

**BROADMEADOW RIVER ESTUARY
(SWORDS/MALAHIDE), CO. DUBLIN**

**WATERBIRDS IN JULY AND AUGUST 2008
(with additional counts from 2004-2008)**

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1 Introduction

Dr. Fintan Bracken, Senior Consultant, of P. H. McCarthy Consulting Engineers, contacted the writer of this report to discuss the possibility of carrying out late summer surveys and censuses of waterbirds at the Broadmeadow River Estuary (Swords/Malahide) to help inform an Appropriate Assessment of the impact of increasing the capacity of the Swords Wastewater Treatment Works. This followed an initial query from Suzanne Dempsey, Associate Director (Environment), of the same consultancy regarding a series of 54 waterbird censuses carried out by the author between 2004 and 2008, covering the upper part of the estuary. It was agreed that the author would provide the results of these censuses for the Appropriate Assessment, and also carry out high tide and low tide waterbird counts of the entire estuary in late summer – July and August 2008. The latter work was to follow the specification provided by Fintan Bracken on 22nd July. This report covers the results of the July and August censuses, while the earlier censuses of the upper estuary are contained in an appendix to the report.

2 Broadmeadow River Estuary Study Area

The Broadmeadow River Estuary (also known as Swords/Malahide Estuary) lies c.15 km NNE of the centre of Dublin City, with the towns of Swords and Malahide to the west and SE sides respectively. The estuary is roughly triangular in shape and is approximately 550 ha in extent. It is divided in two by the Dublin-Belfast railway line, which crosses the estuary on a viaduct. The lands to the north and south of the estuary (other than those occupied by Malahide town) are low-lying agricultural lands, while sand dunes form a wide spit on the seaward side. The inner part of the estuary is semi-lagoonal and shallow, with little tidal variation and somewhat reduced salinity, while the outer part is fully tidal and saline. Most of the outer estuary (>90%) dries out at low tide.

The Study Area comprises the entire estuary, from Lissenhall Bridge on the Broadmeadow River, to the narrow channel separating Malahide town and the extensive sand dune system which protects the outer estuary from the sea. For the purposes of this study, the estuary was divided into three sections (see **Figure 1**).

3 Conservation Status of Study Area

The entire Broadmeadow River Estuary between Swords and Malahide is designated as a Special Protection Area (SPA) under the European Union Directive on the conservation of wild birds (the Birds Directive). The reason for this designation is that the estuary is internationally important for Light-bellied Brent Geese and Black-tailed Godwits*, and nationally important for a further twelve species – including two which are listed in Annex I of the Birds Directive as species of conservation concern in the European Union.

These are Golden Plover and Bar-tailed Godwit. Two additional Annex I species, Little Egret and Ruff, occur regularly in small numbers (Anon. 2004; own data).

* *Scientific names of waterbirds mentioned in this report are given in Appendix III.*

The estuary is also designated as a Special Area of Conservation (SAC) under the European Union Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive).

The estuary is also included in the *List of Wetlands of International Importance* under the Ramsar Convention (Anon. 1971), primarily because it regularly supports Internationally Important numbers of Light-bellied Brent Geese in winter.

The estuary is a proposed Natural Heritage Area (pNHA) under national law – the Wildlife Amendment Act (2000).

It is also a statutory Nature Reserve (Wildlife Amendment Act (2000)).

4 Waterbird Survey/Census Methodology

Fintan Bracken, Senior Consultant of P. H. McCarthy Consulting Engineers, provided the following specification for the July/August 2008 survey of waterbirds in the Broadmeadow Estuary:-

Specification for a Summer Bird Survey of the Broadmeadow Estuary in relation to an Appropriate Assessment of the impact of increasing the capacity of the Swords Wastewater Treatment Works.

Summer bird survey of the Broadmeadow/Malahide Estuary

Complete waterbird surveys are required of the Broadmeadow/Malahide Estuary for the high and low cycles of spring tide in July and August 2008 (i.e. 2 counts per spring tide = 4 counts required in total).

