-sponsored this event. Rock Lake, south of Cheney, Washington, is the deepest and most rugged of the Missoula Flood canyons in eastern Washington. The history of the now defunct Milwaukee Railroad and the origin of the deepest lake and canyon in eastern Washington were highlighted. The Milwaukee was the last of the transcontinental railroads completed to the Pacific Northwest. Engineered for heavy traffic, it was completed

just as a combination of economic forces reduced the need for it. Transportation routes across the Inland Empire were shaped by the Floods' 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 rail bed is mostly owned by Washington State Parks and will eventually be opened to the public. By special permit, the northern part of the rail grade was explored for an 11-mile roundtrip on relatively easy trail. Along the trail were steep cliffs, rockslides, and a trestle requiring extreme caution.

Steamboat Rock Hike, Grand Coulee - Cheney Merchants Association co-sponsored this hike led by Gene Kiver and Bruce Bjornstad. Twenty-eight hikers participated on Saturday, October 10. This hike was about 5-6 miles round trip and required a 700-foot hike up a steep trail with a couple of sections over some poor trail. The hike on the top of the flat mesa was considered easy. The superb view of Floods features helped hikers to understand the amazing geologic story of the origin of Grand Coulee.

Wagon Road Trail Hike, Northrup Canyon - 24 hikers participated in this hike co-sponsored by Cheney Merchants Association on Sunday, October 11. Gene Kiver and Bruce Bjornstad led this hike that partially followed the old stagecoach and wagon road to the scabland summit of the east wall of Grand Coulee where more outstanding views of Floods features in the Grand Coulee were seen. Northrup Canyon Coulee, Steamboat Rock, and part of the 25-mile-long Grand Coulee was visible from our perch 700 feet above the coulee floor. Round trip distance was about four miles with an elevation change of 530 feet.

Fasten Your Seatbelts Geology Fans - This event was co-sponsored with the Spokane Community College Science Department on Friday, October 23 in The Lair Auditorium on the Spokane Community College campus. Tom Tabbert and his powered hang glider called a Trike allowed 142 individuals to fly over, around, and through some of the most profound and breathtaking scenery of the Inland Pacific Northwest. He flew through features left behind from the Ice Age Floods that ravished the area from western Montana through

northern Idaho and eastern Washington. Floodies saw a bird's eye view of the evidence of Glacial Lake Missoula from Flathead Lake all the way to Lake Pend Oreille. From there, exploration of the devastation it caused through eastern Washington down to Wallula Gap near the Tri-Cities was seen.

Tabbert is a graduate of the University of Wisconsin with a degree in Geology. His career, however, led him to a tenure flying in the Navy aboard the USS Nimitz carrier before settling into his present career as a company consultant for knee and hip replacement. He began flying 'Trikes' four years ago and today brings his passions for flying and geology together in a unique format. Much of his video work can be viewed today by visiting [youtube.com/ttabbs](https://www.youtube.com/ttabbs).



Tom Tabbert flying his Trike over Ice Age Floods features

The video presentation was preceded by the annual membership meeting and dessert reception for active members of the IAFI Cheney-Spokane Chapter. President Gary Ford provided an update on membership, IAFI, and chapter activities.

Annual Spring Palouse Canyon to Palouse Falls Hike. Eighty-three hikers gathered under the railroad bridge near Lyons Ferry Fish Hatchery near Washtucna, Washington, on Saturday, March 5. The hike was an eight-mile route up the Palouse Canyon to Palouse Falls State Park. Along the way the Ice Age Floods story was emphasized, as well as the local Native American and settlement history by leaders Lloyd Stoess and Dr. Gene Kiver. Hikers had to be in good physical condition to traverse the hike, rated a "10" for most difficult. This was the earliest this hike has been scheduled and no one

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reported a rattlesnake sighting. The newest IAFI chapter, Palouse Falls Chapter in the Washtucna, WA area, co-sponsored the hike with the Cheney-Spokane Chapter.



Dawn Bennett, her son Jon Bennett, and Tim Heiydt and his daughter, Alexa, pause at a great photo spot.

Their smiles indicate they are having fun while enjoying the scenery and learning about the Floods.



Celeste and Greg Key, Karen Ringwood, Julie Haakenson, Nancy Flood, and Brian Traversi wrote that they loved the hike. "It is definitely a "10" along the ever so narrow, steep, bumpy, rocky, grassy, holey and everything else to our destination. The weather was great, the guides were great and informative and the scenery was absolutely beautiful. We faired well, only had a couple of blisters."

--Melanie Bell

Coeur du Deluge Chapter

The primary activity of the Coeur du Deluge (CDD) Chapter in Sandpoint, ID since the last IAFI Newsletter was a field trip on September 26, 2015 entitled "Ice Age Flood Deposits, Flood Features, and Bedrock of the Rathdrum Prairie, Idaho." The field trip was attended by 19 participants and began and ended at Farragut State Park. Although the focus was on the location of the ice dam and the "breakout" area of the Glacial Lake Missoula Floods, the Hoodoo Channel, the giant Floods-formed current dunes, the large pendant bar formation behind Round Mountain, the present-day lakes formed by Ice Age Flood deposits and the importance of Ice Age Flood deposits in forming the Rathdrum aquifer, we also discussed the importance of the Farragut Naval Training Station during World War II and the northernmost outcrops of the Columbia River Basalts in the area. The weather gods were smiling and everyone enjoyed the field trip. See below for field trip related pictures.

Roy and Dean at the southern end of Lake Pend Oreille discussing how the lake was glacially over deepened to nearly 500 feet below the present-day sea level.



Dean Garwood at Farragut St. Park, explains how this depression, a Kettle, (behind him) formed when a large mass of ice from the Ice Plug lodged here and later melted.

Piles of huge boulders were excavated along the railroad right-of-way from gravel bars deposited by Ice Age Floods bursting from the south end of Lake Pend Oreille.



