



**Enumeration of Pacific Walrus Carcasses on Beaches of  
the Chukchi Sea in Alaska Following a Mortality Event,  
September 2009**

Open File Report 2009–1291

**U.S. Department of the Interior  
U.S. Geological Survey**

**Cover:** Photograph of walrus carcasses near Icy Cape, Alaska, September 14, 2009.  
(Photograph taken by Daniel H. Monson, Wildlife Biologist, Anchorage, Alaska, 2009.)

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By A.S. Fischbach, D.H. Monson, and C.V. Jay

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**U.S. Department of the Interior**  
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## Conversion Factors

### Inch to SI

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
mile, nautical (nmi)	1.852	kilometer (km)

### SI to Inch

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch
millimeter (mm)	0.03937	inch
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
kilometer per hour (km/h)	0.6214	mile (mph)
kilometer per hour (km/h)	0.5400	knots

## Datum

Horizontal coordinate information is based on World Geodetic System of 1984 (WGS 1984). Altitude, as used in this report, refers to distance above the vertical datum.

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## Abstract

On September 14, 2009, we encountered substantial numbers of fresh walrus carcasses on the Alaskan shores of the Chukchi Sea near Icy Cape. We enumerated 131 carcasses using geo-referenced strip transect photography and visual counts of solitary carcasses. All appeared to be young animals based on review of aerial photographs and reference to 12 carcasses that we examined on the ground. The events that led to the death of these animals are unknown, but appear to be related to the loss of sea ice over the Chukchi Sea continental shelf. In years prior to this event, other investigators have linked walrus deaths at other Chukchi Sea coastal haulouts to trampling, exhaustion from prolonged exposure to open sea conditions, and separation of calves from their mothers.

## Introduction

In autumn, Pacific walrus (*Odobenus rosmarus divergens*, Illiger) occur throughout the continental shelf waters of the Bering and Chukchi Seas, and the vast majority of females and young are restricted to the Chukchi Sea (Fay, 1982). Historically, coastal haulouts with tens of thousands of walrus formed on the Russian shores of the Chukchi Sea in the autumn when sea ice approached its annual minimum (Fay, 1982; Kochnev, 1999, 2006; Kavry and others, 2006; Ovsyanikov and others, 2008). Large aggregations of walrus on the Alaskan side of the Chukchi Sea have been unknown prior to 2007. In late August and September 2007, large coastal haulouts with hundreds to thousands of walrus were observed for the first time on the Alaskan shores of the Chukchi Sea from Peard Bay to Cape Lisburne (Shell Oil, unpublished data, 2007). These Alaskan Chukchi Sea haulouts occurred when the pack ice had dissipated far to the north of the continental shelf waters and the last of the marginal and sparse ice had disappeared (Jay and Fischbach, 2008).

In September 2009, we were engaged in an ongoing study of walrus foraging movements using satellite-link radio tags (see Jay and Fischbach, 2008, for study overview). During a search for live walrus along the coast of northwestern Alaska, we encountered substantial numbers of fresh walrus carcasses near Icy Cape. Subsequent to our discovery of the carcasses, an inter-agency team mobilized to conduct necropsies and assess the demographic composition of the dead animals. The team included members from the Alaska Sea Life Center, the North Slope Borough, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey (USGS). Here, we report on our discovery of the carcasses and our enumeration of them.

## Methods

We documented the distribution and number of walrus carcasses along the northwestern coast of Alaska to the extent possible with the field gear and transportation available when we discovered them ancillary to a radio-tagging project. Two observers (A.S. Fischbach and D.H. Monson) and a pilot searched the coast and outer barrier islands for walrus carcasses in a light helicopter (Robinson model R44 Clipper II fit with tundra pads and external cargo racks) flown at 70 to 150 m above ground level at ground speeds between 130 and 160 km/h. We surveyed 285 km of beach between the Barrow airport and a point 40 km south of Icy Cape (fig. 1). After flying the coast from Barrow to Wainwright on September 14, we surveyed portions of the coastline from Wainwright to Icy Cape and as far south as 40 km south of Icy Cape each day from September 14 through 19, weather permitting. When individual carcasses were observed, we noted the location and number. In the region of the greatest number of carcasses, we photographed the shoreline from the surf to above the upper storm wash line at 1 to 2 second intervals using a handheld digital camera (Panasonic model DMC-FX12 set at a wide-angle focal length equivalent to 35 mm with a resolution of  $3072 \times 2304$  pixels). Geo-referencing software (RoboGEO produced by PreTek Inc, Cleveland, Tennessee) assigned locations to each photograph based on interpolation of the exposure time with track-log data acquired every 30 seconds by a handheld global positioning receiver (model eTrex Legend produced by Garmin<sup>®</sup> International Inc., Olathe, Kansas). In addition, we examined a small subset of these carcasses to make a preliminary assessment of the age, sex, and condition of the animals.

