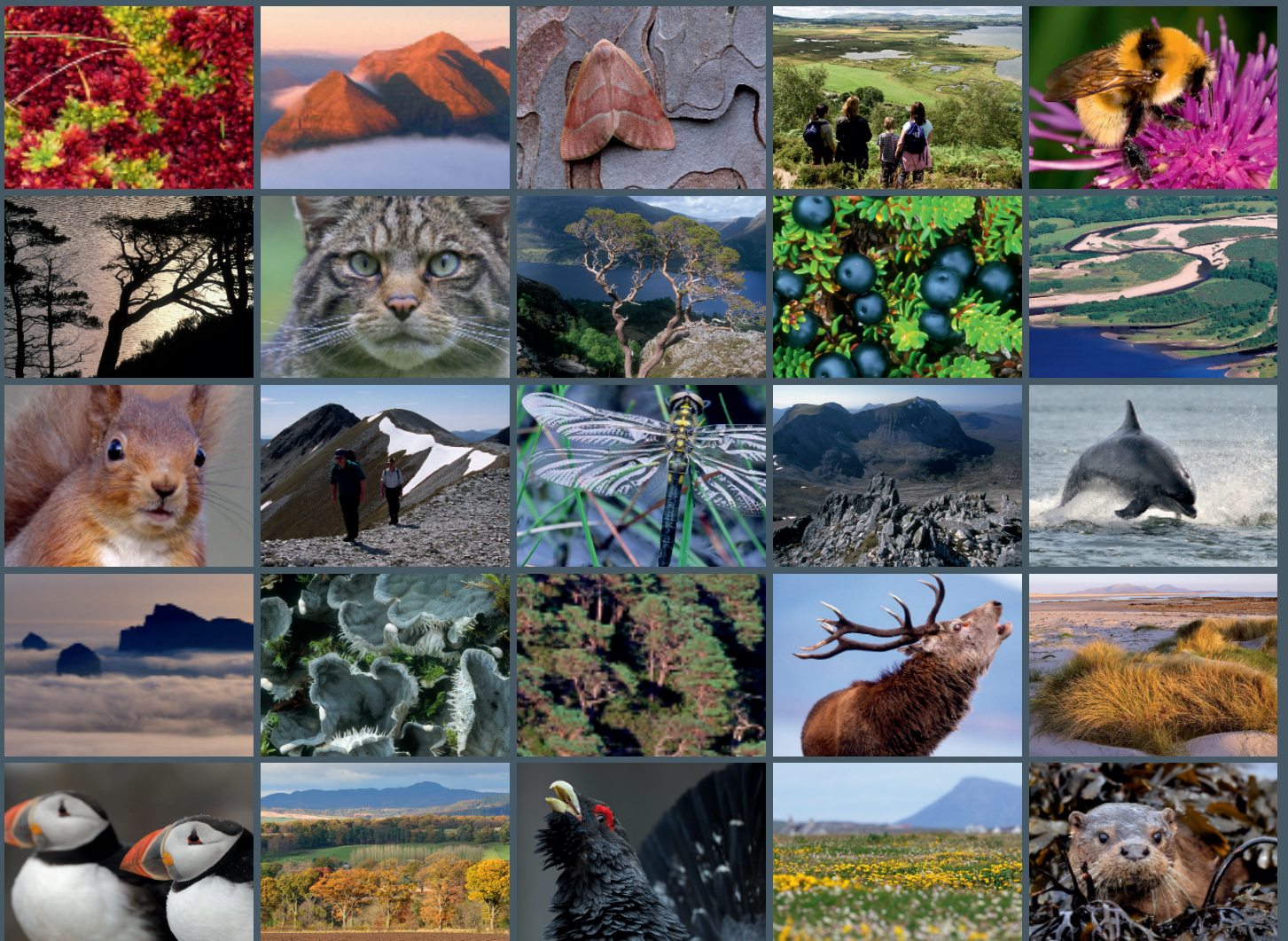


Waders and wildfowl on the Ythan Estuary 1998/1999





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Waders and wildfowl on the Ythan Estuary 1998/1999

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**WADERS AND WILDFOWL ON THE
YTHAN ESTUARY 1998/99
A REPORT TO SNH**

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INTRODUCTION

The wader and wildfowl counts in this report are a direct continuation of the series started in 1989/90, with the same objective of monitoring the bird populations of the Ythan estuary by means of twice-monthly surveys of numbers and distribution. The counts were carried out from 12 July 1998 to 24 June 1999, using the same methods as in previous years (Patterson and Cosgrove 1998; Appendix 1). Since the field surveys in 1998/99 were again carried out by a specialist ornithologist, it was possible to include counts of species which occur less commonly on the Ythan.

RESULTS

a) Individual species

As in previous reports, the data are presented in separate species accounts, arranged in taxonomic order. For each species, a table shows the number of birds found in each section of the estuary from the mouth upstream (ie, Mouth, Inches, Quay, Tarty, Sleek, Haddo, Snub, Machar, and Logie), as defined in Figure 1, and the total on the whole estuary on each count date. Information which is not obvious from the data tables is appended and peak numbers are compared with those in the previous year. Only the commoner species, which were included in previous reports, are dealt with in this section; the species recorded less commonly during the year are tabulated in section d).

HERON *Ardea cinerea*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	1	1	2	8	4	1	2	2	0	21
22 7 98	1	4	2	0	9	0	2	2	0	20
5 8 98	1	1	0	0	1	1	2	1	0	7
25 8 98	0	5	2	6	1	3	4	6	0	27
12 9 98	2	1	1	0	2	1	1	0	1	9
29 9 98	1	0	2	0	2	1	4	0	0	10
15 10 98	0	1	2	0	4	2	0	0	0	9
25 10 98	0	0	3	0	2	0	1	0	1	7
10 11 98	0	3	1	0	0	0	0	0	0	4
25 11 98	0	1	0	0	2	0	0	0	0	3
9 12 98	0	2	0	0	0	1	0	0	0	3
28 12 98	0	1	2	1	3	0	0	0	1	8
5 1 99	1	2	0	1	1	0	1	0	0	6
22 1 99	0	1	0	0	1	0	1	1	1	5
18 2 99	0	2	1	0	1	0	0	0	0	4
24 2 99	0	1	2	1	0	0	0	0	0	4
14 3 99	0	0	0	0	1	0	0	0	0	1
25 3 99	0	0	1	1	0	0	0	0	0	2
9 4 99	0	0	0	0	0	2	0	0	0	2
29 4 99	0	8	1	0	3	2	0	0	1	15
13 5 99	1	5	0	0	3	0	0	1	0	10
25 5 99	0	3	2	0	3	1	0	0	1	10
10 6 99	1	1	1	1	3	0	0	0	0	7
24 6 99	0	3	1	0	9	0	0	0	0	13

