BOTANICAL SURVEY OF TUSSOCK GRASSLANDS

WITHIN THE CENTRAL HAMERSLEY RANGE (N95/050)

Progress Report 2

Prepared by: *Stephen van Leeuwen*

Date: *October 1997*

TITLE OF PROJECT:

Botanical Survey of Tussock Grasslands within the Central Hamersley Range

AGENCY:

Western Australian Department of Conservation and Land Management (CALM) - Science and Information Division.

PROJECT SUPERVISOR:

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PROJECT OFFICERS:

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   Research Scientist
2. Mr Robert Bromilow
   Technical Officer

AIM OF PROPOSAL:

To undertake a botanical survey of the Tussock Grassland communities found on valley floors within the Central Hamersley Range. This survey will then enable an assessment of the nature conservation values of such grasslands and their constituent species and facilitate the quantitative assessment of their representativeness and the adequacy of the existing reserve system.

SCOPE OF PROPOSAL:

a. Identify grassland assemblages within the study area through aerial photographic interpretation, satellite imagery and subsequent field inspections.

b. Establish and sample each of the assemblages via the use of permanent quadrats, supplementing flora collections with random sampling. Information recorded for each permanent quadrat will include landform unit, soil type, species presence and type of vegetation associations encountered.

c. Quantitatively analyse plant assemblage and vegetation association data, discussing patterns of community structure, species richness, species turnover and distribution. Prepare descriptions on the vegetation associations present and map their distribution. Undertake supplementary sampling.

d. Publish survey results and subsequent data analysis. Discuss implications of results with reference to conservation values and regional representativeness of the Karijini National Park and biological importance

of the Central Hamersley Range Tussock Grasslands. Make recommendations for management and reservation where appropriate.

WORK COMPLETED

Work completed on this project over the past twelve months has been minimal because of the project supervisor's secondment to other duties within Government. This secondment was onto a taskforce examining extensions to the Karijini National Park where the supervisor's primary role was to prepare a review of the biological and conservation values of the proposed additions. Figure 1 illustrates the areas under consideration for addition to the conservation estate in the Central Hamersley Range and highlights the tussock grasslands under investigation as part of this NEGP project.

Many aspects of the taskforce review were relevant to this NEGP project. The review not only drew upon information already collected as part of this project but also provided the impetus for data gathering and the development, particularly of GIS themes (geology, beard's vegetation, landsystem), which will be required for the multivariant and pattern analyses planned as part of this Tussock Grasslands project. Apart from using information already collected under the auspices of this project the taskforce review also facilitated access to valuable information held by mining companies on the biological attributes of many tussock grassland sites in the Central Hamersley Range, particularly those in the vicinity of West Angelas. Data gathered during this review process and the development of the GIS database for the Central Hamersley Range will undoubtedly assist with determining the representativeness and comprehensiveness of the existing conservation estate in the region and the adequacy of reservation with respect to tussock grassland community types.

An immediate spin-off from the taskforce review has been the development of an inter-agency administration protocol for the management of those tussock grassland communities within the proposed 'Coondewanna Addition' (see Figure 1). This protocol not only includes government agencies but also involves representatives from the principal Iron Ore Mining companies with interests in the area, namely BHP Iron Ore, Hamersley Iron, Hancock Resources and Robe River Iron Associates. The principal aim of the protocol is to minimise the impacts of minerals exploration activities and to promote an awareness of the need for appropriate fire management in the area. The taskforce review also strengthens the alliance between CALM and Hamersley Iron with reference to the Memorandum of Understanding over Juna Downs, particularly in respect to the biological and conservation values of Munjina Claypan and Coondewanna Flats.

Another spin-off from the review has been the identification of tussock grasslands which have not previously been investigated botanically. The 1998 field schedule will be designed to include such communities in the sampling program.

