



February 26, 2019

United States Department of Commerce
National Oceanic and Atmospheric Administration
NMFS Office of Protected Resources
ATTN: Stephanie Egger
Silver Spring, MD 20910

SUBJECT: 2018 Year-End Summary Report

REFERENCE: NMFS LOA dated May 11, 2017 issued to the Alaska Aerospace Corporation (AAC)

Dear Ms. Egger:

In accordance with paragraph 6(e) of the referenced LOA please find attached the 2018 Year-End Summary Report of the rocket launch activities and our harbor seal monitoring work at the Pacific Spaceport Complex-Alaska.

Please contact Art Isham at 907-561-3338 or art.isham@akaerospace.com if there are any questions.

Sincerely,

Craig E. Campbell
Chief Executive Officer

Enclosure

1. 2018 Year-End Summary Report

**SEAL MONITORING AT UGAK ISLAND, PACIFIC SPACEPORT
COMPLEX ALASKA, KODIAK ISLAND—2018 ANNUAL REPORT**

Prepared for

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INTRODUCTION

Rocket launches began in 1998 at the Kodiak Launch Complex (now Pacific Spaceport Complex Alaska [PSCA]) operated by Alaska Aerospace Development Corporation (now Alaska Aerospace Corporation or AAC) at Narrow Cape on Kodiak Island, Alaska (ENRI 1999). Several species of marine mammals occur in the area of Narrow Cape seasonally or year-round (ENRI 1995), but only 2 species use land-based haulouts in that area—Steller sea lions (*Eumetopias jubatus*) and harbor seals (*Phoca vitulina*). Disturbance of haulouts by rocket launches is a major concern of the National Marine Fisheries Service (NMFS), the agency responsible for management of sea lions and harbor seals. Sea lions and harbor seals may flush from haulouts into the water when frightened; during flushing events, young may get trampled or separated from their mothers (Porter 1997, Sandegren 1969, Johnson 1979, Pitcher and Calkins 1979, Richardson et al. 1995). Marine mammals in the Kodiak area, other than sea otters (*Enhydra lutris*), are managed by NMFS under the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*). Marine mammals that are listed as threatened or endangered are also managed under the Endangered Species Act (ESA) of 1973, as amended (PL 93-205; 16 U.S.C. 1531–1544). Both the MMPA and ESA prohibit the taking of species they manage—activities that may result in disturbance, harassment, injury, or killing—without specific authorization. In 2006, NMFS issued a final rule that regulated the types of effects rocket launches could have on marine mammals and authorized the incidental take by harassment of Steller sea lions and adult harbor seals, and incidental take by harassment or mortality of harbor seal pups, during rocket launches. An annual Letter of Authorization (LOA) was issued each year which prescribed the specific monitoring and reporting requirements and authorized incidental take with restrictions for the year in which it was issued. See the five-year summary report (ABR et al. 2011) for further details.

The current LOA is valid from 11 May 2017 to 25 April 2022 and authorizes incidental take of marine mammals for up to 9 launches per year. AAC is authorized to incidentally take 315 harbor seals per year by Level B harassment. Steller sea lions have not been using Ugak Island regularly for haulouts and are no longer a focus of the monitoring (ABR et al. 2011). The LOA

stipulates that AAC must designate technical experts, approved in advance by NMFS Office of Protected Resources, to:

1. Install time-lapse photography systems designed to monitor pinniped abundance and detect pinniped responses to rocket launches at each of the pinniped haulout locations around Ugak Island. The number of camera systems, equipment capabilities, placement of the systems to be used, and the daily photo frequency shall be determined through a cooperative effort between AAC, NMFS Office of Protected Resources, and the technical experts;
2. Ensure that the time-lapsed photography systems shall be in place and operating in locations that allow for visual monitoring of all pinniped haulouts during launches;
3. Relocate the time-lapsed photography systems in cooperation with NMFS after 5 launches if the system is not accurately capturing all pinniped haulouts and total pinniped abundance during the launches;
4. Monitor and review the effectiveness of these systems, comparing the results to aerial surveys for pinniped presence, abundance, behavior, and re-occupation time from the data obtained from the time-lapsed photography systems for the first 5 launches and report results to NMFS Office of Protected Resources within 90 days (after the fifth launch); and
5. Conduct a study in coordination with NMFS Office of Protected Resources to evaluate the effectiveness of the time-lapsed photography systems (specifically, the accuracy of the photography systems compared with the aerial count surveys). The results of this study shall determine the need to continue aerial surveys. The study shall be conducted through a minimum of 5 launches.

