

COMPARISON OF 290 PHOTOS OF WILD SWAN NESTS

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ABSTRACT

One hundred sixty Trumpeter Swan (*Cygnus buccinator*) nest photos are compared with 130 similar photos of Tundra Swan (*Cygnus columbianus*) nests, taken from a small airplane approximately 500 feet (152 m) above ground. The photos include an area about 200 by 300 feet (61 by 91 m) when taken perpendicularly, more if taken at an angle. The male swan was not in the photo for 33 percent of the Trumpeter Swan nests and 78 percent of the Tundra Swan nests. The trumpeter nests were 100 percent in or very near (average 3 ft (0.9 m) a rearing lake while 56 percent of the 108 Tundra Swan photos showed a rearing lake averaged 36 feet (11 m) from the nest. Beaver structures were important for trumpeters. Tundra polygons were important for Tundra Swans. Man made structures showed in 2 percent of photos for each species. Litter showed in 7 percent of tundra photos, but not in trumpeter photos. Other less obvious characteristics are described. Discussion includes possible improvements in photographic technique and the potential value of such photographs for future scientists and wildlife managers dealing with problems we can not conceive of today.

STUDY AREA

Wild swans nest on most of the lowlands of mainland Alaska. Trumpeter Swans (*Cygnus buccinator*) use the temperate rain forest region of the south coast and the boreal forest region of the Interior. The Tundra Swans (*Cygnus columbianus*) use the treeless habitat of western and northern Alaska. Some overlap occurs where these distinct habitats meet. One hundred and sixty trumpeter nest photos are compared with 130 similar pictures of Tundra Swan nests taken from a small airplane approximately 500 feet (152 m) above. The trumpeter nests were on the Copper/Bering River deltas near Cordova, Alaska, at about 60 ° north latitude. The tundra nests were in the treeless Arctic oil fields some 750 miles (1,200 km) farther north at about 70 ° north latitude. The trumpeters were photographed in the last week of May 2004 and the tundras about 3.5 weeks later. Rainfall for the nesting months May through July averages 14.6 inches (37 cm) at Cordova and only 1.3 inches (3.4 cm) at Barrow in the Arctic. Temperatures for those 3 months average about 50 °F (10 °C) at Cordova and 32 °F (0 °C) at Barrow (Figure 1).

METHODS

The U.S. Fish & Wildlife Service (USFWS) has been plotting the location of trumpeter nests at various locations in Alaska for nearly 50 years. Oil companies – first ARCO Alaska then ConocoPhillips Alaska – have employed ABR, Inc. to plot Tundra Swan nests in their Kuparuk oil field since 1988 (Anderson *et al.* 2003) so their engineers can avoid these sensitive areas when designing oil field structures. The author has been participating in these

surveys for a number of years and has taken advantage of this opportunity to photograph swan nests. This paper deals only with photos taken in 2004.

The camera used was a Cannon EOS Rebel S II with a 35-70mm zoom lens. This camera has an automatic setting for sports events that uses maximum shutter speed for the available light and instantly adjusts for focus. This camera gives a point and shoot capability that minimizes extra flight time. The lens was set at 35mm to include maximum habitat, thus the swans appear as white dots. The photos include an area of about 200 by 300 feet (61 by 91m) when taken perpendicularly, larger if at an angle. ASA 400 print film was used. The location of each nest was plotted and numbered on 1:63,360 scale U.S. Geological Survey maps. The observation number was recorded with a dot and a number on the margin of each map. The film and exposure numbers were also recorded on the map margin. Later, a small sticker with this information was placed on each print so it could easily be identified with its map location.

A high wing, single engine, light Cessna airplane flown at about 100 mph (167 km per hr.) was used. The photographer rode in the right front seat, kept the camera turned on and hung around his neck so no time was lost when a photo opportunity occurred. For this, paper photos were compared but the maps were not used. Tables were developed so the photos could be easily scored on 23 criteria (Table 2, Table 3).

RESULTS

It appears that the presence of the off duty bird, generally the male for each species, at or near the nest is much more important for trumpeters than for tundras (Table 1). In contrast, both parents of each species are equally attentive once the young are hatched. The trumpeter nests are in or immediately adjacent to the rearing wetland, averaging less than 3 feet (9m) that the cygnets would have to toddle for their first swim. A rearing wetland did not even show in 19 percent of the tundra photos. In the 108 instances where a rearing wetland was visible, the average distance was 36 feet (11m). Thus, newly hatched tundra cygnets are clearly expected to be better walkers than the only slightly larger trumpeters of the same age.