Roy Breckenridge on the crest of a "giant current dune" along Hwy 54 near Ramsey Road. These dunes, sometimes referred to as "giant ripple marks," are 20 to 200m apart and 1 to 15m high, indicating high energy water flow.

Sharp boundary demarcating different types of land use, geomorphic features, and geologic conditions of formation. This location is along Scarcello Road just off of Hwy 41.





Looking SE towards the mouth of the Clark Fork River around sunrise. The notch near the center was an overflow channel when Glacial Lake Missoula reached several thousand feet deep at the Ice Plug.

The Cabinet Mountains at sunrise. Formed along the Hope Fault, they also helped funnel the Glaciers up the Clark Fork River.



Looking East towards Hope and the Cabinet Mts. This valley was filled periodically with glacial ice coming through the Purcell Trench and plugging the Clark Fork River to form Glacial Lake Missoula.

Our chapter also had a good representative number of attendees at the IAFI Annual Meeting held in Wenatchee, WA, the Field Trip titled “Glacial Geology of the Lake Chelan Area” on September 19, 2016, and field trips organized by other IAFI Chapters, such as the Steamboat Rock Hike held on October 10, 2015 that was organized by Gene Kiver and Bruce Bjornstad through the IAFI Chapter in Spokane/Cheney, WA. Chapter members have been asked to help with the collection of documented and annotated photographs that illustrate Ice Age Floods features in North Idaho.

A Memorandum of Understanding with the Idaho Master Naturalists, Pend Oreille Chapter, has been initiated in order to further the missions and facilitate cooperation between the groups. Both

groups are focused on a better understanding and protection of our natural environment in North Idaho. The MoU has been approved by our Chapter Officers and signed by Clem Yonker and Tony Lewis as representatives of both groups.

Our Chapter continues to receive emails and telephone calls from individuals from out-of-state requesting information on field trips and brochures about the Ice Age Floods. These inquiries are especially related to the Ice Dam, its formation and collapse. Work continues on our Chapter’s Ice Age Floods brochure that should help visitors better understand the Ice Age Floods and observe their impact on our landscape.

--Tony Lewis

Columbia River Gorge Chapter

2015 Gorge Geology Field Trips - April 18, May 9, September 12 - Our 2015 April and September field trips were sold out but the May trip was greatly underbooked, possibly because it was the day before Mother’s Day. All participants continue to be thrilled with the trips, while we continue to make adjustments to limit the duration and improve the content and presentation.

Community Float Trip - July 15 and August 23, 2015 - We were invited on two raft trips, for Wet Planet and All Adventures rafting companies, to provide interpretive geologic information about the White Salmon River to raft guides and clients. This information then allows the raft guides to provide their clients with a fuller and more accurate river rafting experience.

Memaloose State Park Gorge Geology Presentation on August 8, 2015 - We were invited to present a one-hour slide show and talk about Gorge geology and the Ice Age Floods that was well received by an audience of about 30 park visitors.

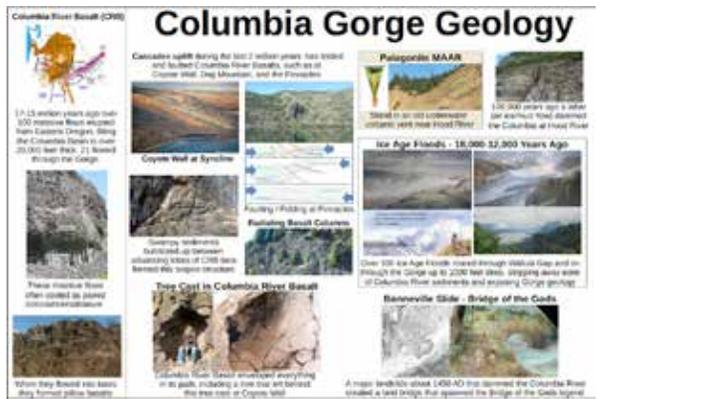
Facebook and Websites - We try to share information and generate interest through online media about Floods-related topics in our area and about IAFI in general. We continue to regularly post news, information and events to our gorgefloods.org website, but we could sure use your cooperation by sending new and relevant items of interest to iafi.cgc@gmail.com.

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We also discovered that IAFI had an inactive Facebook page which we tried unsuccessfully to reactivate. We were then given the OK to create a new Facebook page for the Ice Age Floods Institute and have kept it regularly updated since then with relevant and interesting articles. If you're on Facebook, please visit and 'Like' the page, and let us know (iafi.cgc@gmail.com) if you would like to help keep the page active.

We have also proposed replacing the current IAFI website that only the contract webmaster can update with a WordPress website where all chapters can directly contribute news and information, and where we can readily develop new ways to tell the Ice Age Floods stories. We will present this proposal to the Spring meeting of the IAFI Board.

"Gorge-ous Night Out" in Salem, OR (February 3, 2016) and Olympia, WA (February 9, 2016) - One Gorge (a Gorge-wide advocacy group) and state legislators from the Gorge region arranged separate informal evenings for Oregon and Washington legislators to showcase the Columbia River Gorge. We presented display panels on Gorge geology and the Ice Age Floods that were very popular at both events. We hope this will stir our state legislators to support the Ice Age Floods National Geologic Trail, and maybe even join us on our field trips.



Workshops from January to April, 2016 - The Columbia River Gorge and Portland chapters are representing IAFI and the Ice Age Floods National Geologic Trail at a series of Travel Oregon forums and workshops developed to help shape the future of tourism in the Columbia Gorge.

Sandhill Crane Festival - March 18-20, 2016, in Othello, WA - IAFI played a huge part in this year's Festival. We presented 9 separate lectures and tours focused on the Ice Age Floods and geology of this central WA area.

Ellen Morris Bishop Talk - 'Wild About Nature,' April 22, 2016 at the White Salmon Library - We will host a talk and a possible field trip by Ellen Morris Bishop, a locally well-known geologist/teacher and writer, for the *Wild About Nature* series of the Friends of the White Salmon River. Ellen will also be available to autograph her latest book "Living with Thunder: Exploring the Geologic Past, Present, and Future of Pacific Northwest Landscapes." We are also working to have Ellen back next September for another talk at the Gorge Discovery Center. Stay tuned.

