ELLENBROOK NATURE RESERVE AND ADJACENT BUSHLAND, UPPER SWAN

Boundary Definition: protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland; Boundary adjusted from that in draft *Perth's Bushplan*.)

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 301 **Area (ha):** bushland 63.6
Map no. 32 **Map sheet series ref. no.** 2134–III NW, 2134–IV SW
Other Names: J and B Martyn Reserve, part Location 95 (Keighery, BJ, and Trudgen 1992)
Local Authorities (Suburb): Shire of Swan (Upper Swan)
Includes CALM Managed Land: Reserve A27620 (Preservation of Fauna: Short - Necked Tortoise)
System 6 (1983): Part M17 area of bushland goes beyond System area boundaries, all bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS
Pinjarra Plain
Guildford Formation (Qpa: Mgs1, S11)
Wetlands (within the Pinjarra Plain)
Holocene Swamp Deposits (Qhw: Cps)
VEGETATION AND FLORA
Vegetation Complexes
Pinjarra Plain
Guildford Complex
Yanga Complex (in area of southern limit)
Floristic Community Types
Supergroup 1: Foothills/Pinjarra Plain
3c *Eucalyptus calophylla — Xanthorrhoea preissii* woodlands and shrublands
Supergroup 2: Seasonal Wetlands
6 Weed dominated wetlands on heavy soils
8 Herb-rich shrublands in clay pans
WETLANDS
Wetland Types: floodplain, palusplain, creek (Ellen Brook), river
Natural Wetland Groups
Swan Coastal Plain Rivers
Ellen Brook (R.3)
Wetland Management Objectives: Conservation (38.4ha), Resource Enhancement, Multiple Use
Swan Coastal Plain Lakes EPP: none identified
THREATENED ECOLOGICAL COMMUNITIES
Not assessed, Critically Endangered (floristic community type 3c), Vulnerable (floristic community type 8)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, creek, vegetated uplands
Vegetation and Flora: limited survey (part Site — DEP 1999, Gibson *et al.* 1994 (Ellen 01–07) (Ellenbrook Nature Reserve), Keighery, BJ, and Trudgen 1992); detailed survey (part Site — Keighery, BJ, 1996 (Ellenbrook Nature Reserve))
Structural Units: mapping (Keighery, BJ, and Trudgen 1992)
Uplands: *Eucalyptus calophylla* Open Forest to Woodland
Wetlands: *Eucalyptus calophylla* Open Forest to Woodland; *Eucalyptus rudis* Open Forest; *Viminaria juncea* and *Acacia saligna* Tall Open Scrub; *Kunzea* aff. *recurva* (GJK 12828) and *Verticordia densiflora Open* Low Heath, sometimes with scattered emergent *Eucalyptus rudis*; *Melaleuca lateritia* Shrubland; Herbland dominated by *Borya scirpoidea*, *Tribonanthes australis*, Asteraceae and Stylidiaceae species and combinations of these; *Neurachne alopecuroidea* Open Grassland; Sedgelands dominated by *Meeboldinia cana*, *Chorizandra enodis*, *Cyathochaeta avenacea*; mixed Sedgeland
Scattered Native Plants: *Eucalyptus rudis* Woodland — regionally significant vegetation recognised as being included in the area of Site in need of protection
Vegetation Condition: >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance
Total Flora: 236 native taxa (Keighery, BJ, 1996) (estimated >60% expected flora)

Significant Flora: *Eleocharis keigheryi* (R), *Hydatella dioica* (R); *Stylidium longitubum* (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Schoenus capillifolius* (2), *Chamaescilla gibsonii* (3), *Myriocephalus appendiculatus* (3) (southern limit of range), *Rhodanthe pyrethrum* (3), *Stylidium mimeticum* (3), *Hydrocotyle lemnoides* (4); *Pimelea imbricata* var. *major*

Fauna: limited survey. Significant reptile species: Western Swamp Tortoise (*Pseudemydura umbrina*) (one of two remaining areas for this threatened species (Burbidge and Kuchling 1994)). Significant mammal species: Quenda (L. Mutter pers. comm. 1998)

Linkage: adjacent bushland to the north (Site 296) and west (Site 300); part of Greenway 44 (Tingay, Alan & Associates 1998a); part of a regionally significant fragmented bushland/wetland linkage (Part A, Map 7)

Other Special Attributes: see Fauna; contains plant communities representative of the eastern side of the Swan Coastal Plain; contains 1046m of regionally significant river (WRC 1996a GIS)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

Recommendation: Part A: Site with Some Existing Protection; the existing purpose, care, control and management of Reserve A27620 is endorsed. Part B: Rural Complementary Mechanism (see Table 3, Volume 1).

