

10. Weeds and current management activities by catchment

10.1 Adelaide River (8)

- Total Area: 7417 km²
- Aboriginal Owned Land 742 km²
- Total Species Count: 1263
- Number of Weeds Recorded 60
- Percentage Flora as Weeds 4.75%

Aboriginal land

Cape Hotham, Djukbinj, Acacia Gap (part of the Delissaville/Wagait/Larrakia Aboriginal Land Trust).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 1	0.7	54.3	Mixed species closed-forest (monsoon vine-thicket).
Map unit 4	16.5	1220.6	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with a sorghum grassland understorey.
Map unit 9	4.6	343.7	<i>Eucalyptus tetradonta</i> (stringybark) <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) open-forest with a sorghum grassland understorey.
Map unit 11	3.3	241.64	<i>Eucalyptus miniata</i> (Darwin woollybutt) woodland with a sorghum grassland understorey.
Map unit 15	43.7	3241.8	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with a sorghum grassland understorey.
Map unit 18	0.3	19.2	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 21	11.6	862.7	<i>Eucalyptus tintinans</i> (salmon gum) with a sorghum grassland understorey.
Map unit 51	3.2	239.8	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 54	13.7	1016.7	Mixed closed-grassland/sedgeland (seasonal floodplain).

General land management issues

Aboriginal land (e.g. Acacia Gap) is downstream of Adelaide River township with consequent potential management problems.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Little is known about the extent of weed populations on Aboriginal land in this catchment. This catchment is severely infested with *Mimosa pigra* (mimosa). Introduced pasture grasses, *Hymenachne*

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amplexicaulis (olive hymenachne) and *Echinochloa polystachya* (aleman grass)¹⁷ are currently being trialed at a Government Research Station and populations of olive hymenachne are currently expanding. This species has also been planted on Mt Bunday Station near Adelaide River and at culverts south of the town that flow directly to the Adelaide River. Particularly at risk here is the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54).

Tothill and Gillies (1992) list severe *Sida* and *Hyptis* invasion affecting *Eriachne* spp (wanderrie grass) grasslands; and *Hyptis*, *Sida* and *Cassia* (*Senna*) on cleared overgrazed lands of *Chrysopogon* grasslands.

Eichhornia crassipes (water hyacinth) infestation in the Fogg Dam area is under continual treatment by the NTDPIF. A salvinia infestation was eradicated from the Adelaide River system in the 1980's (Miller and Pickering 1988).

Weeds

The following weed species have been recorded for this catchment:

Aeschynomene americana, *Aeschynomene villosa*, *Alysicarpus ovalifolius*, *Andropogon gayanus*, *Bidens pilosa*, *Calopogonium mucunoides*, *Centrosema pascuorum*, *Chloris gayana*, *Clitoria ternatea*, *Crotalaria goreensis*, *Crotalaria pallida*, *Cynodon dactylon*, *Cyperus brevifolius*, *Cyperus compressus*, *Desmanthus virgatus*, *Digitaria ciliaris*, *Echinochloa colona*, *Eichhornia crassipes*, *Eragrostis pilosa*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Evolvulus nummularis*, *Grewia asiatica*, *Heliotropium indicum*, *Hymenachne amplexicaulis*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Indigofera tinctoria*, *Ipomoea pes-tigridis*, *Ipomoea triloba*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Melia azadiracht*, *Melinis minutiflora*, *Melinis repens*, *Mimosa pigra*, *Passiflora foetida*, *Passiflora suberosa*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Ruellia tuberosa*, *Senna obtusifolia*, *Senna occidentalis*, *Sesamum indicum*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Sorghum bicolor*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Themeda quadrivalvis*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa maxima*.

Management initiatives and recommendations

Djukbinj National Park

Has a draft weed management plan which it is working to control major weed species. High-priority weeds have been identified and work is currently being carried out in strategic manner according to a work schedule.

Acacia Gap

Acacia/Larrakia Aboriginal Corporation has asked CFCU for assistance with controlling mimosa down the Manton River toward the Adelaide River. Their aim is to clear important resource billabongs and areas of floodplain for wildlife habitat. Currently the infestation is being mapped in conjunction with NTDPIF and planning for control work is under way. The floodplain is infested with approximately 365 hectares of mimosa which threatens to increase if not effectively managed. The community is also exploring the viability of a commercial wildlife harvesting program based primarily on magpie geese. Mimosa will decrease the areas of floodplain habitat available to the geese, and will inhibit the development of any harvesting program.

Currently no ILC money is set aside for the Acacia Gap. The area is of medium priority for input with much input needed. CFCU to assist community fill in an ILC survey form. However work can start—a spray trailer and chemical are available through CFCU. There are 10 young men on CDEP available for the work.

¹⁷ The weed status of *Echinochloa polystachya* is currently uncertain. It appears that cultivated material from the NT matches that of *E. praestans* from the NT and also New Guinea where the type material originates. The status of this species needs further checking thus has been omitted from any further weed lists in this report.

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Currently they are receiving some Batchelor Institute training in literacy and numeracy and will need basic mimosa control training and safe handling of herbicide training.

The presence of *Sorghum bicolor* in this catchment, although not yet a fully naturalised weed, is worth noting. This species has become a problem weed in Queensland and some populations in the Katherine region are expanding, particularly along creek lines. Landholders urgently need information about the potential of this species to establish itself outside of cultivation so informed choices can be made about permitting this species to grow on their country.

10.2 Barkly (30)

- Total Area: 12303 km²
- Aboriginal Owned Land 480 km²
- Total Species Count: 1096
- Number of Weeds Recorded: 5
- Percentage Flora as Weeds 0.4%

Aboriginal land

Small excisions from pastoral properties. South-east corner of the NT Freehold portions granted in settlement of the Wombaya land claim and now generally known as Wombaya or Lija Mukanpala.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 20	>1.0	90.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	1.0	1214.8	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	0.3	437.8	<i>Eucalyptus pruinosa</i> (silver box) low woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 25	3.3	4057.1	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 26	1.7	2082.0	<i>Eucalyptus microtheca</i> (coolibah) low-open woodland with <i>Eulalia aurea</i> (silky browntop), <i>Astrelba</i> (mitchell grass) grassland understorey.
Map unit 27	2.3	2857.2	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with open-grassland understorey.
Map unit 28	4.6	5637.3	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with <i>Chenopodium auricomum</i> (bluebush) sparse-shrubland understorey.
Map unit 31	0.2	212.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.

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Map unit 33	1.3	1610.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 34	1.8	2245.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 36	7.4	9084.3	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex), <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 39	4.2	5119.4	<i>Eucalyptus pruinosa</i> (silver box), <i>Lysiphillum cunninghamii</i> (bauhinia) low open-woodland with hummock/tussock grassland understorey
Map unit 40	>1.0	70.9	<i>Eucalyptus ferruginea</i> (rusty bloodwood) low open-woodland or <i>Jacksonia odontocarpa</i> open-shrubland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 41	2.7	3274.3	<i>Eucalyptus opaca</i> (bloodwood) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 42	19.2	23600.3	<i>Eucalyptus opaca</i> (bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 43	5.8	7162.5	<i>Eucalyptus</i> low open-woodland and/or <i>Acacia</i> sparse-shrubland with <i>Triodia spicata</i> (spike flower spinifex), <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 45	0.2	281.6	<i>Lysiphillum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 55	0.4	494.2	<i>Acacia. shirleyi</i> (lancewood) open-forest with open-grassland understorey
Map unit 57	0.1	151.1	<i>Macropteranthes kekwickii</i> (bullwaddy) tall shrubland with open-grassland understorey.
Map unit 58	1.0	1263.9	<i>Acacia aneura</i> (mulga)/mixed species low open-woodland with open-grassland understorey.
Map unit 62	>1.0	28.8	<i>Acacia georginae</i> (giddier) low open-woodland with <i>Astrebala pectinata</i> (bull mitchell grass) open-grassland understorey
Map unit 65	>1.0	68.9	<i>Acacia aneura</i> (mulga) tall open-shrubland with <i>Eragrostis eriopoda</i> (woollybutt) open-grassland understorey.
Map unit 69	0.2	193.7	<i>Acacia aneura</i> (mulga) tall, sparse shrubland with <i>Aristida contorta</i> (bunched kerosene grass) or <i>Triodia</i> open-tussock/hummock grassland understorey.
Map unit 71	0.6	733.2	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with grassland understorey.
Map unit 76	10.7	13217.9	<i>Triodia pungens</i> (soft spinifex), <i>Plectrachne schinzii</i> (curly spinifex) hummock grassland with <i>Acacia</i> tall sparse-shrubland overstorey.
Map unit 95	0.1	144.5	Mixed species sparse-grassland or herbland.

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Map unit 96	26.0	32050.5	<i>Astrebala pectinata</i> (barley mitchell grass) grassland.
Map unit 98	2.2	2766.3	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 107	2.3	2879.8	<i>Chenopodium auricomum</i> (bluebush) low open-shrubland with ephemeral grassland understorey.

General land management issues

Morton et. al. (1995) listed land degradation due to overgrazing, especially affecting minor habitats such as bluebush swamps. As well they stated that invasive plants—particularly *Acacia nilotica*—are causing substantial problems. Perry (1960) noted that the chenopod shrublands were particularly susceptible to the dominant land-use, grazing. They stated that due to Bluebush's high palatability it is selectively grazed in preference to other pasture types and in some cases has been destroyed.

Tothill and Gillies (1992) list increase in *Parkinsonia*, decline in 'desirable' species, and active erosion for mitchell grasslands in this area. Pitts (1990) documents spread of weeds (notably *Parkinsonia*) onto a conservation reserve.

The impacts of grazing and fire regime on mitchell grasslands and the impact of grazing on chenopod shrublands is being considered in studies by PWCNT (Connors et. al. 1996).

Weeds

The following weed species have been recorded for this catchment:

Acacia nilotica, *Echinochloa colona*, *Euphorbia prostrata*, *Parkinsonia aculeata* and *Prosopis limensis*.

Management initiatives and recommendations

Only five species collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey Aboriginal land in this area to ascertain the level and extent of weed introductions.

CFCU has not established a working presence in this area due to lack of staff. In the longer term CFCU aims to have sufficient staff to be able to assist landowners and their agencies with a variety of land management needs. A working arrangement exists between CFCU and the Indigenous Land Management Facilitator (ILMF) based at PWCNT in which the ILMF will give priority to the Barkly and other areas where CFCU has not been able to provide advice and service.

For this region the Julalikari/Buramana resource agencies have a close working relationship with outstation and excision communities. Support for strategic weeds work should proceed through assistance to the land management unit within Julalikari/Buramana.

10.3 Blyth River (15)

- Total Area: 9088 km²
- Aboriginal Owned Land 9088 km²
- Total Species Count: 564
- Number of Weeds Recorded: 68
- Percentage Flora as Weeds 12%

Aboriginal land

Wholly Aboriginal owned within the Arnhem Land Aboriginal Land Trust.

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Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	65.8	5963.0	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with <i>Sorghum</i> grassland understorey.
Map unit 7	2.32	209.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with grassland understorey.
Map unit 9	2.1	190.2	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 15	12.9	1172.7	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 18	0.9	81.8	<i>Eucalyptus papuana</i> , (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 32	6.6	600.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	0.2	18.4	<i>Melaleuca viridiflora</i> (broad leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	0.8	76.7	<i>Melaleuca</i> forest (paperbark swamp).
Map unit 54	6.6	599.5	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 102	0.1	13.2	Coastal dune complex.
Map unit 106	1.5	135.2	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Indigenous ecosystems dominant with no widespread degrading land use. However processes of disturbance present i.e. feral animals, weeds and fire (Storrs and Finlayson 1997).

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Fire is also influencing vegetation patterning in the Arnhem Land escarpment (Bowman et. al. 1990b).

Weeds

The following weed species have been recorded for this catchment:

Alysicarpus ovalifolius, *Arundo donax*, *Asystasia gangetica*, *Calopogonium mucunoides*, *Cenchrus brownii*, *Cenchrus echinatus*, *Centrosema molle*, *Chloris inflata*, *Chloris pumilio*, *Citrullus lanatus* (cv watermelon), *Crotalaria goreensis*, *Cyperus compressus*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Desmodium tortuosum*, *Desmodium triflorum*, *Digitaria ciliaris*, *Echinochloa colona*, *Eleusine indica*, *Emilia sonchifolia*, *Eragrostis tenella*, *Euphorbia heterophylla*,

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Euphorbia hirta, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Ipomoea pes-tigridis*, *Ipomoea quamoclit*, *Ipomoea triloba*, *Khaya senegalensis*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Malvastrum americanum*, *Manihot esculentia*, *Merremia aegyptia*, *Merremia dissecta*, *Micrococca mercurialis*, *Mimosa pigra*, *Mitracarpus hirtus*, *Nerium oleander*, *Oldenlandia corymbosa*, *Oryza sativa*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Phyllanthus amarus*, *Quisqualis indica*, *Ricinus communis*, *Sansiveria trifasciata*, *Scoparia dulcis*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Sorghum alnum*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes humilis*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tridax procumbens*, *Triumfetta pentandra*, *Urochloa maxima*, *Urochloa mosambicensis*

Management initiatives and recommendations

The status of weeds outside the settlements in this catchment is largely unknown. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa), a weed of Territory and national significance, was found on the Blyth River in April 1999. Particularly at risk here are the *Melaleuca* forest-paperbark swamp communities (map unit 53), the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54).

The majority of weeds recorded in this catchment were found around the town of Maningrida, outstations and along roadsides near camps and creek crossing. Some of the weeds of concern include *Gmelina arborea* (gmelina) and *Leucaena leucocephala* (coffee bush) naturalising from some outstations e.g. Ji-marda. In consultations with traditional owners there is an urgent need to inform landowners of the invasive nature of these species so they can make informed choices as to whether they want them growing on their country. During the period while this report was being compiled this work was being undertaken by the Djelk Community Rangers from Bawinanga Aboriginal Corporation and science student volunteers.

A successful community ranger/land management program (Djelk Ranger Program) is hosted by the Bawinanga Aboriginal Corporation with CDEP-based employees from some clans throughout the Blyth-Cadell and Liverpool-Tomkinson River systems. Originally this program was instituted to combat several small incursions of mimosa within the Liverpool catchment and has since grown into a broad-based land management program that has interests in enterprise development based on natural resources as well as general land management.

The Djelk Ranger Program consists of about 15 Aboriginal Rangers and a three-year NHT-funded Ranger Coordinator. The Ranger office is based at Djinkarr, some 20 km south of Maningrida, and other facilities include a laboratory/training building and visitor quarters. While Djelk Rangers have sought training and other support from PWCNT the community would appear committed to continuing exclusively community controlled management.

The presence of *Nerium oleander* and *Manihot esculenta* in this catchment, although not yet naturalised weeds, is worth noting. These species have become problem weeds in Queensland. Landholders urgently need information about the potential of these species to establish outside of cultivation so informed choices can be made about permitting these species to grow on their country.

10.4 Buckingham River (18)

- Total Area: 8495 km²
- Aboriginal Owned Land 8495 km²
- Total Species Count: 1852
- Number of Weeds Recorded: 128
- Percentage Flora as Weeds 6.9%

Aboriginal land

Wholly within Arnhem Land Aboriginal Land Trust.

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Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	60.9	5173.8	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) Open-forest with a <i>Sorghum</i> understorey.
Map unit 7	1.4	119.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with grassland understorey.
Map unit 8	5.7	488.8	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a <i>Sorghum</i> grassland understorey.
Map unit 9	12.3	1043.7	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a <i>Sorghum</i> grassland understorey.
Map unit 18	2.0	169.0	<i>Eucalyptus papuana</i> , (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 51	8.6	732.6	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	0.4	38.5	<i>Melaleuca</i> forest (paperbark swamp).
Map unit 54	2.4	205.8	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 105	0.7	63.3	Mangal low-closed forest (mangroves).
Map unit 106	5.4	460.1	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

The bauxite mine and associated township of Nhulunbuy are perhaps the major disturbing influences in the catchment. Increased numbers of people, tourists and residents, have potential to degrade local area (erosion, transport of weeds etc.) and open-cut mining methods result in large areas of disturbed ground.

Weed problems (particularly salvinia) in the town lagoon are exacerbated by influx of nutrients from the township.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Gambold et. al. (1995) discussed management issues for Cape Arnhem Peninsula. These included fire management, control of tourist impacts (particularly erosion due to vehicles), feral animals, weeds, dieback and impacts of harvesting on turtle populations.

Weeds

The following weed species have been recorded for this catchment:

Allamanda cathartica, *Alstonia scholaris*, *Alternanthera dentata* cv *rubra*,
Alysicarpus ovalifolius, *Amaranthus spinosus*, *Amaranthus tricolor*,

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Amaranthus viridis, *Amaranthus* sp. NMS (Nhulunbuy), *Anacardium occidentale*, *Andrographis paniculata*, *Andropogon gayanus*, *Antigonon leptopus*, *Ardisia humilis*, *Arundo donax*, *Axonopus affinus*, *Bidens bipinnata*, *Bidens pilosa*, *Bothriochloa pertusa*, *Cajanus cajan*, *Calotropis gigantea*, *Calotropis procera*, *Capiscum annum*, *Caryota mitis*, *Cascabela thevetica*, *Cassia fistula*, *Cassia nodosa*, *Catharanthus roseus*, *Cenchrus brownii*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Cenchrus setigerus*, *Centrosema molle*, *Chloris gayana*, *Chloris inflata*, *Citrullus lanatus*, *Clitoria ternatea*, *Crotalaria goreensis*, *Crotalaria pallida*, *Cryptostegia madagascariensis*, *Cynodon dactylon*, *Cynodon radiatus*, *Cyperus brevifolius*, *Cyperus compressus*, *Cyperus involucratus*, *Cyperus rotundus*, *Cyperus sphaclatus*, *Cucumis* sp., *Dactyloctenium aegyptium*, *Dalbergia sissoo*, *Desmodium scorpiurus*, *Desmodium tortuosum*, *Digitaria bicornis*, *Digitaria ciliaris*, *Digitaria violascens*, *Dioscorea alata*, *Echinochloa colona*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Emilia sonchifolia*, *Eragrostis pilosa*, *Euphorbia cyathophora*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Heliotropium indicum*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Ipomoea batatas*, *Ipomoea pes-tigridis*, *Ipomoea quamoclit*, *Ipomoea triloba*, *Jatropha gossypifolia*, *Leucaena leucocephala*, *Lycopersicon esculentum*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Malvastrum americanum*, *Malvastrum coromandelianum*, *Manihot esculentia*, *Melia azadiracht*, *Melinis minutiflora*, *Melinis repens*, *Merremia aegyptia*, *Merremia dissecta*, *Mitracarpus hirtus*, *Oldenlandia corymbosa*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Pilea microphylla*, *Quisqualis indica*, *Ravenala madagascariensis*, *Richardia scabra*, *Ruellia tuberosa*, *Salvinia molesta*, *Scoparia dulcis*, *Senna alata*, *Senna obtusifolia*, *Senna occidentalis*, *Setaria sphaclata*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Solanum americanum*, *Solanum nigrum*, *Solanum torvum*, *Spathodea campanulata*, *Spermacoce assurgens*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Synedrella nodiflora*, *Tecoma stans*, *Themeda quadrivalvis*, *Thunbergia grandiflora*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tribulus terrestris*, *Tridax procumbens*, *Triumfetta pentandra*, *Turnera ulmifolia*, *Urochloa maxima*, *Urochloa mosambicensis*, *Urochloa mutica* and *Wedelia trilobata*.