## Results

We encountered fresh carcasses of young walruses scattered on sandy beaches at and south of Wainwright, along the barrier island within 10 km east of Icy Cape, in a large group at Icy Cape, and in a small group 40 km south of Icy Cape ( $70.0516^\circ$  N,  $162.5856^\circ$  W; fig. 2). Nearly all carcasses lay well above the surf, but below the upper line of beach marine debris. The carcasses were first encountered on September 14 while flying from Barrow to a point 24 km south of Icy Cape. Between September 14 and 19, we encountered three groups of live walruses hauled out on the beach (estimated group size based on counts of aerial photographs = 800, 150, and 2). Near and south of Icy Cape, we also observed marks in the sand indicating the recent presence of probably hundreds of walruses. A few carcasses were located near hauled out walruses; however, no carcasses appeared directly associated with an active or recently used haulout location. We documented the presence of 131 fresh carcasses on the beach between September 14 and 19, 2009. On 2 days, we acquired geo-referenced photographs along the shore from Icy Cape to the northeast, resulting in 151 photographs along 5.8 km of contiguous beach on September 17, and 169 photographs along 10.6 km of contiguous beach on September 18 (available as digital material supplemental to this report). From these photographs, we distinguished 114 carcasses in the photographs between Icy Cape and the channel crossing 10 km east of Icy Cape (Akoliakatat Pass). Most of these carcasses ( $n = 82$ ) occurred within 1.75 km of Icy Cape, a second cluster ( $n = 15$ ) occurred along 500 m of beach 3 km east of Icy Cape. The remainder ( $n = 27$ ) were scattered as individual carcasses. In addition to the 114 photographed walruses, we encountered 10 carcasses 40 km south of Icy Cape ( $70.0516^\circ$  N,  $162.5856^\circ$  W), and 7 carcasses scattered along the beach from 18 km south to 3.3 km north of Wainwright. On September 21, 2009, U.S. Fish and Wildlife Service and the North Slope Borough Department of Wildlife Management flew a reconnaissance flight from Barrow to a point 90 km south of our surveyed area (Cape Sabine  $69.024^\circ$  N,  $163.857^\circ$  W) and did not observe any fresh carcasses south of our surveyed area (J. Snyder, U.S. Fish and Wildlife Service, written commun., 2009).

We examined 12 carcasses on the ground located from Wainwright to about 5 km east of Icy Cape. All appeared to be relatively recent mortalities. Two carcasses had been scavenged by bears and had substantial facial wounds. We observed a young solitary polar bear scavenging one carcass and inferred bear scavenging by the nature of the wounds on another carcass. Most carcasses (9 of 10 with intact heads) had obvious blood exuding from the mouth and nose, and none appeared emaciated. Based on examination of teeth and body size (mean length 159 cm; table 1), we classified all 12 carcasses as young of the year. All fresh carcasses observed from the helicopter and examined in aerial photographs appeared similar in body size and facial morphology to those examined from the ground. We also observed a small number of older carcasses that appeared to be adults that had been on the beach for a much longer time.

