



Friends of Grasslands

supporting native grassy ecosystems

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Nature Conservation Policy
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Dear Sir/Madam

Draft Action Plan - Pink-tailed Worm-lizard - *Aprasia parapulchella* 2016

Friends of Grasslands (FOG) is a community group dedicated to the conservation of natural temperate grassy ecosystems in south-eastern Australia. FOG advocates, educates and advises on matters to do with the conservation of grassy ecosystems, and carries out surveys and other on-ground work. FOG is based in Canberra and its members include professional scientists, landowners, land managers and interested members of the public.

Thank you for the opportunity to comment on the draft Action Plan. FOG has a strong interest in this species, particularly as it has been identified as a species occurring in critically endangered Natural Temperate Grassland (community r8: Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland in the Southern Tablelands region of the South Eastern Highlands Bioregion) within the Molonglo River Corridor and the Murrumbidgee River Corridor (West Belconnen), both highly important areas for the species. We provide further information and references regarding the habitat for *Aprasia parapulchella* in attachments to this submission to consider for inclusion in the Action Plan.

1. Habitat for *Aprasia parapulchella*

The draft plan identifies that *Aprasia parapulchella*, or the Pink-tailed Worm-lizard (PTWL), occurs in a 'rocky habitat' and in a 'vegetation community dominated by tussock-forming grasses such as *Themeda [triandra]* (Kangaroo grass), *Austrodanthonia* (Wallaby grass) [should be *Rytidosperma* species], *Aristida [ramosa]* (Wire grass), *Bothriochloa [macra]* and *Poa* [species]' (p. 7, also similarly on p. 2). However, the plan does not link that vegetation community to recently revised ACT vegetation communities or associations. FOG suggests that it is highly likely that the optimal habitat for PTWL is critically endangered Natural Temperate Grassland of the South-Eastern Highlands, or mosaics of the same within forest or shrubland, and that the action plan be amended to reflect this.

This suggestion is based on a note written by Sarah Sharp, Will Osborne, Rainer Rehwinkel and David Wong, that was sent to ACT Government (Conservation Research) in November 2013 (Attachment 1), a summary of which was written up in an article published in the FOG newsletter (Sharp 2014, see Attachment 2). The note identifies PTWL habitat as likely to be the vegetation association, r8: Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (Rocky Natural Grassland) described in Armstrong et al. (2012).

Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (r8) is characterised primarily by the most dominant species *Themeda triandra*, *Aristida ramosa* and *Lomandra* species, the lack of trees present or any evidence of trees except in more sheltered gullies; the amount of

embedded and loose rocks; south-western to westerly aspect, steepness and very shallow soil (see the full description from Armstrong et al. 2012 in Attachment 1).

It is clear that the optimal habitat for PTWL is very similar, being described as grassland with embedded and loose smallish rocks, few or no trees, a range of species, including Kangaroo Grass *Themeda triandra* (syn. *T. australis*), Purple Wiregrass (*Aristida ramosa*), Barbed-wire Grass (*Cymbopogon refractus*) and a diversity of forbs and scattered low and procumbent shrubs (Wong 2013).

Rocky Natural Grassland was identified as occurring in the Molonglo River corridor (Sharp 2014) (Attachment 2) and subsequently several areas in Molonglo River Park identified initially as derived grassland, Yellow Box – Blakely’s Red Gum grassy woodland were revised and identified as Natural Temperate Grassland (Sharp et al., 2015).

References:

Armstrong R.C., Turner K. D., McDougall K.L., Rehwinkel R., Crooks J.I., 2012. *Plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory*. *Cunninghamiana* 13 (1): 125 – 266.

Sharp S., 2014. Incidence of a previously unidentified Natural Temperate Grassland type in the Lower Molonglo Valley and possibly elsewhere in ACT. *News of Friends of Grasslands* July-August 2014, pp 7-8.

Sharp S., ngh environmental, Osborne W., 2015. *Molonglo conservation Areas Ecological Management Guidelines*. Report for Territory and Municipal Services.