ELLENBROOK NATURE RESERVE AND ADJACENT BUSHLAND, UPPER SWAN

Boundary Definition: protected area/bushland (part taken to cadastre) boundary (Areas of bushland within the boundaries of the Bushplan Site are not accurately mapped. The boundary has been drawn to include any unmapped bushland.)

SECTION 1: CADASTRAL INFORMATION

(Lots, locations and derived information to be updated in the public submission period)

Bushplan Site no. 301 **Map no.** 36, 42 **Map sheet series ref. no.** 2134–III NW, 2134–IV SW

System 6 (1983): Part M17 area of bushland goes beyond System area boundaries, all bushland described

Other Names
J and B Martyn Reserve, part Location 95 (Keighery, BJ, and Trudgen 1992)

Area (ha): total 71.9; bushland 60.7

Local Authorities (Suburb)
Shire of Swan (Upper Swan)

Zoning
MRS: Parks and Recreation, Rural, Other Major Highways
TPS: Landscape, General Rural

Ownership Categories
Private (commercial organisation), Not identified

Lot/Location/Reserve numbers (Purpose), Street name
12, 7715 Lexia Ave
Crown Reserve

CALM Managed Land

Reserve A27620 (Preservation of Fauna Short Necked Tortoise)

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Pinjarra Plain
Guildford Formation (Qpa: Mgs1, S11)

Wetlands (within the Pinjarra Plain)
Holocene Swamp Deposits (Qhw: Cps)

VEGETATION AND FLORA

Vegetation Complexes

Pinjarra Plain
Guildford Complex
Yanga Complex (in area of southern limit)

Floristic Community Types

Supergroup 1: Foothills/Pinjarra Plain
3c *Eucalyptus calophylla — Xanthorrhoea preissii* woodlands and shrublands

Supergroup 2: Seasonal Wetlands
6 Weed dominated wetlands on heavy soils
8 Herb-rich shrublands in clay pans

WETLANDS

Wetland Types: floodplain, palusplain, creek (Ellen Brook), river

Natural Wetland Groups

Swan Coastal Plain Rivers
Ellen Brook (R.3)

Wetland Management Objectives: Conservation (38.4ha), Resource Enhancement, Multiple Use

Swan Coastal Plain Lakes EPP: none identified

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Critically Endangered (floristic community type 3c), Vulnerable (floristic community type 8)

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: vegetated wetland, creek, vegetated uplands

Vegetation and Flora: limited survey (part Bushplan Site (Ellenbrook Nature Reserve) — Gibson *et al.* 1994 (Ellen 01–07), Keighery, BJ, and Trudgen 1992); detailed survey (part Bushplan Site (Ellenbrook Nature Reserve) — Keighery, GJ, 1996)

Structural Units: mapping (Keighery, BJ, and Trudgen 1992)
Uplands: *Eucalyptus calophylla* Open Forest to Woodland
Wetlands: *Eucalyptus calophylla* Open Forest to Woodland; *Eucalyptus rudis* Open Forest; *Viminaria juncea* and *Acacia saligna* Tall Open Scrub; *Kunzea littoricola* ms and *Verticordia densiflora Open* Low Heath, sometimes with scattered emergent *Eucalyptus rudis*; *Melaleuca lateritia* Shrubland; Herbland dominated by *Borya scirpoidea*, *Tribonanthes australis*, Asteraceae and Stylidiaceae species and combinations of these; *Neurachne alopecuroidea*

Open Grassland; Sedgelands dominated by *Leptocarpus canus*, *Chorizandra enodis*, *Cyathochaeta avenacea*; mixed Sedgeland

Scattered Native Plants: *Eucalyptus rudis* Woodland - regionally significant vegetation recognised as being included in the area of Bushplan Site in need of protection

