BOTANICAL SURVEY OF

CENTRAL PILBARA UPLANDS

Project (N709)

Final Report - First Year 1995

Prepared by: *Stephen van Leeuwen*

Date: *April 1996*

Research and the collation of information presented in this report was undertaken with funding provided by the Australian Nature Conservation Agency. The project was undertaken for the National Reserves System Cooperative Program. This report details research conducted under project N709.

The views and opinions expressed in this report are those of the Chief Investigator and do not reflect those of the Commonwealth Government, the Minister for the Environment, Sport and Territories, or the Director of the Australian Nature Conservation Agency.

Copies of this Final Report-First Year 1995 may be borrowed from the library:

Australian Nature Conservation Agency
GPO Box 636
CANBERRA ACT 2601
AUSTRALIA

or

Stephen van Leeuwen
Research Scientist
Science and Information Division
CALM Karratha
PO Box 835
KARRATHA WA 6714
AUSTRALIA

PRECIS

BOTANICAL SURVEY OF CENTRAL PILBARA UPLANDS

Project N706

The botanical survey of Central Pilbara upland sites commenced in 1995. A total of 107 upland sites were identified in the project area, where an upland site was defined as a hill or peak above 1 000 m. Through a process of elimination and selection designed to sample the biophysical north-south and east-west gradients present in the Hamersley Range, a total of 34 upland sites were selected for intensive survey during this project. Site selection to achieve the final 34 locations was accomplished by selecting the upland most central to each of 66 15' grid cells associated with lines of latitude and longitude. On each upland site four 40 m^2 plots were established in which all plants were recorded and sampled, where necessary. Plot location was based on microclimatic and refugial habitat considerations. Intensive opportunistic sampling over the entire upland site was also undertaken.

During 1995 a total of ten upland sites were visited in the central portion of the project area. A total of 238 species from 98 genera in 49 families were recorded from the ten sites. Many species of conservation significance were recorded and numerous specimens which appear to represent novel taxa were collected. Subjective differences were evident between upland sites which appears to be related to heterogeneity in geological setting. Quantitative interrogation of the specimen data base should verify these patterns. Plant specimens collected during the 1995 field program are being processed and incorporated into the appropriate herbaria and specialist taxonomists are being consulted regarding the identification of poorly known species. Development of specimen and GIS data bases has progressed.

In 1996, the remaining 24 selected upland sites will be surveyed.

TITLE OF PROJECT:

Botanical Survey of Central Pilbara Uplands

AGENCY:

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

CHIEF INVESTIGATOR:

Stephen van Leeuwen
Research Scientist
CALM Karratha
P.O. Box 835
KARRATHA WA 6714 (091) 431 628

AIM OF PROJECT:

To comprehensively document the flora of upland sites within the Central Pilbara in order to facilitate an evaluation of the distribution of rare, geographically restricted and endangered plant species and to assist with the identification of areas of high floristic richness.

SCOPE:

1. Identification of Central Pilbara upland sites to be surveyed through aerial photographic, Landsat and topographical map interpretation.

2. Establish and commence sampling of permanent replicated quadrats at each of the upland sites identified in Scope 1.

3. Compile results of 1995 survey.

4. Begin data entry and preliminary analysis of survey results.

5. Begin the preparation of quantitative descriptions of the species composition of each site detailing and discussing patterns of floristic composition and richness.

6. Map the distribution of any species of conservation significance encountered during 1995 surveys.

7. Begin the analysis of plant species data using multivariate and ordination techniques to determine patterns of species richness, turnover and distribution between upland sites.

8. Begin the development and presentation of management recommendations which will be designed to ensure that sites identified as biologically significant are not affected by deleterious perturbations.

PROGRESS TOWARDS COMPLETION OF SCOPE ITEMS:

Progress has been made towards fulfilment of all eight scope items. The majority of the research effort during 1995 was directed at surveying ten upland sites in the Central Pilbara and subsequently processing and identifying the plant specimens collected. Two field trips were undertaken during the past eight months during which extensive use was made of a helicopter to gain access to remote and inaccessible sites.