Sharp S., Osborne W., Rehwinkel R., Wong D., 2014. Incidence of a previously unidentified Natural Temperate Grassland type in the Lower Molonglo Valley and elsewhere in ACT. Note sent to Conservation Planning, November 2013

Other comments

- p. 4, plantings in areas of PTWL habitat within reserves should be in line with conservation requirements for the species and with the matching dot point on p. 8, i.e. in para 1, Planting of trees and tall shrubs should not occur in areas of *A. parapulchella* habitat that are within reserves.
- p. 5, information on population densities for survival needs referencing – 2nd, 3rd and 4th paras under protection, e.g. Larger populations of the species are considered to be those containing 500 or more individuals; Medium-sized populations are likely to be widespread within areas of known and potential habitat...
- P. 8, in addition to the dot point: ‘Plantings of trees and tall shrubs should not occur in habitat and buffer areas.’, consider adding a further dot point: ‘Natural regeneration of trees and denser shrubs may need to be thinned or removed to maintain the open rocky grassland habitat required for the species’. This is potentially going to happen in areas where the open rocky grasslands occur within a mosaic of forest or shrubland.
- P. 9. Table 1:
 - Point 1. Objective and action: Define what is meant by ‘important corridor areas’
 - Point 2. Actions: Suggest addition of another point between 2a and 2b:
 - 2a. Monitor abundance of key representative populations, together with the effects of management actions.
 - 2b. Develop site specific management guidelines for all reserves and areas of high populations that are regularly reviewed on the basis of monitoring and research results.

2c. Implement management actions to conserve the species and its habitat, including an appropriate grazing/ fire/slashing regime for managing herbage biomass (recognising current imperfect knowledge).

- References, p. 5 under Climate Change – Sharp 2011 not in reference list. Presume this is:
Sharp S. B., 2011. Distribution and abundance of African Lovegrass in the ACT and Capital Region and options for strategic control. Report to the Southern ACT Catchment Group

Yours sincerely

Naarilla Hirsch
Advocacy coordinator

29 November 2016

Attachment 1: Note sent to Conservation Research, ACT Government, in November 2013.

Incidence of a previously unidentified Natural Temperate Grassland type in the Lower Molonglo Valley and elsewhere in ACT

Sarah Sharp¹, Will Osborne², Rainer Rehwinkel³, David Wong², November 2013

1. DESCRIPTION OF NATURAL TEMPERATE GRASSLAND PLANT COMMUNITIES IN THE ACT AND REGION

The grassland communities identified as being present in the ACT and as listed and described in the ACT declaration of natural temperate grassland endangered ecological community are all communities typical of frost hollows, where cold air drainage impedes the growth of woody vegetation. These, by definition, do not include natural grassland above 625 m (ACT *Nature Conservation Act 1988*). Under the declaration under the Commonwealth's *Environmental Protection of Biodiversity Conservation Act 1999*, grasslands up to 1200 m are included, and therefore contain montane grasslands that are present within Namadgi National Park (SEWPAC 2012). With one exception, the mapping and location of grassland sites in the ACT followed Pryor (1938), who mapped grasslands as occurring under 600 m, in frost hollows, mainly on the major valley floors of Canberra, Gungahlin, Majura, Jerrabomberra and Tuggeranong. The exception is the inclusion of Natural Temperate Grassland in the Molonglo Valley at Kama Nature Reserve.

In 2012 descriptions of plant communities in the Upper Murrumbidgee catchment of NSW and the ACT were published (Armstrong et al., 2012). For this study multiple sites were surveyed across the region, including the ACT, and classification analysis undertaken to group similar sites. Eight natural grassland plant communities were identified and described (Armstrong et al., 2012; Table 1). Of these, four are equivalent to the five previously described natural grassland communities that form part of the Natural Temperate Grassland declared endangered ecological community (ACT Government 2005). Two communities identified as present in ACT are combined under the 2012 analysis (Table 1).

The community Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (Rocky Natural Grassland (r8)), is described from surveys undertaken in sites in NSW. However, recent deliberation of vegetation in the Molonglo River riparian corridor has led to the view that this plant community also occurs in Molonglo and possibly elsewhere in ACT. Appendix A contains the description of this community.

Table 1. Natural Grassland communities in NSW and ACT

Natural Grassland communities in NSW and ACT (Armstrong et al., 2012)	Equivalent natural temperate grassland plant communities described as being present in ACT (ACT Government 2005; SEWPAC 2012)
r1: Sub-montane Moist Tussock Grassland of the South Eastern Highlands Bioregion	Included under the EPBC Act, but not under the ACT Nature Conservation Act.
r2: River Tussock - Kangaroo - Grass - Rush Wet Tussock Grassland of Foothills, Drainage Lines and Flats of the South Eastern Highlands Bioregion	<i>Poa labillardierei</i> Grassland
r3: Wallaby-grass – Kangaroo Grass – Rush tussock	

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grassland of seasonally wet sites of the South Eastern Highlands Bioregion	
r4: Lacustrine Grass-forbland of the South Eastern Highlands Bioregion	
r5: Wallaby-grass - Tall Speargrass – Common Everlastings Tussock Grassland of the South Eastern Highlands Bioregion	<i>Austrodanthonia</i> Grassland <i>Austrostipa</i> Grassland
r6: Dry Tussock Grassland of the Monaro in the South Eastern Highlands Bioregion	Dry Themeda Grassland
r7: Kangaroo Grass - Wallaby-grass - Snow-grass Moist Tussock Grassland of the South Eastern Highlands Bioregion	Wet Themeda Grassland
r8: Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland in the Southern Tablelands region of the South Eastern Highlands Bioregion (Rocky Natural Grassland)	

