

Diets and feeding methods of captive seabirds in mixed exhibits (*Rissa tridactyla*, *Uria Aalge*, *Fratercula arctica* and *Somateria mollissima*)

Bundle of appendices



Author

Linda Vervloed (3014239)

Commissioning company

Rotterdam Zoo
Blijdorplan 8
3041 JG Rotterdam

Place and date

Rotterdam, May 28, 2015

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Student	Linda Vervloed (3014239) Student 'Animal health and management' Dronten University of Applied Sciences, the Netherlands
Discipline	Graduation thesis Bundle of appendices
Assessor	Irma Schouwenaars i.schouwenaars@cahvilentum.nl
Commissioning company	Rotterdam Zoo Blijdorplaan 8 3041 JG Rotterdam The Netherlands
Supervisors	Dionne Slagter (d.slagter@rotterdamzoo.nl) Harald Schmidt (h.schmidt@rotterdamzoo.nl)
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Photos first page: Pictures of bird species in Bass Rock, Rotterdam Zoo. Top left: common guillemot (*by Bryan Black*), top right: common eider (*by Marco Valenti*), bottom left: Atlantic puffin (*by Massimiliano Sticca*) and bottom right: black-legged kittiwake (*photographer unknown*).

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Appendix 1. Ethogram behavioural sampling

Table A1. Example ethogram behavioural sampling of seabirds in alphabetic order		
Behaviour	Abbreviation	Definition
Abnormal swimming	AS	Stereotype movement through water without any clear function or aim and continuous repeated
Aggression initiator	AGI	Picking or attacking another animal
Aggression receiver	AGR	Be picked or attacked by other animals
Bathing	BA	Washing or immersion of something, especially the body, in water
Displacement	DI	Any other forward or backward movement than walking
Display	DIS	Mating with other bird
Drinking	DR	To take water (or other liquid) into the mouth and swallow it
Eating	EA	Take up small bits of food with the beak and swallow it
Foraging	FO	The seeking or obtaining of such food.
Grooming	GR	Cleaning of feathers and fur with beak
Incubating	INC	to sit upon (eggs) for the purpose of hatching
Interaction	INT	Reciprocal action, effect, or influence
Lie	LI	Rest in a horizontal or flat position
Looking	LO	Turn eyes toward something or in some direction in order to see
Nestling	NE	Making a place to breed
Picking	PI	Pointing and touching an object or other birds by beak
Resting	RE	Relaxing by doing nothing, but still awake
Scratching	SC	Rub the skin with nails
Sleeping	SL	To take rest with closed eyes for at least ten seconds
Standing	ST	Having an erect or upright position for at least five seconds
Swimming above water	SAW	Forward movement above water, but still in contact with the water, while moving legs
Swimming under water	SUW	Forward movement under water while moving wings
Walking	WA	Forward moving with both feet
Yawning	YA	Opening of the mouth widely because of fatigue, boredom or displacement

Appendix 2. Protocols behavioural studies

2.1 Behavioural study of Atlantic puffins

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swinming	Swimming	Scratching	Aggression Ini	Aggression Recei	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				6																6
2.5-5				6																6
5-7.5	3			1															2	6
7.5-10				6																6
10-12.5	4			2																6
12.5-15				6																6
15-17.5				5			1													6
17.5-20	1						2	3												6
20-22.5							2	4												6
22.5-25							2	4												6
25-27.5	1						5													6
27.5-30							6													6
30-32.5	1					2	3													6
32.5-35				2		3	1													6
35-37.5						4	2													6
37.5-40				1	1	3	1													6
40-42.5				1	2	2	1													6
42.5-45					2	3	1													6
45-47.5					2	3			1											6
47.5-50					2	3			1											6
50-52.5					2	3			1											6
52.5-55				1	1	4														6
55-57.5					2	2			2											6
57.5-60					3	2			1											6
Total	10	0	0	37	17	34	27	11	6	0	0	0	0	0	0	0	0	0	2	144
Mean per bird	1,667	0,000	0,000	6,167	2,833	5,667	4,500	1,833	1,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,333	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																			
Number of birds	6																			
Day number	1																			
Observation number	1																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5					1	2		2	1										6
2.5-5					2	3		1											6
5-7.5					2	2			2										6
7.5-10					2	1			1		2								6
10-12.5					2	4													6
12.5-15					3	2			1										6
15-17.5					3	2			1										6
17.5-20					2	4													6
20-22.5					1	4			1										6
22.5-25					4	2													6
25-27.5					4	1			1										6
27.5-30					4	2													6
30-32.5					5	1													6
32.5-35					5	1													6
35-37.5					5				1										6
37.5-40					5	1													6
40-42.5					5	1													6
42.5-45					5	1													6
45-47.5					4	2													6
47.5-50					5	1													6
50-52.5					3	3													6
52.5-55					3	2			1										6
55-57.5					5	1													6
57.5-60					5	1													6
Total	0	0	0	0	85	44	0	3	10	0	2	0	0	0	0	0	0	0	144
Mean per bird	0,000	0,000	0,000	0,000	14,167	7,333	0,000	0,500	1,667	0,000	0,333	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																		
Number of birds	6																		
Day number	1																		
Observation number	2																		

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5	3			3														6
2.5-5				1		3	2											6
5-7.5					1	3	2											6
7.5-10					1	5												6
10-12.5				2		2		1		1								6
12.5-15				3	1	2												6
15-17.5				2		2		2										6
17.5-20				2	1	2	1											6
20-22.5				2	1	3												6
22.5-25				2	1	3												6
25-27.5				2		3		1										6
27.5-30				2	3			1										6
30-32.5				2	4													6
32.5-35				1	4			1										6
35-37.5				1	5													6
37.5-40				1	5													6
40-42.5				1	5													6
42.5-45				1	4	1												6
45-47.5				1	5													6
47.5-50				1	5													6
50-52.5				1	5													6
52.5-55				1	5													6
55-57.5				1	5													6
57.5-60				1	5													6
Total	3	0	0	34	66	29	5	6	0	1	0	0	0	0	0	0	0	144
Mean per bird	0,500	0,000	0,000	5,667	11,000	4,833	0,833	1,000	0,000	0,167	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	1																	
Observation number	3																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2	3		1											6
2.5-5				1	2		2	1										6
5-7.5				3	1		2											6
7.5-10				4			2											6
10-12.5				3			3											6
12.5-15						3	1	2										6
15-17.5				2		3		1										6
17.5-20				1	1	2	1	1										6
20-22.5				1	1	2	1			1								6
22.5-25		2			1		1	2										6
25-27.5				1	1	3	1											6
27.5-30				2	2	2												6
30-32.5				2	2	2												6
32.5-35				2	2	2												6
35-37.5				2	2	2												6
37.5-40				1	2	2		1										6
40-42.5					3	3												6
42.5-45				1	3	1	1											6
45-47.5					2	2	1					1						6
47.5-50					4	1						1						6
50-52.5					2	1	1	1				1						6
52.5-55				1	2	1	1					1						6
55-57.5				2	3		1											6
57.5-60				2	2		1					1						6
Total	0	2	0	33	41	32	21	9	0	1	0	5	0	0	0	0	0	144
Mean per bird	0	0,333333	0	5,5	6,833333	5,333333	3,5	1,5	0	0,166667	0	0,833333	0	0	0	0	0	24
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	2																	
Observation number	4																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				4			2											6
2.5-5				2		2	2											6
5-7.5				4		2												6
7.5-10				2		4												6
10-12.5				2		4												6
12.5-15				2		2	2											6
15-17.5				2		2	2											6
17.5-20				4			2											6
20-22.5				4			2											6
22.5-25				2		2	2											6
25-27.5				4			2											6
27.5-30				2			4											6
30-32.5				1			5											6
32.5-35				1			5											6
35-37.5				1			5											6
37.5-40				1			5											6
40-42.5							6											6
42.5-45							6											6
45-47.5							6											6
47.5-50							6											6
50-52.5				6														6
52.5-55				4			2											6
55-57.5				2			4											6
57.5-60				4			2											6
Total	0	0	0	54	0	18	72	0	0	0	0	0	0	0	0	0	0	144
Mean per bird	0	0	0	9	0	3	12	0	0	0	0	0	0	0	0	0	0	24
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	2																	
Observation number	5																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggressor	Aggressor	Interaction	Bathing	Drinking	Flying	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2	4															6
2.5-5				2	4															6
5-7.5				2	4															6
7.5-10				1	5															6
10-12.5				1	5															6
12.5-15				2	2	2														6
15-17.5				2	4															6
17.5-20				1	5															6
20-22.5				1	2	2		1												6
22.5-25				2	1	3														6
25-27.5				2	2	2														6
27.5-30				2	1	2		1												6
30-32.5				3	1	1		1												6
32.5-35				2	3	1														6
35-37.5				3	1	1		1												6
37.5-40				6																6
40-42.5				3			2	1												6
42.5-45	1			4		1														6
45-47.5	1			1	1	1	2													6
47.5-50				3		2							1							6
50-52.5				4		2														6
52.5-55				5		1														6
55-57.5				5		1														6
57.5-60				3		3														6
Total	2	0	0	62	45	25	4	5	0	0	0	0	1	0	0	0	0	0	0	144
Mean per bird	0,333	0,000	0,000	10,333	7,500	4,167	0,667	0,833	0,000	0,000	0,000	0,000	0,167	0,000	0,000	0,000	0,000	0,000	0,000	24
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																			
Number of birds	6																			
Day number	2																			
Observation number	6																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5					4	1	1											6
2.5-5					4	1	1											6
5-7.5					2	1	2			1								6
7.5-10					2	2	1	1										6
10-12.5					3	2	1											6
12.5-15					2	2	2											6
15-17.5					2	1	3											6
17.5-20					2	1	3											6
20-22.5					2	1	2	1										6
22.5-25					2	2	2											6
25-27.5					3	1	2											6
27.5-30	1				2	1	2											6
30-32.5	1				2	2	1											6
32.5-35					2	2	1			1								6
35-37.5					4	1	1											6
37.5-40					4	1	1											6
40-42.5					3	1	2											6
42.5-45					3	1	2											6
45-47.5					1	3	2											6
47.5-50					2	3	1											6
50-52.5					1	5												6
52.5-55					1	5												6
55-57.5					1	5												6
57.5-60				4	1	1												6
Total	2	0	0	4	55	46	33	2	0	2	0	0	0	0	0	0	0	144
Mean per bird	0,333	0,000	0,000	0,667	9,167	7,667	5,500	0,333	0,000	0,333	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	3																	
Observation number	7																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				1	4		1											6
2.5-5				1	4		1											6
5-7.5				2	2		2											6
7.5-10				2	2		2											6
10-12.5				2	2		2											6
12.5-15				3	2		1											6
15-17.5				2	2		2											6
17.5-20				1	2		2			1								6
20-22.5	1			3	1	1												6
22.5-25				3	2	1												6
25-27.5				2	2	1		1										6
27.5-30				1	4	1												6
30-32.5				2	2	1		1										6
32.5-35				3	2			1										6
35-37.5				3	1	2												6
37.5-40				3	3													6
40-42.5				4	2													6
42.5-45				2	3	1												6
45-47.5					6													6
47.5-50					6													6
50-52.5					5	1												6
52.5-55					6													6
55-57.5					6													6
57.5-60					6													6
Total	1	0	0	40	77	9	13	3	0	1	0	0	0	0	0	0	0	144
Mean per bird	0,167	0,000	0,000	6,667	12,833	1,500	2,167	0,500	0,000	0,167	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	3																	
Observation number	8																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				4	2													6
2.5-5				2	4													6
5-7.5				2	4													6
7.5-10				2	4													6
10-12.5	1			1	3		1											6
12.5-15	2			1	1		2											6
15-17.5				1	3		2											6
17.5-20				2	2		2											6
20-22.5				2	2	1	1											6
22.5-25					2	2	2											6
25-27.5				2	1	1	2											6
27.5-30				3	1	1	1											6
30-32.5				2	1	2	1											6
32.5-35				2	1	2	1											6
35-37.5				2	1	1		1				1						6
37.5-40					2	3	1											6
40-42.5					5	1												6
42.5-45				1	3	1						1						6
45-47.5				2	3	1												6
47.5-50				1	4	1												6
50-52.5				2	4													6
52.5-55				1	5													6
55-57.5					6													6
57.5-60					6													6
Total	3	0	0	35	70	17	16	1	0	0	0	2	0	0	0	0	0	144
Mean per bird	0,500	0,000	0,000	5,833	11,667	2,833	2,667	0,167	0,000	0,000	0,000	0,333	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	3																	
Observation number	9																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				1	5													6
2.5-5				2	3	1												6
5-7.5				1	3	1		1										6
7.5-10				2	2	1		1										6
10-12.5				4	2													6
12.5-15				4	2													6
15-17.5				4	2													6
17.5-20				3	2		1											6
20-22.5				3	2							1						6
22.5-25				3	2	1												6
25-27.5				2	2	1	1											6
27.5-30				2	1	1	1					1						6
30-32.5				2	1	2	1											6
32.5-35		2		1	1		1					1						6
35-37.5	1				1		2	1				1						6
37.5-40				3			2					1						6
40-42.5	2				1	1	2											6
42.5-45				2	1	1						2						6
45-47.5				1	1	1		1				2						6
47.5-50				3		1	1	1										6
50-52.5				6														6
52.5-55						6												6
55-57.5				1		5												6
57.5-60						6												6
Total	3	2	0	50	34	29	12	5	0	0	0	9	0	0	0	0	0	144
Mean per bird	0,500	0,333	0,000	8,333	5,667	4,833	2,000	0,833	0,000	0,000	0,000	1,500	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	4																	
Observation number	10																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2	1		2					1						6
2.5-5				2	2		2											6
5-7.5				2	3		1											6
7.5-10				2	1	2	1											6
10-12.5				2	2	1						1						6
12.5-15				2	2	1	1											6
15-17.5				1	3	1	1											6
17.5-20				2	3		1											6
20-22.5				2	2	1	1											6
22.5-25				3	2	1												6
25-27.5				1	2	2	1											6
27.5-30				2	2	1	1											6
30-32.5				2	1	1	1	1										6
32.5-35				1	2	3												6
35-37.5				3	2			1										6
37.5-40				1	2	3												6
40-42.5				3	2	1												6
42.5-45				1	2	2	1											6
45-47.5				2	2	2												6
47.5-50					3	2		1										6
50-52.5				2	1	3												6
52.5-55					1	5												6
55-57.5				2	1	3												6
57.5-60				3	1	2												6
Total	0	0	0	43	45	37	14	3	0	0	0	2	0	0	0	0	0	144
Mean per bird	0,000	0,000	0,000	7,167	7,500	6,167	2,333	0,500	0,000	0,000	0,000	0,333	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	4																	
Observation number	11																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2	2		2											6
2.5-5	1			1	1	1	1					1						6
5-7.5					1	4						1						6
7.5-10				1	1	2	1					1						6
10-12.5				2	1	1	1					1						6
12.5-15				3		3												6
15-17.5				2	2	2												6
17.5-20				1	4	1												6
20-22.5				2	4													6
22.5-25				1	3	2												6
25-27.5				5	1													6
27.5-30				2	2	2												6
30-32.5				3	2	1												6
32.5-35				1	5													6
35-37.5					5	1												6
37.5-40				1	5													6
40-42.5				1	5													6
42.5-45					6													6
45-47.5					6													6
47.5-50					6													6
50-52.5					6													6
52.5-55					6													6
55-57.5					6													6
57.5-60					6													6
Total	1	0	0	28	86	20	5	0	0	0	0	4	0	0	0	0	0	144
Mean per bird	0,167	0,000	0,000	4,667	14,333	3,333	0,833	0,000	0,000	0,000	0,000	0,667	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	4																	
Observation number	12																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2,000	4,000													6
2.5-5				2,000	2,000		2,000											6
5-7.5				1,000	3,000		2,000											6
7.5-10				2,000	2,000		1,000	1,000										6
10-12.5				1,000	3,000		2,000											6
12.5-15		1,000		1,000	2,000		2,000											6
15-17.5				3,000	2,000		1,000											6
17.5-20				2,000	2,000	2,000												6
20-22.5				3,000	2,000	1,000												6
22.5-25				4,000	2,000													6
25-27.5				3,000	2,000	1,000												6
27.5-30				2,000	3,000	1,000												6
30-32.5					4,000	2,000												6
32.5-35				1,000	5,000													6
35-37.5				1,000	5,000													6
37.5-40				1,000	5,000													6
40-42.5				1,000	5,000													6
42.5-45				1,000	5,000													6
45-47.5					6,000													6
47.5-50					5,000			1,000										6
50-52.5				1,000	4,000			1,000										6
52.5-55				1,000	5,000													6
55-57.5				2,000	4,000													6
57.5-60				2,000	4,000													6
Total	0	1	0	37	86	7	10	3	0	0	0	0	0	0	0	0	0	144
Mean per bird	0,000	0,167	0,000	6,167	14,333	1,167	1,667	0,500	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	5																	
Observation number	13																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				4	2													6
2.5-5				4	1	1												6
5-7.5				3	1	1										1		6
7.5-10				3	1	1										1		6
10-12.5				3	3													6
12.5-15				2	3	1												6
15-17.5				4	2													6
17.5-20				5	1													6
20-22.5				5	1													6
22.5-25				4	2													6
25-27.5				2	2	1		1										6
27.5-30				2	2		1					1						6
30-32.5				1	2	2		1										6
32.5-35				3	2	1												6
35-37.5			1	1	2	1		1										6
37.5-40			1	1	2	2												6
40-42.5				1	2	2	1											6
42.5-45				1	1	2	1					1						6
45-47.5					3	2	1											6
47.5-50				2	2	2												6
50-52.5				1	3	2												6
52.5-55					4	2												6
55-57.5					4	2												6
57.5-60					4	2												6
Total	0	0	2	52	52	27	4	3	0	0	0	2	0	0	0	2	0	144
Mean per bird	0,000	0,000	0,333	8,667	8,667	4,500	0,667	0,500	0,000	0,000	0,000	0,333	0,000	0,000	0,000	0,333	0,000	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	5																	
Observation number	14																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				1	4			1										6
2.5-5				2	2			2										6
5-7.5				2	4													6
7.5-10					5			1										6
10-12.5				3	2			1										6
12.5-15				3	2		1											6
15-17.5	1			2	2		1											6
17.5-20	1			2	2		1											6
20-22.5				4	2													6
22.5-25				3	3													6
25-27.5				5	1													6
27.5-30				3	3													6
30-32.5				3	2			1										6
32.5-35				2	3												1	6
35-37.5	1			2	2			1										6
37.5-40	1			2	2			1										6
40-42.5	2			2	2													6
42.5-45				5	1													6
45-47.5	1			5														6
47.5-50				6														6
50-52.5				3	3													6
52.5-55	1			2	3													6
55-57.5				5	1													6
57.5-60				4	2													6
Total	8	0	0	71	53	0	3	8	0	0	0	0	0	0	0	0	1	144
Mean per bird	1,333	0,000	0,000	11,833	8,833	0,000	0,500	1,333	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,167	24,000
Bird species	Atlantic puffin (<i>Fratercula Arctica</i>)																	
Number of birds	6																	
Day number	5																	
Observation number	15																	