All waterbirds should be counted on all parts of the estuary including:-

- A – Upper part of the estuary from Lissenhall Bridge to Prospect Point;
- B – Remainder of the inner estuary to the west of the viaduct;
- C – Malahide Estuary part of the estuary east of the viaduct to the east of Malahide town.

The waterbirds to be recorded are those defined by Wetlands International which in Ireland comprise of divers, grebes, cormorant, herons and egrets, swans, geese, ducks, rails, waders, gulls, terns and kingfisher.

Care should be taken to avoid double counting when moving between vantage points around the estuary.

A report of the results of these surveys will also be required.

On 20th July 2008 the author of this report carried out a reconnaissance of Sections A, B and C of the Study Area and also made a rapid census of the waterbirds present in these three Sections. The time of this reconnaissance was 09.55 to 11.05 hrs, when the tide was about one-third and rising. The results of this census are given below (Appendix I), but it should be noted that those from Section C (Malahide Estuary) are incomplete because the northern part of this Section at Corballis was not visited, but only viewed by telescope from afar (Malahide town).

The full censuses on 23rd July and 15th August 2008 were carried out over the high and low tides during the spring tide periods of the July and August full moons (18th July and 16th August).

During the reconnaissance visit on 20th July a series of suitable viewpoints was identified, as follows:-

Section A: north and south sides of the upper Broadmeadow Estuary, giving clear views of all waterbirds between Lissenhall Bridge and Prospect Point;

Section B: two small car parks along the public road on the south side of the estuary, covering all the estuary between Sections A and C (Prospect Point to railway viaduct);

Section C: one point at the seafront at Malahide town, giving clear views of Malahide Estuary from the viaduct bridge to the mouth of the estuary; and two points on the minor road at the north side of Malahide Estuary (Corballis), giving clear views of the northern part of Malahide Estuary.

The surveys/censuses were carried out in fair weather (*i.e.* with good light and visibility, and light/moderate winds) to aid detection and identification of all waterbirds present, even at long range. High quality optics (8x42 mm binoculars, 22-47x75 mm telescope) were used.

A car was used to move quickly between the viewpoints in order to minimise the time out of sight of the estuary and therefore reduce the possibility of double counting/omission of

bird flocks. All waterbirds were located by carefully scanning the Study Area Sections, identified, and counted carefully and accurately by binoculars and/or telescope.

High and low tides on 23rd July were at 15.45 hrs (3.7m) and 09.30 hrs respectively, while those on 15th August were at 11.44 hrs (3.6 m) and 17.45 hrs respectively.

5 Results of July/August 2008 Survey/Census

The results of the preliminary reconnaissance waterbird census on 20th July, the high and low tide counts on 23rd July, and the high and low tide counts on 15th August 2008 are presented at the end of this report as Appendix I. For each count the numbers of waterbirds recorded in each of the three sub-sections of the Study area are given, along with the total number of waterbirds in each section and for the complete count.

From Appendix I it can be seen that a total of 28 waterbird species was recorded in the July and August 2008 survey and census, and that overall numbers of waterbirds increased in August – probably as the autumn migration commenced.

It should be noted that the census of waterbirds on 20th July was incomplete as the northern part of Malahide Estuary (Section C) was not adequately covered. However, the data from Sections A and B on that date are considered to be complete.

6 Conservation Status of Waterbirds in Study Area

The majority of the 28 waterbird species recorded in the Broadmeadow River Estuary during the July/August surveys/censuses are of some conservation concern.

Four species – **Little Egret, Ruff, Bar-tailed Godwit** and **Sandwich Tern** – are included in **Annex I** of the EU Birds Directive, being species with an unfavourable conservation status within the European Union.

Five species – **Lapwing, Curlew, Redshank, Black-headed Gull, Herring Gull** – are included in the **Red List** of birds of conservation concern in Ireland (Lynas, *et al.* 2007), *i.e.* species of greatest conservation concern because of decreases of >50% in their breeding population over the last 25 years. However, it should be noted that none of these five species breeds in the Study Area, although their presence in July and August may indicate that many, if not all, were from the Irish breeding population rather than immigrants from elsewhere.

