Supplement S4

This section of supplementary materials describes the variables and models fitted during discrete choice modeling of polar bear kill locations.

Variables Used in Modeling:

Table S4.1: Description of variables used in discrete choice modeling of polar bear kill locations.

Variable	*Type*	*Description*
DISTSEAkm	Distance	Distance from site* to the coastline in kilometers. When kill site was onshore, distance to the coast was positive. When kill site was offshore (on ice), distance to coast was negative.
DISTLAND_ALLkm	Distance	Distance from site* to the nearest of all registered landing sites for tourists in the period 1996-2016, in kilometers.
DISTLAND_Lkm	Distance	Distance from site* to the nearest of 21 large landing sites for tourists in the period 1996-2016, in kilometers. Large landing sites were defined as >10,000 visitors passing through per year.
DISTSETkm	Distance	Distance from site* to the nearest of seven permanent settlements, in kilometers.
DISTRAPPERkm	Distance	Distance from the site* to the nearest of five trapper's cabins that were active during the period 1987-2016, in kilometers.
Nring25	Ice	Ice concentration (percent of sea surface area) in the 0-25 km band off Svalbard coastline in the same sector as the site*.
[similar for NringXXX]	Ice	[Similar: Ice concentration in offshore band from XXXkm -25km to XXXkm].
Nring400	Ice	Ice concentration (percent of sea surface area) in the 375-400 km band off Svalbard coastline in the same sector as the site*.

*The 'site' referred to in this table is either a bear kill site or a randomly chosen location in the discrete choice set for the bear kill.

Fitted Model Set

We constructed the candidate discrete choice models by first constructing a set of 169 models that used ice concentrations during the month of the kill incident. We called these 169 models "lag 0" models. The 169 lag 0 models consisted of the nine distance models listed in Table S4.2, sixteen ice models listed in Table S4.3, and 144 models obtained by crossing the distance models with the ice model (Table S4.4) (i.e., (9 distance) + (16 ice) + (9*16 distance and ice) = 169 models). We allowed no more than one ice variable in the discrete choice model at once.

To investigate temporal lag effects, we lagged ice concentration variables when they appeared in the lag 0 models by 1 to 9 months. For each of the 169 lag 0 models, investigating lags increased the

number fitted models by 9. For example, we fitted the lag 0 model *sObj ~ Nring25*, then the nine lagged Nring25 models *sObj ~ lag(Nring25,1)*, *sObj ~ lag(Nring25,2)*, …, *sObj ~ lag(Nring25,9)*. A total of 16 + 144 = 160 lag 0 models contained an ice variable. Swapping the lag 0 ice concentration for one of the nine lags in these 160 models resulted in an additional 1,440 models. In total, we fitted 9 distance models, 16 lag 0 ice models, 144 lag 0 distance by ice models, and 1,440 models with lags in ice concentration, for a total of 1,609 models

Table S4.2: Nine models without ice concentration fitted to polar bear kill site discrete choice data. 'sObj' is the conditional log-odds of a bear kill, given covariate values in the model.

Model #	Description
1	sObj ~ DISTSEAkm
2	sObj ~ DISTLAND_ALLkm
3	sObj ~ DISTLAND_Lkm
4	sObj ~ DISTSETkm
5	sObj ~ DISTRAPPERkm
6	sObj ~ DISTSEAkm + DISTLAND_ALLkm
7	sObj ~ DISTSEAkm + DISTLAND_Lkm
8	sObj ~ DISTSEAkm + DISTSETkm
9	sObj ~ DISTSEAkm + DISTRAPPERkm

Table S4.3: Sixteen lag 0 ice models fitted to polar bear kill site discrete choice data. 'sObj' is the conditional log-odds of a bear kill, given covariate values in the model.

Model #	Description
10	sObj ~ Nring25
11	sObj ~ Nring50
12	sObj ~ Nring75
13	sObj ~ Nring100
14	sObj ~ Nring125
15	sObj ~ Nring150
16	sObj ~ Nring175
17	sObj ~ Nring200
18	sObj ~ Nring225
19	sObj ~ Nring250
20	sObj ~ Nring275
21	sObj ~ Nring300
22	sObj ~ Nring325
23	sObj ~ Nring350
24	sObj ~ Nring375
25	sObj ~ Nring400

Table S4.4: One-hundred and forty-four discrete choice models obtained by crossing nine distance models with sixteen ice concentration models. 'sObj' is the conditional log-odds of a bear kill, given covariate values in the model.

