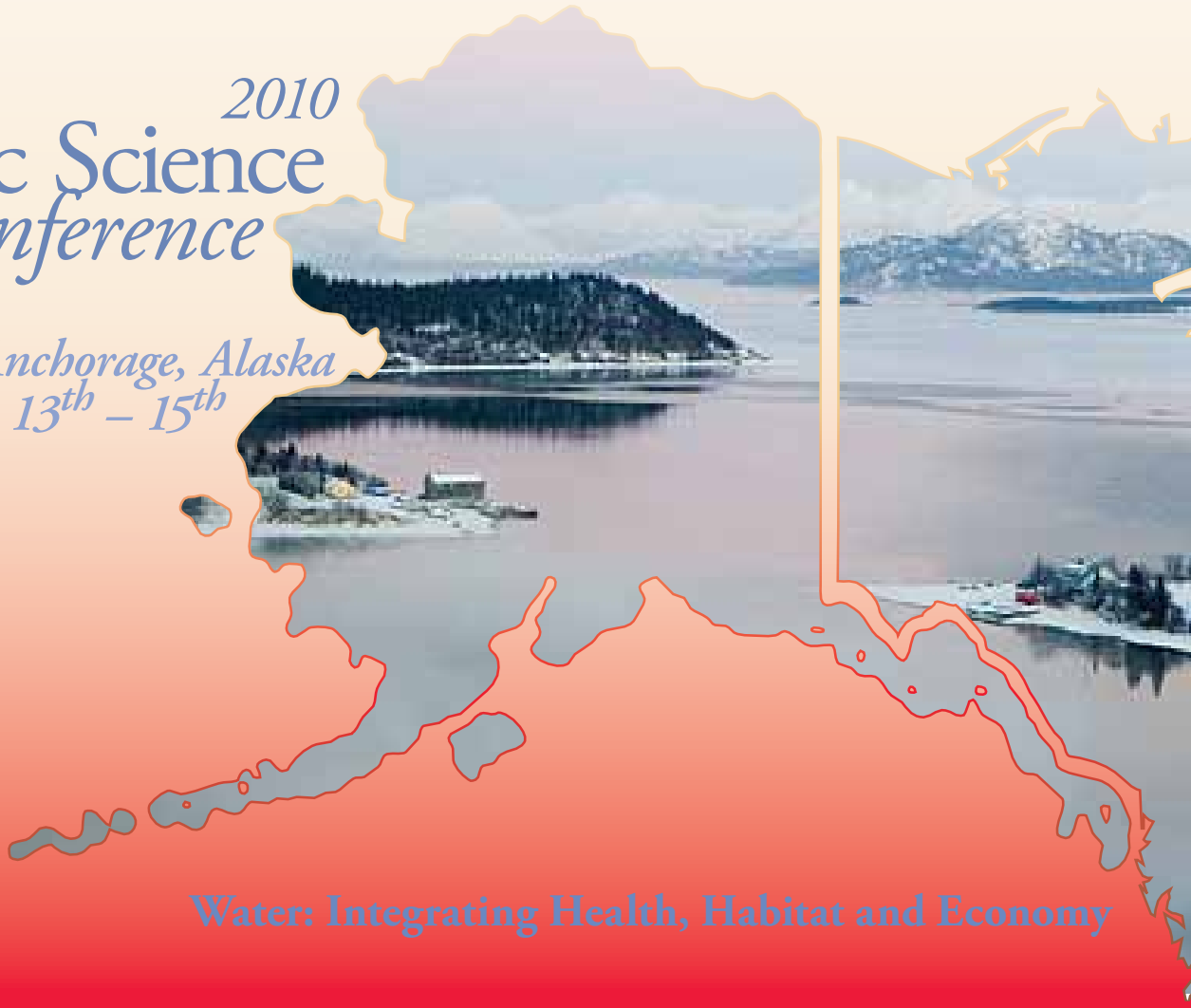
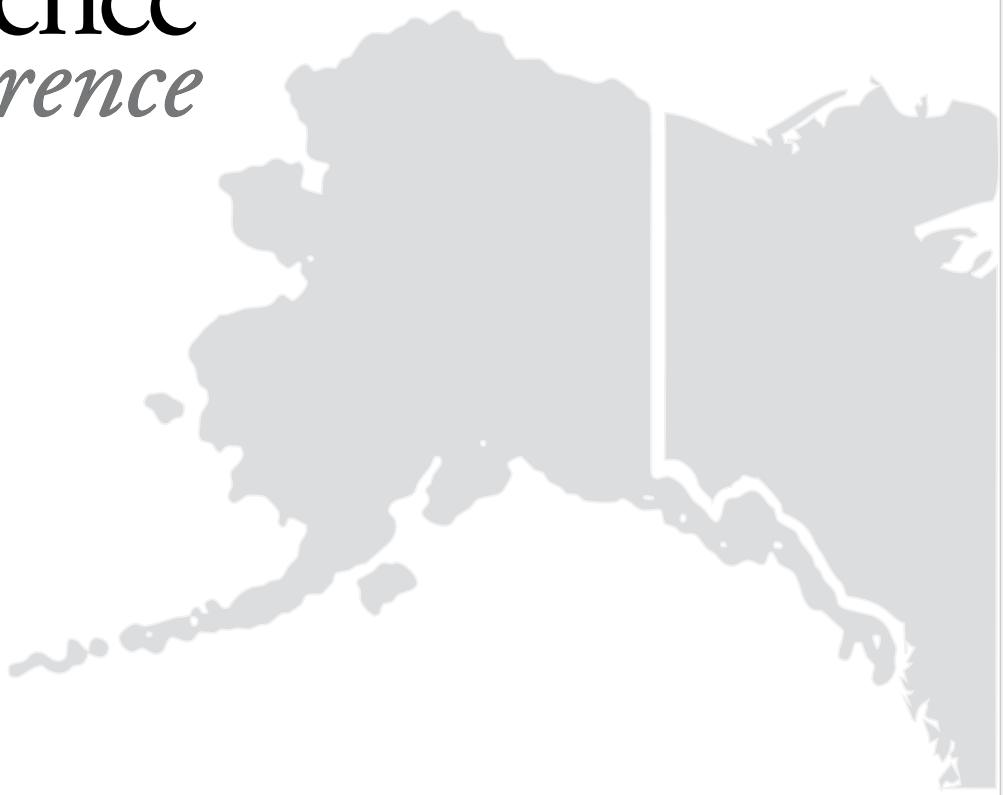
2010 Arctic Science Conference

Anchorage, Alaska
September 13th – 15th



Water: Integrating Health, Habitat and Economy

2010 Arctic Science Conference



Water: Integrating Health, Habitat and Economy

Anchorage, Alaska
September 13th – 15th, 2010

• *Notes* •

Cover photography information: Deb Horner takes a kayak out for a morning adventure in Cordova, Alaska. Credit: Photo by Jan Stitt, UAF Marketing and Publications.

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We thank the following sponsors for their support and the contributions that have made the 60th Annual Arctic Science Conference possbile:

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www.aaas.org

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The Arctic Science Conference is an annual meeting that is organized and supported by the Arctic Division of the American Association for the Advancement of Science (AAAS). The locations and themes of the conference vary from year to year, although the themes and locations are always related to the Arctic and the scientific endeavors of the Arctic Division AAAS members and their colleagues. It is a continuing goal of this conference that it be open and accessible to all scientific scholars who are working on Arctic, Alaskan, Canadian, northern or Antarctic issues, and to communicate their interests and discoveries at the event. This year's conference was organized by:

Conference Organizers

Conference Chair
Lilian Alessa, The Resilience and Adaptive Management Group, University of Alaska Anchorage, ram.uaa.alaska.edu

Conference Coordinator
Barb Krekel, Visions Event and Meetings Management, www.visionsus.com

Conference Advisor
Lawrence Duffy, Executive Secretary, Arctic Division, AAAS, www.arctic.aaas.org

Exhibition Curator and Publication Design
Annie Duffy, Duffy Infodesign, www.duffyinfodesign.com

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Area 3 Representative (Yukon, Northwest Territories, and Nunavut)
Eddy Cormack, Institute of Ocean Science, Saanichton Canada

General Information

Registration Desk
The Arctic Division AAAS registration staff will provide assistance with program information, audio and visual aids for sessions, and other administrative needs. The registration desk will be open:

Monday, Sept. 13th from 8:00 a.m. to 5:00 p.m.
Tuesday, Sept. 14th from 8:00 a.m. to 5:00 p.m.
Wednesday, Sept. 15th from 8:00 a.m. to 1:30 p.m.

Conference Fees

Full Conference:	$275
Single Day:	$100
Student:	$90
Student Single Day:	$30

*All registrations include snacks on the days registered.

Badges
Each participant should obtain a badge at the registration desk prior to attending any of the sessions.

Coffee and Registration Area
Coffee will be available inside the session meeting rooms.

List of Participants
A list of pre-registered conference participants will be available at registration.