In addition, AAC shall conduct one pre-launch and one post-launch aerial survey for each launch to obtain data on pinniped presence, abundance, and behavior at all pinniped haulouts. If no launches occur during a year, the LOA directs AAC to conduct quarterly aerial surveys, ideally during midday and coinciding with low tide. Results shall be reported to NMFS as part of the year-end summary reports.

This report serves as the year-end summary report for 2018 and includes results of the pre- and post-launch aerial surveys and comparison of the results using the time-lapse photography systems. No quarterly aerial surveys were conducted in 2018. A final 5-year report must be submitted to NMFS at least 90 days prior to expiration of regulations if new regulations are sought or 180 days after expiration of regulations.

The primary study area for marine mammal monitoring during 2017–2022 at the PSCA was established in the 2017 final rule and focuses on the shoreline and rocks within 500 m of Ugak Island (5–8 km from the launch pads; Figure 1). The objective of marine mammal monitoring during rocket launches is to record the abundance and distribution of harbor seals on Ugak Island and to evaluate the effect of rocket noise on seal occupation at haulout sites, as stipulated in the 2017 final rule and annual LOA.

METHODS

AERIAL SURVEYS

Monitoring protocols are outlined in the 2017 LOA and aerial survey protocols are similar to historical protocols (ABR et al. 2011). Marine mammal abundance and distribution were recorded during aerial surveys flown in a single-engine R-44 helicopter with floats. The aerial survey route started at the northern spit of Ugak Island and was flown counter-clockwise for 1 or 2 circuits of the island (depending on abundance, weather conditions, etc.). A Global Positioning System (GPS) was used for navigation. When possible, all surveys were flown within 2 h of the daytime low tide and during midday, when we expected haulout attendance to peak for harbor seals; however, available daylight, time of low tide, weather, time of launch, and aircraft availability limited the ability to schedule surveys for optimum times. The aerial survey schedule prescribed by the 2017 LOA consisted of 1 pre- and 1 post-launch survey for each launch. The 15 July pre-launch survey was repeated on 19 July because the launch was delayed after the initial pre-launch survey was conducted.

Aerial surveys were flown 500 ft above sea level at 30–60 nautical mph and the flight line was kept ≥ 0.25 mi from known haulouts. Observation conditions (wind speed and direction, visibility, cloud cover, precipitation, and wave height) were recorded for each survey. One or 2 observers were seated on the left side of the aircraft and recorded the number of individuals,

species, age, GPS waypoint, and photo number of marine mammals observed. When species could not be determined or fully enumerated on the initial observation, the aircraft circled (away from the shoreline) to attempt identification or enumeration. Mammal locations were recorded on a GPS and copies of printed maps. The waypoints, track logs and shoreline photos for each observation were used to map estimated locations after the surveys. Aerial surveys were conducted by ABR biologists during May and July; surveys in October and November were conducted by AAC personnel.

Digital photographs of all groups of seals were taken with a Cannon Powershot image stabilizing camera. Images were reviewed on a personal computer and counts of seals were summarized from sets of overlapping images. All counts were made from digital images taken from the aircraft, unless the images were blurred or underexposed, in which case visual estimates were reported. All data were transcribed into an Excel spreadsheet. All times in this report are presented in 24-h local time (Alaska Daylight Time [ADT] or Alaska Standard Time [AST]).

