

The Occurrence of Historical Polar Bear Maternal Denning on a Man-made Feature, North Slope, Alaska

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Background

A gravel pad near Milne Point on Alaska's North Slope, named the Staging Pad, has become a unique maternal denning location for polar bears (*Ursus maritimus*) in that the substrate is a man-made gravel stockpile rather than a natural feature (Fig. 1). While denning by polar bears on man-made substrates has been reported in other areas of the Alaskan arctic, the Staging Pad is the only such feature in Alaska that is consistently used by pregnant female polar bears for their dens. Between 2000 and 2015 thirteen maternal den sites have been verified at the site by radio-telemetry, cameras, scent-trained dogs, summer inspections, or a combination of these (Fig. 2). No den sites were confirmed for 2001, 2002, 2006, or 2014. Snow drift measurements indicate that most historical den locations correspond to areas of heavy snow accumulation on the Staging Pad.

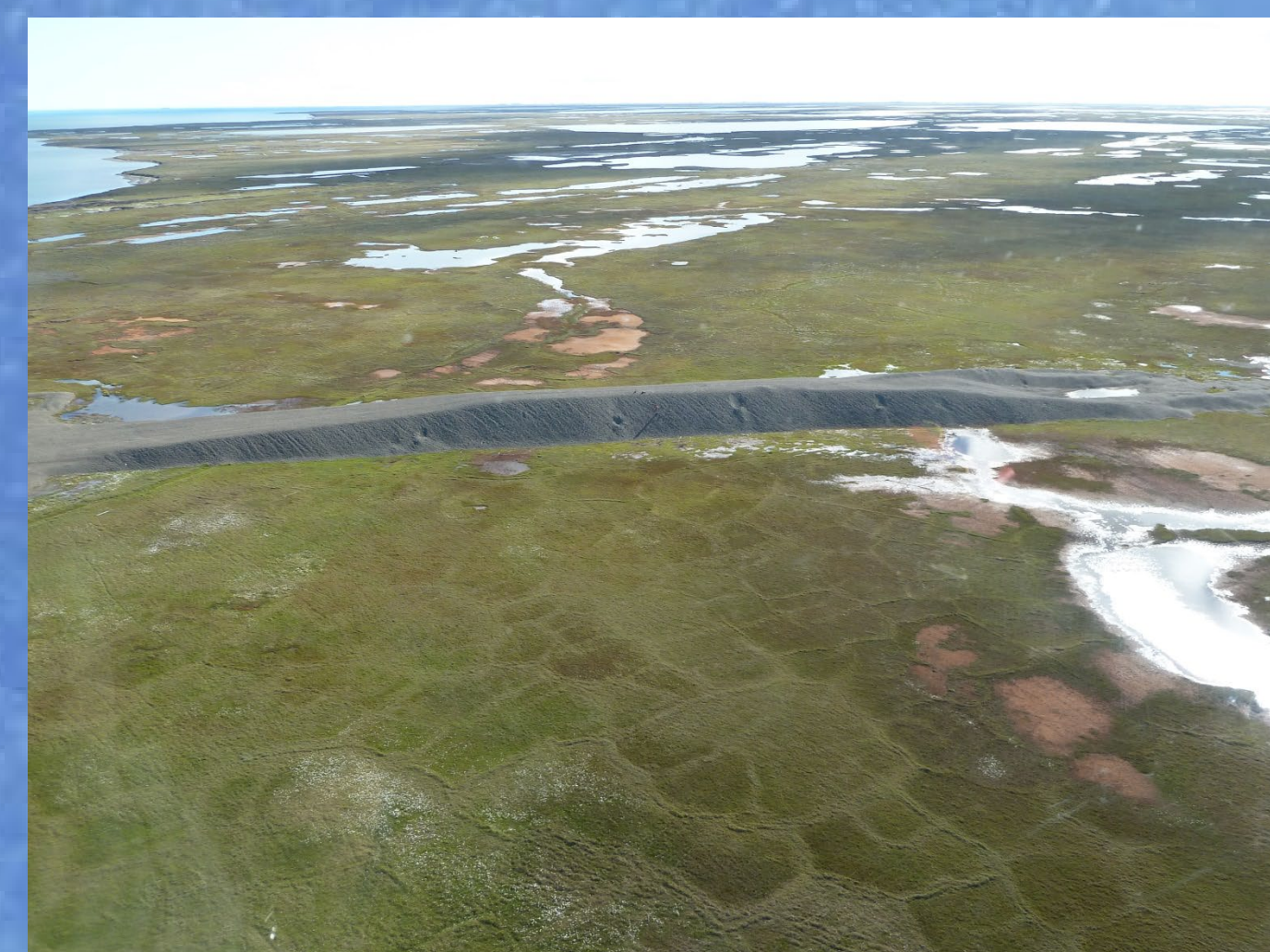


Figure 3. The Staging Pad consists of a wide, thin gravel pad and a large north/south-oriented tail, ca. 7 m high x 50 m wide x ca. 270 m long.

The Uniqueness of the Staging Pad

Since on average polar bears breed every third year, the consistency of successful dens almost every year suggests that multiple females are using the Staging Pad. For its size (2.7 ha), the Staging Pad appears to be a stable and highly selectable habitat for bears when choosing maternal den locations (Fig. 3). Features that promote its repeated use include its location, orientation, and geomorphology. Its location along the coast ensures that bears traveling the coastline will find it. Its north-south alignment, perpendicular to the prevailing winds, as well as its height, length and steep slope promote accumulation of snow on its western and eastern flanks (Fig. 4). Buildup of deep drifts begins early in the winter (October) when pregnant females are searching for den sites, and continues as the denning season progresses (Fig. 5).

