

APPENDIX 1

Number and proportion of 475 dead birds of 23 species on beached bird surveys by McNair on outer Cape Cod, Massachusetts, USA from 27 January to 28 March 2013. Species listed in descending order of abundance; alcids in bold type.

Species Name	Number	Proportion	Dates Recorded
Razorbill <i>Alca torda</i>	264	55.6	27 Jan – 28 Mar
Atlantic Puffin <i>Fratercula arctica</i>^a	39	8.2	29 Jan – 17 Mar
Common Loon <i>Gavia immer</i>	29	6.1	28 Jan – 28 Mar
Red-breasted Merganser <i>Mergus serrator</i>	20	4.2	08 Feb – 27 Mar
Horned Grebe <i>Podiceps auritus</i>	19	4	16 Feb – 28 Mar
Great Black-backed Gull <i>Larus marinus</i>	18	3.8	03 Feb – 28 Mar
Common Eider <i>Somateria mollissima</i>	17	3.6	08 Feb – 27 Mar
Herring Gull <i>L. argentatus</i>	11	2.3	16 Feb – 18 Mar
Little Auk <i>Alle alle</i>	11	2.3	27 Jan – 25 Feb
Thick-billed Murre <i>Uria lomvia</i>	9	1.9	23 Feb – 28 Mar
Red-necked Grebe <i>P. grisegena</i>	7	1.5	19 Feb – 27 Mar
Northern Gannet <i>Morus bassanus</i>	7	1.5	15 Feb – 02 Mar
White-winged Scoter <i>Melanitta fusca</i>	6	1.3	19 Feb – 23 Feb
Common Murre <i>U. aalge</i>^b	4	0.8	22 Feb – 28 Mar
Northern Fulmar <i>Fulmarus glacialis</i> ^c	3	0.6	16 Feb – 28 Mar
Red-throated Loon <i>G. stellata</i>	2	0.4	19 Feb – 02 Mar
Great Cormorant <i>Phalacrocorax carbo</i>	2	0.4	22 Feb – 21 Mar
American Black Duck <i>Anas rubripes</i>	1	0.2	08 Feb
Black Scoter <i>Mel. americana</i>	1	0.2	01 Mar

Scoter, spp. <i>Mel. spp.</i>	1	0.2	21 Feb
Long-tailed Duck <i>Clangula hyemalis</i>	1	0.2	21 Feb
Pacific Loon <i>G. pacifica</i> ^d	1	0.2	21 Feb
Ring-billed Gull <i>L. delawarensis</i>	1	0.2	16 Feb
Black Guillemot <i>Cepphus grylle</i>	1	0.2	13 Mar

^a Eight birds salvaged (University of New Brunswick/New Brunswick Museum).

^b One bird salvaged (University of New Brunswick).

^c All birds (two light-phase, one dark-phase) salvaged (Acadia University).

^d Salvaged (New Brunswick Museum).

APPENDIX 2

**Abundance of six species of dead alcids on beached bird surveys over five consecutive winters^a at
outer Cape Cod, Massachusetts, USA**

Species	Winter ^b					Total
	2012/13	2013/14	2014/15	2015/16	2016/17	
Little Auk <i>Alle alle</i>	11	0	5	2	5	27
Common Murre <i>Uria aalge</i>	4	1	2	2	11	20
Thick-billed Murre <i>Uria lomvia</i>	9	11	42	10	13	85
Murre, unidentified <i>Uria spp.</i>	0	5	16	6	6	33
Razorbill <i>Alca torda</i>	264	13	17	14	34	342
Large Alcid, unidentified (see text)	0	2	2	1	2	7
Black Guillemot <i>Cephus grylle</i>	1	0	7	0	3	11
Atlantic Puffin <i>Fratercula arctica</i>	39	1	5	0	8	53
Alcid Total	328	33	96	35	86	578
All species total	475	494	567	691	558	2 785
Alcid % of all species	69	7	17	5	15	21

^a Winters 2013/14 through 2016/17 defined as 01 November to 15 April; winter 2012/13, 27 January to 28 March.

