

BOTANICAL AND TERRESTRIAL
INVERTEBRATE SURVEY
OF
MARSHALL'S ARM, NORTHWICH
CESHIRE 2009 - 2010



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CONTENTS

1. INTRODUCTION	2
2. BOTANY	3
3. TERRESTRIAL INVERTEBRATES	6
4. MANAGEMENT RECOMMENDATIONS	9
5. REFERENCES	11
APPENDIX 1 – BOTANICAL SPECIES LISTS	
APPENDIX 2 – INVERTEBRATE SPECIES LIST	
HABITAT MAP	

1.0 INTRODUCTION

- 1.1 Rachel Hacking Ecology Limited was commissioned in 2009 by the Marshall's Arm management group to conduct botanical and terrestrial invertebrate survey work at Marshall's Arm Local Nature Reserve. The aim of the surveys was to determine what species were present at the site and to suggest management regimes sympathetic and beneficial to the species assemblage.

Site Description

- 1.2 Marshall's Arm Local Nature Reserve (LNR) is situated on the banks of the River Weaver, south of Northwich town centre. It was designated an LNR in 1998. The site is approximately 15ha and comprises clough woodlands, reedbeds, grassland and riverbanks. Greenbank Wood Site of Biological Interest (SBI) lies within the site boundary. This is a Grade A SBI, of county importance, designated for its woodland flora.
- 1.3 The site has many public rights of way throughout it and therefore is regularly used by the public.

2.0 BOTANY

Methodology

- 2.1 The whole of Marshall's Arm LNR was surveyed and all plant species seen were noted. Each species was given a DAFOR rating, that is Dominant, Abundant, Frequent, Occasional or Rare within the habitat. In addition to the compilation of species lists, the habitats were mapped.
- 2.2 The site was visited at different times of the year, in the spring, early summer and late summer to record early and late flowering species. All botanical nomenclature follows Stace, C. A., 2010. *New Flora of the British Isles*, 3rd Ed. Cambridge University Press.

Habitats

- 2.3 A total of 116 species of plant were recorded across the whole of Marshall's Arm. Most of the species came from within the clough woodlands, primarily Greenbank Wood SBI. The swamp habitat within the ox-bow area also supported many species. A description of each habitat can be found below.

Broad-leaved Woodland

- 2.4 Broad-leaved woodland is the dominant habitat on the site, making up % of the site. Three woodland arms follow the three valleys leading up from the River Weaver towards the schools. The most southerly arm is Greenbank Wood Site of Biological Interest (SBI). This is a Grade A SBI, designated for its flora. The canopy here is a mix of Beech *Fagus sylvatica*, Pedunculate Oak *Quercus robur*, Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus*. The scrub layer is well developed and comprises species such as Hawthorn *Crataegus monogyna*, Hazel *Corylus avellana*, Holly *Ilex aquifolium* and Elder *Sambucus nigra*. The ground flora is typical of mature woodland, comprising species such as Wood Melick *Melica nutans*, Ramsons *Allium ursinum* and Wood Anemone *Anemone nemorosa*.
- 2.5 The most northerly clough, called 'Clough Wood' is very similar to Greenbank Wood. The canopy species include Pedunculate Oak, Ash, Beech and Sycamore. The ground flora includes species such as Enchanter's Nightshade *Circaea lutetiana*, Wood Avens *Geum urbanum* and Bluebell *Hyacinthoides non-scripta*.
- 2.6 A small clough woodland exists between Greenbank Wood and Clough Wood. This woodland is similar to the other clough woodlands in its species assemblage. Wood Sage *Teucrium scorodonia* and Wood Forget-me-not *Myosotis sylvatica* were recorded here.
- 2.7 All of the clough woodlands are a steep sided and a mixture of semi-natural ancient woodland and more recently planted woodland. In places, dense stretches of the understory are dominated by one

species, for example, Bracken *Pteridium aquilinum* or Rhododendron *Rhododendron ponticum*.

Neutral Grassland

2.8 A small area of neutral grassland exists between the ox-bow and the woodland. This is species-poor and comprises Meadow Vetchling *Lathyrus pratensis*, Yarrow *Achillea millefolium* and Red Clover *Trifolium pratense* with the grasses Rough Meadow-grass *Poa trivialis*, Fed Fescue *Festuca rubra* and Yorkshire Fog *Holcus lanatus*. Around the edges of the grassland, where it grades into swamp, taller, rank grasses are found such as False Oat-grass *Arrhenatherum elatius* and Cock's-foot *Dactylis glomerata*.

2.9 This habitat is valuable for small mammals and invertebrates. During the survey, there were plenty of open flowers of Creeping Buttercup *Ranunculus repens* in addition to other species; a good source of pollen and nectar.

Tall, Ruderal Herb

2.10 Two areas of tall, ruderal herb exist within Marshall's Arm. One area is situated next to the entrance to the reserve, by the boatyard. This is dominated by Rosebay Willowherb *Chamerion angustifolium* and Stinging Nettle *Urtica dioica*. Another swathe of tall, ruderal herb exists between the swamp and the neutral grassland at the ox-bow. This is dominated by Stinging Nettle and Hogweed *Heracleum sphondylium*.

