

2010 BIRD BACKGROUND CARCASS DEPOSITION, CARCASS PERSISTENCE, AND SEARCHER EFFICIENCY STUDIES IN THE REGION OF THE *SELENDANG AYU* GROUNDING, UNALASKA ISLAND, ALASKA

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The Ford, *et al.* draft report¹ proffered that ~122,000 seabirds were killed by fuel oil spilled from the *Selendang Ayu* which grounded on the north shore of Unalaska Island in December 2004 (Figure 1). It was further speculated that Crested Auklets *Aethia cristatella* made up the bulk (100,000 + birds) of the seabirds killed. This species is reported to aggregate in large feeding flocks in some passes between the Aleutian Islands during the winter months. To assess bird background carcass deposition two embayments were surveyed in January/February 2005; Nikolski Bay on Umnak Island and Chernofski Harbor on Unalaska. Nikolski is located on the north side of Umnak Island, and is not near a pass between islands. Also, there are no available data suggesting that large numbers of seabirds winter off Nikolski Bay. The lack of a large numbers of birds near Nikolski would expectedly result in an observed low level of background mortality at that location. Greater background mortality was documented at Chernofski Harbor in 2005 (Varoujean and Polaris²), but because approximately half of the carcasses retrieved were oiled, Ford, *et al.*³ concluded that it was inappropriate to calculate background mortality levels using data from Chernofski. The data, however, were deemed to be suitable for use in the Beached Bird Model to calculate a background carcass deposition density that was in turn used to estimate seabird mortality caused by the spill in the SE sector of the spill study zone.

To reassess seabird mortality caused by the spill, another background carcass deposition study was conducted in January/February 2010 on the shores of Nikolski Bay and in the Chernofski Harbor area. In addition to the searching of beaches for bird carcasses at Chernofski, searcher efficiency and carcass persistence studies were also carried out. This report presents the methods and results of these various studies.

METHODS

Study Logistics/Timing

Project staging occurred at Dutch Harbor with survey personnel flying in on 12 January 2010. The Nikolski Bay three-man survey team flew on to Umnak Island on 12 January 2010. Beach surveys began on 13 January and continued (except for one “weather day” on 19 January) through 27 January on the nine beaches searched during the 2005 study (Figure 2, Table 1).

On 13 January, part of the survey crew was taken to Chernofski Harbor by boat. Two days later, the two remaining survey personnel arrived at Chernofski. The 12 beaches surveyed at Chernofski were the same as those searched during the 2005 study (Figure 3, Table 2). Beach surveys began on 15 January on the west side of the harbor and continued (except for one weather day [19 January] and a crew transfer day [29 January]), through 1 February. One

additional survey was conducted on the west side on 4 February. Beach surveys on the east side of the harbor did not begin until 21 January because high, wind-driven seas prevented a survey crew from safely crossing the harbor in small boats. Beach surveys continued (except for two weather days [26 and 27 January]) through 4 February. In addition, a searcher efficiency study was conducted on 28 January after the beach surveys were conducted, and bird carcasses were deployed for persistence studies on 2 and 6 February. The project team left Chernofski for Dutch Harbor on 7 February.

Background Mortality Study

At both Nikolski and Chernofski the searching of beaches for bird carcasses was performed by three observers walking abreast, but spaced far enough apart to adequately cover the high and low tide areas of each beach. The GPS coordinates (the same recorded in 2005) were confirmed and the time was recorded for start and finish points of each beach segment surveyed. The first search of the designated beaches was performed to “clean/clear” the beaches of carcasses. These carcasses were labeled and photographed before being packed back to and discarded at the base camps. These carcasses are not used in determining the deposition density/rate.

Carcasses found on beaches after they were “cleaned” were assigned a specimen number, photographed with a data card, and then bagged for return to the base camp for further species/taxon confirmation or determination. The carcasses were identified to species when possible, the condition and degree of scavenging, and the presence of oil was recorded on the field data forms. These data were then transferred to spreadsheets.

Searcher Efficiency Study

Since different personnel were used to carry out the bird carcass surveys than were used in 2005, a detection probability/searcher efficiency study was conducted. The detection probability/searcher efficiency study was carried out on 28 January 2010 using the sampling and data recording protocols reported in Byrd and Reynolds⁵. Carcasses used for the test were a randomly selected subset of those collected during the background mortality study. Thirteen specimens were selected and placed at randomly determined distances along beach CK-1. The wash zone location, block number and species order of deployment was also randomly determined. Note that the number of the block placed under the specimens did not correspond to the number of specimens deployed (Table 3). The first three-man survey crew started the test about 1630 h and took about 45 min to complete their search. During their search the tide was beginning to ebb and the beach was approximately 15 m wide. Upon finding a specimen, a crew member would lift the specimen and record the number on the exposed block and then replace the specimen to its original position on the beach. The second crew began the test at 1710 h and took 50 min to complete their search. The continued tidal ebb increased the width of the beach to approximately 25 m, and the light levels had fallen off substantially by the end of the second crew’s test. The second crew retrieved the test specimens they found, and then were given, by radio transmission, the location of the missed specimens so they could be retrieved as the survey crew walked back to the beginning location.

Carcass Persistence Study

The study involved two deployments of 12 carcasses on the two separate beaches used in 2005 at Chernofski (*i.e.* Beaches CK-2 and CK-6) on 2 February 2010. In addition, 12 carcasses were again placed on CK-2 on 6 February. All the carcasses used (which were supplied by the Trustees) were kept frozen in ice chests and thawed out only a few days before deployment. The carcasses were marked at the keel of the carina and/or just the wrists with numbered, small metal patagial tags. A small, numbered wooden block was placed under each carcass (Tables 4 - 6). Carcasses were placed at randomly selected distances starting from the beginning of the “test” beach. Carcasses were placed in the high or mid wash zone, and the order in which the various species were distributed were determined randomly. Collection of carcass persistence data used the sampling and data recording protocols used in 2005 by Varoujean and Polaris², and by Byrd and Reynolds⁴, except that the photographs taken of the carcasses were “watermarked” with the longitude/latitude of the carcass location.

RESULTS

Background Mortality Study

The crew working out of Nikolski Bay spent one day clearing and 13 days surveying the nine beaches in their study area from 13 - 27 January 2010. The beaches were surveyed on successive days except on one day (19 January) when weather conditions prevented surveying. A total of 63.42 km of beach was surveyed. This effort resulted in the retrieval of 7 carcasses, or 0.11 carcasses/km searched (refer to data table in Appendix A). This is lower than the retrieval rate documented during 2005 of 0.41 carcasses/km searched (*i.e.* 18 carcasses found while searching a total of 43.7 km of beaches over an 18 day period, see Byrd⁶).

Survey crews working at Chernofski Harbor spent one day clearing and 16 days surveying the beaches on the west side of the harbor from 15 January - 4 February. A total of 73.12 km was surveyed. This effort resulted in the retrieval of 87 carcasses, or the retrieval of 1.19 carcasses/km searched (refer to data tables in Appendix B). Survey crews searched the beaches on the east side of the harbor from 21 January - 4 February, with weather preventing searches on 26 and 27 January. Twelve days were spent surveying the beaches on the east side of the harbor, except on beach CK-10 where 11 surveys were conducted. A total of 54.92 km of beach was surveyed. This effort resulted in the retrieval of 66 carcasses or the retrieval of 1.20 carcasses/km searched. Over all, approximately 128 km of beach were surveyed and 153 carcasses were retrieved for a retrieval rate of 1.20 carcasses/km searched. The retrieval rate for Chernofski during the 2005 study was higher at 2.05 carcasses/km searched (*i.e.* 169 carcasses found while searching 82.50 km over 21 days of searching).

Approximately 31% of the carcasses retrieved during the 2010 Chernofski study were identified as auklets, 18 % were identified as ducks/geese and 15 % were identified as fulmars/petrels. Approximately 8% of the carcasses retrieved were oiled. It is not possible to compare the species makeup of the 2010 study with the Chernofski 2005 study because over half of the 169 specimens collected in 2005 were apparently never logged into the morgue for identification. Auklets (*Aethia* sp.) made up 77% of the 79 specimens that were logged into the

morgue, and the field investigators indicated that auklets made up the majority of the carcass remains collected in 2005². Eighty-eight (52%) of the 169 carcasses collected in 2005 were noted as being oiled, which is in sharp contrast to the 8% oiled carcasses noted in the 2010 study.