Progress on this project is outlined below.

Scope 1:

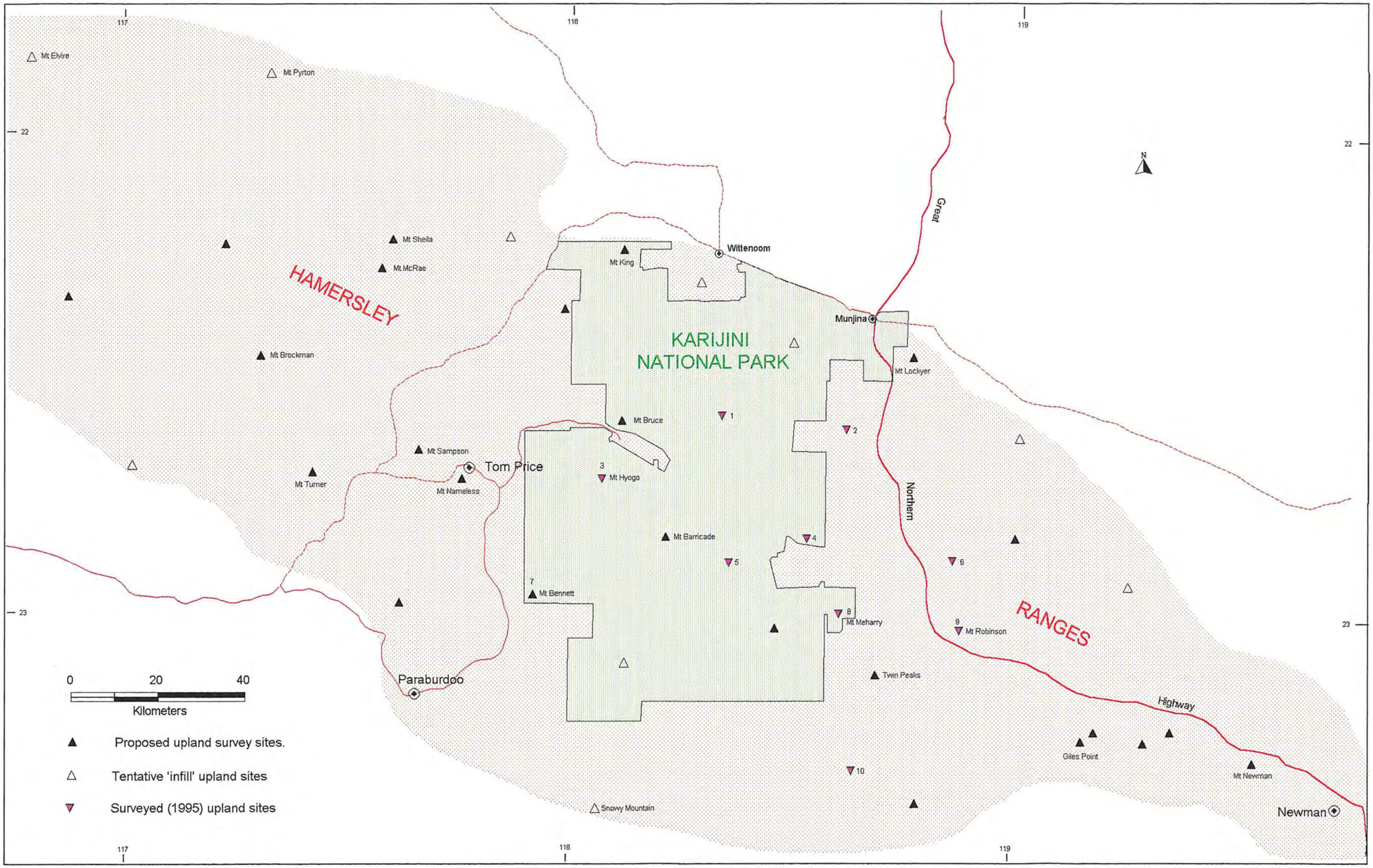
Identification of upland sites was undertaken with reference to 1 : 100 000 and 1 : 250 000 topographic maps. Upland sites were defined as peaks and hills above 1 000 m. A total of 107 such sites are located in the Hamersley Range. To reduce this number of sites to a manageable figure for survey purposes and to remove any sampling bias associated with the clustering of sites in particular areas, such as around dominant ridges, the upland site selection strategy was further refined. This refinement was designed to sample the north-south and east-west biophysical gradient which occurs in the Hamersley Range. Site selection was therefore based on the height and position of upland sites in 15` grid cells with the selection strategy favouring uplands which were located towards the centre of each grid cell. A total of 34 upland sites were finally selected for survey from the 66, 15` grid cells covering the Hamersley Range (Figure 1).