2.11 Whilst a species-poor habitat, typical of disturbed ground, these areas of tall vegetation do provide cover and foraging habitat for small mammals. Invertebrate species can also be found, either host-specific such as the *Phyllobius* weevils found on nettles or the insects such as *Bombus* spp. visiting the Rosebay Willowherb.

Swamp

2.12 A large area of swamp habitat exists within the ox-bow. The dominant species is Common Reed *Phragmites australis*. A number of other emergent species exist within the Reedbed including Greater Willowherb *Epilobium hirsutum*, Yellow Flag *Iris pseudacorus* and Bulrush *Typha latifolia*.

2.13 Towards the edges of the ox-bow, and along the edge of the River Weaver, the swamp vegetation exhibits greater species diversity. Here, emergent plants such as Nodding Bur-marigold *Bidens cernua*, Lesser Pond-sedge *Carex acutiformis*, Reed Canary-grass *Phalaris arundinacea*, Wild Angelica *Angelica sylvestris* and Marsh Woundwort *Stachys palustris* grow.

2.14 Swamp is excellent habitat for invertebrates, birds and small mammals.

Open Water

- 2.15 The ox-bow supports areas of open water. Here, the invasive species Floating Pennywort *Hydrocotyle ranunculoides* can be dominant. Other species found within the open water include Broad-leaved Pondweed *Potamogeton natans*, Lesser Water-parsnip *Berula erecta* and Spiked Water-milfoil *Myriophyllum spicatum*. Two species of Duckweed occur on the water surface; Common Duckweed *Lemna minor* and Fat Duckweed *Lemna gibba*.
- 2.16 A pond exists near to the edge of the playing fields of Hartford High School. It is used by the school for pond-dipping. This pond is particularly species-rich. The emergent aquatic vegetation includes Water Mint *Mentha aquatica*, Gipsywort *Lycopus europaeus*, Bogbean *Menyanthes trifoliata*, Hard Rush *Juncus inflexus* and Water Dock *Rumex hydrolapathum*. The submerged vegetation includes Rigid Hornwort *Ceratophyllum demersum* along with two non-native species; Nuttall's Waterweed *Elodea nuttallii* and New Zealand Pigmyweed *Crassula helmsii*. The floating vegetation includes a variety of water lily *Nymphaea* var. and Ivy-leaved Duckweed *Lemna trisulca*.
- 2.17 A small pond exists at the bottom of Greenbank Wood, where the stream pools. This pond is shallow, heavily shaded and supports few aquatic macrophytes. Bulrush *Typha latifolia* and Branched Bur-reed *Sparganium erectum* occur here.
- 2.18 Aquatic habitats support a wide range of invertebrates. The pond near to the school is species-rich and offers a rich source of pollen and nectar. A non-native invasive species occurs within this pond (*Crassula helmsii*) – see Section 4 Management Recommendations.

Hedgerow

- 2.19 A Blackthorn *Prunus spinosa* hedgerow exists along the footpath at the boatyard entrance.

Scarce/Local species

- 2.20 During the survey, no species that are nationally or locally rare were encountered.

3.0 TERRESTRIAL INVERTEBRATES

Methodology

- 3.1 Two main invertebrate groups were surveyed for. These were the Coleoptera (beetles) and Diptera (true flies). Incidental records of other groups were also noted.
- 3.2 Due to the public access across the site, static collection techniques could not be used so the following methodologies were used:
 - Sweep-netting – A robust insect net was used to sweep the vegetation. For scrub this involved sweeping the net against high branches. Sweeping was also carried out along the ground to collect low-flying invertebrates.
 - Hand-searching – This involved searching under fallen wood, in grass tussocks, sieving through the leaf-litter and searching beneath bark.
 - Pootering – A pooter was used during all the above methodologies to catch smaller invertebrates which would otherwise have been missed.
- 3.3 All invertebrates caught were potted in 70% ethanol to be identified later, unless identification could be made in the field, in which case the animal was released.
- 3.4 The areas of Marshall's Arm surveyed for invertebrates were Greenbank Wood, Clough Wood, the middle clough, the ox-bow and the neutral grassland.

Results

Coleoptera

- 3.5 Forty-one species of Coleoptera were recorded from across the site. Sixteen of these species came from the ground beetle family (Carabidae).
- 3.6 The most species-rich area of the site for Coleoptera was Greenbank Wood SBI, with twenty-four species recorded. Thirteen species of ground beetle were recorded here along with three species of rove beetle (Staphylinidae). Included in the Carabidae, the Snail-killer Beetle *Cychnus caraboides* and the Violet Ground Beetle *Carabus violaceus* were seen frequently beneath dead wood. *Notiophilus rufipes* was also seen, this species being typical within leaf litter. The rove beetle Devil's Coach-horse *Ocypus olens* was also seen in abundance within the woodland.

