



# THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

VOLUME 77, NUMBER 6  
NOVEMBER/DECEMBER 2011

## The Geological Society of the Oregon Country

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VISITORS WELCOME AT ALL MEETINGS

## CALENDAR

### NOVEMBER/DECEMBER ACTIVITIES

Friday evening talk, November 11, 2011, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Scott Burns, Portland State University professor of Geology, will present "The Geology of Our National Parks".

#### GSOC Annual Christmas Party

GSOC Members and their guests are invited to the GSOC Annual Christmas Party and field trip slideshow, Friday December 9th, 2011 at the Simon Benson House on the Portland State University Campus, 1803 SW Park Avenue at Montgomery Street corner. Ham will be served. Members please bring vegetable, side dishes or

desserts for 6 to share. Those interested to bring wine, soda or table ware please contact Anne O'Neill (503)200-9308. Donations will be accepted for the room rental.

#### Schedule of Christmas Party activities:

6:30 p.m. Dinner buffet

7:30 p.m. Year in Review. This year's GSOC field trip leaders will present slide shows of their trips:

- Dave Olcott, "Globally Renowned Neogene Floods; May 20-22"
- Past President Janet Rasmussen, "Tidepools, Tsunamis, and Terraces; June 17-19"
- Secretary Paul Edison-Lahm and Past President Clay Kelleher, "A Geological Walking Tour of Downtown Portland; August 6"
- President Rik Smoody, "Mt. Rainier Aggradation; August 12-13"

8:30 p.m. Cookies/dessert

Musicians are encouraged to volunteer for the GSOC Christmas Chamber Players who play during the party; contact Dawn Juliano (503)367-7708. Dressy apparel for the evening is encouraged.

*If you would like to come but are not yet a member of GSOC, you may join now and receive membership benefits throughout 2011.*

## FUTURE ACTIVITIES

Friday evening talk, January 13, 2012, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker TBA.

Check the GSOC website ([www.gsoc.org](http://www.gsoc.org)) for updates to the calendar.

## BOARD MEETING NOTES

September 10, 2011

The meeting was called to order by President Rik Smoody at the Smoody residence. Board and GSOC members present also included Jane Walpole, Paul-Edison Lahm, Richard Bartels, Dawn Juliano, Anne O'Neill, Dave Olcott, and Antonella Mancini.

### Field Trips and Other Events

#### *Downtown Portland Geology Tour:*

Paul thanked all who volunteered to help at the last minute as the number of tour participants swelled. The folks at Fossil Cartel are excited to work with us again on the next walk.

#### *President's Field Trip:*

Rik reported that his trip was blessed with good weather, excellent speakers and gorgeous views of Mt. Rainer's glaciers, dams and aggradation. The guide used for the trip, Pat Pringle's Roadside Geology of Mount Rainer National Park and Vicinity, is highly recommended for anyone wanting to take a self-guided tour.

#### *Upcoming Field Trips:*

Jane and Janet are looking into a less structured self-guided trip to the Wallows for next year. For her anticipated President's Field Trip, Jane is

looking into planning a three day event in the Portland area that would draw in members who might not otherwise go on the longer overnight field trips.

Dave is working on a possible "Geology of the Portland Basin" field trip with Terry Tolan. Bev and Bart may plan a two-day trip to the Crooked River calderas.

The board decided on a tentative schedule of next year's events:

- Jane's Portland area trip August 2012
- Dave's Portland basin trip September 2012
- Paul's walk for July/August 2012

It was also agreed that Larch Mountain should again be the site for the annual picnic.

#### *Upcoming Speakers (Jane):*

Roger Dellinger will be speaking at the October lecture on computer models for Iceland and Missoula floods. Scott Burns will be speaking on National Parks in November. Speakers for January and February 2012 remain TBA. Rik is also looking for a speaker for the annual banquet in March.

Holiday Banquet (Anne): the contract has been signed with Portland State for use of the Benson House for the holiday banquet. Dinner will be a general potluck (rather than arbitrarily assigned by last name) and served prior to the dessert course. Anne will bring spiral ham. Musicians interested in performing should contact Dawn. Donations will be accepted.

### Old and New Business

#### *Nominating Committee:*

Rik will be appointing the nominating committee for next year's officers.

#### *Mug Sales and Inventory:*

A mug was presented to the speaker at the Friday lecture, and a number of mugs were sold to the audience members.