## Discussion

This is the first large mortality event reported for walrus hauling out on the Chukchi Sea shores of Alaska. This is the second year that walrus were observed hauled out on the Chukchi Sea shores of Alaska (Jay and Fischbach, 2008). Both the formation of large coastal haulouts and the mortality event appear to be related to the loss of sea ice over the Chukchi Sea continental shelf. Formation of large coastal haulouts in the Chukchi Sea appears to be associated with reductions or loss of sea ice over the Chukchi Sea continental shelf waters (Kochnev, 1999, 2004; Jay and Fischbach, 2008; Kavry and others, 2008). Remote sea ice sensor data and National Ice Center analysis, as well as aerial observations, indicated that in 2009 the Chukchi Sea continental shelf was free of sea ice in late August and on through September. Passive microwave data indicated that pack ice had retreated north of the continental shelf by August 10 (Spren and others, 2009) and National Ice Center analysis and offshore aerial survey efforts indicated that sparse ice had disappeared from the continental shelf by August 18 (National Ice Center, 2009; B.K. Rone, National Oceanic and Atmospheric Administration, written commun., 2009). This suggests that the eastern Chukchi Sea continental shelf was free of sea ice for more than 25 days prior to our discovery of the carcasses. In addition to the lack of ice, strong winds were recorded for this region in the weeks immediately prior to the discovery of the carcasses (fig. 3). In the absence of sea ice, strong winds result in heavy sea states. Walrus cannot remain at sea indefinitely without rest. Telemetry data from walrus in ice-bearing waters of the northern Bering Sea revealed that walrus generally hauled out and rested every day or so, and that 98 percent of their in-water bouts lasted no longer than 7.5 days, and none exceeded 13 days (Udevitz and others, 2009).

The events that led to the death of these animals are unknown. In years prior to this event, walrus deaths at other Chukchi Sea coastal haulouts have been linked to trampling, exhaustion, and separation of calves from their mothers. Trampling-related injuries and mortalities have been commonly reported at coastal walrus haulouts used by adult females and young (Fay and Kelly, 1980; Ovsyanikov and others, 1994, 2008; Kochnev, 1999, 2006; Kavry and others, 2006, 2008). Based on previous reports of trampling mortalities at Chukchi Sea coastal haulouts in Russia, young animals appear to be more susceptible to trampling than older animals. Although mortalities reported from Russian Chukchi Sea coastal haulouts in recent years have included substantial numbers of older animals, young constituted the majority (Kochnev, 1999; Kavry and others, 2006, 2008) or a disproportionately high fraction of the carcasses (Ovsyanikov and others, 1994, 2008). Only once before has a mortality event involved only young animals. This occurred in 1991 and involved “several” calves at a haulout of tens of thousands of walrus (Kochnev, 1999).

Calves separated from their mothers may have a greater risk of trampling injury without the protection afforded by their mothers on haulouts. Ice-free conditions in recent years have been associated with separation of calves from mothers (Cooper and others, 2006; Shell Inc., unpublished data, 2007). The loss of sea ice combined with frequent wind events apparently led to the exhaustion and contributed to the death of walruses on Wrangel Island in 2007 (Ovsyanikov and others, 2008). It is unclear whether these conditions contributed to the mortalities reported here. We observed that several carcasses had been scavenged by bears; however, it is unknown whether the bears disturbed live walrus herds and caused the death of some walruses from trampling, as has been observed at Russian Chukchi Sea coastal haulouts (Kochnev, 1999, 2006; Kavry and others 2006, Ovsyanikov and others 2008), or were drawn to carcasses to scavenge.

It is unclear whether carcasses were deposited at or near the site of death, or were re-deposited from offshore or from another section of beach, because all marks on the sand were eroded before we encountered the carcasses, and all carcasses were found between the surf and the upper line of beach cast marine debris. As such, it is difficult to gain insight on the mechanisms of animal injuries from the geographic clustering and dispersion of the carcasses.

## Summary

We encountered fresh walrus carcasses along the Alaskan shores of the Chukchi Sea on September 14, 2009. Using strip transect photography and counts of solitary carcasses, we enumerated 131 carcasses between Wainwright Alaska and a point 40 km south of Icy Cape. Most carcasses lay near Icy Cape. All carcasses appeared to be young animals based on review of aerial photographs and reference to 12 carcasses that we examined on the ground. The events that led to the death of these animals are unknown, but appear to be related to the loss of sea ice over the Chukchi Sea continental shelf.

