



## Diversity, Education, and Workforce Development (DEW)

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# DEW Core Team Members



**Dr. Laura Conner**  
DEW Lead



**Dr. Beth Leonard**  
Indigenous Science



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Learning Sciences Postdoc



**Courtney Breest**  
UAA/UAS Coordinator



**Dr. Joanna Young**  
UAF Inspiring Girls Director



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UAF Inspiring Girls Coordinator

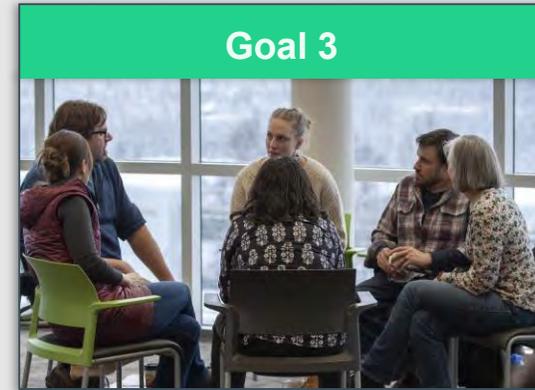
# DEW Goals



Build key competencies among stakeholders to address ecological change.



Build a diverse pool of STEM learners and workers in Alaska.



Increase capacity for F&I science and teaching among UA faculty and students.

# GOAL 1: Build key competencies among stakeholders to address ecological change.

Objectives	Planned Activities	Accomplished to date
<b>Objective 1.1</b> Increase K-12 student knowledge and skills about ecological change related to F&I themes.	<ul style="list-style-type: none"><li>Reach 350 students via <b>STEM curricula</b></li><li>Train 60 teachers in <b>workshops</b></li></ul>	<ul style="list-style-type: none"><li>Estimated 200-300 students reached to date</li><li>Reached 34 teachers to date</li></ul>
<b>Objective 1.2</b> Prepare UA students with F&I-related knowledge and skills.	<ul style="list-style-type: none"><li>Implement <b>Fire &amp; Ice content</b> in 4 UA courses per year</li></ul>	<ul style="list-style-type: none"><li>4-6 courses include F&amp;I content annually</li></ul>

# After-school Curriculum

- Partnered with Fairbanks North Star Borough School District to assess needs and define target audience, scope, length, etc.
- Set of five lessons for 3<sup>rd</sup>-5<sup>th</sup> grades (adaptable for other ages)
- Lessons use observation and science sense-making (aligned with Next Generation Science Standards)

