The Class of 2021

Doctor of Philosophy Degrees

College of Engineering and Mines

Dr. William E. Schnabel, Dean

Robin J. Bullock

Ph.D. Engineering: Environmental Engineering

B.S., Montana Tech College of Technology, 1984.

Thesis: Effectiveness, Environmental Pathways and Operational Readiness of OP-40 Chemical Herder when used in Conjunction with In-Situ Burning for Oil Spill Response in the Offshore Arctic

The Arctic contains large reserves of natural resources, and, as the Earth's climate changes, so does the Arctic and its economy. Oil spills in this environment can prove damaging, as well as logistically challenging. This research assessed the effectiveness, environmental pathways and operational readiness of herder-assisted in-situ burning.

Major Professors: Dr. Robert Perkins and Dr. Srijan Aggarwal

Dustin Ray

Ph.D. Engineering: Mechanical Engineering

B.S., University of Alaska Fairbanks, 2011; M.S., University of Alaska Fairbanks, 2013.

Thesis: Computational Analysis of Nanofluids Flow and Heat Transfer in Microchannels and Fin Tube Air Coils

Investigations on compact and microchannel heat exchangers to determine nanofluids' thermal and fluid dynamic performance demonstrated improvements in both areas. Furthermore, new hydrodynamic entrance length and apparent friction factor correlations were developed for rectangular microchannels for a wide range of aspect ratios and Reynolds numbers using computational fluid dynamics software.

Major Professors: Dr. Debendra Das and Dr. Rorik Peterson

Roy Takeo Strandberg

Ph.D. Engineering: Mechanical Engineering

B.S.M.E., University of Washington, 1996; M.S., University of Alaska Fairbanks, 2009.

Thesis: Computational and Experimental Evaluation of Nanofluids in Heating and Cooling Forced Convection Applications

The purpose of the research was to examine the heat transfer and fluid dynamic performance of various nanofluids in heating and cooling applications using empirical and computational methods. The nanofluids were found to offer the potential of improved performance but present some practical challenges that may hinder widespread adoption.

Major Professors: Dr. Debendra Das and Dr. Rorik Peterson

College of Fisheries and Ocean Sciences

Dr. S. Bradley Moran, Dean

Channing Bolt

Ph.D. Oceanography: Chemical

B.S., Humboldt State University, 2016.

Thesis: Utility of Trace Element Studies for Improving our Understanding of Geochemical Processes within the Arctic Ocean Environment

Chapter One investigates particulate trace elements in Arctic pack ice, snow and surface waters. Chapter Two considers dissolved barium, a lithogenic element, as a tracer of meteoric water throughout the Siberian Arctic Ocean. In Chapter Three, additional spatiotemporal geochemical parameters were used to model spatiotemporal distributions of Arctic water masses.

Major Professor: Dr. Ana Aguilar-Islas

Dmitry Brazhnikov

Ph.D. Oceanography: Physical

B.S., Moscow Institute of Physics and Technology, 2008; M.S., Moscow Institute of Physics and Technology, 2010.

Thesis: Investigation of Variability of Internal Tides in the Tasman Sea

Internal tides, waves forced by the tidal flow in the ocean interior, are hard to predict and interpret, but their life cycle shapes deep ocean water properties. This study identifies and quantifies mechanisms driving significant changes of the Tasman Sea tide in response to varying oceanic conditions.

Major Professor: Dr. Harper Simmons

Marcus Jonathan Gho *

Ph.D. Fisheries

B.A., Brigham Young University, 2003; M.S., Utah State University, 2006.

Thesis: Bristol Bay Dual Permit Operations, Vessel Heterogeneity, and the Migration of Alaskan Permit Holders

Three chapters examined aspects of Alaska's Limited Entry program: the outcome of dual-permit regulations, the persistence of heterogeneity in the size of fishing vessels active in the Bristol Bay salmon drift gillnet fishery, and the factors that influence the migration of permit holders.

Major Professor: Dr. Keith Criddle

Sonia Natalie Ibarra

Ph.D. Fisheries

B.S., Humboldt State University, 2008.