Model #	Description
26	sObj ~ DISTSEAkm + Nring25
27	sObj ~ DISTSEAkm + Nring50
28	sObj ~ DISTSEAkm + Nring75
29	sObj ~ DISTSEAkm + Nring100
30	sObj ~ DISTSEAkm + Nring125
31	sObj ~ DISTSEAkm + Nring150
32	sObj ~ DISTSEAkm + Nring175
33	sObj ~ DISTSEAkm + Nring200
34	sObj ~ DISTSEAkm + Nring225
35	sObj ~ DISTSEAkm + Nring250
36	sObj ~ DISTSEAkm + Nring275
37	sObj ~ DISTSEAkm + Nring300
38	sObj ~ DISTSEAkm + Nring325
39	sObj ~ DISTSEAkm + Nring350
40	sObj ~ DISTSEAkm + Nring375
41	sObj ~ DISTSEAkm + Nring400
42	sObj ~ DISTLAND_ALLkm + Nring25
43	sObj ~ DISTLAND_ALLkm + Nring50
44	sObj ~ DISTLAND_ALLkm + Nring75
45	sObj ~ DISTLAND_ALLkm + Nring100
46	sObj ~ DISTLAND_ALLkm + Nring125
47	sObj ~ DISTLAND_ALLkm + Nring150
48	sObj ~ DISTLAND_ALLkm + Nring175
49	sObj ~ DISTLAND_ALLkm + Nring200
50	sObj ~ DISTLAND_ALLkm + Nring225
51	sObj ~ DISTLAND_ALLkm + Nring250
52	sObj ~ DISTLAND_ALLkm + Nring275
53	sObj ~ DISTLAND_ALLkm + Nring300
54	sObj ~ DISTLAND_ALLkm + Nring325
55	sObj ~ DISTLAND_ALLkm + Nring350
56	sObj ~ DISTLAND_ALLkm + Nring375
57	sObj ~ DISTLAND_ALLkm + Nring400
58	sObj ~ DISTLAND_Lkm + Nring25
59	sObj ~ DISTLAND_Lkm + Nring50
60	sObj ~ DISTLAND_Lkm + Nring75
61	sObj ~ DISTLAND_Lkm + Nring100
62	sObj ~ DISTLAND_Lkm + Nring125
63	sObj ~ DISTLAND_Lkm + Nring150
64	sObj ~ DISTLAND_Lkm + Nring175
65	sObj ~ DISTLAND_Lkm + Nring200
66	sObj ~ DISTLAND_Lkm + Nring225
67	sObj ~ DISTLAND_Lkm + Nring250

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sObj ~ DISTLAND_Lkm + Nring275
sObj ~ DISTLAND_Lkm + Nring300
sObj ~ DISTLAND_Lkm + Nring325
sObj ~ DISTLAND_Lkm + Nring350
sObj ~ DISTLAND_Lkm + Nring375
sObj ~ DISTLAND_Lkm + Nring400
sObj ~ DISTSETkm + Nring25
sObj ~ DISTSETkm + Nring50
sObj ~ DISTSETkm + Nring75
sObj ~ DISTSETkm + Nring100
sObj ~ DISTSETkm + Nring125
sObj ~ DISTSETkm + Nring150
sObj ~ DISTSETkm + Nring175
sObj ~ DISTSETkm + Nring200
sObj ~ DISTSETkm + Nring225
sObj ~ DISTSETkm + Nring250
sObj ~ DISTSETkm + Nring275
sObj ~ DISTSETkm + Nring300
sObj ~ DISTSETkm + Nring325
sObj ~ DISTSETkm + Nring350
sObj ~ DISTSETkm + Nring375
sObj ~ DISTSETkm + Nring400
sObj ~ DISTRAPPERkm + Nring25
sObj ~ DISTRAPPERkm + Nring50
sObj ~ DISTRAPPERkm + Nring75
sObj ~ DISTRAPPERkm + Nring100
sObj ~ DISTRAPPERkm + Nring125
sObj ~ DISTRAPPERkm + Nring150
sObj ~ DISTRAPPERkm + Nring175
sObj ~ DISTRAPPERkm + Nring200
sObj ~ DISTRAPPERkm + Nring225
sObj ~ DISTRAPPERkm + Nring250
sObj ~ DISTRAPPERkm + Nring275
sObj ~ DISTRAPPERkm + Nring300
sObj ~ DISTRAPPERkm + Nring325
sObj ~ DISTRAPPERkm + Nring350
sObj ~ DISTRAPPERkm + Nring375
sObj ~ DISTRAPPERkm + Nring400
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring25
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring50
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring75
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring100
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring125
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring150
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring175
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring200
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring225
sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring250
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116 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring275
117 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring300
118 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring325
119 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring350
120 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring375
121 sObj ~ DISTSEAkm + DISTLAND_ALLkm + Nring400
122 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring25
123 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring50
124 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring75
125 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring100
126 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring125
127 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring150
128 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring175
129 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring200
130 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring225
131 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring250
132 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring275
133 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring300
134 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring325
135 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring350
136 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring375
137 sObj ~ DISTSEAkm + DISTLAND_Lkm + Nring400
138 sObj ~ DISTSEAkm + DISTSETkm + Nring25
139 sObj ~ DISTSEAkm + DISTSETkm + Nring50
140 sObj ~ DISTSEAkm + DISTSETkm + Nring75
141 sObj ~ DISTSEAkm + DISTSETkm + Nring100
142 sObj ~ DISTSEAkm + DISTSETkm + Nring125
143 sObj ~ DISTSEAkm + DISTSETkm + Nring150
144 sObj ~ DISTSEAkm + DISTSETkm + Nring175
145 sObj ~ DISTSEAkm + DISTSETkm + Nring200
146 sObj ~ DISTSEAkm + DISTSETkm + Nring225
147 sObj ~ DISTSEAkm + DISTSETkm + Nring250
148 sObj ~ DISTSEAkm + DISTSETkm + Nring275
149 sObj ~ DISTSEAkm + DISTSETkm + Nring300
150 sObj ~ DISTSEAkm + DISTSETkm + Nring325
151 sObj ~ DISTSEAkm + DISTSETkm + Nring350
152 sObj ~ DISTSEAkm + DISTSETkm + Nring375
153 sObj ~ DISTSEAkm + DISTSETkm + Nring400
154 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring25
155 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring50
156 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring75
157 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring100
158 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring125
159 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring150
160 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring175
161 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring200
162 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring225
163 sObj ~ DISTSEAkm + DISTRAPPERkm + Nring250
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164  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring275
165  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring300
166  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring325
167  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring350
168  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring375
169  sObj ~ DISTSEAkm + DISTRAPPERkm + Nring400
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