Aerial Survey of Wintering Waterbirds in the Proposed Nai Kun Wind Farm Project Area of Hecate Strait, 2005

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SUMMARY:
An aerial survey was conducted in the proposed Nai Kun wind farm area of Hecate Strait during the period February 24 to 28, 2005. Estimates for the most abundant species were 19,224 white-winged scoters, 16,616 long-tailed ducks and 3,431 loons. Glare on the water surface reduced observations by as much as 81 percent. Additional surveys during migration periods are recommended.

INTRODUCTION:

The proposed Nai Kun wind farm project area is located in Hecate Strait off the northeast shoulder of Haida Gwaii, an area that is utilized by thousands of waterbirds in winter and far more during migration periods. As many as 350 wind turbines are planned, each rotating through a circle from 44 meters (150 feet) to 152 meters (500 feet). The waters out to 23 km from shore remain less than 10 fathoms in depth and provide feeding habitat for diving ducks and loons. This survey represents the first systematic offshore survey of the avian resources utilizing this unique area. Twenty-six transect lines spaced 1 nautical mile apart were flown twice between February 24 and February 28, 2005.

METHODS:

A turbine powered DeHaviland Beaver was flown by the senior author observing from the left seat and the second author observing from the right seat. The 26 transect lines were located on each minute of latitude between 53^{o} 40'N and 54^{o} 5'N inclusive and extended from shore to the 131^{o} 20'W longitude (Figure 1). The transects varied in length from 22.3 km at the north end to 38 km at the south end and totaled 785 km. Survey speed was 90 knots and altitude was 35 meters. Observations were made out to 200 meters on either side of the aircraft. Voice recordings were digitally recorded into two computers which were integrated with the aircraft's GPS radio, providing point location data for each observation.

Every other line was flown from south to north and then the intermediate lines were flown while working north to south. We were always two nautical miles from the previously flown transect. Scoters were classified to species, but goldeneyes, mergansers and loons were not.

Three categories of glare were recorded for all points along the transects by recording any changes between 0) no glare, 1) medium glare and 2) high glare. The classification of glare was made subjectively based on all factors involved with visibility problems. The degree to which glare interfered with observation depended on the interaction of sunlight, bright clouds or sky, wave height and texture, cloud type and color, sun angle to the horizon and sun angle to the direction of flight.

Visibility correction factors were determined as the average of values reported on two separate boat to air comparison studies in similar habitats of southeast Alaska. (Conant et al 1988 and Hodges and Groves, unpublished data). The estimates were expanded to the area blanketed by the transects, and the area expansion factor was simply the width of the transect divided into the distance between transects, or 4.6.

RESULTS:

The most abundant birds were white-winged scoters, long-tailed ducks, and loons (species unknown) (Table 1). For the most part, the first and second replicates were completed several days apart. The long-tailed ducks were three times more abundant on the second replicate as the first, indicating movement into the area during that period. In contrast, white-winged scoters were equally present on both survey dates.

With the application of area expansion and visibility correction factors, the estimates of total numbers by species were white-winged scoters 19,224, long-tailed ducks 16,616, loons 3,431, grebes 2709, and crab pots 1,241 (Table 2).

Waterbirds were distributed throughout the wind farm area. Scoters were more abundant in the northwestern part of the study area while long-tailed ducks were more abundant in the southern half (Figures 2 and 3).

Glare was a consistent negative factor for all species as well as crab pot buoys (Table 3). Moderate glare had the most effect, reducing long-tailed duck observations by 81 percent, loons by 59 percent, scoters by 25 percent and crab pots by 45 percent. Severe glare showed somewhat less effect, but still caused a 31 percent drop in long-tailed ducks and a 40 percent drop in loons. The percent of time spent under moderate or severe glare conditions was very similar for both replicates; 40% for the first replicate and 39% for the second replicate.

DISCUSSION:

This survey gave a good snapshot of the abundance and distribution of waterbirds in the proposed Nai Kun Wind Farm area of Hecate Strait in late February of 2005. It does not imply that similar numbers occur at other

times during the winter or in other years. This is a unique area with widespread shallow water within a large exposed waterbody. Scoters, long-tailed ducks and grebes were utilizing the entire study area.

We estimated 40,000 ducks using the area during the survey period. This number likely fluctuates throughout the winter months and probably increases dramatically during periods of migration. We recommend repeating this survey in April to document the height of spring migration numbers.

As expected, we experienced a decrease in our ability to see birds when glare was present. We expected severe glare to cause more problems than moderate glare, but we found the greatest effect from moderate glare. Possibly we tried harder to compensate for severe glare by directing our attention to portions of the field of view that were less affected, usually further aft. Even crab pot buoys were difficult to see when significant glare was present, in spite of their relatively large size and bright coloration.