Peak; 27 : (1997/98 peak; 26)

MUTE SWAN *Cygnus olor*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	0	0	0	0	0	0	2	2
22 7 98	0	0	0	0	0	0	1	0	1	2
5 8 98	0	0	0	0	0	0	2	0	0	2
25 8 98	0	0	0	0	0	0	2	0	0	2
12 9 98	0	0	0	0	0	0	5	0	0	5
15 10 98	0	1	6	0	3	23	0	0	0	33
25 10 98	0	3	0	2	3	24	0	3	0	35
10 11 98	0	8	3	0	8	10	0	0	0	29
25 11 98	0	10	0	0	17	6	0	0	0	33
9 12 98	0	4	0	0	14	10	0	0	0	28
28 12 98	0	2	0	0	19	9	0	0	0	30
5 1 99	0	0	0	0	12	6	0	0	0	18
22 1 99	0	2	0	0	15	6	0	0	0	23
18 2 99	0	0	0	0	7	23	2	0	0	32
24 2 99	0	0	0	0	22	6	1	0	0	29
14 3 99	0	0	1	0	2	43	0	4	0	50
25 3 99	0	0	0	0	5	52	0	0	0	57
9 4 99	0	0	0	0	3	19	3	0	8	33
29 4 99	0	1	1	0	16	26	0	7	7	58
13 5 99	0	3	0	0	16	3	4	2	0	28
25 5 99	0	1	0	7	15	2	4	1	6	36
10 6 99	0	0	0	6	0	7	0	2	0	15
24 6 99	0	3	0	0	15	5	2	2	0	27

Peak; 58 : (1997/98 peak; 54)

The highest count was the same as the peak count in 1996/97. Peak spring numbers have thus been very consistent.

SHELDUCK *Tadorna tadorna*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	1	2	4	15	0	0	3	25
22 7 98	7	0	0	0	10	2	0	2	4	25
5 8 98	0	0	0	0	6	0	0	2	1	9
25 8 98	0	0	0	0	0	0	0	0	1	1
12 9 98	0	0	0	0	0	0	3	0	0	3
25 11 98	0	0	0	0	8	0	0	0	0	8
9 12 98	0	0	0	0	19	2	0	0	0	21
28 12 98	0	0	0	0	27	0	0	0	0	27
5 1 99	0	0	0	0	32	0	0	0	0	32
22 1 99	0	0	3	0	63	1	0	0	0	67
18 2 99	0	2	7	3	88	17	5	3	0	125
24 2 99	0	5	12	17	69	3	2	0	0	108
14 3 99	0	7	8	0	35	2	6	18	2	78
25 3 99	0	2	6	14	92	22	0	8	0	144
9 4 99	0	4	5	11	52	15	17	2	0	106
29 4 99	1	4	5	3	42	17	15	17	3	107
13 5 99	1	6	2	8	31	14	19	9	3	93
25 5 99	2	2	8	7	48	51	7	19	0	144
10 6 99	0	4	6	3	31	42	9	4	1	100
24 6 99	2	3	0	0	65	48	4	0	0	122

Peak; 144 : (1997/98 peak; 126)

As in previous years, the counts do not include the whole breeding population, since birds on freshwater pools, in the Forvie dunes and on the Ythan above Logie Buchan bridge were not counted.

EIDER *Somateria mollissima*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
11 7 98	871	106	77	1	20	1	0	0	0	1076
19 7 98	1145	133	96	2	8	4	0	0	0	1388
7 8 98	729	0	4	0	2	0	0	0	0	735
26 8 98	923	0	0	0	6	2	0	0	0	931
13 9 98	1846	42	80	0	3	0	0	0	0	1971
29 9 98	1263	21	461	0	158	2	0	0	0	1905
15 10 98	224	790	85	0	46	0	0	0	0	1145
24 10 98	114	724	173	0	13	0	0	0	0	1024
16 11 98	88	208	914	0	5	0	0	0	0	1215
28 11 98	214	401	245	0	11	0	0	0	0	871
27 12 98	99	886	67	0	11	0	0	0	0	1063
12 12 98	558	404	41	0	0	0	0	0	0	1003
11 1 99	92	670	164	0	18	0	0	0	0	944
27 1 99	35	542	302	0	24	0	0	0	0	903
13 2 99	33	64	552	0	69	0	0	0	0	718
26 2 99	35	507	93	0	45	0	0	0	0	680
14 3 99	444	44	194	0	41	0	0	0	0	723
25 3 99	397	5	284	0	34	0	0	0	0	720
10 4 99	627	702	24	0	14	0	0	0	0	1367
30 4 99	1587	1227	324	0	44	2	0	0	0	3184
7 5 99	1966	1195	132	0	28	0	0	0	0	3321
13 5 99	1247	1485	261	0	45	0	0	0	0	3038
20 5 99	1601	721	282	0	36	3	0	0	0	2643
27 5 99	1899	494	169	5	44	0	0	0	0	2611
3 6 99	1960	272	46	0	40	0	0	0	0	2318
10 6 99	2706	268	114	0	6	12	0	0	0	3106
24 6 99	1519	156	29	0	17	11	0	0	0	1732

Peak; 3,321 : (1997/98 peak; 4,075)

The peak count of 3,321 was probably an underestimate because of very early nesting (Patterson and Thorpe 1999). Fledging success was virtually double that of the previous year, at 614 compared to 309.

WIGEON *Anas penelope*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	0	0	0	6	0	0	0	6
12 9 98	0	0	0	0	24	0	0	0	0	24
29 9 98	0	1	9	0	128	0	0	0	0	138
15 10 98	6	87	37	0	107	0	0	0	0	237
25 10 98	88	8	29	0	270	0	0	0	0	395
10 11 98	96	30	53	0	163	0	0	0	0	342
25 11 98	124	67	63	0	53	17	0	0	0	324
9 12 98	63	158	2	0	13	0	0	0	0	236
28 12 98	41	53	8	0	153	0	2	0	0	257
5 1 99	12	144	37	0	309	0	0	0	0	502
22 1 99	39	101	64	0	64	0	0	0	0	268
18 2 99	43	21	137	0	106	0	0	0	0	307
24 2 99	31	23	141	0	99	0	0	0	0	294
14 3 99	5	47	0	0	0	0	83	0	0	135
25 3 99	0	7	0	0	102	0	0	7	21	137
9 4 99	1	0	0	0	42	0	24	0	0	67
29 4 99	2	16	0	0	14	0	4	2	0	38
10 6 99	0	0	0	0	0	0	4	0	0	4
24 6 99	0	0	0	0	0	4	0	0	0	4

