

**KNEPP ESTATE
BOTANICAL SURVEY
OF RIVER ADUR AND LANCING BROOK**

***DOLPHIN ECOLOGICAL SURVEYS
2005***

**Dolphin Ecological Surveys
6a Northfield Cottages
Isfield
Uckfield
East Sussex
TN22 5XN**

**01825 750645
eco.dolphin@virgin.net**

INTRODUCTION

A botanical survey of parts of the River Adur and Lancing Brook that run through the Knepp Estate in West Sussex was carried out on 17th August 2005 by Kate Ryland of Dolphin Ecological Surveys in hot, dry weather conditions.

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. A list of the vascular plant species observed in these zones was prepared for each distinct section of the watercourses and a measure of their abundance given on the DAFOR scale (D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare, L = Locally). The different sections of the watercourses for which species lists were prepared are shown on site maps.

Aquatic vegetation was sampled at regular intervals along the watercourses using a grapnel, however, submerged vegetation was found to be very patchy in distribution along both the river and the Lancing Brook and had very low species diversity. Whilst this may be a reflection of the usual aquatic plant communities within these stretches of river and stream, it should be noted that 2005 has been a year of very low rainfall consequently very low water levels across many catchments, including the Adur. This was well illustrated by the extraordinarily low water levels at the confluence of the River Adur and the Lancing Brook near Tenchford Bridge, where almost the whole of the riverbed was exposed. There have also been periods of high temperature during the year. In other sites across Sussex 2005 appears to have been a poor year for aquatic plants, especially the fine-leaved pondweeds *Potamogeton* spp. (Alan Knapp, BSBI county recorder for West Sussex pers.comm.).

The surfaces of both the river and Lancing Brook supported dense rafts of duckweed in many of the sections that were not shaded by trees and shrubs. Common duckweed *Lemna minor* is present in places, but much more commonly fat duckweed *Lemna gibba* was the dominant floating aquatic. Low flow rates in the watercourses will have promoted the development of dense stands of duckweeds and both these species are characteristic of eutrophic waters though *Lemna gibba* has a higher phosphorous requirement than *Lemna minor* and may be more associated with greater levels of eutrophication. *Lemna gibba* is also thought to be associated with warmer conditions than *Lemna minor* so its abundance in 2005 may be linked with the warm weather conditions in combination with the low water levels.

Since the botanical survey was carried out on only one day in late summer the results are subject to seasonal bias. The most likely omissions from the species lists will include the early flowering wetland species, such as cuckoo-flower *Cardamine pratensis*, that may occur on the river and stream margins and in the fen around the Hammer Pond. Early flowering grasses and herbaceous plants from the river banks are also likely to be under-recorded.

RESULTS

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

The river from Shipley Windmill to Capps Bridge varies in width from an average of 3-4m to wider sections of up to 8m in places. The banks are generally steep and are eroded and cracked in many places.

Trees and shrubs occur on the banks near South Barn Farm and the channel is most densely wooded near the windmill. The banks tend to support a rather coarse flora with abundant nettle, bramble, dock and creeping thistle, though there are more grassy stretches with common herbs such as common knapweed, yarrow and meadow vetchling, especially towards Capps Bridge.

The river has an almost continuous strip of marginal vegetation that extends across the channel in places, especially downstream towards Capps Bridge. Reed canary-grass, branched bur-reed and bulrush are the most prominent species.

The aquatic vegetation includes extensive stands of fat duckweed with some patches of common duckweed. Yellow water-lily and arrowhead also occur throughout much of this section and a small amount of unbranched bur-reed was observed.

