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From the President

A belated happy 2004 to all of you! The winter doldrums are setting in, however, the snow in the Inland Northwest has been great this winter and there have been many memorable ski and snowshoe trips. I was fortunate to attend the GSA annual meeting in Seattle last November, and I want to thank all the section members that participated and helped out in our session honoring Bob Christman. There were many excellent talks and over the next few newsletters we will be including abstracts of some of those talks.

Being still relatively early in the year and following GW's example, I want say a few things about the "state of the state," specifically, the state of state geological agencies. I can only speak for Washington, but it seems that state geological agencies are at the very least being negatively impacted by the budgetary catharsis that has been occurring over the last several years. In Washington, since the election of a new Commissioner of Public Lands, a new State Geologist has been appointed and many of the earth science-related programs run by the State Department of Natural Resources, have been either cut or severely reduced. In fact, the 2003-04 biennium budget for the DNR Division of Geology and Earth Resources (DGER) was cut 40%. For fans of the quarterly publication, Washington Geology, it was a hard pill to swallow when it was announced that the publication was going digital and hardcopy's would be eliminated. The reason given was that the DGER could no longer afford to publish and distribute the hardcopy version. I visited the State website this week, and no new volumes have been posted since that sad announcement. I for one really looked forward to receiving Washington Geology in the post. Is the publication an extinct species? If trends and decisions made by the DGER continue as they have of recent, I'm sorry to say that is likely. Is it because potential authors are hesitant to submit to web-based, digital-only publications? Or is it because people want that hardcopy in their hands and don't devote the energy to web-based pubs? Clearly, we the citizens and earth science educators of the Pacific Northwest will suffer from such a drastic policy put forth by the DGER.

Another example of the apparent decay of our state geological agency was the release of one of the most competent and devoted state employees, Connie Manson. Connie essentially built the state earth science library in Olympia. Many of you have utilized the DNR earth science library, and you know what a quality collection it is. We no longer have Connie at the helm because of so-called budget cuts and downsizing. In the Nicholas Basbanes book, "A Splendor of Letters," the attack on libraries and books is addressed. Libraries are somewhat easy targets for bureaucrats, yet they are so critical to us in academia. To see the decline in support for our state earth science library should be of great concern to all of us -- not just Washingtonians, but to all educators throughout the Northwest because it might be your state survey that goes to the budgetary guillotine next. In Spokane, we had to fight hard and send many letters to local politicians on behalf of preserving the only field office outside of Olympia. It is clear that our geological agency is under attack and subversion, and if we don't do something soon, there may be little left to save. I can only hope that similar attacks (to your state survey) are not occurring in your state. If they are, all the earth science educators in your state will be negatively impacted in one way or another.

Finally, regarding the state of the geosciences in general, a recent article in EOS (January 16th issue, v. 85, no. 3) summarizes an extensive report by the International Union of Geodesy and Geophysics (IUGG) on the state and future trends for the geosciences. The report discusses the relationship of the geosciences to various agencies and professional organizations and the importance of marketing (to government officials and the public) the significance of the geosciences in society today. And we thought we had our hands full just trying to be effective classroom educators!

Andy Buddington, Spokane Community College

Annual Conference June 17th-19th 2004 NAGT Pacific Northwest Section

Join with members of the Pacific Northwest Section of the National Association of Geoscience Teachers to discuss earth science education and explore the dynamic geology of North Central Washington. In Wenatchee, where mid-June weather is usually quite warm and sunny, pastoral scenes of fruit orchards cap a late Tertiary history of flood basalts, rapid orogenic uplift, large landslides, and glacial outburst floods. This conference promises some absolutely wonderful field trips and opportunities to meet with colleagues. For more information on the conference schedule, field trips, etc., visit the conference website at: <http://wvcweb.ctc.edu/rdawes/earthscience/> or contact: Ralph Dawes, dawes@wvc.edu.

Your Community College
Your Community

Section Elections: A Call for Names

I am excited to announce that the section will be holding elections for section officers and state councilors this spring. Positions that will be up for election include:



- › President
- › Vice President
- › Secretary/Treasurer
- › Newsletter Editor
- › State Councilors

If you presently hold one of these positions and wish to continue in that position for another two years, please send me your name. I also invite anyone interested in helping our section by putting your name into the hat. If you know someone that would be interested, please submit their name. We desperately need your help in keeping this section going and adding new life and ideas to the effort. A formal announcement ballot with names will be sent out in the spring via the post. Please send names of potential candidates to Andy Buddington.

