

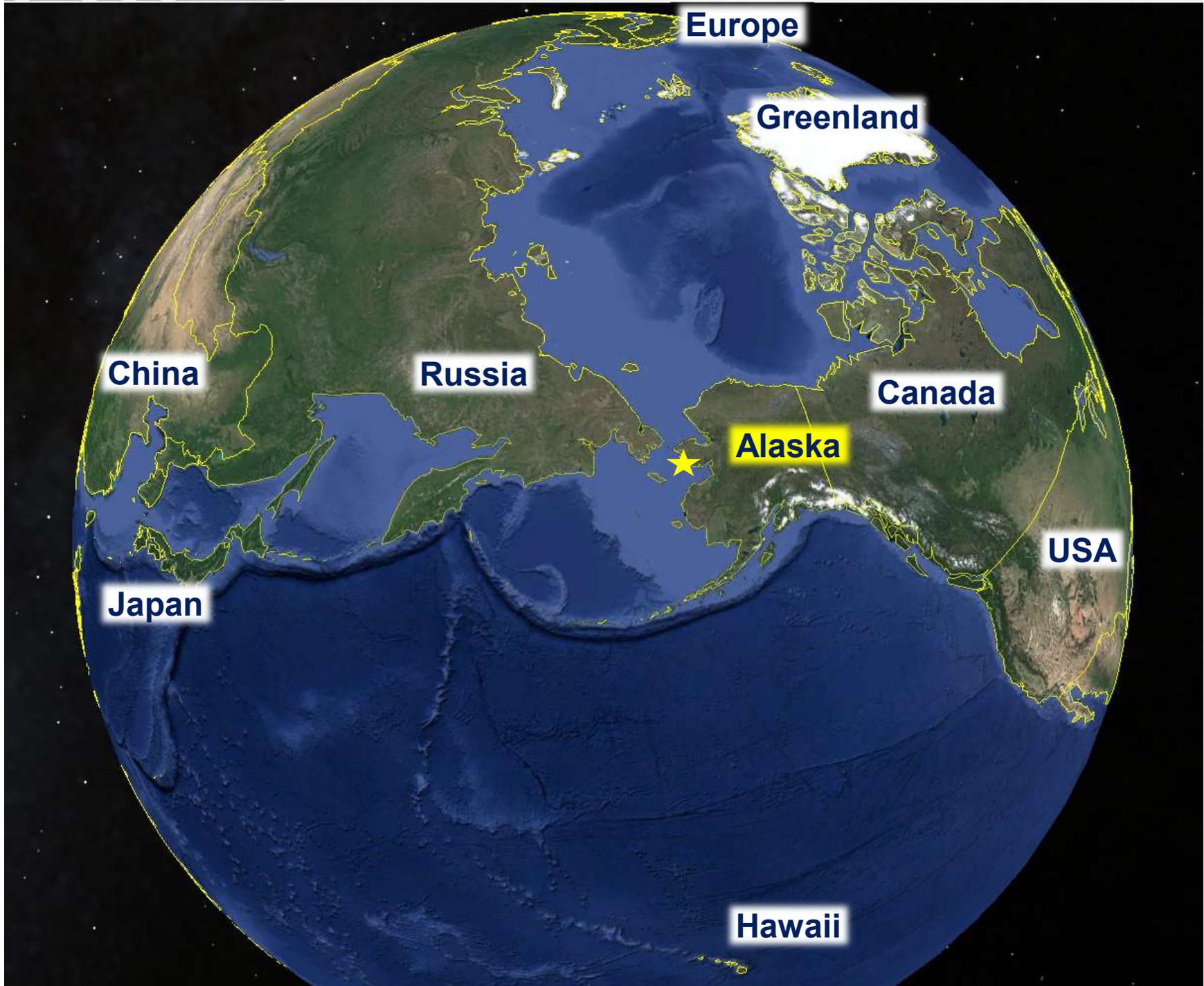
Bering Strait

A Regional Perspective to Arctic Science

UNOLS Annual Meeting
Gay Sheffield
UAF-CFOS Alaska Sea Grant (Nome)
November 2019

Photo: E. Soolook

- **Bering Strait region**
- **Communications**
- **Regional Perspectives**
- **What has happened?!**
- **Summary**



Europe

Greenland

China

Russia

Canada

Alaska

USA

Japan

Hawaii

Regional Differences



Regional Differences



Regional Differences



Regional Differences



Regional Differences



Regional Differences



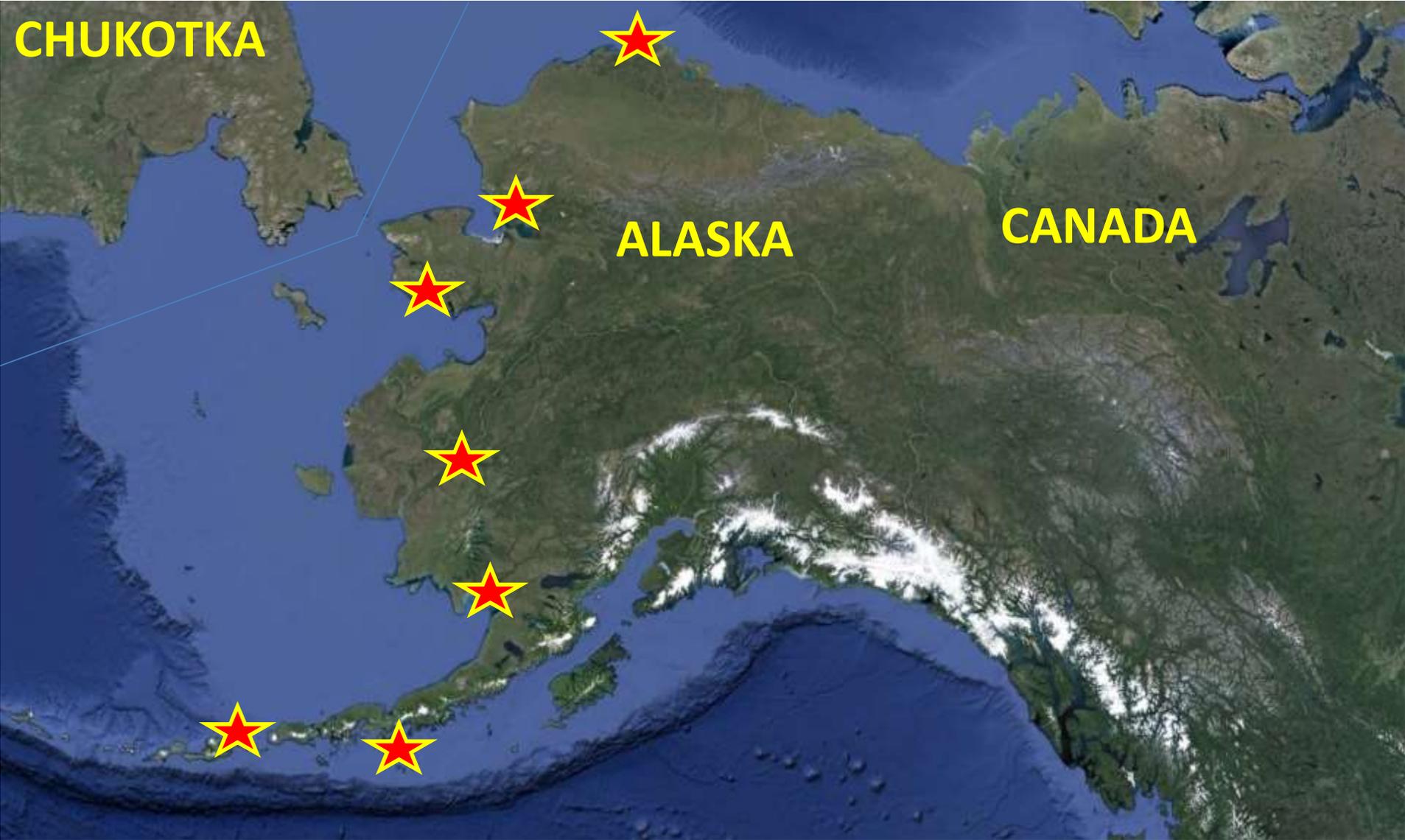
Regional Differences

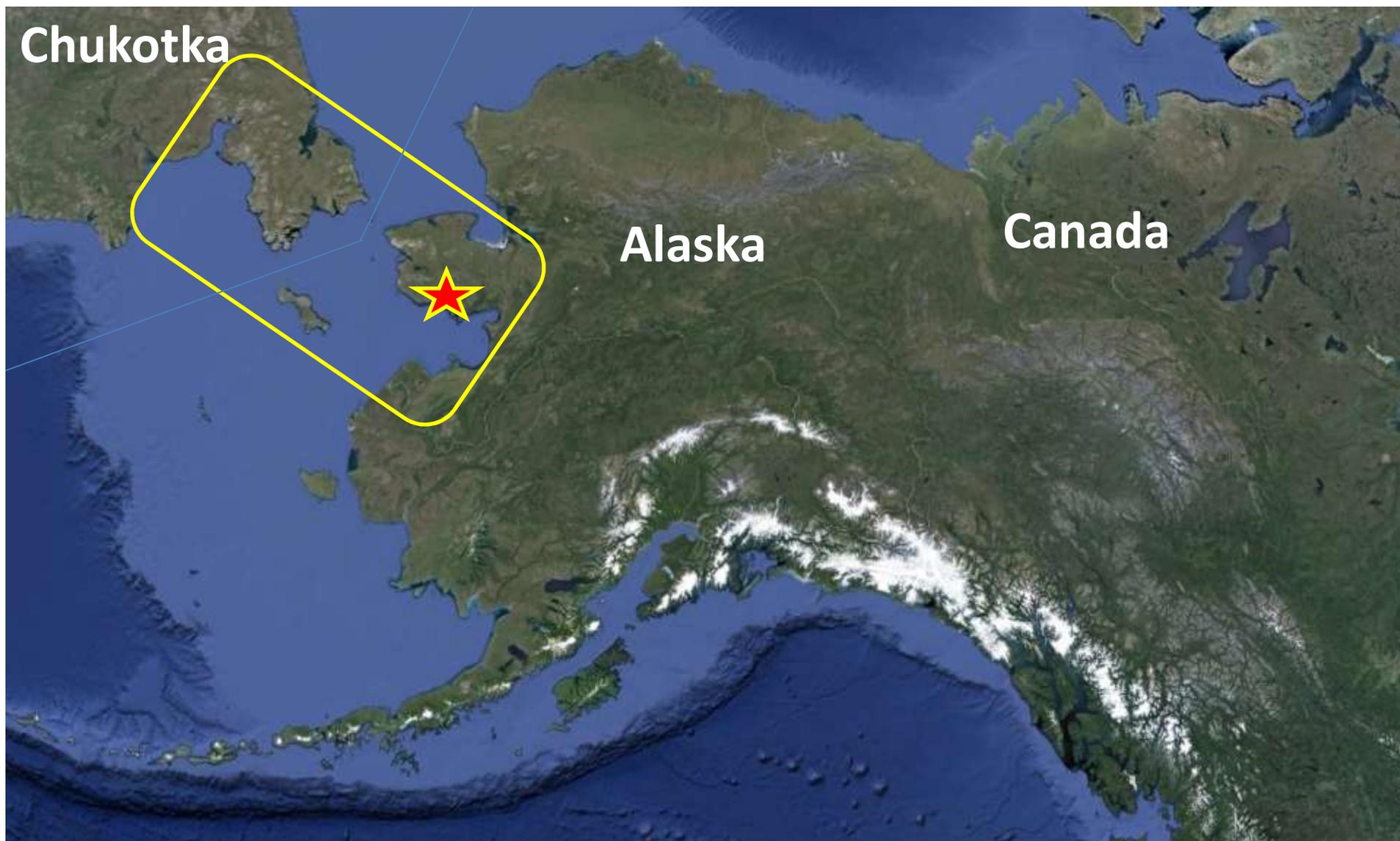


Regional Differences



Regional Differences





Chukotka

Alaska

Canada

Port of Nome



Norton Sound: \$\$

- Cargo / Transportation
- Commercial fishing/crabbing
- Offshore mining
- Ecotourism
- Research