2016 Gorge Geology Field Trips - April 30, (May 14?) and September 17 - Our April 30 field trip is full with a six-person waiting list and we have two signed up for the September field trip. If we get 12 more registrations for the Spring trip we will schedule another one for May 14 and everyone will be given an option to change dates. If you or anyone you know might be interested in this very popular field trip, please look for more information at <http://gorgefloods.org/field-activities/gorge-geology-fieldtrip/>.

--Lloyd DeKay

Ellensburg Chapter

The Ellensburg Chapter continues to offer evening lectures and Sunday afternoon field trips. All are welcome. No charge.

Recent lectures include Andy Ritchie's "Elwha PlaneCam - Measuring the biggest dam removal ever with cheap cameras bolted to a plane," Wendy Gerstel's "Puget Sound Beaches: The Dynamics of Sediment Supply," Tim Melbourne's "Washington's



Earthquake Early Warning System,” and Andrea Balbas’ “Dating the Ice Age Floods using Cosmogenic Nuclides.”

Recent Sunday field trips include Nick Zentner’s “Old Blewett Pass Geology” and Karl Lillquist’s “Lower Grand Coulee Geology.”



125 gold miners in Liberty, Washington on the Old Blewett Pass field trip. September, 2015.

Karl Lillquist teaching during his Lower Grand Coulee field trip in November, 2015



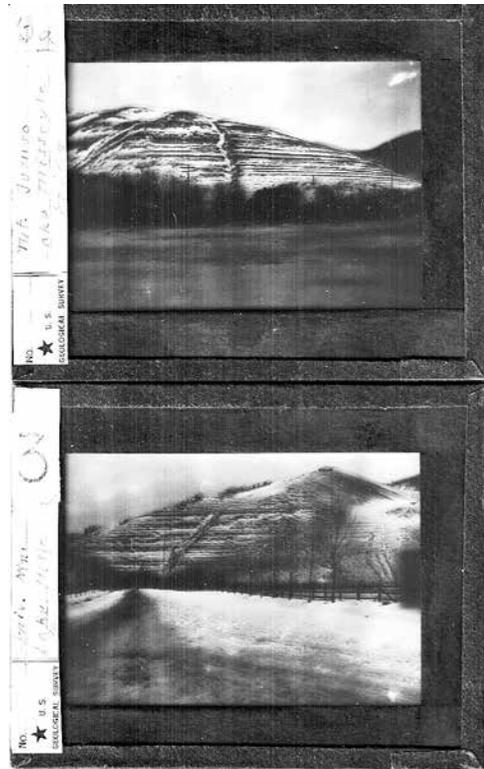
--Nick Zentner

Glacial Lake Missoula Chapter

The Missoula Chapter had a quiet but productive year. We continue with monthly meetings at the Montana Natural History Center, with whom we partner. They supply us a meeting place, an exhibit area, and help coordinate events. At least once a year, we hold an event at that location. In return, we pay them a minimal rental fee and provide educational opportunities. We’ve been working with them to obtain a tourism grant to upgrade our exhibit. We applied last June, but due to our Legislature’s inability to pass an infrastructure bill, the grant money was used for more critical purposes and we did not receive funding. We did, however, get a partnership grant with the Forest Service for \$10,000 – to be used in the next five years for projects that include the National Forest.

A significant accomplishment was the completed inventory of 4 boxes of JT Pardee’s personal effects. The historian we hired, Anne Milbrooke,

finished this task with the help of Norm Smyers and Jim Sheldon. She was paid via a grant from the Geological Society of America. We plan to show some of these incredibly neat pictures and other items at the national meeting next September.



Slides of Mt. Jumbo strand lines in Missoula taken by JT Pardee. Probably mid 1930s. Supplied by Richard Chambers.

We’ve also been in contact with Richard Chambers, one of the first geologists to describe the glacial lake deposits near Alberton, MT. He was Dave Alt’s grad student at the time. He has sent us some of the original Pardee slides. More importantly, he plans to be a field trip leader for the national meeting. On that note, we should mention that Dave Alt died last summer. Dr. Alt (as I knew him) was a great proponent of the Floods story and an entertaining speaker. He authored several *Roadside Geology* books and *Glacial Lake Missoula and Its Humongous Floods*.

Jim Sheldon has given a few presentations locally, the latest being for the Historical Society. I gave one to the Friendship Force. We are gearing up for the annual meeting and field trip this fall, which should be quite interesting. The critical features are spaced far apart, so the bus ride will be 170 miles. We will have lunch at an historic schoolhouse in Paradise.

--Lynne Dickman

Lake Lewis Chapter

In August, George and Linda Last set up a Floods display at the Hat Rock Gem and Mineral Show in Hermiston, OR. George also manned a booth at Battelle's Family Day in Richland in August.

After the long and hot summer of 2015, the Lake Lewis Chapter resumed its bimonthly meetings on September 8th, highlighted by a talk on "Rock Glaciers" by Dr. Karl Lillquist of Central Washington University (CWU). Karl introduced the audience to this interesting landform which amounts to a combination of rock debris and ice found in alpine settings. On September 25th and 26th several Lake Lewis members manned a booth at "Heritage Days" at Sacajawea State Park near Pasco, WA. Living history exhibits of mountain man life and crafts, Native American dance, early Twentieth Century mechanical technology, and exhibits on the Floods and Ice Age megafauna were sponsored by Friends of Sacajawea State Park.



Elementary school children crowding around our hands-on display about the Ice Age Floods and the Coyote Canyon Mammoth Dig during Heritage Days at Sacajawea State Park

In November, George Last and Gary Kleinknecht manned a double booth on the Floods and the mammoth dig at the *Visit Tri-Cities* annual meeting and tourism show at the Three Rivers Convention Center in Kennewick. Professor Nick Zentner of CWU presented the November 10th meeting's talk on "The Columbia Gorge." Nick dispelled some widely accepted misconceptions about the Floods in the Gorge and brought to light even more fascinating information about that gorgeous stretch of the Columbia River. Also in November Gary Kleinknecht presented a talk at The Columbia Gorge Discovery Center on the "Coyote Canyon Mammoth and the Ice Age Floods" in conjunction with an art workshop conducted by well-known Floods artist Stev Ominski.