2.2 Behavioural study of Black-legged kittiwakes

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression Initiator	Aggression Receiver	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				14		3	3							1				21
2.5-5				14		4	2							1				21
5-7.5				13		6	2											21
7.5-10				17										4				21
10-12.5	1		2	14		1					2			1				21
12.5-15		1		17								1		2				21
15-17.5		1	1	17		1								1				21
17.5-20			1	19										1				21
20-22.5	1			15		2								3				21
22.5-25	1			13							3			4				21
25-27.5				15		2					3			1				21
27.5-30	1			16										4				21
30-32.5	1			12			3		1					4				21
32.5-35	1	1		13		2			1					3				21
35-37.5				9		3					2			7				21
37.5-40	2	2		8		2	3				2			2				21
40-42.5				12		4	3							2				21
42.5-45	1	1	1	7		3	6							2				21
45-47.5				15		2	4											21
47.5-50	4		1	9		3	2							2				21
50-52.5	1	1		15		1	1							2				21
52.5-55	1	2		9		5	2							2				21
55-57.5	3	1		13		4												21
57.5-60	1			16		2	2											21
Total	19	10	6	322	0	50	33	0	2	0	12	1	0	49	0	0	0	504
Mean per bird	0,905	0,476	0,286	15,333	0,000	2,381	1,571	0,000	0,095	0,000	0,571	0,048	0,000	2,333	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	1																	
Observation number	1																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				6	15													21
2.5-5				4	17													21
5-7.5				2	19													21
7.5-10				6	15													21
10-12.5				9	11									1				21
12.5-15				7	7		6							1				21
15-17.5				2	3		15					1						21
17.5-20	4				1	2	14											21
20-22.5	2			3	2		10					1		3				21
22.5-25				10	1	3	6							1				21
25-27.5				8			9				2	2						21
27.5-30				7	1		10					1		2				21
30-32.5				6			8				2	2		3				21
32.5-35		1			2	3	8					7						21
35-37.5				6			4				2	9						21
37.5-40				5		8	5					3						21
40-42.5	1			5		5	4					5		1				21
42.5-45				4		5	6					4		2				21
45-47.5				4		5	7					5						21
47.5-50				8		2	6					5						21
50-52.5				4		4	7				2	4						21
52.5-55				7		3	7					4						21
55-57.5				5		4	6					5		1				21
57.5-60				9		1	5				2	4						21
Total	7	1	0	127	94	45	143	0	0	0	10	62	0	15	0	0	0	504
Mean per bird	0,333	0,048	0,000	6,048	4,476	2,143	6,810	0,000	0,000	0,000	0,476	2,952	0,000	0,714	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	1																	
Observation number	2																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				20				1										21
2.5-5				17	1	3												21
5-7.5				15		6												21
7.5-10	1			15										5				21
10-12.5	1			14										6				21
12.5-15				19										2				21
15-17.5		2		11	1		6							1				21
17.5-20	1			9	1	2	6							2				21
20-22.5		3		6	3		8							1				21
22.5-25	1			6	4		10											21
25-27.5	2			2	5		12											21
27.5-30				1	7		12							1				21
30-32.5				3	4		14											21
32.5-35	1	4		2	1		13											21
35-37.5	1				5		15											21
37.5-40				5	3		13											21
40-42.5	1			3	4		10							3				21
42.5-45				11	1	2	2							5				21
45-47.5	3			9	3	1	4							1				21
47.5-50		1		6	4	1	9											21
50-52.5	1	1		2	4		10							3				21
52.5-55	2			8	5		6											21
55-57.5	1			5	4	3	7	1										21
57.5-60	1			6	5	3	6											21
Total	17	11	0	195	65	21	163	2	0	0	0	0	0	30	0	0	0	504
Mean per bird	0,810	0,524	0,000	9,286	3,095	1,000	7,762	0,095	0,000	0,000	0,000	0,000	0,000	1,429	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	1																	
Observation number	3																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5			1	7	2	3	7							1				21
2.5-5			1	12	2	1	3				2							21
5-7.5	1	2		14	1		2	1										21
7.5-10				16	1		4											21
10-12.5				16		3								2				21
12.5-15				15		2		1						3				21
15-17.5				21														21
17.5-20				19	1	1												21
20-22.5				18		3												21
22.5-25				19										2				21
25-27.5			1	17		2								1				21
27.5-30				18	1	1								1				21
30-32.5				16	1	1									3			21
32.5-35	2			5	1						7				6			21
35-37.5	1			12	1						5				2			21
37.5-40	1	1		15											4			21
40-42.5		2		15		1	2								1			21
42.5-45	1			14		1	2				1				2			21
45-47.5		1		10		1	8	1										21
47.5-50				10			6					1			4			21
50-52.5				16		1	2								2			21
52.5-55		1		18			1								1			21
55-57.5		2	1	15			2								1			21
57.5-60				12			2								7			21
Total	6	9	4	350	11	21	41	3	0	0	15	1	0	43	0	0	0	504
Mean per bird	0,286	0,429	0,190	16,667	0,524	1,000	1,952	0,143	0,000	0,000	0,714	0,048	0,000	2,048	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	2																	
Observation number	4																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression I	Aggression II	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				13	5						2			1					21
2.5-5	1	1		11	5						2			1					21
5-7.5	3	2		2			13											1	21
7.5-10	2	2		3			14												21
10-12.5	1	1		1			14				2			2					21
12.5-15	2	1		1	1		16												21
15-17.5	1				1	1	15							3					21
17.5-20	1			4			14							2					21
20-22.5				3	1		17												21
22.5-25				3			18												21
25-27.5				2	1		18												21
27.5-30	1			2	1		17												21
30-32.5	2			2	1	1	15												21
32.5-35	2			1			17							1					21
35-37.5	2			2		2	15												21
37.5-40	0			4	1	1	15												21
40-42.5	2			2	1		15					1							21
42.5-45	1			2	1		17												21
45-47.5	3				1	2	15												21
47.5-50	2				2		16							1					21
50-52.5	2				2		15					1		1					21
52.5-55	1			1	1	1	16					1							21
55-57.5	1				1	1	18												21
57.5-60	2				2	1	16												21
Total	32	7	0	59	28	10	346	0	0	0	6	3	0	12	0	0	0	1	504
Mean per bird	1,524	0,333	0,000	2,810	1,333	0,476	16,476	0,000	0,000	0,000	0,286	0,143	0,000	0,571	0,000	0,000	0,000	0,048	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																		
Number of birds	21																		
Day number	2																		
Observation number	5																		