- 3.7 Nineteen species of beetles were found at the ox-bow. This total included members of the Chrysomelidae (leaf beetles), including three found on emergent vegetation; *Donacia simplex*, *Phaedon armoracia* and *Altica lythri*. Two species of hygrophilous ground beetle were also recorded at the ox-bow; *Agonum fuliginosum* and *Bembidion aeneum*. A ground beetle *Curtonotus aulicus* was also picked up from the ox-bow. This species climbs vegetation at night to eat seeds. Two species of weevil were swept from the tall vegetation; *Phyllobius pomaceus* and *Phyllobius roboretanus*.
- 3.8 Seventeen species of beetle were recorded from the neutral grassland area. This total included two species of soldier beetle which are found on open flowers; *Cantharis pallida* and *Rhagonycha fulva*. A Tenebrionidae beetle was also noted here on the vegetation, this being *Lagria hirta*. The pollen beetle *Meligethes aeneus* was seen in abundance on the open flowers. Three species of ladybird were recorded here; 7-spot, 2-spot and 14-spot. The Green Dock beetle *Gastrophysa viridula* and the leaf beetle *Neocrepidodera transversa* were also noted on the vegetation at the edge of the grassland.
- 3.9 None of the Coleoptera species recorded are considered to be uncommon or rare on a national or local scale.

Diptera

- 3.10 Thirty-one species of true fly were recorded across the site. This is a poor number considering the different habitats on site. Within this species total, seventeen species came from the Syrphidae (Hoverfly) family.
- 3.11 Greenbank Wood SBI proved to support the highest number of Diptera species out of all the habitat areas surveyed, with twenty species recorded. This included ten species of hoverfly, including *Sphaerophoria scripta*, *Chrysotoxum festivum*, *Volucella pellucens* and *Syrpitta pipiens*. Two species of Soldierfly were recorded from here; *Beris geniculata* and *Beris vallata*, both of which can be found in moist woodlands. A Muscid fly, associated with Badger setts was netted at Greenbank Wood. This was *Hydrotea cyrtoneurina*.
- 3.12 Fifteen species of Diptera were netted at the Ox-bow included twelve species of hoverfly, including three species only netted at the ox-bow; *Eristalis arbustorum*, *Eristalis intricarius* and *Meredon equestris*. A Dolichopid fly was netted here; *Dolichopus popularis*. This group of flies is typical of wet habitats.
- 3.13 A locally common crane fly was recorded at the middle clough woodland. This was *Lipsothrix remota*. This species is found at seepages and streams in woodland. *Fannia postica* was recorded from the middle clough as well as the other woodlands. This species is reared from rotting oak tree stumps.

- 3.14 Eleven species of Diptera were recorded from the neutral grassland. This included the large crane fly *Tipula maxima* and nine species of hoverfly, including the Marmalade Hoverfly *Episyrphus balteatus*. Other hoverflies to be recorded include *Helophilus trivittatus*, *Eristalis pertinax* and *Scaeva pyrastris*, the latter only being netted at the grassland.
- 3.15 None of the Diptera species recorded are considered to be uncommon or rare on a national or local scale.

5.0 MANAGEMENT RECOMMENDATIONS

5.1 The following management recommendations aim to increase the invertebrate diversity of the site by increasing the abundance of niche habitats and floristic diversity.

Woodland

- Create log piles from fallen timber or from selective thinning (see Pond recommendations below). Place log piles in various locations throughout the woodlands, particularly Greenbank Wood. The log piles should be spread between shaded habitats, edge (less shaded) habitats and wet habitats, such as the edge of the stream or next to pools. This is to attract a variety of invertebrates (e.g. some species of hoverfly and dragonfly favour rotting wood by the edge of water). Dig a small pit to place the bottom of the log pile in to speed up decomposition of the base layer of wood.
- Attempt to clear the Rhododendron or part of it and re-plant the area with native berry-bearing species such as Rowan and Holly and with other valuable food-source species such as Blackthorn and Hazel. This will, in turn, increase the structural diversity of the woodland which will favour the biodiversity of the area including such groups as invertebrates and birds.
- Erect bird nest boxes and bat boxes on mature trees. Also create 'bug homes' from bundles of canes, cut to 6 inch lengths, tied together and hung from tree branches.

Grassland

- Diversify the sward within the small area of neutral grassland by sowing a 'wildflower mix' of seeds. This should include species such as Black Knapweed, Pignut, Common Cat's-ear, Ox-eye Daisy, Self-heal and Tufted Vetch. Introducing a small amount of Yellow Rattle to the grassland will help to reduce the vigour of the existing grass species and open up the sward to allow other species to establish. Open grassland is a rare habitat at Marshall's Arm but could prove to be extremely beneficial for invertebrates and for the habitat mosaic as a whole.
- The edge of the grassland, as it grades into tall herb habitat, should be strimmed to prevent vigorous tall herbs such as Dock and Stinging Nettle encroaching onto the grassland. A 'wet meadow' seed mix could be sown here to enhance the edge of the reedbed and increase the floristic diversity of the grassland. The seed mix should include species such as Ragged Robin, Great Burnet, Angelica, Valerian and Meadowsweet.