Thesis: Addressing a Complex Resource Conflict: Humans, Sea Otters, and Shellfish in Southeast Alaska

Competition for resources between sea otters and humans in Southeast Alaska has led to food security concerns in rural subsistence communities. This dissertation documents Indigenous and local knowledge of Alaska Native customary and traditional food experts, sea otter hunters and elders to understand empirical observations for restoring balance with otters.

Major Professor: Dr. Ginny Eckert

Jenell Trillium Larsen Tempel *

Ph.D. Fisheries

B.S., Jacksonville University, 2014.

Thesis: Environmental Impacts on Reproductive Responses of Pacific Walruses (*Odobenus rosmarus divergens*) and Subsistence Users of St. Lawrence Island

In walruses, reproductive capacity fluctuated with changes in carrying capacity and the Bering Sea environment over a 35-year period; hormone profiles support the first physiological evidence for pseudopregnancy in this species. Discussions with St. Lawrence Island community members highlighted changes in key subsistence resources with regard to food security.

Major Professor: Dr. Shannon Atkinson DeMaster

Christopher Joseph Latty

Ph.D. Marine Biology

B.S., Grand Valley State University, 2000; M.S., University of Alaska Fairbanks, 2008.

Thesis: Sources and Effects of Strontium in Waterfowl Eggs

Strontium may be a contaminant of concern in bird eggs. The factors affecting strontium concentration in the eggshells of waterfowl in Interior Alaska and the relationship between eggshell strontium and eggshell quality both appear related to the geochemistry near the nest, hen diet and hen physiology.

Major Professor: Dr. Tuula Hollmen

Valentina Melica **

Ph.D. Fisheries

B.S., University of Trieste, 2010; M.S., University of Trieste, 2013.

Thesis: Reproduction and Stress Response Endocrinology in Blue (*Balaenoptera musculus*) and Gray (*Eschrichtius robustus*) Whales

Hormones are tiny molecules produced by the body during important physiological processes, such as reproduction and stress response. This dissertation measured hormone concentrations in blubber of blue and gray whales from the eastern North Pacific Ocean and developed analytical tools to detect pregnancy and assess metabolic well-being.

Major Professor: Dr. Shannon Atkinson DeMaster

* *Summer degree recipient*

** *Fall degree recipient*

Wendel W. Raymond *

Ph.D. Fisheries

B.S., Oregon State University, 2012.

Thesis: Sea Otters in Southeast Alaska: Subsistence Harvest and Ecological Effects in Seagrass Communities

Sea otter (*Enhydra lutris*) subsistence harvest and population effects varied depending on locations and sizes of areas studied. Measuring biomass, stable isotopes and fatty acids in seagrass habitats found that sea otters have negative effects on shellfish, weak positive effects on seagrass and varied effects on other seagrass-associated species.

Major Professor: Dr. Ginny Eckert

Robert E. Spangler **

Ph.D. Fisheries

B.S., Oregon State University, 1991; M.S., University of Idaho, 1997.

Thesis: Spawning Migration Characteristics and Ecology of Eulachon (*Thaleichthys pacificus*)

This research sought to fill key knowledge gaps in eulachon spawning ecology that have impeded population monitoring efforts and habitat protection. Tests proved that eulachon produced viable offspring in brackish water, used estuaries as spawning habitat and migrated during the highest tides associated with the spring tide phase.

Major Professor: Dr. Brenda Norcross

Benjamin Phillip Weitzman *

Ph.D. Marine Biology

B.S., University of California Santa Cruz, 2008; M.A., University of California Santa Cruz, 2013.

Thesis: Sea Urchin Ecology: Effects of Food-Web Modification, Climate Change and Community Structure

Sea urchins showed increased variability in size and abundance and became more sensitive to environmental forcing following the loss of sea otters. These studies showed how large-scale global ocean change and fine-scale species interactions could influence sea urchins and their role as a driver of coastal ecosystem structure and function.

