

Aerial Infrared Survey of Maternal Polar Bear (*Ursus maritimus*) Denning Habitat



Winter 2019/2020

FINAL

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Introduction

Infrared (IR) surveys were conducted in the winter of 2019/2020 to locate potential maternal polar bear dens in the vicinity of ongoing and planned industrial operations occurring on the North Slope of Alaska. During a pre-flight meeting on November 12, 2019, the USFWS identified the specific survey areas to be flown based on the levels and types of activities to occur, as well as their location in proximity to known denning habitat. This report summarizes the results of the survey effort conducted on behalf of ConocoPhillips Alaska, Inc. (CPAI) under the Letters of Authorization (LOA) 16-13, 19-14, 19-16, 19-18, and 19-19.

Surveys of CPAI's planned areas of activity for the winter of 2019/2020 were conducted on December 12, 13, and 16, 2019 and repeated on January 12, 13, and 16, 2020. The areas and activities included:

- Routine operations and ice road construction within the Kuparuk River Unit;
- Routine operations and ice road construction within and near the Alpine oil field in the Colville River Unit and Greater Mooses Tooth Unit;
- GMT2 Development construction activities; and,
- An exploration program in the National Petroleum Reserve – Alaska (NPR).

Methodology

The December surveys were conducted using the Shared Services Twin Otter (DHC-6) equipped with the Star SAFIRE® 380-HD FLIR. Due to maintenance requirements of the 380-HD FLIR camera system, CPAI chose to conduct the January surveys using a Vulcanair P68C aircraft equipped with a WESCAM MX-10 imaging system to ensure that quality data were obtained. In all cases surveys were flown between 700- and 1,500-feet above ground level, depending on weather conditions.

Prime terrestrial maternal polar bear denning habitat in northern Alaska has been identified as snow drifts that form on banks or bluffs measuring $\geq 16^\circ$ in slope and ≥ 1.3 m in height (Durner et al., 2001). These features have been mapped as denning habitat (Durner et al., 2001; Durner et al., 2006; Blank, 2012; Durner et al., 2013), and were overlaid with the current proposed industrial activities. The crew utilized Global Positioning System coordinates, computer mapping software, and visual ground references to target these areas of overlap in-flight. The survey coordinator directed the pilots and IR operator to ensure adequate coverage of target areas and acquisition of high-quality imagery. Some areas were surveyed repeatedly to account for unfavorable environmental conditions or suspect thermal detections (hotspots) that required follow-up.

High probability denning habitat, (e.g. along the barrier islands), outside of the planned areas of activity were surveyed in order to calibrate the IR equipment. The locations of all potential polar bear dens (hotspots) observed outside of CPAI's operations were transferred directly to the USFWS and are not addressed in this report.

Survey times, locations, and flight crew are shown in Tables 1 and 2. Reported weather conditions at nearby airports are shown in Tables 3-9.

Survey Activities

On December 12, 13, and 16, 2019 and January 12, 13, and 16, 2020, potential denning habitat, including drainages, bluffs, and channels conducive to adequate snow drifting, was surveyed near CPAI project areas. Survey areas and aircraft flight tracks are shown in Figures 1 and 2.

Results

Video imagery was reviewed by the Fairweather Science data manager/image analyst post-flight to identify potential locations to re-survey. Video files were made available to the USFWS via Egnyte (a document storage and sharing website) and were reviewed by staff in Anchorage and on the North Slope. CPAI will also receive the survey data to accompany this report.

Hotspots indicative of potential dens were not detected in the CPAI survey area during the December surveys.

On the morning of January 3, 2020, a putative den site was detected during another North Slope operator's den detection survey (not commissioned by CPAI) and its location was provided to CPAI by the USFWS. The site (identified as HS1903) was in a small drainage about 0.5 miles west of the road between Drill sites 3A and 3I in the Kuparuk oilfield. HS1903 was subsequently revisited January 3 (afternoon), 4, and 7 by that operator, to determine if the site remained hot or other evidence of bear presence could be identified. The site appeared to be cooling down (weaker infrared signal) on January 4. Two revisit surveys were conducted on January 7, an afternoon/daylight survey and an evening survey. A hole in the snow was visible in the electro-optical (EO) imagery but there was no heat signature visible in the IR imagery on the January 7 afternoon survey. A heat signature for HS1903 was also not detected on the January 7 evening flight, although the image quality was poor due to low-lying clouds, fog, and precipitation. On January 9, USFWS officials, the survey team, a CPAI environmental representative, and a bear guard walked out to the location of HS1903. A vacated fox hole was discovered at the location of HS1903.