Poster Sessions
Posters will be on display according to the following schedule:

Tuesday, Sept. 14th from 8 a.m. to 5 p.m.
Wednesday, Sept. 15th from 8 a.m. to 12:30 p.m.

Authors are requested to be present to discuss their material at 4 p.m. on Monday or Tuesday or designate times when they will be available.

Lunch
The conference has scheduled lunch break on each day.

Monday, September 13th, 2010

8:00 a.m. — **Registration and Coffee Service Begins**

9:00 a.m. – 9:30 a.m. — **Welcoming and Opening Remarks**

9:30 a.m. – 12:30 p.m. — **Plenary Speakers**

Avoiding Collapse - The Easter Island Way — Dr. Terry Hunt, University of Hawai'i, Manoa

A History of AAAS in Alaska — Dr. Robert White, University of Alaska Anchorage

A History of AAAS — Dr. Al Teich, AAAS

12:30 p.m. – 1:30 p.m. — **Lunch with Speaker**
Dr. Lawrence Duffy

1:30 p.m. – 3:30 p.m. — **Poster Display and Exhibition Set Up**

1:30 p.m. – 4:30 p.m. — **Technical Sessions:**

Policies and Sustainability — Chair: Dr. Mark Altaweel, University of Chicago

- Some Insights on Community Perceptions of Change in Water Resources: Potential Rules for Building Resilience and Promoting Adaptation – *Andrew Kliskey*
- Social-Ecological Relationships Between Anchorage Residents Water Quality and Quantity – *Mark Ferrell*
- Tea Parties and Movement Since the Late 1800s: A Historical Look at Freshwater Values and Human Agency in Chukotka, Russia – *Sveta Yamin-Pasternak*
- Monitoring Environmental Change through the Capture of Data from Social Systems – *Mark Altaweel*
- Policies that Might Restrict Arctic Data in Climate-change Negotiations – *Thomas Newbury*
- Sustainable Agriculture and Food Security in the Circumpolar North: Environmental, Geophysical, Biological, and Socio-cultural Challenges and Potential Solutions – *Kalb Stevenson*

Fisheries — Chair: Dr. Jeffrey Welker, University of Alaska Anchorage

- Benthic Faunal Zones of Nushagak Bay – *Todd Radenbaugh*

4:30 p.m. – 6:30 p.m. — **Dinner Break (on own)**

6:30 p.m. – 7:30 p.m. — **Power Social with Refreshments**

Tuesday, September 14th, 2010

8:00 a.m. — **Registration and Coffee Service Begins**

8:00 a.m. – 5:00 p.m. — **Poster Displays**

9:00 a.m. – 12:00 p.m. — **Technical Sessions:**

Habitat — Chair: Dr. Jeffrey Welker, University of Alaska Anchorage

- Challenging the Myth of Freshwater Abundance in the Canadian North: Critical Concerns and Contemporary Policy Opportunities – *Caitlin Robinson*
- Confronting Bear Management in the Changing North – Future Foci for Efficient Sustainable Adaptive Management Strategies – *Kim Jochum*

- Precipitation Variability and Trends in Alaska – *Gerd Wendler*
- Regional Variations in Sea Ice Extent – *Tracy Rogers*

Development and Economies — Chair: Dr. Andrew Kliskey, University of Alaska Anchorage

- Ice Fishing in an Ice Dependant World: The Impact of Climate Change on Spring Subsistence Ice Fishing – *Daven Holen*

Health — Chair: Dr. Lawrence Duffy, University of Alaska Fairbanks

- Sustainability: Resources, Health and Education – *Lawrence Duffy*

12:00 p.m. – 1:30 p.m. **Lunch (on own)**

1:30 p.m. – 4:00 p.m. **Afternoon Immersion Experience:**

Field trip along Coastal Trail and/or to Ship Creek with Development, Habitat, and Health Guides — Jeffrey Welker, University of Alaska Anchorage, and Lawrence Duffy, Univeristy of Alaska Fairbanks
This will be an interactive walking session to re-invigorate the body while exercising the mind and lifting the spirit. *Alternate events will be available in the event of poor weather.*

4:00 p.m. – 5:00 p.m. **Poster Sessions with Refreshments**

5:00 p.m. – 6:30 p.m. **Dinner Break (on own)**

Wednesday, September 15th, 2010

8:00 a.m. **Registration and Coffee Service Begins**

8:00 a.m. – 12:00 p.m. **Poster Displays**

9:00 a.m. – 11:45 a.m. **Technical Sessions:**

Interdisciplinary Science and Education — Chairs: Dr. Lawrence Duffy, University of Alaska Fairbanks, and Dr. Andrew Kliskey, University of Alaska Anchorage

- Ascension: Exploring the Art of Denali – *Annie Duffy*
- Electric Cars in Arctic Regions: Implementation of Quantitative Measurements of Air Pollution Effects and Potential Impact on Permafrost – *Michael Golub*
- The Ethnography of Water – *Emile Springer*

***11:45 a.m.** **ASCH Annual Business Meeting**

12:00 p.m. – 1:30 p.m. **Lunch (on own)**

1:30 p.m. – 3:00 p.m. **Technical Sessions:**

Roundtable Discussions: Evolving the University Through Partnerships/Closing Resolutions for Inquiry, Response and Adaptation — Chairs: Dr. Lawrence Duffy and Dr. Pips Veazey, University of Alaska Fairbanks

3:00 p.m. – 3:30 p.m. **Closing Session and Final Remarks**

• *Arctic Division AAAS Meeting History* •

The Arctic Division of the American Association for the Advancement of Science (AAAS) has a long and illustrious history. Founded in 1951 as the Alaska Division, the Arctic Division was established to foster scientific communication in the then rather isolated Arctic territory. The name was changed to Arctic Division in 1982 to reflect the membership's growing interest in high latitudes outside of Alaska. Most of the Division members reside in Alaska and Canada's Yukon, Northwest Territory, and Nunavut, but any AAAS member who has an interest in the Arctic or Antartic may join. More information about the Arctic Division AAAS can be found online at www.arctic.aaas.org.

Previous Arctic Division AAAS Meetings

No.	Dates	Year	Location	Chair	Theme
1	Nov. 9 - 11	1950	Washington, D.C.	John C. Reed	Science in Alaska
2	Sept. 4 - 8	1951	Mt. McKinley National Park	Laurence Irving, UA Biology Dept.	Science in Alaska
3	Sept. 22 - 27	1952	Mt. McKinley National Park	Laurence Irving, UA Biology Dept.	Science in Alaska
4	Sept. 28 - Oct. 3	1953	Juneau	Christian T. Elvey, UA Geophysical Inst.	Science in Alaska
5	Sept. 7 - 10	1954	Anchorage	Hugh A. Johnson, US Dept. of Agriculture	Science in Alaska
6	Jun. 1 - 4	1955	College	Neil W. Hosley, Univ. of Alaska	Science in Alaska
7	Sept. 27 - 30	1956	Juneau	Troy L. Pewe, US Geological Survey	Science in Alaska
8	Sept. 10 - 13	1957	Anchorage	Victor P. Hessler, Univ. of Alaska	Science in Alaska
9	Sept. 2 - 5	1958	College	Robert L. Rausch, Arctic Health Res. Cntr., US Public Health Svc.	Science in Alaska
10	Aug. 25 - 28	1959	Juneau	Norman J. Wilimovsky, Univ. of British Columbia	Science in Alaska
11	Aug. 30 - Sept. 2	1960	Anchorage	Roger R. Robinson, US Bureau Land Mgmt.	Science in Alaska
12	Aug. 28 - Sept. 1	1961	College	John P. Hannon, Arctic Aeromedical Lab	Science in Alaska
13	Aug. 22 - 26	1962	Juneau	James W. Brooks, AK Dept. of Fish and Game	Science in Alaska
14	Aug. 22 - 30	1963	Anchorage	Allan H. Mick, AK Agricultural Exp. Sta.	Science in Alaska
15	Aug. 31 - Sept. 4	1964	College	Charles J. Eagan, Arctic Aeromedical Lab	Science in Alaska
16	Aug. 30 - Sept. 1	1965	Juneau	Richard M. Hurd, Inst. Northern Forestry	Science in Alaska
17	Aug. 29 - Sept. 2	1966	Anchorage	William Davis, Alaska Methodist Univ.	Science in Alaska
18	Aug. 28 - Sept. 1	1967	College	Peter R. Morrison, UA Inst. of Arctic Biology	Science in Alaska
19	Aug. 26 - 30	1968	Whitehorse	Richard Hill, Dept. of Indian Affairs	Science in Alaska & Northern Development
20	Aug. 24 - 27	1969	College	Victor Fisher, UA Inst. Social & Econ. Res.	Change in the North: People, Petroleum & Environment
21	Aug. 16 - 19	1970	College	T. Neil Davis, UA Geophysical Inst.	Change in the North: UA Physical Environment
22	Aug. 17 - 19	1971	College	Laurence Irving, UA Inst. of Arctic Biology	Adaptation for Northern Life
23	Aug. 15 - 17	1972	Fairbanks	Gordon S. Harrison, UA Inst. of Social & Econ. Res.	Science and Policy in the North
24	Aug. 15 - 17	1973	Fairbanks	Gunter E. Weller, UA Geophysical Inst.	Climate of the Arctic
25	Oct. 18 - 20	1974	Anchorage	William Davis, Alaska Methodist Univ.	Behavioral Sciences in the North
26	Aug. 11 - 15	1975	Fairbanks*	Donald W. Hood, UAF Inst. of Marine Science	Third International Conference on Port & Ocean Engineering Under Arctic Conditions (POAC)
27	Aug. 4 - 7	1976	Fairbanks	George C. West, UAF Inst. of Arctic Biology	Resource Development: Processes and Problems
28	Sept. 22 - 24	1977	Anchorage	David M. Hickok, UA Arctic Environ. Info. & Data Center	Science Information Exchange in Alaska
29	Aug. 15 - 17	1978	Fairbanks	Donald H. Rosenberg, UA Alaska Sea Grant	Alaska Fisheries: 200 Years & 200 Miles of Change
30	Sept. 19 - 21	1979	Fairbanks	Daniel B. Hawkins, UAF Geophysical Inst.	Science for Alaska
31	Sept. 17 - 19	1980	Anchorage	E. Lee Gorsuch, UAA Inst. od Social and Econ. Res.	Agenda 80S
32	Aug. 25 - 27	1981	Fairbanks	John Bligh, UAF Inst. of Arctic Biology	Life Sciences in the Service of Alaska
33	Sept. 16 - 18	1982	Fairbanks	Vera Alexander, UAF Inst. of Marine Science	Science in the North
34	Sept. 28 - Oct. 1	1983	Whitehorse	Arthur Pearson, Rampart Dev. Corp.	Alaska/Canada North: Neighbours in Science
35	Oct. 2 - 5	1984	Anchorage	John Davies, UAF Geophysical Inst.	Science in Public Policy
36	Sept. 27 - 29	1985	Fairbanks	Robert G. White, UAF Inst. of Arctic Biology	Technology and the Scientist
37	Jun. 8 - 13	1986	Vancouver**	Richard Bushey, Yellowknife, NWT	All Disciplines