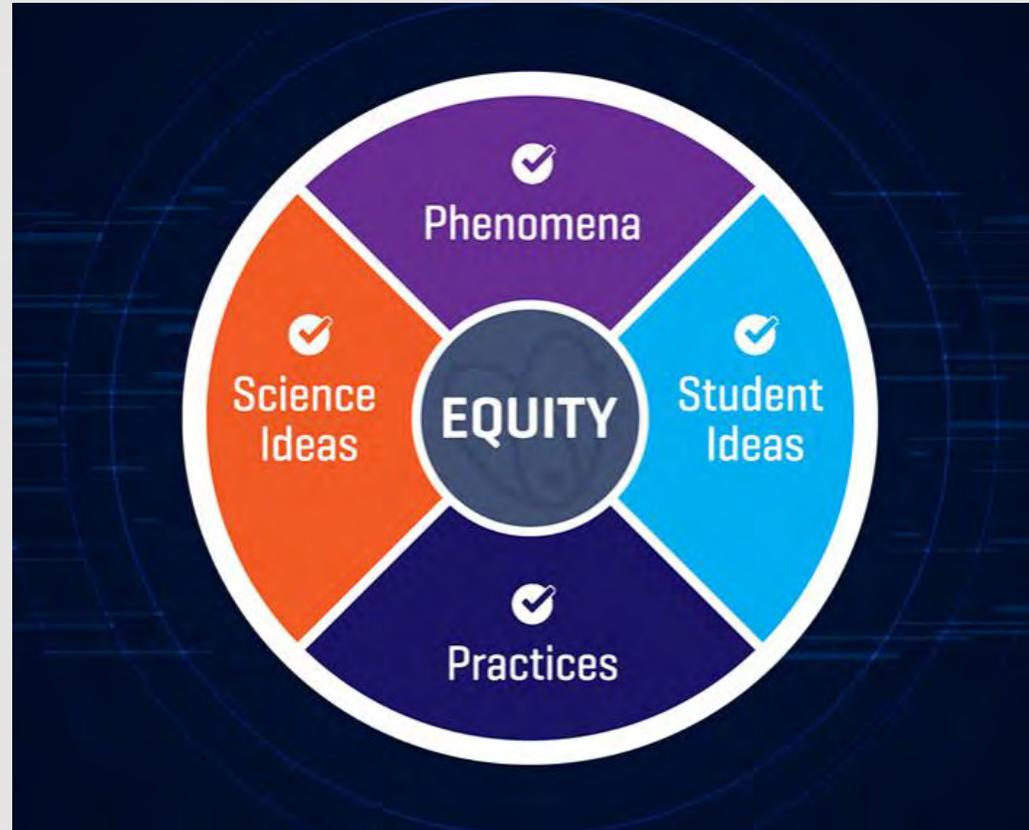
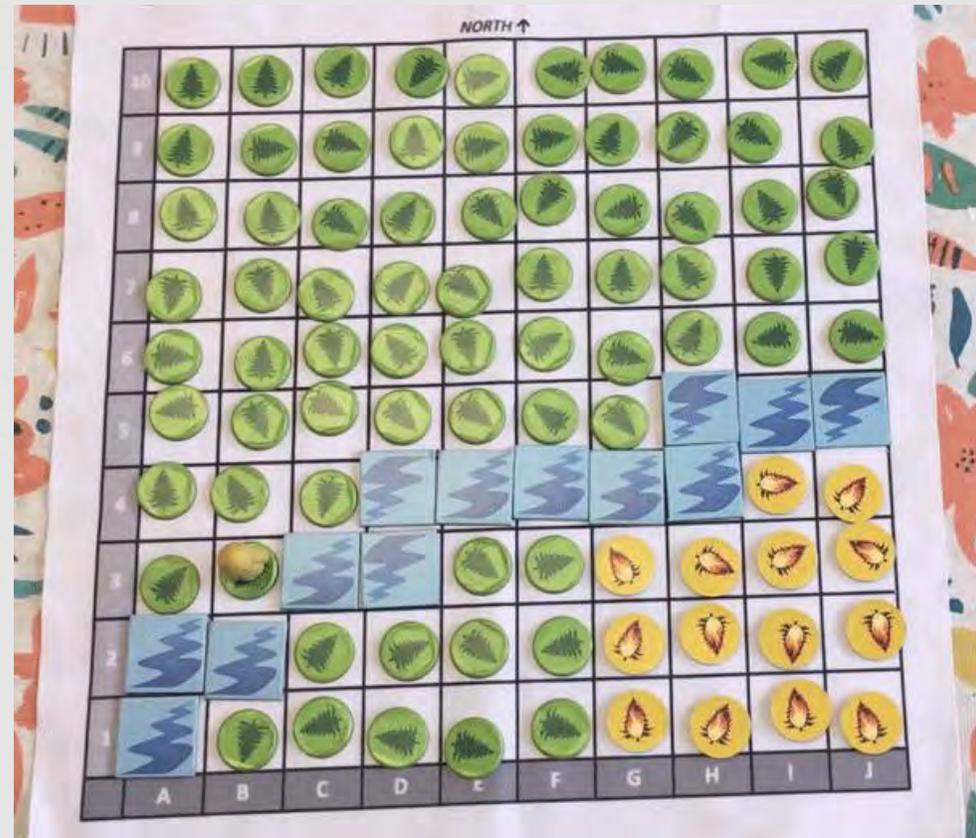


Image Courtesy: NSTA

# After-school Curriculum

- Lessons centered on “Forest Fire Simulation Game” that explores wildfire behavior
- Students work through scenarios, explore their own ideas
- Learn that humans are part of the cycle and can influence it

*“You have been asked to conduct a prescribed burn that is big enough to cover 10 squares, but ONLY 10 squares. Where will you cut the fire break?”*



## After-school Curriculum

- Partnered with Alaska Afterschool Network to hold online teacher workshop and disseminate kits
- Distributed 81 additional kits to Project Learning Tree and Alaska Fire Science Consortium educators
- Held in-person teacher workshop August 9-10
- Evaluation:
  - External curriculum review
  - Teacher survey
  - Student survey



Megan McGinty working with a student in the After School program

# Fire and Ice content in UA courses



Faculty teaching courses

## Geoscience Applications of Remote Sensing (UAF)

- Incorporated remote sensing of wildfires

## Principles and Techniques of Wildlife Management (UAF)

- Addressed wildfire impact on moose, caribou and other ecosystem services
- Completed implicit bias exercise to facilitate discussion of gender issues in the field

