TEACHERS AND RESEARCHERS EXPLORING AND COLLABORATING

POLAR TREC

Welcome to *PolarConnect*

with PolarTREC Teacher Lisa Seff

ED 593: Integrated Life and Earth Sciences in the Context of the Polar Regions

Thursday, 24 October 2013

2pm AKDT

[3pm PDT, 4pm MDT, 5pm CDT, 6pm EDT]

Blackboard collaborate

Slides will be shown here

Exit the presentation

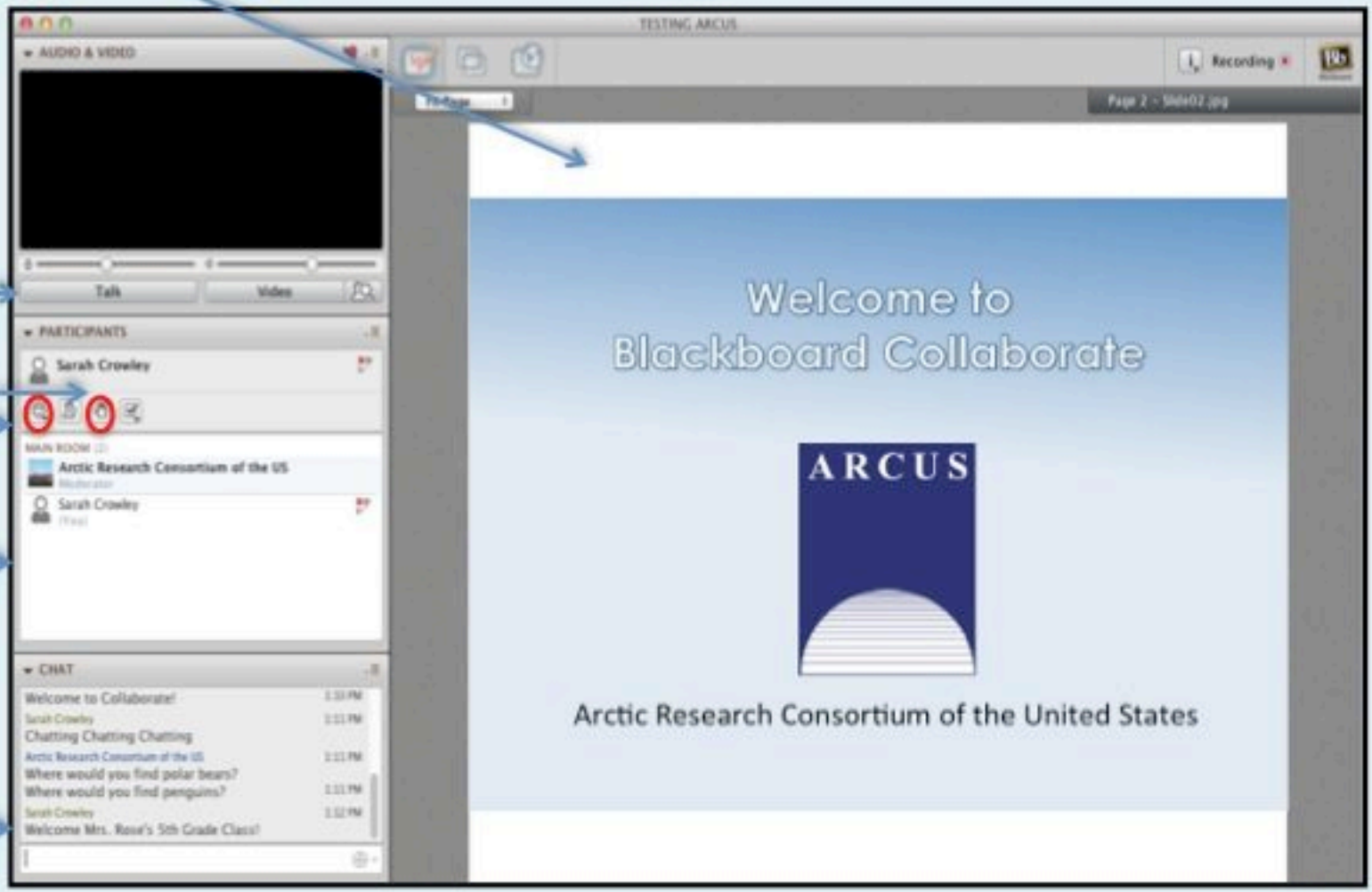
Click to Talk, **Unclick** to finish talking

Raise your hand to ask a question

Share with emoticons

List of all participants

Chat with one person or the entire group



Please Note:

- Participants using the telephone can mute/unmute by **pressing *6** on the phone.
- Today's event will be recorded and archived.

Participant Introductions

When called, please state your:

- ✓Name
- ✓School / Institution
- ✓The number of students and adults participating with you in the same location

What is PolarTREC?

PolarTREC is a professional development experience in which K-12 teachers are paired with researchers for 2-6 week research experiences in the polar regions.

From 2010-2013, nearly 50 teachers from around the United States will join scientists in the Arctic and Antarctica to learn about science, the polar regions, and to share what they have learned with their students and communities.

Questions

During the Presentation:

- Type your question in the text chat box

At the End of the Presentation:

- Raise your hand with the "hand button".
- PolarTREC staff will call on you.
- Speak loud and clear and directly into the phone to ask your question.

Click on the Talk button to speak.

Unclick when you are done.

These two pictures are intriguing and get students thinking and asking questions. When you think of the Polar Regions, what do you picture? How is the Arctic different from the Antarctic? How are they similar? How do they compare with Springs?

Arctic vs. Antarctic

- **Ocean surrounded by land**
- **Polar bears**
- **Mosquitoes**
- **Sea ice 2m average**

- **Land surrounded by ocean**
- **Penguins**
- **No mosquitoes**
- **Sea ice 1m average**

Ask student to brainstorm with the questions:
Who do you picture when you hear the word scientist or researcher? What do they look like? What clothes do they wear?

http://www.vims.edu/newsandevents/topstories/archives/2010/draw_a_scientist.php

http://ed.fnal.gov/projects/scientists/sandra.html

Introduction to what some scientists look like: In August/September 2012 the team onboard the R/V Ukpik included research scientists, a technician, boat captains and a teacher. The team conducted research on the Oceanographic Conditions of the Bowhead Whale Habitat off the coast of Barrow AK. Springs School students and community members joined the expedition virtually through PolarTREC .