No.	Dates	Year	Location	Chair	Theme
38	Sept. 24 - 26	1987	Anchorage	Thomas Morehouse, UA Inst. of Social and Econ. Res.	Alaska's Resources, Alaska's Future
39	Oct. 7 - 10	1988	Fairbanks	Neal B. Brown, UAF Geophysical Inst.	Science Education
40	Sept. 14 - 16	1989	Fairbanks	Francis Williamson, UAF Inst. of Arctic Biology	Global Change
41	Oct. 8 - 10	1990	Anchorage	Thomas Newbury, US Minerals Mgmt. Svc.	Circumpolar Perspectives
42	May 16 - 18	1991	Fairbanks***	Neal B. Brown, UAF Geophysical Inst.	Circumploar Modeling of Climate Change
43	Sept. 8 - 12	1992	Valdez	Kenneson Dean, UAF Geophysical Inst.	Environmental Change: Natural and Man-Made
44	Sept. 15 - 18	1993	Whitehorse	Arthur Pearson, Rampart Dev. Corp.	Circumpolar Information Exchange: Shrinking the Circumpolar Community
45	Aug. 25 - 27 Aug. 29 - Sept. 2	1994	Anchorage Vladivostok	Rosa Meehan, US Fish and Wildlife Serv.	Bridges of Science Between North America and the Russia Far East
46	Sept. 19 - 21	1995	Fairbanks	Robert G. White, UAF Inst. of Arctic Biology	Landscapes
47	Sept. 19 - 21	1996	Girdwood	Jack Kruse, UA Inst. of Social and Econ. Res.	Shaping an Unpredictable Future: Science and Communities
48	Sept. 24 - 27	1997	Valdez	R. Ted Cooney, UAF Inst. of Marine Science	Arctic Science and Resource Management: Exploring the Issues
49	Oct. 25 - 28	1998	Fairbanks	Syun-ichi Akasofu, UAF Geophysical Inst.	International Cooperation in Arctic Research: Detecting Global Change and its Impacts in the Western Arctic
50	Sept. 19 - 22	1999	Denali National Park & Reserve	Claus-M.Naske, UAF History Dept.	Science in the North: 50 Years of Change
51	Sept. 21 - 24	2000	Whitehorse	Joan Eamer, Yukon Science Inst.	Science and Community Crossing Borders - Arctic Science 2000
52	Sept. 12 - 15	2001	Anchorage****	Don Spalinger, AK Dept. of Fish and Game	2001 Arctic Science Odyssey: Exploring New Technologies and Methodologies for Arctic Science Management
53	Sept. 18 - 21	2002	Fairbanks	Terry Whitledge, UAF Inst. of Marine Science	Connectivity in Northern Water: Arctic Ocean, Bering Sea, and Gulf of Alaska Interrelationship
54	Sept. 21 - 24	2003	Fairbanks	John C. Eichelberger, UAF Geophysical Inst.	Extreme Events: Understanding Perturbations to the Physical and Biological Environment
55	Sept. 14 - 16 Sept. 26 - Oct. 1	2004	Vladivostok - 1 Anchorage - 2	Craig E. Dorman, VP Research UA Statewide System	1 - Bridges of Science 2 - Human Dimensions of the Arctic Environment
56	Sept. 27 - 29	2005	Kodiak	Scott Smiley, Fishery Industrial Technology Center, UAF	Consequences of Arctic and Sub-Arctic Environmental Variation
57	Oct. 2 - 4	2006	Fairbanks	John Walsh, Center for Global Change and Arctic Systems Research, UAF	State of the Arctic: Current State of the Arctic Observations and Evaluations of Arctic Change
58	Sept. 24 - 26	2007	Anchorage	John Kelley, School of Fisheries and Ocean Sciences, UAF	Partnering for Northern Futures: Science, Policy, Education, and Learning in the International Polar Year
59	Sept. 15-17	2008	Fairbanks	S. Craig Gerlach, UAF Anthroplogy Dept.	Growing Sustainability Science in the North: Science • Policy • Education • Legacy In the International Polar Year
60	Sept. 14-16	2009	Juneau	Brian Edmonds, UAF Dept. of Chemistry and Biochemistry	Impact of Environment on Human Health: Interdisciplinary Science and Education

*Arctic Division co-sponsored the International Port and Ocean Engineering Under Arctic Conditions (POAC) Conference
**Joint with the Pacific Division
***Yukon College cancelled; conference moved to Fairbanks
****Not held due to the tragic events of Sept. 11, 2001 at the World Trade Center and the Pentagon

2010 Arctic Science Conference Abstracts

Abstracts are listed alphabetically according to first author.

1. PdpE Requires a Free Amino Terminus for Expression.

Acord M.
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Francisella tularensis causes the disease tularemia, which affects over 200 species. It can be transmitted to humans by cuts or bites. The molecular mechanisms of the organism's pathogenicity are not known. Virulence, the degree of pathogenicity, is linked to the Francisella Pathogenicity Island (FPI), a cluster of 16-19 genes required for virulence and intercellular growth. In order to find intervention strategies, we transformed F. novicida, a subspecies of F. tularensis that is non-virulent to humans, with plasmids that express both N-term and C-term FLAG tag. We then used western blot and microscopy to examine the different tags. The results were that PdpE, a protein that is in the FPI, requires a free amino terminus for expression and the N-term flag disrupts protein integrity.

2. Monitoring Environmental Change through the Capture of Data from Social Systems.

Altaweel M., Alessa L., Kliskey A.
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Social and environmental factors affecting land use change are among the most significant drivers transforming the planet. Such change has been and continues to be monitored through the use of satellite imagery, aerial photography, and technical reports. While these monitoring tools are useful in observing the empirical results of land use and environmental change, including issues of sustainability, the data they provide are often not useful in capturing the fundamental policies, social drivers, and unseen factors that shape how landscapes and ecological systems are transformed. In addition, some monitoring approaches can be prohibitively expensive and too slow in providing useful data at a timescale in which data are needed. This presentation argues that techniques using information fusion, data mining, and other real-time monitoring techniques are needed in order to effectively observe primary social and ecological mechanisms affecting how geographic settings are changed over different time scales. We present a computational approach that couples open source tools in order to conduct an analysis of text and real-time data, helping to determine relevant land use events and trends. To demonstrate the approach, we discuss a case study that integrates varied sources from the United States, showing how potentially significant environmental issues and events can be captured. Although the approach we present is useful for monitoring current web-based data streams, we argue that such a method should ultimately be integrated closely with less managed systems and modeling techniques in order to enhance not only land use and environmental monitoring but also to better forecast and understand social-ecological change.

3. www.arctichealth.org, Integrating Access to Arctic Environmental Change and Human Health Research for the People of the Arctic.

