

Getting and keeping the flora: long term management

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Basic Method used by ICT & Peter Millett

- Chose receptor site carefully
- Use SSSI-quality source
- Harvest at normal hay time
- Transfer as soon as cut
- Remove existing vegetation on receptor site
- Cultivation is not necessary on lighter soils
- Spread over twice area
- Do not cut before hay-making time
- Annual cut and remove early August is minimum
- Management MUST be agreed long-term



Species Transfer success at Bushbury Hill

- Success:

Anthoxanthum odoratum, *Centaurea nigra*, *Cerastium fontanum*, *Cynosurus cristatus*, *Dactylis glomerata*, *Festuca rubra*, *Holcus lanatus*, *Hypochaeris radicata*, *Leucanthemum vulgare*, *Leontodon hispidus*, *Lolium perenne*, *Plantago lanceolata*, *Primula veris*, *Ranunculus bulbosus*, *Rhinanthus minor*, *Rumex acetosa*, *Trifolium dubium*, *Trifolium pratense*, *Trifolium repens*, *Trisetum flavescens*, *Bellis perennis*, *Taraxacum* sp.,

- Partial success:

Achillea millifolium, *Agrostis capillaris*, *Briza media*, *Conopodium majus*, *Prunella vulgaris*, *Ranunculus acris*, *Lotus corniculatus*.

- Failure:

Botrychium lunaria, *Campanula rotundifolium*, *Dactylorhiza fuchsii*, *Galium verum*, *Lathyrus pratensis*, *Lathyrus linifolius*, *Linum catharticum*, *Ophioglossum vulgatum*, *Pilosella officinalis*, *Platanthera chlorantha*, *Potentilla erecta*, *Vaccinium myrtillus*, *Veronica chamaedrys*, *Vicia cracca*, *Viola lutea*, *Viola riviniana*



BUSHBURY HILL - representative 2m x 2m quadrats in 2015, 31 years after strewing.

Values are dominns

sample	1	2	3	4	5	6
Agrostis capillaris	4	3	3		3	
Anthoxanthum odoratum	2	2	1	2	4	1
Arrhenatherum elatius			4	4	4	
Briza media	3					
Centaurea nigra	4			5		4
Cerastium fontanum	1					1
Crepis biennis				4	5	
Cynosurus cristatus	4	4	4	3	4	4
Dactylis glomerata	4	4	5	5	4	3
Equisetum arvense	4			4	5	4
Festuca rubra	3	3	3	2	4	5
Fraxinus excelsior	1					
Heracleum sphondylium					4	
Holcus lanatus	4	4	4	4	4	4
Leucanthemum vulgare	2	3	1			
Lolium perenne	4	4	4	4	3	2

sample	1	2	3	4	5	6
Medicago lupulina						1
Plantago lanceolata	5	6	4	4	3	7
Poa trivialis				1		
Ranunculus acris	4					
Rhinanthus minor	3			1	3	4
Rumex acetosa						
Taraxacum spp.	1		1			
Tragopogon pratense			1		1	
Trifolium pratense	7	7	7	5	7	6
Trifolium repens		5	5			
Trisetum flavescens	1	4	4	4		3
Brachythecium rutabulum			1			
Calliergonella cuspidata	4					
Kindbergia praelonga	1		1			





Species successfully transferred from Eades meadow to Kitchen Lane landfill site Wolverhampton (assessed after 7 years)

<i>Agrostis capillaris</i>	<i>Allium vineale</i>	<i>Anthoxanthum odoratum</i>
<i>Bromus racemosus</i>	<i>Bromus hordeaceus</i>	<i>Centaurea nigra</i>
<i>Cerastium fontanum</i>	<i>Crepis biennis</i>	<i>Crepis capillaris</i>
<i>Cynosurus cristatus</i>	<i>Dactyloctenium aegyptium</i>	<i>Dactylis glomerata</i>
<i>Schedonorus pratensis</i>	<i>Festuca rubra</i>	<u><i>Avenula pubescens</i></u>
<i>Holcus lanatus</i>	<u><i>Hordeum secalinum</i></u>	<i>Hypochaeris radicata</i>
<i>Lathyrus pratensis</i>	<i>Scorzonera autumnalis</i>	<i>Leucanthemum vulgare</i>
<i>Neottia ovata</i>	<i>Lotus corniculatus</i>	<u><i>Anacamptis morio</i></u>
<i>Plantago lanceolata</i>	<i>Poa pratensis</i>	<i>Poa trivialis</i>
<i>Prunella vulgaris</i>	<i>Ranunculus acris</i>	<i>Ranunculus bulbosus</i>
<i>Ranunculus repens</i>	<i>Rhinanthus minor</i>	<i>Rumex acetosa</i>
<i>Tragopogon pratensis</i>	<i>Trifolium dubium</i>	<i>Trifolium pratense</i>
<i>Trifolium repens</i>	<i>Trisetum flavescens</i>	

