



# University of Alaska

## *Growing World Class Research & Driving Economic Development*

University of Alaska  
House Finance Budget Subcommittee

February 15<sup>th</sup>, 2018

# Today's Agenda

- Research
  - An Important Alaska Industry
  - Alaska on the Forefront of Arctic Research
  - Solving Real Alaskan Problems
  - Supporting Sound Policy & Decision Making
- Driving Economic Development
  - Science, Technology, Engineering & Math (STEM)
  - Research and Intellectual Property Commercialization

# Investment by Strategic Objective

(UGF Millions \$)

FY2018 Base Operating Budget	\$317
• Compensation	\$0.0
• Fixed Cost Increases	\$9.7
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• Strategic Investments by Objective	\$14.7
• Increase Degree Attainment	\$7.3
• <b>Grow Our World Class Research</b>	<b>\$3.7</b>
• Provide A Skilled Alaskan Workforce	\$2.1
• Contribute to Alaska's Economic Development	\$1.6
• Operate More Cost Effectively	\$0.0
FY2019 Board of Regents Budget Request	\$341

# An Important Alaskan Industry

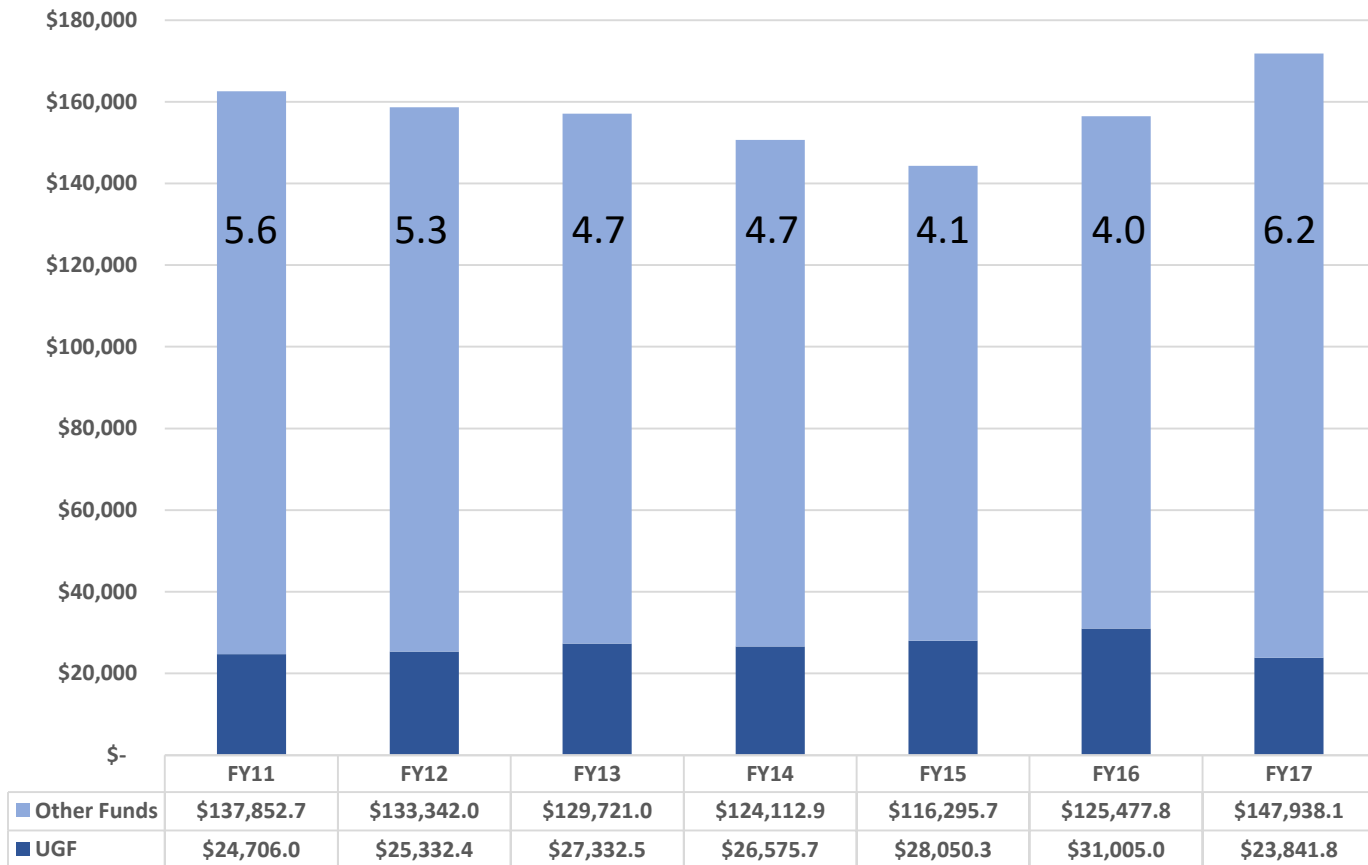
*Since **FY10**, research revenue  
generated by the  
University of Alaska has  
exceeded **\$1 billion***