Some blemishes in this sampling strategy are apparent. Firstly, there is an absence of upland sites on the leading and trail edges of the Hamersley Range, as a consequence of elevations not attaining the 1 000 m cut-off point. This bias will be addressed by sampling the highest upland site in some of these leading and trailing edge grid cells, if time permits. Eight such sites, six along the leading edge and the remainder on the trailing edge of the range have already been tentatively identified (Figure 1). Some clustering of sites was also apparent (Figure 1, Giles Point area) as a consequence of only one upland site being identified in several adjacent grid cells. This sampling bias will be incorporated into the project design and will provide an interesting comparison of similarity measures between adjacent uplands during multivariant and ordination analyses.

Landsat imagery of the project area has been obtained through the Pilbara Ranges Project (Agriculture Western Australia) and is currently being used to develop a GIS data base on the location of selected and other uplands sites within the project area. This data base will be used to produce maps showing the distribution of species of conservation significance identified during this project (Figure 2).

Scope 2:

Two field trips were conducted during August and September 1995 as part of this project. Extensive use was made of a helicopter to gain access to some of


117
118
119
22
23
N
Mt Elvire
Mt Pyrton
Mt Sheila
Mt McRae
HAMERSLEY
Mt Brockman
Mt King
Wittenoom
Great
Northern
Munjina
KARIJINI
NATIONAL PARK
Mt Lockyer
Mt Bruce
1
2
Mt Sampson
Tom Price
Mt Turner
Mt Nameless
3
Mt Hyogo
Mt Barricade
4
5
6
7
Mt Bennett
8
Mt Meharry
9
Mt Robinson
RANGES
Twin Peaks
Paraburdoo
Giles Point
Mt Newman
Highway
10
Snowy Mountain
Newman
0
20
40
Kilometers
Proposed upland survey sites.
Tentative 'infill' upland sites
Surveyed (1995) upland sites

117 118 119

22 22

N

Mt Elvire

Mt Pyrton

Mt Sheila

Mt McRae

HAMERSLEY

Mt Brockman

Mt King

Wittenoom

Great

Munjina

KARIJINI
NATIONAL PARK

Mt Lockyer

Mt Bruce

1

2

Mt Sampson

Tom Price

3

Mt Hyogo

Mt Turner

Mt Nameless

Mt Barricade

4

5

6

7

Mt Bennett

8

Mt Meharry

9

Mt Robinson

Northern

RANGES

23 23

Twin Peaks

Paraburdoo

Highway

Giles Point

Mt Newman

10

Snowy Mountain

Newman

0 20 40

Kilometers

▲ Proposed upland survey sites.

△ Tentative 'infill' upland sites

▼ Surveyed (1995) upland sites

117 118 119

the remote and inaccessible peaks while vehicular access was obtained to a few other sites. A total of 10 sites were sampled during this field program, most in the central portion of the study area (Figure 1). At each of the sites, four 40 m^2 quadrats were established. The size and number of quadrats per sample site did not follow established CALM conventions for botanical surveys in the Pilbara Region as the area and terrain (cliff faces) of many upland sites precluded the establishment of 100 m^2 nested quadrats.