Talk at the Columbia Gorge Discovery Center in the Dalles, OR

In January, Bruce Bjornstad graciously held the chapter meeting for president Gary Kleinknecht. Gary managed to injure his quadriceps tendon and underwent surgery in mid-December. Bruce also presented the evening's program titled "Awesome Floodscape of the Mid-Columbia." He featured numerous new images of our region's spectacular Floods created scenery. Bruce has continued to publish his quadcopter videos on YouTube and currently has 10 videos posted for all to view. Also, in January, George Last spoke on the Floods in the Community Lecture Series at the Mid-Columbia Library in Kennewick.

Dr. Eugene Kiver presented the March 8th program on the "Geology of the Grand Coulee." Lloyd Stoess, president of the IAFI's newest chapter based in Washtucna, WA, is up for our May 9th meeting at the Hanford Reach Interpretive Center (The Reach) in Richland. Lloyd will teach the attendees how to read the landforms of the Floods landscape. The Lake Lewis annual field trip will be a unique partnership with The Reach and is scheduled for August 13, 2016. The September meeting will feature a talk by Dr. Scott Burns on ancient floods.

Lake Lewis members continue to participate in ongoing Floods related projects, including the Coyote Canyon Mammoth Dig near Kennewick, and Ice Age Floods tours by The Reach.

--Gary Kleinknecht

Lower Columbia Chapter

In November, Sheila Alfsen, gave her talk: "Salvage Paleontology." It was fascinating to hear about all the regulations when a construction site finds something, and the detailed work in checking out the evidence to see if it will need further investigation.



She showed how a good relationship with the construction crew is vital. She was so well received that we will hear from her again later this year speaking about the Cascadia earthquake.

In January, Professor Scott Burns Ph.D., Geology, of Portland State University and Oregon's Scientist Of The Year for 2014 and an expert on earthquakes talked about being ready for the "big one" in light of the New Yorker Magazine article about earthquakes. Scott is very knowledgeable on several subjects and is our most popular speaker. We recommend him highly.



In February, Alice Norris (former mayor of Oregon city, Oregon) of the Willamette Falls Heritage Area, talked about the process for making the Willamette Falls a Heritage Area and plans to apply for National Heritage status.

Willamette Falls, the second largest waterfall by volume in the United States, is very significant, both geologically and historically. It is a receding waterfall created by the Lake Missoula Floods as the water rushed through the Oregon City Gap. The Willamette Falls Heritage Area was the sight of the first long distance transmission of electricity, as well as many other "firsts" west of the Rocky Mountains.



Our March speaker will be a return engagement for retired railroad engineer, Bill Burgel, telling us the "History of the Development of the Continental Drift - Sea Floor Spreading Hypothesis." We look forward to hearing from him again.

In January, our chapter president, Rick Thompson, and several officials from the City of Tualatin were interviewed for the Northwest Boomer and Senior News/Portland and Vancouver edition about the progress on the new Ice Age Floods National Geologic Trail. Here is a link to that newspaper article: <http://www.gigaflood.com/Heading%20down%20an%20ice%20age%20trail.pdf>

Also in January, The Portland Tribune newspaper had this article: "Interpretive Elements Installed Along Tualatin River Greenway Trail," about the new Ice Age themed trail in Tualatin. You can read about it here: <http://portlandtribune.com/ttt/89-news/287542-164214-interpretive-elements-installed-along-tualatin-river-greenway-trail>

The February Tualatin Today newspaper had a short article and photo with a map of their new Tualatin River Greenway Trail featuring local natural history and human history of the area. This included a section called the Ice Age Discovery Trail. Here is a link to that article: http://www.gigaflood.com/tualatintoday_february_2016_3.pdf

On January 26, 2016, The Oregonian newspaper came out with the exciting news that a fossil mammoth had been discovered under the Oregon State University (Corvallis) football field. David Ellingson, a Woodburn, Oregon teacher and local IAFI member, was one of those called to help dig up and identify the bones. David has led a number of excavations right on the Woodburn High School grounds with some amazing discoveries including what might be the largest Bison Antiquis to date. For the article and video see http://www.oregonlive.com/today/index.ssf/2016/01/mammoth_bones_unearthed_at_ore.html



A new OSU mascot, maybe? Move over beaver, this one's bigger!



David Ellingson unearthing the newly discovered fossil mammoth at the Oregon State University football field

Members of our chapter, and president of the Columbia Gorge chapter, have been participating in the Columbia River Gorge Tourism Studio. This is a series of meetings designed to pull together all aspects of Gorge tourism on both sides of the river in order to further tourism within the area. There are four major trails through the Gorge: 1) The Oregon Trail 2) The Lewis and Clark Trail 3) The Pacific Crest Trail, and 4) The Ice Age Floods National Geologic Trail (IAFNGT). It is great to bring awareness of the IAFNGT and help make sure it is included in the tourism plan. It is actually a major unifying part that ties together so many diverse entities: parks, restaurants, hospitality companies, wineries, outdoor guides, recreation and tourism companies and almost anything else you can mention. It is a great time to be part of the Ice Age Floods Institute.

--Rick Thompson

Lower Grand Coulee Chapter

Members of the Lower Grand Coulee Chapter (LGCC) generally meet on the second Saturday of each month in the Soap Lake Senior Center at 121 2nd Avenue SE. Usually, our LGCC meeting begins at 11 am following the meeting of the Soap Lake Conservancy. However, a time change to 10 am may be forthcoming to allow more time for our afternoon outings and hikes. A business meeting is conducted where partners give reports on activities. One of the ongoing activities is planning for trails in the Soap Lake and Ephrata area. Also, planning for a number of forthcoming events takes place. The business meeting is often followed by a program about one or more unique features found in our area along the Ice Age Floods National Geologic Trail. A highlight of each second Saturday is an afternoon outing and hike to a nearby area exploring some of the geologic features left by the many Ice Age Floods. These free outings are announced on the “Soap Lake for Locals” web site and are well attended by both members and friends and their families.