# An Important Alaskan Industry

- ✧ In 2017, UA brought in \$148 million in external research funding
- ✧ The \$24 million in state research funding was multiplied by 6
- ✧ \$90 million in direct wages and salaries; about 1250 direct jobs
- ✧ Another \$27 million indirect income, 350 jobs from multiplier effects of direct employment
- ✧ \$70 million in purchases, contracted services, travel, student aid and equipment

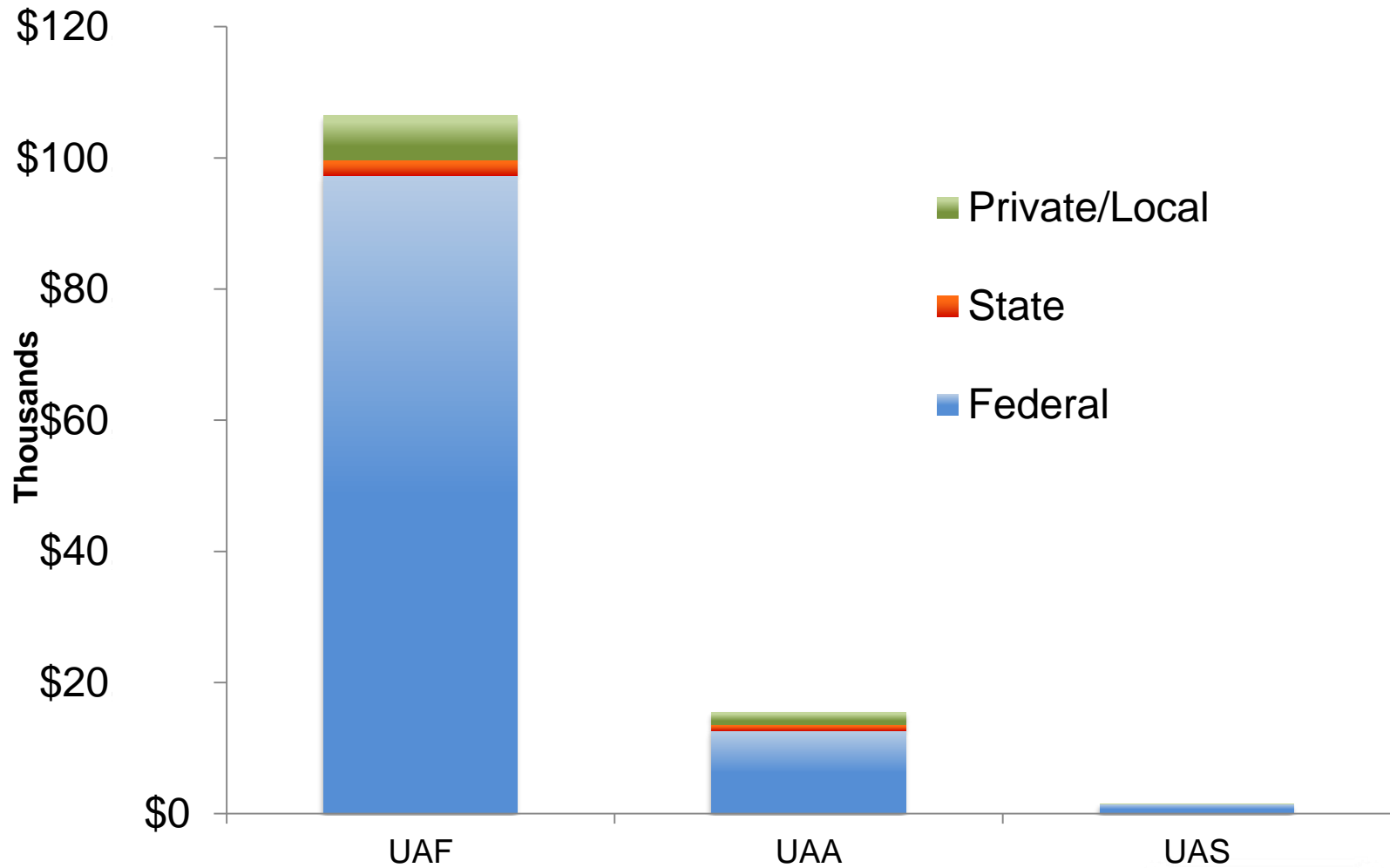
# UA Research Return on Investment

(Millions of \$)



