On behalf of everyone at the University of Alaska Northwest Campus and the Conference Steering Committee, we would like to welcome you to the sixth Western Alaska Interdisciplinary Science Conference (WAISC).

We hope to bring together a diversity of people—researchers, educators, and residents of western Alaska—to share and discuss the multitude issues of particular concern to rural Alaska residents, such as subsistence resources, alternative energy ideas, and our need to continue gathering information to gain a better understanding of these issues. We hope that your collaborations at this conference will help to inspire new ideas, solutions, and future cooperative efforts on these issues.

We look forward to meeting new people, discussing the issues, and thinking of future possibilities. Enjoy our conference, have fun, and welcome to Nome!

Claudia Ihl  
WAISC Co-chair  
Assistant Professor of Biology  
UAF Northwest Campus

Gay Sheffield  
WAISC Co-chair  
Bering Strait Agent  
UAF Marine Advisory Program, Northwest Campus

STEERING COMMITTEE

Bob Metcalf  
Director, UAF Northwest Campus

Claudia Ihl  
WAISC Co-chair  
Assistant Professor of Biology  
UAF Northwest Campus

Gay Sheffield  
WAISC Co-chair  
Bering Strait Agent  
UAF Marine Advisory Program

Carol Gales  
WAISC Steering Committee  
Program Development Manager  
UAF Northwest Campus

Jackie Hrabok-Leppijärvi  
WAISC Steering Committee  
Visiting Scholar  
Joint Faculty UAF-NWC / Sámi Education Institute  
High Latitude Range Management & Applied Arts

Kevin Keith  
WAISC Steering Committee  
Fisheries Biologist  
Norton Sound Economic Development Corporation

Julie Raymond-Yakoubian  
WAISC Steering Committee  
Director, Social Science Program  
Kawerak, Inc.

Anahma Shannon  
WAISC Steering Committee  
Regional Backhaul & Recycling Specialist  
Kawerak, Inc.

Mike Sloan  
WAISC Steering Committee  
Director, Tribal Resources Program  
Nome Eskimo Community

Kevin Zweifel  
WAISC Steering Committee  
Director, Office of Environmental Health  
Norton Sound Health Corporation
ABOUT WAISA

Western Alaska Interdisciplinary Science Association

The Western Alaska Interdisciplinary Science Association, or WAISA, is the executive authority that sponsors the Western Alaska Interdisciplinary Science Conference (WAISC) in partnership with local organizers. At its annual general meeting (held at WAISC), WAISA votes on the location of its next meeting and elects representatives. Anyone who attends WAISC automatically becomes a member of WAISA. There are no membership dues.

2012-2014 WAISA EXECUTIVE

**PRESIDENT:** Todd Radenbaugh (2014)

**SECRETARY/TREASURER:** Claudia Ihl (2014)


**STUDENT MEMBER:** David Finney (2013) (high school student from Bristol Bay School District)

**MAJOR DUTIES OF WAISA EXECUTIVE**

**PRESIDENT:** To convene and chair an annual meeting and to convene such other activities as the executive deems appropriate.

**SECRETARY/TREASURER:** To be responsible for notifying all members of details of the annual meeting at least one month in advance of that meeting. He/she shall have charge of the finances of the association, shall be responsible for producing a newsletter, and shall keep the files of the association. The secretary/treasurer shall also provide liaison between members.

**FOUR EXECUTIVE MEMBERS-AT-LARGE:** Responsible for assisting the secretary with liaison between the executive and the general membership. They shall also assist in conducting the business of the association.

**STUDENT MEMBER:** Responsible for assisting the secretary with liaison between the executive and the general membership. The student member shall also assist in conducting the business of the association.

WAISC SCIENCES AWARDS

Colleagues who have demonstrated excellence are presented awards at Thursday night’s banquet.

**EXCELLENCE IN INTERDISCIPLINARY SCIENCE:** Given to an individual showing achievement in interdisciplinary science through contributions in research, teaching, and service in western Alaska.

**LEADERSHIP FOR SUSTAINABLE COMMUNITIES:** Given to an individual or organization to recognize successful initiatives that promote sustainable communities in western Alaska.

**EDUCATIONAL LEADERSHIP:** Given to an educator that has distinguished him or herself as a leader in a western Alaska educational institution through innovative programs and curriculum.

**DISTINGUISHED TEACHING AWARD:** Given to a teacher in Western Alaska who has made extraordinary contributions to the field of science teaching.

**DISTINGUISHED CONTRIBUTIONS IN SCIENCE - WAISC SPECIAL AWARD:** Given to an individual selected by the WAISA conference organizing committee who has shown significant contributions in promoting science in western Alaska.

WAISC STUDENT AWARDS

**INTERDISCIPLINARY SCIENCE STUDENT AWARD:** Award for the best paper on interdisciplinary science presented by a student at the WAISC.

**COMMUNITY STEWARDSHIP AWARD:** Award to the best student paper that shows success and excellence in stewardship in a Western Alaska community.
UAF Northwest Campus is located in the heart of Beringia, a crossroads of cultures and an exciting place to call home. Established as Northwest Community College in 1976, the college became a branch of the University of Alaska Fairbanks in 1987.

NWC serves a population of 11,000 people in Nome and 15 surrounding communities in the 44,000-square-mile Bering Strait region, an area about the size of Indiana. NWC and the villages it serves are entirely off the road system, requiring residents to rely primarily on air travel. Attending college in the traditional sense of on-campus, face-to-face instruction is out of the question for most of the region’s residents. NWC uses both traditional and distance delivery methods for courses. In addition to the main campus in Nome, there are learning centers in Shishmaref and Unalakleet.

NWC offers certificates, associate’s degrees, bachelor’s degrees and master’s degrees in areas of study including allied health, applied business, education, high latitude range management, human services, information technology, rural development, and social work. In 2011, NWC and regional partners were successful in making Nome an outreach site for the UAA School of Nursing associate degree program. Our High Latitude Range Management Certificate Program is unique in the United States. Created in cooperation with employers and area reindeer producers, the program prepares students for natural resource-related jobs or further education in related fields.

NWC responds to vocational, academic and community needs within the region. Many courses, programs and degrees are offered in cooperation with regional health and tribal organizations, school districts and corporations.

MISSION: Northwest Campus provides excellent opportunities for academic, vocational, and community education to the Bering Strait Region.

VISION: Northwest Campus will provide programs to meet our students’ personal and educational goals and to contribute to the success of our communities.

VALUES: Respect for diversity • Innovation • Collaboration • Excellence • Empowerment • Life-long learning
CONFERENCE SESSION CHAIRS

ALTERNATIVE ENERGY & CONSERVATION
TOM MARSIK
Assistant Professor, Sustainable Energy
Bristol Bay Environmental Science Lab
UAF Bristol Bay Campus

CHET CHAMBERS
Sustainable Energy Coordinator
Bristol Bay Environmental Science Lab
UAF Bristol Bay Campus

ART & SCIENCE
CLAUDIA IHL
Assistant Professor of Biology
UAF Northwest Campus

ECOLOGY, CLIMATE & HEALTH
CLAUDIA IHL
Assistant Professor of Biology
UAF Northwest Campus

FISHERIES
KEVIN KEITH
Fisheries Biologist
Norton Sound Economic Development Corporation

MARINE SCIENCE
GAY SHEFFIELD
Bering Strait Agent
Marine Advisory Program
UAF Northwest Campus

REINDEER PRODUCTION
GREG FINSTAD
Manager, Reindeer Research Program
University of Alaska Fairbanks

JACKIE HRABOK-LEPPÄJÄRVI
Joint Faculty
UAF-Northwest Campus / Sámi Education Institute
High Latitude Range Management & Applied Arts

PERSPECTIVES ON SUBSISTENCE & ENVIRONMENT
JULIE RAYMOND-YAKOUBIAN
Director, Social Science Program
Kawerak, Inc.

SOLID WASTE MANAGEMENT
ANAHMA SHANNON
Regional Backhaul and Recycling Specialist
Kawerak, Inc.

MIKE SLOAN
Director, Tribal Resources Program
Nome Eskimo Community

KEVIN ZWEIFEL
Director, Office of Environmental Health
Norton Sound Health Corporation

WATER QUALITY
ANAHMA SHANNON
Regional Backhaul and Recycling Specialist
Kawerak, Inc.

MIKE SLOAN
Director, Tribal Resources Program
Nome Eskimo Community

KEVIN ZWEIFEL
Director, Office of Environmental Health
Norton Sound Health Corporation
Löki Gale Tobin, M.A.
*Rural Development, University of Alaska Fairbanks
Program Specialist, Caleb Lumen Pungowiyi Scholars Program, Kawerak, Inc.*

**Diversity in Science: Inspiring the Next Generation**

Alaska born and raised, Löki is a *Star Trek The Next Generation* fanatic who earned her graduate degree serving in the U.S. Peace Corps Master’s International Program in the Republic of Azerbaijan. Deeply interested in intellectual property rights and the preservation of cultural diversity, Löki is also a mediocre ceramist and a zealous supporter of waste reduction.

Christa P.H. Mulder, Ph.D.
*Chair, Department of Biology and Wildlife and Professor of Ecology
Institute of Arctic Biology, University of Alaska Fairbanks*

**Invasive Plants and Risks for Berry Production in Alaska**

Christa Mulder is an ecologist who works primarily on plant-animal interactions, usually at the intersection of population, community, and ecosystem ecology. Current research include impacts of invasive plants on native plants via pollinator interactions, and effects of climate change on plant phenology and food availability for geese in subarctic saltmarshes.

Michael Y. Brubaker, M.S.
*Director, Department of Community Environment and Safety
Co-Director, Center for Climate and Health
Alaska Native Tribal Health Consortium*

**Climate Change & Community Impacts in the Bering Strait Region**

Born in Juneau and raised in Anchorage, Mike received his M.S. in environmental management from the University of San Francisco. As a Peace Corps volunteer in Hungary in 1995, Mike advised local governments on water and sanitation infrastructure and cleanup of old military sites. Mike worked for 10 years as community services director for Aleutian Pribilof Islands Association, and joined ANTHC in 2008.

R. Dale Guthrie, Ph.D.
*Professor Emeritus, University of Alaska Fairbanks*

**The Science of Art before the Written Word**

Retired University of Alaska Fairbanks professor R. Dale Guthrie holds a doctoral degree in evolutionary biology and paleoecology from the University of Chicago. A 50-year Alaska resident, Dale specializes in Alaska mammalian ecology and evolution. Dale has published widely about Pleistocene fossil art. Dale has taught at Cambridge University UK, the University of Bonn, and the University of Tubingen. He spent two years in Africa working on research projects.
**WEDNESDAY, MARCH 20 - OLD ST. JOE’S**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5pm</td>
<td>Registration <em>(Northwest Campus)</em></td>
</tr>
<tr>
<td>7:00pm</td>
<td>OPENING EVENT: Keynote - Löki Tobin - Diversity in Science: Inspiring New Generations (Old St. Joe’s)</td>
</tr>
<tr>
<td>7:30pm</td>
<td>OPENING EVENT: Community Barn Dance - with Landbridge Tollbooth (Old St. Joe’s)</td>
</tr>
</tbody>
</table>

**THURSDAY, MARCH 21 - UAF NORTHWEST CAMPUS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>7:30am</td>
<td>Registration &amp; Coffee</td>
</tr>
<tr>
<td>8:00am</td>
<td>Plenary Session - Christa Mulder - Invasive plants and competition for pollinators: what are the risks for berry production in Alaska? <em>(library)</em></td>
</tr>
<tr>
<td>9:00am</td>
<td>PERSPECTIVES ON SUBSISTENCE AND ENVIRONMENT <em>(library)</em></td>
</tr>
<tr>
<td>9:20am</td>
<td>A tribal initiative to promote collaborative research and restore subsistence resources - <em>Seaman</em></td>
</tr>
<tr>
<td>9:40am</td>
<td>Community climate adaptation in Unalakleet, Alaska - <em>Aronson</em></td>
</tr>
<tr>
<td>10:00am</td>
<td>Bering Strait and Norton Sound traditions of respectful marine mammal harvesting - <em>Moon-Kimoktoak</em></td>
</tr>
<tr>
<td>10:20am</td>
<td>Changing Values for Ecosystem Services in Bristol Bay - <em>Radenbaugh</em></td>
</tr>
<tr>
<td>10:40am</td>
<td>10-MINUTE MORNING BREAK</td>
</tr>
<tr>
<td>10:50am</td>
<td>Ice seal and walrus harvest mapping to protect indigenous use and articulate local concepts of habitat - <em>Gadamus</em></td>
</tr>
<tr>
<td>11:00am</td>
<td>Arctic food security: Building a conceptual framework on how to assess food security from an Inuit perspective - <em>Behe</em></td>
</tr>
<tr>
<td>11:30am</td>
<td>Sea mammal hunting and community advocacy in Lorino and Sireniki: Two case studies in Chukotka, Russian Far East - <em>Yashchenko</em></td>
</tr>
<tr>
<td>11:50am</td>
<td>Integrating local knowledge and scientific observations to model driftwood harvest from the Yukon River in a changing climate - <em>Jones</em></td>
</tr>
<tr>
<td>12:10PM-1:30PM — Lunch <em>(ON YOUR OWN)</em></td>
<td></td>
</tr>
<tr>
<td>1:30pm</td>
<td>Marine mammal research &amp; “A day in the life” stories - <em>DeFilippo &amp; students</em></td>
</tr>
<tr>
<td>1:50pm</td>
<td>Seal: It could be what’s for dinner (if you’re a walrus) - <em>Seymour</em></td>
</tr>
<tr>
<td>2:10pm</td>
<td>Winter site fidelity of bearded seals in the Bering Sea - <em>Boveng</em></td>
</tr>
<tr>
<td>2:30pm</td>
<td>More marine mammal research &amp; “A day in the life” stories - <em>DeFilippo &amp; students</em></td>
</tr>
<tr>
<td>2:50pm</td>
<td>Using traditional knowledge interviews and participatory mapping to identify drivers of habitat change and fine-scale habitat features for ice seals and walruses - <em>Gadamus</em></td>
</tr>
<tr>
<td>3:10pm</td>
<td>Northern pinniped unusual mortality event (UME): An update on the mystery of sick seals and walruses in Alaskan waters - <em>Sheffield</em></td>
</tr>
<tr>
<td>3:30pm</td>
<td>10-MINUTE AFTERNOON BREAK</td>
</tr>
<tr>
<td>3:40pm</td>
<td>Arctic Eis: An integrated survey of the northern Bering Sea and Chukchi Sea - <em>Weems</em></td>
</tr>
<tr>
<td>3:50pm</td>
<td>Ecosystem health and management in the Nushagak Bay Estuary: PCB contamination and fish waste utilization - <em>Graber</em></td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4:00pm</td>
<td>Alaskan Arctic shelf epibenthic communities: A tale of two seas - Ravelo</td>
</tr>
<tr>
<td>4:20pm</td>
<td>Investigations of estuarine fauna from the Nushagak Bay in Southwest Alaska - Radenbaugh</td>
</tr>
<tr>
<td>4:40pm</td>
<td>Submarine canyons of the Bering Sea - Pletnikoff</td>
</tr>
<tr>
<td>5:00pm</td>
<td>Poster Session - in main building hallway</td>
</tr>
<tr>
<td>6:30pm</td>
<td>WAISC Banquet with Keynote: Mike Brubaker - Climate Change and Community Impacts in the Bering Strait Region (Bering Sea Bar &amp; Grill)</td>
</tr>
</tbody>
</table>