Dr. Steve Okkonen, UAF

Dr. Bob Campbell, URI

Dr. Carin Ashjian, WHOI

Captain Bill Kopplin

Captain Mike Fleming

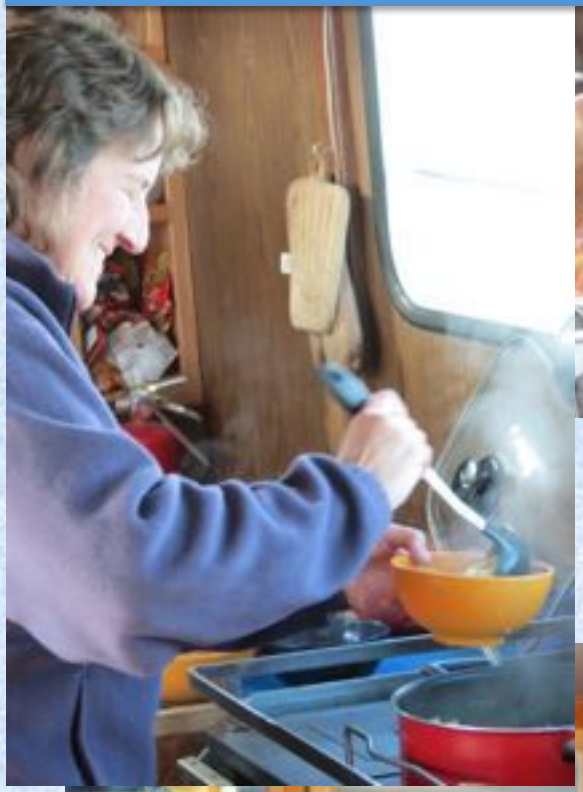
Lisa Seff
PolarTREC Educator

Phil Alatalo, WHOI

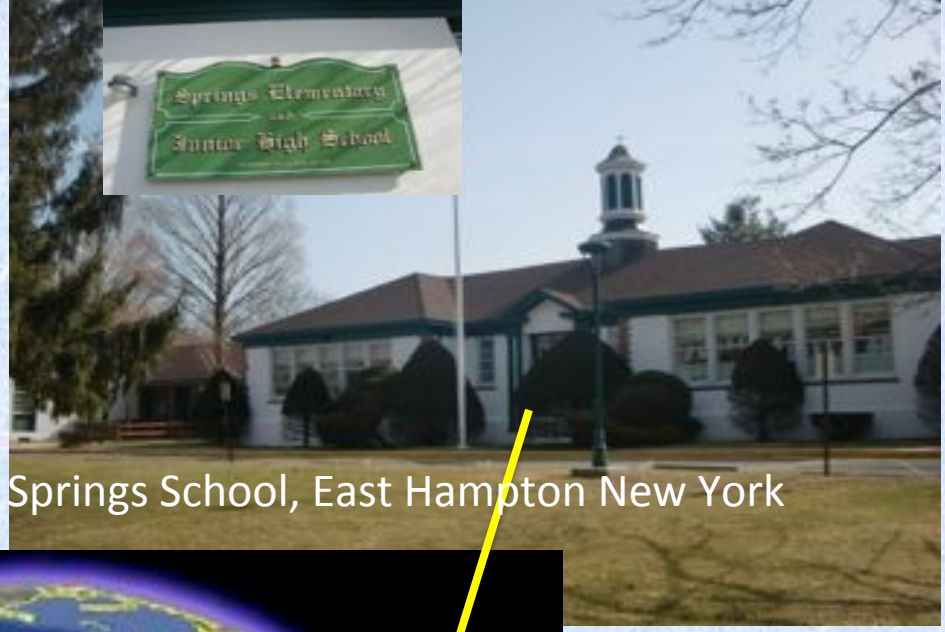
Let students know, scientists are regular people too.

At the end of a hard days work, the all important question for the researchers is……

What's for dinner?



UIC-NARL Barrow Alaska



Springs School, East Hampton New York

71°17’44”N
156°45’59”W

The Big Picture: Compare and contrast where students live to the area you want them to become invested in as an active participant and student scientist.

40.9638° N,
72.1853° W

Where do researchers conduct research? When conducting research where do they live? What hazards do they face? I use PolarTREC videos and journals, along with other websites and articles to bring science into the classroom.

researchers PolarTREC Sea Cruise Video
http://www.youtube.com/watch?v=XjbkklTceAM

Photo courtesy Woods Hole Oceanographic Institute

What do some scientists study?
It's not all in a test tube!

Bowhead Whales

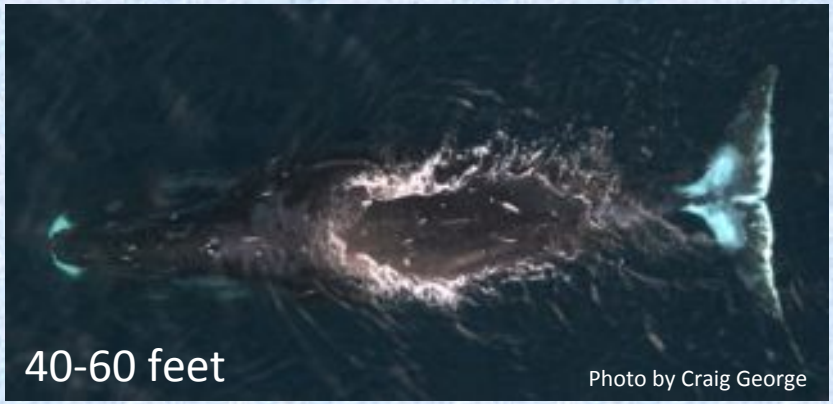


Figure courtesy of Lori Quakenbush,
Alaska Department of Fish and Game.