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				11	4	4		1						1						21
2.5-5				8	6	5	1							1						21
5-7.5				10	5		2	1						3						21
7.5-10	1			12	6		1							1						21
10-12.5				13	3		3							2						21
12.5-15				14	1		1				3			2						21
15-17.5	1			17	1		1							1						21
17.5-20	3			7	6		3					1		1						21
20-22.5				10	6		1							4						21
22.5-25				4			2							15						21
25-27.5				3			7				6	1		4						21
27.5-30	1			8			2	1			4			5						21
30-32.5	2			10			3				4			2						21
32.5-35		1		8		2	6					2		2						21
35-37.5				9	4	1	3							4						21
37.5-40				6	6	1	3	1				2		2						21
40-42.5				7	5	4	4							1						21
42.5-45		1		5	3	3	6	2				1								21
45-47.5				8	4	1	5	2						1						21
47.5-50				4	5	3	8	1												21
50-52.5				6	5	5	4							1						21
52.5-55		1		2	6	3	6	1						2						21
55-57.5				7	7	2	3							2						21
57.5-60				10	5	1	3							2						21
Total	8	3	0	199	88	35	78	10	0	0	17	7	0	59	0	0	0	0	0	504
Mean per bird	0,381	0,143	0,000	9,476	4,190	1,667	3,714	0,476	0,000	0,000	0,810	0,333	0,000	2,810	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																			
Number of birds	21																			
Day number	2																			
Observation number	6																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				9	1	3	8											21
2.5-5				15	2	2								2				21
5-7.5				12	2	7												21
7.5-10				14	2	1					2			2				21
10-12.5				18	2	1												21
12.5-15				14	2	5												21
15-17.5				15	4	2												21
17.5-20				16	3						2							21
20-22.5				18	2	1												21
22.5-25				17	2	2												21
25-27.5				14	1	6												21
27.5-30				14	2	5												21
30-32.5		1		17	2									1				21
32.5-35		1		17	2									1				21
35-37.5				17	2	1								1				21
37.5-40				17	2									2				21
40-42.5				17		1					2			1				21
42.5-45	2	1		16										2				21
45-47.5	1			17	1									2				21
47.5-50	1			15	2	1								2				21
50-52.5	1			17			1							2				21
52.5-55				13	1		5							2				21
55-57.5				12			8							1				21
57.5-60				2	1		6				2			10				21
Total	5	3	0	353	38	38	28	0	0	0	8	0	0	31	0	0	0	504
Mean per bird	0,238	0,143	0,000	16,810	1,810	1,810	1,333	0,000	0,000	0,000	0,381	0,000	0,000	1,476	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	3																	
Observation number	7																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				7	1		7							6				21
2.5-5				15	1		3							2				21
5-7.5				18		1								2				21
7.5-10				16		2					2			1				21
10-12.5				10	1		4				4			2				21
12.5-15				8	1	1	9				2							21
15-17.5				5		2	12				2							21
17.5-20				7		1	10							3				21
20-22.5				6		2	10							3				21
22.5-25				8			10							3				21
25-27.5				7			10							4				21
27.5-30				1			10							10				21
30-32.5				8			9					3		1				21
32.5-35	2	2		2		1	12					2						21
35-37.5				8		1	12											21
37.5-40	1			17		1								2				21
40-42.5	1	1		10			5					2		2				21
42.5-45				17			4											21
45-47.5				14		1	5					1						21
47.5-50		1		14			5							1				21
50-52.5	2			9		4	5							1				21
52.5-55				16			5											21
55-57.5				16			5											21
57.5-60				15			6											21
Total	6	4	0	254	4	17	158	0	0	0	10	8	0	43	0	0	0	504
Mean per bird	0,286	0,190	0,000	12,095	0,190	0,810	7,524	0,000	0,000	0,000	0,476	0,381	0,000	2,048	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	3																	
Observation number	8																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				9		2	6					2		2				21
2.5-5				5	2	6	8											21
5-7.5				19	2													21
7.5-10				14	1	2		1			2			1				21
10-12.5				17	2	1								1				21
12.5-15				12	3	6												21
15-17.5				12	2	7												21
17.5-20				9	4	7		1										21
20-22.5				14	2	5												21
22.5-25				16	2	3												21
25-27.5				14		4					2			1				21
27.5-30				10	5	5								1				21
30-32.5				11	8	1								1				21
32.5-35				11	5	2		1						2				21
35-37.5				11	5	4								1				21
37.5-40				8	5	4	3							1				21
40-42.5	1			9	5		3	1						2				21
42.5-45	1			8	5		5							2				21
45-47.5	1			11	1		4				2			2				21
47.5-50	5			7			7							2				21
50-52.5				5	1		13							2				21
52.5-55				5	1		13							2				21
55-57.5				6	1		13							1				21
57.5-60				6	1		13							1				21
Total	8	0	0	249	63	59	88	4	0	0	6	2	0	25	0	0	0	504
Mean per bird	0,381	0,000	0,000	11,857	3,000	2,810	4,190	0,190	0,000	0,000	0,286	0,095	0,000	1,190	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	3																	
Observation number	9																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5	1			8	2						5			1		4		21
2.5-5		2		10	3	1								1		4		21
5-7.5				14	3									2		2		21
7.5-10				13	4									2		2		21
10-12.5				16		1					2			2				21
12.5-15				12	2						6					1		21
15-17.5				19	2													21
17.5-20				18	3													21
20-22.5				17	1	3												21
22.5-25				16	1						2			2				21
25-27.5				15	2						2			2				21
27.5-30				15	2	1					2			1				21
30-32.5				9	2	1					8			1				21
32.5-35				15	2	1					2			1				21
35-37.5				15	3	1					2							21
37.5-40			1	17	3													21
40-42.5				13	3		5											21
42.5-45				11	3	3	2							2				21
45-47.5				11	3	5								2				21
47.5-50				11	3	5								2				21
50-52.5				14	4	1					2							21
52.5-55				10	4	2					3			2				21
55-57.5				8	4	2	5							2				21
57.5-60				11	4	3	2							1				21
Total	1	2	1	318	63	30	14	0	0	0	36	0	0	26	0	13	0	504
Mean per bird	0,048	0,095	0,048	15,143	3,000	1,429	0,667	0,000	0,000	0,000	1,714	0,000	0,000	1,238	0,000	0,619	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	4																	
Observation number	10																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				11	2	8												21
2.5-5				17	2	2												21
5-7.5				15	5									1				21
7.5-10				17	1	2								1				21
10-12.5				16	3						2							21
12.5-15	2	1		11	2						2	1		2				21
15-17.5				15	1	2					2			1				21
17.5-20				15	3	3												21
20-22.5		1		9	2		5					3		1				21
22.5-25	1			13	2	1	3					1						21
25-27.5	1			9		1	6					2		2				21
27.5-30	1			12			4							4				21
30-32.5		1		12			7					1						21
32.5-35				15			6											21
35-37.5	1			10		1	6				2			1				21
37.5-40				6			12							1		2		21
40-42.5				6			14							1				21
42.5-45	1				1		17					2						21
45-47.5				2			18					1						21
47.5-50				1			18							2				21
50-52.5	1			3		2	15											21
52.5-55				5			15					1						21
55-57.5				5			15					1						21
57.5-60				6			15											21
Total	8	3	0	231	24	22	176	0	0	0	8	13	0	17	0	2	0	504
Mean per bird	0,381	0,143	0,000	11,000	1,143	1,048	8,381	0,000	0,000	0,000	0,381	0,619	0,000	0,810	0,000	0,095	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	21																	
Day number	4																	
Observation number	11																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						17	1											18
2.5-5				5		12	1											18
5-7.5				10		7	1											18
7.5-10				11		6	1											18
10-12.5				13	1	3	1											18
12.5-15				12	2	1	1	2										18
15-17.5				12	2	2	1	1										18
17.5-20				12	2	2	1	1										18
20-22.5				11	4	2	1											18
22.5-25				11	4	1	1							1				18
25-27.5				12	4	1	1											18
27.5-30				11	5	1	1											18
30-32.5				13	4		1											18
32.5-35				8	3	2	4						1					18
35-37.5				8	3		7											18
37.5-40				8	2	1	7											18
40-42.5				8	2	1	7											18
42.5-45				8	2	1	7											18
45-47.5				5	1	1	11											18
47.5-50				5	1	1	10					1						18
50-52.5				2		1	14					1						18
52.5-55				4		1	13											18
55-57.5				4		1	11					2						18
57.5-60				5		1	12											18
Total	0	0	0	198	42	66	116	4	0	0	0	4	1	1	0	0	0	432
Mean per bird	0,000	0,000	0,000	11,000	2,333	3,667	6,444	0,222	0,000	0,000	0,000	0,222	0,056	0,056	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)			3 birds caught for transport to England, 1 bird will be caught tomorrow														
Number of birds	18																	
Day number	4																	
Observation number	12																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				17		1												18
2.5-5				15	1	2												18
5-7.5				13	3	2												18
7.5-10				5	2						8			3				18
10-12.5	2			10	2						2			2				18
12.5-15				10	1						4			3				18
15-17.5	2			10	1		3					1		1				18
17.5-20	1			8			7					1		1				18
20-22.5		1		10			5							2				18
22.5-25	3			9			5							1				18
25-27.5	1			8			5				2			2				18
27.5-30				8			8							2				18
30-32.5	1			9			8											18
32.5-35	1			7		2	4							4				18
35-37.5			1	10			6							1				18
37.5-40	1			12		4							1					18
40-42.5	1			14		2	1											18
42.5-45				12		2	2							2				18
45-47.5				12		2	4											18
47.5-50				12			2							4				18
50-52.5				13		2	2							1				18
52.5-55				15			2							1				18
55-57.5				15			1							2				18
57.5-60	1			13		2	1							1				18
Total	14	1	1	267	10	21	66	0	0	0	16	2	1	33	0	0	0	432
Mean per bird	0,778	0,056	0,056	14,833	0,556	1,167	3,667	0,000	0,000	0,000	0,889	0,111	0,056	1,833	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	18																	
Day number	5																	
Observation number	13																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				13	1	3												17
2.5-5				15	1	1												17
5-7.5				15	1									1				17
7.5-10				16	1													17
10-12.5				15	2													17
12.5-15				15	2													17
15-17.5				3										14				17
17.5-20				12										5				17
20-22.5				10			2					5						17
22.5-25				10		2	2					3						17
25-27.5				11		5						1						17
27.5-30				11		5						1						17
30-32.5				11		3						2		1				17
32.5-35				13		2						2						17
35-37.5				9		4						3		1				17
37.5-40				8		7	1					1						17
40-42.5				12		4								1				17
42.5-45	1			9		3	3							1				17
45-47.5	1			11		1	4											17
47.5-50	2			9		1	5											17
50-52.5	2			10			5											17
52.5-55	2			13										2				17
55-57.5	1			14								1		1				17
57.5-60	1			13								1		2				17
Total	10	0	0	278	8	41	22	0	0	0	0	20	0	29	0	0	0	408
Mean per bird	0,588	0,000	0,000	16,353	0,471	2,412	1,294	0,000	0,000	0,000	0,000	1,176	0,000	1,706	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)					1 bird caught for transport to England												
Number of birds	17																	
Day number	5																	
Observation number	14																	

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Scratching	Aggression I	Aggression F	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				16										1				17
2.5-5				15	1	1												17
5-7.5				14	2	1												17
7.5-10				13		1								3				17
10-12.5				13	1						2			1				17
12.5-15	1			10	1		1							4				17
15-17.5	2	1		6			8											17
17.5-20	1			6			10											17
20-22.5	1			2	1	1	12											17
22.5-25	1			5			11											17
25-27.5		1		11	1		3							1				17
27.5-30				10			4					1		2				17
30-32.5				9	1		5							2				17
32.5-35				9			6							2				17
35-37.5				11		1	5											17
37.5-40				11			6											17
40-42.5	1			11			5											17
42.5-45				10			4				3							17
45-47.5				13			3							1				17
47.5-50				10		1	6											17
50-52.5		1		11			4							1				17
52.5-55		1		9			6							1				17
55-57.5				6			7				2			2				17
57.5-60				7	1		8							1				17
Total	7	4	0	238	9	6	114	0	0	0	7	1	0	22	0	0	0	408
Mean per bird	0,412	0,235	0,000	14,000	0,529	0,353	6,706	0,000	0,000	0,000	0,412	0,059	0,000	1,294	0,000	0,000	0,000	24,000
Bird species	Black-legged kittiwakes (<i>Rissa tridactyla</i>)																	
Number of birds	17																	
Day number	5																	
Observation number	15																	

2.3 Behavioural study of common guillemots

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5					2	2	17													21
2.5-5					2	4	15													21
5-7.5				2	2	2	15													21
7.5-10							21													21
10-12.5	1				1		19													21
12.5-15	3	2		3	1		12													21
15-17.5				5	1	4	11												1	21
17.5-20				5		5	8		1				2							21
20-22.5				5	2	6	8													21
22.5-25				6	4	5	6													21
25-27.5				5	4	6	6													21
27.5-30				5	8	5	3													21
30-32.5				6	10	5														21
32.5-35		1		5	12	3														21
35-37.5		2		10	9															21
37.5-40				10	11															21
40-42.5				6	15															21
42.5-45				4	17															21
45-47.5				2	19															21
47.5-50				3	16	2														21
50-52.5					18	3														21
52.5-55				3	18															21
55-57.5				2	19															21
57.5-60				1	20															21
Total	4	5	0	88	211	52	141	0	1	0	0	0	2	0	0	0	0	0	1	504
Mean per bird	0,190	0,238	0,000	4,190	10,048	2,476	6,714	0,000	0,048	0,000	0,000	0,000	0,095	0,000	0,000	0,000	0,000	0,000	0,048	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	1																			
Observation number	1																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				7	1		7	4											2	21
2.5-5				9	2		8	2												21
5-7.5				8	2	3	7	1												21
7.5-10				9	2	5	5													21
10-12.5							20	1												21
12.5-15				5		6	10													21
15-17.5		7		5		2	5												2	21
17.5-20		4		5		8	3												1	21
20-22.5	1	2		7		11														21
22.5-25	2	1		5		13														21
25-27.5				6		15														21
27.5-30				8	3	10														21
30-32.5				5	6	10														21
32.5-35				8	10	3														21
35-37.5				5	12	4														21
37.5-40				4	12	5														21
40-42.5				4	12	4	1													21
42.5-45				3	16	1	1													21
45-47.5				2	14	2	2	1												21
47.5-50				2	11	3	2	3												21
50-52.5				5	11	1	2	2												21
52.5-55				6	9	1	5													21
55-57.5				7	9		5													21
57.5-60				5	5	2	6	3												21
Total	3	14	0	130	137	109	89	17	0	0	0	0	0	0	0	0	0	0	5	504
Mean per bird	0,143	0,667	0,000	6,190	6,524	5,190	4,238	0,810	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,238	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	1																			
Observation number	2																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				7	7		7													21
2.5-5				15	1		4	1												21
5-7.5				15		2	4													21
7.5-10				16	1	4														21
10-12.5				14	2	5														21
12.5-15				10	6	5														21
15-17.5				4	12	5														21
17.5-20		1		5	12	3														21
20-22.5				3	11	7														21
22.5-25				2	15	4														21
25-27.5				3	17	1														21
27.5-30				2	17	2														21
30-32.5		2		4	14	1														21
32.5-35				5	12	1	2	1												21
35-37.5				2	16		3													21
37.5-40				4	10	1	6													21
40-42.5				7	3		6	5												21
42.5-45				3	3		12	3												21
45-47.5				2	1		16	2												21
47.5-50				3			18													21
50-52.5		1		7			10	3												21
52.5-55				9			12													21
55-57.5				8		3	10													21
57.5-60				8		3	9	1												21
Total	0	4	0	158	160	47	119	16	0	0	0	0	0	0	0	0	0	0	0	504
Mean per bird	0,0000	0,1905	0,0000	7,5238	7,6190	2,2381	5,6667	0,7619	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	24,0000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	1																			
Observation number	3																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	SAW	SUW	Scratching	Aggression Initiator	Aggression Receiver	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				12			9												21
2.5-5				9			10					2							21
5-7.5				6		2	12	1											21
7.5-10	1			10			6	1					3						21
10-12.5				5		4	7	3					2						21
12.5-15				6		6	4	3				2							21
15-17.5				8		4	8	1											21
17.5-20				10		4	3	3		1									21
20-22.5				12		4	3	2											21
22.5-25				14		3	3	1											21
25-27.5				15		3	2	1											21
27.5-30				14		2	4	1											21
30-32.5				16			3	2											21
32.5-35				15	2		2	2											21
35-37.5				13		3	5												21
37.5-40				13	3		4						1						21
40-42.5				15	3	1	2												21
42.5-45				18		3													21
45-47.5			1	14	2	4													21
47.5-50	1			18	2														21
50-52.5				17	2	2													21
52.5-55				18	1	1		1											21
55-57.5		1		15	1	3		1											21
57.5-60				19	1	1													21
Total	2	1	1	312	17	50	87	23	0	1	0	4	6	0	0	0	0	0	504
Mean per bird	0,10	0,05	0,05	14,86	0,81	2,38	4,14	1,10	0,00	0,05	0,00	0,19	0,29	0,00	0,00	0,00	0,00	0,00	24,00
Bird species	Common guillemots (<i>Uria Aalge</i>)																		
Number of birds	21																		
Day number	2																		
Observation number	4																		