Work on each of the project's scope items completed over the past 12 months, with the exception of issues addressed above, includes:

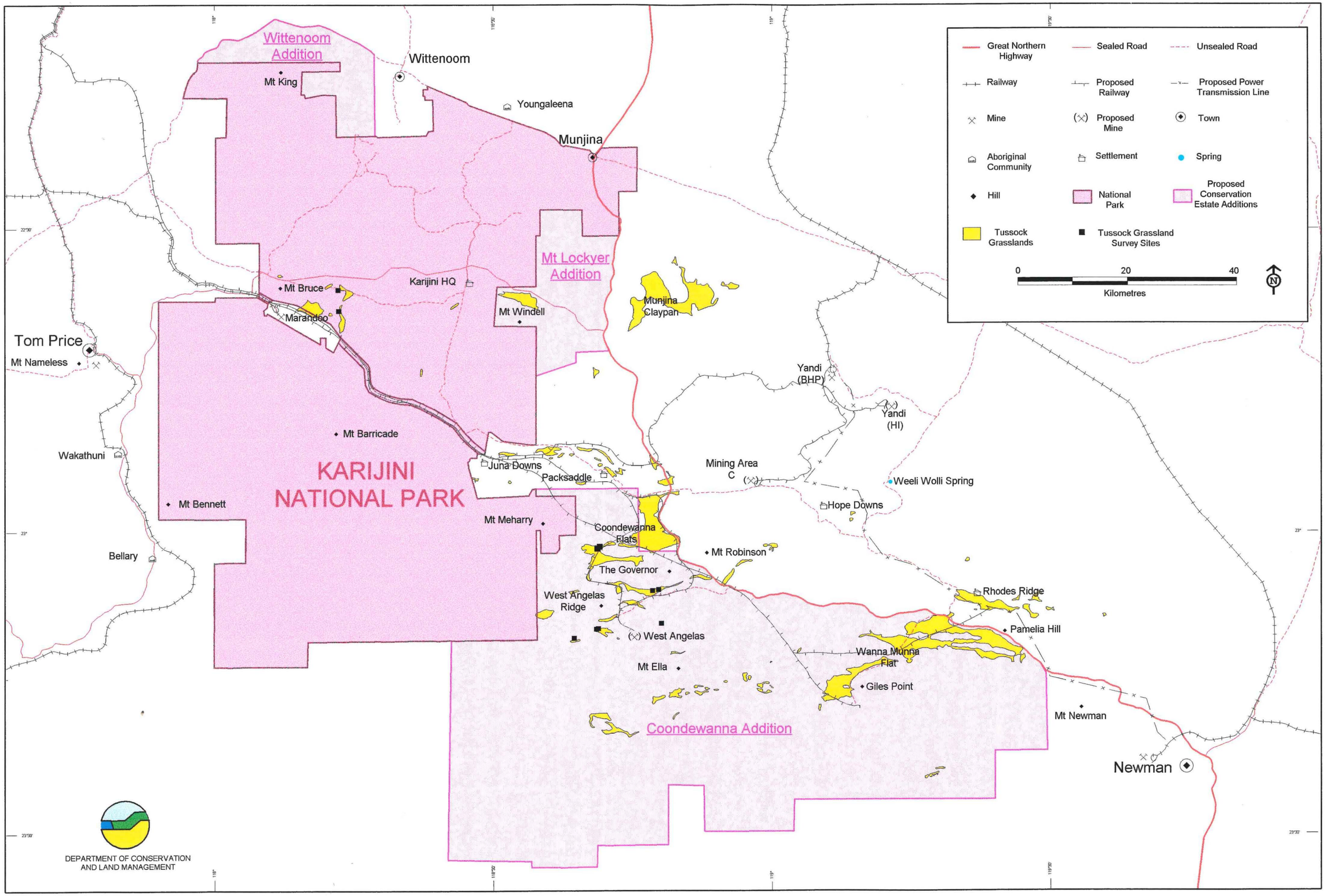
Wittenoom Addition
Wittenoom
Mt King
Youngaleena
Munjina
Mt Lockyer Addition
Karijini HQ
Mt Bruce
Marandoo
Mt Windell
Munjina Claypan
Tom Price
Mt Nameless
Yandi (BHP)
Yandi (HI)
Mt Barricade
KARIJINI NATIONAL PARK
Wakathuni
Juna Downs
Packsaddle
Mining Area C
Weeli Wolli Spring
Hope Downs
Mt Bennett
Mt Meharry
Coondewanna Flats
Mt Robinson
Bellary
The Governor
West Angelas Ridge
Rhodes Ridge
Pamelia Hill
West Angelas
Wanna Munna Flat
Mt Ella
Giles Point
Mt Newman
Coondewanna Addition
Newman
Great Northern Highway
Sealed Road
Unsealed Road
Railway
Proposed Railway
Proposed Power Transmission Line
Mine
Proposed Mine
Town
Aboriginal Community
Settlement
Spring
Hill
National Park
Proposed Conservation Estate Additions
Tussock Grasslands
Tussock Grassland Survey Sites
0
20
40
Kilometres
N
DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