Zooplankton: Bowhead whale prey

Euphausiids or Krill

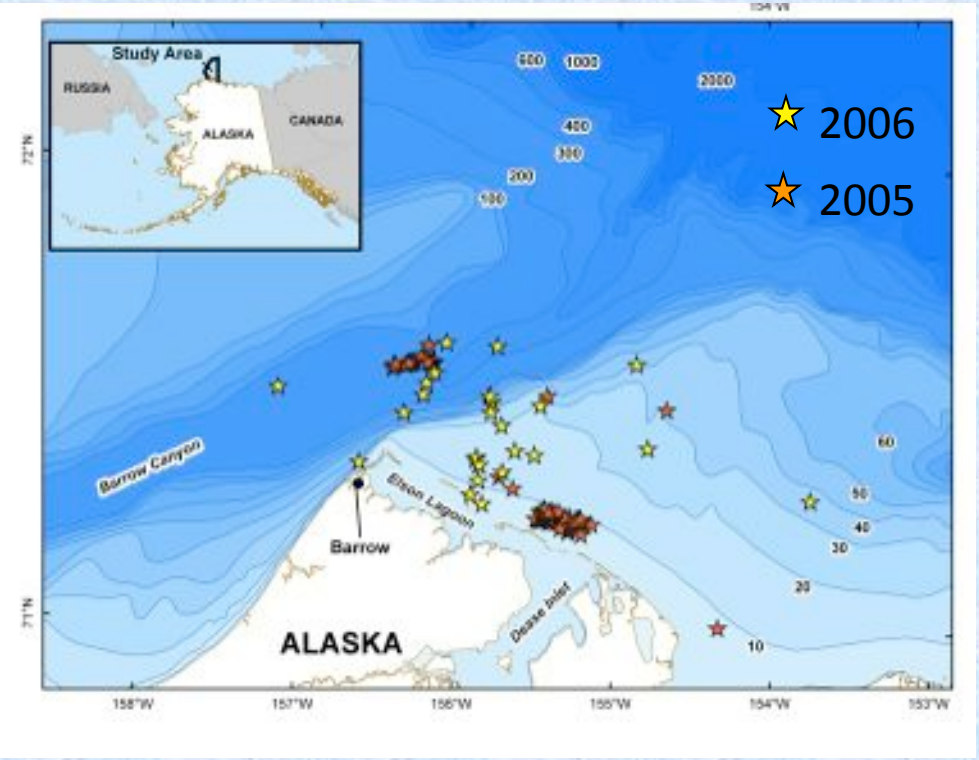
Copepods

Arctic Ocean Current Systems

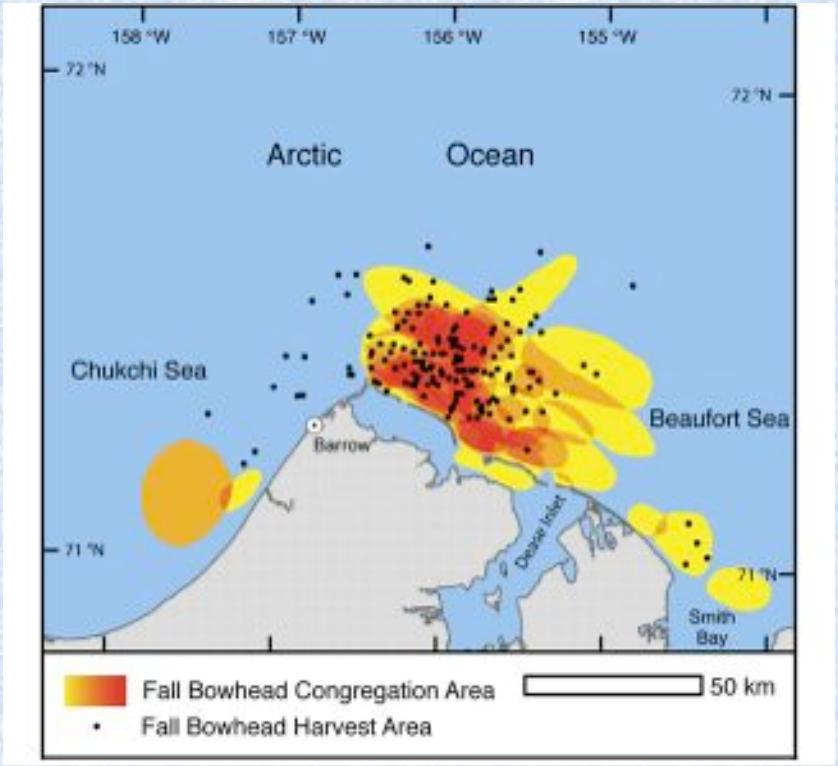
(Illustration by Jack Cook, Woods Hole Oceanographic Institution)

How does a research project begin?
Scientists wondered: Why do the whales congregate at this location near Barrow?

Aerial Surveys in Early September 2005 & 2006



68 Hunter Interviews and Whale Strike Locations



Ashjian et al., in press, Arctic June 2010

Locations of Whales Near Barrow
based on aerial surveys and hunter interviews

Bring it all back to the Scientific Method:

The first step: Develop a research question that you want to solve.

?

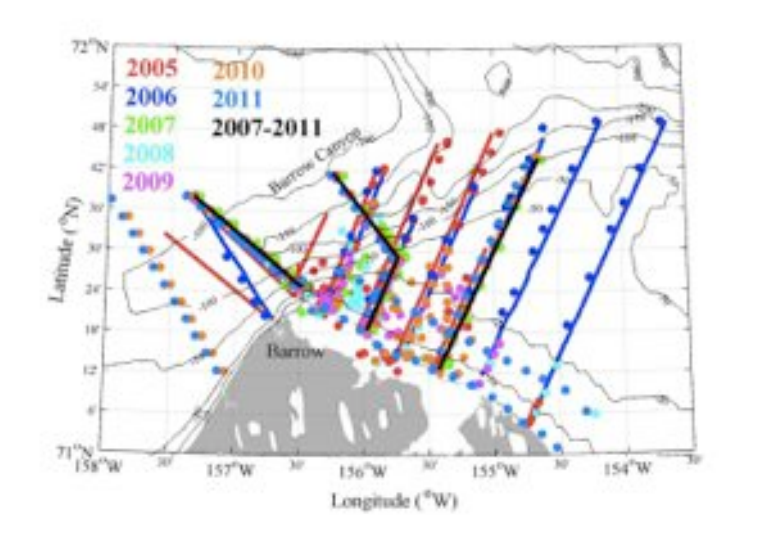
Our Research Questions/Goals

Our Main research question:

- **Why do bowhead whales stop at Barrow during their migrations?**
  - **Hypothesis: Bowhead whales stop at Barrow in fall because of dense patches of their prey that form there**
- What oceanographic conditions form these patches?
- How do the ocean conditions, and amount of whale prey, vary inter-annually?
- How might climate variability change this?