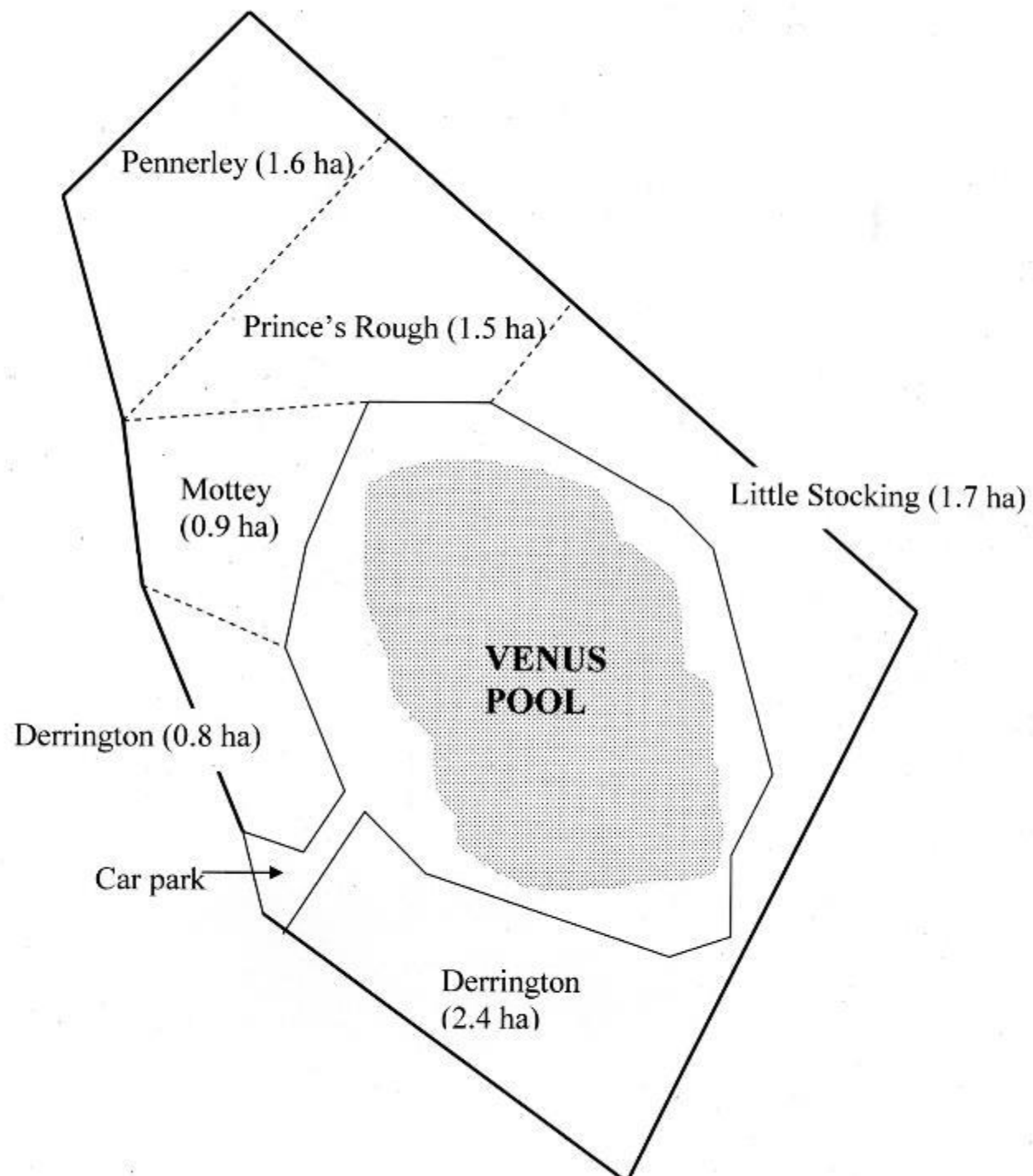
KITCHEN LANE - representative 2m x 2m quadrats in 2015,
(20 years after strewing; Values are dominants)