Sixteen other species – **Great Crested Grebe, Cormorant, Mute Swan, Shelduck, Wigeon, Coot, Oystercatcher, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Greenshank, Common Sandpiper, Common Gull, Lesser Black-backed Gull, Great**

Black-backed Gull, Sandwich Tern – are included in the **Amber List** of birds of conservation concern in Ireland, *i.e* species of medium conservation concern.

Only five of the 28 species recorded in July/August 2008 – **Grey Heron, Mallard, Moorhen, Turnstone and Little Gull** – are of no particular conservation concern in Ireland at present.

No species were recorded in Internationally or Nationally Important numbers (>1% of the flyway population or Irish population respectively) in the Study Area in July and August 2008. However, **Light-bellied Brent Goose** and **Black-tailed Godwit** occur in Internationally Important numbers in the winter months, and **Shelduck, Pintail, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Knot, Dunlin, Bar-tailed Godwit, Redshank** and **Greenshank** occur in Nationally Important numbers in winter (Crowe 2005).

7 Discussion

Wintering and migratory waterbirds have been censused in the Broadmeadow River Estuary at monthly intervals from September to March each winter since 1994/95 as a contribution to the Irish Wetland Bird Survey (I-WeBS) (Crowe 2005). Prior to the commencement of the I-WeBS project, similar waterbird counts were carried out in the winters of 1971/72 to 1974/75 (Hutchinson 1979) and 1984/85 to 1986/87 (Sheppard 1993). These series of winter counts established the great importance of the Broadmeadow River Estuary for a number of waterbird species. The estuary was found to be Internationally Important for Light-bellied Brent Geese and Black-tailed Godwits, and Nationally Important for Shelduck, Pintail, Goldeneye, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Knot, Dunlin, Bar-tailed Godwit, Redshank and Greenshank. These findings were the main reason for designating the estuary as a Special Protection Area under the European Union Birds Directive (Anon. 2004).

In spite of the great importance of the estuary for wintering and migratory waterbirds, very little information on the summering waterbirds has been gathered over the decades, and the July and August 2008 surveys and censuses of waterbirds in the Broadmeadow River Estuary appear to be the first comprehensive counts carried out in the entire estuary during the summer months. However, some waterbird count data from the summer months were collected by the author of this report between 2004 and 2008, but the counts were restricted to the upper estuary between Lissenhall Bridge and Prospect Point, an area which corresponds with Section A of the July/August 2008 study. No summer data were collected by the author in respect of Sections B and C of the present study. These 2004-2008 summer data are attached to this report as Appendix II, along with additional winter counts from that period. Most of the latter were submitted to the I-WeBS project and, where appropriate, were incorporated in the I-WeBS database.

In the inner estuary (Sections A and B) it is clear from the July/August 2008 waterbird count data that the relatively small area of Section A is far more important for numbers and diversity of waterbirds than the very extensive Section B. It is believed this is due to the diverse nature of the wetland habitats in Section A, including areas of saltmarsh, creeks and channels, shallow waters with a small tidal influence, exposed mudflats and the greater level of shelter than in Section B. Regular hand-feeding of Mute Swans by the public is at least partly responsible for the flock congregating in Section A. By contrast, Section B is deeper, very exposed and choppy/rough in windy conditions, has a narrow stony shore, and is subject to disturbance from sailing, sail-boarding and other water sports. The importance of Section A is borne out by the 2004-2008 summer counts (Appendix II), while casual observations and anecdotal information tend to confirm that Section B generally contains far fewer waterbirds and less species diversity.

The outer estuary, seaward of the railway viaduct (Section C) consists of extensive intertidal mudflats, deep water channels, saltmarsh, and two main high tide roosting areas – south side of Malahide Island/Malahide Point, and the isolated peninsula on the east side of the railway viaduct in the northern part of the estuary. At low tide, the waterbirds in Section C tend to spread out over the mudflats to feed, mainly on intertidal invertebrates. At high tide most of the waterbirds roost at the two sites mentioned above. Based on limited observations it seems that some of the waterbirds which feed in Section C (especially Redshanks and Dunlin, occasionally Bar-tailed Godwits and other waders) fly up the estuary to roost in Section A.