2. PINK-TAILED WORM-LIZARD HABITAT IN ACT

It is surmised that prior to European settlement Pink-tailed Worm-lizards (*Aprasia parapulchella*) were associated with an open grassy habitat type on low rocky hills, containing few or no trees, either in frost hollows or sites too rocky for tree cover, but including low epacrid shrubs and grasses and forbs. These habitats were either in treeless areas or in natural clearings within woodland and open forest. The current distribution of the species in rocky areas within secondary native grassland suggests that the species can disperse through open woodland in the hill country (most likely Yellow Box – Blakely's Red Gum Grassy Woodland).

The Pink-tailed Worm-lizard has a patchy distribution along the slopes of the Molonglo and Murrumbidgee River corridors and on some adjacent outlying hills such as Mount Taylor, Cooleman Ridge, Urambi Hills, The Pinnacle and Googong Hill. Its habitat has been described as being dominated by primary and secondary native grassland or pasture usually characterised by an absence, or very low cover of, trees, little or no leaf litter and by a cover of predominantly native grasses, particularly Kangaroo Grass (*Themeda triandra*), Redleg Grass (*Bothriochloa macra*), Barbed-wire Grass (*Cymbopogon refractus*) and Wattle Matrush (*Lomandra filiformis*), and at more disturbed sites Redleg Grass (*Bothriochloa macra*) (Osborne *et al.* 1991; Osborne and McKergow 1993; Jones 1992, 1999; Wong *et al.* 2011). The likelihood of the occurrence of Pink-tailed Worm-lizards is increased with an increasing cover of Kangaroo Grass and other species indicative of reduced disturbance (species such as Creamy Candles (*Stackhousia monogyne*), Scaly Buttons (*Leptorhynchus squamatus*) and Early Nancy (*Wurmbea dioica*).

3. OCCURRENCE OF KANGAROO GRASS - PURPLE WIRE-GRASS – WATTLE MAT-RUSH DRY TUSOCK GRASSLAND (ROCKY NATURAL GRASSLAND) IN ACT

Typical habitat of the Pink-tailed Worm-lizard is shown in Figures 1 and 2 in the Molonglo River corridor. The descriptions of Pink-tailed Worm-lizard habitat are very similar to that described for the Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (Rocky Natural Grassland) community, including its location in the landscape. A comparison of the main characteristics of Pink-tailed Worm-lizard habitat and the Rocky Natural Grassland community is presented in Table 2.

While not previously identified as being present in the ACT, sites containing grassland that appear to fit the description of the Rocky Natural Grassland community occur within the Molonglo River corridor, including much of the area mapped as high and medium quality habitat for the Pink-tailed Worm-lizard (Figure 3). In addition rocky grasslands on low hills previously identified at Amtech, 'Cookanalla', Jerrabomberra East and West and on 'Jarramlee' (ACT Government 2005) may also be

the Rocky Natural Grassland community. The Pink-tailed Worm-lizard is known to occur at Jerrabomberra West.

4. ESTIMATED EXTENT OF KANGAROO GRASS - PURPLE WIRE-GRASS – WATTLE MAT-RUSH DRY TUSSOCK GRASSLAND (R8) IN MOLONGLO

Across the landscape in Molonglo, as indicated in Figures 1 and 2) and nearby Murrumbidgee River (Figure 3), the steep rocky slopes on the river corridor could be described as a ‘grassland-woodland mosaic’, with areas of exposed rocky slopes containing no woody vegetation or evidence of past tree growth, and more sheltered saddles and drainage lines containing a range of tree species. Figure 4 maps the extent of Pink-tailed Worm-lizard habitat in the Molonglo Valley.

On the basis of existing data, Table 3 indicates that there may be in the order of 100 ha of Rocky Natural Grassland in the Molonglo Valley. If so, these areas would meet the criteria as endangered Natural Temperate Grassland of the Southern Tablelands (SEWPAC 2012). 64 ha of these areas were described as Box-Gum Woodland (derived grassland) in the NES Plan (ACTPLA 2012). In addition there may be areas of Rocky Natural Grassland within Pink-tailed Worm-lizard habitat in moderate condition.

Table 2. Key characteristics of grassland plant community r8 and comparison with key characteristics of Pink-tailed Worm-lizard habitat (data extracted from Armstrong et al., 2012 and Sharp et al., in prep.). Note *Themeda australis* is the same species as *T. triandra*.

