# KNEPP ESTATE REPEAT BOTANICAL SURVEY OF RIVER ADUR AND LANCING BROOK

## DOLPHIN ECOLOGICAL SURVEYS 2007

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#### INTRODUCTION

The original botanical survey of parts of the River Adur and Lancing Brook that run through the Knepp Estate in West Sussex was carried out on 17<sup>th</sup> August 2005 by Kate Ryland of Dolphin Ecological Surveys. An early season repeat of this survey was undertaken on 24<sup>th</sup> and 25<sup>th</sup> May 2007 using the same methodology, though more time was available for the field survey in 2007.

The survey covered aquatic plants found within the channel, marginal species and plants growing on the banks of the watercourses up to the change of slope at the top of the banks. Aquatic vegetation was sampled at regular intervals along the watercourses using a grapnel. A table of the results of the 2005 and 2007 surveys shows the vascular plant species observed in each distinct section of the watercourses with a measure of their abundance given on the DAFOR scale (D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, L = Locally).

#### RESULTS

Submerged aquatic vegetation was almost absent from the stretches of river surveyed in 2007, but this is not unexpected at the beginning of the field season since many aquatics do not become evident until later in the summer.

There was much less duckweed present in 2007 than was observed during the 2005 survey. A marked difference between 2005 and 2007 was the significant reduction in the amount fat duckweed in 2007, which may be a result of both seasonal factors and the much higher water levels in 2007 compared with the survey period in 2005. A greater volume of water in the channel (although much of the river was still very sluggish or static) combined with less extreme eutrophic conditions and cooler water temperatures than those in 2005 are likely to account for this observed difference.

As predicted in 2005, carrying out a survey earlier in the season has produced additional botanical records for all four stretches of watercourse. These additional records tend to consist of a small number of early flowering wetland species (such as cuckoo-flower and ragged robin), identifiable sedges (false fox-sedge, greater pond-sedge) grasses and common herbaceous plants from the riverbanks.

In summary the likely reasons for differences in the species lists for each section of the river between 2005 and 2007, especially the increased number of species recorded in 2007, are:

- Seasonal effects, including overall lower vegetation height on the riverbanks in spring allowing more ground level species to be seen.
- Recorder error/omissions from 2005.
- More time available for survey in 2007.
- Real differences caused by habitat change. This applies particularly to section 4 where poplar plantation has been felled so there is much more light reaching the watercourse.
- Higher water levels and lower water temperatures in 2007.
- Some slight natural changes in bankside and marginal communities over a two-year period.
- The DAFOR scale is subjective and not especially accurate, though sufficient for the purpose of giving a picture of riparian plant communities present. However, it does not allow direct, accurate comparison of species abundance over time.

#### Section 1 River Adur, Shipley Windmill to Capps Bridge (TQ144217 to TQ148217)

There was much less duckweed in this section in 2007 and the only other aquatic plant recorded was yellow water-lily.

The centre of the channel was clear of emergent vegetation for most of its length, in contrast to 2005. A continuous fringe of marginal plants was present, dominated by reed canary-grass, bulrush and branched bur-reed. It appears that some of the channel vegetation may have been mechanically cleared between 2005 and 2007.

The riverbanks are steep in this section and access to the water's edge is poor. The coarse vegetation on the banks is dominated by bramble and nettle.

#### Section 2 River Adur, Capps Bridge to A24 (TQ148217 to TQ164207)

There was more water in this section of the river in 2007 than in 2005, but nevertheless areas of low/no flow were present and the water was scummy in places between Tenchford and Pound Farm bridges and alga was locally frequent in the water upstream of the small weir and near the confluence with Lancing Brook.

Downstream of the main weir, near the A24, there was little water in the channel and emergent vegetation was dense, dominated by reed canary-grass, branched bur-reed and common club-rush.

Aquatic vegetation was very scarce, but some fragments of shining pondweed were retrieved and yellow water-lily was quite frequent. Fringed water-lily was observed in small quantities near the A24 in a similar location to 2005. Some common duckweed was present towards Capps Bridge but much less was observed in the downstream areas.

Great yellow-cress was recorded in the same area as in 2005 and also appears to have spread downstream since the first survey and was observed in small quantities as far downstream as the footpath bridge.

