POSI T I VELY CHARGE D
COLLEGE OF NATURAL SCIENCE & MATHEMATICS 2014 ANNUAL REPORT

RECORD NUMBER OF GRADUATES

GEOGRAPHY JOINS CNSM

PROFESSOR NAMED ARCTIC CHAIR

SUMMER SCHOOL MEETS ON A GLACIER

Looking back on student research in 2014
First and foremost, I want to thank our donors and other supporters of CNSM. With budgets tightening, we rely on donors to help support our many programs. Donations over the past year have provided travel funds for our graduate and undergraduate students to present their research. Donations have also supported our Alaska Native Science and Engineering Program and our many K-12 outreach programs such as GeoFORCE Alaska, Girls on Ice and the Alaska Summer Research Academy. We have also been increasing the number of scholarships available to CNSM students. If you’d like to help our efforts, please feel free to contact me. Thank you for your support.

This past year saw a record number of graduates from CNSM. We awarded 98 baccalaureate degrees, 53 master’s degrees and 25 doctorate degrees. As part of our accreditation report, I looked back to where our master’s and doctorate degree recipients in 2012 and 2013 have gone. I was pleased to see that more than 93% of the approximately 100 students were employed in positions directly related to their area of study.

We are now looking at where the 2014 graduates have gone. We also continue to follow up with earlier graduates. If you are an alum of CNSM, either from our undergraduate or graduate programs, I’d like to hear from you to find out what you are doing and how your time at UAF helped you get to where you are now. Please submit your stories to uaf-cnsm@alaska.edu.

In the summer of 2014, the geography program from the School of Natural Resources and Agricultural Sciences joined CNSM’s Geosciences Department. Geography will remain a discrete program, but it will allow us to better integrate all of our earth science offerings.

This past year has also seen a ramp-up in our joint veterinary medicine program with Colorado State University. In fact, we just accepted our first group of 10 students who will start in the fall of 2015.

As many of you are aware, we are sailing into uncertain financial waters, both at the state level and at the university level. While it is difficult to predict what will come in the next years, our faculty and staff at CNSM are committed to providing quality graduate, undergraduate and outreach programs. I thank them and you for supporting our college.

Dean Paul Layer
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where travel grants have taken students</td>
<td>2</td>
</tr>
<tr>
<td>Thank you to these CNSM donors</td>
<td>3</td>
</tr>
<tr>
<td>The world through undergrad David Broome’s lens</td>
<td>4</td>
</tr>
<tr>
<td>Professor and undergrad form part of “Velvet Ice” team in Antarctica</td>
<td>6</td>
</tr>
<tr>
<td>Undergrad syncs with a California synchrotron</td>
<td>7</td>
</tr>
<tr>
<td>Grad students’ research sites double as fun destinations</td>
<td>8</td>
</tr>
<tr>
<td>CNSM awards record number of degrees</td>
<td>9</td>
</tr>
<tr>
<td>Physics professor sheds light on power grids</td>
<td>10</td>
</tr>
<tr>
<td>Geophysicist named Fulbright arctic chair</td>
<td>11</td>
</tr>
<tr>
<td>$23.8m grant will engage rural Alaska students</td>
<td>11</td>
</tr>
<tr>
<td>Student surveys recognize these teachers</td>
<td>11</td>
</tr>
<tr>
<td>22 seeds and a beetle</td>
<td>12</td>
</tr>
<tr>
<td>Welcomes and farewells</td>
<td>14</td>
</tr>
<tr>
<td>Chapman chairs bid adieu</td>
<td>15</td>
</tr>
<tr>
<td>Geography joins CNSM</td>
<td>15</td>
</tr>
<tr>
<td>Memorial award reaches endowment goal</td>
<td>15</td>
</tr>
<tr>
<td>News briefs</td>
<td>16</td>
</tr>
<tr>
<td>Vet-med program welcomes first class</td>
<td>17</td>
</tr>
<tr>
<td>These eight undergrads stand out</td>
<td>18</td>
</tr>
<tr>
<td>Summer school meets on a glacier</td>
<td>19</td>
</tr>
<tr>
<td>Art introduces girls to science</td>
<td>20</td>
</tr>
<tr>
<td>High school outreach program receives $11,000</td>
<td>21</td>
</tr>
<tr>
<td>Students all over Alaska walk on water</td>
<td>21</td>
</tr>
</tbody>
</table>
How donations help

CNSM travel grants are funded through donations and help students travel to research conferences, field schools or research sites.

**China**
- Grenoble, France
- Paris, France
- Reykjavik, Iceland
- Kamchatka, Russia
- Barcelona, Spain
- Bergun, Switzerland

**Northeast U.S.**
- Fairbanks, Alaska
- Los Angeles, California
- San Diego, California
- San Francisco, California
- Honolulu, Hawaii
- Minneapolis, Minnesota
- Las Vegas, Nevada
- Washington, D.C.

**U.S. GLOBE**
- Jordan Metzgar
- Simon Filhol
- Timothy Mullet
- Rebecca Finger
- Summer Miller
- Theresia Schnurr
- Annalisa Stephens
- Christoff Furin
- Kathryn Everson
- Danielle Serratos
- Katherine Anderson
- Mitchell Reed
- Heming Liao
- Benjamin Abbott
- Erin Gleason
- Soumik Basu
- Kimberly Tweet
- Rebecca Hewitt
- Joshua Miller
- Swarup Mitra

**Fieldwork in Yunnan & Sichuan provinces**
- International Snow Science Workshop 2013
- Ecology & Acoustics Symposium
- Intl. Conference on Climate Change Impacts & Responses
- International Volcanological Field School
- XII Intl. Symposium on Insulin Receptors & Insulin Action
- Swiss Federal Inst. for Forest, Snow and Landscape Research

**PhD dissertation defense**
- Next-Generation DNA Sequencing training
- Society of Vertebrate Paleontology 73rd Annual Meeting
- Society of Vertebrate Paleontology 73rd Annual Meeting
- American Physiological Society Annual Conference
- American Geophysical Union Fall Meeting
- American Geophysical Union Fall Meeting
- American Geophysical Union Fall Meeting
- American Geophysical Union Fall Meeting
- American Geophysical Union Ocean Sciences Meeting
- 2013 Annual Meeting of the Ecological Society of America
- Geothermal Resources Council Convention
- National IDeA Symposium for Biomedical Excellence

A travel grant helped biochemistry major Theresia Schnurr go to Barcelona, Spain for the XII International Symposium on Insulin Receptors & Insulin Action.