FIGURE 1

Tussock grasslands of the Central Hamersley Range and proposed additions to the conservation estate.

Scope Item A

The accurate delineation of tussock grassland communities within the Central Hamersley Range has continued through aerial photograph and Landsat imagery interpretation in conjunction with opportunistic ground truthing. The grassland communities are readily identifiable from Landsat imagery, returning unique textural signatures which differs markedly from the ubiquitous mulga woodland communities on adjacent gently sloping stony pediments.

No new grassland communities have been located, however, some classification of communities into subtypes based on Landsat data and geological considerations has been undertaken. This has resulted in the identification of two types of cracking clay communities in addition to the more common alluvial flat-valley communities. The two cracking clay communities are the Brockman Land System grasslands and the West Angelas doleritic clay grasslands. The location of both grasslands is depicted in Figure 2. The Brockman Land System grassland is located on Munjina Claypan and covers an area of 1 418 ha. This grassland is comprised of a clay soils supporting a vegetation assemblage of sparse *Acacia aneura* trees over tall perennial grasses of *Chryspogon fallax* and *Themeda triandra*. This grassland is the only representation of its type within the project area, however, is common to the west of the national park on Hamersley Station. The West Angelas doleritic clay grassland comprises three, perhaps, four cells covering an area of 492 ha. This community is comprised of *A. synchronicia*, *A aneura* open scrub over *C. fallax* tall grass over dense ephemeral grasses and forbs. The community is unusual with respect to its landscape setting occurring mid-slope in the catena profile. All other tussock grassland communities occur at the base of the catena profile on the valley floor.

Scope Item B

No new sampling quadrats were established in 1997. Ten permanent benchmark flora sampling sites were established in 1996. These benchmark quadrats comply with CALM's Pilbara biogeographical survey protocol and are identical to biological survey sites established at other locations within the Pilbara, such as those in the Barlee Range Nature Reserve and on the Burrup Peninsula.

The flora at six of these Tussock Grassland sites has been sampled on two occasions, although no sampling occurred in 1997. Opportunistic sampling of tussock grasslands through the study area has occurred with many interesting plant species being collected. Identification and databasing of specimens has continued along with the incorporation of vouchers into the appropriate repositories.

Soil samples collected from the six quadrats sampled in 1996 have been analysed for their chemical and edaphic properties. Results are presented in Table 1. No interpretation of these results have been undertaken, however, it appears that values are generally homogeneous between sites. Both the

Figure 2 Location of Brockman Land System and West Angelas Doleritic Clay grassland communities east of Karijini National park