<i>Acer campestre</i>	Field maple	O
<i>Achillea millefolium</i>	Yarrow	O
<i>Agrostis stolonifera</i>	Creeping bent	A
<i>Alnus glutinosa</i>	Alder	OLF
<i>Angelica sylvestris</i>	Wild angelica	O
<i>Anisantha sterilis</i>	Barren brome	O
<i>Apium nodiflorum</i>	Fools water-cress	R
<i>Arctium minus</i>	Lesser burdock	O
<i>Arrhenatherum elatius</i>	False oat-grass	F
<i>Calystegia sepium</i>	Hedge bindweed	A
<i>Centaurea nigra</i>	Common knapweed	O
<i>Cirsium arvense</i>	Creeping thistle	FLA
<i>Conium maculatum</i>	Hemlock	R
<i>Cornus sanguinea</i>	Dogwood	R
<i>Cruciata laevipes</i>	Crosswort	R
<i>Dactylis glomerata</i>	Cocks-foot	F
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Dipsacus fullonum</i>	Teasel	OLF
<i>Epilobium hirsutum</i>	Great willowherb	F
<i>Filipendula ulmaria</i>	Meadowsweet	F
<i>Fraxinus excelsior</i>	Ash	O
<i>Glechoma hederacea</i>	Ground-ivy	O
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Juncus effusus</i>	Soft rush	O
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Lemna gibba</i>	Fat duckweed	ALD
<i>Lemna minor</i>	Common duckweed	LA
<i>Lycopus europaeus</i>	Gipsywort	F
<i>Lysimachia vulgaris</i>	Yellow loosestrife	O
<i>Lythrum salicaria</i>	Purple loosestrife	F
<i>Mentha aquatica</i>	Water mint	F
<i>Nupha lutea</i>	Yellow water-lily	OLF
<i>Oenanthe crocata</i>	Hemlock water-dropwort	F
<i>Phalaris arundinacea</i>	Reed canary-grass	ALD

<i>Plantago lanceolata</i>	Ribwort plantain	R
<i>Potentilla reptans</i>	Creeping cinquefoil	O
<i>Prunus spinosa</i>	Blackthorn	OLF
<i>Rubus fruticosus</i>	Bramble	A
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Sagittaria sagittifolia</i>	Arrowhead	O
<i>Salix babylonica</i>	Weeping willow	R
<i>Sambucus nigra</i>	Elder	O
<i>Scrophularia auriculata</i>	Water figwort	F
<i>Scutellaria galericulata</i>	Common skullcap	R
<i>Senecio aquaticus</i>	Marsh ragwort	O
<i>Senecio erucifolius</i>	Hoary ragwort	R
<i>Senecio jacobaea</i>	Common ragwort	O
<i>Sison amomum</i>	Stone parsley	F
<i>Sparganium emersum</i>	Unbranched bur-reed	R
<i>Sparganium erectum</i>	Branched bur-reed	ALD
<i>Stachys palustris</i>	Marsh woundwort	O
<i>Typha latifolia</i>	Bulrush	OLF
<i>Urtica dioica</i>	Nettle	A
<i>Vicia cracca</i>	Tufted vetch	O

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

The river varies in width along this section but is on average about 4-5m wide with a significantly narrower stretch upstream of Tenchford Bridge.

From Capps Bridge to the confluence of the River Adur and Lancing Brook at Tenchford Bridge the main river has a more or less continuous band of trees and shrubs on its western bank casting shade onto parts of the channel. The bankside flora is for the most part quite coarse with abundant creeping thistle and nettle.

Downstream of the confluence the banks are generally more open, though there are still occasional grey willows and patches of scrub, especially where a footpath crosses the river. The banks from the confluence to the A24 tend to have a rather grassy flora with a range of common herbaceous species. Stone parsley is quite prominent in a band along the top of the bank and the less common pepper-saxifrage is present in small quantities. In many places the banks are very steep and there are frequent signs of slip causing areas of bare soil and deep fissures.

There is an abundance of marginal, emergent vegetation throughout this section of the river comprising predominantly reed canary-grass and branched bur-reed with common club-rush especially in the eastern section, a stand of reed sweet-grass in the west and associated species including hemlock water-dropwort, purple loosestrife and marsh woundwort. The presence of flowering rush in several places along the margins in this section of the river is notable and the Sussex Scarce species great yellow-cress occurs just upstream of Tenchford Bridge.