Ponds

- The silt trap pond at the eastern end of Greenbank Wood is heavily shaded and therefore extremely species-poor. Leaf litter will also be affecting the quality of the water. Thin the trees and scrub from around this pond to allow light to penetrate to the water. Create log piles around the pond from the thinned wood. The pond can either be left to develop naturally, as over time, with the increased levels of light, a greater diversity of aquatic vegetation will develop. Or the pond edges can be planted using native aquatic vegetation brought from other parts of the site. It is not recommended to take vegetation from the pond near to the playing fields as that contains *Crassula helmsii*.
- The pond nearest to the playing fields contains an extremely invasive pond plant; *Crassula helmsii*. This needs to be kept within the confines of this pond. Notices should be erected asking dog owners not to allow their dogs to enter the water here (if indeed they do) as dogs are a vector of this plant. The only way that has been proven to control *Crassula* is to fill the pond in and start again but the pond provides a valuable resource to the students and is extremely species-rich. Therefore, annual manual clearance of as much of the *Crassula* as possible is recommended using rakes and by hand. The *Crassula* should then be allowed to dry out completely (i.e. die) in a safe place such as a composting box.

Reedbeds

- No management is thought necessary of the reedbeds, other than to keep a check on the amount of scrub taking hold within the reed.

5.0 REFERENCES

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APPENDIX 1 – BOTANICAL SPECIES LISTS

The DAFOR scale proceeds the species name. D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare. The pre-fix "L" indicates Locally.

Greenbank Wood SBI:

Scientific name	Vernacular name	DAFOR
Canopy:		
<i>Fagus sylvatica</i>	Beech	LA
<i>Fraxinus excelsior</i>	Ash	LA
<i>Quercus robur</i>	Pedunculate Oak	LA
<i>Quercus rubra</i>	Red Oak	R
<i>Prunus avium</i>	Bird Cherry	O
<i>Alnus glutinosa</i>	Alder	O
<i>Sambucus nigra</i>	Elder	LF
<i>Ulmus glabra</i>	Wych Elm	O
<i>Aesculus hippocastanum</i>	Horse-chestnut	O
<i>Salix fragilis</i>	Crack Willow	O
<i>Acer pseudoplatanus</i>	Sycamore	LD
<i>Corylus avellana</i>	Hazel	O
<i>Prunus spinosa</i>	Blackthorn	O
<i>Salix cinerea</i>	Grey Willow	O
<i>Salix caprea</i>	Goat Willow	O
<i>Ilex aquifolium</i>	Holly	O
<i>Crataegus monogyna</i>	Hawthorn	O
Ground flora:		
<i>Hyacinthoides non-scripta</i>	Bluebell	LA
<i>Brachypodium sylvaticum</i>	False Wood-brome	LF
<i>Hedera helix</i>	Ivy	LD
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Myosotis sylvatica</i>	Wood Forget-me-not	O
<i>Carex remota</i>	Remote Sedge	LA
<i>Silene dioica</i>	Red Campion	LF
<i>Mercurialis perennis</i>	Dog's Mercury	LA
<i>Allium ursinum</i>	Ramsons	LA
<i>Rhododendron ponticum</i>	Rhododendron	LD
<i>Epilobium montanum</i>	Broad-leaved Willowherb	O
<i>Epilobium ciliatum</i>	American Willowherb	O
<i>Lamium galeobdolon</i>	Yellow Archangel	R
<i>Geum urbanum</i>	Wood Avens	LF
<i>Circaea lutetiana</i>	Enchanter's Nightshade	LF
<i>Anemone nemorosa</i>	Wood Anemone	LF
<i>Melica nutans</i>	Wood Melick	LF
<i>Arrhenatherum elatius</i>	False Oat-grass	LF
<i>Plantago major</i>	Greater Plantain	R
<i>Urtica dioica</i>	Stinging Nettle	O
<i>Anthriscus sylvestris</i>	Cow Parsley	O
<i>Rubus fruticosus</i> agg.	Bramble	LA
<i>Digitalis purpurea</i>	Foxglove	LF
<i>Festuca arundinacea</i>	Tall Fescue	R
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	LF

Clough Wood:

Scientific name	Vernacular name	DAFOR
Canopy:		
<i>Fraxinus excelsior</i>	Ash	LA
<i>Quercus robur</i>	Pedunculate Oak	LA
<i>Corylus avellana</i>	Hazel	O
<i>Ilex aquifolium</i>	Holly	O
<i>Alnus glutinosa</i>	Alder	O
<i>Sorbus aucuparia</i>	Rowan	O
<i>Sambucus nigra</i>	Elder	O
<i>Crataegus monogyna</i>	Hawthorn	LF
<i>Acer campestre</i>	Field Maple	O
<i>Acer pseudoplatanus</i>	Sycamore	LA
<i>Fagus sylvatica</i>	Beech	LA
Ground flora:		
<i>Hyacinthoides non-scripta</i>	Bluebell	LA
<i>Urtica dioica</i>	Stinging Nettle	LA
<i>Rubus fruticosus agg.</i>	Bramble	LD
<i>Festuca rubra</i>	Red Fescue	LF
<i>Holcus mollis</i>	Creeping Soft-grass	LA
<i>Geranium robertianum</i>	Herb-robert	F
<i>Pteridium aquilinum</i>	Bracken	LA
<i>Rubus idaeus</i>	Raspberry	O
<i>Lonicera periclymenum</i>	Honeysuckle	O
<i>Circaea lutetiana</i>	Enchanter's Nightshade	O
<i>Rosa arvensis</i>	Field Rose	O
<i>Elytrigia repens</i>	Couch Grass	O
<i>Stellaria holostea</i>	Greater Stitchwort	O
<i>Glechoma hederacea</i>	Ground Ivy	O
<i>Stachys sylvatica</i>	Hedge Woundwort	O
<i>Rumex sanguineus</i>	Wood Dock	R
<i>Cardamine hirsuta</i>	Hairy Bittercress	O
<i>Geum urbanum</i>	Wood Avens	O
<i>Epilobium hirsutum</i>	Greater Willowherb	O
<i>Juncus effusus</i>	Soft Rush	O
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	O

Middle Clough Woodland:

Scientific name	Vernacular name	DAFOR
Canopy:		
<i>Quercus robur</i>	Pedunculate Oak	LD
<i>Sambucus nigra</i>	Elder	F
<i>Tilia x europaea</i>	Lime	O
<i>Acer pseudoplatanus</i>	Sycamore	F
<i>Crataegus monogyna</i>	Hawthorn	LA
<i>Fagus sylvatica</i>	Beech	LF
<i>Fraxinus excelsior</i>	Ash	LF
<i>Ilex aquifolium</i>	Holly	O
<i>Aesculus hippocastanum</i>	Horse-chestnut	O
<i>Corylus avellana</i>	Hazel	O
Ground flora:		
<i>Rubus fruticosus</i> agg.	Bramble	LD
<i>Anthriscus sylvestris</i>	Cow Parsley	LF
<i>Dactylis glomerata</i>	Cock's-foot	LF
<i>Urtica dioica</i>	Stinging Nettle	LA
<i>Geum urbanum</i>	Wood Avens	F
<i>Hedera helix</i>	Ivy	LD
<i>Rosa arvensis</i>	Field Rose	LF
<i>Rosa canina</i> agg.	Dog Rose	O
<i>Myosotis sylvatica</i>	Wood Forget-me-not	R
<i>Rumex sanguineus</i>	Wood Dock	R
<i>Ranunculus acris</i>	Meadow Buttercup	R
<i>Geranium robertianum</i>	Herb-robert	O
<i>Stachys sylvatica</i>	Hedge Woundwort	O
<i>Teucrium scorodonia</i>	Wood Sage	O
<i>Dryopteris felix-mas</i>	Male Fern	R
<i>Asplenium scolopendrium</i>	Hart's-tongue	R
<i>Cirsium vulgare</i>	Spear Thistle	R

Pond at edge of playing field:

Scientific name	Vernacular name	DAFOR
<i>Ceratophyllum demersum</i>	Rigid Hornwort	LD
<i>Nymphaea</i> sp.	Waterlily variety	LF
<i>Juncus effusus</i>	Soft Rush	O
<i>Epilobium hirsutum</i>	Greater Willowherb	LF
<i>Lycopus europaeus</i>	Gipsywort	LF
<i>Mentha aquatica</i>	Water Mint	LF
<i>Berula erecta</i>	Lesser Water-parsnip	LF
<i>Lemna minor</i>	Common Duckweed	LA
<i>Phalaris arundinacea</i>	Reed Canary-grass	LA
<i>Salix cinerea</i>	Grey Willow	O
<i>Crassula helmsii</i>	New Zealand Pigmyweed	LD
<i>Menyanthes trifoliata</i>	Bogbean	LA
<i>Glyceria maxima</i>	Reed Sweet-grass	LF
<i>Lemna trisulca</i>	Ivy-leaved Duckweed	LF
<i>Sparganium erectum</i>	Branched Bur-reed	LF
<i>Rumex hydrolapathum</i>	Water Dock	R
<i>Equisetum fluviatile</i>	Water Horsetail	R
<i>Eloдея nuttallii</i>	Nuttall's Waterweed	LA
<i>Carex otrubae</i>	False Fox-sedge	R
<i>Juncus inflexus</i>	Hard Rush	R
On banks:		
<i>Rubus fruticosus</i> agg.	Bramble	LD
<i>Vicia sylvatica</i>	Wood Vetch	R
<i>Phleum pratense</i>	Timothy	R
<i>Urtica dioica</i>	Stinging Nettle	O
<i>Calystegia sepium</i>	Hedge Bindweed	R
<i>Dactylis glomerata</i>	Cock's-foot	O
<i>Vicia sepium</i>	Bush Vetch	O
<i>Heracleum sphondylium</i>	Hogweed	LF
<i>Trifolium pratense</i>	Red Clover	O
<i>Senecio jacobaea</i>	Ragwort	O
<i>Galium aparine</i>	Cleavers	O
<i>Ranunculus repens</i>	Creeping Buttercup	LF
<i>Lolium perenne</i>	Perennial Rye-grass	LF
<i>Taraxacum officinale</i>	Dandelion	O
<i>Plantago major</i>	Greater Plantain	O
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Poa pratensis</i>	Smooth Meadow-grass	R
<i>Centaurea nigra</i>	Black Knapweed	O
<i>Elytrigia repens</i>	Couch Grass	LF
<i>Rumex acetosella</i>	Sheep's Sorrel	R