#### Section 3 Lancing Brook, Hammer Pond (TQ148208 to TQ144208)

Little change was observed in this section, though there are now some young black poplars planted in the wet grassland/fen area at the upstream extent of the section.

The additional species recorded in this section include some wetland plants, probably overlooked in 2005, such as yellow flag, water horsetail, common spike-rush and false fox-sedge.

### Section 4 Lancing Brook, Hammer Pond to Tenchford Bridge/Adur confluence (TQ148208 to TQ153210)

The main change in this section of Lancing Brook is the removal of the poplar plantation, which has allowed considerably more light to reach the channel. Additional species recorded include fools watercress, greater pond-sedge, gipsywort and fat duckweed (the only location where this latter species was recorded in 2007). Several grasses and herbaceous species were also added to the list for this section.

#### Table of Results Comparing 2005 and 2007 Surveys

2005   2007   2005   2005	SPECIES	Section 1		Section 2		Section 3		Section 4	
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Cornus sanguinea Dogwood       R       R       R       R       R         Corylus avellana Hazel       RLO R       R       R       R         Crataegus monogyna Hawthorn       R       R       R       R         Cruciata laevipes Crosswort       R       OLF R       O OLF O       O         Cynosurus cristatus Crested dogs-tail       O       O       OLF OLF O       O         Dactylis glomerata Cocks-foot       F       F       O       O OLF OLF O       O         Deschampsia cespitosa Tufted hair-grass       O       O       O       O       O         Dipsacus fullonum Teasel       OLF O       RLO O       O       O       R         Dryopteris filix-mas Male fern       R       R       R         Eleocharis palustris Common spike-rush       R       R       R		P			OLE	OLI	U		
Corylus avellana Hazel       RLO R       R         Crataegus monogyna Hawthorn       R R R R R R R R R R R R R R R R R R R			P						
Crataegus monogyna Hawthorn       R       R       R       O       OLF       O       O         Cruciata laevipes Crosswort       R       OLF       R       O       OLF       O       O         Cynosurus cristatus Crested dogs-tail       O       O       OLF       OLF       O       O         Dactylis glomerata Cocks-foot       F       F       O       O       OLF       OLF       O       O         Deschampsia cespitosa Tufted hair-grass       O       O       O       O       O       O       O       O       R         Dipsacus fullonum Teasel       OLF       O       RLO       O       O       O       R         Dryopteris filix-mas Male fern       R       R       R       R         Eleocharis palustris Common spike-rush       R       R       R		IX	K	RIO					
Cruciata laevipes Crosswort       R       OLF       R       O       OLF       O       O         Cynosurus cristatus Crested dogs-tail       O	•		P	KLO					
Cynosurus cristatus Crested dogs-tail       O       Secondary       O <t< td=""><td></td><td>R</td><td></td><td>R</td><td></td><td>OLE</td><td>0</td><td></td><td>0</td></t<>		R		R		OLE	0		0
Dactylis glomerata Cocks-footFFOOOLFOLFODeschampsia cespitosa Tufted hair-grassOOOODipsacus fullonum TeaselOLFORLOOORDryopteris filix-mas Male fernRRREleocharis palustris Common spike-rushRR	•	1	OLI			OLI			
Deschampsia cespitosa Tufted hair-grass       O       O       O       O       O         Dipsacus fullonum Teasel       OLF       O       RLO       O       O       R         Dryopteris filix-mas Male fern       R       R       R         Eleocharis palustris Common spike-rush       R       R       R	·	F	F		0	OLE	OLE	0	0
Dipsacus fullonum Teasel     OLF     O     RLO     O     O     R       Dryopteris filix-mas Male fern     R     R       Eleocharis palustris Common spike-rush     R     R	• •					OLI	OLI		
Dryopteris filix-mas Male fern R Eleocharis palustris Common spike-rush R						0	0		R
Eleocharis palustris Common spike-rush R	1 0	JLI'		ILLO				R	11
	V 1 V						R	1	
	Elytrigia repens Common couch	1	LF	OLF	OLF	LA	LA	<del> </del>	