Major Professor: Dr. Brenda Konar

College of Liberal Arts

Dr. Ellen D. S. Lopez, Dean

Charlene Aqpik Apok

Ph.D. Indigenous Studies

B.A., University of Washington, 2013; M.A., University of Alaska Fairbanks, 2016.

Thesis: Alaska Native Men's Voices: Tracking Masculinities through Indigenous Gender Constructs

The Alaska Native Men's Voices project made visible experiences of what it means to identify as an Indigenous male. Illumination of Indigenous gender knowledge systems contributes to Indigenous sovereignty and self-determination. Findings articulated holistic notions of health and well-being for future generations.

Major Professor: Dr. Sean Asiqłuq Topkok

Ellen Margaret Carrlee **

Ph.D. Anthropology

B.A., University of Wisconsin Madison, 1995; M.A., New York University, 2000.

Thesis: The Yup'ik Relationships of Qiluliuryaraq (Processing Intestine)

Investigation of intestine as an obsolete material revealed changes in technology and spirituality, while resilience of gut processing demonstrated identity and traditional values. The theoretical orientation focused on reciprocal relationships among humans and non-humans, while the methodology prioritized hands-on learning from Indigenous experts in both museums and Yup'ik communities.

Major Professor: Dr. Peter Schweitzer

Samuel Holmes Johnson *

Ph.D. Clinical-Community Psychology

B.A., Western Colorado University, 2005; M.S.W., University of Alaska Anchorage, 2007.

Thesis: Mental Health Problems in the Mountains: Needs, Assets, and Recommendations for Managing Mental Health Problems in Mountain-Focused Wilderness-Based Education and Related Fields

This exploratory community-based participatory research assessed needs, assets and recommendations related to mental health problems among students and instructors in wilderness-based education and related fields. Many areas are in need of further development, and the study provides recommendations for future directions in the development of training, screening, protocol and policy.

Major Professors: Dr. Ellen Lopez and Dr. Patrick Dulin

Yoko Kugo

Ph.D. Ethnogeography: Interdisciplinary Studies

B.A., University of Alaska Southeast, 2011; M.A., University of Alaska Anchorage, 2014.

Thesis: Iliama Lake Ethnogeography: Yup'ik Place Names and Sense of Place

This dissertation examines Iliamna Lake ethnogeography, the physical and mental understanding of landscape, by researching place names and related stories from Yup'ik perspectives. Telling and retelling such stories allows people to visualize their landscapes while reinforcing the knowledge that has enabled them to thrive in the region.

Major Professors: Dr. Mary Ehrlander and Dr. Walkie Charles

* *Summer degree recipient*
** *Fall degree recipient*

Annie Nichole Laweryson *

Ph.D. Clinical-Community Psychology: Rural Indigenous Emphasis

B.S., Saint Martin's University, 2011; M.S., Bastyr College, 2015.

Thesis: Stigma, Self-Efficacy, and Adherence Behaviors in People with Type 2 Diabetes: Unexpected Outcomes

Social stigma negatively affects many people with Type 2 diabetes. Moderated-mediation analyses were conducted to test the ability of positive patient-provider relationships to deter the negative impact of stigma on health behaviors. Findings were unexpected and revealed paradoxical relationships between variables but were consistent with psychological reactance theory.

Major Professor: Dr. Kendra Campbell

Davita Aphrodite-Lee Marsden Giniw'Waabi 'To See Like a Golden Eagle'

Ph.D. Indigenous Studies

B.F.A., University of British Columbia, 2002; B.Ed., Simon Fraser University, 2004; M.Ed., University of British Columbia, 2010.

Thesis: The Sound of 1001 Indigenous Drums: The Catalytic Cycle of Fire Eagle, Golden Eagle, Thunderbird

This dissertation addresses how integration of Indigenous culture in public school curricula supports success of urban Indigenous students. Drawing on students' artwork stories, the dissertation investigates how the adoption of Indigenous drumming and singing in classrooms contributes to student success. The study aligns with evidence-based approaches and quantification of learning.