The water level in this section of the river is variable with particularly low levels near Tenchford Bridge. Aquatic vegetation was found to be quite limited with large quantities of fat duckweed over much of the water's surface, especially in the downstream part of this

reach. Yellow water-lily and arrowhead occur throughout and there are large patches of shining pondweed at intervals along the river. Fringed water-lily occurs in the easternmost part of this section.

<i>Acer campestre</i>	Field maple	R
<i>Achillea millefolium</i>	Yarrow	O
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Alisma plantago-aquatica</i>	Common water-plantain	O
<i>Alnus glutinosa</i>	Alder	OLF
<i>Angelica sylvestris</i>	Wild angelica	RLO
<i>Apium nodiflorum</i>	Fools water-cress	O
<i>Arctium minus</i>	Lesser burdock	R
<i>Barbarea vulgaris</i>	Wintercress	R
<i>Bidens tripartite</i>	Trifid bur-marigold	R
<i>Brassica nigra</i>	Black mustard	R
<i>Bromus hordeaceus</i>	Soft brome	O
<i>Butomus umbellatus</i>	Flowering rush	O
<i>Callitriche agg.</i>	Water-starwort	R
<i>Calystegia sepium</i>	Hedge bindweed	OLF
<i>Carex pendula</i>	Pendulous sedge	O
<i>Carex sp.</i>	Sedge sp.	LF
<i>Centaurea nigra</i>	Common knapweed	R
<i>Cirsium arvense</i>	Creeping thistle	OLF
<i>Cirsium vulgare</i>	Spear thistle	O
<i>Conium maculatum</i>	Hemlock	O
<i>Corylus avellana</i>	Hazel	RLO
<i>Cruciata laevipes</i>	Crosswort	R
<i>Cynosurus cristatus</i>	Crested dogs-tail	O
<i>Dactylis glomerata</i>	Cocks-foot	O
<i>Deschampsia cespitosa</i>	Tufted hair-grass	O
<i>Dipsacus fullonum</i>	Teasel	RLO
<i>Elytrigia repens</i>	Common couch	OLF
<i>Epilobium hirsutum</i>	Great willowherb	O
<i>Equisetum arvense</i>	Field horsetail	O
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Fraxinus excelsior</i>	Ash	O
<i>Geranium dissectum</i>	Cut-leaved cranesbill	R
<i>Glyceria maxima</i>	Reed sweet-grass	LF
<i>Heracleum sphondylium</i>	Hogweed	RLO
<i>Holcus lanatus</i>	Yorkshire fog	O
<i>Hordeum secalinum</i>	Meadow barley	FLA
<i>Humulus lupulus</i>	Hop	OLF
<i>Hypochaeris radicata</i>	Common cats-ear	R
<i>Iris pseudacorus</i>	Yellow flag	R
<i>Juncus effusus</i>	Soft rush	O
<i>Juncus inflexus</i>	Hard rush	O
<i>Lathyrus pratensis</i>	Meadow vetchling	O
<i>Lemna gibba</i>	Fat duckweed	ALD
<i>Lemna minor</i>	Common duckweed	O