Between January 4th and 7th, 2020 CPAI worked with USFWS to implement a restriction on non-essential traffic, both on and off road, within 1-mile of the putative densite. Based on the multiple overflights, and on-the-ground reconnaissance, the site was determined to not be a polar bear den, and the USFWS rescinded all travel and operational restrictions in the area on January 9th. See Table 10, Figure 2, and Photos 1 and 2.

Surveys targeting the CPAI project areas took place on January 12, 13, and 16, 2020. Putative den sites were not discovered during these surveys.

Summary

While HS1903 was still considered a putative den site, CPAI moved a drill rig in the vicinity of this location with guidance and approval from the USFWS. CPAI consulted with the USFWS on if the move was permissible and how to minimize potential disturbance. The USFWS allowed the

rig move and requested that CPAI minimize engine revving, turn off unnecessary lights and alarms, and station an individual to monitor the HS1903 site from a distance for polar bear activity while the move was underway.

No other suspected den sites were identified in CPAI's project area.

Aerial IR survey equipment and techniques, while the recognized standard methodology for locating and evaluating potential polar bear dens, may not detect 100% of the dens inhabited in the survey area. Operations should be completed with caution in all areas. USFWS will advise CPAI on any supplemental findings once available.

Table 1. December Survey Summary

Aircraft	Shared Services Twin Otter (DHC-6) [N842AR]			
Sensor	Star SAFIRE® 380-HD FLIR			
Pilot	Mike Watson – Dec 12, Dec 13am Larry Shue – Dec 13pm, Dec 16			
Co-Pilot	Brooke Roman – Dec 12, 13am Adam Skinner – Dec 13pm, Dec 16			
FLIR Operator	Nate Gilbert – Dec 12, Dec 13am, Dec 16 Brian Nelson – Dec 13pm			
Survey Coordinator	Justin Blank			
Observer	Kathleen Leonard – Dec 12, Dec 16 Joe Wells (ABR) – Dec 12, Dec 13am John Ribbich (CPAI) – Dec 13pm			
Image Analyst	Kathleen Leonard			
Area Surveyed	NPR-A, CRD, Kuparuk			
Survey Date	Dec 12	Dec 13 (am)	Dec 13 (pm)	Dec 16
Departed	6:52	6:30	17:14	17:33
Landed	10:15	9:28	22:25	19:56
Notes	<ul style="list-style-type: none"> • Departed and landed at Alpine airstrip (PALP). • Barrier islands were surveyed for calibration before and/or after effort in the CPAI survey area. • No potential dens were detected in the survey area. 			

Table 2. January Survey Summary

Aircraft	P68C (N170WL)		
Sensor	WESCAM MX-10		
Pilot	Greg Rowe		
FLIR Operator	Chelsea Merriman		
Survey Coordinator	Justin Blank		
Image Analyst	Kathleen Leonard		
Area Surveyed	NPR-A, CRD, Kuparuk		
Survey Date	Jan 12	January 13	January 16
Departed	6:17	6:37	5:03
Landed	8:52	9:00	9:37
Notes	<ul style="list-style-type: none"> • Departed and landed at Deadhorse airport (SCC). • Barrier Islands and/or other operator areas surveyed before and/or after effort in the CPAI survey area. • HS1903 was detected close to the CPAI survey area on January 3 and revisit surveys were conducted on January 3 (afternoon), 4, and 7 by another North Slope operator. 		

Table 3. Weather Conditions on December 12, 2019

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	6:45	6:53	6:45	6:53	6:55
Temperature (Celsius)	-20.0	-19.4	-22.0	-23.9	-19.8
Dew Point (Celsius)	-22.0	-21.1	-26.0	-25.6	-21.7
Altimeter (in Hg)	29.69	29.69	29.70	29.52	29.50
Wind Direction (magnetic)	130	310	120	Calm	Calm
Wind Speed (knots)	5	5	3	-	-
Visibility (miles)	8	7	4	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	0	≥ 12,000	≥ 12,000
Cloud Cover (feet)	FEW @ 200	Scattered @ 100	Broken @ 0	Sky Clear	Sky Clear
Notes	-	Fog in vicinity	Mist	-	-

