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Waders and wildfowl on the Ythan Estuary 2003/2004

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ARCHIVE REPORT

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Waders and wildfowl on the Ythan Estuary 2003/2004

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ARCHIVE REPORT

Summary

Waders and wildfowl on the Ythan Estuary 2003/2004

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Background

Counts of waders and wildfowl on the Ythan estuary were made from 10 July 2003 to 22 June 2004, using similar methods to those used in the past, to enable the data to be comparable; a systematic survey from the estuary mouth to Logie Buchan bridge (Appendix 1). Fortnightly counts and the distribution of birds over the estuary are shown in detail for each species.

Main findings

- The highest monthly mean count of Eiders in spring decreased from 3,361 in 2003 (April) to 3,134 in 2004 (May), while the peak monthly mean total of other species also decreased, from 11,266 (September 2002) to 9,343 (October 2003).
- The overall mean total of birds other than Eiders over the whole autumn and winter (August to February) decreased from 6,036 in 2002/03 to 5,741 in 2003/04.
- There was no consistent evidence of a change in the numbers of individual wildfowl species between 2002/03 and 2003/04, with peak counts showing equal numbers of species increasing and decreasing while winter median counts showed mainly increases. The wader species showed mainly decreases in their peak counts but mainly increases in their winter median counts.
- A number of species less commonly seen on the Ythan were again recorded systematically in 2002/03; their occurrence and numbers are tabulated.
- There was no correlation between the percentage algal cover on the different counting sections of the estuary 2002 and 2003 and that of key bird species in the subsequent autumn and winter periods.

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1. INTRODUCTION

The wader and wildfowl counts in this report can be compared with data collected since 1989/90, and had 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 10 July 2003 to 22 June 2004, using the same methods as in previous years (Appendix 1). Since data on the algal cover on the estuary in 2002 and 2003 became available, it was possible to test whether the distribution of key bird species was related to that of the algae.

2. RESULTS

2.1 Individual species which occur commonly on the Ythan

As in the previous report to the Ythan Project, 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 2.4.

CORMORANT *Phalacrocorax carbo*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	0	0	19	6	0	0	0	25
23 7 2003	0	0	0	0	5	6	0	1	0	12
6 8 2003	0	0	0	0	3	16	0	0	0	19
19 8 2003	0	3	0	0	0	0	0	0	0	3
3 9 2003	13	4	0	0	5	0	1	0	0	23
15 9 2003	1	2	0	0	24	0	20	0	0	47
17 10 2003	0	1	0	0	22	5	13	2	0	43
10 11 2003	4	3	2	0	20	0	0	0	0	29
25 11 2003	1	8	2	0	4	1	0	0	1	17
12 12 2003	0	0	6	0	3	0	1	4	0	14
29 12 2003	0	1	3	0	6	0	0	2	0	12
13 1 2004	3	5	2	0	6	0	1	1	1	19
25 1 2004	2	1	1	0	8	3	0	0	0	15
6 2 2004	1	5	1	0	3	0	0	0	0	10
28 2 2004	0	0	1	0	0	0	0	0	0	1
8 3 2004	1	1	1	0	0	2	0	0	0	5
26 3 2004	0	0	0	0	4	0	5	1	0	10
8 4 2004	0	0	1	0	2	0	1	2	0	6
22 4 2004	0	0	2	0	3	0	7	0	0	12
6 5 2004	1	8	0	0	11	0	2	7	0	29
25 5 2004	0	2	0	0	10	0	0	0	0	12
9 6 2004	0	3	0	0	6	0	5	0	0	14
22 6 2004	0	0	1	0	0	2	2	0	0	5

Peak; 47: (2002/2003 peak; 48)

HERON *Ardea cinerea*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	0	17	3	0	2	0	2	24
23 7 2003	0	1	2	0	6	10	0	1	1	21
6 8 2003	0	1	0	0	1	1	0	0	0	3
19 8 2003	0	0	0	50	6	0	8	1	1	66
3 9 2003	0	0	2	9	7	0	2	0	1	21
15 9 2003	4	6	7	4	9	1	1	0	0	32
5 10 2003	0	0	2	1	2	0	1	0	0	6
17 10 2003	1	2	0	0	3	0	0	0	0	6
10 11 2003	1	3	1	2	2	0	2	0	0	11
25 11 2003	2	4	2	0	3	0	1	0	0	12
12 12 2003	0	0	0	0	1	0	0	0	0	1
29 12 2003	1	5	2	0	2	0	0	0	0	10
13 1 2004	2	2	2	0	2	1	0	0	1	10
25 1 2004	4	9	2	0	3	1	2	0	0	21
6 2 2004	1	7	1	3	1	0	2	0	0	15
28 2 2004	0	1	0	0	1	0	0	1	0	3
8 3 2004	0	2	1	0	2	0	0	0	0	5
26 3 2004	1	1	0	0	7	1	0	0	0	10
8 4 2004	1	2	2	0	1	2	0	0	0	8
22 4 2004	0	3	2	0	6	1	0	0	1	13
6 5 2004	1	1	2	0	5	0	0	0	2	11
25 5 2004	1	4	1	0	3	0	0	0	1	10
9 6 2004	1	2	1	0	5	0	0	0	0	9
22 6 2004	2	3	3	1	5	0	1	0	0	15

Peak; 66: (2002/2003 peak; 50)

MUTE SWAN *Cygnus olor*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	0	0	0	0	3	0	0	3
23 7 2003	0	0	0	0	1	5	0	1	0	7
3 9 2003	0	0	0	0	0	0	0	1	0	1
15 9 2003	0	0	0	0	0	2	0	0	0	2
5 10 2003	0	0	0	0	5	0	0	0	0	5
17 10 2003	0	0	0	0	3	0	0	0	0	3
10 11 2003	0	0	0	0	0	5	0	0	0	5
25 11 2003	0	0	0	0	1	6	0	0	0	7
12 12 2003	0	0	0	0	21	7	0	0	0	28
29 12 2003	0	3	8	0	13	33	0	0	0	57
13 1 2004	0	2	0	0	0	2	2	2	0	8
25 1 2004	0	4	0	0	21	54	2	0	0	81
6 2 2004	0	2	0	2	24	22	0	0	0	50
28 2 2004	2	0	0	0	6	1	0	0	0	9
8 3 2004	0	0	4	0	7	0	0	0	0	11
8 4 2004	0	0	0	0	4	3	0	0	0	7
22 4 2004	0	0	0	0	2	6	0	0	0	8
6 5 2004	0	2	0	0	19	2	2	2	0	27
25 5 2004	0	0	16	4	20	4	0	0	0	34
9 6 2004	0	3	0	0	25	0	0	0	0	28
22 6 2004	0	5	0	2	25	0	2	0	0	34

Peak; 81: (2002/2003 peak; 49)