Characteristics	Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (r8)	Pink-tailed Worm-lizard habitat
Species	Open to dense, mid to tall tussock grassland with the upper stratum dominated by Kangaroo Grass (<i>Themeda australis</i>), with high cover of Purple Wiregrass (<i>Aristida ramosa</i>), Wattle Matrush (<i>Lomandra filiformis</i>) and Brush-tailed Speargrass (<i>Austrostipa densiflora</i>) and with the inter-tussock spaces occupied by <i>Rytidosperma</i> syn. <i>Austrodanthonia</i> spp., <i>Chrysocephalum apiculatum</i> , <i>Microlaena stipoides</i> , <i>Wahlenbergia</i> spp., <i>Pimelea curviflora</i> , <i>Goodenia hederacea</i> subsp. <i>hederacea</i> , <i>Lomandra multiflora</i> , <i>Austrostipa scabra</i> var. <i>falcata</i> , <i>Gonocarpus tetragynus</i> and <i>Poa sieberiana</i> . Isolated or scattered trees may be present, including Snow Gum (<i>Eucalyptus pauciflora</i>), <i>Jacksonia scoparia</i> , <i>Acacia mearnsii</i> , Yellow Box (<i>E. melliodora</i>) and <i>A. dealbata</i> . Isolated patches of shrubs may also occur. Sites in high condition may have a variety of other uncommon grassland forbs including <i>Tricoryne elatior</i> , <i>Dianella revoluta</i> , <i>Boerhavia dominii</i> , <i>Stylidium graminifolium</i> sens. lat., <i>Bulbine glauca</i> , <i>Cymbopogon refractus</i> and <i>Dianella longifolia</i> .	Suitable rocky areas generally dominated by, or supporting a large component of, large tussock-forming grasses such as Kangaroo Grass (<i>Themeda triandra</i>) or Purple Wiregrass (<i>Aristida ramosa</i>) and also often containing <i>Poa sieberiana</i> . The least disturbed habitat contains a range of disturbance sensitive native forbs, geophytes, sub-shrubs, or graminoids such as <i>Lomandra</i> spp. Other low disturbance habitat contains suitable rocky areas not dominated by large tussock-forming grasses, but containing a number of disturbance sensitive species of forbs, graminoids, sub-shrubs or geophytes indicative of lower disturbance levels (e.g. Creamy Candles (<i>Stackhousia monogyna</i>), Scaly Buttons (<i>Leptorhynchos squamatus</i>), Early Nancy (<i>Wurmbea dioica</i>).
Habitat	This grassland type is most commonly found on midslope and upslope situations and to a lesser degree on rocky flats adjacent to creeks. Usually found on steep, exposed sites including in river gorges. Such slopes are north-westerly in aspect and overlook	Habitat contains numerous scattered surface rocks which are well-weathered and partially embedded in the soil and grass. The species has a patchy distribution along the slopes of the Molonglo and Murrumbidgee River corridors and on some

Characteristics	Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (r8)	Pink-tailed Worm-lizard habitat
	extensive valleys or plains; they are thus subjected to hot drying north-westerly winds in summer, which is a main driver of this community.	adjacent outlying hills such as Mount Taylor, Cooleman Ridge, Urambi Hills, The Pinnacle and Googong Hill. The highest densities and largest populations of the species have been recorded in the Lower Molonglo Corridor (Wong and Osborne 2010), but this may in part reflect a lack of field work in other parts of the species range.
Geology	It is found most commonly on soils derived from sedimentary strata and infrequently from granite	PTWL has mainly been found in areas underlain by acid volcanic rock types - Late Silurian acid volcanoclastic deposits (e.g. rhyodacite, rhyolite, dacite, and quartz). Some specimens have also been found under sandstone rocks (a single site on Black Mountain) and metamorphosed shales (sites near Googong).

Table 3. Identification of areas in Molonglo offset areas that have previously been described as derived grassland (Box-Gum Woodland) and/or moderate and high quality Pink-tailed Worm-lizard habitat that may be Natural Temperate Grassland type r8.

