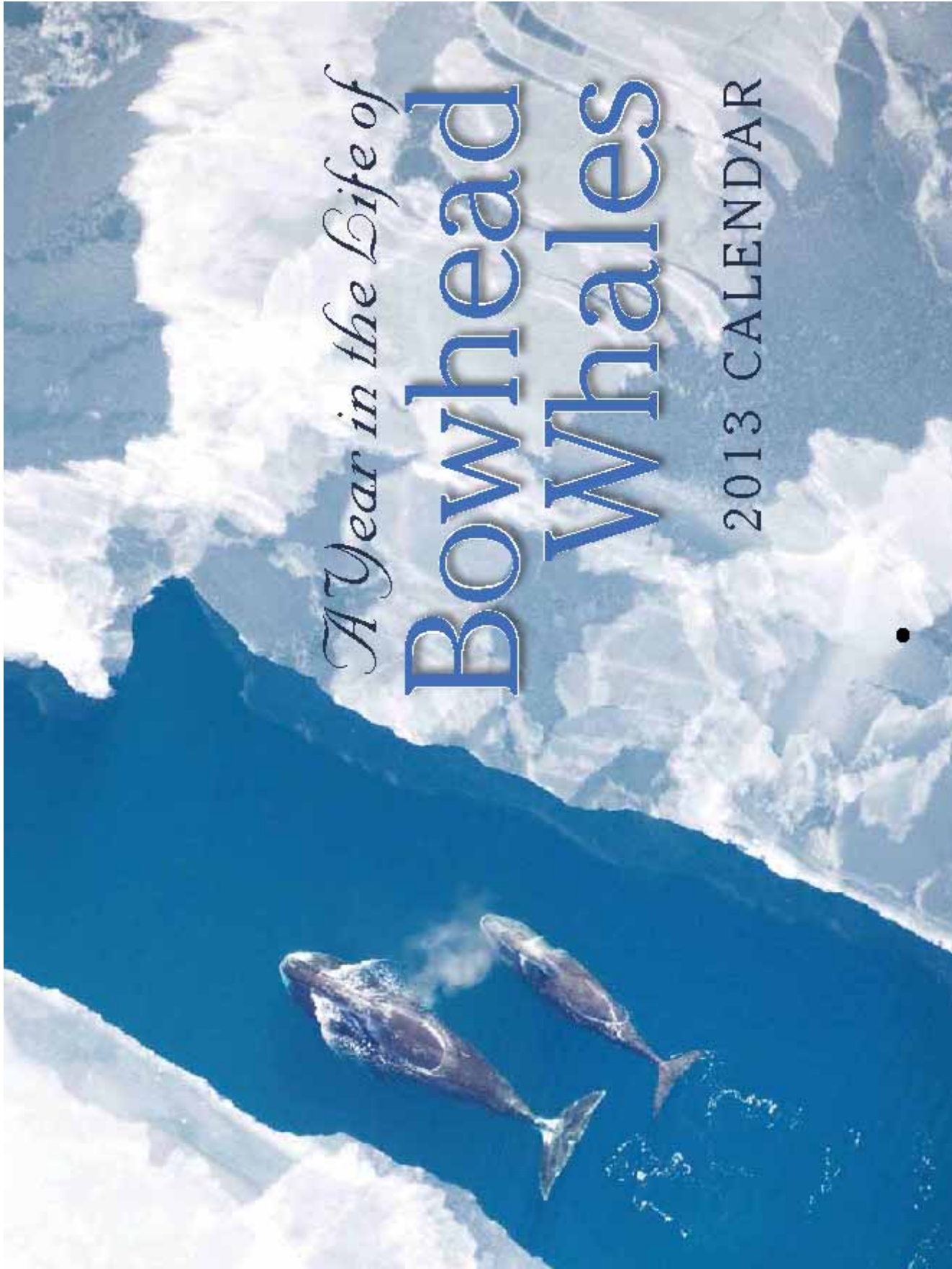


A Year in the Life of

Bowhead Whales

2013 CALENDAR



Tracking bowhead whales from airplanes

The three aircraft (aircraft, with 8.5 feet wings) mounted track the NOAA Twin Otter's belly gun.