SHELDUCK *Tadorna tadorna*

Date			Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10	7	2003	0	0	0	2	51	12	0	0	0	65
23	7	2003	0	0	0	0	13	4	1	0	0	18
6	8	2003	0	0	0	0	20	0	7	2	0	29
19	8	2003	0	0	0	13	11	5	0	0	0	29
3	9	2003	0	0	0	1	2	3	0	2	0	8
15	9	2003	0	0	0	0	1	12	0	0	0	13
5	10	2003	0	0	0	0	4	10	0	0	0	14
10	11	2003	0	0	0	0	5	22	0	0	0	27
25	11	2003	0	0	0	0	1	0	0	0	0	1
12	12	2003	0	0	0	0	0	19	0	0	0	19
29	12	2003	0	0	0	0	0	19	0	0	0	19
13	1	2004	0	2	0	0	2	29	0	0	0	33
25	1	2004	0	2	3	0	8	71	0	0	0	84
6	2	2004	0	2	0	0	65	17	0	3	0	87
28	2	2004	0	4	6	1	113	24	0	0	0	148
8	3	2004	0	22	15	11	74	38	24	1	0	185
26	3	2004	0	7	8	4	67	30	8	6	5	115
8	4	2004	0	2	3	4	25	18	0	6	0	58
22	4	2004	0	6	15	4	73	28	15	6	10	157
6	5	2004	1	7	3	8	68	37	2	13	2	141
25	5	2004	3	4	13	7	82	55	4	0	3	171
9	6	2004	0	6	14	11	100	50	7	0	0	188
22	6	2004	0	4	12	3	128	40	5	0	0	192

Peak; 192: (2002/2003 peak; 207)

EIDER *Somateria mollissima*

Date			Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
11	7	2003	1747	24	22	0	20	0	0	0	0	1813
22	7	2003	2014	17	13	0	3	0	0	0	0	2047
0	7	2003	0	0	0	0	0	0	0	0	0	0
5	8	2003	838	22	2	0	3	0	0	0	0	865
22	8	2003	1031	5	4	0	0	0	0	0	0	1040
5	9	2003	352	6	8	0	0	0	0	0	0	366
22	9	2003	2029	2	193	0	23	0	0	0	0	2247
3	10	2003	2274	121	0	0	2	0	0	0	0	2397
22	10	2003	759	3	693	0	0	0	0	0	0	1455
7	11	2003	144	1237	99	0	0	0	0	0	0	1480
20	11	2003	6	470	327	0	0	0	0	0	0	803
4	12	2003	2	1	1432	0	0	0	0	0	0	1435
27	12	2003	97	720	541	0	0	0	0	0	0	1358
6	1	2004	73	153	1107	0	0	0	0	0	0	1333
20	1	2004	148	31	1246	0	0	0	0	0	0	1425
2	2	2004	677	372	322	0	0	0	0	0	0	1371
29	2	2004	379	319	417	0	7	0	0	0	0	1122
15	3	2004	939	43	542	0	27	0	0	0	0	1551
30	3	2004	688	309	15	0	25	0	0	0	0	1037
8	4	2004	1754	0	0	0	42	0	0	0	0	1796
22	4	2004	2285	390	200	0	53	0	0	0	0	2928
29	4	2004	1323	1873	192	0	50	0	0	0	0	3438
10	5	2004	1753	1592	84	0	41	0	0	0	0	3470
19	5	2004	1544	1380	263	0	59	0	0	0	0	3246
25	5	2004	1529	958	177	0	22	0	0	0	0	2686
9	6	2004	1835	355	121	0	13	0	0	0	0	2324
22	6	2004	1836	412	52	0	8	0	0	0	0	2308

Peak; 3,470: (2002/2003 peak; 3,739)

The total number of ducklings reared in 2004 was 104, including 27 on the sea coast between Collieston and the mouth of the estuary.

WIGEON *Anas penelope*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
19 8 2003	0	0	0	0	0	0	5	0	0	5
3 9 2003	0	0	0	0	0	0	0	10	0	10
5 10 2003	0	21	0	0	13	0	0	0	0	34
17 10 2003	10	21	41	0	81	10	310	0	0	473
10 11 2003	22	20	34	0	645	0	0	0	0	721
25 11 2003	330	44	470	0	102	0	0	0	0	946
12 12 2003	570	115	95	0	120	0	0	0	0	900
29 12 2003	100	65	35	2	30	30	40	0	0	302
13 1 2004	234	135	145	0	14	11	0	2	0	541
25 1 2004	210	66	60	0	71	0	22	0	0	429
6 2 2004	95	73	74	0	51	0	0	0	0	293
28 2 2004	41	0	0	0	110	0	320	0	0	471
8 3 2004	24	19	38	0	210	0	0	0	0	291
26 3 2004	0	24	5	0	0	0	0	0	0	29
8 4 2004	0	0	0	0	115	0	0	0	0	115
22 4 2004	0	0	0	0	36	0	0	0	0	36
25 5 2004	0	0	2	0	0	0	0	0	0	2

Peak; 946: (2002/2003 peak; 1,034)

TEAL *Anas crecca*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
3 9 2003	0	0	0	0	0	0	0	0	23	23
15 9 2003	0	0	0	0	0	0	0	0	8	8
5 10 2003	0	0	0	0	10	0	0	0	0	10
17 10 2003	0	0	0	0	0	0	0	0	2	2
10 11 2003	0	0	0	0	11	0	0	0	0	11
13 1 2004	0	0	0	0	0	0	0	0	3	3
8 3 2004	0	0	0	0	0	0	2	0	23	25
26 3 2004	0	0	0	0	0	0	8	65	3	76
8 4 2004	0	0	0	0	0	0	0	0	7	7
22 4 2004	0	0	0	2	0	0	0	0	39	41

Peak; 76: (2001/2002 peak; 21)

MALLARD *Anas platyrhynchos*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	2	0	0	0	32	0	2	0	36
23 7 2003	0	2	0	0	2	0	8	0	0	12
6 8 2003	0	6	0	0	2	0	0	0	0	8
19 8 2003	1	2	0	0	0	0	0	0	0	3
3 9 2003	0	0	0	0	0	0	5	0	0	5
15 9 2003	0	19	0	0	0	0	0	0	6	25
5 10 2003	0	12	0	0	0	0	0	0	0	12
17 10 2003	0	10	0	0	0	0	0	0	0	10
10 11 2003	0	14	0	0	4	0	0	0	0	18
25 11 2003	2	27	0	0	2	0	0	0	0	31
12 12 2003	1	15	0	0	2	0	0	0	0	18
29 12 2003	0	23	8	0	6	0	0	0	0	37
13 1 2004	0	36	4	0	2	0	0	0	0	42
25 1 2004	0	33	14	0	0	0	0	0	0	47
6 2 2004	0	0	10	0	0	0	0	0	0	10
28 2 2004	0	37	8	0	2	10	0	0	0	57
8 3 2004	2	2	1	0	0	1	0	0	0	6
26 3 2004	0	7	0	0	4	3	0	0	3	17
8 4 2004	0	0	0	0	0	0	0	0	1	1
22 4 2004	0	0	0	0	0	5	0	0	0	5
6 5 2004	0	2	0	0	2	0	0	0	1	5
25 5 2004	0	4	1	0	1	8	0	0	0	14
9 6 2004	0	1	0	1	1	2	0	0	0	5
22 6 2004	0	4	0	0	0	22	2	0	0	28