*Newsletter:*

The board decided that alternate month mailings will be eliminated in 2012, reducing to six the annual number of newsletters.

*Website/Internet committee:*

Minutes are now available for board members online. Please contact Paul if you are a GSOC member and wish to read the unabridged board meeting minutes.

Next Board Meeting will be Saturday, November 12, 2011, 10:00 a.m. at the Vogt/Bartels' residence. Meeting Adjourned.

edited from the meeting minutes provided by GSOC  
Paul Edison-Lahm, Secretary

## **SMUG MUGS**

GSOC is proudly selling its new logo mugs. The mugs feature a GSOC logo on each side of the cup, plus the statement 'Supporting Geology in the Pacific Northwest since 1935' and the website address 'GSOC.org' opposite the handle. Pricing schedule is \$7 each, two for \$13 and four for \$25. Contact Richard Bartels or Carol Hasenberg for more information.



## **OWYHEE CANYON ADVENTURE**

Synopsis of the October 14, 2011, lecture by Cynthia Hovind, Geotechnical Engineer, Principal, Terra Dolce Consultants, Inc.

by Carol S. Hasenberg

Earlier in the year professional engineer Cynthia Hovind got a rare opportunity to visit one of the most remote, beautiful, and geologically interesting corners of Oregon when she got invited to join a rafting expedition down the Owyhee River. Not only that, but she was hired to explain the geology to a group of Road Scholars (formerly Elderhostel) while doing the trip. The trip had only one drawback and that was that it was cold enough to be snowing the first day of the trip, then gradually warmed as the trip progressed.

To do the job of interpreting the geology of the area, Cynthia turned to Owyhee River basin geology expert Kyle House, currently of the USGS office in Flagstaff, Arizona, who has been mapping some of the geological units in the area since 2007. Kyle has been overlaying his work onto geologic maps of the area and was able to give Cynthia the history of the basin for the last 15 million years.

The Owyhee River is a 350-mile long tributary of the Snake River and occupies the remote southeast corner of Oregon. According to Orr and Orr, the Owyhee uplands has a geology that is unique and different from that of the adjacent Basin and Range province to the west. Rather than alternating high and low blocks resulting from crustal extension, this highland was formed by volcanic activity beginning in the Miocene about 15 million years ago. Geologists have concluded that this activity was produced by the same hot spot that is now located beneath Yellowstone National Park.

Three Miocene sources that have been mapped in the Owyhee uplands include the Mahogany Mountain Caldera, the Three Fingers Caldera, and the Saddle Butte Caldera. Both rhyolitic and basaltic flows came from these sources.

After a period of volcanic quiescence and erosion, the area was again the scene of much volcanic

activity in the Late Cenozoic, about 1.8 million years ago. Many Late Cenozoic lavas have been mapped by House, including the Bogus Rim, Greeley Bar, Clarks Butte, Saddle Butte, West Crater, Rocky Butte, and Coffee Pot lavas. These flows were responsible for repaving the plateau by producing a capping basalt layer, damming the Owyhee River in several places forming lakes that are now breached, and failing the sides of the canyon in massive landslides.

After the Miocene volcanics and until about 8 million years ago, there were also a number of lakes in the area created in crustal extension basins in which a lot of volcanic sediments were deposited. The many layers of volcanic lava that can be seen in the sides of the canyon alternate with the massive lake bed deposits, making the Owyhee canyon one of the most spectacular and varied geological wonders of the state.

Floating down the river to enjoy the astonishing beauty, the Road Scholars group encountered a number of rapids, hot springs, and old farms which have been “grandfathered” into the Wild and Scenic River. The low point of the trip for Hovind was getting thrown from the raft in the Bulls Eye Rapids and being rescued about a half of a mile downstream. Due to its flow characteristics the river is not runnable in hot weather, so the trip occurred in the early part of May which is still pretty cold in that region.

Nevertheless the rafting expedition enjoyed the variety of sights to be seen along the river. In the Rhyolite Canyon, twisted and folded rhyolitic flows formed the canyon walls. The Weeping Wall featured pillow basalts where the Saddle Butte lava flowed into a lake. Polished boulders that were thrown downstream from the lava dam breaches dotted the riverbanks in places. The canyon had beautiful colors, and in places where basalt dikes cut through lakebed sediments the patterns were dazzling. Hoodoos, pillars, and basalt columns were found in many areas.