**WE WELCOME CONTRIBUTIONS**

Go to www.uaf.edu/cnsm and click on “GIVING” to make your secure contribution.

For information, contact Executive Officer Hild Peters at 907-474-7941 or hmpeters@alaska.edu

Photo by Todd Paris.
THANKS TO OUR DONORS

Generous contributions help CNSM deliver quality academic and outreach programs and assist undergraduate and graduate students with their research and travel to conferences.

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<thead>
<tr>
<th>PLATINUM LEVEL</th>
<th>COPPER LEVEL INDIVIDUALS $1,000 TO $4,999</th>
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FRIENDS OF CNSM

BUSINESSES

UP TO $1,000

American Chemical Society
Granite Construction Company
Pacific Section AAPG
Shannon and Wilson
Sigma Xi Club Alaska

FRIENDS OF CNSM

INDIVIDUALS

UP TO $1,000

Alan Batten
Alice Stickney
Andrea Azan
Anne and Owen Hanley
Anne Doyle

Kif Augustine-Adams and Stirling Adams
Laurence Dean
Layne and Beth Adams
Lee and Patricia Snyder
Linda B. Distad
Ling-Hsiao Lyu
Lisa Jackson
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Thomas Hamilton
Tom and Renetta Cade
Tom Royer
Trang Tran
Valli Peterson and Tyler Dann
William and Donna McClure
William Dambeck
“I hope what I do with my actions in this world will lead to something good, even if it’s microscopic. I want to leave a fingerprint and influence the chemicals and electricity in other people’s brains even if it’s just for a moment.”
David Broome’s fingerprints are his photographs — moody landscapes and visual slices of life like an abandoned mine in the Arctic or a shooting star as it arcs through a blazing aurora. He is a senior at UAF who is majoring in geography to combine his love of science with his love of art. Broome likes to understand the land, its features and how people relate to it. He captures if not transforms this understanding into a visual medium that he can share with others. Broome’s photography has taken him throughout the United States and Europe. His images have appeared in many different online and print magazines, even gracing the cover of the journal *Polar Geography*. We asked the senior how majoring in geography has influenced his photography and his college experience.

**Why did you major in geography?**
Perhaps because of its interdisciplinary nature, I found geography to be a subject of particular interest. I felt that it would allow me to expand the horizon of my intellectual capacity and help develop my understanding of the various aspects of the world around us – both natural and cultural. The field has provided me with just that, and I feel that my education has contributed significantly to the development of my visions, philosophies and technical knowledge, all of which, contribute to my visions as a photographer.

**What brought you to UAF?**
The greatest influence in my decision to pursue my undergrad at UAF was, undoubtedly, the geographic setting. Alaska is a crown jewel of natural beauty, and I knew that I had to go there.

**How did majoring in geography influence your photography?**
When I am capturing images, I am often trying to express the geographic qualities of a certain place, and I like to produce images that have the ability to provoke thought regarding its geographic factors. I often give captions to my photos to fuel these thoughts and help provide a basic analysis, whether it be related to geoscience, history, the humanities and the various relationships in between.

**What did you do as an exchange student in Norway?**
I was a student at the university of Tromsø. I also played hockey for the city, in both an international hockey league between Norway, Finland and Russia, and in the Norwegian Second Division. My time there yielded me the opportunity to explore the geographic qualities of the region. I was able to travel and photograph locations throughout Norway, Sweden, Denmark, Northwestern Finland, Northwestern Russia, Svalbard, Paris, Southern England and Iceland. I can say that I have befriended a number of incredible people from a multitude of cultural backgrounds.

**What will you do after you graduate?**
I am not sure what I want to do after I graduate. However, I do know where I want to be, and I trust fate that this is a good first step. I plan to return to Norway for graduate school, and my sights are set on fall of 2015 at the Norwegian University of Science and Technology in Trondheim. I have begun my application to their fine art program and my ambition is to take on a project that will somehow combine photography and geography.

**Is there anything you would like to add?**
*Geography has a little something to do with everything.* What are the physical sciences behind what has shaped our world into what it is today? What are these physical geographic factors that have produced the locations of human population centers, their cultural landscapes, and their psychological interpretation of reality? What are the historic factors that govern humanity’s intangible institutions which influence our economies, ways of life, and ultimately have a tangible effect on the world? There is geography in it all!

Antarctica may lack trees, but it's the perfect place for logging. A four-member team including a researcher and an undergraduate student from CNSM will "log" information about the ice surrounding a man-made hole in the West Antarctic Ice Sheet (WAIS). The borehole is more than two miles long and 650 miles away from the South Pole.

The team includes Erin Pettit, a CNSM assistant professor of geophysics; Rachel Obbard, an assistant professor of engineering at Dartmouth College; Yamini Bala, a teacher with the program PolarTREC and CNSM undergraduate Tiffany Green who is majoring in geophysics. The grant funding the project started in 2012, and the four are ready to collect data this winter.

They will look at the dynamic processes that shape the evolution and arrangement of ice crystals in the center of the ice sheet and how it all relates to past climate change.