Major Professor: Dr. Sean Asiqłuq Topkok

Jessica McKay **

Ph.D. Clinical-Community Psychology

B.A., University of Alaska Fairbanks, 2009; M.S.W., University of Alaska Anchorage, 2010.

Thesis: "I Hear What You're Saying": Evaluating the Couple Validation Training (CVT), a Brief Behavioral Intervention

This study explored the role of relationship education in reducing conflict among couples in a committed relationship. After a workshop to help couples, more than 85% of study participants improved their communication skills and experienced greater satisfaction from their relationships.

Major Professors: Dr. Valerie Gifford and Dr. John Worrall

Nicholas Schmuck

Ph.D. Anthropology

B.A., Messiah College, 2011; M.A., University of York, 2012.

Thesis: Contextualizing the Development of Coastal Adaptations in Postglacial Southeast Alaska

To address the late Pleistocene people of Southeast Alaska, theoretical models were developed to explore how humans adapt to unfamiliar and changing landscapes. A regional synthesis of the marine reservoir effect refined local sea-level histories, and obsidian analysis reframed early Holocene lithic technology as an adaptation to local sources.

Major Professor: Dr. Joshua Reuther

Gerad M. Smith **

Ph.D. Anthropology

B.A., University of Montana, 2008; M.A., University of Alaska Fairbanks, 2012.

Thesis: Ethnoarchaeology of the Middle Tanana Valley, Alaska

This study explores the shifting constructs of identity for the Middle Tanana people at the Swan Point and Pickupsticks archaeological sites. Construction methods there show a shift from single-family structures to multifamily houses approximately 1,000 to 1,800 years ago, reflecting the social importance of the potlatch in bringing nonrelated kin together in one society.

Major Professor: Dr. Joshua Reuther

Angel R. Vasquez *

Ph.D. Clinical-Community Psychology: Rural Indigenous Emphasis

B.A., University of New Mexico, 2009; M.S., University of Alaska Anchorage, 2013.

Thesis: In Pursuit of Harm Reduction in the Alaskan Context: Patient Cultural Explanatory Models of Addiction and Treatment Outcomes for a Medically-Assisted Program Utilizing a Buprenorphine/Naloxone Formulation

This three-phase mixed methods study utilized a sequential explanatory case study design to examine a medically assisted treatment (MAT) program for opioid use disorder in Fairbanks, Alaska. Treatment outcomes were examined and recovery trajectories were explored to better understand patient experiences and next steps to MAT development in the Alaska context.

Major Professors: Dr. Kendra Campbell and Dr. Ellen Lopez

* *Summer degree recipient*
** *Fall degree recipient*

College of Natural Science and Mathematics

Dr. Kinchel C. Doerner, Dean

Chris G. Carr

Ph.D. Geophysics

B.S., Montana State University Bozeman, 2006; M.S., Montana State University, 2011.

Thesis: Blood Falls, Taylor Glacier, Antarctica: Subglacially-Sourced Outflow at the Surface of a Cold Polar Glacier as Recorded by Time-Lapse Photography, Seismic Data, and Historical Observations

Blood Falls forms when iron-rich, hypersaline, subglacially sourced brine flows from a crack in the surface of Taylor Glacier, Antarctica. This research provides context for the history of brine release events from 1903-1994, wintertime brine release characteristics from winter 2014 and descriptions of the local seismic environment at Taylor Glacier.

Major Professors: Dr. Erin Pettit and Dr. Carl Tape

Matvey Vladimirovich Debolskiy **

Ph.D. Geophysics: Snow, Ice and Permafrost Geophysics

B.S., Lomonosov Moscow State University, 2013; M.S., Lomonosov Moscow State University, 2013.

Thesis: Modeling Permafrost Dynamics and Water Balance of Arctic Watersheds in a Changing Climate

Permafrost is a key feature of the Arctic landscape. The role of permafrost in the terrestrial part of the Earth's water cycle was investigated by the numerical modeling of coupled heat and moisture transport in soil on centennial and millennial timescales.