Vegetation Condition: >50% Very Good to Excellent, <50% Good to Degraded, with areas of severe localised disturbance

Total Flora: 236 native taxa (Keighery, GJ, 1996) (estimated >60% expected flora)

Significant Flora: *Eleocharis keigheryi* (R), *Hydatella dioica* (R); *Stylidium longitubum* (1), *Eryngium pinnatifidum* subsp. *palustre* ms (2), *Schoenus capillifolius* (2), *Chamaescilla* sp. Ellen Brook (GJK 12501) (3), *Myriocephalus appendiculatus* (3), *Rhodanthe pyrethrum* (3), *Stylidium mimeticum* (3), *Hydrocotyle lemnoides* (4); *Pimelea imbricata* var. *major*

Fauna: no systematic survey. Significant reptile species: Western Swamp Tortoise (*Pseudemydura umbrina*) (one of two remaining areas for this threatened species) (Burbidge and Kuchling 1994). Significant mammal species: Quenda (L Mutter pers. comm. 1998)

Linkage: adjacent bushland to the north (BS296) and west (BS300); part of proposed Greenway 50 (Tingay, Alan & Associates 1997a); part of a regionally significant fragmented bushland/wetland linkage (Volume 2A, Map 8)

Other Special Attributes: contains plant communities representative of the eastern side of the Swan Coastal Plain; contains 1046m of regionally significant river (WRC 1996a GIS)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

ANCA Directory of Important Wetlands in Australia; Listed on the Register of the National Estate

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

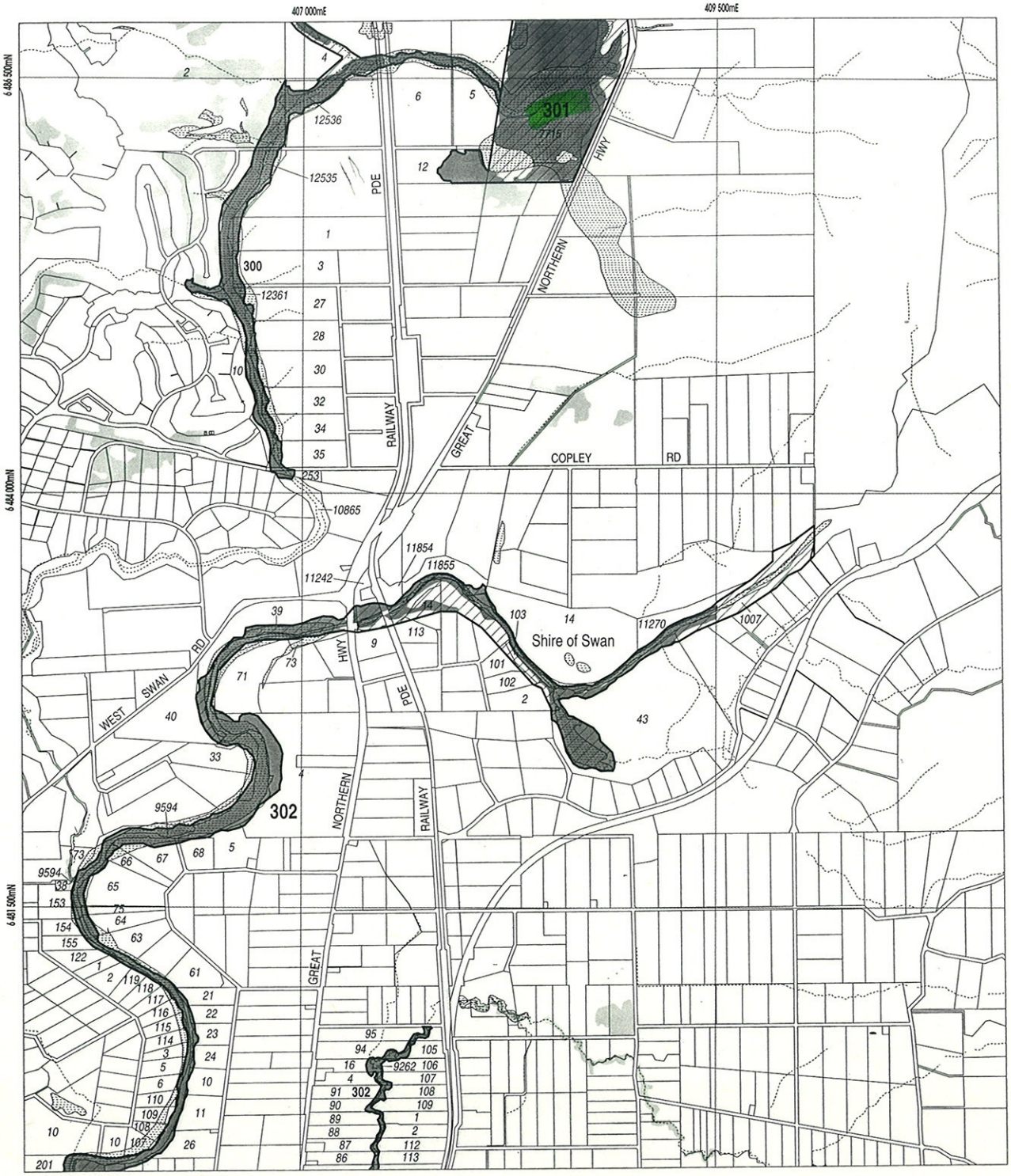
Criteria: Representation of ecological communities, Diversity, Rarity, Scientific or evolutionary importance, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Opportunities and/or Constraints