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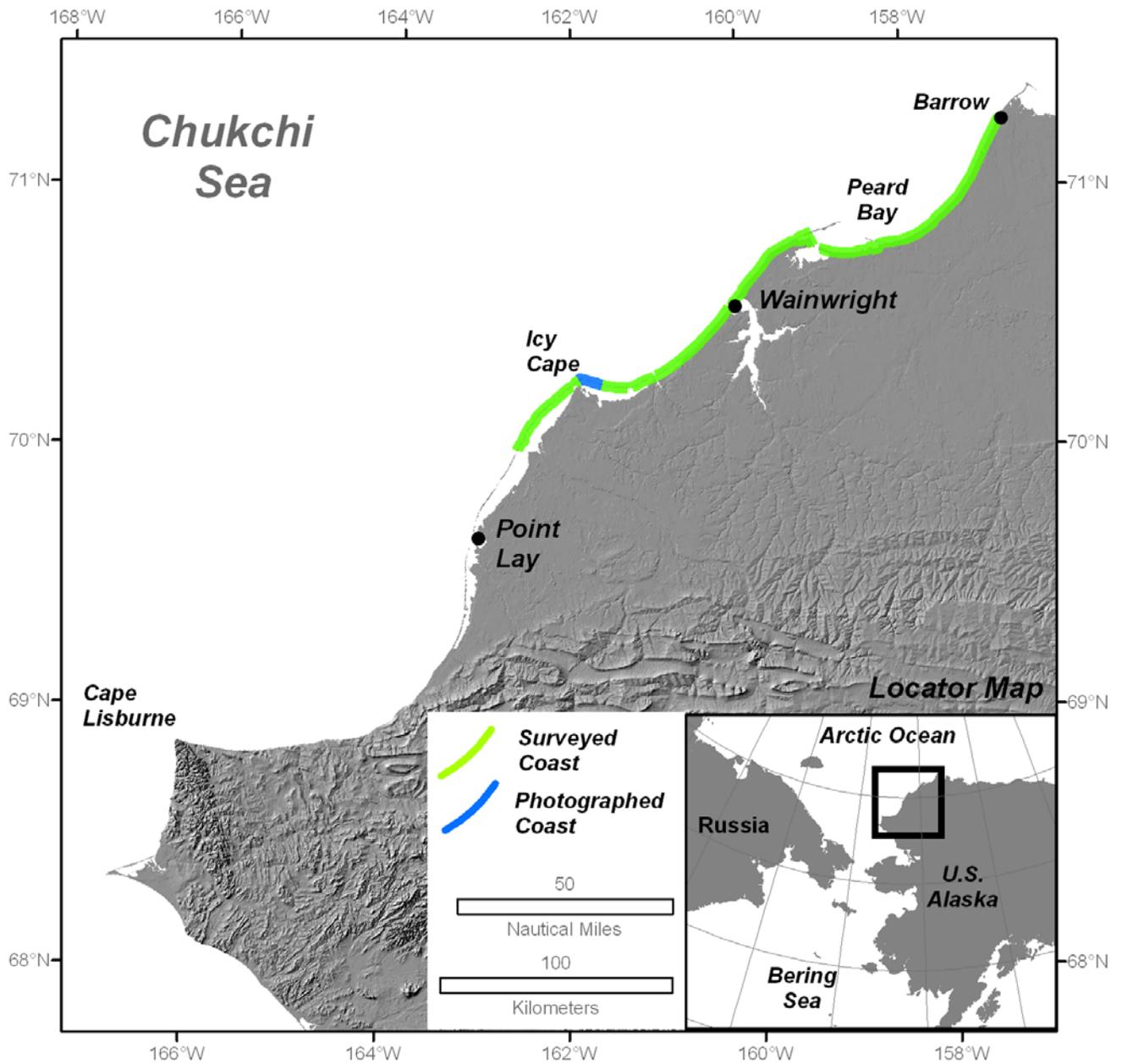


Figure 1. Coastline of northwestern Alaska surveyed for walrus carcasses September 14–19, 2009.