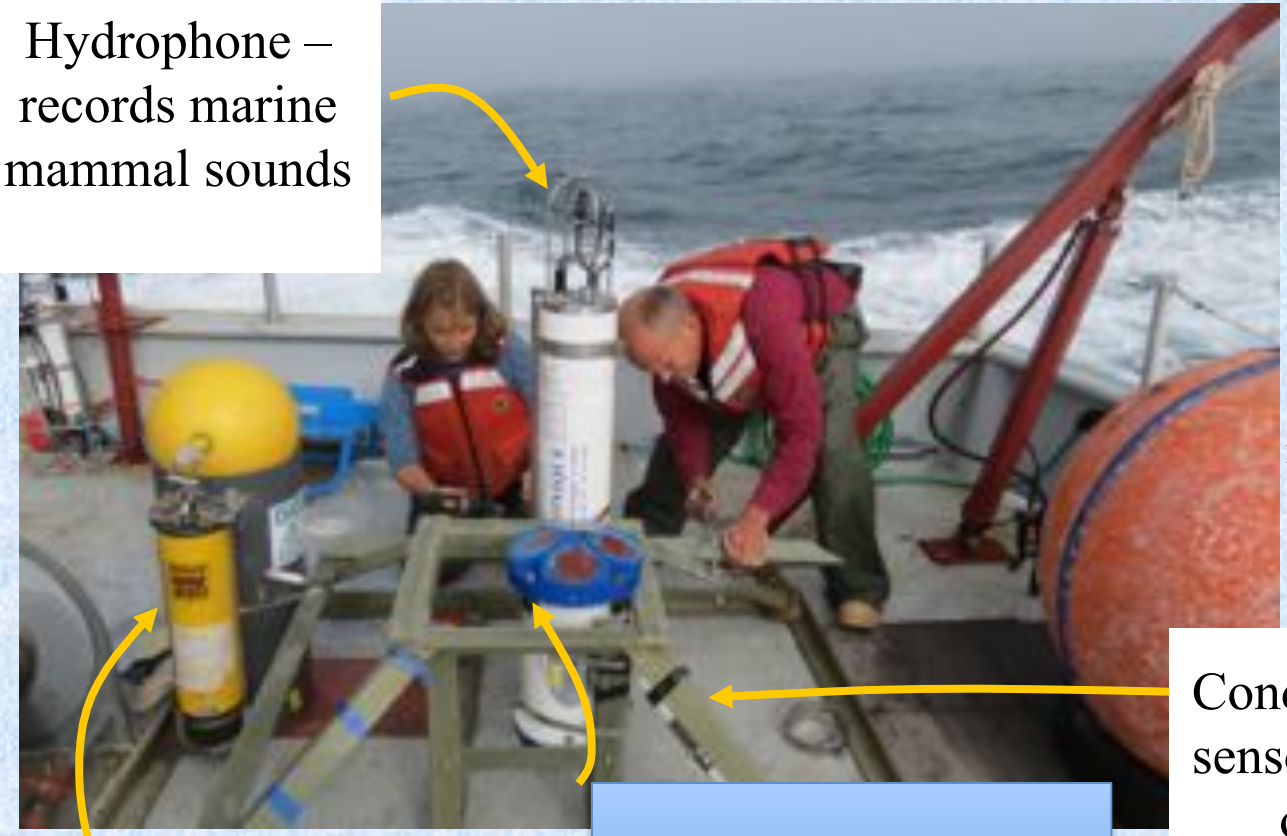
Scientific Method:

Design a research project where we can collect data to help answer our research questions.



Scientific Method: Materials
Tools used to conduct oceanographic research.

Hydrophone – records marine mammal sounds



On the cruise from Prudhoe Bay to Barrow we deployed a shallow- water, short-term mooring. Oceanographic moorings measure and record 'weather' in the ocean

Conductivity Temperature sensor – measures/records ocean salinity and temperature

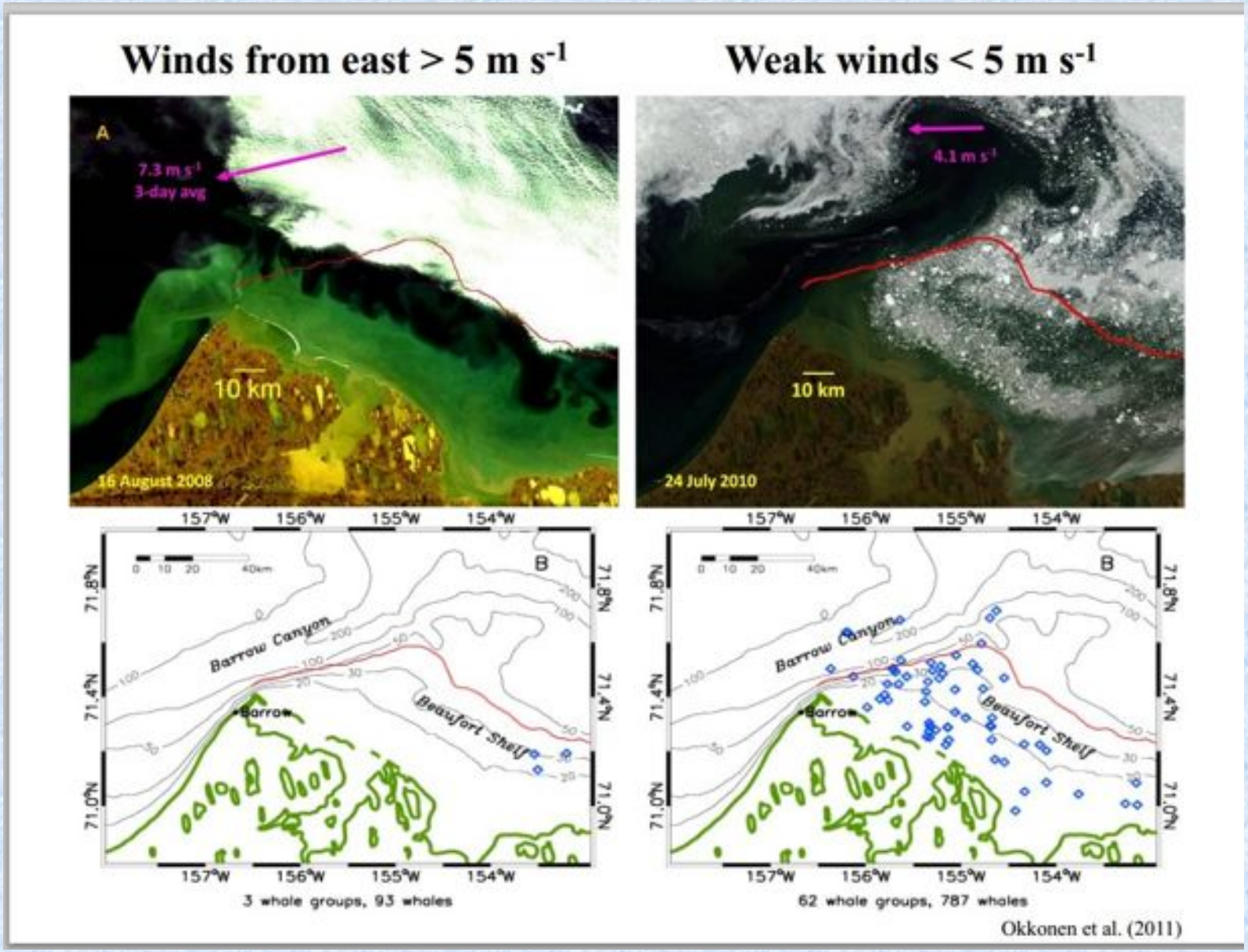
ADCP – measures/ records ocean current speed and direction