Photo: ADF&G (Nome)



Photo: Nome Nugget





Photo: NSHC

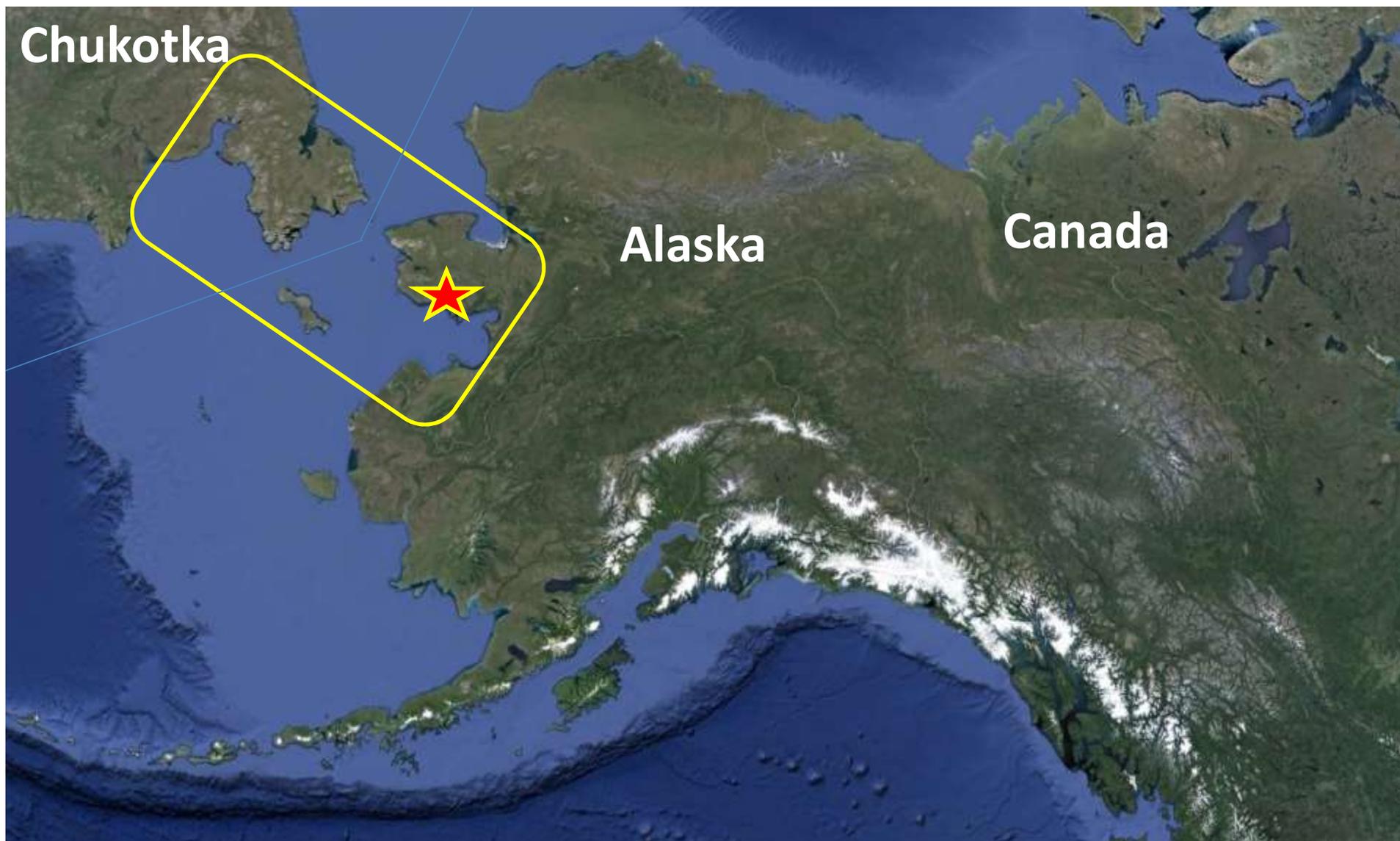


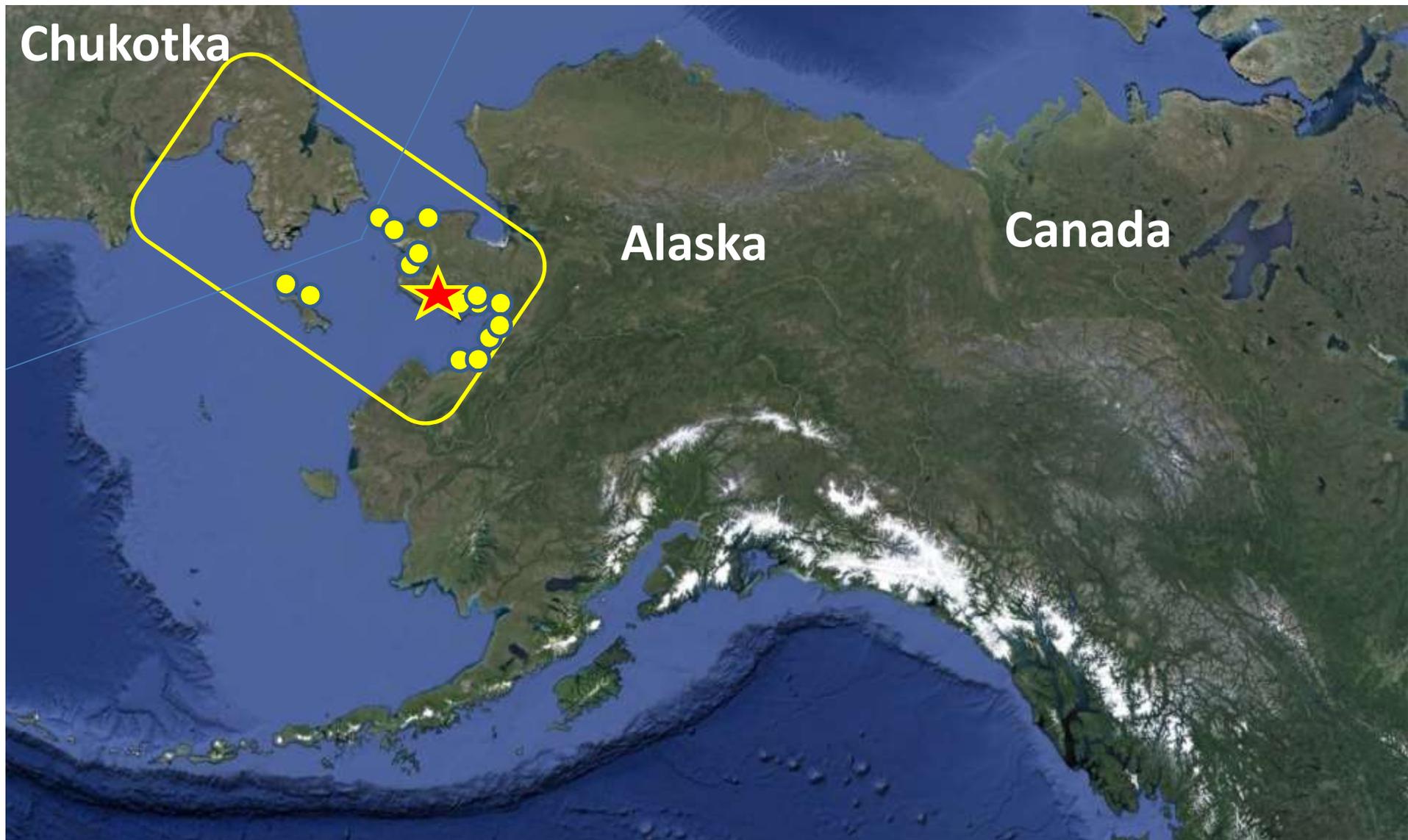
Photo: UAF-NWC



Photo: UAF-NWC







Chukotka

Alaska

Canada



Bering Strait



TRANSBOUNDARY

Diomedede Islands

CHUKOTKA

ALASKA

- Cultures & Histories
- Marine Ecosystems
- Foods & Health concerns
- Risks & Opportunities



Community	Per Capita Income
Nome	\$30,744
Unalakleet	\$28,737
Gambell	\$16,588
Golovin	\$16,165
Elim	\$13,460
Teller	\$12,790
Wales	\$12,675
Shishmaref	\$11,849
Diomede	\$11,671
Koyuk	\$11,061
Stebbins	\$10,650
Savoonga	\$9,659
Brevig Mission	\$8,425

Data: 2013–2017 American Community Survey
5-Year Estimate; Photo: G. Sheffield



Photo: G. Sheffield



Photo: G. Kuunuka



Non-commercial acquisition of marine resources - essential



Photos: G. Sheffield

Maritime Research / Subsistence

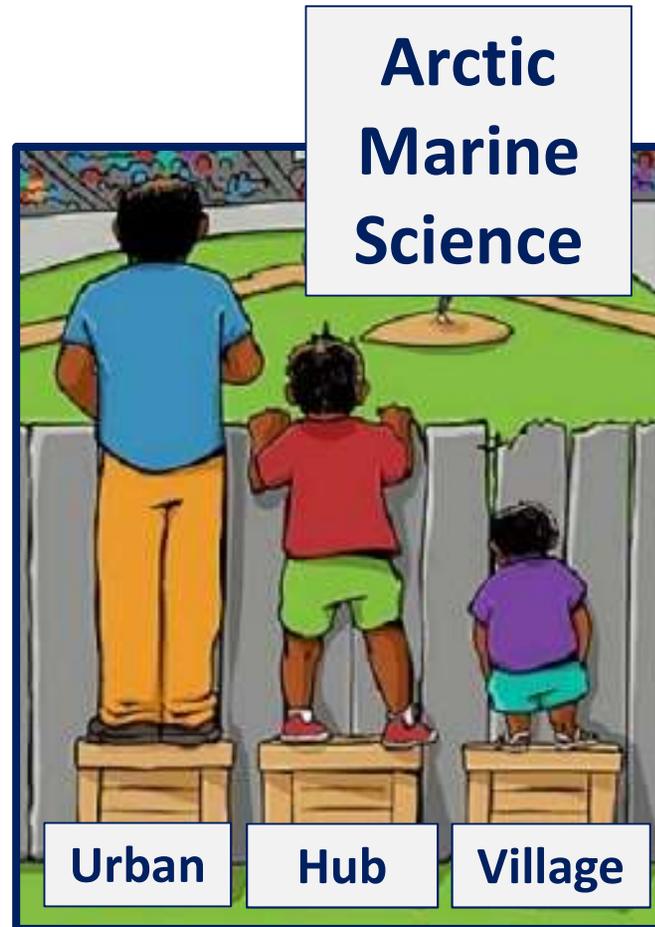
Who?
When?
How?



Who?
What?
Why?