SPECIES	Section 1		Section 2		Section 3		Section 4	
	2005	2007	2005	2007	2005	2007	2005	2007
Epilobium hirsutum Great willowherb	F	F	О	R			R	О
Epilobium sp. Willowherb sp.						О		
Equisetum arvense Field horsetail			О	R			R	О
Equisetum fluviatile Water horsetail						OLF	LF	OLF
Equisetum sp. Horsetail sp.				LO		О		
Festuca rubra Red fescue		R						
Filipendula ulmaria Meadowsweet	F	F	О	О			О	О
Fraxinus excelsior Ash	О	О	О	О			R	
Galium aparine Common cleavers		OLF			OLF	F	F	F
Galium palustre Common marsh-					OLF	OLF		
bedstraw								
Geranium dissectum Cut-leaved		R	R	R				О
cranesbill								
Geum urbanum Wood avens		R						
Glechoma hederacea Ground-ivy	О	О		R		R	LF	О
Glyceria fluitans Floating sweet-grass					LA	LA		
Glyceria maxima Reed sweet-grass			LF	RLO				
Hedera helix Ivy		О					LA	О
Heracleum sphondylium Hogweed	О	O	RLO	R	О	R		0
Hieracium agg. Hawkweed				R				
Holcus lanatus Yorkshire fog	F	F	О	OLF	F	F		OLF
Hordeum secalinum Meadow barley		O	FLA	F	O	0		
Humulus lupulus Hop		R	OLF	0	0	Ü		
Hypochaeris radicata Common cats-ear			R	Ü				
Iris pseudacorus Yellow flag		0	R	О		О	R	О
Juncus effusus Soft rush	О	O	0	OLF	OLF	OLF	0	O
Juncus inflexus Hard rush		R	Ō	0	021	R		
Lathyrus nissolia Grass vetchling		R		Ŭ				
Lathyrus pratensis Meadow vetchling	O	0	0					
Lemna gibba Fat duckweed	ALD	Ü	ALD					LF
Lemna minor Common duckweed	LA	OLA	0	О		R	LA	LF
Leontodon autumnalis Autumnal hawkbit	27.1	OLIT	0	R		10	127.1	121
Linaria vulgaris Common toadflax			Ü	R				
Lolium perenne Perennial rye-grass			F	F		OLF		0
Lychnis flos-cuculi Ragged robin			1	R		OLI		
Lycopus europaeus Gipsywort	F		0	OLF	F	F		R
Lysimachia vulgaris Yellow loosestrife	O	О		OLI	F	FLA	0	OLF
Lythrum salicaria Purple loosestrife	F	F	OLF	OLF	0	0	0	R
Malva sylvestris Common mallow	1	1	R	R				IX.
Mentha aquatica Water mint	F	OLF	OLF	F	F	F	OLF	OLF
Myosotis scorpioides Water forget-me-	1	OLI	OLF	OLF	OLF	F	OLF	R
not			OLI	OLI	OLI	1.	OLI	K
Myosoton aquaticum Water chickweed	1		R	R		<b> </b>	OLF	
Nuphar lutea Yellow water-lily	OLF	F	F	F		<b> </b>	OLI	R
Nymphoides peltata Fringed water-lily	OLI.	1.	О	R				1
Oenanthe crocata Hemlock water-	F	FLA	OLF	OLF	F	FLA	OLF	FLA
dropwort	1.	LLA	OLF	OLF	¹.	LLA	OLF	LLA
Persicaria amphibia Amphibious bistort	1		OLF	0	FLA	FLA	<del>                                     </del>	
• •	1		F	FLA	OLF	OLF		
Persicaria hydropiper Water-pepper	1		OLF	O			0	0
Persicaria maculosa Redshank			ULF	U	OLF	OLF	U	U