	1	2	3	4	5
Agrostis capillaris	3	2	4	4	4
Anacamptis morio	3		3		
Anthoxanthum odoratum	4	5	4	4	4
Arrhenatherum elatius				4	5
Bromus racemosus	2			2	3
Carex flacca	2				
Centaurea nigra	4	4	4	1	5
Cerastium fontanum				1	
Crepis biennis	4	5	4	4	
Cynosurus cristatus	3	4	1	3	1
Dactylis glomerata		2		4	4
Festuca rubra	3	3	3	4	4
Avenula pubescens	2	4	4	4	4
Holcus lanatus		2	2	2	4
Leontodon hispidus	8	5	8		
Leucanthemum vulgare			2	2	

	1	2	3	4	5
Lolium perenne				2	
Lotus corniculatus	4	4	4	1	
Plantago lanceolata	5	5	4	4	4
Primula veris	1	1	4	5	4
Prunella vulgaris	4	5	4		
Ranunculus acris	4	5	4		
Rhinanthus minor	4	4	3	4	4
Rumex acetosa	1			4	
Stellaria graminea		1			
Taraxacum spp.				4	
Trifolium pratense	4	5	5	7	
Trifolium repens				4	3
Trisetum flavescens				4	
Calliergonella cuspidata	5				
Brachythecium rutabulum		4	4	4	3