## Human Dimensions of Wildlife Management (UAF)

- Included presentation on human development in wildlife refuges and facilitation of land management issues

## EPSCoR seminar (UAF)

- Students presented project data and discuss related papers

## Environmental Geochemistry (UAA)

- Students analyzed F&I stream data

## Earth and Environment (UAS)

- Students visited F&I field site and discussed F&I data

# GOAL 2: Build a diverse pool of STEM learners and workers in Alaska.

Objectives	Planned Activities	Accomplished to date
<p><b>Objective 2.1</b> Support diverse UA STEM undergraduates (focus on First-Generation students); diversify hires</p>	<ul style="list-style-type: none"> <li>● <b>Tutor</b> 180 First-Generation (FG) students</li> <li>● Reach 215 FG students through <b>difference- education interventions</b></li> <li>● Conduct <b>research</b> on undergraduate FG STEM pathways</li> <li>● Produce 5-10 “<b>Faces of STEM</b>” stories</li> <li>● Support diversity in <b>research hires</b></li> </ul>	<ul style="list-style-type: none"> <li>● Supported five STEM tutors, reaching 125 students</li> <li>● Held two difference education events, reaching 98 students</li> <li>● STEM research presented at a conference</li> <li>● Created 10 “Faces of STEM” stories</li> <li>● Created and implemented hiring plan</li> </ul>
<p><b>Objective 2.2</b> Increase interest in, and identification with, science among pre-college girls</p>	<ul style="list-style-type: none"> <li>● Enroll 54 girls in <b>Girls on Water</b> (GOW) and <b>Girls in the Forest</b> (GIF) programs</li> </ul>	<ul style="list-style-type: none"> <li>● 27 girls participated in person, 36 reached virtually</li> </ul>

## Girls on Water & Girls in the Forest

- Based on successful NSF-funded “**Girls on Ice**” program
- Two-week wilderness expeditions for 16 and 17 year-old girls
- Community of practice model includes:
  - Authentic science practices: observation, experimentation, gathering and analyzing data, presentation
  - “Leave no trace” ethic
  - Physical challenge
  - Leadership training



# Girls on Water & Girls in the Forest



- Two programs are unique to Fire & Ice but spun off from “Girls on Ice” model
- Girls on Water: kayak expeditions in Kachemak Bay in Southcentral AK
- Girls in the Forest: packraft expeditions on Chena River in Interior Alaska