Opportunities: Bushplan Site/part Bushplan Site subject to Swan and Canning Rivers EPP, Western Swamp Tortoise Draft EPP; location of Declared Rare Flora and Scheduled Fauna, conservation category wetlands; under MRS Parks and Recreation Reservation and TPS Landscape Zoning, Crown Reserve

Constraints: private land; under MRD regional road requirements, General Mineral Resource Area (clay)

Recommendation: The existing purpose, care, control and management of Reserve A27620 is endorsed. The most appropriate mechanism for the protection of the remainder of this Bushplan Site be considered through the public comment period in consultation with the land owner(s).



LEGEND

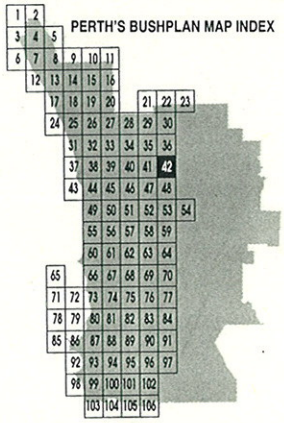
- 472 — Bushplan Sites With Regionally Significant Bushland
- Other Native Vegetation
- Conservation Category Wetlands
- Bushplan Sites With Some Existing Protection
- 696 — Lot Number, Location Number
- Channel Wetlands
- Local Government Boundary

2134 - III NW

IV | I
2134
42 NW | NE
III
SW | SE | II

1 : 25 000 AMG Reference Grid showing Perth's Bushplan Map Sheet Breakdown

PERTH'S BUSHPLAN MAP INDEX



N

SCALE

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Metres

Produced by Project Mapping Section
Land Information Branch, Ministry for Planning, Perth W.A. November 1998