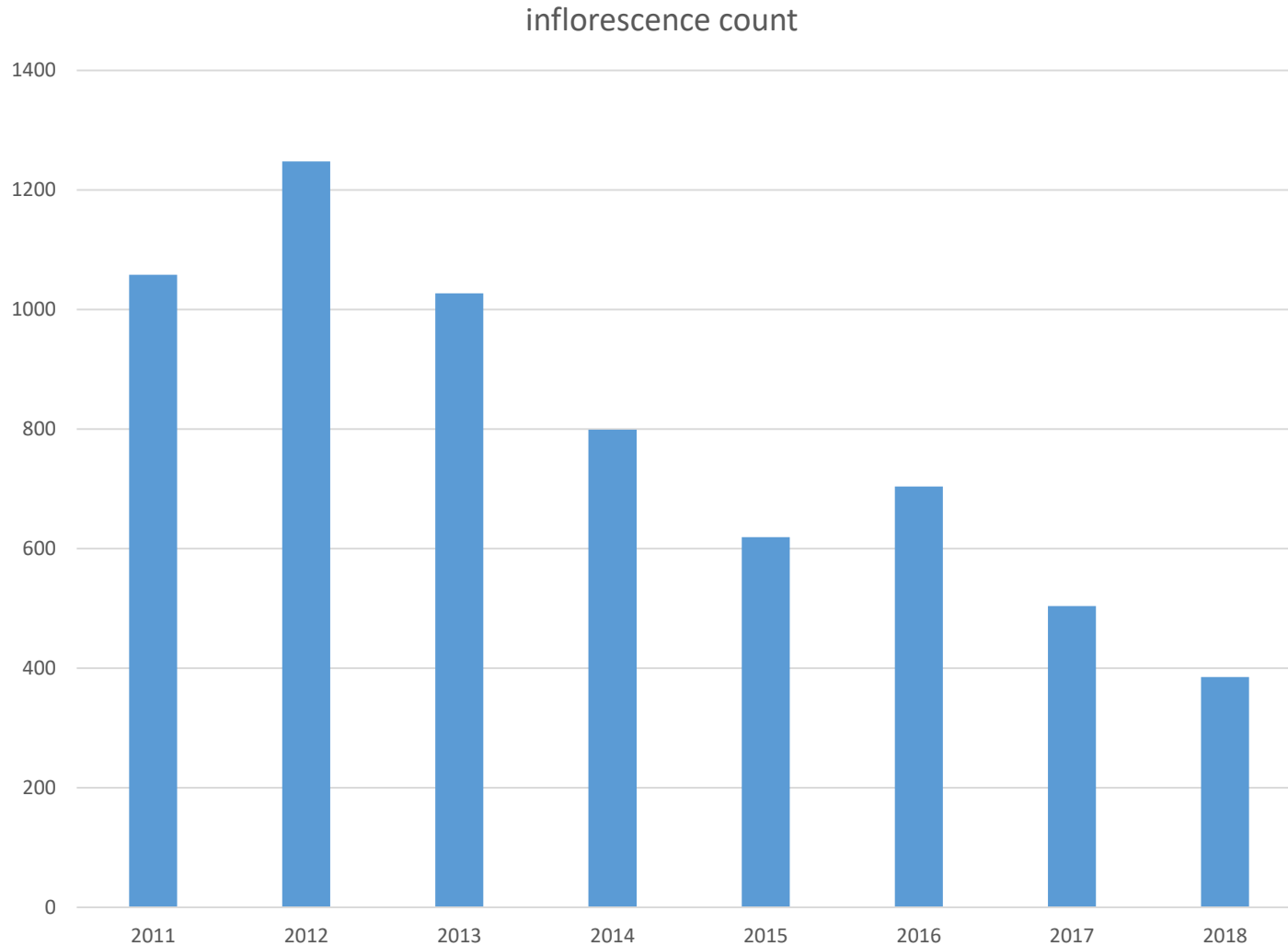












Total number of *Anacamptis morio* inflorescences in area at Venus Pool strewn from Little Stocking Meadow, Shropshire in 2001. Annual mucking started 2013