<i>Leontodon autumnalis</i>	Autumnal hawkbit	O
<i>Lolium perenne</i>	Perennial rye-grass	F
<i>Lycopus europaeus</i>	Gipsywort	O
<i>Lythrum salicaria</i>	Purple loosestrife	OLF
<i>Malva sylvestris</i>	Common mallow	R
<i>Mentha aquatica</i>	Water mint	OLF
<i>Myosotis scorpioides</i>	Water forget-me-not	OLF
<i>Myosoton aquaticum</i>	Water chickweed	R
<i>Nupha lutea</i>	Yellow water-lily	F
<i>Nymphoides peltata</i>	Fringed water-lily	O
<i>Oenanthe crocata</i>	Hemlock water-dropwort	OLF
<i>Persicaria amphibia</i>	Amphibious bistort	OLF
<i>Persicaria hydropiper</i>	Water-pepper	F
<i>Persicaria maculosa</i>	Redshank	OLF
<i>Phalaris arundinacea</i>	Reed canary-grass	A
<i>Phleum pratense</i>	Timothy	OLF
<i>Pimpinella saxifrage</i>	Burnet saxifrage	R
<i>Poa trivialis</i>	Rough meadow-grass	O
<i>Potamogeton lucens</i>	Shining pondweed	FLA
<i>Prunus spinosa</i>	Blackthorn	OLF
<i>Pteridium aquilinum</i>	Bracken	O
<i>Pulicaria dysenterica</i>	Fleabane	O
<i>Quercus robur</i>	Pedunculate oak	R
<i>Ranunculus repens</i>	Creeping buttercup	OLF
<i>Ranunculus sceleratus</i>	Celery-leaved buttercup	R
<i>Rorippa amphibian</i>	Great yellow-cress	LO
<i>Rubus fruticosus</i>	Bramble	O
<i>Rumex conglomeratus</i>	Clustered dock	O
<i>Rumex crispus</i>	Curled dock	O
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Sagittaria sagittifolia</i>	Arrowhead	OLF
<i>Salix caprea</i>	Goat willow	R
<i>Salix cinerea</i>	Grey willow	OLA
<i>Salix viminalis</i>	Osier	O
<i>Sambucus nigra</i>	Elder	R
<i>Schoenoplectus lacustris</i>	Common club-rush	OLF
<i>Scrophularia auriculata</i>	Water figwort	O
<i>Senecio erucifolius</i>	Hoary ragwort	O
<i>Senecio jacobaea</i>	Common ragwort	O
<i>Silaum silaus</i>	Pepper-saxifrage	R
<i>Sison amomum</i>	Stone parsley	F
<i>Solanum dulcamara</i>	Bittersweet	O
<i>Sonchus asper</i>	Prickly sow-thistle	R
<i>Sparganium emersum</i>	Unbranched bur-reed	O
<i>Sparganium erectum</i>	Branched bur-reed	FLA
<i>Stachys palustris</i>	Marsh woundwort	F
<i>Taraxacum agg.</i>	Dandelion	O
<i>Trifolium pratense</i>	Red clover	R
<i>Trifolium repens</i>	White clover	LF
<i>Typha latifolia</i>	Bulrush	OLF

<i>Urtica dioica</i>	Nettle	FLA
<i>Vicia cracca</i>	Tufted vetch	O

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

The Hammer Pond is a large body of open water with an extensive fringe of marginal vegetation that includes a variety of wetland species. Common club-rush, reed canary-grass and bulrush are very prominent along with yellow loosestrife, hemlock water-dropwort and marsh woundwort.

The only aquatic vegetation recorded from the Hammer Pond were the large mats of amphibious bistort. Despite searches with a grapnel there appeared to be no submerged vegetation, at least within reach of the bank.

Upstream the Hammer Pond grades into a wide area of fen on the banks of the Lancing Brook where silverweed, hairy sedge, reed canary-grass and floating sweet-grass are very frequent along with stands of nettle and hedge bindweed. Fools water-cress and common duckweed occur in the brook in this area.