TIME-LAPSE PHOTOS

Time-lapse camera systems were built and installed by North Pacific Wildlife Consulting at 2 locations on 31 May 2018 to capture images of the northeast Ugak Island seal haulout (Figures 1–3). The cameras are Canon Rebel digital single-lens reflex (SLR) cameras hooked up to an electronic controller, battery, solar system, and light meter. The controller was set to take 1 photo every 5 minutes during daylight hours. By using 512 gigabyte SD memory card in each camera, the system should be able to take photos for ~1 year under ideal conditions. The cameras, controller, light meter, and external battery are housed within a durable, waterproof case which is mounted to a large tripod, while the solar panel is bolted in a south-facing position on the tripod. The solar panel should keep the battery fully charged throughout the year and the controller is programmed to conserve the battery in the event of long-term, low-light conditions by increasing the interval between photos to 1 per hour or eventually suspending photos until the battery is recharged. The tripods were constructed on-site using 10-ft long, 4-inch × 4-inch treated timbers sunk into the ground about 2 ft deep.

There are limited areas on rugged Ugak Island where a remote camera can have a good view of a consistently used seal haulout and can be safely deployed (ABR et al. 2011). We chose the

northeast Ugak Island haulout because it was regularly used and had terrain that allowed for safe camera deployment with minimal exposure to landslides and avalanches compared with other haulout locations. This haulout location also is backed by slopes that allow the cameras to have an elevated perspective for more accurate counting.

We retrieved and replaced the memory cards in the cameras on 8 October 2018; they were in good working order. Data from the memory cards were downloaded to ABR's secure servers. These servers are backed up daily in 2 physical locations and on a cloud storage service.

ABR biologists used photo editing software to count and identify individuals in each photograph. To select the time-lapse photos for counting, we excluded photos within 2 minutes of the survey aircraft flight past the cameras to account for any discrepancies in camera clock times; we counted the 3 photos (each at 5-minute intervals) preceding the aircraft passing by the cameras to reduce potential effects of disturbance on the counts of hauled out seals. Photos taken post-launch would be counted in the same manner and reviewed to determine and quantify any behavioral reactions to successful launches. Counts are presented as the average number of seals \pm standard error.

RESULTS AND DISCUSSION

In 2018, there were 5 scheduled rocket launches (Table 1). None of the launches flew near or over Ugak Island. Two launches (20 July and 29 November) achieved liftoff but exploded back on the ground and 3 launches failed to ignite; therefore, no post-launch aerial surveys were conducted. At least 1 pre-launch survey was conducted in each calendar quarter except for the first quarter of 2018.

AERIAL SURVEYS

Six pre-launch aerial surveys were conducted in 2018 (Table 2). Surveys conducted on 3 dates covered the entire coastline of the island. Surveys on 2 dates had unknown coverage (no GPS records of survey) and a survey on 1 date did not attain complete coverage; counts from these 3 surveys represent the minimal number of seals on Ugak Island. Harbor seals were the only marine mammal observed, with most individuals located on the southeast Ugak Island haulout. The pattern of distribution observed on surveys in 2018 was similar to the pattern

observed during surveys in 2006–2010, although the northeast Ugak Island haulout had higher numbers in those earlier years (ABR et al. 2011). No Steller sea lions were observed in the water or hauled out. All photographs were of sufficient quality to count seals; therefore none of the counts relied on visual estimates.

The mean number of harbor seals counted on the entire Ugak shoreline was 586.7 ± 130.5 ($n = 6$ surveys) with a mean of 127.3 ± 35.3 pups in 2018 ($n = 4$ surveys; minimal counts, not all photos with identifiable pups; Table 2). Harbor seals were most abundant during the survey on 19 July (973 seals) and least abundant during surveys on 11 May and 16 October (207 seals). Pups were most abundant during the survey conducted on 30 October (194 pups) and least abundant on 11 May (33 pups). The pup count for the survey on 19 July should be considered a minimal count because pups were not clearly distinguishable in 3 of 18 photos. Pups were not clearly distinguishable in any of the photos taken on 16 October or 15 November (Table 2). There are no estimates of the number of pinnipeds harassed or time spent away from the haulouts because no post-launch surveys were conducted.