Highlights of the trip were shown to the GSOC group in a slide show that demonstrated Hovind’s remarkable photography skill. All in all it is a raft

trip we’re sure she’ll never forget.

### **Additional Reading:**

Cynthia Hovind’s Geotechnical Engineering site:  
<http://www.terradolceconsultants.com/>

Cynthia Hovind’s photography site:  
<http://www.terradolcephotography.com/>

Kyle House’s blog with lots of geologic maps:  
<http://owyheeflatsam.posterous.com/>

Geology of Oregon, 5th ed., by William N. Orr and Elizabeth L. Orr, Kendall/Hunt Pub. Co., 1999.

Learn More About Oregon’s Geology web page:  
<http://www.oregon.gov/DOGAMI/learnmore/learnmore.shtml> has a map showing the geologic provinces of Oregon (from Orr and Orr).

Owyhee Wild and Scenic River BLM site:  
[http://www.blm.gov/or/resources/recreation/site\\_info.php?siteid=317](http://www.blm.gov/or/resources/recreation/site_info.php?siteid=317)

OPB recently showed some film footage of Leslie Gulch and Mahogany Mountain in the airing of Oregon Field Guide on October 20, 2012, and this episode is available on the OPB website ([www.opb.org](http://www.opb.org)). Ellen Morris Bishop was the field trip leader on the filmed expedition.

## **SAVING THE OLD BRINY**

Synopsis of the September 9, 2011, lecture by Dr. Douglas Larson, limnologist and writer based in Portland, Oregon  
by Carol S. Hasenberg

Dr. Larson has made quite a splash in the Pacific Northwest by studying the history, ecology, and conservation of lakes in the region. He spoke to GSOC four years ago about the origins of lakes in Oregon (see reprinted article below), and mentioned in passing the work he had been doing at Mt. St. Helens and Crater Lake. More recently he has been

studying Lake Abert, a remnant of the enormous Ice Age Lake Chewaucan in the basin-and-range geological province of south-central Oregon.

Larson has taken up the cause of saving Lake Abert, which has few defenders as it is largely in human terms a non-resource lake. It is intensely saline, lacks any shade in the vicinity, has a brutal desert climate, and the area “teems with rattlesnakes” – an inhospitable place. Yet, it also teems with migratory birds which come to nest and feed on brine shrimp and alkali flies when the salinity of the lake is optimal for the growth of these organisms. The problem occurs when the lake’s supply of fresh water to provide optimal-habitat conditions is reduced. Maintaining lake elevation between 1,452 and 1,458 feet is essential for optimal salinity.

Larson briefly reviewed the history of Lake Abert since the arrival of Europeans to the area and their interaction with the lake. The earliest reference to the lake was made by Hudson Bay employees who dubbed it “Salt Lake” in 1832. In the 1840’s, Captain John Fremont visited the lake as part of his survey of the Oregon Territory and named it after his boss, J. J. Abert. Larson noted that Lake Abert is the only lake whose sketch is shown in the monumental G. Evelyn Hutchinson’s *A Treatise on Limnology*, a 4,000-page bulwark of the profession.

Since that time, there have been a number of ideas and attempts to develop the lake for human needs:

- generating electricity by installing a pump-storage hydro-electric plant
- mining the lake for salt
- diverting water for irrigation from the Chewaucan River which feeds the lake
- building a dam for irrigation on the Chewaucan River
- stocking the lake with fish (which immediately died) from the Salton Sea
- conducting explosions in the lake to see how seismic waves work (Fortunately, this plan was not implemented.)
- harvesting brine shrimp for aquaculture and tropical fish food, a practice that scientists claim has no adverse effect on lake biota.

Larson and Dr. Ron Larson of the U.S. Fish and Wildlife Service have prepared a paper, titled "Lake Abert: Salt lake in the high desert," which will be published in the Winter 2011-2012 issue of *Lakeline* magazine, the journal of the North American Lake Management Society.

In studying the lake’s water budget, Larson utilized records from the Chewaucan River gauging station located in Paisley, which has kept records since 1912. Other gauging records from a site in the marshes closer to the lake were used to compare how much water has been diverted for irrigation. Between 1912 and 1991, an average of 105,000 acre-ft of water flowed past Paisley per year but only about an average of 62,000 acre-ft made it to the lake. This loss is overwhelmingly due to irrigation use. Other water sources such as direct precipitation on the lake account for an additional 8,000 acre-ft per year. The lake loses 40 inches of water per year to evaporation. There is virtually no seepage loss due to a deep, mineralized, “hard pan” layer that seals the basin bottom.