Management initiatives and recommendations

Most of the weed species identified have come from around the township area of Nhulunbuy and Yirrkala (83 species) with smaller numbers recorded for the centres of Gapuwiyak (21 species) and Galiwinku (55 species).

Little is known about weeds and their management from the centres of Gapuwiyak and Galiwinku. Further, the status of weeds outside the major regional centres in this catchment is largely unknown. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa) is a weed of national significance as well as in the Territory. It has also been recorded in the neighbouring catchment of Goyder River. Particularly at risk here are the *Melaleuca* forest-paperbark swamp communities (map unit 53), the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54). There is an urgent need to consult traditional owners to survey this catchment area and to map the distribution of all weeds present.

Dhimurru Aboriginal Land Management Corporation.

Dhimurru currently looks after the recreation areas around the Nhulunbuy which are relatively weed free. Consequently little weed control work is being undertaken. Some weed control work is being carried out on *Cenchrus echinatus* (mossman river grass) which is mainly a problem the coastal dunes and *Leucaena leucocephala* (coffee bush). Other activities also include survey for weeds. In the past volunteers have been utilised to hand pull weeds in various areas.

Landowners in the area have put more than \$500,000 in royalty funding into support for Dhimurru. Dhimurru is at present seeking further funding to conduct management planning for establishment of an indigenous protected area involving the aggregation of recreation areas serviced by Dhimurru.

Weeds and current management activities by catchment

NLC and CFCU are committed to assisting Dhimurru to find sufficient funds to continue as well as improving the capacity of Dhimurru to deal with land management issues across the board, including weeds. At the time of writing, negotiation for PWCNT assistance to Dhimurru is stalled because landowners have rejected the PWCNT negotiating position in which support will only forthcoming if landowners agree to joint management. Landowners have indicated they would like to work with PWCNT but do not want to shift management control from customary law under the Aboriginal Land Rights Act to joint management.

Nhulunbuy Corporation Limited

The town area under the Corporation's control is very badly infested with all major classes of weeds. The weed control work falls under the responsibility of the building surveyor who also has the responsibility for mosquito control around the town. The main weeds targeted include *Leucaena leucocephala* (coffee bush) and *Senna alata* (candle bush). The approach is to try to eradicate these from the town area. Some other control work has been carried out on *Spathodea campanulata* (african tulip tree), *Wedelia trilobata* (singapore daisy), *Calotropis procera* (rubber bush) and *Jatropha gossypifolia* (bellyache bush). Most of the weed control work is contracted out to a private contractor.

The Corporation has had an extension program informing town residents of some potential problems with weeds and the implications of dumping garden refuse outside of the official landfill area. A colour bulletin was produced and distributed to all residents. The Corporation is working strategically by targeting weeds in upstream areas and working their way down. The Corporation is also a member of the regional weeds committee.

Northern Land Council

The responsibility for weeds in the area outside the Nhulunbuy town and mining leases falls to the CFCU which has an officer based in Nhulunbuy to assist the traditional owners along the Bulman track with their land management aspirations. Some work on weed control is currently being carried out in conjunction with Nabalco for the rehabilitation and fencing of borrow pits in the region to exclude the dumping of refuse. The Nhulunbuy-based CFCU land-management coordinator is working with landowners along the road from Nhulunbuy to Bulman to identify areas of weed infestation and to devise strategies to minimise spread of weeds along the road. The road runs along the southern boundary of the catchment and is thus ideally positioned for weed seed distribution downstream of minor and major rivers and streams draining to the north. Long-term control will require resources committed to regular monitoring and control work. Finding funds to support this work is problematic as the problem arises directly because of non-Aboriginal development initiatives. One option is to develop a weed-management road-use levy.

Yirrkala Dhanbul

Weeds targeted around Yirrkala township include *Leucaena leucocephala* (coffee bush) and *Pennisetum polystachion* (mission grass). When necessary, *Senna alata* (candle bush) and *Hyptis suaveolens* (hyptis) are also controlled. The main control programs include slashing and mowing weeds before seed is set and chemical control for coffee bush and hyptis. Soil being brought into the town from the community farm, along with weed species, is a major problem. Weeds need to be eradicated at the source of this soil so that only weed-free soil is spread. The Landcare Management Project (Gamarrwa Nuwul Association) has been very successful in controlling a large infestation of coffee bush along with assistance from ATCV volunteers. Gamarrwa Nuwul Association also recently offered to extend its excellent work on weeds to those outstations under support from Laynhapuy Homelands Inc.

Laynhapuy Homelands Inc.

Weeds are not recognised as a major problem for homeland areas and no weed control or extension work is being carried out. Negotiation should begin with Laynhapuy homelands to develop an appropriate program of weed awareness to lead into consideration of weed management by landowners in designing CDEP work programs.

Weeds and current management activities by catchment

Gapuwu Mel'ngu Mala Waterwatch Group

This group looks at issues of water quality and aquatic weeds in the town lagoon. They are concentrating on local community education about these issues and are involving local school children in aquatic weed identification through on site demonstrations.

Nabalaco

Has established a three to four year program in conjunction with the Northern Land Council to revegetate old gravel pits and tracks to prevent weeds building up. Weed control follows a developed weed management plan for the area (see Fox 1997). Targeted weeds include *Leucaena leucocephala* (coffee bush), *Pennisetum polystachion* (mission grass), *Jatropha gossypifolia* (Bellyache Bush), *Themeda quadrivalvis* (grader grass) and *Senna alata* (candle bush).

Most of the weed control work is carried out by a private contractor, Yirrkala Business Enterprises (YBE) or Yirrkala Dhanbul Council. In the past ATCV volunteers were engaged in weed control work. The rehabilitation officer is the driving force for the establishment of a regional weeds committee to look at a coordinated approach to weed control. Of importance for the Nhulunbuy region is the adoption of the principal weed management strategies outlined in Fox 1997. The NLC should make a priority to form a cohesive regional weeds committee so that a coordinated and focused approach can be taken towards weed management of the region. Some of the more critical considerations for the region include:

1. The unrestricted importation of hay into the region to feed horses. There needs to be close monitoring of the importation of hay into the region. Currently hay is being transported under unsatisfactory conditions by road and also by barge. The recent introduction of *Andropogon gayanus* (gamba grass) into the region highlights the urgency. Permits need to be issued before hay should be brought in and transport of hay should adhere to best practices listed in appendix 2.
2. The importation, sale and planting of exotic plants in parks and gardens around the town, some of which are known invasive weed species. A recent check of the local Mitre 10 nursery in Nhulunbuy revealed four aquatic species for sale, three of which have known weed history elsewhere, viz. *Sagittaria subulata* (dwarf arrowhead), *Pontederia cordata* (pickerel weed) and *Hydrocleys nymphoides* (water poppy). Furthermore the sale of plants labeled as Northern Territory native plants including those known from the local area but seed sourced from different provenances and states is also of major concern. There is every possibility that we already have pollution of local gene pools as well as the possibility of unwanted species hybridisation. Good nursery facilities are available at Yirrkala Business Enterprises (YBE) and at Landcare Yirrkala. The town suppliers of plants should be encouraged to obtain material for sale through these places rather than from outside of the region.
3. The high volumes of traffic moving in and out of the region along the Bulman track. This has the potential to spread weeds from infested to clean areas unless specifically monitored. Establishing a road use levy within the NLC permit system to fund weed control and other management along the road is an option which should be explored.
4. The lack of washdown of any machinery before they enter the region. All machinery movement should adhere to best practices outlined in appendix 2. Nabalco could be approached to sponsor washdown facilities at Nhulunbuy and at Bulman. These could be voluntary for private vehicles and compulsory for heavy vehicles machinery and graders etc. These could be conditions of permits. Consideration should also be given to Washdown facilities at Perkins Barge area in Darwin where before loading all vehicles must be washed down. Currently Perkins Shipping require all vehicles to be dirt free before loading however radiators and other confined areas are not checked for the weeds. In 1988 the NLC and the Department of Transport and Works introduced requirements into their contracts that for all contractors bringing in heavy machinery into Arnhemland washdown the machinery before hand. YBE also ensures that all of their equipment coming into the region is washed down and waste disposed of in caustic mud ponds. Their machinery is also utilised within the area before proceeding to any work down the Bulman track. These policies however need to be extended to include any piece of machinery entering into Arnhemland by any person.

Weeds and current management activities by catchment

Of major concern for the Nhulunbuy region is the amount of high-priority naturalised exotics in the town lagoon area and the lack of control work being carried out on these species. For instance there are extremely large expanding populations of *Ardisia humilis* (ardisia), *Cyperus involucratus* (windmill sedge) and *Clitorea ternatea* (blue pea) that need urgent attention as well as the infestation of *Salvinia molesta* (salvinia)¹⁸ in the lagoon itself. All billabongs in the Gove Peninsula area are under immediate threat from the spread of *Cyperus involucratus* and all monsoon vine forests in North East Arnhem region are at threat from *Ardisia humilis*.

Ardisia humilis is recognised as a potential invasive weed by Csurhes & Edwards 1998 and has the potential to spread widely across the Top End. The seeds are spread by birds which feed on the fruits. It is now a established understory species in the monsoon vine forest of the town lagoon area. There is an urgent need to accurately survey this area to determine the weed species present and their distribution and to strategically remove them. Nhulunbuy Corporation is now aware of the populations of this species and is taking steps to control it. The presence of *Allamanda cathartica* (yellow trumpet vine), *Cajanus cajan* (pidgeon pea), *Manihot esculenta* (cassava) and *Cassia fistula* (golden shower tree) in this catchment, although not yet naturalised weeds, is worth noting. These species have become problem weeds in Queensland. Landholders urgently need information about the potential of these species to establish outside of cultivation so informed choices can be made about permitting these species to grow on their country.

The presence of both *Andropogon gayanus* (gamba grass) and *Pennisetum polystachion* (mission grass) in this catchment from around residential and industrial areas at Nhulunbuy is worth noting. Both these species are present in very low numbers and are being controlled by the NLC, the Nhulunbuy Corporation, YBE, Gumatj Association and Dhimurru. However, great effort is needed now to ensure populations do not expand to a point where control is not feasible.

Gapuwiyak

A couple of species from the settlement of Gapuwiyak need monitoring and perhaps flagging for removal or replacement with less invasive species, viz. *Gmelina arborea* (gmelina), *Stachytarpheta jamaicensis* (snake weed) and *Quisqualis indica* (rangoon creeper). Council should be consulted and information made available on these species. In consultation with traditional owners there is an urgent need to survey the surrounding homelands for the distribution of invasive and high priority weeds.

Galiwinku

The settlement of Galiwinku has a wide range of weed species of which a number are high-priority weeds. Some of greatest concern for this area include *Antigonon leptopus* (coral vine), *Cenchrus ciliaris* (buffel grass), *Clitorea ternatea*, (blue pea), *Ipomoea quamoclit* (cupids flower), *Leucaena leucocephala* (coffee bush), *Pennisetum pedicellatum* (annual mission grass), *Stachytarpheta* spp. (snake weeds) and *Urochloa mutica* (para grass). Buffel grass on the coastal dunes around Galiwinku presents a real threat to the biodiversity of these coastal dune systems. Buffel is known to alter fire regimes and displace native species. All the above species need urgent investigation to ascertain their status. Council should be consulted and information made available on these species. In consultation with traditional owners there is an urgent need to survey the surrounding homelands for the distribution of invasive and high priority weeds.

Howard Island

The invasive species *Leucaena leucocephala* (coffee bush) has been recorded for Howard Island. There is an urgent need to consult landowners from this area to inform them of the invasive nature of this species and the potential threats to their country.

10.5 Calvert River (26)

• Total Area:	9932 km ²
• Aboriginal Owned Land	1428 km ²
• Total Species Count:	297
• Number of Weeds Recorded:	10
• Percentage Flora as Weeds	2.9%

¹⁸ According to NTDPF the population of *Salvinia molesta* (salvinia) in the town lagoon is under biological control yet considerable resources are still being expended by the Nhulunbuy Corporation on chemical control.

Weeds and current management activities by catchment

Aboriginal land

Headwaters in small portion of Waanyi/Garawa Aboriginal Land Trust (Nicholson River), small portion of Garawa Aboriginal Land Trust or Mugularrangu (former Robinson River pastoral lease) and a small excision.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 1	0.2	15.9	Mixed species closed-forest (monsoon vine-thicket).
Map unit 6	4.0	395.1	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 8	9.0	889.6	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a <i>Sorghum</i> grassland understorey
Map unit 10	27.1	2696.2	<i>Eucalyptus tetradonta</i> (stringybark) woodland with a <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 16	4.6	458.9	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 25	3.0	305.8	<i>Eucalyptus microtheca</i> (Coolibah), low open-woodland with <i>Eulalia aurea</i> (Silky brown-top), <i>Dicanthium</i> (bluegrass) grassland understorey.
Map unit 31	28.7	2847.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	15.6	1552.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 40	0.6	57.3	<i>Eucalyptus ferruginea</i> (rusty bloodwood) low open-woodland or <i>Jacksonia odontocarpa</i> open-shrubland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 45	0.9	89.2	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 51	0.7	73.4	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 55	2.0	199.2	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 103	1.5	151.2	<i>Vetiveria elongata</i> grassland.
Map unit 106	2.0	200.0	Saline tidal flats with scattered chenopod low shrubland (samphire).

Weeds and current management activities by catchment

General land management issues

Tourists (particularly fishers) have a great potential to move weeds to, or from, Queensland. Dirt roads with low-level creek crossings increase this hazard. The current largest threats to this area are the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it inhabits vast areas of the Gulf Country and an outbreak of *Argemone ochroleuca* (mexican poppy) on Wollgorang Homestead in the neighbouring catchment of Settlement Creek. Morton et. al. (1995) noted that “burning regimes may be too frequent. Better management of cattle enterprises is also recommended”. Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Holmes (1986, 1990) assessed land-use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable. Tothill and Gillies (1992) list ‘Hyptis, Sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Alternanthera pungens, *Argemone ochroleuca*, *Azadirachta indica*, *Cyperus rotundus*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Parkinsonia aculeata*, *Sida acuta*, *Tribulus cistoides* and *Xanthium strumarium*.

Management initiatives and recommendations

The fact that only eight species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions.

There is relatively little Aboriginal land in this catchment. See neighboring catchments of Robinson River and Nicholson River for management initiatives.

This catchment is strategic in stopping of the advancement of weeds from Queensland and every effort should be made to keep it weed free.

10.6 Daly River (6)

- Total Area: 52924 km²
- Aboriginal Owned Land 17557 km²
- Total Species Count: 1806
- Number of Weeds Recorded: 75
- Percentage Flora as Weeds 4.15%

Aboriginal land

Jawoyn sections of Arnhem Land Aboriginal Land Trust, Manyallaluk, Nitmiluk, King Valley, Innesvale Station, Douglas Hot Springs Nature Park, NT Portions 4058, 4175, 2119 (need to be check with Jawoyn and elsewhere for any other omissions), Upper Daly Aboriginal Land Trust, Malak Malak Aboriginal Land Trusts, northern Daly River/Port Keats Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 1	0.1	74.76	Mixed species closed-forest (monsoon vine-thicket).

Weeds and current management activities by catchment

Map unit 4	9.0	4747.8	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 8	2.7	1422.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 9	5.5	2926.2	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with a sorghum grassland understorey.
Map unit 12	2.5	1313.5	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 13	16.2	8602.7	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) woodland with <i>Plectrachne pungens</i> (curly spinifex), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 15	32.5	17192.7	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 16	1.7	888.9	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 17	7.6	4018.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) woodland with grassland understorey.
Map unit 18	0.7	380.2	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 20	0.9	499.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 19	1.6	865.6	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus patellaris</i> (weeping box) woodland with grassland understorey.
Map unit 21	6.0	3200.2	<i>Eucalyptus tintinans</i> (salmon gum) with a Sorghum grassland understorey.
Map unit 22	0.2	133.3	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	0.4	225.2	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 24	0.1	64.3	<i>Eucalyptus microtheca</i> (coolibah), <i>Excoecaria parvifolia</i> (gutta-percha) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey.

Weeds and current management activities by catchment

Map unit 25	1.7	902.5	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 29	0.9	467.7	<i>Eucalyptus phoenicea</i> (scarlet gum) low woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 32	2.5	1333.2	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	0.3	145.8	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 37	2.1	1149.1	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 44	1.7	931.6	<i>Terminalia arostrata</i> (nutwood) low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 45	0.1	77.1	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 51	0.9	477.7	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 54	1.5	799.4	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 55	>1.0	14.8	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 105	>1.0	39.5	Mangal low closed-forest (mangroves).
Map unit 106	>1.0	29.9	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Of all the catchments in the Top End, the Daly River Catchment is under the greatest pressure from rural development. The Northern Territory Government plans a large increase in horticultural activity using groundwater in the Katherine area and further downstream cotton farming is proposed for areas near the Douglas/Daly Research Farm. At this time it is not known what effect these activities will have on the dry season flow of Daly River and also how clearing for this development might increase flooding events during the wet season.

There has been limited but significant clearing of native woody vegetation in the Northern Territory, with most of the clearance in this catchment (Storrs and Finlayson 1997). Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Tohill and Gillies (1992) list severe sida and hyptis invasion affecting *Eriachne* spp. (wanderrie grass) grasslands; and hyptis, sida and cassia (senna) on cleared overgrazed lands of *Chrysopogon* grasslands.

Weeds

The following weed species have been recorded for this catchment:

Acacia nilotica, *Acanthospermum hispidum*, *Aerva javanica*, *Allamanda cathartica*, *Alternanthera pungens*, *Andropogon gyanus*, *Azadirachta indica*, *Bidens bipinnata*,

Weeds and current management activities by catchment

Bidens pilosa, *Calotropis procera*, *Canavalia gladiata*, *Cenchrus brownii*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Chloris inflata*, *Chloris pilosa*, *Crotalaria goreensis*, *Cynodon dactylon*, *Cyperus compressus*, *Dactyloctenium aegyptium*, *Delonix regia*, *Desmodium tortuosum*, *Echinochloa colona*, *Euphorbia hirta*, *Fabaceae sp.*, *Gossypium hirsutum*, *Grewia asiatica*, *Heliotropium indicum*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Ipomoea triloba*, *Jatropha gossypifolia*, *Jatropha multifida*, *Khaya senegalensis*, *Leonotis nepetifolia*, *Leucaena leucocephala*, *Lycopersicon esculentum*, *Macroptilium lathyroides*, *Martynia annua*, *Melia azedarach*, *Melinis repens*, *Merremia dissecta*, *Mimosa pigra*, *Mitracarpus hirtus*, *Parkinsonia aculeata*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Phyllanthus amarus*, *Prosopis limensis*, *Richardia scabra*, *Salvinia molesta*, *Scoparia dulcis*, *Senna occidentalis*, *Senna tora*, *Sesamum indicum*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Sorghum almum*, *Sorghum bicolor*, *Spermacoce assurgens*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Themeda quadrivalvis*, *Thunbergia grandiflora*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tribulus terrestris*, *Urochloa mosambicensis*, *Xanthium strumarium* and *Ziziphus mauritiana*.