**FRIDAY, MARCH 22 - UAF NORTHWEST CAMPUS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30am</td>
<td>Registration &amp; Coffee</td>
<td></td>
</tr>
<tr>
<td>8:00am</td>
<td>Plenary Session - R. Dale Guthrie - The Science of Art before the Written Word (library)</td>
<td>WATER QUALITY (conference room)</td>
</tr>
<tr>
<td>9:00am</td>
<td>Overview of Norton Sound Fisheries Research and Development Department - Jones</td>
<td>Exploring recreational mining in Alaska - Brubaker</td>
</tr>
<tr>
<td>9:20am</td>
<td>Assessment of red king crab in eastern Norton Sound: Year 1 - Bell</td>
<td>Baseline environmental condition documentation in the Golovin Bay Watershed - Morris</td>
</tr>
<tr>
<td>9:40am</td>
<td>Salmon enhancement in Norton Sound: History and opportunities for the future - Smith</td>
<td>2012 Telida village water quality assessment findings - Dubay</td>
</tr>
<tr>
<td>10:00am</td>
<td>Using juvenile salmon surveys to understand early marine ecology and survival of Yukon River Chinook salmon - Howard</td>
<td>How’s the water? Nome Eskimo Community’s In-stream Water Quality Study &amp; Solid Waste Program - Sloan</td>
</tr>
<tr>
<td>10:20am</td>
<td>10-MINUTE MORNING BREAK</td>
<td></td>
</tr>
<tr>
<td>10:30am</td>
<td>Fishery regulations and their origins with an emphasis on Norton Sound - Lean</td>
<td>Isopod distribution in the Wood River: Investigation of the range of Saduria entomon in the Nushagak Bay estuary - Reigh</td>
</tr>
<tr>
<td>10:50am</td>
<td>Tracking long-term trends in trophic level through carbon and nitrogen stable isotope data of Pacific cod - Misarti</td>
<td>NSEDC’s water quality monitoring program - Keith</td>
</tr>
<tr>
<td>11:00am</td>
<td>Dispersal of Dolly Varden from the Wulik River, evaluated using satellite telemetry - Scanlon</td>
<td>ART &amp; SCIENCE (conference room)</td>
</tr>
<tr>
<td>11:10am</td>
<td>Sockeye salmon rehabilitation in Salmon Lake - Keith</td>
<td>Recycling reindeer via research and handicrafts: Preservation of cultural values - Hrabok-Leppäjärvi</td>
</tr>
<tr>
<td>11:30am</td>
<td>Using natural indicators to predict Chinook salmon run timing in the Yukon River - Howard</td>
<td>A muskox cultural exchange - Ihl</td>
</tr>
<tr>
<td>12:10PM-1:30PM — Lunch (on your own)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:30pm</td>
<td>Reindeer (Rangifer tarandus) 4-H program in Alaska as a platform for math and science education and food security - Aguilar</td>
<td>Low-cost home energy efficiency upgrades: Quantified savings - Chambers</td>
</tr>
<tr>
<td>1:50pm</td>
<td>Sinrock Mary: Reindeer Queen of Alaska - DeFilippo &amp; students</td>
<td>Engineering students design an electric snow-go (2012) - Golub</td>
</tr>
<tr>
<td>2:10pm</td>
<td>Got meat? What are the do’s and don’ts to a quality product? - Finstad</td>
<td>Net zero energy ready home in Dillingham, Alaska - Marsik/Chambers</td>
</tr>
<tr>
<td>2:30pm</td>
<td>Reindeer rangelands of the Alaska Peninsula, 1904-1947 – Lincoln</td>
<td>Statewide occupational endorsement in sustainable energy - Chambers/Marsik</td>
</tr>
<tr>
<td>2:50pm</td>
<td>Reindeer herding in 2043: Your culture, your future - Hrabok-Leppäjärvi</td>
<td>Alternative sources for energy – Marvin &amp; students</td>
</tr>
<tr>
<td>3:10pm</td>
<td>Good versus bad management of reindeer - Davis</td>
<td>Feasibility of LED in a residential home in 2012 - Slatter</td>
</tr>
<tr>
<td>3:30pm</td>
<td>10-MINUTE AFTERNOON BREAK</td>
<td></td>
</tr>
<tr>
<td>3:40pm</td>
<td>Reindeer herding on St. Lawrence Island - Kiyuklook &amp; Tooie</td>
<td>UAF successful electric snowmobile wins big in 2012 - Thompson</td>
</tr>
<tr>
<td>4:00pm</td>
<td>Q&amp;A with speakers</td>
<td>Can wood be manufactured in Interior Alaska? - Nash</td>
</tr>
<tr>
<td>4:20pm</td>
<td>Attitudes, knowledge, and beliefs on cancer and its prevention in northwestern rural Alaska - Schmidt</td>
<td>Tanana River School Districts: Burning wood into educational dollars! - Nash</td>
</tr>
</tbody>
</table>
SESSIDONS IN LIBRARY BUILDING

- *Perspectives on Subsistence & Environment* (Thursday morning)
- *Marine Science* (Thursday afternoon)
- *Fisheries* (Friday morning)
- *Reindeer Production* (Friday afternoon)

Computers, printers and Internet access available here during conference hours

SESSIDONS IN CONFERENCE ROOM

- *Ecology, Climate & Health* (Thursday morning)
- *Solid Waste Management* (Thursday afternoon)
- *Water Quality* (Friday morning)
- *Art & Science* (Friday morning)
- *Alternative Energy & Conservation* (Friday afternoon)
ABSTRACTS

Organized alphabetically by session, then by author

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Ecology, Climate & Health  ......................... 15
Fisheries .............................................. 18
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Reindeer Production ................................. 29
Solid Waste Management ......................... 32
Water Quality ...................................... 35
Workshop ............................................. 38
Poster Session ...................................... 38
Statewide occupational endorsement in sustainable energy

Chet Chambers, Sustainable Energy Coordinator, UAF Bristol Bay Campus, Dillingham, AK (cochambers@alaska.edu)

Tom Marsik, Assistant Professor, Sustainable Energy, Bristol Bay Environmental Science Lab, UAF Bristol Bay Campus, Dillingham, AK (tmarsik@alaska.edu)

Sustainable energy education plays a significant role in solving many energy related problems such as diminishing supplies of fossil fuels and associated costs. Collaboration across the state is an important component of effectively delivering this education and developing an appropriate curriculum. This presentation describes one such collaborative effort—a statewide Occupational Endorsement in Sustainable Energy that is being developed jointly by UAA, UAF, and UAS.

The Occupational Endorsement in Sustainable Energy provides students with an educational foundation based on the two pillars of sustainable energy: energy efficiency and renewable energy. The program is structured as a required core providing foundation knowledge combined with electives that allow students to specialize in specific areas of sustainable energy. This degree program prepares students for entry-level employment and can serve as a stepping stone towards further degrees in science and engineering. It has options for 100% distance delivery making it available statewide at any location with an internet access. More information is available at http://www.uaf.edu/bbesl/sustainable-energy/.

Low-cost home energy efficiency upgrades: Quantified savings

Chet Chambers, Sustainable Energy Coordinator, UAF Bristol Bay Campus, Dillingham, AK (cochambers@alaska.edu)

Often, people ask the questions “What low-cost, energy efficient upgrades can be made by homeowners?” and “What energy savings can be expected?” This presentation provides insight into the answers to those questions. Using my home as a case study, I’ve completed several small, inexpensive energy efficiency upgrades and quantified each of them through the use of several energy diagnostic tools including a blower door and home energy simulation software. The purpose of this project was to quantify the energy savings and simple payback period of each efficiency upgrade using diagnostic tools rarely at the disposal of most homeowners. Although many of my upgrades directly reduced my electrical use, the upgrades used in this case study were directed mostly at reducing my heating fuel consumption. I will also briefly discuss some upgrades that were completed prior to the case study as well as some plans for future energy-saving projects. Each individual project will be described and data will be shared. Overall, a $101 investment resulted in energy savings of over $1200 per year with an estimated payback period of about one month.
**Engineering students design an electric snow-go (2012)**

*Michael Golub, Student/Staff, UAF Department of Theatre & Film, Fairbanks, AK (migolub@alaska.edu)*

This is a 5 minute film production about how several engineering students from UAF came together and developed an electric snow-go. It contains actual test ride footage. The film contains images of the students at the SAE 2012 Clean Snowmobile Challenge (CSC). It allows the viewer to obtain a sense of the hardships and learning challenges the UAF team went through to finish 1st place.

Much of the film was shot ethnographically using a camera mounted inside a pair of sunglasses. Students were filmed continuously, so that they wouldn’t feel the strain of being continuously filmed.

The production was produced to compete for an SAE video contest, however additional footage may be available from the 2013 competition which ends March 9, 2013. Depending on resources the film may be updated.

These students performed very well in this engineering endeavor. Too often we find the need to just look at the end result, when judging a successful program. Sometimes the journey is more important. Hopefully, this film will expand the audience’s knowledge of teamwork and engineering.

---

**Net zero energy ready home in Dillingham, Alaska**

*Tom Marsik, UAF Bristol Bay Campus, Dillingham, AK (tmarsik@alaska.edu)*

*Kristin Donaldson, UAF Bristol Bay Campus, Dillingham, AK (kristinmdonaldson@gmail.com)*

Despite increases in the energy efficiency of homes, the total energy used in the residential sector in the USA continues to rise. As shown in the residential statistics of the US Department of Energy for the period of 1985-2004, the average energy usage per square foot decreased by about 10%, but at the same time, the average square footage of a household increased by almost 20%. If society acknowledges the importance of reducing energy consumption, a logical question to ask is: What good does it do to increase the energy efficiency of homes if it is outweighed by escalations in their size?

This question is addressed by the project described in this presentation. The house built in this project has the following energy features:

- Small size (2 bedrooms, 1 bathroom)
- 28-inch thick walls
- Extremely tight building envelope (<0.1 ACH50)
- Majority of needed heat comes from internal heat gains (byproduct heat from lighting and appliances, body heat, passive solar gain)
- Heat that needs to be supplied from a heat source corresponds to about 35 gal of heating oil annually

A one-year data collection period was recently completed and it was successfully demonstrated that by combining super-efficient construction technology with small house size, an extremely low energy home can be achieved. More information is available at http://energy-alaska.wikidot.com/nzer-dillingham.

---

**Alternative sources for energy**

*Brian M. Marvin, Nome Beltz Junior/Senior High School Science Teacher, Nome, AK (bmarvin@nomeschools.com)*

7th Grade Science Students: *Henrik Brandt, Joe Kinneen and ReaAnne Scarlett*

There are many sources of electricity. Yet not all sources are reliable. Fossil fuels have been used for electricity since the 1880s. Since then fossil fuels have been damaging the environment. The fact is they are damaging the environment by polluting our air. Not to mention the fossil fuels are running out. We have been using fossil fuels for 123 years just for electricity alone. We have to run out soon. Maybe not in our lifetime but the fact is we will run out.

Now to talk about how electrons flow from one place to another. First of all to make electric current, you have to have a wire, source and a load. Just hook up the source to the wire and to the light bulb and that’s how to make a circuit.

This is our savior for electricity: hydro electricity and solar energy. Hydro electricity is a very common form of electricity. Dams produce a lot of electricity. They generate about 4 trillion kilowatt-hours per year worldwide. The Hoover Dam is one of the largest dams in the US. It creates enough electricity for 1.3 million people.
You see we can use this type of energy and lots of other types of energy like solar energy.

We are demonstrating a 500W wind generator. Watch the volt and current meters to see the output! Be careful not to touch.

**ALTERNATIVE ENERGY & CONSERVATION**

Can wood be manufactured in Interior Alaska?

*Art Nash*, Extension Energy Assistant Professor and Energy Specialist, UAF Cooperative Extension Service, Fairbanks, AK (alnashjr@alaska.edu)

With an overabundance of several species of fuel on the ground throughout the Interior, various manufacturing systems have been looked at for getting home heat as well as facility level Combined Heat and Power (CHP) out of the BTUs. Hog chips, pellets, bio bricks and torrefaction have all been considered as means to get wood to the burner in viable and economic ways. What are the processes involved? The delivery methods of the fuels? What types of costs are incurred in the production process? These questions will be answered with photo and lecture as we look at the various ways wood can be “commoditized” into a more useful space-heating product.

**ALTERNATIVE ENERGY & CONSERVATION**

Tanana River School Districts: Burning wood into educational dollars!

*Art Nash*, Extension Energy Assistant Professor and Energy Specialist, UAF Cooperative Extension Service, Fairbanks, AK (alnashjr@alaska.edu)

Along the 584-mile Tanana River cutting across Alaska, three school districts have taken advantage of biomass to reduce surrounding wildfire dangers around their schools, fend off high heating costs at 50 below, and educate their children on a locally sustainable way of life. Alaska Gateway school district (Tok, AK) has produced not only heat for their community school, but also recently steam/electricity from burning chipped-up black spruce trees on state and school property. Delta Greely school district has greatly reduced its heating cost with wood chips three fold it's first winter utilizing a new chip boiler. Finally, Tanana City school district has created a whole wood collection industry around collecting driftwood out of the river and supplying heat to teacher housing as well as the school. Join us to see how schools are taking their heating destiny into their own hands with wood conversion.