Areas in Molonglo offset areas that are likely to be NTG type r8	Identified as BGW (ACTPLA 2012)	Size (ha)
Patch K1 (Figure 1)	Yes	33.2 ha
Patch T	Yes	6.4 ha
Patch Q	Yes	6.0 ha
Patch R	Yes	2.5 ha
Patch S	Yes	5.6 ha
Patch K2	Yes (downlisted from 2012 surveys as not meeting the criteria as BGW)	10.2
Total area previously identified as BGW		63.9 ha
Additional estimated potential high quality PTWL areas (approximate) (Figure 4)	Veg type not identified	40 ha
Total NTG type r8 that is estimated to be present in Molonglo (approximate)		104 ha
Additional estimated potential moderate quality PTWL areas (approximate) (Figure 4) that may be NTG type r8	Veg type not identified	50 ha

5. IMPLICATIONS FOR MANAGEMENT OF THESE AREAS IN MOLONGLO

The management recommended for the retention and enhancement of Pink-tailed Worm-lizard habitat in Molonglo (Sharp et al., in prep.) will result in best outcomes for the retention and enhancement of Natural Temperate Grassland. Both preclude planting of trees and shrubs. In lower quality Pink-tailed Worm-lizard habitat or lower quality grassland that does not contain Pink-tailed Worm-lizard trees should not be planted and diversity of native forbs and grasses should be encouraged through management, allowing for natural regeneration or restoration. Any burning of these grasslands should be driven by recommendations for protecting the Pink-tailed Worm-lizard.

6. RECOMMENDATIONS

If the advice presented in this note is accepted by ACT Government there are several actions that need to be considered, including:

- a) Identifying that this vegetation type is present in ACT

- b) Examination of existing vegetation data to determine if sites previously described as other types of Natural Temperate Grassland or secondary Box-Gum Woodland are better described as Rocky Natural Grassland meets the criteria to map the location of this community.
- c) Reviewing vegetation data from all areas identified as Pink-tailed Worm-lizard habitat to determine which areas may contain Rocky Natural Grassland that meets the criteria to be listed as the endangered Natural Temperate Grassland.
- d) Surveying areas to confirm extent of Rocky Natural Grassland in ACT, particularly Molonglo, and updating maps.
- e) Reviewing the NES Plan commitments in light of the results of these studies.
- f) Revising the definition of Natural Temperate Grassland under the ACT's Nature Conservation Act 1980 to include Rocky Natural Grassland.

7. REFERENCES

- ACT Government, 2005. *A Vision Splendid of the Grassy Plains Extended. ACT Lowland Native Grassland Conservation Strategy. Action Plan No. 28.* Environment ACT, Canberra.
- ACT Planning and Land Authority (ACTPLA) (2011). *The Molonglo Valley Plan for the Protection of Matters of National Environmental Significance (the NES Plan)*, September 2011
- Armstrong R.C., Turner K. D., McDougall K.L., Rehwinkel R., Crooks J.I., 2012. *Plant communities of the upper Murrumbidgee catchment in New South Wales and the Australian Capital Territory.* *Cunninghamiana* 13 (1): 125 – 266.
- Jones, S.R. (1992) Habitat relationships, diet and abundance of the endangered pygopodid, *Aprasia parapulchella*. B. App. Sc. (Honours) Thesis, University of Canberra.
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- Osborne, W.S. and McKergow, F.V.C. (1993). Distribution, population density and habitat of the pink-tailed legless lizard, *Aprasia parapulchella* in Canberra Nature Park. ACT Parks and Conservation Service, Technical Report 3.
- Pryor L.D. (1938). *Vegetation Map of the ACT.* Department of the Interior, Canberra.
- SEWPAC (2012) SPRAT Profile for Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory. <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=14>. Accessed June 2012.
- Sharp S., ngh environmental, Osborne W., in prep. Molonglo conservation Areas Ecological Management Guidelines. Draft report being prepared for Territory and Municipal Services.
- Wong D. T. Y., Jones, S. R., Osborne, W. S., Brown, G. W., Robertson, P., Michael, D. R. and Kay, G. M. (2011) The life history and ecology of the Pink-tailed Worm-lizard *Aprasia parapulchella* Kluge – a review. *Australian Zoologist* 35, 927-940.
- Wong, D. and Osborne, W.S. (2010) Confirmatory surveys for Pink-tailed Worm-lizards (*Aprasia parapulchella*) and additional mapping of habitat along the Molonglo River corridor between

Coppins Crossing and Tuggeranong Parkway, ACT. Report commissioned by ACT Planning and Land Authority. Institute for Applied Ecology, University of Canberra.



Figure 1. Existing grassland containing high quality Pink-tailed Worm-lizard habitat in Molonglo (Patch K), identified as derived grassland (Box-Gum Woodland) in previous reports. Note the absence of trees, shrubs, stumps or other evidence of past trees right across this landscape (photo, S. Sharp).