Aerial surveys can be used to describe changes in the timing and locations of bowhead whales. In addition, aerial photography provides information on how long individual whales stay in an area and on the sizes of whales.

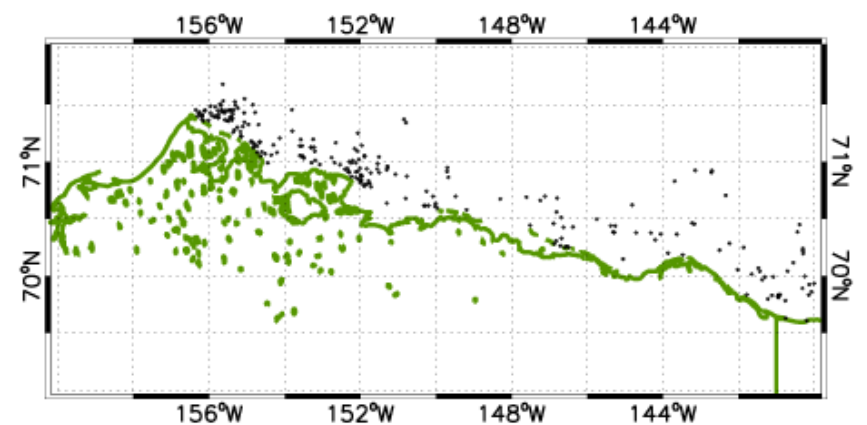
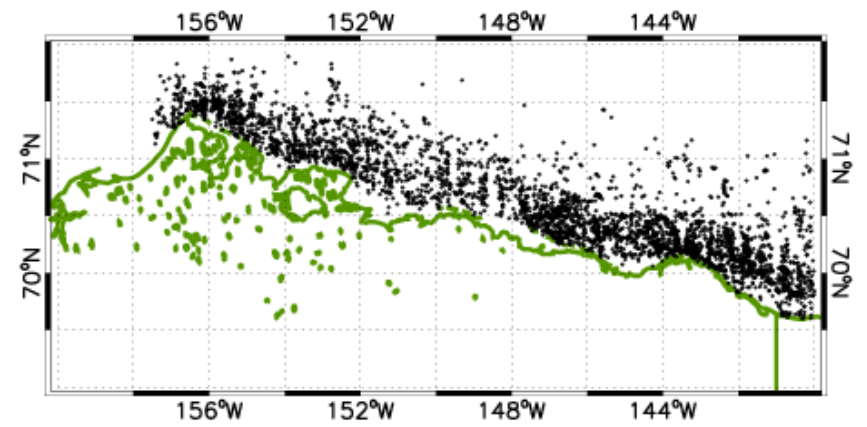
Bowhead whale behavior is also observed by the aerial survey team. Often, bowheads are seen feeding, based on mud on the body, open mouths, and the presence of feces. However, the most commonly observed whale behavior near Barrow is hauling.

Map showing locations of all bowhead sightings during the aerial survey season, 2007 - 2011.

February | Siqĩññaasugruk 2013

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
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17	18	19	20	21	22	23
24	25	26	27	28		