Diagram: Carleton college



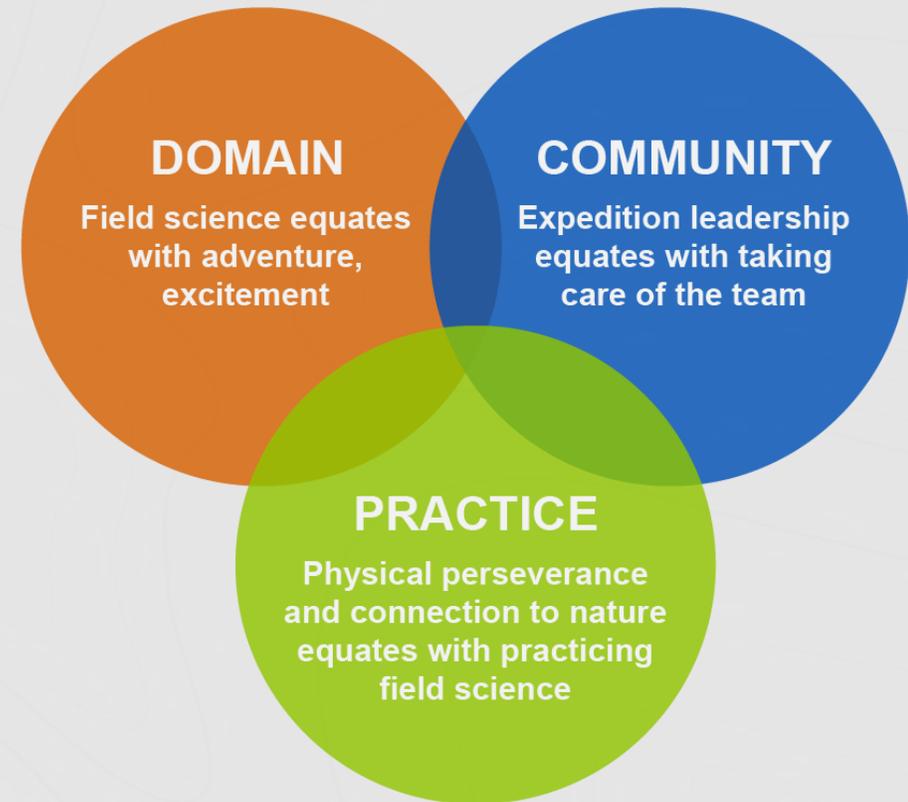
## Girls on Water & Girls in the Forest

Model supports **tacit and explicit science skills & knowledge\***

\*Carsten Conner et al. 2018 International Journal of Science Education



Diagram: Carleton college



## Girls on Water & Girls in the Forest

Model supports **tacit and explicit science skills & knowledge\***

\*Carsten Conner et al. 2018 International Journal of Science Education

## Clayton (2003): Environmental identity

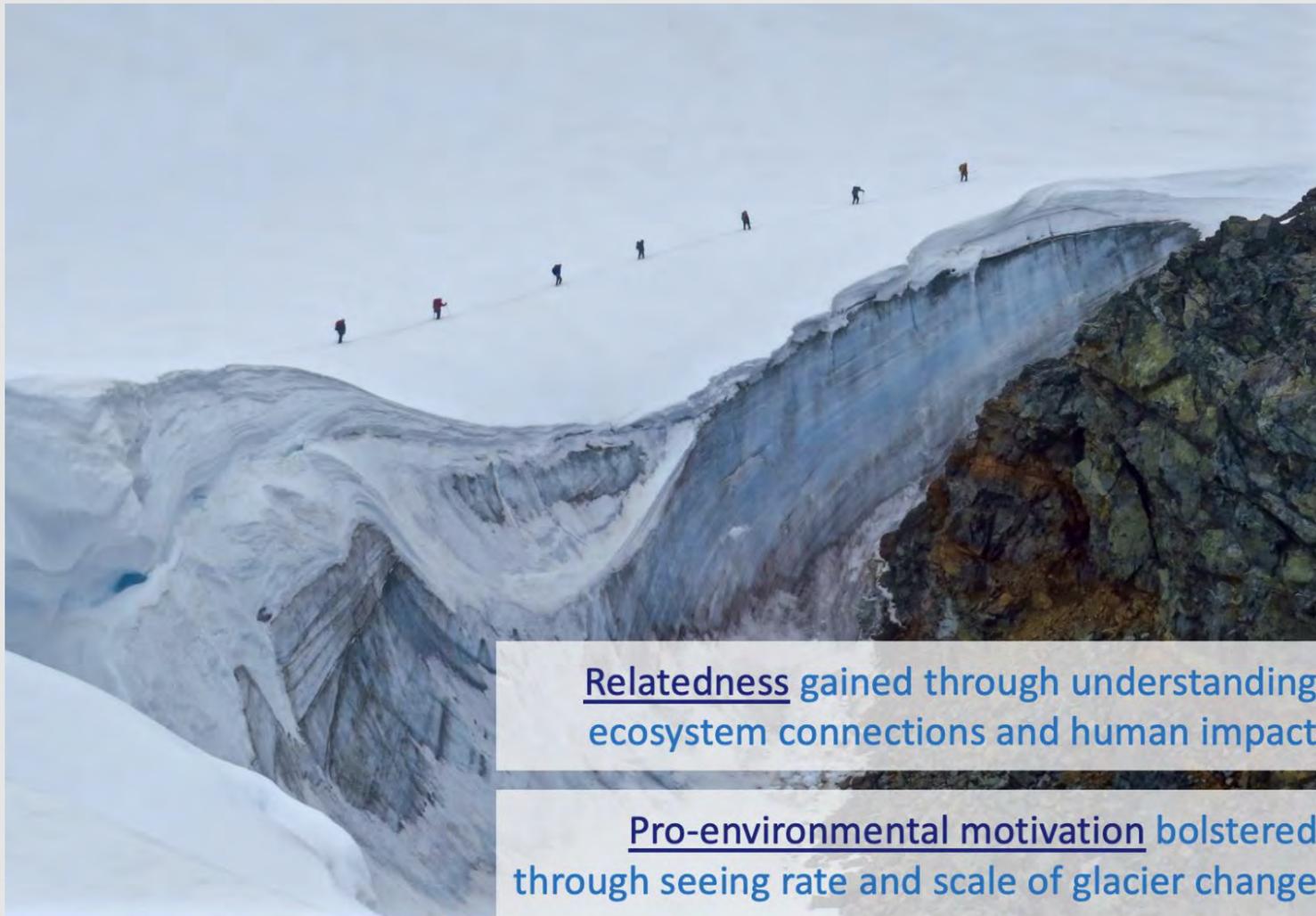
- **Personal history**
- **Place attachment**
- **Autonomy**
- **Social influences**
- **Competence**
- **Relatedness** - spiritual relation or sense of fitting into a larger picture
- **Pro-environmental motivation** - desire to act on behalf of nature