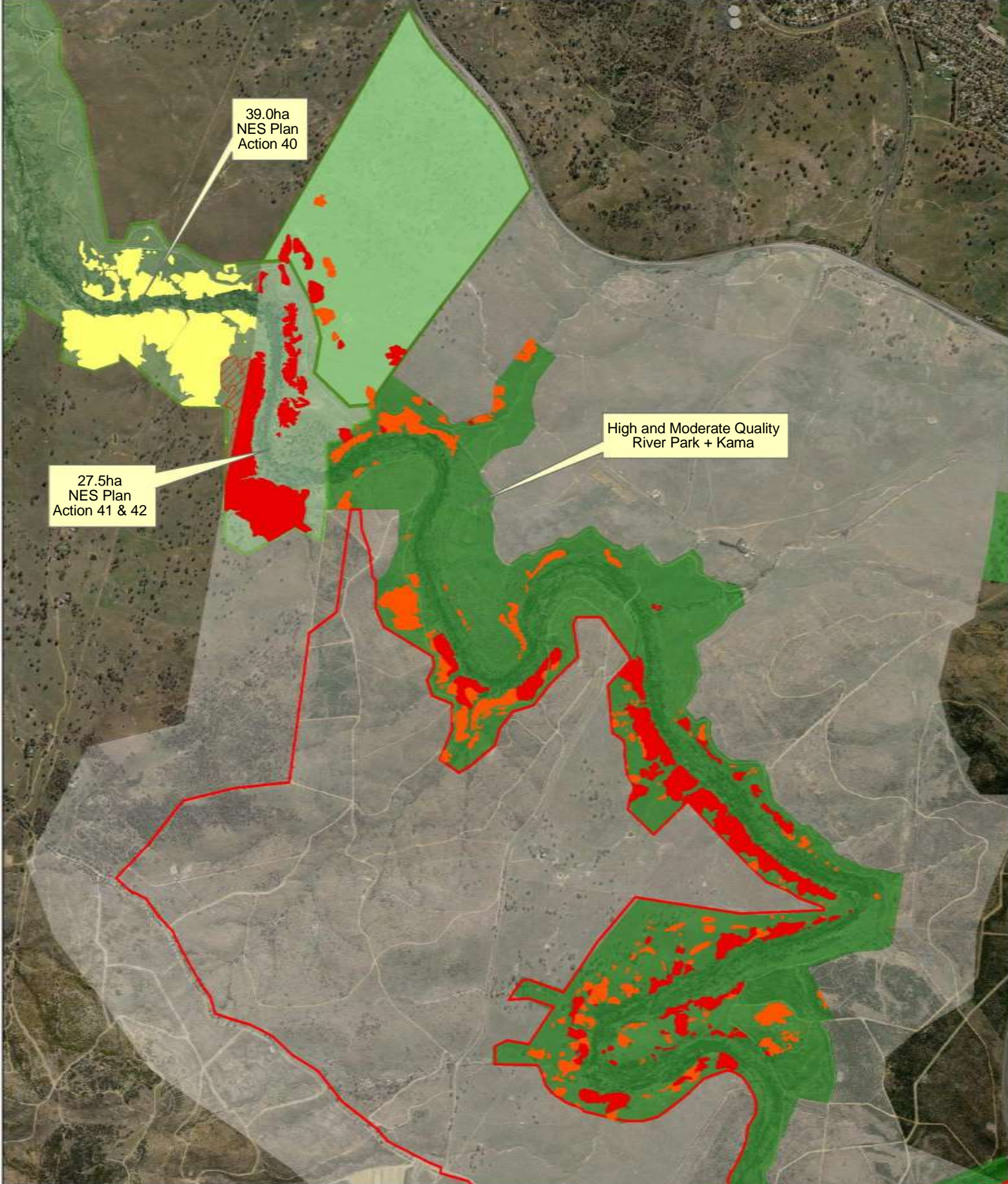


Figure 2. Grassland on southern bank of Molonglo, taken from Kama Nature Reserve natural grassland. The river is in the valley below the dam. Note the lack of trees in the hills above the river, and trees and shrubs in the drainage lines (photo, S. Sharp).











Figure 3. Murrumbidgee River corridor north of the confluence with the Molonglo River. Photo taken from Shepherd's Lookout (photo, Rosemary Blemings).

Figure 4 (below). *Aprasia parapulchella* habitat in Molonglo Valley. Map provided by Territory and Municipal Services.