Peak; 57: (2002/2003 peak; 45)

GOLDENEYE *Bucephala clangula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
17 10 2003	0	0	0	0	9	0	0	0	0	9
10 11 2003	19	7	0	0	6	4	0	0	0	36
25 11 2003	13	5	5	0	10	2	0	0	3	38
12 12 2003	1	10	4	0	15	0	0	3	5	38
29 12 2003	32	25	3	0	0	0	0	0	2	62
13 1 2004	21	16	7	0	2	0	0	4	0	50
25 1 2004	10	4	9	0	7	11	0	0	0	41
6 2 2004	3	9	4	0	5	0	1	0	0	22
28 2 2004	7	6	2	0	3	0	2	2	0	22
8 3 2004	2	0	1	0	43	0	2	0	0	48
26 3 2004	1	4	3	0	27	1	4	0	1	41
8 4 2004	0	1	0	0	20	0	3	0	1	25
22 4 2004	0	2	0	0	38	0	0	0	1	41
6 5 2004	0	2	0	0	0	0	0	0	0	2

Peak; 62: (2002/2003 peak; 38)

RED-BREASTED MERGANSER *Mergus serrator*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
23 7 2003	2	0	0	0	0	0	0	0	0	2
19 8 2003	1	0	0	0	0	0	0	0	0	1
15 9 2003	3	0	0	0	0	0	0	0	0	3
5 10 2003	0	13	0	0	4	0	0	0	0	17
17 10 2003	6	4	2	0	1	0	0	0	0	13
10 11 2003	9	7	0	0	9	0	0	0	0	25
25 11 2003	11	4	3	0	2	2	0	0	1	23
12 12 2003	1	6	3	0	3	0	0	0	0	13
29 12 2003	6	5	0	0	4	0	0	0	0	15
13 1 2004	3	9	5	0	1	0	0	1	0	19
25 1 2004	6	6	4	0	3	0	0	0	0	19
6 2 2004	0	5	0	0	4	0	0	0	0	9
28 2 2004	2	11	4	0	4	0	0	0	0	21
8 3 2004	0	6	1	0	5	0	1	0	0	13
26 3 2004	0	0	1	0	0	0	0	0	0	1
8 4 2004	0	0	2	0	0	0	0	0	0	2
22 4 2004	0	0	7	0	2	1	0	0	0	10
6 5 2004	1	0	0	0	0	0	0	0	0	1
9 6 2004	0	2	0	0	2	0	0	0	0	4
22 6 2004	1	0	4	0	0	0	0	0	0	5

Peak; 25: (2002/2003 peak; 32)

OYSTERCATCHER *Haematopus ostralegus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	279	145	22	2	44	12	0	1	0	505
23 7 2003	114	204	47	7	75	0	9	12	0	468
6 8 2003	127	195	26	1	31	3	0	1	0	384
19 8 2003	387	177	29	0	13	0	0	0	0	606
3 9 2003	337	142	18	1	13	1	0	0	0	512
15 9 2003	313	144	1	2	8	0	0	0	0	468
5 10 2003	234	383	22	0	8	4	0	0	0	651
17 10 2003	188	159	21	1	16	0	0	0	0	385
10 11 2003	267	110	10	0	12	0	1	0	0	400
25 11 2003	247	146	26	0	31	3	0	0	0	453
12 12 2003	172	93	22	11	4	0	0	0	0	302
29 12 2003	132	95	18	2	4	4	0	0	0	255
13 1 2004	175	143	37	2	14	2	0	0	0	373
25 1 2004	174	93	63	0	29	3	0	1	0	363
6 2 2004	244	71	64	0	18	2	0	0	0	399
28 2 2004	236	70	39	0	27	0	0	0	0	372
8 3 2004	158	54	26	5	56	32	0	33	2	366
26 3 2004	53	74	19	7	53	7	37	2	2	234
8 4 2004	59	49	15	3	42	4	46	0	0	218
22 4 2004	41	39	10	4	29	8	12	0	0	143
6 5 2004	45	60	3	4	22	0	1	0	0	135
25 5 2004	28	36	9	3	12	5	2	2	0	94
9 6 2004	56	79	11	13	24	5	2	0	0	190
22 6 2004	47	82	17	5	8	7	4	1	0	171

Peak; 651: (2002/2003 peak; 639)

RINGED PLOVER *Charadrius hiaticula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	10	0	0	0	0	0	0	0	0	10
23 7 2003	2	2	0	0	0	0	0	0	0	4
6 8 2003	10	0	19	0	2	0	0	0	0	31
19 8 2003	2	0	21	0	19	0	0	0	0	42
3 9 2003	0	5	23	0	3	0	0	0	0	31
15 9 2003	4	11	8	0	2	1	0	0	0	26
5 10 2003	0	13	0	0	0	0	0	0	0	13
17 10 2003	0	0	0	0	0	5	0	0	0	5
10 11 2003	0	0	0	10	0	0	0	0	0	10
25 11 2003	0	0	0	3	0	0	7	0	0	10
12 12 2003	1	0	0	0	0	0	0	0	0	1
29 12 2003	0	0	0	0	0	9	0	0	0	9
8 3 2004	0	0	0	0	4	0	0	0	0	4
26 3 2004	3	2	0	0	1	0	0	0	0	6
8 4 2004	0	8	0	0	0	0	0	0	0	8
22 4 2004	2	15	8	0	0	0	0	0	0	25
25 5 2004	0	0	0	0	10	0	0	0	0	10
9 6 2004	0	19	0	0	0	0	0	0	0	19
22 6 2004	0	0	1	0	0	0	0	0	0	1

Peak; 42: (2002/2003 peak; 64)

GOLDEN PLOVER *Pluvialis apricaria*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	119	0	0	0	0	0	0	0	119
23 7 2003	0	555	1	0	0	0	0	0	0	556
6 8 2003	0	523	2	10	130	0	0	0	0	665
19 8 2003	0	328	0	6	0	0	0	0	0	334
3 9 2003	0	890	40	0	0	0	0	0	0	930
15 9 2003	0	1050	0	0	21	620	0	0	0	1691
5 10 2003	0	2465	0	0	12	0	0	0	0	2477
17 10 2003	0	700	0	0	0	6000	0	0	0	6700
10 11 2003	0	2620	0	0	2000	0	0	0	0	4620
25 11 2003	0	2000	0	0	0	0	70	0	0	2070
12 12 2003	0	203	100	0	0	0	0	0	0	303
29 12 2003	0	860	0	0	0	0	0	0	0	860
13 1 2004	0	31	32	0	0	0	0	0	0	63
25 1 2004	0	17	0	0	0	0	0	0	0	17
6 2 2004	0	0	0	0	2	0	0	0	0	2
28 2 2004	0	19	0	0	0	0	0	0	0	19
8 3 2004	0	18	0	0	0	0	0	0	0	18
26 3 2004	0	0	0	0	0	0	25	0	0	25
8 4 2004	0	0	0	0	0	0	17	0	0	17