Acoustic release and buoy – mooring recovery equipment

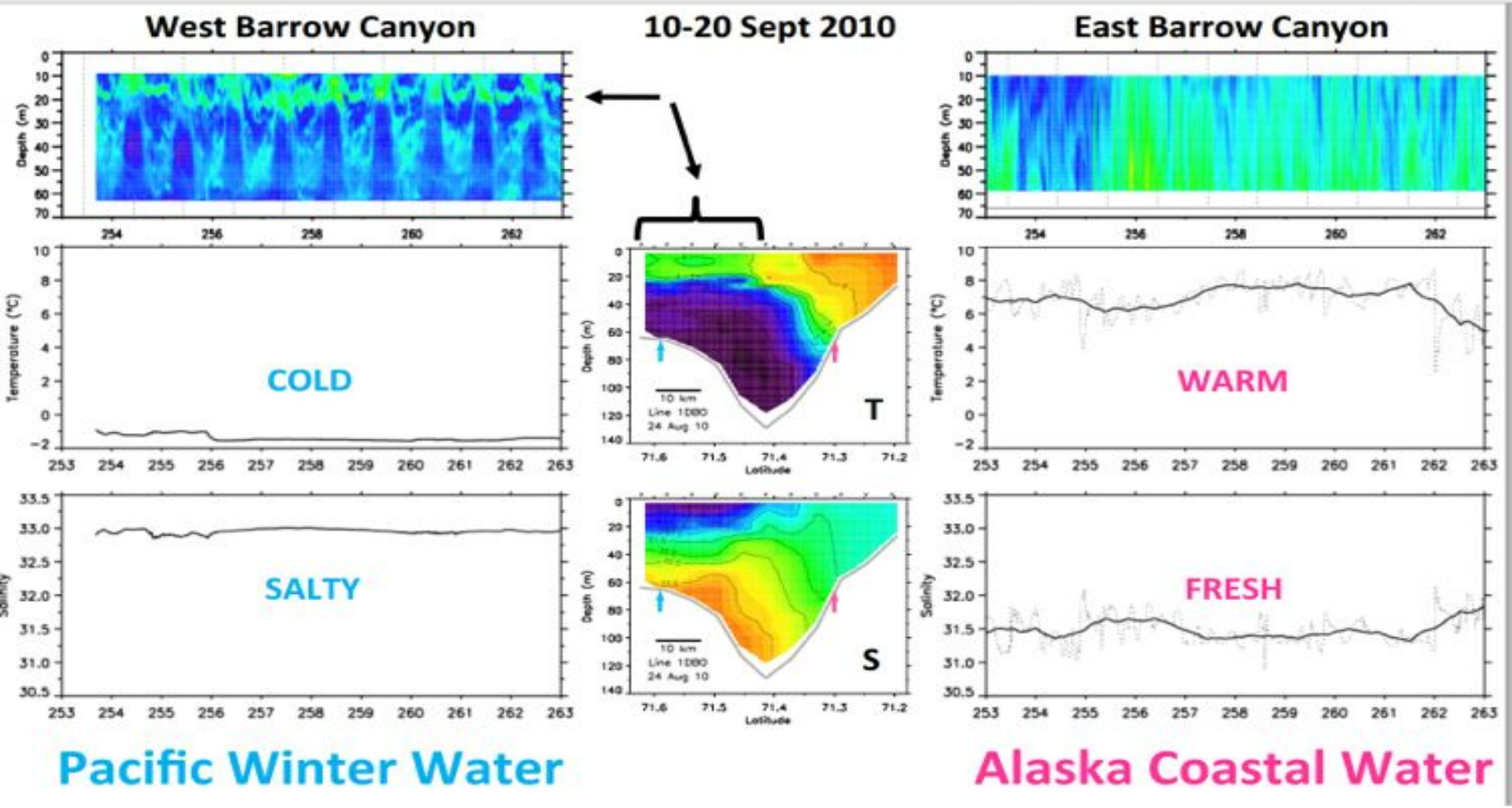
PolarTREC Mooring Anticipation
http://www.youtube.com/watch?v=C5KsWEgr5lc

Scientific Method: Collect and Analyze Data

Let students analyze the data: Satellite imagery: Sediment and ice as tracers for krill

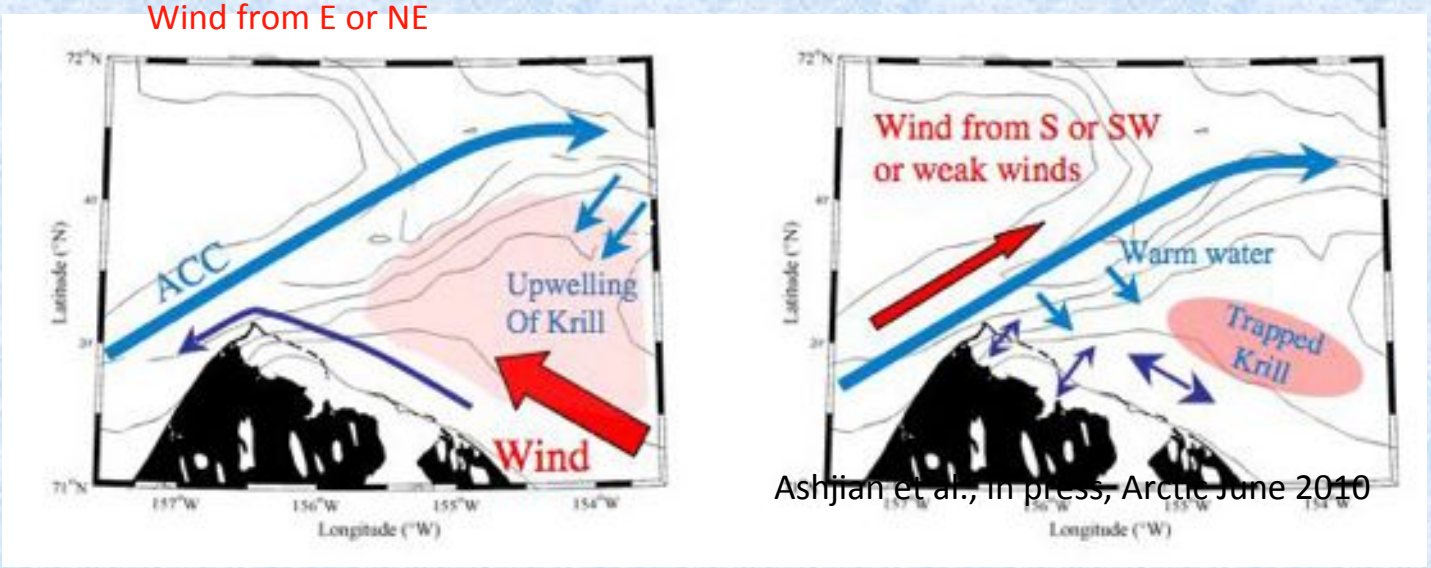


Final data translated from the acoustic Doppler current profiler (ADCP)