Searcher Efficiency Study

The search results differed for the two test teams with Team 1 finding 70% of the carcasses placed on the beach, whereas Team 2 found only 46% of the same carcasses (Table 3). The difference is most likely due to the increase in the width of the beach (15 m to 25 m) with the ebbing tide and the waning light levels that Team 2 experienced. The two results probably represent the range of detection probabilities that existed in the field where beach surveys occurred during calm sunny days at high tide (*i.e.* narrow beach) as well as on overcast days with wind-driven sleet when the tide was out. Overall, the searchers detected approximately 60% of the carcasses present and 40% missed. In contrast, the searcher efficiency tests conducted in 2005 resulted in 40% of the carcasses being found and 60% being missed.

Carcass Persistence Study

Three lots of 12 seabird carcasses were deployed on the test beaches CK-2 and CK-6, and then monitored at varying time intervals (Tables 4-6). A summary of the number (percent) of the carcasses that persisted on the beaches are presented in the inset table in Figure 4. Note that the values for 23 hours represents the sum of the carcass remains found 22 - 24 hours after deployment on CK-2 (Tables 4 and 6) and the those remains assumed to still be present after 24 hours on CK-6 (Table 5). The values for 44 hours represent the sum of the carcasses found 43 - 46 hours after deployment (Tables 4 and 5). To ascertain an estimate of persistence at various time intervals that would be efficacious for use in the Beached Bird Model a power curve was fitted to the data in the inset table. As the field data and the estimate from the power curve indicate, 25 - 28% of the specimens identified as carcasses remained after 24 hrs, and 17 - 20% remained after 48 hrs. These estimates are approximately 5% percent higher than those reported in Byrd and Reynolds⁴ as the joint persistence probability for carcasses deployed in 2005.

DISCUSSION

The carcass retrieval rate for Nikolski in 2005 was 0.41 carcasses/km searched which, when incorporated into the Beached Bird Model, resulted in an estimate of about 60 birds being deposited on the study beaches during the 18 day study period (Ford, et al.¹). As an approximation, the retrieval rate of 1.20 carcasses/km searched calculated for the 2010 Chernofski study period of 18 days would be equivalent (*i.e.* solve the simple ratio of $60/0.41 = x/1.20$) to a BBM output of 176 birds being deposited on the study area.. The carcass deposition rate for Chernofski in 2005 was 2.05 carcasses/ km searched, which, when fed into the BBM, resulted in an estimate of 1,061 birds being deposited on the beaches over the 21 days of surveying. Again, by solving the simple ratio (*i.e.* $1061/2.05 = x/1.20$) the carcass deposition at Chernofski during the 2010 study period would then be 621 birds. So, it appears that the BBM output for carcass deposition would range between 176 birds and 621 birds. Given that there were differences in the searcher efficiency and carcass persistence estimates derived from the 2005 and 2010 studies, and the possible differences in the number of days used to run the model,

it is likely that an actual run of the BBM using the Chernofski 2010 data would result in a total carcass deposition estimate of approximately 400 birds, i.e. the average of 176 birds and 621 birds. This figure translates into a deposition rate of 2.78 birds per km per day (i.e. 400 birds/9 km/16 dys). Applying this value to the formula listed for the calculation of background mortality ($B_{Bak} = T_{Tx} * R_{Cher} * L_{TotDep}$) in Ford, et al.¹ results in a background mortality estimate of approximately 16,588 birds (i.e. 23.4 dys * 2.78 * 255 km). This estimate is approximately 12,600 birds greater than the background mortality estimate of 3,975 birds listed in Ford, et al.¹.

References

¹Ford, R.G., N.A. Strom, G.V. Byrd and J.H. Reynolds. 2008 Draft Report. M/V *Selendang Ayu*: Seabird Mortality Model.

²Varoujean, D. and Polaris Applied Sciences. 2005 Final Report. NRDA Pre-Assessment Studies: Summary of Field Surveys of Bird Carcass Persistence, Searcher Efficiency, and Background Bird Stranding Rates at Chernofski, Unalaska Island and Nikolski, Umnak Island, Alaska.

³Ford, R.G., V. Byrd and J. Reynolds. 2007 Draft Final Report. Preassessment Data Report: M/V *Selendang Ayu* Background Beaching and Oiling Rates for Bird Carcasses.

⁴Byrd, G.V. and J.H. Reynolds. 2006 Draft Final Report. Preassessment Data Report: Persistence rates of bird carcasses on beaches of Unalaska Island, Alaska, following the wreck of the M/V *Selendang Ayu*.

⁵Byrd, G.V. and J.H. Reynolds. 2006 Draft Final Report. Preassessment Data Report: Detection probabilities for bird carcasses on beaches of Unalaska Island, Alaska, following the wreck of the M/V *Selendang Ayu*.

⁶Byrd, V. 2008 Report. Background Mortality of Birds: A Reevaluation of Specimens from Nikolski, Umnak Island.

Acknowledgments

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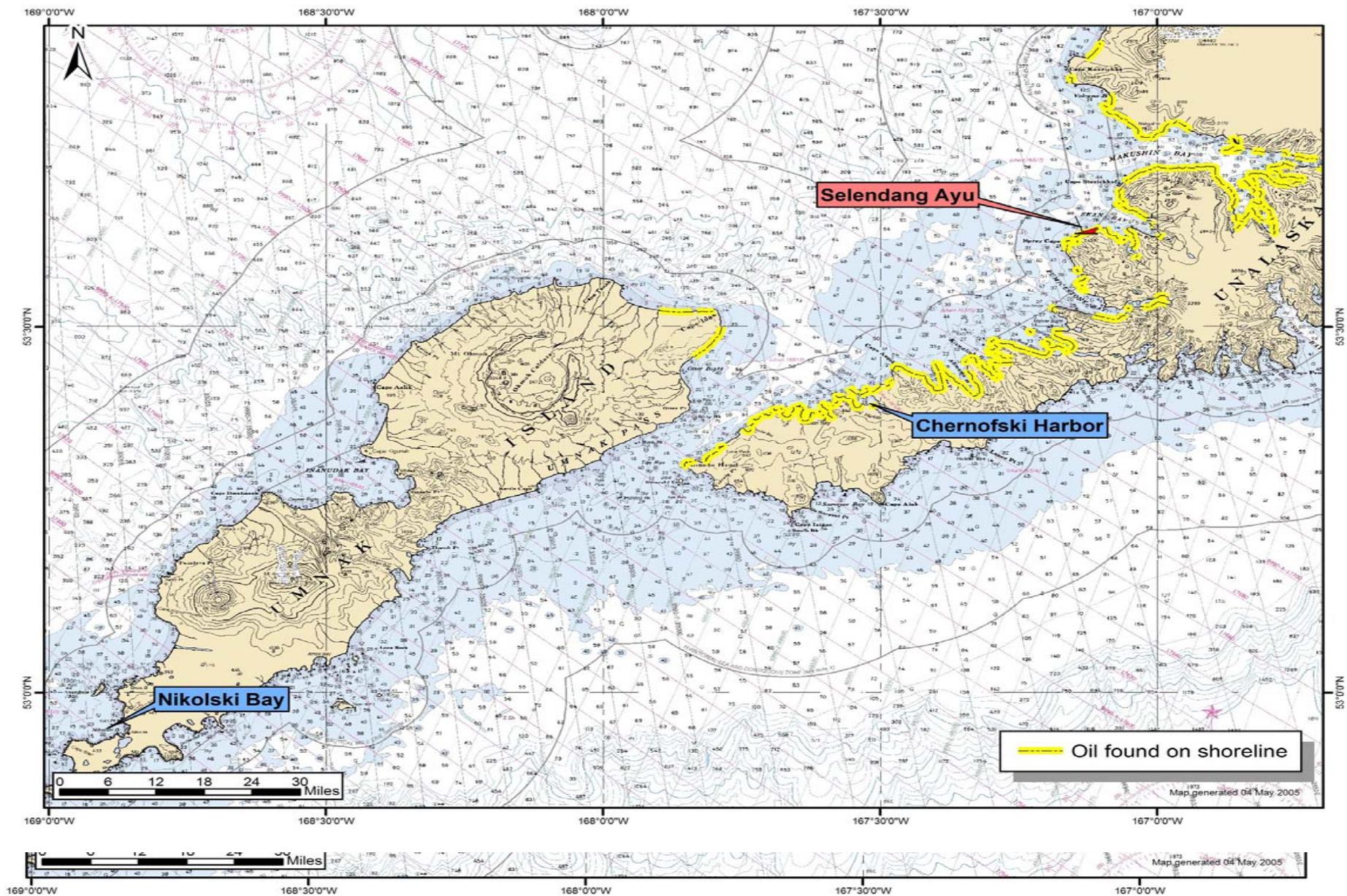


Figure 1. Location of the vessel grounding in December 2004 and Chernofski Harbor on Unalaska Island, and Nikolski Bay on Unmak Island.