ntw-map11//environ/bushplan//bushv2_42.dgn

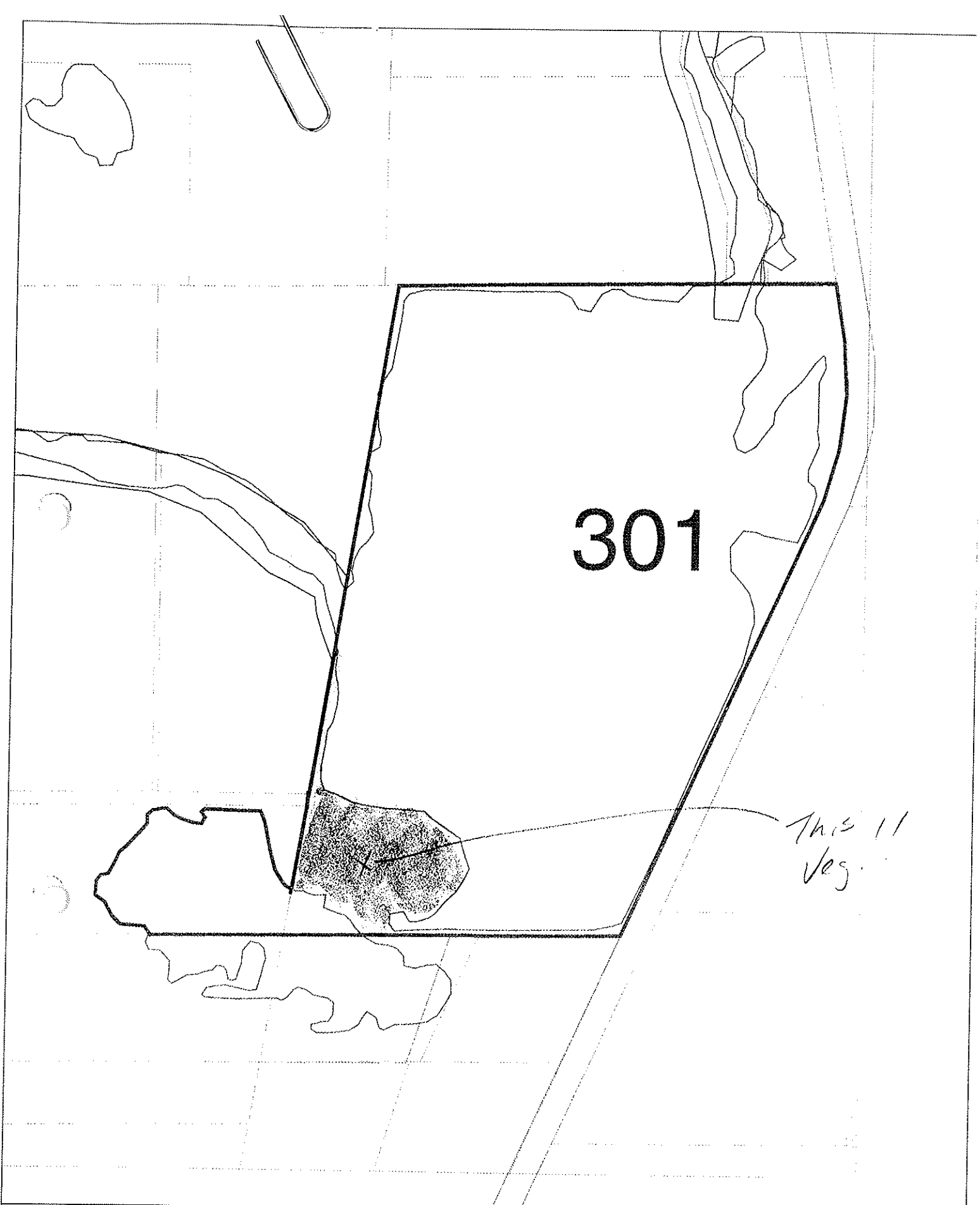
Cadastral Data supplied by Department of Land Administration, W.A.

Wetlands Data supplied by Water and Rivers Commission

Native Vegetation Extent for Study Area supplied by Agriculture Western Australia

Bushplan Site Map

Map 42



BUSHPLAN SITES CORRECTED B OK 27/10/98

THE GOVERNMENT OF WESTERN AUSTRALIA

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

Veg field inspection for Gibson et al (1994)