Their expedition is called "Velvet Ice" because scientists often describe the finite structure of ice in terms of "fabric" and "texture." Like the way there are many grains of sand in a beach, there are many ice crystals in an ice sheet. These crystals are oriented in a variety of directions, and are known as fabric when taken together. The ice crystals’ different shapes and sizes provide the texture.

The research team will lower acoustic, optical and other instruments into the 11,160-foot borehole to record information about the surrounding ice crystal structures. This process of systematically gathering information in boreholes is known as "logging."

The team hopes the knowledge gleaned will help scientists corroborate recent studies of the WAIS Divide ice core, which left the borehole behind. Scientists drilled the core to obtain one of the largest and most detailed records of climate history for the past 68,000 years. Scientists have studied and sampled the core extensively, but Pettit said there's much to be learned by looking at the ice sheet through the borehole.

The ice sheet is a timeline of the past. This is because more snow falls in Antarctica than melts. The snowfall builds up in annual layers and compresses under its own weight into ice. Trapped within these layers are chemicals and gases that were in the atmosphere at the time of the snowfall.

Scientists examine thin slices of the WAIS Divide ice core to look at Antarctica's past climate, but Pettit said examining the microstructure of the ice sheets around the borehole offers a different and complementary way to peer backwards in time. It figures in factors like how the ice in the ice sheet was flowing at a given time period. This is important to know because ice flows can reverse some of the chronological layers of ice, putting a kink in how scientists read the timeline.

Green said the research opportunity is a dream come true. “I’ve been in love with Antarctica since high school,” she said. She hopes to pursue a geophysics career where she can study both the Arctic and Antarctica.
Last May, I took an unparalleled look behind the scenes at a particle accelerator. I traveled to the Stanford Synchrotron Radiation Lightsource (SSRL) in Palo Alto, CA, as part of a UAF research group led by Assistant Professor Sarah Hayes in the Department of Chemistry and Biochemistry. The SSRL, which is about the size of a football field, is part of and located several miles behind the campus of Stanford University.

Built in the 1970s, the SSRL started as an offshoot of the Stanford Linear Accelerator Complex, a facility where the research underlying two separate Nobel Prizes in physics was done. Synchrotron radiation was originally seen as a complicating source of noise in particle accelerator data, but it has become a highly useful research tool in its own right.

Using synchrotron radiation, facilities like the SSRL are able to create detailed maps of samples on the atomic level, as they scan them with high-energy, synchrotron X-rays. These X-rays are emitted when a particle travels a nonlinear path.

The SSRL facility offers researchers more than 30 experimental stations called “beamlines,” which provide synchrotron radiation in various forms suited to research using x-ray absorption spectroscopy, x-ray microscopy and imaging, macromolecular crystallography and x-ray scattering and diffraction.

We used the facility to help with Hayes’ research. She studies the effects of mineral weathering on the mobility and bioaccessibility of toxic metals in geomedia such as soils, mine tailings, and dusts.

One of my most vivid recollections from the research trip occurred late one night during a long scan, when the rest of the group was off sleeping or getting some food. I sat monitoring the beamline by myself. Suddenly, a cacophony of alarms and flashing lights went off, and a French woman working at the next experimental station came over and asked me in a thick accent what was wrong.

The display above our workstation flashed that our beamline was down, so we immediately phoned the Duty Operator on call, Tom Hostetler, a former mechanical engineer who had spent his career fixing the equipment on nuclear submarines. Troubleshooting the beamlines during the middle of the night was his retirement gig, although to most people it would not seem like a relaxing place to work.

Tom was wearing his typical worn Icelandic sweater and carrying a cup of coffee and a voltmeter. He asked me and Hayes to check fuse boxes and connections between the lead-shielded room and the data workstation.

We concluded that the problem was a software issue, which was solved with a complete system reboot. It was early in the morning when we were finally collecting data again. By that time, I had a much better understanding of how the beamline worked. I also had a synchrotron-sized sense of accomplishment.

“I had a much better understanding of how the beamline worked. I also had a synchrotron-sized sense of accomplishment.”

— Riley Witte
Grad students tell us why their Alaska research sites are worth visiting

**Place:** Kenai Fjords National Park  
**Researcher:** Jennifer Curl, wildlife biology and conservation graduate student  
**Why it’s cool:** Jennifer Curl has a whale of a tale. “One of the great things about the park is all of the marine life you get to see, given that most of the park is only accessible by boat. One afternoon, I happened by humpback whales roiling the waters as they surrounded a school of fish. They all came up at the same time with their mouths open and throat pleats fully expanded. After they finished feeding, four or five of them breached.” Curl attributes this sight to spending so much time in the nooks and crannies of the park, where tour boats rarely go. She has found an abundance of wildlife, hidden beaches and remote corners to explore. Her research focuses on methods to estimate seabird population trends in the park.

**Place:** City of Wales, the western-most point of Alaska and mainland North America  
**Researcher:** Gregory Deemer, atmospheric sciences graduate student  
**Why it’s cool:** “Wales is one of the most special places on Earth. Situated on the eastern side of the Bering Strait, one can see the Diomede Islands and on the clearest of days, the Chukotka Peninsula [Russia]. It is a thrilling experience to look across the Bering Strait with a setting sun and sea ice drifting by,” said Deemer. The graduate student is trying to develop better ways of predicting sea ice conditions for people navigating the Bering and Chukchi Seas. He is getting help from those who know sea ice best – subsistence hunters and others members of the small coastal community. “They have a tremendous knowledge of the sea ice in this region that may help operational seaice forecasters.”
CNSM AWARDED A RECORD NUMBER OF DEGREES

