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Appendix A

Description of mapping units used for mapping the Magela floodplain in June 1996 (descriptions of the four grassland mapping units are given in Chapter 2).

Melaleuca open woodland

These areas consisted of scattered *Melaleuca leucadendra* (cover <10%) with a mixture of understorey species. These were usually the same as those in adjacent areas of the floodplain and included the grasses *Hymenachne acutigluma*, *Oryza meridionalis* and *Pseudoraphis spinescens* with *Nelumbo nucifera, Nymphoides* spp., *Nymphaea* spp. also present (Finlayson *et al.* 1989). This mapping unit covered 1511 ha, 17% of the total area mapped in 1996.

Melaleuca Open Forest/Woodland

This mapping unit occurred predominantly around the margins of the floodplain and in the southernmost section of the area mapped. It covered 819 ha, 9% of the total area mapped in 1996, and was comprised of areas dominated by one or more Melaleuca species (cover 10-70%). These included *Melaleuca viridiflora, Melaleuca symphyocarpa* and *Melaleuca leucadendra.* The understorey contained a wide variety of species including *Brachiaria mutica*, *Hymenachne acutigluma*, *Oryza meridionalis*, *Pseudoraphis spinescens*, *Ecliptica prostrata, Coldenia procumbens, Dentella dioeca, Glinus oppositifolius, Heliotropium indicum, Phyla nodiflora, Euphorbia vachellii, Fimbristylis* spp., *Nymphaea* spp. and *Nymphoides* spp. (Finlayson *et al.* 1989).

Nelumbo swamp

The Nelumbo swamp covered 1466 ha (16%) of the area mapped in 1996. It occurred mainly in the western plain section of the floodplain and was dominated by large patches of *Nelumbo nucifera.* In areas that were not so densely populated, *Nymphoides* spp., and floating mats of *Hymenachne acutigluma* with *Ludwigia adscendens* and *Cyperus platystylis* were common (Finlayson *et al.* 1989).

Hymenachne/Eleocharis swamp

This vegetation type covered 572 ha (6%) scattered in the northern section of the area mapped in 1996 and it consisted of a variety of sedges including *Eleocharis dulcis* and *Eleocharis sphacelata* co-occurring with *Hymenachne acutigluma* and in some cases with *Oryza meridionalis*. *Nymphaea* spp. and *Nymphoides* spp. were also common in this community (Finlayson *et al.* 1989).

Mixed Grassland/Sedgeland

This mapping unit was found to cover a small area (89 ha, 1%) in the south in 1996. It contained a mixture of species including the grasses *Hymenachne acutigluma*, *Oryza meridionalis*, and *Pseudoraphis spinescens.* The sedges *Eleocharis dulcis, Eleocharis sphacelata, Cyperus platystylis* and the herbs *Ludwigia adscendens, Ipomoea aquatica* and *Nymphoides* spp. were also found (Finlayson *et al.* 1989).

Terrestrial Vegetation

This mapping unit was not extensively examined, but the species occurring within it include the trees *Eucalyptus papuana, E. miniata, E. alba, Alstonia actinophylla, Syzigium suborbiculare* (Finlayson *et al.* 1989).

Appendix B

The Disk supplied contains two text files; germ.aso and vg120.aso. These files are the association matricies generated by PATN (Belbin 1993b).

Appendix C

Significant differences found in species richness and diversity of quadrat data collected from a vegetation survey in four grassland communities on the Magela floodplain in dry and wet seasons (1995-1996)

Table C.1 LSD test on species richness of nested quadrat data collected from four grassland communities on the Magela floodplain during wet and dry seasons of 1995-96 (*Brachiaria*, *Oryza*, *Hymenachne* and *Pseudoraphis* grasslands). (** = p < 0.01, *** = p < 0.001).

	Oryza grassland	*Hymenachne* grassland	*Pseudoraphis* grassland
Brachiaria grassland	< 0.001***	< 0.001***	0.441
Oryza grassland	↘	< 0.001***	.002**
Hymenachne grassland		↘	< 0.001***

Table C.2 Results from two factor ANOVA (LSD test) showing differences in mean species richness between *Brachiaria* grassland (Bm), *Oryza* grassland (Om), *Hymenachne* grassland (Ha) and *Pseudoraphis* grassland (Ps) on the Magela floodplain for dry and wet seasons, 1995-96 (* = p < 0.05, *** = p < 0.001).