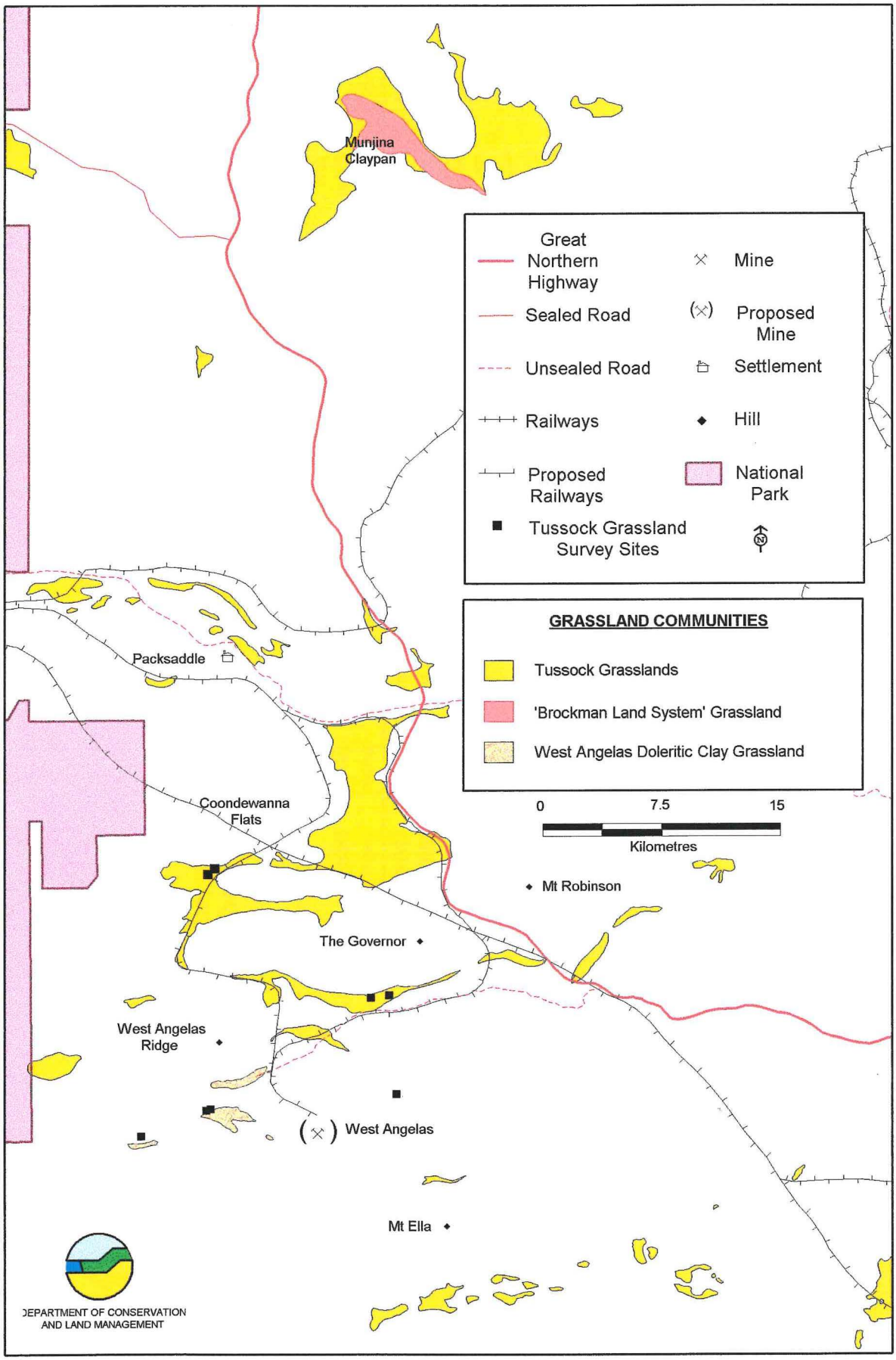

Table 1 Chemical and physical attributes of the soils from six botanical survey sites established on tussock grasslands within the Central Hamersley Range.