**ALTERNATIVE ENERGY & CONSERVATION**

Feasibility of LED in a residential home in 2012

*Triena Slatter*, Student, UAF Bristol Bay Campus, Dillingham, AK (tslatter@alaska.edu)

This study was conducted to evaluate the economics of using LED lights versus CFL lights in a residential home in 2012. LEDs are constantly coming down in price and the technology is getting better. Do the numbers show it is worth switching from CLFs to LEDs now? The study was done using same quality lights (passing US standardized tests and not just the cheapest), light output, and all the A19 type fixtures in an average 2 bedroom apartment while comparing watts used and life expectancy to determine what the economic payback would be, if any.

**ALTERNATIVE ENERGY & CONSERVATION**

UAF successful electric snowmobile wins big in 2012

*Isaac Thompson*, Graduate Student, Electrical Engineering Department, UAF, Fairbanks, AK (nhfreeride@gmail.com)

The UAF EV team’s latest electric snowmobile has a 20 mi range at 20 mph under optimal snow conditions. We started this project with a Ski-Doo Renegade Sport 550F (wet weight: 512 lb). The modified NetGain WarP 7 DC-series motor is connected directly to the sprocket shaft using a Gates Poly Chain. The accumulator is configured to support 177.6 V using 72 Turnigy 5 A·h lithium-ion polymer hybrid packs, which utilize a gel electrolyte. The battery box, containing the 7.992 kW·h accumulator, comes off as one piece. Innovation was a key design concept as the team developed the first electric snowmobile on the Ski-Doo RevXP Chassis. This was a difficult design challenge with its tight pyramidal frame; however the result is having one of the most efficient snowmobile chassis available, running on electric power. The design allowed for any part to be easily removed and replaced. The team developed an
open source Battery Management System (BMS) based on the Peter Perkins design. Not content with current DC motor controllers the team utilized the Open ReVolt plans to come up with a reliable and safe unit. The 137 inch suspension was retained to allow for use of the GTX silent track technology and assist during the draw-bar pull. Our innovations have kept our resale price the lowest amongst the competition sleds. The snowmobile weighs 550 lb, has a top speed of 75 mph and a noise level of less than 60 dB. This snowmobile won first place in the 2012 competition.

**ART+SCIENCE**

Friday, March 22 • 11:10a.m.-12:10pm
Conference Room
Session Chair: Claudia Ihl

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**ART & SCIENCE**

Physical Geography 111X: An evolving science course using distance education

**Tara Borland**, Laboratory Coordinator, University of Alaska Fairbanks, College of Rural and Community Development (taborland@alaska.edu)

**Todd Radenbaugh**, Assistant Professor, University of Alaska Fairbanks, College of Rural and Community Development (taradenbaugh@alaska.edu)

Rural Alaska is often underserved from an educational perspective as many degrees requiring core classes are not being offered in their region on a regular basis. This is particularly true when it comes to Science Core classes. To meet this challenge, from 2006 to 2012 the University of Alaska Fairbanks (UAF) College of Rural and Community Development (CRCD) has increased science course offerings by 50%. Most of these science courses required expensive lab intensives where students travel to hub communities for periods of up to seven days. To reduce cost and improve student recruitment there has been a movement to teach more distance science labs.

Teaching science labs using distance education techniques has many challenges. A distance-delivered introductory Physical Geography course (GEOG 111X) has been developed through a cooperative effort between three UAF major administration units: (1) CRCD, (2) School of Natural Resources & Agricultural Sciences (SNRAS), and (3) eLearning and Distance Education. The UAF Bristol Bay Campus has offered GEOG 111X to rural students statewide using distance education techniques for both lecture and lab. Transitioning from a face-to-face to an online environment requires using appropriate technology and learning methods so that curriculum standards and learning objectives are maintained. The GEOG 111X online course has evolved over the past five years by incorporating critical feedback to improve the student experience and learning objectives. During the fall 2012 semester the online lab was overhauled to help resolve issues with rural bandwidth limitations and lab standardization. In addition, some of the labs incorporated a more interactive format to improve the students learning experience. As this online teaching laboratory continues to evolve, we hope to provide an online science course that is effectively engaging, educational, and allows students to meet their educational goals.

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**ART & SCIENCE**

Recycling reindeer via research and handicrafts: Preservation of cultural values

**Jackie Hrabok-Leppäjärvi**, Visiting Scholar, Joint Faculty UAF Northwest Campus and Sámi Education Institute, Nome, AK, and Kaamanen, Finland (jthl@alaska.edu)

More than 100,000 reindeer herders belonging to 20 in-
digienous peoples in 9 nations practice reindeer herding in the circumpolar north. The Sámi Education Institute, 200 miles north of the Arctic Circle in Finland, vigorously promotes Sámi culture. Reindeer husbandry and traditional handicrafts are two programs in which cultural values are preserved. Instruction is offered in three Sámi languages and Finnish. During the 3-year Reindeer Entrepreneurship students study a full range of courses to prepare to manage their own reindeer herding business with a self-sustaining economy. Reindeer hides, antlers, toenails, and bones are processed using traditional and modern techniques resulting in high quality handmade products and additional income. In the year of graduation students conduct a research project of their choice and report to the community.

The Sámi Education Institute collaborates with the Association of World Reindeer Herders, Finnish Reindeer Herders Association, and The Finnish Game and Fish Reindeer Research Station. The University of Alaska Fairbanks Northwest Campus is the newest partner in an agreement to preserve cultural values in the circumpolar north. Undergraduate travel grants are available for student exchanges between Alaska and Finland via University of the Arctic North2North grants in 2014.

ECOLOGY, CLIMATE + HEALTH

Thursday, March 21 • 9:00a.m.-12:10pm
Conference Room
Session Chair: Claudia Ihl

Potential applications of climate divisions in western Alaska

Peter Bieniek, International Arctic Research Center, UAF, Fairbanks, AK (pbieniek@alaska.edu)

Climate divisions describe regions of similar climate variability. They are valuable for developing and disseminating climate services, research and products such as drought monitoring, seasonal climate forecasting, evaluating climate change etc. An effort is currently underway to establish a set of 13 climate divisions for Alaska (they have been in use for decades in the contiguous United States) allowing for potentially enhanced climate research, products and services. Western Alaska is divided into three separate climate divisions. In this presentation we will explore questions related to the establishment of climate divisions in Western Alaska such as: How were they created? What can and can’t they be used for? What new information do they tell us about regional climate variability and change? How can they be helpful for land managers, hunters and local governments?

ART & SCIENCE

A muskox cultural exchange

Claudia Ihl, Associate Professor of Biology, UAF Northwest Campus, Nome, AK (cihl@alaska.edu)

Muskoxen have been hunted in northwest Alaska since 1996. Hunters in northwest Alaska are not yet as proficient in muskox hunting lore and in their knowledge of how to use the carcass and muskox parts as are hunters of Nunivak Island, who have the longest muskox hunting tradition in Alaska. This project aimed to get muskox hunters and knitters of muskox wool from Nunivak Island and northwest Alaska to come together in a couple of workshops—one in Mekoryuk, Nunivak Island, and one in Nome—to exchange knowledge and traditions regarding muskox hunting. Eight northwest Alaskans visited Mekoryuk in April 2012, and eight Mekoryukers visited Nome in May 2012. Another 45 people from northwest Alaska villages and the Nome area attended the Nome workshop. The workshops were a successful exchange of ideas. Friendships and relationships were forged and in the future we hope to have more cultural exchanges between these two muskox hunting regions of Alaska.
Antioxidants in Alaska’s wild berries

Kari van Delden, Associate Professor, UAF Cooperative Extension Service, Nome, AK (kvlvandelden@alaska.edu)

Alaska’s wild berries not only taste good, they are good for us. Alaska berries are packed with nutrition, and research shows they have high levels of antioxidants. A research project at the University of Alaska Fairbanks looked at not only the antioxidants in Alaska berries but also how antioxidants are affected by various food preservation techniques. Cooperative Extension Service publications with information on Alaska wild berries and recipes will be available.

Adaptability, resilience and industrial development: the need for stakeholder-directed watershed monitoring programs

Lawrence Duffy, UAF Department of Chemistry and Biochemistry, Fairbanks, AK (larry.duffy@alaska.edu)
Phil Loring, UAF Institute of Northern Engineering, Fairbanks, AK
Kriya Dunlap, UAF Department of Chemistry and Biochemistry, Fairbanks, AK
C. Scott Gerlach, UAF Institute of Arctic Biology, Fairbanks, AK

Research question: Mechanisms involving oxidative stress and inflammation have been proposed to explain associations of pollution from a changing environment with cardiovascular morbidity. Rural circumpolar people have exhibited a low incidence of obesity, diabetes, and cardiovascular disease. These health benefits are attributable to a subsistence diet that is rich in omega-3 fatty acids and antioxidants that reduce oxidative stress and inflammation. Pollution, both global and local, is a new threat to subsistence diets through the introduction of contaminants in a variety of ways into the food system.

Methods: Extensive scientific research and recommendations from professional societies, health organizations, and government agencies consistently support dietary guidance to consume fish regularly.

Results: Nevertheless, consumers are being warned to eliminate or minimize their consumption of certain species. The warnings, which have been issued because of risks associated with mercury in fish, have received extensive coverage in news articles and stories in popular magazines. There have been a series of mixed messages to the Alaskan consumer about the benefits or risks of eating fish. The management of environmental health at the regional and local level requires an approach that is cognizant of local circumstances and needs, and addresses health in a systemic and integrative fashion capable of incorporating qualitative social, cultural, and economic drivers and determinants.

An evaluation of survey methods used to monitor the Seward Peninsula muskox population

Tony Gorn, Alaska Department of Fish and Game, Nome, AK (tony.gorn@alaska.gov)
Joshua Schmidt, National Park Service, Fairbanks, AK

State and federal biologists monitor Seward Peninsula muskoxen (Ovibos moschatus) populations as part of collaborative survey and inventory programs. Survey results assist managers and members of the public when tasked to make management decisions for both consumptive and non-consumptive uses of muskoxen. Historic methods used to monitor composition and population levels were evaluated as a result of the Seward Peninsula population increasing in size and range since relocated to the western Seward Peninsula in 1970. We evaluate the strengths and weaknesses of counting muskox using a minimum count and distance sampling technique and completing composition surveys from a temporal and small- and large-scale perspective.

White spruce sustainability study as citizen science outreach project

Adam Kane, Science Education Liaison, UAF Bristol Bay Campus, Bristol Bay Environmental Science Lab, Dillingham, AK (adam.kane@alaska.edu)
Todd Radenbaugh, UAF Bristol Bay Campus, Bristol Bay Environmental Science Lab, Dillingham, AK
Isaac Reynolds, UAF Bristol Bay Campus, Bristol Bay Environmental Science Lab, Dillingham, AK
Mariano Peters, Bristol Bay Native Association, Natural Resources-Forestry, Dillingham, AK

White spruce trees are commonly found in tree stands
surrounded by tundra throughout Southwest Alaska. The trees are frequently harvested to provide heat. The sustainability of white spruce depends on the resource size, growth rates and harvest rates. Collecting baseline data is helpful in identifying favorable growing conditions and estimating the regional resource size. The Great Christmas Tree Challenge started in 2011 as a way to include Bristol Bay residents in a citizen science project and to increase awareness to potential resource sustainability issues. Local residents were asked to cut off a slice from the bottom of their Christmas tree and submit it for analysis. Tree information is put into a database where characteristics of each sample are compared. Characteristics studied include overall growth rates and time-specific growth rates. Samples have ranged from 15 to 90 years old, which, when compared with unknown species of conifer used for Christmas trees in the lower 48, are about 13% to 85% older. White spruce from the Dillingham area were sampled as part of a student internship project at UAF Bristol Bay Campus assisted by staff, faculty and BBNA Natural Resources Forestry personnel. Trees yielded growth rates as small as .275 CM/year. This could indicate that the harvest of living trees for fuel (or Christmas) uses could be unsustainable. Results of this continuing study will help identify important characteristics of white spruce growth as well as the sustainability of harvesting white spruce in the Bristol Bay region.

ECOLOGY, CLIMATE & HEALTH

Quinhagak Drifters: An outreach video from a collaborative rural project

Liz O’Connell, Wonder Visions, www.FrontierScientists.com, Fairbanks, AK (wondervision2@yahoo.com)

Quinhagak Drifters is a University of Alaska research project, a School of Fisheries and Ocean Science (SFOS) Marine Advisory project, a Quinhagak Village Council and School project, a NOAA Alaska Fisheries Science Center project and a video on FrontierScientists.com.

Definition: Drifters are satellite-tracked buoys providing informative and nearly real-time depiction of surface circulation that complements other measurement collected by shipboard sampling, instrumented mooring, and numerical models.

Quinhagak Drifters, a 5.5-minute video, describes a collaborative research project in a visual, short and easy to digest way, that can reach a lot of people and be accessible at any time. This is an example of Rural Science in Action. The presentation will detail how videos can help the visibility of local/rural projects. The video and supporting materials will demonstrate how local/rural collaboration can increase rural and scientific knowledge.

University of Alaska scientists Seth Danielson and Tom Weingarten describe the reason for studying near-shore circulation. Terry Reeve, Marine Advisory Program agent, in the Quinhagak classroom helps direct student interest about the drifters, and assists parents with students as they deploy the drifters into the Bering Sea. During the experiments in 2009, all could watch via computer the movements of the drifters. The goal of the project was to improve understanding of near-shore circulation that connects Kuskokwim Bay and northern Bristol Bay with the adjacent Bering shelf. The information is needed to understand possible migratory pathways used by juvenile salmon as they enter the marine environment.

More information about the Oceanographic Drifter Deployments in Alaska project can be found at http://mather.sfos.uaf.edu/drifters/.