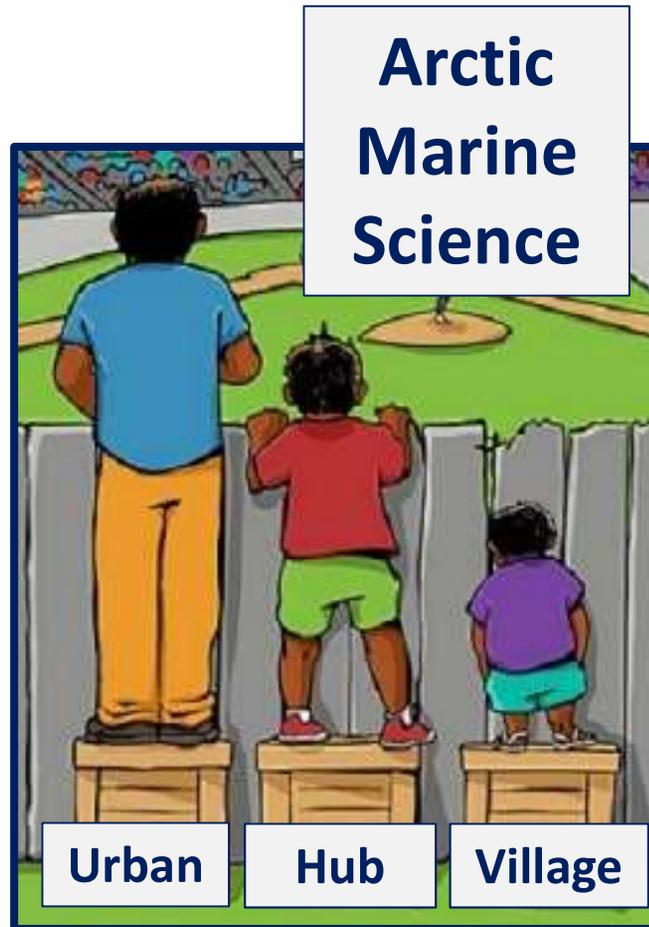
Communication Challenges



Modified from S. Quinn-Davidson (UAF)