Again, based on limited observations, Section B appears to be the main area used in winter by Great Crested Grebes, Goldeneye and Red-breasted Mergansers.

The Light-bellied Brent Goose flock (up to 1,700 birds in recent winters – personal observations) which spends the winter in the area moves between the mudflats in Section C (where the birds feed on *Zostera* and green algae) and the saltmarshes in Section A. In recent winters the geese have taken to feeding on terrestrial grasses and winter cereals in agricultural fields adjacent to the estuary, and also on short grass swards in playing fields and parkland on the south side of the estuary.

8 Conclusions

The July and August 2008 censuses of waterbirds at the Broadmeadow River Estuary appear to be the only comprehensive counts carried out in the area during the summer months. They show that significant numbers of waterbirds, of a variety of species (28), occur in the estuary in late summer. The small area in the upper estuary (Section A) and the fully tidal outer estuary (Section C) are the most important parts in summer, while the middle part (Section B) contained rather few waterbirds and low diversity.

The July and August 2008 censuses are supplemented by a series of summer counts carried out between 2004 and 2008, but limited to Section A of the present study.

There is the possibility that the limited summer 2008 data are not fully representative of the normal, long-term pattern of distribution of waterbirds in the estuary in summer, and it may be advisable to carry out further surveys/censuses in summer 2009.

9 Acknowledgements

The author of this report wishes to thank Dr. Fintan Bracken (Senior Consultant of PH McCarthy Consulting Engineers) for helpful discussions regarding this project.

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APPENDICES

Appendix I - High and low tide counts of waterbirds in Broadmeadow River Estuary Study Area in July and August 2008

Date	20.7.08	Low tide, rising			23.7.08	Low tide			23.7.08	High tide	
Species	Sect. A	Sect. B	Sect. C*		Sect. A	Sect. B	Sect. C		Sect. A	Sect. B	Sect. C
Great Crested Grebe	0	0	0		0	1	0		0	2	0
Cormorant	3	7	38		0	9	37		1	2	39
Little Egret	1	1	4		0	0	9		1	0	7
Grey Heron	10	1	5		9	0	7		10	0	5
Mute Swan	92	2	0		109	0	0		106	1	0
Shelduck	2	0	0		4	0	5		2	0	5
Wigeon	0	0	9		0	0	0		0	0	0
Mallard	15	0	0		11	0	13		22	0	24
Moorhen	1	0	0		1	0	0		1	0	0
Coot	0	0	0		0	0	0		0	0	0
Oystercatcher	8	0	243		13	1	152		27	7	510
Lapwing	1	0	0		5	0	3		11	0	0
Dunlin	0	0	9		0	0	2		2	0	2
Ruff	1	0	0		0	0	0		1	0	0
Black-tailed Godwit	42	0	0		53	0	25		59	0	25
Bar-tailed Godwit	0	0	0		0	0	0		0	0	0
Curlew	0	0	1		0	0	66		0	0	201
Redshank	6	0	2		1	0	90		21	0	88
Greenshank	1	0	0		0	0	4		0	0	2
Common Sandpiper	1	0	1		3	0	0		2	0	0
Turnstone	0	0	1		0	0	0		0	0	0
Little Gull	0	0	0		0	0	0		1	0	0
Black-headed Gull	439	11	56		538	17	255		705	56	252
Common Gull	15	0	15		7	0	19		16	0	16
Lesser Black-backed Gull	1	0	2		3	0	1		3	0	0

Date	20.7.08	Low tide, rising			23.7.08	Low tide			23.7.08	High tide	
Species	Sect. A	Sect. B	Sect. C*		Sect. A	Sect. B	Sect. C		Sect. A	Sect. B	Sect. C
Herring Gull	5	7	100		10	3	67		12	25	15
Great Black-backed Gull	16	7	24		6	4	31		17	2	12
Sandwich Tern	0	1	130		1	0	57		0	0	120
Totals per Section	660	37	640		774	35	843		1020	95	1323
Grand total	1337				1652				2438		