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	SAW	SUW	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				5	1	7	8												21
2.5-5				5	1	6	7	2											21
5-7.5				4	4	5	6	2											21
7.5-10				10	4	7													21
10-12.5				17			4												21
12.5-15				2			16	3											21
15-17.5				3			18												21
17.5-20				1		3	17												21
20-22.5				1		3	17												21
22.5-25				1		3	17												21
25-27.5				1	1		15	2				2							21
27.5-30				4	3	5	9												21
30-32.5				5	4	6	6												21
32.5-35		1		9		7	3						1						21
35-37.5				5	3	5	4	2	1				1						21
37.5-40				14	3			4											21
40-42.5				12	4	4		1											21
42.5-45				10	4	7													21
45-47.5				12	4	5													21
47.5-50				14	4	2	1												21
50-52.5				13	5	1						2							21
52.5-55				15	6														21
55-57.5				12	8	1													21
57.5-60				13	7		1												21
Total	0	1	0	188	66	77	149	16	1	0	0	4	2	0	0	0	0	0	504
Mean per bird	0,000	0,048	0,000	8,952	3,143	3,667	7,095	0,762	0,048	0,000	0,000	0,190	0,095	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																		
Number of birds	21																		
Day number	2																		
Observation number	5																		

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	SAW	SUW	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				10	8		1					2								21
2.5-5				7	9	3		2												21
5-7.5			1	7	8	1		2				2								21
7.5-10				13	8															21
10-12.5	1	1		8	7		4													21
12.5-15				9	8		3	1												21
15-17.5				9	7		2						3							21
17.5-20				7	6	4	2					2								21
20-22.5				8	6	5	1	1												21
22.5-25				10	5	3	2												1	21
25-27.5				12	5		4													21
27.5-30				10	6		5													21
30-32.5		1		6	8		6													21
32.5-35				10	7		4													21
35-37.5		1		8	7		2					2					1			21
37.5-40		6		6	3		6													21
40-42.5				12	2	1	5						1							21
42.5-45				8	3	3	5	2												21
45-47.5		1		6	6		6					2								21
47.5-50				11	7		3													21
50-52.5		2		7	5		6												1	21
52.5-55				8	6		7													21
55-57.5				7	5	1	4						2						2	21
57.5-60				7	7		4						1				2			21
Total	1	12	1	206	149	21	82	8	0	0	0	10	7	0	0	0	3	0	4	504
Mean per bird	0,048	0,571	0,048	9,810	7,095	1,000	3,905	0,381	0,000	0,000	0,000	0,476	0,333	0,000	0,000	0,000	0,143	0,000	0,190	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	2																			
Observation number	6																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	SAW	SUW	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				8		1	11												1	21
2.5-5	1			5			15													21
5-7.5	2			8		1	7						3							21
7.5-10				7	2	8	2						2							21
10-12.5				7	2	8	2						2							21
12.5-15				13	2	3			1				2							21
15-17.5		1		8	3	8	1													21
17.5-20				5	4	11							1							21
20-22.5				10	4	7														21
22.5-25				11	2	8														21
25-27.5				15			4												2	21
27.5-30				13		1	7													21
30-32.5						2	5	14												21
32.5-35						3	16						2							21
35-37.5				1		2	18													21
37.5-40				3	1	6	11													21
40-42.5				2	1	4	14													21
42.5-45						9	12													21
45-47.5				9		2	9						1							21
47.5-50				6		5	10													21
50-52.5				8	1	4	8													21
52.5-55				10	2	1	8													21
55-57.5				3	2	6	8						2							21
57.5-60				10	4		7													21
Total	3	1	0	162	30	100	175	14	1	0	0	0	15	0	0	0	0	0	3	504
Mean per bird	0,143	0,048	0,000	7,714	1,429	4,762	8,333	0,667	0,048	0,000	0,000	0,000	0,714	0,000	0,000	0,000	0,000	0,000	0,143	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	3																			
Observation number	7																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	SAW	SUW	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				1	1		15	4												21
2.5-5				1			3	17												21
5-7.5				2		2	17													21
7.5-10				10			11													21
10-12.5				10		8	2	1												21
12.5-15				1		17	3													21
15-17.5		1		8		11	1													21
17.5-20		1		6		14														21
20-22.5	1			8		13														22
22.5-25				15		5													1	21
25-27.5				16	2	3														21
27.5-30				16	3	1													1	21
30-32.5				15	2	3													1	21
32.5-35				17	2	2														21
35-37.5				14	5	2														21
37.5-40				11	8	2														21
40-42.5	1			11	8	1	1													22
42.5-45				8	8	3													2	21
45-47.5				13	8															21
47.5-50	1			15	4	1														21
50-52.5		1		16	3	1														21
52.5-55		1		15	4	1														21
55-57.5				17		4														21
57.5-60				16		5														21
Total	3	4	0	262	58	99	53	22	0	0	0	0	0	0	0	0	0	0	5	506
Mean per bird	0,143	0,190	0,000	12,476	2,762	4,714	2,524	1,048	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,238	24,095
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	3																			
Observation number	8																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				13	7	1																21
2.5-5				15	5	1																21
5-7.5							21															21
7.5-10						1	15						5									21
10-12.5						1	20															21
12.5-15						2	18						1									21
15-17.5		1				6	13														1	21
17.5-20				2		8	11															21
20-22.5				11		4	4					2										21
22.5-25		1		15		2	3															21
25-27.5		2		10		7	2															21
27.5-30	1			13		6	1															21
30-32.5	1			13		4			1												2	21
32.5-35	1			15		3	2															21
35-37.5				10		5		2				2									2	21
37.5-40				15		3		3														21
40-42.5	2			13		2		2													2	21
42.5-45				11	5			3					2									21
45-47.5		1		11	5	3	1															21
47.5-50				11	6	3	1															21
50-52.5				10	7	3	1															21
52.5-55				11	4	3	1									2						21
55-57.5				8	7	1	1														4	21
57.5-60				11	7	2	1															21
Total	5	5	0	218	53	71	116	10	1	0	0	4	8	0	0	2	0	0	0	0	11	504
Mean per bird	0,238	0,238	0,000	10,381	2,524	3,381	5,524	0,476	0,048	0,000	0,000	0,190	0,381	0,000	0,000	0,095	0,000	0,000	0,000	0,000	0,524	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																					
Number of birds	21																					
Day number	3																					
Observation number	9																					

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				10	3	8																21
2.5-5				8	1	1	11															21
5-7.5				11	1		9															21
7.5-10				8	1	2	9							1								21
10-12.5				11	1	3	3	3														21
12.5-15				9	1	4	2	5														21
15-17.5				6	2	6	1	6														21
17.5-20				7	3	7	4															21
20-22.5				12	2	6	1															21
22.5-25				13	2	5	1															21
25-27.5				10	5	5	1															21
27.5-30				3	13	4	1															21
30-32.5				5	15	1																21
32.5-35				8	13																	21
35-37.5				1	15	2	1					2										21
37.5-40				5	16																	21
40-42.5				4	17																	21
42.5-45				3	17	1																21
45-47.5				4	15	2																21
47.5-50				5	16																	21
50-52.5				4	16	1																21
52.5-55				4	17																	21
55-57.5				4	16	1																21
57.5-60				5	16																	21
Total	0	0	0	160	224	59	44	14	0	0	0	2	0	1	0	0	0	0	0	0	0	504
Mean per bird	0,000	0,000	0,000	7,619	10,667	2,810	2,095	0,667	0,000	0,000	0,000	0,095	0,000	0,048	0,000	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																					
Number of birds	21																					
Day number	4																					
Observation number	10																					

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimmin	Swimming	Scratching	Aggressio	Aggressio	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				9	7	2	3													21
2.5-5				14			7													21
5-7.5				13		1	7													21
7.5-10				15			2	4												21
10-12.5				15		2	2						2							21
12.5-15				15	1	2	3													21
15-17.5				13	3		3	2												21
17.5-20				8	5		5	1											2	21
20-22.5				9	7	2	1	2												21
22.5-25				9	7	4		1												21
25-27.5				10	7	4														21
27.5-30				12	7														2	21
30-32.5				9	10	2														21
32.5-35				5	16															21
35-37.5				4	16	1														21
37.5-40				4	17															21
40-42.5				4	17															21
42.5-45				3	18															21
45-47.5				3	18															21
47.5-50					20	1														21
50-52.5				2	19															21
52.5-55				2	19															21
55-57.5				2	19															21
57.5-60				1	20															21
Total	0	0	0	181	253	21	33	10	0	0	0	0	2	0	0	0	0	0	4	504
Mean per bird	0,000	0,000	0,000	8,619	12,048	1,000	1,571	0,476	0,000	0,000	0,000	0,000	0,095	0,000	0,000	0,000	0,000	0,000	0,190	24
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	4																			
Observation number	11																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				1	20															21
2.5-5							21													21
5-7.5							21													21
7.5-10							21													21
10-12.5						1	19						1							21
12.5-15						1	18	2												21
15-17.5			1			3	15	2												21
17.5-20		3	1			9	8													21
20-22.5		2		1		4	13	1												21
22.5-25		1		11	1		8													21
25-27.5	1	1		9		5	2	1					2							21
27.5-30				14	2	3	2													21
30-32.5				12	3	4	2													21
32.5-35				11	3	4	3													21
35-37.5				12	3	1	5													21
37.5-40				9	6	1	5													21
40-42.5				9	7	2	3													21
42.5-45				1	13	4	2	1												21
45-47.5				2	14	1		1					3							21
47.5-50				5	8	6		2												21
50-52.5		2		6	11	2														21
52.5-55				8	12			1												21
55-57.5				7	12		2													21
57.5-60				9	10		2													21
Total	1	9	2	127	125	51	172	11	0	0	0	0	6	0	0	0	0	0	0	504
Mean per bird	0,048	0,429	0,095	6,048	5,952	2,429	8,190	0,524	0,000	0,000	0,000	0,000	0,286	0,000	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	4																			
Observation number	12																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				17	1	1								2						21
2.5-5				20	1															21
5-7.5				15	3	3														21
7.5-10				16	1	3	1													21
10-12.5	3	2		14			2													21
12.5-15	3	1		11	1		5													21
15-17.5		1		12		1	4					2	1							21
17.5-20	3			11	2	1	3						1							21
20-22.5				12	3	2	4													21
22.5-25				12	4	2	2						1							21
25-27.5				10	4	3	4													21
27.5-30				10	4	3	3						1							21
30-32.5				15	2	1	3													21
32.5-35				12	2	3	3						1							21
35-37.5				13		4	4													21
37.5-40				12	2	3	4													21
40-42.5				12	2	3	4													21
42.5-45				11	2	5	3													21
45-47.5	1			10	1	3	3	1	1				1							21
47.5-50				11	2	3	5													21
50-52.5				10	2	5	4													21
52.5-55				13	2	3	3													21
55-57.5				13		6	2													21
57.5-60				14		5	2													21
Total	10	4	0	306	41	63	68	1	1	0	0	2	6	2	0	0	0	0	0	504
Mean per bird	0,476	0,190	0,000	14,571	1,952	3,000	3,238	0,048	0,048	0,000	0,000	0,095	0,286	0,095	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	5																			
Observation number	13																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5				16		1	3							1						21
2.5-5	2			12	1	3	3													21
5-7.5	1			14	2	4														21
7.5-10				19	2															21
10-12.5				15	4	2														21
12.5-15				13	4	1			1			2								21
15-17.5				9	5	3						4								21
17.5-20				14	7															21
20-22.5				10	7	2						2								21
22.5-25				13	7	1														21
25-27.5				7	12	1			1											21
27.5-30				7	12	2														21
30-32.5				3	14							4								21
32.5-35				8	10							2		1						21
35-37.5				7	13	1														21
37.5-40				5	16															21
40-42.5				3	15	3														21
42.5-45				5	15	1														21
45-47.5	1			6	14															21
47.5-50				3	17	1														21
50-52.5				4	16	1														21
52.5-55				2	15	3			1											21
55-57.5				3	15	3														21
57.5-60				5	15	1														21
Total	4	0	0	203	238	34	6	0	3	0	0	14	0	2	0	0	0	0	0	504
Mean per bird	0,190	0,000	0,000	9,667	11,333	1,619	0,286	0,000	0,143	0,000	0,000	0,667	0,000	0,095	0,000	0,000	0,000	0,000	0,000	24,000
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	5																			
Observation number	14																			

S	Eating L	Eating R	Foraging	Standing	Resting	Grooming	Swimming	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	Walking	
0-2.5							20						1							21
2.5-5						1	20													21
5-7.5							21													21
7.5-10						2	19													21
10-12.5				1		3	17													21
12.5-15						3	18													21
15-17.5				3		5	13													21
17.5-20	1			3	1	4	12													21
20-22.5				7	1	7	6													21
22.5-25		1		10	1	4	5													21
25-27.5	1			6	2	7	5													21
27.5-30	1	2		6	2	5	5													21
30-32.5		1		11	2	4	3													21
32.5-35				16	2	3														21
35-37.5				6	2	9	3		1											21
37.5-40				8	4	8	1													21
40-42.5				7	5	8	1													21
42.5-45				9	8	4														21
45-47.5				9	11		1													21
47.5-50		1		9	10			1												21
50-52.5				4	16			1												21
52.5-55				3	18															21
55-57.5					19														2	21
57.5-60				1	20															21
Total	3	5	0	119	124	77	170	2	1	0	0	0	1	0	0	0	0	0	2	504
Mean per bird	0,143	0,238	0,000	5,667	5,905	3,667	8,095	0,095	0,048	0,000	0,000	0,000	0,048	0,000	0,000	0,000	0,000	0,000	0,095	24
Bird species	Common guillemots (<i>Uria Aalge</i>)																			
Number of birds	21																			
Day number	5																			
Observation number	15																			