Brudie S., Garrett C.
University of Alaska Anchorage • ansmb6@uaa.alaska.edu

Each day, people in the communities of the Arctic face challenges to their health and well-being from changing climatic and environmental conditions and increasing levels of pollution to emerging infectious diseases. For this reason, it is critical that Arctic residents have access to timely, accurate, and relevant information addressing their unique health concerns. To meet this need, the National Library of Medicine (NLM) and the Alaska Medical Library at the University of Alaska, Anchorage (UAA) developed the Arctic Health website, www.arctichealth.org.

The website provides an easy-to-use one-stop shop for information on the diverse health-related aspects of the Arctic region, with particular emphasis on climate change issues and environmental health. Other relevant topics include traditional healing, telehealth and telemedicine. The Arctic Health website provides links to the most reliable resources available from throughout the arctic community: local, state, and international agencies, universities, and professional organizations. In addition there is an emphasis on seeking out the stories and observations of people residing in the arctic, especially locating copies of the words of those elders and researchers whose experiences can help us understand better the issues of climate change and how changes in the environment affect the health of the arctic population.

Two major goals of the site are to create a comprehensive, accessible repository for various media and a searchable

listing of research projects, past and present that relate to human health in the Arctic. To increase the site's relevance, the project has established and continues to create collaborations with researchers, communities, and other organizations to supply publications not available elsewhere, including gray literature, streaming video of traditional healers, and oral histories. These collaborations will also help ensure a database with a comprehensive list of research projects being done in the Arctic, from the international to the local level.

4. Possible Speciation in the Orchid Corallorhiza maculata.

Clement C.
christopher.jc@hotmail.com

Corallorhiza maculata is a widely-distributed orchid that is non-photosynthetic and parasitizes on fungi. It gathers nutrients by extracting carbon and nitrogen from the hyphe of mushrooms that enter its roots. Currently it is believed that there are six varieties of C. maculata, each of which associates with a different group of fungi. Our hypothesis is that there is speciation occurring in C. maculata. We gathered fifteen plant samples from five different states and extracted the DNA. We amplified the internal transcribed spacer region and a chloroplast locus located in the DNA sequence of each sample. We then compared these DNA sequences and created two phylogenetic trees using the computer programs Sequencher, Bioedit, and MEGA 4. By looking at the two phylogenetic trees, we were able to determine that several plants were genetically more related to plants in a different state, than to plants growing alongside them. This concludes that genetic difference is not correlated with geographical distance, which is possible evidence for speciation in C. maculata.

5. Description and Dynamic Model of a Sustainable Rural Alaskan Village.

Cole H.
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A simulation and visual depiction is presented which shows the functional relationship in a rural Alaska village between the natural resources of wood, water, wind, sources of diesel and alternative power and the uses of that power for energy utilization, government village activities, community and citizen homes, schools and municipal offices. Private sector enterprises are also included such as development of saleable produce from a greenhouse, ecotourism, fishing, or firefighting. The point of this exercise is to ╥connect the dots╨ and show that it is always necessary to view the village system in a comprehensive manner in order to devise successful public policy public leading to sustainability and the greatest economic benefit. Comprehensive analysis of existing villages often reveal lacks and deficiencies in village businesses and infrastructure and thus suggests possible areas of village growth. Through this simulation exercise we seek to identify the elements which can make this village sustainable.

6. Ascension: Exploring the Art of Denali.

Duffy A.
University of Alaska Fairbanks • aduffy@alaska.edu

Art and science share common ground. Both disciplines promote inquiry and discovery, and through these processes reveal insights that can leave our ideas about the world forever changed. ╥Ascension╨ explores the synergy between art and science through the fine arts and ethnology collections of Denali National Park and Preserve and the University of Alaska Museum of the North. The artwork in the park collection was created in large part through its Artist-in-Residence Program that provides artists the opportunity to focus an inquisitive eye toward the park environs. Additional work from the museum's collection broadens the scope of that artistic investigation both geographically and in time. Each piece in the exhibition builds upon the elements of observation, examination, and a desire for understanding – all of which are qualities fostered and highly valued in scientific realms.

7. Involvement of Cytokine IL-IRa in Regulating the Secretion of VEGF in SH-SY5Y Neuroblastoma Cells.

Duffy L., Nicholas-Figueroa L., Dunlap K.
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Cancer, inflammation and neurodegeneration are associated with cellular features of signal transduction associated with molecules originally identified with the immune system. For example, cytokines such as interleukin-1 (IL-1), IL-6,

and tumor necrosis factor-a (TNF-a) have been associated with transformed cells and Alzheimer's Disease neuritic plaques. The expression of IL-1 and IL-1Ra, are currently not well understood in human neuroblastoma cells. To further study the role of cytokines in early stage neuroinflammation, neurodegeneration and brain cancer, SH-SY5Y neuroblastoma cells were characterized for the presence of the IL-1 and IL-1Ra as well as vascular endothelial growth factor (VEGF). The expression of these cytokines was measured using a sensitive ELISA assay before and after stressing the cells with TNF. Intracellular IL-1RA (icIL-1RA) levels increased (13.6 g/mL) after exposure to TNF-a when compared to non-treated cells (NT) (6.7 g/mL). VEGF levels in the culture supernatant had increased levels compared to the control of 217.3 g/mL and 172.2 g/mL, respectively. Since berries are high in antioxidant and polyphenolic capacity and are known for their therapeutic benefits, we researched the inhibitory effects on neuroinflammation using partially purified extracts of the wild Alaskan Bog Blueberries (BBX) on these cytokines and VEGF. The cells were pretreated with different BBX prior to TNF-a exposure. BBX fraction 8 increased icIL-1Ra protein levels (25.2 g/mL), while returning VEGF levels to normal. In conclusion, we hypothesize that compounds in this blueberry fraction enhance the signal transduction feedback leading to a restoration of the intracellular balance between IL-1Ra and IL-1 signals. Supported in part by NIH SNRP/NINDS grant 2U54 NS041069-09 A1 and USDA 2009-34495.

8. Lipid Profiles in Subsistence Fed Sled Dogs along the Yukon River.

Dunlap K., Reynolds A., Gerlach S., Duffy L.
University of Alaska Fairbanks • fskld2@uaf.edu

The switch to grains and dairy during the agricultural revolution initiated a decline in the use of traditional foods. This was followed by the advent of food processing in the industrial era and the start of the ┗western diet'. As a result, diets saw a dramatic decline in omega-3 fatty acids and a concurrent increase in saturated and omega-6 fatty acids that persists today. Historically, many populations, including circumpolar people have had a low incidence of obesity, diabetes and cardiovascular disease and this is largely attributed to polyphenolic compounds and omega-3 fatty acids offered from subsistence foods. Today fewer people live a traditional subsistence lifestyle, but some Alaskan Natives still do. In this study, lipid profiles were done on subsistence fed village sled dogs along the Yukon River who were maintained largely on salmon and compared to a control kennel maintained on commercial food. As expected, omega-3 fatty acids were higher in village dogs compared to control and vice verse for saturated and omega-6 fatty acids. Previously published mercury levels from these sled dogs revealed a positive correlation with omega-3 fatty acids found in fish and a negative correlation with omega-6 fatty acids typical of a westernized diet. Sled dogs eat much of the same foods as their human counter parts and continue to provide an ideal model for researching health implications of subsistence lifestyles.

9. Trophic ecology of non-native Alaska blackfish (Dallia pectoralis) in Cook Inlet Basin, Alaska.

Eidam D., von Hippel F., Lopez A.
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The Alaska blackfish (Dallia pectoralis) is a small freshwater mudminnow endemic to Beringia. Alaska blackfish occur on the Chukotka Peninsula of Eastern Russia, across Western Alaska, Central Alaska in the Yukon River drainage, and on the North Slope. First introduced to Southcentral Alaska in the 1950s, Alaska blackfish are believed to inhabit most Cook Inlet Basin waters. The species exhibits extreme hardiness from an ability to breathe atmospheric air and also legendary cold-tolerance. Alaska blackfish ecology is poorly described, and fisheries managers express concern over possible predation of introduced blackfish on native salmonids as well as competition with native fishes for food. The aims of this study are to describe diet of non-native Alaska blackfish across seasons, sex, and age. Specimens are collected every month for a full year from a wetlands pond, stream, and lake. Morphometric measurements include gape width, eye diameter, and gill raker counts. Stomach contents are dissected and quantified by percent frequency of occurrence, percent abundance of food items, and percent volume for calculation of the index of relative importance (IRI). Intensity of feeding is measured by an index of fullness. Percent empty stomachs is also calculated. We expect non-native blackfish to be zoophagous opportunistic feeders whose primary diet consists of assorted invertebrates. We also expect non-native blackfish to be piscivorous on smaller conspecifics, native juvenile salmon and threespine stickleback.