Phalaris arundinacea Reed canary-grass       ALD       ALD<	LA
Phalaris arundinacea Reed canary-grass	
Phleum pratense Timothy       OLF       OLF         Phragmites australis Common reed       OLA OLA OLA OLA OLA Picris echioides Bristly ox-tongue       R         Pimpinella saxifraga Burnet saxifrage       R       R         Plantago lanceolata Ribwort plantain       R       R         Poa trivialis Rough meadow-grass       F O F       F A         Populus x Poplar hybrid       O F       F A         Potamogeton lucens Shining pondweed       FLA RLO       O         Potentilla anserina Silverweed       ALD FLA       O         Potentilla reptans Creeping cinquefoil       O R       O         Prunus spinosa Blackthorn       OLF OLF OLF OLF OLF OLF F       O         Prunus spinosa Blackthorn       OLF OLF OLF OLF OLF OLF F       O         Pulicaria dysenterica Fleabane       O R       O         Quercus robur Pedunculate oak       R R       R       R         Ranunculus acris Meadow buttercup       O O       R         Ranunculus ficaria Lesser celandine       O O       R         Ranunculus repens Creeping buttercup       O OLF OLF F       F F OLF O         Ranunculus sceleratus Celery-leaved       R       R       R         buttercup       R       R       R       R       R	LA
Phragmites australis Common reed       OLA OLA OLA OLA Picris echioides Bristly ox-tongue       R         Pimpinella saxifraga Burnet saxifrage       R         Plantago lanceolata Ribwort plantain       R         Poa trivialis Rough meadow-grass       F O F         Populus x Poplar hybrid       FLA RLO         Potamogeton lucens Shining pondweed       FLA RLO         Potentilla anserina Silverweed       ALD FLA         Potentilla reptans Creeping cinquefoil       O R         Prunus spinosa Blackthorn       OLF OLF OLF OLF OLF OLF F O         Pteridium aquilinum Bracken       O R         Pulicaria dysenterica Fleabane       O R         Quercus robur Pedunculate oak       R R R         Ranunculus acris Meadow buttercup       O O         Ranunculus ficaria Lesser celandine       O O         Ranunculus repens Creeping buttercup       R R         Ranunculus sceleratus Celery-leaved       R R         buttercup       R         Rosa canina Dog rose       O R         Rubus fruticosus Bramble       A A O O O         Rumex acetosa Common sorrel       R	LA
Picris echioides Bristly ox-tongue       R         Pimpinella saxifraga Burnet saxifrage       R         Plantago lanceolata Ribwort plantain       R         Poa trivialis Rough meadow-grass       F       O         Populus x Poplar hybrid       D       F         Potamogeton lucens Shining pondweed       FLA       RLO         Potentilla anserina Silverweed       ALD       FLA         Potentilla reptans Creeping cinquefoil       O       R         Prunus spinosa Blackthorn       OLF       OLF       OLF       OLF       OLF       F       O         Pulicaria dysenterica Fleabane       O       R       O       R       R       R       R       R         Quercus robur Pedunculate oak       R       R       R       R       R       R         Ranunculus acris Meadow buttercup       O       O       R       R       R         Ranunculus repens Creeping buttercup       O       O       R <td></td>	
Pimpinella saxifraga       R       R         Plantago lanceolata Ribwort plantain       R       R         Poa trivialis Rough meadow-grass       F       O       F       F       A         Populus x Poplar hybrid       Do F       F       A       A       ALD       FLA       RLO       D         Potamogeton lucens Shining pondweed       FLA       RLO       ALD       FLA       RLO       D       D       D       ALD       FLA       PLA       D <td></td>	
Plantago lanceolata Ribwort plantainRRRPoa trivialis Rough meadow-grassFOFFAPopulus x Poplar hybridSilverwedFLA RLOSilverwedDPotentilla anserina SilverweedFLA RLOSilverweedDALD FLAPotentilla reptans Creeping cinquefoilOROOPrunus spinosa BlackthornOLF OLF OLF OLF OLF OLF OLF OLF FOOPPresidium aquilinum BrackenOROPPulicaria dysenterica FleabaneORORQuercus robur Pedunculate oakRRRRRRanunculus acris Meadow buttercupOORRRanunculus ficaria Lesser celandineOORRRanunculus repens Creeping buttercupOOLF OLF FFOLF OLF ORanunculus sceleratus Celery-leaved buttercupRRRRRRosa canina Dog roseORRROORubus fruticosus BrambleAAOOOLF OLF OOLF OLF ORumex acetosa Common sorrelRRRROOLF OLF O	
Poa trivialis Rough meadow-grassFOFFAPopulus x Poplar hybrid	
Populus x Poplar hybridBelance of the composition of the composi	
Potamogeton lucens Shining pondweed   Potentilla anserina Silverweed   ALD FLA	
Potentilla anserina SilverweedALDFLAPotentilla reptans Creeping cinquefoilOROPrunus spinosa BlackthornOLFOLFOLFOLFOLFFOPteridium aquilinum BrackenORORPulicaria dysenterica FleabaneORORQuercus robur Pedunculate oakRRRRRRanunculus acris Meadow buttercupOOORRanunculus ficaria Lesser celandineOOLFOLFFFOLFORanunculus repens Creeping buttercupOOLFOLFFFOLFORanunculus sceleratus Celery-leaved buttercupRRRRRRorippa amphibia Great yellow-cressLOORRROORubus fruticosus BrambleAAOOOLFOLFORumex acetosa Common sorrelRRRRR	