ECOLOGY, CLIMATE & HEALTH

Drugs that can supposedly make you smart can also make you anxious

Anshul Pandya, Assistant Professor of Bioscience, Chukchi Campus, Department of Science, UAF College of Rural and Community Development, Kotzebue, AK (aapandya@alaska.edu)

J. L. Yakel, Laboratory of Neurobiology, National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services, Research Triangle Park, NC

The α7 nicotinic acetylcholine receptors are proteins expressed on the surface of the cells found in the brain. Previous studies have shown that drugs which act on these receptors can supposedly increase cognition i.e. improve memory and attention. In this study, we compared the effects of two types of drugs for the α7 receptors an agonist and a positive allosteric modulator (PAM) in a variety of behavioral tests in Sprague Dawley rats. We look at the effects of these two drugs on cognition (learning and memory) as well as anxiety. We found that neither the agonist nor the PAM improved memory when given to the rat itself. However, in case of induced cognitive impairment both the drugs were able to improve cognition and relieve the impairment. By itself the α7 receptor agonist (at higher dose) also caused anxiety while the PAM did not do so. The anxi-
ety induced by the agonist was reduced by the serotonin type 1a (5-HT1a) receptor antagonist. Our results show that α7 agonists that can improve cognitive ability at high doses may also cause anxiety. The α7 PAMs on the other hand do not have this effect, an important fact to consider while developing drugs that target this receptor.

**ECOLOGY, CLIMATE & HEALTH**

**Seasons of stress: Developing a comprehensive framework for planning and responding to climate change impacts**

*Henry J. Penn, Human Dimensions Laboratory, Water & Environmental Research Center, UAF, Fairbanks, AK (hjpen@alaska.edu)*

During a recent field trip to the Bristol Bay region, managing seasonal stresses on community infrastructure was seen to be a future challenge of significant concern. Seasonal stress refers to the interactions amongst community needs, climate change impacts, subsistence activities, and the practicalities of life in rural Alaska. This study seeks to understand the mechanisms by which seasonal issues create challenges and opportunities for Alaskan communities, and aims to develop a framework for visualizing seasonal stresses to aid community planning and response to change. We aim to better understand human resource challenges in the region and evaluate if and how human capital drives a community’s ability to mobilize other kinds of capital to solve environmental challenges. In this seminar I will review what we have observed about the importance of seasonal timing of stresses like coastal erosion, as well as the seasonal considerations of community planning for issues such as water and wastewater management, and discuss how I plan to develop a more accurate understanding of the role and importance of seasonality. A specific focus will be on seasonal challenges and human resource issues, with a focus on developing better planning and forecasting tools to help community managers, planners, and environmental officials to respond effectively to change.

**FISHERIES**

Friday, March 22 • 9:00a.m.-12:10p.m.
Library Building
Session Chair: Kevin Keith

**FISHERIES**

Assessment of red king crab in eastern Norton Sound: Year 1

*Jenefer Bell, Alaska Department of Fish and Game, Nome, AK (jenefer.bell@alaska.gov)*

*Justin Leon, Alaska Department of Fish and Game, Nome, AK*

Year one of a three-year study examining movement, size composition, potential essential habitat, and handling of red king crab (*Paralithodes camtschaticus*) in eastern Norton Sound was completed. Catch observers voluntarily participated in an observer program and an additional 4 vessels collected tagged crab information in lieu of an observer. Over the 44-day commercial fishing season, 3 observers made a total of 31 trips, recovered 60 tagged crabs, and examined 106 crab pots for species composition. Three distinct movement patterns were apparent depending on initial tagging location; movement was to the south from eastern statistical areas and southwest from western statistical areas. A total of 19 different species were identified and the purple-orange sea star (*Asterias amurensis*) was the most numerous non-crab species. In pots configured with a large mesh panel, target crab made up 78% of the catch while in pots configured with escape rings target crab made up only 37% of the catch; there was no difference in catch
ability of pots configured with different escape mechanisms. Utilizing information from individual tagging events, there was no difference in the size composition of crab captured in this study compared to the size composition entered into the Crab SAFE model. Further there was an area of high abundance of sublegal red king crab that may indicate a rearing area. Additional years will allow us to evaluate the persistence of these patterns over time.

FISHERIES

Using natural indicators to predict Chinook salmon run timing in the Yukon River

Kathrine G. Howard, Alaska Department of Fish and Game, Anchorage, AK (kathrine.howard@alaska.gov)
Phillip Mundy, NOAA Fisheries, Alaska Fisheries Science Center, Juneau, AK
William Koeppen, Alaska Ocean Observing System (AOOS); Axiom Consulting, Anchorage, AK

The timing range of the Chinook salmon run in the Yukon River can vary by as much as twenty days. Over the past 50 years the first pulse of Chinook on the Yukon delta has occurred between the 6th and the 26th of June. When the first pulse comes late, it is reasonable for fishery managers to conclude that the run is weak, perhaps so weak that fishing needs to be slowed or stopped altogether. Traditional knowledge on the Yukon holds that spring weather conditions, including ice, temperatures and wind, determine when the fish enter the river; but each spring brings a different combination of conditions, so pinning down a schedule for the arrival of the first pulse can be tricky. Researchers from NOAA Fisheries and the Alaska Department of Fish and Game, with the support of the Alaska Ocean Observing System, have identified a combination of spring conditions that is closely related to the timing of Chinook salmon on the Yukon delta. Using percent spring ice cover between St. Lawrence Island and the Yukon delta, April air temperatures in Nome, and marine surface temperatures just offshore of the delta in May, the timing of the run was predicted prior to the start of the run in the last three seasons to within three days of the actual timing. Similar run timing forecasts based on spring environmental conditions may be possible throughout Western Alaska and could improve management uncertainty when making decisions early in the season.

FISHERIES

Using juvenile salmon surveys to understand early marine ecology and survival of Yukon River Chinook salmon

Kathrine G. Howard, Alaska Department of Fish and Game, Anchorage, AK (kathrine.howard@alaska.gov)
James Murphy, Auke Bay Laboratories, Alaska Fisheries Science Center, NOAA Fisheries, Ted Stevens Marine Research Institute, Juneau, AK

Chinook salmon stocks in western Alaska have declined dramatically in recent years and efforts are underway to use juvenile salmon information to understand mechanisms driving stock-specific cohort survival patterns and predict future returns. Juvenile salmon surveys on the Northeastern Bering Shelf in the fall, apportioned by genetic mixed stock analysis, have been used to develop juvenile abundance estimates for Canadian Yukon River Chinook salmon. Surveys capture juveniles after they have spent their first summer in the ocean. Researchers are investigating the roles of juvenile Chinook salmon abundance, geographic distribution, size, condition, growth and diet as it relates to survival and return to the Yukon River. Size selective mortality of juvenile Chinook salmon after their first summer in the ocean is apparent: scale growth patterns of adult survivors can be used to estimate size of these fish as juveniles and, when compared to sizes of juveniles present in these juvenile surveys, it is evident that many fish do not survive to adulthood and there is a bias against survival of smaller individuals. Size selective mortality metrics will be used to calibrate annual juvenile abundance estimates to assess cohort survival patterns and develop brood year return forecasts. Future studies to understand the role of outmigration timing and the role of habitat and diet as fish transition from freshwater to marine environments in cohort survival are also needed to fully assess cohort survival patterns and develop useful forecasts.
**FISHERIES**

Overview of Norton Sound Fisheries Research and Development Department

*Wes Jones, Norton Sound Economic Development Corporation, Unalakleet, AK (wes@nsedc.com)*

The Norton Sound Economic Development Corporation (NSEDC) is doing more fisheries research than any other entity in the Norton Sound region. NSEDC set up the Norton Sound Fisheries Research and Development Department (NSFR&D) to increase the work being conducted on important subsistence and commercial fish stocks within Norton Sound. Most of the work NSFR&D does is focused on salmon, herring and crab stocks. This talk will review NSFR&D work in each of these areas. We will also cover NSFR&D cooperative projects with organizations such as the Alaska Department of Fish and Game, the University of Alaska Fairbanks and different funding sources, such as the Alaska Sustainable Salmon Fund and the North Pacific Research Board.

Conversely, low adult returns followed a period of little to no fertilization with resulting low zooplankton levels and decreased smolt size.

**FISHERIES**

Fishery regulations and their origins with an emphasis on Norton Sound

*Charlie Lean, Norton Sound Economic Development Corporation, Nome, AK (charlie@nsedc.com)*

A historical perspective on the development of salmon, crab, and herring fisheries from 1900 to the present will be presented. The evolution of these fisheries from their origin as subsistence fisheries to customary trade opportunities to both artisanal and fully capitalized commercial fisheries will be explained. Regulations of these fisheries were put in place to deal with issues as they arose and to facilitate management practices. Both of these will be considered with specific examples.

**FISHERIES**

Sockeye salmon rehabilitation in Salmon Lake

*Kevin Keith, Norton Sound Economic Development Corporation, Nome, AK (kevin@nsedc.com)*

Sockeye salmon harvests from the Pilgrim River stock were depressed for many years. In the 1990s studies were initiated to collect baseline data about the rearing capacity for sockeye salmon smolt in Salmon Lake. Based on these studies, the Alaska Department of Fish and Game recommended Salmon Lake for fertilization. Fertilization began in 1997. Since that time, Salmon Lake has been fertilized, limnological data from Salmon Lake has been collected, sockeye smolt production has been monitored, and returning sockeye adult salmon have been counted. Results have been wildly variable with over 90,000 adults returning to the Pilgrim River in 2004 and less than 3000 adults returning to the Pilgrim River in 2009. In this talk, to understand this variability, we will look at the data that has been collected; the data include the amounts of fertilizer applied, nutrient levels, chlorophyll levels, zooplankton densities, smolt sizes, and adult escapement. In general, high adult returns followed fertilization, which produced increased zooplankton and increased smolt size.

**FISHERIES**

Tracking long-term trends in trophic level through carbon and nitrogen stable isotope data of Pacific cod

*Nicole Misarti, Water and Environmental Research Center, University of Alaska Fairbanks, Fairbanks, AK (nmisarti@alaska.edu)*

This presentation will discuss the remains of Pacific cod (*Gadus macrocephalus*) from archaeological sites on Sanak Island, Alaska. Pacific cod were an important resource for the Aleut for thousands of years, and continue to be an important species in Alaska fisheries to this day. I compared changes in trophic dynamics and size of more than 420 individual Pacific cod over the last few thousand years using carbon and nitrogen stable isotope analysis coupled with fish size. Fish size is based on allometric relationships of premaxillas to live fish length. Based on this data it is apparent that cod have fluctuated in both size and trophic position over the last 4500 years. Comparisons with data collected over the last 40 years show that both size and trophic position of Pacific cod post-commercial fishing are within the normal range of variation for the last few thousand years. In addition, smaller fish are more susceptible to climate and regime shifts and therefore studying younger/smaller Pacific cod may be of more value for management purposes. This research is a first step toward creating long-term baseline data sets, which
could be very useful to fisheries management, conservation, and the economic well-being of communities reliant on the Pacific cod fishery.

**FISHERIES**

Dispersal of Dolly Varden from the Wulik River, evaluated using satellite telemetry

*Brendan Scanlon, Alaska Department of Fish and Game, Sport Fish Division, Fairbanks, AK (brendan.scanlon@alaska.gov)*

*Andy Seitz, UAF School of Fisheries and Ocean Sciences, Fairbanks, AK*

In northwest Alaska, Dolly Varden is highly valued as a subsistence fish and local residents harvest thousands of these fish each year. In the villages of Noatak and Kivalina, these harvests regularly exceed the combined harvests of all other fish species combined. These Dolly Varden undertake oceanic migrations during summers, which may exceed 1,500 km. Although these fish may be broadly distributed, there have been no studies that examined oceanic ecology of Dolly Varden in the Chukchi Sea. Using Pop-up Satellite Archival Transmitting (P-SAT) tags, we attempt to describe timing of outmigration from the Wulik River to the Chukchi Sea, summer dispersal in the ocean, and depth and temperature occupancy in the ocean. Preliminary results suggest that Dolly Varden undertake a variety of marine dispersal strategies, and that Russian Chukchi Sea waters may provide an important summer feeding area for Dolly Varden.

**FISHERIES**

Salmon enhancement in Norton Sound: History and opportunities for the future

*Tim Smith, Nome Fishermen's Association, Nome, AK (timsmith@gci.net)*

Beginning in the early 1980s, Norton Sound salmon returns declined precipitously leading to state and federal fisheries disaster declarations. The causes of these declines are unknown but interception in commercial salmon fisheries and bycatch in the pollock trawl fisheries are known contributing factors. In May 1993, the commissioner of the Alaska Department of Fish and Game, (ADF&G), initiated comprehensive salmon planning under the guidance of the Norton Sound/Bering Strait Regional Salmon Planning Team comprised of members appointed by ADF&G and Norton Sound salmon user groups. The Norton Sound/Bering Strait Regional Comprehensive Salmon Plan 1996-2010 was signed June 21, 1996. The plan was intended to identify projects for increasing salmon harvesting opportunity including a hatchery program. Further, the plan set 2010 target harvest goals for each salmon species. Salmon enhancement projects conducted in accordance with the plan include instream incubator boxes, Salmon Lake nutrification, habitat improvement projects, mist incubation and the Hobson Creek Hatchery. None of the projects significantly contributed to long term increased salmon harvests and the plan goals were not achieved. The Hobson Creek Hatchery, operated by the Nome Fishermen's Association, is the only hatchery on the Bering Sea Coast. It has been thoroughly tested but has never operated at capacity. In other parts of Alaska, hatcheries have dramatically increased subsistence, sport and commercial salmon harvests contributing significantly to the economy of the state. Reasons for the failure of salmon restoration and enhancement in Norton Sound are discussed and recommendations for achieving better results in the future are presented.
Marine mammal research & “A day in the life” stories

**Lynn DeFilippo**, Junior High School Teacher, Nome Beltz Junior/Senior High School, Nome, AK (ldefilippo@nomeschools.com)

Nome Beltz Junior High School 8th Grade Students

Small groups of students will present their research on different species of arctic marine mammals. Students will also showcase creative writing in which they incorporated researched information about arctic marine mammals into creative/fiction stories.

Using traditional knowledge interviews and participatory mapping to identify drivers of habitat change and fine-scale habitat features for ice seals and walruses

**Lily Gadamus**, Social Scientist, Kawerak Natural Resources Division, Nome, AK (ss.pi@kawerak.org)

Alaska’s Bering Strait region is undergoing considerable changes in seasonal sea ice quantity and quality, as well as dramatic increases in shipping due to reductions in Arctic summer sea ice cover. In this study we document indigenous perspectives on how these changes may affect ice seals and walruses, as these species provide food security and cultural identity to area communities. We conducted semi-structured interviews and mapping focus groups with 82 elders and expert hunters in order to identify important seal and walrus habitat areas, fine-scale habitat characteristics, and drivers of change in habitat areas. This has led to the identification of three locally-recognized drivers of habitat change: ice conditions, prey species, and disturbance. Some project
participants have also articulated a theory of marine mammal adaptive capacity, based on long-term observations, that provides a more optimistic prediction of marine mammal response to climate change. These indigenous theories of habitat and habitat change have generated policy recommendations for the protection of ice seals and walruses.