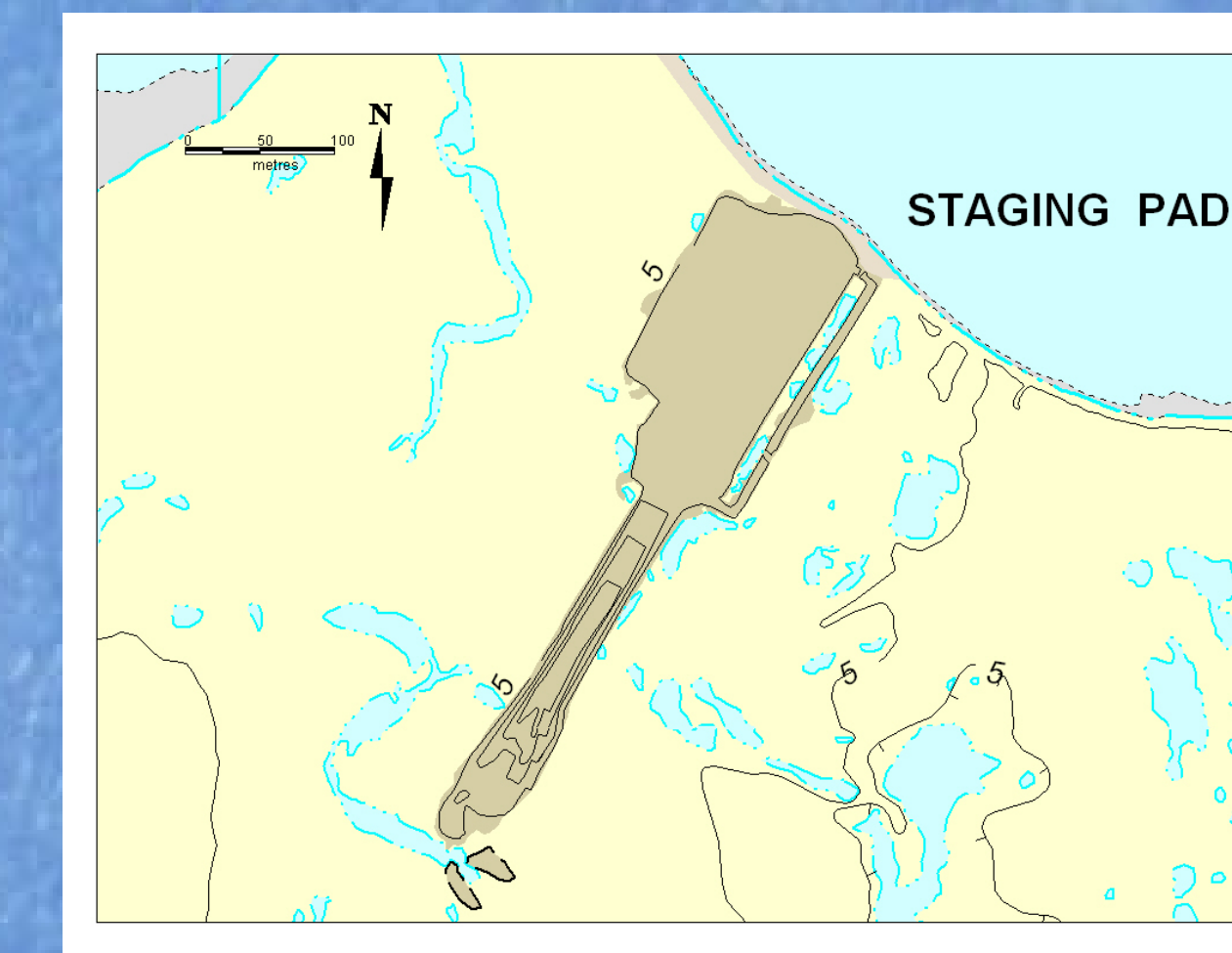


Figure 1. The Staging Pad, an abandoned gravel pad located on the Beaufort Sea coast, was most likely constructed in support of a well site drilled in December 1970.



Figure 2. Polar bear maternal den locations on the Staging Pad, 2000-2015.



pad in the 1970s which was never built. Note the remnant bear den site (arrow).



Figure 5. Open maternal polar bear den on the western flank of the Staging Pad tail, 2012.



Figure 6. The U.S. Fish and Wildlife Service works to minimize disturbance to pregnant females using the Staging Pad as a den site. One way is to conduct den detection surveys using Forward-looking infra-red (FLIR). Note: Polar bear den heat signature in red circle.

