

COMMUNITY REPORT: Steller sea lion distribution and counts in the Bering Strait

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OBJECTIVES:

1. Document seasonal presence of Steller sea lions in the Bering Strait region
2. Document the number of sea lions using Saint Lawrence and Ingalik Islands in the fall
3. Photo-document branded sea lions to determine where they were born, where they travel, and how long they live
4. Document sea lions entangled in or injured by human-made trash (e.g., plastic packing bands)

INTRODUCTION:

Steller sea lions, a marine resource utilized for subsistence purposes by Alaska Natives and a top predator in the Bering Sea ecosystem, are extending their seasonal use in the Bering Strait region and expanding their range northward. These shifts are happening at the same time ecosystem-wide changes are ongoing in the northern Bering Sea since 2017, as a result of recent unprecedented low sea ice coverage. The lack of sea ice has reduced sea ice algae growth and reduced the annually replenished cold briny water that served as a thermal barrier separating the previously-distinct southern and northern ecosystems of the Bering Sea. Massive northward shifts of large, predatory, commercially viable fish populations (e.g., Alaska pollock, Pacific cod) from the southern Bering Sea are currently dominating the Bering Strait region and are re-configuring the marine food web of the northern Bering Sea.

Steller sea lion abundance and distribution at Alaskan haulouts in the northern Bering Sea are poorly understood. Reports from the 1950s describe late summer/fall use by groups of males that were presumed to have originated from the Aleutian Islands. The largest concentration of animals (~1,000) was reported on southwestern Saint Lawrence Island in 1953 (Francis Fay in Kenyon and Rice 1961). Few data from this region have been recorded since that time. Steller sea lions were once abundant along the North Pacific Rim but declined by more than 80% from the 1970s-2000 in the western portion of their range. From 2000-2012, overall abundance increased in most regions of Alaska, but data are lacking from the Bering Strait region.

Sea temperature increases and sea ice declines in the Bering Sea are leading to increased human activities such as the northward shift and increase in industrial ship traffic in the Bering Strait region (e.g., commercial fisheries, ecotourism, military, research, and cargo). Understanding sea lion distribution and abundance in the northern Bering Sea/Bering Strait region will help resource managers evaluate and mitigate the impacts of these activities.

GOALS:

1. Collect data on distribution, abundance, and timing of sea lions in the Bering Strait region
2. Determine where sea lions in the northern Bering Sea are from (where were they born)
3. Document sea lions entangled in marine trash

METHODS:

Aerial surveys

Aerial surveys were conducted using a Bering Air Navajo aircraft, flown along the coast of Saint Lawrence and Ingalik Islands at an altitude of 600-1,200 ft. Observers included two biologists and participants from Gambell and Savoonga. Observers recorded, photographed, and estimated the number of sea lions on shore and in the water and documented dead marine mammals and/or marine trash seen along the coast.

Land-based surveys

Land-based surveys were conducted from the cliffs above the Sivuonok and SW Cape haulouts. Access to the top of the cliffs was via snow machine or 4-wheeler. Animals on shore and in the water were scanned using binoculars from a vantage point at or near the top of the cliffs. Data recorded during each survey included some or all of the following information: date, time, weather and sea conditions, presence/absence of animals or number of sea lions present, and observations of branded and entangled sea lions. Photographs were taken of the sea lions on shore and near-shore, and of branded and entangled animals. Surveys were conducted by biologist from UAF-Alaska Sea Grant, the Alaska Department of Fish and Game, and local hire residents from Saint Lawrence Island. Opportunistic observations of branded and entangled sea lions were made at Ingalik Island and when possible, branded and entangled animals were photographed. These opportunistic observations and photographs were provided to G. Sheffield.

RESULTS:

Distribution, abundance, and timing

We conducted eight complete and one partial aerial survey of sea lions at St. Lawrence and Ingalik Islands during fall-winter months (September-December) in 2012-2015. Sea lions were hauled out at three locations along Saint Lawrence Island (SW Cape Beach, SW Cape Rocks, and Sivuonok), and were spread along the southern shore of Ingalik Island (Figure 1), the southern-most island near Punutuk Island. The highest number of sea lions recorded each year were: 478 (18-Oct-2012), 758 (1-Nov-2013), 856 (30-Oct-2014), and 1,071 (14-Oct-2015) (Table 1). From 2010-2017, the Sivuonok haulout was observed 43 times: 34 land-based observations, 8 aerial observations, and once from a skiff (Table 2). Most of these observations were dedicated land-based surveys by local residents, however some were also additional observations made by local residents and reported to G. Sheffield. The data collected during aerial surveys, land-based surveys, and additional observations confirmed that sea lions are in the Bering Strait region during August through December in most years, with additional sightings of animals in January, May, June, and July.