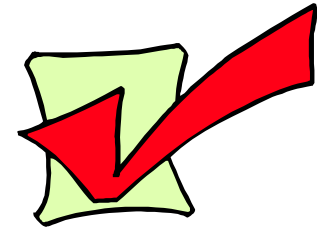
Awards, Scholarships and Grants

Folks! Please be aware not only of the OEST award, that really does have some wonderful benefits for recipients, but also the many other awards granted by NAGT. Visit the NAGT National website at <http://www.nagt.org/> to get information on other awards and opportunities such as:

- › Neil Miner Award
- › James Shea Award
- › Outstanding Teaching Assistant
- › Summer Field Programs & Scholarships

- › Dorothy LaLonde Stout NAGT Professional Development Grants

There are numerous awards, scholarships, and grant opportunities available through NAGT. Please check them out and take advantage of them!!! Surely some of you know of a great TA or an undergraduate student that could use scholarship help for their field program. It is somewhat embarrassing to report each year at the national meeting that once again the Northwest Section didn't nominate anyone!



Northwest Section Honors Bob Christman at 2003 GSA Meeting

Rob Viens, Bellevue Community College

In November, Northwest geology and teaching issues were prominent at the 2003 national meeting of the Geological Society of America in Seattle. The Northwest Section of NAGT was represented by the section officers (Andy Buddington and Rob Viens), who co-chaired an NAGT-sponsored session in tribute to the career of Bob Christman, titled "Teaching Local Geology: An NAGT Session in Honor of Robert Christman". Talks represented local geology of different parts of the country, including Marie Johnson's overview of teaching geology to West Point cadets in New York, Kate Pound's Archean adventures in Minnesota, and John Garver's advice on setting up field courses outside of the U.S. Other speakers concentrated on less traditional geologic field trips. Helene Grall-Johnson showed us how she uses local geology to teach art, Bob Carson led us on an oceanic field trip in Eastern Washington (see page 3), and Dave Matty illustrated how he created a campus-wide artificial outcrop when the real thing wasn't found near campus. Steve Semken gave an excellent presentation on using the "sense of geologic place" when teaching to students of different cultural backgrounds (see page 3). Not to be outdone, Northwest section members - including Ron Metzger, Ralph Dawes, and Andy Buddington gave well-received presentations on different approaches to teaching local geology here in the Northwest. And of course, to honor the man of the hour, Scott Babcock gave the crowd an entertaining overview of Bob Christman's career (see "Geobiography of Robert Christman" on page 3). Overall, the turnout for the session, which was competing with several other excellent education and regional geology sessions, was quite good.

Geobiography of Robert Christman

Scott Babcock, Western Washington University

Bob Christman began his geologic career with an undergraduate degree from the University of Michigan and went on to complete his PhD at Princeton. His first job was as a geologist with the Mineral Deposits Branch of the U.S. Geological Survey. His first academic appointment was as an Assistant Professor of Mineralogy at Cornell. During this time he spent his summers mapping several quadrangles for the Vermont Geological Survey. In 1960, Bob came to Western Washington State College as Chair of the Department of Geology. This was also the beginning of his long and illustrious association with geoscience education. Since then he has tirelessly contributed to the quality of teaching on a

state and national level. His role with two organizations is particularly notable. He has served as President and a

long standing board member of the Washington Science Teacher's Association and has been editor of the WSTA journal since 1980. He has also been an officer and editor of the National Association of Science Teachers and has been the Executive Director of this organization since 1991. In recognition of his remarkable service to the profession, this NAGT session on Teaching Local Geology is held in Honor of Robert Christman.

"Since then he has tirelessly contributed to the quality of teaching on a state and national level."

Teaching Local Geology: A NAGT Session in Honor of Robert Christman, GSA Annual Meeting, Seattle, 2003

The following are abstracts from three memorable talks presented during the session hosted by the Northwest Section at last year's GSA meeting.