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Girls on Water & Girls in the Forest

Model supports **environmental identity shifts**\*\*

\*\*Young et al. 2020 International Journal of Science Education



Relatedness gained through understanding ecosystem connections and human impact

Pro-environmental motivation bolstered through seeing rate and scale of glacier change

## Girls on Water & Girls in the Forest

Model supports **environmental identity shifts**\*\*

\*\*Young et al. 2020 International Journal of Science Education;

# Program Evaluations



- Currently underway; prelim findings include Year 1 GOW and Year 3 GOW & GIF (n=24)
- Constructs: general science interest, science career interest, science identity, systems thinking
- Significant increases in science career interest and science identity markers
- Decrease in systems thinking construct; several possible explanations

# STEM Pathways Research

## Introduction to research

- First-Generation STEM students are increasingly represented at colleges across the nation
- Documented higher drop-out rates, lower academic performance, and longer time to finish degree\*
- Some research shows cultural capital deficits, such as low levels of family support, and ill-defined educational degree expectations and plans\*\*
- While this research illuminates the need to support FG students, it has led to a *deficit-based* narrative



First-Generation event at UAF

\* Davis, 2012; Engle & Tinto, 2008; Harackiewicz et al., 2014; Sirin, 2005;

\*\* reviewed in Pascarella et al., 2004

# STEM Pathways Research

## Theory



Example of deficit-based frame.

Image Courtesy: Trabian Shorters

We approached the research from an *assets-based* frame: what strengths do students bring?

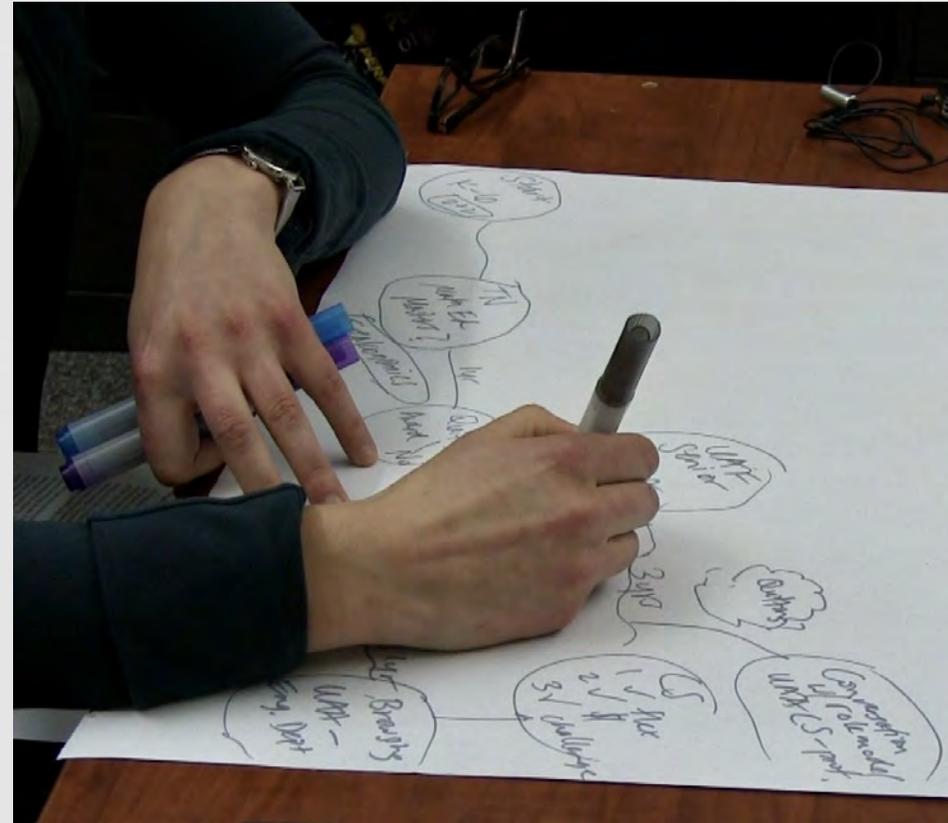
- Looking at STEM pathways before and during college
- Some theory suggests possible tensions between STEM pathways and cultural roots
- Others suggest that connection to roots could be a form of *cultural capital*