<i>Achillea millefolium</i>	Yarrow	O
<i>Agrostis stolonifera</i>	Creeping bent	A
<i>Alisma plantago-aquatica</i>	Common water-plantain	OLF
<i>Alopecurus geniculatus</i>	Marsh foxtail	OLA
<i>Alopecurus pratensis</i>	Meadow foxtail	OLA
<i>Arrhenatherum elatius</i>	False oat-grass	F
<i>Bidens tripartite</i>	Trifid bur-marigold	OLF
<i>Calystegia sepium</i>	Hedge bindweed	FLA
<i>Carex hirta</i>	Hairy sedge	OLA
<i>Centaurea nigra</i>	Common knapweed	R
<i>Cirsium arvense</i>	Creeping thistle	OLF
<i>Cirsium vulgare</i>	Spear thistle	OLF
<i>Cruciata laevipes</i>	Crosswort	OLF
<i>Dactylis glomerata</i>	Cocks-foot	OLF
<i>Dipsacus fullonum</i>	Teasel	O
<i>Elytrigia repens</i>	Common couch	LA
<i>Galium aparine</i>	Common cleavers	OLF
<i>Galium palustre</i>	Common marsh-bedstraw	OLF
<i>Glyceria fluitans</i>	Floating sweet-grass	LA
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Hordeum secalinum</i>	Meadow barley	O
<i>Juncus effusus</i>	Soft rush	OLF
<i>Lycopus europaeus</i>	Gipsywort	F
<i>Lysimachia vulgaris</i>	Yellow loosestrife	F
<i>Lythrum salicaria</i>	Purple loosestrife	O
<i>Mentha aquatica</i>	Water mint	F
<i>Myosotis scorpioides</i>	Water forget-me-not	OLF
<i>Oenanthe crocata</i>	Hemlock water-dropwort	F

<i>Persicaria amphibia</i>	Amphibious bistort	FLA
<i>Persicaria hydropiper</i>	Water-pepper	OLF
<i>Persicaria maculosa</i>	Redshank	OLF
<i>Phalaris arundinacea</i>	Reed canary-grass	ALD
<i>Phleum pratense</i>	Timothy	OLF
<i>Potentilla anserina</i>	Silverweed	ALD
<i>Prunus spinosa</i>	Blackthorn	OLF
<i>Pulicaria dysenterica</i>	Fleabane	O
<i>Ranunculus repens</i>	Creeping buttercup	F
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Salix alba</i>	White willow	R
<i>Salix cinerea</i>	Grey willow	F
<i>Schoenoplectus lacustris</i>	Common club-rush	FLA
<i>Scirpus sylvaticus</i>	Wood club-rush	OLF
<i>Senecio aquaticus</i>	Marsh ragwort	R
<i>Solanum dulcamara</i>	Bittersweet	O
<i>Sonchus arvensis</i>	Perennial sow-thistle	RLO
<i>Sparganium erectum</i>	Branched bur-reed	OLF
<i>Stachys palustris</i>	Marsh woundwort	FLA
<i>Trifolium pratense</i>	Red clover	OLF
<i>Typha latifolia</i>	Bulrush	FLA
<i>Urtica dioica</i>	Nettle	FLA

Section 4 Lancing Brook, Hammer Pond to Tenchford Bridge/Adur confluence (TQ148208 to TQ15321)

This section of the Lancing Brook comprises two channels; a small feeder stream from the Hammer Pond and the main tributary that flows from the south via New Barn Farm. The survey extended along the whole of the smaller stream to the Hammer Pond and along the main tributary where it adjoins a poplar plantation (TQ150208). Beyond this point the Lancing Brook flows through heavily grazed horse pasture and although there are sections that have a diverse emergent flora it is generally very narrow, shallow and in places severely poached (see Knepp Phase I Survey 2005 – Dolphin Ecological Surveys/Record Centre Survey Unit).

From the Hammer Pond the minor channel flows into a small pond then under a track and into a wider, shaded pool with mature oaks on the banks. From this point downstream to the confluence of the two tributaries the minor channel is generally shaded by trees and scrub with little aquatic vegetation apart from common duckweed and only small patches of emergent vegetation where light reaches the channel. Parts of the minor channel were dry at the time of the survey.

The main tributary adjoining the poplar plantation has a dense stand of common reed, the only location for this species on the sections of river surveyed. Nettle and hedge bindweed are also frequent along the banks in this section.