Oceanography Field Trips in the Desert

Robert J. Carson, Geology, Whitman College

Although much of the Columbia Plateau of eastern Washington and Oregon gets less than 20 cm mean annual precipitation, the area abounds in features to demonstrate the geology and, to a limited extent, the biology of ocean floors and margins. The Columbia River basalt has, in places, a thickness comparable to that of *oceanic crust*. Although most of this basalt is subaerial, in places it is *pillow lava*, for the Miocene flows disrupted the preexisting drainage system. In scattered areas across the region, the Pleistocene Touchet

Beds have much in common with *turbidities*. Deposited by *jökulhlaups* from glacial Lake Missoula, these rhythmites are *graded beds* with *load casts*, *rip-up clasts*, and other sedimentary structures like those in sediments deposited by turbidity currents at the base of the continental slope. Erratics transported by icebergs riding the Missoula floods are akin to *dropstones* in glaciomarine drift deposited from ice shelves and icebergs. Sheeted clastic dikes within the Touchet Beds are in some ways like *dike swarms* at spreading ridges. The edges of reservoirs impounded along the Columbia and Snake Rivers have physical, geological, and biological characteristics similar to those along coasts. The weekly and annual fluctuations of reservoir levels, although not on the same time scale, are not unlike the rise and fall of the *tides*. Mud flats exposed when reservoirs are low are similar to estuarine *mud flats*. Tributaries to the Columbia Snake River, such as the Yakima and Walla Walla Rivers, are building deltas out into the reservoirs. These deltas have morphologies and sediments similar to those of larger *deltas* along coasts. The deltas, and places where reservoirs are very shallow, such as at McNary National Wildlife Refuge, have freshwater wetlands with plant and animal species similar to (e.g., grasses) or identical to (e.g., bald eagles) those in coastal *wetlands*. On these field trips students supplement what is learned in class, for example seeing *beaches* with *waves*, and imagining an alluvial fan as a *deep-sea fan*. They compare and contrast continental and oceanic earth materials: caliche with *marine carbonates*, diatomite with *siliceous ooze*, loess with *aeolian marine sediment*, Mazama ash with *marine tephra*. Our desert is a good substitute for the real ocean, which is more than 500 km from the classroom.

Geological Understanding Resides in Local Places

Steven Semken, Department of Geological Sciences, Arizona State University

Places, which are localities given meaning by human experiences in them, are integral to most if not all knowledge systems of Native American peoples. Indigenous ways of teaching imbue Native youth with a strong sense of place: understanding of, and identification with, the attributes and dynamics of their natural and cultural environment. Sense of place does not necessarily manifest itself in proportionate Native American (and other indigenous minority) enrollments in undergraduate geoscience, perhaps in part because physical geology is typically organized by processes and materials, and historical geology by time. Indigenous students may not identify with either system. Places, which may have meaning for Native students for non-geological reasons, are seen as figure captions and sidebars. In some cases, places may be presented in unfamiliar or even abhorrent contexts, such as mining or waste disposal on lands held sacred.

“Place studies” of significant localities within an indigenous homeland can be organized into geoscience courses that meet a basic meta-objective of teaching geological reasoning through inquiry. A principal difference is that the geological attributes of the homeland will control the course content. By means of a learning-cycle approach, students can re-introduce themselves to a locality through geological exploration, and derive key dynamic principles such as relative time or rock-forming processes in subsequent stages. Examples of this approach in the context of Native American homelands in Arizona and environs will be presented. Where an indigenous homeland has undergone significant physical and cultural change, field-based “place studies” may be better supplanted by virtual studies, now made possible by instructional technology, that help students visualize a region’s pre-conquest geography.

Any introductory student residing in a given region can benefit from this approach, whether Native American or not. Geological understanding of the signature places of one’s home (e.g., the Grand Canyon in Arizona; Cascade volcanoes in the Pacific Northwest) is, or should be, part of one’s cultural literacy.

Living on the Edge: An International Field Course in Geologic Hazards at Subduction Zones

John I. Garver, Geology Department, Union College, Donald T. Rodbell, Geology, Union College, Jacqueline A. Smith, Earth Sciences, Syracuse University