**MARINE SCIENCE**

Submarine canyons of the Bering Sea

George Pletnikoff, Alaska Oceans Campaigner for Greenpeace USA, Palmer, AK (george.pletnikoff@greenpeace.org)

Two of the largest submarine canyons in the world, Zhemchug and Pribilof, cut into the edge of the continental shelf in the southeastern Bering Sea. A submersible was used to conduct systematic video transects of the sea floor. Dozens of specimens were collected and preserved for analysis. Data are presented showing the distribution of corals and sponges from research undertaken in 2007 and 2012. High densities of gorgonian and pennatulacean corals and sponges are present in the canyons likely due to enhanced surface productivity at the shelf edge, combined with benthic currents and seafloor topography. Rockfishes, including the commercially important Pacific Ocean perch, *Sebastes alutus*, were associated with corals and sponges as well as with isolated boulders. Sculpins and poachers were also associated with corals in Pribilof Canyon, where corals were most abundant. Fishes likely use corals and sponges as sources of vertical relief, which may harbor prey as well as provide shelter from predators. Boulders are also habitat in this regard, but are generally sparse in deep water habitats, including in the canyons, strongly suggesting that biogenic structure is important fish habitat there. Evidence of disturbance to the benthos/seafloor from fishing activities was observed in these remote canyons. Bottom trawling and other benthic fishing gear has been shown to damage corals and sponges that may be very slow to recover from such disturbance. Establishment of conservation zones is a cost effective means to protect benthic habitats in these canyons and the ecosystem services they provide.

**MARINE SCIENCE**

Investigations of estuarine fauna from the Nushagak Bay in Southwest Alaska

Todd A. Radenbaugh and Dan Dunaway, Bristol Bay Environmental Sciences Lab, UAF Bristol Bay Campus, Dillingham, AK (taradenbaugh@alaska.edu)

Nushagak Bay is a large and important estuary Southwest Alaska that receives fresh water outflow from the Nushagak, Wood Snake, and Igushik Rivers. Each summer since 2007, UAF BBC’s Bristol Bay Environmental Science Lab (BBESL) has been collecting baseline data on the estuary’s biodiversity, water quality and sediments. Many of these studies have been part of an environmental field techniques course (ENVI 260). Environmental data collected are used in student directed individual studies and capstone research projects with results presented at conferences such as WAISC and Alaska Forum on the Environment.

These summer activities will continue in 2013 as we plan to sample key upper estuary stations and hope to add new lower estuary stations to further describe the bay’s variety of bottom types and fauna. As in previous seasons, a 3-meter otter trawl will be used to collect samples of fish and invertebrates at each sampling station. Catches will be sorted by species, counted, weighed, and recorded. Unique biological specimens may be preserved for identification and additional examination. Catches may be subsampled and prepared for caloric analysis. Grab samples will be used to assess bottom characteristics. Water quality will be sampled at each station for salinity, turbidity, conductivity and pH. New for 2013 is the use of a ROV (SeaRay Pro 3Etm) to conduct video transects record biota and sediments in the lower estuary (where visibility permits). The ROV will be lowered to the sea floor and operated from the deck or towed along transects. The ROV will also be used to carry various probes to collect water quality and chemistry data across the full water column.
Alaskan Arctic shelf epibenthic communities: A tale of two seas

Alexandra Ravelo and Brenda Konar, UAF School of Fisheries and Ocean Sciences, Fairbanks, AK (amravelo@alaska.edu)

Epibenthic organisms that live on the seafloor can occur in large numbers and high biomass on the Alaskan Arctic continental shelves. From an ecosystem perspective, they are important in recycling and redistributing organic matter deposited in offshore waters, and as key members of the local food web. Invertebrate biomass, abundance and taxon composition were analyzed from 125 stations sampled during 2009-2011 in the Northeastern Chukchi and Alaskan Beaufort seas using small bottom trawls. This analysis compared the epibenthic communities across the two regions, focusing on changes in biomass, abundance and taxonomic dominance. Most stations in the Chukchi sea region had a higher invertebrate biomass and abundance than the Beaufort Sea region. The sampling stations with higher biomass and higher abundance of both regions were the ones closest to Barrow Canyon in the Northeastern Chukchi Sea. In terms of abundance and biomass, Ophiuroidea, Chionoecetes opilio, Caridea, Pagurus spp. and Saduria spp. were selected as important representatives of the community across both regions. Stations clustered by water depth within regions (but not between regions), especially at the mid and deeper depth categories. These results highlight the importance of the offshore Barrow Canyon for epibenthic/seafloor biological communities, both as the connection point between ocean regions and an area of abundance for epibenthic standing stock. Also, the dissimilarities observed in the epibenthic biomass, abundance and taxon composition of these two regions mark the differences in the physical environment and processes that take place across regions.

Seal: It could be what’s for dinner (if you’re a walrus)

Jill-Marie Seymour, Lara Horstmann-Dehn, and Matt J. Wooller, UAF School of Fisheries and Ocean Sciences, Fairbanks, AK (jseymour@alaska.edu)

Pacific walruses (Odobenus rosmarus divergens) depend substantially on Arctic sea ice as a resting and diving platform for foraging and energetically-efficient access to benthic (bottom-dwelling) prey along the Chukchi Sea continental shelf. However, it has been suggested that under nutritionally stressful situations or unfavorable sea ice conditions walruses may prey on seals. We quantified higher trophic level feeding (such as seals) in walruses by applying stable carbon and nitrogen isotope values of walrus muscle, liver, and skin tissues to a Bayesian mixing model (SIAR). Tissue samples came from Alaskan Native subsistence harvests, natural mortality events, and archived specimens (n=258). Mean contribution of higher trophic level prey (HTLP) to walrus diet was ~23% (±0.1); higher than estimates based on historical stomach content analyses, but consistent with contaminant studies on Atlantic walruses. A broader range in proportion of HTLP (0-60%) indicated by liver and skin mixing models suggests walruses are opportunistic foragers. Comparison between muscle data (n=154) and historical sea ice extent suggests a cyclical diet pattern between reliance on HTLP and ice extent. The possibility of a cyclical pattern is supported by oscillations in δ15N (~3‰) and δ13C (~2‰) values along the length of a whisker from a seal-eating walrus sampled in 2011. Analysis indicated periodic increases in the proportional contribution of HTLP to its diet. Our findings are contrary to the hypothesis that decreases in ice extent lead to walrus predation on seals and seabirds and suggest that walruses forage opportunistically as a result of multiple environmental factors.

Northern pinniped unusual mortality event (UME): An update on the mystery of sick seals and walruses in Alaskan waters

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Vera Metcalf, Director, Eskimo Walrus Commission, Kaverak, Inc., Nome, AK
Raphaela Stimmelmayr, North Slope Borough Department of Wildlife Management, Barrow, AK

During 2011, coastal communities in western and northern Alaska reported over 150 pinnipeds with unexpected hair loss, sores on the face, body, and/or flippers, as well as being unusually approachable/weak. Additionally, there were a variety of organ tissue changes often to the lungs, liver, and thymus. Several walruses were reported with unusual skin conditions. Similar cases of sickness in seals were reported in western Canada and eastern Russia. An Unusual Mortality Event (UME) was declared by the federal government which allowed for a more formal
investigation into this biological mystery. Despite extensive testing, the cause of this sickness remains unknown. This presentation will provide a comprehensive update of the UME, including 2012 when a number of seal sickness “survivors” were reported during subsistence harvest activities.

MARINE SCIENCE

Arctic Eis: An integrated survey of the northern Bering Sea and Chukchi Sea

Jared Weems, Arctic Ecosystem Integrated Survey (Arctic Eis) Project Manager, UAF School of Fisheries and Ocean Sciences, Juneau, AK (arctic.eis@alaska.edu)

The Arctic Ecosystem Integrated Survey (Arctic Eis) project is a 2-year comprehensive field study of the water masses, circulation and biological resources of the northeastern Bering Sea and Chukchi Seas. Results from our ecosystem-wide analyses will provide a baseline against which to assess the impacts of potential oil and gas development and climatic change on the polar marine environment. During 2012 and 2013, we used surface and bottom trawls (Chukchi Sea only) to obtain baseline data collections and our analyses helped define the regional structure, function, and ecology of the plankton, fish and shellfish communities under current climate and habitat conditions. During our August - September 2012 field season in, two ship were used to collect data and samples on the oceanography, small plankton, pelagic and demersal fish, and benthic invertebrates during a total of 107 sea days. Oceanographic results show warmer bottom waters along the coast and cooler waters offshore on the northern Bering and Chukchi shallow shelves. Surface trawls from the upper water column found that jellyfish, herring and capelin were relatively abundant throughout both regions, while juvenile Arctic cod were mostly found north of 70°N latitude. Juvenile chum salmon were the most abundant salmonid and were most abundant in the northern Bering Sea. On the Chukchi sea floor, fish (mostly Arctic and saffron cod) accounted for less than 4% of the catch weight per unit area, with most of the biomass consisting of green sea urchin, snow crab, and other invertebrate species.

PERSPECTIVES ON SUBSISTENCE & ENVIRONMENT

Thursday, March 21 • 9:00a.m.-12:10p.m.
Library Building
Session Chair: Julie Raymond-Yakoubian

PERSPECTIVES ON SUBSISTENCE & ENVIRONMENT

Community climate adaptation in Unalakleet, Alaska

Rachael Aronson, M.A. Candidate/Marine and Environmental Affairs, University of Washington, Seattle, WA (raronson@uw.edu)

Climate change is affecting western Alaskan communi-
conducted semi-structured interviews with residents of Unalakleet, AK. The results were interpreted using grounded theory analysis and in the context of theories of how identity in place-based cultures arises from a “sense of place”. My preliminary findings suggest that climate change and other environmental changes have large effects on residents of Unalakleet. However, some of these changes have more extreme cultural effects than expected and in some cases opposite effects to those predicted. This research suggests that local autonomy and guidance must be blended with state and federal efforts in order to respond appropriately to climate change in Unalakleet.

**Perspectives on Subsistence & Environment**

**Arctic food security: Building a conceptual framework on how to assess food security from an Inuit perspective**

*Carolina Behe, Traditional Knowledge/Science Advisor, Inuit Circump polar Council, Anchorage, AK (carolina@iccalaska.org)*

Inuit possess a unique understanding of food security within the Arctic, viewing food security as encompassing both cultural and environmental systems—systems that interlink and support each other. As many changes currently take affect within Arctic ecosystems, primarily as a result of climate change and industrialization, food security is becoming a central topic of conversation and concern. Research shows that food security definitions and assessment mechanisms do not necessarily match the Arctic ecosystem or cultures within it. In response to the need to address food (in)security of traditional food resources within a changing Arctic, the Inuit Circumpolar-Council Alaska (ICC-AK), has commenced building a framework on how to assess food security from an Inuit perspective. The project builds upon the decision of the ICC-AK Board to place food security as its first priority. In addition, the Arctic Council chairmanship has also placed food and water security as a top priority. This project has three main objectives: 1) to provide an understanding of Arctic food security from an Inuit perspective; 2) to prioritize Inuit concerns which impact food security; 3) to provide a tool to assess food security across both cultural and environmental systems. Throughout the project, the Inuit perspective and traditional knowledge will be sought and documented through semi-directive interviews, community meetings, and information gained from previous projects and regional workshops.

**Perspectives on Subsistence & Environment**

**Ice seal and walrus harvest mapping to protect indigenous use and articulate local concepts of habitat**

*Lily Gadamus, Social Scientist, Kawerak Social Science Program, Nome, AK (ss.pi@kawerak.org)*

Alaska’s Bering Strait region is facing projected rapid increases in industrial shipping due to climatically-induced reductions in sea ice. Industrial development threatens the marine mammals that provide food security and cultural identity to resident Inupiat, Yup’ik, and St. Lawrence Island Yupik tribes. Kawerak, Inc., an Alaska Native non-profit, is conducting participatory mapping in collaboration with nine region tribes in order to determine important seal and walrus habitat and harvest areas. Many participants have expressed concern about the potential for maps to misrepresent the mobility of marine mammals and harvest areas, to limit future harvest area flexibility, to increase outside regulations of harvest activities, to generate conflict between communities with overlapping use areas, and to attract commercial activity to important tribal harvest areas.

We are using four strategies to preserve tribal interests and to avoid harmful effects: 1) a participatory project design so that communities set mapping goals, 2) a significant qualitative component to ensure maps are accompanied by local perspectives, 3) community map review, and 4) community use of maps in decision-making.

We conducted interviews and focus groups with 82 elders and active hunters, and, in addition to making maps, have identified four locally-recognized drivers of habitat change: ice conditions, prey species, disturbance, and pollution. Additionally, we have documented a number of landscape and cultural features that are frequently associated with ice seal or walrus concentrations. At the request of local elders, we have also documented the local informal institutions traditionally used to regulate marine mammal harvests.
Integrating local knowledge and scientific observations to model driftwood harvest from the Yukon River in a changing climate

**Chas Jones**, Ph.D. Candidate/Interdisciplinary Studies, UAF, Fairbanks, AK (cejonesjr@alaska.edu)

Villages in rural Alaska are decreasing their dependence upon expensive fossil fuels by generating heat and/or electricity with wood fired boilers fed by driftwood, a cheap and easily accessed wood source. At the same time, however, the character of summer discharge in the Yukon River appears to be changing in a manner that is negatively affecting rural residents’ driftwood harvest. For example, residents of Tanana, Alaska typically harvest driftwood from the Yukon River during high flow events associated with spring break-up and the “June rise,” but these annual events have become less predictable. This study analyzes the nature of the timing of flood events in the Yukon River with the goal of understanding if the perceived changes in driftwood availability are related to river hydrology and how future changes in hydrology may affect the driftwood harvest and the livelihoods of rural Alaskans. Data gathered from interviews is integrated with USGS gaging station data, U.S. Census data, and a numerical model of driftwood harvest rates to estimate changes in driftwood harvest rates for the USGS period of record (1977 and 2012).