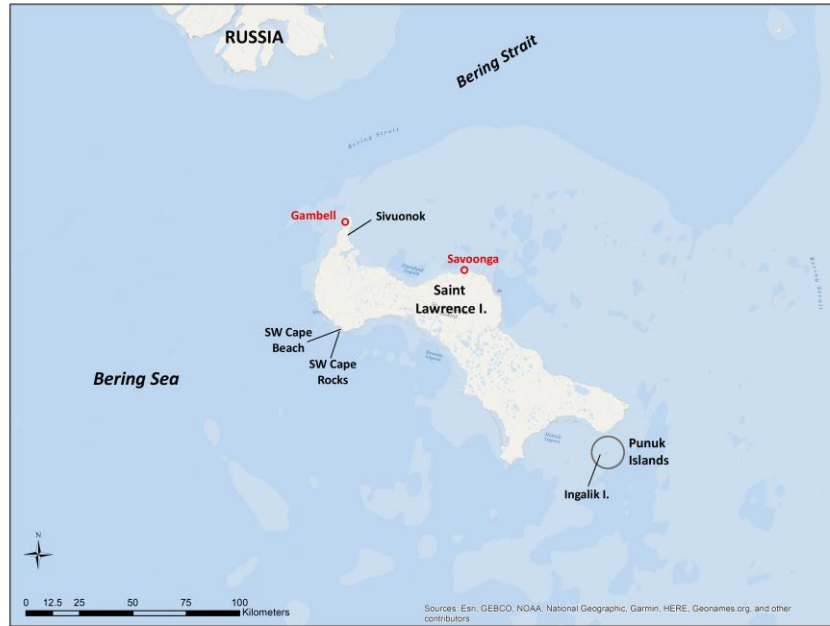


Figure 1. Location of Steller sea lion haulouts on Saint Lawrence and Ingalik Islands, Alaska.

Table 1. Number of Steller sea lions observed during aerial surveys at Saint Lawrence and Ingalik Islands, Alaska.

Date	Total number	Survey notes
10/18/2012	474	
11/20/2012	478	
10/30/2013	525	Partial survey: SW Cape, SW Cape rocks; Ingalik and Sivuonok not surveyed
11/1/2013	758	
11/16/2013	534	
9/23/2014	419	
10/30/2014	856	
12/22/2014	75	
10/14/2015	1,071	

Table 2. Number of Steller sea lions on shore at Sivuonok, Saint Lawrence Island, Alaska.