CLASS OF 2014

98 baccalaureate degrees
53 master’s degrees
25 doctorate degrees

MASTER’S DEGREES
Claire Addis
Brian Allman
Cecilia Borries
Bonnie Broman
Christopher Bruton
Kyle Campbell
Cameron Carroll
Mingyuan Cheng
Arvind Chittambakkam
Lucero Correa
Alyssa Crawford
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Biology
Statistics
Remote Sensing Geophysics
Environmental Chemistry
Statistics
Atmospheric Sciences
Biology
Wildlife Biology and Conservation
Mathematics
Mathematics
Physics
Atmospheric Sciences
Botany
Geology
Biology
Biological Sciences
Snow, Ice & Permafrost Geophysics
Atmospheric Sciences
General Geology
Snow, Ice & Permafrost Geophysics
Atmospheric Sciences
Mathematics
Atmospheric Sciences
Statistics
Atmospheric Sciences
Mathematics
Statistics
General Geology
Biology
Economic Geology
Atmospheric Sciences
Volcanology
Solid Earth Geophysics
Wildlife Biology & Conservation
Biochemistry/Molecular Biology
Statistics
Biological Sciences
General Geology
Quaternary Geology
Physics
Biology
Volcanology, Remote Sensing
Wildlife Biology and Conservation
Statistics
Snow, Ice and Permafrost Geophysics
Biochemistry/Molecular Biology

DOCTORATE DEGREES
Timothy Bartholomais
Soumik Basu
Jennifer Bell
Zhipeng Dai
Melody Durrett
Wenyu Gong
Marijke Habermann
Rebekah Hare
Joanne Healy
Benjamin Jones
Corrine Knapp:
Mary-Cathrine Leewis
Robert McNabb
Hirotsugu Mori
Bryan Mosher
David Podrasky
Susana Salazar Jaramillo
Grant Shimer
Torge Steensen
Ina Timling
Trang Thu Tran
Barbara Truessel
Shannon Uffenbeck
James Willacker
Rebecca Young

Geophysics
Atmospheric Sciences
Environmental Chemistry
Biochemistry/
Molecular Biology
Geophysics
Geophysics
Geophysics
Biological Sciences
Educational Bioanthropology:
Interdisciplinary Program
Geoscience:
Interdisciplinary Program
Environmental
Change and Human
Interdisciplinary Program
Biological Sciences
Geophysics
Geology
Biological Sciences
Geophysics
Geology
Geology
Geophysics
Biological Sciences
Biological Sciences
Environmental Chemistry
Geophysics
Biochemistry/
Molecular Biology
Biological Sciences
Newman and two coauthors make this claim in the paper “Does size matter?” published in the American Institute of Physics’ journal Chaos.

Newman said it’s possible to calculate a system’s optimal size, which can help engineers reduce the chances of system failure and its associated human and economic costs.

Many people currently design large networks with the idea that bigger is better. This includes electrical transmission grids, the Internet and many other infrastructures that society depends on.

This mentality can lead to failures like the 2003 Northeast Blackout, during which an estimated 55 million people lost power in the U.S. and Canada, said the professor. It started from one failure cascading into others that spread throughout the system like wildfire. The magnitude of the failures was a function of the system’s size, Newman said.

In the paper, he and his coauthors, physicist Ben Carreras and electrical engineer Ian Dobson, investigated models of different electrical transmission grids and determined that each one had an optimal size. Anything smaller is inefficient. Anything larger is susceptible to cascading failures with scale-tipping costs. The optimal size is calculable using six different factors from their models.

The researchers looked at the models through the branch of physics that studies complex systems and how its many parts connect and behave as a dynamic whole. Biological organisms, nuclear fusion and the Internet are all complex systems and share similar behaviors such as cascading failures.

Newman and his team will continue testing their theories on different models of varying sizes and hope to apply what they learn to other infrastructures like the Internet.

They also want to look at whether complex systems beyond an optimal size can be divided into sections that behave independently and can keep cascading failures from spreading.

The team needs a larger research budget before they can tackle all these goals, Newman said. There are some times, he admits, when bigger is better.
Professor named Fulbright arctic chair

UAF marine geophysicist Bernard Coakley will be the 2014-2015 U.S. Fulbright arctic chair in Norway, the U.S.-Norway Fulbright Foundation announced.

Coakley, a professor in the Geosciences Department, received a grant to collaborate and share his expertise on reconstructing the Arctic Ocean’s geologic history with four of Norway’s top research and education institutions.

“This is a great opportunity to facilitate interaction at the two ends of the Arctic Ocean,” he said. “It’s better when there are more minds on a problem. We come at problems with our different experience and training.”

Coakley will work with scientists at the University of Oslo’s Centre for Earth Evolution and Dynamics to develop an international program for detailed mapping of the Alpha-Mendeleev Ridge, a major feature of the Arctic Ocean. He will also lecture and collaborate with colleagues at the Norwegian University Center at Svalbard and the University of Bergen.

Faculty have a BLaST

Three CNSM faculty are spearheading a $23.8 million, five-year award from the National Institutes of Health to launch a new undergraduate program that will engage students from diverse backgrounds, especially those from rural Alaska, in biomedical research as a way to foster their interest and success in biomedical and health careers.

The leads are Barbara Taylor, an associate professor of neurobiology; Karsten Hueffer, an associate professor of veterinary microbiology; and Arleigh Reynolds, associate dean for the Department of Veterinary Medicine.

The Biomedical Learning and Student Training program received the competitive award through the NIH’s Building Infrastructure Leading to Diversity initiative, which awarded funding to 10 BUILD initiative programs nationwide. The programs seek to learn how to attract students from diverse backgrounds into the biomedical research workforce and help them become future contributors to NIH-funded research. BUILD is part of the Diversity Consortium — a $240 million commitment to enhancing the diversity of the NIH-funded workforce.