Conclusions:

Formation of the wind driven ocean current “Krill Trap”



Ashjian et al., In press, Arctic June 2010

- During periods of winds from the east, krill upwell along the Beaufort Shelf but are diffuse on the shelf. Water escapes around Pt. Barrow to the SW
- During periods of wind from the S, SW, or W or weak winds, the ACC is strong and close to the eastern side of Barrow Canyon, trapping water on the shelf and concentrating krill

Bowhead whale migration pathways in winter and summer-Western Arctic

Figure courtesy of Lori Quakenbush, Alaska Department of Fish and Game.
Arctic Research Initiative Report March 2009
Interannual Variability in Physical-Biological Properties on the Shelf near Barrow, Alaska
Carin J. Ashjian, Biology Department WHOI.

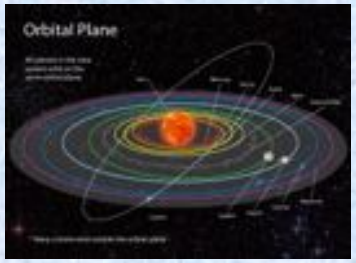
North Atlantic Right whale migration pathways- East Coast of the United States

Credit: Adapted from E. Paul Oberlander, Woods Hole Oceanographic Institution Graphics; Data from North Atlantic Right Whale Consortium

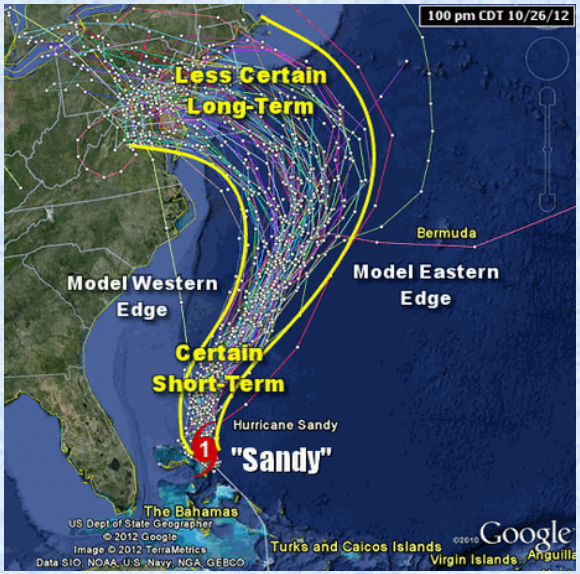
Bowhead Whale (Balaena mysticetus) pair / Photo by Dave Rugh courtesy NOAA, National Oceanic and Atmospheric Administration

Right Whale and calf. http://www.noaanews.noaa.gov/stories2010/20101101_shipstrike.html

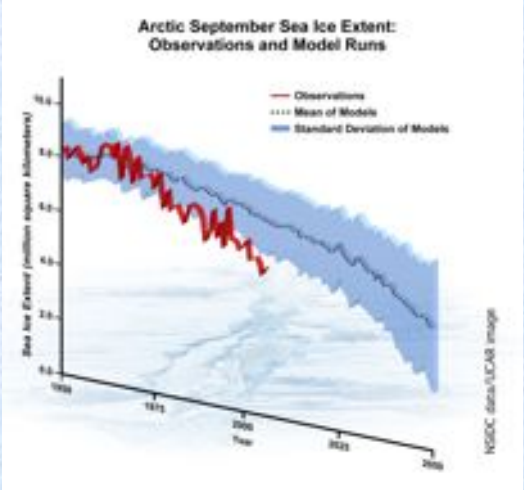
What many students picture when asked to describe a model used in science.



Introducing students to the use and importance of models in research AND the types of models used by researchers.



These computer models from Oct. 26 of then-Hurricane Sandy show different predictions for the storm's path. http://www.npr.org/2012/10/31/164046039/high-def-storm-models-yielded-accurate-predictions



Sea based ice melt vs. land based ice melt, what's the difference?

Postcards from the edge! Special delivery from Matt Conforti and the Barrow Post Office

Student game development based on the Earth's biological, chemical and physical oceanographic processes .

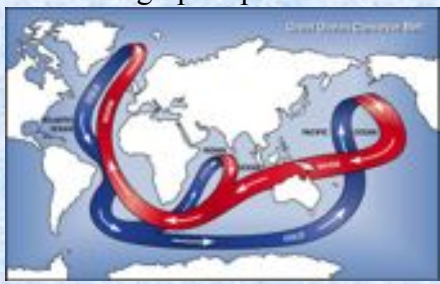


Photo from Argonne National Laboratory

Student research on local currents and plankton.

