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Timeline: Final year of data collection anticipated in summer 2022

Funding: [Coastal Marine Institute](#) and the [Bureau of Ocean Energy Management](#).
The project also relies on substantial funding from existing projects:
the [Alaska Arctic Observatory and Knowledge Hub](#) (AAOKH) at the
University of Alaska Fairbanks and the [Ice Seal Research Program](#) at the
North Slope Borough Department of Wildlife Management (NSB-DWM).

Permitting:

- National Marine Fisheries Service General Authorization No. 23546
- Bureau of Land Management Land Use Permit FF097621
- University of Alaska Fairbanks IACUC Protocol 1610672-2

Summary: Spotted seals (*Phoca largha*) are seasonally abundant throughout coastal regions of the Chukchi and Beaufort Seas during the summer and fall, frequently hauling out on coastal sandbars, spits, and islands. Yet, the influence of environmental factors and potentially increasing human disturbance on distribution, numbers, and behavior is unclear. The frequency, duration, and timing of haulout use can vary with local conditions (e.g., wind, water level, fish movements, seasonality, and human presence). We are conducting pilot studies to evaluate the potential for time-lapse cameras and other monitoring equipment to assess the seasonal presence, behavior, and numbers of spotted seals at summer-fall coastal haulouts near Utqiagvik, Alaska (Figure 1). Data have so far been collected during summer 2020 and 2021.

Objectives: The original goal of this pilot study was to evaluate the potential for new and emerging technologies, specifically time-lapse cameras (e.g. commonly known as ‘game cameras’) and small quad-copter style Unmanned Aircraft Systems (sUAS, or commonly known as ‘drones’), to assess the seasonal presence, behavior, and numbers of ice seals at several summer-fall Alaskan coastal haulout sites near Utqiagvik, AK. Specifically:

1. Test and refine remote camera and sUAS survey methods to assess relative numbers, presence/absence, and behavior of spotted seals at known haulout sites.
2. Quantify the effects of environmental conditions on spotted seal summer-fall haulout behavior.
3. Assess combined effects of environmental conditions and human activity on numbers and behavioral responses of hauled out spotted seals.
4. Quantify disturbance effects of sUAS on hauled out spotted seals.
5. Assess feasibility of using sUAS to survey spotted seal abundance at coastal haulouts.

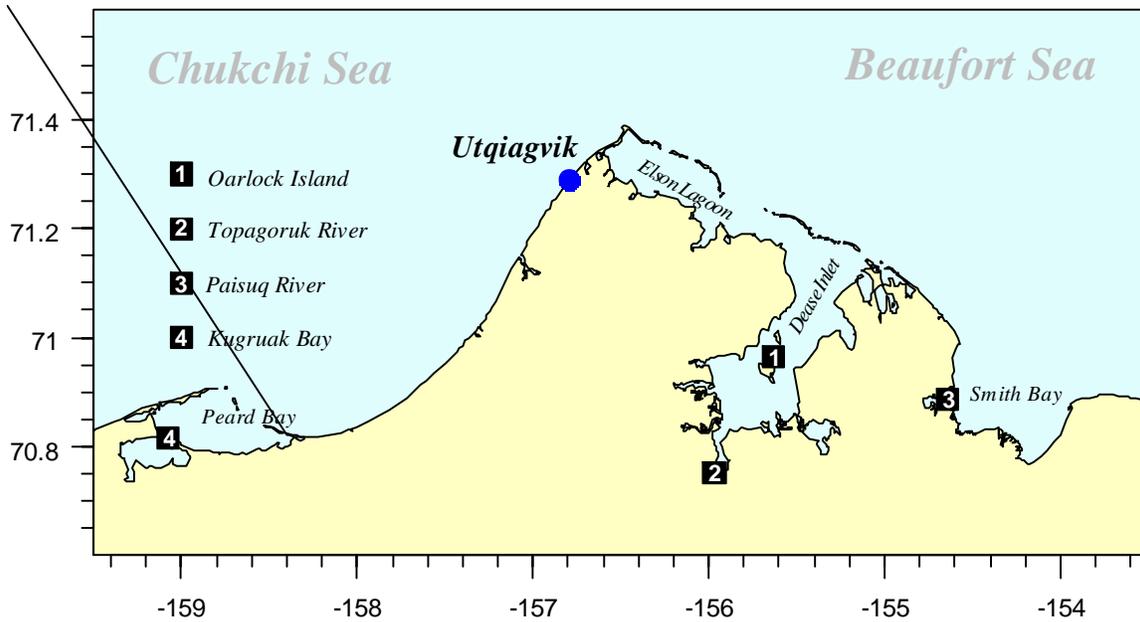


Figure 1. Study sites to monitor spotted seal coastal haulouts. Spotted seals are known to use each site based on previous telemetry data and Indigenous Knowledge, but the frequency and number of seals using each site is unclear. Additionally, environmental and other conditions may affect use of haulout sites. Note that site 4 was added in 2021.

Update to Activities: Our field activities have been affected by the COVID-19 Pandemic, as well as an unanticipated cessation order that grounded all UAS operations that was issued in January 2019 by our Federal funding source (Department of Interior Memorandum 3379). Given the DOI UAS cessation order and additional travel restrictions due to COVID-19, we revised our 2020 field plans to include a shortened season (August to October) that only involved deployment of the time-lapse camera component of our research plan. We continued to evaluate opportunities to develop UAS surveys of spotted seal haulout sites during the first two quarters of 2021, but the UAS cessation order has not been lifted or modified. As a result of limitations to our originally proposed UAS approach, our project is now particularly focusing on and expanding the use of time-lapse camera data collection approaches. We added another field site for camera monitoring in 2021 (for a total of four sites), and will add another year of data collection in 2022. We are currently considering an alternative funding source that will support collection of data from small drones during our summer 2022 field season.

