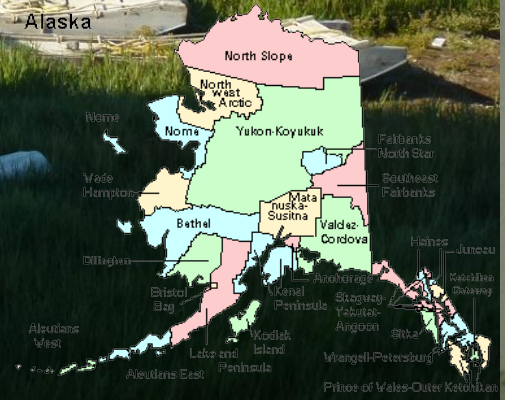
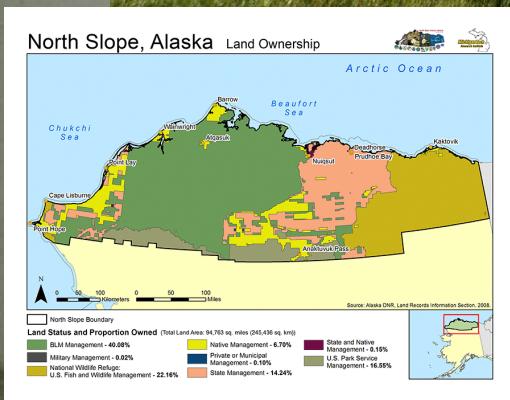


Historical Ecology for Risk Management

Anne Garland, Anthropology, PhD., Laura Thomas, R.N. Nurse
Applied Research in Environmental Sciences Nonprofit, Inc.
North Slope Borough Risk and Emergency Management
Coastal Observers of Barrow Community-Based Monitoring

ariesnonprofit@yahoo.com

Fb [@arieshermys](#)



Applied Research in Environmental Sciences Nonprofit, Inc.

MISSION

ARIES is a non-profit research association promoting collaborative research, public education, and public outreach designed to enhance corporate and community based decision making.



Historical Ecology for Risk Management

Background and Context

1. Risk Management Program- Science and Technology Center of Excellence for Department of Homeland Security, CREATE

- Working Together for a Safer Tomorrow Program: TIGA(Tribal Inclusive Geographic Areas)
- Applied Project for TIGA Emergency Management
 - 1.Cumulative Regional Integrated Operability Score Project (CRIOS)
 - 2. Regional Cooperation, Operability, and Organizational Partnerships (RE-COOP)



2. Historical Ecology Research Model

- Integration of Historical, Social-Ecological Sciences
- Transdisciplinary Applied Research