*The ratio of UGF research revenue to other revenue measures the return on State investment in research*

# FY17 UA Direct Research Expenditures



Research as an industry

# **Alaska's research university and America's Arctic university**

**We take on challenges of practical importance that affect the lives of Alaskans and Alaskan business.**

**Our researchers are world-renowned in their fields, and the work they do is important and notable.**

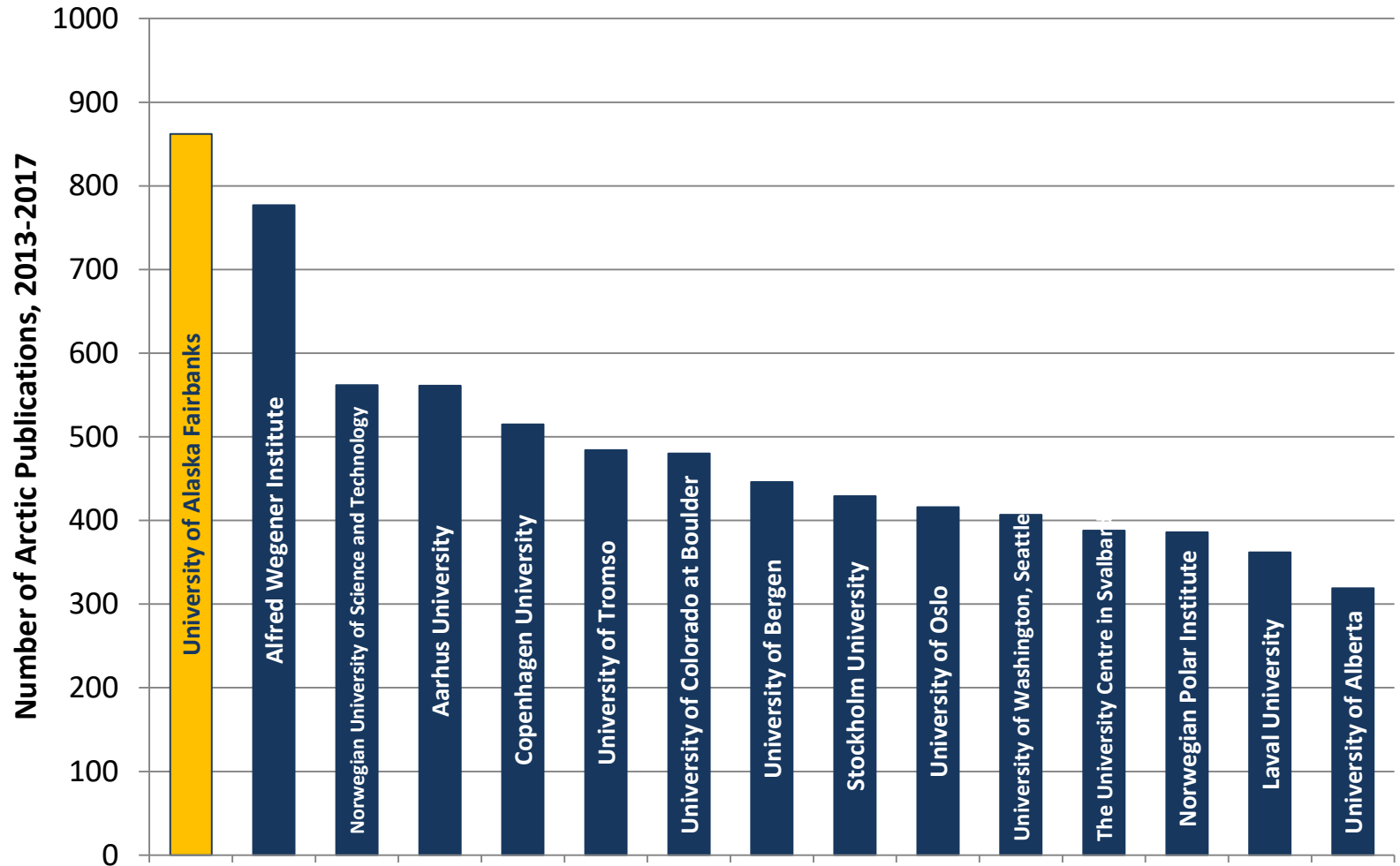
**We maintain many partnerships and collaborations throughout Alaska and the world that drive innovation and create meaningful discoveries.**