Table 1. Location, length and type of beaches surveyed at Nikolski Bay, Unmak Island in January/February 2005 and January/February 2010.

Segment	Start Lat	Start Long	End Lat	End Long	Beach Type	Length (km)
NK1	52° 58.162'	168° 51.675'	52° 58.032'	168° 51.671'	Collector	0.26
NK3	52° 58.014'	168° 51.677'	52° 57.908'	168° 51.917'	Collector	0.44
NK5	52° 57.577'	168° 52.080'	52° 57.525'	168° 51.717'	Exposed	0.45
NK6	52° 57.525'	168° 51.717'	52° 57.423'	168° 51.591'	Collector	0.25
NK7	52° 57.423'	168° 51.591'	52° 57.301'	168° 51.070'	Exposed	0.66
NK8	52° 57.301'	168° 51.070'	52° 57.074'	168° 51.142'	Collector	0.54
NK9	52° 57.074'	168° 51.142'	52° 56.556'	168° 51.599'	Exposed	1.07
NK11	52° 56.308'	168° 51.812'	52° 56.433'	168° 52.260'	Exposed	0.81
NK12	52° 58.334'	168° 51.802'	52° 58.162'	168° 51.675'	Exposed	0.42

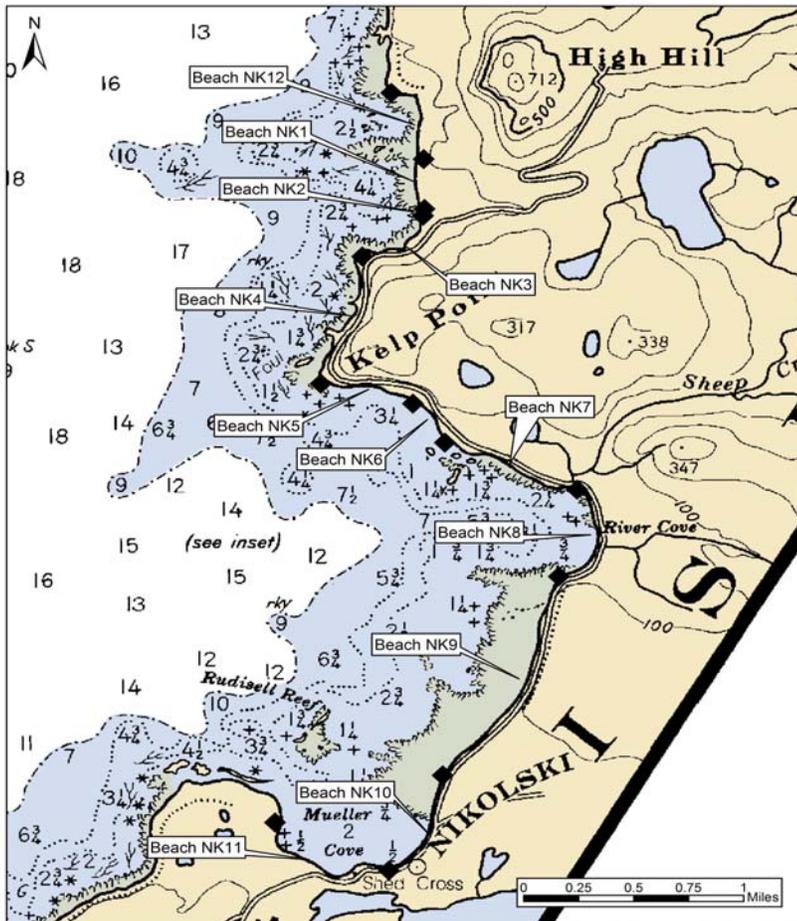


Figure 2. Location of shorelines at Nikolski Bay, Unmak Island, surveyed for background mortality studies in January/February 2005. Note that Beaches NK-2, NK-4 and NK-10 were designated, but not surveyed in 2005; therefore, they were not surveyed in 2010.

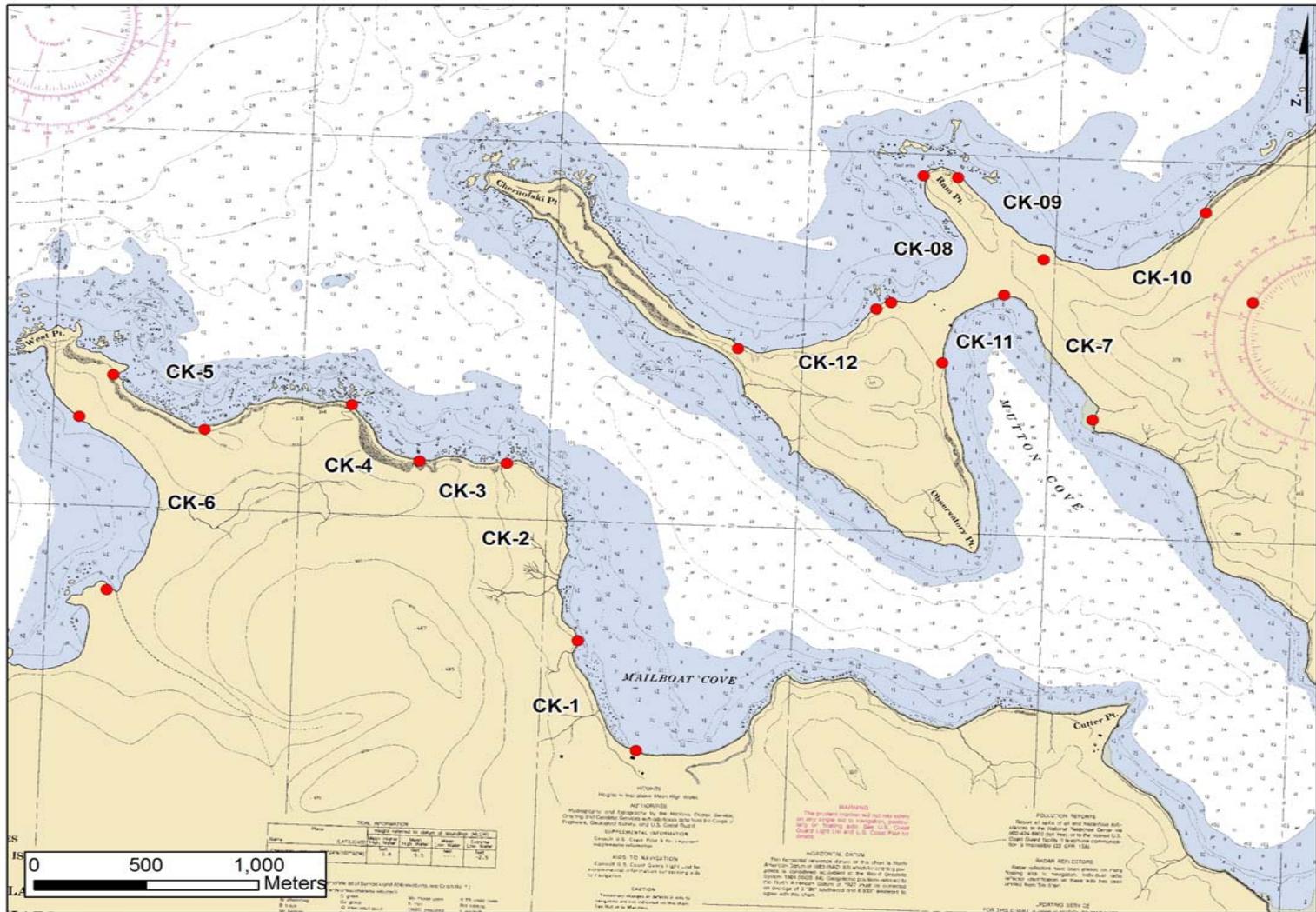


Figure 3. Location of shorelines at Chernofski Harbor, Unalaska Island used for background mortality, carcass persistence and searcher efficiency studies in January/February 2005 and January/February 2010.