Pond within Greenbank Wood:

Scientific name	Vernacular name	DAFOR
<i>Lemna minor</i>	Common Duckweed	
<i>Sparganium erectum</i>	Branched Bur-reed	
<i>Typha latifolia</i>	Bulrush	
<i>Stachys sylvatica</i>	Hedge Woundwort	
<i>Urtica dioica</i>	Stinging Nettle	

Swamp:

Scientific name	Vernacular name	DAFOR
<i>Phragmites australis</i>	Common Reed	D
<i>Chamerion angustifolium</i>	Rosebay Willowherb	LF
<i>Epilobium hirsutum</i>	Greater Willowherb	LA
<i>Urtica dioica</i>	Stinging Nettle	O
<i>Juncus inflexus</i>	Hard Rush	O
<i>Stachys sylvatica</i>	Hedge Woundwort	O
<i>Juncus articulatus</i>	Jointed Rush	O
<i>Berula erecta</i>	Lesser Water-parsnip	O
<i>Hydrocotyle ranunculoides</i>	Floating Pennywort	LF
<i>Lemna minor</i>	Common Duckweed	LA
<i>Potamogeton natans</i>	Broad-leaved Pondweed	LF
<i>Lemna gibba</i>	Fat Duckweed	LF
<i>Sparganium erectum</i>	Branched Bur-reed	R

Species-rich swamp areas at edge of ox-bow and River Weaver:

Scientific name	Vernacular name	DAFOR
<i>Sparganium erectum</i>	Branched Bur-reed	LF
<i>Iris pseudacorus</i>	Yellow Flag	LF
<i>Carex acutiformis</i>	Lesser Pond-sedge	LF
<i>Hydrocotyle ranunculoides</i>	Floating Pennywort	LD
<i>Arrhenatherum elatius</i>	False Oat-grass	O
<i>Stachys palustris</i>	Marsh Woundwort	O
<i>Typha angustifolia</i>	Bulrush	LF
<i>Typha latifolia</i>	Lesser Bulrush	LF
<i>Epilobium hirsutum</i>	Greater Willowherb	LA
<i>Phragmites australis</i>	Common Reed	LD
<i>Phalaris arundinacea</i>	Reed Canary-grass	LA
<i>Crataegus monogyna</i>	Hawthorn	O
<i>Heracleum sphondylium</i>	Hogweed	R
<i>Urtica dioica</i>	Stinging Nettle	LF
<i>Bidens cernua</i>	Nodding Bur-marigold	O
<i>Carex otrubae</i>	False Fox-sedge	R
<i>Angelica sylvestris</i>	Angelica	R
<i>Myriophyllum spicatum</i>	Spiked Water-milfoil	LF

Neutral grassland:

Scientific name	Vernacular name	DAFOR
<i>Lathyrus pratensis</i>	Meadow Vetchling	LA
<i>Heracleum sphondylium</i>	Hogweed	R
<i>Holcus lanatus</i>	Yorkshire Fog	LA
<i>Dactylis glomerata</i>	Cock's-foot	O
<i>Lolium perenne</i>	Perennial Rye-grass	LA
<i>Alnus glutinosa</i>	Alder	R
<i>Achillea millefolium</i>	Yarrow	O
<i>Epilobium hirsutum</i>	Greater Willowherb	R
<i>Rubus fruticosus</i> agg.	Bramble	R
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Plantago major</i>	Greater Plantain	O
<i>Equisetum arvense</i>	Field Horsetail	O
<i>Trifolium pratense</i>	Red Clover	LF
<i>Arrhenatherum elatius</i>	False Oat-grass	R
<i>Poa trivialis</i>	Rough Meadow-grass	O
<i>Poa annua</i>	Annual Meadow-grass	O
<i>Urtica dioica</i>	Stinging Nettle	R
<i>Ranunculus repens</i>	Creeping Buttercup	LA
<i>Festuca rubra</i>	Red Fescue	LF

Tall, ruderal herb:

