Diversity, Education, and Workforce Development (DEW)
DEW Core Team Members

Dr. Laura Conner
DEW Lead

Dr. Beth Leonard
Indigenous Science

Dr. Joanna Young
UAF Inspiring Girls Director

Sarah Clement
UAF Inspiring Girls Coordinator

Courtney Breest
UAA/UAS Coordinator

Dr. Megan McGinty
Learning Sciences Postdoc
DEW Goals

Goal 1
Build key competencies among stakeholders to address ecological change.

Goal 2
Build a diverse pool of STEM learners and workers in Alaska.

Goal 3
Increase capacity for F&I science and teaching among UA faculty and students.
**GOAL 1:** Build key competencies among stakeholders to address ecological change.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Planned Activities</th>
<th>Accomplished to date</th>
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</table>
| **Objective 1.1**  
Increase K-12 student knowledge and skills about ecological change related to F&I themes. | ● Reach 350 students via STEM curricula  
● Train 60 teachers in workshops | ● Estimated 200-300 students reached to date  
● Reached 34 teachers to date |
| **Objective 1.2**  
Prepare UA students with F&I-related knowledge and skills. | ● Implement **Fire & Ice content** in 4 UA courses per year | ● 4-6 courses include F&I content annually |
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 3rd-5th 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

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

Faculty teaching courses
**GOAL 2:** Build a diverse pool of STEM learners and workers in Alaska.

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<tr>
<td><strong>Objective 2.1</strong>&lt;br&gt;Support diverse UA STEM undergraduates (focus on First-Generation students); diversify hires</td>
<td>● Tutor 180 First-Generation (FG) students&lt;br&gt;● Reach 215 FG students through <strong>difference-education interventions</strong>&lt;br&gt;● Conduct <strong>research</strong> on undergraduate FG STEM pathways&lt;br&gt;● Produce 5-10 “<strong>Faces of STEM</strong>” stories&lt;br&gt;● Support diversity in <strong>research hires</strong></td>
<td>● Supported five STEM tutors, reaching 125 students&lt;br&gt;● Held two difference education events, reaching 98 students&lt;br&gt;● STEM research presented at a conference&lt;br&gt;● Created 10 “<strong>Faces of STEM</strong>” stories&lt;br&gt;● Created and implemented hiring plan</td>
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<tr>
<td><strong>Objective 2.2</strong>&lt;br&gt;Increase interest in, and identification with, science among pre-college girls</td>
<td>● Enroll 54 girls in <strong>Girls on Water (GOW)</strong> and <strong>Girls in the Forest (GIF)</strong> programs</td>
<td>● 27 girls participated in person, 36 reached virtually</td>
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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
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*
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

Girls on Water & Girls in the Forest

Model supports environmental identity shifts**

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

* Davis, 2012; Engle & Tinto, 2008; Harackiewicz et al., 2014; Sirin, 2005;
** reviewed in Pascarella et al., 2004
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)
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.

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| Objective 3.1  
Provide mentorship, training, and travel opportunities to F&I faculty and postdocs | ● Mentor at least 12 F&I faculty and postdocs  
● Provide 40 faculty travel awards | ● Reached 61 people through workshops and/or postdoctoral mentoring group  
● Awarded 47 travel awards |
| Objective 3.2  
Increase UA faculty capacity to teach diverse students | ● Reach 150 people through diversity workshops  
● Reach 80 people through teaching and learning workshops | ● 116 participants in diversity workshops  
● 32 participants in teaching and learning workshops  
● 1 conference presentation |
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

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

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

Lee Foulkes
Fisheries Biologist, Muckleshoot Tribe
UAS Marine Biology

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
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