Table 2. Location, length and types of beaches surveyed and used for testing at Chernofski Harbor, Unalaska Island in January/February 2005 and January/February 2010. January/February 2005 and January/February 2010.

Beach	Type	Length (km)	Start location				End location			
CK1	Exposed/Protected	0.70	N 53°	23.398	W 167°	32.607	N 53°	23.684	W 167°	32.857
CK2	Protected	1.36	N 53°	23.684	W 167°	32.857	N 53°	24.146	W 167°	33.17
CK3	Exposed	0.31	N 53°	24.146	W 167°	33.17	N 53°	24.145	W 167°	33.521
CK4	Exposed	0.42	N 53°	24.145	W 167°	33.521	N 53°	24.288	W 167°	33.801
CK5	Collector	0.59	N 53°	24.21	W 167°	34.389	N 53°	24.347	W 167°	34.764
CK6	Protected	1.19	N 53°	24.234	W 167°	34.895	N 53°	23.779	W 167°	34.757
CK7	Protected	0.51	N 53°	24.634	W 167°	31.201	N 53°	24.449	W 167°	31.438
CK8	Exposed, Protected	0.91	N 53°	24.604	W 167°	31.653	N 53°	24.943	W 167°	31.543
CK9	Exposed	0.76	N 53°	24.941	W 167°	31.404	N 53°	24.731	W 167°	31.047
CK10	Exposed	0.88	N 53°	24.731	W 167°	31.047	N 53°	24.868	W 167°	30.403
CK11	Protected	0.82	N 53°	24.311	W 167°	31.826	N 53°	24.634	W 167°	31.201
CK12	Collector	0.77	N 53°	24.586	W 167°	31.712	N 53°	24.47	W 167°	32.261

Table 3. Layout and results for searcher efficiency study which was conducted on beach CK-1 on 28 January 2010 at Chernofski Harbor, Unalaska Island, Alaska. Carcasses collected during beach searches were placed on the test beach at randomly selected distances from the start point near the pier. Using the start and end latitude positions, transect distance and transect orientation of approximately 45° to true north it was possible to generate latitude readings for the distance measures. The location in the intertidal of high (1), middle (2) and low (3) were randomly assigned, and the 13 carcasses used were selected randomly from the first 50 carcasses collected from the west side of the study area. All random numbers were generated using the RandBetween function in Microsoft Excel. X = carcass found.

Distance (m)	Latitude	Beach Position	Specimen No. & Description	Block Number	Team 1*	Team 2*
67	53° 23.421'	2	037 Emperor Goose; feathers	6	X	X
100	53° 23.439'	1	045 auklet parts	20	X	
108	53° 23.442'	3	025 unknown sp.; dark feathers w/skin	12	X	X
128	53° 23.451'	3	024 Short-tailed Shearwater; intact except breast meat gone.	4	X	X
212	53° 23.485'	2	049 auklet; carina and feathers	31	X	
236	53° 23.495'	1	031 Crested Auklet; wings attached to meatless carina.	22	X	
252	53° 23.501'	3	007 auklet; clump of feathers	7	X	
269	53° 23.508'	2	030 unknown sp.; tuft of feathers w/skin	10	X	X
336	53° 23.536'	2	015 unknown sp.; feather pile.	19		X
447	53° 23.581'	1	006 unknown sp.; dark feathers.	8		
513	53° 23.608'	1	032 Fork-tailed Storm Petrel; one wing	25		
605	53° 23.646'	2	020 auklet; various parts	30		
620	53° 23.652'	2	022 auklet; various parts	16	X	X

Number (percent) found = 9 (70%) 6 (46%)
Overall = 15 (58%)

* - **Team 1:** J. Williams, J. Green, D. Varoujean III. **Team 2:** A. Graham, J. Griffith, C. Wegner.

Table 4. Persistence experiment conducted on Beach CK-2, Chernofski Harbor, Unalaska Island, Alaska. The carcasses were first deployed on 2 February 2010 from 1710 h to 1740 h. The distance from the beginning of the beach, the location in the high (2) or mid (3) wash zone and the species order were determined randomly. A wooden block was placed under each carcass. The carcasses were also tagged with metal patagial clips (PT) at the wrist of the left wing (LW) and right wing (RW), and in the keel edge of the carina (CA).

Distance (m)	Latitude	Longitude	Beach Location	Species	Block Number	PT Numbers			Revisit - 3 February	Revisit - 4 February	Revisit - 6 February	Revisit - 7 February
						LW	RW	CA	1115 h -1200 h (16 hrs after deployment)	1100 h-1140 h (40 hrs after deployment)	1010 h (86 hrs after deployment)	1010 h (110 hrs after deployment)
39	53° 23.699'	167° 32.879'	2	Surf Scoter	1	2	3	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
64	53° 23.710'	167° 32.886'	2	Brandt's Cormorant	2	5	6	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
119	53° 23.731'	167° 32.908'	3	Common Murre	3	8	9	Carcass gone; block moved, possible rewash.	Carcass still missing	Carcass still missing	Carcass still missing	
330	53° 23.821'	167° 32.951'	2	Western Grebe	4	11	12	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
526	53° 23.908'	167° 32.925'	2	Rhinoceros Auklet	5	14	15	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
620	53° 23.951'	167° 32.935'	2	Cassin's Auklet	6	17	18	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
628	53° 23.954'	167° 32.932'	3	Black-legged Kittiwake	7	20	21	Carcass gone; block moved, possible rewash	Carcass still missing	Carcass still missing	Carcass still missing	
725	53° 23.993'	167° 32.929'	2	White-winged Scoter	8	23	24	Carcass gone; block present w/fox bite marks. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
908	53° 24.073'	167° 32.950'	3	Surf Scoter	9	26	27	Small feathers w/skin present; block present.	Misc. feathers and right wing w/tag #26 found.	Misc. feathers and right wing w/tag #26 still present.	Misc. feathers and right wing w/tag #26 still present.	
999	53° 24.097'	167° 33.001'	3	Surf Scoter	10	29	30	Feather pile w/fresh flesh present near original position; block did not move.	Feathers w/skin & flesh found.	Carcass missing	Carcass missing	
1015	53° 24.101'	167° 33.010'	2	Rhinoceros Auklet	11	32	33	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing	Carcass still missing	
1150	53° 24.111'	167° 33.032'	2	Common Murre	12	35	36	Carcass gone; block near original position. Carcass probably scavenged.	Right wing w/tag # 35 found.	Wing with/tag # 35 missing.	Wing with/tag # 35 missing.	

Table 5. Persistence experiment conducted on Beach CK-6, Chernofski Harbor, Unalaska Island, Alaska. The carcasses were first deployed on 2 February 2010 from 1520 h to 1600 h. The distance from the beginning of the beach, the location in the high (2) or mid (3) wash zone and the species order were determined randomly. A numbered wooden block was placed under each carcass. The carcasses were also tagged with metal patagium clips (PT) at the wrist of the left wing (LW) and right wing (RW), and in the keel edge of the carina (CA).

Distance (m)	Latitude	Longitude	Beach Location	Species	Block Number	PT Numbers			Revisit - 3 February	Revisit - 4 February	Revisit - 6 February
						LW	RW	CA	1330 h-1400 h (22 hrs after deployment)	1320 h-1410 h (46 hrs after deployment)	1310 h (110 hrs after deployment)
11	53° 24.225'	167° 34.893'	2	White-winged Scoter	13	37	38	39	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
159	53° 24.179'	167° 34.816'	2	Black-legged Kittiwake	14	40	41	42	Carcass gone; block moved, possible rewash.	Carcass still missing	Carcass still missing
314	53° 24.148'	167° 34.719'	3	Common Murre	15	43	44	45	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
353	53° 24.137'	167° 34.696'	3	Surf Scoter	16	46	47	48	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
405	53° 24.119'	167° 34.667'	2	White-winged Scoter	17	49	50	51	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
642	53° 24.035'	167° 34.582'	2	Brandt's Cormorant	18	52	53	54	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
715	53° 24.002'	167° 34.570'	2	Common Murre	19	55	56	57	Feathers and fresh flesh present; near original position. Block did not move.	Feathers and fresh flesh still present .	Feathers, but fewer, and fresh flesh still present. Camera battery dead, no photo.
808	53° 23.963'	167° 34.566'	2	Rhinoceros Auklet	20	58	59	60	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
889	53° 23.930'	167° 34.587'	3	Surf Scoter	21	61	62	63	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
905	53° 23.921'	167° 34.592'	2	Rhinoceros Auklet	22	64	65	66	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
1007	53° 23.878'	167° 34.612'	2	Surf Scoter	23	67	68	69	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing
1082	53° 23.853'	167° 34.645'	3	Western Grebe	24	70	71	72	Carcass gone; block near original position. Carcass probably scavenged.	Carcass still missing	Carcass still missing

Table 6. Replicate persistence experiment conducted on Beach CK-2, Chernofski Harbor, Unalaska Island, Alaska. The carcasses were first deployed on 6 February 2010 from 0950 h to 1020 h. The distance from the beginning of the beach, the location in the high (2) or mid (3) wash zone and the species order were determined randomly. A numbered wooden block was placed under each carcass. The carcasses were also tagged with metal patagial clips (PT) at the wrist of the left wing (LW) and right wing (RW); the carina was not tagged.