Teaching Excellence
Criteria is a score of 4.5 or above on surveys with at least 8 respondents.

**Fall 2013**
- **Biology & Wildlife**: Perry Barboza, Laura Conner, Mike Harris, Falk Huettmann, Knut Kielland, Todd O’Hara, Link Olson, Andrej Podlutsky and Diane Wagner
- **Chemistry & Biochemistry**: Cathy Cahill and Bill Simpson
- **Mathematics & Statistics**: Ron Barry, Jill Faudree and John Gimbel
- **Geosciences**: Hajo Eicken and Franz Meyer
- **Physics**: David Newman

**Spring 2014**
- **Biology & Wildlife**: Donie Bret-Harte, Laura Conner, Andrea Ferrante, Kris Hundertmark, Denise Kind, Mary Beth Leigh and Kevin Winker
- **Chemistry & Biochemistry**: Kriya Dunlap, Tom Green, Bill Howard and Tom Kuhn
- **Mathematics & Statistics**: Ron Barry, Leah Berman, Ed Bueler, Jill Faudree, John Gimbel and John Rhodes
- **Geosciences**: Patrick Druckenmiller, Sarah Fowell, Jochen Mezger, Rainer Newberry, Vladimir Romanovsky and Wes Wallace
How to look into the past and future with 22 seeds and a beetle

CNSM researcher Nancy Bigelow divines greater meaning from the small and often overlooked pollen, plants and seeds of long ago.

Researcher Nancy Bigelow flashes a smile as she carries the equipment needed for sampling peat, which contains the pollen microfossils and plant macrofossils.

Photos courtesy of Nancy Beigelow.
Twenty-two seeds and a beetle. Nancy Bigelow considered it a good find, even more so than the remains of an ancient helmeted muskox. They all came from a tall bluff overlooking the swift-flowing Birch Creek north of Fairbanks.

Granted, the yellowed skeleton belonged to a charismatic furry animal with big brown eyes. But Bigelow was drawn to the fossils of life un-blossomed and the remarkable six-legged creature whose lack of evolutionary ambition made it a good indicator of past climate. Her findings offered a glimpse into what interior Alaska’s winters were like 125,000 years ago, and what they could be like in a future of global warming.

Before exploring the significance of this, we must first delve into Bigelow’s vocation. She is a University of Alaska researcher who divines greater meaning from the small and often overlooked pollen, plants and seeds of long ago. They might not be the diamond-studded bling of fossils, but they provide a wealth of information about Alaska’s past vegetation and climate.

Looking back

“I’ve always been interested in the past and knowing what I would have seen if I were wandering around thousands of years ago,” Bigelow said.

This time-travel wanderlust fueled her to earn a Ph.D. in anthropology at UAF and create a career niche of using microfossils like pollen and macrofossils like seeds to paint historical backdrops for Alaska archaeological sites in the broad strokes of vegetation and climate. Sites in Alaska can date as far back as 14,000 years.

“My role with the archaeologists is to provide the context about the landscape the people were living in when the sites were occupied,” she said.

To reconstruct the past, Bigelow takes samples of active or fossilized peat from lake beds, swamps or river banks, and identifies the types and amounts of fossils. Microfossils like pollen, which can travel great distances, can tell Bigelow a lot about plants far from the site. Macrofossils like seeds provide more info about plants closer to the site because they tend not to travel too far from their source.

She has used this technique to determine what the landscape looked like when the first people showed up in interior Alaska 14,000 years ago, which can pretty much be summed up as no lakes and no trees. The former was just starting to develop then and the latter emerged 5,000 years later.

Currently, she works as a researcher for CNSM and is providing context for a site where they discovered the remains of a cremated infant from 10,000 years ago, one of the oldest human remains in North America. She just returned from a trip to the Aleutian Island Kiska where organic contents in a mound like fish bones are influencing the vegetation around it and may have been used to cultivate a certain type of grass. On Alaska’s west coast, Bigelow’s expertise provides insight about the landscape for people who lived on a series of beach dunes 1,000 years ago.

All this “contexting” has meant long hours in lab, peering into a microscope and spending countless hours identifying thousands of pollen grains, but Bigelow doesn’t mind. “It’s relaxing. It’s just you and the pollen,” she said in the tone of the wise.

Looking forward (kind of)

The seeds and the beetle

The twenty-two seeds and a beetle provide Bigelow with a much older picture of Alaska than the archaeological sites. They date back to a period between two ice ages that was warmer than it is today.

In modern times, the beetle and the aquatic plant, which bears the seeds, can only be found as far north as central Canada, a place where winters are comparatively warmer by 25 degrees Fahrenheit. Beetles are especially good indicators of temperature because they’ve been well studied, have changed very little over time and their climatic needs are well known.

Mary Edwards, affiliate faculty with UAF and a professor of physical geography at the University of Southampton, England, helped Bigelow analyze the data and said the study throws light on a past warmer period that people can use to gauge future changes.

“It can give you benchmarks and guidelines as to what you can expect, since the planet has been there before,” she said.

Bigelow said scientists predict that future climate change will happen, but possibly at a faster rate than such changes in the past.