	Bm (Wet)	Om (Dry)	Om (Wet)	Ha (Dry)	Ha (Wet)	Ps (Dry)	Ps (Wet)
Bm (Dry)	0.068	0.056	< 0.001***	< 0.001***	<0.001***	0.547	< 0.001***
Bm (Wet)	↘	0.953	< 0.001***	< 0.001***	0.012*	0.016*	0.093
Om (Dry)		↘	< 0.001***	< 0.001***	0.013*	0.013*	0.099
Om (Wet)			↘	< 0.001***	0.399	< 0.001***	0.079
Ha (Dry)				↘	<0.001***	< 0.001***	< 0.001***
Ha (Wet)					↘	< 0.001***	0.363
Ps (Dry)						↘	< 0.001***

Table C.3 LSD test on species diversity (Shannon Index) of nested quadrat data collected from four grassland communities on the Magela floodplain during wet and dry seasons of 1995-96 (*Brachiaria*, *Oryza*, *Hymenachne* and *Pseudoraphis* grasslands). (* = p < 0.05, *** = p < 0.001).

	Oryza grassland	*Hymenachne* grassland	*Pseudoraphis* grassland
Brachiaria grassland	< 0.001***	< 0.001***	0.039*
Oryza grassland	↘	< 0.001***	< 0.001***
Hymenachne grassland		↘	< 0.001***

Table C.4 Results from two factor ANOVA (LSD test) showing differences in species diversity (Shannon Index) between *Brachiaria* grassland (Bm), *Oryza* grassland (Om), *Hymenachne* grassland (Ha) and *Pseudoraphis* grassland (Ps) on the Magela floodplain for dry and wet seasons, 1995-96 (* = p < 0.05, ** = p < 0.01, *** = p < 0.001).

	Bm (Wet)	Om (Dry)	Om (Wet)	Ha (Dry)	Ha (Wet)	Ps (Dry)	Ps (Wet)
Bm (Dry)	0.005**	< 0.001***	< 0.001***	< 0.001***	<0.001***	0.327	< 0.001***
Bm (Wet)	↘	0.153	< 0.001***	< 0.001***	<0.001***	< 0.001***	< 0.001***
Om (Dry)		↘	< 0.001***	< 0.001***	0.010*	< 0.001***	0.014*
Om (Wet)			↘	0.008**	0.199	< 0.001***	0.148
Ha (Dry)				↘	<0.001***	< 0.001***	< 0.001***
Ha (Wet)					↘	< 0.001***	0.884
Ps (Dry)						↘	< 0.001***

Appendix D

Significant differences found within and among grassland sediment samples collected from four grasslands on the Magela floodplain (1995) and germinated under flooded and moist water regimes.

Table D.1: LSD test on species richness of seedlings emerging from samples collected along three transects in a *Oryza* grassland on the Magela floodplain (Nov 95) and germinated under two treatments (T = transect, * = p < .05, ** = p < .01)

	T5	T6
T4	0.477	0.018*
T5	↳	0.003**

Table D.2: LSD test on total number of seedlings emerging from samples collected along three transects in a *Hymenachne* grassland on the Magela floodplain (Nov 95) and germinated under two treatments (log(x+1) transformed data)(T = transect, * = p < 0.05, ** = p < 0.01)

	T8	T9
T7	0.433	0.002**
T8	↳	0.014*

Table D.3: LSD test on interactions of total number of seedlings (log(x+1) transformed) emerging from samples collected in a *Hymenachne* grassland on the Magela floodplain (Nov 95) with germination under two water regimes (T = transect, M = moist, F = flooded; *** = p < 0.001)

	T7 M	T8 F	T8 M	T9 F	T9 M
T7 F	0.479	0.281	0.463	< 0.001***	0.422
T7 M	↳	0.704	0.979	< 0.001***	0.923
T8 F		↳	0.723	< 0.001***	0.777
T8 M			↳	< 0.001***	0.943
T9 F				↳	< 0.001***

Table D.4: LSD test on species richness of seedlings emerging from samples collected along three transects in a *Hymenachne* grassland on the Magela floodplain (Nov 95) and germinated under two treatments (T = transect, * = p < 0.05)

	T8	T9
T7	0.046*	0.013*
T8	↳	0.565

Table D.5: LSD test on species richness of seedlings emerging from samples collected along three transects in a *Pseudoraphis* grassland on the Magela floodplain (Nov 95) and germinated under two treatments (** = p < 0.01)