Communication Challenges

Technology
Access



Technology
Unreliable

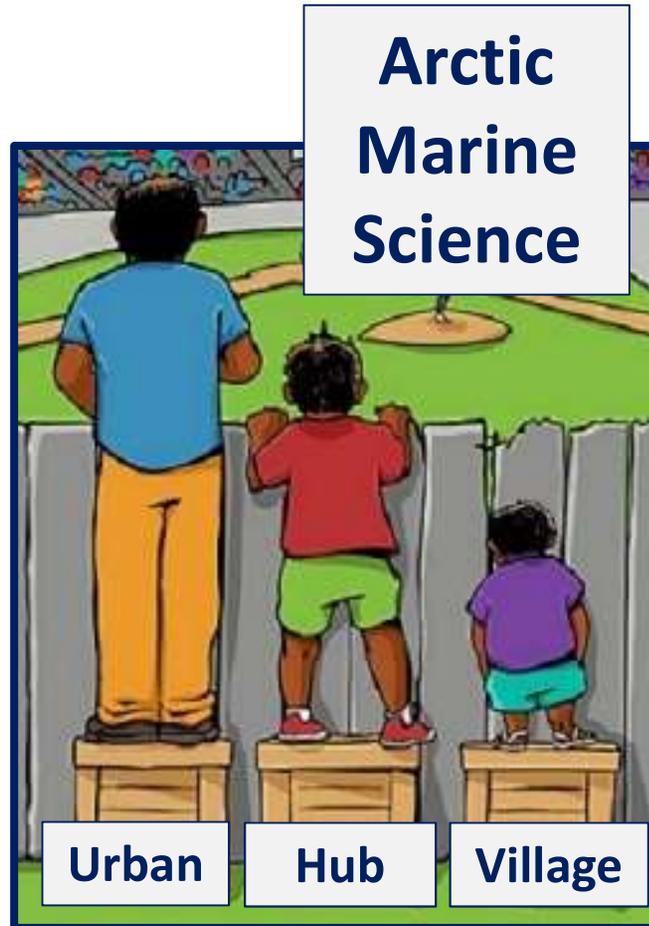
Communication Challenges

Technology

Access

Public Process

Known / Engaged



Technology

Unreliable

Public Process

Unknown/Unengaged

Communication Challenges

Technology

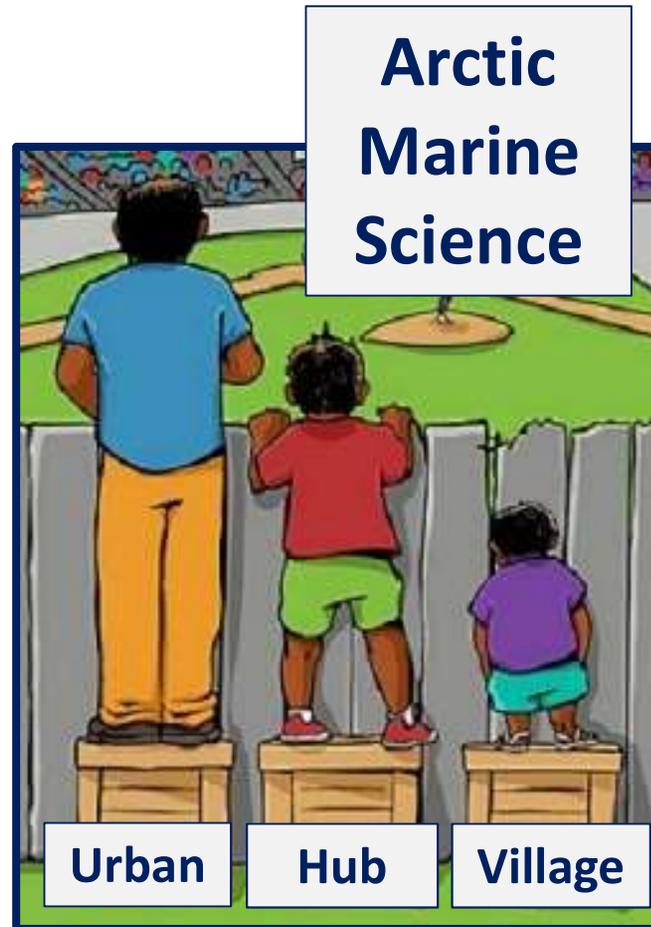
Access

Public Process

Known / Engaged

Meetings

Attends + familiar



Technology

Unreliable

Public Process

Unknown/Unengaged

Meetings

No \$ to travel

Communication Challenges

Technology

Access

Public Process

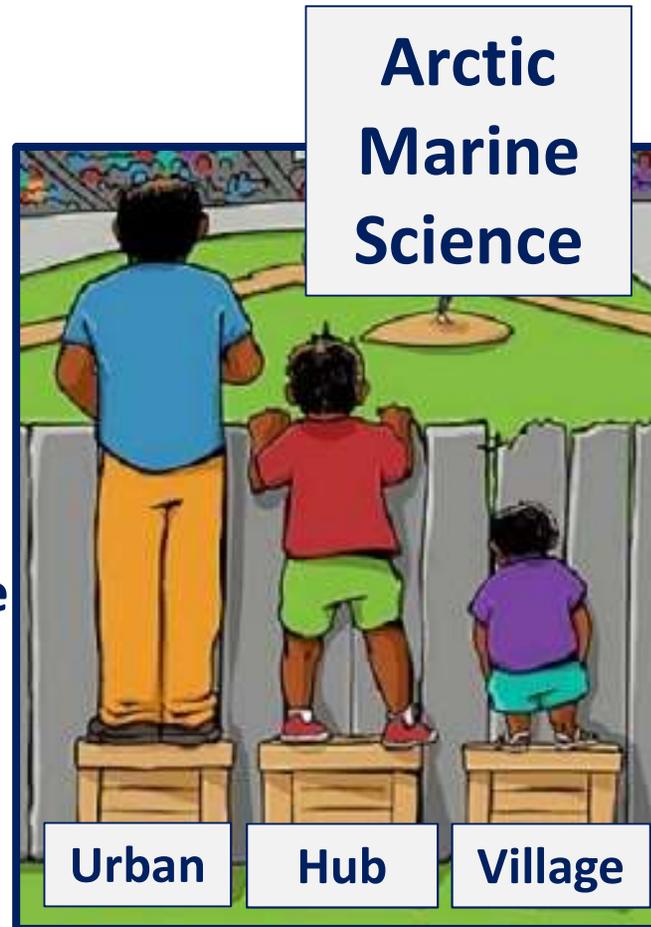
Known / Engaged

Meetings

Attends + familiar

Unfamiliar

Indigenous language



Technology

Unreliable

Public Process

Unknown/Unengaged

Meetings

No \$ to travel

Unfamiliar

Scientific language

Communication Challenges

Technology

Access

Public Process

Known / Engaged

Meetings

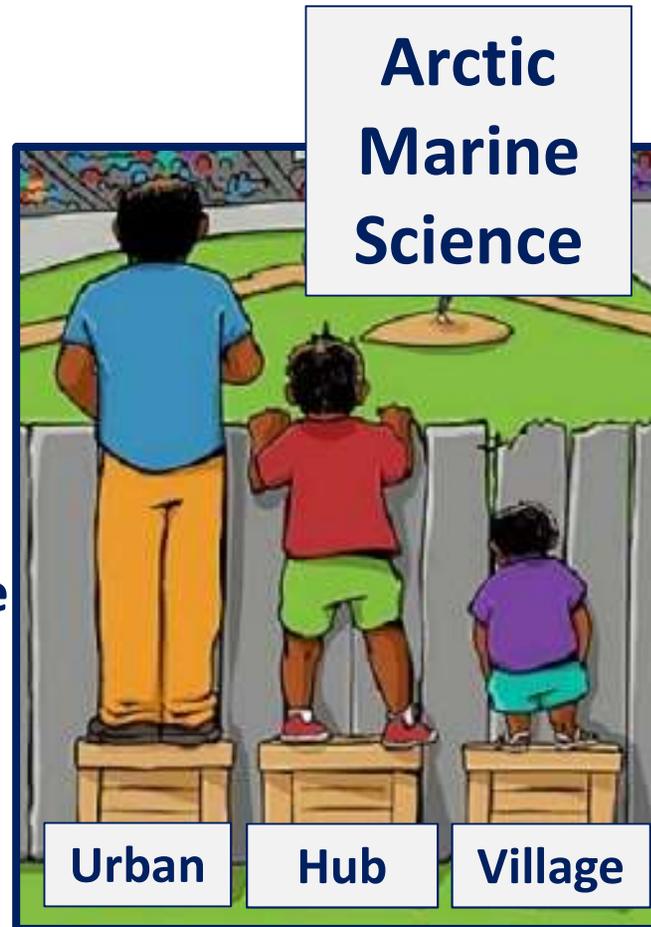
Attends + familiar

Unfamiliar

Indigenous language

Communication

Written



Technology

Unreliable

Public Process

Unknown/Unengaged

Meetings

No \$ to travel

Unfamiliar

Scientific language

Communication

Oral

Communication Challenges

Technology

Access

Public Process

Known / Engaged

Meetings

Attends + familiar

Unfamiliar

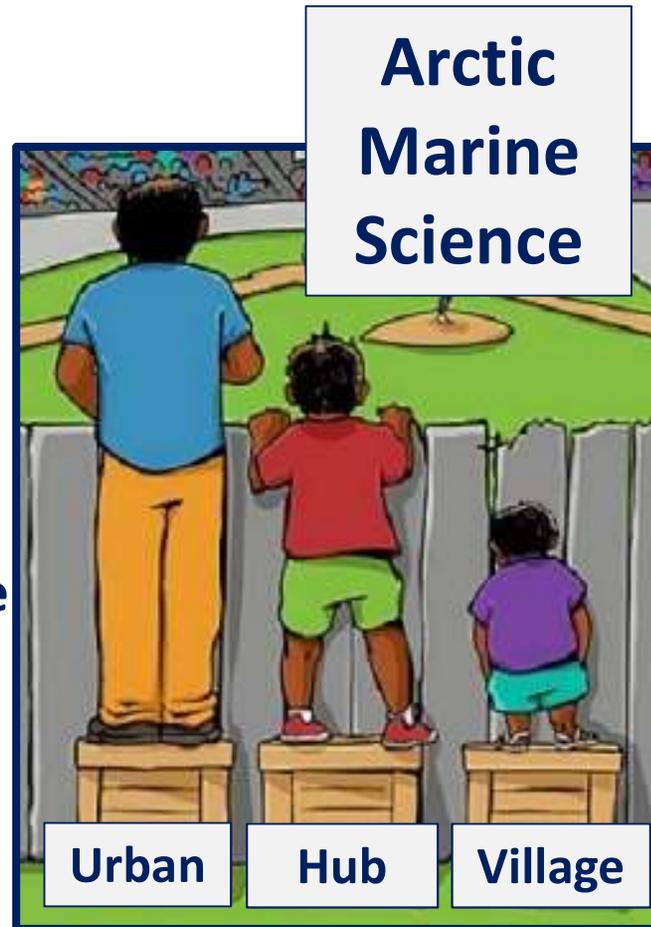
Indigenous language

Communications

Written

Economy

Cash



Technology

Unreliable

Public Process

Unknown/Unengaged

Meetings

No \$ to travel

Unfamiliar

Scientific language

Communications

Oral

Economy

Subsistence

Communication Challenges

Technology

Access

Public Process

Known / Engaged

Meetings

Attends + familiar

Unfamiliar

Indigenous cultures

Communications

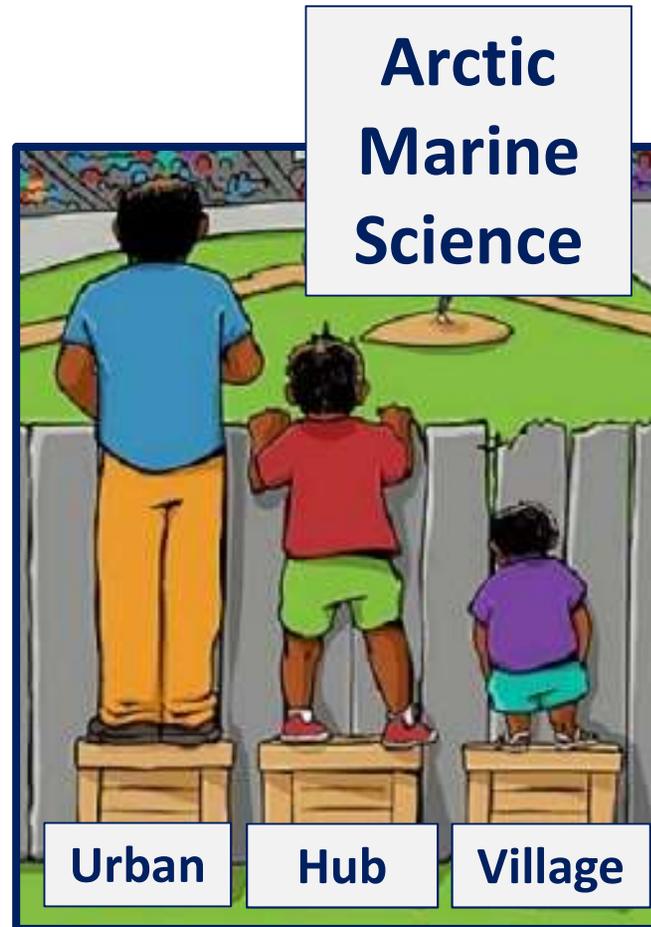
Written

Economy

Cash

Finances

Stable (cc, bank account)



Technology

Unreliable

Public Process

Unknown/Unengaged

Meetings

No \$ to travel

Unfamiliar

Science "cultures"

Communications

Oral

Economy

Subsistence

Finances

Sporadic



Photo: G. Sheffield

- ***The people of the Bering Strait region are a part of the ecosystem that is being studied. We should be the first ones to be aware of the results of research.***
- ***It is important to be involved, be able to ask questions, and to understand more of what is happening in our waters – especially if something is changing. - Savoonga (2006)***



S T R A I T S C I E N C E S E R I E S

2019 FISHERIES SURVEY: WHAT DID THEY FIND?

Thursday, Nov. 7 • 6:30p
Grand Hall • NWC Education Center

Have our seafloor fishes, crabs and other marine life changed since 2017? Come learn the results of the 2019 Bering Sea bottom trawl survey and how these compare to past survey results! Learn how these findings will better equip Alaska Native communities, scientists, and resource managers to predict and respond to changes taking place, and to ensure food security and protection of marine species.

FREE admission! • www.nwc.uaf.edu

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Lyle Britt is a NOAA research biologist with at the Alaska Fisheries Science Center in Seattle. Lyle's team conducts trawl surveys in the Bering Sea and Bering Strait regions.



Northern Bering Sea Warming Waters + Biological Change

Thursday, August 1 • 6:30pm
NWC Nagozruk Conference Room

The northern Bering Sea is changing dramatically. With less sea ice, the seawater is warming and changing the types of prey on the seafloor that are used by sea ducks, walrus, gray whales, and bottom-feeding fish, etc. Jackie will provide an



Jackie Grebmeier is a Research



S T R A I T S C I E N C E S E R I E S

SIKULIAQ HEADS NORTH STORMS, ICE, AND THE FOOD CHAIN

Tuesday, Nov. 5 • 6:30p
Grand Hall • NWC Education Center

Storms bring wave activity to the growing open water of the Arctic Ocean. R/V SIKULIAQ heads north with a new project to study how increased wave action affects the changing Arctic. Also, learn about the new trawl net that will finally allow under-ice sampling of Arctic Cod and krill. Researchers will be able to discover more about the sea ice habitat and life history of these important cold-tolerant organisms. Catch this research expedition before R/V SIKULIAQ departs Nome to find the still-elusive ice edge!

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Jim Thomson is a Senior Oceanographer at the University of Washington's Applied Physics Lab. Franz Mueter is a Fisheries Oceanographer at the University of Alaska Fairbanks, and Hauke Flores is a marine ecologist at the Alfred Wegener Institute.



Strait Science



Since 2012...
117 presentations
>2,500 headcount

S T R A I T S C I E N C E S E R I E S

"STRAIT" OFF USCG ICEBREAKER HEALY

Friday, August 23 • 6:30p
NWC Nagozruk Conference Room

**Chukchi Sea Research:
An Update**
with Bob Pickart

**SPECIAL
STRAIT SCIENCE
DOUBLE
FEATURE!**



Bob Pickart is a senior scientist at the Woods Hole Oceanographic Institution. He studies the impact of ocean currents on the Arctic ecosystem.

Get an overview of recent research focusing on influences to the arctic ecosystem in the Northern Bering and Chukchi Seas. Research efforts include monitoring ocean currents, fish, and krill in the region. Bob will also present new results regarding harmful algal toxins in Alaskan Arctic waters.

**Lack of Sea Ice: Northern and
Southern Bering Sea Response**
with Janet Duffy-Anderson

Lack of winter sea ice in recent years is unprecedented. Janet's recent studies focus on what this means for Bering Sea oceanic plants and animals and the northern and southern ecosystems that depend on them. Come hear an overview of how the seas have responded to these rapid changes.



Janet Duffy-Anderson is the Program Manager for Alaska Fisheries Science Center's Recruitment Processes Program.

FREE admission! • www.nwc.uaf.edu



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The Nome Nugget

Alaska's Oldest Newspaper

• USPS 598-100 • Single Copy Price - 50 Cents in Nome •
VOLUME CXV NO. 46 November 14, 2019

LOCAL

THE NOME NUGGET

Warm water fish migrating to Northern Bering Sea are thriving

By Sandra L. Medearis

Lyle Britt, NOAA fisheries research biologist visited Nome last week with colleague Dwayne Stevens to report on impacts of sea ice loss on the Bering Sea ecosystem and the creatures within it.

Britt supervises teams of fisheries research biologists conducting surveys of Bering Sea and arctic ground fish surveys. Britt's team has been on the water surveying the Southeastern Bering Sea and the Northern Bering Sea for six weeks. The assessment surveys monitor the same GPS points, or stations—144 of them in the Northern Bering Sea—in the same places each season to achieve base lines for a variety of investigations.

The program uses a bottom trawl device to sample fish and invertebrate organisms — crabs, snails, urchins and species that are foundation prey in the food web that lead up to larger fish, marine mammals and human consumption on which regional communities depend for food

and commercial value. The bottom trawl has a mouth 50 feet wide and about 10 feet high. The chartered fishing vessels dragging them have labs aboard where scientists count, weigh, measure and study the composition and health of the species collected.

The survey of the Northern Bering Sea in August revealed a significant happening: the presence of larvae and age zero and age one fish apparently spawned by mature warm-water fish that have traveled north from the South Bering Sea or possibly from Russia. Scientists cannot say for sure.

While the 2019 survey shows the biomass of walleye pollock in the Northern Bering Sea had fallen by 11 percent compared to 2017 estimates, the abundance (estimated number of fish in the survey area) of pollock had grown by 59 percent, increased to 2.9 billion fish from 1.8 billion fish in 2017. Much of this increase

continued on page 4

4 THURSDAY, NOVEMBER 14, 2019



Photo by Sandra L. Medearis
RESEARCHER— Lyle Britt, NOAA fisheries research biologist visited Nome last week to report on impacts of sea ice loss on the Bering Sea ecosystem.

• Northern Bering Sea

continued from page 1

in number was due to more young fish in the area.

The increased catch of the very young pollock and cod strengthens the biologists' hypothesis that these species are overwintering in the region during periods of low ice covering and spawning.

Findings from the 2019 Northern Bering Sea survey overall again show that large numbers of sub-arctic species of fish—walleye pollock, Pacific cod, flathead sole, etc.—distributed throughout the region.

The Southeastern Bering Sea has been studied as a separate ecosystem since 1982. Now the dramatic loss of sea ice and very warm water temperatures in the Northern Bering Sea

now appearing there in increasing numbers. A few have appeared even farther north into the Chukchi Sea, according to other surveys.

The dramatically increased biomass of cod and pollock in the Northern Bering Sea have attracted operators of long line fishing vessels to the vicinity of St. Lawrence Island, where they have not fished in the recent past.

The NOAA scientists did not come off a research vessel tied up at Port of Nome and head to sea. That ship has sailed weeks ago. Britt, Stevens and Maggie Mooney-Seuss, NOAA information coordinator for Alaska and the West Coast, flew to Nome to deliver new information from the survey assessment to communities that depend on marine re-

Research vessel *Sikuliaq* heads north to investigate the new Arctic

By Sandra L. Medearis

A team of researchers came off the *FV Sikuliaq* that docked at the Port of Nome Nov. 5 to share information from another expedition into northern arctic waters when not so long ago the calendar showing November would have made such a voyage impractical and perhaps risky after the USCG had weighed anchor and gone south.

The *RV Sikuliaq* is a 261-ft. polar research vessel owned by the National Science Foundation and operated by University of Alaska Fairbanks. The oceanic vessel is an icebreaker that can take research scientists to the ice-laden waters of Alaska. However, unless the scientists and satellites miss their well-founded predictions, the vessel that took off from Nome Saturday, due to dock in Utoqavik (formerly Barrow) the next afternoon would not likely need its capability to go through ice as thick as 2.5 feet. The voyage is scheduled to last about three weeks with the *FV Sikuliaq* returning to

Dutch Harbor on Nov. 27.

Very warm surface temperatures and unseasonably warm weather in the Bering Sea and Chukchi Sea regions in the 2019 season have left these oceans bereft of the sea ice that would have covered them just a few years ago.