Scientific name	Vernacular name	DAFOR
<i>Stachys sylvatica</i>	Hedge Woundwort	O
<i>Rubus fruticosus</i> agg.	Bramble	LD
<i>Arrhenatherum elatius</i>	False Oat-grass	LA
<i>Ranunculus repens</i>	Creeping Buttercup	LF
<i>Anthriscus sylvestris</i>	Cow Parsley	LF
<i>Fraxinus excelsior</i>	Ash	O
<i>Acer pseudoplatanus</i>	Sycamore	O
<i>Quercus robur</i>	Pedunculate Oak	O
<i>Salix caprea</i>	Goat Willow	LF
<i>Alnus glutinosa</i>	Alder	O
<i>Chamerion angustifolium</i>	Rosebay Willowherb	LF
<i>Urtica dioica</i>	Stinging Nettle	LA
<i>Heracleum sphondylium</i>	Hogweed	LF
<i>Holcus lanatus</i>	Yorkshire Fog	LF

APPENDIX 2 – INVERTEBRATE SPECIES LIST

	Greenbank Wood	Oxbow	Middle Clough	Clough Wood	Grassland
COLEOPTERA					
Carabidae:					
<i>Abax parallelopedus</i>	+		+		
<i>Pterostichus madidus</i>	+				
<i>Pterostichus vernalis</i>	+		+		
<i>Pterostichus niger</i>	+		+	+	
<i>Pterostichus strenuus</i>	+				
<i>Carabus violaceus</i>	+		+	+	
<i>Cychrus caraboides</i>	+		+	+	
<i>Notiophilus biguttatus</i>	+		+		
<i>Notiophilus rufipes</i>	+				
<i>Nebris brevicollis</i>	+		+	+	+
<i>Loricera pilicornis</i>	+	+	+		+
<i>Platynus assimilis</i>	+		+		
<i>Agonum fuliginosum</i>		+			
<i>Curtonotus aulicus</i>	+	+			
<i>Bembidion lampros</i>		+			
<i>Bembidion aeneum</i>		+			
Staphylinidae:					
<i>Ocyopus olens</i>	+		+		
<i>Philonthus decorus</i>	+				
<i>Stenus similis</i>	+	+			
Chrysomelidae:					
<i>Donacia simplex</i>		+			
<i>Gastrophysa viridula</i>	+	+			+
<i>Altica lythri</i>		+			
<i>Chrysolina polita</i>		+			
<i>Neocrepidodera transversa</i>					+
<i>Phaedon armoracia</i>		+			
<i>Agelastica alni</i>	+	+		+	
Cantharidae:					
<i>Rhagonycha fulva</i>		+			+
<i>Cantharis nigra</i>	+				
<i>Cantharis pallida</i>					+

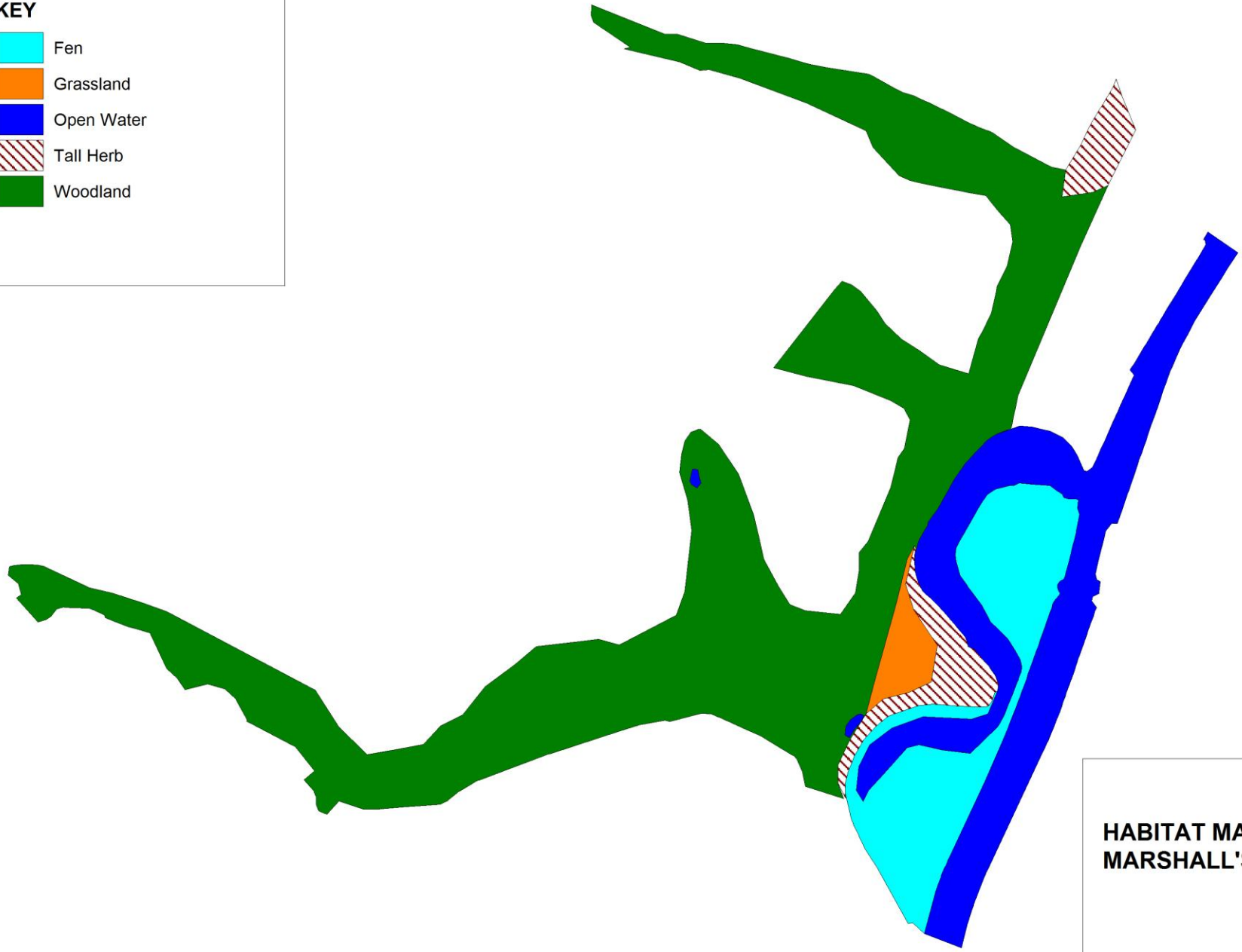
COLEOPTERA continued	Greenbank Wood	Oxbow	Middle Clough	Clough Wood	Grassland
Malachiidae:					
<i>Malachius bipustulatus</i>	+				+
Nitidulidae:					
<i>Meligethes aeneus</i>		+			+
Oedemeridae:					
<i>Oedemera lurida</i>		+			+
Tenebrionidae:					
<i>Lagria hirta</i>					+
Coccinellidae:					
<i>Coccinella septempunctata</i>	+	+	+		+
<i>Propylea 14-punctata</i>	+				+
<i>Halyzia 16-guttata</i>	+				
<i>Adalia bipunctata</i>					+
Apionidae:					
<i>Apion frumentarium</i>					+
<i>Perapion curtirostre</i>		+			
<i>Protapion apricans</i>					+
Curculionidae:					
<i>Phyllobius pomaceus</i>	+	+		+	
<i>Phyllobius roboretanus</i>		+			+
<i>Sitona lineatus</i>					+
Total Coleoptera/site	24	19	11	6	17
DIPTERA					
Limoniidae:					
<i>Lipsothrix remota</i>			+		
Tipulidae:					
<i>Tipula maxima</i>	+				+
Rhagionidae:					
<i>Chrysopilus cristatus</i>	+	+			
Stratiomyidae:					
<i>Beris geniculata</i>	+				+
<i>Beris vallata</i>	+			+	