**Research question: What forms of cultural capital do First-Generation students leverage along STEM pathways?**

# STEM Pathways Research

## Methods

- Qualitative study of 19 First-Generation STEM undergraduates
- Semi-structured interviews
- Students asked to draw their personal STEM timelines
- Grounded theory used for analysis (codes emergent from data)



# STEM Pathways Research

## Findings



In contrast to dominant narratives, students reported robust familial support that took several forms:

- 1) *Nurturance* of college aspirations and early STEM interests
- 2) *Financially related support*, including direct support, or emphasizing the value of/pushing for college attendance education even in the absence of financial resources
- 3) *Modeling STEM careers* that don't require bachelor degrees
- 4) *Expectations of attending college*

# GOAL 3: Increase capacity for F&I science and teaching among UA faculty and students.

Objectives	Planned Activities	Accomplished to date
<p><b>Objective 3.1</b> Provide mentorship, training, and travel opportunities to F&amp;I faculty and postdocs</p>	<ul style="list-style-type: none"> <li>● <b>Mentor</b> at least 12 F&amp;I faculty and postdocs</li> <li>● Provide 40 faculty <b>travel awards</b></li> </ul>	<ul style="list-style-type: none"> <li>● Reached 61 people through workshops and/or postdoctoral mentoring group</li> <li>● Awarded 47 travel awards</li> </ul>
<p><b>Objective 3.2</b> Increase UA faculty capacity to teach diverse students</p>	<ul style="list-style-type: none"> <li>● Reach 150 people through <b>diversity workshops</b></li> <li>● Reach 80 people through <b>teaching and learning workshops</b></li> </ul>	<ul style="list-style-type: none"> <li>● 116 participants in diversity workshops</li> <li>● 32 participants in teaching and learning workshops</li> <li>● 1 conference presentation</li> </ul>

# Diversity Workshop

“Strategies for Maximizing Salary and Workload Conditions”

- Workshop aimed at early-career faculty and postdocs (45 attended)
- Surfaced racial and gender salary disparities
- Addressed implicit bias
- Discussed strategies to negotiate job offers, workload conditions

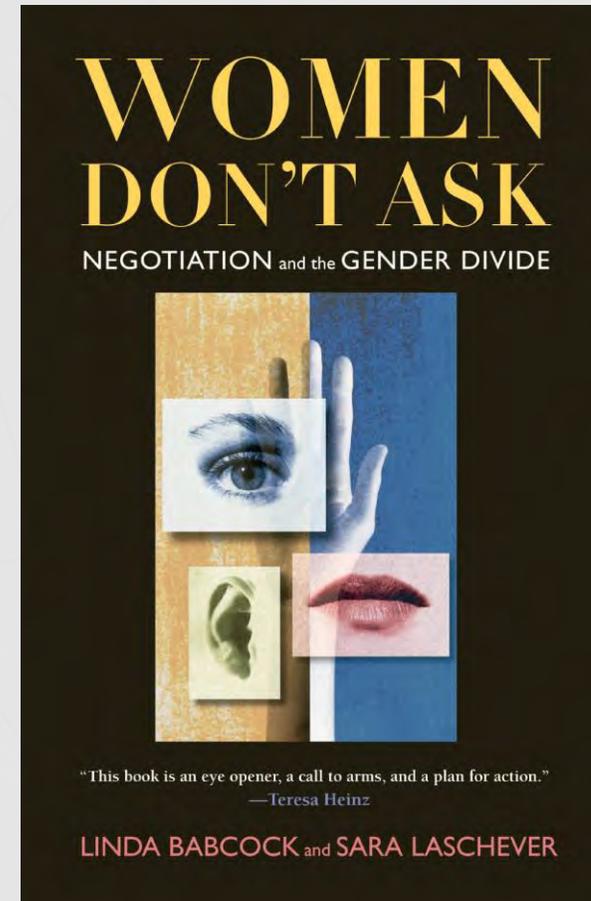
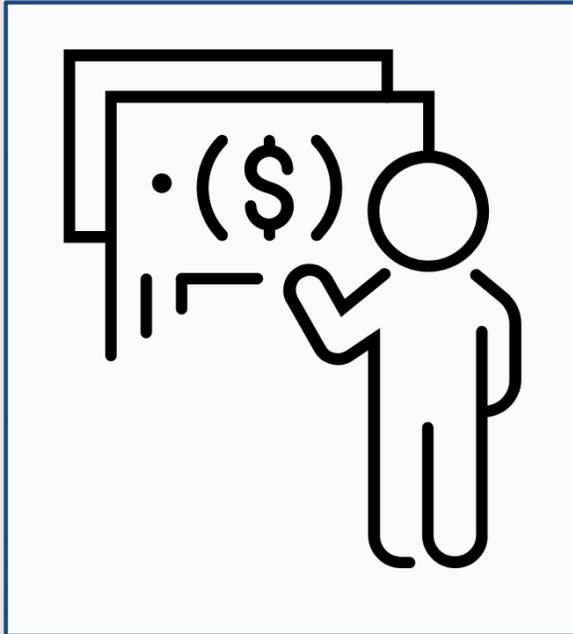