For the LGCC, the Dry Falls Cataract, The Lower Grand Coulee, Soap Lake and the Ephrata fan are key visible features central to the Ice-Age Floods National Geologic Trail. Soap Lake is the location of the original plunge pool for the receding waterfall that carved the Lower Grand Coulee

channels. The Dry Falls cataract is the terminus left by that receding waterfall at the end of the last Ice Age Flood pouring out of Glacial Lake Columbia through the Grand Coulee.

Our Chapter looks to educate the public about the gigantic Floods that carved the Grand Coulee and the area’s unique landscapes, including Steamboat Rock, Dry Falls, the Sun Lakes Chain and the mineral-water Soap Lake. The City of Soap Lake is at the crossroads of Washington Highway 28 and Washington Highway 17, which is the southern portion of the Coulee Corridor National Scenic Byway. Soap Lake is the place of the healing waters, also known as “Smokiam.”

Again this March, the LGCC set up and manned the Ice Age Floods Institute’s informational display at the Othello Sandhill Crane Festival. This event was headquartered at the High School, and the display was in the gym on Saturday, March 19. Speakers and tour guides from IAFI chapters are a key part of this annual event that attracts visitors from throughout the state of Washington and the U.S.



IAFI's informational display at the Sandhill Crane Festival in Othello, WA

The 2016 Flood Fest celebrating the 50th Anniversary of the Dry Falls Visitor Center will take place on Saturday, May 14. Our chapter meeting will be held in the Visitor Center at 11 am that day. Chapter members will set up and man an information table on the grounds at the Dry Falls overlook.

Our most recent hike on February 13 was along the top of the Dry Falls cataract. It is a challenge due to the terrain left by the Ice Age Floods that carved out the basalt. Two photos are included that were taken by our Outing Coordinator, John Glassco. The hike began at the Dry Falls Visitor Center two miles from this location along the rim. Dry Falls

Lake below was frozen with open water at the base of the south facing cliff.



One of several finger canyons that can be hiked across. In some cases hiking around is easier - but longer

Dry Falls Visitor Center, seen at the far left, is two miles from where this photo was taken



--John R. Moody

Palouse Falls Chapter

While the Palouse Falls chapter of the Ice Age Floods Institute may be the youngest of the group, it is led by the experience of our president, Lloyd Stoess. Lloyd brings with him 12 years spent as a member of the Cheney-Spokane chapter and the education of a BA in Geography from Eastern Washington College (now known as Eastern Washington University). As a permanent Washtucna resident, Lloyd has been living among and fascinated by Floods features his entire life.

In August of 2015, a series of exploratory meetings were held to see if there was indeed enough interest to form and sustain a regional chapter. After determining that there was, the Palouse Falls chapter immediately began recruiting members the best way we know how: face to face.

We acquired booths at three regional fairs, the Wheatland Communities Fair in Ritzville, the Palouse Empire Fair outside of Colfax, and the Adams County Fair in Othello, and introduced ourselves to area residents. It was a pleasure to learn that the IAFI's efforts were somewhat familiar to most, and everyone had at least one story of their own to tell about Palouse Falls.



Fair booth display as seen at the Wheatland Communities Fair in Ritzville, Washington. The display featured photos from the popular Palouse Canyon hike, which the Palouse Falls chapter will be co-sponsoring in 2016, as well as less well-known local Floods features.

We were off and rolling! In September of 2015, amidst our fair blitz, Lloyd travelled to the IAFI annual meeting in Wenatchee to present the chapter for acceptance. Bruce Bjornstad and Gene Kiver generously agreed to be our advisors.

Our style of lecture, due to our rural location, is what we refer to as the "traveling lecture series." Lloyd's presentations are repeated in a variety of small towns, often on main street, and largely in restored venues.

October and into November of 2015, our first foray into such an approach began with a very basic presentation for anyone unfamiliar with what this is all about. "Introduction to IAFI and an Overview of the Missoula Floods" was received by 75 attendees between Ralston, LaCrosse, Othello, and Washtucna.

Our chapter decided to go big for our annual membership meeting in November as well, and once Bruce Bjornstad was secured as our speaker with a "Bird's-eye View of the Ice Age Floods," we rented the recently restored Ritz Theatre in

Ritzville, Washington for our venue. The 55 member audience was the first to see Bruce’s “drone” videos on a movie screen. Even Bruce seemed to enjoy the experience of seeing his videos that big!



Bruce Bjornstad poses with the Ritz Theatre marquee, where he gave a video presentation titled “Bird’s-eye View of the Ice Age Floods” to 55 attendees.

The new year meant a new lecture, one that built on the basics presented in our first series. Lloyd introduced audience members to the “Geomorphology of the Channeled Scablands,” with 55 participants split between LaCrosse, the Carnegie Library in Ritzville, and Washtucna. We were even approached by a branch of the Mid-Columbia library in Connell to repeat the talk there in March.



An audience at the beautifully restored Gathering Place in LaCrosse learns what a hoodoo is during the “Geomorphology of the Channeled Scablands” presentation led by Lloyd Stoess.

We hit the ground walking at the beginning of March when we co-sponsored the very popular

Palouse Canyon hike with the Cheney-Spokane chapter. The eight mile hike took participants up the Palouse River canyon from Lyons Ferry -- where the Palouse and Snake rivers meet -- to Palouse Falls State Park.

For many, this hike was an opportunity to experience, up close and in-person, features carved out by the Floods. Gene Kiver and Lloyd Stoess also touched on Native American and white settler historical features that can be seen during the hike including the Marmes Man archaeological dig site, and a portion of the Mullan trail that is still visible near the fish hatchery.