^b Effort: 2012/13, 200.7 km; 2013/14, 224.0 km; 2014/15, 337.1 km; 2015/16, 356.7 km; 2016/17, 324.4 km.

APPENDIX 3

Age, condition and wing wear of Atlantic Puffins collected on Cape Cod by McNair in winter 2012/13

Month	Day	Beach	Water body	Age ^a	No. bill grooves	Head-bill (mm)	Condition (% intact)	Mass (g)	Wing (mm)	Flight feathers: age/wear ^b
Feb	08	First Encounter Beach	Bay	ATY	N/A	N/A	<75	N/A	158	old/very worn
Feb	11	Corn Hill Beach	Bay	SY	N/A	N/A	>75	N/A	158	N/A
Feb	15	Corn Hill Beach	Bay	SY	0	80.5	>75	264	156	moderately worn
Feb	15	Fishers Beach	Bay	SY	0.5	83	>75	297	163	new/moderately worn
Feb	15	Race Point	RP	SY	N/A	N/A	>75	N/A	N/A	N/A
Feb	16	Corn Hill Beach	Bay	SY	0	N/A	>75	N/A	152	worn
Feb	16	Beach Point	Bay	ATY	2	87.3	>75	405	163	old/worn
Feb	16	Beach Point	Bay	ATY	2.5	80.5	>75	N/A	161	old/worn
Feb	16	Corn Hill Beach	Bay	ATY	2	86.5	>75	315	168	old/worn
Feb	16	Corn Hill Beach	Bay	N/A	1(+?)	N/A	>75	N/A	158	old/worn
Feb	16	Corn Hill Beach	Bay	N/A	N/A	N/A	<75	N/A	154	new
Feb	16	Corn Hill Beach	Bay	N/A	N/A	N/A	>75	N/A	160	new
Feb	16	Corn Hill Beach	Bay	ATY	2.5	N/A	>75	N/A	162	old/worn

Feb	19	Corn Hill Beach	Bay	ATY	1.5	78.5	>75	330	158	old/worn
Feb	19	Fishers Beach	Bay	N/A	N/A	N/A	>75	N/A	161	new
Feb	25	Herring Cove Beach	Bay	N/A	N/A	N/A	>75	N/A	170	old/ slightly worn
Feb	28	Corn Hill Beach	Bay	N/A	N/A	N/A	<75	N/A	162	old/moderately worn
Feb	20	Corn Hill Beach	Bay	ATY	2.5	79.5	>75	315	163	new
Feb	20	Race Point	RP	ATY	3	N/A	>75	N/A	168	active moult
Feb	21	Beach Point	Bay	ATY	2	N/A	>75	N/A	158	old/worn
Feb	21	Corn Hill Beach	Bay	ATY	3	86.2	>75	325	170	new
Feb	21	Beach Point	Bay	SY	1.5	83	>75	390	157	old/moderately worn
Feb	22	Jeremy Point	Harbor	SY	0	75.3	>75	290	160	new
Feb	23	Duck Harbor	Bay	ATY	2.5	76.9	>75	N/A	159	old/moderately worn
Feb	25	First Encounter Beach	Bay	ATY	3	N/A	>75	N/A	155	old/moderately worn
Feb	28	Duck Harbor	Bay	ATY	2.5	N/A	>75	N/A	165	old/slightly worn
Feb	28	Duck Harbor	Bay	ATY	2.5	86.1	>75	N/A	160	old/slightly worn
Feb	28	Nauset Inlet	ocean	ATY	2.5	85.1	>75	425	163	old/moderately worn

Mar	05	Corn Hill Beach	Bay	ATY	2	80.6	>75	284	158	old/moderately worn
Mar	09	First Encounter Beach	Bay	ATY	3	85.1	>75	455	170	old/moderately worn
Mar	13	Jeremy Point	Bay	SY	0	86.6	>75	305	166	new/slightly worn
Mar	13	Jeremy Point	Bay	SY	1	N/A	>75	290	161	old/moderately worn

^a SY = second year (fledged previous summer); ATY= After Third Year.

^b Sequence: worn/slightly worn/moderately worn/very worn/active moult.