Nearly half the trumpeter nests are off shore either as a mound or on a tiny islet surrounded with not more than 20 inches (.5m) of perennial vegetation. Only 4 percent of tundra nests are on such islets. Larger islands are only moderately attractive and used at the same rate of 9 percent by both species. The “donut” image described by Hansen *et al.* (1971) for Trumpeter Swan nests where there is a moat around a nest mound in emergent vegetation occurred in 21 percent of the trumpeter pictures, but in none of the tundra photos.

Beaver activity, including lodges and dams, appear in 9 percent of the trumpeter photos, but are not a part of tundra habitat. It is obvious that beaver dams beyond the photos were far more important than indicated.

Patterned ridges sometimes found in otherwise wet tundra, known as polygons from their shape, seem to offer attractive nest sites for Tundra Swans (Figure 2).

Stirred up, muddy water suggested bottom feeding in some photos or perhaps nest building for trumpeters. There was evidence of mammals showing in several photos: beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*) in 37 percent of Trumpeter pictures and caribou (*Rangifer arcticus*) trails in 21 percent of the tundra photos. There is no evidence of interference by these species, although the occasional presence of caribou may be a factor in the inclination of Tundra Swans to build nests on mounds.

The presence of man-made structures, recent or abandoned, at 2 percent for both species suggest that such structures are a minor factor. Vehicle tracks that can last for years on the tundra are likewise a small

feature of this active oil field. Litter appeared in 7 percent of the tundra pictures, mostly in the form of wind distributed plastic.

DISCUSSION

This paper really describes an experiment in techniques rather than offering new scientific information. The data basically supports swan behavior that was described years ago by Hansen *et al.* (1971). Well organized photos can provide a solid record that could be useful to current land managers, but will have increasing value to biologists 50 or 100 years hence wrestling with problems of climate change and human technology we can not even imagine today. Some thoughts on how to develop a record for the ages immerge.

A permanent archive will be essential. Universities and museums know how to do this. There is a good deal of inducement, at this time, to use electronic images stored in computer files. There are still some questions as to whether such records will be as permanent as the black and white images archived for the past 150 years.

How to correlate images to a location on a map is a problem. USGS maps are the result of painstaking interpretation of stereo photos by expert cartographers providing detail not available from satellite images. But this was done before the Global Positioning System (GPS) was in place so there are small differences in the latitude/longitude positions. The Tundra Swan photos were all located on USGS maps and are fairly precise for obvious locations such as islands or lake shorelines, but are less so for nests in open meadows. A trumpeter nest was located by the GPS system in the airplane which was not exactly over the nest. Perfecting these imperfections may not be possible now, but such limitations need to be considered.

New digital cameras are comparable in price to the film camera we used and could result in cost savings for film, for the moments of air time used while changing film, for labeling and archiving the images, for zooming in on nest and vegetation details, and other activities.

Taking pictures at 35mm from 500 feet may be too distant. These photos do not show much about actual nest detail such as its size, type of mound, whether on a beaver house. I could not identify species of emergent vegetation in many cases. The photos are sharp enough so that they could be enlarged. This would be a simpler with digital photography. Photos

at 70mm from 400 ft (122 m) might give more useful detail. The analysis described in this paper is rather superficial in that it covers only 1 year and is not correlated with what shows on the maps. These areas may not be representative of the entire range of these birds, even for Alaska.

Biologists with ABR, Inc. have analyzed 10 years of Tundra Swan photos and maps (Anderson *et al.* 2003). They found that, in 2003, 30 percent of 75 active nest mounds in the Kuparuk had been used the preceding year and that some nest mounds had been used as many as 6 of the past 10 years. They described the plant communities surrounding the nests and a distance to the nearest rearing lake for all nests.

An expanded photo project would be required to really understand the difference between the selection requirements of the two species. A sample of trumpeter nest photos should include the Cook Inlet, Gulkana, Tanana and Yukon Flats regions as well as the Copper River Delta. Tundra samples would need to include the Alaska Peninsula/Bristol Bay area, Yukon Delta, Kotzebue Sound, and a broader range of the North Slope. A plot sampling system could be developed perhaps using USGS maps. A minimum of 5 years would be essential. An adequate project might not be unreasonable as there are National Wildlife Refuges with aircraft support in most of these areas.