TIME-LAPSE CAMERA SURVEYS

The time-lapse cameras were functioning well after 131 days and new memory cards were installed. The cameras captured images of the northeast Ugak Island harbor seal haulout during aerial surveys on 15 and 19 July and 16 October 2018. No photos from post-launch periods were reviewed because the launches were deemed to have failed.

The patterns of abundance were similar between the aerial photo counts and the time-lapse camera photos; counts were highest on 19 July and lowest on 16 October. Counts from aerial photos of the northeast Ugak Island haulout were consistently higher than those from the time-lapse photos (Table 3). The lower numbers on time-lapse photos are likely due to the more oblique angle of the ground-mounted systems. Seals can haul out in tight clusters, which often obscure individual seals. The more elevated view from an aircraft was better for distinguishing individual seals. The same factors make counting pups on the time-lapse images a challenge. The cameras will continue capturing images through the winter of 2018/19. Cameras will be checked and memory cards swapped again in spring 2019.

LITERATURE CITED

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Table 1. Launch attempts from the Pacific Spaceport Complex Alaska, Kodiak, AK, 2018.

Launch Name	Date/ Time	Launch Description	Number of Surveys Completed	
			Pre-launch	Post-launch
P120	11 May 2018/1222	Ignition sequence aborted at T-1.3 sec, no liftoff, minimal sound.	1	0
P120	20 July 2018/1400	Vehicle lifted off, engine cut off ~T+20 sec. The launch vehicle flew straight up to ~2,000 feet agl with no down range component then fell to the ground and exploded.	2	0
P124	16 Oct 2018/1600	Countdown ended with no launch attempt.	1	0
P124	30 Oct 2018/1755	Countdown ended with no launch attempt.	1	0
P124	29 Nov 2018/1800	Vehicle lifted off, engine cut off ~T+26 sec. The launch vehicle flew straight up to ~7,000 ft. agl with no down range component and then fell to the ground and exploded.	1	0

Table 2. Aerial surveys of harbor seals on Ugak Island, Kodiak, AK, in 2018.

Survey Date/Time	Time Nearest Low Tide	Weather	Number of seals		Survey notes
			Total (adults + pups)	Pups ^a	
11 May 2018/0817	0534	Cloud 90%, 1,000 ft, unlim vis, wind 20 mph S, 40 °F, mod seas	207	33	Complete coverage
15 July 2018/0826	1011	Cloud 15%, wind 0–5 mph, seas flat, 60 °F	628	155 ^b	Complete coverage
19 July 2018/1027	1315	Cloud 1,200 ft, wind 14 mph S, 50 °F	973	161 ^c	Complete coverage
16 Oct 2018/1034	1240	Cloud 75% 1,500', unlim vis, light precip, 55 °F	207		Unknown coverage
30 Oct 2018/1340	1158	Clear, unlim vis, 41 °F	784	194	Unknown coverage
28 Nov 2018/1425	1054	Clear, unlim vis, 34 °F	769		~1 km of shore not surveyed

^a Seal pups are counted separately when they are distinctive enough by size and photo quality is good.

^b Minimal estimate; pups were not clearly identifiable in 3 of the photos.

^c Minimal estimate; pups were not clearly identifiable in 1 of the photos.

Table 3. Counts of harbor seals from photos taken during aerial surveys and by ground-based time-lapsed cameras at NE haulout on Ugak Island, Kodiak, AK, 2018.

Launch Name	Survey Date/ Time	Aerial Survey Photos				Time-lapsed Photos NE Haulout ^{a,b}	
		Entire Island		NE Haulout		Cam A	Cam B
		Total (adults + pups)	Pups	Total (adults + pups)	Pups	Total	Total
P120-1	15 July 2018/0826	628	155 ^c	108	23 ^e	0	68.3 ± 2.2
P120-1	19 July 2018/1027	973	161 ^d	247	6 ^f	0	222.3 ± 3.1

^a Analyzed 3 photos taken 2–20 min prior to the passage of survey aircraft. Values represent averages ± standard errors.

^b Count of pups not available because they were not clearly distinguishable in the photos.