* Count incomplete for Section C

Date	15.8.08	High tide			15.8.08	Low tide	
Species	Sect. A	Sect. B	Sect. C		Sect. A	Sect. B	Sect. C
Great Crested Grebe	0	1	0		0	0	0
Cormorant	0	16	33		0	2	0
Little Egret	2	2	24		1	0	9
Grey Heron	12	0	22		16	0	5
Mute Swan	93	17	0		99	11	0
Shelduck	0	0	8		0	0	8
Wigeon	0	0	2		0	0	2
Mallard	78	0	85		68	0	74
Moorhen	2	0	0		2	0	0
Coot	1	0	0		0	2	0
Oystercatcher	7	17	243		4	2	333
Lapwing	21	0	9		16	0	8
Dunlin	3	0	44		5	0	295
Ruff	2	0	0		4	0	0
Black-tailed Godwit	128	0	4		151	0	11

Date	15.8.08	High tide			15.8.08	Low tide	
Species	Sect. A	Sect. B	Sect. C		Sect. A	Sect. B	Sect. C
Bar-tailed Godwit	0	0	2		0	0	0
Curlew	0	0	149		0	0	68
Redshank	158	0	426		64	0	68
Greenshank	26	0	14		1	0	1
Common Sandpiper	0	0	0		0	0	0
Turnstone	0	0	1		0	0	4
Little Gull	0	0	0		0	0	0
Black-headed Gull	675	397	689		325	114	661
Common Gull	1	0	43		2	0	4
Lesser Black-backed Gull	6	0	0		28	0	0
Herring Gull	17	12	24		5	3	26
Great Black-backed Gull	2	5	6		3	1	5
Sandwich Tern	0	0	61		0	0	17
Totals per Section	1234	467	1889		794	135	1599
Grand total	3590				2528		

Appendix II - Waterbird Counts (54) in Section A of Study Area of Broadmeadow River Estuary (Lissenhall Bridge - Prospect Point), 2004-2008

Date	17.3.04	24.6.04	16.7.04	16.9.04	9.10.04	15.2.05		8.6.05	9.7.05	5.8.05	11.8.05
Species											
Great Crested Grebe	0	0	0	0	0	7	0	0	0	0	0
Little Grebe	0	0	0	0	0	8	0	0	0	0	0
Cormorant	1	0	5	0	1	0	0	1	4	5	3
Little Egret	0	0	0	0	0	0	1	0	0	0	0
Grey Heron	0	3	6	0	2	1	1	1	6	6	12
Mute Swan	37	34	31	41	49	43	40	53	64	76	83
Whooper Swan	2	0	0	0	0	0	0	0	0	0	0
White-fronted Goose	0	0	0	0	0	0	0	0	0	0	0
Brent Goose	330	0	0	0	0	0	0	0	0	0	0
Shelduck	2	22	2	0	0	1	7	6	8	20	4
Wigeon	0	0	0	0	0	0	0	0	0	0	0
Teal	33	0	0	0	15	31	4	0	0	0	0
Mallard	45	64	60	4	67	86	37	40	71	38	47
Shoveler	0	0	0	0	0	0	0	1	0	0	0
Pochard	0	0	0	0	0	0	0	0	0	0	0
Tufted Duck	0	0	0	0	0	0	0	0	0	0	0
Goldeneye	0	0	0	0	0	0	0	0	0	0	0
Red-breasted Merganser	0	0	0	0	0	0	0	0	0	0	0
Moorhen	1	0	0	0	1	2	0	0	1	1	0
Coot	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	0	16	0	8	8	0	0	6	26	25
Ringed Plover	0	0	0	0	0	8	0	0	0	0	0
Golden Plover	3150	0	0	0	1170	4150	0	0	0	0	0
Grey Plover	0	0	0	0	0	2	0	0	0	0	

[illegible]