Peak; 502 : (1997/98 peak; 370)

TEAL *Anas crecca*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 8 98	0	0	12	0	0	0	0	0	0	12
12 9 98	0	0	0	4	0	0	0	0	0	4
15 10 98	1	0	0	0	0	0	0	0	0	1
10 11 98	0	0	0	0	0	0	2	7	1	10
9 12 98	0	0	0	0	0	0	0	0	18	18
28 12 98	0	0	0	0	0	0	0	4	0	4
5 1 99	0	0	0	0	0	0	0	0	5	5
22 1 99	0	0	0	0	0	0	0	77	0	77
24 2 99	0	0	0	0	0	0	4	6	16	26
9 4 99	0	0	0	0	0	0	42	0	11	53
29 4 99	0	0	0	0	0	0	43	0	10	53
13 5 99	0	0	0	0	0	0	1	0	0	1

Peak; 77 : (1997/98 peak; 64)

MALLARD *Anas platyrhynchos*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	1	0	0	0	0	0	0	1	2
25 8 98	0	0	0	0	0	0	0	0	2	2
12 9 98	0	1	0	0	0	0	0	0	0	1
10 11 98	0	0	3	4	0	0	0	0	0	7
9 12 98	0	0	0	0	0	0	0	0	2	2
28 12 98	0	0	8	0	0	0	0	0	0	8
5 1 99	0	0	10	0	0	0	0	0	1	11
22 1 99	0	0	12	0	0	0	0	0	0	12
18 2 99	0	12	2	0	0	0	0	0	0	14
24 2 99	0	0	6	0	1	0	0	0	4	11
14 3 99	0	1	0	0	0	0	2	4	0	7
25 3 99	0	2	0	0	2	0	0	0	0	4
9 4 99	2	0	2	2	1	2	0	2	0	11
29 4 99	0	0	0	0	2	0	0	1	0	3
13 5 99	0	4	0	0	0	0	0	2	0	6
25 5 99	0	4	0	1	0	0	0	2	0	7
10 6 99	0	0	2	0	0	0	1	0	0	3
24 6 99	0	1	0	0	0	0	0	0	0	1

Peak; 14 : (1997/98 peak; 36)

GOLDENEYE *Bucephala clangula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 9 98	0	0	0	0	0	1	0	0	0	1
15 10 98	0	0	1	0	4	0	0	0	0	5
25 10 98	0	0	0	0	1	0	0	0	0	1
10 11 98	1	0	3	0	7	0	0	0	0	11
25 11 98	2	0	7	0	5	2	1	2	0	19
9 12 98	5	1	7	0	4	0	0	2	1	20
28 12 98	7	6	5	0	3	2	0	0	0	23
5 1 99	4	7	8	0	2	1	0	0	0	22
22 1 99	7	3	6	0	6	0	0	8	3	33
18 2 99	8	2	12	0	10	0	0	4	1	37
24 2 99	4	6	4	0	5	2	1	2	0	24
14 3 99	3	1	1	0	0	0	3	0	2	10
25 3 99	1	0	3	0	2	8	2	1	0	17
9 4 99	0	2	3	0	5	8	18	0	0	36
29 4 99	0	2	0	0	0	5	0	0	3	10
13 5 99	0	1	0	0	0	0	0	0	0	1
10 6 99	0	0	0	0	1	0	0	0	0	1
24 6 99	0	0	0	0	1	0	0	0	0	1

Peak; 37 : (1997/98 peak; 54)

RED-BREASTED MERGANSER *Mergus serrator*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 9 98	1	0	0	0	0	0	0	0	0	1
29 9 98	3	0	12	0	0	0	0	0	0	15
15 10 98	15	0	12	0	1	0	0	0	0	28
25 10 98	3	4	10	0	9	0	0	0	0	26
10 11 98	9	2	10	0	19	0	0	0	0	40
25 11 98	7	0	10	0	5	1	0	0	0	23
9 12 98	7	2	8	0	3	0	0	0	0	20
28 12 98	5	3	12	0	2	0	0	0	0	22
5 1 99	2	6	6	0	5	0	0	0	0	19
22 1 99	4	9	5	0	1	0	0	0	0	19
18 2 99	4	5	3	0	2	0	0	0	0	14
24 2 99	3	7	7	0	2	0	1	0	0	20
14 3 99	13	0	0	0	0	0	0	0	0	13
25 3 99	1	3	1	0	0	0	0	0	0	5
9 4 99	6	8	0	0	0	0	0	0	0	14
29 4 99	15	0	1	0	0	0	0	0	2	18
13 5 99	0	0	2	0	0	0	0	0	0	2
10 6 99	0	0	0	0	2	0	0	0	0	2
24 6 99	0	0	0	0	3	0	0	0	0	3

Peak; 40 : (1997/98 peak; 35)

OYSTERCATCHER *Haematopus ostralegus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	5	113	2	0	8	2	6	4	3	143
22 7 98	119	170	6	0	19	3	6	4	0	327
5 8 98	108	296	5	0	0	0	0	0	0	409
25 8 98	269	40	8	0	0	5	0	0	0	322
12 9 98	246	135	0	0	0	0	10	0	0	391
29 9 98	172	104	0	0	0	0	0	0	0	276
15 10 98	306	0	71	2	17	0	0	0	0	396
25 10 98	276	146	56	2	23	0	0	0	0	503
10 11 98	187	123	48	0	58	0	0	3	0	419
25 11 98	191	103	28	0	35	0	0	0	0	357
9 12 98	185	133	32	0	29	0	0	0	0	379
28 12 98	172	154	21	2	19	0	5	0	0	373
5 1 99	229	121	38	1	17	0	0	0	0	406
22 1 99	181	95	46	1	12	0	0	6	0	341
18 2 99	387	132	75	2	35	3	2	0	0	636
24 2 99	293	131	70	1	28	19	7	0	0	549
14 3 99	62	40	21	0	60	8	0	14	0	205
25 3 99	13	63	38	20	11	40	24	9	2	220
9 4 99	77	85	21	1	9	9	8	16	0	226
29 4 99	108	70	7	0	4	28	12	24	0	253
13 5 99	73	69	10	1	3	8	2	29	0	195
25 5 99	37	83	14	4	3	13	0	11	0	165
10 6 99	53	100	8	0	6	1	4	21	0	193
24 6 99	45	90	17	0	17	10	0	13	0	192

Peak; 636 : (1997/98 peak; 468)