Table 4. Weather Conditions on December 13, 2019 (AM)

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	6:45	6:53	6:45	6:53	6:53
Temperature (Celsius)	-24.0	-24.4	-22.0	-23.9	-19.5
Dew Point (Celsius)	-27.0	-27.2	-26.0	-25.6	-21.3
Altimeter (inHg)	29.52	29.49	29.50	29.52	29.50
Wind Direction (magnetic)	Calm	240	230	Calm	Calm
Wind Speed (knots)	-	3	2	-	-
Visibility (miles)	10+	10+	10+	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000
Cloud Cover (feet)	Sky Clear	Sky Clear	Sky Clear	Sky Clear	Sky Clear
Notes	-	-	-	-	-

Table 5. Weather Conditions on December 13, 2020 (PM)

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	16:55	16:53	16:45	16:53	16:55
Temperature (Celsius)	-24.0	-22.2	-24.0	-25.6	-19.6
Dew Point (Celsius)	-27.0	-25.0	-26.0	-28.3	-22.2
Altimeter (inHg)	29.60	29.57	29.59	29.60	29.58
Wind Direction (magnetic)	Calm	250	280	Calm	270
Wind Speed (knots)	-	5	3	-	9
Visibility (miles)	8	10+	10+	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000
Cloud Cover (feet)	FEW @ 400	Sky Clear	Sky Clear	Sky Clear	Scattered @ 200
Notes	-	-	-	-	-

Table 6. Weather Conditions on December 16, 2020

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	17:45	17:53	17:45	17:53	17:35
Temperature (Celsius)	-13.0	-12.0	-13.0	-19.0	-10.0
Dew Point (Celsius)	-15.0	-15.0	-15.0	-21.0	-12.0
Altimeter (inHg)	29.80	29.78	29.79	29.79	29.76
Wind Direction (magnetic)	80	90	70	50	100
Wind Speed (knots)	14	17	4	6	32
Visibility (miles)	10+	8	10+	8	1.5
Ceiling (feet)	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000	700
Cloud Cover (feet)	Sky Clear	Sky Clear	Sky Clear	Sky Clear	-
Notes	-	-	-	-	Snow

Table 7. Weather Conditions on January 12, 2020

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	16:50	16:53	16:45	16:53	16:35
Temperature (Celsius)	-28.0	-33.3	-30.0	-31.1	-29.7
Dew Point (Celsius)	-33.0	-37.8	-35.0	-34.4	-33.0
Altimeter (inHg)	30.02	30.03	30.04	30.02	30.08
Wind Direction (magnetic)	100	120	120	60	Calm
Wind Speed (knots)	5	6	4	4	-
Visibility (miles)	10+	10+	10+	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000
Cloud Cover (feet)	FEW @12,000	Scattered @ 20,000	Scattered @ 11,000	Sky Clear	Sky Clear
Notes	-	-	-	-	-

Table 8. Weather Conditions on January 13, 2020

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	5:45	5:53	5:59	5:53	6:15
Temperature (Celsius)	-21.0	-17.8	-21.0	-23.3	-20.0
Dew Point (Celsius)	-24.0	-22.2	-23.0	-26.1	-22.3
Altimeter (inHg)	30.00	30.00	30.01	30.01	30.02
Wind Direction (magnetic)	170	220	210	200	240
Wind Speed (knots)	6	16	10	10	10
Visibility (miles)	10+	10+	10+	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000	≥ 12,000
Cloud Cover (feet)	Scattered @ 5,000	Sky Clear	FEW @ 6,000	Sky Clear	Sky Clear
Notes	-	-	-	-	-

Table 9. Weather Conditions on January 16, 2020

	Alpine (PALP)	Deadhorse (PASC)	Kuparuk (PAKU)	Nuiqsut (PAQT)	Point Thomson (PAAD)
Time (AKST)	4:45	4:53	4:45	4:53	5:15
Temperature (Celsius)	-21.0	-23.9	-21.0	-20.0	-22.7
Dew Point (Celsius)	-25.0	-27.2	-25.0	-23.9	-25.3
Altimeter (inHg)	30.40	30.40	30.40	30.40	30.42
Wind Direction (magnetic)	170	90	200	200	120
Wind Speed (knots)	6	3	3	9	7
Visibility (miles)	10+	10+	10+	10+	10+
Ceiling (feet)	≥ 12,000	≥ 12,000	15,000	≥ 12,000	≥ 12,000
Cloud Cover (feet)	FEW @14,000 FEW @ 15,000	Sky Clear	Broken @ 15,000	Sky Clear	Sky Clear
Notes	-	-	-	-	-

Table 10. HS1903 Detection Details

Hotspot	Date Detected	Platform/ Sensor	Location	Revisited	Notes
HS1903	January 3, 2020	P68C/ MX-10	70.41691N 149.95879W	Jan 3 (afternoon) Jan 4 Jan 7	Not observed during December surveys. Determined to be a fox excavation.