How grateful modern biologists would be if Lewis and Clark had been able to photograph a sample of all swan nests as they crossed the land. They could not do that, but they did a superlative job of recording what they could and we still use their records. How grateful future biologists will be, if we do an equally good job of recording what we can in our time.

ACKNOWLEDGMENTS

Thanks to Caryn Rea of ConocoPhillips Alaska, Inc. and to Bob Ritchie of ABR, Inc. for making the Tundra Swan surveys possible. Bruce Conant of USFWS coordinated the Trumpeter Swan survey. The careful attention of pilots, A. J. Jain of ABR, Inc. and Ed Mallek of USFWS, made the photography possible. Thanks to Mary Lou King, James King, Steve Lewis, and Bruce Conant for help with this manuscript.

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Table 1. Presence of swans at 290 swan nests.

	160 Trumpeter Swan		130 Tundra Swan	
	Number	Percent	Number	Percent
Presence of swans				
Single bird on nest	133	83%	123	95%
Pair on nest	20	13%	7	5%
No bird on nest	7	4%	0	0

Table 2. Nest site location for 290 swan nests.

Location	160 Trumpeter Swan		130 Tundra Swan	
	Number	Percent	Number	Percent
Mound in open water	31	19%	2	2%
Mound in emergent vegetation	66	41%	5	4%
On islet	38	24%	4	3%
On island	15	9%	12	9%
On peninsula	3	2%	12	9%
On shoreline	6	4%	22	17%
On upland	1	1%	73	56%

Table 3. Observations made from photos of 290 nest sites.

Characteristic	160 Trumpeter Swan		130 Tundra Swan	
	Number	Percent	Number	Percent
Male not seen in photo	53	33%	102	78%
Donut shape	34	21%	0	0%
Old nest present	22	14%	8	6%
Polygon high center	0	0	31	24%
Polygon low center	0	0	19	15%
On ridge	0	0	32	25%
Open meadow	0	0	51	39%
Stirred up mud	34	21%	2	2%
Beaver structures present	15	9%	0	0%
Other mammal sign	59	37%	27	21%
Lingering ice or snow	13	8%	33	25%
Evidence of flooding	7	4%	0	0%
Manmade structure	2	2%	1	1%
Vehicle tracks	0	0%	7	5%
Oilfield structure	0	0%	1	1%
Litter	0	0%	9	7%

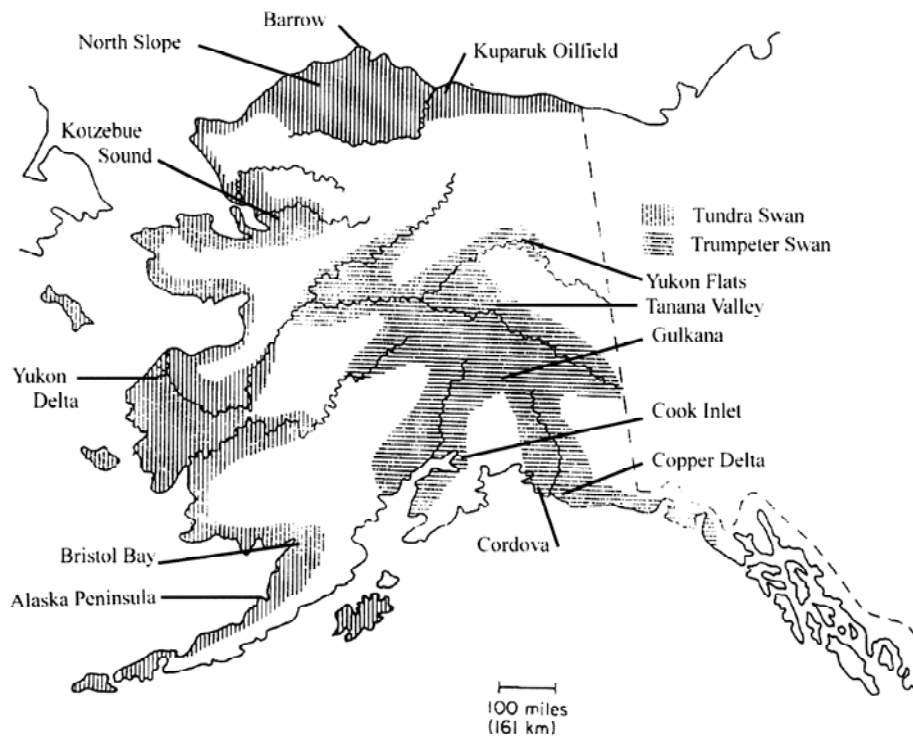


Figure 1. Approximate swan breeding range in Alaska.