Tussock Grassland Quadrat	EC (1:5) mS/m	pH (H_2O)	pH ($CaCl_2$)	OrgC (W/B) %	N (total) %	P (total) mg/kg	P (HCO_3) mg/kg	Ca[1] (exch) me%	Mg (exch) me%	Na (exch) me%	K (exch) me%	Al (exch) me%	Mn (exch) me%	Sand %	Silt %	Clay %
01	2	6.5	5.4	0.48	0.055	546	14	5.57[a]	1.38[a]	0.02[a]	1.10[a]	-	-	42.0	30.5	27.5
02	5	-	5.1	0.59	0.059	600	24	5.22[b]	1.56[b]	0.02[b]	1.03[b]	0.02[b]	0.06[b]	33.0	42.5	24.5
03	2	6.3	5.1	0.37	0.049	592	29	4.64[b]	1.75[b]	<0.02[b]	1.05[b]	0.02[b]	0.02[b]	31.0	42.5	26.5
04	4	6.3	5.0	0.52	0.063	587	33	2.99[b]	1.17[b]	0.02[b]	2.10[b]	0.02[b]	0.57[b]	27.0	53.0	20.0
05	1	5.8	4.3	0.28	0.046	446	11	2.67[b]	1.82[b]	0.05[b]	0.78[b]	0.19[b]	0.06[b]	35.5	37.0	27.5
06	2	5.7	4.6	0.25	0.042	438	10	3.49[b]	2.26[b]	0.05[b]	0.69[b]	0.07[b]	0.07[b]	25.5	48.5	26.0

Note: 1 Methods used in determination of exchangeable cations:
- a extracted in 1M NH_4Cl, pH 7.0
- b extracted in 0.1M $BaCl_2$
- c extracted in 1M NH_4Cl, pH 8.5

levels of total nitrogen and phosphorus from these tussock grasslands are significantly greater than for soils obtained from sites higher up the landscape profile (van Leeuwen and Start, unpublished data).

Scope Item C

No qualitative analysis of plant specimens or vegetation association data has been undertaken. The databases required to undertake such analyses have yet to be developed. Further systematic and opportunistic sampling of quadrats is required to develop these data sets.

Several interesting flora records were collected during opportunistic searches of tussock grassland communities over the past 12 months. These records include:

Eragrostis sp. nov. (MET 7053)

This taxon is poorly collected and appears to be endemic to the Hamersley Range. During 1997 it was collected from a tussock grassland near the base of Mt Robinson.

Euphorbia sp. Harding (MET15683)

This novel taxon, which is endemic to the Pilbara, has been collected from three locations. In 1997 it was collected from a tussock grassland near West Angelas. The two other localities are in the Chichester Range where the taxon also grows in a tussock grassland community.

Boerhavia sp. nov.

An upright, perennial (?) *Boerhavia* which is only known from two localities in the Hamersley Range, one near West Angelas and the other near Mt Brockman, north of Tom Price. This taxon has also been collected on three other occasions from tussock grassland habitats in the Chichester Range.

Sida sp. nov.

A novel taxon only known from three collections in the Hamersley Range. The 1997 collection was from a tussock grassland community near West Angelas. The previous two collections were from a similar habitat to the west of Tom Price on Hamersley Station.

Further collecting and ongoing taxonomic research will undoubtedly result in the identification of additional specimens of conservation significance. Such research will also provide a clearer understanding of the status of taxa already collected.

Scope Item D

No progress has been made with the publication of survey results or subsequent data analyses.

The next progress report will be submitted at the end of February 1998.

EXPENDITURE TO DATE

An expenditure statement from the Administration Assistant in the Pilbara Regional Office is attached as Appendix One. As of the 30th September a total

of $2 570 or 7.5% of the $34 100 NEGP budget for this project had been consumed.

Expenditure since the commencement of the project has been entirely related to the purchase of materials, in particular topographical maps and supplementary digitising software. Outstanding charges from 1996 associated with the purchase of Landsat imagery have now been debited against this project.

During the next three months it is anticipated that expenditure will be associated primarily with the development of specimen and GIS databases. Some expenditure will be associated with the purchase of topographical maps, both in hard copy and digital format for the study area.

A cost overrun in the budget for this project is not anticipated.

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APPENDIX ONE

HERITAGE COUNCIL OF WESTERN AUSTRALIA
NATIONAL ESTATE GRANT PROGRAM
(N95/050)

Project: BOTANICAL SURVEY OF TUSSOCK GRASSLANDS WITHIN THE CENTRAL HAMERSLEY RANGE.

Expenditure statement

	$
1996-97 (31/10//96 - 30/09/97)	
Materials & Equipment	1 880.00
Total expenditure (30/09/97)	**$ 1 880.00**

D. Connors
A/Admin. Assistant
12/11/97