The elevation of the lake has fluctuated dramatically over the past century. The lowest recorded elevation was 4246.6 ft. during 1924-1937, when the lake was dry or nearly dry. By 1958 the lake had swelled to an elevation of 4260.5 ft. with an area of 64 sq.mi. and a volume of 360,000 acre-ft. In 2009 the lake’s elevation was 4248 ft., with a 39 sq. mi. area and a volume of 59,000 acre-ft. Correspondingly, salinity has fluctuated with the amount of water available to dilute it. The salinity has been measured as high as 200 g/L (32g/L is normal for the ocean). Brine shrimp need a salinity of 30-80 g/L to thrive.

The input of water to the lake from the Chewaucan River has declined significantly since the 1950’s, and Larson hopes that his efforts will help to convince the public about Lake Abert’s importance. In 1991, the State of Oregon and the federal government authorized a private developer to further impound the Chewaucan River with a higher earth-filled dam. The dam further depletes flows in the river, thus jeopardizing lake biota. Larson believes that the dam should be removed, thus

freeing the river and saving one of the world's great saline lakes.

### Additional Reading:

For more information about Larson's life and work on Lake Abert and other lake ecology studies, see [Oregonlive.com](http://Oregonlive.com) article from February 2011, [Craterlakeinstitute.com](http://Craterlakeinstitute.com), [Craterlakeinstitute.com](http://Craterlakeinstitute.com) and [Americanscientist.org](http://Americanscientist.org) articles. Also see the December 2007 issue of *The Geological Newsletter* for "Doug Larson Gives GSOC a Tour of Lake Origins," an article about a previous lecture to GSOC by Dr. Larson.

Oregon Field Guide episode of Lake Abert reviews Keith Kreuz's brine shrimp collection and the lake ecology and conservation:

<http://www.opb.org/programs/ofg/segments/view/1121>

Wikipedia page "G. Evelyn Hutchinson", the "father of American limnology":

[http://en.wikipedia.org/wiki/G.\\_Evelyn\\_Hutchinson](http://en.wikipedia.org/wiki/G._Evelyn_Hutchinson)

Keith Kreuz's brine shrimp business website:

<http://www.oregondesertbrineshrimp.com/>

Oregon tui chubs paper:

[http://www.fs.fed.us/pnw/publications/pnw\\_gtr405/pnw\\_gtr405\\_65.pdf](http://www.fs.fed.us/pnw/publications/pnw_gtr405/pnw_gtr405_65.pdf)

## DOUG LARSON GIVES GSOC A TOUR OF LAKE ORIGINS

*Reprinted from The Geological Newsletter, Volume 73, Number 12, December 2007.*



"The Origin of Lake Basins in the Pacific Northwest" was the topic of a slide show by Dr. Doug Larson, an independent scientist and writer, presented on

the November 9, 2007, GSOC Friday night meeting.

Editor's recommendation: Have a copy of the DeLorme Oregon Atlas & Gazeteer, or similar publication, on hand when you read this article.

The GSOC Friday night meeting crowd was entertained last month by Dr. Doug Larson and his discussion of lake origins in Oregon and Washington. Dr. Larson studied the recovery and formation of lakes in Mt. St. Helens National Monument for the Army Corps of Engineers after the eruption in 1980. He monitored the evolution of Spirit Lake during that time as well as the formation of Coldwater and Castle Lakes. These lakes were all formed by mudflows from the volcano which blocked water drainage out of low areas. Spirit Lake formed 3000 years ago but its latest location and size are due to the massive 1980 landslide which triggered the eruption.

After discussing his work at Mt. St. Helens, Dr. Larson headed south to discuss lake origins in southern Washington. He mentioned both Battleground Lake and Vancouver Lake. Battleground Lake is really unique in origin and shape – it has "bull's eye" contours (refer to the [USGS-CVO website](http://USGS-CVO_website) for maars and Battleground Lake). Vancouver Lake, a cutoff channel created from the Columbia River, received 20 million dollars to rehabilitate as part of the Clean Water Act – the largest such grant in the U.S.