Teaching local and regional geology has been the hallmark of the geology curriculum at Union College in upstate NY. Our field-rich curriculum has grown in the last decade as we have added field components to virtually all of our introductory and advanced offerings. With the advent of 3-week stand-alone mini-term courses at Union College, we were able to design and teach a new offering titled “Living on the Edge,” which explores the geologic hazards at subduction zones. This new international field experience focuses on understanding the science and policy behind geologic hazards that lead to catastrophic events and loss of life. We have taught this course twice, once in New Zealand and once in Peru. Fieldwork for the course is aimed at getting students to recognize hazards, to understand the processes behind the hazards, and to see the role that society plays in mitigating these hazards. We designed this course to capitalize on heightened awareness of geologic hazards and the role of hazards in public policy and planning. We have noted that many potential geology majors are less interested in traditional fields in the Earth Science and are very interested in hazards, coastal/marine geology, and climate change. These students see geologic hazards as interesting and relevant to society. In New Zealand the main focus of the course

is on seismic and volcanic hazards. The course concentrates on volcanic hazards in the Taupo volcanic zone and on seismic hazards, mainly around Wellington. In Peru, the main focus is on seismic hazards and mass movements in the Cordillera Blanca. Students map and determine the chronology of moraines cut by a factive normal fault, and then evaluate deposits associated with aluviones (breakout floods) and massive landslides, including the 1970 Yungay disaster. In both cases, the inclusion of policy and engineering components in the course provides an effective balance that allows students to see the relevance and applicability of the science they learn.

Using Mars to Hook Students on Learning about Earth

Peter Wampler, Oregon State University

The recent landing of Spirit and Opportunity Rovers, and the orbit of the Mars Express, could not have come at a better time for those teaching about earth’s surface processes. What does Mars have to do with an earth science class? I would argue plenty. The first day of Geo202 earth system science, I played a computer animation of the Mars Rover trip from earth to the surface of Mars -- what an incredible example of science and geology in action.

Mars updates are a staple of my lectures, including data, images, and mission information. The data can often be related to topics we are covering in class. For example, when the first images from Opportunity revealed what



NASA/JPL/Cornell/US Geological Survey

looks like sedimentary layers, it gave me a perfect opportunity (no pun intended) to review what we had learned about strata on earth and what other earth processes could produce horizontal layers. The Mars Rover WWW site at the Jet Propulsion Laboratory is <http://www.jpl.nasa.gov/index.html> and the European Space Agency WWW site is http://www.esa.int/SPECIALS/Mars_Express/.

How Geologists Can Help Put Geoscience Back into the K-12 Curriculum: an example from Washington State

Scott R. Linneman, *Western Washington University*

In recent years, K-12 teachers in Washington State have been focusing much attention on the reading and mathematics learning of their students. The driving force behind this heightened attention has probably not been the existence of state learning standards (Essential Academic Learning Requirements or EALRs). Rather, it was the institution of the assessment of those standards in the form of the reading and mathematics tests (Washington Assessment of Student Learning or WASL). The state of Washington has developed and is now implementing the WASL in science to assess how well our students are achieving the science EALRs. This development is a partnership between the state Office of the Superintendent of Public Instruction, Riverside Publishing, and Washington science educators. The assessment is given to all children in Washington in the spring of grades 5, 8 and 10 with the critical goal of using results to improve student learning. The WASL will thus enable Washington to comply with the new Federal Elementary and Secondary Education Act that requires annual yearly science assessment in one grade within three grade levels (i.e., 3-5, 6-9 and 10-12) beginning in 2007.

The science WASL is a criterion (not norm) reference assessment. Test items are based on scenarios and include multiple choice, short answer and extended response items. Science educators from K-16 have developed scenarios and items that were then subject to content and fairness review before pilot testing. Student responses to the pilot tests were subject to range finding and scoring which then lead to selection of operational items. In 2003, the 8th and 10th grade WASL in science was voluntary. By 2005, it will be mandatory for all three grades. Sixty percent of the items will assess understanding of scientific process (inquiry and problem solving), whereas 40% will be scientific concept items.

Notable for the geoscience education community is that, in accordance with the EALRs, Earth and Space Science concepts will be *on par* with physical and life sciences in the WASL. The disciplinary concepts in the EALRs are

organized by the interdisciplinary concept strands of (1) properties and characteristics; (2) systems and system interactions; and 3) changes in matter and energy. The Earth System Science approach is very well adapted to fill this curricular niche.

Academic and government geologists with concerns about the state of geoscience education in the K-12 curriculum should pay careful attention to their state's science assessment effort. In Washington, only a few higher ed scientists participated in the development of the state science assessment. That one of the scientists is a geologist has had a significant impact on the quantity and quality of geoscience scenarios included in the assessment. It is probably not a coincidence that many Washington school districts are now adopting science curricula that include a significantly enhanced Earth and Space Science component. This trend should increase the demand for Earth Science certified teachers since the ESEA also has requirements regarding "highly qualified teachers."