Management initiatives and recommendations

The relatively recent discovery of *Mimosa pigra* (mimosa) at Scott Creek west of Katherine represents the most southern known location for this species. It also highlights the need for Aboriginal landowners in this area to be aware of the possibility of further infestations. There is an urgent need to survey around this area.

Jawoyn Association is working on systematic weed surveys for all Jawoyn land. A database of weeds has been developed and will be maintained to aid in the development weed management plans. Weed distribution maps will be able to be produced by using associated GIS software. To date only the Waterhouse River, in the Roper catchment, has been surveyed in conjunction with the NTDPF. Little weed control work is currently being undertaken due to lack of funds and personnel.

The Upper Katherine is part of the Arnhem Land Escarpment area which is the subject of a fire management project conducted collaboratively by the Jawoyn Association, NLC and Bushfires Council NT. This project will provide opportunities for increased surveying and monitoring of weeds and other factors. Further development of bushwalking ventures in this area represents a degree of threat for weed spread but also provides for continued monitoring. Jawoyn Association is also involved collaboratively with staff from NTDLPE&E in a fine-grained vegetation study of this area.

Expansion of the work of the Jawoyn Association's land management section is essential to develop effective ongoing weed management. With Jawoyn committed to increasing commercial development of Jawoyn lands, environmental management capacity needs to grow at a rate to deal with the associated increase in ecological disturbance. The more settled areas of Jawoyn Lands outside of Katherine (Barunga, Wugularr) have much greater weed problems than the upper Katherine. However these communities are the source of machinery which may be used for road construction and buffalo work to the north. Appropriate control of access and development of protocols for washdown of vehicles coming out of "dirty" areas are essential strategies which are being worked on by Jawoyn currently.

Nitmiluk

Staff from Nitmiluk National Park are working to a weed control program developed by the PWCNT (1996). Rangers at the park are currently controlling weeds in a systematic strategic fashion according to a work schedule. Surveys for weeds, particularly in the intensive use zones of the park, are ongoing.

Upper Daly Aboriginal Land Trust

The Tropical Savannas CRC is supporting an NLC-CFCU project to develop effective management for the Upper Daly Land Trust Area. This area of about 3500 km² currently has no permanent settlement and access is limited to the dry season. Various factors have inhibited reoccupation and resettlement by traditional owners. Without the permanent presence of owners the area has been subject to regular illegal entry, poaching and other illegal activities. Absence of people has also resulted in wildfire problems.

Weeds and current management activities by catchment

Landowners are working with the BFCNT and CFCU to improve fire management. Landowners and CFCU will continue on ground evaluation and mapping of land management problems as part of participatory planning to develop general land management capacity, including weed control.

Mimosa

The northern Daly River/Port Keats Aboriginal Land Trust (floodplains on the western bank of the Daly River) requires surveillance and control of outlying incursions and impact reduction of large infestations. There are very few people living on the land and mimosa control currently does not occur. However, interest has been shown by community members. Currently there is no ILC money set aside for this area. The area is medium priority with much input needed. CFCU should assist group of landowners to fill in ILC application form and facilitate these landowners joining the nascent landcare group (see below) and assist in the development of a formal land management program.

The Malak Malak Aboriginal Land Trust is situated in the vicinity of Nauiyu (Daly River Mission). The landowners have grave fears for their land. Mimosa was only noticed four years ago and over the past 12 months has enclosed important resource waterholes. Surveillance and control of outlying incursions and impact reduction of large infestations is needed. There is good community support. The Malak Malak is included in the ILC Mimosa agreement.

This is a high priority area and much input is needed. The CFCU and NTDPIF will assist the Malak Malak develop a weed program utilising the labour of around four people on CDEP. Training and planning assistance is required. Further to this the Malak Malak are involved in a process of forming a landcare group with surrounding landowners (Tiperrary group of stations) and the Nauiyu Nambiyu Community Council. It is envisaged that the landcare group forum will be useful in planning weed work and lead to a coordinated approach in the lower catchment. There are moves to apply for NHT funding for a land management coordinator to be based with the landcare group which would further enhance weed planning and management in this area. *Xanthium strumarium* (noogoora burr), a declared noxious weed, badly infests this catchment. There is some scope for local control where the weed has nuisance value to humans i.e. Nauiyu Community.

The presence of *Allamanda cathartica* and *Sorghum bicolor* (sorghum) in this catchment, although not yet fully naturalised, is worth noting. Both these species have become problem weeds in Queensland with populations of *S. bicolor* expanding forming dense swards in the Katherine area, particularly around and along creek lines west of the township. The environmental effects of these two species is unknown, however landholders urgently need information about the potential of these species to establish itself outside of cultivation so informed choices can be made about permitting those species to grow on country.

10.7 East Alligator River (12)

- Total Area: 15299 km²
- Aboriginal Owned Land 15299 km²
- Total Species Count: 1810
- Number of Weeds Recorded: 100
- Percentage Flora as Weeds .52%

Aboriginal Land

Wholly Aboriginal owned or under claim partly within Kakadu National Park, the Arnhem Land Aboriginal Land Trust and Cobourg National Park

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 2	3.9	596.6	Allosyncarpia ternata closed-forest

Weeds and current management activities by catchment

Map unit 3	15.8	2422.1	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus nesophila</i> (Melville Island Bloodwood) open-forest with <i>Sorghum</i> grassland understorey.
Map unit 4	23.0	3526.3	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 5	3.8	588.1	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus nesophila</i> (Melville Island Bloodwood), <i>Callitris intratropica</i> (cypress pine) open-forest with open-shrubland understorey.
Map unit 8	5.0	765.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a <i>Sorghum</i> grassland understorey
Map unit 15	8.8	1352.9	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 21	2.5	377.9	<i>Eucalyptus tintinans</i> (Salmon Gum) with a <i>Sorghum</i> grassland understorey.
Map unit 32	24.2	3706.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	0.3	39.5	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 54	9.4	1440.7	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 105	1.0	166.6	Mangal low closed-forest (mangroves).
Map unit 106	2.0	316.7	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Bowman et. al. (1990a) found that fire, grazing (by Banteng) and their interaction were influencing vegetation patterning on coastal grasslands with rainforest thickets on Cobourg Peninsula. Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Fire is also influencing vegetation patterning in the Arnhem Land escarpment (Bowman et. al. 1990b).

A severe mimosa infestation (now under treatment) developed on the Oenpelli floodplain during the 1980s with outliers in the Mt Borradaile and Murganella areas. A salvinia infestation was found in Tin Camp Creek in the Mekinj Valley in 1988. This infestation has since moved downstream to infest the Oenpelli floodplain (red lily area) and Cannon Hill (Storrs and Julien 1996). The floodplains of the East Alligator Catchment are severely infested with the pasture grass *Urochloa mutica* (para grass) which was first introduced to the area in the 1920s (Storrs 1996a). PWCNT reported a first mainland sighting of *Leonotis nepetifolia* (lion's tail) in the Amorrduk area during mimosa control work in 1998. This species is also recorded for Minjilang (M. Storrs, pers comm).

An *Andropogon gayanus* (gamba grass) infestation occurs within Kakadu National Park at the site of the former Mudjinberri Abattoir (Storrs 1996a).

Weeds and current management activities by catchment

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica, *Ageratum conyzoides*, *Allamanda cathartica*, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Andrographis paniculata*, *Annona reticulata*, *Arundo donax*, *Asystasia gangetica*, *Bidens bipinnata*, *Bidens pilosa*, *Bothriochloa pertusa*, *Calopogonium mucunoides*, *Capiscum annum*, *Cascabela thevetica*, *Cassia fistula*, *Catharanthus roseus*, *Cenchrus brownii*, *Cenchrus echinatus*, *Centrosema molle*, *Chloris inflata*, *Citrullus lanatus*, *Clitoria ternatea*, *Crotalaria gorensis*, *Crotalaria pallida*, *Cryptostegia madagascariensis*, *Cynodon dactylon*, *Cynodon radiatus*, *Cyperus brevifolius*, *Cyperus compressus*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Delonix regia*, *Desmodium tortuosum*, *Digitaria bicornis*, *Digitaria violascens*, *Echinochloa colona*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Emilia sonchifolia*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Evolvulus nummularis*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Heliotropium indicum*, *Hibiscus sabdariffa*, *Hyptis capitata*, *Hyptis suaveolens*, *Indigofera glandulosa*, *Indigofera hirsuta*, *Indigofera tinctoria*, *Ipomoea batatas*, *Ipomoea triloba*, *Jatropha curcas*, *Jatropha gossypifolia*, *Jatropha multifida*, *Khaya senegalensis*, *Leonotis nepetifolia*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Malachra capitata*, *Mangifera indica*, *Melia azadiracht*, *Melinis repens*, *Merremia aegyptia*, *Merremia dissecta*, *Mimosa pigra*, *Mitracarpus hirtus*, *Nerium oleander*, *Oldenlandia corymbosa*, *Opuntia* sp., *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Salvinia molesta*, *Scoparia dulcis*, *Senna alata*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Spathodea campanulata*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stachytarpheta mutabilis*, *Stylosanthes guianensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Synedrella nodiflora*, *Themeda quadrivalvis*, *Tribulus cistoides*, *Tridax procumbens*, *Triumfetta pentandra*, *Urochloa maxima*, *Urochloa mosambicensis* and *Urochloa mutica*.

Management initiatives and recommendations

At greatest risk in this catchment is map unit 54 mixed closed-grassland/sedgeland (seasonal floodplain), particularly those around Kunbarllanjja and Murganella, from the ever-expanding populations of the invasive species *Mimosa pigra* (mimosa).

Mimosa was first seen on the Oenpelli floodplain in the early 1980s. Some control was undertaken in the late 1980s but a concerted effort was not made until the 1990s when some 8000 ha of floodplain were infested. A commonwealth-funded (around \$8 million) control campaign was instituted in 1992 resulting in a massive reduction in the real extent of the mimosa infestation. However little effort was put into developing a weed management structure in the local community and hence NTDPF are still undertaking most of the follow-up work.

There is an urgent need to assist the community set up a land management program to undertake the follow-up ground works on the floodplain. The Demed resource agency are keen to host such a land management program based on CDEP and in late 1998 and early 1999 have been active in pursuing continued work on the mimosa areas just north of Kunbarllanjja.

The presence of *Allamanda cathartica*, *Cassia fistula*, *Stachytarpheta mutabilis* and *Nerium oleander* in this catchment, although not yet fully naturalised weeds is worth noting. These species have become problem weeds in Queensland. Landholders urgently need information about the potential of these species to establish outside of cultivation so informed choices can be made about permitting these species to grow on their country.

Kakadu National Park

Weed management in Kakadu National Park is currently being carried out by Parks Australia North staff in a strategic fashion according to the draft weed management strategy for the park (see Storrs 1996a). Highlighted in this strategy was the importance of controlling high priority weeds for the area such as *Mimosa pigra* (mimosa), *Andropogon gyanus* (gamba grass) and *Pennisetum polystachion*

Weeds and current management activities by catchment

(mission grass). *Salvinia* is managed under an integrated strategy (Storrs and Julien 1996) and a weed strategy has been written for Jabiluka Mineral Lease (Storrs 1996b).

Currently a study by NTU on weed management and the biodiversity and ecosystem processes of tropical wetlands is under way in this catchment. This project mainly aims to look at the impacts of *Urochloa mutica* (para grass) including management guidelines and recommendations for control.

Murganella

Weed control around Murganella is currently being assisted by the PWCNT which has developed a draft weed management plan for the Amorrduk area (see PWCNT 1999, Bielby 1998). Weed survey and control work has also been carried out in the Gummulkban and Mount Borradaile areas. All weeds work performed by the PWCNT is carried out in a strategic fashion according to a work schedule. *Mimosa* has been highlighted as one of the high-priority weeds for the area however other weeds are also currently under control e.g. *Pennisetum polystachion*, *Urochloa mutica* and *Senna alata*.

Gurig National Park

In Gurig National Park weed control work is being carried out in a strategic fashion to a work schedule by PWCNT rangers following draft weed management plan (see Larcome 1995). There have been reports that *Senna obtusifolia* (sicklepod) seeds are being spread and are germinating in Banteng cattle pads. The control of this species is therefore dependent upon cattle control. Currently these cattle are used in safari type hunting trips for commercial gain and control of this species is not under consideration.

Narbalek

The occurrence of *Pennisetum polystachion* (mission grass) at Nabarlek is worth noting. This represents an outlier of this species that has the potential to spread quickly to neighboring clean areas. There needs to be a concerted effort to make sure this population is eradicated.

The weed distribution map (see Figure 3) shows that there is a clear drop-off in weed numbers once Kunbarllanjja is reached in Arnhem land in this catchment. The establishment of practical washdown facilities at Kunbarllanjja could prove effective in help to reduce the spread of weeds by vehicles into Arnhem land, including vehicles on the way to Maningrida and Ramingining.

There have been unconfirmed reports of residents in both Maningrida and Ramingining bringing in hay to use as garden mulch. This represents a serious threat to the areas around these communities and options to discourage residents from doing this need to be explored. As the major transport route is through Kakadu National Park liaison between NLC and Kakadu staff should occur re this matter.

Residents at Kamakarrwan outstation on the Mann River reported that hay from Kunbarllanjja is being transported to their outstation for amenity planting work by DEMED Association. Export of para grass hay from Kunbarllanjja further into Arnhem Land is a matter to be discussed as soon as possible with DEMED.

Croker Island

A small land management program of two rangers based on CDEP positions borrowed from Bawinanga Aboriginal Corporation is operating on the Island but suffers from a lack of resources and supervision. Major problem is *Urochloa mutica* (para grass) on floodplains with assorted weeds near settlements including *Leonotis nepetifolia* (lion's tail).

10.8 Finnis River (7)

- Total Area: 9158 km²
- Aboriginal Owned Land 1531 km²
- Total Species Count: 1610
- Number of Weeds Recorded: 133
- Percentage Flora as Weeds 8.2%

Weeds and current management activities by catchment

Aboriginal Land

Catchment includes Darwin region (Native Title Claim), Belyuen and Wagait portions of the Delissaville/Wagait/Larrakia Aboriginal Land Trust and Gwalwa Daraniki Association, Kulaluk Aboriginal Community.

Vegetation

The following are the major broad vegetation types present (after Wilson et al 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	23.8	2175.5	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with <i>Sorghum</i> grassland understorey.
Map unit 9	23.6	2161.6	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a <i>Sorghum</i> grassland understorey.
Map unit 11	12.0	1104.3	<i>Eucalyptus miniata</i> (Darwin woollybutt) woodland with a sorghum grassland understorey
Map unit 15	0.5	43.4	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 21	6.4	584.2	<i>Eucalyptus tintinans</i> (Salmon Gum) with a sorghum grassland understorey.
Map unit 32	3.1	287.4	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 48	10.5	959.3	<i>Livistona humilis</i> (Fan Palm) tall open-shrubland with <i>Sorghum</i> grassland understorey.
Map unit 51	0.2	19.0	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	2.4	224.2	Melaleuca forest (paperbark swamp).
Map unit 54	12.3	1126.9	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 105	2.5	224.9	Mangal low closed-forest (mangroves).
Map unit 106	2.7	246.9	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

In areas closer to Darwin indigenous ecosystems present but coexisting with pastoral industries. In other areas indigenous ecosystems dominant with no widespread degrading land uses. However processes of disturbance are present i.e. feral animals, weeds and fire (Storrs and Finlayson 1997).

This area is coming under increasing developmental pressure with consequent land-use conflicts. Major changes to the ecology of savanna woodland areas are expected in the Darwin rural areas due to the proliferation of tall introduced grass species, particularly *Andropogon gayanus* (gamba grass) and *Pennisetum polystachion* (mission grass). In contrast to the native *Sorghum* spp., the introduced species with their deeper root systems are able to remain green well in to the dry season and this together with their larger biomass means that they can fuel very intense fires late in the dry season.

Weeds and current management activities by catchment

This can kill mature trees and inhibit any regrowth. Woodland areas are fast turning into open grassland systems.

Floodplains in this catchment are used for pastoral purposes and the introduced pasture species, *Urochloa mutica* (para grass) is well established. Increased profitability of pastoralism through the live cattle trade to Asia is further entrenching pastoral activities and the use of northern floodplains as staging points to fatten cattle prior to shipment has the potential to increase weed movement and cause local degradation through erosion etc. Aboriginal people are involved in this trade.

A further issue for the future is the construction of dams in the area. NTG plans include construction of dams on the Finnis which would have significant immediate and unknown longer-term effects on Aboriginal land in this catchment.

Weeds

The following weed species have been recorded for this catchment:

Aeschynomene americana, *Aeschynomene villosa*, *Agave sisalana*, *Ageratum conyzoides*, *Alternanthera dentata cv rubra*, *Alysicarpus ovalifolius*, *Amaranthus viridis*, *Andrographis paniculata*, *Andropogon gayanus*, *Annona reticulata*, *Antigonon leptopus*, *Ardisia humilis*, *Asystasia gangetica*, *Azadirachta indica*, *Bidens pilosa*, *Bothriochloa pertusa*, *Calopogonium mucunoides*, *Calotropis procera*, *Caryota mitis*, *Cascabela thevetica*, *Catharanthus roseus*, *Cenchrus brownii*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Cenchrus setigerus*, *Centrosema molle*, *Chloris inflata*, *Clitoria ternatea*, *Crotalaria goreensis*, *Crotalaria pallida*, *Cynodon dactylon*, *Cynodon radiatus*, *Cyperus brevifolius*, *Cyperus compressus*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Delonix regia*, *Desmanthus virgatus*, *Desmodium tortuosum*, *Desmodium triflorum*, *Digitaria ciliaris*, *Digitaria violascens*, *Echinochloa colona*, *Eichhornia crassipes*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Emilia sonchifolia*, *Eragrostis pilosa*, *Eragrostis tenella*, *Euphorbia cyathophora*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Evolvulus nummularis*, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Grewia asiatica*, *Heliotropium indicum*, *Hibiscus sabdariffa*, *Hymenachne amplexicaulis*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Indigofera tinctoria*, *Ipomoea carnea*, *Ipomoea pes-tigris*, *Ipomoea quamoclit*, *Ipomoea triloba*, *Jatropha gossypifolia*, *Khaya senegalensis*, *Lantana camara*, *Leonotis nepetifolia*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Malvastrum americanum*, *Malvastrum coromandelianum*, *Mangifera indica*, *Melia azadiracht*, *Melinis minutiflora*, *Melinis repens*, *Merremia aegyptia*, *Merremia dissecta*, *Micrococca mercurialis*, *Mimosa pigra*, *Mitracarpus hirtus*, *Mucuna puriens*, *Oldenlandia corymbosa*, *Oryza sativa*, *Paspalum notatum*, *Passiflora foetida*, *Passiflora suberosa*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phoenix dactylifera*, *Phoenix sylvestris*, *Phyllanthus amarus*, *Phyllanthus emblica*, *Quisqualis indica*, *Richardia scabra*, *Ricinus communis*, *Ruellia tuberosa*, *Salvinia molesta*, *Sansiveria trifasciata*, *Scoparia dulcis*, *Senna alata*, *Senna obtusifolia*, *Senna occidentalis*, *Senna siamea*, *Sesamum indicum*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Solanum nigrum*, *Sorghum alnum*, *Spermacoce assurgens*, *Spermacoce hispida*, *Sporobolus coromandelianus*, *Sporobolus natalensis*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes viscosa*, *Synedrella nodiflora*, *Themeda quadrivalvis*, *Thunbergia grandiflora*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa maxima*, *Urochloa mosambicensis*, *Urochloa mutica*, *Wedelia trilobata* and *Ziziphus mauritiana*.