3. Historical Ecology for Risk Management-Youth Sustainability (HERMYS)

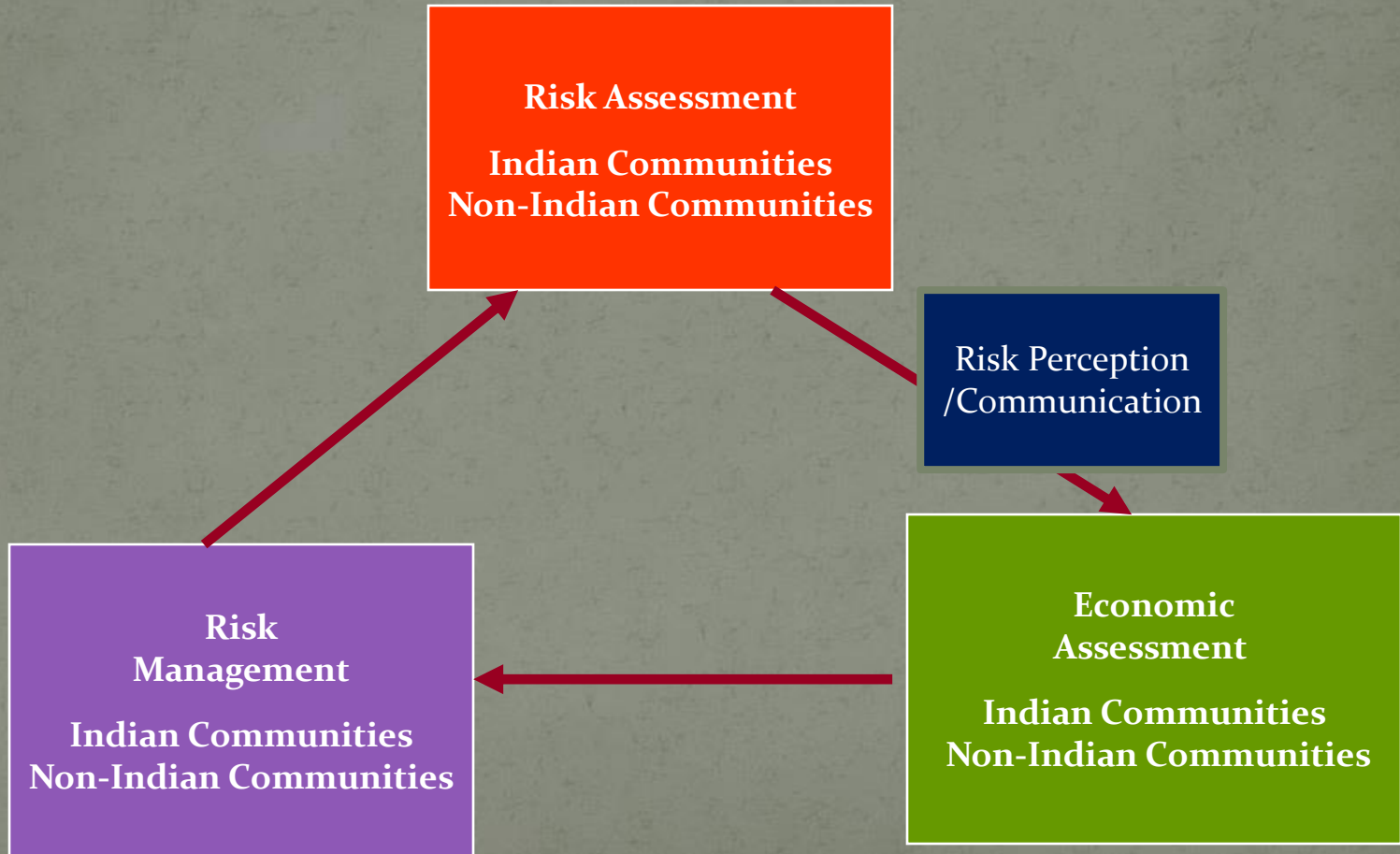
- Research Application with and for North Slope Borough, AK. 2013-present and long term for multiple risks and hazards
- Coastal Observers of Barrow Community Based Monitoring Harmful Algal Blooms
- Navigating the New Arctic Click NSF for project summary



“Working Together for a Safer Tomorrow”

Research Framework

(Trially Inclusive Geographic Area)



CRIOS 2007 (IPY) and 2013-2024 North Slope Borough AK.

- Collaboration with the North Slope Risk Management and Local Emergency Planning Committee for risk workshops (IPY 2007-2008)

- Historical Ecology for Risk Management: Youth Sustainability (2013-2024) [fb journal @arieshermys](#)

- Coastal Erosion Mitigation Study
 - Sea level rise
 - Storm Surge
 - Permafrost Calving
 - NSB RM Priority for Critical Infrastructure



Historical Ecology for Risk Management: Youth. Sustainability(HERMYS) **Abstract**

Historical ecology is an applied research program that focuses on

- interactions of people and their environments (social-ecological systems)
- in both time and space
- to gain a full picture of all of its accumulated effects.

The research program can be applied to understanding changes among community landscapes that **can assist management strategies for the future.**

This includes applications to:

- environmental conservation,
- ecosystem services, and
- **hazard mitigations**

For this project, the emphases align with:

- the ARIES mission that combines research, education and community outreach,
- **the Inupiaq Learning Framework, and**
- **the eco-heritage indicator of the CRIOS model** (Cumulative Regional Integrated Operability Scores).