“Climate change is all the time,” said Bigelow. “Personally, I hate change in my life and the whole thought of human-caused climate change, but on the other hand we will survive it. We’ll have to change along with it.”
Welcome faculty and staff to CNSM or new positions within CNSM

BIOLOGY & WILDLIFE
• Greg Breed, Assistant Professor of Wildlife Biology
• Todd Brinkman, Assistant Professor of Wildlife Biology
• Devin Drown, Assistant Professor of Biological Sciences

CHEMISTRY & BIOCHEMISTRY
• Jennifer Guerard, Assistant Professor of Chemistry
• Lori Gildehaus, Office Manager for the Dept. of Chemistry & Biochemistry

GEOSCIENCES
• Katie Kennedy, Outreach Coordinator
• Christopher Maio, Assistant Professor of Geography
• Daniel Mann, Assistant Professor of Geography
• Cary de Wit, Associate Professor of Geography

MATHEMATICS & STATISTICS
• Kristin Angeli, Math Bridge Coordinator
• Kellie Dolan, Office Manager for the Dept. of Mathematics & Statistics
• Lubov Zeifman, Term Assistant Professor of Statistics

PHYSICS
Ellen Craig, Office Manager for the Dept. of Physics

VETERINARY MEDICINE
• Lisa Lunn, Associate Professor Associate of Veterinary Medicine, Large Animal and Food Animal Medicine
• Molly Murphy, Assistant Professor of Veterinary Medicine
• Ors Petnehazy, Assistant Professor of Anatomy and Diagnostic Imaging
• Arleigh Reynolds, Associate Dean of the Veterinary Medicine Program

CNSM DIVISION OF RESEARCH
• Deanna Fitzgerald, Travel and Purchasing Coordinator

DEAN’S OFFICE
• Jessica Armstrong, Graduate Student Coordinator
• Carolyn Chapin, Undergraduate Student Advisor

FAREWELLS

HIGHLIGHTS FROM CNSM DIVISION OF RESEARCH
• 2014 has been a fantastic time, with several faculty from the CNSM Division of Research receiving the good news about their proposals being funded. Nothing feels better than hearing the magic words ‘Awarded’ or ‘Recommended’ after a long and anxious wait. Congratulations to CNSM researchers Sergei Avdonin, Nancy Bigelow, Doug Dasher, Sarah Fowell, Dan Mann, Alexei Rybkin, Todd O’Hara and Tom Trainor.
• The US Army Research Laboratory recently funded CNSM researcher and chemist Chris Iceman to analyze aerosol samples collected at military sites in Iraq, Afghanistan and Kuwait. Air quality in the Middle East is of concern to the Department of Defense because of the long term exposure of troops to foreign air particulates that may affect the health of soldiers and operation of equipment deployed in the field.
Chapman chairs bid adieu

Chapman Chairs David Scholl and Eddy Carmack are passing on the torch after eight years of organizing UAF seminars and workshops that bring in distinguished scientists from all over the world.

Scholl and Carmack were chosen for these positions because of their accomplishments in research and leadership.

Scholl is a United States Geological Survey emeritus geologist who organized the spring 2014 lecture series. Four scientists described how they are using seafloor data near Alaska to study topics ranging from earthquakes to economic rights.

Carmack is a climate research oceanographer who worked with the Institute of Ocean Sciences in Canada. He organized a workshop in 2014 where scientists, wildlife managers and graduate students discussed how to foster the long-term survival of salmon stocks in Alaska. The workshop focused on the weak Chinook (King) Salmon runs.

CNSM has formed a committee to search for candidates, but no Chapman Chairs have been named yet.

The college wants to thank these two leaders in arctic science for all their hard work in bringing scientific talent to UAF to share their research with the Fairbanks community. They have enriched many lives.

Geography joins CNSM

In the summer of 2014, the Geography program joined CNSM. The program was formerly in the School of Natural Resources and Agricultural Sciences, but reorganization of that school provided an opportunity for the program to come to CNSM. The program has been merged with our Department of Geosciences. This change will allow better integration of all of our Earth science offerings and better utilize laboratory and teaching spaces.

Ted Fathauer Atmospheric Sciences Memorial Award

To honor our dear colleague, the Ted Fathauer Atmospheric Sciences Memorial Award was established at the University of Alaska Foundation in 2013. The account has reached endowment level ($25k), which means the base can be invested and grow. It will take some time, however, to generate enough earnings to make scholarship awards. We would like donations toward the spendable portion of the endowment so that scholarships can be awarded right away. We thank the many folks who have generously contributed to this award and we look forward to helping students achieve their dreams of becoming atmospheric scientists. Please contact Hild Peters, the CNSM Executive Officer, at hmpeters@alaska.edu if you would like to contribute to the award.
Atmospheric Sciences

Graduate student Jintai Li won first place at the 2014 Coupling, Energetics and Dynamics of Atmospheric Regions workshop in Seattle for his poster entitled “First Lidar observation of mesospheric nickel layer.”

Professor Nicole Mölders mentored a student from Germany, Dina Khordakova, for her bachelor of science thesis and two students, Helene Hameau and Antoine Lescure, from the French Air Force Academy for their master’s degree theses.

Chemistry & Biochemistry

Assistant Professor Sarah Hayes and Assistant Professor Christopher Iceman were chosen as fellows in the Chancellor’s Innovation in Technology and Elearning program, which supports innovative faculty who teach online courses or use improved technological tools in their classrooms.

Mathematics & Statistics

UAF alum Jed Brown won the 2014 SIAM Activity Group on Supercomputing (SIAG/SC) Junior Scientist Prize. He received a B.S. in physics and a B.S. and M.S. in mathematics, all from UAF. He currently works for Argonne National Laboratory.

Professor Elizabeth Allman was the guest editor for the MAA Focus, a newsletter of the American Mathematical Society.

Geosciences

In November’s issue of the Journal of Vertebrate Paleontology, Associate Professor of Geology Pat Druckenmiller and his colleagues have confirmed the identity of a skeleton found in the northern foothills of the Brooks Range as an ichthyosaur, making it the first one found in Alaska and also the largest and most complete specimen known from the state. A U.S. Geological Survey mapping expedition came upon the fossil in 1950 but it wasn’t moved to Fairbanks until 2002 with the help of a Fort Wainwright army unit.