Preliminary results: Four sites were monitored over the course of the July-October 2021 field season (Figure 1). Monitoring stations were established at three sites in July 2021: Peard Bay, Oarlock Island in Dease Inlet, and the mouth of the Paisuq River in Smith Bay. These sites were serviced in September 2021, and subsequently decommissioned in October 2021. Of note however, the Oarlock Island site became defunct in early August 2021 – the sand spit that has been a persistent spotted haulout area (in our 2020 data as well as in previous years based on NSB-DWM tagging data and Indigenous Knowledge) was partially flooded and under water when we deployed equipment in July 2021 (see Figure 2). Persistent strong winds and high water levels continued into August and eventually completely eroded the haulout site. The camera and acoustic recording equipment disappeared, apparently also eroded out of the substrate at the site. No seals were seen at this site, nor was there substrate available for haulout purposes (A. Von Duyke, pers. comm). In September, a fourth site was established at the mouth of the Topagoruk River in Dease Inlet, which was maintained into October.

In 2021, two cameras, an acoustic recorder, and weather station were deployed at the Peard Bay, Smith Bay, and Dease Inlet (first Oarlock Island then Topagoruk River, as described above) sites. Summaries of the operational periods for equipment at each site is shown in Table 1. Overall, we collected data on a *cumulative* of 41 days at two sites in 2020 and 165 days at four sites in 2021.



Figure 2. Oarlock Island haulout site on 24 July 2021. The water level marker is in the background along the far side of the spit, while coPI Andrew Von Duyke replaces the time-lapse camera. The acoustic recorder is located on the post below the camera. The same post was used for monitoring in 2020, but was not located in the water in 2020. Wind-driven erosion of the spit occurred subsequent to this photograph, and the spit was under water and unavailable as a haulout for seals by August 2021. Photo by D. Hauser.

Table 1. Sampling summary table of monitoring conducted in 2020 and 2021. Each site was monitored during daylight hours with 1-2 Reconyx Hyperfire2 time-lapse cameras for high definition photos (one per minute) of the haulout area, a Wildlife Acoustics SongMeter4 recorder to detect ambient airborne sound, and a HOBO weather station to continuously record local wind speed and direction, max wind gusts, precipitation, temperature, and relative humidity in each area (Peard, Dease, and Smith). Additional regional environmental monitoring was provided by community-based Iñupiaq observers in Utqiaġvik as part of the Alaska Arctic Observatory & Knowledge Hub.

Year	Site	Monitoring dates	Total no. days monitored
2020	Dease: Oarlock	20 Aug – 5 Sept	17
	Smith Bay	31 Aug – 24 Sept	24
2021	Peard Bay	14 July – 22 Aug 17 Sep – 7 Oct	59
	Dease: Oarlock	12 July – 13 July	1
	Dease: Topagoruk	17 Sep – 17 Oct	30
	Smith Bay	12 July - 23 Aug 17 Sep – 20 Oct	75

Nearly all 2020 data have been entered and 2021 data entry is underway. To date, no seals have been observed on the Smith Bay cameras from 2020, although data entry from camera 2 remains to be completed.

Preliminary analysis of the 2020 observations at the Oarlock Island haulout site in Dease Inlet focus on examining the numbers and presence of spotted seals during hourly intervals relative to environmental factors (see Figure 3). Spotted seals were present in 59.7% of the 305 hourly observations that occurred from 8/20/2020-9/5/2020. The greatest number of seals hauled out was 69 seals on 8/26/20. Seals were present for some proportion of the hourly periods monitored on nearly every day, but attendance varied over the monitoring period and was more common in late August than early September. Wind also affected the presence of seals. We observed a greater number of hauled out seals during periods with low wind speeds, calm sea state conditions, and northeasterly or easterly wind directions. There were no clear disturbance events observed during the 2020 monitoring period at Oarlock Island (described as multiple seals in “alert” behavior or flushing/fleeing from the haulout).

UAF student involvement: This project has also involved three undergraduate Biology & Wildlife students at UAF in the review and entry of data collected from the time-lapse cameras, including: Kimberly Kivvaq Pikok, Saoirse Bogart, and Ashlynn Nakvinda. We anticipate direct involvement in the field work by at least one student during summer 2022.

Local involvement and outreach: Project plans were originally introduced to the Ice Seal Committee for review in 2019. Local involvement and outreach continue to be fundamental components of the project. Project updates and results continue to be shared with the Ice Seal Committee as well as updates in ‘AAOKH News’ and NSB-DWM newsletters. Local weather and environmental observations at spotted seal haulout sites are also put in the context of holistic regional environmental conditions contributed by Utqiaġvik observers with the Alaska Arctic Observatory & Knowledge Hub (AAOKH) community-based monitoring program at the University of Alaska Fairbanks (<https://arctic-aok.org/>).



Figure 3. Oarlock Island time-lapse camera photo on 29 August 2020. Example photo of spotted seals hauled out at the Oarlock Island site in 2020. The water level marker is in the foreground, which can also be seen in Figure 2 illustrating how this site changed in 2021. NMFS Permit 23546.