2.4 Behavioural study of common eiders

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression Initiator	Aggression Receiver	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5							2											2
2.5-5							2											2
5-7.5							2											2
7.5-10							2											2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20						2												2
20-22.5						2												2
22.5-25						2												2
25-27.5						2												2
27.5-30						2												2
30-32.5						2												2
32.5-35						2												2
35-37.5						2												2
37.5-40						2												2
40-42.5						2												2
42.5-45					2													2
45-47.5					1		1											2
47.5-50						2												2
50-52.5						2												2
52.5-55						2												2
55-57.5						2												2
57.5-60						2												2
Total	0	0	0	0	3	36	9	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	0,0	0,0	0,0	0,0	1,5	18,0	4,5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	24,0
Bird species	Common eider (<i>Somateria Mollissima</i>)																	
Number of birds	2																	
Day number	1																	
Observation number	1																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						2												2
2.5-5						2												2
5-7.5						2												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20						2												2
20-22.5						2												2
22.5-25						2												2
25-27.5						2												2
27.5-30						2												2
30-32.5						2												2
32.5-35						2												2
35-37.5						2												2
37.5-40						2												2
40-42.5						2												2
42.5-45						2												2
45-47.5						2												2
47.5-50						2												2
50-52.5						2												2
52.5-55						2												2
55-57.5						2												2
57.5-60						2												2
Total	0	0	0	0	0	48	0	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	24
Bird species	Common eider (<i>Somateria Mollissima</i>)																	
Number of birds	2																	
Day number	1																	
Observation number	2																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						2												2
2.5-5						2												2
5-7.5						2												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20			1			1												2
20-22.5	2																	2
22.5-25						2												2
25-27.5						2												2
27.5-30						2												2
30-32.5						2												2
32.5-35					2													2
35-37.5					2													2
37.5-40			1		1													2
40-42.5			1		1													2
42.5-45			1		1													2
45-47.5			1		1													2
47.5-50			1		1													2
50-52.5			1		1													2
52.5-55			1		1													2
55-57.5			1		1													2
57.5-60			1		1													2
Total	2	0	10	0	13	23	0	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	1	0	5	0	6,5	11,5	0	0	0	0	0	0	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	1																	
Observation number	3																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5					2													2
2.5-5					2													2
5-7.5					2													2
7.5-10			1	1														2
10-12.5				1	1													2
12.5-15			2															2
15-17.5			2															2
17.5-20			2															2
20-22.5			2															2
22.5-25				2														2
25-27.5				2														2
27.5-30				2														2
30-32.5				1	1													2
32.5-35				2														2
35-37.5				2														2
37.5-40				2														2
40-42.5				2														2
42.5-45				2														2
45-47.5				2														2
47.5-50				2														2
50-52.5				2														2
52.5-55				2														2
55-57.5				2														2
57.5-60				2														2
Total	0	0	9	31	8	0	0	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	0	0	4,5	15,5	4	0	0	0	0	0	0	0	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	2																	
Observation number	4																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5							2											2
2.5-5							2											2
5-7.5							2											2
7.5-10							2											2
10-12.5															2			2
12.5-15							2											2
15-17.5							2											2
17.5-20							2											2
20-22.5												2						2
22.5-25												2						2
25-27.5												2						2
27.5-30												2						2
30-32.5					2													2
32.5-35					2													2
35-37.5			1										1					2
37.5-40					2													2
40-42.5					2													2
42.5-45			1		1													2
45-47.5			1		1													2
47.5-50			1		1													2
50-52.5			1		1													2
52.5-55					2													2
55-57.5			1		1													2
57.5-60			1		1													2
Total	0	0	7	0	16	0	14	0	0	0	0	8	1	0	2	0	0	48
Mean per bird	0	0	3,5	0	8	0	7	0	0	0	0	4	0,5	0	1	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	2																	
Observation number	5																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Drinking	Flying	Display	Nestling	Yawning	
0-2.5							2													2
2.5-5							2													2
5-7.5						2														2
7.5-10							2													2
10-12.5						2														2
12.5-15						2														2
15-17.5						2														2
17.5-20						2														2
20-22.5						2														2
22.5-25						2														2
25-27.5						2														2
27.5-30						2														2
30-32.5						2														2
32.5-35						2														2
35-37.5						2														2
37.5-40						2														2
40-42.5						2														2
42.5-45							2													2
45-47.5	2																			2
47.5-50			1										1							2
50-52.5					1								1							2
52.5-55					2															2
55-57.5			1										1							2
57.5-60			1		1															2
Total	2	0	3	0	4	28	8	0	0	0	0	0	3	0	0	0	0	0	0	48
Mean per bird	1	0	1,5	0	2	14	4	0	0	0	0	0	1,5	0	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																			
Number of birds	2																			
Day number	2																			
Observation number	6																			

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggressor	Aggressor	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						2												2
2.5-5						2												2
5-7.5						2												2
7.5-10												2						2
10-12.5						2												2
12.5-15					2													2
15-17.5					2													2
17.5-20						2												2
20-22.5	1					1												2
22.5-25						2												2
25-27.5						2												2
27.5-30												2						2
30-32.5						2												2
32.5-35						2												2
35-37.5						2												2
37.5-40						2												2
40-42.5						2												2
42.5-45						2												2
45-47.5						2												2
47.5-50						2												2
50-52.5						2												2
52.5-55						2												2
55-57.5						2												2
57.5-60						2												2
Total	1	0	0	0	4	39	0	0	0	0	0	4	0	0	0	0	0	48
Mean per bird	0,5	0	0	0	2	19,5	0	0	0	0	0	2	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	3																	
Observation number	7																	

S	Eating L	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5			2															2
2.5-5						2												2
5-7.5						2												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20						2												2
20-22.5						2												2
22.5-25	2																	2
25-27.5						2												2
27.5-30						2												2
30-32.5						2												2
32.5-35						2												2
35-37.5						2												2
37.5-40						2												2
40-42.5						2												2
42.5-45												2						2
45-47.5												1	1					2
47.5-50													2					2
50-52.5					1								1					2
52.5-55													2					2
55-57.5					1								1					2
57.5-60					2													2
Total	2	0	2	0	4	30	0	0	0	0	0	3	7	0	0	0	0	48
Mean per bird	1	0	1	0	2	15	0	0	0	0	0	1,5	3,5	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	3																	
Observation number	8																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5							2											2
2.5-5						2												2
5-7.5	1						1											2
7.5-10	1						1											2
10-12.5							2											2
12.5-15							2											2
15-17.5	1												1					2
17.5-20	1						1											2
20-22.5							2											2
22.5-25							2											2
25-27.5					2													2
27.5-30					2													2
30-32.5					1								1					2
32.5-35			2															2
35-37.5			1		1													2
37.5-40			1										1					2
40-42.5			1										1					2
42.5-45			2															2
45-47.5			2															2
47.5-50			2															2
50-52.5			2															2
52.5-55			2															2
55-57.5			2															2
57.5-60			2															2
Total	4	0	19	0	6	10	5	0	0	0	0	0	4	0	0	0	0	48
Mean per bird	2	0	9,5	0	3	5	2,5	0	0	0	0	0	2	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	3																	
Observation number	9																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swim	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5			1		1													2
2.5-5			1			1												2
5-7.5					1	1												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20						2												2
20-22.5						2												2
22.5-25						2												2
25-27.5						2												2
27.5-30						2												2
30-32.5						2												2
32.5-35	1					1												2
35-37.5						1						1						2
37.5-40					2													2
40-42.5													2					2
42.5-45													2					2
45-47.5					1								1					2
47.5-50													2					2
50-52.5			1										1					2
52.5-55			1		1													2
55-57.5					2													2
57.5-60					2													2
Total	1	0	4	0	10	24	0	0	0	0	0	1	8	0	0	0	0	48
Mean per bird	0,5	0	2	0	5	12	0	0	0	0	0	0,5	4	0	0	0	0	24
Bird species	Common eider (<i>Somateria Mollissima</i>)																	
Number of birds	2																	
Day number	4																	
Observation number	10																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swim	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5			1		1													2
2.5-5			1		1													2
5-7.5				1	1													2
7.5-10				2														2
10-12.5				2														2
12.5-15				2														2
15-17.5				2														2
17.5-20				2														2
20-22.5				2														2
22.5-25				2														2
25-27.5				2														2
27.5-30				2														2
30-32.5				2														2
32.5-35				2														2
35-37.5				2														2
37.5-40				2														2
40-42.5				2														2
42.5-45				2														2
45-47.5				2														2
47.5-50				2														2
50-52.5				2														2
52.5-55				2														2
55-57.5				2														2
57.5-60				2														2
Total	0	0	2	43	3	0	0	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	0	0	1	21,5	1,5	0	0	0	0	0	0	0	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	4																	
Observation number	11																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				2														2
2.5-5				2														2
5-7.5				2														2
7.5-10				1	1													2
10-12.5			1	1														2
12.5-15				2														2
15-17.5				2														2
17.5-20				2														2
20-22.5				2														2
22.5-25				2														2
25-27.5				2														2
27.5-30				2														2
30-32.5				2														2
32.5-35				2														2
35-37.5				2														2
37.5-40													2					2
40-42.5				2														2
42.5-45	1					1												2
45-47.5						2												2
47.5-50							2											2
50-52.5							2											2
52.5-55							2											2
55-57.5							2											2
57.5-60							2											2
Total	1	0	1	30	1	3	10	0	0	0	0	0	2	0	0	0	0	48
Mean per bird	0,5	0	0,5	15	0,5	1,5	5	0	0	0	0	0	1	0	0	0	0	24
Bird species	Common eider (<i>Somateria Mollissima</i>)																	
Number of birds	2																	
Day number	4																	
Observation number	12																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggressor	Aggressor	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5				1	1													2
2.5-5			1	1														2
5-7.5				1	1													2
7.5-10			2															2
10-12.5				2														2
12.5-15				2														2
15-17.5				2														2
17.5-20				2														2
20-22.5				2														2
22.5-25				2														2
25-27.5				2														2
27.5-30				2														2
30-32.5				2														2
32.5-35				2														2
35-37.5				2														2
37.5-40				2														2
40-42.5				2														2
42.5-45				2														2
45-47.5				2														2
47.5-50				2														2
50-52.5				2														2
52.5-55	1			1														2
55-57.5						2												2
57.5-60	1					1												2
Total	2	0	3	38	2	3	0	0	0	0	0	0	0	0	0	0	0	48
Mean per bird	1	0	1,5	19	1	1,5	0	0	0	0	0	0	0	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	5																	
Observation number	13																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggression	Aggression	Interaction	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						2												2
2.5-5						2												2
5-7.5						2												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						1									1			2
17.5-20						2												2
20-22.5					1		1											2
22.5-25					2													2
25-27.5												2						2
27.5-30							1					1						2
30-32.5	2																	2
32.5-35					1	1												2
35-37.5					2													2
37.5-40					2													2
40-42.5					2													2
42.5-45					2													2
45-47.5					2													2
47.5-50					2													2
50-52.5					1							1						2
52.5-55					2													2
55-57.5					2													2
57.5-60					2													2
Total	2	0	0	0	23	16	2	0	0	0	0	4	0	0	1	0	0	48
Mean per bird	1	0	0	0	11,5	8	1	0	0	0	0	2	0	0	0,5	0	0	24
Bird species	Common eider (<i>Somateria Mollissima</i>)																	
Number of birds	2																	
Day number	5																	
Observation number	14																	

S	Eating	Foraging	Standing	Resting	Grooming	Abn. Swin	Swimming	Scratching	Aggressor	Aggressor	Interactio	Bathing	Drinking	Flying	Display	Nestling	Yawning	
0-2.5						2												2
2.5-5						2												2
5-7.5						2												2
7.5-10						2												2
10-12.5						2												2
12.5-15						2												2
15-17.5						2												2
17.5-20						2												2
20-22.5						2												2
22.5-25						2												2
25-27.5						2												2
27.5-30					1								1					2
30-32.5					1		1											2
32.5-35						2												2
35-37.5						2												2
37.5-40							1	1										2
40-42.5							1	1										2
42.5-45						2												2
45-47.5					1							1						2
47.5-50					2													2
50-52.5					2													2
52.5-55					2													2
55-57.5					2													2
57.5-60					2													2
Total	0	0	0	0	13	28	3	2	0	0	0	1	1	0	0	0	0	48
Mean per bird	0	0	0	0	6,5	14	1,5	1	0	0	0	0,5	0,5	0	0	0	0	24
Bird species	Common eider (<i>Sommateria Mollissima</i>)																	
Number of birds	2																	
Day number	5																	
Observation number	15																	

Appendix 3. Questionnaire for zoos

1. General information	
Name	
Name organisation	
Country	

2. Seabirds in your zoo				
Bird species	Present yes/no	Number of birds		
		Male	Female	Unknown
Black-legged kittiwake (<i>Rissa tridactyla</i>)				
Common guillemot (<i>Uria Aalge</i>)				
Atlantic puffin (<i>Fratercula arctica</i>)				
Common eider (<i>Somateria mollissima</i>),				
Other similar seabirds (<i>please note the bird species</i>)				

3. Environment
Are the birds mentioned above living in the same exhibit? If no, please explain
Yes / No,
Are there any other species (mammals, birds, fish) living in the same exhibit? (<i>Please also note the number per species</i>)

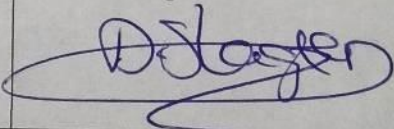
4. Feed/nutrition
What type and amount of diet does a bird get per day (per bird species)? <i>If possible, attach the diet sheet as reply for the mentioned species.</i>
Do you make use of additives? (Vitamins for example) What brand, substance and in what amount?
How many times a day are the birds being fed? <i>Please note times below</i>
When the birds are fed, do they have feeding preference? <i>Specific species of fish, size of fish or feeding time?</i>
What method do you use to feed the birds? (<i>How is the feed given? Scatter feed? In the water or in bowls? In floating bowl? Please attach some pictures of feeding methods when sending e-mail back.</i>)

4. Feed/nutrition
What are the advantages of the feed and feeding method your zoo uses?
What are the disadvantages of the feed and feeding method?

5. Other questions
Did you notice some abnormalities in behaviour, disease, reproduction etc. that might influenced by feed or feeding method? Please explain.
Do you have any pictures of the living space and feed of the birds?
<i>Please send photographs as attachment per e-mail.</i>
Are there any comments regarding the birds, feed of the birds, methods etc. that you would like me to take into consideration in this research?