Sam Herreid, who graduated with a bachelor of science in geology last spring, presented his research poster at “Posters on the Hill” for the US Congress on Capitol Hill in Washington, D.C. in April 2014. He was one of 60 presenters chosen in a nation-wide competition of 600 at this annual event hosted by the Council on Undergraduate Research. Sam was the first UAF student to present. The poster’s title is, “First estimates of glacier melt rate reduction from rock debris cover for all Alaskan glaciers.”

A geosciences doctoral student has been selected to represent the United States in a program to discuss future development in the High North with leaders in academia, business and the public sector. Yekaterina (Katia) Kontar will participate in the Arctic Frontiers’ Emerging Leaders program held in Norway in January, 2015. She will be one of two U.S. representatives.

Advanced Instrumentation Laboratory

Over 2 million Copper River Sockeye salmon were harvested commercially in 2014. AIL used the Electron Microprobe to identify an induced metal salt mark in the ear bones, known as otoliths, of Gulkana Hatchery salmon. This provided near real time reporting of hatchery versus wild harvest to Copper River fishery managers at the Alaska Department of Fish & Game. These reports were used for in-season management of the fishery to better target hatchery fish for harvest.

AIL offered three classes to provide students with hands-on instruction and training in the use of the Electron Microprobe, X-ray Fluorescence Spectrometer and Scanning Electron Microscope. UAF is unique among peer institutions in formally training students to operate instrumentation so that students can perform their own analyses independent of lab personnel. For many students, work performed in these classes are the foundation of their thesis research.
UAF and Colorado State University joint veterinary medicine program is welcoming its first class of future veterinarians.

The program has asked 10 candidates, including five Alaska residents, to be the first students in the program, which will open its doors in the fall of 2015.

Of the Alaska residents, one undergraduate attends UAF and one studies at the University of Alaska Southeast. Two attend out-of-state universities and one is currently working in Anchorage. The remaining candidates are residents of other states.

The candidates have until April 15 to accept the offer.

Arleigh Reynolds, associate dean for UAF’s Department of Veterinary Medicine, said the professional veterinary medicine program has come a long way since its idea was conceived several years ago.

“It was exciting to get this program on its feet, hire faculty and get all the facilities ready. But the real joy is bringing the students in and helping them reach a lifelong goal.”

- Arleigh Reynolds

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“It was exciting to get this program on its feet, hire faculty and get all the facilities ready,” he said. “But the real joy is bringing the students in and helping them reach a lifelong goal.”

The program is a partnership between UAF’s College of Natural Science and Mathematics and CSU’s College of Veterinary Medicine and Biomedical Sciences, one of the top veterinary schools in the country. Students receive their Doctor of Veterinary Medicine degrees from CSU, but their starting point is at UAF. They will take the CSU veterinary curriculum for all four years. The first two years are taught at UAF and students then complete their second two years at CSU.

The program admits 10 students per year, giving preference to Alaska residents. Residents pay the reduced tuition of approximately $28,000 their first two years while non-residents pay the full price of $56,000.

Christine Hardy, who oversees admissions and student services for CSU’s veterinary program said the candidates for the first class are outstanding.

“Each candidate presented an application that shows they have the full package,” she said. “They have excellent academics, strong recommendations and additional attributes such as leadership, interpersonal, communication and business skills to thrive in the program and excel in veterinary medicine. This inaugural class will pave the path for those who follow.”

Hardy was part of the selection committee, which included faculty from both UAF and CSU.

Chris Clement, a biology and wildlife major from UAF, received one of the offers. “I’m really excited,” he said. “I remember when I first heard about there being a potential vet program at UAF.” Clement said he originally had planned to attend veterinary school out of state until he saw the program developing while he attended UAF.

CNSM Dean Paul Layer said the inaugural class will be a significant milestone. “We’re happy to have such outstanding students as candidates because they will be leading the way for others,” he said.
“Students are CNSM’s strength,” said Anupma Prakash.

Every year, faculty from each program within CNSM nominates a full-time, undergraduate student for the Outstanding Undergraduate Award. Meet all 8 below.

David Leonard, Statistics
“I think of mathematics and statistics as the most powerful tools to study the things that are most interesting to me - life, the universe, everything,” said David Leonard. He was also part of the Peace Corps.

Jonathan Nations, Biological Sciences
Jonathan Nations is also the Brina Kessel award recipient. He studies the skeletal variation between climbing and non-climbing voles in order to better understand the evolution of climbing in mammals.

Michael Saccone, Physics
No one can express it better than Michael Saccone does. He said, “Alaska’s sunless bite drug and awful beauty drug me from balmy California. Mostly, though it was truth and adventure that I sought.”

Julia Duncan, Chemistry & Biochemistry
Julia Duncan respects and embraces diversity. She took chemistry and biochemistry because she saw that as a way to understand nature. Duncan said “not knowing is more exciting than knowing something” and therefore “new challenges constantly intrigue me.”

Justin Cannon, Mathematics
Justin Cannon is a double major in Petroleum Engineering and mathematics. Cannon said, “I came in for the engineering program, but couldn’t stop.”

Chris Ballek, General Science
Chris Ballek is from North Pole and has been a high school football coach. He will graduate this fall and would like to be a science teacher. Ballek wants to give back to the community.
For the third time glaciology faculty from CNSM and the Geophysical Institute hosted an intense 11-day International Summer School in Glaciology in the heart of the Wrangell Mountains in McCarthy, fittingly in immediate vicinity of the breathtaking beauty of massive bodies of ice. The course included 27 graduate students from around the world including India, Australia, New Zealand and Europe and a dozen institutions around the U.S., as well as 8 instructors from UAF, Anchorage, Miami, Great Britain and Norway.