The scientists, an oceanographer, a marine ecologist and a fisheries oceanographer shared the theme of what is happening in the new arctic in the new Arctic. Jim Thompson is a senior principle oceanographer and the lead in the research voyage. The program is Coastal Ocean Dynamics in the Arctic—CODA, out of the University of Washington applied physics lab.

The new Arctic is when there is less ice and the ice is slow to return, Thompson explained.

Thompson has been looking into sea ice dynamics that have combined with melting permafrost and other forces that caused some Alaska coasts to recede at rates in meters per year. He talked on understanding

wave mechanics and how storm waves affect ice formation and durability along the shore.

Wave events are assailing the coasts without sea ice to protect them. The CODA project has focused on northern coasts of Alaska with deployments and measures at Icy Cape, Jones Islands and Flaxman Island. The project sites straddle whaling communities and avoid interference with hunting patterns.

As ice returns later and later, there has seemed a trend toward a rate of one day later each year. At that rate, three decades would bring the ice about a month later.

"This is something that we published a few years ago when we thought, yeah, the freeze up is about a month later. Well, things appeared to have accelerated a fair bit and now the freeze up in some cases this year, it feels like it's going to be almost two months later depending on how you count it," Thompson informed

continued on page 5



Photo by Jim Menard
SIKULIAQ— The research vessel *Sikuliaq* docked at the port of Nome prior to its journey north, on Nov. 5.



Sikuliaq Researchers Studying “New Arctic” in Ice-Free Beaufort, Chukchi

By [Davis Hovey](#) | November 19, 2019 | 0



SEA ICE FORMING IN THE CHUKCHI AND BEAUFORT SEAS is starting to close in on [Utqiagvik](#), leaving a lot of open water currently through the Bering Strait. One research cruise taking advantage of the favorable sailing conditions with little ice in Arctic waters, is the [Sikuliaq](#), a [University of Alaska Fairbanks vessel](#).

Trawl Survey Results Show Northern Bering Sea In Flux

By [Davis Hovey](#) | November 13, 2019 | 0



NORTON SOUND RED KING CRAB ARE MOVING, Arctic cod numbers have dropped significantly, and Pacific cod are continuing to increase as the Northern Bering Sea ecosystem undergoes drastic change. That's all according to preliminary results from NOAA Fisheries' trawl survey this summer in the Northern Bering Sea (NBS).