^c Minimal count; could not distinguish pups on 1 photo (out of 13) with 25 total seals.

^d Minimal count; could not distinguish pups on 3 photos (out of 18) with 275 total seals.

^e Minimal count; could not distinguish pups on 1 photo (out of 3) with 25 total seals.

^f Minimal count; could not distinguish pups on 1 photo (out of 2) with 214 total seals.

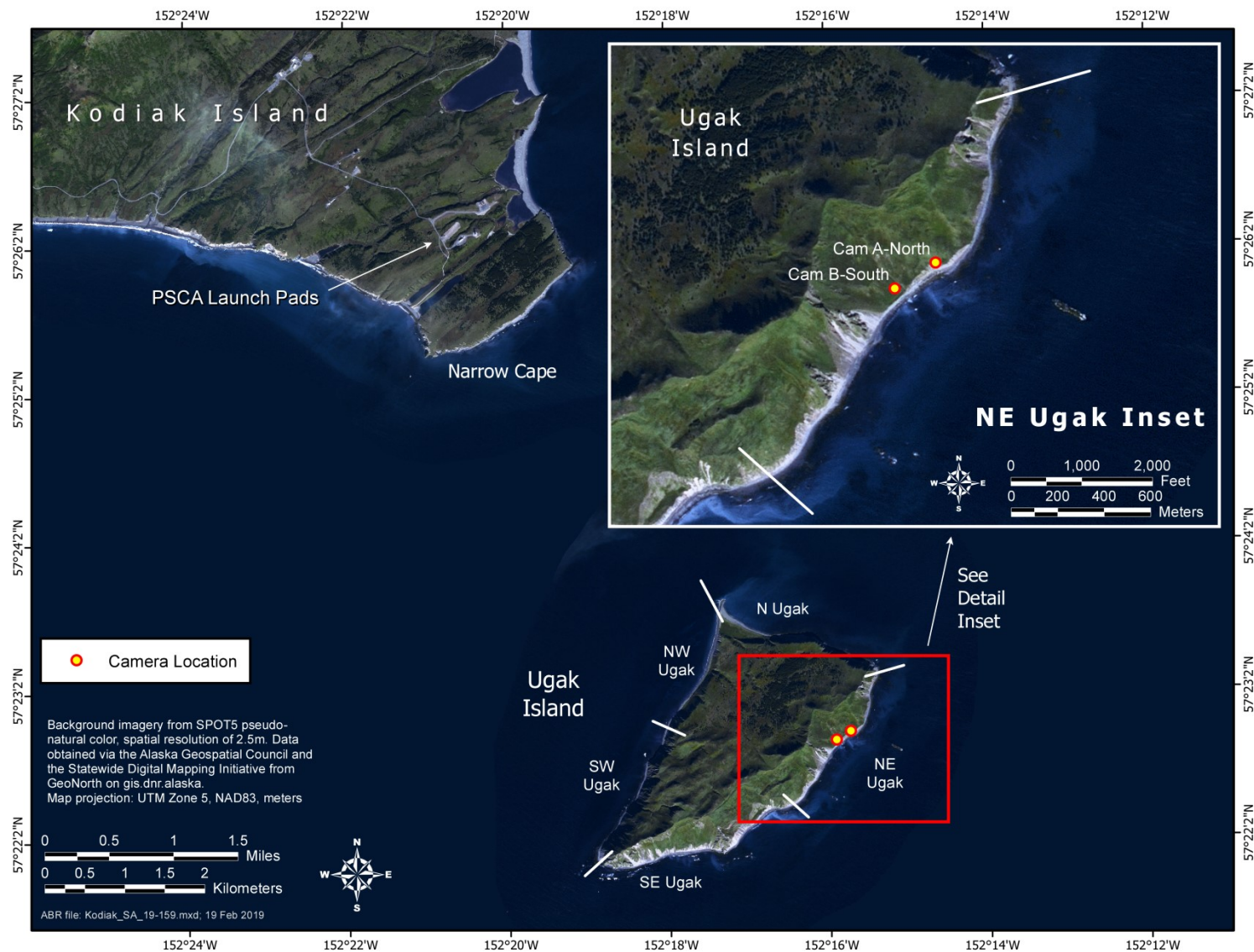


Figure 1. Study area, haulout names, and locations of time-lapse cameras on Ugak Island, Kodiak, Alaska.