**Our research helps sustain Alaska's economic growth and enhance Alaska communities.**





# Leading the World in Arctic Research



Arctic publications



**NORTHERN  
ARIZONA  
UNIVERSITY**



College of Engineering,  
Forestry, and Natural Sciences  
Center for Ecosystem Science and Society

FLORIDA ATLANTIC UNIVERSITY

**3<sup>rd</sup> Sea-Level Rise Summit**  
*Connected Futures from Alaska to Florida*

**May 3–5, 2016 • Fort Lauderdale**  
[www.ces.fau.edu/arctic-florida](http://www.ces.fau.edu/arctic-florida)



## China Stakes Its Claim to the Arctic

Beijing's Arctic White Paper claims interests in the region for China as a "near Arctic state."

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**By Marc Lanteigne and Mingming Shi**  
January 29, 2018

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After a long period of speculation, the government of China released its first White Paper on the Arctic on January 26. The **document**, entitled "China's Arctic Policy" (《中国的北极政策》), was introduced by Vice Minister of Foreign Affairs Kong Xuanyou at a Beijing press



Image Credit: **Wikimedia Commons/ Газпром нефть**

## Russia is building up its Arctic military presence and NATO should be worried, says new report

The Henry Jackson Society says Moscow reopened old Soviet-era military bases and deployed a missile early-warning radar system

Russia's militarization of the Arctic has accelerated dramatically since 2014, according to a new study.

# Producing an Educated Workforce

✧ Students who conduct research enter the workforce better prepared

✧ Making Alaska businesses more competitive



# Research and Quality Education

- ✧ Research opportunities attract outstanding faculty
- ✧ Research is integral to a curriculum that reflects the most up-to-date knowledge
- ✧ Undergraduate and graduate student involvement in research
- ✧ Quality research institutions attract out-of-state students and retain outstanding resident students. Builds a pipeline of outstanding students who become employees of Alaska businesses and institutions

# Oil & Gas

- ✧ Applied research in hydrocarbon optimization
- ✧ Recovery of viscous oil, shale oil and gas
- ✧ Addressing industry needs: permitting, ice formation in TAPS, ice road construction





# Engineering Research

## *Applied solutions for Alaska's Industries*



**Landscape Processes**



**Pavement Design**



**Renewable Energy**



**Geologic Hazards**



**Mining**



**Aerospace**



**Rural Infrastructure**



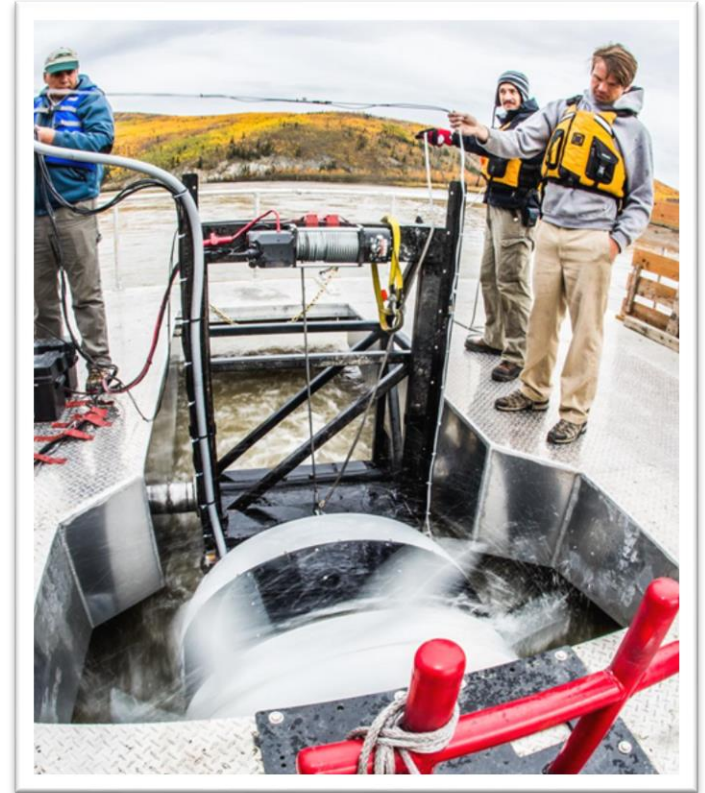
**Transportation Infrastructure**



**Oil & Gas**

# Energy & Power

- ✧ Alaska Center for Energy and Power
- ✧ Finding solutions to energy challenges





# Fisheries and Ocean Resources

## Alaska Coastal Rainforest Center

**LEARN ABOUT YOUR OCEAN**

Once a week, the M/V Columbia sails the 1,854-mile roundtrip between Bellingham, Washington and Skagway, Alaska.