Nome

Photo: G. Sheffield



Savoonga

Photo: G. Sheffield

Teamwork: In-Person meetings



Shishmaref

Photo: A. Ahmasuk

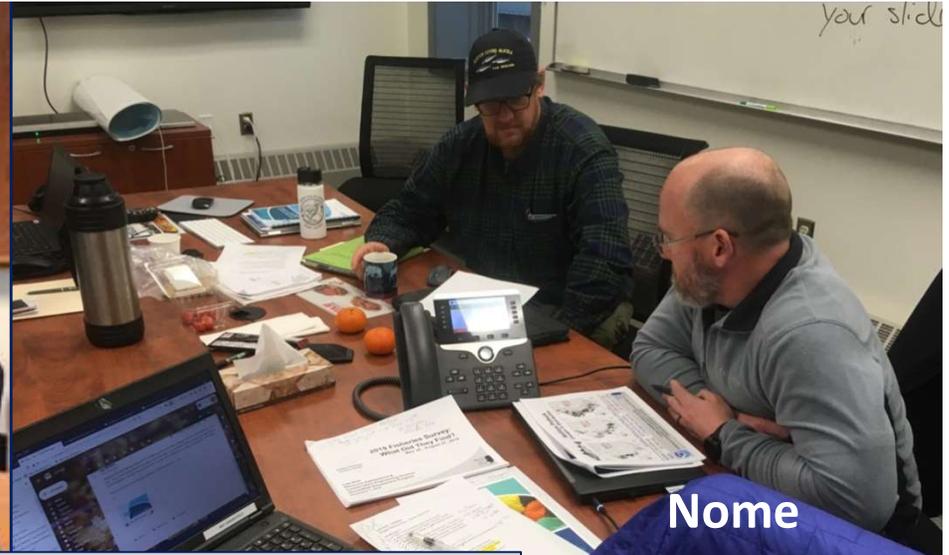


Photo: A. Ahmasuk



Nome

Photo: E. Ahkvaluk



Nome

Photo: G. Sheffield

Teamwork: Community calls



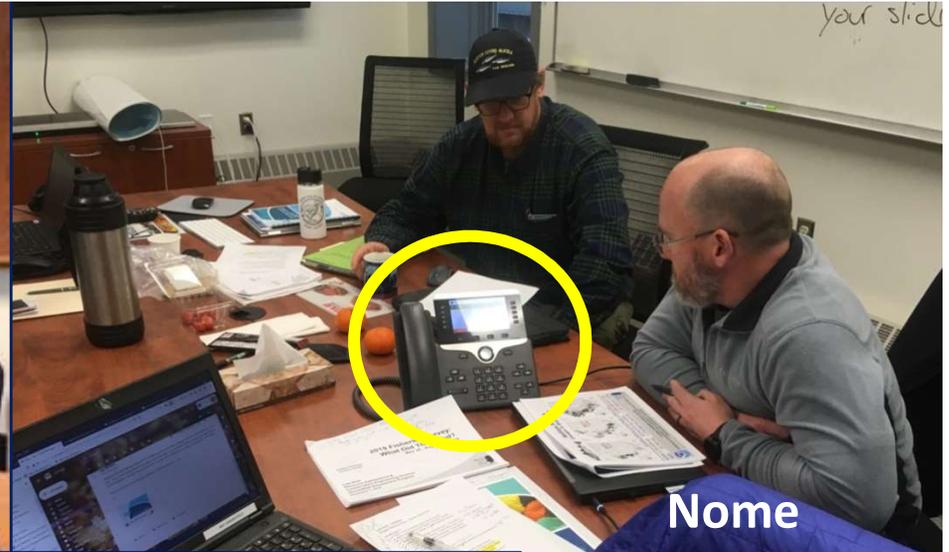
Diomedes

Photo: O. Ahkinga



Nome

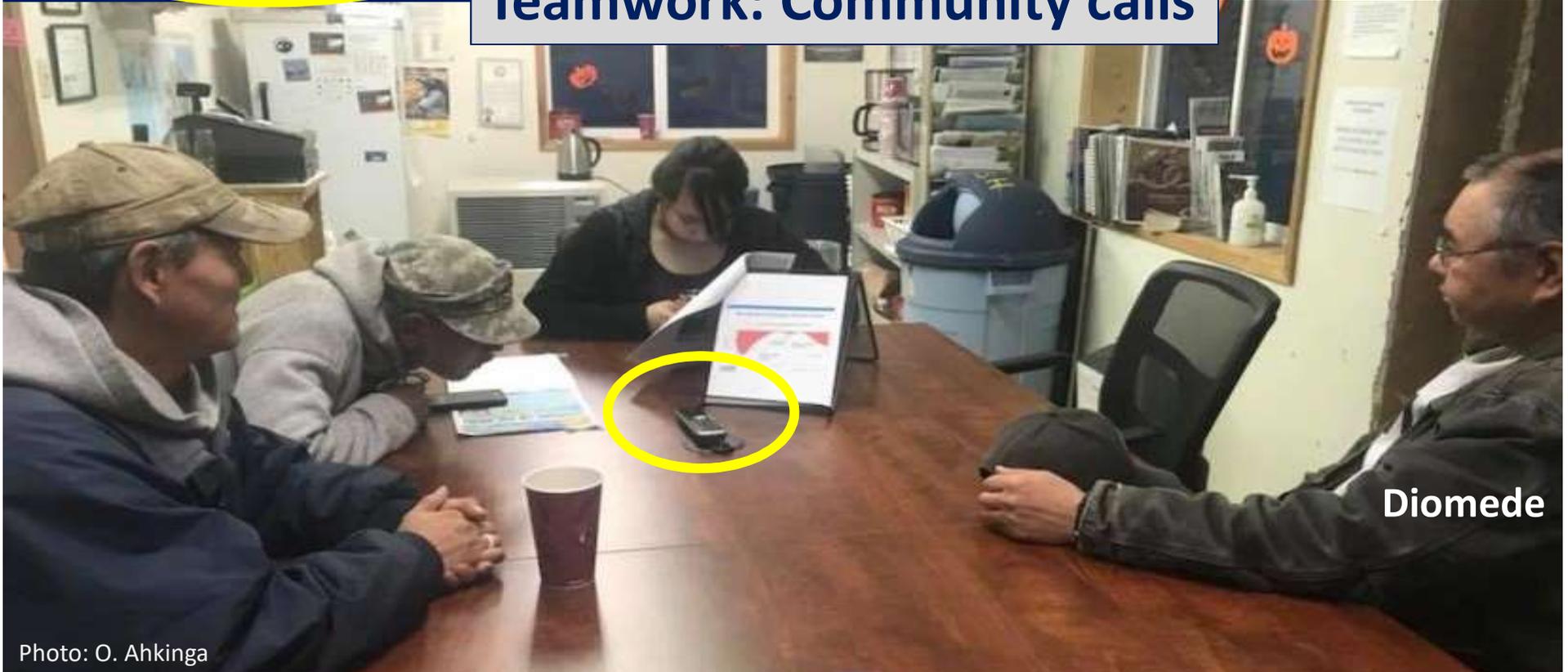
Photo: E. Ahkvaluk



Nome

Photo: G. Sheffield

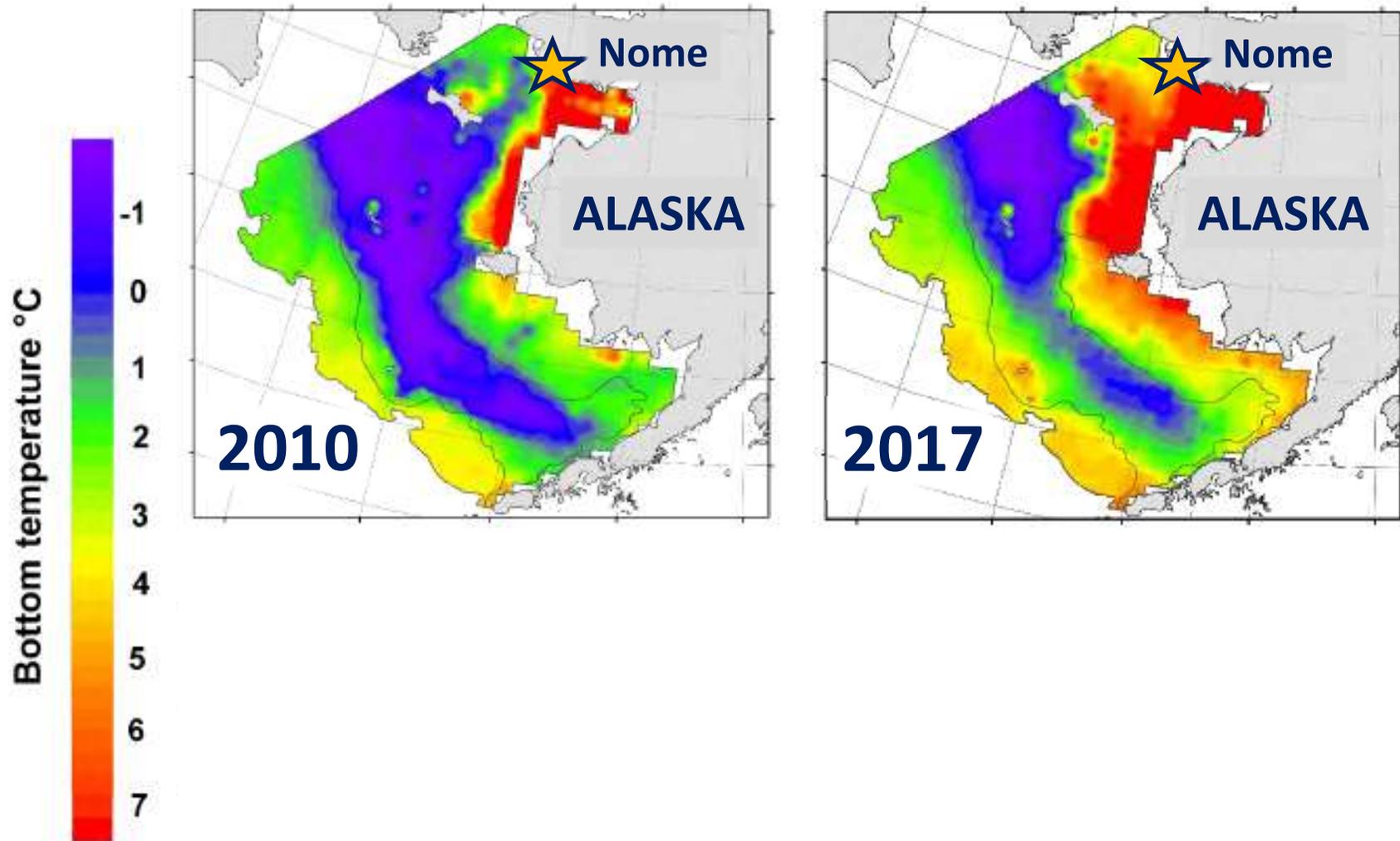
Teamwork: Community calls



Diomede

Photo: O. Ahkinga

Bering Sea: Bottom Water Temperatures



Bering Strait: 2010-2017...

EVENTS

Diseases

- *Ice Seal UME*
- *Avian Cholera*
- *Saxitoxin*
- *Starvation*

Invasive / Extension Oil-Fouling / Debris



Photo: T. Akeya



Photo: G. Sheffield



Photo: L. Tungiyang



Photo: G. Sheffield



Photo: G. Sheffield



Photo: C. Koonooka

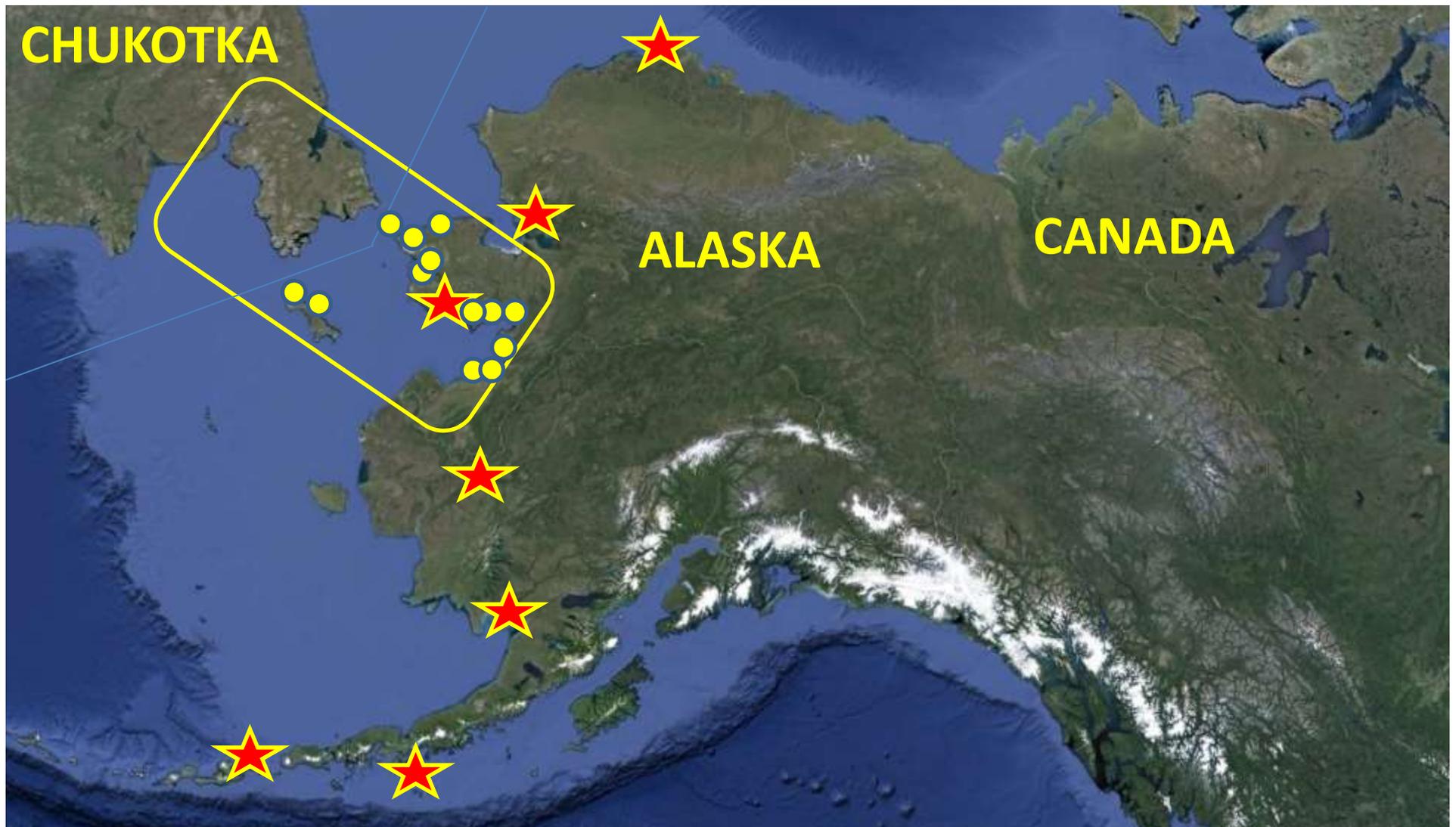


F/V Kapitan Bulsinovski (2012)

**Regional Perspectives
or
“Lessons learned”**

**Active maritime subsistence communities
most likely to discover anomalies and
alert regional partner institutions.**





Science most effective when integrated with regional communication networks, tribal governments, and traditional knowledge holders.

Lack of scientific data does not mean lack of knowledge



Photo: G. Sheffield



Photo: G. Noongwook

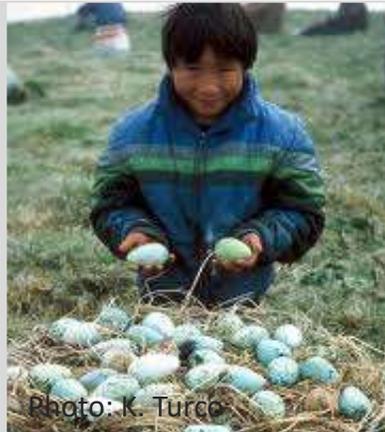


Photo: K. Turco



Photo: G. Noongwook

Arctic science is not solely conservation / academic issues



Photos: G. Sheffield



Photo: G. Sheffield

Project observations and summary results are of immediate need and use – by coastal communities & researchers



Adaptable science leadership allows diverse information flow



Photo: G. Sheffield



Photo: G. Sheffield

Ethically responsible to alert Chukotka of shared public health and/or marine wildlife concerns

Bering Strait

What has happened?!

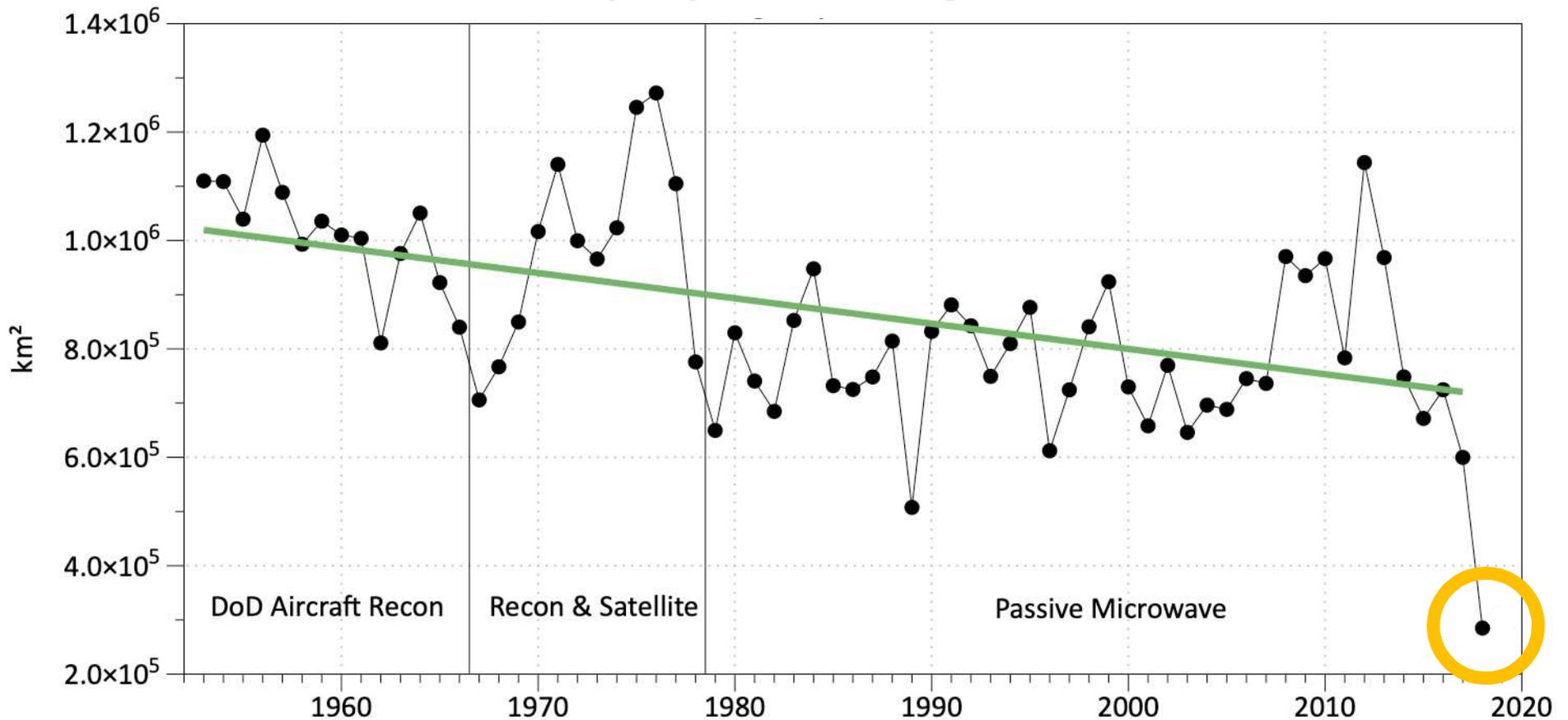
February 2018 happened...