Image Courtesy: Amazon.com

# Diversity Workshop

## Survey results



Item	Percent that agreed or strongly agreed
I enjoyed the workshop	90%
The workshop was helpful	90%
This workshop increased my understanding of when and how to negotiate the terms of job offers	90%
This workshop increased my understanding of when and how to negotiate workloads	90%
This workshop increased my understanding of how gender or race might impact negotiations	80%
This workshop increased my confidence in my ability to negotiate terms of a job offer	80%
This workshop increased my confidence in my ability to negotiate workload issues	70%

# Faces of STEM



**Sigrun Hreinsdottir**  
Geodetic Scientist,  
GNS Science  
UAF Geoscience



**Thomas Hughes**  
Design Engineer,  
Alaska DOT&PF  
UAF Civil Engineering



**Carla Cartenega**  
Pediatrician, Tanana  
Valley Clinic  
UAF Biological Sciences



**Nikki Grant-Hoffman**  
Ecologist & Science  
Coordinator, US BLM  
UAF Biology & Wildlife



**Lee Foulkes**  
Fisheries Biologist,  
Muckleshoot Tribe  
UAS Marine Biology



**Thomas Farrugia**  
Program Coordinator,  
AK Harmful Algae Bloom  
UAF Fisheries



**Liz Dennet**  
Lead Solutions Architect,  
Amazon Web Service  
UAA Geology / Earth  
Sciences



**Mindy Kim Graham**  
Cancer Researcher,  
John Hopkins School  
of Medicine  
UAA Chemistry



**Shawn Takak**  
Engineering Project  
Manager, ANTHC  
UAA Mechanical  
Engineering



**James Campbell**  
Meteorologist, Naval  
Research Laboratory  
UAF Atmospheric Sciences



# Science Pubs

- Virtual live pub with Anchorage Science Pub: **How is Glacier Loss Impacting Communities and Ecosystems in Alaska?** by Eran Hood (UAS) (May 23, 2021)
- Hybrid virtual and in-person science pub with Telesomm: **Wildfire & Wine** (November 9th, 2021)
- **Coming soon:** Wine & Ice/Coastal Margins with Telesomm



# Webinar with Alaska Travel Industry Association (ATIA)



## “Natural History Information for Tour Guides” (May 13, 2021)



**Rick Thoman**  
**Climate Change**  
*UAF IARC*



**Marian Snively**  
**Alaska's Bears**  
*Alaska*  
*Department of*  
*Fish & Game*



**Brandon Browne**  
**Volcanoes**  
*Alaska Volcano*  
*Observatory*

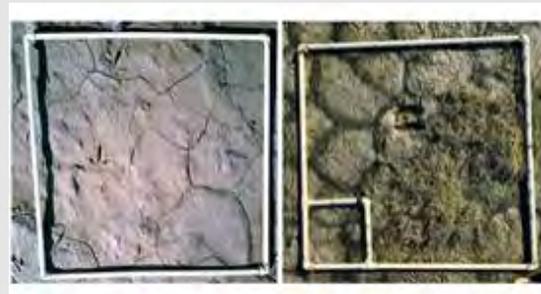
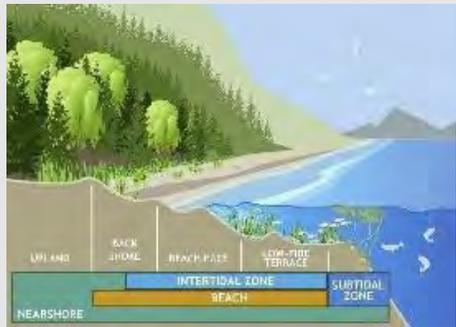