**WHAT IS OCEAN ACIDIFICATION?**  
Oceans absorb a quarter of the carbon dioxide (CO<sub>2</sub>) that humans emit into the atmosphere. That means about 7 million tons of CO<sub>2</sub> enter the oceans each day.

The extra CO<sub>2</sub> changes the chemistry of seawater, making it more acidic. Higher acidity slows the growth of animals with hard shells, like clams, oysters, crabs, corals, and plankton.

Shellfish farms and fisheries in the Pacific Northwest are already experiencing negative effects of ocean acidification — shellfish larvae cannot form their shells fast enough to survive.

**WHAT ARE WE MEASURING ON THE FERRY?**  
The Alaska Marine Highway System provides an ideal research platform to study ocean acidification. Instruments installed on this vessel are recording CO<sub>2</sub>, as well as seawater temperature, salinity, and dissolved oxygen.

Tracking these variables lets us study seasonal changes in ocean chemistry, how it varies from place to place, and what drives these changes.

**WHY ARE COASTAL OCEANS DIFFERENT?**  
In coastal Alaska and British Columbia, meltwater from glaciers and massive amounts of freshwater from rivers intensify ocean acidification, making the region a potential hotspot for change.

**LEARN MORE**  
[aops.org/ferry-for-science](http://aops.org/ferry-for-science)

**RECORDING**  
CARBON DIOXIDE • WATER TEMPERATURE • SALT CONTENT • DISSOLVED OXYGEN  
EVERY 3 MINUTES.  
EACH TRIP. ALL SEASON

**NOW BOARDING**

**FERRY FOR SCIENCE**  
TRACKING OCEAN CHANGES WHILE SAILING THE SCENIC INSIDE PASSAGE

- ✧ Climate and environmental changes affect fisheries and human health
- ✧ Alaska's coastal communities most vulnerable
- ✧ We are monitoring the impacts of ocean acidification
- ✧ Partnership with Alutiiq Pride Shellfish Hatchery (APSH) to study impacts on shellfish and mariculture industry

### Partners:

Alaska Marine Highway System  
Alaska Ocean Observing System  
NIH BLAST program, UAF  
NOAA Pacific Marine Environmental Lab  
Sitka Tribe of Alaska  
Tula Foundation

# Fisheries and Ocean Resources

## ✧ Supporting Alaska mariculture industry

- ✧ Developing predictions for harmful algal bloom and paralytic shellfish toxin events
- ✧ Informing mariculture project planning



- ✧ \$500K DOE ARPA-E award in develop seaweed farming in Alaska
- ✧ Commercializing new pet treats made from pollock skins

# Rural Health & Nutrition



- ✧ Collaborative research with Alaska Native communities & health organizations
- ✧ \$50 million in federal research funding since 2001

# Health Care Research

- More than \$6M in grants to improve our health and wellbeing:
  - Increasing cost-effectiveness of recidivism reduction programs
  - Treating opioid use disorder in DOC facilities
  - Reducing homelessness and related health problems
  - Reducing youth suicide and promoting wellness
  - Ending violence against women
  - Improving early childhood mental health
  - Improving care of Alzheimer's Disease
  - Promoting informed alcohol consumption to prevent FASD
  - Preventing, detecting, and treating cancer
  - Improving nutritional health
- Research directly informs practice and public policy
- Positive return on investment
- Developing solutions to Alaska problems