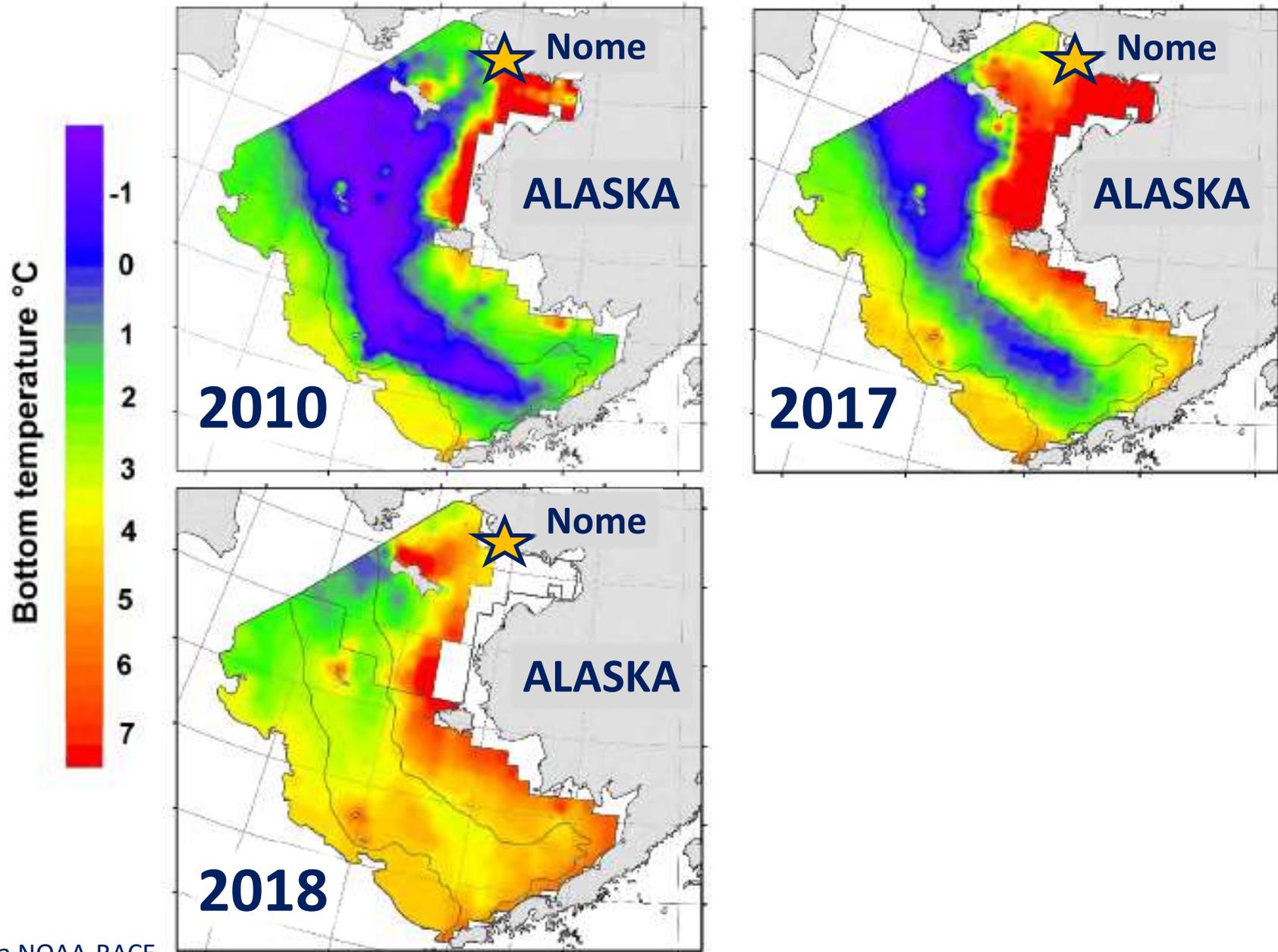
Photo: C. Ahkvaluk

Loss of Sea Ice: 1953-2019

February-April: Bering Sea Ice Extent



Bering Sea: Bottom Water Temperatures



Data NOAA-RACE

Bering Strait: 2018 Unfolding Events

NO THERMAL BARRIER

- *Massive ecological shifts*
- *Mass strandings (seals)*
- *Seabird die-off*
- *HAB concerns*



Photo: Public (Nome)



Photo: S. Komonaseak Jr.



Photo: A. Angqatenganwan



Photo: B. Ahmasuk



Photo: NOAA



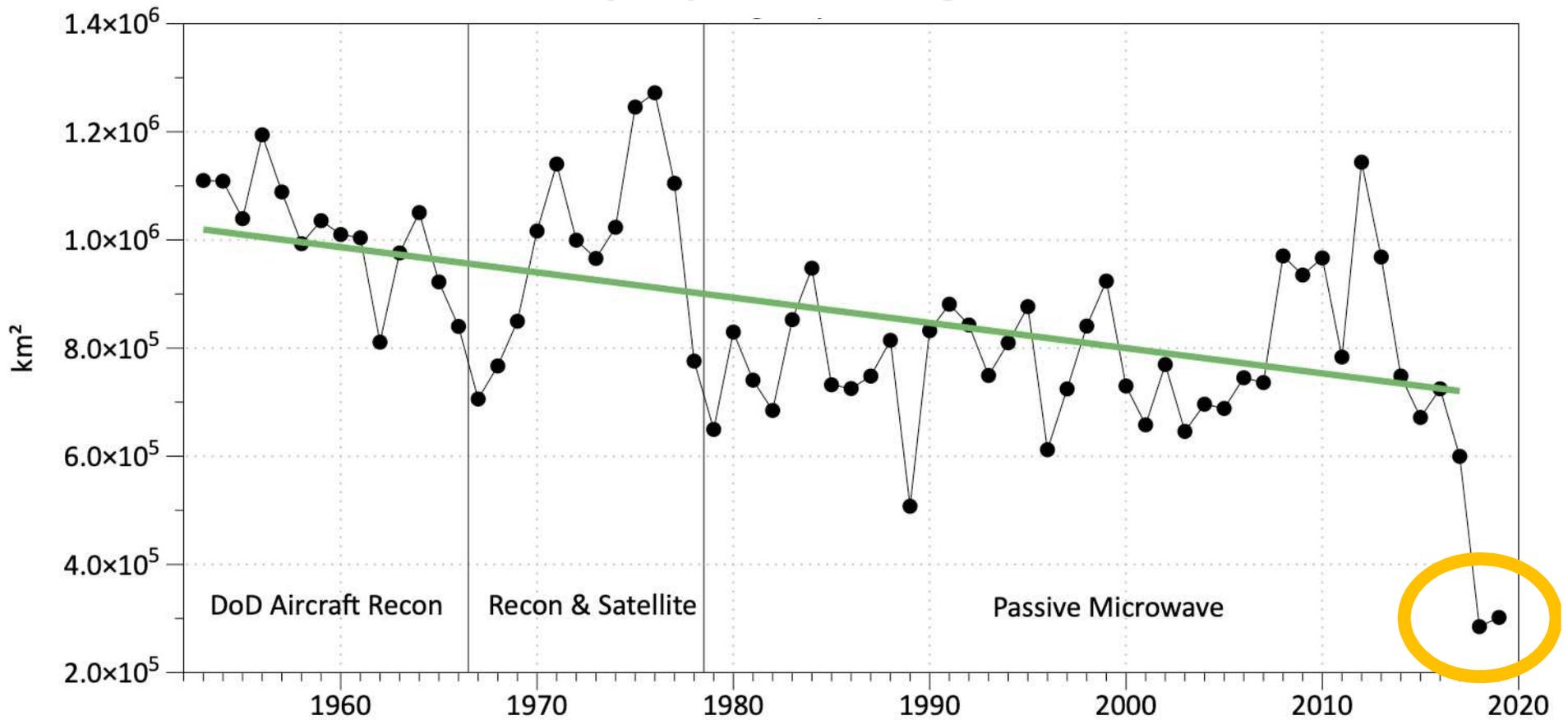
Photo: E. Apassingok



Photo: M. Rauzon

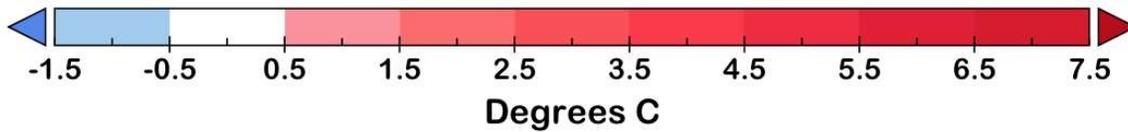
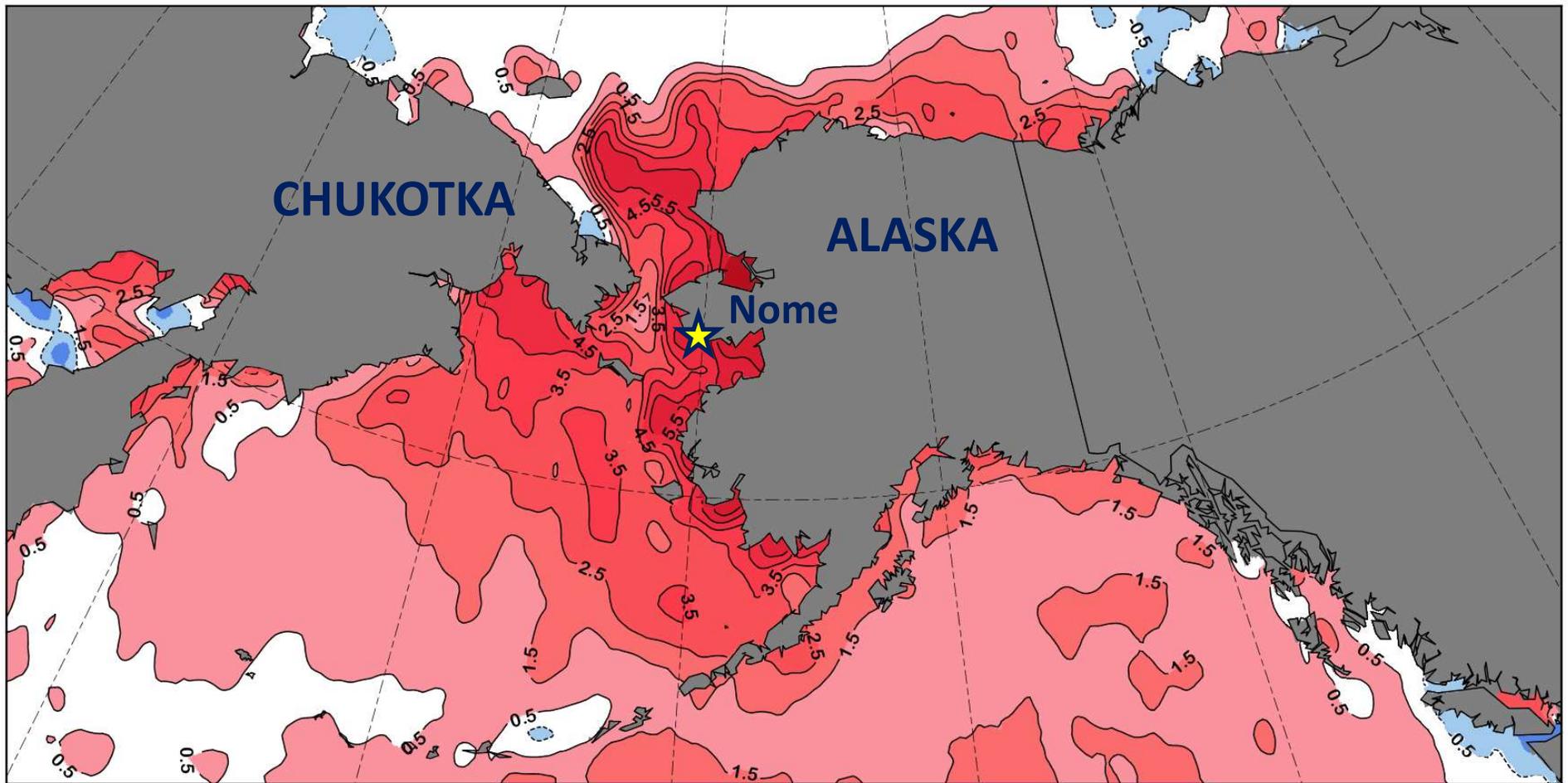
Loss of Sea Ice: 1953-2019