The positioning of sample plots on each upland site adhered to a predefined sampling strategy. This plot sampling strategy was based on microclimatic and refugial habitat considerations and ensured consistency between sites in the location of sample plots. At each of the ten upland sites surveyed one sample plot was located adjacent to the summit, one was located on the northern slopes, another on the south-western slopes and the remaining plot was positioned on the south-eastern slope.

In addition to the systematic sampling of these plots, random opportunistic sampling was undertaken over the entire upland site. This was achieved by walking over the site and opportunistically collecting and recording all species encountered. A minimum of 3 hours random opportunistic sampling was undertaken at each upland site.

Scope 3:

A total of 238 species representing 98 genera in 49 families were recorded during the 1995 field program (Appendix One). Specimens were collected for 141 of these species. Taxa of *Acacia, Senna, Sida* and *Eucalyptus* were the most commonly recorded and were usually dominant components of each upland site. The ground cover at each upland was usually dominated by *Triodia* species, however, few specimens were collected as their sterile state would have preluded identification.

Species of conservation significance identified during 1995 were:

Paraceterach reynoldsii

No specimens of this taxon are housed in the Western Australian Herbarium and therefore specimens collected during this field program appear to represent a new record for the State. Some confusion appears to exist regarding the occurrence of this species in Western Australia, however, since it is recorded in the 'Census of Australian Vascular Plants' (R. J. Hnatiuk, 1990, Bureau of Flora and Fauna, Australian Flora and Fauna Series No 11) as occurring in the Pilbara.

Thysanotus manglesianus

This species was again collected on Mt Meharry. The population located at this site consists of several hundred plants which were first identified in 1991. This population represents a disjunct outlier of a south western taxon with the nearest known populations being on Mt Augustus and Mt Essendon in the Ashburton and Little Sandy Desert regions, respectively. This population is of considerable taxonomic and evolutionary interest.

Thysanotus sp. "VHF Hill"

This taxon was previously known from only one site in the Hamersley Range, however, during the current field program it was found at an additional two sites. The taxon is also known from similar arid zone upland systems in South Australia and the Northern Territory. Populations in the Hamersley Range are of taxonomic and evolutionary interest.

Indigofera sp. SVL 2011

This specimen represents a taxon which is known from several sites throughout the Hamersley Range and the Ashburton. It is usually confined to the summit or apron of large hills. Two new populations were identified during the 1995 field program.

Maytenus aff. *cunninghamii*

The taxonomic status of this taxon is unclear, however, it may be identical to another undescribed *Maytenus* species recorded in the Northern Territory. One new population of this taxon was recorded during the current field program.

Cryptandra monticola

This recently described species is endemic to the Hamersley Range, where it is represented by about 10 populations. Two new populations were located during the current field program. Until recently, this species was on CALM's Priority Flora list as a species of conservation significance.

Brachychiton acuminatus

This species was recorded from two sites during the 1995 field program. Both sites represent new locations for this species which CALM has listed on the Priority Flora list.

Eucalyptus ewartiana

This mallee was located at two sites during the current field program. This species has previously been recorded from a few upland sites in the Hamersley Range. These populations represent disjunct outliers for the species distribution which is centred on the Murchison district.

Eucalyptus pilbarensis

This species was rediscover on Mt Meharry. The species is a Pilbara endemic and is all but confined to the Hamersley Range. The species is listed on CALM's Priority Flora List.

Thryptomene wittweri

This is a Declared Rare Flora species which is known from only three upland sites in Western Australia. The population located in the current field program was on Mt Meharry and represented a previously identified population.

Eremophila "magnifica"

Two populations of this undescribed taxon, which appears to be endemic to the Hamersley Range, were collected during this field program. Both subspecies are poorly known having been collected from only a handful of sites. Further taxonomic work is required to clarify the taxonomic status of the two subspecies.

Many of the undescribed species listed, and some of those which have been tentatively identified in Appendix One, may also be of conservation significance.