Management initiatives and recommendations

In this catchment map units, 53 Melaleuca forest (paperbark swamp) and map unit 54 Mixed-closed grassland/sedgeland (seasonal floodplain), are most at risk from the very expanding populations of *Mimosa pigra* (mimosa), *Hymenachne amplexicaulis* (olive hymenachne) and *Urochloa mutica* (para grass).

The presence of *Ipomoea carnea*, *Senna siamea* and *Mucuna puriens* in this catchment, although not yet fully naturalised weeds, is worth noting.

Weeds and current management activities by catchment

These species have become problem weeds in Queensland. Landholders urgently need information about the potential of these species to establish outside of cultivation so informed choices can be made about permitting these species to grow on their country.

Gwalwa Daraniki Association

Gwalwa Daraniki Association, Kulaluk Aboriginal Community are currently carrying out weed control work under a CDEP and an NT Correctional Services support program in conjunction with ALEP. The major species targeted are *Leucaena leucocephala* (coffee bush) and *Pennisetum polystachion* (mission grass). All areas are being successfully revegetated with native species to help regenerate a rare monsoon vine forest habitat first damaged during World War II. The program is concentrating on the area known as “Herman’s Beach”.

Wagait

A 1976 government report on the land units of the Wagait Aboriginal Land Trust stated that there were no weeds of importance in the area and that this situation should be maintained. Unfortunately little management has occurred and the area is now severely infested with *Mimosa pigra* (mimosa) and *Salvinia molesta* (salvinia).

The ponded pasture species *Urochloa mutica* (para grass) is promulgated by Aboriginal landholders on the eastern side of the Wagait. Para grass is considered by landowners to be a beneficial plant in this situation as it will smother mimosa seedlings. This is cause for concern. Replacing one weed with another vigorous invasive species may not be the best option. Landowners need detailed information on the environmental effects of para grass along with viable options for selecting alternative species. Landholders however, do recognise the weediness of another ponded pasture species, *Hymenachne amplexicaulis* (olive hymenachne), and are concerned about its spread.

Mimosa

On the eastern side of the Wagait Reserve—the lands of the White Eagle Aboriginal Corporation (WEAC)—impact reduction of the mimosa infestation is well under way as control operations began in the early 1990s. This was achieved through the very hard work of the local community with substantial funding from ATSIC and now the ILC. It is anticipated that after this impact reduction phase mimosa management will be entirely supported by the community themselves through their cattle agistment enterprise. There is a need for continued support of the group but little extra input needed.

The western side of the Wagait (Werat and Wajigan) is another matter. No control of outlying incursions is taking place and much impact reduction of large infestations is needed. The lack of formal land management is due to conflict within the landowning groups. No ILC money is currently set aside for this area. The area is of medium priority and much input is needed. CFCU should institute conflict resolution and facilitate the setting up of formal land management programs. In the first instance there is a need for an ILC survey form to be completed.

10.9 Fitzmaurice River (4)

- Total Area: 10049 km²
- Aboriginal Owned Land 6042 km²
- Total Species Count: 717
- Number of Weeds Recorded: 10
- Percentage Flora as Weeds 1.3%

Aboriginal land

Wholly Aboriginal owned or under Native Title Claim—part of the Upper Daly Aboriginal Land Trust and southern portion of the Daly River/Port Keats Aboriginal Land Trust. Bradshaw Station Army Training Facility (under Native Title Claim).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Weeds and current management activities by catchment

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 4	6.6	668.2	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with <i>Sorghum</i> grassland understorey.
Map unit 9	18.5	1863.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a sorghum grassland understorey.
Map unit 15	19.2	1933.9	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 29	14.8	1489.3	<i>Eucalyptus phoenicea</i> (Scarlet Gum) low woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 32	19.2	1929.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 37	3.9	391.2	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 50	2.5	249.1	<i>Melaleuca minutifolia</i> (paperbark) low woodland with <i>Sorghum</i> grassland understorey.
Map unit 51	3.9	391.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 98	1.4	142.5	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 104	0.6	65.5	<i>Xerochloa</i> (rice grass) grassland.
Map unit 106	9.2	925.3	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Land degradation due to grazing pressure has been described for this region Condon (1986). Tothill and Gillies (1992) list serious frontage erosion (now recovering with fencing and seeding) and 'decline of desirable species' for bluegrass—golden beard grass grasslands; increased 'undesirable annual grasses (Aristida)', 'decline in desirable species' and active erosion for plains mitchell grass; and 'past scalding and stream erosion, now recovering'.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Bradshaw Station Army Training Facility under strict management regime but issues of weed movement on vehicles and degradation of vegetation during exercises leading to weed invasion.

Weeds

The following weed species have been recorded for this catchment:

Calotropis procera, *Cenchrus echinatus*, *Dactyloctenium aegyptium*, *Echinochloa colona*, *Hyptis suaveolens*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Sida acuta*, *Trianthema portulacastrum* and *Tribulus cistoides*.

Weeds and current management activities by catchment

Management initiatives and recommendations

The fact that only nine species collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions.

A management planning project is underway in the north east of the catchment on the Upper Daly Land Trust area. The joint Tropical Savannas CRC and NLC–CFCU project involves traditional owners in on-ground survey and subsequent management action planning. A major obstacle to sustainable management is the difficulty of getting resources to help people get back onto the land. Currently CDEP is not available for working on the block. It is hoped to extend the planning project further westward towards the mouth of the Fitzmaurice where there is considerable illegal entry by fishermen and others.

Little is known about weeds and their management in this catchment. This has serious implications for weed management in the future considering that mimosa, a weed of Territory and national significance, has been recorded for the neighbouring catchments of Daly, Moyle and Victoria Rivers. Particularly at risk here is the major community of *Xerochloa* (rice grass) grasslands (map unit 104). There is an urgent need to consult traditional owners to survey this catchment area and to map the distribution of all weeds present.

Small incursions of mimosa have been found in the northern area of this catchment on floodplains of creeks to the north of the Fitzmaurice River. These incursions are being dealt with by Palumpa cattle station (see Moyle Catchment). As the Fitzmaurice River itself is currently presumed mimosa-free it can act as a buffer to stop the spread of this species into the uninfected areas of coastal Victoria River and further toward Western Australia. As the Australian Army have interests in this catchment through the occupation of Bradshaw Station, the NLC should liaise with it and seek funds and support to help ensure this area remains mimosa free. Options include the rigorous survey of the catchment to ascertain its weed status and to attack mimosa in the southern portion of the Moyle Catchment to increase the buffer zone.

10.10 Georgina River (29)

- Total Area: 99673 km²
- Aboriginal Owned Land 86 km²
- Total Species Count: Not known
- Number of Weeds Recorded: 4
- Percentage Flora as Weeds >1%

Aboriginal land

A number of small excisions.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 27	2.2	2151.9	<i>Eucalyptus microtheca</i> (Coolibah) low open-woodland with open-grassland understorey.
Map unit 28	0.2	233.9	<i>Eucalyptus microtheca</i> (Coolibah) low open-woodland with <i>Chenopodium auricomum</i> (bluebush) sparse-shrubland understorey.
Map unit 39	0.3	327.3	<i>Eucalyptus pruinosa</i> (silver box), <i>Lysiphyllum cunninghamii</i> (bauhinia) low open-woodland with hummock/tussock grassland understorey

Weeds and current management activities by catchment

Map unit 42	2.2	2212.9	<i>Eucalyptus opaca</i> (bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 43	2.8	2764.9	Eucalyptus low open-woodland and/or acacia sparse-shrubland with <i>Triodia spicata</i> (spike flower spinifex), <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 58	1.2	1245.6	<i>Acacia aneura</i> (mulga)/mixed species low open-woodland with open-grassland understorey.
Map unit 59	2.9	2861.4	<i>Acacia estrophiolata</i> (Ironwood), <i>Atalaya hemiglauca</i> (Whitewood) low open-woodland with open-grassland understorey.
Map unit 62	11.0	10935.6	<i>Acacia georginae</i> (giddier) low open-woodland with <i>Astrebala pectinata</i> (bull mitchell grass) open-grassland understorey
Map unit 63	9.2	9126.4	<i>Acacia georginae</i> (gidyea) low open-woodland with open-grassland understorey.
Map unit 65	5.3	5284.8	<i>Acacia aneura</i> (mulga) tall open-shrubland with <i>Eragrostis eriopoda</i> (woollybutt) open-grassland understorey.
Map unit 66	0.8	772.7	<i>Acacia aneura</i> (mulga) tall open-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) open-shrubland understorey.
Map unit 68	1.6	1612.7	<i>Acacia kempeana</i> (witchetty bush) <i>Acacia</i> tall open-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) open-shrubland understorey.
Map unit 70	2.7	2735.8	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) low sparse-shrubland understorey.
Map unit 71	1.3	1336.6	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with grassland understorey.
Map unit 72	0.1	78.6	<i>Acacia kempeana</i> (witchetty bush) sparse-shrubland to tall sparse-shrubland with grassland understorey.
Map unit 74	1.3	1287.6	<i>Acacia stowardii</i> (bastard mulga), <i>Cassia</i> , <i>Eremophila</i> (fuchsia) sparse-shrubland
Map unit 76	21.5	21445.3	<i>Triodia pungens</i> (soft spinifex), <i>Plectrachne schinzii</i> (curly spinifex) hummock grassland with acacia tall sparse-shrubland overstorey.
Map unit 82	0.3	300.6	<i>Triodia basedowii</i> hummock grassland with <i>Acacia aneura</i> (mulga) tall sparse-shrubland overstorey between dunes.
Map unit 84	2.7	2660.4	<i>Triodia basedowii</i> (hard spinifex) hummock grassland with <i>Eucalyptus gamophylla</i> (blue mallee) tall sparse-shrubland overstorey.
Map unit 85	8.4	8402.5	<i>Triodia basedowii</i> (hard spinifex) hummock grassland with <i>Acacia</i> tall sparse shrubland overstorey between dunes and <i>Zygochloa paradoxa</i> (sandhill cane grass) open-hummock grassland on dune crests.
Map unit 92	0	4.9	<i>Triodia clelandii</i> (weeping spinifex) hummock grassland with mixed species low open-woodland overstorey.
Map unit 95	0.4	443.2	Mixed species sparse-grassland or herbland.

Weeds and current management activities by catchment

Map unit 96	21.2	21126.8	<i>Astrelba pectinata</i> (barley mitchell grass) grassland
Map unit 100	0.02	20.6549	<i>Eragrostis xerophila</i> (neverfail) open-grassland with scattered trees and shrubs.
Map unit 107	0.3	300.0	<i>Chenopodium auricomum</i> (bluebush) low open-shrubland with ephemeral grassland understorey.

General land management issues

Morton et. al. (1995) listed land degradation due to over-grazing, especially affecting minor habitats such as bluebush swamps. As well they stated that invasive plants—particularly *Acacia nilotica*—are causing substantial problems. Perry (1960) noted that the chenopod shrublands were particularly susceptible to the dominant land-use, grazing. They stated that due to Bluebush's high palatability it is selectively grazed in preference to other pasture types and in some cases has been destroyed.

Tohill and Gillies (1992) list increase in *Parkinsonia*, decline in 'desirable species, and active erosion for Mitchell Grasslands in this area. Pitts (1990) documents spread of weeds (notably *Parkinsonia*) onto a conservation reserve. The impacts of grazing and fire regime on Mitchell grasslands and the impact of grazing on chenopod shrublands is being considered in studies by PWCNT (Connors et. al. 1996).

Weeds

The following weed species have been recorded for this catchment:

Acacia nilotica, *Cryptostegia grandiflora*, *Parkinsonia aculeata* and *Xanthium strumarium*.

Management Initiatives and Recommendations

The fact that only four species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal land in this catchment to ascertain the level and extent of weed introductions. The presence of *Cryptostegia grandiflora* (rubber vine) in this catchment is of concern and all efforts should be made to inform landholders of the invasive nature of this species. Traditional owners need to be kept informed of the outcomes of the Rubber Vine Buffer Zone Committee (NT, QLD etc.) as well as access to the Rubber vine Buffer Management Plan (Fuller, NTDPPIF) for their information and to make sure they are kept up to date about the possible formation of a Gulf region weed management group. (See McArthur River catchment for details). Efforts should be made to develop a community ethos which encourages immediate action on sighting of new infestations.

10.11 Goomadeer River (13)

- Total Area: 5581 km².
- Aboriginal Owned Land 5581 km².
- Total Species Count: 317
- Number of Weeds Recorded: 27
- Percentage Flora as Weeds 8.5%

Aboriginal land

All Aboriginal land wholly within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 2	0.3	16.5	<i>Allosyncarpia ternata</i> closed-forest.

Weeds and current management activities by catchment

Map unit 4	44.1	2460.64	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey
Map unit 8	2.1	117.6	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 15	22.9	1276.2	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 18	2.4	132.5	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 21	6.7	373.9	<i>Eucalyptus tintinans</i> (salmon gum) with a sorghum grassland understorey.
Map unit 32	16.5	922.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	1.3	70.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	0.2	13.1	Melaleuca forest (paperbark swamp).
Map unit 105	1.2	66.4	Mangal low closed-forest (mangroves).
Map unit 106	2.3	131.3	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Indigenous ecosystems dominant with no widespread degrading land use. However processes of disturbance present i.e. feral animals, weeds and fire (Storrs and Finlayson 1997). Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Fire is also influencing vegetation patterning in the Arnhem Land escarpment (Bowman et. al. 1990b).

Weeds

The following weed species have been recorded for this catchment:

Agave attenuata, *Alysicarpus ovalifolius*, *Bothriochloa pertusa*, *Clitoria ternatea*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Desmanthus virgatus*, *Desmodium tortuosum*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Heliotropium indicum*, *Hyptis suaveolens*, *Macroptilium atropurpureum*, *Malvastrum americanum*, *Melinis repens*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Senna alata*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Tribulus cistoides*, *Tridax procumbens* and *Triumfetta pentandra*.

Management Initiatives and Recommendations

The fact that only 27 species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal land in this catchment to ascertain the level and extent of weed introductions.

Most of the weeds in this catchment were recorded from the major settlements at Waruwi and from surrounding outstations. Furthermore the status of weeds outside the these settled areas is largely unknown. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa), a weed of Territory and national significance, has been recorded for the

Weeds and current management activities by catchment

neighbouring catchments of East Alligator and Liverpool Rivers. Particularly at risk here are the *Melaleuca* forest-Paperbark swamp communities (map unit 53) and the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54). Other weeds of concern in neighbouring catchments include *Andropogon gayanus* (gamba grass) and *Pennisetum polystachion* (mission grass) both of which have been proven to drastically alter fire regimes and kill native vegetation. There is an urgent need to consult traditional owners to survey this catchment area and to map the distribution of all weeds present.

Of concern in this catchment was the recording of *Clitoria ternatea* (blue pea) and *Stachytarpheta* spp. (snake weeds) from around communities. Landowners need culturally appropriate information about the invasive nature of these species so they can decide if they want them growing on their country.

10.12 Goyder River (17)

- Total Area: 10365 km²
- Aboriginal Owned Land 10365 km²
- Total Species Count: 723
- Number of Weeds Recorded: 55
- Percentage Flora as Weeds 7.6%

Aboriginal land

All Aboriginal owned land wholly within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	35.6	3693.4	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetrodonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 7	10.7	1106.4	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with grassland understorey.
Map unit 8	6.6	685.8	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 14	4.1	423.0	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus tectifera</i> , (northern box) woodland with <i>Sorghum</i> grassland understorey.
Map unit 15	22.8	2360.7	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 18	2.9	303.8	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 32	2.3	241.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.

Weeds and current management activities by catchment

Map unit 51	8.5	883.5	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	5.4	559.2	Melaleuca forest (paperbark swamp).
Map unit 54	0.7	75.9	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 106	0.3	32.3	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Upgrading of Central Arnhem Land Road has led to increased usage of the road and extended the period of travel into the wet season. However with low-level crossings of rivers and creeks there is great potential for weeds propagules being washed off vehicles and infesting currently clean catchments.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Fire is also influencing vegetation patterning in the Arnhem Land escarpment (Bowman et. al. 1990b).

Low-intensity pastoralism present in the Arafura Swamp on the Aboriginal-owned pastoral enterprise, Murwangi. Associated activities include safari hunting and crocodile egg collection. Some degradation caused by cattle is leading to the extension of saltwater reaches in the northern most parts of the Swamp.

Weeds

The following weed species have been recorded for this catchment:

Alternanthera dentata cv rubra, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Anacardium occidentale*, *Andrographis paniculata*, *Antigonon leptopus*, *Arundo donax*, *Asystasia gangetica*, *Bothriochloa pertusa*, *Calopogonium mucunoides*, *Calotropis procera*, *Catharanthus roseus*, *Cenchrus brownii*, *Cenchrus echinatus*, *Centrosema molle*, *Chloris inflata*, *Clitoria ternatea*, *Crotalaria goreensis*, *Cynodon dactylon*, *Cyperus rotundus*, *Cyperus sphaelatus*, *Dactyloctenium aegyptium*, *Delonix regia*, *Desmodium tortuosum*, *Digitaria ciliaris*, *Echinochloa colona*, *Emilia sonchifolia*, *Euphorbia heterophylla*, *Gmelina arborea*, *Gomphrena celosioides*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Khaya senegalensis*, *Macropodium atropurpureum*, *Malvastrum coromandelianum*, *Mimosa pigra*, *Mucuna puriens*, *Oryza sativa*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Senna alata*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tridax procumbens* and *Urochloa mutica*.

Management initiatives and recommendations

Most of the weeds in this catchment were recorded from the major settlements at Ramingining and from surrounding outstations. The status of weeds outside these areas is largely unknown. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa), a weed of Territory and national significance, has been recorded for this catchment within the Arafura Swamp; Australia's largest freshwater paperbark swamp. Particularly at risk here are the *Melaleuca* forest-Paperbark swamp communities (map unit 53), the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54). Other weeds of concern in this catchments include an unconfirmed report of *Andropogon gayanus* (gamba grass) and the presence of *Pennisetum polystachion* (mission grass) from Ramingining, both of which have been proven to drastically alter fire regimes and kill native vegetation. A relatively small *Urochloa mutica* (para grass) infestation is situated in the northern most part of the Arafura Swamp near the settlement of Ring (Nangalala or White Star Landing). Negotiations should be held with landowners about its possible eradication.