Environment

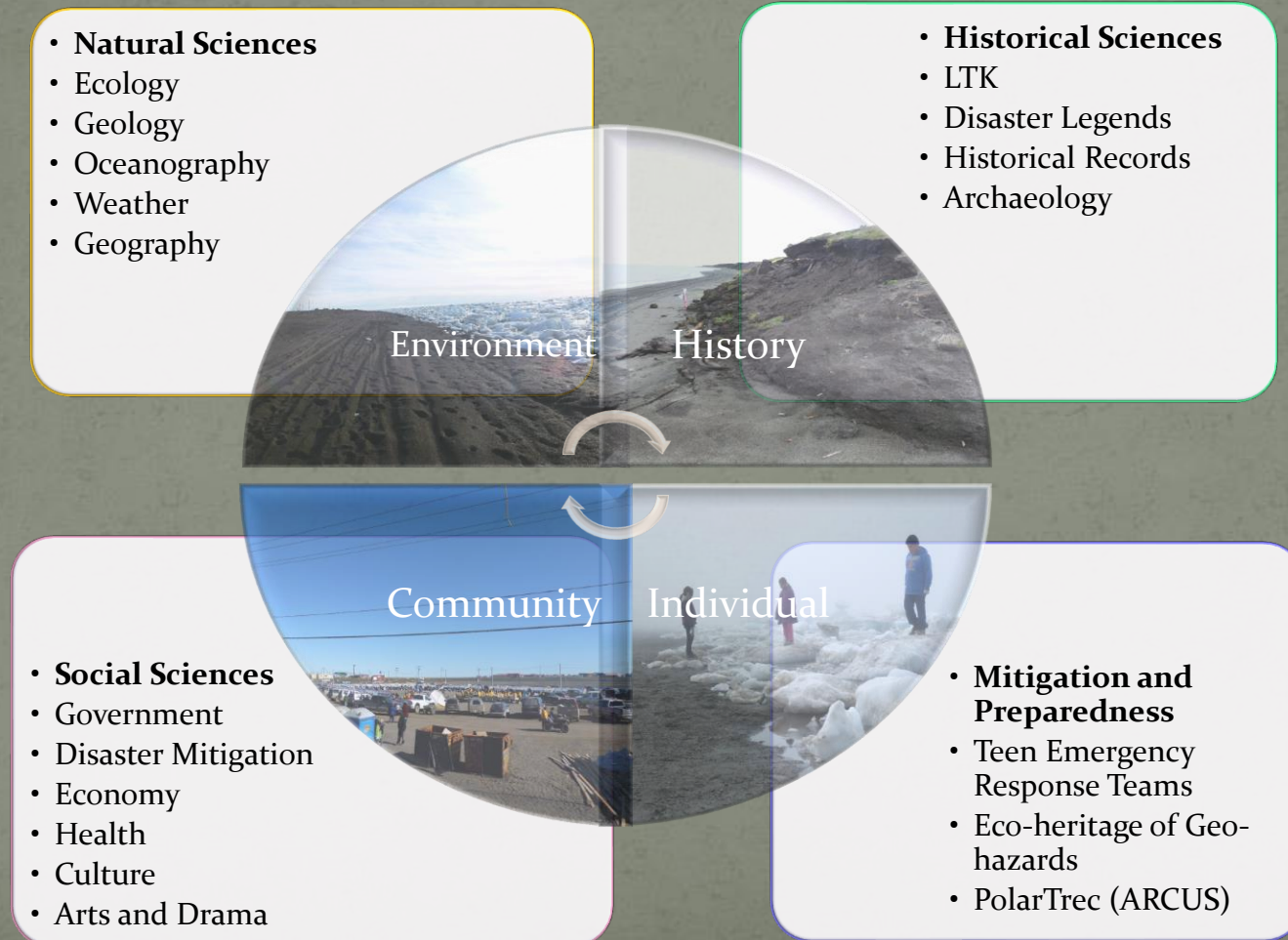
Community



History

Individual

Historical Ecology for Risk Management: Youth Sustainability(HERMYS) Model



Historical Ecology for Risk Management: Youth Sustainability(HERMYS)

Eco Heritage Community Service-Learning **Goals**

RIA Framework and Emphases (Risk Interpretation and Action-See References):

- Community Based Monitoring for Beach Erosion, Tundra Green Engineering and Harmful Algal Blooms by Coastal Observers of Barrow (COB CBM)
- Community Salvage Archaeology of Threatened Sites from Coastal Erosion
- PERCIAS Applied Theater (Perceptions of Risk Communication, Interpretation, & Action in SES Systems)
- Youth Habitat Corps for Arctic and Tundra Gardens (Food Security and Public Health)
- **PolarTREC Teachers** assist with research and eco-heritage data for disaster preparedness among the “Next Generation”, that is, middle and high school students
- NSB Risk Management Risky Business Camps and Activities
- North Slope Borough TEACH (STEAM Challenge)