Distance (m)	Latitude	Longitude	Beach Location	Species	Block Number	PT Numbers			Revisit - 6 February	Revisit - 7 February
						LW	RW	CA	1750 h -1840 h (8 hrs after deployment)	0940 h-1015 h (24 hrs after deployment)
39	53° 23.698'	167° 32.879'	2	Surf Scoter	1	73	74	NA	Small feather pile with skin and blood present. Block near original position.	Small feather pile with skin and blood still present.
64	53° 23.711'	167° 32.886'	2	Surf Scoter	2	75	76	NA	Carcass gone; block near original position. Carcass probably scavenged.	Few feathers uncovered by wind; would not be considered a carcass.
119	53° 23.729'	167° 32.911'	3	Rhinoceros Auklet	3	77	78	NA	Carcass & block present at point of original placement.	Carcass & block still present at point of original placement.
330	53° 23.822'	167° 32.952'	2	Brandt's Cormorant (putrid)	4	79	80	NA	Carcass & block present at point of original placement.	Carcass & block still present at point of original placement. Fox scat on carcass.
526	53° 23.910'	167° 32.926'	2	Surf Scoter	5	81	82	NA	Carcass & block present at point of original placement.	Carcass gone, block present. Carcass scavenged.
620	53° 23.951'	167° 32.933'	2	White-winged Scoter	6	83	84	NA	Carcass & block present at point of original placement.	Few feathers w/o skin; would not be considered a carcass.
628	53° 23.953'	167° 32.930'	3	Surf Scoter	7	85	86	NA	Carcass gone; block moved, possible rewash.	Carcass still missing.
725	53° 23.992'	167° 32.931'	2	Common Murre	8	87	88	NA	Many bloody feathers, i.e. carcass present; block present.	Few bloody feathers still present.
908	53° 24.074'	167° 32.951'	3	Surf Scoter (putrid)	9	89	90	NA	Carcass & block present at point of original placement.	Carcass still present, but with signs of light scavenging.
999	53° 24.094'	167° 33.000'	3	Surf Scoter	10	91	92	NA	Carcass gone; block moved slightly, possible rewash.	Carcass still missing.
1015	53° 24.099'	167° 33.006'	2	Western Grebe	11	93	94	NA	Carcass gone; block moved slightly, possible rewash.	Carcass still missing.
1150	53° 24.108'	167° 33.030'	2	Surf Scoter	12	95	96	NA	Carcass & block present at point of original placement. Camera error, no photo.	Clump of feathers w/o skin; would not be considered a carcass.

Table 7. Taxonomic breakdown of bird carcass/carcass remains retrieved from selected beaches in the Chernofski Harbor, Unalaska Island, Alaska study area during the January/February 2010 background, bird mortality study. Numbers compiled from data in Appendix A.

Common Name	Scientific Name	Number	Percent
Unidentified Bird	Aves	43	28.1
Northern Fulmar	<i>Fumarus glacialis</i>	12	7.8
Short-tailed Shearwater	<i>Puffinus tenuirostris</i>	1	0.6
Fork-tailed Storm-Petrel	<i>Oceanodroma furcata</i>	2	1.3
Bald Eagle	<i>Haliaeetus leucocephalus</i>	1	0.7
Peregrine Falcon	<i>Falco peregrinus</i>	1	0.7
Larus gull	<i>Larus sp.</i>	6	3.9
Glaucous-winged Gull	<i>Larus glaucescens</i>	5	3.3
Black-legged Kittiwake	<i>Rissa tridactyla</i>	2	1.3
auklet	<i>Aethia sp.</i>	47	30.7
Crested Auklet	<i>Aethia cristatella</i>	3	2.0
Least Auklet	<i>Aethia pusilla</i>	1	0.7
Emperor Goose	<i>Chen canagica</i>	23	15.0
dabbling/diving duck	Anatidae	4	2.6
Long-tailed Duck	<i>Clangula hyemalis</i>	2	1.3
	Total	153	100.0

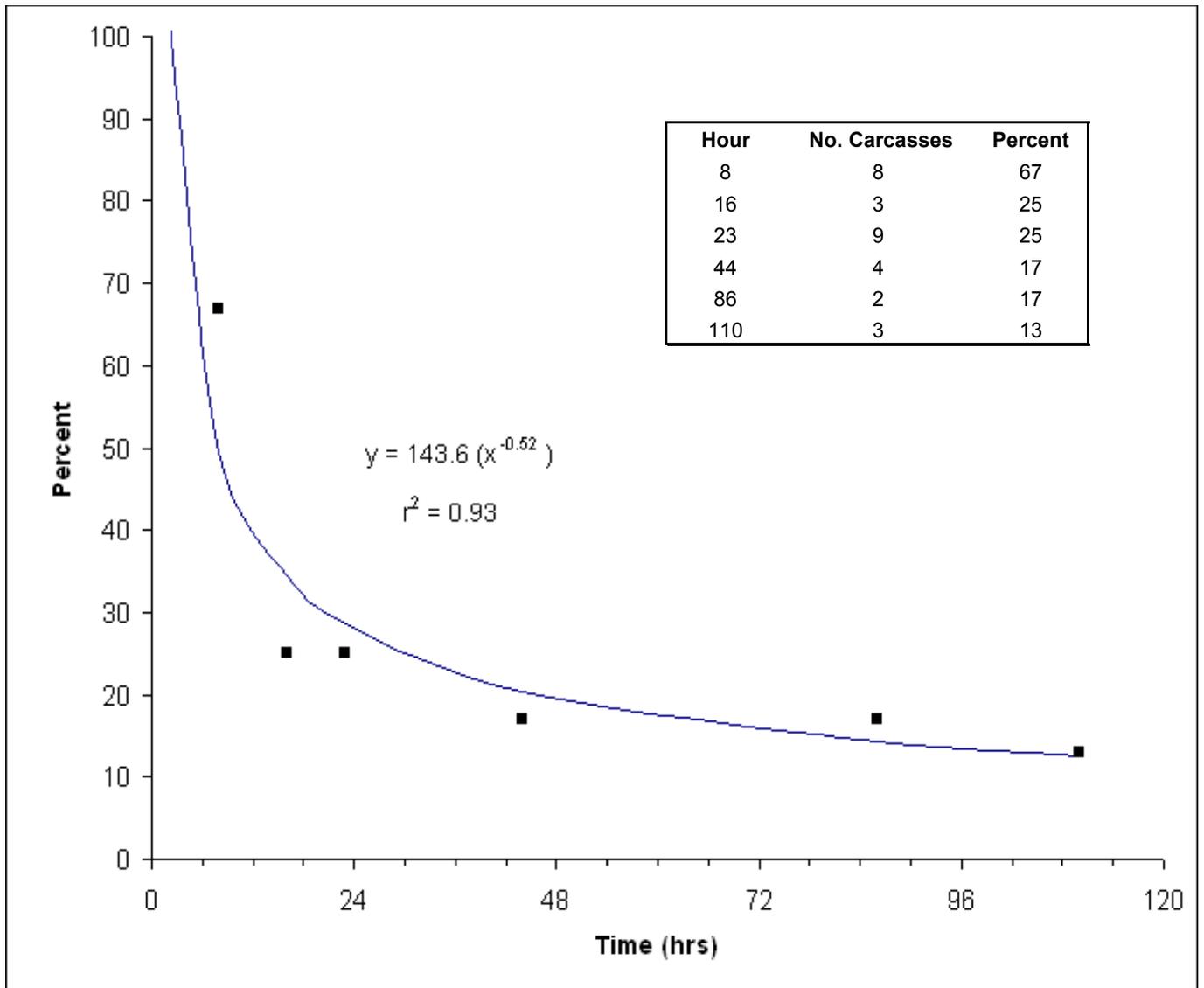


Figure 4. Carcass persistence represented as the percent of carcasses deployed that remained on the test beach through time. Data in the inset table, developed from the information listed in Tables 4-6, are shown as data points and were used to generate the power curve.