Legend

 High quality potential habitat - 67.018ha	 East Molonglo Urban Development Area
 Moderate quality potential habitat - 32.3995ha	 Kama Nature Reserve
 High quality potential habitat outside the Strategic Assessment Area (21.8ha)	 Offset Area
 Potential habitat (not specified) - 39.014ha	 Strategic Assessment Area



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 Time: 9:40 AM
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 Northing: 4,510,193.4939
 Central Meridian: 143.0093
 Scale Factor: 1.0001
 Latitude Of Origin: 0.0000

Molonglo Valley Potential PTWL Habitat

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<i>Acacia rubida</i>	1	21
<i>Acaena ovina</i>	1	21
<i>Aristida ramosa</i>	1	58
<i>Astroloma humifusum</i>	1	26
<i>Austrodanthonia</i> spp.	2	68
<i>Austrostipa bigeniculata</i>	1	21
<i>Austrostipa densiflora</i>	2	47
<i>Austrostipa scabra</i> var. <i>falcata</i>	1	47
<i>Boerhavia dominii</i>	1	32
<i>Bothriochloa macra</i>	1	37
<i>Brachyloma daphnoides</i>	1	21
<i>Bulbine glauca</i>	1	26
<i>Bursaria spinosa</i>	1	26
<i>Carex</i> spp. (<i>C. breviculmis</i> or <i>C. inversa</i>)	1	21
<i>Cheilanthes</i> spp. (<i>C. austrotenuifolia</i> or <i>C. sieberi</i>)	1	37
<i>Chrysocephalum apiculatum</i>	2	63
<i>Convolvulus angustissimus</i>	1	21
<i>Crassula sieberiana</i>	1	21
<i>Cryptandra amara</i>	1	21
<i>Cymbopogon refractus</i>	1	26
<i>Dianella longifolia</i>	1	26
<i>Dianella revoluta</i>	1	42
<i>Dillwynia sericea</i>	1	26
<i>Diuris punctata</i>	1	21
<i>Dodonaea boroniifolia</i>	1	26
<i>Elymus scaber</i>	1	26
<i>Enneapogon nigricans</i>	1	26
<i>Eragrostis</i> spp.	1	26
<i>Euchiton</i> spp.	1	53
<i>Glycine tabacina</i>	1	37
<i>Gonocarpus tetragynus</i>	1	42
<i>Goodenia hederacea</i> subsp. <i>hederacea</i>	1	53
<i>Hibbertia obtusifolia</i>	1	42
<i>Hovea linearis</i>	1	21
<i>Hypericum gramineum</i>	1	21
<i>Joycea pallida</i>	1	21
<i>Laxmannia gracilis</i>	1	21
<i>Leptorhynchus squamatus</i>	1	32
<i>Lissanthe strigosa</i>	1	47
<i>Lomandra filiformis</i>	2	100
<i>Lomandra longifolia</i>	1	32
<i>Lomandra multiflora</i>	1	58
<i>Luzula</i> spp.	1	26
<i>Melichrus urceolatus</i>	1	37
<i>Microlaena stipoides</i>	2	63
<i>Microtis</i> spp.	1	21
<i>Opercularia hispida</i>	1	21
<i>Oxalis perennans</i>	1	42
<i>Panicum effusum</i>	1	37
<i>Pimelea curviflora</i>	1	63
<i>Plantago varia</i>	1	21

<i>Poa sieberiana</i>	1	42
<i>Rumex brownii</i>	1	26
<i>Schoenus apogon</i>	1	26
<i>Solenogyne dominii</i>	1	42
<i>Stylidium graminifolium sens. lat.</i>	1	32
<i>Thelymitra</i> spp.	1	21
<i>Themeda australis</i>	5	95
<i>Tricoryne elatior</i>	1	53
<i>Triptilodiscus pygmaeus</i>	1	26
<i>Vittadinia muelleri</i>	1	26
<i>Wahlenbergia</i> spp.	2	74
<i>Westringia eremicola</i>	1	21

Threatened Communities: EPBC Act 1999 – *Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory*; Although not yet quantified in the ACT, it confirmed this community would be listed under the NC Act 1980 - *Natural Temperate Grassland*.

Frequently occurring weeds: *Eragrostis curvula*, *Nassella trichotoma*, *Hypericum perforatum*, *Hypochaeris radicata*, *Acetosella vulgaris*, *Vulpia* spp. *Cirsium vulgare* and *Onopordum acanthium*.

Equivalent vegetation types: Group 8 (Rehwinkel unpub.).

Threats: This community has been extensively cleared and/or modified with remnants subject to small-scale clearing, weed invasion and grazing pressures.

Reservation Status: Not known to occur in any formal conservation reserves, however it occurs on Nature Conservation Trust covenanted land in the upper Shoalhaven catchment.

Extent of clearing: Clearing figures are unavailable for grassland communities. Throughout its range, only 3% of the *Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory* EEC remains in high ecological integrity, relative to its pre-European settlement extent (Environment ACT 2006).

Attachment 2. Sharp S., 2014. News of Friends of Grasslands July-August 2014, pp 7-8.