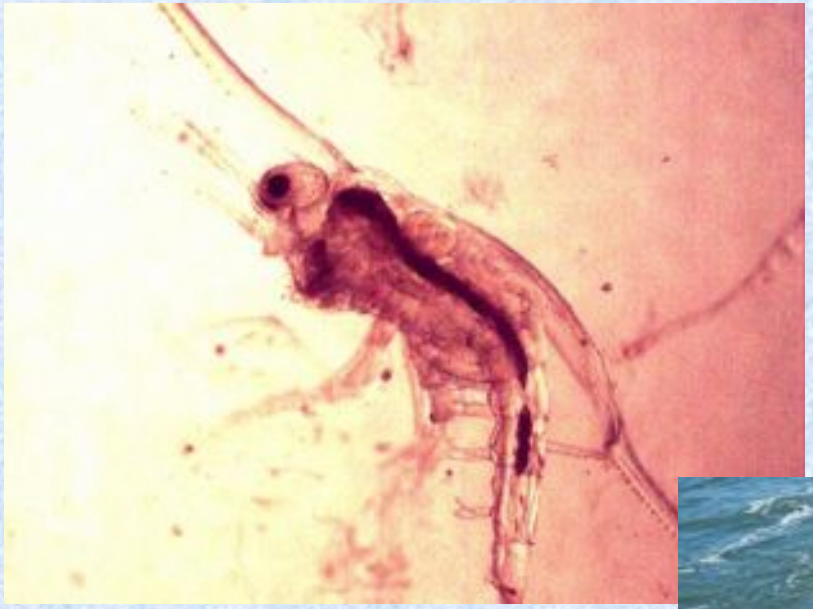
PolarTREC Learning Resources

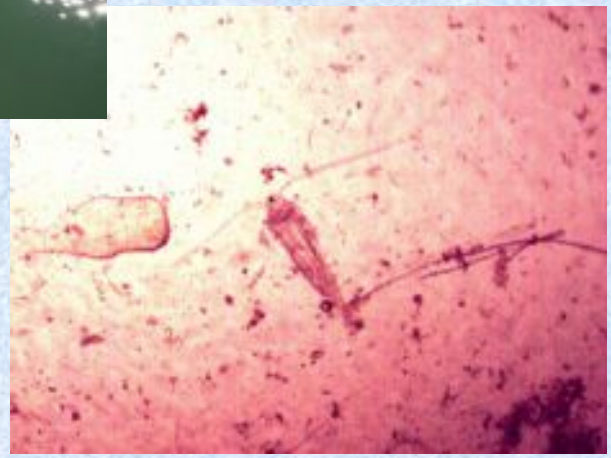
PolarTREC live Polar science webinars and "Ask the Team"help students to connect with the research in real time. Journals provide authentic non-fiction science written by educators and researchers in the field.

Zooplankton Bingo

Ring net student/teacher plankton collecting

Zooplankton net in the water! Three Mile Harbor East Hampton
Student class photos of zooplankton
Student quote: “Best class ever!” –Justin 7th grade

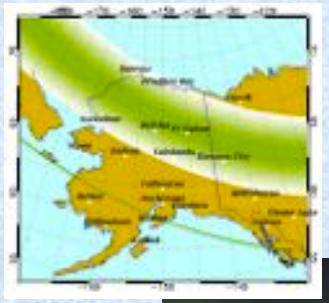


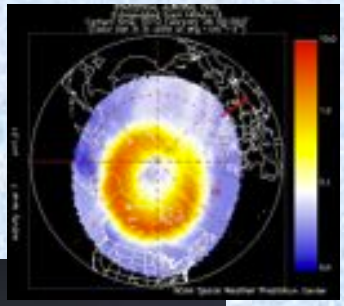


Pulling in the polar science

The angle and duration of incoming solar radiation

Aurora Borealis





UAF
Geophysical Institute
Aurora Forecast

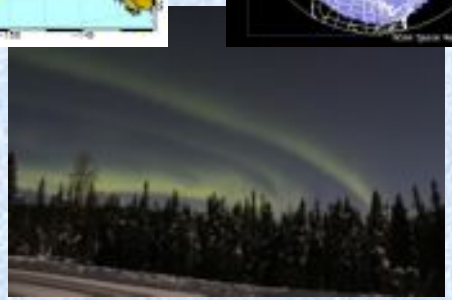
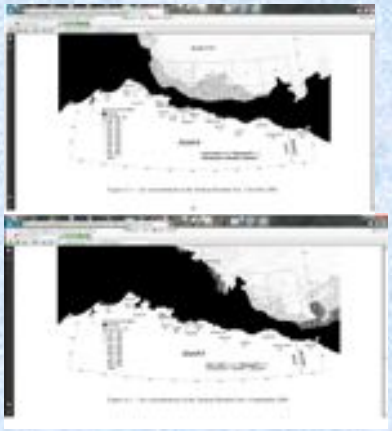


Photo:Tim Spuck

Coastal Aerial Surveys

Aerial Surveys of Sea Ice in the Beaufort Sea

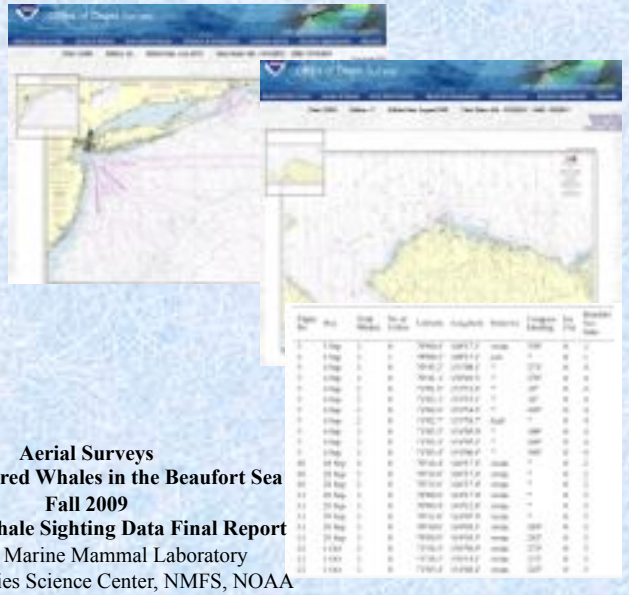


Fall 2009 Ice Concentrations Final Report
National Marine Mammal Laboratory
Alaska Fisheries Science Center, NMFS, NOAA
Funding Agency:
Bureau of Ocean Energy Management

Coastal aerial photographs of Bridgehampton, NY.

The view is looking northwest across the south shore of Long Island towards Mecox Bay. This location is a very narrow and periodically opens during large storms. Large volumes of material were transported into Mecox Bay when it breached during the storm. One week after the storm, the breach was being closed by mechanical means. The yellow arrow in each image points to the same feature.
http://coastal.er.usgs.gov/hurricanes/sandy/photo-comparisons/

NOAA Charts



Aerial Surveys
Of Endangered Whales in the Beaufort Sea
Fall 2009
Bowhead Whale Sighting Data Final Report
National Marine Mammal Laboratory
Alaska Fisheries Science Center, NMFS, NOAA

Sea level rise and climate change at home…

The impacts of global warming will be a mixed blessing for Long Island farmers, who already are seeing signs of a longer growing season and hints that midsummer irrigation will become more important as weather patterns continue to change. Along with the warmer weather, farmers also are starting to see new invasive species of weeds and other pests take hold.
LI farmers discuss effects of global warming
Published: Friday January 11, 2013
By Mitchell Freedman Newsday

Temperatures measured at Islip are on average 1.5 degrees higher than they were 30 years ago. Over 40 years, the waters of eastern Long Island Sound have warmed 1.8 degrees.
Global warming affects life on LI
Published: August 13, 2011 7:10 PM
By Jennifer Smith, Newsday