10. Social-Ecological Relationships Between Anchorage Residents Water Quality and Quantity.

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A community's resilience to change is, among other things, dependent on their ability to perceive a change in a changing environment. Water resources are one important component of the environment that is subject to environmental changes, including climate change. This study attempted to answer three questions concerning an individual's understanding of social and ecological relationships within the Anchorage watershed. First, are the perceptions of Anchorage residents with respect to local waterways directly correlated with physical measurements of water quality and availability? Second, is there a divergence between perceptions and water quality measurements in Anchorage, and does this differ significantly from the perceptions of residents in villages on the Seward Peninsula. Third, does the observed relationship between perceptions and water quality measurements support the Technology Induced Environmental Distancing (TIED) model. A questionnaire survey was undertaken of users of the three main waterways that run through urban Anchorage in summer 2009 and 2010. This social survey was designed to measure respondents' perceptions of change in water quality and quantity in Ship Creek, Campbell Creek, and Chester Creeks. Recorded water quality changes based on empirical measurements were based on data collected by the Anchorage Waterways Council. Water quantity changes were based on data collected from the U.S. Geological Survey gauging stations along the waterways. Preliminary analysis shows that there are fluctuations in an individual's perceptions based on age, time spent outdoors and the interactions that an individual has with the creeks. The data suggests that there are some aspects of creek quality and quantity that Anchorage residents are able to perceive. The data also suggest that there are some factors regarding perceptions of water quality for Anchorage residents that correlate with rural residents in Seward Peninsula communities.

11. The Arctic Research Consortium of the United States (ARCUS).

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The Arctic Research Consortium of the United States (ARCUS) is a nonprofit membership organization composed of universities and institutions that have a substantial commitment to research in the Arctic. ARCUS was formed in 1988 to serve as a forum for planning, facilitating, coordinating, and implementing interdisciplinary studies of the Arctic; to act as a synthesizer and disseminator of scientific information on arctic research; and to educate scientists and the general public about the needs and opportunities for research in the Arctic. ARCUS, in collaboration with the broader science community, relevant agencies and organizations, and other stakeholders, coordinates science planning and educational activities across disciplinary and organizational boundaries. Examples of current ARCUS science planning activities include: serving as the project office for the multi-agency Study of Environmental Arctic Change (SEARCH) program, providing support to the related Bering Ecosystem Study (BEST), and serving as the Science Management Office for the National Science Foundation (NSF) Arctic System Science (ARCSS) Program. ARCUS' central educational activity is PolarTREC (Teachers and Researchers Exploring and Collaborating), an International Polar Year (IPY) program whereby K-12 educators and researchers work together in hands-on field experiences in the Arctic and Antarctic to advance polar science education. Additional science planning, educational, information, and outreach activities include, among many others, the Witness the Arctic newsletter, the Arctic Visiting Speakers' Series, the ArcticInfo listserve, the Internet Media Archive (IMA), and the annual Arctic Forum conference. More information about these and other ARCUS activities can be found at the ARCUS website at: http://www.arcus.org.

12. Electric Cars in Arctic Regions: Implementation of Quantitative Measurements of Air Pollution Effects and Potential Impact on Permafrost.

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Electric vehicles (EVs) are cars that run on electricity stored in batteries. Electric cars could greatly reduce the amount of carbon dioxide emissions in our environment, which in turn could lessen the effects of global warming and slow the melting of permafrost in our region. Electric vehicles could also change the way drivers operate in cold regions, since preheating of the engine is not necessary. Thus this project will involve physical and social processes. This research focuses on the implementation of quantitative measurements of electric car effects on carbon dioxide emissions in a region where CO2 affects permafrost. We have installed several instruments on the electric car. In this Phase II study, we collected and analyzed the performance data and their impact on air pollution and energy consumption in cold regions. The data are critically needed by many researchers to evaluate alternative energy use in cold regions. Outreach wise we did very well. A total of six electric car conversion course have been taught. Three of the courses were in Rural communities. We would like to utilize more vehicles in these communities to collect more data and prove sustainability. UAF has added ES 166: Electric Car Conversion to the catalog. We also were able to compete successfully in the 2009 SAE Clean Snowmobile Challenge with an electric snowmobile which finished with the farthest

range of 16.6 miles in slush, and our team finished second overall. The environmental and health-related advantages of electric cars include (i) reduction of emissions of carbon dioxide, a green house gas that contributes to global warming; (ii) lessening cancer risk from exposure to toxic air contaminants such as benzene; and (iii) reduction of oil consumption and dependence on imported oil.

13. Possible New Species in Eritrichium Genus in Alaska.

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Our research project focused on identifying how many species of Eritrichium spp. exist in Alaska. Our group efforts were a small piece of a larger puzzle known as the "Florals of North America," a project attempting to identify all the species of plants in North America. We compared the three species of Eritrichium found in Alaska by sequencing the TRNSG and RPS16 genes. The samples will be mailed to the a lab in Washington state for sequencing. There are currently three recognized species of Eritrichium in Alaska: E. splendens, E. aretioides, and E. chamissonis. The samples were collected in Kodiak, the interior of the state, and northern Yukon territories. There is suspicion of another species of Eritrichium, due to a sample collected with a slightly longer root system. I hypothesize that no other species will be found in Alaska. All of the existing species overlap geographically. I hypothesize that if there was another species, if would have been found among other collection sites. There is still much work to be done before I can write up our findings.

14. Ice Fishing in an Ice Dependant World: The Impact of Climate Change on Spring Subsistence Ice Fishing.

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Ice fishing has been an important part of the local economy in communities in Alaska for millennia. Fishing through the ice for freshwater fish is especially important in the spring when food stored through the winter begins to run out and game becomes scarce. Indigenous peoples in Alaska fished through the ice using jigging equipment as well as nets to catch large numbers of freshwater fish throughout late winter and early spring before the salmon return. Ice fishing today is still a strong component of the local subsistence economy in many communities in Alaska, as well as across the North. Fishing occurs mainly in the spring as the days warm and residents can spend considerable time on the ice. Climate change though is bringing breakup on lakes and rivers earlier than in the past, making travel on the ice dangerous. In addition in some areas lakes and rivers are completely drying up and disappearing. This paper will examine ice fishing through a cultural and economic context in Alaska's rural communities.

15. Confronting Bear Management in the Changing North — Future Foci for Efficient Sustainable Adaptive Management Strategies.

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Resource development and the expansion of industrial activity contribute to problems concerning natural resource use, especially in relation to water. As a result wildlife has to adapt to increasing rural and urban development. These effects are driven by governmental policies of economic growth, an increasing human population, and the resulting human footprint. In northern ecosystems wildlife in general, but especially bear species and humans alike have tremendous interest in rivers during salmon run season. In some parts of the world strict regulations have been established to regulate fisheries and to assure salmon numbers in rivers meet ecosystem needs (e.g. Alaska). In other regions regulations might exist, however their implementation, the education of local people, and poaching control are absent (e.g. Russian Far East). Independent of official regulations, in either region overfishing and damming of rivers does occur and has tremendous effects on ecosystem stability. Additionally during recent years human-bear conflicts have increased along with human population growth in the Russian Far East and in Alaska. Whichever factor is the major trigger - economy, population or ecosystem - such incidences bring into question existing management strategies. Adams et al. (2010) and Woodroffe et al. (2005), among others, conclude that adaptive resilient wildlife management has yet to be accomplished. Its application reveals substantial implementation problems. A major shortcoming in applied wildlife management is the need for researchers to understand the linkage between social and ecological sciences within an interdisciplinary framework when managing wildlife and human interests. This study compares the current state-of-knowledge and problems in relation to human-brown bear conflicts along the Pacific

Rim (Alaska and Sakhalin Island), identifies reasons for failures in the past, and makes suggestions for improving future brown bear management approaches across regions.

16. Some Insights on Community Perceptions of Change in Water Resources: Potential Rules for Building Resilience and Promoting Adaptation.

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Historical and contemporary relationships between people and a changing environment can offer insights for modeling and management that promotes social-ecological resilience, even under unfamiliar conditions of change. Of particular importance is the need for continued existence of high quality freshwater resources on which communities rely for subsistence and proximal use of natural resources (e.g., fish). In this paper, we provide evidence that our understanding and modeling of the diverse responses by human networks to change may be better informed by understanding several facets that contribute to the perception of change by individuals in Arctic communities. We provide data from an on-going collaborative study on Seward Peninsula which reveals that community resilience at local scales may be significantly influenced by the way individuals perceive changes in their water resources.

17. Dynamic Temperate Rainforests: Local Ecological Knowledge as Significant Baseline Data.

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The focus of my study has been the timing of harvest of cedar bark and spruce roots for basketry. Tlingit and Haida people knew when to gather weaving materials based on ecological knowledge which had been passed on through generations. However, the timing of the harvest has been changing these past few years. My research addresses the questions of how human activities such as building roads and houses and cutting trees affect spruce roots, and how global climate change may be impacting the areas that are harvested for basketry materials. For instance, yellow cedar now grows in the Juneau area, which it previously didn't grow. I have been measuring soil and air temperature in a spruce gathering location to see if the scientific data matches the timing of the traditional harvest. Local ecological knowledge can help inform scientists with baseline data regarding climate change.