Appendix A. NIKOLSKI BAY: BIRD BACKGROUND MORTALITY STUDY - JANUARY 2010

Observers: D. Lewis, B. Kvam, T. Green

Date	Beach	Distance Surveyed (km)	Number Carcasses Found	Number/km	Specimen ID Numbers
13-01-10	NK-1	0.26	0	0.00	
13-01-10	NK-3	0.44	0	0.00	
13-01-10	NK-5	0.45	0	0.00	
13-01-10	NK-6	0.25	0	0.00	
13-01-10	NK-7	0.66	1	1.52	CL-001 (Glaucous Gull[!?!])
13-01-10	NK-8	0.54	0	0.00	
13-01-10	NK-9	1.07	0	0.00	
13-01-10	NK-11	0.81	0	0.00	
13-01-10	NK-12	0.42	0	0.00	
14-01-10	NK-1	0.26	0	0.00	None found.
14-01-10	NK-3	0.44	0	0.00	
14-01-10	NK-5	0.45	0	0.00	
14-01-10	NK-6	0.25	0	0.00	
14-01-10	NK-7	0.66	0	0.00	
14-01-10	NK-8	0.54	0	0.00	
14-01-10	NK-9	1.07	0	0.00	
14-01-10	NK-11	0.81	0	0.00	
14-01-10	NK-12	0.42	0	0.00	
15-01-10	NK-1	0.26	0	0.00	None found.
15-01-10	NK-3	0.44	0	0.00	
15-01-10	NK-5	0.45	0	0.00	
15-01-10	NK-6	0.25	0	0.00	
15-01-10	NK-7	0.66	0	0.00	
15-01-10	NK-8	0.54	0	0.00	
15-01-10	NK-9	1.07	0	0.00	
15-01-10	NK-11	0.81	0	0.00	
15-01-10	NK-12	0.42	0	0.00	
16-01-10	NK-1	0.26	0	0.00	None found.
16-01-10	NK-3	0.44	0	0.00	
16-01-10	NK-5	0.45	0	0.00	
16-01-10	NK-6	0.25	0	0.00	
16-01-10	NK-7	0.66	0	0.00	
16-01-10	NK-8	0.54	0	0.00	
16-01-10	NK-9	1.07	0	0.00	
16-01-10	NK-11	0.81	0	0.00	
16-01-10	NK-12	0.42	0	0.00	
17-01-10	NK-1	0.26	0	0.00	None found.
17-01-10	NK-3	0.44	0	0.00	
17-01-10	NK-5	0.45	0	0.00	
17-01-10	NK-6	0.25	0	0.00	
17-01-10	NK-7	0.66	0	0.00	
17-01-10	NK-8	0.54	0	0.00	
17-01-10	NK-9	1.07	0	0.00	
17-01-10	NK-11	0.81	0	0.00	
17-01-10	NK-12	0.42	0	0.00	

Date	Beach	Distance Surveyed	Number Carcasses	Number/km	Specimen ID Numbers
18-01-10	NK-1	0.26	0	0.00	None found.
18-01-10	NK-3	0.44	0	0.00	
18-01-10	NK-5	0.45	0	0.00	
18-01-10	NK-6	0.25	0	0.00	
18-01-10	NK-7	0.66	0	0.00	
18-01-10	NK-8	0.54	0	0.00	
18-01-10	NK-9	1.07	0	0.00	
18-01-10	NK-11	0.81	0	0.00	
18-01-10	NK-12	0.42	0	0.00	
19-01-10	None	0.00	-	-	No survey
20-01-10	NK-1	0.26	0	0.00	
20-01-10	NK-3	0.44	0	0.00	
20-01-10	NK-5	0.45	0	0.00	
20-01-10	NK-6	0.25	0	0.00	
20-01-10	NK-7	0.66	0	0.00	
20-01-10	NK-8	0.54	1	1.85	NK001
20-01-10	NK-9	1.07	1	0.93	NK002
20-01-10	NK-11	0.75	0	0.00	
20-01-10	NK-12	0.42	0	0.00	
21-01-10	NK-1	0.26	0	0.00	
21-01-10	NK-3	0.44	0	0.00	
21-01-10	NK-5	0.45	0	0.00	
21-01-10	NK-6	0.25	0	0.00	
21-01-10	NK-7	0.66	0	0.00	
21-01-10	NK-8	0.54	0	0.00	
21-01-10	NK-9	1.07	0	0.00	
21-01-10	NK-11	0.75	0	0.00	
21-01-10	NK-12	0.42	0	0.00	
22-01-10	NK-1	0.26	0	0.00	
22-01-10	NK-3	0.44	0	0.00	
22-01-10	NK-5	0.45	1	2.22	NK003
22-01-10	NK-6	0.25	0	0.00	
22-01-10	NK-7	0.66	0	0.00	
22-01-10	NK-8	0.54	0	0.00	
22-01-10	NK-9	1.07	0	0.00	
22-01-10	NK-11	0.79	2	2.53	NK004,005
22-01-10	NK-12	0.42	0	0.00	
23-01-10	NK-1	0.26	0	0.00	
23-01-10	NK-3	0.44	0	0.00	
23-01-10	NK-5	0.45	0	0.00	
23-01-10	NK-6	0.25	0	0.00	
23-01-10	NK-7	0.66	0	0.00	
23-01-10	NK-8	0.54	0	0.00	
23-01-10	NK-9	1.07	0	0.00	
23-01-10	NK-11	0.79	1	1.27	NK006
23-01-10	NK-12	0.42	0	0.00	

Date	Beach	Distance Surveyed	Number Carcasses	Number/km	Specimen ID Numbers
24-01-10	NK-1	0.26	0	0.00	
24-01-10	NK-3	0.44	0	0.00	
24-01-10	NK-5	0.45	0	0.00	
24-01-10	NK-6	0.25	0	0.00	
24-01-10	NK-7	0.66	0	0.00	
24-01-10	NK-8	0.54	0	0.00	
24-01-10	NK-9	1.07	0	0.00	
24-01-10	NK-11	0.69	0	0.00	
24-01-10	NK-12	0.42	0	0.00	
25-01-10	NK-1	0.26	0	0.00	
25-01-10	NK-3	0.44	0	0.00	
25-01-10	NK-5	0.45	0	0.00	
25-01-10	NK-6	0.25	0	0.00	
25-01-10	NK-7	0.66	0	0.00	
25-01-10	NK-8	0.54	0	0.00	
25-01-10	NK-9	1.07	0	0.00	
25-01-10	NK-11	0.81	0	0.00	
25-01-10	NK-12	0.42	0	0.00	
26-01-10	NK-1	0.26	0	0.00	
26-01-10	NK-3	0.44	0	0.00	
26-01-10	NK-5	0.45	0	0.00	
26-01-10	NK-6	0.25	0	0.00	
26-01-10	NK-7	0.66	0	0.00	
26-01-10	NK-8	0.54	0	0.00	
26-01-10	NK-9	1.07	0	0.00	
26-01-10	NK-11	0.81	0	0.00	
26-01-10	NK-12	0.42	0	0.00	
27-01-10	NK-1	0.26	0	0.00	
27-01-10	NK-3	0.44	0	0.00	
27-01-10	NK-5	0.45	0	0.00	
27-01-10	NK-6	0.25	0	0.00	
27-01-10	NK-7	0.66	0	0.00	
27-01-10	NK-8	0.54	0	0.00	
27-01-10	NK-9	1.07	0	0.00	
27-01-10	NK-11	0.81	1	1.23	NK007
27-01-10	NK-12	0.42	0	0.00	

Appendix B: CHERNOFSKI HARBOR: BIRD BACKGROUND MORTALITY STUDY - JANUARY/FEBRUARY 2010

Date	Beach	Distance Surveyed (km)	Number Carcasses Found	Number/km	Specimen ID Numbers
15-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
15-Jan-2010	CK-2	1.36	3	2.21	All labeled CK-2 in photo
15-Jan-2010	CK-3	0.31	10	32.26	All labeled CK-3 in photo
15-Jan-2010	CK-4	0.42	0	0.00	Misc. bones/feathers; no carcasses found
15-Jan-2010	CK-5	0.59	2	3.39	All labeled CK-5 in photo
15-Jan-2010	CK-6	1.19	3	2.52	All labeled CK-6 in photo
END OF BEACH CLEANING					
16-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
16-Jan-2010	CK-2	1.36	1	0.74	CKW-001; one photo
16-Jan-2010	CK-3	0.31	6	19.35	CKW-002*,003 ⁺ ,004,005,006 ⁺ ,007,008; one photo @; 002* considered to be carcass missed on 15 Jan, and is not included in number found. + = oiled
16-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
16-Jan-2010	CK-5	0.59	2	3.39	CKW-009*,010,011; one photo @; 009* determined to not be a carcass and not included in number found.
16-Jan-2010	CK-6	1.19	3	2.52	CKW-012,013,014; one photo @.
17-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
17-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
17-Jan-2010	CK-3	0.31	3	9.68	CKW-015,016,017; one photo @.