	T11	T12
T10	0.009**	0.065
T11	↳	0.382

Table D.6: LSD test on species richness of seedlings emerging from samples collected in four grassland vegetation types on the Magela floodplain (Nov 95) and germinated under two treatments (Bm = *Brachiaria* grassland, Ha = *Hymenachne* grassland, Om = *Oryza* grassland, Ps = *Pseudoraphis* grassland; ** = p < 0.01, *** = p < 0.001)

	Om	Ha	Ps
Bm	<0.001***	0.163	<0.001***
Om	↳	0.006**	0.899
Ha		↳	0.008**

Table D.7: LSD test on interactions of species richness of seedlings emerging from samples collected in four grassland vegetation types on the Magela floodplain (Nov 95) with germination under two water regimes (Bm = *Brachiaria* grassland, Ha = *Hymenachne* grassland, Om = *Oryza* grassland, Ps = *Pseudoraphis* grassland, M = moist, F = flooded; * = p < 0.05, ** = p < 0.01, *** = p < 0.001)

	Bm M	Ha F	Ha M	Om F	Om M	Ps F	Ps M
Bm F	0.107	0.719	1.000	1.000	< 0.001***	0.589	< 0.001***
Bm M	↳	0.049*	0.107	0.107	< 0.001***	0.032*	< 0.001***
Ha F		↳	0.719	0.719	< 0.001***	0.857	0.002**
Ha M			↳	1.000	< 0.001***	0.589	< 0.001***
Om F				↳	< 0.001***	0.589	< 0.001***
Om M					↳	< 0.001***	0.472
Ps F						↳	0.002**

Appendix E

Table E.1 Seedlings estimated to emerge from 1m^2 of grassland communities on the Magela floodplain in 1984 and 1996 (1984 data from Finlayson *et al.* (1990).