Community Based Monitoring

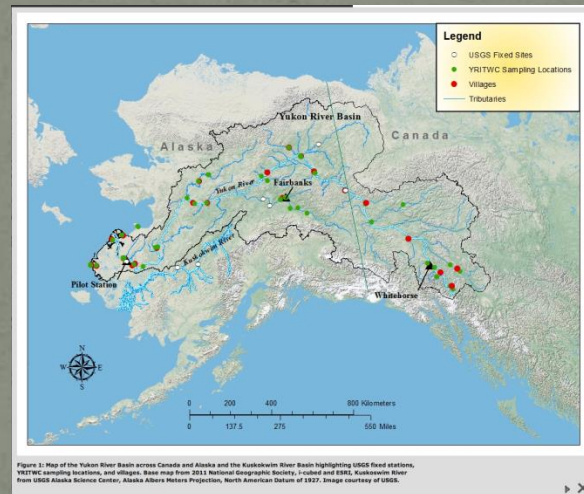
- Community-based monitoring and citizen science programs are expanding throughout Alaska.
- These programs allow local people to participate in the scientific process
- Observe environmental phenomenon on front lines of change
- Alaska Ocean Observing System and Alaska Sea Grant Best Practices

<http://www.aous.org/community-based-monitoring/>

<http://seagrant.uaf.edu/conferences/2014/community-based-monitoring/index.php>

Atlas of Community Based Monitoring in a Changing Arctic

Example: [Yukon River Inter-Tribal Watershed Council \(YRITWC\)](#)



http://www.arcticcbm.org/index.html?modules=module_arcticcbmAlaska

Citizen Scientists

- Scientific research conducted, in whole or in part, by amateur or nonprofessional scientists, often by crowd sourcing and crowd funding
- Formally defined as "the systematic collection and analysis of data; development of technology; testing of natural phenomena; and the dissemination of these activities by researchers on a primarily avocational basis".^[1]
- Sometimes called "public participation in scientific research."^[2]
- Limitations?
 - The question of data accuracy
 - Some projects may not be suitable for volunteers, such as complex research methods or require arduous or repetitive work.
 - Volunteers have insufficient training in research and monitoring protocols, they are more at risk of introducing bias into the data.^[3]
 - Members may be inaccurate about data. This risk is even greater when bounties are awarded as an incentive to participate.

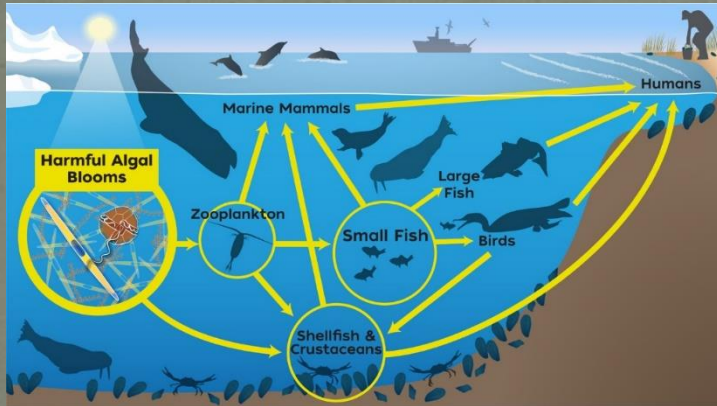
http://en.wikipedia.org/wiki/Citizen_science

Harmful Algal Blooms

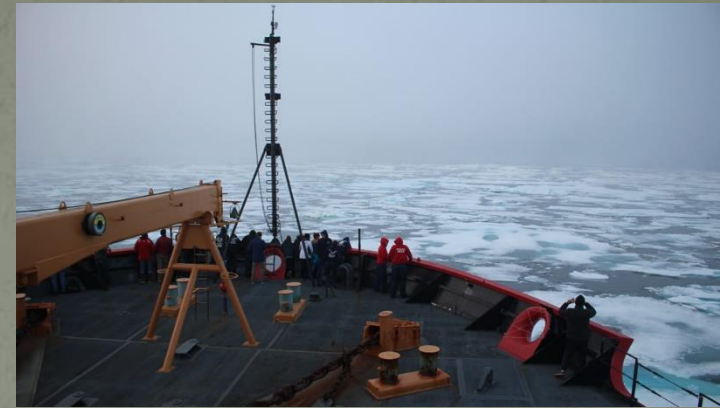
- NOAA Phytoplankton Monitoring Network (PMN)
- Coastal Observers of Barrow Community Based Monitors
 - 2016 to present for baseline
 - blooms temperature dependent
 - Water Sample Sites
 - (4 coastal and 2 lagoons)
 - Recruitment Issues
- NSB Wildlife Vet Samples
 - harvested marine mammals
 - subsistence toxicities