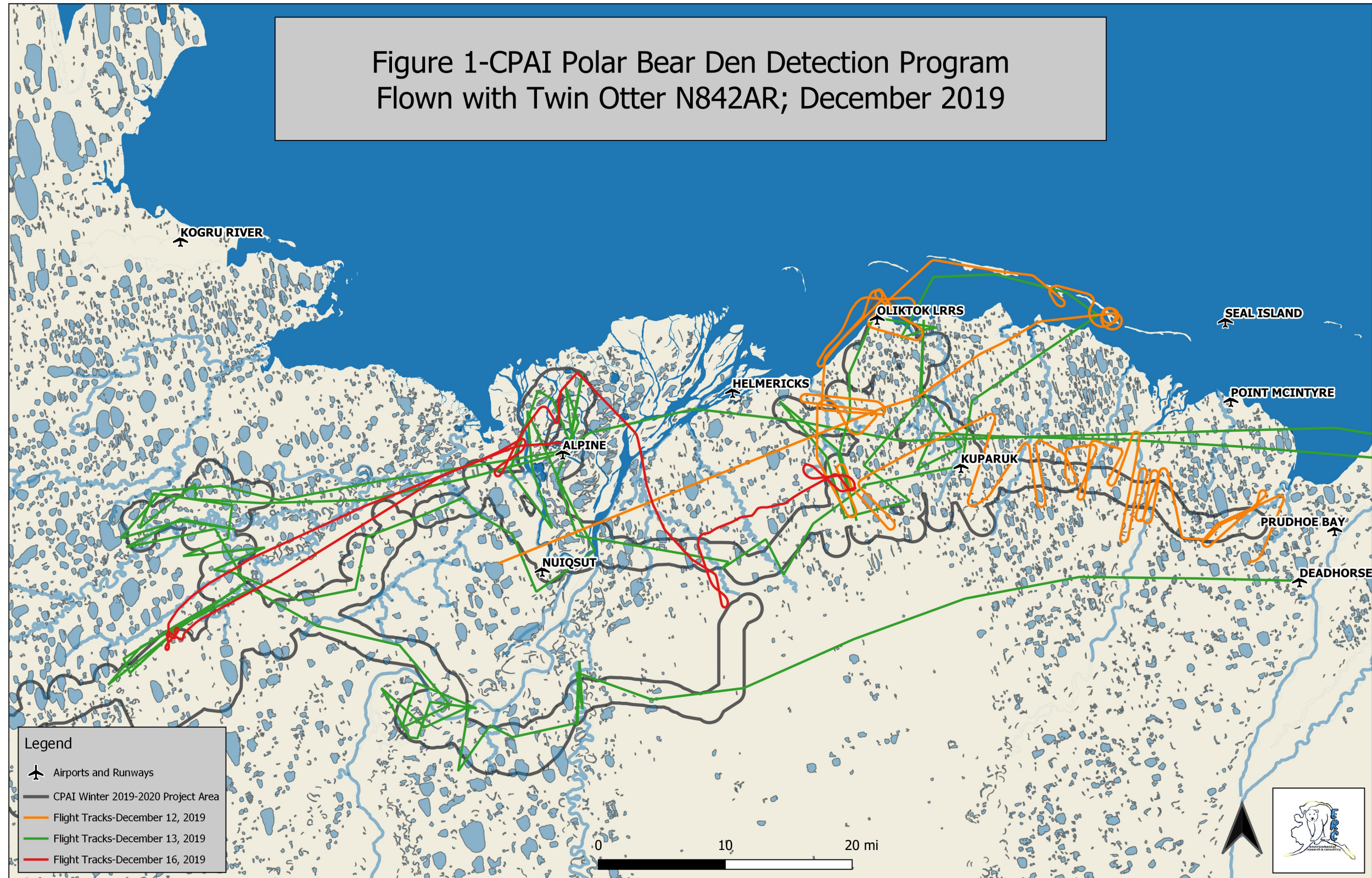


Figure 1. December 2019 Survey Flight Tracks

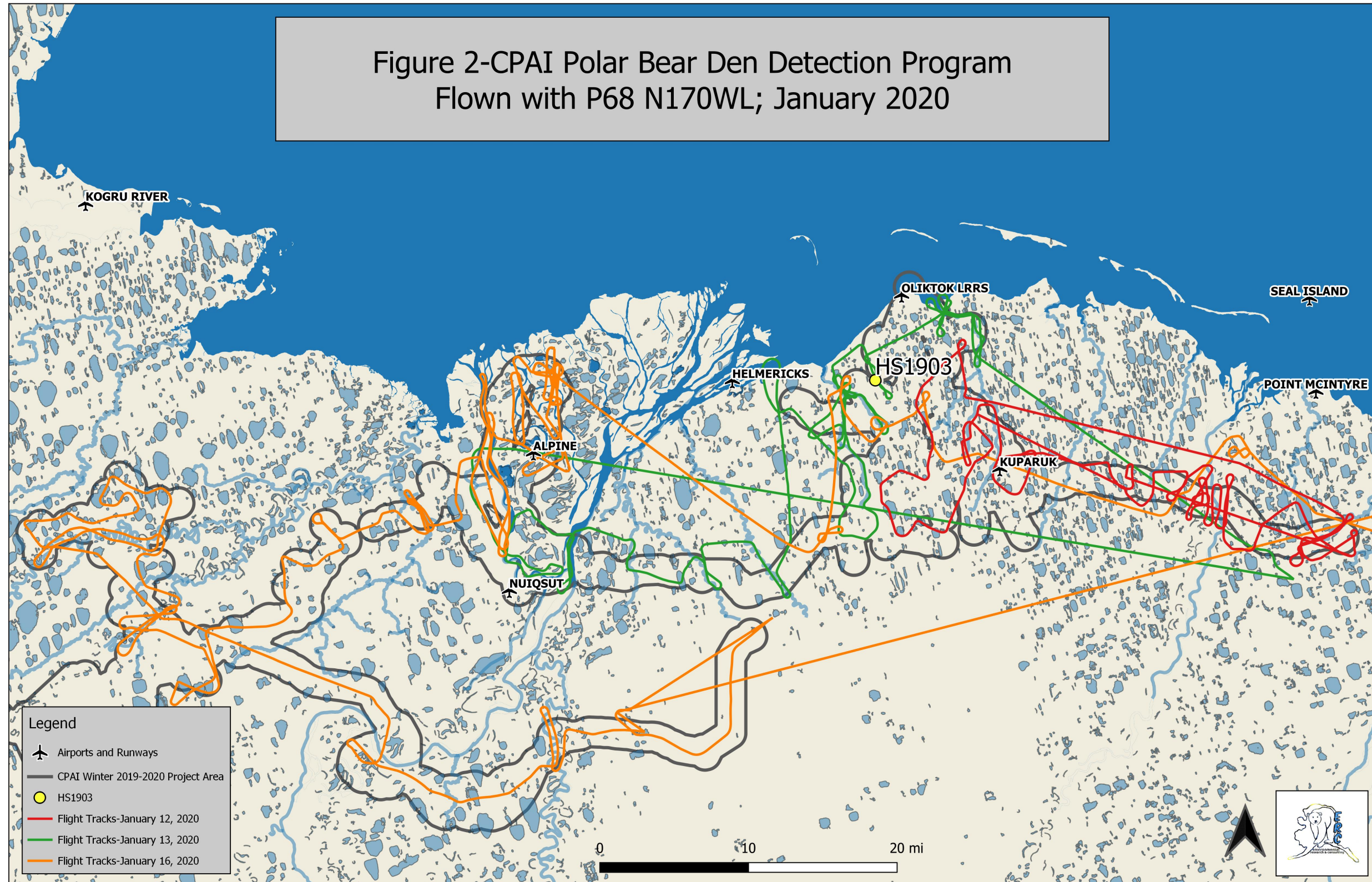