A Year in the Life of **Bowhead Whales**

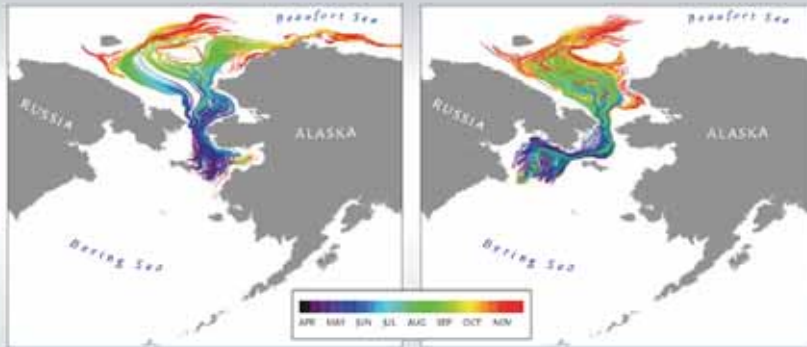


www.afsc.noaa.gov/nmml/personnel/nmmlprofile.php?name=Julie.Mocklin

www.afsc.noaa.gov/nmml/

www.alaska.boemre.gov/ess/bwasp/xbwasp.htm

Bowhead food in the Beaufort Sea: Alaska grown



Computer studies of ocean currents show how food might be carried from their spawning grounds in the Bering Sea to the Beaufort Sea. The map on the left shows that some of the food spawning in April near Alaska could arrive at Barrow in time for bowhead whales to feed on them during September and October. The map on the right shows that food spawning in April near Russia are not likely to arrive at Barrow by September and October.

Computer studies of ocean currents show how food might be carried from their spawning grounds in the Bering Sea to the Beaufort Sea. The map on the left shows that some of the food spawning in April near Alaska could arrive at Barrow in time for bowhead whales to feed on them during September and October. The map on the right shows that food spawning in April near Russia are not likely to arrive at Barrow by September and October.

April | Qargilliigvik 2018

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
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21	22	23	24	25	26	27
28	29	30				

A Year in the Life of **Bowhead Whales**

www.oc.nps.edu/NAME/name.html

psc.apl.washington.edu/wordpress/research/projects/arctic-sea-ice-volume-anomaly/

data.aos.org/maps/arctic_assets/

Summer picnic: copepods eat algae, bowheads eat copepods

Bowhead whales spend much of the summer feeding on copepods in the southeastern Beaufort Sea. Here, near Amundsen Gulf and where the Mackenzie River flows into the Beaufort Sea, vast swarms of algae (tiny, microscopic plants) feed great swarms of copepods. These great swarms of copepods, in turn, feed thousands of bowhead whales.

The plot shows the distribution of algae in the southeastern Beaufort Sea in July 2010. Red colors indicate high concentrations of algae, blue colors indicate low concentrations of algae.

A copepod

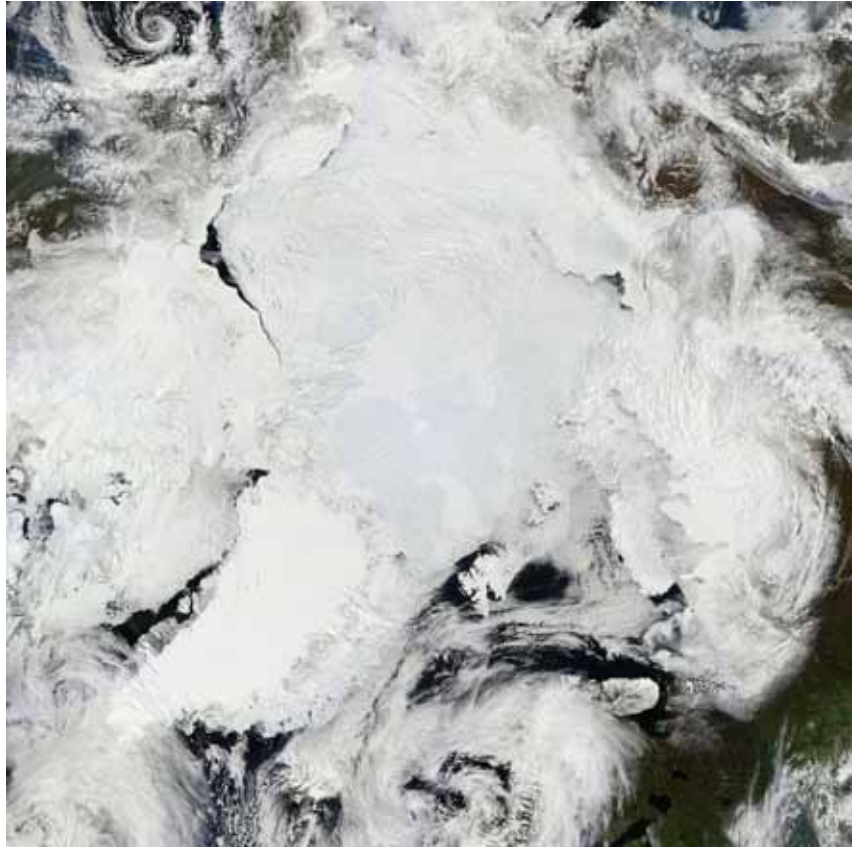
Алигитт уоттэргэтир миттэ нигиттэриитэтиэ илгиттэрииттэ тэриитэ уоттэриитэ Кэриитэ эгиттэтиэ. Тэриитэ, Амундсен Гэуфэтиэ Аллэ тэриитэ (Кэриитэтиэ) миттэриитэ Кэриитэтиэ эгиттэтиэ, миттэриитэтиэ миттэриитэтиэ илгиттэриитэтиэтиэ миттэриитэтиэ эгиттэтиэ. Тэриитэ илгиттэриитэтиэ илгиттэриитэтиэ, миттэриитэтиэ эгиттэтиэ.