Movement into and out of the area between the two surveys was documented for long-tailed ducks. There were significantly more long-tailed ducks on the second replicate than the first ($p < .01$). Glare problems would not explain this change in numbers because of the nearly equal incidence of glare on both replicates.

Literature Cited:

Conant, B., J.G. King, J.L. Trapp and J.I. Hodges. 1988. Estimating populations of ducks wintering in Southeast Alaska. PP. 541-551, In: Weller, M.W. (ed.) Waterfowl in Winter.

Hodges, J.I. and Deborah Groves. Distribution and abundance of waterbirds near shore in southeast Alaska, 1997 – 2002. Unpublished data. U.S. Fish and Wildlife Service. Juneau, Alaska.

Table 1. Observed birds during the winter aerial survey encompassing the proposed Nai Koon wind farm northeast of Graham Iland, Queen Charlotte Islands. Survey period was February 24 to 28, 2005.

	First Replicate		Second Replicate		First Replicate Total	Second Replicate Total	Average
	Odd Transects	Even Transects	Odd Transects	Even Transects			
Loon	215	92	285	209	307	494	401
Long-tailed Duck	291	248	781	749	539	1530	1035
Goldeneye	0	1	1	1	1	2	2
Black Scoter	26	70	66	38	96	104	100
Surf Scoter	127	170	199	210	297	409	353
White-winged Scoter	1540	1219	888	1642	2759	2530	2645
Merganser	3	14	15	10	17	25	21
Black-legged Kittiwake	4	10	4	1	14	5	10
Glaucous-winged Gull	50	63	82	47	113	129	121
Herring Gull	9	15	22	15	24	37	31
Mew Gull	1	1	31	3	2	34	18
Grebe (Species)	7	23	45	28	35	79	57
Murrelet	2	3	10	6	5	16	11
Alcid (Large)	1	7	0	3	8	3	6
Alcid (Small)	0	7	28	3	7	31	19
Crabpot	123	118	188	110	241	298	270

Table 2. Expanded estimates of the most abundant species corrected for visibility bias.

	Observed Number	Expanded By Area	Visibility Correction Factor	Expanded Estimate	Estimated Density per km^2
Loon (Species)	401	1845	1.86	3431	11.0
Long-tailed Duck	1035	4761	3.49	16616	53.3
Black Scoter	100	460	1.58	727	2.3
Surf Scoter	353	1624	1.58	2566	8.2
White-winged Scoter	2645	12167	1.58	19224	61.7
Grebe (Species)	57	262	10.33	2709	8.7
Crab Pots	270	1241	1	1241	4.0

Table 3. Effects of glare measured as percent change in the ratio of one side of the plane, Observer 1, to the other side, Observer 2.

		Ratio: Observer 1 to Observer 2			
		Loons	Scoters	Long-tailed Duck	Crab Pots
Observer 1	No Glare				
Observer 2	No Glare	0.82	0.66	0.78	0.83
Observer 1	No Glare				
Observer 2	Moderate Glare	2.01	0.88	4.2	1.5
Observer 1	Severe Glare				
Observer 2	No Glare	0.49	0.58	0.54	0.58

	Percent Change			
	Loons	Scoters	Long-tailed Duck	Crab Pots
No Glare to Moderate Glare	-59%	-25%	-81%	-45%
No Glare to Severe Glare	-12%	-24%	-40%	-31%

Figure 1. Locations of 26 transect lines on each minute of latitude between 53° 40'N and 54° 5'N inclusive, west of 131° 20'W longitude.

