

A Year in the Life of Bowhead Whales

An Educational Outreach Product in Calendar Format

Stephen Okkonen
University of Alaska Fairbanks
okkonen@alaska.net

Dixon Jones
University of Alaska Fairbanks
dijones@alaska.edu

Phil Alatalo
Woods Hole Oceanographic Institution
palatalo@whoi.edu

Carin Ashjian
Woods Hole Oceanographic Institution
cashjian@whoi.edu

Mark Baumgartner
Woods Hole Oceanographic Institution
mbaumgartner@whoi.edu

Ronald Brower Sr
University of Alaska Fairbanks
rbrowers@alaska.edu

Jaclyn Clement-Kinney
Naval Postgraduate School
jlclemen@nps.edu

Robert G. Campbell
University of Rhode Island
campbell@gso.uri.edu

John Citta
Alaska Department of Fish and Game
john.citta@alaska.gov

Craig George
North Slope Borough Dept. Wildlife
craig.george@north-slope.org

Kim Goetz
National Marine Mammal Laboratory
kim.goetz@noaa.gov

Lara Horstmann-Dehn
University of Alaska Fairbanks
lara.horstmann@alaska.edu

Wieslaw Maslowski
Naval Postgraduate School
maslowsk@nps.edu

Julie Mocklin
National Marine Mammal Laboratory
julie.mocklin@noaa.gov

Dave Rugh
National Marine Mammal Laboratory
dave.rugh@noaa.gov

Lori Quakenbush
Alaska Department of Fish and Game
lori.quakenbush@alaska.gov

Kate Stafford
University of Washington
stafford@apl.washington.edu

Linda Vate Brattstrom
National Marine Mammal Laboratory
linda.vatebrattstrom@noaa.gov

ACKNOWLEDGMENTS
Support was provided by the Bureau of Ocean Energy Management and the Cooperative Institute For Alaska Research. Thanks to Rachel Potter (UAF) for processing the MODIS chlorophyll image.

Tracking bowhead whales from airplanes

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

Bowhead whale behavior is also observed by the aerial survey team. Often, bowhead whales are seen feeding, based on mud on the belly, open mouths, and the position of flukes. However, the most commonly observed whale behavior near Barrow is "swallowing".

Alaska Department of Fish and Game
National Marine Mammal Laboratory
University of Alaska Fairbanks
Woods Hole Oceanographic Institution
Woods Hole, MA

February | Siqĩñaasugruk 2013

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

A Year in the Life of Bowhead Whales

The big picture: tracking bowheads from satellites

When and where bowhead whales passed by their tracking tags fell from bowheads tracked by the satellite system, but where they spent the winter was not well known by scientists. A cooperative project began in 2006, and conventional satellite tracking was used to track satellite tags on bowhead whales to track their movements whenever they go. These tags have told us 13 when bowhead whales winter in the Beaufort Sea, 21 when whales did not go to Barrow in the spring, but stay in the Chukchi Sea, 11 that during the summer, some whales go back and forth on the Beaufort Sea and Chukchi Sea, 11 that some whales go south to Greenland, and 41 that in fall, most bowhead whales stay in the Beaufort Sea and Chukchi Sea, then far out as they cross the Chukchi Sea and then travel into the Beaufort Sea before entering the Bering Sea for the winter.

Ukrainian satellite tracking system (Argos) tracks bowhead whales (Brower et al. 2010). The system uses satellite tracking to monitor whale movements. The system uses satellite tracking to monitor whale movements. The system uses satellite tracking to monitor whale movements.

January | Siqĩñaatchiq 2013

SUN	MON	TUE	WED	THU	FRI	SAT	
			1	2	3	4	5
6	7	8	9	10	11	12	
13	14	15	16	17	18	19	
20	21	22	23	24	25	26	
27	28	29	30	31			

A Year in the Life of Bowhead Whales

Bowheads live a really long time

Recent evidence that bowhead whales live a long time comes in part, from stone weapons (right) that were found in the gut of a whale recently harvested in Barrow, Alaska. These weapons were generally thought to be used by humans in the 1800s. This suggests that whales live for at least 100 years, and perhaps much longer.