RINGED PLOVER *Charadrius hiaticula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	1	0	0	0	0	0	0	1
22 7 98	15	0	0	0	0	0	0	0	0	15
5 8 98	0	0	14	0	0	0	0	0	0	14
25 8 98	1	0	2	0	0	0	0	4	0	7
15 10 98	3	3	0	0	0	0	0	0	0	6
25 10 98	0	11	0	0	0	0	0	0	0	11
10 11 98	0	8	0	0	0	0	3	0	0	11
25 11 98	0	11	0	0	0	0	0	0	0	11
9 12 98	0	11	0	0	0	0	0	0	0	11
28 12 98	0	10	0	0	0	0	0	0	0	10
5 1 99	0	0	0	6	0	0	0	0	0	6
5 1 99	0	4	0	0	0	0	0	0	0	4
22 1 99	0	0	0	8	0	0	0	0	0	8
18 2 99	0	2	0	2	0	0	0	0	0	4
24 2 99	0	3	0	6	0	0	1	0	0	10
14 3 99	2	0	0	0	0	0	0	0	0	2
25 3 99	0	2	0	0	0	6	0	0	0	8
9 4 99	2	0	0	0	0	30	0	0	0	32
29 4 99	0	0	0	0	0	5	0	0	0	5
13 5 99	2	24	0	0	0	6	0	0	0	32
25 5 99	1	0	122	0	0	14	0	0	0	137
10 6 99	8	10	9	0	0	2	0	0	0	29
24 6 99	7	0	0	0	0	0	0	0	0	7

Peak; 137 : (1997/98 peak; 82)

The peak count was exceptional, the next highest being only 32.

GOLDEN PLOVER *Pluvialis apricaria*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
22 7 98	0	0	0	0	223	0	0	0	0	223
5 8 98	0	82	0	140	0	0	0	0	0	222
25 8 98	0	0	15	0	0	0	0	0	0	15
12 9 98	190	114	0	0	0	0	0	0	0	304
29 9 98	0	420	0	0	1200	0	388	0	0	2008
15 10 98	0	63	0	0	0	0	0	0	0	63
25 10 98	0	140	0	0	0	0	0	0	0	140
10 11 98	0	34	5	0	0	1250	0	0	0	1289
25 11 98	0	158	0	0	0	342	0	0	0	500
9 12 98	0	128	0	0	0	145	0	0	0	273
28 12 98	0	0	0	0	218	0	0	0	0	218
5 1 99	0	209	43	0	90	0	33	0	0	375
22 1 99	0	20	0	0	0	0	47	0	0	67
18 2 99	0	6	0	0	0	3	1	0	0	10
24 2 99	0	0	0	0	0	34	0	0	0	34
25 3 99	0	9	0	0	0	0	0	0	0	9

Peak; 2,008: (1997/98 peak; 2,270)

LAPWING *Vanellus vanellus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	11	4	15	14	10	93	0	147
22 7 98	0	8	398	0	507	57	6	210	1	1187
5 8 98	0	6	39	0	24	30	300	0	2	401
25 8 98	0	53	286	6	17	42	0	0	0	404
12 9 98	0	500	880	30	600	90	350	0	0	2450
29 9 98	0	75	1220	0	480	10	440	0	0	2225
15 10 98	0	16	68	0	12	5	3	0	0	104
25 10 98	0	6	9	0	14	1	8	0	0	38
10 11 98	0	201	285	8	12	233	164	0	0	903
25 11 98	0	90	164	161	122	539	102	73	0	1251
9 12 98	0	739	14	0	17	551	0	0	0	1321
28 12 98	0	0	0	4	180	311	0	0	0	495
5 1 99	0	0	20	6	163	200	116	0	0	505
22 1 99	0	16	10	0	99	62	263	0	0	450
18 2 99	0	1	2	0	1	1	0	0	0	5
24 2 99	0	20	6	2	0	46	9	0	0	83
14 3 99	0	0	0	0	2	3	78	0	0	83
25 3 99	0	0	12	4	0	0	26	0	0	42
9 4 99	0	0	2	5	1	2	1	0	0	11
29 4 99	0	0	0	1	0	2	3	2	0	8
13 5 99	0	0	0	0	0	1	1	0	0	2
25 5 99	0	0	1	0	0	12	4	5	0	22
10 6 99	0	0	0	0	1	1	1	0	0	3
24 6 99	0	3	1	22	44	21	117	67	1	276

Peak; 2,450: (1997/98 peak; 3,590)

KNOT *Calidris canutus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
22 7 98	0	0	0	0	34	0	0	0	0	34
5 8 98	35	0	0	0	0	0	12	0	0	47
12 9 98	155	0	0	0	0	0	0	0	0	155
29 9 98	138	48	0	0	0	0	0	0	0	186
15 10 98	45	89	0	0	0	0	0	0	0	134
25 10 98	217	0	0	0	0	0	0	0	0	217
10 11 98	92	4	0	0	0	0	0	0	0	96
25 11 98	171	0	0	0	0	0	0	0	0	171
9 12 98	50	2	0	0	0	0	0	0	0	52
28 12 98	46	8	0	0	0	0	0	0	0	54
5 1 99	2	54	0	0	0	0	0	0	0	56
22 1 99	0	1	0	0	0	0	0	0	0	1
18 2 99	94	2	0	0	0	0	0	0	0	96
24 2 99	102	2	0	0	0	0	0	0	0	104
14 3 99	66	0	0	0	0	0	0	0	0	66
25 3 99	79	0	0	0	0	0	0	0	0	79
9 4 99	0	1	0	0	0	49	3	0	0	53
29 4 99	9	0	0	0	0	23	0	0	0	32
10 6 99	0	18	0	0	0	0	0	0	0	18

Peak; 217 : (1997/98 peak; 345)

DUNLIN *Calidris alpina*

12	7	98	0	0	0	0	0	0	6	0	0	6
22	7	98	0	1	3	0	85	2	28	0	0	119
5	8	98	5	0	0	6	13	0	82	1	0	107
25	8	98	0	0	12	8	46	0	31	0	0	97
12	9	98	0	2	0	0	20	0	278	0	0	300
29	9	98	0	2	6	0	2	0	638	0	0	648
15	10	98	97	61	1	23	0	0	409	2	0	593
25	10	98	0	13	0	64	0	33	354	12	0	476
10	11	98	0	5	3	0	0	6	3	0	0	17
25	11	98	48	28	130	0	0	146	75	62	0	489
9	12	98	11	131	0	0	0	227	11	0	0	380
28	12	98	15	40	0	0	12	109	61	0	0	237
5	1	99	19	66	10	3	20	92	17	2	0	229
22	1	99	32	5	151	0	105	43	0	0	0	336
18	2	99	28	18	175	0	0	0	0	0	0	221
24	2	99	20	7	147	3	12	6	16	0	0	211
14	3	99	58	0	0	0	0	0	0	0	0	58
9	4	99	0	0	0	0	0	17	0	0	0	17
29	4	99	0	0	0	0	0	8	0	0	0	8
13	5	99	0	41	0	0	0	6	0	0	0	47
25	5	99	0	0	62	0	0	10	0	0	0	72
10	6	99	0	1	0	0	0	1	0	0	0	2