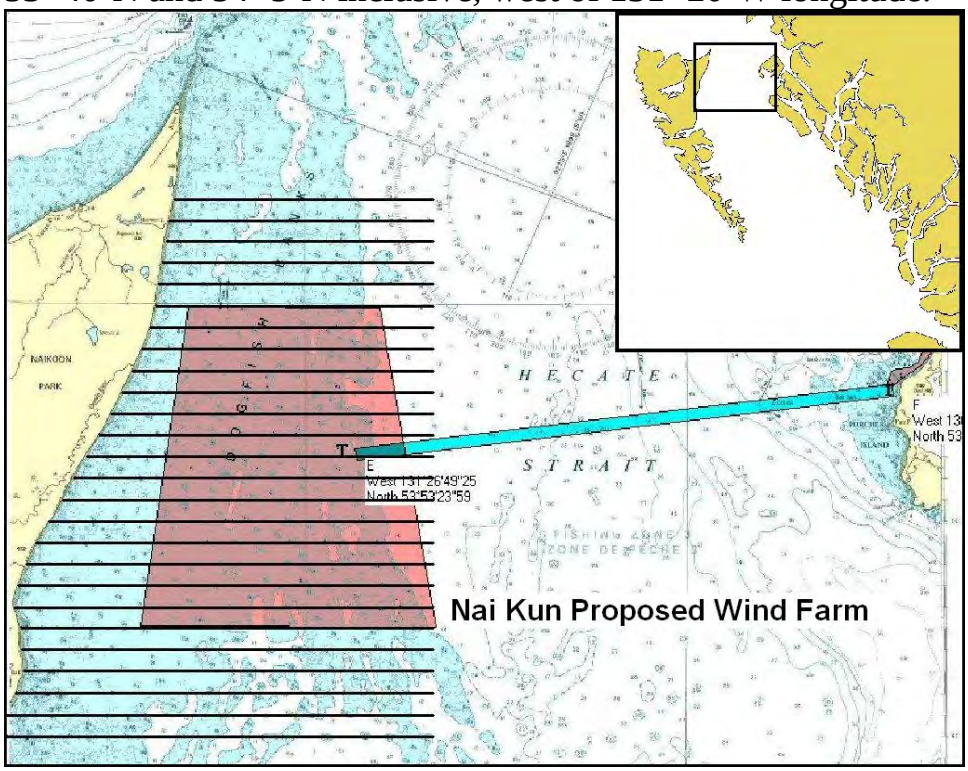

Figure 2. Locations of white-winged scoters during two replicate surveys in the period February 24 to 28, 2005.

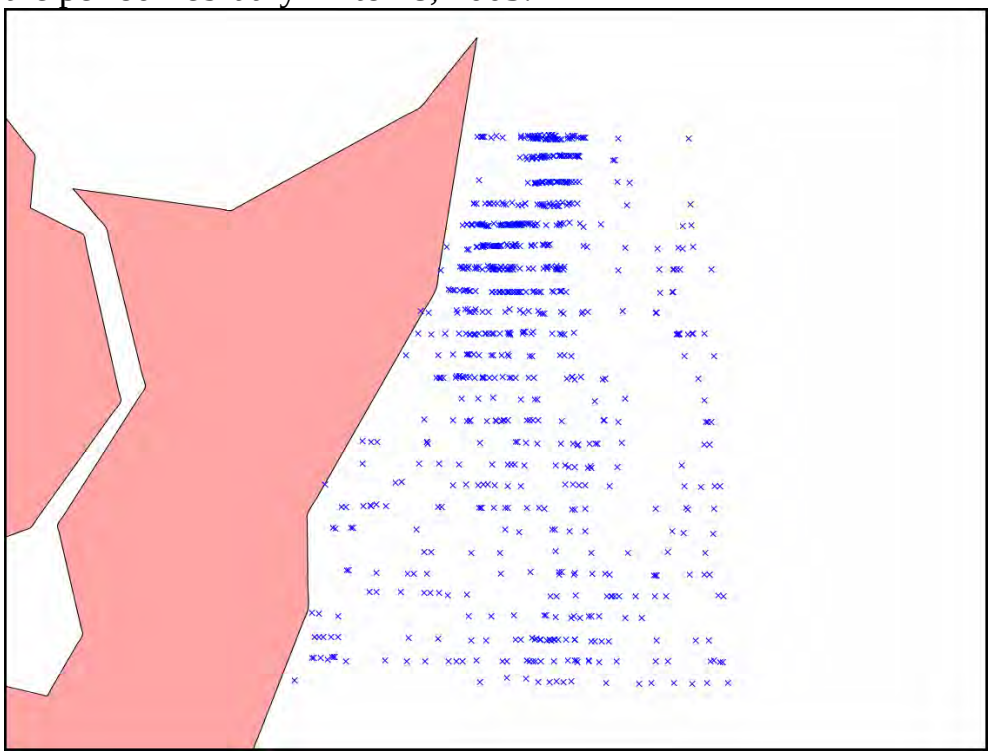

Figure 3. Locations of long-tailed ducks during two replicate surveys in the period February 24 to 28, 2005.