The course aimed to equip early stage graduate students with tools to address the expanding challenges in quantifying and modeling rapid changes in glaciers and ice sheets occurring in response to a warming climate. A major goal of the summer school was also to offer a valuable platform for international networking with peers and senior glaciologists alike, for which the intimate and isolated location of McCarthy offered the perfect setting. Activities included daily lectures, exercises and group projects, as well as two glacier excursions, a public talk and a student poster session with posters pitched to clotheslines or the outside wall of the more than 100-year-old McCarthy Hardware Store. For the first time science communication taught by a professional science communicator from Miami was part of the curriculum (see blog: www.miamisci.org/lindsayinthearctic).

Students left with a better and more comprehensive grounding in glaciology, solid hands-on experience in collaborative projects, connections with fellow scientists from across the globe, and great appreciation of the course. Students said it was an “experience of a lifetime,” “unforgettable” and the “most fun and productive academic experience ever.” The course was sponsored by the National Science Foundation and several international organizations.

Summer school meets on a glacier

by Regine Hock, Professor of Geophysics

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by Laura Conner
CNSM Outreach Coordinator

It’s no secret that women are underrepresented in many science careers. For instance, in the U.S., only about 23% of working Earth scientists and only 17% of working physicists are female*. Why so few?

Girls are now scoring as well as boys on high school standardized math and science tests, so preparation is not the problem. The leading reason appears to be that girls often do not identify with science. Middle and high school girls frequently report that science is not relevant to their interests. They also commonly perceive science as a rote, uncreative, and passionless enterprise that leads to an unattractive lifestyle.

The CNSM Colors of Nature project is trying to change that trend by offering summer academies to pre-middle school girls that show the creative side of science. The project is led by an interdisciplinary team: CNSM’s Laura Conner is a biologist and educational researcher; Mareca Guthrie is the art curator at the University of Alaska Museum of the North; Steve Pompea is an optical scientist at the National Optical Astronomy Observatory in Tucson, AZ; and Carrie Tzou is a learning scientist at the University of Washington, Bothell.

The team designed a range of activities that span optical science, biology, and art. The program highlights the similarities between art and science, such as the need for creativity, close observation, innovation, and experimentation. During the academy, girls engage in activities such as creating animations about biology, designing art pieces with light, or building decorative camera obscura. Sometimes the girls cannot tell exactly where the art leaves off and the science begins.

The project’s research component shows that interest in science and science careers increases after attending the academy. The project is funded by the National Science Foundation. More information can be found at: www.colorsofnature.org.

*Data from National Science Foundation’s 2014 Science and Engineering indicators

ALASKA NATIVE SCIENCE & ENGINEERING PROGRAM continues to foster the academic success of Alaska Native students pursuing bachelor of science degrees in science, technology, engineering, and mathematics.

ALASKA SUMMER RESEARCH ACADEMY offered a two week, day-only middle school academy this past June and a two week residential high school academy in July. Due to budget cuts, the academy will continue as a day only academy for both middle and high school students during July.

GIRLS ON ICE had another successful year as high school girls traveled to glaciers in Alaska and Washington to learn about glaciology.

SCIENCE POTPOURRI: Around 1500 people enjoyed the free, three-hour event filled with experiments, explosions, shows and crafts last spring. Next year’s Science Potpourri will be on April 11, 2015 from noon to 3 p.m. in the Reichardt Building.
Students in Alaska walked on water

Students in Fairbanks, Anchorage, Yukon, Cordova and Nome explored the Pacific Ocean with one of the world’s largest maps. Geography outreach coordinator Katie Kennedy visited elementary and middle schools with a National Geographic map that is taller than a three-story building. The map gave students an interactive experience that enlivens the study of geography.

Health Summit was a success

The third annual Alaska Interior Medical Education Summit was a success with nearly 200 college and high school students in attendance. Students explored career and educational options in the health fields. Vendors across the nation participated. Thanks to undergraduate advisor Carolyn Chapin who organized the event.

GeoFORCE Alaska had a “lava” fun

In July 2014, GeoFORCE Alaska students scrambled up and around mountains, gorges, coastlines and volcanoes in Washington and Oregon to study geology on their third academy trip. The high school students are from the rural areas of northern Alaska and stay in the program for four years. Associate Professor of Geology Sarah Fowell and Program Coordinator Anne Rittgers organize GeoFORCE Alaska. Photo by Colby Wright.

High school science symposium received $11,000

An award of $11,000 from the Junior Science and Humanities Symposia program will support the 30th Alaska Statewide High School Science Symposium in spring 2015. The Alaska event is one of 48 regional symposia where high school students complete original research in science, technology, engineering or mathematics and compete for scholarships and cash prizes.

CNSM will host the symposium on March 27-29, 2015. The $11,000 award will help fund the event, cash prizes and travel support for attending students.

The research arm of the U.S. Army, Navy and Air Force sponsors the award to encourage high school students to consider education and career paths in the sciences. The Academy of Applied Science, a nonprofit dedicated to inventive thinking and research, administers the award.

As part of the symposium, students make oral and written presentations about their original research and can earn scholarships and other prizes at the regional level. Finalists can present their research at the National Junior Science and Humanities Symposium in Washington, DC and compete for additional scholarships.

Abel Bult-Ito, the symposium’s director and a UAF neurobiology professor, said the symposium has served 1,519 high school students during its 30 years of operation and has awarded more than $1 million in cash awards, scholarships and travel funds to high school students.

“We are extremely excited for the continued support,” he said. “It gives students an opportunity to present their work, receive constructive expert feedback, and experience what a research career might entail.”
As part of her Ph.D. work in biology and wildlife, Nina Hansen studied bacteria-caused embryo deaths in the eggs of white-fronted geese on the North Slope. She found that bacteria probably reduce the hatchling rate. She also found a potentially novel bacterial species in the Neisseria genus. Nina is also a veterinarian and will be one of the lead vets for the Yukon Quest. Photo courtesy of Nina Hansen.