Date	3.9.05	11.9.05	21.9.05	18.2.06	26.2.06	14.3.06	11.4.06	18.4.06	16.5.06	19.5.06	25.6.06
Species											
Little Grebe	0	0	0	5	1	0	0	0	0	0	0
Great Crested Grebe	0	0	0	5	0	4	8	7	10	0	0
Cormorant	4	6	4	1	0	0	3	2	1	3	1
Little Egret	0	1	0	0	1	1	2	2	0	0	0
Grey Heron	2	8	5	1	0	0	1	3	1	1	0
Mute Swan	62	60	58	48	58	43	46	61	77	66	84
Whooper Swan	0	0	0	0	0	0	0	0	0	0	0
Brent Goose	0	0	0	0	247	6	14	0	0	0	0
Shelduck	0	1	0	2	5	4	8	13	14	6	5
Wigeon	0	1	3	0	0	0	0	0	0	0	0
Teal	12	0	7	72	36	24	6	4	0	0	0
Mallard	72	76	59	29	45	18	23	9	24	13	48
Shoveler	0	0	1	0	0	0	0	0	0	0	0
Pochard	0	0	0	8	9	0	0	0	0	0	0
Tufted Duck	0	0	0	0	0	0	0	0	0	0	0
Goldeneye	0	0	0	9	0	2	0	0	0	0	0
Red-breasted Merganser	0	0	0	0	0	1	4	1	0	0	0
Moorhen	0	1	0	5	3	1	2	2	0	0	0
Coot	0	0	0	0	0	0	0	0	0	2	0
Oystercatcher	19	64	0	6	9	1	6	0	1	0	1
Ringed Plover	0	0	0	0	0	0	0	3	1	0	0
Golden Plover	0	1	0	190	650	485	65	0	0	0	0
Grey Plover	0	1	0	0	3	0	10	22	0	0	0
Lapwing	6	0	8	420	95	0	0	0	0	0	2
Knot	0	7	0	0	0	0	0	0	0	0	0
Dunlin	1	2	0	16	11	2	4	0	0	0	0

Date	3.9.05	11.9.05	21.9.05	18.2.06	26.2.06	14.3.06	11.4.06	18.4.06	16.5.06	19.5.06	25.6.06
Species											
Ruff	0	0	0	0	0	0	0	1	0	0	0
Snipe	0	1	0	0	0	0	0	0	0	0	0
Black-tailed Godwit	195	180	31	87	177	128	247	0	0	65	11
Bar-tailed Godwit	1	3	0	0	12	0	9	170	31	0	0
Curlew	1	2	0	0	1	0	2	0	0	0	0
Spotted Redshank	1	0	0	0	0	0	0	0	0	0	0
Redshank	116	194	3	39	136	115	191	0	0	2	1
Greenshank	28	20	1	1	7	2	3	10	0	0	0
Green Sandpiper	0	0	0	0	0	0	0	3	0	0	0
Common Sandpiper	0	0	0	0	0	0	0	1	0	0	0
Turnstone	0	0	0	0	2	0	5	0	0	0	0
Little Gull	0	0	0	0	0	0	0	0	0	0	0
Black-headed Gull	570	387	318	680	315	185	178	295	24	0	55
Common Gull	31	2	2	0	10	3	4	1	0	0	0
Lesser Black-backed Gull	6	1	0	0	1	0	3	10	10	5	8
Herring Gull	18	10	3	0	14	1	13	20	5	7	10
Great Black-backed Gull	37	3	0	0	1	4	11	7	13	21	11
Sandwich Tern	0	0	0	0	0	0	0	2	0	0	0
Common Tern	0	0	0	0	0	0	0	0	0	0	0
White-winged Black Tern	1	0	0	0	0	0	0	0	0	0	0
Kingfisher	0	0	0	0	0	0	0	1	0	0	0