Members of the Palouse Falls chapter are also active with the LaCrosse Community Pride organization (LCP), and we have partnered with LCP to create an Ice Age Floods Institute/Missoula Floods Museum in LaCrosse at their rock house station.

The rock houses were constructed in the 1930s by a local businessman from basalt stones, which can be found in surrounding fields. The LCP has worked closely with the School of Design and Construction’s Rural Communities Design Initiative at Washington State University on this project in 2014-2015, facilitating community input and conceptual designs.



One of the six rock house structures donated to LaCrosse Community Pride by the family of H.D. Owings. Photo provided by LaCrosse Community Pride.

LCP is continuing to collaborate with WSU/RCDI this current school year on this project. The LCP was recently awarded a \$750 grant from the Valerie Sivinski Washington Preserves Fund to assist in stabilizing the structures.

-- Michelle Plumb

Puget Lobe Chapter

This chapter had the following interesting presentations since the last IAFI newsletter.

Geology Underfoot in Western Washington, September 14, 2015 - A new regional guidebook, *Geology Underfoot in Western Washington*, by Dave Tucker, was presented and copies were available for purchase. Dave is a research associate in Western Washington University's geology department. He is well-known for his energetic commitment to the presentation of significant local geology topics to the general public. In his book, he presents a wide variety of 22 readily accessible and interesting geologic sites in Western Washington, combining engaging descriptions with full-color photos and illustrations, to bring their geological history to life. The material is selected from his long-running, user-tested online blog, "Northwest Geology Field Trips," at <https://nwgeology.wordpress.com/>. The blog includes a handy "Field Trip Sorter-Outer," which provides a categorical index to the blog's specific entries about a wide range of features, including significant and accessible glacial erratics in western Washington.

Plate Tectonics for Glacier Lovers, November 2, 2015 - John Whitmer, a dedicated and well-known student of the geology of the Pacific Northwest, and a teacher in the Telos Program at Bellevue Community College, introduced basic concepts of plate tectonics theory and showed how this can enhance the understanding of the waxing and waning of glaciers. It is plate tectonics that accounts for the great flows of the Columbia River Basalts, which determined the landscape of much of the Northwest and set the stage for the advances and retreats of the Cordilleran Ice sheet.

The Hidden Half of Nature, January 4, 2016 - David Montgomery and Anne Biklé presented their book, "The Hidden Half of Nature: The Microbial Roots of Life and Health." Microbes are all around us. From the plants in our backyards to the lining of the human gut, these minuscule bacteria are essential to all living things. For the husband-and-wife team of UW geologist David Montgomery and environmental planner Anne Biklé, this was certainly true when they reconstituted their barren backyard with organic matter. "The Hidden Half of Nature" is an exploration of their experiences--not just their gardening expertise, but also a

"thoughtful discussion" of Biklé's cancer diagnosis, and of the connections between what we eat (and more importantly, what the microbes we consume also eat), examining the many ways the planet's smallest inhabitants affect the development of other forms of life.

Fire and Ice: Flooding young minds with geomorphology, March 7, 2016 - Dale Lehman holds an adjunct position at the University of Washington, under which he teaches introductory geology to students at Tahoma High School in Maple Valley. Over the past 16 years, he has introduced nearly 1,000 students to the geomorphology of the Columbia Basin through 30 short field camps. These two-day field camps, involving 700 miles of Washington's geology, are the final exam for the geology course. During field camp, students apply academic knowledge of igneous processes, glacial processes, outburst flooding, sedimentation, hydrology, and crustal deformation, to interpret the landscape of Central Washington. Dale and some of his graduates shared their experiences from these geological adventures.

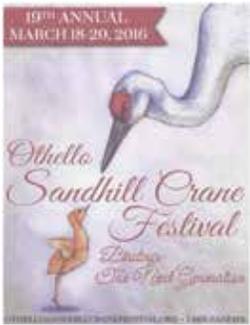
-- Dale Middleton

Wenatchee Valley Erratics Chapter

Education, Education, Education - The Ice Age Floods Institute (IAFI) basically had two main goals when the organization came to fruition almost twenty years ago. The first goal was to establish and denote the area affected by the Pleistocene catastrophic Ice Age Floods (IAF) so that future generations could see the magnitude and expanse of these Floods within the Pacific Northwest (portions of MT, ID, WA & OR). The IAFI lobbied Congress and cooperated with the Department of the Interior-National Park Service (NPS) to eventually accomplish this goal by establishing the Ice Age Floods National Geologic Trail (IAFNGT) which is now a recognized unit in the NPS. This first goal was accomplished on March 30, 2009 with the establishment of the IAFNGT.

The second IAFI goal was to educate the public on the IAF story, whether that be the human aspect (Bretz, Pardee, other scientists), geologic, cultural or how the Floods have basically dictated development history especially in eastern Washington. The Wenatchee Valley Erratic's (WVEs) chapter of the IAFI has always strived to

make education and telling of the story of the IAF a top priority. Currently the WVEs are working on two education endeavors.



The first was an effort that started with Ken Lacy, a founding member and longtime enthusiast of the IAF's story. Ken went the extra mile in coordinating with the organizers of the Othello Sandhill Crane Festival (March 18-20, 2016) to emphasize the IAF story. In the past there have

been many IAF lectures and field trips associated with the festival, but 2016 was the best year yet with nine IAF enthusiasts on the agenda. The following represented the IAFI by giving lectures and/or field trips.