Taxa	Treatment	Number of seedlings calculated per square metre						
		Oryza 1984	*Brachiaria* 96	*Oryza* 96	*Pseudoraphis* 84	*Pseudoraphis* 96	*Hymenachne* 84	*Hymenachne* 96
Blyxa aubertii	M	NA	0	0	NA	0	NA	0
	F	NA	0	0	NA	71 ± 41	NA	0
Brachiaria mutica	M	NA	121 ± 40	0	NA	0	NA	10 ± 10
	F	NA	0	0	NA	0	NA	0
Cyperus aquatilis	M	NA	0	20 ± 14	NA	0	NA	0
	F	NA	0	0	NA	0	NA	0
Cyperus platystylis	M	NA	10 ± 10	0	NA	0	NA	414 ± 282
	F	NA	0	0	NA	0	NA	1313 ± 708
Cyperus serotinus	M	NA	10 ± 10	10 ± 10	NA	0	NA	2182 ± 858
	F	NA	10 ± 10	0	NA	0	NA	980 ± 480
Cyperus digitatus	M	0	0	0	121 ± 56	0	393 ± 242	0
	F	0	0	0	30 ± 30	0	967 ± 383	0
Ceratopteris thalictroides	M	0	182 ± 102	808 ± 527	30 ± 30	0	0	20 ± 14
	F	483 ± 166	71 ± 44	929 ± 634	0	0	0	0
Chara spp.	M	NA	0	0	NA	0	NA	0
	F	NA	1222 ± 321	455 ± 147	NA	71 ± 49	NA	354 ± 134
Coldenia procumbens	M	NA	20 ± 14	61 ± 36	NA	0	NA	91 ± 57
	F	NA	0	0	NA	0	NA	0
Commelina lanceolata	M	NA	0	20 ± 14	NA	0	NA	0
	F	NA	0	0	NA	0	NA	0
Dentella dioeca	M	NA	0	0	NA	0	NA	293 ± 179
	F	NA	0	0	NA	0	NA	0
Ecliptica prostrata	M	NA	0	0	NA	10 ± 10	NA	202 ± 73
	F	NA	0	0	NA	0	NA	141 ± 52
Eleocharis spp.	M	272 ± 212	242 ± 86	101 ± 38	30 ± 30	606 ± 574	0	0
	F	0	182 ± 73	101 ± 44	0	232 ± 149	0	10 ± 10
Eriocaulon setaceum	M	2145 ± 848	40 ± 23	141 ± 65	0	0	0	0
	F	1602 ± 151	10 ± 10	192 ± 56	0	0	60 ±36	0
Euphorbia vachellii	M	NA	0	0	NA	0	NA	10 ± 10
	F	NA	0	0	NA	0	NA	0
Fimbristylis spp.	M	0	30 ± 30	61 ± 44	786 ± 348	0	1571 ±589	81 ± 57
	F	0	0	10 ± 10	0	0	181 ±110	51 ± 51
Glinus oppositifolius	M	30 ± 30	20 ± 20	30 ± 16	2659 ± 880	6091 ± 2958	604 ±136	919 ± 561
	F	30 ± 30	0	0	242 ± 106	333 ± 161	30 ±30	0
Heliotropium indicum	M	725 ± 212	111 ± 45	778 ± 245	60 ± 36	0	876 ±348	10 ± 10
	F	0	0	0		0	60 ±36	0
Hydrilla verticillata	M	NA	0	0	NA	0	NA	0
	F	NA	0	0	NA	0	NA	51 ± 35
Hygrochloa aquatica	M	725 ± 91	0	0	0	0	0	0
	F	181 ± 147	0	0	0	0	0	0
Hymenachne acutigluma	M	0	0	0	0	0	242 ±21	384 ± 135
	F	0	0	0	0	0	91 ±30	81 ± 32
Isoetes spp.	M	1450 ± 438	2404 ± 977	3141 ± 1258	0	10 ± 10	0	0
	F	121 ± 91	141 ± 48	374 ± 125	0	0	0	0
Ludwigia adscendens	M	NA	0	0	NA	0	NA	0
	F	NA	0	0	NA	0	NA	91 ± 39
Ludwigia perennis	M	NA	0	10 ± 10	NA	0	NA	0
	F	NA	0	10 ± 10	NA	0	NA	0
Limnophila spp.	M	1179 ± 1027	444 ± 110	192 ± 75	0	0	0	0
	F	544 ± 212	677 ± 177	404 ± 114	0	0	0	0
Maidenia rubra	M	60 ± 36	111 ± 48	81 ± 36	0	0	0	141 ± 79
	F	635 ± 105	293 ± 83	303 ± 44	30 ± 30	0	0	81 ± 25
Najas spp.	M	181 ± 76	30 ± 22	0	222 ± 151	20 ± 20	30 ±30	61 ± 61
	F	0	657 ± 168	404 ± 69	1238 ± 393	30 ± 22	1450 ±196	444 ± 181
Nitella sp.	M	NA	606 ± 251	30 ± 30	NA	20 ± 20	NA	141 ± 111
	F	NA	4273 ± 492	1394 ± 227	NA	1141 ± 386	NA	1040 ± 368
Nymphaea spp.	M	0	283 ± 67	20 ± 14	846 ± 332	1283 ± 279	212 ±181	727 ± 222
	F	0	192 ± 56	61 ± 25	423 ± 91	889 ± 149	1934 ±438	909 ± 186
Nymphoides spp.	M	NA	283 ± 74	51 ± 32	NA	61 ± 41	NA	1566 ± 467
	F	NA	152 ± 59	111 ± 72	NA	131 ± 71	NA	576 ± 166
Oldenlandia sp.	M	NA	0	10 ± 10	NA	0	NA	10 ± 10
	F	NA	0	0	NA	10 ± 10	NA	0
Oryza meridionalis	M	272 ± 56	10 ± 10	20 ± 14	0	0	60 ±30	0
	F	0	10 ± 10	10 ± 10	0	0	0	0
Persicaria spp.	M	NA	0	0	NA	0	NA	81 ± 33
	F	NA	0	0	NA	0	NA	10 ± 10
Phyla nodiflora	M	NA	0	40 ± 40	NA	0	NA	0
	F	NA	0	0	NA	0	NA	0
Pseudoraphis spinescens	M	0	20 ± 14	172 ± 57	6316 ± 3536	1333 ± 310	11060 ±2040	1182 ± 421
	F	0	0	0	604 ± 212	71 ± 33	1813 ±544	71 ± 36
Utricularia spp.	M	0	10 ± 10	0	60 ± 60	20 ± 20	30 ±30	91 ± 46
	F	0	222 ± 99	121 ± 68	393 ± 212	909 ± 415	363 ±106	263 ± 79

Appendix F

Significant differences found in production of flowering culms (m^{-2}), florets per inflorescence, germination of seeds, viability of ungerminated seeds and overall viability of seeds of four grass species that dominate different grassland communities on the Magela floodplain.