Weeds and current management activities by catchment

The presence of *Mucuna puriens* (velvet bean) in this catchment from the settlement of Ramingining, although not yet a naturalised weed, is worth noting. This species has become a problem weed in Queensland and in the Pacific Islands. Landholders urgently need information about the potential of this species to establish itself outside of cultivation so informed choices can be made about permitting this species to grow on their country.

Socio-politically the Arafura Swamp is divided into two. Landowners for the northern two-thirds are centered on the community of Ramingining while those in the south-east third live in outstations on their land on the edge of the Swamp and associate with communities in the Walker Catchment.

Northern Arafura Swamp

A land management program facilitated by the CFCU centered on Ramingining was instituted in early 1998. A land management coordinator was employed for one year using grants from the National Wetlands Program and the Tropical Savannas CRC. A further three-year grant was received from the NHT. Currently there are about 12 Rangers in the program, the Wanga Djakamirr Community Rangers, who receive Certificate 1 in Resource Management training from NTU FATSIS. This course involves accredited weed training.

The Rangers are currently consulting traditional owners to survey a large part of this catchment area and to map the distribution of all weeds present. Control of a wide variety of weeds is also being undertaken.

Situated in the northern part of the Swamp is the cattle station of Murwangi. This enterprise has been integral to the successful management—so far—of mimosa. They have spent considerable resources on managing an outbreak of *Senna alata* (candle bush) on a billabong near the station homestead. There have been unconfirmed reports of this station expanding its improved pasture program to include more areas of the invasive species *Urochloa mutica* (para grass). Landholders in this area need to be presented with suitable alternatives as well as information about the invasive nature of this species so they can make informed decisions about the type of introduced species they allow on their country. Further, local reports have indicated the importation of hay onto this station in uncovered trucks travelling through Arnhem land. If this is the case then land managers and landowners urgently need to be informed about the potential risks of these activities.

South-east Arafura Swamp

Several small community-based land-management programs are based in the south-east of the Swamp and catchment at Mirrngadja (Senior Ranger, Mangay Gayula) and Donydji (Senior Ranger, Tom Gunamin). These programs are in receipt of a small NHT grant—coordinated by Dr Neville White—which is greatly enhancing this group's ability to identify and deal with weed problems. Support from the CFCU Bulman Track Land Management Coordinator is assisting also. Links are being made with Murwangi and the Rangers from this area which is helping to provide a coordinated approach to weed control. Greater support through the ILC and CDEP is needed especially in the recognition of the important role this group is playing in weed control in the region.

Mimosa

Continual surveillance for, and control of, small incursions is required. Surveys of the Arafura Swamp are being conducted by the NTDPIF in association with relevant community programs—11 incursions have been treated since 1992. Rangers from the south-east Arafura swamp played a significant role in the identification of mimosa in that region and in conjunction with NTDPIF officers have brought it under control. The last survey in December 1999 failed to find any surviving plants in treated areas and no new infestations. A quad bike made available through the NLC CFCU has greatly increased this groups capacity to check for Mimosa. Limited ILC money is available for herbicide etc.

Given the functional nature of land management programs in this area the area has a medium priority for further input. Continued support for the land management programs (Ramingining and SE of Arafura Swamp) is necessary—some training in mimosa control and safe use of herbicides is required.

Weeds and current management activities by catchment

10.13 Keep River (2)

- Total Area: 5869 km²
- Aboriginal Owned Land 24 km²
- Total Species Count: 690
- Number of Weeds Recorded: 3
- Percentage Flora as Weeds 0.43%

Aboriginal land

Small excision but whole Northern Territory portion of catchment under Native Title Claim.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 9	14.8	870.0	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 13	5.2	305.2	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) woodland with <i>Plectrachne pungens</i> (curly spinifex), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 15	19.3	1130.3	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 22	4.4	261.4	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	>1.0	0.01	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 29	9.3	543.7	<i>Eucalyptus phoenicea</i> (scarlet gum) low woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 32	13.8	811.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	1.0	52.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low, open woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 37	2.2	128.3	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 44	1.1	64.6	<i>Terminalia arostrata</i> (nutwood) low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey.

Weeds and current management activities by catchment

Map unit 98	10.1	593.7	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 104	5.9	344.3	<i>Xerochloa</i> (rice grass) grassland.
Map unit 105	0.1	5.7	Mangal low closed-forest (mangroves).
Map unit 106	12.9	757.9	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Land degradation due to grazing pressure has been described for this region Condon (1986). Tothill and Gillies (1992) list serious frontage erosion (now recovering with fencing and seeding) and 'decline of desirable species' for bluegrass-golden beard grass grasslands; increased 'undesirable annual grasses (*Aristida*)', 'decline in desirable species' and active erosion for plains mitchell grass; and 'past scalding and stream erosion, now recovering'.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica, *Euphorbia hirta* and *Sida acuta*.

Management initiatives and recommendations

The fact that only three species collected from this catchment indicates our lack of knowledge about the status of weeds in this area.

10.14 Koolatong River (19)

- Total Area: 7840 km²
- Aboriginal Owned Land 7840 km²
- Total Species Count: 748
- Number of Weeds Recorded: 58
- Percentage Flora as Weeds 7.75%

Aboriginal land

All Aboriginal owned land wholly within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 9	14.8	870.1	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with sorghum grassland understorey.
Map unit 4	43.3	3392.9	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with a sorghum grassland understorey.

Weeds and current management activities by catchment

Map unit 7	13.5	1060.2	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with grassland understorey.
Map unit 8	14.4	1125.6	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) woodland with a sorghum grassland understorey
Map unit 9	4.9	380.6	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a sorghum grassland understorey.
Map unit 14	9.2	722.1	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus tectifera</i> , (northern box) woodland with sorghum grassland understorey.
Map unit 18	1.8	142.7	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 32	3.5	271.4	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrarchne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	0.4	30.5	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 54	3.4	266.9	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 102	3.19	250.1	Coastal dune complex.
Map unit 105	0.6	47.1	Mangal low closed-forest (mangroves).
Map unit 106	1.9	149.6	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Of concern in this area is the fact, *Mimosa pigra* (mimosa), a weed of Territory and national significance, has been recorded for the neighbouring catchment of Goyder River as well as the nearby catchments of Blyth and Roper River.

There are issues with the introduction of pasture grasses on the developing cattle property of Garrathiya, approximately 70 km by road from Nhulunbuy (see below).

Weeds

The following weed species have been recorded for this catchment:

Alternanthera dentata cv *rubra*, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Amaranthus tricolor*, *Amaranthus viridis*, *Andropogon gayanus*, *Cassia fistula*, *Catharanthus roseus*, *Cenchrus echinatus*, *Chloris inflata*, *Crotalaria goreensis*, *Crotalaria pallida*, *Cynodon dactylon* cv *speedy*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Delonix regia*, *Desmodium tortuosum*, *Digitaria ciliaris*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Emilia sonchifolia*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gmelina arborea*, *Gomphrena celosioides*, *Hymenachne amplexicaulis*, *Hyptis spicigera*, *Hyptis suaveolens*, *Ipomoea triloba*, *Jatropha gossypifolia*, *Khaya senegalensis*, *Lantana camara*, *Macroptilium lathyroides*, *Melinis repens*, *Merremia aegyptia*, *Mitracarpus hirtus*, *Oldenlandia corymbosa*, *Passiflora foetida*,

Weeds and current management activities by catchment

Pennisetum pedicellatum, *Phyllanthus amarus*, *Ruellia tuberosa*, *Scoparia dulcis*, *Senna alata*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Spathodea campanulata*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stachytarpheta mutabilis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa mutica* and *Wedelia trilobata*.

Management initiatives and recommendations

Most of the weed species identified have come from outstations along the Gulf coastline where little is known about their management. Further, the status of weeds outside outstations in this catchment is largely unknown. This has serious implications for weed management in the future considering that mimosa has been recorded for the neighbouring catchment of Goyder River. Particularly at risk here is the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54). There is an urgent need to consult traditional owners to survey this catchment area and to map the distribution of all weeds present.

Weeds of concern for this catchment include the possible recording of *Andropogon gyanus* (gamba grass) from the outstation of Barrartjpi and *Stachytarpheta mutabilis* (giant snake weed) from the outstations of Dirripitja and Wandawuy. There is an urgent need to check for the presence of gamba grass and to inform landowners of the invasive nature of both these plants.

The cattle property of Garathea (approximately 70 km south of Nhulunbuy) was also surveyed for this report. In the past there have been trials of improved pasture species including the highly invasive species of *Urochloa mutica* (para grass), *Hymenachne amplexicaulis* (olive hymenachne), *Cynodon dactylon* (couch) and the less invasive species of *Urochloa mosambicensis* (sabi grass). These trial plots were located and examined. Only remnant plants of *Cynodon dactylon* cv. (speedy couch) could be found persisting. This property is examining management options that include improved pastures on a larger scale. There is an urgent need to inform landholders about the invasive nature of some of the intending pasture species so they can make informed decisions about the use of these species on their country. Alternatives to invasive exotic species need to be presented to landholders so appropriate choices can be made.

Also located at this property was the species *Hyptis spicigera*. This represents the only known location of this species in Australia. According to local knowledge this populations of this species are expanding. Herbarium (DNA) records show a collection of this plant from there same area in 1972 and there is some confusion over its status as a weed. There is an urgent need to consult traditional owners about the status of this species as weed. If it in fact turns out to be introduced to this country then this species will need to be eradicated from the area.

The presence of *Cassia fistula* (golden shower tree) in this catchment, although not yet a fully naturalised weed is worth noting. This species has become a problem weed in Queensland and populations in the NT are expanding. Landholders urgently need information about the potential of this species to establish itself outside of cultivation so informed choices can be made about permitting this species to grow on their country.

10.15 Limmen Bight (22)

- Total Area: 15701 km²
- Aboriginal Owned Land 3060 km²
- Total Species Count: 746
- Number of Weeds Recorded: 28
- Percentage Flora as Weeds 3.6%

Aboriginal land

Bauhinia Downs Station, Carpentaria Downs Station, parts of Alawa and Marra Aboriginal Land Trusts.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Weeds and current management activities by catchment

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 8	4.6	728.0	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) woodland with sorghum grassland understorey
Map unit 10	17.9	2808.4	<i>Eucalyptus tetrodonta</i> (stringybark) woodland with a <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 16	16.8	2644.3	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 20	2.5	395.4	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	5.6	884.2	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	8.2	1280.9	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 31	27.2	4272.7	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetrodonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 32	0.8	130.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 35	3.5	556.5	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 36	0.1	10.4	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex), <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 45	3.9	613.8	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 49	4.2	658.2	<i>Melaleuca citrolens</i> (paperbark) low woodland with <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 55	2.3	363.0	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey
Map unit 98	1.3	207.5	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 103	>1.0	0.1	<i>Vetiveria elongata</i> grassland.
Map unit 106	0.9	147.0	Saline tidal flats with scattered chenopod low shrubland (samphire).

Weeds and current management activities by catchment

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Morton et. al. (1995) noted that 'burning regimes may be too frequent. Better management of cattle enterprises is also recommended'.

Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Tothill and Gillies (1992) list 'hyptis, sida on overused frontages' for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica, *Alternanthera pungens*, *Bothriochloa pertusa*, *Catharanthus roseus*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Clitoria ternatea*, *Cynodon dactylon*, *Echinochloa colona*, *Eragrostis tenella*, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hyptis suaveolens*, *Ipomoea carnea*, *Leonotis nepetifolia*, *Leucaena leucocephala*, *Lycopersicon esculentum*, *Macroptilium atropurpureum*, *Parkinsonia aculeata*, *Sida acuta*, *Sida cordifolia*, *Stylosanthes hamata*, *Tecoma stans*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa mosambicensis*, *Xanthium strumarium*.

Management initiatives and recommendations

Little is known about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions. The NLC's pastoral unit should develop weed strategies with landowners for Aboriginal pastoral properties in this area.

The presence of *Ipomoea carnea* in this catchment, although not yet a naturalised weed is worth noting. This species has become a problem weed in Queensland. Landholders urgently need information about the potential of this species to establish itself outside of cultivation so informed choices can be made about permitting this species to grow on country.

10.16 Liverpool River (14)

- Total Area: 8933 km²
- Aboriginal Owned Land 8933 km²
- Total Species Count: 531
- Number of Weeds Recorded: 58
- Percentage Flora as Weeds 15.25%

Aboriginal land

All Aboriginal owned land wholly within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	29.3	2619.0	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with Sorghum grassland understorey.

Weeds and current management activities by catchment

Map unit 7	1.7	154.9	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with grassland understorey.
Map unit 8	23.1	2068.0	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 9	6.3	562.0	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a sorghum grassland understorey.
Map unit 14	3.2	285.5	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus tectifera</i> , (northern box) woodland with sorghum grassland understorey.
Map unit 15	3.1	278.8	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 18	1.6	143.2	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 21	0.5	48.6	<i>Eucalyptus tintinans</i> (salmon gum) with a <i>Sorghum</i> grassland understorey.
Map unit 32	27.4	2445.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	1.5	134.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	0.7	60.8	Melaleuca forest (paperbark swamp).
Map unit 54	0.9	81.7	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 106	0.6	51.0	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Indigenous ecosystems dominant with no widespread degrading land use. However processes of disturbance present i.e. feral animals, weeds and fire (Storrs and Finlayson 1997). Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Fire is also influencing vegetation patterning in the Arnhem Land escarpment (Bowman et. al. 1990b). However, in some areas studied by PWCNT where there has been continuous management under traditional fire regimes vegetation is said to be showing the benefits of that management. (Bowman et. al. in preparation). *Andropogon gayanus* (gamba grass) is considered a major problem in this catchment (Pers. Com. Piers Barrow).

Weeds

The following weed species have been recorded for this catchment:

Andropogon gayanus, *Antigonon leptopus*, *Azadirachta indica*, *Bothriochloa pertusa*, *Cajanus cajan*, *Cascabela thevetica*, *Cassia fistula*, *Catharanthus roseus*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Centrosema molle*, *Chloris inflata*, *Clitoria ternatea*, *Crotalaria goreensis*, *Dactyloctenium aegyptium*, *Desmanthus virgatus*, *Desmodium tortuosum*, *Digitaria ciliaris*, *Echinochloa colona*, *Eragrostis pilosa*, *Eragrostis tenella*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hibiscus sabdariffa*, *Hyptis suaveolens*

Weeds and current management activities by catchment

Indigofera hirsuta, *Indigofera tinctoria*, *Ipomoea quamoclit*, *Jatropha gossypifolia*, *Lantana camara*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Melia azadiracht*, *Melinis repens*, *Merremia dissecta*, *Mimosa pigra*, *Mitracarpus hirtus*, *Oldenlandia corymbosa*, *Passiflora foetida*, *Passiflora suberosa*, *Pennisetum pedicellatum*, *Phyllanthus amarus*, *Scoparia dulcis*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Synedrella nodiflora*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa maxima* and *Urochloa mosambicensis*.

Management initiatives and recommendations

Most of the weeds in this catchment were recorded from the major settlement of Maningrida and from surrounding outstations. Further, the status of weeds outside these areas is largely unknown. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa), a weed of Territory and national significance, has been recorded for this catchment on the Tomkinson River Floodplain. Particularly at risk here are the *Melaleuca* forest-Paperbark swamp communities (map unit 53), the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54). Known mimosa populations have been controlled or possibly eradicated by Djelk Community rangers.

Other weeds of concern in this catchment include the presence *Andropogon gayanus* (gamba grass) and of *Cenchrus ciliaris* (buffel grass) from Maningrida, both of which have been proven to drastically alter fire regimes and kill native vegetation. The tree species *Gmelina arborea* (gmelina) and *Azadirachta indica* (neem) have been recorded for outstations in this catchment and also from the town of Maningrida. Neem is known to form dense swards in Africa and according to the Pacific Island Ecosystem at Risk group (PIER), US Forest Service, this species exhibits undesirable invasive characteristics in wildland ecosystems of the Pacific region. There is an urgent need to consult traditional owners and to provide culturally appropriate information about the invasive nature of these species so they can make informed decisions. Currently Djelk Rangers are consulting traditional owners to survey a large part of this catchment area and to map the distribution of all weeds present. The presence of *Cassia fistula* (golden shower tree) and *Cajanus cajan* (pigeon pea) in this catchment, although not yet fully naturalised, is also worth noting. These species have become problem weeds in Queensland. Landholders urgently need information about the potential of these species to establish outside of cultivation so informed choices can be made about permitting these species to grow on their country.

See Blyth River section for more information on the Djelk Ranger program.

Mimosa

Continued surveillance for, and control of, small Mimosa incursions is required. Some ILC money for herbicide is available. Lower priority for intensive input but continued support for existing land management program.

10.17 Mary River (9)

- Total Area: 8038 km²
- Aboriginal Owned Land 212 km²
- Total Species Count: 1000
- Number of Weeds Recorded: 25
- Percentage Flora as Weeds 2.5%

Aboriginal land

Some of southern Kakadu National Park (Jawoyn Lands) at headwaters and Mt Bunday Army Training Area (under Land Claim).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Weeds and current management activities by catchment

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 4	10.8	869.4	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 8	2.4	196.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 11	1.7	138.8	<i>Eucalyptus miniata</i> (Darwin woollybutt) woodland with a sorghum grassland understorey
Map unit 12	1.6	126.9	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 15	48.8	3924.4	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 18	0.3	21.2	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 21	14.3	1150.7	<i>Eucalyptus tintinans</i> (salmon gum) with a <i>Sorghum</i> grassland understorey.
Map unit 32	0.4	31.7	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	7.0	559.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	2.9	230.1	Melaleuca forest (paperbark swamp).
Map unit 54	8.2	659.2	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 106	1.6	130.2	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Issues of salinisation, mimosa infestation, introduction of pasture grasses on the floodplains low in the catchment (Storrs and Finlayson 1997).

Weeds

The following weed species have been recorded for this catchment:

Alysicarpus ovalifolius, *Andropogon gayanus*, *Calopogonium mucunoides*, *Crotalaria goreensis*, *Crotalaria pallida*, *Cynodon dactylon*, *Cynodon radiatus*, *Dactyloctenium aegyptium*, *Digitaria ciliaris*, *Echinochloa colona*, *Euphorbia hirta*, *Hibiscus sabdariffa*, *Hymenachne amplexicaulis*, *Hyptis suaveolens*, *Ipomoea pectinifera*, *Ipomoea triloba*, *Macroptilium atropurpureum*, *Mimosa pigra*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Stachytarpheta spp.*, *Tribulus cistoides* and *Urochloa maxima*.

Weeds and current management activities by catchment

Management initiatives and recommendations

Aboriginal land under Northern Territory and Commonwealth conservation management regimes.

The big threat to this catchment is *Urochloa mutica* (para grass) and *Mimosa pigra* (mimosa), a weed of Territory and national significance, which has been recorded for this catchment over vast areas. Particularly at risk here are the *Melaleuca* forest-Paperbark swamp communities (map unit 53), the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54).

Andropogon gayanus (gamba grass) is a major problem moving off the pastoral properties in the area. Currently a study is being undertaken by Trish Flores, a Ranger at Wildman River, as an honours project with NTU, to look at the reproductive ecology of gamba grass. Information gathered will assist in the management of gamba grass. Gamba grass was found to establish readily in “undisturbed” natural vegetation.