Private land not inspected WJK 24/8

N

SCALE 1:2500

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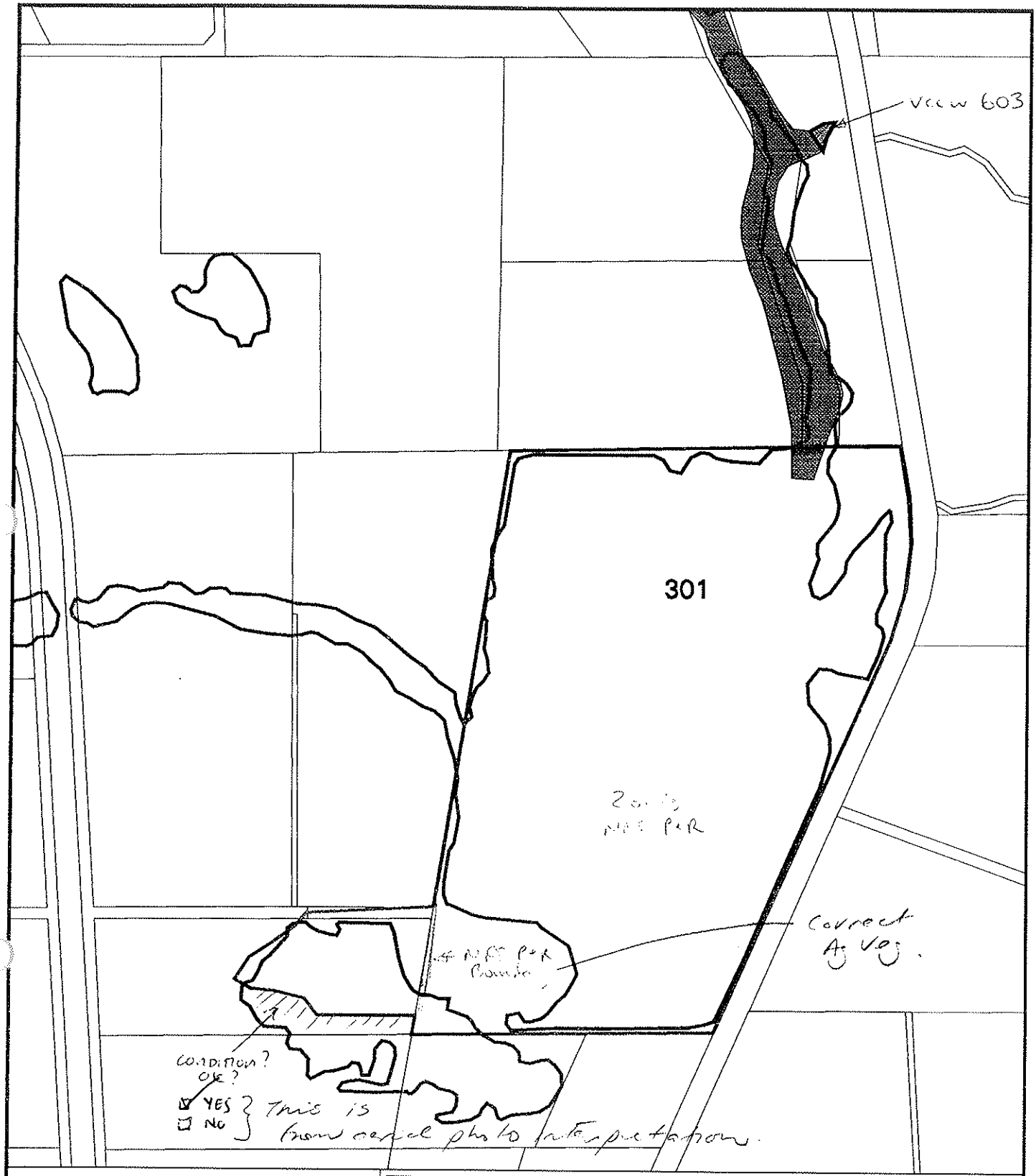
Metres