Many of the unidentified specimens collected may represent novel taxa which will require identification by specialist taxonomists before an assessment of conservation status can be made. Further identification and specimen processing work is required to clarify such problems.

Subjectively, there appears to be marked differences between the ten upland sites surveyed during 1995, based on geological, terrain/topography and fire history considerations. Sites with an underlying geology dominated by basalts and volcanics (eg. Mt Hyogo, Mt Bennett, Barricade East) contrast markedly with sites in a jaspilite and/or banded ironstone geological setting (eg. Mt Meharry, Mt Robinson, Karijini Central) (Table 1). The most obvious difference is in the dominance of *Eucalyptus* mallees which prevail at the ironstone sites while the spindly *Acacia maitlandii* with some *A. aneura* dominate at basalt and volcanics upland sites. Similarly, upland sites which contain many refugial habitats (steep slopes, deeply incised shaded gullies and rock piles) accommodate a different assemblage of species to those sites with more homogeneous and gentle slope. Such incongruity between sites may also relate to fire history, where sites located closer to the front of the Hamersley escarpment experience an increase in fire frequency through orographic effects enhancing the incidence of lightning. The two most northerly sites surveyed in 1995, which are the closest to the escarpment, appear to have a less diverse species assemblage than those sites located further away from the escarpment. These two sites also had many ubiquitous Hamersley Range species which usually grow on more gentle slopes lower in the landscape profile.

These subjective assessments must be treated cautiously, however, and need to be confirmed through quantitative processes associated with multivariant and ordination analyses.

Scope 4:

Processing, incorporation and data basing of plant specimens into the Pilbara Regional Herbarium is underway. Duplicate specimens are also being forwarded to the Western Australian Herbarium and, in the case of taxa of taxonomic interest, specimens are being forwarded to appropriate taxonomists at Eastern States and overseas institutions.

A specimen data base has been established and a GIS data base is currently being developed. Digital data is being obtained from several sources to provide geological, land system and vegetation themes. A fire history GIS data base will also be developed based on CALM and Shire records, if sufficient information of a reliable quality is available.

Scope 5:

Preliminary work has commenced on the compilation of quantitative descriptions for the floristic composition and richness of the upland sites surveyed. Some preliminary, exploratory multivariant analyses have been undertaken with outcomes tentatively supporting the subjective assessment presented above, particularly with regards to the impact of geological setting on the species composition of the uplands sites.

Table 1 Location and geological setting of the ten upland sites survey in 1995.

Location				Geological setting [A]			
Name	ID Number [B]	Latitude	Longitude	Age	Group	Formation	Characteristics
Karijini Central	1	22° 35' 59.6"	118° 20' 38.4"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Windell Block	2	22° 24' 51.2"	118° 41' 07.6"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Mt Hyogo	3	22° 42' 54.5"	118° 04' 22.6"	Archaean	Fortescue	Boongal	Metabasaltic pillows larva and breccia
The Gap	4	22° 50' 25.3"	118° 32' 12.7"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Barricade East	5	22° 53' 29.8"	118° 21' 40.1"	Archaean	Fortescue	Boongal	Metabasaltic pillows larva and breccia
Flat Rocks	6	22° 53' 30.8"	118° 50' 27.7"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Mt Bennett	7	22° 57' 18.6"	117° 55' 01.9"	Archaean	Fortescue	Boongal	Metabasaltic pillows larva and breccia
Mt Meharry	8	22° 58' 54.2"	118° 35' 06.1"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Mt Robinson	9	23° 02' 11.0"	118° 52' 56.9"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite
Sargeant	10	23° 19' 02.5"	118° 38' 28.1"	Proterozoic	Hamersley	Brockman Iron	Banded jasperlite ad shale dolomite

[A] Geological data obtained from Geological Survey of Western Australia 1 : 250 000 maps and explanatory notes for Sheets SG50-11 (Mt Bruce), SG50-12 (Roy Hill) and SG50-16 (Newman).

[B] Id Numbers as for Figure 1 (pg. 5).