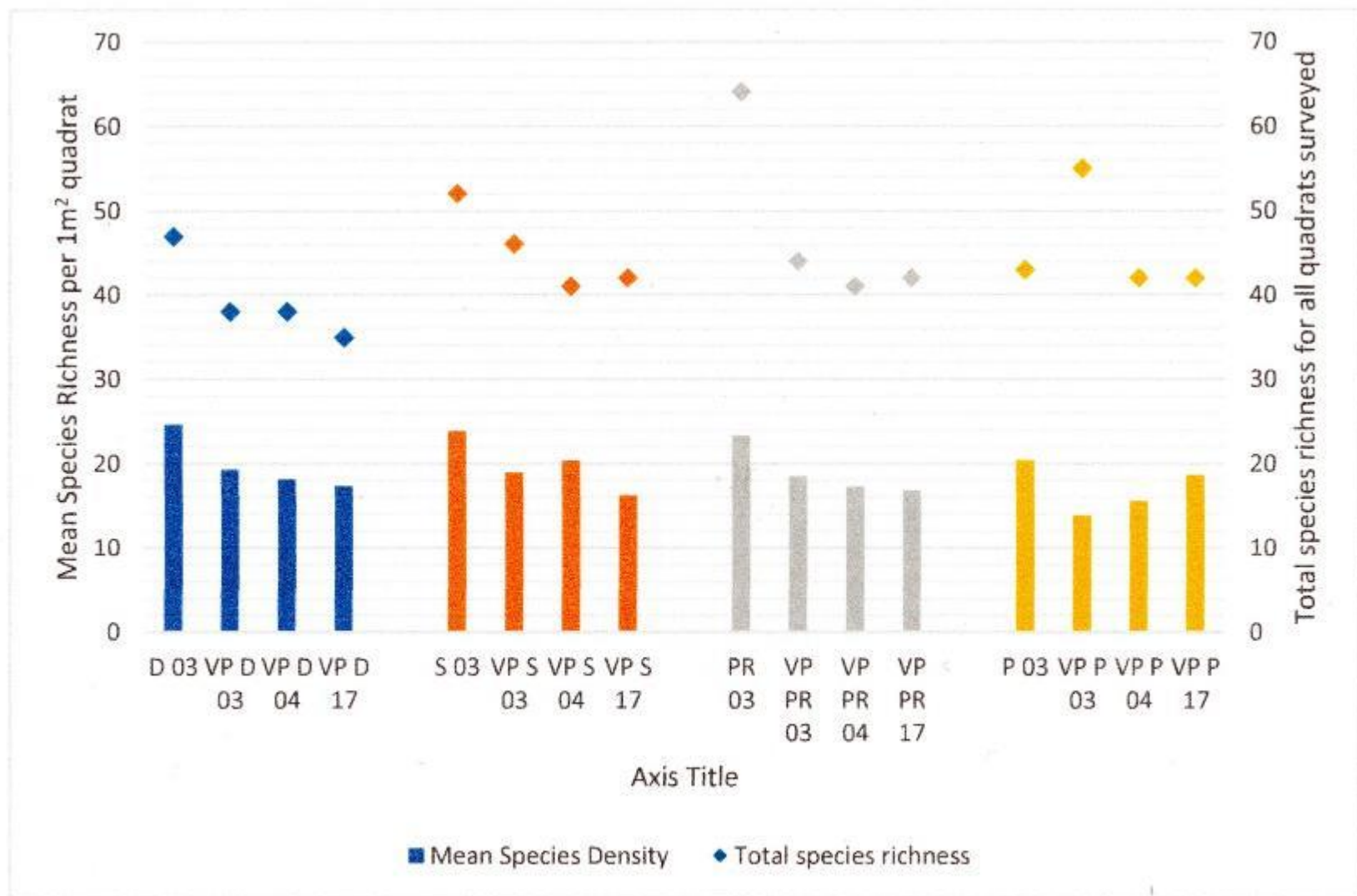


Figure 3. Mean species richness per 1m² quadrat and total species richness across quadrats for each meadow in each year surveyed.

C.M. Jones (2018)

MG5 Constants (35+ years)

Agrostis capillaris

Anthoxanthum odoratum

Centaurea nigra

Cynosurus cristatus

Dactylis glomerata

Festuca rubra

Holcus lanatus

Lotus corniculatus (18+)

Plantago lanceolata

Trifolium pratense

Trifolium repens

OTHER SPECIES IN MG5 GRASSLANDS

Readily transfer	Moderately transfer	No record of transfer
Avenula pubescens 24+	Allium vineale 7	Botrychium lunaria
Bromus hordeaceus 32	Alopecurus pratensis 18+	Cardamine pratensis
Bromus racemosus 24+	Betonica officinalis 23	Campanula rotundifolia S34+
Cerastium fontanum 35+	Briza media 32	Danthonia decumbens
Crepis biennis 24+	Carex flacca 24+	Galium verum S34+
Heracleum sphondylium 35+	Conopodium majus 35+	Genista tinctoria S34+
Hypochaeris radicata 11	Crepis capillaris 18+	Knautia arvensis
Leontodon hispidus 24+	Euphrasia sp. 18+	Lathyrus linifolius
Leucanthemum vulgare 32	Juncus inflexus 18+	Linum catharticum S34
Luzula campestris 18+	Lathyrus pratensis 18+	Pilosella officinalis
Poa pratensis 18+	Rumex acetosa 24+	Potentilla reptans
Poa trivialis 32	Potentilla erecta 5	Ophioglossum vulgatum
Primula veris 24+	Schedonorus pratensis 7	Phleum bertolonii
Prunella vulgaris 24+	Scorzoneroidea autumnalis 7	Phleum pratense
Ranunculus acris 35+	Silaum silaus 23	
Ranunculus bulbosus 32	Tragopogon pratensis 18+	
Rhinanthus minor 35+	Veronica chamaedrys 18+	
Stellaria graminea 24+	Vicia cracca 18+	
Trifolium dubium 18+		
Trisetum flavescens 32		

Numbers are years known to persist; + = present in 2019; S= only from seed

Orchids

***Anacamptis morio* Green-winged Orchid.** Transfers readily and persists indefinitely (24 years)

***Anacamptis pyramidalis* Pyramidal Orchid.** Transferred readily on limed receptor site, persisted for 18 years but lost when site was not maintained