10.18 McArthur River (24)

- Total Area: 19219 km²
- Aboriginal Owned Land 1347 km²
- Total Species Count: 1263
- Number of Weeds Recorded: 52
- Percentage Flora as Weeds 4.1%

Aboriginal land

Balbarini Pastoral Lease, Narwinbi Aboriginal Land Trust (Borrooloola ‘common’), Wurralibi Aboriginal Land Trust (parts of the Sir Edward Pellew Group).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 6	2.1	412.8	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 8	0.4	78.7	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a <i>Sorghum</i> grassland understorey.
Map unit 10	8.7	1672.8	<i>Eucalyptus tetradonta</i> (stringybark) woodland with a <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 16	21.0	4044.9	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 20	5.5	1053.4	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	4.7	897.8	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.

Weeds and current management activities by catchment

Map unit 23	7.0	1346.9	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky Brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 25	1.2	234.7	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 26	1.1	220.8	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 31	29.0	5577.7	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 32	0.2	36.9	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	1.6	306.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 35	9.8	1879.2	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 36	0.5	87.5	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex), <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 49	1.1	214.4	<i>Melaleuca citrolens</i> (paperbark) low woodland with <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 51	0.2	42.9	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 55	3.9	755.8	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 98	0.6	125.5	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 103	0.2	38.8	<i>Vetiveria elongata</i> grassland.
Map unit 105	0.1	17.0	Mangal low closed-forest (mangroves).
Map unit 106	0.9	174.2	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Tourists (particularly fishers) have a great potential to move weeds to, or from, Queensland. Dirt roads with low-level creek crossings increase this hazard. Currently, the most serious threats to this area are the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it inhabits vast areas of the Gulf Country and an outbreak of *Argemone ochroleuca* (mexican poppy) on Wollgorang Homestead in the nearby catchment of Settlement Creek.

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Morton et. al. (1995) noted that “burning regimes may be too frequent.

Weeds and current management activities by catchment

Better management of cattle enterprises is also recommended.” Wonoiski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region.

Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Tohill and Gillies (1992) list ‘hyptis, sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Feral goats appear to be having a substantial impact on vegetation of Vanderlin Island (Johnson and Kerle 1991)

Weeds

The following weed species have been recorded for this catchment:

Acanthospermum hispidum, *Aerva javanica*, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Amaranthus viridis*, *Argemone ochroleuca*, *Aristolochia elegans*, *Bidens bipinnata*, *Cascabela thevetica*, *Catharanthus roseus*, *Cenchrus biflorus*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Citrullus colocynthis*, *Clitoria ternatea*, *Cynodon dactylon*, *Cyperus rotundus*, *Echinochloa colona*, *Euphorbia cyathophora*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Ipomoea carnea*, *Jatropha gossypifolia*, *Jatropha multifida*, *Khaya senegalensis*, *Manihot esculentia*, *Merremia aegyptia*, *Merremia dissecta*, *Momordica balsamina*, *Parkinsonia aculeata*, *Pennisetum pedicellatum*, *Phyllanthus amarus*, *Quisqualis indica*, *Scoparia dulcis*, *Senna alata*, *Sida acuta*, *Sida cordifolia*, *Spathodea campanulata*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Tecoma stans*, *Tribulus cistoides*, *Tridax procumbens*, *Urochloa mosambicensis*, *Xanthium strumarium* and *Ziziphus mauritiana*.

Management initiatives and recommendations

Balbarini is a pastoral property managed by the NLC.

Most of the weed species identified have come from around the township area of Borroloola with smaller numbers being recorded for some outstations. However very little is known about weeds and their management from outside the main regional centres.

The recent abolition of the position of resident NTDPFIF Stock Inspector is a concern. This position undertook weed spraying operations around creek crossings and this important work is currently not being addressed.

Landowners in the catchment area, through a meeting of councillors at Mabunji Aboriginal Resource Association, expressed the need for weed surveys to be taken in their country and for more appropriate extension material to be developed so they can be informed as possible of weeds and their management.

Currently largest threats to this area is the occurrence of *Argemone ochroleuca* (mexican poppy) in the near catchment of Settlement creek, which is being controlled by NTDPFIF and the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it inhabits vast areas of the gulf country. One record of this species has been reported from Rocklands Station in the Northern Territory in the close-by catchment of Georgina. There is an urgent need to survey this area for weeds and to inform traditional owners of present threats to their country.

Traditional owners need to be kept informed of the outcomes of the Rubber Vine Buffer Zone Committee (NT, QLD etc.) as well as access to the Rubber vine Buffer Management Plan (Fuller, NTDPFIF) for their information and to make sure they are kept up to date about the possible formation of a Gulf region weed management group. Mabunji Aboriginal Resource Association should be kept informed. Efforts should be made to develop a community ethos which encourages immediate action on sighting of new infestations.

Weeds and current management activities by catchment

The presence of *Ipomoea carnea*, *Manihot esculenta* and *Aristolochia elegans* in this catchment, although not yet naturalised weeds is worth noting. These species has become a problem weeds in Queensland. Landholders urgently need information about the potential of this species to establish itself outside of cultivation so informed choices can be made about permitting these species to grow on their country. Information on the alternative native species needs to be provided to landholders.

This catchment, in particular the area around Borroloola, is strategic in stopping of the advancement of weeds from Queensland and every effort should be made to keep it weed free.

10.19 Moyle River (5)

- Total Area: 6948 km²
- Aboriginal Owned Land 6898 km²
- Total Species Count: 422
- Number of Weeds Recorded: 48
- Percentage Flora as Weeds 11.3%

Aboriginal land

Almost completely within Aboriginal owned land within the Daly River/Port Keats Aboriginal Land.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 4	53.6	3723.3	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 9	10.2	708.6	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a <i>Sorghum</i> grassland understorey.
Map unit 15	8.8	609.2	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with sorghum grassland understorey.
Map unit 32	2.4	167.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	8.7	604.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 54	14.2	984.4	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 105	1.0	67.3	Mangal low closed-forest (mangroves).
Map unit 106	1.2	84.4	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Weeds and current management activities by catchment

The catchment marks the south-western extent of the mimosa infestation with areas on the north side of the Moyle River badly infested while those on the southern side in early stages of invasion with small outlier incursions.

Low intensity pastoralism present to the south of the River on Aboriginal owned cattle station, Palumpa.

Weeds

The following weed species have been recorded for this catchment:

Alternanthera dentata cv rubra, *Alysicarpus ovalifolius*, *Bothriochloa pertusa*, *Calotropis procera*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Clitoria ternatea*, *Cryptostegia madagascariensis*, *Cynodon dactylon*, *Desmodium tortuosum*, *Desmodium triflorum*, *Echinochloa colona*, *Echinochloa crus-galli*, *Eleusine indica*, *Eragrostis tenella*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gmelina arborea*, *Gomphrena celosioides*, *Heliotropium indicum*, *Hyptis suaveolens*, *Ipomoea quamoclit*, *Jatropha gossypifolia*, *Leucaena leucocephala*, *Macroptilium atropurpureum*, *Melinis repens*, *Mimosa pigra*, *Oldenlandia corymbosa*, *Paspalum notatum*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Phyllanthus amarus*, *Phyllanthus emblica*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Sporobolus natalensis*, *Stylosanthes guianensis*, *Stylosanthes hamata*, *Tecoma stans*, *Thunbergia grandiflora*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tribulus terrestris*, *Tridax procumbens*, *Urochloa maxima* and *Urochloa mosambicensis*

Management initiatives and recommendations

Most of the weeds in this catchment were recorded from the major settlements of Wadeye and from surrounding outstations. The status of weeds outside these areas is largely unknown. This has serious implications for weed management in the future and there is an urgent need to consult traditional owners to carry out weed surveys of this catchment. The most significant threat to this catchment is mimosa, a weed of Territory and national significance, which has been recorded for this catchment over vast areas. Particularly at risk here is the mixed closed-grassland/sedgeland (seasonal floodplain) community (map unit 54).

Other species that are of concern are the presence of *Gmelina arborea* (gmelina), *Thunbergia grandiflora* (thunbergia), *Clitoria ternatea* (blue pea) and *Ipomoea quamoclit* (cupids flower) from around Wadeye. There is an urgent need to consult with traditional owners and to provide culturally appropriate information on the invasive nature of these species so that traditional owners can make informed decisions about growing these species on their country.

Mimosa

Mimosa is the single most important weed threat in the area. In the southern Daly River/Port Keats Aboriginal Land Trust (south of the 14° S—the Moyle River) a regional approach is required to the surveillance and eradication of small mimosa incursions. ILC mimosa funds are available for this area. Planning, training and resourcing is required.

This is a high-priority area which is strategically very important in stopping the movement of mimosa toward Western Australia. Much input needed. An excellent program of control is being undertaken on the Aboriginal cattle station of Palumpa which has resulted in the area to the south of the Moyle River being well managed. Mimosa on the floodplain on the north side of the Moyle River however is out of hand. Peppimenarti community needs assistance in developing a capacity to deal with the problem. Training in ground control and safe use of herbicides is required.

In the central Daly River/Port Keats Aboriginal Land Trust on the floodplain of the Little Moyle River (Chindi area) and the floodplain of Docherty Creek little to no mimosa control is occurring. Surveillance and control of outlying incursions and impact reduction of large infestations is required. There are very few people in the area but some interest has been shown. This is a lower-priority area and much input is required.

The CFCU has undertaken consultations with different communities within the land trust with the view to taking a regional approach to land management, and in particular mimosa.

Weeds and current management activities by catchment

A proposal has been developed for consideration by the ILC to employ a land management coordinator to be based at Peppimenarti who in the first instance institutes control teams in a number of areas based on the Palumpa model and also looks to addressing broader land management issues as well as enterprise development based on the use of natural resources.

10.20 Nicholson River (28)

- Total Area: 15758 km²
- Aboriginal Owned Land 9509 km²
- Total Species Count: 470
- Number of Weeds Recorded: 5
- Percentage Flora as Weeds 0.85%

Aboriginal land

Waanyi/Garawa Aboriginal Land Trust (former Nicholson River pastoral lease)

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 16	2.5	395.3	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 25	0.7	114.5	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 31	18.0	2820.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	7.58	1194.2	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 36	35.7	5627.8	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex), <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 39	3.0	467.3	<i>Eucalyptus pruinosa</i> (silver box), <i>Lysiphyllum cunninghamii</i> (bauhinia) low open-woodland with hummock/tussock grassland understorey
Map unit 40	13.8	2176.5	<i>Eucalyptus ferruginea</i> (rusty bloodwood) low open-woodland or <i>Jacksonia odontocarpa</i> open-shrubland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 45	6.0	949.3	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 96	12.7	1995.0	<i>Astrelba pectinata</i> (barley mitchell grass) grassland.
Map unit 98	0.1	18.3	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.

Weeds and current management activities by catchment

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Morton et. al. (1995) noted that “burning regimes may be too frequent. Better management of cattle enterprises is also recommended.” Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region. Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable. Tothill and Gillies (1992) list ‘hyptis, sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Hyptis suaveolens, *Sida acuta*, *Thunbergia grandiflora*, *Tribulus cistoides* and *Xanthium strumarium*.

Management initiatives and recommendations

The fact that only four species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions.

The occurrence of *Cryptostegia grandiflora* (rubber vine) from neighboring catchments is of real concern and needs urgent investigation. This species is a major weed in Queensland where it inhabits vast areas of the gulf country. There is an urgent need to survey this area for this weed and to inform traditional owners of present threats to their country.

Traditional owners need to be kept informed of the outcomes of the Rubber Vine Buffer Zone Committee (NT, QLD etc.) as well as access to the Rubber Vine Buffer Management plan (Fuller, NTDPIF) for their information and to make sure they are kept up to date about the possible formation of a Gulf region weed management group. (See McArthur River catchment for details). Efforts should be made to develop a community ethos which encourages immediate action on sighting of new infestations. This catchment is strategic in stopping of the advancement of weeds from Queensland and every effort should be made to keep it weed free.

10.21 Ord River (1)

- Total Area: 11386 km²
- Aboriginal Owned Land 0
- Total Species Count: 272
- Number of Weeds Recorded: 1
- Percentage Flora as Weeds 0.3%

Aboriginal land

No Aboriginal-owned land, however some in northern part of the catchment under Native Title Claim.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in tCatchment	Broad Vegetation Type
Map unit 15	0.1	12.9	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.

Weeds and current management activities by catchment

Map unit 22	19.7	2243.9	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	0.5	55.5	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 33	0.6	69.8	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 37	5.0	566.4	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 38	20.0	2284.7	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 88	31.0	3527.2	<i>Triodia</i> (spinifex) hummock grassland.
Map unit 91	5.4	617.8	<i>Triodia wiseana</i> (limestone spinifex) hummock grassland with <i>Terminalia arostrata</i> (nutwood) low open-woodland overstorey.
Map unit 96	4.6	524.2	<i>Astrelba pectinata</i> (barley mitchell grass) grassland
Map unit 97	2.2	246.0	<i>Astrelba</i> (mitchell grass), mixed species grassland with scattered trees and shrubs.
Map unit 98	2.9	329.7	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 99	8.0	908.4	<i>Enneapogon purpurascens</i> (nine awn grass) grassland.

General land management issues

Land degradation due to grazing pressure was highlighted for this region by Condon (1986). Winter (1990) noted substantial erosion (due to previous and continuing overgrazing) for the Ord Catchment.

Morton et. al. (1995) listed feral livestock (donkey and cattle), presence of cat, horse, pig, camel and water buffalo.

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica.

Management initiatives and recommendations

The fact that only one species collected from this catchment indicates our lack of knowledge about the status of weeds in this area.

10.22 Robinson River(25)

- Total Area: 10976 km²
- Aboriginal Owned Land 5023 km²
- Total Species Count: 395
- Number of Weeds Recorded: 11
- Percentage Flora as Weeds 2.8%

Aboriginal land

Garawa Aboriginal Land Trust (former Robinson River pastoral lease—Mugularrangu) and off-lying islands (see McArthur River).

Weeds and current management activities by catchment

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 6	4.2	461.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 8	0.08	8.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 10	29.2	3204.3	<i>Eucalyptus tetradonta</i> (stringybark) woodland with a <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 16	21.6	2374.1	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 31	27.3	3000.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	3.6	392.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low, open woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 49	7.3	801.5	<i>Melaleuca citrolens</i> (paperbark) low woodland with <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 51	0.7	80.5	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 55	0.4	42.1	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 103	1.8	199.3	<i>Vetiveria elongata</i> grassland.
Map unit 106	3.8	412.3	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region. Morton et. al. (1995) noted that “burning regimes may be too frequent. Better management of cattle enterprises is also recommended.”

Fire escaping from the Aboriginal owned Robinson River is an issue with surrounding landholders which is recognised by the owners of the Station. Holmes (1986, 1990) assessed land-use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Weeds and current management activities by catchment

Tohill and Gillies (1992) list 'hyptis, sida on overused frontages' for bluegrass-golden beard grass pasture in this region.

Currently, the largest weed threats to this area is the occurrence of *Argemone ochroleuca* (mexican poppy) on Wollogorang Homestead (Settlement Creek catchment), which is being controlled by NTDPF and the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it inhabits vast areas of the gulf country. Populations of *Xanthium strumarium* (noogoora burr) is also reported to be expanding along the Robinson River.

Weeds

The following weed species have been recorded for this catchment:

Acanthospermum hispidum, *Alternanthera pungens*, *Hyptis suaveolens*, *Momordica balsamina*, *Parkinsonia aculeata*, *Passiflora foetida*, *Senna alata*, *Senna obtusifolia*, *Sida acuta*, *Sida cordifolia*, *Tribulus cistoides* and *Xanthium strumarium*

Management initiatives and recommendations

Mugularrangu pastoral property receives some advice and assistance from the NLC Pastoral Unit. ALEP has visited Mungoorabada on Robinson River providing information and technical support. Identified concerns include environmental health, weed and feral animal control and the management of fire. The ILMF facilitator and CFCU are making arrangements with landowners for meetings to advance fire development strategies. Representatives of Mugularrangu management are attending meetings of the Border Action Group (BAG).

The fact that only 11 species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal land in this catchment to ascertain the level and extent of weed introductions. Landowners in the catchment area, through a meeting of councilors at Mabunji Aboriginal Resource Association, expressed the need for weed surveys to be taken in their country and for more appropriate extension material to be developed so they can be informed as possible of weeds and their management.

Traditional owners need to be kept informed of the outcomes of the Rubber Vine Buffer Zone Committee (NT, QLD, etc.) as well as access to the Rubber Vine Buffer Management Plan (Fuller, NTDPF) for their information and to make sure they are kept up to date about the possible formation of a Gulf region weed management group. (see McArthur River Catchment for details). Efforts should be made to develop a community ethos which encourages immediate action on sighting of new infestations.

The ILMF is currently doing property management planning and indigenous land management planning with landholders. Work was to have begun in 2000.

10.23 Roper River (16)

- Total Area: 79115 km²
- Aboriginal Owned Land 27462 km²
- Total Species Count: 1330
- Number of Weeds Recorded: 48
- Percentage Flora as Weeds 3.6%

Aboriginal land

Headwaters in parts of Jawoyn Aboriginal Land Trust and Eva Valley pastoral lease. Aboriginal land includes Beswick Aboriginal Land Trust, Elsey Station pastoral lease, Alawa No. 1 Aboriginal Land Trust (Hodgson Downs), Alawa Aboriginal Land Trust (former Cox River pastoral lease), Roper Valley pastoral lease, Yutpundji-Djindiwirritj Aboriginal Land Trust (Roper Bar area), Marra Aboriginal Land Trust and southeast Arnhem Land Aboriginal Land Trust.

Weeds and current management activities by catchment

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	2.3	1820.3	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with a sorghum grassland understorey.
Map unit 6	0.3	243.0	<i>Eucalyptus tetradonta</i> (stringybark), <i>Callitris intratropica</i> (cypress pine) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 8	4.6	3634.0	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey
Map unit 9	1.5	1184.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) Woodland with a sorghum grassland understorey.
Map unit 10	2.9	2306.0	<i>Eucalyptus tetradonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 12	1.3	1033.4	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 13	2.3	1853.8	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) woodland with <i>Plectrachne pungens</i> (curly spinifex), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 14	2.5	1977.9	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus tectifera</i> (northern box) woodland with Sorghum grassland understorey.
Map unit 15	8.2	6472.4	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 16	9.5	7510.2	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 17	16.3	12925.6	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) woodland with grassland understorey.
Map unit 18	0.9	730.8	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 19	1.9	1508.9	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus patellaris</i> (weeping box) woodland with grassland understorey.