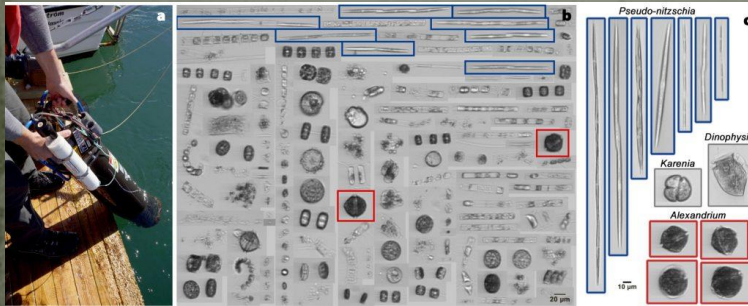
Collaboration about Food Web Impacts



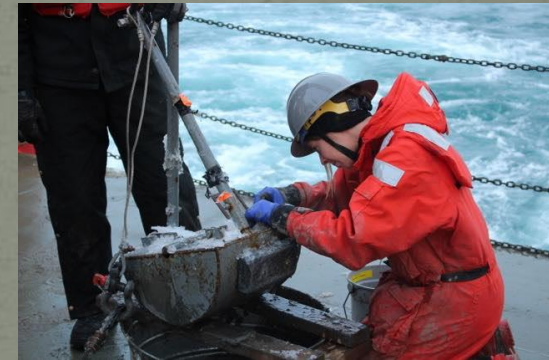
The Alaska Harmful Algal Bloom Network (AHAB)



Ice off the bow of the USCG Healy (August 2018) NSF Funded Woods Hole Oceanographic Institution Cruises 2018-2023



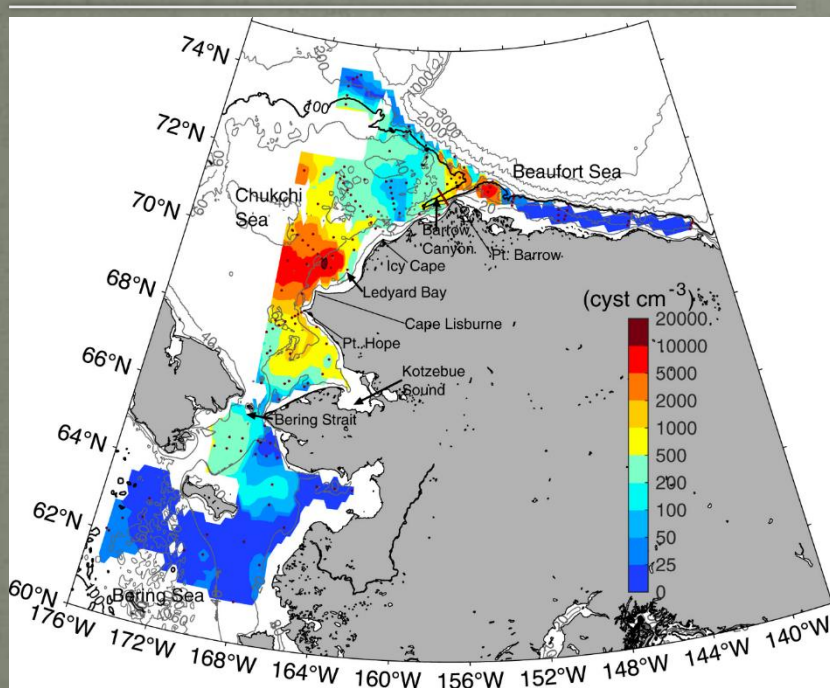
(a) An *Imaging FlowCytobot* (IFCB). Image credit: Michael Brosnahan, WHOI (b) Examples of phytoplankton imaging data that the instrument produces. A single water sample collected from shipboard underway seawater in the Chukchi Sea during an August 2018 cruise contained *Alexandrium* (red boxes) and *Pseudo-nitzschia* (blue boxes). (c) Post-processing of IFCB imagery classifies cells by type, allowing easy identification and quantification of HAB cells, including *Alexandrium*, *Pseudo-nitzschia*, *Karenia*, and *Dinophysis*.



Collection of samples for cyst processing (USCGC Healy, August 2018) Citation Ecology and Oceanography of Harmful Algal Blooms *ECOHAB AND NSB Wildlife Veterinarian*