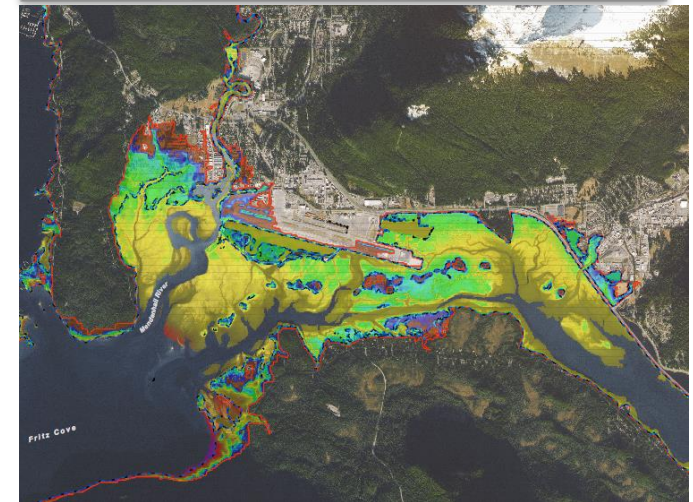
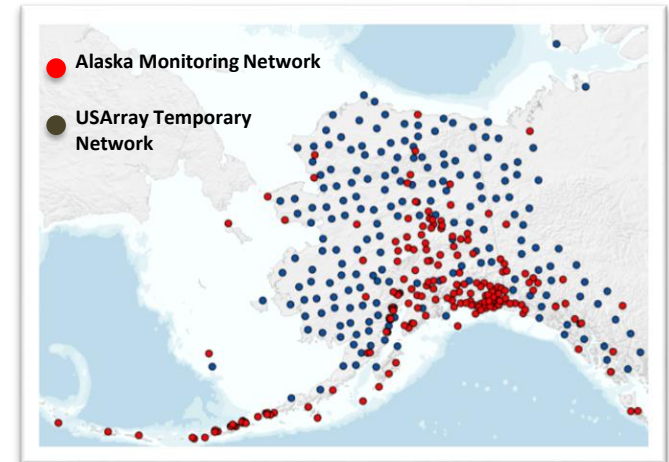
# Natural Resources and Extension

- ✧ Studying how the changing climate affects the distribution of vegetation, forest productivity, regrowth and management, and new agricultural possibilities
- ✧ Supporting Alaska's food security and agricultural industry through vegetable and grain variety trials
- ✧ Working closely with Alaska reindeer producers to develop a red meat industry
- ✧ Investigating opportunities for use of bioenergy resources for communities across our state



# Advancing Earthquake Resilience

- ✧ Provide continuous regional earthquake monitoring
- ✧ Develop tsunami hazard maps for coastal communities and assist in mitigation planning
- ✧ Advise State and Federal agencies
- ✧ Assist with community and industry efforts as subject matter experts



# Supporting Policy & Decision Making

## Alaska Justice Information Center

✧ Provides data and information to improve public safety, increase accountability, and reduce recidivism



**Dr. Brad Myrstol** testifying  
to House Judiciary Committee

- ✧ Recently analyzed effectiveness of Alaska's state-funded adult criminal justice programs
- ✧ All but one reduced recidivism
- ✧ Benefit cost ratios ranged from  $-\$0.13$  to  $\$23.80$

# Supporting Policy & Decision Making

## Alaska Justice Information Center

- ✧ Nationally recognized for research on violence against:
  - ✧ Women in Alaska
  - ✧ American Indian and Alaska Native Women and Men
- ✧ Justice Center research helped lower the annual rates of violence against women in Alaska by more than 30%

Half of adult women in Alaska have experienced violence in their lifetime.