Peak; 648 : (1997/98 peak; 650)

BAR-TAILED GODWIT *Limosa lapponica*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	1	3	0	0	0	0	0	0	4
22 7 98	0	5	1	0	0	0	0	0	0	6
5 8 98	0	0	0	0	1	0	0	0	0	1
25 8 98	0	1	1	0	0	0	0	0	0	2
12 9 98	2	8	0	0	0	0	6	0	0	16
29 9 98	0	2	0	0	2	0	0	0	0	4
15 10 98	16	19	4	1	5	4	0	0	0	49
25 10 98	9	13	15	3	7	2	0	0	0	49
10 11 98	14	19	2	0	5	2	0	0	0	42
25 11 98	11	29	6	0	12	21	0	0	0	79
9 12 98	18	39	2	4	14	6	2	0	0	85
28 12 98	4	37	0	8	17	12	0	0	0	78
5 1 99	10	30	9	3	8	12	2	0	0	74
22 1 99	6	16	14	1	3	58	0	0	0	98
18 2 99	13	14	19	0	10	7	0	0	0	63
24 2 99	9	19	10	0	34	12	0	0	0	84
14 3 99	0	0	4	0	47	0	0	0	0	51
25 3 99	1	0	0	0	11	8	0	0	0	20
9 4 99	0	3	0	0	14	6	0	0	0	23
29 4 99	0	0	0	0	0	4	0	10	0	14
13 5 99	1	0	0	0	0	16	0	0	0	17
25 5 99	0	0	0	0	0	0	0	18	0	18
10 6 99	0	0	9	0	0	0	0	0	0	9
24 6 99	0	10	0	0	0	0	0	0	0	10

Peak; 98 : (1997/98 peak; 59)

CURLEW *Numenius arquata*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	4	59	0	2	308	13	12	8	0	406
22 7 98	1	64	1	16	93	16	11	6	0	208
5 8 98	6	147	3	236	45	6	6	1	2	452
25 8 98	1	86	8	108	234	2	42	0	1	482
12 9 98	3	124	0	12	65	2	10	0	1	217
29 9 98	0	232	0	30	15	0	15	0	0	292
15 10 98	5	153	3	10	52	0	10	1	0	234
25 10 98	8	108	7	3	266	10	2	1	2	407
10 11 98	4	64	2	29	416	15	6	9	0	545
25 11 98	1	53	10	2	13	85	1	0	2	167
9 12 98	1	475	12	43	238	39	15	2	1	826
28 12 98	62	385	27	71	301	23	21	12	0	902
5 1 99	25	875	20	80	12	20	15	1	1	1049
22 1 99	10	84	13	96	15	27	3	8	1	257
18 2 99	2	56	11	10	66	25	146	0	0	316
24 2 99	6	112	45	71	66	5	22	2	0	329
14 3 99	2	42	1	1	22	2	12	0	0	82
25 3 99	0	26	0	1	207	351	102	21	0	708
9 4 99	0	19	2	0	39	93	4	7	0	164
29 4 99	0	1	0	0	2	32	0	4	0	39
13 5 99	0	13	2	7	117	7	9	0	0	155
25 5 99	0	17	5	2	30	22	4	0	0	80
10 6 99	0	4	1	0	34	43	6	0	0	88
24 6 99	0	10	4	5	101	53	20	0	0	193

Peak; 1,049 : (1997/98 peak; 1,793)

REDSHANK *Tringa totanus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	6	18	4	10	57	116	80	13	304
22 7 98	0	100	51	0	351	117	237	36	0	892
5 8 98	2	187	55	27	269	29	250	12	9	840
25 8 98	3	212	78	16	303	16	580	140	32	1380
12 9 98	5	182	26	40	794	280	130	6	0	1463
29 9 98	14	72	26	70	10	12	260	0	0	464
15 10 98	60	407	25	67	90	48	112	5	1	815
25 10 98	14	115	32	73	330	164	64	23	0	815
10 11 98	23	124	18	58	355	187	17	21	0	803
25 11 98	17	78	12	93	288	129	93	20	1	731
9 12 98	10	86	6	108	231	210	43	7	1	702
28 12 98	33	100	17	89	250	172	7	35	2	705
5 1 99	8	155	15	93	277	52	30	13	0	643
22 1 99	3	85	11	70	286	40	60	12	2	569
18 2 99	8	69	13	92	225	109	132	8	0	656
24 2 99	17	52	28	100	272	98	145	4	0	716
14 3 99	2	58	6	34	239	231	223	4	0	797
25 3 99	0	39	31	98	160	349	109	4	3	793
9 4 99	0	98	48	15	62	156	246	19	0	644
29 4 99	0	0	0	24	116	2	8	0	0	150
13 5 99	0	0	0	9	0	0	4	0	0	13
25 5 99	0	1	1	0	1	0	2	0	0	5
10 6 99	0	0	0	7	0	0	2	0	0	9
24 6 99	0	0	0	2	3	0	42	5	1	53

Peak; 1,463 : (1997/98 peak; 940)

TURNSTONE *Arenaria interpres*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	2	7	0	0	0	0	0	0	9
25 8 98	0	1	2	0	0	0	0	0	0	3
12 9 98	8	0	5	0	0	0	0	0	0	13
29 9 98	6	0	0	0	0	0	0	0	0	6
15 10 98	14	12	20	0	0	0	0	0	0	46
25 10 98	6	11	2	0	10	1	0	0	0	30
10 11 98	2	54	11	0	14	3	0	0	0	84
25 11 98	10	13	3	0	18	4	0	0	4	52
9 12 98	7	22	0	0	1	0	0	0	0	30
28 12 98	18	20	3	0	5	0	1	0	0	47
5 1 99	9	21	4	0	3	0	0	0	0	37
22 1 99	6	8	6	1	0	0	0	0	0	21
18 2 99	8	13	3	0	1	0	0	0	0	25
24 2 99	16	12	6	0	3	2	0	0	0	39
14 3 99	8	7	8	0	4	0	0	0	0	27
25 3 99	2	2	0	0	0	0	0	0	0	4
9 4 99	0	2	1	0	0	0	0	0	0	3
29 4 99	16	1	0	0	0	0	0	0	0	17
13 5 99	0	46	0	0	0	0	0	0	0	46
10 6 99	7	0	0	0	0	0	0	0	0	7

Peak; 84 : (1997/98 peak; 19)

b) Total number of birds on the estuary

The total number of birds of all species was calculated for each count date and the mean taken for each month. Since Eiders were so numerous, they were considered separately.