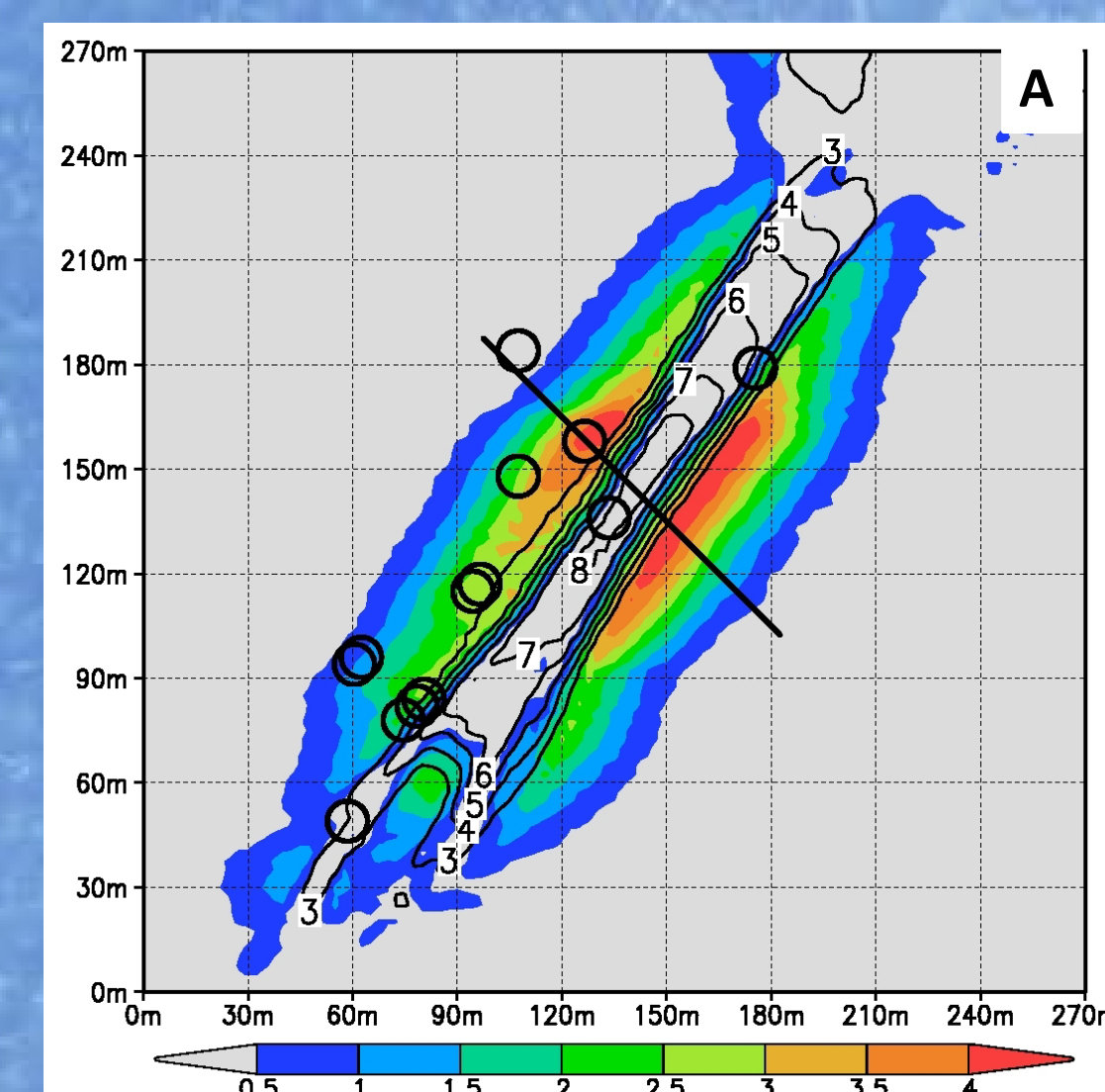


Figure 7a. The Staging Pad showing a Tabler equilibrium snowdrift depth surface (m; color shades) for NE, E, SW, and W winds, and topography (1 m contour interval; black contour lines); and historical den locations 1995-2012 (black circles) (Liston et al. 2016).

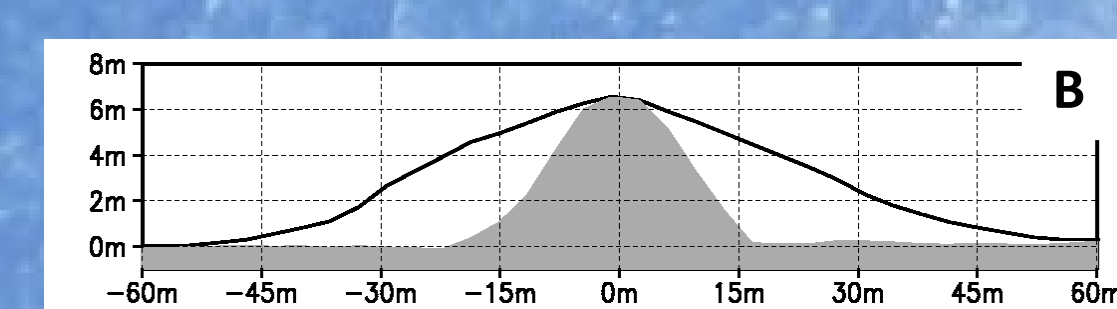


Figure 7b. A cross-section topography (gray shade) of the Staging Pad and Tabler snowdrift profile along the northwest-to-southeast line drawn in (A); Liston et al. 2016).

Importance to Polar Bears

Even though the pad is located within the North Slope oil fields, its distance (greater than 7 km) from permanent industrial facilities limits potential anthropogenic disturbance, further increasing its attractiveness to bears as a denning site. Any additional industrial encroachment closer to the Staging Pad or removal of gravel may alter the selection of this site by pregnant females (Fig. 6). A snow drift model developed by Liston et al. (2016) will help predict denning potential of the Staging Pad to polar bears based on snow accumulation (Fig. 7). Additionally, with the potential increase of bears selecting terrestrial den sites due to the changing sea ice conditions, the importance of stable, denning habitat, such as the Staging Pad, to the Southern Beaufort Sea polar bear population will become more important in the future.