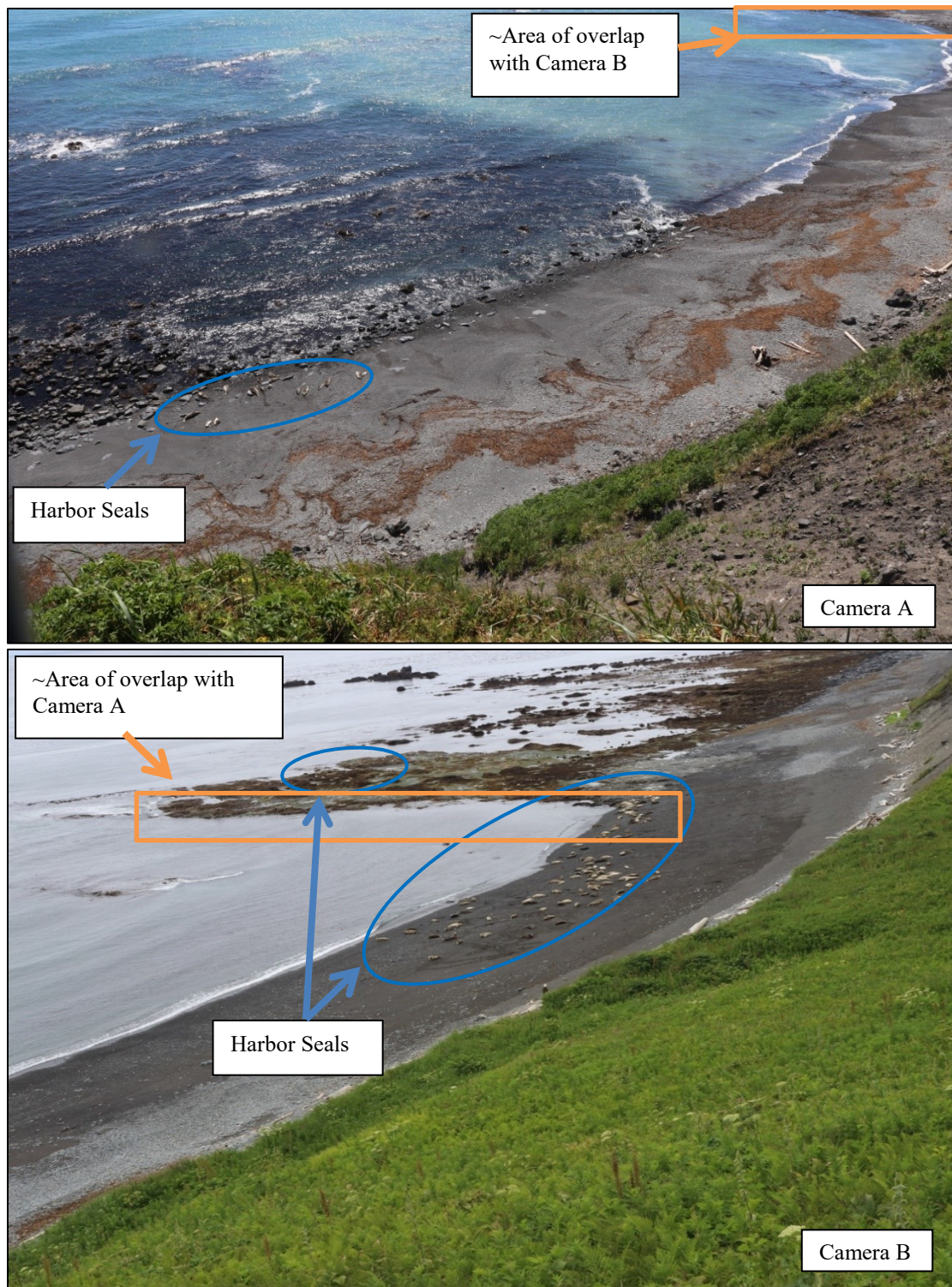


Figure 2. Example photos of the northeast Ugak Island harbor seal haulout from time-lapse cameras. Camera A view (top) and Camera B view (bottom) with approximate area of overlap indicated by the orange box, Kodiak, Alaska, 2018.