Date	13.7.06	9.8.06	16.8.06	16.8.06	28.8.06	16.9.06	17.12.06	30.12.06	18.1.07	5.2.07	10.2.07
Species											
Little Grebe	0	0	0	0	0	5	4	5	3	0	2
Great Crested Grebe	0	0	0	0	0	11	2		32	3	6
Cormorant	2	5	5	0	2	1	0		0	0	0
Little Egret	0	0	0	0	1	1	1	1	0	0	0
Grey Heron	1	13	14	16	8	22	2	7	6	4	1
Mute Swan	83	87	61	91	83	57	57	72	71	75	74
Whooper Swan	0	0	0	0	0	0	0		0	0	0
Brent Goose	0	0	0	0	0	0	0	121	29	238	0
Shelduck	2	0	7	0	4	9	0		0	3	10
Wigeon	0	0	0	0	0	0	0	6	0	0	0
Teal	0	3	0	0	0	0	9	18	29	12	28
Mallard	41	42	12	104	38	21	64	58	51	31	66
Shoveler	0	0	0	0	0	0	0	0	0	0	0
Pochard	0	0	0	0	0	0	0	0	6	0	0
Tufted Duck	0	0	0	0	0	0	0	0	0	1	0
Goldeneye	0	0	0	0	0	0	36	0	17	42	91
Red-breasted Merganser	0	0	0	0	0	0	0	13	4	4	17
Moorhen	3	2	1	3	4	1	2	2	0	1	0
Coot	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	23	0	21	5	5	0	161	5	45	0
Ringed Plover	0	0	0	0	0	0	0	0	0	0	0
Golden Plover	0	0	0	0	0	0	6150	1050	7	655	6100
Grey Plover	0	0	0	0	0	0	2	0	0	0	2
Lapwing	17	1	0	1	5	0	245	385	705	575	1160
Knot	0	0	0	0	0	0	40	0	0	0	0
Dunlin	1	31	0	1	2	0	125	0	0	275	170
Ruff	0	0	0	0	0	2	0	0	0	0	0
Snipe	0	0	0	0	1	0	0	0	0	0	0

[illegible]

Date	13.7.06	9.8.06	16.8.06	16.8.06	28.8.06	16.9.06	17.12.06	30.12.06	18.1.07	5.2.07	10.2.07
Species											
Little Grebe	0	0	0	0	0	5	4	5	3	0	2
Great Crested Grebe	0	0	0	0	0	11	2		32	3	6
Cormorant	2	5	5	0	2	1	0		0	0	0
Little Egret	0	0	0	0	1	1	1	1	0	0	0
Grey Heron	1	13	14	16	8	22	2	7	6	4	1
Mute Swan	83	87	61	91	83	57	57	72	71	75	74
Whooper Swan	0	0	0	0	0	0	0		0	0	0
Brent Goose	0	0	0	0	0	0	0	121	29	238	0
Shelduck	2	0	7	0	4	9	0		0	3	10
Wigeon	0	0	0	0	0	0	0	6	0	0	0
Teal	0	3	0	0	0	0	9	18	29	12	28
Mallard	41	42	12	104	38	21	64	58	51	31	66
Shoveler	0	0	0	0	0	0	0	0	0	0	0
Pochard	0	0	0	0	0	0	0	0	6	0	0
Tufted Duck	0	0	0	0	0	0	0	0	0	1	0
Goldeneye	0	0	0	0	0	0	36	0	17	42	91
Red-breasted Merganser	0	0	0	0	0	0	0	13	4	4	17
Moorhen	3	2	1	3	4	1	2	2	0	1	0
Coot	0	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	23	0	21	5	5	0	161	5	45	0
Ringed Plover	0	0	0	0	0	0	0	0	0	0	0
Golden Plover	0	0	0	0	0	0	6150	1050	7	655	6100
Grey Plover	0	0	0	0	0	0	2	0	0	0	2
Lapwing	17	1	0	1	5	0	245	385	705	575	1160
Knot	0	0	0	0	0	0	40	0	0	0	0
Dunlin	1	31	0	1	2	0	125	0	0	275	170
Ruff	0	0	0	0	0	2	0	0	0	0	0
Snipe	0	0	0	0	1	0	0	0	0	0	0

[illegible]