Downstream of the confluence of the two channels the Lancing Brook has a varied emergent flora with frequent reed canary-grass, branched bur-reed and hemlock water-dropwort.

Yellow water-lily is present in the eastern part of this section and there are areas where common duckweed is present in some abundance.

The width of the main channel ranges from approximately 1m to 2m and the banks are generally steep. The minor channel is around 1m wide for most of its length but widens considerably towards the Hammer Pond.

The Lancing Brook runs through pasture in this section and the banks have a fairly coarse flora dominated by nettle or are grazed and sometimes poached by horses.

<i>Acer campestre</i>	Field maple	R
<i>Achillea millefolium</i>	Yarrow	R
<i>Agrostis stolonifera</i>	Creeping bent	F
<i>Alisma plantago-aquatica</i>	Common water-plantain	O
<i>Angelica sylvestris</i>	Wild angelica	OLF
<i>Callitriche agg.</i>	Water-starwort	O
<i>Calystegia sepium</i>	Hedge bindweed	A
<i>Carex sp.</i>	Sedge sp.	R
<i>Cirsium arvense</i>	Creeping thistle	LF
<i>Dactylis glomerata</i>	Cocks-foot	O
<i>Dryopteris filix-mas</i>	Male fern	R
<i>Epilobium hirsutum</i>	Great willowherb	R
<i>Equisetum arvense</i>	Field horsetail	R
<i>Equisetum fluviatile</i>	Water horsetail	LF
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Fraxinus excelsior</i>	Ash	R
<i>Galium aparine</i>	Common cleavers	F
<i>Glechoma hederacea</i>	Ground-ivy	LF
<i>Hedera helix</i>	Ivy	LA
<i>Iris pseudacorus</i>	Yellow flag	R
<i>Juncus effusus</i>	Soft rush	O
<i>Lemna minor</i>	Common duckweed	LA
<i>Lysimachia vulgaris</i>	Yellow loosestrife	O
<i>Lythrum salicaria</i>	Purple loosestrife	O
<i>Mentha aquatica</i>	Water mint	OLF
<i>Myosotis scorpioides</i>	Water forget-me-not	OLF
<i>Myosoton aquaticum</i>	Water chickweed	OLF
<i>Nupha lutea</i>	Yellow water-lily	O
<i>Oenanthe crocata</i>	Hemlock water-dropwort	OLF
<i>Persicaria maculosa</i>	Redshank	O
<i>Phalaris arundinacea</i>	Reed canary-grass	OLF
<i>Phragmites australis</i>	Common reed	OLA
<i>Prunus spinosa</i>	Blackthorn	F
<i>Quercus robur</i>	Pedunculate oak	R
<i>Ranunculus repens</i>	Creeping buttercup	OLF
<i>Rosa canina</i>	Dog rose	O
<i>Rubus fruticosus</i>	Bramble	OLF
<i>Rumex obtusifolius</i>	Broad-leaved dock	O
<i>Salix caprea</i>	Goat willow	R
<i>Salix cinerea</i>	Grey willow	F

<i>Sambucus nigra</i>	Elder	R
<i>Scrophularia auriculata</i>	Water figwort	O
<i>Sison amomum</i>	Stone parsley	R
<i>Solanum dulcamara</i>	Bittersweet	R
<i>Sonchus arvensis</i>	Perennial sow-thistle	R
<i>Sparganium erectum</i>	Branched bur-reed	OLF
<i>Stachys palustris</i>	Marsh woundwort	OLF
<i>Urtica dioica</i>	Nettle	ALD
<i>Vicia cracca</i>	Tufted vetch	R

Fauna observed along the river and stream during the survey

Comma
 Small tortoiseshell
 Common blue
 Gatekeeper

 Emperor
 Common darter
 Southern hawker
 Brown hawker
 Blue-tailed damselfly

 Moorhen
 Mute swan