Next Dr. Larson took the GSOC audience on a trip around Oregon, reviewing some origins of major groups of lakes. On the central Oregon coast near Florence and Reedsport, the lakes have been formed by rising sea level and sand dune encroachment. Because they are impoundment lakes, they have a characteristic branched shape. Most of the lakes are in private hands, and show signs of human interference. Larson showed a slide of Munsel Lake, which has had some sand infill for home sites, and also a slide of the ineffectually tiny buffer zones from clear cuts around Siltcoos Lake, which is a municipal water supply. Clear Lake, another such water supply lake south of Reedsport, is protected much more strictly. Cleawox Lake is also interesting because there a very large sand dune is pinching off a region of the lake due to recreational bathers using it as a slide.

Along the north Oregon coast one finds lakes in interdunal swales. Examples of this are Coffenbury Lake and Crabapple Lake at Fort Stevens State

Park. These lakes are long and thin and parallel to the shoreline. In the Coast Range, Dr. Larson noted two lakes created by landslides -- Triangle Lake west of Eugene and Loon Lake east of Reedsport.

Moving inland, Dr. Larson mentioned a number of oxbow lakes in the Willamette valley near Harrisburg, Oregon. These lakes were created by neck cutoffs and chute cutoffs as the Willamette River abandoned its curvy path in favor of a more direct route as it meandered across the flood plain.

Next Dr. Larson described a number of truly spectacular lakes in or near the Cascade Range of Oregon. By any standard Crater Lake, in a collapse caldera with water about 2000 feet deep, is one of the world's most spectacular lakes. Larson compared it to a lake in northern Quebec created by a meteorite strike, which would be a real "crater" lake. Newberry Crater is another caldera (not crater) lake system containing East Lake and Paulina Lake, separated by a cinder cone. Diamond Lake between Mt. Bailey and Mt. Thielsen was formed by lava flows and glacial action. Odell Lake, a glacial trough, is a very fine kokanee lake.

Waldo Lake, a large lake southeast of Eugene near Willamette Pass, is very special. Waldo Lake is a very oligotrophic lake with about 150 foot clarity. The water chemistry of the lake approximates that of distilled water. Motorboats have been outlawed on the lake, which cannot be stocked because there is no food source for the fish (oligotrophic means the water has few plant nutrients). The bottom of lake is covered with moss and liverworts.

Moving to northeast Oregon, Dr. Larson showed in an airphoto that Wallowa Lake, with its lateral and end moraines, is a glacial trough. He also described glacial cirque lakes in the Wallowa Mountains. Then in a southward move, Larson mentioned Malheur Lake and Harney Lake, ice age (pluvial) lakes which emptied into the Snake River during their heyday. About a dozen small lakes are all that remains of the pluvial lake in Warner Valley, which formed in south central Oregon's basin and range topography. The region also boasts Lake Abert, a tilted fault block lake, and Summer Lake, an evaporation basin.

Near the end of the talk Dr. Larson mentioned manmade lakes in Oregon, but as he pointed out, the word "lake" is a misnomer applied to these reservoirs of water. Now that we have been shown around the state by Dr. Larson's lake tour, we should have a new appreciation for how lakes originate in our state. We can consider how the geology of the area affects the creation and shape of a lake.

Carol Hasenberg

#### References and Additional Reading

Johnson, Daniel, and others, Atlas of Oregon Lakes, Oregon State University Press, Corvallis, Oregon, 1985, 314 p.

# GEOLOGICAL SOCIETY OF THE OREGON COUNTRY ACTIVITIES:

**ANNUAL EVENTS:** President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.

**FIELD TRIPS:** About 4 per year. Fees: see field trip announcements on the calendar next page.

**GSOC LIBRARY:** Rm. 69, Cramer Hall, Portland State University. Open 7:00 p.m. prior to meetings.

**PROGRAMS:** Second Friday evening most months, 7:30 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

**MEMBERSHIP:** Per year from January 1: Individual--\$25, Family--\$35, Junior (under 18)/Student--\$15. Membership applications are available on the website [www.gsoc.org](http://www.gsoc.org).

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Geologic Interests and Hobbies \_\_\_\_\_

Please indicate Membership type and include check for appropriate amount:

Individual \$25.00 \_\_\_\_\_ Family \$35.00 \_\_\_\_\_ Student \$15.00 \_\_\_\_\_

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