**Eric Klein**  
**Glaciers**  
*UAA Geology*



**Omega Smith**  
**Aurora Borealis**  
*UAA Planetarium*

# Hands-On Activities: Coastal Margins Portfolio of Lessons



# 3D Watershed Maps



Hand-painted 3-D printed models of Kachemak Bay & Lynn Canal



Artist, Sarah Glaser (right) @glacierlines



# Upcoming Collaborations



- Working with **Alaska Teen Media Institute (ATMI)** students to create videos on wildfire education in collaboration with **Alaska Natural Resource and Outdoor Education Association (ANROE)** and **Project Learning Tree (PLT)**.
- Potential videos include:
  - Comprehensive demonstration and instruction of the Alaska EPSCoR wildfire curriculum and lessons to be used for teacher training and in classroom instruction for the students.
  - Interviews with scientists
  - Fire ecology field day / virtual field trips

# DEW seed grant awards

Awarded eight DEW seed grants to date, including:

- Engaging Juneau students in STEM through whale dissection and drones
- Expanding access to STEM for youth in care of the state
- Participatory research on children as environmental stewards



Image courtesy of C. Green



Image courtesy of S. Atkinson

# Upcoming Opportunities

- Facilitation Workshop, April 18-19
  - **registration open!**
- Alan Alda Communicating Science Workshop, April 4-5
- Sitka Sound Science Center SIRF fellowships, Scientist in the Schools program

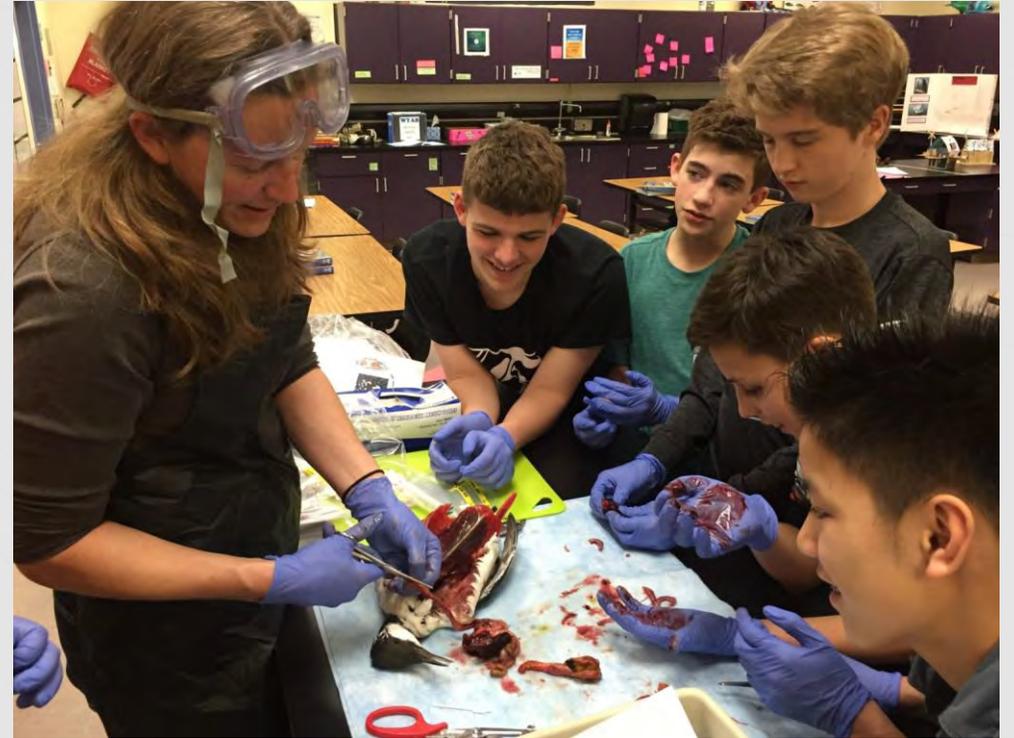


Image courtesy of Sitka Sound Science Center

# DEW Future Plans

- Hold additional teacher workshop; continue to broadly distribute curriculum
- Analyze longitudinal research data, submit paper
- Increase post-COVID travel funding opportunities
- Further collaborate with research components on models and activities
- Continue partnership activities with SSS



Postdoc Megan McGinty at work on research data