Yes, there are reasons to be optimistic, but the future of Earth Science education depends, in part, on our involvement in our local schools.

State/Province Reports and News

British Columbia

From UBC Department of Earth and Ocean Sciences:
The Pacific Museum of the Earth (PME) is now open at UBC's Department of Earth and Ocean Sciences! We had a very successful shake-down period during the last half of 2003 and are very excited about the projects we have planned for 2004. Projects already underway this year include the development of new displays and a membership drive for the Friends of the Museum society. We are moving the Gift Shop to a more visible location and establishing a Teacher's Resource Centre. For news, more information on the benefits of the Friends of the Museum Society, and other general information, visit our website at: <http://www.eos.ubc.ca/public/museum/>. Please feel welcome to contact the Curator, Kirsten Parker kparker@eos.ubc.ca, with suggestions and other comments!

The undergraduate geology and geological engineering students at UBC hosted the **40th annual Western Inter-University Geology Conference** (WIUGC) for over 70 undergraduate and graduate students from across western Canada from January 8-11, 2004. Two days of technical talks presented by students for students were rounded out with a local field trip, industry and career night, and several other social events. Guest speaker at the

"... the future of Earth Science education depends, in part, on our involvement in our local schools."

conference banquet was Dr. Lee Groat of UBC who talked about recent gem beryl discoveries in Yukon Territory. Mary Lou Bevier is currently on sabbatical leave "down under". Her undergraduate textbook on field geology will be published by McGraw-Hill in the fall of 2004.

From UVic School of Earth and Ocean Sciences: The Pacific Section of the Geological Association of Canada, together with the University of Victoria and the Pacific Geoscience Centre, is running an **EdGEO workshop for Grade 10 teachers "Earth History Demystified,"** on February 20, 2004. Grade 10 Science in BC is in the process of being examined and added to the graduation package for BC students. Many teachers have not taught the earth science portion of the curriculum before, but now that it is going to be examined this will have to change. The workshop will focus on the PLO's of the Grade 10 Earth



Science curriculum including: how

we learn about the earth, figuring out the events and order of Earth's history, fossils and geological time, evidence for and effects of plate tectonics, earthquakes and volcanoes. The workshop will involve hands-on activities and development of further classroom activities through discussion and sharing of ideas. EdGEO will provide funds for take-home resources including rock and fossils sets, books, maps and the Geoscape Victoria poster. For more information contact E. Van der Flier-Keller (SEOS, U. Victoria) at 250-721-2725 or fkeller@uvic.ca.

Idaho

We will have a new 20-page description of the Geology of Craters of the Moon with many color **photographs mounted for download from our website** sometime this winter.

In conjunction with our partner, the Sawtooth Science Institute, there will be three workshops offered at Craters of the Moon this year that are available for college credit. Two are on

"Craters of the Moon Natural History" (April 23-24 and August 27-28) designed for teachers bringing

school groups to visit Craters of the Moon. The third one is on **"Craters Geology"** (June 25-26) and will be an in-depth look at the geology. Call the Sawtooth Science Institute (208) 788-9686 to sign up. For more information, contact Doug Owen, Park Ranger (Interpretation)/ Park Geologist, Craters of the Moon National Monument and Preserve, P.O. Box 29, Arco, ID 83213 (208) 527-3257 (ext 302).



Washington

Hawaii Island Field Excursion in Geology and Environmental Biology!

Aug. 23-Sept. 9, 2004 (a Fall Quarter class)

10 credits of Natural Science!

Instructors: Tom Bush, Dale Blum.

www.pierce.ctc.edu/tbush



- ▶ Explore and adventure in Hawaii Volcanoes National Park and nearby areas while learning about volcanoes and environmental biology!
- ▶ Hike and marvel at the spectacular scenery of the Big Island of Hawaii while earning college credit!
- ▶ Fulfills natural science, core elective, or general elective course requirements
- ▶ Transferable to most four-year colleges and universities
- ▶ Need not be a Pierce College student to enroll-bring a friend from another college!
- ▶ Don't need college credit? Enroll and attend just for fun! Many do!
- ▶ Cost includes 10 credits of tuition and most trip expenses (meals and air fare NOT included)
- ▶ Register *now* at any Pierce College location (\$150 nonrefundable deposit due upon registration; balance due 6/28/04)
- ▶ Terms and Conditions apply-please consult the web site above for details
- ▶ Trips fill up quickly!