18. Design of a Rainwater Harvesting System For Irrigation of Raised Beds.

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Fairbanks, Alaska, has a relatively low annual precipitation (approx. 11 ㍑ per year) and rates of evapotranspiration often exceed rainfall in the summer months. Rainwater harvesting can help meet the summer demand for water, particularly for gardening. To this end, a rainwater harvesting system was designed to provide irrigation water for a series of raised beds to be built at the Georgeson Botanical Garden. The water is filtered to remove pollen, dust, and some biological contaminants, but does not result in potable water. The catchment area for the system is an 895 square foot roof covering an outdoor classroom. The volume of water that could be harvested monthly and the volume of water needed by the beds (which will cover approximately 1,500 square feet) were estimated. In keeping with the mission of the Georgeson Botanical Garden, a series of educational panels was developed to explain the calculations needed to design the system to Garden visitors. In addition, an Excel-based calculator was created for the Garden website so that interested persons could design their own system and estimate the extent to which such a system would meet the demands of their garden.

19. Policies that Might Restrict Arctic Data in Climate-change Negotiations.

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Reports from the UN's Intergovernmental Panel on Climate Change (IPCC) provide the main scientific input to the UN's Negotiating Text; the draft Text summarizes specifically that deep cuts in global emissions are required . . . as documented by the IPCC Fourth Assessment Report . . . Climate changes in the Arctic are substantial, especially in the permafrost and summer sea-ice cover. So, I reviewed those physical subjects in the Fourth Assessment Report (AR4). I focused on two aspects: the IPCC-selected authors and reviewers, and the frequency and timeliness of AR4. The U.S. authors and reviewers included “the best” Arctic physical scientists in my opinion. However, the IPCC policy

of seven years between assessments probably restricts the use of current Arctic data in climate-change negotiations. For example, AR4 was published in 2007. The IPCC requirement for published references meant that it included data through only 2005. The AR5 won't be published until 2013. Is pre-2006 summer sea-ice data representative of the present conditions, and will the pre-2006 data be representative of the Arctic conditions until 2013? The schedule restriction might be relieved if the IPCC adopts interim updates of Arctic conditions, especially updates that are written and/or peer-reviewed within multiple countries. A related solution might be a reduction of the time burden on authors and reviewers due to interim reports for the IPCC. The burden could be reduced by, for example, NSF support for graduate assistants through their IGERT program. Similar international work is conducted by the State Department, so maybe the department would help fund U.S. contributors to interim Arctic reports for the IPCC? UN policies require registration of conference Observers. Registration doesn't imply that Observers are for or against the negotiations; it implies simply that they are listening to – and concerned about – the negotiations.

20. Role of Adiponectin (adipoQ) Gene in Obesity.

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Traditionally, communities in Southwest Alaska consumed diets containing “healthy fats”. This includes land animals, fish and birds. As Western civilization began to emerge in Alaska, the diet for Alaskans began to change. An increased amount of Western food led to increased obesity, diabetes and heart disease. There are two factors that relate to obesity: heart disease and diabetes. The environment relates to these three diseases through diet and exercise. The Alaskans that consumed these healthy fats, including omega 3, did not suffer from obesity, diabetes or heart disease. Genetics, another factor, plays an important role relating to these diseases. A small subset of Alaskans was tested to determine where a certain SNP (Single Nucleotide Polymorphism) resided in the adiponectin (adipoQ) gene. This SNP relates to obesity, heart disease and type 2-diabetese. The SNP percentages have been reported in Caucasian populations but not in Alaskans in Southwestern communities. In case white blood cells were ╥lost╙ a test was run to determine if serum, red blood cells or dried whole blood spots would give the next best results next to while blood cells. It is assumed that whole dried blood spots would give reliable DNA results but for an unknown reason red blood cells and serum had high levels.

21. A Review of Traditional and Indigenous Knowledge and Practices Related to Natural Disasters.

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Public health emergency and disaster preparedness and planning have emerged to the forefront since increasing and seemingly more intense natural events are occurring worldwide. It is not uncommon for communities to be affected by recurring natural disaster events. Collaborative efforts strengthen and improve community preparedness. A literature review of international references was conducted on traditional and indigenous knowledge and practices as they relate to the occurrence and mitigation of natural emergency and disaster events and population resiliency. Key points were highlighted from peer-reviewed journal articles, academic studies, and organization project reports which involved cultures and communities throughout the world. Traditional and indigenous societies and communities have sustained knowledge systems for decades if not generations. Traditionally, understanding patterns of nature through detailed observations of multiple external factors has previously led to predictability of outcomes. Survival and adaptive integrity have been a process of changing over time and are significant for related environmental and health issues today. For effective reduction of natural disaster risks in local communities, the value of traditional and indigenous knowledge have been recognized at some locations and incorporated into risk assessment, disaster preparedness and planning strategies as well as risk communication. Examples of community understanding of events, preparedness and interventions are highlighted to illustrate local organizational knowledge, technical and non-technical knowledge, and communication strategies. Key points on past experiences, trade-offs, perceptions, and beliefs related to specific natural disasters are discussed. Local insights on natural disaster issues that affect their communities are invaluable and make a significant contribution to community-based preparedness planning and mitigation projects, programs, and policies.

22. Benthic Faunal Zones of Nushagak Bay.

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Nushagak Bay is a large estuary covering about 80 km2 in southwestern Alaska. The estuary trends primarily north to south and is fed by several rivers including the Nushagak, Wood, Igushik, and Snake Rivers. As the host one of the world's largest sockeye salmon runs it has been studied primarily in terms of sustaining salmon fisheries. However, given the estuary's importance, there have been few comprehensive benthic studies describing the fauna. Over the summers from 2007 to 2010 we made 35 otter trawls that sampled over 70,000 m3. Throughout the estuary the dominate species in numbers and biomass include bay shrimp (Crangon alaskensis) and Gammarid amphipods (Gammarus sp.). Fin fish species are more specific with faunal zones and salinity but wide-spread species include the starry flounder (Platichthys stellatus) and Spinyhead sculpin (Dasycottus setiger). We found that estuary fauna can be divided into 4 zones based on salinity, tidal current strength (turbidity) and bottom sediments. The entire estuary was found to have a low Shannon Diversity (H') value of 1.54 but diversity increase southward and as salinity increases. The low diversity of Nushagak Bay is most likely due to its low salinity, strong currents, and high turbidity."

23. Challenging the Myth of Freshwater Abundance in the Canadian North: Critical Concerns and Contemporary Policy Opportunities.

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There is popular misconception that our northern waters are overwhelmingly abundant, and will continue to be so, as a result of the careful stewardship of territorial and federal governments in Canada. This paper subverts this stereotype through the identification of several pressing concerns about the real health of our freshwater sources in the North. Current capacity gaps in Canadian water governance represent fundamental challenges to the northern aboriginal ways of life, where populations are completely dependent on the immediate availability of freshwater in order to successfully subsist on the land. The Mackenzie River Basin is selected as a case study to articulate the particular consequences of a multiplayer inter-jurisdictional watershed. This paper argues that Northern waters are significant on local, regional, national, and even international scales. The connection between the careless practices undertaken in upstream jurisdictions and the overwhelmingly negative effects seen downstream are underlined. This uneven relationship acts as a lens through which the mismanagement of our critical watersheds can be better understood. Discussions of pollution, upstream disruption in natural flows, northern development pressures, fears of water export and diversion, and climate change are held in contrast to the current difficulties implicit in northern governance structures. Fifteen participants were selected and interviewed in light of their unique expertise in areas of water science, law, and policy; northern governance, industrial development, and traditional indigenous knowledge. The paper considers what conclusions can be drawn from the insights of these northern experts; all of whom have had considerable experience working in what is arguably one of the world's most significant watersheds.

24. Regional Variations in Sea Ice Extent.

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The arctic system is undergoing unprecedented changes, many of which result from global warming trends that are amplified at high latitudes. Most climate models predict that high latitudes will experience a much larger rise in temperature than the rest of the globe over the coming century. These changes are particularly evident in recent observations of Arctic sea ice extent. From 1980 through 2008, minimum (September) sea ice extent decreased by 40%, whereas maximum (March) sea ice extent decreased by only 8%. The present study evaluates the spatial dependence and the drivers of these trends. We divided the Arctic Ocean into four quadrants based on longitude: 46 W to 45 E (Atlantic quadrant), 46 E to 135 E (Russian quadrant), 136 E to 135 W (Pacific quadrant), and 136 W to 45 W (Canadian quadrant). While three of the four quadrants followed similar trends to the overall sea ice loss, sea ice extent in the Atlantic quadrant (46 W to 45 E) decreased by 16% in September and 30% in March, a seasonality opposite to that of the global trend. Our hypothesis is that Arctic summer winds move sea ice from other quadrants into the first quadrant, masking September sea ice loss, whereas warmer Atlantic waters are quickening the rate of decline in the Atlantic quadrant March sea ice extent. To test this, we compared Atlantic quadrant March sea ice extent to mean Northern Atlantic Ocean temperatures, and compared mean summer wind velocity along the 180 degree meridian from 70N to 90N to September sea ice extent in the Atlantic quadrant. We used NSIDC's passive microwave datasets for sea ice extent and NCEP/NCAR reanalysis for Atlantic Ocean temperatures and Pacific wind patterns. The results support the role of Atlantic Ocean temperatures in the variations of the Atlantic sector sea ice, while the trans-polar winds show a weaker relationship to the variations.