Table F.1: Results of LSD test (p values) on the number of flowering culms m^{-2} recorded for *Brachiaria mutica, Oryza meridionalis, Hymenachne acutigluma* and *Pseudoraphis spinescens* recorded in their respective vegetation types during peak biomass production (May 1996) (*** = $p < 0.001$).

	Oryza meridionalis	*Hymenachne acutigluma*	*Pseudoraphis spinescens*
Brachiaria mutica	< 0.001***	< 0.001***	< 0.001***
Oryza meridionalis	↳	< 0.001***	< 0.001***
Hymenachne acutigluma		↳	0.431

Table F.2: Results of LSD test (p values) on the number of florets per inflorescence recorded for *Brachiaria mutica, Oryza meridionalis, Hymenachne acutigluma* and *Pseudoraphis spinescens* during peak biomass production (May 1996) (*** = $p < 0.001$).

	Oryza meridionalis	*Hymenachne acutigluma*	*Pseudoraphis spinescens*
Brachiaria mutica	< 0.001***	< 0.001***	< 0.001***
Oryza meridionalis	↳	< 0.001***	< 0.001***
Hymenachne acutigluma		↳	< 0.001***

Table F.3: Results of LSD test (p values) on percentage germination of *Brachiaria mutica, Oryza meridionalis, Hymenachne acutigluma* and *Pseudoraphis spinescens* seeds placed in a growth cabinet for three weeks (*** = $p < 0.001$).

	Oryza meridionalis	*Hymenachne acutigluma*	*Pseudoraphis spinescens*
Brachiaria mutica	0.396	< 0.001***	0.805
Oryza meridionalis	↳	< 0.001***	0.276
Hymenachne acutigluma		↳	< 0.001***

Table F.4: Results of LSD test (p values) on viability assessment (using tetrazolium chloride) of remaining ungerminated *Brachiaria mutica, Oryza meridionalis, Hymenachne acutigluma* and *Pseudoraphis spinescens* seeds after three weeks in a growth chamber (*** = $p < 0.001$).

	Oryza meridionalis	*Hymenachne acutigluma*	*Pseudoraphis spinescens*
Brachiaria mutica	0.155	0.071	< 0.001***
Oryza meridionalis	↳	< 0.01***	< 0.001***
Hymenachne acutigluma		↳	< 0.01***

Table F.5: Results of LSD test (p values) on overall viability (germination + tetrazolium chloride tests) of *Brachiaria mutica, Oryza meridionalis, Hymenachne acutigluma* and *Pseudoraphis spinescens* seeds. (* = $p < 0.05$,*** = $p < 0.001$).

	Oryza meridionalis	*Hymenachne acutigluma*	*Pseudoraphis spinescens*
Brachiaria mutica	0.116	0.476	< 0.001***
Oryza meridionalis	↳	0.028*	< 0.001***
Hymenachne acutigluma		↳	< 0.001***

Appendix G

List of taxa found in this study either emerging from sediment samples or present in the extant vegetation.

Azolla pinnata R. Br.
Blyxa aubertii Rich.
Brachiaria mutica (Forsskal) Stapf
Cyperus aquatilis R. Br.
C. platystylis R. Br.
C. serotinus Rottb.
Ceratopteris thalictroides (L.) Brongn.
Chara spp.
Coldenia procumbens L.
Commelina lanceolata R. Br.
Dentella dioeca Airy Shaw
Eclipta prostrata (L.) L.
Eleocharis spp.
Eriocaulon setaceum L.
Euphorbia vachellii Hook. & Arn.
Fimbristylis spp.
Glinus oppositifolius (L.) R.DC.
Heliotropium indicum L.
Hydrilla verticillata (L.f.) Royle
Hygrochloa aquatica Lazarides
Hymenachne acutigluma (Steudel) Gilliland
Ipomoea aquatica Forsskal
Isoetes coromandelina L. f.
Ludwigia adscendens (L.) H. Hara
L. perennis L.
Limnophila australis Wannan & J. T. Waterh.
Maidenia rubra Rendle
Merremia gemella (N. Burman) H Hallier
Najas spp.
Nelumbo nucifera Gaertner
Nitella spp.
Nymphaea spp.
Nymphoides spp.
Oldenlandia sp.
Oryza meridionalis N. Ng
Persicaria sp.
Phyla nodiflora (L.) E. Greene
Pseudoraphis spinescens (R. Br.) Vick.
Salvinia molesta D. Mitch.
Utricularia spp.