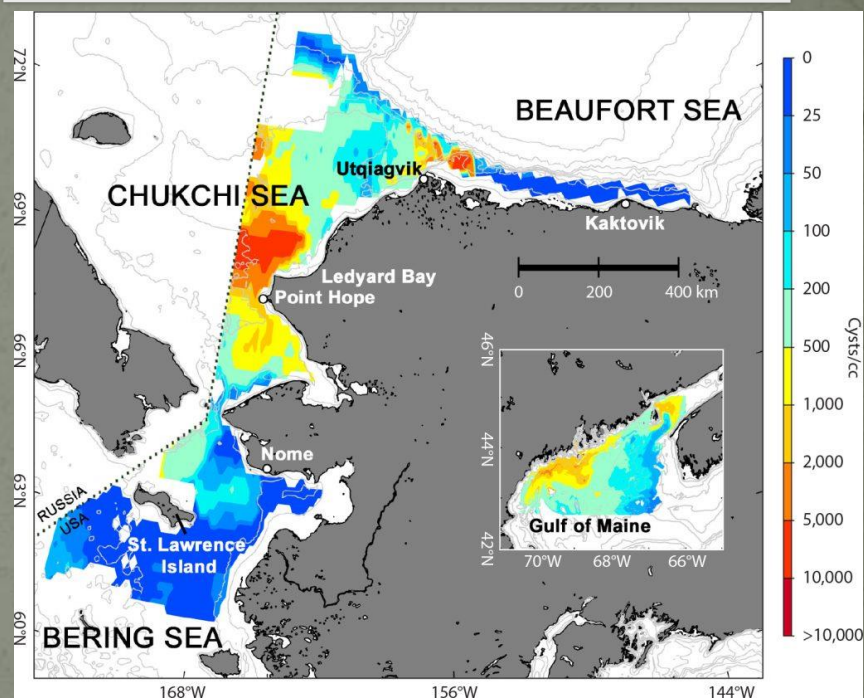
Cruise Results

Dense Cyst Beds from in Barrow Canyon and Ledyard Bay



- to study temperature, sediment density, nutrients
- to understand how it gets formed/seeded
- to know if it blooms and seasonal patterns

Harmful Algal Blooms in the Alaskan Arctic: An Emerging Threat as Oceans Warm Citation




- Alaskan (2018–2020) and Gulf of Maine (2004–2012) *Alexandrium catenella* cyst abundance in surface sediments, depicted on the same scale (Albers Equal-Area Conic projection). Sites visited across multiple years were averaged to create these composite maps.

Collaborations for Local Policies

- 1.2023 ARIES Requested a Joint Review of Research Results for North Slope Borough (NSB) EM and NSB Wildlife Veterinarian by ECOHAB and WHOI
- 9.2023 ARIES requested, invited, and met 7 residents for a Local Advisory Committee (LAC)
- Proposed Tasks of LAC
 - Quarterly Meet
 - Advise on all public education and public monitor recruitments
 - Coordinate, invite to meet, and update NSB EM, Wildlife, and Public health
 - Provide FAQs by community residents about food security and impacts
 - Pan Arctic comparisons about policies
 - Assist for PSA Alerts about Blooms
 - Assist on proposals to continue studies






Healthy Animals, Healthy People, Healthy Environment

The NSB-DWM Marine Mammal Health Program

The Chukchi and Beaufort Seas are home to large numbers of marine mammals that are important subsistence resources for the North Slope communities. The main objective of the NSB-DWM Marine Mammal Health Program is to work with hunters and community members on the North Slope to better understand healthy, harvested animals, and to investigate diseases and parasites for hunter-concern animals. We support the traditional and customary practices that guide decision making on when an animal is used for subsistence, and we continue to monitor and watch for the major man-made and environmental threats to the health of our marine mammals today.



Why do we do it?
Hunter observations, as with many scientific studies, indicate that the Arctic is undergoing major changes in duration of seasonal sea ice extent and sea ice thickness, extreme weather patterns, increased maritime traffic, etc. Coupled with these environmental changes are changes in animal distribution, migration routes and timing, start of breeding season, and arrival of new species, just to name a few.

How do we do it?
We are contacted by a hunter and we go to their harvest or butchering site. The animal is measured and observed for age, sex, and body condition. Samples of various tissues (blubber, muscle, liver, kidney, stomach contents, etc.) are collected and the animal is examined for signs of disease, presence of parasites, injuries, etc. Samples are archived and, over time, are analyzed for contaminants, nutrients, and other health studies. We also respond to hunter-concern or beach-cast marine mammals where the animal is also measured and sampled in order to answer a hunter's concerns or to determine cause of death.

Acknowledgements: Many thanks to the North Slope hunters who allow us to sample their food and who alert us to animals of concern when they are encountered. Without them, this work could not be done. **Questions or Concerns?** Please contact the NSB-DWM research biologist, Raphaela Stimmelmayer, at 852-0350 or email her at raphaela.stimmelmayer@north-slope.org.