Date	13.7.06	9.8.06	16.8.06	16.8.06	28.8.06	16.9.06	17.12.06	30.12.06	18.1.07	5.2.07
Species										
Little Grebe	0	0	0	0	0	5	4	5	3	0
Great Crested Grebe	0	0	0	0	0	11	2		32	3
Cormorant	2	5	5	0	2	1	0		0	0
Little Egret	0	0	0	0	1	1	1	1	0	0
Grey Heron	1	13	14	16	8	22	2	7	6	4
Mute Swan	83	87	61	91	83	57	57	72	71	75
Whooper Swan	0	0	0	0	0	0	0		0	0
Brent Goose	0	0	0	0	0	0	0	121	29	238
Shelduck	2	0	7	0	4	9	0		0	3
Wigeon	0	0	0	0	0	0	0	6	0	0
Teal	0	3	0	0	0	0	9	18	29	12
Mallard	41	42	12	104	38	21	64	58	51	31
Shoveler	0	0	0	0	0	0	0	0	0	0
Pochard	0	0	0	0	0	0	0	0	6	0
Tufted Duck	0	0	0	0	0	0	0	0	0	1
Goldeneye	0	0	0	0	0	0	36	0	17	42
Red-breasted Merganser	0	0	0	0	0	0	0	13	4	4
Moorhen	3	2	1	3	4	1	2	2	0	1
Coot	0	0	0	0	0	0	0	0	0	0
Oystercatcher	0	23	0	21	5	5	0	161	5	45
Ringed Plover	0	0	0	0	0	0	0	0	0	0
Golden Plover	0	0	0	0	0	0	6150	1050	7	655
Grey Plover	0	0	0	0	0	0	2	0	0	0
Lapwing	17	1	0	1	5	0	245	385	705	575
Knot	0	0	0	0	0	0	40	0	0	0
Dunlin	1	31	0	1	2	0	125	0	0	275
Ruff	0	0	0	0	0	2	0	0	0	0
Snipe	0	0	0	0	1	0	0	0	0	0

[illegible]

Appendix III – Scientific names of waterbirds recorded in the Broadmeadow River Estuary in July/August 2008 study and in waterbird counts carried out in 2004-2008.

Little Grebe	<i>Tachybaptus ruficollis</i>
Great Crested Grebe	<i>Podiceps cristatus</i>
Cormorant	<i>Phalacrocorax carbo</i>
Little Egret	<i>Egretta garzetta</i>
Grey Heron	<i>Ardea cinerea</i>
Mute Swan	<i>Cygnus olor</i>
Whooper Swan	<i>Cygnus cygnus</i>
Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>
Light-bellied Brent Goose	<i>Branta bernicla hrota</i>
Shelduck	<i>Tadorna tadorna</i>
Wigeon	<i>Anas penelope</i>
Teal	<i>Anas crecca</i>
Mallard	<i>Anas platyrhynchos</i>
Shoveler	<i>Anas clypeata</i>
Pochard	<i>Aythya ferina</i>
Tufted Duck	<i>Aythya fuligula</i>
Goldeneye	<i>Bucephala clangula</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Moorhen	<i>Gallinula chloropus</i>
Coot	<i>Fulica atra</i>
Oystercatcher	<i>Haematopus ostralegus</i>
Ringed Plover	<i>Charadrius hiaticula</i>
Golden Plover	<i>Pluvialis apricaria</i>
Grey Plover	<i>Pluvialis squatarola</i>
Lapwing	<i>Vanellus vanellus</i>
Knot	<i>Calidris canutus</i>
Dunlin	<i>Calidris alpina</i>
Ruff	<i>Philomachus pugnax</i>
Snipe	<i>Gallinago gallinago</i>
Black-tailed Godwit	<i>Limosa limosa</i>
Bar-tailed Godwit	<i>Limosa lapponica</i>
Curlew	<i>Numenius arquata</i>
Spotted Redshank	<i>Tringa erythropus</i>
Redshank	<i>Tringa totanus</i>
Greenshank	<i>Tringa nebularia</i>
Green Sandpiper	<i>Tringa ochropus</i>
Common Sandpiper	<i>Actitis hypoleucos</i>
Turnstone	<i>Arenaria interpres</i>
Little Gull	<i>Larus minutus</i>
Black-headed Gull	<i>Larus ridibundus</i>
Common Gull	<i>Larus canus</i>
Lesser Black-backed Gull	<i>Larus fuscus</i>

Herring Gull	<i>Larus argentatus</i>
Great Black-backed Gull	<i>Larus marinus</i>
Sandwich Tern	<i>Sterna sandvicensis</i>
Common Tern	<i>Sterna hirundo</i>
White-winged Black Tern	<i>Chlidonias leucopterus</i>
Kingfisher	<i>Alcedo atthis</i>