Appendix 4. Review competences

Tussenbeoordeling Competenties							
De student moet de in het afstudeerstagecontract vastgelegde competenties op Hbo-niveau hebben ontwikkeld (meestal 3 tot 4 competenties).							
1. Leiding geven: Coacht de ontwikkeling van medewerkers en vertoont voorbeeldgedrag; houdt in complexe situaties het overzicht, neemt het initiatief om op strategische momenten richting aan veranderingsprocessen te geven en gebruikt daarvoor de passende leiderschapsstijl.							
Motivatie/toelichting begeleider bedrijf : <i>naemt leiding in onderzoek + voorstellen goede compassingen doet/afstemmen en draagt zorg dat de juiste informatie bij de juiste personen komt zodat uitvoering gelukt komt.</i>							
Beoordeling:	10	9	8 X	7	6	5	4
2. Samenwerken: Zorgt voor een goede sfeer, gaat zorgvuldig om met de belangen van anderen, kan weerstanden en conflicten overwinnen en benut de kwaliteiten van alle teamleden om gezamenlijk het gestelde doel te bereiken.							
Motivatie/toelichting begeleider bedrijf <i>gaat zorgvuldig om met de verschillende persoonlijkheden in team Amerika.</i>							
Beoordeling:	10	9	8 X	7	6	5	4
3. Presenteren Kan aan een kritische doelgroep een boodschap over een complex onderwerp begrijpelijk en overtuigend overbrengen en kiest daarvoor bewust de meest doeltreffende vorm.							
Motivatie/toelichting begeleider bedrijf <i>communicatie verhoudende uitbreiding hoeveelheid + wisselende werkbare werkbareheden is netjes en doeltreffend gecommuniceerd.</i>							
Beoordeling:	10	9	8 X	7	6	5	4
4. Onderzoeken Signaleert en beschrijft een probleem of ontwikkeling, formuleert een praktijkgerichte onderzoeksvraag en beantwoordt deze met behulp van een geschikte onderzoeksmethode.							
Motivatie/toelichting begeleider bedrijf <i>zit nog midden in dit proces. Gaat zorgvuldig voort met hierin.</i>							
Beoordeling:	10	9	8	7 X	6	5	4
5. Innoveren Gebruikt creativiteit om nieuwe producten, diensten of toepassingen te ontwikkelen die in de praktijk bruikbaar zijn.							
Motivatie/toelichting begeleider bedrijf <i>net => bij eindconclusie + aanbesteding straks naar verwachting wel.</i>							
Beoordeling:	10	9	8	7	6	5	4
6. Organiseren Plant en voert activiteiten uit, zet daarbij mensen en middelen effectief in, bewaakt de voortgang, stuurt zonodig bij en bereikt het beoogde resultaat.							
Motivatie/toelichting begeleider bedrijf <i>Draagt zorg dat planning nageleefd wordt en stelt bij waar nodig</i>							

Beoordeling:	10	9	8 X	7	6	5	4
7. Zelfsturen							
Heeft inzicht in eigen gedrag en geeft richting aan de eigen ontwikkeling zodat het eigen functioneren en de werkomgeving op elkaar aansluiten.							
Motivatietoelichting begeleider bedrijf							
Linda past eigen werktijden op aan het bedrijf aan. Groeit in de stage en ontwikkelt aanzienlijk hierin.							
Beoordeling:	10	9	8	7 X	6	5	4
8. Ondernemen							
Ziet kansen en zet deze voor eigen risico om in het beoogde resultaat.							
Motivatietoelichting begeleider bedrijf							
is creatief in het vinden naar antwoorden zodat het resultaat behaald kan worden.							
Beoordeling:	10	9	8 X	7	6	5	4
9. Duurzaam handelen							
Verantwoordt eigen handelen met respect voor waarden, normen en gericht op het evenwichtige gebruik van beschikbare bronnen.							
Motivatietoelichting begeleider bedrijf							
niet => straks bij evalueren wordt lijst uitst inloop wel.							
Beoordeling:	10	9	8	7	6	5	4
10. Globaliseren							
Ziet de wereld als werkterrein en functioneert in een internationale omgeving.							
Motivatietoelichting begeleider bedrijf							
Questionnaire breed binnen Europa verspreiden stage bezoek in Duitsland naar toekomstigheid afgerond.							
Beoordeling:	10	9	8 X	7	6	5	4
Eindcijfer (gemiddelde van de gegeven cijfers): 7,7.							
Datum: 20/4/2015.				Handtekening: 			

Appendix 5. Anseres sea duck pellets expanded



6160 Anseres sea duck pellet expanded

Complete feed for sea ducks. This floating ornamental waterfowl food is very suitable for those birds that do not like to leave the water to eat. Anseres Floating can be fed in the water, it will not immediately sink to the bottom. The protein level of this food has been adapted to the increased need of a number of diving duck species.

See www.kasperfaunafood.nl

Analytical constituents

Crude protein	32,0 %
Crude fat	8,0 %
Crude fibre	2,0 %
Crude ash	8,0 %
Calcium	1,7 %
Phosphorus	1,1 %
Sodium	0,3 %

Lysine	2,1 %
Methionine	0,8 %

Nutritional additives (/kg)

E672 vitamin A	32.000 IU
E671 vitamin D3	3.000 IU
3a700 vitamin E	135 IU
E4 copper (copper(II)sulphate pentahydrate)	23 mg
E1 Iron (iron(II)sulphate monohydrate)	45 mg
E5 manganese (manganese oxide)	150 mg
E6 zinc (zinc oxide)	90 mg
E2 Iodine (potassium iodine)	3,0 mg
E8 selenium (sodium selenite)	0,3 mg

Appendix 6. Average feed intake per bird species

Abbreviations:

Morning (M) = 07:45 – 08:45 AM

Afternoon (A) = 12:00 AM – 01:00 PM

Evening (E) = 03:00 – 04:00 PM

Left bowl (L)

Right bowl (R)

1. Atlantic puffins

Atlantic puffin						
Day	07:45 AM - 08:45 AM		12:00 AM - 01:00 PM		03:00 PM – 04:00 PM	
	L	R	L	R	L	R
1	10	0	2	0	4	0
2	0	2	0	0	3	0
3	6	0	2	0	5	0
4	6	3	0	0	1	0
5	0	1	0	0	15	0
Total	22	6	4	0	28	0

Average number of eaten fish per puffin

Calculation: Total fish eaten per bowl (per part of the day) / total number of Atlantic puffins = average per week

Average per week / 5 = number of days

Atlantic puffin						
	07:45 AM - 08:45 AM		12:00 AM - 01:00 PM		03:00 PM – 04:00 PM	
Bowl	L	R	L	R	L	R
Average per bird per week	3.670	1.000	0.670	0.000	4.670	0.000
Average per bird per day	0.730	0.200	0.130	0.000	0.930	0.000

2. Kittiwakes

Kittiwake						
Day	07:45 AM - 08:45 AM		12:00 AM - 01:00 PM		03:00 PM – 04:00 PM	
	L	R	L	R	L	R
1	28	10	12	5	32	37
2	15	17	61	11	11	11
3	11	5	13	6	15	0
4	1	3	0	0	0	0
5	28	3	14	0	16	6
Total	83	29	100	22	74	54

Average amount of eaten fish per kittiwake

Calculation: Total fish eaten per bowl (per part of the day) / total number of kittiwakes = / 5 = number of days

Kittiwake						
	07:45 AM - 08:45 AM		12:00 AM - 01:00 PM		03:00 PM – 04:00 PM	
Bowl	L	R	L	R	L	R
Average per bird per week	4.170	1.840	4.757	1.048	3.703	2.639
Average per bird per day	0.834	0.368	0.951	0.210	0.741	0.528

3. Common guillemots

Common guillemot						
Day	07:45 AM - 08:45 AM		12:00 AM - 01:00 PM		03:00 PM – 04:00 PM	
	L	R	L	R	L	R
1	6	5	6	17	1	6
2	3	1	2	1	2	17
3	6	2	6	7	9	10
4	0	0	0	0	1	17
5	33	7	10	0	10	12
Total	47	15	24	25	23	62

Average amount of eaten fish per guillemot

Calculation: Total fish eaten per bowl (per part of the day) / total number of common guillemots = average per week

Average per week / 5 = average per day

4. Common eiders

Common eider - 2			
Day	07:45 AM - 08:45 AM	12:00 AM - 01:00 PM	03:00 PM – 04:00 PM
1	0	0	2
2	0	0	1
3	1	4	4
4	1	0	1
5	2	2	1
Total	4	6	9

Average amount of eaten food per common eider

Calculation: Total fish eaten per part of the day/ total number of common eiders = average per week

Average per week / 5 = average per day

Common eider			
Time	07:45 AM - 08:45 AM	12:00 AM - 01:00 PM	03:00 PM – 04:00 PM
Average per week	2	3	4.5
Average per day	0.40	0.60	0.9

Appendix 7. Given feed during observations

Table A7 'Amount of fish per (part of the) day during observational studies'						
Date	Observations: yes/no?	07:45 AM	12:00 AM	03:00 PM	Out (next day)	Total amount eaten
03-09-2015	Yes	1000 capelin 1000 sand eels	1002.5 sand eels 1002.5 capelin	502.5 sand eels 502.5 capelin	1016	1997 capelin 1997 sand eels Total: 3994 grams
03-10-2015	Yes	1000 capelin 1000 sand eels	-	-	171	Capelin: 914.5 grams Sand eels: 914.5 grams Total: 1829
03-11-2015	Yes	2000 sprat	-	1000 sprat	-	3000 sprat
03-12-2015	Yes	2000 sprat	2000 sprat	792 sprat	-	4972 sprat
03-13-2015	Yes	2500 sprat	2000 sprat	2000 sprat	-	6500 sprat
03-14-2015	No	2000 sprat	1500 sprat	3000 sprat	-	6500 sprat
03-15-2015	No	2000 sprat	3000 sprat	2000 sprat	-	7000 sprat
03-16-2015	Yes	2000 capelin	-	2000 capelin 2000 sprat	-	4000 capelin 2000 sprat Total: 6000
03-17-2015	Yes	2000 sprat	2000 sprat	500 sprat	2000	2500 sprat
03-18-2015	Yes	1000 capelin 1000 sprat	1000 capelin	1000 capelin	-	3000 capelin 1000 sprat Total: 4000
03-19-2015 18	Yes	1000 capelin 1000 sprat	1000 capelin 1000 sprat	500 sprat	420	2000 capelin 2080 sprat Total: 4080
03-20-2015 18	No	3000 sprat	1500 sprat	-	-	4500 sprat
03-21-2015 17	No	1500 sprat	2500 sprat	-	-	4000 sprat
03-22-2015	No	2000 sprat	-	1500 sprat	-	3500 sprat
03-23-2015	Yes	2000 sprat	1000 capelin 1000 sprat	-	-	3000 sprat 1000 capelin Total: 4000
03-24-2015	Yes	2000 capelin	1000 capelin	1000 sand eels	214	3000 capelin 786 sand eels Total: 3786

03-25-2015	No	2000 sand eels	-	1000 sand eels	605	2395 sand eels	
03-26-2015	No	2000 capelin	2000 capelin	1000 capelin 1000 sprat	-	5000 capelin 1000 sprat Total: 6000	
03-27-2015	No	2000 capelin	1000 capelin	2000 sand eels	510	3000 capelin 1490 sand eels Total: 4490	
03-28-2015	No	2000 sand eels	1000 sand eels	1000 sand eels	-	4000 sand eels	
03-29-2015	No	2905 capelin	-	1208 capelin	-	4113 capelin	
03-30-2015	Yes	2000 capelin	-	1500 capelin 1500 sand eels	-	3500 capelin 1500 sand eels Total: 5000	
03-31-2015	Yes	2000 sand eels	-	500 sand eels	462	2038 sand eels	
04-01-2015	Yes	2000 sprat	-	2000 sprat	-	4000 sprat	
Total	Sprat	25000	16500	15797		57297	55552
	Capelin	16905	8002.5	7210.5		32118	31524.5
	Sand eels	8000	2002.5	7502.5		17505	15120.5
	Total	49905	26505	30510	5398	106920- 5398= 101552	101552

Calculations:

1. Average amount eaten per day: $101552 / 24 = 4231$ grams per day (4.2 kg)
2. Average amount eaten per bird per day:
 46295 (amount of fish till 19 March)/ $48 = 964.48$
 8580 (amount of fish eaten on 20 and 21 March)/ $45 = 190.67$
 47322 (amount of eaten fish from the 22th of March till the 1st of April) / $44 = 1075.5$
 $964.48 + 190.67 + 1075.50 = 2230.65$ grams of fish / $24 = 92.94$ grams of fish per day

Appendix 8. Behaviour per day (frequencies and percentages)

Table A8.1 'Behaviour per day for Atlantic puffins'																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	%
EL	10		3			2	2	1	3	3		1			8	33	1,53
ER				2						2			1			5	0,23
FO														2		2	0,09
ST	37		34	33	54	62	4	40	35	50	43	28	37	52	71	580	26,85
RE	17	85	66	41		45	55	77	70	34	45	86	86	52	53	812	37,59
GR	34	44	29	32	18	25	46	9	17	29	37	20	7	27		374	17,31
SWN	27		5	21	72	4	33	13	16	12	14	5	10	4	3	239	11,06
SWU	11	3	6										3			23	1,06
SWA																0	0,00
SC	6	10		9		5	2	3	1	5	3			3	8	55	2,55
AI																0	0,00
AR		2	1	1			2	1								7	0,32
IN																0	0,00
BA				5					2	9	2	4		2		24	1,11
DR						1										1	0,05
FL																0	0,00
DIS																0	0,00
YA															1	1	0,05
WA	2															2	0,09
NE														2		2	0,09
Total	144	144	144	144	144	144	144	144	144	144	144	144	144	144	144	2160	100,00