DIPTERA continued	Greenbank Wood	Oxbow	Middle Clough	Clough Wood	Grassland
Syrphidae:					
<i>Helophilus pendulus</i>	+	+	+	+	+
<i>Helophilus trivittatus</i>		+			+
<i>Volucella pellucens</i>	+				
<i>Chrysotoxum festivum</i>	+	+			
<i>Eristalis tenax</i>	+		+	+	+
<i>Eristalis pertinax</i>	+	+			+
<i>Eristalis arbustorum</i>		+			
<i>Eristalis intricarius</i>		+			
<i>Melanostoma scalare</i>	+	+			
<i>Sphaerophoria scripta</i>	+				+
<i>Syritta pipiens</i>	+				+
<i>Episyrphus balteatus</i>		+			+
<i>Meredon equestris</i>		+			
<i>Scaeva pyrastris</i>					+
<i>Syrphus ribesii</i>	+	+	+	+	
<i>Syrphus vitripennis</i>	+	+			
<i>Rhingia campestris</i>		+		+	+
Empididae:					
<i>Empis aestiva</i>		+		+	
<i>Hilara cornicula</i>	+				
<i>Rhamphomyia longipes</i>	+				
Dolichopodidae:					
<i>Chrystus graminus</i>				+	
<i>Dolichopus popularis</i>	+	+			
Opomyzidae:					
<i>Opomyza germinationis</i>			+	+	
Sphaeroceridae:					
<i>Alloborborus pallifrons</i>	+		+	+	
Muscidae:					
<i>Hydrotea cyrtoneurina</i>	+		+	+	
Fanniidae:					
<i>Fannia postica</i>	+		+	+	
Total Diptera/site	20	15	8	11	11

INCIDENTAL RECORDS:	Greenbank Wood	Oxbow	Middle Clough	Clough Wood	Grassland
LEPIDOPTERA					
Speckled Wood	+		+		
Comma		+			
Green-veined White					+
Large White		+			+
6-spot Burnet					+
HYMENOPTERA					
<i>Apis mellifera</i>	+				
<i>Bombus lapidarius</i>		+			+
<i>Bombus pascuorum</i>		+			
<i>Bombus lucorum</i>					+
TOTAL SPECIES PER SITE	46	38	20	17	33

KEY

-  Fen
-  Grassland
-  Open Water
-  Tall Herb
-  Woodland



**HABITAT MAP
MARSHALL'S ARM**