Major Professors: Dr. Regine Hock and Dr. Vladimir Romanovsky

Stanley Gene Edwin *

Ph.D. Atmospheric Sciences

B.A., University of Alaska Fairbanks, 2013; M.S. University of Alaska Fairbanks, 2016.

Thesis: Current Exposure of Yukon Flats Tribal Villages' Residents to PM2.5 from Natural and Anthropogenic Sources: Establishing Baselines for Climate Change Adaptation and Resilience

An experimental analysis of air quality and meteorology was conducted for the eastern interior region of Alaska, where no data is available. This thesis provides an excellent level of scientific analysis using in-situ experimental data to guide the modeling effort and the use of reanalysis and satellite data.

Major Professor: Dr. Nicole Mölders

Jessica Inez Garron **

Ph.D. Remote Sensing in Decision Making: Interdisciplinary Studies

B.S., University of Maine, 1997; M.S., University of Alaska Fairbanks, 2007.

Thesis: Integration of Remote Sensing Technologies into Arctic Oil Spill Response

Successful integration of landscape-level science into decision-making processes is vital for quality environmental stewardship. This dissertation identifies opportunities and solutions that support improved Arctic oil spill response decision-making through the application of remote sensing data and information in remote operational settings.

Major Professors: Dr. Franz Meyer and Dr. Sarah Trainor

Jason Edward Geck **

Ph.D. Geology

B.A., California State University, Sacramento, 1996; M.S., Alaska Pacific University, 2001.

Thesis: Changing Glaciers in the Brooks Range and Western Chugach Mountains, Alaska: Mass Loss, Runoff Increase, and Supraglacial Volcanic Tephra Coverage

Volume change of central glaciers in the Brooks Range, Alaska, were calculated for 1970s-2010 using elevational datasets. The mass change of Eklutna Glacier, Alaska, was hindcast over 1985-2019 using a glacier model. Remote sensing methods investigated the persistence of tephra from the 1992 Mt. Spurr eruption in western Chugach Mountains glaciers.

Major Professor: Dr. Regine Hock

Taylor R. Gofstein *

Ph.D. Environmental Chemistry

B.S., University of Bridgeport, 2015.

Thesis: Fate and Effects of Commercial Crude Oil Bioremediation Products in Arctic Seawater

Increased oil exploration in the Arctic has necessitated an investigation of the effects of the oil spill response products Corexit 9500 and Oil Spill Eater II on crude oil biodegradation in Arctic seawater and the associated shifts in the microbial community structure and function using mesocosm incubations.

Major Professor: Dr. Mary Beth Leigh

Marcus Hirtl

Ph.D. Natural Sciences: Interdisciplinary Studies

B.S., Vienna University of Technology, 2002.

Thesis: Atmospheric Modeling of Natural Hazards

The Weather Research Forecasting model with in-line chemistry was extended and used to simulate the emission and dispersion of volcanic ash and SO2 clouds. The model was evaluated with observations and applied during a natural hazard exercise to show the benefit of its integration into emergency response systems.

Major Professor: Dr. Martin Stuefer

* *Summer degree recipient*

** *Fall degree recipient*

Alexandra Michelle Iezzi *

Ph.D. Geophysics

B.A., Connecticut College, 2015.

Thesis: Exploring Infrasound Wavefields to Characterize Volcanic Eruptions

Characterization of the propagation path infrasound experiences between the source and a receiver is vital in order to better understand the infrasound source itself. The effects of the atmosphere and topography on the recorded infrasound waveforms were modeled to better interpret the acoustic source and its implications on volcanic eruptions.

Major Professor: Dr. David Fee

Michael Edgar Johns **

Ph.D. Biological Sciences: Wildlife Biology and Conservation

B.S., California State University, Monterey, 2009; M.S., University of Alaska Fairbanks, 2018.

Thesis: The Effects of Individual and Environmental Heterogeneity on Long-Term Population Dynamics of Cassin's Auklets (*Ptychoramphus aleuticus*)

Reproductive output and survival are balanced through a tradeoff between current success and future potential. A 37-year record of breeding Cassin's auklets showed evidence of a positive relationship between double brooding and survival attributed to individual quality. Higher rates of double brooding buffered the population against climate-driven periods of low adult survival.