February-April: Bering Sea Ice Extent

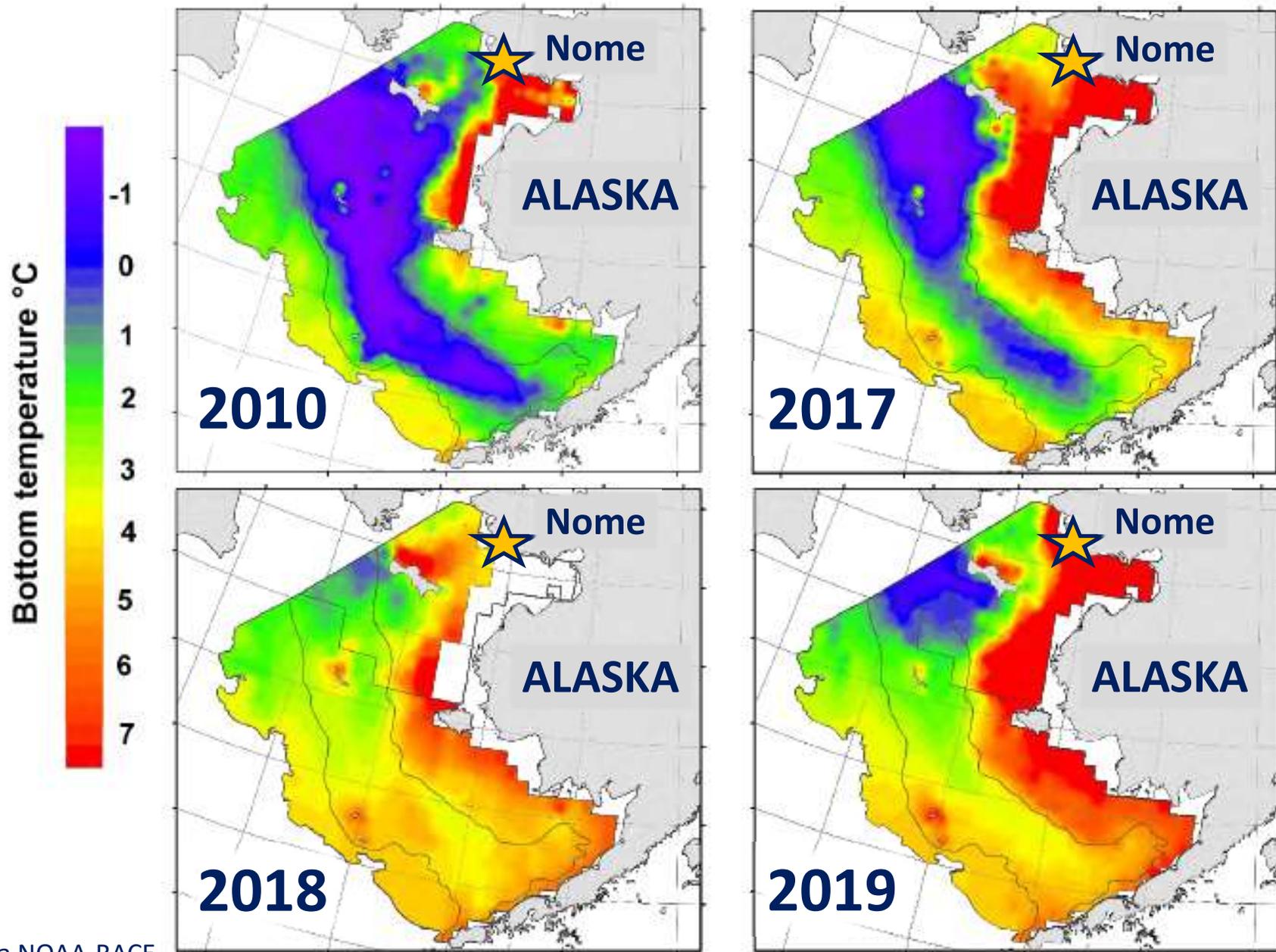


June 2019

Sea Surface Temperature: Departure from Normal



Bering Sea: Bottom Water Temperatures



Bering Strait: 2018-2019 Events

NO THERMAL BARRIER

- Massive ecological shifts
- Mass strandings (UME)
- Seabird die-off
- HAB Events, "Hot" clams

Photo: G. Sheffield



Photo: M. Ahkinga Sr.



Photo: V. Ongtowsruk



Photo: B. Ahmasuk



NOAA – RACE Div.

NBS: Biomass (mt)

	2010	2017	2019	Change
Pollock	21,141	1,319,062	1,319,062	5,421%
Pacific Cod	29,124	287,535	364,982	1,153%
Smelts	16,377	5,260	4,891	-70 %
Arctic Cod	37,861	3,906	47	-100 %



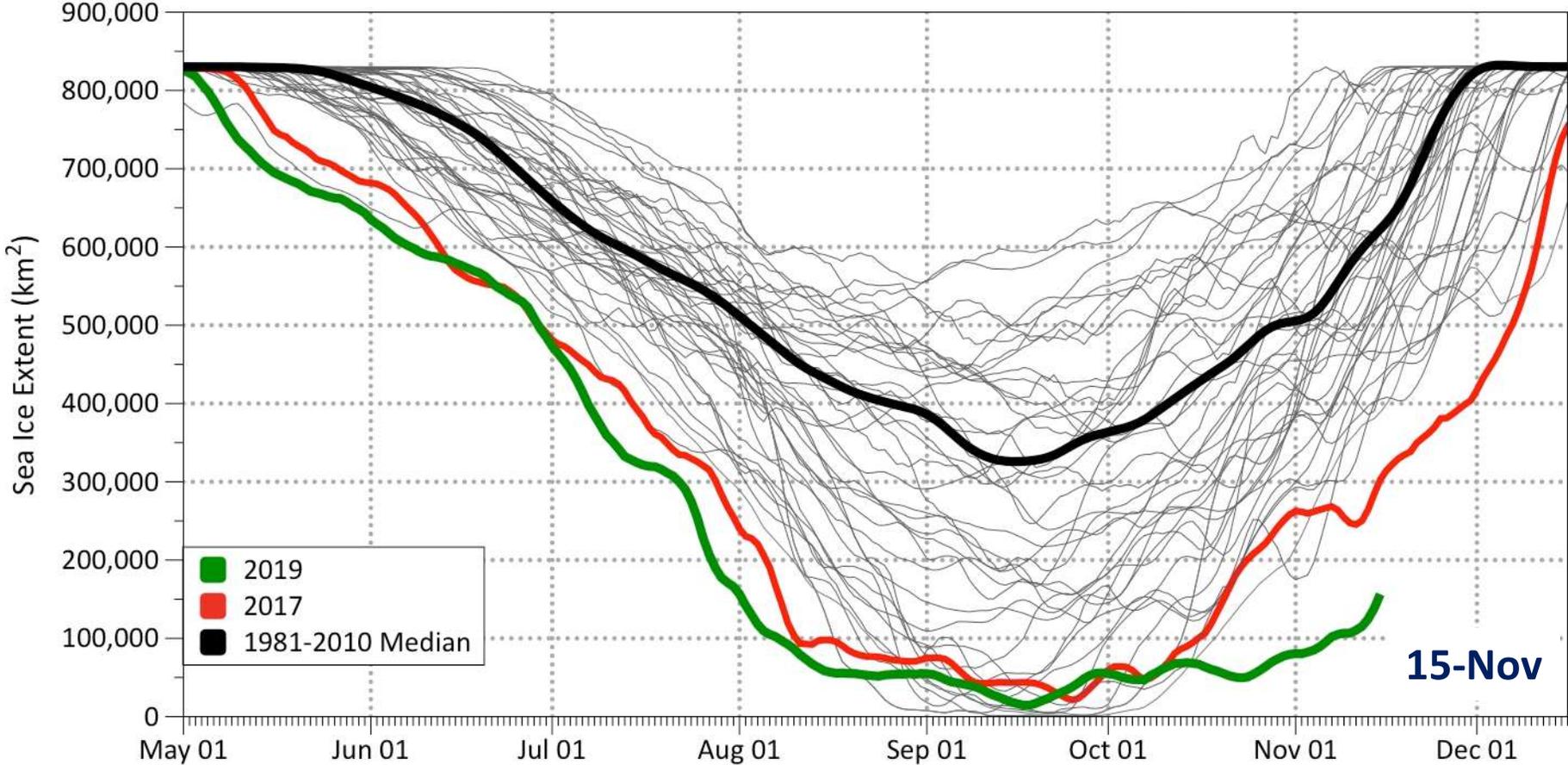
Photo: NOAA

Bering Strait: 30-Oct.

Industry is responding



Chukchi Sea: Daily Ice Extent 1979-2019



15-Nov



Data source: NSIDC Sea Ice Index, Version 3
Updated through November 15, 2019

Saturday: Nov. 16, 2019

NWS Daily Sea Ice Concentration



Summary

Regional Perspectives

- N + W coasts are regionally diverse
- Communities have a system-wide understanding
- More regional knowledge than published
- Food Security / Public Health paramount
- Need summary results / observations ASAP
- Integrate with regional communications networks and tribal governments
- Ethical obligation to engage Chukotka

Bering Strait

- Marine resources are essential human foods
- Two entire ecosystems – in massive flux
- Significant environmental / industrial changes



***“We are currently operating blind.
Coordinate the science. Bring it.”***

29-November 2019

**Port of Nome
- OPERATIONAL -**





Development of best practices for scientific research vessel operations in a changing Arctic: A case study for R/V *Sikuliaq*



B. Konar^a, L. Frisch, S.B. Moran

^a College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Fairbanks, AK 99775-7220, United States

ARTICLE INFO

Keywords:
Environment
Compliance
Arctic
Subsistence
R/V *Sikuliaq*

ABSTRACT

Reduced sea ice has made the Arctic Ocean more accessible for vessel traffic. In turn, the heightened interest to better understand rapidly changing sea ice dynamics, ecosystems, and related ocean processes in the Arctic Ocean has led to closer interactions with and the need to avoid potential conflicts between scientific researchers and indigenous coastal communities. In particular, researchers need to minimize spatial and temporal overlap of science activities with subsistence hunts as the Arctic is essential to indigenous communities for their food security and cultural heritage. In this regard, a Community and Environmental Compliance Standard Operating Procedure (CECSOP) was recently developed for the R/V *Sikuliaq*, which is owned by the National Science Foundation and operated by the University of Alaska Fairbanks College of Fisheries and Ocean Sciences and is part of the University-National Oceanographic Laboratory System. The CECSOP was developed with input and guidance from Alaska indigenous community groups, state and federal agencies, and sea-going scientists. Here the document's basic principle and procedures are described, as well as its utility in helping guide constructive discussions and interactions between scientific users of R/V *Sikuliaq* and subsistence hunting communities when research and subsistence hunt activities have spatial and temporal overlap. The CECSOP is a "living" document and subject to future modifications and improvements. It may serve as a model for other scientific, commercial and industrial vessel operators to ensure best practices between subsistence hunting communities and vessel operators in the Arctic.

SIKULIAQ: Community and Environmental Compliance Standard Operating Procedure (CECSOP).

The Arctic polar regions have been home to humans for thousands of years. While much has changed since first contact between Inuit and Europeans more than one thousand years ago, many culturally and linguistically distinct peoples remain nutritionally, culturally and economically reliant on the available traditional marine based food resources. As scientific interest in the Arctic has increased so has the potential for conflicts between research and subsistence users, typically in biologically significant areas. Coastal Alaskans in western and northern Alaska are adapting to shifting industrial and environmental regimes.