For more information:

See the web site above, or contact:

Tom Bush (Earth Sciences Instructor)

(253) 840-8484 or tbush@pierce.ctc.edu or

Dale Blum (Biology Instructor) or

dblum@pierce.ctc.edu

The **Columbia Basin Geological Society** (Spokane, Washington) is now into its fourth year! We meet on the last Tuesday of the month at Aracelia's Restaurant in the Spokane Valley. For more information, call Bob Derkey at 509-359-7857.

The 9th Annual, **Geology Lecture Series** at Spokane Community College has its 2003-04 series schedule posted at:

<http://www.scc.spokane.edu/libarts/sci/geol/gls.htm>. All talks are free and open to the public.

Alaska

The **Alaska Geological Society** is now accepting student applications for 2004 student scholarships; go to the following website for more information:

<http://www.alaskageology.org/scholarship/>

The **Science for Alaska Public Lecture Series** will feature Doug Christensen, Professor of Geophysics and Associate Director of the Geophysical Institute at UAF, speaking in Fairbanks, Anchorage and Juneau about “Alaska’s Greatest Earthquake” during February 2004. http://www.gi.alaska.edu/InfoOffice/Science_for_Alaska/juneau_schedule.html.

Alaska Earth Science Degree Program Information

- ▶ Geophysical Institute UAF Fairbanks www.gi.alaska.edu/
- ▶ Geology Department UAF Fairbanks <http://www.uaf.edu/geology/>
- ▶ Geology Dept UAA Anchorage <http://www.uaa.alaska.edu/geology/>
- ▶ Environmental Science Program UAS Juneau <http://www.uas.alaska.edu/envs>



OEST Report

Ron Metzger, OEST Coordinator

The Pacific Northwest section made two OEST awards this year with the Pacific Northwest Section award going

“If you know of a worthy candidate, PLEASE take the time to put together a nomination for them.”

to Shawn Doan of Bellingham, Washington and the British Columbia Provincial award going to Chris Lock of Burnaby, British Columbia. While I am pleased that we were able to deliver two awards in 2003, the response by applicants was minimal. As you receive this newsletter,

science teachers around the section will be alerted to the 2004 OEST Award. If you know of a worthy candidate, PLEASE take the time to put together a nomination for them. Additionally, if you are willing to review applications please contact me at rmetzger@socc.edu. I am interested in having the committee meet at the sectional meeting in Wenatchee this June in order to nominate the 2004 awardees.

Pacific Northwest Section Award

Shawn Doan is an earth science educator at Sehome High School in Bellingham, Washington. Mr. Doan is a graduate of Western Washington University and the University of Hawaii. Shawn utilizes an active inquiry approach in his classes with students completing self-paced laboratory projects. His extensive research experience has taken him throughout California, the Pacific Northwest, Hawaii and Tahiti. Spending 180 days aboard a research ship provided opportunity for several ALVIN submarine dives, while work as a

fisheries research technician, field technician for an environmental consulting firm and a research SCUBA diver all provide a working foundation to the topics that he teaches in the classroom. Shawn has contributed to the extracurricular experiences of many students as advisor to the Ocean Sciences and Bike Clubs and through his role as coach/mentor of the Science Olympiad team and a team of students participating in the National Ocean Sciences Bowl in La Jolla. He has recently received a Gates Foundation Teacher Leadership Project technology grant that has provided training and equipment for his classroom. Shawn has actively worked with faculty in other disciplines ranging from English as a Second Language (ESL), Special Education, Life Science and working with other Global Sciences teachers in developing curriculum. Additionally, he is part of a faculty group that is focused on coordinating the curriculum of science, English, social studies, mathematics and technology education at Sehome. A simple quote from one of his students represents something we as educator’s all strive for: “his class makes you think”.

British Columbia Provincial Award

Chris Lock is being recognized as the Provincial winner for British Columbia. He teaches at Burnaby South in Burnaby, British Columbia. Chris is a graduate of Simon Fraser University, where he recently returned to work on his Master’s Degree in Education. Chris is the faculty sponsor for the Burnaby South Science Club, assists with the annual Science Fair and is a member of the Burnaby School District’s Network of Earth Science Teachers. Outside of the sciences, Chris has volunteered to coach the Burnaby South track sprint team and is an accomplished musician who is a member of the New Westminster Symphony in British Columbia.