Table A8.2 'Behaviour per day for Black-legged kittiwakes																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	%
EL	19	7	17	6	32	8	5	6	8	1	8		14	10	7	148	2,05
ER	10	1	11	9	7	3	3	4		2	3		1		4	58	0,80
FO	6			4						1			1			12	0,17
ST	322	127	195	350	59	199	353	254	249	318	231	198	267	278	238	3638	50,36
RE		94	65	11	28	88	38	4	63	63	24	42	10	8	9	547	7,57
GR	50	45	21	21	10	35	38	17	59	30	22	66	21	41	6	482	6,67
SWN	33	143	163	41	346	78	28	158	88	14	176	116	66	22	114	1586	21,95
SWU																0	0,00
SWA																0	0,00
SC			2	3		10			4			4				23	0,32
AI	2															2	0,03
AR																0	0,00
IN	12	10		15	6	17	8	10	6	36	8		16		7	151	2,09
BA	1	62		1	3	7		8	2		13	4	2	20	1	124	1,72
DR												1	1			2	0,03
FL	49	15	30	43	12	59	31	43	25	26	17	1	33	29	22	435	6,02
DIS																0	0,00
YA																0	0,00
WA					1											1	0,01
NE										13	2					15	0,21
Total	504	504	504	504	504	504	504	504	504	504	504	432	432	408	408	7224	100,00

Table A8.3 'Behaviour per day for common guillemots																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	%
EL	4	3		2		1	3	3	5		181	1	10	4	3	220	2,91
ER	5	14	4	1	1	12	1	4	5		253	9	4		5	318	4,21
FO				1		1					21	2				25	0,33
ST	88	129	158	312	188	206	162	262	218	160	33	127	306	203	119	2671	35,32
RE	211	137	160	17	66	149	30	58	53	224	10	125	41	238	124	1643	21,73
GR	52	109	47	50	77	21	100	99	71	59		51	63	34	77	910	12,03
SWN	141	89	119	87	149	82	175	53	116	44		172	68	6	170	1471	19,45
SWU		17	16	23	16	8	14	22	10	14		11	1		2	154	2,04
SWA							1									1	0,01
SC	1				1				1				1	3	1	8	0,11
AI				1												1	0,01
AR																0	0,00
IN				4	4	10			4	2			2	14		40	0,53
BA	2			6	2	7	15		8		2	6	6		1	55	0,73
DR									2	1			2	2		7	0,09
FL																0	0,00
DIS																0	0,00
YA																0	0,00
WA	1	5				4	3	5	11		4				2	35	0,46
NE	4	3		2		1	3	3	5		181	1	10	4	3	3	0,04
Total	505	503	504	504	504	504	504	506	504	504	504	504	504	504	504	7562	100,00

Table A8.4 'Behaviour per day for common eiders																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total	%
EL																	
ER	0	0	2	0	0	2	1	2	4	1	0	1	2	2	0	17	2,36
FO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
ST	0	0	10	9	7	3	0	2	19	4	2	1	3	0	0	60	8,33
RE	0	0	0	31	0	0	0	0	0	0	43	30	38	0	0	142	19,72
GR	3	0	13	8	16	4	4	4	6	10	3	1	2	23	13	110	15,28
SWN	9	0	0	0	14	8	0	0	5	0	0	10	0	2	3	51	7,08
SWU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
SWA	36	48	23	0	0	28	39	30	10	24	0	3	3	16	28	288	40,00
SC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0,28
AI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
IN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
BA	0	0	0	0	8	0	4	3	0	1	0	0	0	4	1	21	2,92
DR	0	0	0	0	1	3	0	7	4	8	0	2	0	0	1	26	3,61
FL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
DIS	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	3	0,42
YA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,00
Total	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	720	100,00

Appendix 9. SPSS output statistical results

9.1 Results paired samples test of bowl preference

Paired Samples Test Atlantic puffin

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Left_bowl - Right_bowl	,53333	,74589	,19259	,12027	,94639	2,769	14	,015

Paired Samples Test Black-legged kittiwake

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
					Mean	Std. Deviation			
Pair 1	Left_bowl - Right_bowl	,46937	,67506	,17430	,09553	,84320	2,693	14	,017

Paired Samples Test common guillemot

Paired Samples Test-Common gametoc									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Left bowl - Right bowl	-,02221	,48089	,12416	-,28852	,24409	-,179	14	,861

9.2 ANOVA tests of amount of fish per period of the day

ANOVA Atlantic puffin

Amount_fish

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,067	2	,533	1,664	,208
Within Groups	8,656	27	,321		
Total	9,722	29			

ANOVA common guillemot

Amount_fish

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,149	2	,075	,613	,549
Within Groups	3,287	27	,122		
Total	3,436	29			

ANOVA Black-legged kittiwake

Amount fish

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,016	2	,008	,017	,983
Within Groups	12,126	27	,449		
Total	12,142	29			

ANOVA Common eider

Amount fish

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,533	2	1,267	,679	,526
Within Groups	22,400	12	1,867		
Total	24,933	14			

Appendix 10. Answers on questionnaires

Note: The results are bundled per question.

1. Participants				
No	Name Zoo	Country	Charadriiformes present?	Anseriformes (common eiders) present?
1	AG Zoologischer Garden Köln	Germany		X
2	Aquamarine Fukushima	Japan	X	
3	Biodôme de Montréal	Canada	X	X
4	Bristol Zoological Society	UK		X
5	Burger's Zoo	The Netherlands		X
6	Cincinnati Zoo and Botanical Garden	USA	X	X
7	Cotswold Wildlife Park	UK		X
8	Exmoor Zoo	UK		X
9	Fota Wildlife Park	Ireland		X
10	Hannover Zoo	Germany		X
11	Heidelberg Zoo	Germany		X
12	Jurong Bird Park	Singapore	X	
13	Leipzig Zoo	Germany		X
14	Living Coasts	UK	X	
15	Loro Parque Tenerife	Spain	X	
16	Lotherton Bird Garden	UK		X
17	National Aquarium Denmark	Denmark	X	
18	Oceanário de Lisboa	Portugal	X	
19	Omaha's Henry Doorly Zoo	USA	X	
20	Parc des Oiseaux	France	X	X
22	Point Defiance Zoo & Aquarium	USA	X	
22	Riga Zoo	Latvia		X
23	SeaWorld California	USA	X	
24	SeaWorld San Antonio	USA	X	
25	Whipsnade Zoo	UK		X
26	Woodland Park Zoo	USA		X
27	WWT Martine Mere Wetland Centre	UK		X
28	Zoo Augsburg	Germany		X
29	Zoo Zürich	Switzerland		X
30	ZooParc de Beauval	France		X
31	Zoo Basel	Germany		X
	Total		13	21

Question 2 + 3. Marine birds in your zoo and environment						
Zoo	Atlantic puffin	Black-legged kittiwake	Common guillemot	Common eider	Other species	Together with:
AG Zoologischer Garden Köln				4.4.0	Harlequin Duck: 1.1.0	> 10 different species
Aquamarine Fukushima			1.3.0		Tufter puffin: 3.2.0	White-edged Rockfish(<i>Sebastes taczanowskii</i>): ,Snowy sculpin(<i>myoxocephalus brandti</i>):
Biodôme de Montréal	42.26.0	5.4.6	10.15.0	3.4.3	King eider: 2.0.0 Common tern: 7.4.6 Razorbill: 1.5.0	Atlantic puffin, common murre and King eider are in polar exhibit Kittiwakes, common eider ,black guillemot, razorbill and common tern are kept in St-Laurence Gulf exhibit
Bristol Zoological society				4.3.0	Inca tern: 62 – sex unknown	African penguins
Burger's Zoo				3.4.0		American green-winged teal Cinnamon teal Common goldeneye Eurasia spoonbill Ferruginous Duck Green-winged teal
Cincinnati Zoo and Botanical Garden			4.10.0		Horned puffin: 1.1.0 Spectacled eider: 1.1.0 Pigeon guillemot: 4.1.0 Crested auklet: 3.2.1 Wiskered auklet: 0.1.0	Living in two exhibits 1 exhibit: murre, pigeon guillemot, horned puffin, harlequin duck 1 exhibit: murre, auklets, juvenile guillemots, spec eider, smew
Cotswold Wildlife Park				1.2.0		> 10 different species
Exmoor Zoo				1.1.0		Humboldt penguins Pink backed pelican Spotbills Canvasback Ruddy duck Carolina Tufted Red crested pochard Northern pintail
Fota Wildlife Park				3.2.4		Spider monkeys Chilean flamingo Mandarin ducks
Hannover Zoo				1.1.0		Jackass penguin (<i>Spheniscus demersus</i>) Hooded merganser (<i>Mergus cucullatus</i>) Siberian sturgeon (<i>Acipenser baerii baerii</i>)

Zoo	Atlantic puffin	Black-legged kittiwake	Common guillemot	Common eider	Other species	Together with:
Heidelberg Zoo				3.3.0		> 10 species in 2 exhibits
Jurong Bird Park				7.5.0	Grey-headed gull: 0.0.1 Silver gull: 0.0.4 Inca tern: unknown	King penguin Humboldt penguin Macaroni penguin and rockhopper penguin together with silver gull
Leipzig Zoo				3.3.0		Oxyura leucocephala Mergus albellus Anas crecca
Living coasts			14.14.1		Tufted puffin: 4.6.3 Red-legged kittiwake: 0.3.0	No other species in same enclosure
Loro Parque Tenerife	44.21.2					Gilt-head breams
Lotherton Bird Garden				3.1.0		Fulvous whistling duck Red-crested pochard Hooded merganser Tufted duck Smew Common pochard
National Aquarium Denmark				6.4.0		Fish: cod, wolfeel, eel, nursesharks,
Oceanário de Lisboa	7.2.0		6.7.0		Razorbill Auk (Alca Torda): 4.0.0	> 10 different species of fish
Omaha's Henry Doorly Zoo	1.2.0		3.3.0		Tufted puffin: 7.10.0	No other species in same enclosure
Parc des Oiseaux				1.0.0	Inca tern: 3.7.0	No species present together with inca terns. With Eiders: Gyps himalayensis, Anas Penelope, Aythya fuligula, Grus vipio
Point Defiance Zoo & Aquarium			4.2.0		Tufted puffin: 9.12.0 Horned puffin: 3.1.0	No species living in same enclosure
Riga Zoo				0.3.0		Branta leucopsis Tadorna ferruginea Aix galericulata
SeaWorld California	8.8.0		13.18.0		Tufted puffin: 19.20.0	Fish: Sheepshead and kelpheads
SeaWorld San Antonio	24.18.0		18.17.0		Tufted puffin: 8.7.0 Razorbill: 0.1.0	No other species in same enclosure
ZSL Whipsnade Zoo				3.2.2		Hooded merganser Northern rockhopper penguins
Woodland Park Zoo				2.2.0		> 10 species in same enclosure
WWT Martin Mere				8.5.0		No other species in same enclosure

Zoo	Atlantic puffin	Black-legged kittiwake	Common guillemot	Common eider	Other species	Together with:
Zoo Augsburg				2.2.0		Ciconia ciconia Grus grus Cygnus atratus Aythya fuligula Aythya marila Aythya nyroca Bucephala clangula Mergus albellus Mergus cucullatus Oxyura jamaicensis Wild Ardea cinerea Wild Anas platyrhynchos
Zoo Basel				4.4.0		Other ducks: Unknown species
Zoo Zürich				4.4.0	- Somateria Fischeri: 3.4.0 - Tachyeres Pteneres: 3.2.0	Anser erythropus Aix galericulata Bucephala clangula Mergus albellus Cygnus culumbianus bewicki Anthropoides virgo Ciconia ciconia
ZooParc de Beauval				0.0.6		> 10 species in same enclosure
Omaha's Henry Doorly Zoo	1.2.0		3.3.0		- Tufted puffin: 7.10.0	No other species in same enclosure
Point Defiance Zoo & Aquarium			4.2.0		- Tufted puffin: 9.12.0 - Horned puffin: 3.1.0	No other species in same enclosure

4. Feed/nutrition							
Feed and additives and feeding times							
Species	Zoo no.	Commercial feed	Fish (or other food items)	Amount per day (all birds)	Additives	Preferences	Feeding times
Common eiders	1	Unknown					Once
	3	Mazuri Sea Duck pellets	Capelin, silversides, lake smelt, krill and lettuce	Ad libitum	Jaapharm Canada thiamine: T Dex supplement, 500mg per 30g + Univet Pharma vitamin E: Ultra E 3000IU Amount: 1g vitamin E for 3g vitamin B ₁	Pellets and capelin thrown in the water	9:00AM 2:00PM
	4	SDS Sea duck pellets	Sprat	Ad libitum, sprat during pinguin feed	-	-	Once
	5	AB Anseres breeder pellet 4, AB floating Sea Duck pellets	Chopped vegetables, endive	Ad libitum	Calcium (one table spoon) and spirulina (1 table spoon)	-	10:30AM
	6	-	Sand eels, krill, lake smelt, peruvian smelt, anchovies, mealworms, cyclopeeze.	1200g, 1700g, 800g, 600g, 800g, 1 cup and 7tbl Once a week: 1lb shiners and 1lb minnows (both live)	Vitamins in ratio: Nekton Bio 7.5, Nekton multi: 7.5, Nekton MTA: 1.5, Beta carotene: 2, Nekton:3 and Mazuri Auklet: 10.	-	Once a day
	7	Mazuri flamingo pellets	-	150g	-	-	9:00AM 02:00PM
	8	Sea Duck pellets, but also access to waterfowl pellets, mixed corn and sprat	-	Ad libitum	-	Pellets and sprat	8:00AM 03:00PM (03:30PM summertime)
	9	Mazuri Sea Duck pellets	-	Ad libitum	-	-	10:00AM 03:00PM
	10	Eider pellets	Capelin	5-20 capelins and 120-240g pellets	Fish eater tablets, every 2 nd day	Capelins	3-4 times
	11	Hassel micro pellets, Versele laga allround pellets and sea mixture	Smelt, limicol, minched chicken, mealworms	Ad libitum	Claus supramin	Smelt and mealworms (preference for soft feed)	Three times a day
	13	Lundi eider pellets and Mazuri duck pellets	Sprat	Ad libitum	-	-	9:00AM 04:00PM
	16	Sea duck pellets	Whit bait as enrichment	185g pellets	Oyster shells before breeding season	Pellets in water	10:00AM 04:00PM
	20	Exquisite pellets	Smelt	Ad libitum	-	Smelt	Once a day
	22	Sea bird pellets	Boiled, grated red beet, carrots grated, grain, grated cabbage, pumpkin	Per bird: 100g pellets, 30g beet, 30g carrot, 70g grain, 50g cabbage, 20g pumpkin	Occasionally, Nekton S, Nekton MSA or Nekton Bio	-	Once a day