Scope 6:

Development of a GIS data base for plant species of conservation and biological significance is underway. Figure 2 is a presentation of the spatial data stored in this data base at present. At the completion of this project it is envisaged that this GIS data base will include information on all species of conservation and biological significance found on upland sites within the Hamersley Range.

Scope 7:

Preliminary exploratory analyses have been undertaken on the flora data set developed from presence/absence records colleted from the ten upland sites sampled in 1995. Results tentatively support the assertion that geology, geographical, and landscape setting have a marked influence on the distribution of species and the floristic richness of upland sites. Further analyses of a larger data set, once the 1996 sampling sessions have been completed, should clarify distribution and floristic richness patterns and substantiate the controlling influences.

Scope 8:

Distributional data for flora species of biological and conservation significance has already been utilised for routine management and operational procedures within the Karijini National Park. Species distributional data has been incorporated onto Wildfire Threat Analysis maps. This data assisted with determining the level of threat and type of response required to numerous wildfires during the recent fire season. This distributional data has also been incorporated into operational plans, such as the Master Burn Plan for Karijini National Park which is associated with the development of strategic aerial buffers for the control and suppression of wildfires. The owners of Juna Downs pastoral lease, Hamersley Iron, have also been notified of populations of significant species on land which they manage.

PLANNED ACTIVITIES TOWARDS COMPLETION OF SCOPE ITEMS:

During 1996 four, five day field trips are planned as part of the works program for this project. It is envisaged that the remaining 24 upland sites identified and not surveyed in 1995 (Figure 1) will be visited during this field program. If time permits, several of the other tentatively identified 'infill' sites will also be visited.

Work will also continue on the identification, processing and incorporation of plant specimens into the appropriate herbaria. The flora specimen data base will be continually updated as new determinations are provided and hopefully the GIS data base will be augmented with additional themes or through refinement of existing themes, particularly geology. Negotiations are currently underway to obtain geological themes from Hamersley Iron.

The scope of this project and plot sampling strategy will be modified to include the collection of soils sampled for laboratory analysis. Data on soil properties will be incorporated into an additional data base which will hopefully assist with discriminating between different upland groups identified during multivariant and

ordination analyses. It is also hoped that such soil property data will complement the botanical composition of upland sites and provide an explanation for some of the patterns detected.

* * * * * * * * * * *

Appendix One

Vascular Plant Species

Botanical Survey of Central Pilbara Uplands

1996

This list of vascular plants includes all specimens collected during the 1995 field program and subsequently identified before 1 April 1996. Taxa are listed alphabetically in the order of genus and species in their respective families. The family sequence follows approximately the classification presented in Green (1985) "Census of the Vascular Plants of Western Australia". Nomenclature generally follows Green op. cit. *and that employed by the Western Australian Herbarium, apart from a few exceptions where recent taxonomic revisions have suggested alternative classifications.*

Underlined taxa are of biological or conservation significance

APPENDIX 1

ADIANTACEAE

Cheilanthes brownii
Cheilanthes seiberi
Paraceterach reynoldsii

CUPRESSACEAE

Callitris glaucophylla

POACEAE

Amphipogon caricinus
Aristida contorta
Cymbopogon obtectus
Eriachne dominii
Eriachne mucronata
Themeda triandra
Themeda ? triandra
Triodia pungens

CYPERACEAE

Cyperus sp. SVL 2026

ANTHERICACEAE

Thysanotus manglesianus
Thysanotus sp. "VHF Hill"
Tricoryne "trudgenae"

PROTEACEAE

Grevillea pyramidalis
Grevillea wickhamii subsp. *aprica*
Grevillea sp. SVL 1984
Hakea suberea

SANTALACEAE

Exocarpus sparteus
Santalum lanceolatum

CHENOPODIACEAE

Dysphania rhadinostachya
Dysphania sp. SVL 1985
Rhagodia eremaea
Salsola kali

AMARANTHACEAE

Ptilotus aervoides
Ptilotus auriculifolius
Ptilotus calostachyus
Ptilotus exaltatus
Ptilotus helipteroides
Ptilotus macrocephalus
Ptilotus obovatus
Ptilotus polystachyus
Ptilotus rotundifolius