Peak; 6,700: (2002/2003 peak; 4,699)

LAPWING *Vanellus vanellus*

Date			Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10	7	2003	0	9	0	0	61	252	140	27	7	496
23	7	2003	0	21	41	0	193	340	280	0	30	905
6	8	2003	0	45	3	33	250	610	80	0	2	1023
19	8	2003	4	20	32	22	210	200	100	0	0	588
3	9	2003	0	20	135	76	260	120	30	40	60	741
15	9	2003	0	40	140	100	880	1060	94	160	160	2634
5	10	2003	0	4	0	0	210	0	150	0	0	364
17	10	2003	0	20	340	130	1460	1030	180	0	0	3160
10	11	2003	0	212	680	50	1100	40	300	60	0	2442
25	11	2003	0	70	58	2	0	0	0	0	0	130
12	12	2003	0	18	190	90	376	0	70	0	0	744
29	12	2003	0	158	530	0	520	300	400	0	0	1908
13	1	2004	0	22	62	3	80	280	230	2	0	683
25	1	2004	0	32	310	0	120	160	690	30	0	1342
6	2	2004	0	26	60	0	450	400	0	50	0	986
28	2	2004	0	15	0	0	120	290	31	0	3	459
8	3	2004	0	16	100	0	160	250	700	90	0	1316
26	3	2004	0	1	1	5	48	20	110	0	0	185
8	4	2004	0	0	0	0	2	0	5	6	0	13
22	4	2004	0	0	0	0	2	3	0	1	0	6
6	5	2004	0	0	0	0	1	0	0	0	0	1
25	5	2004	0	0	0	0	0	0	0	22	5	27
9	6	2004	0	0	0	0	11	35	12	45	9	112
22	6	2004	0	0	0	0	73	0	1	9	3	86

Peak; 3,160: (2002/2003 peak; 5,223)

KNOT *Calidris canutus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
23 7 2003	0	47	0	0	59	0	1	0	0	107
6 8 2003	0	2	0	0	0	28	0	0	0	30
19 8 2003	94	2	0	0	0	0	0	0	0	96
3 9 2003	60	0	2	0	0	0	0	0	0	62
5 10 2003	0	370	0	0	0	0	0	0	0	370
17 10 2003	0	210	0	0	0	0	0	0	0	210
10 11 2003	0	420	0	0	0	0	0	0	0	420
25 11 2003	60	280	0	0	0	0	0	0	0	340
12 12 2003	0	280	0	0	51	0	0	0	0	331
29 12 2003	230	0	0	0	0	0	0	0	0	230
13 1 2004	220	0	0	0	0	0	0	0	0	220
25 1 2004	0	260	4	0	0	0	0	0	0	264
6 2 2004	0	110	0	0	0	0	0	0	0	110
28 2 2004	0	210	0	0	0	0	0	0	0	210
26 3 2004	220	0	0	0	0	0	0	0	0	220
8 4 2004	81	0	0	0	0	0	0	0	0	81
22 4 2004	0	15	0	0	0	0	0	0	0	15
6 5 2004	2	1	0	0	0	0	0	0	0	3

Peak; 420: (2002/2003 peak; 550)

DUNLIN *Calidris alpina*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	0	0	0	13	0	0	0	13
23 7 2003	0	4	0	0	207	0	0	0	0	211
6 8 2003	0	0	2	0	9	0	5	0	0	16
19 8 2003	0	0	5	0	9	0	299	38	51	402
3 9 2003	1	14	21	0	45	120	70	250	0	521
15 9 2003	0	41	0	0	30	28	0	18	48	165
5 10 2003	16	166	0	0	21	0	0	51	0	254
17 10 2003	0	0	0	0	0	4	310	16	0	330
10 11 2003	0	455	0	0	0	2	40	0	0	497
25 11 2003	0	96	59	0	0	90	20	0	0	265
12 12 2003	0	214	95	14	0	28	0	0	0	351
29 12 2003	0	70	90	0	18	280	0	0	0	458
13 1 2004	14	290	20	1	3	310	0	0	0	638
25 1 2004	0	0	44	0	0	0	541	0	0	585
6 2 2004	0	0	20	0	325	0	0	0	0	345
28 2 2004	0	0	0	0	0	430	0	0	0	430
8 3 2004	0	0	0	0	74	0	0	0	0	74
26 3 2004	0	0	0	0	3	0	0	0	0	3
22 4 2004	0	8	3	0	0	0	0	0	0	11
6 5 2004	0	8	0	0	0	0	0	0	0	8
9 6 2004	0	10	0	0	0	0	0	0	0	10

Peak; 638: (2002/2003 peak; 752)

BAR-TAILED GODWIT *Limosa lapponica*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	2	0	0	0	0	0	0	2
23 7 2003	0	0	2	0	7	0	0	0	0	9
6 8 2003	0	0	2	0	1	0	0	0	0	3
19 8 2003	2	2	2	0	1	0	0	0	0	7
3 9 2003	0	0	13	0	1	0	0	0	0	14
15 9 2003	0	5	2	0	0	0	0	0	0	7
5 10 2003	0	5	3	0	2	0	0	0	0	10
17 10 2003	0	5	0	0	1	0	0	0	0	6
10 11 2003	1	17	0	0	1	0	0	0	0	19
25 11 2003	1	12	1	0	0	0	0	0	0	14
12 12 2003	1	19	11	0	0	0	0	0	0	31
29 12 2003	0	9	5	0	1	0	0	0	0	15
13 1 2004	0	15	18	0	4	0	0	0	0	37
25 1 2004	0	7	12	0	15	0	0	0	0	34
6 2 2004	0	0	32	0	7	0	0	0	0	39
28 2 2004	0	1	5	0	7	0	0	0	0	13
8 3 2004	0	0	0	0	31	0	0	0	0	31
26 3 2004	0	0	0	0	5	0	21	0	0	26
8 4 2004	0	0	0	0	0	0	10	0	0	10
22 4 2004	0	2	0	0	1	0	0	0	0	3
25 5 2004	0	1	0	0	0	0	0	0	0	1
22 6 2004	0	0	0	0	1	0	0	0	0	1

Peak; 39: (2002/2003 peak; 109)