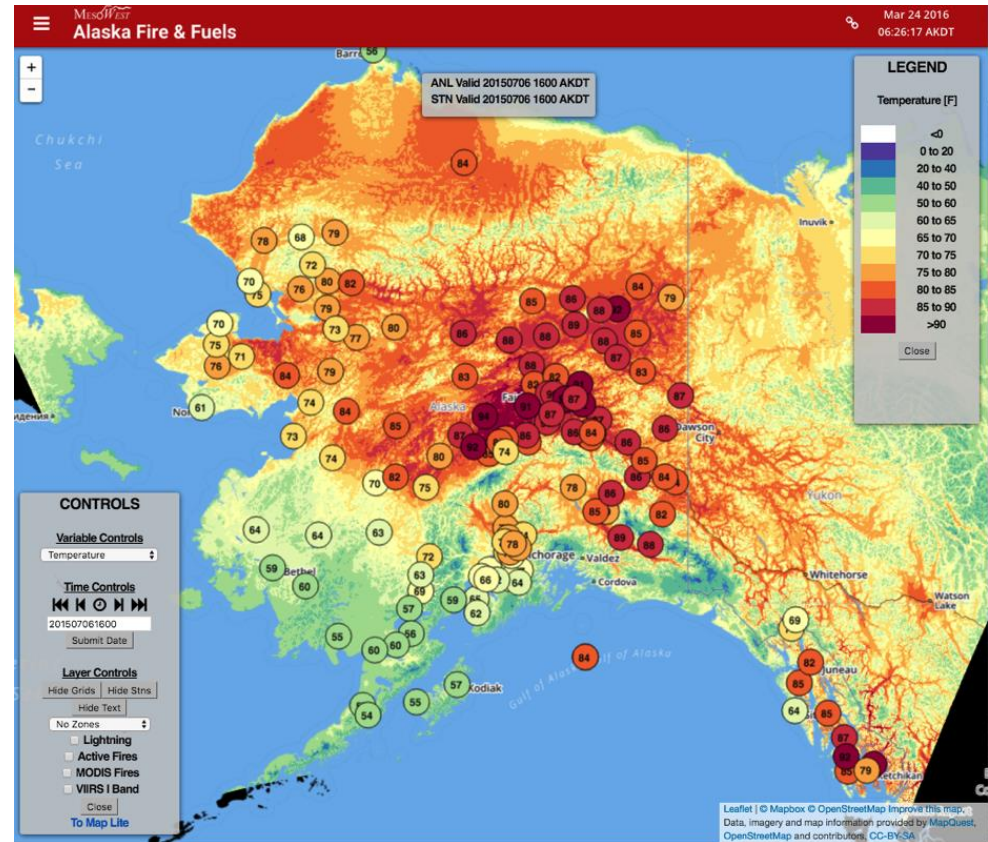




# Supporting Policy & Decision Making

## Alaska Fire Science Consortium

- ✧ Improving fire management & response policies
- ✧ Serve needs of fire & resource managers: Improve fire fuel prediction
- ✧ Extend prediction to full season
- ✧ Link to prevention & mitigation at the local level → SNAP Tools



High Fire Threat in Southcentral  
& Kenai Peninsula

# Driving Economic Development

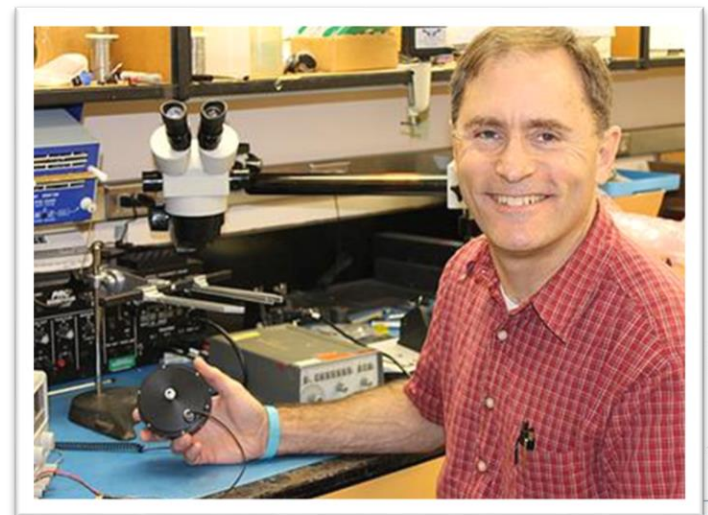
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# Innovation & Economic Diversity

- ✧ Scientific research leads to discovery
- ✧ Basic science drives innovation
- ✧ Economic diversity & commercialization
- ✧ Better products, better life, better Alaska





# STEM Initiatives



*Randall Friendly of Tuntutuliak conducting Brown Bear research on Kodiak Island.*

University of Alaska investment since 1995: \$11.8 million

ANSEP external cash raised since 1995: \$55+ million

The Urban Institute (2015 Program Evaluation): *ANSEP students on the average outperform all students in the nation*