Date	Total number	Survey type	Survey notes
10 Nov 2010	3	Land-based	0 on land + 3 in water. Report to G. Sheffield
23 Nov 2010	>200	Land-based	
25 Nov 2010	86	Land-based	NW 25 kt, seas 3 ft, snow showers
26 Nov 2010	232	Land-based	NE 20 kt, seas 2-3 ft overcast
27 Nov 2010	275	Land-based	NW 15, seas 2-3 ft, snow squalls
06 Dec 2010	154	Land-based	144 on land + 10 water. ESE 20 kt, seas 3 ft, overcast
12 Dec 2010	0	Land-based	
09 Oct 2011	5-6	Skiff	MK fishing near Sivuonok, saw 5-6 sea lions on nearshore rocks
Oct/early Nov 2011	~400	Land-based	Estimated ~400 at Sivuonok and to east feeding on small fish (capelin?)
16 Nov 2011	74	Land-based	69 on land + 5 in water; survey after big storm-hundreds reported prior to storm
05 Dec 2011	0	Land-based	No sea lions, just clean white snow on beach
18 Oct 2012	1	Aerial survey	
05 Nov 2012	2	Land-based	0 on land + 2 in water
09 Nov 2012	present	Land-based	Hunter near Sivuonok could hear sea lions calling continuously
12 Nov 2012	51	Land-based	46 on land + 5 in water. Storm moving in during survey.
16 Nov 2012	1	Land-based	1 in water
20 Nov 2012	0	Aerial survey	
21 Nov 2012	0	Land-based	
01 Dec 2012	0	Land-based	
10 Dec 2012	0	Land-based	Iced in
18 Oct 2013	0	Land-based	
31 Oct 2013	3	Land-based	
01 Nov 2013	2	Aerial survey	
12 Nov 2013	0	Land-based	
15 Nov 2013	3	Land-based	2 on land + 1 in water
16 Nov 2013	0	Aerial survey	
27 Nov 2013	0	Land-based	
16 Dec 2013	0	Aerial survey	
23 Sep 2014	0	Aerial survey	
23 Oct 2014	8	Land-based	0 on land + 8 in water
30 Oct 2014	11	Aerial survey	
05 Nov 2014	1	Land-based	
17 Nov 2014	30-35	Land-based	
20 Nov 2014	183	Land-based	182+ on land + 1 in water
24 Nov 2014	144	Land-based	
25 Nov 2014	122	Land-based	118 on land + 4 in water
29 Nov 2014	145	Land-based	140 on land + 40 in water
30 Nov 2014	68	Land-based	63 on land + 5 in water
10 Dec 2014	0	Land-based	
22 Dec 2014	0	Aerial survey	
14 Oct 2015	0	Aerial survey	
3 Nov 2015	1	Land-based	1 in water
14 Nov 2015	0	Land-based	
Nov/Dec 2016	"many"	Land-based	
8 Jan 2017	100+	Land-based	

Origin of sea lions using the Bering Strait region

We photo-documented 23 sea lions with unique brands on Saint Lawrence and Ingalik islands during aerial and land-based surveys. Branded sea lions ranged in age from 3.2 – 12.4 years. Branded animals were born at 9 different rookeries spanning the North Pacific Ocean from southern Southeast Alaska near the U.S. - Canada border to the Kuril Islands and Sea of Okhotsk in Russia (Figure 2). About half (12) of the branded sea lions were born at rookeries in the eastern Aleutian Islands (Ugamak and Akutan Islands). The remaining 11 branded sea lions were born at rookeries in Southeast Alaska (2), the central Gulf of Alaska (3), and in Russia (Medny Island-3, Kozlov Cape-1, Yamskiye Island-1, and Srednego Island-1; Figure 2). Additional observations by residents at Ingalik Island were very valuable, providing observations of 10 branded sea lions including photographs of 7 of those animals (contributing 30% of the photo-documented brands in this study).