Continued Directions and Feedback

- 2024 Proposal for NPRB and NSF Arctic System Science or CHIRRP

- Convergence and Transdisciplinary collaboration of ARIES, Don Anderson at Woods Hole Oceanographic Institute, AHAB, UAF Oceanography, and Local Advisory Committee
- Support Local Advisory Committee to assist subsistence food safety for local policies
- Proposal to study Barrow Canyon cyst bed and (Video Presentation) water conditions for blooms (Article)
- Study seasonal blooms from water and sediment samples off and near coast (train subsistence boaters as monitors and more coastal monitors)
- Effects of Currents and Storms to understand bloom distributions and deposits
- Course Curricula/Projects for Associate Science at lisagvik College and NSBSD by Instructor Specialists






Photo by J. Robson

OUR INUPIAT VALUES

AVOIDANCE OF CONFLICT PAAQLAKTAUTAIÑIÑI	HUMILITY QIÑUIÑIÑI
COMPASSION NAGLIKTUUTIQAGÑI	HUMOR QUVIANGUNI
COOPERATION PAAMMAAGIÑI	HUNTING TRADITIONS ANJUNIALANI
FAMILY & KINSHIP ILAGIÑI	KNOWLEDGE OF OUR LANGUAGE INUPIURAALLANI
SHARING AVIKTUAGATIGIÑI	SPIRITUALITY UKPIQUTIQAGÑI
RESPECT FOR NATURE QIKSIKRAUTIQAGÑI IÑUUNIAGVIGMUN	
LOVE AND RESPECT FOR OUR ELDERS AND ONE ANOTHER PIQPAKKUTIQAGÑI SULI QIKSIKRAUTIQAGÑI UTUQGANAANUN ALLANULLU	

 North Slope Borough Healthy Communities Initiative
Nunaagivut Sayyagiksvlugi 

Healthy
communities
economically,
spiritually, and
culturally



The North Slope Borough Mission and Inupiat Values on NSB Website (click on picture links)

Historical Ecology for Risk Management: Youth Sustainability (HERMYS)

Want to help with some
RISKY BUSINESS?

Volunteer Citizen Scientists Needed!

All ages welcome

Thursday August 28th, 7:00PM to 9:00PM

OR

Saturday August 30th, 3:00PM to 5:00PM

Tuzzy Consortium Library

Door Prizes!

Snacks!

- > Risky **EROSION** along the Beach
- > **CEO Challenge** about Risky **EROSION** and Less **EROSION** with "GOING GREEN"
- > **AWARDS** for Citizen Scientists who take the **RISK** of the **CEO Challenge**
- > Take the Hazard **Charades** Challenge!



Sponsored by North Slope Borough Risk Management, Tuzzy Library, and Applied Research in Environmental Sciences Nonprofit, Inc. (ARIES)
For more information, contact Anne Garland (ARIES) ariesnonprofit@yahoo.com or 757-334-9568



JOIN US

FOR RISKY BUSINESS

CITIZEN SCIENTISTS

YOU ARE NEEDED

- FREE TRAINING
- VOLUNTEER AND PAID POSITIONS
- MAKE A DIFFERENCE IN HAZARD SAFETY!
- LEARN HOW TO USE SCIENTIFIC INSTRUMENTS TO COLLECT DATA
- MONITOR SURGES AND EROSION ALONG UTQIAQVIK COASTLINE.

For Field Training at your convenience Contact facilitator
Anne Garland
awhgarland@yahoo.com
or call Yvonne at 907 852 6186