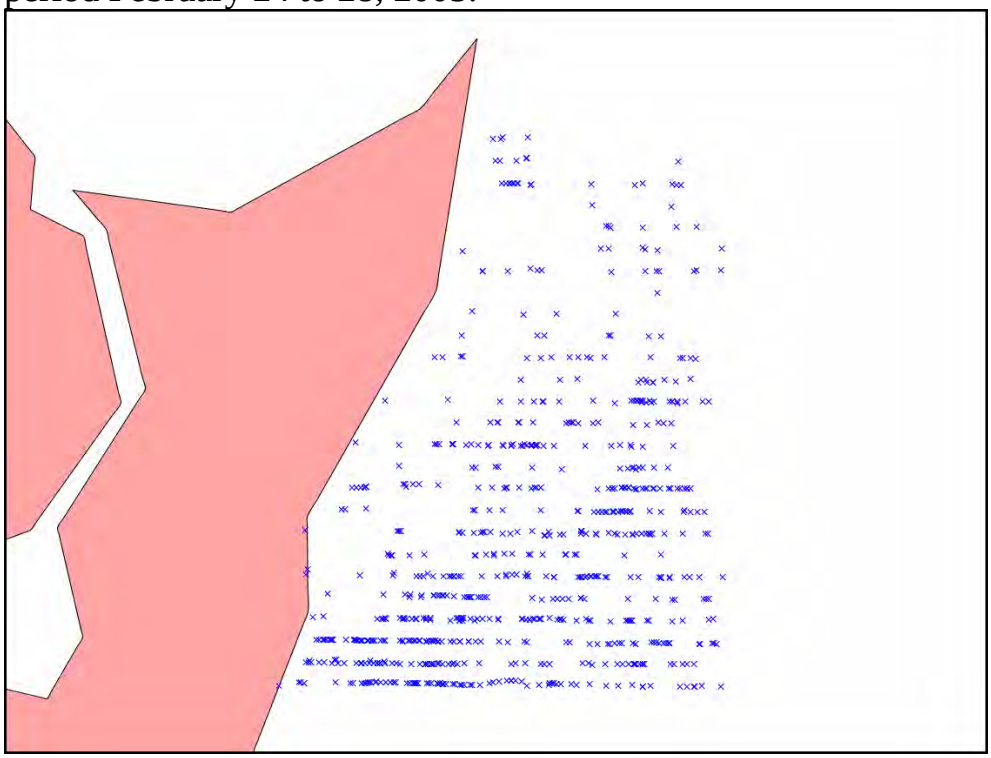

Figure 4. Locations of loons (species) during two replicate surveys in the period February 24 to 28, 2005.

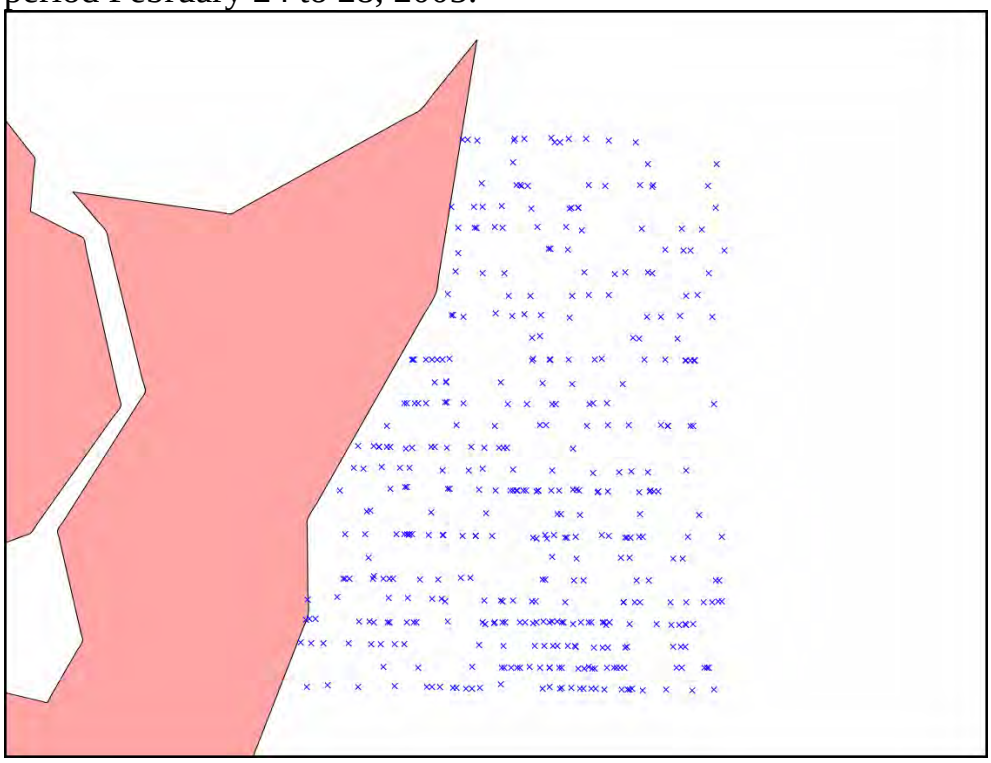

Figure 5. Locations of crab pots during two replicate surveys in the period February 24 to 28, 2005.