Incidence of a previously unidentified Natural Temperate Grassland type in the Lower Molonglo Valley and possibly elsewhere in ACT

(Article summarised from a note of the same name provided to ACT Government, by Sarah Sharp⁶, Will Osborne⁷, Rainer Rehwinkel⁸, David Wong², November 2013)

The natural temperate grassland endangered ecological community of the ACT as defined under the ACT *Nature Conservation Act 1988* and the Commonwealth's *Environmental Protection of Biodiversity Conservation Act 1999* is described as occurring in frost hollows, where cold air drainage impedes the growth of woody vegetation, assumed to have occurred prior to development of Canberra, as occurring under 600 m, in frost hollows, mainly on the major valley floors of Canberra, Gungahlin, Majura, Jerrabomberra and Tuggeranong. Following declaration of the community under ACT and Commonwealth legislation a further site was identified, at Kama Nature Reserve in the Molonglo Valley (ACT Government 2005).

Descriptions of plant communities in the Upper Murrumbidgee catchment of NSW and the ACT were published in 2012 (Armstrong et al., 2012). For this study multiple sites were surveyed across the region, including the ACT, and classification analysis undertaken to group similar sites. Eight natural grassland plant communities were identified and described by Rainer Rehwinkel in Armstrong et al. (2012). Of these, four are equivalent to the five previously described natural grassland communities that form part of the Natural Temperate Grassland declared endangered ecological community (ACT Government 2005).

The community Kangaroo Grass - Purple Wire-grass – Wattle Mat-rush dry tussock grassland (Rocky Natural Grassland (r8)), is described from surveys undertaken in sites in NSW. This grassland association occurs on steep, exposed sites including in river gorges. Such slopes are north-westerly in aspect and overlook extensive valleys or plains; they are thus subjected to hot drying north-westerly winds in summer, which is a main driver of this community (Armstrong et al., 2012).

Recent deliberation of vegetation in the Molonglo River riparian corridor has led to the view that this plant community also occurs in Molonglo and possibly elsewhere in ACT, and that much of the habitat for the vulnerable Pink-tailed Worm Lizard (*Aprasia parapulchella*) is probably Rocky Natural Grassland. Previous descriptions of these sites containing Pink-tailed Worm-lizard habitat assumed the vegetation community was derived Box-Gum Woodland (i.e. where the trees had been cleared). There are, however, extensive areas with exposed surface rocks along the Molonglo River where there is no evidence whatever of trees having been there (no isolated trees and no stumps, and no regrowth), although there are trees within the drainage lines between the exposed slopes. This suggests that these sites have not been cleared, but may be naturally treeless.

A comparison of the main characteristics of Pink-tailed Worm-lizard habitat and the Rocky Natural Grassland community indicates that they correlate closely in terms of plant species present and their location in the landscape (Figure 1). Pink-tailed Worm-lizard habitat is dominated by grassland or

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pasture usually characterised by an absence, or very low cover of, trees, little or no leaf litter and by a cover of predominantly native grasses, particularly Kangaroo Grass (*Themeda triandra*), Redleg Grass (*Bothriochloa macra*) and Barbed-wire Grass (*Cymbopogon refractus*) as well as Wattle Matrush (*Lomandra filiformis*) (most recently described in Wong *et al.* 2011). The likelihood of the occurrence of Pink-tailed Worm-lizards is increased with an increasing cover of Kangaroo Grass and other species indicative of reduced disturbance (species such as Creamy Candles (*Stackhousia monogyna*), Scaly Buttons (*Leptorhynchos squamatus*) and Early Nancy (*Wurmbea dioica*). These are all species typical of Rocky Natural Grassland (Armstrong *et al.*, 2012).

On the basis of existing data there may be in the order of 100 ha of Rocky Natural Grassland in the Molonglo Valley. If so, these areas would meet the criteria as endangered Natural Temperate Grassland under the Commonwealth and ACT's legislation.

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- Wong D. T. Y., Jones, S. R., Osborne, W. S., Brown, G. W., Robertson, P., Michael, D. R. and Kay, G. M. (2011) The life history and ecology of the Pink-tailed Worm-lizard *Aprasia parapulchella* Kluge – a review. *Australian Zoologist* 35, 927-940.



Pink-tailed Worm-lizard habitat on the Molonglo River. The tight spacing of rocks and the exposed slope is assumed to exclude the natural regeneration of trees (photo S. Sharp).



Existing grassland containing high quality Pink-tailed Worm-lizard habitat in Molonglo, identified as derived grassland (Box-Gum Woodland) in previous reports. Note the total absence of trees, shrubs, stumps or other evidence of past trees right across this landscape, but their presence along the river (photo, S. Sharp).