Figure 2. January 2020 Survey Flight Tracks

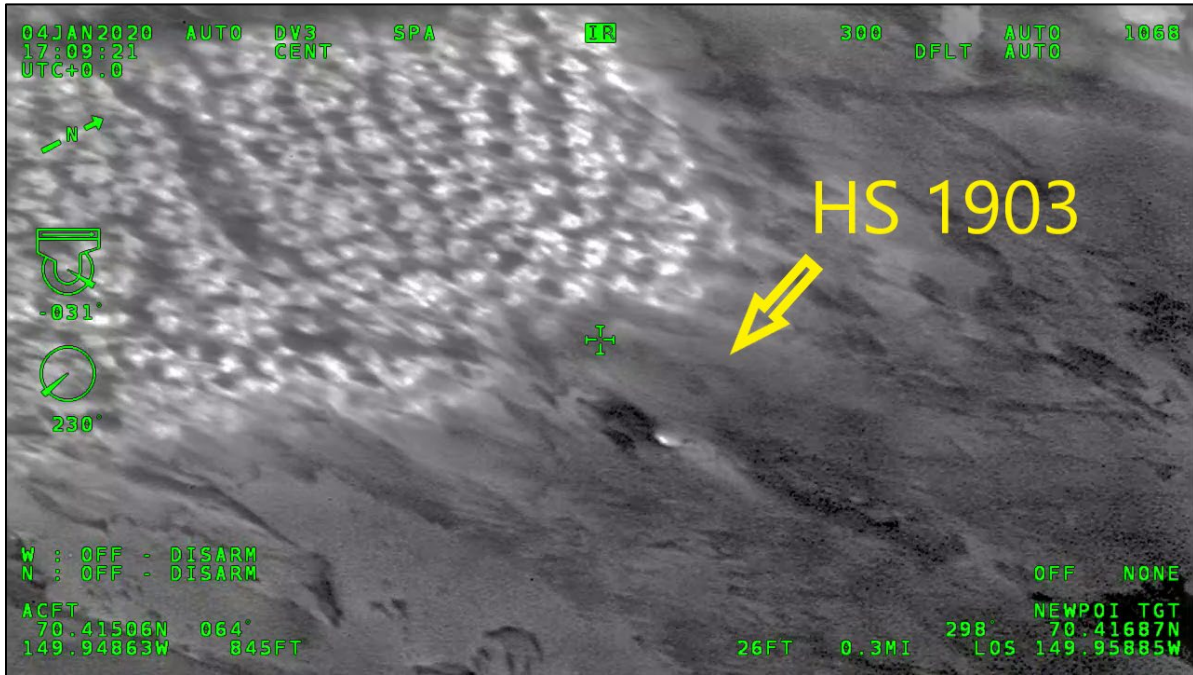


Photo 1: Infrared Image of HS1903