bp site 301

AG VEG 1998 BOUNDARY THEME

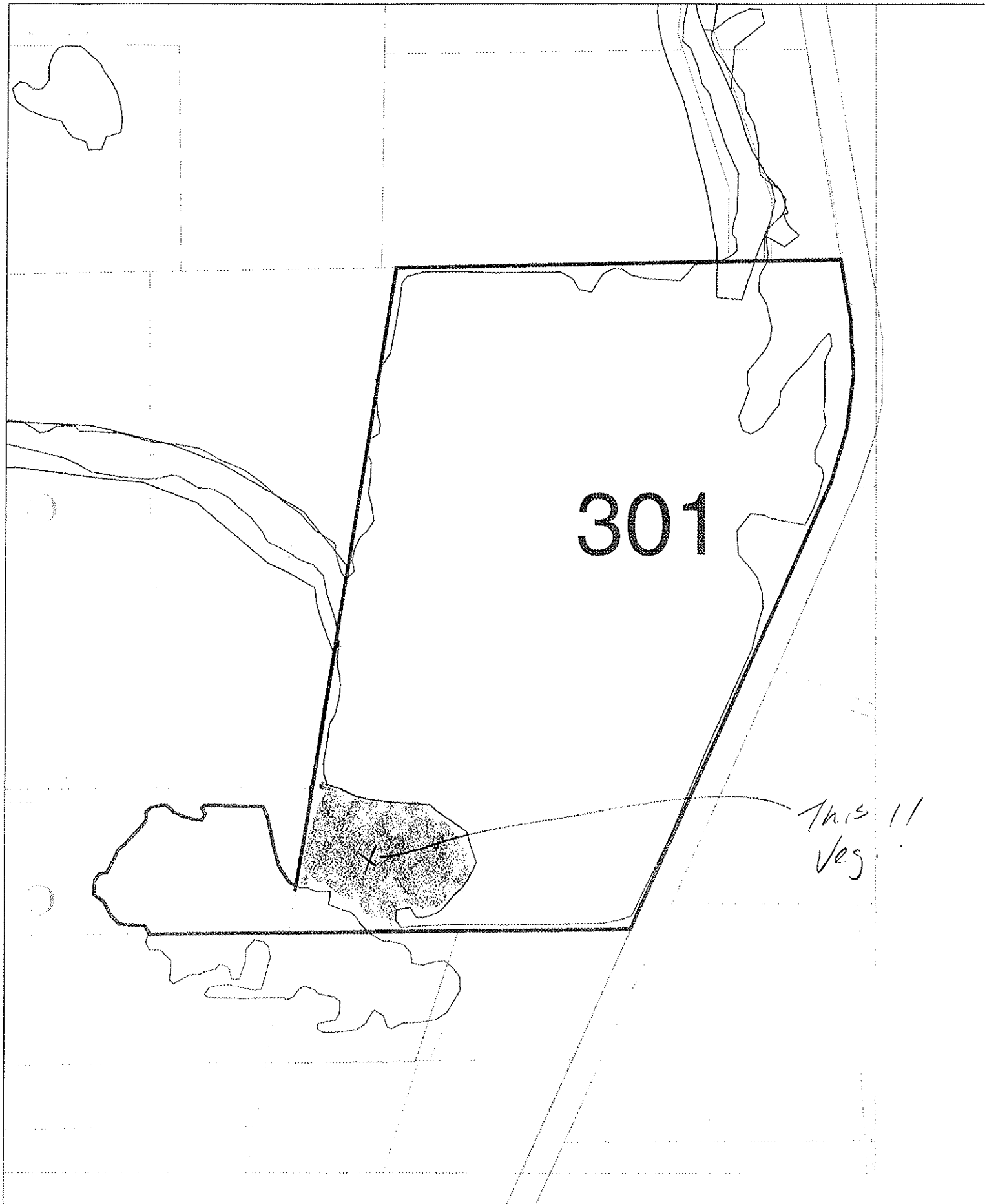
Cadastre

Bushplan sites refno 1-500 SCP BOUNDARY THEME

cons category wetlands

Verified CCWs

MFP INTERNAL USE ONLY
Prepared By: Andrea Zappacosta
Prepared For:
Map Ident: plot980528_1
Date: 28 May 98
Scale 1:9503



BUSHPLAN SITES CORRECTED

WESTERN AUSTRALIAN PLANNING COMMISSION

CUSTOMER FOCUS WESTERN AUSTRALIA

Veg field inspection for Gibson et al (1994)

Private land not inspected BJK 24/8

N

SCALE 1:2500

0 50m

Metres

CONTACT DR N. GIBSON CALM WOODVALE for further information.
Flora list for M17 (extracted from CALM Swan Coastal Plain database, ELLEN sites 1 - 7 2/1995).