Weeds and current management activities by catchment

Map unit 20	10.1	7992.8	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 21	0.3	201.9	<i>Eucalyptus tintinans</i> (salmon gum) with a <i>Sorghum</i> grassland understorey.
Map unit 22	1.7	1340.1	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	8.0	6352.4	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 24	0.8	617.4	<i>Eucalyptus microtheca</i> (coolibah), <i>Excoecaria parvifolia</i> (gutta-percha) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 25	4.3	3412.4	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 26	0.01	10.3	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 29	2.0	1623.0	<i>Eucalyptus phoenicea</i> (scarlet gum) low woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 31	1.5	1220.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 32	2.6	2095.2	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 35	2.2	1718.7	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 49	1.4	1098.0	<i>Melaleuca citrolens</i> (paperbark) low woodland with <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 51	0.3	236.6	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 55	4	3165.4	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 56	3.8	3018.9	Complex of <i>Acacia shirleyi</i> (lancewood) low-woodland mixed with <i>Eucalyptus</i> low open-woodland.
Map unit 98	1.2	963.6	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Weeds and current management activities by catchment

Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region. Morton et. al. (1995) noted that “burning regimes may be too frequent. Better management of cattle enterprises is also recommended.”

Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Upgrading of Central Arnhem Land Road has led to increased use of the road as well as the Ngukurr to Numbulwar road. The period of travel has also been extended into the wet season. However, with low-level crossings of rivers and creeks there is high potential for weeds propagules being washed off vehicles and infesting currently clean catchments.

Tothill and Gillies (1992) list ‘hyptis, sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Acacia nilotica, *Acanthospermum hispidum*, *Aerva javanica*, *Alternanthera pungens*, *Amaranthus viridis*, *Bothriochloa pertusa*, *Calotropis procera*, *Cascabela thevetica*, *Catharanthus roseus*, *Cenchrus ciliaris*, *Clitoria ternatea*, *Cryptostegia madagascariensis*, *Cynodon radiatus*, *Cyperus compressus*, *Cyperus involucratus*, *Eragrostis pilosa*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gmelina arborea*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Ipomoea carnea*, *Jatropha gossypifolia*, *Macroptilium atropurpureum*, *Malvastrum americanum*, *Malvastrum coromandelianum*, *Martynia annua*, *Melia azedarach*, *Mimosa pigra*, *Parkinsonia aculeata*, *Parthenium hysterophorus*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Quisqualis indica*, *Scoparia dulcis*, *Senna alata*, *Sesamum indicum*, *Sida acuta*, *Sida cordifolia*, *Sorghum almum*, *Spathodea campanulata*, *Themeda quadrivalvis*, *Thunbergia grandiflora*, *Tribulus terrestris*, *Triumfetta pentandra*, *Xanthium strumarium* and *Ziziphus mauritiana*.

Management initiatives and recommendations

Elsy, Hodgson Downs, Roper Valley and Urapunga are pastoral properties which receive management assistance from the NLC Pastoral Unit.

Elsy Station has a vegetation management plan which covers weed infestations and weed management issues (Ecostudy 1993.)

Of concern for this catchment is the discovery of *Mimosa pigra* (mimosa) on the Phelps River just north of Ngukurr. This population was found by accident and there is a strong likelihood that further populations exist. The current infestation totals approximately 45 ha. Some survey work is being carried out by ILMF and NTDPIF to determine the extent of this infestation. There is an urgent need to consult traditional owners of in surrounding regions to conduct extensive surveys for this species.

Other species of concern, particularly around settlements and communities, is the presence of the weeds *Stachytarpheta* spp. (snake weeds) and *Ipomoea carnea*. The latter is a known environmental weed that has yet to establish itself in the Northern Territory but is a known weed from Queensland. There is an urgent need to consult with landowners about these species and to provide culturally appropriate information about their invasive nature so that informed decisions can be made about growing these species on their country. The highly invasive weed *Parthenium hysterophorus* (parthenium weed) has in the past been recorded from this catchment on Elsey Creek. According to NTDPIF this species has been eradicated from the area however constant vigilance is needed to make sure this species does not re-occur.

Ngukurr

An expanding land management program headed by Clarry Rodgers was initiated to undertake dust suppression work in the township and is now dealing with the Phelps River mimosa infestation and other land-management issues such as fire management, weeds and feral animals. The ILMF is currently developing weed literature in Kriol.

Weeds and current management activities by catchment

Bulman

The southern gateway to Arnhem Land. The CFCU land management coordinator based in Nhulunbuy is working with communities in the area to enhance land management capacity through the development of land management strategies through participatory planning. Major problems in this area are grader grass (*Themeda quadrivalvis*), *Gmelina arborea* (gmelina), *Acacia nilotica* (prickly acacia), *Senna alata* (candle bush) and *Ziziphus mauritiana* (chinee apple). The CFCU has been working with the local council, CDEP and senior traditional owners to control *Senna alata* (candle bush), *Leucaena leucocephala* (coffee bush), *Gmelina arborea* (gmelina) as well as surveying for mimosa and other weeds.

Beswick/Barunga area

Jawoyn Association is working on systematic weed surveys for all Jawoyn land. A database of weeds was developed and will be maintained to aid in the development weed management plans. Weed distribution maps can be produced by using associated GIS software. The Waterhouse River was surveyed in conjunction with the NTDPIF. Little weed control work is currently being undertaken because of lack of funds and personnel. *Themeda quadrivalvis* (grader grass) is present in hay paddocks at Barunga. Owners need to be notified and advised on appropriate control so this grass does not spread elsewhere in the catchment through hay carting.

Mimosa

Control of existing infestation and surveillance for, and control of, any new incursions required. ILC money available. Medium priority. Expansion of existing land management program at Ngukurr—planning, training and resourcing required.

10.24 Rosie River (23)

- Total Area: 4963 km²
- Aboriginal Owned Land 0
- Total Species Count: 263
- Number of Weeds Recorded: 9
- Percentage Flora as Weeds 3.4%

Aboriginal land

No Aboriginal owned land.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 10	71.0	3526.4	<i>Eucalyptus tetradonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 16	1.9	94.8	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 25	2.2	108.7	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dicanthium</i> (bluegrass) grassland understorey.
Map unit 31	7.7	381.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.

Weeds and current management activities by catchment

Map unit 35	10.0	497.0	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 51	0.6	30.8	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 103	1.1	55.7	<i>Vetiveria elongata</i> grassland.
Map unit 106	5.4	267.9	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Morton et. al. (1995) noted that “burning regimes may be too frequent. Better management of cattle enterprises is also recommended”.

Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable. Tothill and Gillies (1992) list ‘hyptis, sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica, *Alternanthera pungens*, *Chloris inflata*, *Hyptis suaveolens*, *Parkinsonia aculeata*, *Sida acuta*, *Tribulus cistoides*, *Xanthium strumarium* and *Ziziphus mauritiana*.

Management initiatives and recommendations

The fact that only nine species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area.

10.25 Settlement Creek (27)

- Total Area: 5522 km²
- Aboriginal Owned Land 118 km²
- Total Species Count: 446
- Number of Weeds Recorded: 6
- Percentage Flora as Weeds 1.35%

Aboriginal land

Part of Waanyi/Garawa Aboriginal Land Trust and small excisions.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map unit	% of total in catchment	Area (km ²) in catchment	Broad vegetation type
Map unit 1	0.9	51.8	Mixed species closed-forest (monsoon vine-thicket)
Map unit 10	28.6	1577.6	<i>Eucalyptus tetradonta</i> (stringybark) woodland with a <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.

Weeds and current management activities by catchment

Map unit 16	20.8	1153.1	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) Woodland with a <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 18	1.0	60.4	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (long-fruited bloodwood) woodland with grassland understorey.
Map unit 23	4.7	262.0	<i>Eucalyptus pruinosa</i> (silver box) low open woodland with <i>Eulalia aurea</i> (silky brown-top) <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 25	6.1	337.9	<i>Eucalyptus microtheca</i> (coolibah), low open-woodland with <i>Eulalia aurea</i> (silky brown-top), <i>Dicanthium</i> (bluegrass) grassland understorey.
Map unit 31	33.6	1854.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	1.3	70.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open- woodland with <i>Plectrachne pungens</i> (curly spinifex) open grassland understorey.
Map unit 35	0.9	51.3	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with a <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 51	0.5	25.6	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 55	0.1	5.2	<i>Acacia shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 106	1.3	72.0	Saline tidal flats with scattered chenopod low shrubland (sapphire)

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high Morton et. al. (1995) noted that ‘burning regimes may be too frequent. Better management of cattle enterprises is also recommended’.

Holmes (1986, 1990) assessed land use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Tourists (particularly fishers) have a great potential to move weeds to, or from, Queensland. Dirt roads with low-level creek crossings increase this hazard. Currently, the largest threats to this area is the occurrence of *Argemone ochroleuca* (mexican poppy) from Wollogorang Homestead. This is being controlled by NTDPIF. The other threat is the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it infests vast areas of the Gulf Country.

Tohill and Gillies (1992) list ‘hyptis, sida on overused frontages’ for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Alternanthera pungens, *Argemone ochroleuca*, *Hyptis suaveolens*, *Senna alata*, *Tribulus cistoides* and *Xanthium strumarium*.

Management initiatives and recommendations

The fact that only six species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area.

Weeds and current management activities by catchment

There is an urgent need to survey all Aboriginal land in this area to ascertain the level and extent of weed introductions. Negotiations need to be carried out with traditional owners and Mabunji Resource Centre to investigate.

Currently, the largest threats to this area are the occurrence of *Argemone ochroleuca* (mexican poppy) from Wollogorang Homestead (being controlled by NTDPIF) and the threat of the potential weed species *Cryptostegia grandiflora* (rubber vine) from Queensland where it inhabits vast areas of the Gulf country. One record of this species was reported from Rocklands Station in the Northern Territory in the neighbouring catchment of Nicholson River. There is an urgent need to survey this area for weeds particularly around Wollogorang and on the Waanyi/Garawa Aboriginal Land Trust for these weeds and to inform traditional owners of present threats to their country.

Traditional owners need to be kept informed of the outcomes of the Rubber Vine Buffer Zone Committee (NT, QLD etc.) as well as access to the Rubber Vine Buffer Management plan (Fuller, NTDPIF) for their information and to make sure they are kept up to date about the possible formation of a Gulf region weed management group. (See McArthur River catchment for details). Mabunji Aboriginal Resource Association should also be kept informed. Efforts should be made to develop a community ethos which encourages immediate action on sighting of new infestations.

Landowners in the catchment area, through a meeting of councillors at Mabunji Aboriginal Resource Association, expressed the need for weed surveys to be taken in their country and for more appropriate extension material to be developed so they can be informed as possible of weeds and their management. The ILMF is collaborating with the CFCU and is working with Mabunji Resource Centre to help people develop their capacity to manage country. The ILMF is also developing land-use strategies with Julalikauri. This catchment is strategic in stopping of the advancement of weeds from Queensland and every effort should be made to keep it weed free.

10.26 South Alligator River (11)

- Total Area: 11814 km²
- Aboriginal Owned Land 7572 km²
- Total Species Count: 1682
- Number of Weeds Recorded: 79
- Percentage Flora as Weeds 4.7%

Aboriginal land

Largely Aboriginal owned land. A large percentage of the catchment is within Kakadu National Park and under conservation management by Environment Australia which treats the Park as Aboriginal land. Remaining portion is within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 2	1.34	157.7	<i>Allosyncarpia ternata</i> closed-forest.
Map unit 4	12.6	1486.6	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 8	9.8	1157.7	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey.

Weeds and current management activities by catchment

Map unit 15	41.3	4878.7	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with a <i>Sorghum</i> grassland understorey.
Map unit 21	6.2	731.9	<i>Eucalyptus tintinans</i> (salmon gum) with a <i>Sorghum</i> grassland understorey
Map unit 32	17.6	2076.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	2.7	321.1	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	1.4	161.9	<i>Melaleuca</i> forest (paperbark swamp).
Map unit 54	6.7	791.7	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 106	0.4	50.5	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Andropogon gayanus (gamba grass) is fast invading the north west boundary (Wildman Catchment) of the Park which abuts pastoral properties (Storrs 1996a) *Urochloa mutica* (para grass) and *Calotropis procera* (rubber bush) incursions in the uppermost catchment are being treated by Parks North staff (Storrs 1996a). *Crotalaria goreensis* (gambia pea) is emerging as a major problem in the upper catchment. *Calopogonium mucunoides* (calopo) and other legumes are seen as serious future problems (Pers. Com. Piers Barrow). *Mimosa pigra* (mimosa) is seen as the major threat in the lower catchment.

Weeds

The following weed species have been recorded for this catchment:

Aeschynomene villosa, *Alternanthera dentata* cv *rubra*, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Andropogon gayanus*, *Axonopus compressus*, *Bidens bipinnata*, *Bidens pilosa*, *Bothriochloa pertusa*, *Calopogonium mucunoides*, *Calotropis procera*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Chloris gayana*, *Chloris inflata*, *Chloris pilosa*, *Crotalaria goreensis*, *Cynodon dactylon*, *Cynodon radiatus*, *Cyperus compressus*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Desmodium tortuosum*, *Desmodium triflorum*, *Digitaria ciliaris*, *Digitaria violascens*, *Echinochloa colona*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Emilia sonchifolia*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Evolvulus nummularis*, *Gomphrena celosioides*, *Gossypium hirsutum*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Ipomoea quamoclit*, *Ipomoea triloba*, *Melinis repens*, *Merremia aegyptia*, *Mimosa pigra*, *Mitracarpus hirtus*, *Oldenlandia corymbosa*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Phyllanthus amarus*, *Quisqualis indica*, *Ricinus communis*, *Ruellia tuberosa*, *Salvinia molesta*, *Scoparia dulcis*, *Senna alata*, *Senna obtusifolia*, *Senna occidentalis*, *Sesamum indicum*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Solanum nigrum*, *Spermacoce latifolia*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes hamata*, *Stylosanthes humilis*, *Stylosanthes viscosa*, *Synedrella nodiflora*, *Tabernaemontana coronaria*, *Themeda quadrivalvis*, *Trianthema portulacastrum*, *Tribulus cistoides*, *Tridax procumbens*, *Triumfetta pentandra*, *Urochloa gilvum*, *Urochloa maxima*, *Urochloa mosambicensis* and *Urochloa mutica*.

Management initiatives and recommendations

A large percentage of the catchment is within the Kakadu National Park and under conservation management by Environment Australia.

Weeds and current management activities by catchment

Management of weeds generally under a plan by Storrs (1996a). A weed strategy has also been developed for the Jabiluka Mineral Lease within Kakadu National Park (Storrs 1996b). An integrated management plan was developed for the water weed *Salvinia molesta* (salvinia) for the Kakadu National Park (Storrs and Julien 1996).

Mimosa management in the Park is truly one of the great weed-management success stories and underlines the value of early intervention and continual surveillance. A team of four people have been employed to work full time on mimosa management in the Park since the early 1980s. In 1996 the cost of this program was estimated to be around \$400,000 pa (Storrs 1996a) but has proven its value with Kakadu being described as an island in a sea of mimosa. The current annual cost of mimosa management in the park is now estimated at \$574,00 (Pers. Com. Piers Barrow).

The catchment areas within Arnhem Land require urgent attention by CFCU and landowners in conjunction with partners in the West Arnhem Plateau Fire Project. Approach will be to assist landowners to visit country and make land health evaluations as a first step. Ongoing management to be developed within the fire project.

10.27 Towns River (21)

- Total Area: 5348 km²
- Aboriginal Owned Land 1846 km²
- Total Species Count: 49
- Number of Weeds Recorded: 4
- Percentage Flora as Weeds 8%

Aboriginal land

Parts of the Alawa Aboriginal Land Trust and the Marra Aboriginal Land Trust. Major portion of catchment under Native Title claim (St Vidgeon).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 10	32.2	1723.8	<i>Eucalyptus tetrodonta</i> (stringybark) woodland with <i>Plectrachne pungens</i> (curly spinifex) open-grassland understorey.
Map unit 16	41.0	2193.2	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 20	0.1	6.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	4.8	256.0	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 31	9.0	483.1	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetrodonta</i> (stringybark) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey

Weeds and current management activities by catchment

Map unit 32	3.6	193.2	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrache pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 49	0.06	3.0	<i>Melaleuca citrolens</i> (paperbark) low woodland with <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 56	2.4	126.0	Complex of <i>Acacia shirleyi</i> (lancewood) low-woodland mixed with Eucalyptus low open-woodland.
Map unit 103	1.2	64.5	<i>Vetiveria elongata</i> grassland.
Map unit 106	5.6	298.7	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region. Morton et. al. (1995) noted that 'burning regimes may be too frequent. Better management of cattle enterprises is also recommended'.

Holmes (1986, 1990) assessed land-use options for parts of this region, noting the marginality of most existing cattle enterprises and defining areas which were more suitable.

Tohill and Gillies (1992) list 'hyptis, sida on overused frontages' for bluegrass-golden beard grass pasture in this region.

Weeds

The following weed species have been recorded for this catchment:

Hyptis suaveolens, *Parkinsonia aculeata*, *Sida acuta* and *Tribulus cistoides*.

Management initiatives and recommendations

The fact that only three species were collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions.

10.28 Victoria River (3)

- Total Area: 77188 km²
- Aboriginal Owned Land 6987 km²
- Total Species Count: 1418
- Number of Weeds Recorded: 37
- Percentage Flora as Weeds 9.6%

Aboriginal land

Yingawunarri Mudbura Aboriginal Land Trust (Montejinni—Old Top Springs), Ngaliwurru-Nungali Aboriginal Land Trust (Fitzroy), Nagurunguru Aboriginal Land Trust (Amanbidji—Kildurk), Mayat Aboriginal Land Trust (Timber Creek, except town and Victoria Highway). Gregory National Park (under Land Claim), part of Innesvale (under Land Claim) and Bradshaw Station Army Training Facility (under Native Title Claim).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Weeds and current management activities by catchment

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 9	0.05	39.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with <i>Sorghum</i> grassland understorey.
Map unit 13	2.0	1605.3	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) woodland with <i>Plectrachne pungens</i> (curly spinifex), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 15	1.4	1114.5	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with a sorghum grassland understorey.
Map unit 16	9.9	7678.6	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 17	0.3	205.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) woodland with grassland understorey.
Map unit 18	0.03	20.2	<i>Eucalyptus papuana</i> (ghost gum), <i>Eucalyptus polycarpa</i> (Long-fruited Bloodwood) woodland with grassland understorey.
Map unit 20	0.2	187.6	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	14.0	10775.5	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (Box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	4.1	3192.1	<i>Eucalyptus pruinosa</i> (silver box) low woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 24	1.3	999.8	<i>Eucalyptus microtheca</i> (Coolibah), <i>Excoecaria parvifolia</i> (Gutta-percha) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey
Map unit 25	>1.00	1.1	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 29	6.3	4839.9	<i>Eucalyptus phoenicea</i> (scarlet gum) low woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 32	5.2	3992.6	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 33	6.2	4811.7	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.