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July | Inukkuksaivik 2013

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21	22	23	24	25	26	27
28	29	30	31			

A Year in the Life of **Bowhead Whales**



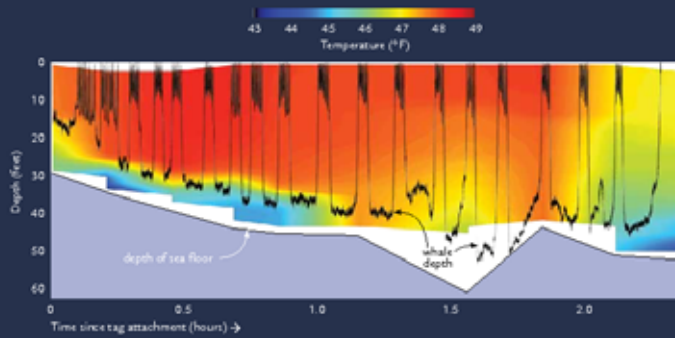
rapidfire.sci.gsfc.nasa.gov/subsets/?mosaic=Arctic

www.ecofoci.noaa.gov/efoci_satellite.shtml

oceancolor.gsfc.nasa.gov/

fermi.jhuapl.edu/sar/stormwatch/web_wind/

“Tags” help us observe whale feeding behavior



Short term tagging is a common way to study whale feeding behavior. A tag is attached to a whale for periods of a few hours while scientists follow the whale's movements and sample the ocean many times along the whale's path to measure temperature, salinity, and the amount of food available to the whale. Once detached from the whale, the tag can be recovered and dive information recorded by the tag can be analyzed. The plot above shows an example of a bowhead whale tagged north of Barrow that is searching for food in the cool water near the sea floor (the black line indicates the whale's depth and the color background indicates the temperature of the water).



Short term tagging is a common way to study whale feeding behavior. A tag is attached to a whale for periods of a few hours while scientists follow the whale's movements and sample the ocean many times along the whale's path to measure temperature, salinity, and the amount of food available to the whale. Once detached from the whale, the tag can be recovered and dive information recorded by the tag can be analyzed. The plot above shows an example of a bowhead whale tagged north of Barrow that is searching for food in the cool water near the sea floor (the black line indicates the whale's depth and the color background indicates the temperature of the water).

August | Amigiksivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
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18	19	20	21	22	23	24
25	26	27	28	29	30	31


A Year in the Life of **Bowhead Whales**




Photo: Mark Baumgartner

www.whoi.edu/sbl/liteSite.do?litesiteid=5252

Copepods and krill – tiny prey for massive whales



A krill, and krill filling the stomach of a whale harvested near Barrow.



A copepod, and copepods filling the stomach of a whale harvested near the Alaska/Canada border.