Scientists can also estimate the age of bowhead whales by measuring chemical changes within the eye lens. These changes occur at known rates and can be used to roughly age the eye lens. This method has been used to estimate the ages of humans and whales. The oldest whale eye lens that has been dated was over 200 years old.

March | Paniqsiqivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

A Year in the Life of Bowhead Whales

Bowhead food in the Beaufort Sea: Alaska grown

Comparison of ocean currents shows how food might be carried from their spawning grounds in the Beaufort Sea to the Beaufort Sea. The map on the left shows the current in April near Alaska could cause a Barrow whale to feed on food on their way during September and October. The map on the right shows the current in April near Barrow and will likely cause a Barrow whale to feed in September and October.

April | Qargilliigvik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

A Year in the Life of Bowhead Whales

The bowhead census shows a growing population

Bowhead whales from the Bering, Chukchi and Beaufort Sea populations are counted in the spring as they swim in open leads near Barrow, Alaska. Some whales are not seen because they pass by the tag. In very few cases, we do not know where they have been in the winter. This counts show the bowhead population is healthy, increasing, and can support a sustainable harvest.

May | Suvliigvik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

A Year in the Life of Bowhead Whales

One-ton baby bowheads gain a ton per month

Bowhead calves are typically born in May, at birth, a calf weighs about one ton and is about 13 feet long. Calves reach the size of 10 months by the time a calf is one year old. It will weigh 10-12 tons and will have grown to 23-30 feet long.

The calf photographed in May 2011 weighs a little more than one ton and is about 14 feet long.

The same calf photographed in September 2011 now weighs about five tons and is about 21 feet long.

June | Iḡñivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

A Year in the Life of Bowhead Whales

Summer picnic: copepods eat algae, bowheads eat copepods

The plot shows the distribution of algae in the southern Beaufort Sea in July 2011. Red colors indicate high concentrations of algae. The color scale on the right indicates the concentration of algae.

July | Inukkuksivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

A Year in the Life of Bowhead Whales

"Tags" help us observe whale feeding behavior

When some tagging is a common way to study whale feeding behavior. The information that a whale for a number of hours, which sometimes follow the whale's movements and record the location of the whale. These data are used to study whale feeding behavior. The information that a whale for a number of hours, which sometimes follow the whale's movements and record the location of the whale.

August | Amigiḡivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

A Year in the Life of Bowhead Whales

Why Barrow is a bowhead feeding hotspot

When winds blow from the east, currents carry food through Barrow Canyon. When winds are calm, the Alaskan Coastal Water remains close to the shore. In this situation, the Alaskan Coastal Water remains close to the shore. In this situation, the Alaskan Coastal Water remains close to the shore.

September | Amigiḡivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

A Year in the Life of Bowhead Whales

Copepods and krill – tiny prey for massive whales

Food is the most abundant animals in the sea. Bowhead whales feed on large copepods the size of a grain of rice. Copepods spend the winter feeding and building up fat, and in the spring, high-density food. Bowhead whales eat copepods along Alaska's coast and use it as a winter food source. Many whales harvested near Barrow and food with krill in their stomachs. Few will show the sign in the stomachs from Barrow.

October | Sikkivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

A Year in the Life of Bowhead Whales

How much food does a bowhead eat?

Bowheads have a massive appetite. During summer and fall they eat about all of the food in the Beaufort Sea for the rest of the year and spring. A 30-foot bowhead whale can hold about 20 gallons of food in its stomach. This is more than 200 gallons of food.

November | Nippivik 2013

SUN	MON	TUE	WED	THU	FRI	SAT
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

A Year in the Life of Bowhead Whales

What are bowhead whales saying?

Bowhead whales make a variety of sounds to communicate with each other, respond to their environment, and find food. Scientists use hydrophones (underwater microphones) to record these sounds. A spectrogram is a graph of the sound frequency over time. The spectrogram shows the frequency of the sound over time.

December | Siqĩngillaq 2013

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

A Year in the Life of Bowhead Whales