If the pace of the rise accelerates as much as expected, researchers found, coastal flooding at levels that were once exceedingly rare could become an every few year occurrence by the middle of this century…
Florida is the most vulnerable however Louisiana, California, New York and New Jersey are also particularly vulnerable, researchers found, and virtually the entire American coastline is at some degree of risk.
Published: March 13, 2012
New York Times
By Justin Gillis

http://www.nytimes.com/interactive/2012/11/24/opinion/sunday/what-could-disappear.html

Sea level rise and climate change in the Arctic…

Point Hope Aerial Photo, 2012

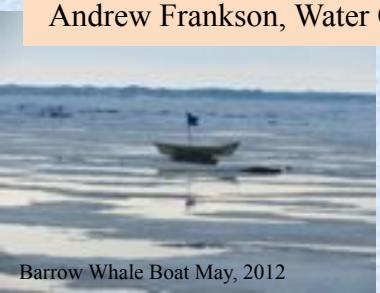
"The city has built a 10 foot (sea) berm for eight to ten miles along Nuvugalak Point."
Willard Hunnicutt

"The ice cellars are thawing. We have to use buckets to get the water out."
Joe Towksjhea

"There have been lots of mosquitoes and mosquito larvae. They plug up the bag filters and we have to change them every five to twenty minutes."
Andrew Frankson, Water Operator

"Last two years the polar bears started coming to town, hungry. It is really dangerous to walk out."
Joe Towksjhea

"The ocean is coming and eroding the beach, real fast. Some of the cellars are all gone—maybe a mile out, just eroded."
Joe Towksjhea

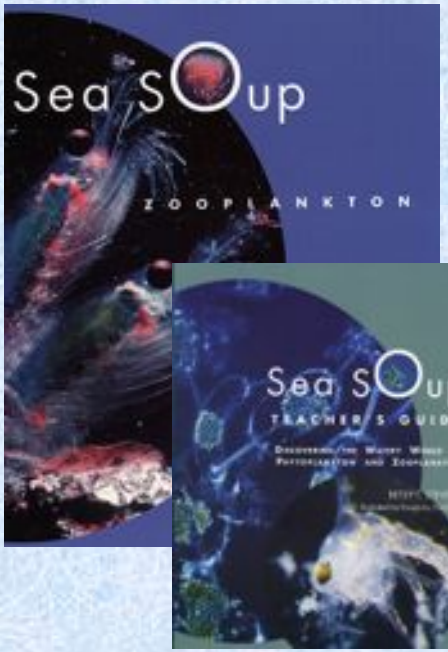


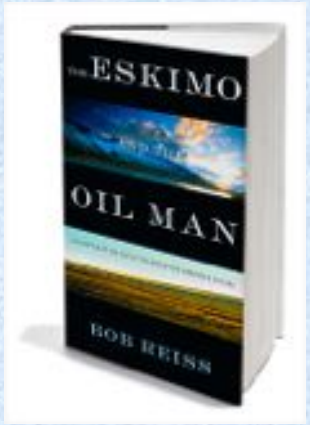
Barrow Whale Boat May, 2012

"The ice is no good for haul out and butchering of bowhead. Too thin."
Ray Koonuk Sr.

Quotes from:
Climate Change in Point Hope, Alaska
Strategies for Community Health
ANTHC Center for Climate and Health
http://www.tribesandclimatechange.org/docs/tribes_415.pdf

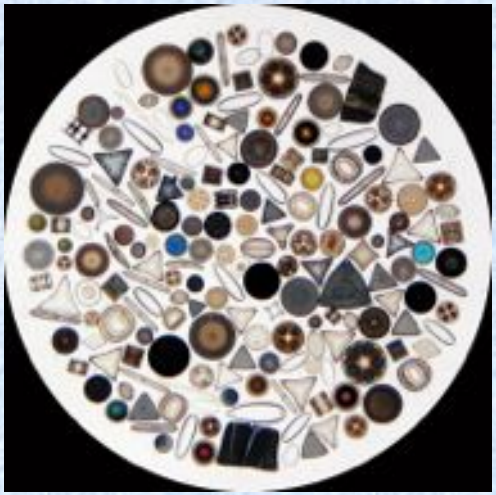
Books





http://beyondpenguins.ehe.osu.edu/stories-for-students

Artwork ideas



Diatom collection at
http://en.wikipedia.org/wiki/File:Diatom2.jpg

Copepods from
Ernst Haeckel's *Kunstformen der Natur*

Arctic animal masks UAF

Inupiat parka Artwork-
Made from recycled plastic bags. UAF

Additional Resources:

Ocean Sounds in the Arctic: Sounds recorded during the RUSALCA cruise to the Bering Strait July 31-August 11, 2010. By Kate Stafford, Applied Physics Laboratory, University of Washington, with support from Mark Baumgartner, Woods Hole Oceanographic Institution. http://www.youtube.com/watch?v=42I3n3brI78

Winter Sounds of the Arctic Sea Ice Pack. The sounds were captured by hydrophones on morrings deployed in Bering Strait during winter of 2011-2012, and are the same as those so vividly described by early Arctic explorers. NOAA
http://www.youtube.com/watch?v=vjtX4GJPFRc

Hearing the Whales: NOAA Tracks Whale Calls Over Large Distances: http://www.magazine.noaa.gov/stories/mag190.htm

NOAA Ocean Explorer: A Collection of Sounds From the Sea
http://oceanexplorer.noaa.gov/explorations/sound01/background/seasounds/seasounds.html

Mosquito Video: Arctic Thriller from Tulik http://www.youtube.com/watch?v=K1gnvKZFCq0

Arctic Bears: Polar Bears Hunt for Seal Pups
http://www.pbs.org/wnet/nature/episodes/arctic-bears/video-polar-bears-hunt-for-seal-pups/783/

"Criminal" Adelie penguin captured on camera by BBC film crew: http://www.bbc.co.uk/nature/15305502

"Sea Cruise" PolarTREC Video by educator Lisa Seff. Oceanographic Conditions of the Bowhead Whale habitat.
http://www.youtube.com/watch?v=Xjbkk1TceAM

"Mooring Anticipation" PolarTREC Video by educator Lisa Seff. Oceanographic Conditions of the Bowhead Whale habitat.
http://www.youtube.com/watch?v=C5KsWEgr5lc

Teachers: Join PolarTREC!

www.polartrec.com/about/join

Every teacher can participate in different ways:

- **Following Expeditions**
- **Participate in PolarConnect Events**
- **Join the Polar Education Email List**
- **Take Online Professional Development Courses**
- **Become a PolarTREC Teacher!**

Upcoming Events

Watch for and register for upcoming events at **www.polartrec.com!**

Thank You!

An archive of the event will be available shortly.

http://www.polartrec.com/polar-connect/archive