17-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
17-Jan-2010	CK-5	0.59	5	8.47	CKW-018,019,020,021,022; one photo @
17-Jan-2010	CK-6	1.19	1	0.84	CKW-023; one photo.
18-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
18-Jan-2010	CK-2	1.36	1	0.74	CKW-024; one photo
18-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
18-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
18-Jan-2010	CK-5	0.59	1	1.69	CKW-027 ⁺ ; one photo; + = oiled
18-Jan-2010	CK-6	1.19	2	1.68	CKW-025,026; one photo @
20-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
20-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
20-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
20-Jan-2010	CK-4	0.42	1	2.38	CKW-028; one photo
20-Jan-2010	CK-5	0.59	7	11.86	CKW-029,030,031,032,033 ⁺ ,034 ⁺ ,035; one photo @. + = oiled
20-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
21-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
21-Jan-2010	CK-2	1.36	3	2.21	CKW-036,037,038 ⁺ ; one photo @. + = oiled

21-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
21-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
21-Jan-2010	CK-5	0.59	3	5.08	CKW-039 ⁺ ,040 ⁺ ,041 ⁺ ; one photo @. + = oiled
21-Jan-2010	CK-6	1.19	2	1.68	CKW-042,043; one photo @.
22-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
22-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
22-Jan-2010	CK-3	0.31	3	9.68	CKW-044 ⁺ ,045,046; one photo @; + = oiled
22-Jan-2010	CK-4	0.42	2	4.76	CKW-047,048*,049; one photo @; * = determined to old skull and left out of number found.
22-Jan-2010	CK-5	0.59	0	0.00	No carcasses found
22-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
23-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
23-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
23-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
23-Jan-2010	CK-4	0.42	1	2.38	CKW-050; one photo.
23-Jan-2010	CK-5	0.59	0	0.00	No carcasses found
23-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
24-Jan-2010	CK-1	0.70	0	0.00	No carcasses found

24-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
24-Jan-2010	CK-3	0.31	1	3.23	CKW-051; one photo. May be an old carcass
24-Jan-2010	CK-4	0.42	1	2.38	CKW-052; one photo
24-Jan-2010	CK-5	0.59	0	0.00	No carcasses found
24-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
25-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
25-Jan-2010	CK-2	1.36	1	0.74	CKW-053; one photo.
25-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
25-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
25-Jan-2010	CK-5	0.59	0	0.00	No carcasses found
25-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
26-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
26-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
26-Jan-2010	CK-3	0.31	1	3.23	CKW-055; one photo.
26-Jan-2010	CK-4	0.42	1	2.38	CKW-054; one photo.
26-Jan-2010	CK-5	0.59	1	1.69	CKW-056; one photo.
26-Jan-2010	CK-6	1.19	0	0.00	No carcasses found

27-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
27-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
27-Jan-2010	CK-3	0.31	2	6.45	CKW-059,060; one photo @
27-Jan-2010	CK-4	0.42	3	7.14	CKW-056b ⁺ ,057,058; one photo @. + = oiled
27-Jan-2010	CK-5	0.59	2	3.39	CKW-063,064; one photo @.
27-Jan-2010	CK-6	1.19	2	1.68	CKW-061,062; one photo @.
28-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
28-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
28-Jan-2010	CK-3	0.31	4	12.90	CKW-065,066,067,068; one photo @
28-Jan-2010	CK-4	0.42	2	4.76	CKW-069,070; one photo @.
28-Jan-2010	CK-5	0.59	1	1.69	CKW-071; one photo.
28-Jan-2010	CK-6	1.19	1	0.84	CKW-072; one photo.
30-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
30-Jan-2010	CK-2	1.36	1	0.74	CKW-073; one photo.
30-Jan-2010	CK-3	0.31	0	0.00	No carcasses found
30-Jan-2010	CK-4	0.42	0	0.00	No carcasses found
30-Jan-2010	CK-5	0.59	1	1.69	CKW-074; one photo.

30-Jan-2010	CK-6	1.19	3	3.00	CKW-075,076,077; one photo @.
31-Jan-2010	CK-1	0.70	0	0.00	No carcasses found
31-Jan-2010	CK-2	1.36	0	0.00	No carcasses found
31-Jan-2010	CK-3	0.31	1	3.23	CKW-078; one photo.
31-Jan-2010	CK-4	0.42	3	7.14	CKW-079,080,081; one photo @.
31-Jan-2010	CK-5	0.59	3	5.08	CKW-082,083,084; one photo @.
31-Jan-2010	CK-6	1.19	0	0.00	No carcasses found
1-Feb-2010	CK-1	0.70	0	0.00	No carcasses found
1-Feb-2010	CK-2	1.36	0	0.00	No carcasses found
1-Feb-2010	CK-3	0.31	1	3.23	CKW-085; one photo.
1-Feb-2010	CK-4	0.42	1	2.38	CKW-086; one photo.
1-Feb-2010	CK-5	0.59	0	0.00	No carcasses found
1-Feb-2010	CK-6	1.19	0	0.00	No carcasses found
4-Feb-2010	CK-1	0.70	0	0.00	No carcasses found
4-Feb-2010	CK-2	1.36	1	0.74	CKW-087; one photo.
4-Feb-2010	CK-3	0.31	0	0.00	No carcasses found
4-Feb-2010	CK-4	0.42	2	4.76	CKW-088,089; one photo @.

4-Feb-2010	CK-5	0.59	0	0.00	No carcasses found
4-Feb-2010	CK-6	1.19	0	0.00	No carcasses found

Total (after "cleaning") = 73.12 87 1.19

Appendix B: CHERNOFSKI HARBOR: BIRD BACKGROUND MORTALITY STUDY - JANUARY/FEBRUARY 2010

Date	Beach	Distance Surveyed (km)	Number Carcasses Found	Number/km	Specimen ID Numbers
21-Jan-2010	CK-7	0.51	0	0.00	No carcasses found
21-Jan-2010	CK-8	0.91	1	1.10	Four photos taken of various parts of this carcass; CK-8 clear label
21-Jan-2010	CK-9	0.76	0	0.00	No carcasses found
22-Jan-2010	CK-10	0.88	7	7.95	One photo @; all designated as CK-10 "Clear"
21-Jan-2010	CK-11	0.82	0	0.00	No carcasses found
21-Jan-2010	CK-12	0.77	4	5.19	One photo @; all designated as CK-12 "Clear"
END OF BEACH CLEANING EAST SIDE					
22-Jan-2010	CK-7	0.51	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
22-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
22-Jan-2010	CK-9	0.76	0	0.00	No carcasses found
22-Jan-2010	CK-11	0.82	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
22-Jan-2010	CK-12	0.77	0	0.00	No carcasses found
23-Jan-2010	CK-7	0.51	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
23-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
23-Jan-2010	CK-9	0.76	0	0.00	No carcasses found

23-Jan-2010	CK-10	0.88	1	1.14	CKE-001
23-Jan-2010	CK-11	0.82	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
23-Jan-2010	CK-12	0.77	1	1.30	CKE-002 ⁺ ; + = oiled
24-Jan-2010	CK-7	0.51	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
24-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
24-Jan-2010	CK-9	0.76	0	0.00	No carcasses found
24-Jan-2010	CK-10	0.88	4	4.55	CKE-003,004,005,006; one photo @.
24-Jan-2010	CK-11	0.82	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
24-Jan-2010	CK-12	0.77	1	1.30	CKE-007; one photo.
25-Jan-2010	CK-7	0.51	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
25-Jan-2010	CK-8	0.91	0	0.00	No carcasses found.
25-Jan-2010	CK-9	0.76	4	5.26	CKE-011,012,013,014; one photo @.
25-Jan-2010	CK-10	0.88	3	3.41	CKE-008,009,010; one photo @.
25-Jan-2010	CK-11	0.82	0	0.00	No carcasses found; Mutton Cove frozen over to shoreline
25-Jan-2010	CK-12	0.77	2	2.60	CKE-015,016 ⁺ ; one photo @. + = oiled
28-Jan-2010	CK-7	0.51	0	0.00	No carcasses found.