Changing values for ecosystem services in Bristol Bay

**Todd Radenbaugh**, Assistant Professor, University of Alaska Fairbanks, College of Rural and Community Development (taradenbaugh@alaska.edu)

The Bristol Bay region of southwest Alaska was one the first places humans settled in North America, yet the land, rivers and estuaries are still unspoiled and naturally productive unlike many regions of the world. The health of this ecosystem is a result of two major factors: historically low population densities (0.06/km²) and a culture that historically understood its dependence on ecosystem services. Environmental stewardship is recorded in Yup’ik culture and is still believed necessary for continued healthy coexistence within the region as seen in its resistance to promote modern, large-scale mining. Over the last 150 years, globalization, consumerism and climate change have altered the socio-economic and ecological systems within the region, yet the healthy quality of nature continues due to management practices. With the introduction of multi-billion-dollar non-renewable resource industries (oil, gas and mining), regional change and environmental challenges have arrived that threaten this health. To maintain sustainability, residents see merit in merging their traditional knowledge with western scientific practice. This requires maintaining access to subsistence resources (e.g. salmon, moose, caribou and berries) while scientifically exploring the best use (or non-use) of non-renewable resources. This may allow for regional resource managers and stakeholders to adapt to shifting patterns in climate, habitats and economy while maintaining a sustainable culture and ecosystem.

Bering Strait and Norton Sound traditions of respectful marine mammal harvesting

**Freida Moon-Kimoktoak**, Research Assistant, Kawerak Social Science Program, Nome, AK (ssr.asst@kawerak.org)

A goal of Kawerak’s Ice Seal and Walrus Project is to learn how residents of the Bering Strait and Norton Sound regions traditionally managed seal and walrus hunting. Interviews and focus groups with 82 expert hunters and elders were conducted in nine communities for this project. Interview and focus group data were digitally recorded, transcribed, and coded using Atlas.ti and Word. Hunters and elders described a variety of traditional methods and practices for managing marine mammal hunting, many of which focused on a personal hunter ethic of respect for marine mammals. Strategies described by participants included avoiding loss, traditions of respect, harvest level, sharing, use, local management and teaching young people. This presentation will give examples of all of these local strategies.
A tribal initiative to promote collaborative research and restore subsistence resources

Glenn Seaman, Seaman Consulting, Homer, AK (glennseaman@gci.net)

The Native Village of Port Graham has taken the initiative to promote collaborative research with neighboring tribes and western scientists to address priority natural resource issues and enhance subsistence resources. Their experiences in applying a community based research approach and building long-term partnerships offer insights on how western Alaska communities can address their natural resource issues and become more meaningfully engaged in research that impacts them.

Over the past two centuries, the Port Graham Tribe has experienced a decline of important subsistence resources as a consequence of colonization, changes in lifestyle, introduction of commercial mining and fishing, and a variety of ecosystem changes. Port Graham sponsored a Wisdomkeeper Workshop in 2003 with the community and scientists to promote understanding of local natural resource issues, exchange traditional ecological and scientific knowledge, and identify collaborative research projects to more fully understand Port Graham Bay and restore depressed stocks of benthic marine invertebrates. In 2011 the Tribal Council revitalized this effort to develop and test a systematic approach to evaluate accomplishments since the 2003 workshop, identify gaps and research needs, promote two-way learning, and develop a strategy to both improve cross-cultural communications and establish long-term tribal researcher partnerships to address tribal natural resource issues. This presentation will review these activities and provide insight into how similar process may be utilized by western Alaska communities.

Sea mammal hunting and community advocacy in Lorino and Sireniki: Two case studies in Chukotka, Russian Far East

Oxana Yashchenko, M.A. Candidate/Anthropology, UAF, Fairbanks, AK (oyashchenko@alaska.edu)

Residents of Western Alaska, as well as researchers and policy makers working in this region, show continuous interest in the lives of their neighbors on the Russian shores of the Bering Strait. This presentation shares the results of ethnographic fieldwork and archival research focusing on the course of the post-Soviet transition in Chukotka.

A comparison of two communities, Sireniki and Lorino, helps address questions about the relationships between traditional knowledge, local leadership, and community well-being. Both communities are home to Chukotka Native peoples who build their livelihoods on the knowledge, harvesting, and use of marine mammals. Comparison of how these two communities adapt to post-Soviet changes reveals remarkable differences in the ways that Sireniki and Lorino residents use their traditional knowledge base to advocate for their rights and take charge of their destinies.

Over the last two decades marine mammal hunters in Lorino have become not only a source of relative economic prosperity, but also the cultural hearth of their community. They create social environments that facilitate native language use and encourage participation in traditional dances and sport competitions. They also take an active role in the allocation of harvest quotas. By contrast, the highly skilled Sireniki hunters have not acted as leaders in the cultural and political domains, instead applying their knowledge mostly to procure meat for the village residents.

The case studies of Lorino and Sireniki help illustrate the involvement of hunters in leadership and social arenas, as well as their roles in community advocacy and well-being.
Reindeer (Rangifer tarandus) 4-H program in Alaska as a platform for math and science education and food security

George Aguiar, Reindeer Research Program, UAF School of Natural Resources and Agricultural Sciences, Fairbanks, AK (gaaguiar@alaska.edu)

Greg Finstad, Reindeer Research Program, UAF School of Natural Resources and Agricultural Sciences, Fairbanks, AK (glfinstad@alaska.edu)

Reindeer are a primary livestock raised in Alaska, but were not included in the historical state 4-H market youth program. In 2007, the Reindeer Research Program in collaboration with Bureau of Indian Affairs, Reindeer Herders Association, Cooperative Extension Service, Risk Management and the FFA launched a 4-H market reindeer pilot project. A reindeer production module was developed to educate and train 4-H candidates prior to their issuance of a reindeer calf from the RRP. The module emphasized the use of math in the feeding and monitoring of gain and reindeer ecology was integrated into relevant husbandry techniques. Educational and training materials to support reindeer 4-H consist of lesson plans, interactive workshops and lectures addressing reindeer feeding and husbandry. In June of 2008, 2009, 6 and 4 candidates were selected to participate in pilot training sessions. In total, 6 animals were raised to market condition and were auctioned off at the Tanana Valley State Fair in 2009 and 2010. This project has served as the foundation for developing reindeer 4H programs in Alaska (10 participants in Kenai) and across North America (14 participants in Kalamazoo, MI. and a program in Alberta, Canada) 4-H participants used an educational and training module developed by RRP to successfully raise and market reindeer. The youth used math and science in an effort to increase Alaska’s food security by enhancing local food production. Rural communities across Alaska with ample range resources, but limited local livestock production could benefit from a reindeer 4-H program.

Sinrock Mary: Reindeer Queen of Alaska

Lynn DeFilippo, Junior High School Writing Teacher, Nome Beltz Junior/Senior High School, Nome, AK (ldefilippo@nomeschools.com)

Nome Beltz Junior High School 7th Graders

Small Groups of students will present their essays on Sinrock Mary and her husband, Charlie Antisarlook, the first Inupiaq reindeer herders in Alaska. Students will read their papers and present posters.

Good versus bad management of reindeer

Bruce & Ann Davis, Reindeer Livestock & Wholesale, Nome, AK (brucedavis99@yahoo.com)

We will discuss the factors influencing the productivity of a local reindeer operation. Appropriate and effective record keeping, herd health, predator control and range management plans will promote a productive and profitable reindeer business. Yet, many challenges emerge such as keeping track of reindeer on large, remote ranges, reindeer loss to predation and commingling and outmigration with caribou, overgrazing and improper harvesting strategies that jeopardize herd growth and profitability.
Got meat? What are the do’s and don’ts to a quality product?

Greg Finstad, Reindeer Research Program, UAF, Fairbanks, AK (glfinstad@alaska.edu)

Alaska has tremendous forage resources; from Aleutian Chain grasslands to Interior Boreal forest for both the commercial and subsistence production of red meat. Commercial production is currently small (cattle, goats, reindeer), but the potential for growth of a local red meat industry in Alaska is quite large, particularly reindeer. One of the most important considerations to ensure sustainability of a subsistence or commercial food system is delivering a uniform, high quality product. The Reindeer Research Program University of Alaska Fairbanks has conducted a number of meat quality experiments to help guide producers and consumers in the harvesting, processing and consumption of a local red meat resource. This presentation will use results from our studies to briefly review the pre and post mortem factors affecting meat characteristics and how they can be manipulated to ensure the meat we buy or put in our freezers is as good as it gets. We will also review cooking methods that complement particular meats or cuts and the unveiling of a few exotic recipes for reindeer meat.

Reindeer herding in 2043: Your culture, your future

Jackie Hrabok-Leppäjärvi, Visiting Scholar, Joint Faculty UAF-NWC and Sámi Education Institute, Nome, AK, and Kaamanen, Finland (jthl@alaska.edu)

More than 100,000 reindeer herders belonging to 20 indigenous peoples in 9 nations practice reindeer herding in the circumpolar north. Reindeer herding is a livelihood in which cultural values are strengthened and preserved. In 2013, the Association of World Reindeer Herders has a special focus on the voices of today’s youth. What will your reindeer husbandry entail 30 years from now? Will your income come from the sale of reindeer meat, traditional crafts, and/or tourism? Reindeer are rather resilient to change. How will your family adjust to climate change, mining, predators, tourism, and advances in reindeer research? How willing are you to work hard to obtain your dreams?

The Sámi Education Institute collaborates with the Association of World Reindeer Herders, Finnish Reindeer Herder’s Association, and The Finnish Game and Fish Reindeer Research Station. The University of Alaska Fairbanks Northwest Campus is the newest partner in an agreement to preserve cultural values in the circumpolar north. Undergraduate travel grants are available for cultural student exchanges between Alaska and Finland via University of the Arctic North2North grants in 2014.

Reindeer herding on St. Lawrence Island

Mitchell Kiyuklook, Native Village of Savoonga, Savoonga, AK (Native Village of Savoonga, PO Box 120, Savoonga, AK 99769)

Ronnie Toolie, Native Village of Savoonga, Savoonga, AK

St. Lawrence Island is situated at the entrance of the Bering Strait and has been inhabited for thousands of years. In 1900 Sheldon Jackson established a herd of reindeer on the island, and by 1917 the herd had grown to over 10,000 animals. A reindeer camp was established in 1916 where grazing lands were better and the herd tended to remain, which became the community of Savoonga. It is a traditional St. Lawrence Yupik village with a subsistence lifestyle based on marine mammal hunting. Savoonga is called the “Walrus Capital of the World.” Subsistence resources comprise 80% of island residents’ diet. This presentation will cover the history of reindeer herding, including the special features of herding on the island and explanations of current management and activities.

During the 3-year Reindeer Entrepreneurship students study a full range of courses to prepare them to manage their own reindeer herding business with a self-sustaining economy. Income comes from the sale of reindeer meat and traditional crafts of leather, fur, antlers, bones, and toenails. Students train reindeer to walk on a lead rope and to pull a sleigh to meet tourism demands. In the year of graduation students conduct a research project of their choice and report to the community. A similar reindeer herding education program is offered in the northern most reaches of Norway, Sweden, and Russia.
Reindeer rangelands of the Alaska Peninsula, 1904-1947

Amber Lincoln, Research Fellow, UAF Department of Anthropology, Fairbanks, AK (aalincoln@alaska.edu)
Patrick Plattet, Assistant Professor, UAF Department of Anthropology, Fairbanks, AK

In this presentation, we use historical records to reconstruct rangeland boundaries of historical reindeer herds in the Alaska Peninsula and their proximity to known caribou herds of the same time. Reindeer herding in the Alaska Peninsula was an extension of the herding that was started in the 1890s by the US government. Reindeer were initially brought to Lake Iliamna in 1904 as part of the US Reindeer Service’s effort to expand the industry. A few years later, Inupiat herders traveled to the central Alaska Peninsula and established private herds in the Pilot Point and Ugashik regions. Herding, initially flourished and by 1920 reindeer meat was a significant source of food for local people and for canning employees. But this initial success was short lived. By the end of the 1940s, a number of factors lead to the rapid decline of the industry. How might have overgrazing and caribou herds competing for rangelands contributed to their decline?

Drawing from archival sources, interviews with descendants of reindeer herders and ethnoarchaeology, this paper reconstructs historical reindeer rangelands boundaries between the Kvichak River and Port Heiden. We examine these boundaries during the 50-year period of reindeer herding in relation to known caribou herd populations. Although, this research is preliminary, we will consider how populations and distribution of caribou herds may have influenced the reindeer industry of the Alaska Peninsula.

Attitudes, knowledge, and beliefs on cancer and its prevention in northwestern rural Alaska

Jenna Schmidt, Norton Sound Health Corporation, Nome, AK (jenna_schmidt51789@hotmail.com)
Angie Gorn, Norton Sound Health Corporation, Nome, AK (agorn@nshcorp.org)

(NOTE: This presenter appears during the reindeer session due to schedule conflicts.)

The State of Alaska Department of Health and Social Services (2009) cites the leading cause of death in Alaska since 1993 as cancer. Early detection and treatment reduce the risk of mortality due to multiple forms of cancer. Rural Alaskans face challenges with the accessibility of cancer education, screening, treatment, and other needs due to the geographical isolation of their communities (State of Alaska, 2006).

This study focuses on northwestern rural Alaskans’ knowledge and perspectives on cancer. Survey results from 178 participants were compiled to yield data on general beliefs and knowledge about various forms of cancer. The survey addressed a variety of questions on four different cancer types: lung, breast, colon, and ovarian. Study outcomes are statistics that can be used in grant writing and determining community preferences and priorities for awareness efforts to increase knowledge and improve accessibility of preventative care.
Solid Waste Management

Thursday, March 21 • 1:30p.m.-5:00p.m.
Conference Room
Session Chairs: Anahma Shannon, Mike Sloan + Kevin Zweifel

Solid Waste Management

Class III Community Landfill regulations changes

Trisha Bower, Environmental Program Specialist, ADEC
Solid Waste Program, Fairbanks, AK (trisha.bower@alaska.gov)

The department is proposing changes to the solid waste regulations that affect the disposal of polluted soil and the permitting of Class III municipal solid waste landfills (MSWLFs). The proposed changes will allow Class III MSWLFs that are used by fewer than 50 people to be authorized by the department via regulatory requirements. Larger Class III MSWLFs will still require a permit but will be able to use a simplified and shortened permit application. The changes will also stipulate source, volume, and contaminate concentration limits for the disposal or beneficial use of polluted soil in Class III MSWLFs.