Major Professors: Dr. Greg Breed and Dr. Mark Lindberg

Marianne Lian *

Ph.D. Veterinary Biochemical Toxicology: Interdisciplinary Studies

B.S., University of Copenhagen, 2009; M.S., University of Copenhagen, 2012.

Thesis: Assessing Adverse Effects of Mercury in Two Pinniped Species

Adverse effects were associated with mercury. There was a significant negative relationship between lipid peroxidation and selenium, and increased antioxidant activity and lipid peroxidation. A significant association between mercury and decreased tactile sensation, less movement and longer rehabilitations was found, confirming adverse effects in free-ranging pinnipeds exposed to mercury in utero.

Major Professor: Dr. Todd O'Hara

Marc Oggier **

Ph.D. Geophysics: Snow, Ice and Permafrost Geophysics

B.S., Swiss Federal Institute of Technology Lausanne, 2007; M.S., Swiss Federal Institute of Technology Lausanne, 2009.

Thesis: Effects of Sea Ice Seasonal Evolution and Oil Properties on Crude Oil Upward Migration through Sea Ice

Should an oil spill happen in ice-covered waters, quantifying oil containment in sea ice and determining the timing of vertical oil migration throughout the ice cover is critical for oil spill response and preparedness efforts. This thesis sought to understand the transport mechanisms and proposed a model to support cleanup efforts.

Major Professor: Dr. Hajo Eicken

Soma Raj Panta *

Ph.D. Physics

B.S., Tribhuvan University, 2006; M.S., Tribhuvan University, 2009.

Thesis: Control of Internal Transport Barriers in Magnetically Confined Tokamak Fusion Plasmas

Turbulence transport, the mechanism that drives plasma particles and energy out of the machine in the magnetic confinement devices, has to be controlled for steady state fusion reactors. This work investigated mechanisms to control such turbulence transport with internal transport barriers. External heating and particle sources are used for such control mechanisms.

Major Professor: Dr. David Newman

Sarah Alison Rice **

Ph.D. Biochemistry & Neuroscience

B.S., Evergreen State College, 2011.

Thesis: Metabolite Influence on the Hibernating Arctic Ground Squirrel

This work aimed to identify how hibernators maintain nitrogen homeostasis and amino acid supply, and how metabolites in return may influence hibernation physiology. The study found production of amino acids is highly regulated and sustained by free nitrogen recycling, while specific metabolites can exert thermogenic influence in hibernating ground squirrels.

Major Professor: Dr. Kelly Drew

Jiake Zhou *

Ph.D. Biological Sciences: Wildlife Biology and Conservation

B.S., University of Montana, 2011.

Thesis: Climate Change, Moose, and Subsistence Harvest in Arctic Alaska

Using field surveys and modeling, this research identified moose habitat requirements, mapped current and future distributions, and assessed harvest opportunities under future warming in Arctic Alaska. The work showed that rapid resource change does not necessarily translate into increased harvest, highlighting the importance of integrated assessment in evaluating climate change impact.

Major Professors: Dr. Knut Kielland and Dr. Gary Kofinas

* *Summer degree recipient*

** *Fall degree recipient*

School of Education

Dr. Amy Vinlove, Director

Michael J. Healey *

Ph.D. Counseling and Counselor Education: Interdisciplinary Studies

B.A., University of New Brunswick, 2002; M.A., Anna Maria College, 2006.

Thesis: Beyond Trending: Using Risking Connection as a Framework for Moving Agency Culture Toward Trauma-Informed Care

Risking Connection (RC) is a curriculum-based training program that works with agencies interested in becoming trauma-informed. The current study examined the impact of RC on trainee outcomes for knowledge gain, attitude change and vicarious trauma on 119 participants who work at a therapeutic group home system in Atlantic Canada.

Major Professor: Dr. Susan Renes