Funding request will support ANSEP Acceleration Academy

# Costs vs. Benefits: Example

## Costs

## Benefits

**Project Deliverables:  
Solutions for Alaska  
communities and  
beyond**

**State  
Investment  
≈ \$75k  
(Assumes  
\$50k writing  
time + \$25k  
F&A)**

**Federal  
Investment ≈  
\$2.4M**

**Potential for broader  
application /  
commercialization**

**≈ \$830k UA Salaries & Bens into AK economy:  
ACEP, WERC, IARC, ISER, UAA Engr.**

**≈ \$400k directly to the private  
sector (mostly Alaskan)**

**≈ \$225k supporting ACEP PSI lab**

**≈ \$730k supports UA research, teaching, and  
service missions through F&A**

**Robust community outreach program**

**Tuition and stipend for 3 students; 3 years each =  
Training Alaska's workforce**

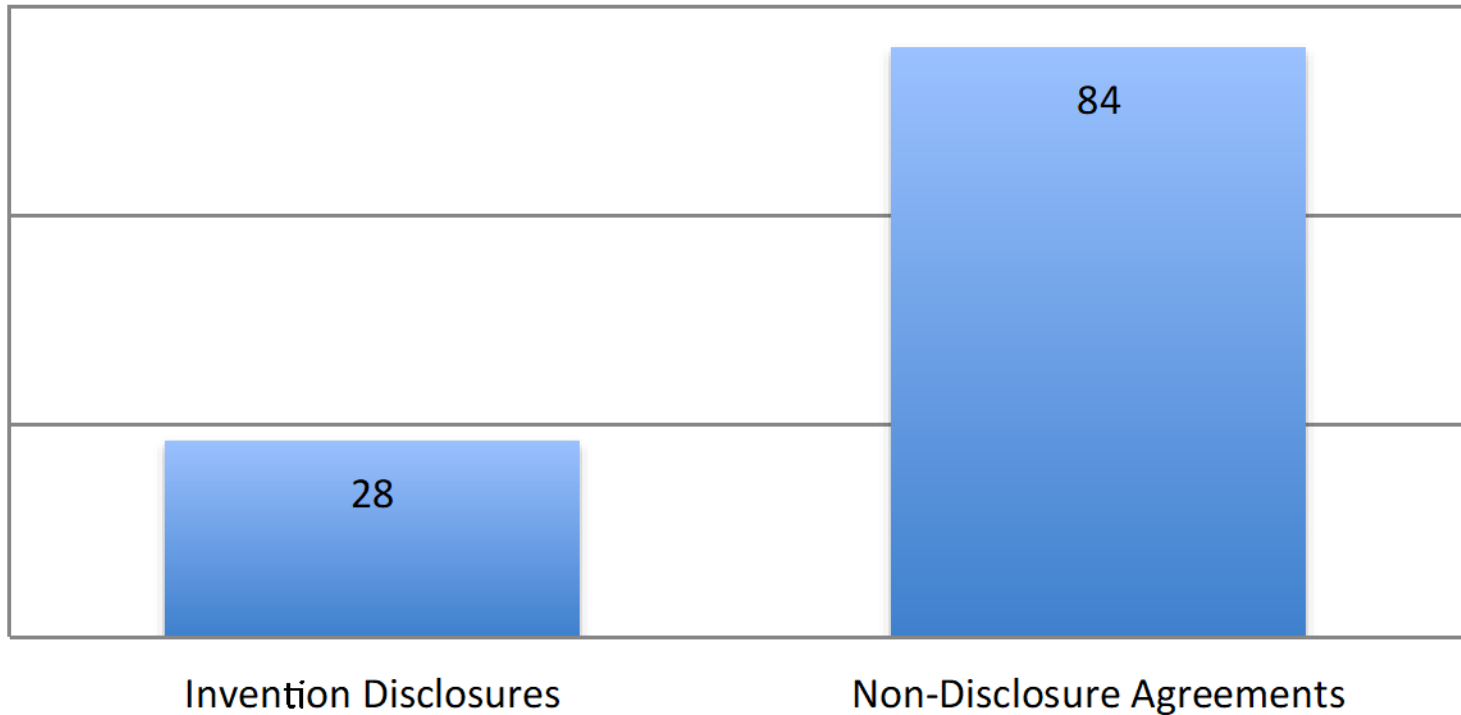
**Continuous engagement with 8+ advisory board members**

# World Class Research

- ❖ **UAA INNOVATE AWARDS** inspire, facilitate, and enable new research, creative works, and innovation.
- ❖ **SUCCESES**
  - **Innovate Awards provided a 6-to-1 return on investment to UAA from externally funded grants (mostly federal agencies) acquired by award recipients.**
  - **Proposal award success rate of 49%, twice above the national average.**
  - **Commercializing research contributes to Alaska's economic development—Innovate Award research formed the foundation for UAA's four (4) start-up companies. Some successes:**
    - **One start-up received national recognition for "Best University Start-Up."**
    - **Another received \$225,000 in external investment from Alaska Accelerator Fund**
- **Award recipients received international distinction—One of the first Americans to have work archived at the leading anthropological institution in Cuba and at the Smithsonian in DC.**
- **Since 2011, UAA has a total of 52 patent filings and 12 patents issued. 38% of the filings and 40% of the patents issued are a direct result of inventors receiving Innovate Award funding to develop their invention.**
- **Award Areas Can Benefit Society:**  
Developed method to enhance cancer immunotherapy by using nanoparticles; developed medical and surgical devices that reduce tissue damage and decrease recovery time (3 patents); carbon fiber tape for heating surfaces (2 patents); therapeutic for improving memory loss; biodegradable insulating material—possibly replace Styrofoam.

# Intellectual Property Commercialization

## UAF FY15-17 AVG



2 Patents Issued in 2017  
11 Patents Pending  
2 Small Business Innovation Research (SBIR) Awards in 2017



# **In Closing.....**

- **Research is an important Alaskan industry**
- **UA research is highly relevant to Alaska - it solves real problems and grows new businesses**
- **Investment in education will drive the future Alaskan economy**