Other proposed changes include specifying that landfill designs must be approved by the department prior to construction, stipulating the criteria for approving one-time use landfills in rural areas, and modifying the definition of polluted soil.

Solid Waste Management

Innovative approaches to using seafood wastes to increase agricultural output in western Alaska

Izetta Chambers, Marine Advisory Program Agent, Alaska Sea Grant, UAF, Dillingham, AK (izetta.chambers@alaska.edu)

The proposed oral presentation and poster aims to highlight some of the application of seafood waste in Alaskan communities to increase agricultural output. The waste products to be discussed include: seafood wastewater, fish bones and invertebrate exoskeletons, liquid fish hydrolysate, heads, entrails and “whatever is left.” The bulk of the presentation will highlight a composting project in Naknek, Alaska, at Alaska Bounty Farm. The presentation will examine current and ongoing research, lessons learned, and where people can find information and advice on topics relevant to use of fish wastes for agriculture. Additionally, I will present a one-page handout on resources and contacts which participants can share with their home community members.

Here is a short synopsis of the main points that will be discussed at the presentation:

- Statistics on fish waste in Alaska’s fishing communities;
- Recent developments with Clean Water Act jurisdiction by the State of Alaska and how this may impact the fishing industry’s current discharge allowances;
- Overview of Alaska Bounty’s fish waste composting project in Naknek, Alaska;
- Summary comparison of a similar project implemented in Washington state;
- Past, current, and potential future uses of seafood by-products;
- How seafood waste utilization can help coastal Alaskan communities to become more sustainable through increasing agricultural output;
- Agricultural application of seafood-based fertilizers—market overview and trends;
- Spin-off research and development from seafood by-product utilization;
- Resources for more information on Alaskan projects, including introduction of pbworks wiki site.
Solid Waste Management

NSEDC’s marine debris clean-up program

FredJay Ivanoff, Senior Crew Leader, Norton Sound Economic Development Corporation, Unalakleet, AK (cleanup@nsedc.com)

In 2006, the Norton Sound Economic Development Corporation (NSEDC) began partnering with the Marine Conservation Alliance Foundation (MCAF) to clean up marine debris from beaches in the Norton Sound region. A test clean-up was organized in Unalakleet in 2006. Since that time, cleanup projects have taken place in each of the 15 communities around Norton Sound: St. Michael, Stebbins, Unalakleet, Shaktoolik, Koyuk, Elim, Golovin, White Mountain, Nome, Teller, Brevig Mission, Wales, Diomede, Savoonga, and Gambell. As of the summer of 2012, over 750,000 pounds of debris has been removed. The current schedule, which is dependent on funding, is to return to each community every 3 or 4 years. Little work has been done on the coastlines between communities, but an aerial survey is planned to identify “hot spots”. Another challenge is the removal of the big fuel tanks that have floated away from some communities and now sit in the tidal flats.

The presence of invasive species in Western Alaska is an environmental concern that has not received much attention. Elodea is an invasive genus of aquatic plants that can choke off a slow-moving creek in a couple of years. Invasive species could affect our fish, our berries and the greens we pick.

Solid Waste Management

Best management practices for class III landfills

Ted Jacobson, Solid Waste Tribal Liaison, EPA/Alaska, Anchorage, AK (tjacobson@ruralcap.com)

Many of rural Alaska’s solid waste issues can be attributed to when the State of Alaska mandated the construction of rural schools in the 1950s. As the schools were being built permanent settlements quickly grew up around them. As the young villages took shape an important consideration was left out of the equation, which was to create a plan for the construction waste. In the absence of those plans, village “dumps” have been bulging with steel, old batteries, drums filled with unidentified liquids in addition to the daily trash build up of any community. As rural Alaska became modernized, washers, dryers, automobiles, snowmachines, ATVs and other large objects found their way upriver, downriver or along the coastline. The packaging of the goods going in, meanwhile, evolved from canvas, cotton and steel to cardboard, aluminum, and an array of plastics that will take thousands of years to decompose. Fifty years of dumping, tossing and spilling have caught up with most rural communities. The effects have reached dangerous proportions especially in villages that lie but a few feet above the water table. In many cases leachate, the water that becomes contaminated by seeping through waste, can contaminate ground and surface water and can affect subsistence practices.

The solution lies with implementing proper landfill management. Among the necessary components, technical training tops the list. Part I of the discussion will include a presentation, “Best Management Practices for Class III Landfills,” which will include the implementation of proper equipment, management of the sites, safety gear, collection programs and other facets of safe solid waste management.

Solid Waste Management

Clean up the old or build a new landfill

Ted Jacobson, Solid Waste Tribal Liaison, EPA/Alaska, Anchorage, AK (tjacobson@ruralcap.com)

Many of rural Alaska’s solid waste issues can be attributed to when the State of Alaska mandated the construction of rural schools in the 1950s. As the schools were being built permanent settlements quickly grew up around them. As the young villages took shape an important consideration was left out of the equation, which was to create a plan for the construction waste. In the absence of those plans, village “dumps” have been bulging with steel, old batteries, drums filled with unidentified liquids in addition to the daily trash build up of any community. As rural Alaska became modernized, washers, dryers, automobiles, snowmachines, ATVs and other large objects found their way upriver, downriver or along the coastline. The packaging of the goods going in, meanwhile, evolved from canvas, cotton and steel to cardboard, aluminum, and an array of plastics which will take thousands of years to decompose. Fifty years of dumping, tossing and spilling have caught up with most rural communities. The effects have reached dangerous proportions especially in villages that lie but a few feet above the water table. In many cases leachate, the water that becomes contaminated by seeping through waste, can contaminate ground and surface water and can affect subsistence practices.
Part Two, “Clean Up the Old or Build a New Landfill,” encapsulates the assessments of landfills to determine if they are indeed full, how to implement clean up procedures to bring them under control if they’re not, and how to begin the process of putting in a new one if they are. The presentation will offer important steps, such as planning and other considerations, including tips on how to affect behavioral changes among residents to prolong the lives of new landfills or extend the old ones life.

**SOLID WASTE MANAGEMENT**

**Doing it right the second time around**

*Glenn Jones, Landfill Operator, City of Nome, Nome, AK (pubworks@nomealaska.org)*

Four years ago, to drive by the Nome landfill on the Beam Road was to squint your eyes, crinkle your nose, look at all the trash scattered over the tundra and wonder why no one was doing anything about the “dump.” Three years ago, the City of Nome took over the landfill contract and hired Glenn Jones to manage it. Glenn had no prior experience in managing a landfill but he could drive heavy equipment, was a mechanic by trade and had the right attitude. He was given no formal training, just a 4-inch binder with the rules and regulations and set about cleaning up the “dump.” Today when you enter Nome’s Class II landfill you just may be inspired to take pictures. You’ll notice the separation piles for metal, wood, major appliances, and burnables. Because of the clear signage you’ll know what days and hours the landfill is open, where to separate your waste, and which way to drive to drop off trash. Glenn has whipped that “dump” into a respectable landfill and Nome’s residents are proud of it. Come and listen to Glenn talk about how he learned and is still learning about implementing environmentally sound techniques for managing his landfill.

**SOLID WASTE MANAGEMENT**

**North River contaminated soil White Alice clean-up site**

*Victoria Kotongan, IGAP Coordinator, Native Village of Unalakleet, Unalakleet, AK (victoria.kotongan@gmail.com)*

In the 1950s the U.S. Air Force established a White Alice site in Unalakleet, Alaska. It was located approximately 14 miles up the road between the North River and the Unalakleet River. Structures no longer remain on site but contamination still exists in the soil. This presentation will go over the work performed from the Cooperative Agreement between the Air Force and the Native Village of Unalakleet (year one) as well as the work performed from the contract between the USAF and Jacob’s Engineering (year two). A temporary permanent bridge has been installed, there has been road maintenance to the site, PCB contaminated soil has been removed, and work continues to be ongoing at the site.

**SOLID WASTE MANAGEMENT**

**Cultural consensus analysis in climate change studies**

*Andres Lopez, Fisheries Division, UAF School of Fisheries and University of Alaska Museum, Fairbanks, AK (jalopez2@alaska.edu)*

*Courtney Carothers, Fisheries Division, UAF School of Fisheries and Ocean Sciences, Fairbanks, AK*

*Katie Moerlein, Fisheries Division, UAF School of Fisheries and Ocean Sciences, Fairbanks, AK*

*Caroline Brown, Alaska Department of Fish and Game, Division of Subsistence, Fairbanks, AK*

*Dave Andersen, Research North, Fairbanks, AK*

*Brittany Retherford, Alaska Department of Fish and Game, Division of Subsistence, Fairbanks, AK)*

There is an increasingly urgent need to develop and deploy diverse study tools and approaches, to establish baseline points to recognize, measure and understand the myriad effects of climate change, and to develop mitigation or adaptive strategies to cope with the environmental and social consequences of those changes. We present an evaluation of Cultural Consensus Theory (CCT) as an effective tool to measure the distribution of cultural knowledge regarding historical trends in subsistence fishing practices and to identify areas of agreement about climate change effects. Cultural consensus analysis is a formal implementation of CCT and provides an efficient and measureable way to characterize the degree to which ideas are shared among members of a large population and/or between populations and to understand how different factors such as age and community roles relate to those shared ideas. Significant concerns with analytical frameworks such as CCT include establishing how a focus on quantitative metrics of cultural knowledge or competency fit within the broader and a largely qualitative framework of ethnographic inquiry. Other challenges of blending insights from CCT and those from traditional models...
of anthropological field work include determining how to interpret ambiguous responses, how to structure questions to yield consistent responses, and, perhaps most importantly, how to accurately characterize the nature of shared knowledge bases. We will draw on examples and results from field work in two related research projects from northwest Alaska and interior Alaska looking at local observations of climate change in fisheries contexts.

**SOLID WASTE MANAGEMENT**

Let’s meet in the middle: Planning a joint landfill

*Jennifer Robinette, IGAP Coordinator, Native Village of Eyak, Dillingham, AK (jmpoindexter@alaska.edu)*

In rural Alaska the handling municipal waste is expensive and complex. This is due to the low population density creates limited economies of scale to handle waste. The high costs of constructing and maintaining landfill and recycling programs are many times overwhelming for rural villages not connected to road systems. One solution is for villages to partner to handle waste streams. However, joint landfill agreements between two communities, in rural Alaska are a rare process. The villages of Ekuk and Clarks Point are one example where residents see benefits to cooperation. Ekuk Environmental is learning how to develop a joint landfill first hand and is documenting the steps so that knowledge and lessons learned is available for other rural communities. The proposed joint village landfill is proposed between Ekuk, with a seasonal population of about 400, and Clarks Point, with a year round population of about 60. These communities are located along the west side of Nushagak Bay and are approximately three miles apart and are 17 miles Southwest of Dillingham. No roads connect these communities. Local stakeholders in the proposed landfill include Ekuk Village Council, Clarks Point Village Council, Bristol Bay Native Association, Clarks Point City Council, Sagoyak (Clarks Point Corporation), Chogguing (Ekuk Corporation). Zender Environmental has been contracted for technical support and governmental agencies are needed to secure the needed permits and provide funding. These agencies include both state and federal levels. For the State of Alaska: Department of Environmental Conservation, solid waste department and for the Federal system: EPA IGAP and USDA. There are also private and 14 3c landowners, and local experts. As the joint landfill is currently starting the planning process a planning outline of want is expected over the next three years will be presented.

**WATER QUALITY**

Friday, March 22 • 9:00a.m.-10:50p.m.
Conference Room
Session Chairs: Anahma Shannon, Mike Sloan + Kevin Zweifel

**WATER QUALITY MONITORING**

Exploring recreational mining in Alaska

*Mike Brubaker, Director of Community Environment and Safety, Alaska Native Tribal Health Consortium, Anchorage, AK (mbrubaker@anthc.org)*

With rising prices a global gold rush has occurred resulting in the resurgence in large and small scale mining. This includes the Arctic where rapid growth and opening of old mining sites have been reported in Russia, Canada and Alaska. This presentation considers the growth in artisanal (subsistence) and recreational mining in Alaska and issues for communities that seek to encourage safe, healthy and environmentally friendly mining practices. Public health concerns are reviewed as well as findings from a recent State of Alaska mercury exposure survey and efforts to encourage best practices through miner training courses.
2012 Telida village water quality assessment findings

Charlene Dubay, Telida Village Environmental Director, Telida Village, Telida, AK (charlenedubaya@hotmail.com)

The amount of basic water quality data collected in the Kuskokwim River near Telida, Alaska is limited and there is need for a more systematic sampling plan to collect baseline data. To meet this data and procedural need, during May and July 2012, Telida Village started a water quality sampling project along the headwater of the Kuskokwim River. The objective of the project was to collect water quality data for seven parameters: dissolved oxygen, temperature, pH, conductivity, nitrate, nitrite, and turbidity. The study followed the approved Quality Assurance Project Plan for the Telida Native Village Water Quality Assessment. Water quality parameters measured were similar for ten stations with some marked differences; the nitrate and nitrite levels having the largest differences between the stations. The study found that the water quality measurements were consistent with the expected levels in naturally flowing rivers in Alaska based on EPA water quality standards. Through this study, Telida Village is building the capacity for defensible water quality testing in the Upper Kuskokwim region.

Ecosystem health and management in the Nushagak Bay Estuary: PCB contamination and fish waste utilization

Summer Graber, Connor Ito, Jae Lee and Kenneth Ramsey, Dillingham High School, Dillingham, AK (summer@alaska.edu)

The amount of basic water quality data collected in the Kuskokwim River near Telida, Alaska is limited and there is need for a more systematic sampling plan to collect baseline data. To meet this data and procedural need, during May and July 2012, Telida Village started a water quality sampling project along the headwater of the Kuskokwim River. The objective of the project was to collect water quality data for seven parameters: dissolved oxygen, temperature, pH, conductivity, nitrate, nitrite, and turbidity. The study followed the approved Quality Assurance Project Plan for the Telida Native Village Water Quality Assessment. Water quality parameters measured were similar for ten station with some marked differences; the nitrate and nitrite levels having the largest differences between the stations. The study found that the water quality measurements were consistent with the expected levels in naturally flowing rivers in Alaska based on EPA water quality standards. Through this study, Telida Village is building the capacity for defensible water quality testing in the Upper Kuskokwim region.