CURLEW *Numenius arquata*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	109	1	2	81	74	22	11	3	303
23 7 2003	2	89	49	13	94	211	29	2	1	490
6 8 2003	0	138	17	19	83	12	56	3	1	329
19 8 2003	4	176	14	1	66	57	41	1	0	360
3 9 2003	5	218	12	30	77	31	29	3	2	407
15 9 2003	7	149	25	9	73	64	11	5	0	343
5 10 2003	1	125	23	14	24	102	10	2	0	301
17 10 2003	2	90	41	0	44	14	4	1	1	197
10 11 2003	8	51	7	111	120	71	0	1	2	371
25 11 2003	14	88	14	7	19	22	8	1	1	174
12 12 2003	4	41	18	3	38	17	2	0	1	123
29 12 2003	12	75	26	4	310	6	21	1	0	455
13 1 2004	2	111	11	3	15	38	9	2	1	192
25 1 2004	8	139	5	3	373	162	56	0	1	747
6 2 2004	5	128	6	1	840	33	45	1	1	1060
28 2 2004	16	40	14	2	51	46	8	1	1	179
8 3 2004	4	134	9	79	642	80	10	0	0	958
26 3 2004	2	33	4	0	4	180	30	260	0	513
8 4 2004	2	24	3	18	57	1	5	0	0	110
22 4 2004	1	14	2	1	30	172	5	0	0	225
6 5 2004	0	1	3	0	5	0	0	0	0	9
25 5 2004	0	8	0	0	1	0	0	0	0	9
9 6 2004	0	12	0	2	20	6	0	0	0	40
22 6 2004	0	29	0	4	98	7	3	1	0	142

Peak; 1,060: (2002/2003 peak; 1,592)

REDSHANK *Tringa totanus*

Date			Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10	7	2003	0	2	13	3	78	67	36	0	0	199
23	7	2003	1	22	151	0	304	46	94	62	1	681
6	8	2003	2	78	73	0	645	468	71	44	1	1382
19	8	2003	123	327	179	2	397	312	361	57	17	1775
3	9	2003	76	267	236	2	573	315	451	84	4	2008
15	9	2003	59	271	121	41	413	411	95	152	6	1569
5	10	2003	148	497	19	48	244	236	119	31	5	1347
17	10	2003	94	173	42	86	267	0	0	23	2	687
10	11	2003	30	86	8	43	71	173	129	18	3	561
25	11	2003	74	143	42	65	211	188	74	7	6	681
12	12	2003	11	84	30	372	41	89	1	0	2	630
29	12	2003	57	133	0	31	476	167	18	6	0	888
13	1	2004	35	101	21	63	213	169	163	5	2	772
25	1	2004	41	125	28	49	276	122	121	12	2	776
6	2	2004	4	93	26	11	228	71	197	0	2	632
28	2	2004	24	39	41	28	231	93	17	6	2	481
8	3	2004	11	37	25	32	127	169	77	0	0	478
26	3	2004	9	62	26	65	138	242	68	3	1	614
8	4	2004	4	96	45	6	140	318	226	14	1	850
22	4	2004	4	60	30	9	76	144	58	2	1	393
6	5	2004	0	1	0	0	3	0	0	0	0	4
25	5	2004	0	0	0	1	0	0	1	3	0	5
9	6	2004	0	0	0	0	0	0	0	4	0	4
22	6	2004	0	0	0	0	2	0	0	28	0	30

Peak; 2,008: (2002/2003 peak; 1,766)

Particularly high numbers were again recorded during the autumn migration.

TURNSTONE *Arenaria interpres*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
23 7 2003	0	3	1	0	0	0	0	0	0	4
6 8 2003	0	2	0	0	1	0	0	0	0	3
19 8 2003	0	0	1	0	0	0	0	0	0	1
3 9 2003	0	5	0	0	0	0	0	0	0	5
15 9 2003	0	4	0	0	0	0	0	0	0	4
5 10 2003	19	36	0	0	0	0	0	0	0	55
17 10 2003	0	31	0	0	0	0	0	0	0	31
10 11 2003	2	21	0	0	1	2	0	0	0	26
25 11 2003	8	38	0	0	0	11	0	0	0	57
12 12 2003	1	16	0	0	0	0	0	0	0	17
29 12 2003	3	21	0	2	0	0	0	0	0	26
13 1 2004	4	43	0	1	6	0	0	0	0	54
25 1 2004	8	15	4	0	11	0	0	0	0	38
6 2 2004	4	41	3	0	20	0	0	0	0	68
28 2 2004	14	8	0	0	0	0	0	0	0	22
8 3 2004	12	2	0	0	0	0	0	0	0	14
26 3 2004	3	11	3	0	0	0	0	0	0	17
22 4 2004	3	2	0	0	1	0	0	0	0	6

Peak; 68: (2002/2003 peak; 52)

2.2 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.

Month	Eiders	Other species	Total
2003			
July	1287	2657	3944
August	953	4161	5114
September	1307	6201	7508
October	1926	9343	11269
November	1142	7834	8976
December	1397	4757	6154
2004			
January	1425	4358	5783
February	1247	3535	4782
March	1294	3071	4365
April	2721	1371	4092
May	3134	380	3514
June	2316	670	2986

The total number of birds of all species on the estuary was strikingly higher in October than in any other month, due mainly to large numbers of Golden Plovers and Lapwings later in the month. There was a decrease in the total number of birds present throughout the spring, in spite of the increase in numbers of Eiders.

2.3 Comparison between 2002/03 and 2003/04

2.3.1 Total number of birds

There was some increase between 2002/03 and 2003/04 in the monthly mean numbers of birds of all species (including Eiders); numbers were higher in 2003/04 in eight of the 12 months. The peak of 11,269 birds in October 2003 was, however, lower than the peaks in 2002/03 (12,788) and 2001/02 (12,628), which were both in September.

Most of the increases in monthly mean numbers were in Eiders, with numbers higher in 2003/04 in nine of the 12 months. Species other than Eiders had higher mean numbers in 2003/04 in seven months. However, as was emphasised in previous reports to SNH, 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 decrease from 6,036 in 2002/03 to 5,741 in 2003/04.

2.3.2 Individual species

For each of the commonly-recorded species, the mean of the three highest counts in 2003/04 was compared with the same measure for the previous year (Patterson and Thorpe 2003).

Species	2002/03	2003/04	Change
Cormorant	42	40	-
Heron	43	40	-
Mute Swan	38	63	+
Shelduck	192	188	-
Eider	3509	3385	-
Wigeon	973	856	-
Teal	15	47	+
Mallard	39	49	+
Goldeneye	33	53	+
Red-breasted Merganser	26	23	-
Oystercatcher	570	590	+
Ringed Plover	52	35	-
Golden Plover	4362	4599	+
Lapwing	3908	2745	-
Knot	512	377	-
Dunlin	669	581	-
Bar-tailed Godwit	99	37	-
Curlew	1017	922	-
Redshank	1685	1784	+
Turnstone	44	60	+

Of the eight wildfowl species, four showed increases and four showed decreases. Of the 10 wader species, four showed increases and six decreased. The data are of course subject to the difficulty that some species (eg Golden Plover and Lapwing) occurred in unusually large numbers in only a few counts out of the whole year, so that peak counts can be misleading. Peak counts were, however, appropriate for Eiders and Shelduck, which reached predictable seasonal peak numbers in the nesting season (usually in May).