***Dactylorhiza fuchsii* Common Spotted-orchid.** Transfers readily, can persist indefinitely (18 years)

***D. maculata* Heath Spotted-orchid.** Seems to transfer and persist for at least 18 years, but little data

***D. praetermissa* Southern Marsh-orchid.** Transfers readily, persists indefinitely (18 years)

D. fuchsii* x *praetermissa Transfers readily, persists indefinitely (18 years)

***Ophrys apifera* Bee Orchid.** Appears, sometimes in numbers on hay-strewn and seed-sown sites but rarely persists (20 years on one v. open site)

***Neottia ovata* Common Twayblade.** Transferred at one site in small numbers, persisted 12 years

***Orchis mascula* Early-purple Orchid.** No success, but only present in small numbers on the one source site used.

***Platanthera chlorantha* Greater Butterfly-orchid** No success, but in small numbers on the one source site used, but used many times.

***Coeloglossum viride* Frog Orchid.** No success, but in small numbers on the one source site used.

‘WEEDS’

- Avoid sites with infestations of such perennial weeds **as *Rumex obtusifolius* or *Cirsium arvense*** or with significant quantities of their seeds in the seed bank. I have however seen them removed by herbicide weed wipes. ***Jacobaea vulgaris* (*Senecio jacobaea*)** is also to be avoided. ***Equisetum arvense*** can become frequent in landfill sites and can only be accepted.
- ***Arrhenatherum elatius* and *Dactylis glomerata*** may increase with under-management and excessive soil fertility. Consistent hay meadow management may control. Aftermath grazing especially. ***Lolium perenne*** may persist after pasture especially in more fertile soils. ***Holcus lanatus*** is often abundant in the first year after hay strewing, but rarely remains so.
- Many **annual weeds** may be prominent in the first year, especially after arable, but most species can be safely ignored since they will be unable to persist without regular disturbance. ***Vulpia bromoides*** has persisted in the dry grasslands at Venus Pool.
- I have had problems with ***Vicia sativa* and *Ervilia (Vicia) hirsuta*** which can build up in a created meadow. Fairly early and very regular hay making will limit their seed production and they seem eventually to abate. On the other hand ***Myosotis discolor*** successfully and welcomely transferred from arable to meadow at Venus Pool.











SPECIES IN WET GRASSLAND AT VENUS POOL AFTER 18 YEARS

Agrostis canina	Dactylis glomerata	Mentha aquatica
Agrostis capillaris	Dactylorhiza spp. & hybrids	<u>Myosotis discolor</u>
Agrostis stolonifera	(Danthonia decumbens 5 years)	Plantago lanceolata
Anthoxanthum odoratum	Deschampsia cespitosa	(Plantago major 5 years)
Bellis perennis	Eleocharis palustris	Poa trivialis
(Briza media 5 years)	Epilobium hirsutum	Prunella vulgaris
Caltha palustris	Epilobium palustre	Ranunculus acris
Cardamine pratensis	Festuca rubra	Ranunculus flammula
Carex acutiformis	Filipendula ulmaria	Ranunculus repens
Carex disticha	Galium palustre	Rumex acetosa
Carex flacca	Glyceria fluitans	(Rumex crispus 5 years)
Carex hirta	Holcus lanatus	Rumex conglomeratus
Carex nigra	Juncus acutiflorus	Sagina procumbens
Carex leporina	Juncus articulatus	Salix caprea
(Carex pallescens 17 years)	Juncus conglomeratus	Sanguisorba officinalis
Carex panicea	Juncus effusus	<u>(Succisa pratensis 5 years?)</u>
Centaurea nigra	Juncus inflexus	(Taraxacum agg. 5 years)
(Centaureum erythraea 5 years)	Lolium perenne	(Trifolium dubium 5 years)
Cerastium fontanum	Lotus corniculatus	Trifolium pratense
Cirsium dissectum	Lotus pedunculatus	Trifolium repens
Cirsium palustre	(Luzula campestris 5 years)	Veronica beccabunga
(Crassula helmsii lost ?)	Silene flos-cuculi	(Vulpia bromoides 5 years)
Cynosurus cristatus	Lycopus europaeus	