Friday March 18, 2016

- Nick Zentner, Central WA University, was the headline speaker on Friday night with a talk entitled "Central Washington is Disneyland for Geology"

Saturday March 19, 2016

- Bruce Bjornstad, Moses Coulee lecture
- Brent Cunderla, General Ice Age Floods lecture and Drumheller Channels tour
- Gene Kiver, Upper Grand Coulee lecture
- Gary Kleinknecht, Hanford Reach Interpretative Center and the Coyote Canyon lecture
- Ken Lacy, Mechanisms of Columbia River Basalt Erosion by the Ice Age Floods lecture
- Karl Lillquist, Babcock Ridge and the Potholes and Frenchman Springs Coulee lecture
- Lloyd Stoess, Palouse Falls lecture

Sunday March 20, 2016

- Bruce Bjornstad, Moses Coulee tour
- Gene Kiver, Upper Grand Coulee tour
- Gary Kleinknecht, Hanford Reach Interpretative Center and the Coyote Canyon tour
- Karl Lillquist, Babcock Ridge and the Potholes and Frenchman Springs Coulee tour
- John Moody, Lower Grand Coulee Geology and Birding tour
- Lloyd Stoess and Ken Lacy, Palouse Falls tour

A big thanks for all that volunteered to give lectures and lead tours highlighting the IAF story at the 2016 Othello Sandhill Crane Festival.

The second education effort that the WVE's are undertaking this year is a partnership with the Wenatchee Valley Museum and Cultural Center (WVMCC) to lead seven IAF field trips. The bus tours will be held on the second Saturday from April to October 2016 (April 9th, May 14th, June 11th, July 9th, August 13th, September 10th, and October 8th). Ken Lacy and Brent Cunderla will be the WVE representatives on the tours. Three tours will be one-half days long to highlight the geology and IAF features of the Wenatchee/East Wenatchee area. Three additional all-day tours will travel from Wenatchee up Moses Coulee to Dry Falls and view continental glaciation features on the Waterville Plateau. The seventh trip will look at IAF features in the Quincy Basin area. A special thanks to Salina Danko of the WVMCC for coordinating the bus transportation and field trip participant registration.

--Brent Cunderla

DON'T BE LEFT OUT!

In order to be sure you receive notices telling you about the latest newsletter release and other important news, please add: membership@IAFI.org to your contact list. We have heard that sometimes our email notifications have gone to spam folders and our members don't get the latest news. By adding the above email to your contacts list we hope to solve any future problems. Thank you!

-- Sylvia Thompson, Membership Manager

FLOODS TALK

BY CONSUELO LARRABEE

Please refer to Links under Resources on our web page at www.IAFI.org for more information and photos.

The geologic vocabulary used to explain the Ice Age Floods may be unfamiliar. Here are some simplified definitions of commonly used terms. We hope these will increase the understanding for newcomers to the Floods story. Other definitions will follow in later newsletters.

COULEES –

What Pacific Northwest landforms, seen from space, helped identify similar landforms on Mars? And why are these landforms – tracts or paths of deeply eroded channels – important in the story of the Ice Age Floods?

Rivers form V shaped valleys. Glaciers form U shaped valleys. But the valleys found in the Channeled Scablands are shaped like boxes with steep sides and flat bottoms. These are called Coulees and were created by the Ice Age Floods. They are usually dry or have a much smaller stream in them now than was present during the Ice Age.



They usually form in areas underlain by basalt which with its columnar structure was easier for the Floods to remove. Here is a photo of Washtucna Coulee in the Cheney-Palouse Scabland Tract.



CATARACTS –

Waterfalls - cataracts - formed as the flood waters flowed over the basalt, undercut the rock and receded. Some of these cataracts formed in pairs with a steep thin strip of basalt in the middle. Dry Falls is the supreme example of a double cataract in a recessional waterfall.



GIANT CURRENT RIPPLES –

Like ripples in the sand at the ocean or in a river, there are Ice Age Floods ripples, too. But these ripples are huge. As the flood waters poured down the channels, they left ripples - waves - of rock & dirt. Some of these are as high as 45' & can be between 30' to 300' apart. Only a huge amount of water could make ripples of this size. Wherever they are found now in the world, they are associated with glacial outburst floods, such as the Lake Missoula Floods. Camas Prairie is a famous example of these current dunes.

A MESSAGE FROM THE NATIONAL PARK SERVICE

This year we are celebrating the Centennial of the National Park Service (NPS). One of the primary goals of the Centennial is to connect with and create the next generation of park visitors and stewards.

For any organization to continue to survive and grow, it must have positive accomplishments from the past and demonstrate its ability to remain relevant in the future. An organization must be able to examine its accomplishments in light of its purpose in order to keep on track, or to change to meet new needs.

As a partnership, we have accomplished some noteworthy items in the past few months. We have launched the Ice Age Floods National Geologic Trail website (<http://www.nps.gov/iafl>) that provides a uniform platform for people to learn about this phenomenal trail. It is and will continue to be a work in progress, but it is a celebration point of providing information about the trail.

Another accomplishment is soon to be realized, in the publication of a long range interpretive plan for the trail. This plan will set the standard for all of us in providing quality interpretive and education offerings to the public.

One of the keys to our future is to make what we do relevant to the next generation. As time continues

to march forward, we too must move forward in reaching out to new audiences.

**FIND YOUR
PARK**

The Ice Age Floods National Geologic Trail has multiple partners that are vital to its success. These include the four State Park systems, multiple federal agencies, Tribes, and local organizations. Each partner plays an important role in reaching new audiences and providing relevancy of the idea of the Centennial celebration. One key theme of the Centennial Celebration is “Find Your Park.” This theme is intended to encourage people to get out into this incredible world we live in and find a place of meaning. This can be a place of enjoyment, physical renewal, or spiritual rebirth. This place can be a National Park site, State Park, forest, city park, or even a local trail. Hence, “Find Your Park” is intended to have people find the relevancy of location to their welfare and enjoyment.

The NPS Centennial is about who we are and what we really value. However, it is also an opportunity to look to the future in providing a legacy of stewardship for future generations.

Thank you for your continued work on this effort.