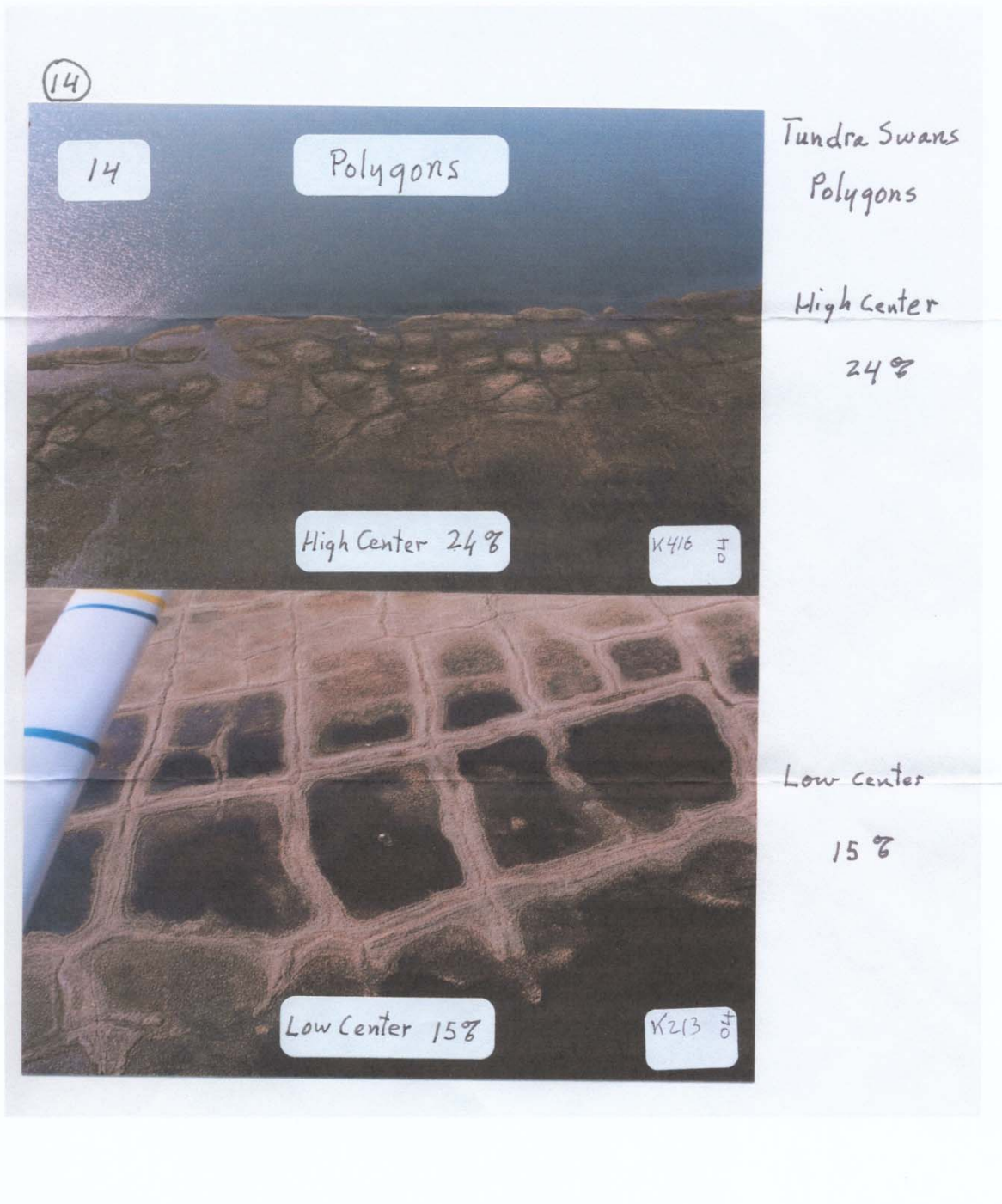


Figure 2. Aerial view of Tundra Swan nesting habitat.