Euphausiid or krill are close relatives of shrimp and look similar. They are born in the Bering Sea in spring and are brought to Alaska's northern coast by ocean currents, arriving at Barrow in the fall as juveniles and adults, in time for migrating bowhead to eat them. Juvenile and adult krill are a little less than an inch long. Many whales harvested near Barrow are found with krill in their stomachs. Few krill survive the trip in the currents from Barrow to Kaktovik, so whales in eastern Alaska and in Canada are rarely found with krill in their stomachs.

Copepods are the most abundant animals in the sea. Bowhead whales feed on large copepods the size of a grain of rice. Copepods spend the summer feeding and building up fat, and are a high-energy, high-calorie food. Bowhead whales eat copepods along Alaska's north coast and in the whales' summering grounds in the Canadian Arctic. Whales harvested at both Barrow and Kaktovik may have copepods in their stomachs.

Эупхаузииды или криль – близкие родственники креветки и выглядят подобно ей. Они рождаются в Беринговом море весной и сгоняются океанскими течениями к северному побережью Аляски, прибывая в Барроу осенью в виде молодых и взрослых особей, в срок миграции кочующих моржей. Молодые и взрослые криль имеют длину чуть меньше сантиметра. Многие моржи, добытые в районе Барроу, имеют криль в желудках. Мало криля выживает в течениях от Барроу до Кактовик, поэтому моржи в восточной Аляске и Канаде редко имеют криль в желудках.

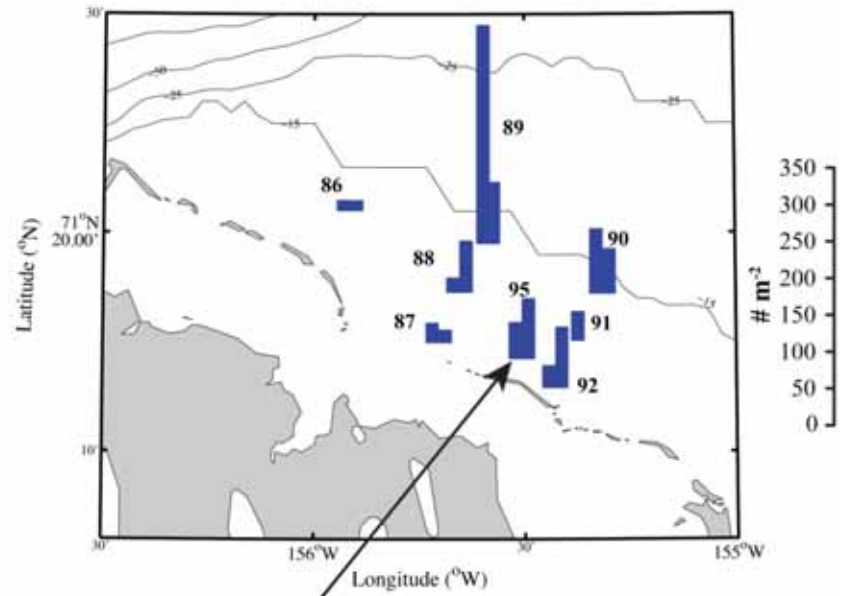
Копеподы – самые многочисленные животные в море. Моржи питаются крупными копеподами размером с зернышко риса. Копеподы летом питаются и накапливают жир, и являются высокоэнергетической, высококалорийной пищей. Моржи поедают копеподов по всей северной Аляске и в местах летнего пребывания моржей в Канадском Арктике. Моржи, добытые в Барроу и Кактовик, могут иметь копеподов в желудках.

October | Sikkuvik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
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20	21	22	23	24	25	26
27	28	29	30	31		

A Year in the Life of **Bowhead Whales**

September 11, 2010- Total Water Column Abundance of Krill



Surface Feeding Bowhead Whales

www.whoi.edu/science/B/people/cashjian/

www.whoi.edu/more.go?username=palatalo

www.gso.uri.edu/users/campbell

A Year in the Life of Bowhead Whales

This calendar illustrates aspects of the life history of bowhead whales. It incorporates traditional knowledge and contemporary research from many individuals representing a variety of institutions, agencies, and organizations.