Potentilla reptans Creeping cinquefoilOROOPrunus spinosa BlackthornOLFOLFOLFOLFOLFFOPteridium aquilinum BrackenOROROPulicaria dysenterica FleabaneOROOOQuercus robur Pedunculate oakRRRRRRanunculus acris Meadow buttercupOOORRanunculus ficaria Lesser celandineOOLFOLFFFOLFORanunculus repens Creeping buttercupOOLFOLFFFOLFORanunculus sceleratus Celery-leaved buttercupRRRRRRRorippa amphibia Great yellow-cressLOORRROORubus fruticosus BrambleAAOOOLFOLFORumex acetosa Common sorrelRRRRR	
Prunus spinosa BlackthornOLFOLFOLFOLFOLFOLFFOPteridium aquilinum BrackenORORORORORPulicaria dysenterica FleabaneORORORORQuercus robur Pedunculate oakRRRRRRRRRanunculus acris Meadow buttercupORORRRRanunculus ficaria Lesser celandineORORORORRanunculus repens Creeping buttercupORORORORRanunculus sceleratus Celery-leaved buttercupRRRRRRRRRorippa amphibia Great yellow-cressLORORRRRRORRubus fruticosus BrambleARARORORORORORRumex acetosa Common sorrelRRRRRROR <td></td>	
Pteridium aquilinum BrackenORPulicaria dysenterica FleabaneORQuercus robur Pedunculate oakRRRRanunculus acris Meadow buttercupOORRanunculus ficaria Lesser celandineOORRanunculus repens Creeping buttercupOOLFFFOLFORanunculus sceleratus Celery-leaved buttercupRRRRRorippa amphibia Great yellow-cressLOOCCRosa canina Dog roseORRROORubus fruticosus Bramble Rumex acetosa Common sorrelRRRRCO	
Pulicaria dysenterica FleabaneOROQuercus robur Pedunculate oakRRRRRanunculus acris Meadow buttercupOORRanunculus ficaria Lesser celandineOORRanunculus repens Creeping buttercupOOLFOLFFFOLFORanunculus sceleratus Celery-leaved buttercupRRRRRorippa amphibia Great yellow-cressLOOCCCRosa canina Dog roseORRROOOCCRubus fruticosus BrambleAAOOOOLFOORumex acetosa Common sorrelRRRRCOOOO	
Quercus robur Pedunculate oakRRRRanunculus acris Meadow buttercupOORRanunculus ficaria Lesser celandineOORRanunculus repens Creeping buttercupOOLFOLFFFOLFORanunculus sceleratus Celery-leaved buttercupRRRIRorippa amphibia Great yellow-cressLOOIORosa canina Dog roseORRROORubus fruticosus Bramble Rumex acetosa Common sorrelAAOOOOLFOI	
Ranunculus acris Meadow buttercup       O       O       R         Ranunculus ficaria Lesser celandine       O       O       Image: Comparison of the comp	
Ranunculus ficaria Lesser celandine       O       O         Ranunculus repens Creeping buttercup       O       OLF       OLF       F       F       OLF       O         Ranunculus sceleratus Celery-leaved buttercup       R       R       R       R       R         Rorippa amphibia Great yellow-cress       LO       O       R       R       R       O       O         Rosa canina Dog rose       O       R       R       R       O       O       OLF       OI         Rubus fruticosus Bramble       A       A       O       O       OLF       OI         Rumex acetosa Common sorrel       R       R       R       R       R	
Ranunculus repens Creeping buttercup       O       OLF       OLF       F       F       OLF       O         Ranunculus sceleratus Celery-leaved buttercup       R       R       R       R       R       R       R       R       R       R       R       R       R       R       R       R       R       R       O       O       R       R       R       O       O       O       O       D	
Ranunculus sceleratus Celery-leaved buttercup       R       R         Rorippa amphibia Great yellow-cress       LO       O         Rosa canina Dog rose       O       R       R       O         Rubus fruticosus Bramble       A       A       O       O       OLF       OI         Rumex acetosa Common sorrel       R       R       R       R       R       R	
buttercup         LO         O           Rorippa amphibia Great yellow-cress         LO         O           Rosa canina Dog rose         O         R         R         R         O         O           Rubus fruticosus Bramble         A         A         O         O         OLF         OI           Rumex acetosa Common sorrel         R         R         R         R	
Rorippa amphibia Great yellow-cressLOORosa canina Dog roseORRORubus fruticosus BrambleAAOOOLFOLFRumex acetosa Common sorrelRRR	
Rosa canina Dog rose         O         R         R         O         O           Rubus fruticosus Bramble         A         A         O         O         OLF         OI           Rumex acetosa Common sorrel         R         R         R         R	
Rubus fruticosus Bramble     A     A     O     O     OLF     OI       Rumex acetosa Common sorrel     R     R     R	
Rumex acetosa Common sorrel R R	LF
Rumex conglomeratus Clustered dock R O R	
Rumex crispus Curled dock O O O OLF	
Rumex obtusifolius Broad-leaved dock O O O O O O O O	
Sagittaria sagittifolia Arrowhead O OLF	
Salix alba White willow	
Salix babylonica Weeping willow R R	
Salix caprea Goat willow R R R	
Salix cinerea Grey willow R OLA OLA F F O	
Salix viminalis Osier O O	
Sambucus nigra Elder O O R R R	
Schoenoplectus lacustris Common club-  OLF OLF FLA OLF	
rush	
Scirpus sylvaticus Wood club-rush OLF OLF	
Scrophularia auriculata Water figwort F F O O O O	
Scutellaria galericulata Common R	
skullcap	
Senecio aquaticus Marsh ragwort O R R	
Senecio erucifolius Hoary ragwort R O O R	
Senecio jacobaea Common ragwort O O O	
Silaum silaus Pepper-saxifrage R	
	LF
Solanum dulcamara Bittersweet O O O O R R	
Sonchus arvensis Perennial sow-thistle R RLO R	
Sonchus asper Prickly sow-thistle R R	
Sparganium emersum Unbranched bur- R O O	
reed	