25. Alaska Center for Ocean Science Education and Excellence: People, Ocean, and Climate Change.

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The Alaska Center for Ocean Science Education Excellence (COSEE)is a five-year National Science Foundation-supported program launched in 2008 that promotes and supports high-quality science outreach and education efforts and increased literacy about Alaska ocean climate change. The Center is one 12 centers nationwide that support and enhance the efforts of scientists to identify the broader impacts of their research and to design and implement effective education, outreach, and communication strategies and activities. The Alaska Center's thematic focus is on the Arctic, climate change, and the integration of Alaska Native knowledge with western science. Partners include the University of Alaska's School of Fisheries and Ocean Sciences, Center for Cross-cultural Studies, and Alaska Sea Grant program along with the Anchorage School District, the Alaska Sea Life Center, and the Alaska Ocean Observing System. COSEE Alaska promotes the effective science communication with activities for a network of more than 500 scientists, educators, science outreach specialists, and media specialists. The activities include an annual workshop provided in conjunction with the Alaska Marine Science Symposium, the SEANET listserve and online networking site (http:oceanseanet.ning.com), a regional resource directory to link scientists and educators, educator-scientist workshops, and a graduate-level course communicating ocean science which will be offered at UAF in spring, 2011. COSEE Alaska's unique program of ocean science fairs provides opportunities for rural Alaska students to combine scientific inquiry with cultural relevance, and for scientists and elders to work together as science project mentors and science fair judges.

26. The Ethnography of Water.

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This presentation is a preliminary exploration related to the presence of water systems and the influence of water as a dimension of cultural identity for Alaska communities. At a time when research efforts related to climate are focused on physical and biological transitions, a review of human culture systems and how they will respond to changes is also important. Change will ultimately be interpreted via human dimensions. The physical presence of water in Alaska is prominent in many features: oceans, glaciers, rivers, lakes and weather systems. I will begin the presentation with a visual outline of the large-scale water systems in the geographic range of Alaska to suggest locations where water may have a particularly notable influence on community identity. I will investigate the varied ways that human culture and society interact with water systems for food (subsistence and commercial), occupation, transportation, residency preferences, aesthetics and other social features. There is a metaphorical feature related to the presence of water and this can be examined via ethnophysiography (Mark and Turk 2003). I expect to encounter a sense of regionalism in the way that residents of a certain location describe their proximal landscape and apply human philosophical meaning on the space and place of the local environment. Knowledge and cultural perception of local water systems will vary from resident to non-resident, outside researcher to community occupant. The heart of this project is in human meaning and value systems and the questions that may provide comprehensive answers to this theme include: How does the cultural concept of water influence human well-being? How are transitions in concepts related to water experienced and interpreted by different human communities? What regional, cultural and individual interpretive variations regarding the meaning of water exist? These questions extend beyond social science and integrate the realms of arts and humanities.

27. Sustainable Agriculture and Food Security in the Circumpolar North: Environmental, Geophysical, Biological, and Socio-cultural Challenges and Potential Solutions.

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Localized sustainable agriculture is becoming increasingly important in circumpolar regions to address problems of insufficient food supply, the high cost of fresh and healthy foods, and poor food security. Countries having a presence in the circumpolar North vary in government policy and history with respect to local food production and supply, and this affects to the current state of agriculture in these regions today. Alaska is capable of meeting a much greater portion of its residents' food demands through local agriculture integrated with other subsistence and personal use activities (e.g., hunting, gathering, fishing). Yet, it depends heavily upon expensive, imported produce and meat products despite having an abundance of available natural resources that could be used in a sustainable

fashion to increase the level of subsistence and commercial agriculture. The disparity between the level of local food supply and food demand in Alaska and some other Northern regions is the result of a suite of environmental, geophysical, biological, and socio-cultural challenges — many of which have not yet been fully identified, characterized, or overcome. The recognition of the various factors and limitations that influence local food production at high latitudes, as well as the identification of avenues for sustainable solutions to underlying problems, will help to build a foundation for improving local food production and food security, strengthening local economies, bettering nutrition, and bolstering community resilience in an area of the world that is often assumed to be too inhospitable for growing.

28. Using Dual Energy X-ray Absorptiometry (DXA) to Measure Seasonal Changes in the Body Condition of Northern Redbacked Voles, Clethrionomys rutilus.

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Dual-energy x-ray absorptiometry (DXA) is a nondestructive technique that can potentially measure specific components of whole-body composition in free-living and lab-raised animals. Our aim was to test the ability of DXA to measure the composition of a common arvicoline rodent, the northern redbacked vole (Myodes rutilus). We used a DXA apparatus to obtain measurements of fat mass (FM), lean mass (LM), bone mineral content, bone mineral density, and fat-free mass (FFM) in carcasses of free-living and lab-raised voles. We then used chemical carcass analysis to derive predictive algorithms for actual values of FM, total body water, total protein, total mineral, LM, and FFM. Unexplained error in the equations for all voles grouped collectively ranged from R2 = 0.82 to R2 = 0.98. The DXA FM measurement had the highest coefficient of variation, and it was higher for free-living voles than for lab raised voles. However, FM can be determined by difference with excellent precision by using the FFM equation (R2 = 0.98). We also derived corrective terms for passive integrated transponder–tagged animals. Thus, DXA is a nonlethal, nondestructive tool capable of precisely and accurately measuring many specific parameters of whole-body composition in small free-living and lab-raised rodents.

29. Understanding the Evolutionary History of the Protacanthopterygii Superorder.

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Reviewing the SVEP gene locating the different sequences in each species to see how diverse they became over time. My hypothesis: Salmoniformes and Esociformes are more closely related than Salmoniformes and Osmeriformes. In trying to find the relation between the Protacanthopterygii Superorder, our research found that the relation between the salmon and smelt were far more related than the salmon and pike. Using the SVEP1 Gene (Sushi, Von willebrand factor type A, EGF and Pentraxin domain-containing protein 1-like) to track the differences in each species locating the mutations and determining the changes over time. We concluded that the pike and salmon were more closely related.

30. Alaska EPSCoR and the Co-Op Extension: Science By Alaskans, Science For Alaskans.

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The Alaska Experimental Program to Stimulate Competitive Research (EPSCoR) is a university-based organization that seeks to increase Alaska's scientific capacity through the strategic investment of state and National Science Foundation research funds. In existence since 2001, EPSCoR currently focuses research on the environmental and social changes taking place in Alaska, via the fields of biology, physical science and social science. EPSCoR funding supports Alaskan research in a variety of ways, but its primary function is supporting UA faculty and staff members in key areas and awarding research and travel grants to faculty members and students at all levels. Alaska EPSCoR also operates a public engagement program which includes dissemination of research results, workforce development activities, and a robust K-12 education program geared toward increasing diversity in the science, technology, engineering and mathematics (STEM) fields. This year Alaska EPSCoR has also initiated a new partnership with the Alaska Cooperative Extension Service to promote science education and develop more effective means of increasing engagement with our research by rural residents and by Alaskans in general.

31. The Alaska Water (d18O, dD) Isotope Network (AKWIN): Precipitation, Lake, River, Ice and Stream Dynamics.

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The hydrologic cycle is central to the function and structure of northern landscapes as well as the basis for interactions between terrestrial, aquatic, marine and atmospheric processes. Understanding the processes and the spatial patterns that govern the isotopic (d18O & dD) characteristics of the hydrologic cycle is especially important today as: a) modern climate/weather-isotope relations allow for more accurate interpretations of climate proxies as well as the calibration of atmospheric models, b) water isotopes facilitate understanding of storm tracks in regulating precipitation isotopic variability, c) water isotopes allow for estimates of glacial melt water inputs, d) water isotopes allow for quantification of surface and groundwater interactions, e) water isotopes allow for quantification of permafrost meltwater use, f) water isotopes allow for the estimate of migratory bird forensics, g) water isotopes are critical to estimating field metabolic rates, water isotopes allow for crop and diet forensics and h) water isotopes can provide insight as to evaporation and transpiration processes. As part of a new NSF MRI project at the Environment and Natural Resources (ENRI) at UAA and an extension of the US Network for Isotopes in Precipitation (USNIP); we are forming AKWIN. The network will utilize long-term weekly sampling at Denali National Park and Caribou Poker Creek Watershed (USNIP sites-1989 to present), regular sampling across Alaska involving land management agencies (USGS, NPS, USFWS, EPA), educators, volunteers and citizen scientists, UA extended campuses, individual research projects, opportunistic sampling and published data to construct isoscapes and time series data bases and information packages.