Mouth	Eiders	Other species	Total
1998			
July	1232	2068	3300
August	833	2670	3503
September	1938	5884	7822
October	1085	2999	4084
November	1043	4453	5496
December	1033	3975	5008
1999			
January	924	3340	4264
February	699	2641	3340
March	722	2142	2864
April	2276	1198	3474
May	2903	693	3596
June	2385	710	3095

The total number of birds of all species on the estuary fluctuated from just over 5,000 to nearly 8,000 over the late summer, autumn and winter, with by far the highest number in September, resulting mainly from large changes in the numbers of species other than Eiders (Figure 2). Numbers of these species decreased markedly in spring. In contrast, Eiders were by far the commonest species in May and June.

c) Comparison between 1996/97 and 1997/98

(i) Total number of birds

There was no consistent difference in the monthly mean numbers of birds of all species (including Eiders) between 1997/98 and 1998/99, with the former having the higher total in seven months and the latter in five months. The peak total of 7,822 in September was, however, considerably higher than the 5,979 counted in the same month in 1997/98 and higher than the peak of 6,779 in that year (in January).

A comparison between years for Eiders and for birds other than Eiders, considered separately, gave similar results. There were, however, fewer Eiders in May 1999 (mean 2,903) than in May 1998 (3,448) but a higher peak count of birds of other species (5,884 in 1998/99 compared to 5,504 in 1997/98). However, as was emphasised in previous reports, such peak monthly values may be affected by year-to-year differences in the timing and

extent of migratory movements and so may not be meaningful in making comparisons between years.

A less variable measure, the mean monthly total of species other than Eiders over the whole autumn and winter (August to February) showed a small decrease, from 4,083 in 1997/98 to 3,709 in 1998/99.

(ii) Individual species

For each of the commonly-recorded species, the mean of the three highest counts in 1998/99 was compared with the same measure for the previous year (Patterson and Cosgrove 1998).

Species	1997/98	1998/99	Change
Heron	22	23	+
Mute Swan	47	43	-
Shelduck	107	138	+
Eider	3821	3204	-
Wigeon	310	413	+
Teal	40	61	+
Mallard	31	12	-
Goldeneye	47	35	-
Red-breasted Merganser	28	31	+
Oystercatcher	452	563	+
Ringed Plover	71	67	-
Golden Plover	1760	1266	-
Lapwing	2909	1999	-
Knot	300	191	-
Dunlin	500	577	+
Bar-tailed Godwit	52	89	+
Curlew	1521	926	-
Redshank	771	1245	+
Turnstone	17	61	+

Of the eight wildfowl species, four showed increases and four showed decreases, although some of the changes were small. The Mallard showed a large proportional decrease, in line with the national trend. Of the 10 wader species, five showed increases and five showed decreases. The data are of course subject to the difficulty that some species occurred in unusually large numbers in only a few counts out of the whole year, so that peak counts can be misleading.

An alternative measure, the median of the winter counts (1 September to 31 March) is not subject to this problem (Patterson and Cosgrove 1997, 1998).

Species	Median		Change
	1997/98	1998/99	
Heron	6	5	-
Mute Swan	10	30	+
Wigeon	191	263	+
Teal	3	3	=
Mallard	5	6	+
Goldeneye	23	18	-
Merganser	14	20	+
Wildfowl total	246	345	+
Oystercatcher	300	389	+
Ringed Plover	1	7	+
Golden Plover	666	378	-
Lapwing	913	711	-
Knot	187	105	-
Dunlin	201	300	+
Bar-tailed Godwit	27	57	+
Curlew	254	452	+
Redshank	497	762	+
Turnstone	6	33	+
Wader total	3052	3194	+
Overall total	3298	3539	+

Of the six species of wildfowl which normally have their highest numbers in winter (ie excluding Eider and Shelduck), only the Goldeneye showed a decrease in its median count. Of the 10 wader species, only three (Golden Plover, Lapwing and Knot) showed decreases. The totals of the median values increased for both groups.

d) Species which occur less commonly on the Ythan, seen during the surveys

The various species recorded during the year are tabulated below. Comments are added where appropriate.

LITTLE GREBE *Tachybaptus ruficollis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 10 98	0	1	0	0	0	0	0	0	0	1
9 12 98	0	1	0	0	0	0	0	0	0	1
28 12 98	0	1	0	0	0	0	0	0	0	1
22 1 99	0	1	0	0	0	0	0	0	0	1
18 2 99	0	2	0	0	0	0	0	0	1	3
24 2 99	0	1	0	0	0	0	0	0	2	3

As in the last two years, birds have wintered in the area.

BLACK STORK *Ciconia nigra*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	0	1	0	0	0	0	0	1

This immature bird constitutes the first record for north-east Scotland.

WHOOOPER SWAN *Cygnus cygnus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	0	0	0	0	1	0	0	0	1
25 10 98	0	0	0	0	0	1	0	0	0	1
10 11 98	0	0	0	0	0	1	0	0	0	1
18 2 99	0	0	0	0	0	4	0	0	0	4
24 2 99	0	0	0	0	5	0	0	0	0	5
13 5 99	0	0	0	0	0	0	0	0	1	1
25 5 99	0	0	0	0	0	0	0	0	1	1

As in the two previous years, an injured bird was present throughout the period.

PINK-FOOTED GOOSE *Anser brachyrhynchus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	0	7	0	0	0	0	0	0	7
25 11 98	0	2	0	0	0	0	0	0	0	2
14 3 99	0	0	0	0	102	0	0	0	0	102
25 3 99	0	0	0	260	0	0	0	0	0	260
9 4 99	0	0	0	0	6	0	0	0	0	6
29 4 99	0	0	0	0	42	0	0	0	0	42

GREYLAG GOOSE *Anser anser*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
22 7 98	0	0	0	0	0	0	1	0	0	1
25 8 98	0	0	0	0	0	0	8	0	0	8
15 10 98	0	0	27	0	0	0	0	0	0	27
24 2 99	0	0	2	0	0	0	0	0	0	2
13 5 99	0	0	0	0	2	2	0	0	0	4

CANADA GOOSE *Branta canadensis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 8 98	0	0	0	0	0	0	19	0	0	19
12 9 98	0	19	0	0	0	0	0	0	0	19
15 10 98	0	0	23	0	0	0	0	0	0	23
29 4 99	0	0	0	0	0	6	0	0	0	6

A small flock seems to move between the Ythan and the Meikle Loch.