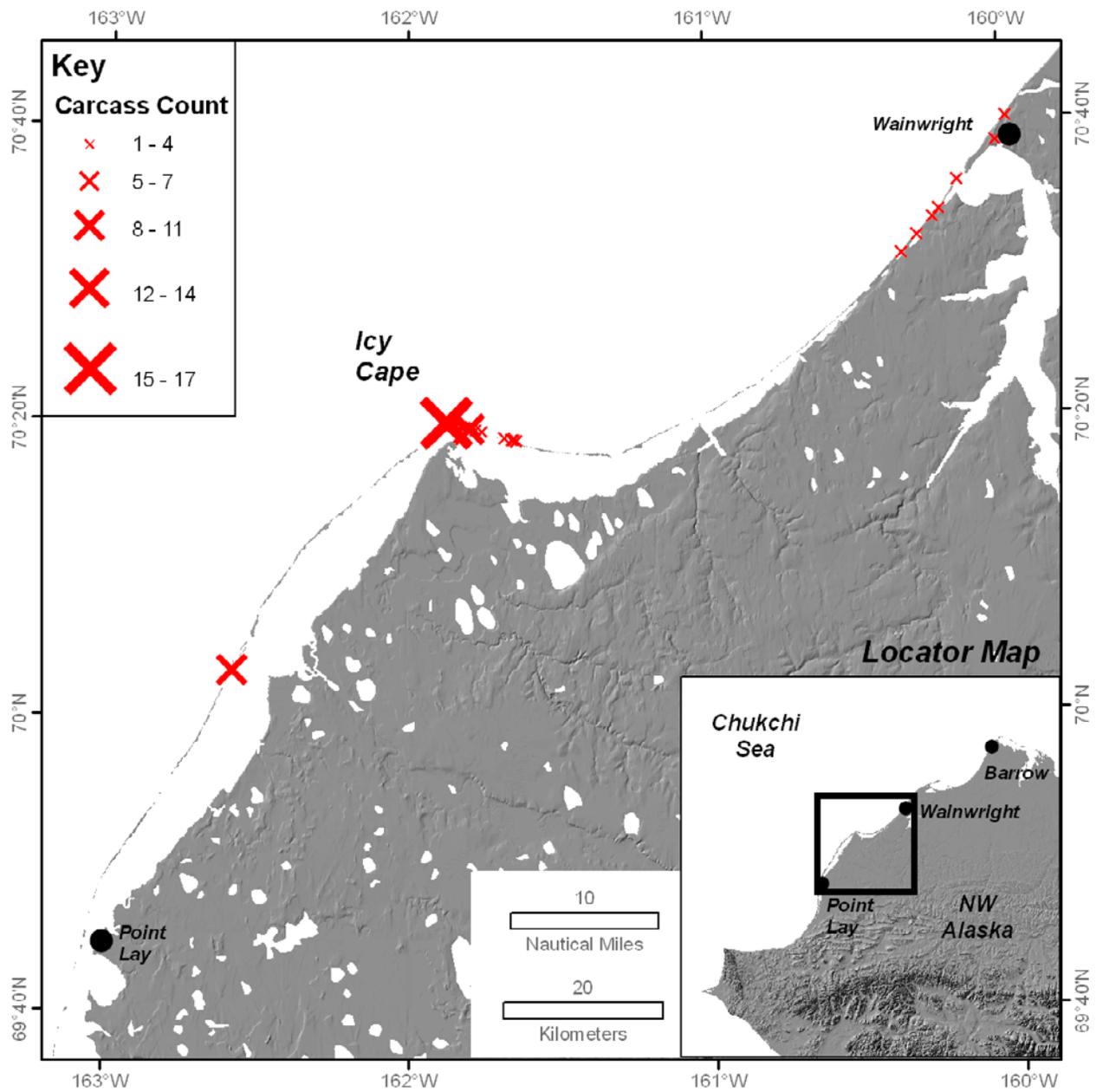
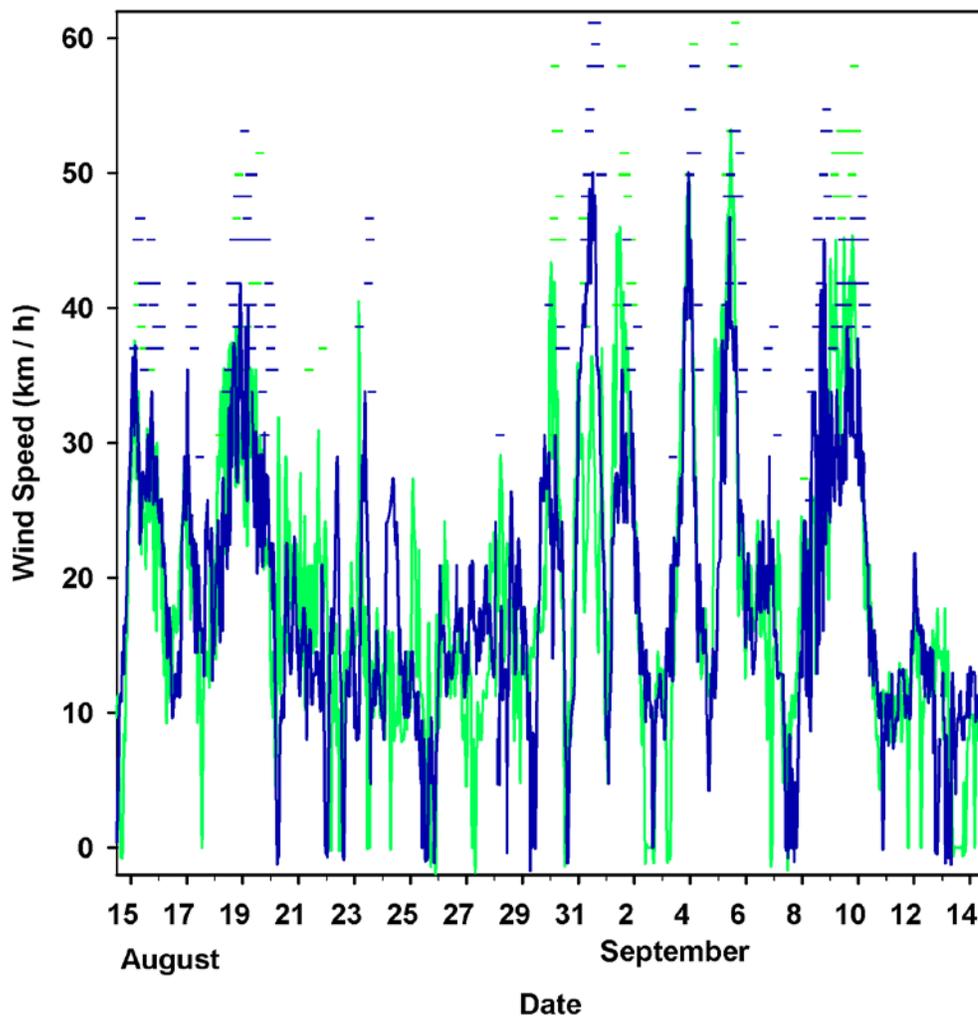


Figure 2. Distribution of walrus carcasses enumerated September 14–19, 2009.



**Figure 3.** Wind speeds recorded at Wainwright (green) and Point Lay (blue) during the month prior to the carcass discovery (National Oceanic and Atmospheric Administration, 2009). Solid lines indicate sustained winds, while dashes indicate gusts.

**Table 1.** Characteristics of carcasses examined on the ground, September 14–16, 2009.

[Location: Latitude, longitude decimal degrees, WGS 84 datum. Approximate length: Measured by reference to scaled object in overhead photographs. cm, centimeters; –, no data]

Carcass ID	Location	Sex	Approximate length (cm)
EC2009001	70.6394, -160.0357	F	158
EC2009002	70.5149, -160.3368	F	178
EC2009003	70.5016, -160.2828	F	160
EC2009004	70.5551, -160.2310	M	155
EC2009005	70.5633, -160.2084	M	150
EC2009006	70.5953, -160.1443	M	168
EC2009007	70.3244, -161.8294	F	159
EC2009008	70.3247, -161.8367	M	152
EC2009009	70.3249, -161.8403	M	153
EC2009010	70.3252, -161.8439	M	–
EC2009011	70.3252, -161.8444	M	166
EC2009012	70.3253, -161.8447	F	150

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