GYROSTEMONACEAE

Codonocarpus cotinifolius

PORTULACACEAE

Calandrinia sp.
Genus sp. SVL 2043

CARYOPHYLLACEAE

Polycarpaea longiflora

CAPPARACEAE

Capparis lasiantha
Capparis spinosa
Capparis umbonata

BRASSICACEAE

Lepidium oxytrichum

PITTOSPORACEAE

Pittosporum phylliraeoides

MIMOSACEAE

Acacia adoxa
Acacia aneura
Acacia arida
Acacia atkinsiana
Acacia ayersiana
Acacia bivenosa
Acacia coriacea subsp *pendens*
Acacia dictyophleba

APPENDIX 1

Acacia hamersleyensis
Acacia inaequilatera
Acacia maitlandii
Acacia marramamba
Acacia monticola
Acacia pachyacra
Acacia pruinocarpa
Acacia rhodophloia
Acacia stowardii
Acacia tenuissima
Acacia tetragonophylla
Acacia validinervia
Acacia sp. SVL 1948
Acacia sp. SVL 1977
Acacia sp. SVL 2024
Acacia sp. SVL 2044
Acacia sp. SVL 2082

CAESALPINIACEAE

Petalostylis labicheoides
Senna artemisioides subsp. *artemisioides*
Senna artemisioides subsp. *helmsii*
Senna artemisioides subsp. *oligophylla*
Senna artemisioides sp. SVL 2063
Senna glutinosa subsp. *ferraria*
Senna glutinosa subsp. *glutinosa*
Senna glutinosa subsp. *luerssenii*
Senna glutinosa subsp. *pruinosa*
Senna notabilis
Senna pleurocarpa
Senna sp. SVL 1946

PAPILIONACEAE

Gastrolobium grandiflorum
Glycine tabacina
Gompholobium polyzygum
Indigofera monophylla
Indigofera sp. SVL 2011
Indigofera sp. SVL 2023
Isotropis sp. SVL 1964
Mirbelia viminalis
Rhynchosia minima
Swainsona maccullochiana
Genus sp. SVL 1962
Genus sp. SVL 1981
Genus sp. SVL 1983
Genus sp. SVL 2012
Genus sp. SVL 2015
Genus sp. SVL 2025
Genus sp. SVL 2037
Genus sp. SVL 2067

ZYGOPHYLLACEAE

Tribilus platypterus
Tribulus astrocarpus

EUPHORBIACEAE

Euphorbia boophthona
Phyllanthus sp.

CELASTRACEAE

Maytenus aff. cunninghamii

STACKHOUSIACEAE

Stackhousia sp. SVL 1961

SAPINDACEAE

Dodonaea coriacea
Dodonaea peteolaris
Dodonaea viscosa subsp angustissima
Dodonaea viscosa subsp spatulata
Dodonaea sp. SVL 2029
Dodonaea sp. SVL 2061
Dodonaea sp. SVL 2083

RHAMNACEAE

Cryptandra monticola

TILIACEAE

Corchorus sp. SVL 1956
Corchorus sp. SVL 2064
Corchorus sp. SVL 2080

APPENDIX 1

MALVACEAE

Abutilon lepidium
Abutilon sp. SVL 1949
Gossypium robinsonii
Hibiscus coatsii
Hibiscus sp. SVL 1998
Malvastrum americanum
Sida fibulifera
Sida aff. *fibulifera*
Sida sp. "golden calys"
Sida sp. SVL 1951
Sida sp. SVL 1966
Sida sp. SVL 1978
Sida sp. SVL 1995
Sida sp. SVL 1997
Sida sp. SVL 2046
Sida sp. SVL 2066