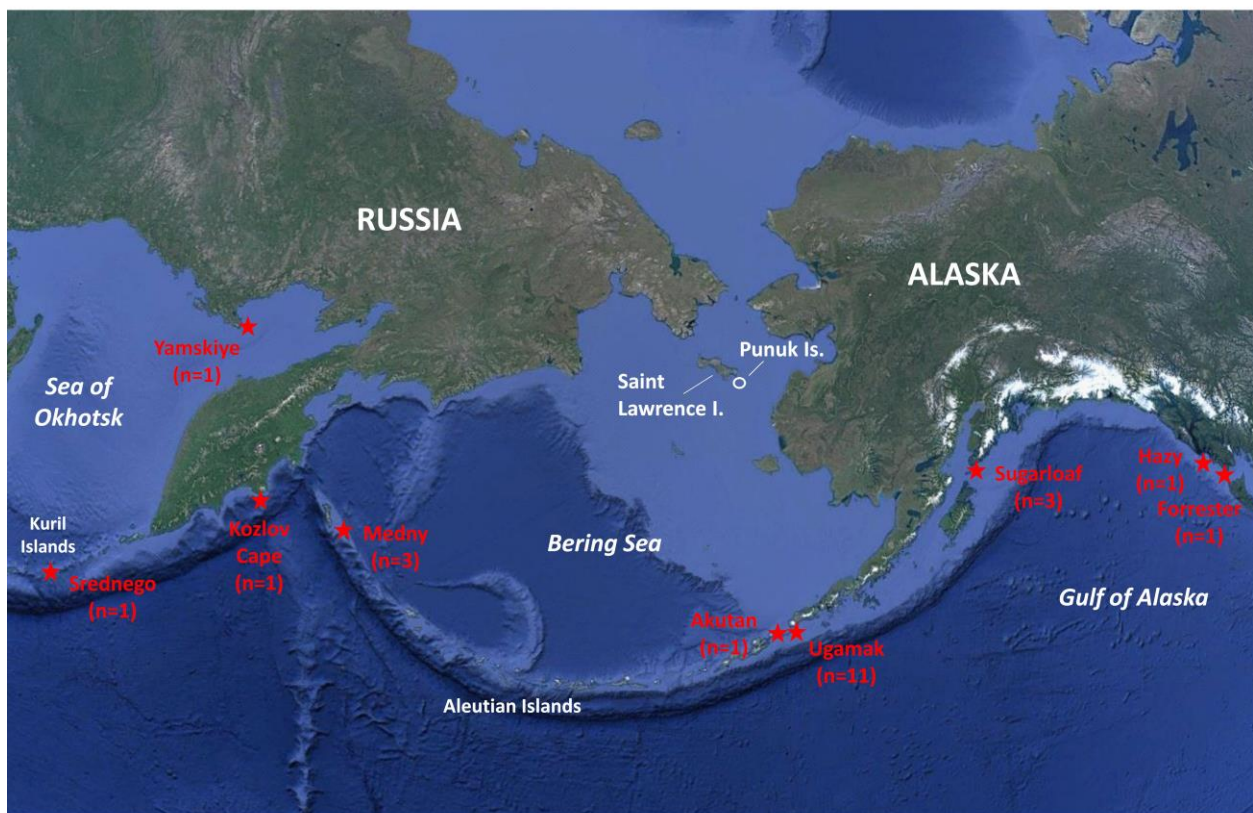


Figure 2. Natal rookeries of Steller sea lions observed at Saint Lawrence and PUnuk Islands, Alaska.

It is difficult to determine the sex of younger (less than ~5 or 6 years old) sea lions, but based on our observations, the older animals seen on shore all appeared to be sub-adult and adult males. All 23 of the branded sea lions were males, which included 9 animals that were <6 years of age (Figure 3).

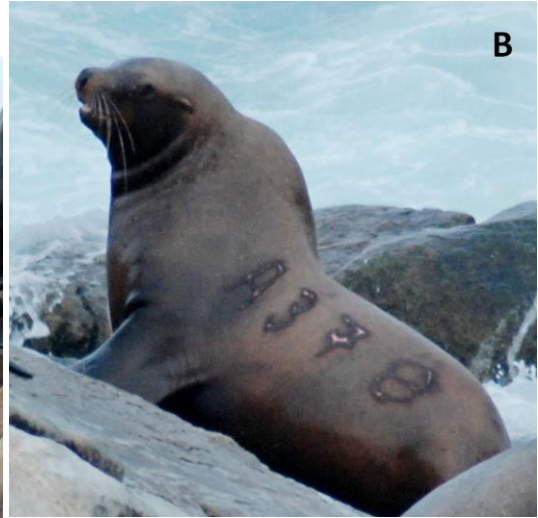


Figure 3. Examples of Steller sea lion males of different ages, photographed at Sivuonok, Saint Lawrence Island, Alaska, 26 November 2010.

A: M706 is 4.5 years old, note the slim neck and lack of bulk around chest/shoulders; to his left is a sub-adult male. M706 was born on Medny Island in Russia.

B: A378 is 5.5 years old, a sub-adult showing thicker neck and chest and blocky head. A378 was born on Ugamak Island in the eastern Aleutian Islands.

C: A77 is 9.5 years old, an adult male born on Ugamak Island. Note large body size with thick neck and chest. A closer image would reveal thicker and longer hair around the neck (a 'mane'). Two adult males are sitting in the background, both scratching with their hind flipper.

During our study, 12 branded sea lions were observed at 9+ years of age, the approximate age when male Steller sea lions are sexually mature and able to hold a territory. Of these adult males, 11 held territories (10 with females present, one without females) during the summer breeding season either prior to or after being seen at Saint Lawrence or Ingalik Islands. Some males traveled long distances from a rookery in summer to the Bering Strait after the breeding season. For example, H183 was seen in late June 2010 as a territorial bull at his natal rookery, Hazy Islands, in southern Southeast Alaska. He was next seen at Sivuonok in early December 2010 and the following July (2011), H183 was back in Southeast Alaska, not far from the Hazy Islands, a round-trip distance of about 4,200 miles. A branded 5-year-old male born on

the Russian island of Yamskiye in the Sea of Okhotsk was seen at Ingalik Island, a one-way distance of approximately 2,300 miles from his birth rookery.