NSEDC’s water quality monitoring program

Kevin Keith, Fisheries Biologist, Norton Sound Economic Development Corporation, Nome, AK (kevin@nsedc.com)

The Norton Sound Economic Development Corporation (NSEDC) is one of six organizations that comprise the Western Alaska CDQ (Community Development Quota) Program. NSEDC uses funds from various Bering Seas fisheries to promote economic development in the Norton Sound region. NSEDC’s Fisheries Research and Development Department operates projects to support local salmon, crab, and herring fisheries. In 2007, as part of its support for local fisheries, the Department began monitoring water quality on the Snake River. Monitoring efforts have expanded since then to include the Niukluk River, the Kachavik River, and McKinley Creek. Temperature and dissolved oxygen are measured with a YSI meter, and water samples have been analyzed at the University of Alaska in Anchorage to determine the concentrations of various elements. Results have shown low levels of the elements tested. The tests have shown some interesting geographic and temporal differences among some of the elements tested. Water monitoring in the present is a step towards ensuring that water quality in the future remains excellent.

Baseline environmental condition documentation in the Golovin Bay Watershed

Eric Morris, Watershed Coordinator, Golovin Bay Watershed Alliance and Native Village of White Mountain, White Mountain, AK (emorris@ak.net)

I will give a brief summary of what the Golovin Bay Watershed Alliance is, what the Wetland Program Plan is, and what the Native Village of White Mountain
Environmental Program is doing. We will talk about the stream/air temperature documentation effort, the need for local environmental scientists, the need for local data managers, and the need for targeted support.

**Research Question:** What is the quantified baseline environmental condition of the Golovin Bay Watershed that White Mountain traditional knowledge documents as essentially pristine.

**Methods:** Implement the Golovin Bay Watershed Alliance Wetland Program Plan for Monitoring and Assessment

**Data:** Water quality data collected by the NVWM through 2012 located on IARC/UAF server under Golovin Bay Watershed Alliance. Water quantity and fish documentation data is located on the NVWM Environmental Program server. TEC data is located in a binder at the ITC Building in White Mountain.

Results: We’ll still be at the beginning 20 years from now. Water quality has five years of data. Water quantity and fish life cycle documentation each have one year. Fish rehabilitation and stream/air temperature relationship documentation are just starting. So far, pretty pristine alright.

**WATER QUALITY MONITORING**

**Isopod distribution in the Wood River: Investigation of the range of Saduria entomon in the Nushagak Bay estuary**

*Clint Reigh* and *Todd Radenbaugh*, UAF Bristol Bay Campus, Dillingham, AK (creigh@alaska.edu)

Saduria entomon is a benthic peracarid crustacean (order isopoda) common to marine and estuarine Arctic ecosystems. In Alaska, it has been found at a variety of water depths (0-100 m) and a broad range of salinity (0-35 ppt). In Bristol Bay, located in Southwest Alaska, Saduria is found in estuaries such as Nushagak Bay. This estuary is characterized by silty to rocky bottoms, turbid water, low salinity, and strong tidal currents. Other common benthic organisms identified in the estuary include: salmon, sculpins, starry flounder, rainbow smelt, crangon shrimp, gammarid amphipods, and mysids.

On the Alaska Peninsula, Saduria has been identified inland in the Becherof and Ugashik lakes, both of which are connected by rivers to Bristol Bay. There are no records of Saduria in Lake Aleknagik (tributary of the Nushagak Bay estuary) although it is similarly connected to Bristol Bay via the Wood River. In an attempt to address the absence of Saduria in Lake Aleknagik, a study was undertaken to document Saduria’s range in the upper Wood River. Minnow traps were used to sample a variety of depth and substrate profiles. The 2012 sampling effort was not able to capture Saduria in the Wood River or Lake Aleknagik. Investigations planned for summer 2013 hope to further characterize the range of Saduria in the Wood River. Sampling parameters will include location, water quality, sediment type, and sampling methods.

**WATER QUALITY MONITORING**

How’s the water? Nome Eskimo Community’s In-stream Water Quality Study & Solid Waste Program

*Mike Sloan, Director of Tribal Resources Program, Nome Eskimo Community IGAP, Nome, AK (mikesloan@gci.net)*

Nome Eskimo Community’s Tribal Resources Program has been conducting stream habitat assessments and water quality monitoring for four years at three locations near Nome. Operating under an EPA-approved Quality Assurance Project Plan (QAPP), NEC’s Tribal Resources Program has collected baseline water quality data, weather observations, and other general observations at Christian Creek, Grand Central River and Livingston Creek.

The three study locations support important subsistence habitat, and the baseline data collected under this program could prove valuable in the future should development or other environmental change occur at these sites. Due to the complexity of privately owned land near Nome, State or publically owned lands were selected for the original field locations.

In addition to these locations, NEC is interested in expanding its program to include additional locations that are important to subsistence users. NEC’s Tribal Resources Program is currently in the process of revising its QAPP in cooperation with the EPA.

Nome Eskimo Community’s Tribal Resources Program also assists the City of Nome and Kawerak with recycling and backhaul activities. While the City of Nome operates two permitted landfills and contracts for curbside pickup of trash, the city’s recycling efforts are minimal and mostly ineffective at reducing the amount of recyclable material reaching the landfills.

NEC staff assists during community clean-up events, backhaul drives, and other recycling activities. The Tribal Resources Program also facilitates the responsible removal of abandoned vehicles and e-waste from the community.
WORKSHOP

Thursday, March 21 • 12:30p.m.-2:00p.m.
Classroom B-West

WORKSHOP

Practical remote camp energy solutions

Art Nash, Extension Energy Assistant Professor and Energy Specialist, UAF Cooperative Extension Service, Fairbanks, AK (alnashjr@alaska.edu)

Walter Rose, Energy Specialist, Kawerak Inc., Nome, AK

Alaska residents living (or playing) in the backcountry often forgo luxuries such as hot water heaters, furnaces, indoor commodes and other high-energy users. However, portable camp energy sources are now available and cost effective for seasonal off-grid use, such as PV solar, passive solar units, small windmills, hydro props, battery banks, efficient diesel generators, electro-thermal devices and rocket stoves. Eight inventions will be looked at (from very simple to complex), which for the most part come from Norton Sound and Interior innovators.

The PowerPoint will include video interview, YouTube videos, as well as music backed Preview presentation. Participants will be led to document on handouts the types and amounts of fuels and electricity they use when at fish camp, hunting cabin or mining claims as well (as past appliances they have utilized). Self-investigation will work into discussion of how much fuel/renewable equipment and what types are needed for the appliances used in the past. Discussion and participation will then look at what the needs are in light of energy source consolidation once new appliances and recent marketed as well as invented technologies are introduced through the above methods.

POSTER SESSION

Thursday, March 21 • 5:00p.m.-6:00p.m.
Hallway in main building

POSTER

Society of Automotive Engineers (SAE) Clean Snowmobile Challenge 2013 Update

Pascale Clerc, Electrical Engineering, Sophomore, UAF, Fairbanks, AK (prclerc@alaska.edu)

This poster would update the viewer on current design strategies from the competing teams, as well as UAF. I am a member of the University of Alaska Fairbanks Clean Snowmobile Team, we will be participating in the 2013 SAE Clean Snowmobile Challenge (CSC) in Houghton, MI, early March 2013. I will also explain my role at the competition, as well as what observations I made and what I learned. The competition allows university student-led design teams to take a standard snow-go chassis, remove the engine and make it an electric vehicle.

Current competition rules limit the capacity of the battery pack to 8 kWh. This limits the theoretical range to about 30 miles. Although this is a stumbling block to gain wider acceptance from possible riders, I see it as a challenge to make a lighter weight (but denser) battery
I recently was awarded an Undergraduate Research & Scholarly Activity (URSA) Student Spring 2013 Project Awards to study better battery technology. I am currently in the computer modeling phase of this research, and would like to share my data, so far. I am working with lithium iron phosphate battery chemistry, and we are looking at increasing current capacity of these batteries about 5 times.

If this battery was available the electric snow-go would be able to travel roughly 100 miles, between charges. This would be a definite right step in getting the machine to a wider interested audience.

**POSTER**

Marine-nutrient assimilation in rearing coho and Chinook salmon in the Unalakleet River

Philip Joy, Alaska Department of Fish and Game, Division of Sport Fish, Fairbanks, AK (philip.joy@alaska.gov)

Wes Jones, Norton Sound Economic Development Corporation, Unalakleet, AK

Craig Strickler, U.S. Geological Survey, Denver, CO

Mark S. Wipfli, U.S. Geological Survey, Fairbanks, AK

Marine-derived nutrients (MDN) imported to freshwater ecosystems by migrating adult salmon can affect growth and survival of rearing juvenile salmon. These marine subsidies provided by several species of salmon can affect other salmon species. However, linking MDN levels to freshwater productivity of salmon at the population level has proven difficult. To examine MDN assimilation in rearing populations of salmon, $d^{15}N$ and $d^{13}C$ in juvenile coho and Chinook salmon tissues in the Unalakleet River (Alaska) were examined throughout the watershed at various periods during their freshwater residency. Migrating Chinook and coho salmon smolt were sampled from two sub-drainages in the watershed, and rearing salmon were sampled at 10 sites before and after adult chum, pink and Chinook salmon spawned. A subset of sites was also sampled in mid-winter (March) before pink and chum salmon fry emerged from the gravel. Caudal fin clips from coho and Chinook salmon were used to assess stable isotope signatures, and diet samples were taken to evaluate marine food sources. Results from 2011 revealed significant within site variability, with seasonal spikes of MDN present at several reaches in the drainage. Smolt stable isotope samples suggested substantial predation on salmon fry by coho and Chinook. These data demonstrate significant utilization of MDN from multiple salmon species by coho and Chinook salmon. Ongoing work through 2013 will aim to further elucidate the influence of MDN on coho and Chinook salmon productivity and condition, at the watershed scale.

**POSTER**

The effects of climate variability on juvenile pink and chum salmon growth and condition in the northeastern Bering and Chukchi Seas

Melissa Prechtl, UAF School of Fisheries and Ocean Sciences, Juneau, AK (meprechtl@alaska.edu)

Dr. Megan McPhee, UAF School of Fisheries and Ocean Sciences, Juneau, AK

Dr. Brian Beckman, Northwest Fisheries Science Center, NOAA Fisheries Service, Seattle, WA

The Arctic is warming at an unprecedented rate. Associated with rising temperatures are decreases in thickness and coverage of summer snow and ice. These changes in temperature and summer sea-ice extent are resulting in a notable shift in the northeastern Bering Sea and Chukchi Sea (NEBS/CS) systems from Arctic to more subarctic conditions. Increases in the abundance of juvenile chum and pink salmon might be expected in the Arctic; however, to date, there is limited information on salmon distribution in the Chukchi Sea. This project will focus on the ability of the NEBS/CS regions to support juvenile pink and chum salmon growth by measuring insulin-like growth factor-I (IGF-I) levels, energy content, and analyzing diet from sampling in 2012 and 2013. IGF-I is a growth hormone that stimulates muscle and cartilage growth and is an accurate measure of relative growth rate in many teleost species. In addition to data collected during scheduled 2012 and 2013 surveys, this project will use diet and energetic data collected by the Bering-Aleutian Salmon International Surveys (BASIS) to make a comparison between warm (2001-2005) and cold (2006-present) regimes. The possibility of increasing utilization of the Arctic for summer feeding grounds by juvenile salmon requires an assessment of these Arctic regions to determine whether these habitats are conducive to early developmental growth and condition of salmon species. Understanding the relationships between diet, growth, and temperature are necessary in order to benefit salmon fisheries and assist in adaptation of fishery management to increasing climate variability.
Indigenous Knowledge and Use of Ocean Currents in the Bering Strait Region (1)

Julie Raymond-Yakoubian, Social Science Program Director, Kawerak, Inc., Nome, AK (juliery@kawerak.org)
Yury Khokhlov, Biologist, Chukotka Branch of the Pacific Scientific Research Fisheries Center, Anadyr, Russia (juri21@mail.ru)

This project is documenting the traditional and contemporary use of and knowledge about ocean currents in collaboration with six communities in the Bering Strait region, in both the United States and Russia. The Alaskan communities that are part of this project are Diomede, Wales and Shishmaref. The Chukotkan communities are Lorino, Lavrentiya and Inchoun. This project also involves a collaboration between an Alaska Native non-profit (Kawerak) and Russian researchers.

Historically, and in contemporary times, the indigenous people of the Bering Strait have had an intimate relationship with and knowledge of the Bering Sea. While many social science projects (or components of projects) have focused on indigenous knowledge of sea ice, weather patterns, and climate change, and have documented some information regarding ocean currents, this project focuses specifically on the topic of currents. Indigenous knowledge of ocean currents relates to sea mammal hunting, collection of and access to other marine resources, travel, weather forecasting and other purposes. Local residents of the collaborating communities have been assisting in gathering historical and current information from experts in their communities regarding ocean currents (in the form of digital recordings, photos, maps, and written field notes).

Navigating change in Iŋalit-Walrus relationships

Julie Raymond-Yakoubian, Social Science Program Director, Kawerak, Inc., Nome, AK (juliery@kawerak.org)
Brenden Raymond-Yakoubian, Contractor, Kawerak, Inc., Nome, AK

Alaska Native subsistence communities in the Bering Strait region, such as Little Diomede, continue to rely on walruses for food, equipment, and cultural significance. Due in part to the isolated location of Little Diomede Island, the scarcity of raw materials on the island, and residents' historic dependence on walruses, many traditional cultural practices associated with walruses continue through to contemporary times. These include the manufacture of equipment (boats, ropes, drums, leather goods) and handicrafts, artistic expression through carvings, locally derived management practices, and unique food preservation and preparation techniques. This project aims to document some of the contemporary and historic relationships between Diomede people (Iŋalit) and walrus through archival research at Kawerak’s Eskimo Heritage Program and through interviews with Diomede walrus experts. Documenting information on walruses with the residents of Little Diomede Island can provide information regarding Pacific walruses relevant to marine and wildlife policy and management. This poster outlines some areas of change, related to walrus behavior, use of walrus, and the environment, that Diomede residents have observed over their lifetimes. We conclude that while the connection between walrus and Iŋalit lifeways remains strong and locally vital, there appear to have been substantial and systemic impacts to this relationship connected with environmental changes.