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

Species	Median 2002/03	2003/04	Change
Cormorant	13	15	+
Heron	9	10	+
Mute Swan	8	8	=
Wigeon	473	366	-
Teal	0	3	+
Mallard	2	18	+
Goldeneye	20	37	+
Merganser	13	14	+
Wildfowl total	538	471	-
Oystercatcher	345	379	+
Ringed Plover	7	6	+
Golden Plover	54	582	-
Lapwing	781	865	-
Knot	367	220	+
Dunlin	466	348	+
Bar-tailed Godwit	36	17	-
Curlew	269	357	+
Redshank	754	684	+
Turnstone	25	26	+
Wader total	3104	3484	+
Overall total	3642	3955	+

Of the six species of wildfowl which normally have their highest numbers in winter (ie excluding Eider and Shelduck), four showed an increase in their median counts, while one decreased and one stayed the same. Of the 10 wader species, seven increased and three decreased. The totals of the median values decreased for wildfowl and increased for waders, with an increase overall.

2.4 Species which occur less commonly on the Ythan, which were seen during the surveys

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

RED-THROATED DIVER *Gavia stellata*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
17 10 2003	0	1	0	0	0	0	0	0	0	1
25 11 2003	0	0	1	0	0	0	0	0	0	1
12 12 2003	0	1	0	0	0	0	0	0	0	1
13 1 2004	0	1	0	0	0	0	0	0	0	1

WHOOPER SWAN *Cygnus cygnus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 11 2003	4	0	0	0	0	0	0	0	0	4

PINK-FOOTED GOOSE *Anser brachyrhychus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 10 2003	0	0	0	0	0	380	0	0	0	380
10 11 2003	0	0	0	0	0	0	3	0	0	3
8 3 2004	0	0	0	0	22	0	0	0	0	22
26 3 2004	0	0	0	0	0	120	0	0	0	120
22 4 2004	0	0	0	0	31	0	0	0	0	31
6 5 2004	0	0	0	0	2	0	0	0	0	2
9 6 2004	0	0	0	0	1	0	0	0	0	1
22 6 2004	0	0	0	0	0	0	2	0	0	2

GREYLAG GOOSE *Anser anser*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
6 8 2003	0	0	0	0	13	0	0	0	0	13
5 10 2003	0	0	0	0	0	28	0	0	0	28
10 11 2003	0	0	0	0	0	0	57	0	0	57
25 11 2003	0	0	0	0	0	0	0	0	31	31
22 4 2004	0	0	0	0	0	0	0	0	4	4
9 6 2004	0	0	0	0	2	0	0	0	0	2

CANADA GOOSE *Branta canadensis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
6 8 2003	0	0	0	0	16	0	0	0	0	16
19 8 2003	0	0	0	0	0	28	0	0	0	28

BARNACLE GOOSE *Branta leucopsis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
6 8 2003	0	4	0	0	0	0	0	0	0	4

PINTAIL *Anas acuta*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
26 3 2004	0	2	0	0	0	0	2	0	0	4
22 4 2004	0	0	0	0	2	2	0	0	0	4

TUFTED DUCK *Aythya fuligula*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
29 12 2003	0	0	7	0	0	0	0	0	0	7
13 1 2004	0	3	0	0	0	0	0	0	0	3
8 3 2004	2	0	0	0	0	0	0	0	0	2

SCAUP *Aythya marila*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
17 10 2003	10	0	0	0	0	0	0	0	0	10
10 11 2003	17	0	0	0	0	0	0	0	0	17
25 11 2003	5	0	0	0	0	0	0	0	0	5
12 12 2003	10	0	0	0	0	0	0	0	0	10
13 1 2004	0	7	0	0	0	0	0	0	0	7

LONG-TAILED DUCK *Clangula hyemalis*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
13 1 2004	0	2	0	0	0	0	0	0	0	2
25 1 2004	2	0	0	0	0	0	0	0	0	2

GOOSANDER Mergus merganser

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
8 3 2004	0	0	0	0	0	0	0	0	1	1
8 4 2004	0	0	0	0	0	0	0	0	3	3
6 5 2004	0	0	0	0	0	0	0	0	21	21

OSPREY *Pandion haliaetus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
3 9 2003	0	0	0	0	0	1	0	0	0	1

MOORHEN *Gallinula chloropus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
3 9 2003	0	0	0	0	0	0	0	0	2	2
15 9 2003	0	0	0	0	0	0	0	0	1	1
25 1 2004	0	0	0	0	0	0	0	0	2	2

GREY PLOVER *Pluvialis squatarola*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
5 10 2003	0	6	0	0	0	0	0	0	0	6
17 10 2003	0	3	0	0	0	0	0	0	0	3
10 11 2003	0	4	0	0	0	0	0	0	0	4
25 11 2003	1	8	0	0	1	0	0	0	0	10
12 12 2003	0	4	0	0	0	0	0	0	0	4
29 12 2003	1	8	0	0	0	0	0	0	0	9
13 1 2004	1	9	0	0	0	0	0	0	0	10
25 1 2004	4	11	0	0	0	0	0	0	0	15
6 2 2004	0	12	0	0	0	0	0	0	0	12
28 2 2004	2	2	0	0	0	0	0	0	0	4
8 3 2004	0	2	0	0	0	0	0	0	0	2

SANDERLING *Calidris alba*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
13 1 2004	3	0	0	0	0	0	0	0	0	3

SNIPE *Gallinago gallinago*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
3 9 2003	0	1	0	0	0	0	0	0	0	1
17 10 2003	0	1	0	0	0	0	0	0	0	1
10 11 2003	0	16	0	0	2	0	0	0	0	18
25 1 2004	0	11	0	0	0	0	0	0	2	13

BLACK-TAILED GODWIT *Limosa limosa*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
3 9 2003	0	0	2	0	0	0	0	0	0	2
15 9 2003	0	0	5	0	0	12	0	0	0	17
22 4 2004	0	0	0	0	2	0	8	0	0	10
6 5 2004	0	0	0	0	1	0	0	0	0	1

WHIMBREL *Numenius phaeopus*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	1	0	0	0	0	0	0	0	1
9 6 2004	0	1	0	0	0	0	0	0	0	1

GREENSHANK *Tringa nebularia*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
10 7 2003	0	0	0	0	1	0	0	1	0	2
23 7 2003	0	0	0	1	1	0	0	0	0	2
6 8 2003	0	0	0	2	5	1	0	0	0	8
19 8 2003	0	0	0	3	4	2	0	0	0	9
3 9 2003	0	1	0	2	5	2	0	1	0	11
15 9 2003	0	2	0	2	1	1	0	1	0	7
5 10 2003	0	1	0	0	1	0	0	0	0	2
17 10 2003	0	0	0	0	1	1	0	0	0	2
12 12 2003	0	1	0	0	0	0	0	0	0	1
22 4 2004	0	0	0	0	2	1	0	0	0	3

COMMON SANDPIPER *Actitis hypoleucos*

Date	Mo	In	Qu	Ta	Sl	Ha	Sn	Ma	Lo	Total
23 7 2003	0	0	1	0	0	0	0	0	0	1

2.5 The relationship between bird distribution and algal cover

GIS maps of algal patches on the Ythan estuary in the summers of 2002 and 2003 were prepared from aerial photographs, by staff in the partner organisations MLURI and SEPA. These maps were used in ArcView to calculate the percentage algal cover in each counting section of the estuary (Figure 1). For this purpose, only the inter-tidal areas, exposed at low tide, were used, since the percentage of total area which was inter-tidal varied considerably, from 58.1% to 92.5% (Appendix 2, Table 1).