Stephen Okkonen
UNIVERSITY OF ALASKA FAIRBANKS

Dixon Jones
UNIVERSITY OF ALASKA FAIRBANKS

Phil Alatalo
WOODS HOLE OCEANOGRAPHIC INSTITUTION

Carin Ashjian
WOODS HOLE OCEANOGRAPHIC INSTITUTION

Mark Baumgartner
WOODS HOLE OCEANOGRAPHIC INSTITUTION

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Jaelyn Clement-Kinney
NAVAL POSTGRADUATE SCHOOL

Robert G. Campbell
UNIVERSITY OF RHODE ISLAND

John Citta
ALASKA DEPARTMENT OF FISH AND GAME

Craig George
NORTH SLOPE BOULDER DEPT. WILDLIFE

Kim Goetz
NATIONAL MARINE MAMMAL LABORATORY

Lara Horstmann-Dehn
UNIVERSITY OF ALASKA FAIRBANKS

Wieslaw Maslowski
NAVAL POSTGRADUATE SCHOOL

Julie Mocklin
NATIONAL MARINE MAMMAL LABORATORY

Dave Rugh
NATIONAL MARINE MAMMAL LABORATORY

Lori Quakenbush
ALASKA DEPARTMENT OF FISH AND GAME

Kate Stafford
UNIVERSITY OF WASHINGTON

Linda Kate Brattstrom
NATIONAL MARINE MAMMAL LABORATORY

Special thanks to Billy Adams, Nok Acker, Lewis Brower, Michael Donovan III, Bill Kopplin, Charles Monnett, Sue Moore, Scott Oyagak, Glenn Sheehan, Michael Stotts, Edith Suvlu and Bryan Thomas.

FRONT COVER Whale photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **JANUARY** Whale photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **FEBRUARY** Ring photo by Kate Stafford, Applied Physics Laboratory, University of Washington. Triple crown photo by Dave Rugh, NOAA/AFSC/NMML. Whale by ice photo by Matt Scaer, NOAA/AFSC/NMML, Permit No. 14243. **MARCH** Whale eye and spine photo by Craig George. Whale by ice photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **APRIL** M/C whale photo by Matt Scaer, NOAA/AFSC/NMML, Permit No. 14243. **MAY** Whale from ice photo by photo by Kate Stafford, Applied Physics Laboratory, University of Washington. Bowhead in luge photo by Matt Scaer, NOAA/AFSC/NMML, Permit No. 14243. **JUNE** Ice on whale photo by Matt Scaer, NOAA/AFSC/NMML, Permit No. 782-1719. Ice on whale photo by BOAIES Tread survey team, NOAA/AFSC/NMML, Permit No. 14243. Big bowhead photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **JULY** Calpod photo by Cole Giffen (LRI). Bowhead photo by Amelia Brower, NOAA/AFSC/NMML, Permit No. 14243. **AUGUST** Whale egg photo by Mark Baumgartner. Whale photo by Amelia Brower, NOAA/AFSC/NMML, Permit No. 782-1719. **SEPTEMBER** Whale photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **OCTOBER** Ice and calpod photo by Cole Giffen (LRI). Whale combed photo by Craig George. Whale photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719. **NOVEMBER** Whale combed photo by Craig George. Whale photo by BOAIES Tread survey team, NOAA/AFSC/NMML, Permit No. 782-1719. **DECEMBER** Hydrophobic photo by Kate Stafford, Applied Physics Laboratory, University of Washington. Whale photo by Amelia Brower, NOAA/AFSC/NMML, Permit No. 14243. **BACK COVER** Ring photo by Julie Madrin, NOAA/AFSC/NMML, Permit No. 782-1719.

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Thanks to Rachel Reier (UAF) for producing this MOIS (draft) image.