Species	Zoo no.	Commercial feed	Fish (or other food items)	Amount per day (all birds)	Additives	Preferences	Feeding times
	25	Mazuri Sea Duck pellets	Soft food with insects (Witte Molen), minced beed, smelt, Seafood cocktail (squid rings, mussels and king prawns), capelin	Per bird: 80g pellets, 30g, 30g, 48g, 12g, 4g.	Twice a week: Avimix and Calcium lactate in meat mix	Fish before pellets	Once
	26	Mazuri waterfowl diet – maintenance and breeder	Dog kibble, smelt	Ad libitum	-	Mornings and evenings	2-5 times a day
	27	SDS Sea Duck pellets	-	Ad libitum	-	-	Twice
	28	Lundi eider pellets	Sprat, smelt, insects (mealworms and zophobas)	4kg fish, 0.5 kg pellets	-	Fish before pellets	Twice
	29	Melior duck pellets, Meyerhans Hotz mixed seeds and scoops		Ad libitum pellets and scoops 6-8	-	-	8:00AM 04:00PM
	30	Mini floating pellets	Salad, wheat	Ad libitum	-	-	Once
	31	Floating pellets	Stilt	Ad libitum	-	-	Unknown
Other birds	2	-	Herring and Antarctic krill, sometimes sardines	1400 and 800g	Mazuri LD301 (Bird liquid vitamin suspension) – 2g a day Once a day given	Prefer herring before krill	8:30AM 10:30AM 03:30PM
	3	-	Lake smelt, silversides, krill, capelin	Ad libitum	Jaapharm Canada thiamine: T Dex supplement, 500mg per 30g + Univet Pharma vitamin E: Ultra E 3000IU Amount: 1g vitamin E for 3g vitamin B ₁	Krill first, then silversides and lake smelt (puffins) and murrens prefer capelin	9:00AM 2:00PM
	6	-	Sand eels, krill, lake smelt, peruvian smelt, anchovies, mealworms, cyclopeeze.	1200g, 1700g, 800g, 600g, 800g, 1 cup and 7tbl Once a week: 1lb shiners and 1lb minnows (both live)	Vitamins in ratio: Nekton Bio 7.5, Nekton multi: 7.5, Nekton MTA: 1.5, Beta carotene: 2, Nekton:3 and Mazuri Auklet: 10.	-	Once a day
	12	-	Lake smelt, capelin, chopped mackerel	Ad libitum	Mazuri vita-zu tablets, 0.5 tablet per day	Gulls and terns prefer lake smelt. Puffins get disinterested when same feed is given for >2 days	10:45AM 03:45PM
	14	-	Smelt, white bait, sprat, mackerel, herring, whiting and sand eels	Ad libitum (around 9.2 kg)	Mazuri fish eater tablets, castaxanthin and spirulina	Puffins prefer feeding from trays, murrens have no preference and feeding in morning is preferred	Seven times a day
	15	-	Capelin, sprat, sand smelt	Ad libitum	Aquavits powder and calcium, both 30 mg per kg fish	Small size of fish	Twice a day

Species	Zoo no.	Commercial feed	Fish (or other food items)	Amount per day (all birds)	Additives	Preferences	Feeding times
	17	-	Lake smelt, capelin and krill	1000g, 300g, 150g	Mazuri Vita-Zu small bird Vitamin pills – twice a day	Varies per bird	Three times a day
	18	-	Capelin, sprat, eperlan, sand eel, smelt, herring	1900g, 450g, 400g, 300g, 200g, 400g	Thiamine: 100 mg per bird, vitamin E: 100mg per bird, Ca: 30 mg per bird, vitamin mix: 300mg per bird. (Brand: Premix, Ida	Herring and capelin	10:00AM 03:00PM
	19	-	Capelin, smelt, herring, mackerel and krill or silversides as enrichment	3.5oz, 5.5oz, 0.5oz, 0.5oz and 1oz	Mazuri multi vitamins, small bird, no vitamin A – 1 tablet per bird	Silversides and capelin	Twice a day
	20	Regular humid pellets	Smelt and mealworms	Ad libitum	Mazuri powder, twice a week	Smelt	Once or twice a day
	21	-	Capelin, sand lance, krill, silversides, squid and herring	Amounts in lbs: 5.0, 0.25, sanlance when available, 0.25, 1.0, 1.0. During nights: 6.75 lbs of fish	Mazuri bird vitamins	Differs per bird and season	Three times a day
	23	-	Lake smelt, silversides, capelin, chopped herring and krill	Ad libitum	1 ea ½ lb Mazuri Vita-Zu Bird tab no vitamin A 5TLC SID and 100 IU Vitamin E twice per week (Mon & Thur) in non-breeding seasons. 1 ea ½ lb Mazuri Vita-Zu Bird tab no vitamin A 5TLC SID, 100 IU Vitamin E twice per week (Wed and Sun), 1 "sliver" (~ 1/6 tab) 10 grain tab calcium carbonate twice per week (Mon & Thur) in breeding seasons 1 ea ½ lb Mazuri Vita-Zu Bird tab no vitamin A 5TLC SID and 100 IU Vitamin E on odd days. Used during periods of stress (transport, construction etc.)	Silversides, capelin and krill	Non-breeding season: 8:30AM 00.30PM Breeding season: 8:30AM 00.30PM 04.00PM
	24	-	Capelin, chopped herring, silversides, lake smelt	Total amount of fish: 75lbs	Mazuri Vita-zu Large bird tab, no vitamin A – 0.5 tablet In breeding season: + 100IU vitamin E twice a week and calcium carbonate twice a week	Silversides	9:00AM 01:00PM 04:30PM

4. Feeding methods and advantages/disadvantages				
What method do you use to feed the birds? (How is the feed given? Scatter feed? In the water or in bowls? In floating bowl? Please attach some pictures of feeding methods when sending e-mail back.				
Species	Zoo no.	Method	Advantages	Disadvantages
Common eiders	1	Scattered in the water	-	Wild mallard feed on the water too
	3			
	4	Bowls Scattered in water	Ease of use	Unknown how individuals are feeding and if they're getting any of the supplements
	5	Bowls Enrichment in water	Less waste in the water, less loss of food in the water and contamination of the food with faeces and bio agents etc.	Not attractive for public, can dominate each other over the food
	6	Bowls and hand feeding	-	-
	7	Scattered in the water	Flamingo's pellet diet is quite close to a natural diet, conditions of the birds seem excellent	-
	8	Scattered in the water	The birds come up to you and you can have a good look at them possibly being to identify any health issues earlier	Only drawback is not being 100% sure what the birds have eaten.
	9	Scattered in the water	Scattering the floating feed on the water lessens the competition between birds and makes it easier to spot birds which may not be eating	It is hard to know how much each bird is eating and wild birds consume some of the feed
	10	Bowls Scattered in water	Direct feeding helps to avoid scraping in the enclosure, especially in the water	Feeding in bowl sometimes attracts crows
	11	Scattered in water and on land Bowls	Feed several times a day Enjoy enrichment	When several ducks are on the side, the ducks will step into the feeding bowl, which can cause infections of the feet
	13	Scattered in water Bowls	Close contact to the birds to check health	Wild pigeons take a large amount
	16	Scattered in the water	Complete diet for eiders and birds can naturally feed on the water	Cannot be certain how much food individual birds are eating as mixed species ponds
	20			
	22	Bowls	It's easier for birds to feed from bowl	-
	25	Bowl (floating bowl)	Floating bowl ensures penguins do not take the eider food	Gulls and wild birds are able to take food from the bowl
	26	Scattered in the water	Scatter feeding cuts down food wastage, helps to improve water quality and increases the birds interest in feeding throughout the day	It's not possible to quantify exact food intake per individual
	27	Cage in water	The advantage is twofold – the birds get all that they need without worrying about seagulls taking the food and it keeps cost down	-
	28	Scattered in the water	Every bird is getting enough to eat	Other birds (especially wild birds) are eating fish and pellets too. Due to the fact that we are feeding a higher amount of food.
	29	Scattered in the water	Feeding in the water is naturally and they have to dive	-
	30	On shore and in the water	It is a good method to disperse food = food enrichment like into the wild. Animals are looking for their food	It is more difficult to check the individual quantity of food
	31	Scattered in the water	-	Not able to determine how much the birds eat

Species	Zoo no.	Method	Advantages	Disadvantages
Other birds	2	Bowl + scattered in water	The colour of the bill becomes vivid by giving a krill	-
	3	Bowls Enrichment in water	Birds can eat anytime in the day because the food is always available	Unable to know exactly what amount of food a single bird will take in a day.
	6	Bowls and hand feeding	-	-
	12	Bowls Hand feeding During mid-flight	Able to monitor keenness and food intake of each bird daily Current feeding technique for the Inca Tern allows it to exercise its flight muscles	For the Atlantic Puffins, feeding on land reduces their swim time and limits diving/hunting behaviour. At least three feeding trays must be put out for Exhibit A because the puffins do not eat from the same feeding tray as the gull.
	14	Bowls Scattered in the water	Feed is available ad lib to the birds so there is no pressure for the birds to be seeking food, they are also able to display more natural feeding behaviours by feeding in the water.	The scatter feed in the water can leave a slight film of oil on the water surface which can adversely affect the birds plumage.
	15	Bowls	Less stress	No individual control
	17	Bowls with ice	During weight sessions we get a good look at each bird	The birds can rarely dive for food as the fish takes all the food in the water
	18	Bowls with ice Hand feeding Scattered in the water	By hand feeding we can control which animals are eating, control their appetite and behaviour, and also control which birds eat the supplements, and then register it. And because it is not possible to give them all the food that will be offered by hand feeding, leaving the food in the plates they can eat when they want, day or night.	The amount of food, accepted by hand feeding, by the animals can vary with the different aquarists that are feeding them. The animals recognize the aquarists that in a regular basis feed them, and when they change the birds notice that and there acceptance of food may vary.
	19	Hand feeding Enrichment in water	Hand feeding allows for visual checks, also potential to medicate within the food items. Keepers also incorporate scale training into the feeding routine.	It takes a little more time, but is much more accurate and better for the birds.
	20	Bowls	The time and price	-

Species	Zoo no.	Method	Advantages	Disadvantages
	21	Hand feeding Bowls	Hand feeding allows us to weigh them, get a close look at them and get each bird their vitamin and/or medication easily	Leaving pans of food out at night does not allows us who is eating at night
	23	Bowls with ice Scattering in the water and land	Vitamin fish is fed out first in the morning. At this time many birds will approach the keeper to eat the vitamin fish. This allows the keeper to get a visual on the bird. We are looking at their body contour, plumage, bands, behaviour, etc. After the vitamin fish is distributed, we hand feed birds or toss fish to birds on land and in the water. The trays are put out last. When tossing fish or hand feeding we are able to assess overall appetite for the colony as well as individual birds. We note if a bird is isolating or being outcompeted by other birds. We like to offer several different feeding methods to accommodate the birds. We do have some birds that like to keep their distance and would never hand feed or take tossed fish, except for the water toss.	All keepers are able to monitor and observe the birds after the feeding for a bit, but we are unable to make sure all birds come up to feed daily due to our keeper time constraints and the activity level of the birds (diving) makes it difficult to see who is eating the fish.
	24	Bowls Scattered in water	In my opinion, the method that we use to feed our birds allows the birds independence from the staff that may come from hand feeding. This appears to help best with breeding season as the birds are more attentive to the breeding season because they can feed themselves whenever they choose as opposed to having to be dictated when to eat by a hand feeding schedule.	Lack of rapport that may occur. Lack of constant scrutiny of individuals for health and other reasons.

Did you noticed some abnormalities in behaviour, disease, reproduction etc. that might influenced by feed or feeding method? Please explain.		
Yes/no?	Number of zoos	Notes
No	30	
Yes	1	We once had aspergillosis

Are there any comments regarding the birds, feed of the birds, methods etc. that you would like me to take into consideration in this research?

Is special feed given to increase nutrition to egg?

Our eider pool is filled with natural sea water by tides and thus contains lots of the eiders' natural food.

We feed only with frozen foods. These foods have good microbiological levels and this decreases the chance of contamination. Since the different species of birds have preferable areas in the habitat, the plates are placed in specific feeding stations and each plate have a specific number and size of the different food items.

The injection of water in the food is important for the good functioning of the kidneys. Before we get in the habitat the aquarist whistle to warn the birds that is feeding time.

Seasonal variations help to encourage breeding by improving body condition

Some food is lost to pests from within this enclosure (gulls). A variety of pest proof feeders are being trialed. The feeder in use currently floats on the water to prevent the penguins consuming the food, and it has a roof on it to reduce attraction to gulls.

It is likely some plant and invertebrate matter may be consumed from within the enclosure.

Our eiders are new to this exhibit, so we have not had them long enough to encounter any problems.

In despite the ad lib method and regarding the fact that we are not able to monitoring what each bird can eat, we never had any bird with a dietary deficiency.

In breeding season, when a pair is caring for a chick into the nest box (terrier), we provide an additional food supply by putting a plate of smaller fish according to the chick's age into the nesting box. Please refer to the comment regarding the breeding season above. This is a big part of the breeding success is at the Biodôme.

The birds are monitored during the breeding season boxes are checked regularly and eggs are removed and replaced with dummies eggs and artificially incubated for a more safe chance to hatch them as if we leave the eggs with the female, will be a high risk of mortality in the youngsters due to possible predation in their first few days of life, (crows, rats, weasels etc...)

Availability is a concern for us. When certain species are not available, it is hard to locate similar options

Do the species breed? These species are difficult to breed, which is an important indicator

Consumption of Silversides by the Atlantic Puffins have been seen to induce courting behaviour + regulation of day lengths also play a part in maintaining their plumage.

We offer a variety of fish species and krill in the diet for the birds. The amount of food varies seasonally and we watch colony appetites closely. The air temperature in the exhibit is usually 65-66 degrees, but we feel strongly about icing our fish trays to keep the fish as fresh as possible. And we monitor oil content in fish closely. Some small herring is not fed in the water due to the fish oil. The oil contaminates the surface of the water and will affect the plumage of the birds.

We have taken into consideration how we feed the birds for the sake of potential imprinting of the birds with the staff. We like that our birds are not bonded to us and that they are still quite "wild" of the staff and anyone who enters the exhibit. This way they are still focused on each other much like that of a wild bird rather than the humans that enter the area