The total algal cover was similar in the two years, at 13.3% of the inter-tidal area in 2002 and 14.8% in 2003 (Appendix 2, Table 1). The distribution of the algae was also similar between years, with the highest percentage cover on the Mouth, Inches, Sleek and Haddo sections. There were no detectable algal patches on the Snub, Machar or Logie sections in either year. Only the small Tarty section varied markedly between years, with 3.0% cover in 2002 and 26.1% in 2003.

Analysis of the relationship between the distribution of algae and that of birds was confined to common species, since less abundant ones provided too little data. Even within the common species, some were unsuitable because they were specialised feeders, confined to particular substrates. Eiders and Oystercatchers, for example, were restricted largely to mussel-beds. Analysis was carried out on Curlews and Redshanks in both years and on Dunlins in 2003, when they were sufficiently abundant.

The autumn and winter of each year was divided into three periods; September and October (when any influence of the previous summer's algal cover should be strongest); November to January, the mid-winter period; and March and April. For each period in each year, the median number of birds of each of the selected species in each counting section of the estuary was calculated and expressed as bird density, the number of birds per hectare of inter-tidal area (Appendix 2, Table 2).

Finally, the distribution of each of the selected species in September and October of each year was plotted, using ArcView, along with the algal mats present in the immediately preceding summer (Figures 3 to 7). There was no clear or consistent relationship between bird densities and algal cover, with the highest bird densities sometimes in sections with no algae (Figures 6 and 7) but sometimes in sections with many algal patches (Figures 3, 4 and 5). The lack of any relationship was confirmed by correlation analysis, which found no significant correlation between bird density per hectare and percentage algal cover for any of the species in any period in either year.

3. 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 2002/03 and 2003/04, 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, there was evidence of some increase in bird numbers between the two years. Species other than eiders had higher numbers in most months in 2003/04 than they had in 2002/03, although their monthly mean total over the whole autumn and winter was lower than in the previous year. There was no consistent change in the peak numbers of the individual wildfowl species, but most of the wintering species had increased winter median numbers. Both of the main breeding species, Eiders and Shelduck, however, showed

decreases in their peak counts. Evidence from the common wader species was ambiguous, with a rather puzzling difference between peak numbers (which tended to decrease between the two years) and winter median numbers (which tended to increase).

The lack of relationship between bird distribution and algal cover may have been related to the relatively low coverage of algae, at 13.3% in 2002 and 14.8% in 2003, compared to 31.4% in 2000 (Dunne 2003). Even the most densely covered sections were largely clear of algae, with only 10.6% – 26.1% coverage (Appendix 2, Table 1), leaving large areas of open mudflat (with at most a light covering of algae, not detectable on the aerial photographs). Such large clear areas may have been sufficient to allow the birds to distribute themselves independently of the algal cover. This, however, is unlikely to be the whole explanation, since Dunne (2003) also found no relationship in the data from 2000, when algal coverage was much higher. It is likely that, provided that no estuary sections are very heavily covered by algae, the birds' distribution is influenced largely by other factors, especially the density of their principal invertebrate prey species.

It would be desirable to show how the changes in bird numbers revealed by the survey were related to national trends. However, the best source of data, the Wetland Bird Survey (WeBS) counts, are published with a delay of at least two years, so it is not possible to make the comparison at present. The study will be published, incorporating a comparison with national population changes, and the role of the Ythan Project will be fully acknowledged.

The results of the study were presented in poster form at the Ythan Project conference and open day on 1-2 October 2004. The event showed how the study related to other features of the Ythan catchment.

4. REFERENCES

Dunne, B. 2003. The relationship between algal mats and wading bird populations on the Ythan estuary, North East Scotland. MSc thesis, Aberdeen University.

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Patterson, I.J. and Thorpe A.W. 2003. Waders and waterfowl on the Ythan estuary, 2002/2003. *Scottish Natural Heritage Archive Report No. 012.*

APPENDIX 1. SURVEY METHODS

1.1 Field survey

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 nine 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.

1.2 Data analysis

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.

APPENDIX 2. ALGAL COVER AND BIRD DENSITIES ON THE YTHAN ESTUARY

Table 1. The counting sections on the Ythan estuary, showing their total area (including the low-tide water channel), the area of inter-tidal shore and the percentage of the total which is inter-tidal. The total area covered by algal patches and the percentage cover of the inter-tidal area is shown for 2002 and 2003.

Section	Area (hectares)			Algae 2002		Algae 2003	
	Total	Shore	% Shore	Ha	%	Ha	%
Mouth	21.58	15.53	71.96	2.67	17.17	2.21	14.23
Inches	50.64	41.30	81.56	4.38	10.61	7.40	17.91
Quay	21.05	14.57	69.22	0.76	5.22	0.34	2.33
Tarty	7.80	7.04	90.26	0.21	2.96	1.84	26.14
Sleek	79.17	63.59	80.32	12.23	19.24	9.37	14.73
Haddo	36.94	34.15	92.45	5.88	17.22	7.86	23.00
Snub	14.60	11.53	78.97	0.00	0.00	0.00	0.00
Machar	9.11	5.63	61.80	0.00	0.00	0.00	0.00
Logie	5.21	3.03	58.16	0.00	0.00	0.00	0.00
Total	246.10	196.37	79.79	26.13	13.31	29.01	14.77

Table 2. The density (birds per hectare) of selected species in the inter-tidal areas of the different counting sections of the Ythan estuary in the autumn, mid-winter, late winter and over the whole autumn and winter period in 2002/03 and 2003/04.