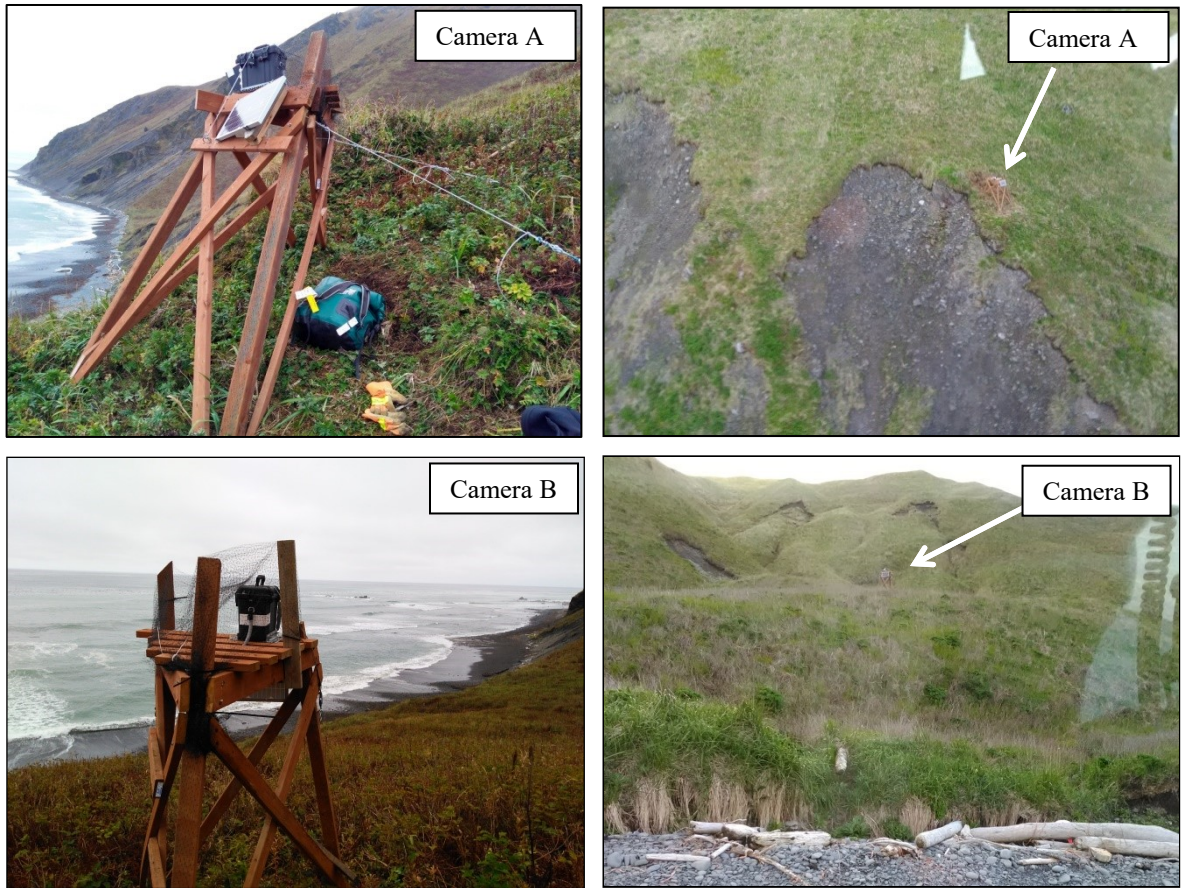


Figure 3. Photos of Camera A (top) and Camera B (bottom) at the northeast Ugak Island haulout, Kodiak, Alaska, 2018.