SPECIES	Section 1		Section 2		Section 3		Section 4	
	2005	2007	2005	2007	2005	2007	2005	2007
Sparganium erectum Branched bur-reed	ALD	FLA	FLA	FLA	OLF	OLF	OLF	OLF
Stachys palustris Marsh woundwort	О		F	OLF	FLA	OLF	OLF	О
Stachys sylvatica Hedge woundwort						R		
Stellaria graminea Lesser stitchwort		О		R		О		
Taraxacum agg. Dandelion		R	О	О				R
Tragopogon pratensis Goat's-beard				R				
Trifolium campestre Hop trefoil				R				
Trifolium pratense Red clover		R	R	R	OLF			
Trifolium repens White clover			LF	LF				
Typha latifolia Bulrush	OLF	О	OLF	R	FLA	FLA		
Urtica dioica Nettle	Α	A	FLA	FLA	FLA	FLA	ALD	ALD
Veronica beccabunga Brooklime				R				
Veronica chamaedrys Germander		R		R				
speedwell								
Veronica hederifolia Ivy-leaved		R						
speedwell								
Vicia cracca Tufted vetch	O	R	O	R		R	R	

#### Fauna observed along the river and stream during the 2007 survey

Beautiful demoiselle *Calopteryx virgo*Banded demoiselle *Calopteryx splendens*Large red damselfly *Pyrrhosoma nymphula*Azure damselfly *Coenagrion puella*Blue-tailed damselfly *Ischnura elegans*Hairy dragonfly *Brachytron pratense*Black tailed skimmer *Orthetrum cancellatum* 

Dingy skipper *Erynnis tages* Small white *Pieris rapae* 

Marsh frog *Rana ridibunda* Grass snake *Natrix natrix* 

Grey heron Ardea cinerea
Mute swan Cygnus olor
Moorhen Gallinula chloropus
Coot Flica atra
Grey wagtail Motacilla cinerea
Reed bunting Emberiza schoeniclus