Weeds and current management activities by catchment

Map unit 37	6.7	5170.9	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Plectrachne pungens</i> (curly spinifex) hummock grassland understorey.
Map unit 38	9.1	7018.2	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 42	0	1.7	<i>Eucalyptus opaca</i> (bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey
Map unit 44	2.6	2029.8	<i>Terminalia arostrata</i> (nutwood) low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey.
Map unit 45	0.4	291.4	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.
Map unit 46	1.6	1246.4	<i>Lysiphyllum cunninghamii</i> (bauhinia), mixed species low open-woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) open-grassland understorey.
Map unit 50	4.4	3413.6	<i>Melaleuca minutifolia</i> (paperbark) low woodland with <i>Sorghum</i> grassland understorey.
Map unit 55	1.1	859.0	<i>Acacia. shirleyi</i> (lancewood) open-forest with open-grassland understorey.
Map unit 57	0.2	170.9	<i>Macropteranthes kekwickii</i> (bullwaddy) tall shrubland with open-grassland understorey
Map unit 76	3.0	2342.9	<i>Triodia pungens</i> (soft spinifex), <i>Plectrachne schinzii</i> (curly spinifex) hummock grassland with <i>Acacia</i> tall sparse-shrubland overstorey.
Map unit 88	0.9	683.8	<i>Triodia</i> (Spinifex) hummock grassland.
Map unit 96	1.3	1006.2	<i>Astrebla pectinata</i> (barley mitchell grass) grassland.
Map unit 97	11.0	8529.9	<i>Astrebla</i> (mitchell grass), mixed species grassland with scattered trees and shrubs.
Map unit 98	5.2	4032.5	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 104	0.5	409.3	<i>Xerochloa</i> (rice grass) grassland.
Map unit 106	0.7	518.3	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests. Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region. Land degradation due to grazing pressure has been described for this region Condon (1986). Winter (1990) noted substantial erosion (due to previous and continuing overgrazing) for the Victoria Catchment, stating “a large proportion of the most valuable land within the Victoria River catchment has been degraded”, including erosion and widespread replacement of ‘preferred’ grasses by less palatable species, including exotic weeds.

Tohill and Gillies (1992) list serious frontage erosion (now recovering with fencing and seeding) and ‘decline of desirable species’ for bluegrass-golden beard grass grasslands; increased ‘undesirable annual grasses (aristida)’, ‘decline in desirable species’ and active erosion for plains mitchell grass; and ‘past scalding and stream erosion, now recovering’.

Weeds and current management activities by catchment

Bradshaw Station Army Training Facility is under a strict management regime but issues of weed movement on vehicles and degradation of vegetation during exercises are leading to weed invasion.

Weeds

The following weed species have been recorded for this catchment:

Aerva javanica, *Alternanthera pungens*, *Amaranthus viridis*, *Azadirachta indica*, *Barleria prionitis*, *Calotropis procera*, *Cenchrus biflorus*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Cenchrus setigerus*, *Citrullus colocynthis*, *Corchorus olitorius*, *Corchorus trilocularis*, *Cynodon dactylon*, *Cynodon radiatus*, *Euphorbia hirta*, *Gmelina arborea*, *Hibiscus sabdariffa*, *Hyptis suaveolens*, *Jatropha gossypifolia*, *Leonotis nepetifolia*, *Malvastrum americanum*, *Malvastrum coromandelianum*, *Martynia annua*, *Merremia dissecta*, *Momordica balsamina*, *Parkinsonia aculeata*, *Senna obtusifolia*, *Sesamum indicum*, *Sida acuta*, *Stylosanthes hamata*, *Stylosanthes scabra*, *Stylosanthes viscosa*, *Tribulus cistoides*, *Tribulus terrestris*, *Tridax procumbens* and *Xanthium strumarium*.

Management initiatives and recommendations

- Weeds recorded from this catchment have come mainly from around the Victoria River and associated settlements.
- Amanbidji, Fitzroy and Innesvale are pastoral properties which receive assistance from the NLC Pastoral Unit..
- A Victoria River district weed management strategy is currently being developed for the VRDCA under NHT funding, NTDFIP (1997). This should give landholders in the catchment a strategic and coordinated approach to weed management.
- Since 1995/96 the Walangeri Ngumpionku Aboriginal Corporation based at Yarralin has been undertaking control of the noxious weed *Leonotis nepetifolia* (lion's tail) along the Wickham River. This is undertaken using NHT funds and is designed to rehabilitate and conserve the native vegetation on the river bank and to prevent the infestation spreading into the entire Victoria River catchment.

10.29 Walker River (20)

- Total Area: 9445 km²
- Aboriginal Owned Land 9445 km²
- Total Species Count: 305
- Number of Weeds Recorded: 50
- Percentage Flora as Weeds 16.4%

Aboriginal land

All Aboriginal land wholly within the Arnhem Land Aboriginal Land Trust.

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km ²) in Catchment	Broad Vegetation Type
Map unit 4	29.6	2795.2	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with a sorghum grassland understorey.
Map unit 8	21.8	2061.7	<i>Eucalyptus tetradonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus ferruginea</i> (rusty bloodwood) Woodland with a sorghum grassland understorey.

Weeds and current management activities by catchment

Map unit 9	1.7	164.2	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus bleeseri</i> (smooth-stemmed bloodwood) woodland with sorghum grassland understorey.
Map unit 10	19.7	1864.4	Saline tidal flats with scattered chenopod low shrubland (samphire).
Map unit 14	7.2	675.8	<i>Eucalyptus tetrodonta</i> (stringybark), <i>Eucalyptus tectifera</i> , (northern box) woodland with sorghum grassland understorey.
Map unit 15	7.4	696.7	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with a sorghum grassland understorey.
Map unit 16	0.1	12.2	<i>Eucalyptus tectifera</i> (northern box), <i>Eucalyptus terminalis</i> (bloodwood) woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey
Map unit 32	7.0	660.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus miniata</i> (Darwin woollybutt) low open-woodland with <i>Plectrarchne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 51	>1.00	>1.0	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 56	1.2	112.7	Complex of <i>Acacia shirleyi</i> (lancewood) low-woodland mixed with eucalyptus low open-woodland.
Map unit 106	4.3	402.0	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Russell-Smith and Bowman (1992), Russell-Smith et. al. (1992) and Price et. al. (1995) note a range of factors (including high frequency and intensity of fire, feral herbivores and weeds) were degrading monsoon rainforests.

Weeds

The following weed species have been recorded for this catchment:

Acanthospermum hispidum, *Alternanthera pungens*, *Alysicarpus ovalifolius*, *Amaranthus hybridus*, *Amaranthus viridis*, *Asystasia gangetica*, *Azadirachta indica*, *Bidens pilosa*, *Catharanthus roseus*, *Cenchrus ciliaris*, *Cenchrus echinatus*, *Chloris inflata*, *Chloris pumilio*, *Clitoria ternatea*, *Crotalaria goreensis*, *Cryptostegia madagascariensis*, *Cynodon dactylon*, *Dalbergia sissoo*, *Desmodium tortuosum*, *Digitaria ciliaris*, *Eleusine indica*, *Eleutheranthera ruderalis*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Gomphrena celosioides*, *Hyptis suaveolens*, *Indigofera hirsuta*, *Khaya senegalensis*, *Macroptilium atropurpureum*, *Macroptilium lathyroides*, *Mangifera indica*, *Melinis repens*, *Passiflora foetida*, *Phyllanthus amarus*, *Senna obtusifolia*, *Senna occidentalis*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Solanum erianthum*, *Stachytarpheta australis*, *S. cayennensis*, *S. jamaicensis*, *Stylosanthes humilis*, *Tamarix aphylla*, *Tribulus cistoides*, *Tridax procumbens*, *Triumfetta pentandra*, *Urochloa mutica* and *Wedelia trilobata*.

Management initiatives and recommendations

Most of the weed species identified have come from around the township area Numbulwar with smaller numbers being recorded for the some of the smaller coastal outstations. Little is known about weeds and their management from this catchment. This has serious implications for weed management in the future considering that *Mimosa pigra* (mimosa), a weed of Territory and national significance, has been recorded for the neighbouring catchments of Goyder and Roper Rivers.

Weeds and current management activities by catchment

There is an urgent need to consult traditional owners to survey this catchment area and to map the distribution of all weeds present.

Numbulwar

Weeds of concern around Numbulwar include *Asystasia gangetica* from along the coastal dunes, *Stachytarpheta* spp. (snake weeds) which are commonly grown as ornamental hedges and *Azadiracta indica* (neem) a shade tree. There is an urgent need to consult with landowners in this area and to advise of appropriate control techniques for *Asystasia gangetica* and to inform landholders of the invasive nature of the other weed species so that informed decisions can be made about growing these species on country.

The lack of CDEP in the area is an impediment to development of formal land management programs at Numbulwar.

Walker River

A small community ranger program is based at Wurrunguyana on the Walker River. Senior Ranger is Christopher Barratja. Much support is needed in the way of resources and training. The CFCU Bulman Track Land Management Coordinator will work with this group on weed management.

10.30 Wildman River (10)

- Total Area: 4804 km²
- Aboriginal Owned Land 3603 km²
- Total Species Count: 515
- Number of Weeds Recorded: 25
- Percentage Flora as Weeds 4.85%

Aboriginal land

Includes western side of Kakadu National Park and Mt Bunday Army Training Lands (under Land Claim).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 4	50.3	2416.686	<i>Eucalyptus miniata</i> (Darwin woollybutt), <i>Eucalyptus tetradonta</i> (stringybark) open-forest with sorghum grassland understorey.
Map unit 15	29.2	1402.487	<i>Eucalyptus tectifica</i> (northern box), <i>Eucalyptus latifolia</i> (round-leaved bloodwood) woodland with a sorghum grassland understorey.
Map unit 51	1.6	76.61482	<i>Melaleuca viridiflora</i> (broad-leaved paperbark), <i>Eucalyptus</i> low open-woodland with <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 53	3.6	175.0657	<i>Melaleuca</i> forest (paperbark swamp).
Map unit 54	13.6	654.0424	Mixed closed-grassland/sedgeland (seasonal floodplain).
Map unit 105	0.2	9.965594	Mangal low-closed forest (mangroves).
Map unit 106	1.4	68.64612	Saline tidal flats with scattered chenopod low shrubland (samphire).

General land management issues

Andropogon gayanus (gamba grass) is currently threatening to invade the western edge of Kakadu National Park which abuts pastoral properties.

Weeds and current management activities by catchment

An infestation occurs within the Park at the site of the former Mudjinberri Abattoir. *Urochloa mutica* (para grass) is a problem at Four Mile Hole, but is currently being treated by Parks' staff. This catchment currently contains about one-third of the known *Mimosa pigra* (mimosa) occurrences within Kakadu National Park. Mt Bunday Army Training facility is under a strict management regime but there are issues of weed movement on vehicles and degradation of vegetation during exercises that are leading to weed invasion.

Weeds

The following weed species have been recorded for this catchment:

Bidens pilosa, *Bothriochloa pertusa*, *Cynodon radiatus*, *Digitaria ciliaris*, *Digitaria violascens*, *Echinochloa colona*, *Emilia sonchifolia*, *Eragrostis tenella*, *Euphorbia hirta*, *Heliotropium indicum*, *Hyptis suaveolens*, *Indigofera tinctoria*, *Jatropha curcas*, *Malachra capitata*, *Mimosa pigra*, *Passiflora foetida*, *Pennisetum pedicellatum*, *Pennisetum polystachion*, *Ricinus communis*, *Senna obtusifolia*, *Sida acuta*, *Sida cordifolia*, *Sida rhombifolia*, *Synedrella nodiflora* and *Tribulus cistoides*.

Management initiatives and recommendations

Aboriginal land under Commonwealth management regime—Kakadu National Park or Defence Force.

10.31 Wiso (31)

- Total Area: 227663 km²
- Aboriginal Owned Land 3182 km²
- Total Species Count: 1325
- Number of Weeds Recorded: 9
- Percentage Flora as Weeds 0.6%

Aboriginal land

Murrnaji Aboriginal Land Trust, Wampaya, Muckaty (under Land Claim) and Beetaloo (under Land Claim).

Vegetation

The following are the major broad vegetation types present (after Wilson et. al. 1990) by map unit in numerical order.

Vegetation Map Unit	% of Total in Catchment	Area (km²) in Catchment	Broad Vegetation Type
Map unit 17	0.1	244.3	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood), <i>Eucalyptus tetradonta</i> (stringybark) woodland with grassland understorey
Map unit 20	2.3	5318.5	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Plectrachne pungens</i> (curly spinifex) grassland understorey.
Map unit 22	0.1	267.3	<i>Eucalyptus terminalis</i> (bloodwood), <i>Eucalyptus chlorophylla</i> (box) low woodland with <i>Sehima nervosum</i> (white grass), <i>Chrysopogon fallax</i> (golden beard grass) grassland understorey.
Map unit 23	0.6	1290.0	<i>Eucalyptus pruinosa</i> (silver box) low woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey.

Weeds and current management activities by catchment

Map unit 24	1.0	2379.6	<i>Eucalyptus microtheca</i> (coolibah), <i>Excoecaria parvifolia</i> (gutta-percha) low woodland with <i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium</i> (bluegrass) grassland understorey
Map unit 26	0.7	1555.4	<i>Eucalyptus microtheca</i> (coolibah) low-open woodland with <i>Eulalia aurea</i> (silky browntop), <i>Astrebla</i> (mitchell grass) grassland understorey
Map unit 27	2.0	4484.9	<i>Eucalyptus microtheca</i> (coolibah) low open-woodland with open-grassland understorey.
Map unit 34	1.0	2357.0	<i>Eucalyptus dichromophloia</i> (variable-barked bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 36	0.7	1631.0	<i>Eucalyptus leucophloia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex), <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey
Map unit 38	1.5	3379.6	<i>Eucalyptus brevifolia</i> (snappy gum) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 39	2.6	5901.7	<i>Eucalyptus pruinosa</i> (silver box), <i>Lysiphyllum cunninghamii</i> (bauhinia) low open-woodland with hummock/tussock grassland understorey
Map unit 40	0.06	142.3	<i>Eucalyptus ferruginea</i> (rusty bloodwood) low open-woodland or <i>Jacksonia odontocarpa</i> open-shrubland with <i>Plectrachne pungens</i> (curly spinifex) open-hummock grassland understorey.
Map unit 42	1	2280.2	<i>Eucalyptus opaca</i> (bloodwood) low open-woodland with <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey
Map unit 43	2.6	6043.0	<i>Eucalyptus</i> low open-woodland and/or acacia sparse-shrubland with <i>Triodia spicata</i> (spike flower spinifex), <i>Triodia pungens</i> (soft spinifex) hummock grassland understorey.
Map unit 45	0.1	328.1	<i>Lysiphyllum cunninghamii</i> (bauhinia), <i>Eucalyptus pruinosa</i> (silver box) low open-woodland with <i>Eulalia aurea</i> (silky browntop), <i>Sehima nervosum</i> (white grass) grassland understorey
Map unit 52	0.08	180.0	<i>Melaleuca glomerata</i> (inland teatree) open-shrubland.
Map unit 55	6.4	14553.6	<i>Acacia. shirleyi</i> (lancewood) open-forest with open-grassland understorey
Map unit 57	1.8	4213.8	<i>Macropteranthes kekwickii</i> (bullwaddy) tall shrubland with open-grassland understorey
Map unit 58	1.2	2843.0	<i>Acacia aneura</i> (mulga)/mixed species low open-woodland with open-grassland understorey.
Map unit 59	0.06	138.8	<i>Acacia estrophiolata</i> (ironwood), <i>Atalaya hemiglauca</i> (whitewood) low open-woodland with open-grassland understorey.
Map unit 65	6.0	13624.3	<i>Acacia aneura</i> (mulga) tall open-shrubland with <i>Eragrostis eriopoda</i> (woollybutt) open-grassland understorey.
Map unit 66	0.06	128.1	<i>Acacia aneura</i> (mulga) tall open-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) open-shrubland understorey.

Weeds and current management activities by catchment

Map unit 68	0.09	203.9	<i>Acacia kempeana</i> (witchetty bush) <i>Acacia</i> tall open-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) open-shrubland understorey.
Map unit 69	0.72	1649.3	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with <i>Aristida contorta</i> (bunched kerosene grass) or <i>Triodia</i> open-tussock/hummock grassland understorey.
Map unit 70	0.06	143.9	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with <i>Cassia</i> , <i>Eremophila</i> (fuchsia) low sparse-shrubland understorey.
Map unit 71	0.81	1851.3	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with a grassland understorey.
Map unit 75	0.8	1831.6	<i>Triodia pungens</i> (soft spinifex) hummock grassland with <i>Acacia lysiphloia</i> (turpentine) tall, open shrubland overstorey.
Map unit 76	46.1	104897.5	<i>Triodia pungens</i> (soft spinifex), <i>Plectrarchne schinzii</i> (curly spinifex) hummock grassland with <i>Acacia</i> tall sparse-shrubland overstorey.
Map unit 77	17.0	38736.0	<i>Acacia aneura</i> (mulga) tall sparse-shrubland with grassland understorey
Map unit 81	0	5.6	<i>Triodia basedowii</i> hummock grassland with <i>Acacia aneura</i> (mulga) tall sparse-shrubland overstorey between dunes.
Map unit 92	0.3	723.6	<i>Triodia clelandii</i> (weeping spinifex) hummock grassland with mixed species low open-woodland overstorey
Map unit 96	0.6	1441.5	<i>Astrelba pectinata</i> (barley mitchell grass) grassland.
Map unit 98	0.5	1111.7	<i>Chrysopogon fallax</i> (golden beard grass), <i>Dichanthium fecundum</i> (bluegrass) grassland.
Map unit 100	0.02	39.0	<i>Eragrostis xerophila</i> (neverfail) open-grassland with scattered trees and shrubs.
Map unit 101	0.34	773.6	Seasonal grassland with <i>Muehlenbeckia cunninghamii</i> (lignum) low sparse-shrubland overstorey.
Map unit 111	0.29	661.2	<i>Halosarcia indica</i> (samphire) low open-shrubland fringing bare salt pans.

General land management issues

Woinarski and Fisher (1995) noted that a high frequency of intense fires was degrading Lancewood vegetation in this region.

Morton et. al. (1995) listed land degradation due to over-grazing, especially affecting minor habitats such as bluebush swamps. As well they stated that invasive plants—particularly *Acacia nilotica*—are causing substantial problems. Perry (1960) noted that the chenopod shrublands were particularly susceptible to the dominant land-use, grazing. They stated that due to Bluebush's high palatability it is selectively grazed in preference to other pasture types and in some cases has been destroyed. Tothill and Gillies (1992) list increase in *Parkinsonia*, decline in 'desirable species, and active erosion for Mitchell Grasslands in this area. Pitts (1990) documents spread of weeds (notably *Parkinsonia*) onto a conservation reserve.

The impacts of grazing and fire regime on Mitchell grasslands and the impact of grazing on chenopod shrublands is being considered in studies by PWCNT (Connors et. al. 1996).

Weeds and current management activities by catchment

Weeds

The following weed species have been recorded for this catchment:

Acacia nilotica, *Aerva javanica*, *Alysicarpus ovalifolius*, *Cenchrus ciliaris*, *Citrullus colocynthis*, *Hyptis suaveolens*, *Parkinsonia aculeata*, *Prosopis limensis* and *Xanthium strumarium*.

Management initiatives and recommendations

Muckaty is a Aboriginal pastoral property which receives management assistance from the NLC.

The Wompaya block is very remote and difficult to access. The two outstations on the block are apparently occupied only sporadically. There is a need to establish what resource centre provides assistance to the Wompaya groups.

The fact that only nine species collected from this catchment indicates our lack of knowledge about the status of weeds in this area. There is an urgent need to survey all Aboriginal Land in this catchment to ascertain the level and extent of weed introductions.