32. Precipitation Variability and Trends in Alaska.

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Precipitation amounts show very large variations in Alaska, from the very dry North, e.g. Barrow with a long term annual mean value of 4.16"", to the wet Southeast, e.g. Little Port Walter with a value of 225.53"". Differently expressed, Little Port Walter receives on average as much precipitation in a week as Barrow in a year. In recent times, due to global warming, the ratio of rain to snow fall has increased. This is especially pronounced in Southern Alaska, where we have temperatures, which are frequently close to the freezing point. Long-term trends for Interior Alaska show a decrease in precipitation. Over the last century we observed for Fairbanks a decrease of 11%, while the temperature increased by 2.5ïF over the same time period. This leads to more frequent droughts, and causes not only more frequent, but also more intense wildfires. In the American Arctic, both for the Alaskan as well as for the high latitude Canadian stations, a decrease in precipitation and snow depth was observed. This decrease was especially pronounced in winter. Both, station observations as well as satellite monitoring of North America snow cover revealed a significant decreasing trend in the mid-spring snow cover since 1972, the start of reliable satellite observations. Looking at the short-term trend, the first decade of the 21st century, the picture is more mixed. Most of Alaska, especially the western part, shows a substantial decrease, Cold Bay giving the maximum value of 62%. On the other hand, Big Delta gave an increase of 17%. Precipitation is, in contrast to temperature, more variable. This is caused by localized showers, which can bring widely varying amounts over short distances.

33. PolarTREC: A Teacher Research Experience Model for Improving Connections Between Arctic Science and Education.

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PolarTREC – Teachers and Researchers Exploring and Collaborating, a program of the Arctic Research Consortium of the U.S. (ARCUS), is a National Science Foundation (NSF) project in which K-12 teachers participate in polar research, working closely with scientists as a pathway to improving science education. The goal of PolarTREC is to invigorate polar science education by bringing educators and polar researchers together through hands-on field experiences. Central to the PolarTREC Teacher Research Experience Model, each year approximately 12 teachers spend two to six weeks in the Arctic or Antarctic, working closely with researchers investigating a wide range of topics such as sea-ice dynamics, glaciology, terrestrial ecology, marine biology, atmospheric chemistry, and long-term climate change. The participants share their experiences with diverse audiences via PolarConnect real-time webinars and online multimedia journals and interactive bulletin boards in the PolarTREC Virtual Base Camp. PolarTREC contributes to the discipline of Science, Technology, Engineering, and Mathematics (STEM) education and pedagogy through a model program conceived and organized according to current best practices, such as pre-research training, mentoring, support for classroom transfer, and long-term access to resources and support. PolarTREC's comprehensive program activities have many positive

impacts on educators and their ability to teach science concepts and improve their teaching methods. Additionally, K-12 students polled in interest surveys showed significant changes in key areas including amount of time spent in school exploring research activities, importance of understanding science for future work, importance of understanding the polar regions as a person in today's world, as well as increased self-reported knowledge and interest in numerous science content areas. PolarTREC provides a tested approach and a clear route for varying levels of researcher participation.

34. SEARCH: Study of Environmental Arctic Change – A System-scale, Cross-disciplinary, Long-term Arctic Research Program.

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The Study of Environmental Arctic Change (SEARCH) is a multi-agency effort to observe, understand, and guide responses to changes in the arctic system. Interrelated environmental changes in the Arctic are affecting ecosystems and living resources and are impacting local and global communities and economic activities. Under the SEARCH program, guided by the Science Steering Committee (SSC), the Interagency Program Management Committee (IPMC), and the Observing, Understanding, and Responding to Change panels, scientists with a variety of expertise – atmosphere, ocean and sea ice, hydrology and cryosphere, terrestrial ecosystems, human dimensions, and paleoclimatology – work together to achieve goals of the program. Over 150 projects and activities contribute to SEARCH implementation. The Observing Change component is underway through National Science Foundation's (NSF) Arctic Observing Network (AON), NOAA-sponsored atmospheric and sea ice observations, and other relevant national and international efforts, including the EU-sponsored Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies (DAMOCLES) Program. The Understanding Change component of SEARCH consists of modeling and analysis efforts, with strong linkages to relevant programs such as NSF's Arctic System Synthesis (ARCSS) Program. The Responding to Change element is driven by stakeholder research and applications addressing social and economic concerns. As a national program under the International Study of Arctic Change (ISAC), SEARCH is also working to expand international connections in an effort to better understand the global arctic system. SEARCH is sponsored by eight (8) U.S. agencies, including: the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the Department of Defense (DOD), the Department of Energy (DOE), the Department of the Interior (DOI), the Smithsonia"

35. Germination Characteristics of Wetland Sedges from Prudhoe Bay, Alaska.

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Developing successful reclamation practices is increasingly important for disturbed sites resulting from petroleum-related development on the North Slope of Alaska. The pedology and hydrology of many sites are similar to natural wetlands, and promoting the development of productive plant communities may be possible by cultivating native wetland vegetation. We tested two wetland sedges that are dominant in wetland communities for germination potential. Testing included determining controls over seed dormancy controls and the effects of harvest date on germination success. Carex aquatilis and Eriophorum angustifolium seeds were harvested from thirty randomly selected sites per species within the Prudhoe Bay oilfield. Each species was harvested three times, at two week intervals, to test for effects of seed maturity. After mechanical separation of filled from empty seeds, filled seeds were chosen randomly for testing for up to 60 days in germination chambers. The percentages of seeds that germinated were compared among harvest locations, harvest dates, constant and alternating temperatures, and seed storage methods (fresh, after-ripened, wet-cold stratified, and after-ripened plus cold-wet stratification). Treatments consisted of 4 replicates, with 100 seeds per replicate. Analysis of variance was used to test for significance differences among germination treatments. Carex seeds displayed good germination success, while Eriophorum seeds did not, suggesting that only the Carex should be considered for reclamation efforts. Carex displayed a maximum germination of 75.2% under conditions of 6 month after-ripening at 4íC, followed by sixty days of cold-wet stratification at 4íC and incubation at 25/10íC. Eriophorum maximum germination was 10.7% after sixty days of cold-wet stratification at 4íC and incubation at 25/10íC.

36. Understanding Changes in Water Resources: Assessing Vulnerability and Adaptation in Indigenous Communities in the Yukon River Basin.

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Alterations in freshwater systems due to climate change have wide-reaching socio-cultural and ecological implications. Indigenous communities, whose livelihood strategies are closely linked with local ecology, are among the most vulnerable to climatic variations. At the same time, Traditional Ecological Knowledge, or the intimate knowledge of the land and water held by these communities contributes to interdisciplinary understandings of climate change impacts and informs adaptive strategies at multiple scales. The Yukon River Basin is an ecologically and culturally diverse international watershed extending through Alaska and the Yukon Territory, Canada. Through an applied case study of Ruby Village, an Alaska Native Village located in the middle river region of the Yukon River Basin, it is possible to gain insight into community vulnerability-resilience to climate change, while revealing a range of adaptation strategies at the local and basin scales. This ongoing research aims to address the gaps in knowledge on adaptation to climate change in the Yukon River Basin and inform policy-maker and practitioner responses to emerging issues in Northern water resources."

37. Systematics of the Alaskan Eritrichium Species.

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We studied the systematics of the Alaskan Eritrichium plants: E. splendens, E. aretioides, and E. chamissonis. We primarily studied the genetics of E. splendens and E. chamissonis by extracting DNA and running it through PCR. We also looked at the morphology of Eritrichium nutlets to be able to, with more data for the data sheets and DNA to compare to, identify each species of Eritrichium. We were also looking to see if speciation was taking place within E. splendens through differences in DNA.

38. Tea Parties and Movement Since the Late 1800s: A Historical Look at Freshwater Values and Human Agency in Chukotka, Russia.

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Since its introduction by Russian and American traders in the second half of the 18th century, tea has consistently remained among the top imported commodities in the Bering Strait region. Over the course of the Soviet period, the custom of drinking tea was increasingly becoming a prominent symbol of hospitality among the Yupik and Chukchi people, and a venue for social bonding in many contexts of daily life. Being the most common and often the only beverage, tea is the main form of the direct dietary consumption of freshwater for the majority of Chukotka residents. Tea is consumed in between and following meals, during everyday and festive eating, out on the tundra and inside one's village home. When talking about the specific taste features that they desire in tea, people emphasize that knowledge and accessibility of excellent freshwater sources are key factors in meeting their high quality standards. Oftentimes, these standards are involuntarily compromised due to lack of supply resulting from seasonal change, absence or malfunction in the delivery services, or inability of individuals or households to reach a freshwater source because of weather or distance. Drawing on historical literature and recent ethnographic field research in Chukotka, this paper illuminates the centrality of tea, and the multifaceted significance of tea consumption, in understanding the relationships between humans and water. It demonstrates that love for tea among the Chukotka residents fosters connectedness with the local landscape and prompts acute awareness of change in the quality and availability of water. While the overall vulnerability varies between communities depending, in part, on physical geography and current environmental conditions, personal mobility and presence of caring social networks are crucial factors in helping individuals procure good water for the “tasty tea."

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