28-Jan-2010	CK-8	0.91	1	1.10	CKE-024; one photo.
28-Jan-2010	CK-9	0.76	3	3.95	CKE-021,022,023; one photo @.
28-Jan-2010	CK-10	0.88	4	4.55	CKE-017,018,019,020; one photo @
28-Jan-2010	CK-11	0.82	0	0.00	No carcasses found
28-Jan-2010	CK-12	0.77	2	2.60	CKE-025,026; one photo @.
29-Jan-2010	CK-7	0.51	0	0.00	No carcasses found
29-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
29-Jan-2010	CK-9	0.76	0	0.00	No carcasses found
29-Jan-2010	CK-10	0.88	0	0.00	No carcasses found
29-Jan-2010	CK-11	0.82	0	0.00	No carcasses found
29-Jan-2010	CK-12	0.77	3	3.90	CKE-027,028,029; one photo @.
30-Jan-2010	CK-7	0.51	0	0.00	No carcasses found
30-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
30-Jan-2010	CK-9	0.76	0	0.00	No carcasses found
30-Jan-2010	CK-10	0.88	1	1.14	CKE-030; one photo.
30-Jan-2010	CK-11	0.82	0	0.00	No carcasses found

30-Jan-2010	CK-12	0.77	1	1.30	CKE-031; one photo.
31-Jan-2010	CK-7	0.51	0	0.00	No carcasses found
31-Jan-2010	CK-8	0.91	0	0.00	No carcasses found
31-Jan-2010	CK-9	0.76	2	2.63	CKE-032,033; one photo @.
31-Jan-2010	CK-10	0.88	0	0.00	No carcasses found
31-Jan-2010	CK-11	0.82	0	0.00	No carcasses found
31-Jan-2010	CK-12	0.77	1	1.30	CKE-034; one photo.
1-Feb-2010	CK-7	0.51	0	0.00	No carcasses found.
1-Feb-2010	CK-8	0.91	3	3.30	CKE-041,042,043; one photo @.
1-Feb-2010	CK-9	0.76	2	2.63	CKE-039,040; one photo @.
1-Feb-2010	CK-10	0.88	4	4.55	CKE-035,036,037,038; one photo @
1-Feb-2010	CK-11	0.82	0	0.00	No carcasses found.
1-Feb-2010	CK-12	0.77	1	1.30	CKE-044; one photo.
2-Feb-2010	CK-7	0.51	0	0.00	No carcasses found.
2-Feb-2010	CK-8	0.91	0	0.00	No carcasses found.
2-Feb-2010	CK-9	0.76	3	3.95	CKE-045,046,047; one photo @.

2-Feb-2010	CK-10	0.88	0	0.00	No carcasses found.
2-Feb-2010	CK-11	0.82	0	0.00	No carcasses found.
2-Feb-2010	CK-12	0.77	1	1.30	CKE-048; one photo.
3-Feb-2010	CK-7	0.51	0	0.00	No carcasses found.
3-Feb-2010	CK-8	0.91	0	0.00	No carcasses found.
3-Feb-2010	CK-9	0.76	2	2.63	CKE-054,055; one photo @.
3-Feb-2010	CK-10	0.88	5	5.68	CKE-049,050,051,052,053; one photo @.
3-Feb-2010	CK-11	0.82	0	0.00	No carcasses found.
3-Feb-2010	CK-12	0.77	3	3.90	CKE-056,057,058; one photo @.
4-Feb-2010	CK-7	0.51	0	0.00	No carcasses found.
4-Feb-2010	CK-8	0.91	0	0.00	No carcasses found.
4-Feb-2010	CK-9	0.76	1	1.32	CKE-063; one photo.
4-Feb-2010	CK-10	0.88	3	3.41	CKE-060,061,062; one photo @.
4-Feb-2010	CK-11	0.82	1	1.22	CKE-059; one photo.
4-Feb-2010	CK-12	0.77	3	3.90	CKE-064,065,066; one photo @.

Total (after "cleaning") = 54.92 66 1.20

Appendix B: Chernofski Harbor: Species/taxon identification of carcass specimens collected in January/February 2010

CHERNOFSKI WEST

Specimen No.	Species/Taxon Identification
CKW 001	unknown Aves
CKW 002	unknown Aves
CKW 003	unknown Aves; oiled
CKW 004	auklet
CKW 005	auklet
CKW 006	unknown Aves; oiled
CKW 007	auklet
CKW 008	Peregrine Falcon
CKW 009	auklet; not a "legitimate" carcass
CKW 010	Northern Fulmar
CKW 011	unknown Aves
CKW 012	Emperor Goose
CKW 013	Northern Fulmar ?
CKW 014	unknown Aves
CKW 015	Black-legged Kittiwake
CKW 016	auklet
CKW 017	Northern Fulmar
CKW 018	unknown Aves
CKW 019	unknown Aves
CKW 020	auklet
CKW 021	auklet
CKW 022	auklet
CKW 023	Emperor Goose

CHERNOFSKI EAST

Specimen No.	Species/Taxon Identification
CKE 001	Emperor Goose
CKE 002	unknown Aves; oiled
CKE 003	unknown Aves
CKE 004	Black-legged Kittiwake
CKE 005	unknown Aves
CKE 006	auklet
CKE 007	auklet
CKE 008	Glaucous-winged Gull
CKE 009	Northern Fulmar
CKE 010	auklet
CKE 011	unknown, small Aves
CKE 012	Crested Auklet
CKE 013	unknown Aves
CKE 014	Northern Fulmar
CKE 015	Crested Auklet
CKE 016	unknown, small Aves; oiled
CKE 017	Glaucous-winged Gull
CKE 018	auklet, fresh carina
CKE 019	Emperor Goose
CKE 020	auklet
CKE 021	auklet
CKE 022	Emperor Goose?
CKE 023	Emperor Goose?

CKW	024	Short-tailed Shearwater
CKW	025	unknown duck
CKW	026	Long-tailed Duck
CKW	027	unknown Aves; oiled
CKW	028	Glaucous-winged Gull
CKW	029	Emperor Goose
CKW	030	Long-tailed Duck, most likely
CKW	031	Crested Auklet
CKW	032	Fork-tailed Storm Petrel
CKW	033	unknown moderate sized Aves; oiled
CKW	034	unknown large sized Aves; oiled
CKW	035	Fork-tailed Storm Petrel
CKW	036	Glaugous-winged Gull
CKW	037	Emperor Goose
CKW	038	unknown Aves; oiled
CKW	039	unknown Aves; oiled
CKW	040	unknown Aves; oiled
CKW	041	unknown Aves; oiled
CKW	042	Bald Eagle
CKW	043	Emperor Goose
CKW	044	unknown Aves; oiled
CKW	045	auklet
CKW	046	auklet
CKW	047	Northern Fulmar
CKW	048	Common Raven; old skull
CKW	049	auklet

CKE	024	Emperor Goose?
CKE	025	auklet
CKE	026	unknown Aves
CKE	027	auklet
CKE	028	auklet
CKE	029	auklet
CKE	030	unknown Aves
CKE	031	auklet
CKE	032	auklet
CKE	033	duck sp.
CKE	034	auklet
CKE	035	unknown duck species
CKE	036	auklet
CKE	037	auklet
CKE	038	Emperor Goose
CKE	039	unknown Aves
CKE	040	unknown Aves
CKE	041	auklet
CKE	042	unknown Aves; raptor regurgitation pellet.
CKE	043	unknown duck species
CKE	044	Least Auklet
CKE	045	auklet
CKE	046	auklet
CKE	047	unknown Aves
CKE	048	auklet
CKE	049	Northern Fulmar