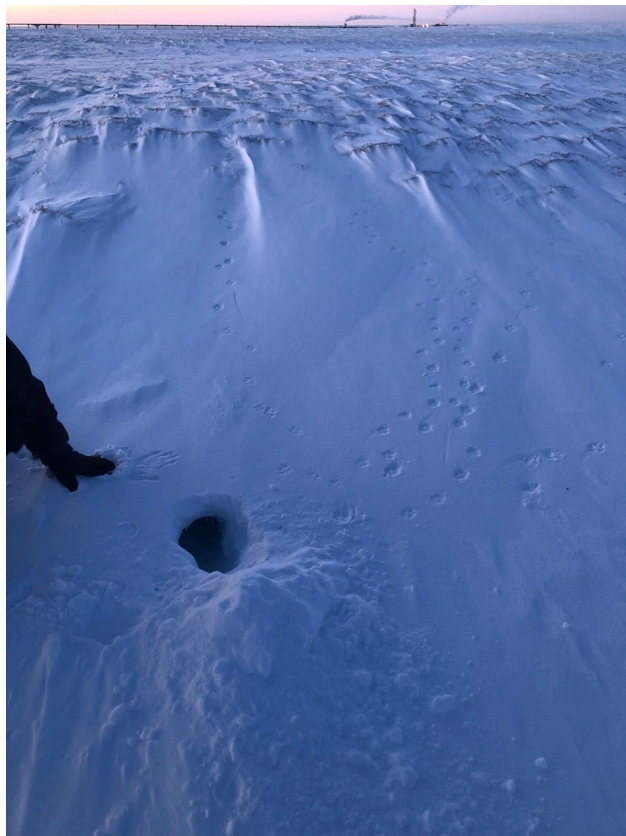


Photo 2: HS1903 determined to be a temporary shelter constructed by a fox.