Curlew 2002/03

Section	Sept – Oct	Nov – Jan	Feb – Mar	Sep - Mar
Mouth	0.35	0.64	0.13	0.34
Inches	2.43	1.56	1.63	1.61
Quay	1.92	0.72	0.58	0.86
Tarty	0.78	0.64	0.43	0.71
Sleek	1.47	1.01	0.67	1.09
Haddo	4.14	0.50	0.92	0.82
Snub	0.26	0.61	0.26	0.48
Machar	0.09	0.00	0.44	0.00
Logie	0.33	0.33	0.33	0.33

Redshank 2002/03

Section	Sept – Oct	Nov – Jan	Feb – Mar	Sep - Mar
Mouth	2.74	1.00	0.71	0.95
Inches	7.92	2.17	1.89	2.21
Quay	4.56	2.23	1.44	2.14
Tarty	11.65	3.98	5.82	6.25
Sleek	7.90	3.40	3.40	3.90
Haddo	5.43	5.84	5.43	5.52
Snub	6.24	3.56	9.24	4.77
Machar	0.18	0.62	0.27	0.36
Logie	0.50	0.00	0.17	0.17

Curlew 2003/04

Section	Sept – Oct	Nov – Jan	Feb – Mar	Sep - Mar
Mouth	0.26	0.52	0.32	0.32
Inches	3.32	1.99	2.03	2.45
Quay	1.65	0.89	0.55	0.89
Tarty	1.70	0.57	0.28	0.57
Sleek	0.93	1.24	5.46	0.97
Haddo	1.41	0.88	1.84	1.23
Snub	0.95	0.78	1.73	0.87
Machar	0.53	0.18	0.18	0.18
Logie	0.33	0.33	0.33	0.33

Dunlin 2003/04

Section	Sept – Oct	Nov – Jan	Feb – Mar	Sep - Mar
Mouth	0.06	0.00	0.00	0.00
Inches	0.68	3.75	0.00	0.68
Quay	0.00	3.57	0.00	0.69
Tarty	0.00	0.00	0.00	0.00
Sleek	0.41	0.00	0.61	0.05
Haddo	0.47	1.73	0.00	0.47
Snub	3.04	0.87	0.00	0.00
Machar	6.22	0.00	0.00	0.00
Logie	0.00	0.00	0.00	0.00

Redshank 2003/04

Section	Sept – Oct	Nov – Jan	Feb – Mar	Sep - Mar
Mouth	5.47	2.45	0.64	2.45
Inches	6.51	2.74	1.23	2.74
Quay	5.63	1.72	1.78	1.85
Tarty	6.39	7.95	4.26	6.53
Sleek	5.35	3.33	2.88	3.62
Haddo	8.08	4.92	3.84	4.95
Snub	9.28	8.50	6.33	7.46
Machar	10.30	1.24	0.36	1.24
Logie	1.65	0.66	0.66	0.66

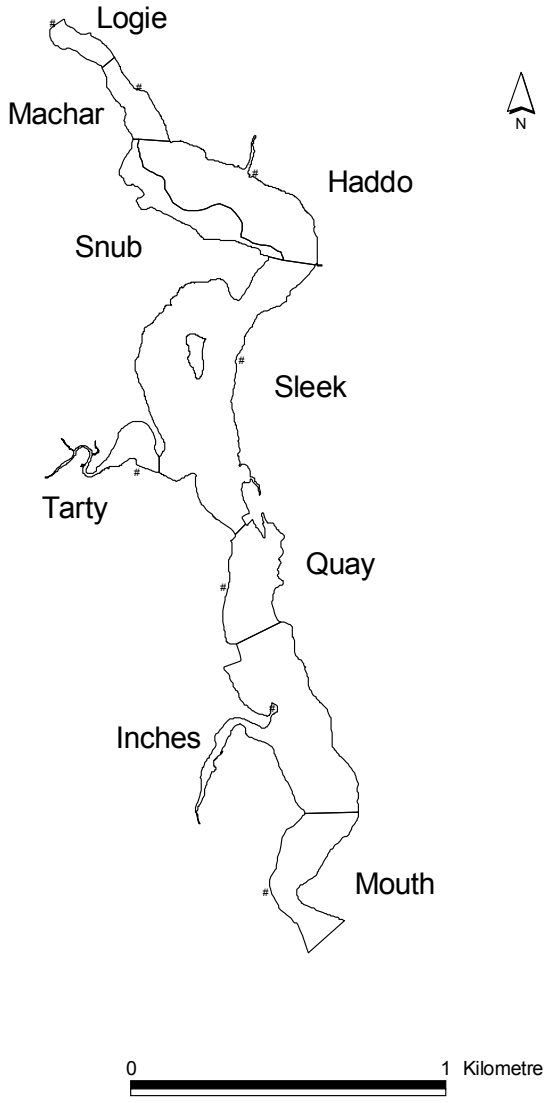

Figure 1. The Ythan estuary, showing the counting sections (named) and count points (spots). The division between the Snub and Haddo sections is the centre of the low-water channel.

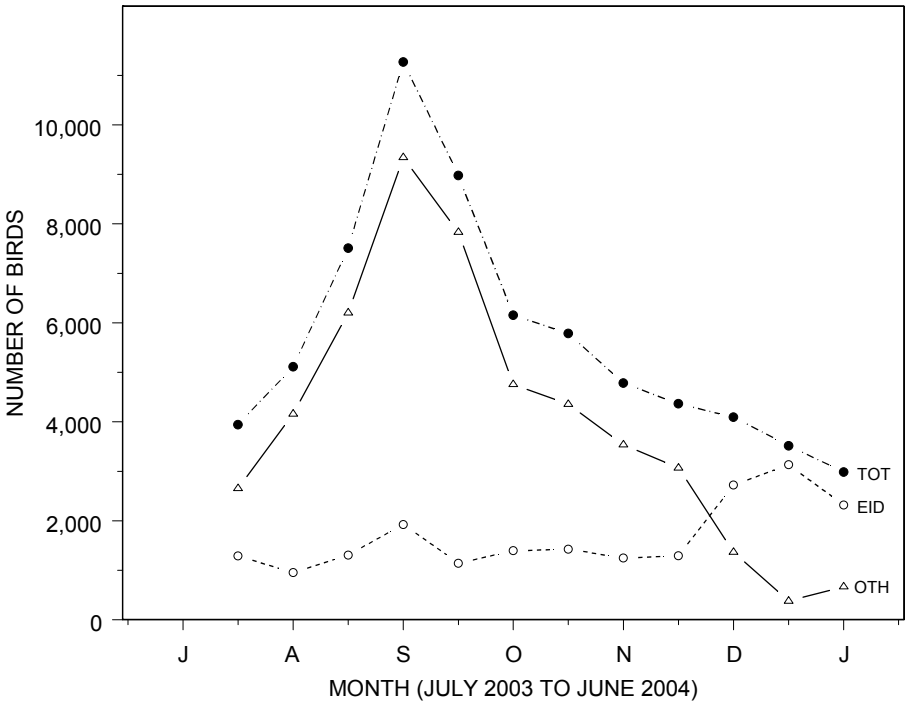

Figure 2. The mean number of Eiders (open circles), birds of other species (triangles) and the total of birds of all species (closed circles) on the Ythan estuary in 2003/04

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