STERCULIACEAE

Brachychiton acuminatus
Brachychiton sp. SVL 1957
Keraudrenia integrifolia
Rulinga sp. SVL 2081
Waltheria indica

DILLENIACEAE

Hibbertia sp. SVL 2019

VIOLACEAE

Hybanthus aurantiacus

THYMELAEACEAE

Pimelea forrestiana

MYRTACEAE

Calytrix carinata
Corymbia ferriticola
Corymbia terminalis
Corymbia aff. terminalis
Corymbia sp. SVL 2085
Eucalyptus deserticola
Eucalyptus ewartiana
Eucalyptus gamophylla
Eucalyptus kingsmillii
Eucalyptus leucophloia
Eucalyptus pilbarensis
Eucalyptus striaticalyx
Eucalyptus trivalvis
Eucalyptus sp. "pilbara box"
Eucalyptus sp. SVL 2086
Thryptomene wittweri

HALORAGACEAE

Haloragis gossei

ARALIACEAE

Astrotricha hamptonii

APIACEAE

Trachymene sp.
Trachymene oleracea
Genus sp. SVL 1971
Genus sp. SVL 2062

OLEACEAE

Jasminum didymum subsp. *lineare*

ASCLEPIADACEAE

Rhyncharrhea linearis
Sarcostemma viminale subsp. *australe*
Genus sp. SVL 2027

CONVOLVULACEAE

Evolvulus alsinoides
Ipomoea ? pes-caprae
Ipomoea sp. SVL 2068
Porana commixta

BORAGINACEAE

Halgania aff. *solanacea*
Heliotropium heteranthum
Heliotropium sp. SVL 2033
Trichodesma zeylanicum

APPENDIX 1

VERBENACEAE

Clerodendrum sp. SVL 1959
Genus sp. SVL 2010

CHLOANTHACEAE

Newcastelia spodiotricha
Spartothamnella teucriiflora

LAMIACEAE

Plectranthus intraterraneus
Plectranthus sp. SVL 2077
Prostanthera albiflora
Prostanthera sp. SVL 1969

SOLANACEAE

Nicotiana benthamii
Nicotiana occidentalis
Solanum ferosissimum
Solanum horridum
Solanum lanceolatum
Solanum lasiophyllum
Solanum sp. SVL 1974
Solanum sp. SVL 1988
Solanum sp. SVL 1994
Solanum sp. SVL 2028
Genus sp. SVL 2038

MYOPORACEAE

Eremophila forrestii
Eremophila fraseri
Eremophila latrobei
Eremophila "magnifica" subsp. *"magnifica"*
Eremophila "magnifica" subsp. *"velutina"*
Eremophila sp SVL 1968
Eremophila sp. SVL 1968
Eremophila sp. SVL 2036
Eremophila sp. SVL 2041

RUBIACEAE

Canthium latifolium
Canthium lineare
Hedyotis crouchiania
Pomax rupestris

CUCURBITACEAE

Mukia maderaspatana

LOBELIACEAE

Lobelia heterophylla

BRUNONIACEAE

Brunonia australis

GOODENIACEAE

Dampiera candicans
Dampiera sp. SVL 1987
Dampiera sp. SVL 2047
Dampiera sp. SVL 2057
Dampiera sp. SVL 2070
Goodenia heterochila
Goodenia stobbsiana
Goodenia triodiophylla
Goodenia sp. SVL 1947
Goodenia sp. SVL 1980
Goodenia sp. SVL 2005
Goodenia sp. SVL 2013
Scaevola parvifolia subsp. *pilbrae*
Scaevola stobbsiana

ASTERACEAE

Bidens pilosa
Calotis eremaea
Calotis hispidula
Calotis multicalus
Olearia stuartii
Rhodanthe helichysoides
Segesbeckia orientalis
Sigesbeckia orientalis
Streptoglossa bubakii
Genus sp. SVL 1950
Genus sp. SVL 1963

APPENDIX 1

Genus sp. SVL 1965
Genus sp. SVL 1975
Genus sp. SVL 1981
Genus sp. SVL 2018