COASTAL OSERVERS
OF BARROW
COMMUNITY BASED
MONITORS



Learn more





North Slope Coastal Erosion Bibliography

- Scottish Natural Heritage site. A guide to managing coastal erosion in beach/dune systems. Appendix 2 Monitoring erosion and change in dune systems. http://www.snh.org.uk/publications/online/heritagemanagement/erosion/appendix_2.shtml. (viewed Feb. 16, 2014).
- [AlaskaWeb.org](http://alaskaweb.org). Far North. <http://alaskaweb.org/region-farnorth.html>. (viewed Feb. 16, 2014).
- Anderson, Robert S., Irina Overeem, and Cameron W. Wobis. Toward a Predictive Model of Arctic Coastal Retreat in a Warming Climate, Beaufort Sea, Alaska. <http://www.onr.navy.mil/reports/FY10/cganders.pdf>. (viewed Feb. 16, 2014).
- Sea Ice Group at the Geophysical Institute, University of Alaska Fairbanks Background: What is Break-Up. http://seaice.alaska.edu/gi/observatories/barrow_breakup. (viewed Feb. 16, 2014).
- Barrow Area Information Database (BAID) Geospatial Data Sets, Barrow, AK, USA. http://data.eol.ucar.edu/codiac/dss/id=106_ARCSS400. (viewed Feb. 16, 2014).
- Brown, Jerry, et al., Long-term rates of coastal erosion and carbon input, Elson Lagoon, Barrow, Alaska. <http://nome.colorado.edu/HARC/Readings/Brown.pdf>. (viewed Feb. 16, 2014).
- Erikson, Li H. Arctic Bluff Retreat and Inundation of an Ecologically Sensitive Barrier Island System due to a Changing Global Climate. <http://geology.usgs.gov/postdoc/profiles/erikson/index.html>. (viewed Feb. 16, 2014).
- Interagency Working Group on Coordination of Domestic Energy Development and Permitting in Alaska, Managing for the Future in a Rapidly Changing Arctic. http://www.afsc.noaa.gov/Publications/misc_pdf/IAMreport.pdf. (viewed Feb. 16, 2014).
- Peckham, Scott D., et al. Modeling Coastal Erosion Near Barrow, Alaska. http://www.powershow.com/view1/da807-ZDc1Z/Modeling_Coastal_Erosion_powerpoint_ppt_presentation. (viewed Feb. 16, 2014).
- Richmond, Brady and Peter Gadd. Coastal Erosion Variability Along the Arctic Coast of Alaska. <http://www.ashpa.org/conferences/2012abstracts/RichmondB.pdf>. (viewed Feb. 16, 2014).
- Scottish National Heritage. A guide to managing coastal erosion in beach/dune systems, Appendix 2 Monitoring erosion and change in dune systems. http://www.snh.org.uk/publications/online/heritagemanagement/erosion/appendix_2.shtml. (viewed Feb. 16, 2014).
- U.S. Arctic Research Commission, Climate Change, Permafrost, and Impacts on Civil Infrastructure. <http://www.arctic.gov/publications/other/permafrost.pdf>. (viewed Feb. 16, 2014).
- Various sites discussing coastal armoring structures, e.g., U.S. Department of Transportation, Federal Highway Administration: Highways in the Coastal Environment (2nd Edition), Chapter 6: Coastal Revetments for Wave Attack. <http://www.fhwa.dot.gov/engineering/hydraulics/pubs/07066/6.cfm>. (viewed Feb. 16, 2014).

References

- Balee, William and Clark Erickson, editors. 2006. Time, Complexity in Historical Ecology. Columbia University Press.
<http://cut.us.upenn.edu/~erickson/fabwz/articles/Time&ComplexityInHistoricalEcology.pdf>
- Crumley, Carol, editor. 1994. Historical Ecology-Cultural Knowledge and Changing Landscapes. Chapter 6, SAR Press.
http://anthropology.usc.edu/frenchrd/vol_6b.html
- J. Richard Eiser n,1, Ann Bostrom 2 , Ian Burton 3 , David M. Johnston 4 , John McClure 5 , Douglas Paton 6 , Joop van der Pligt 7 , Mathew P. White 8
RIA: a conceptual framework for responses to natural hazards, International Journal of Disaster Risk Reduction 1 (2012) 5–16
<http://www.sciencedirect.com/science/article/pii/S221420912000040>
- Swetnam, T.W., C.D. Allen, and J. Betancourt. 1999. Applied historical ecology: Using the past to manage for the future. Ecological Applications 9(4):1189-1206. http://www.wpaizicn.wf.usgs.gov/julio_pdf/Swetnam_ca.pdf
- Resilience Alliance <http://www.resalliance.org/>
- Historical Ecology Wikipedia http://en.wikipedia.org/wiki/Historical_ecology
- <http://www.ariesnonprofit.com/ARIESprojects.php> CRIOS
- <http://iceandtime.wordpress.com/> Anne Jensen Blog -UIC Senior Scientist
- <http://www.fema.gov/video-materials#teen> Teen CERT
- <http://www.polartrec.com/expeditions/historical-ecology-for-risk-management> PolarTREC
- <http://www.nsbds.org/domain/44> NSB School District Inupiaq Learning Framework
- <http://www.inupiaheritage.org/our-culture> Inupiat Heritage Center - Inupiaq Learning Framework
- <http://www.philaprintshop.com/alaska.html> Map-Chicago: George F. Cram, ca. 1880, Color cerograph

QUESTIONS and SUGGESTIONS?

Anne Garland

ariesnonprofit@yahoo.com

Facebook Journal @arieshermys