BARNACLE GOOSE *Branta leucopsis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 9 98	0	1	0	0	0	0	0	0	0	1

Possibly an early-migrating bird, arriving with the grey geese.

BRENT GOOSE *Branta bernicla*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	2	0	0	0	0	0	0	0	2

AMERICAN WIGEON *Anas americana*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 1 99	0	0	0	0	1	0	0	0	0	1

This first-winter bird was present from the end of the previous month.

GADWALL *Anas strepera*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 11 98	0	1	0	0	0	0	0	0	0	1
9 12 98	0	1	0	0	0	0	0	0	0	1

PINTAIL *Anas acuta*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
29 4 99	0	0	0	0	0	0	0	2	0	2

A pair, probably on spring migration.

SHOVELER *Anas clypeata*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
29 4 99	0	0	0	0	3	0	0	0	0	3

Probably birds on pre-breeding passage.

TUFTED DUCK *Aythya fuligula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 11 98	2	0	0	0	0	0	0	0	0	2
22 1 99	1	0	0	0	0	0	0	0	0	1
18 2 99	1	0	0	0	0	0	0	0	0	1
24 2 99	1	0	0	0	0	0	0	0	0	1
9 4 99	0	0	0	0	0	0	2	0	0	2
29 4 99	2	0	0	0	0	0	0	0	0	2

SCAUP *Aythya marila*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 10 98	2	0	0	0	0	0	0	0	0	2
10 11 98	4	0	0	0	0	0	0	0	0	4
25 11 98	4	0	0	0	0	0	0	0	0	4
9 12 98	4	0	0	0	0	0	0	0	0	4
28 12 98	6	0	0	0	0	0	0	0	0	6
5 1 99	2	0	0	0	0	0	0	0	0	2
22 1 99	2	0	0	0	0	0	0	0	0	2
24 2 99	2	0	0	0	0	0	0	0	0	2

A sea duck which winters here regularly in small numbers.

KING EIDER *Somateria spectabilis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 3 99	0	1	0	0	0	0	0	0	0	1
10 4 99	0	1	0	0	0	0	0	0	0	1
30 4 99	0	1	0	0	0	0	0	0	0	1
7 5 99	0	1	0	0	0	0	0	0	0	1
20 5 99	1	0	0	0	0	0	0	0	0	1
27 5 99	1	0	0	0	0	0	0	0	0	1
3 6 99	1	0	0	0	0	0	0	0	0	1
10 6 99	1	0	0	0	0	0	0	0	0	1

A male has been seen annually (except 1985), since 1982.

LONG-TAILED DUCK *Clangula hyemalis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	0	1	0	0	0	0	0	0	1
10 11 98	1	0	0	0	1	0	0	0	0	2
9 12 98	4	0	0	0	1	0	0	0	0	5
28 12 98	8	0	1	0	3	1	0	0	0	13
5 1 99	1	0	2	0	1	0	0	0	0	4
22 1 99	2	0	0	0	0	0	0	0	0	2
18 2 99	1	0	0	0	0	0	0	0	0	1
24 2 99	2	0	0	0	0	0	0	0	0	2
14 3 99	0	1	0	0	0	0	0	0	0	1

GOOSANDER *Mergus merganser*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
9 12 98	0	0	0	0	2	0	0	0	1	3
28 12 98	2	0	0	0	0	0	0	0	1	3

OSPREY *Pandion haliaetus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 8 98	0	0	0	0	0	0	1	0	0	1

In recent years, birds have been seen regularly in this area.

WATER RAIL *Rallus aquaticus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
24 2 99	0	0	0	0	0	0	0	0	1	1

MOORHEN *Gallinula chloropus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
9 4 99	0	0	0	0	0	0	0	0	1	1

CRANE *Grus grus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
13 5 99	0	0	0	0	2	0	0	0	0	2

These two birds were displaying during their brief stay.

GREY PLOVER *Pluvialis squatarola*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
29 9 98	0	0	1	0	0	0	0	0	0	1
15 10 98	4	3	0	0	0	0	0	0	0	7
25 10 98	3	0	0	0	0	0	0	0	0	3
10 11 98	0	1	0	0	0	0	0	0	0	1
25 11 98	3	0	1	0	0	0	0	0	0	4
9 12 98	3	0	0	0	0	0	0	0	0	3
28 12 98	3	0	0	0	0	0	0	0	0	3
5 1 99	2	0	0	0	0	0	0	0	0	2
22 1 99	0	2	0	0	0	0	0	0	0	2
18 2 99	2	0	0	0	0	0	0	0	0	2
24 2 99	3	0	0	0	0	0	0	0	0	3
14 3 99	6	0	0	0	0	0	0	0	0	6
13 5 99	0	0	0	0	1	0	0	0	0	1
10 6 99	0	1	0	0	0	0	0	0	0	1

A return to more typical numbers after the previous year.

SANDERLING *Calidris alba*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
25 10 98	4	0	0	0	0	0	0	0	0	4
5 1 99	11	0	0	0	0	0	0	0	0	11
18 2 99	3	0	0	0	0	0	0	0	0	3
24 2 99	8	0	0	0	0	0	0	0	0	8
14 3 99	1	0	0	0	0	0	0	0	0	1
29 4 99	0	0	0	0	0	1	0	0	0	1
13 5 99	17	0	0	0	0	0	0	0	0	17
25 5 99	0	0	2	0	0	0	0	0	0	2
10 6 99	3	18	0	0	0	0	0	0	0	21

A considerable increase in the number of records, compared to recent years.

LITTLE STINT *Calidris minuta*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	0	0	0	0	0	2	0	0	2

WHITE-RUMPED SANDPIPER *Calidris fuscicollis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	0	0	0	0	0	1	0	0	1

An exceptional record of this rare North American vagrant.

CURLEW SANDPIPER *Calidris ferruginea*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	0	0	0	0	0	1	0	0	1
12 9 98	0	0	0	0	0	0	12	0	0	12
10 11 98	0	1	0	0	0	0	0	0	0	1

The November record was late, for a typical September migrant.

RUFF *Philomachus pugnax*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	0	0	0	0	0	0	2	0	2
12 9 98	0	0	0	0	7	6	0	0	0	13
29 9 98	0	52	0	0	0	0	32	0	0	84
15 10 98	0	0	0	0	0	3	0	0	0	3
10 11 98	0	1	4	0	0	0	0	0	0	5
25 11 98	0	0	0	0	0	1	0	0	0	1

The late September count reflects an exceptional passage.