Other observations:

- In December 2010, we observed a large aggregation of marine mammals and birds feeding in the waters just off the north end of Sivuqaq Mountain on the northwest shore of Saint Lawrence Island. An estimated 50-100 sea lions were in the water along with dozens of belugas whales, several gray whales, and hundreds of gulls. Later that day it was reported that sea lions had been chasing fish near the north beach at Gambell and that fish had washed ashore in large numbers. Fish samples were collected and sent to the Marine Mammal Laboratory (NOAA) to confirm identification as arctic cod (*Boreogadus saida*), locally known as “blue cod” (Figures 4&5).



Figures 4 & 5. “Blue cod” (*Boreogadus saida*) on the north beach of Gambell, December 7, 2010. Residents reported these fish washed up in large numbers, possibly having been concentrated by Steller sea lions and other predators.

- Two adult male sea lions were seen with plastic trash around their neck, one at Ingalik Island on one on SW Cape Beach (Figure 6).



Figure 6. Adult male sea lion with white plastic material around neck, likely a packing band, Ingalik Island, 11 September 2013.

- During the second week of December 2010, a report came from Gambell that two experienced hunters, standing on shore, watched a large sea lion “frantically” swimming toward the beach. The sea lion was then tossed upward and bit on the foreflipper by a shark, both then disappeared underwater. A large amount of blood was seen spreading on the water surface soon afterwards.
- A branded male Steller sea lion (A193) was found dead on the beach southwest of Sivuonok in December 2010 (Figure 7). The sea lion was frozen solid on examination and cause of death was undetermined. Biological specimens (whiskers, skin, blubber, muscle) were collected for health assessment work, including contaminant analysis, and for archival purposes to use for future studies. Tissues were transferred from Nome to Dr. Lorrie Rea, now at the University of Alaska Fairbanks, where some analyses were performed. Results from mercury analysis of the hair showed levels of mercury similar to sea lions in other regions; these levels were not elevated or of concern. Stable isotope analysis of the hair showed carbon values very different from other regions, though this finding is not unexpected given that prey species probably differ in the Bering Strait.



Figure 7. Dead branded Steller sea lion found near Sivuonok, north shore of Saint Lawrence Island, December 2010. A193, born on Ugamak Island, was ~7.5 years old when found dead.

SUMMARY:

The results of this collaborative project between biologists and local resident experts have greatly enhanced our knowledge of Steller sea lion distribution and abundance in the Bering Strait region. In addition to scheduled surveys, opportunistic observations and photographs that were contributed by local residents from throughout the region proved invaluable. These opportunistic observations especially helped provide a broader understanding of the timing of Steller sea lion presence in the Bering Strait and their overall distribution. Photographs of marked animals provided a more complete picture of the natal origin of sea lions using this region.

Although we expected that the sea lions using the Bering Strait would primarily originate in the Aleutian Islands, only half of the uniquely marked animals at Saint Lawrence and Ingalik Islands were born in the

Aleutian Islands. Instead, we found that sea lions from across the North Pacific Ocean were utilizing haulouts on Saint Lawrence and Ingalik Islands. Sea lions born at rookeries from as far away as southern Southeast Alaska (near the U.S. – Canadian border), all the way to the Kuril Islands (Russia) were seen in the Bering Strait. We documented some of the longest distances traveled by Steller sea lions yet known. The Bering Strait region appears to be another ‘mixing zone’ area where sea lions from all three stocks (eastern, western, Asian) congregate.

Bering Strait haulouts are perhaps especially important to adult males following the breeding season. Most of the adult male sea lions that visited Saint Lawrence and Ingalik Islands during late summer through early winter were territorial bulls on rookeries during the summer. These males traveled to the Bering Strait presumably to take advantage of rich prey resources.

Collaboration was critical to expanding our knowledge of sea lions in the Bering Strait region.

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