-- Dan Foster, Superintendent
Ice Age Floods National Geologic Trail

ANSWER TO IAFI PUZZLER



Rock Lake lies about 15 miles south of Cheney in northern Whitman County. Floodwaters entered the Cheney-Palouse Scabland Tract north of Cheney and spread out in a zone over 20 miles wide. Floodwater deepened natural fractures along the Cheney Fracture Zone and related fractures, one of which follows along the 14-mile-long trend of the Bonnie Lake-Rock Lake fracture zone. A recessional or recessional cataracts migrated upstream leaving a 300 foot deep canyon (700 feet near the head of Rock Lake) in its wake. The future cross-state trail, the Iron Horse/John Wayne Trail State Park, follows

along the east rim of the canyon complex. Special-use permits to use the undeveloped trail for hiking, bicycle, or horseback riding can be obtained from the Columbia Plateau State Park office in Washtucna, Washington. The future of the trail was recently challenged by private landowners but fortunately the abandoned Milwaukee Railroad right-of-way still remains the property of all Washington State citizens.

--Gene Kiver

WHAT HAPPENED WHEN THE ICE AGE FLOODS REACHED THE PACIFIC OCEAN?

BY DR. SCOTT BURNS

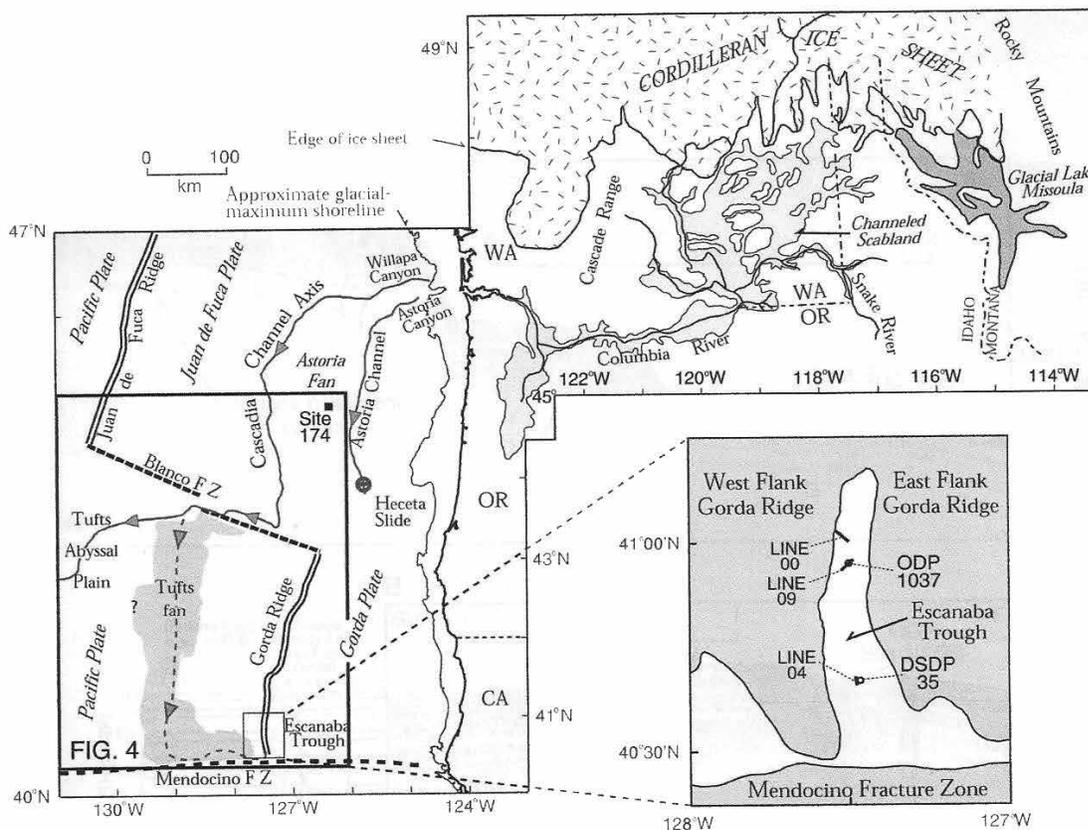
For many years, one of the unanswered questions about the Ice Age Floods was what happened when they reached the Pacific Ocean? One of the researchers who worked to answer that question was William Normark. In 2003 he and Jane Reid, both from the U.S. Geological Survey, published a paper in the *Journal of Geology* on this subject: "Extensive Deposits on the Pacific Plate from Late Pleistocene North American Glacial Lake Outbursts."

The amount of detail found in that article is not appropriate for this newsletter. Instead we are presenting a few key findings provided courtesy of Scott Burns, Professor Emeritus in Geology from Portland State University. It is taken from the book "Cataclysms on the Columbia" revised Second Edition, by John Eliot Allen, Marjorie Burns and Scott Burns, 2009.

Normark and Reid found that the sediment from the Missoula Floods when it reached the ocean continued to flow as generated turbidity currents first through

the Cascadia Channel into and through the Blanco Fracture Zone and west to the Tufts Abyssal Plain (see map below). A small portion of the turbidity currents left the main flow at a bend in the Cascadia Channel at its exit point from the Blanco Fracture Zone and flowed 400 kilometers south to the Escanaba Trough, a rift valley at the southernmost segment of the Gorda Ridge. Ocean Drilling Program Site 1037 collected samples here.

This is also where William Normark, Charlotte Brunner, Gian Zuffa, and Francesca Serra discovered Missoula Flood megaturbidite beds as much as 12 meters thick. Based on radio carbon dates and petrology of the sands, they determined that these beds – over 800 kilometers from the mouth of the Columbia River – came from the Missoula Floods. Research has also found that over 700 cubic kilometers of Missoula Flood deposits occur in the oceans compared to only 20 cubic kilometers deposited in the Willamette Valley.



THANK YOU TO IAFI MEMBER SUPPORTERS

Every member at every membership level is vital to IAFI's continued success. Your support helps us meet our mission of providing the Ice Age Floods story to the public and continuing our work on the Ice Age Floods National Geologic Trail. Every gift—no matter the size—counts. Thank you for making the IAFI what it is today and for helping shape it for the future.

We would like to acknowledge the following people that joined or renewed their membership at the Benefactor or Sustainer levels. (February 2015 – February 2016). We also want to thank the people who made notable donations beyond their membership renewal during this same period.

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