SNIPE *Gallinago gallinago*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
15 10 98	0	1	0	0	0	0	0	0	2	3
25 10 98	0	2	0	0	0	0	0	0	0	2
10 11 98	0	2	0	0	0	0	0	0	4	6
5 1 99	0	0	0	0	0	0	0	0	1	1

WOODCOCK *Scolopax rusticola*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
29 9 98	0	0	0	0	1	0	0	0	0	1

An unusual sighting of this non-estuarine species.

BLACK-TAILED GODWIT *Limosa limosa*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 8 98	0	2	0	0	0	0	0	0	0	2
29 9 98	0	2	0	0	0	0	0	0	0	2
25 10 98	0	2	0	0	0	0	0	0	0	2
9 12 98	0	1	0	0	0	0	0	0	0	1
10 6 99	0	3	0	0	0	0	0	0	0	3

WHIMBREL *Numenius phaeopus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	0	0	1	0	0	0	0	1
22 7 98	0	1	0	1	3	0	0	0	0	5
5 8 98	0	2	0	0	0	0	0	0	0	2
13 5 99	0	0	0	1	0	1	0	3	0	5
25 5 99	0	0	1	0	0	1	0	2	5	9
10 6 99	0	0	1	0	0	0	0	0	0	1

GREENSHANK *Tringa nebularia*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
12 7 98	0	0	0	0	1	1	0	0	0	2
22 7 98	0	0	0	1	0	0	0	0	0	1
5 8 98	0	1	1	1	7	3	4	0	0	17
25 8 98	0	0	1	2	4	1	0	0	0	8
12 9 98	0	0	0	3	0	0	0	1	0	4
29 9 98	0	0	0	0	1	0	0	0	0	1
15 10 98	0	0	0	2	0	0	0	1	0	3
10 11 98	0	0	1	0	0	0	0	0	0	1
29 4 99	0	0	0	0	0	3	0	5	0	8
24 6 99	0	0	0	0	1	1	0	0	0	2

COMMON SANDPIPER *Arctitis hypoleucos*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
22 7 98	0	0	0	0	1	0	0	1	0	2
5 8 98	0	0	0	0	1	0	0	0	0	1

DISCUSSION

As in previous years, the large month-to-month fluctuations in the numbers of some of the most abundant species on the estuary makes it difficult to compare overall bird numbers between 1997/98 and 1998/99, especially since many of the fluctuations may have been the result of large-scale movements, eg cold-weather effects or post-breeding dispersal, not related to conditions on the Ythan itself. Year-to-year comparisons must therefore be interpreted cautiously.

However, it seems reasonable to conclude that overall bird numbers remained similar between the two years; indeed, the median counts suggest an overall increase, with more species increasing than decreasing. The increase in bird numbers which followed the lower coverage of *Enteromorpha* in 1996 (continuing to some extent in 1997; Raffaelli *et al.* 1999), appears to have been maintained.

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APPENDIX 1. Survey methods

Eiders were counted at high tide, when they were roosting on the shore or in sheltered bays, so that errors due to movement and diving would be minimised. All of the other species were counted at low tide, when they were feeding and so were dispersed over the intertidal area; roost counts at high tide were not practicable because roost sites were dispersed (some of them not known) and because some waders were known to feed in fields at high tide in mid-winter.

All surveys started at the estuary mouth and proceeded upstream, so as to minimise the risk of the count being curtailed by the incoming tide. Counts were made from standard observation points (Figure 1) and the counts were subdivided into eight areas of the estuary (Figure 1), so that the distribution of each species could be described. The observer moved quickly by car from one observation point to the next, so as to minimise errors due to birds moving between sections during the survey. Any such movements seen while driving were noted and allowed for in the counts.

The count data were recorded on a pro-forma recording sheet and later stored on computer in a dBase database. At the end of the survey year (after 30 June) the data were checked, sorted and analysed, using dBase functions and specially-written dBase programs.

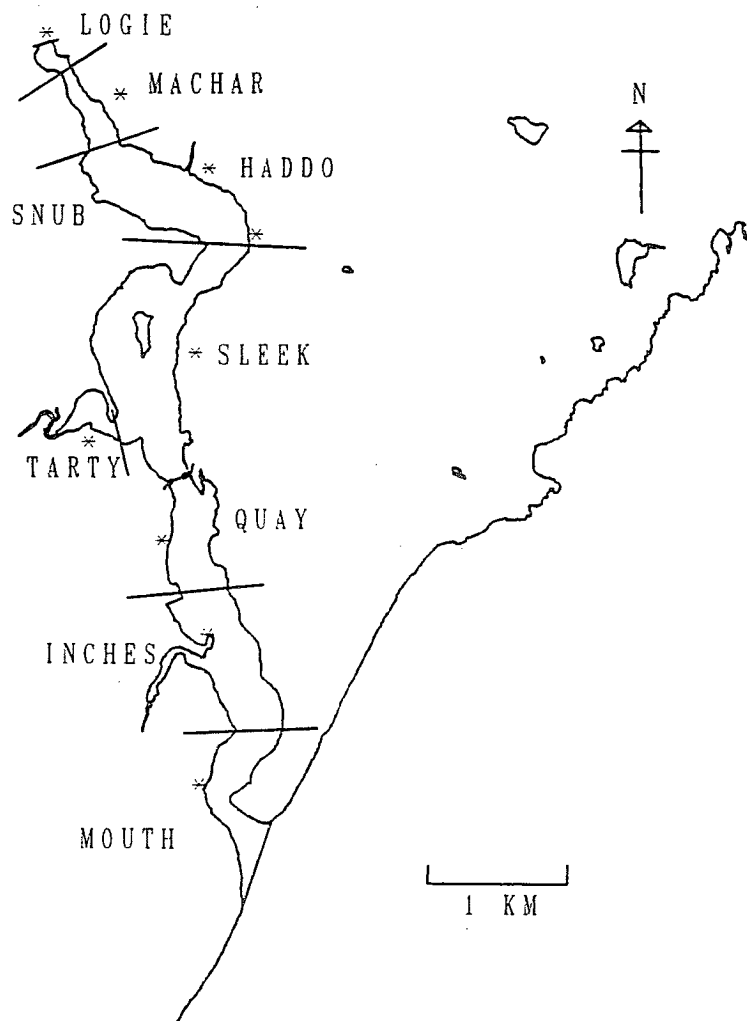


Figure 1. The Ythan estuary, showing the counting sections and count points (asterisks). The division between the Snub and Haddo areas is the centre of the low-tide river channel.

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