Department of Environmental Protection System 6 Update: Site Based Flora List M17, Ellen Brook Nature Reserve
(extracted from the Swan Coastal Plain database, Ellen sites 1 - 7, 2/95)

Anthericaceae
- Borya scirpoidea
- Caesia micrantha
- Sowerbaea laxiflora
- Thysanotus manglesianus
- Thysanotus patersonii
- Thysanotus sp. manglesianus/patersonii scps
- Thysanotus thyrsoideus

Apiaceae
- Eryngium pinnatifidum subsp. "palustre" scps map
- Eryngium pinnatifidum subsp. pinnatifidum scps
- Homalosciadium homalocarpum
- Hydrocotyle alata
- Hydrocotyle diantha

Asteraceae
- Brachyscome iberidifolia
- * Conyza albida
- Hyalosperma cotula
- * Hypochaeris glabra
- Podolepis gracilis swamp (GJK 13126)
- Quinetia urvillei
- Siloxerus humifusus
- * Sonchus oleraceus
- * Ursinia anthemoides

Caryophyllaceae
- * Silene gallica

Centrolepidaceae
- Aphelia cyperoides
- Centrolepis aristata
- Centrolepis drummondiana
- Centrolepis mutica

Colchicaceae
- Burchardia multiflora
- Burchardia umbellata
- Wurmbea dioica subsp. alba

Cyperaceae
- Chorizandra enodis
- Cyathochaeta avenacea
- * Cyperus tenellus
- Isolepis cernua
- Isolepis marginata
- Isolepis oldfieldiana

Isolepis sp. scps
Isolepis stellata
Lepidosperma angustatum
Lepidosperma eastern terete scps (BJK&NG 232)
Lepidosperma sp. scps
Schoenus humilis
Schoenus odontocarpus
Schoenus spp. scps
Schoenus tenellus
Schoenus unispiculatus

Dilleniaceae
Hibbertia commutata

Droseraceae
Drosera gigantea
Drosera glanduligera
Drosera heterophylla
Drosera menziesii subsp. menziesii
Drosera paleacea scps subsp. paleacea
Drosera platystigma
Drosera rosulata
Drosera sp. scps
Drosera stolonifera

Euphorbiaceae
Phyllanthus calycinus

Gentianaceae
* Cicendia filiformis

Goodeniaceae
Dampiera linearis
Goodenia micrantha
Goodenia pulchella

Haemodoraceae
Haemodorum laxum
Haemodorum simplex
Tribonanthes australis
Tribonanthes uniflora

Hydatellaceae
Trithuria bibracteata

Hypoxidaceae
Hypoxis glabella
Hypoxis occidentalis

Iridaceae
* Hesperantha falcata
* Homeria flaccida

* Romulea rosea
* Watsonia sp. scps

Juncaceae
* Juncus capitatus

Juncaginaceae
Triglochin procerum

Lentibulariaceae
Polypompholyx multifida
Polypompholyx tenella scps
Utricularia dichotoma

Linaceae
* Linum trigynum

Lobeliaceae
* Monopsis debilis

Menyanthaceae
Villarsia capitata

Mimosaceae
Acacia saligna

Myrtaceae
Eucalyptus calophylla
Eucalyptus rudis
Hypocalymma angustifolium
Kunzea recurva
Melaleuca lateritia
Verticordia densiflora
Verticordia huegelii

Orchidaceae
Caladenia sp. scps
Diuris laxiflora
Thelymitra antennifera

Orobanchaceae
* Orobanche minor

Oxalidaceae
Oxalis perennans

Papilionaceae
Gompholobium marginatum
Jacksonia sternbergiana
Kennedia prostrata
* Lotus suaveolens
* Trifolium subterraneum

Viminaria juncea

Philydraceae
Philydrella pygmaea

Phormiaceae
Stypandra glauca

Poaceae
Agrostis avenacea
* Aira caryophyllea
* Aira sp. scps
Aristida contorta
* Avena fatua
* Briza maxima
* Briza minor
* Bromus diandrus
Danthonia setacea
* Ehrharta calycina
* Ehrharta longiflora
Microlaena stipoides
Neurachne alopecuroidea
* Pentaschistis airoides
Polypogon tenellus
Stipa compressa
Stipa elegantissima
Stipa flavescens
Stipa semibarbata group scps
* Vulpia bromoides
* Vulpia myuros
* Vulpia sp. scps

Primulaceae
* Anagallis arvensis

Proteaceae
Dryandra nivea
Hakea erinacea

Proteaceae
Hakea lissocarpha
Hakea varia

Ranunculaceae
Ranunculus sessiliflorus var. sessiliflorus

Restionaceae
Leptocarpus canus
Loxocarya flexuosa

Rhamnaceae
Trymalium floribundum

Scrophulariaceae
Gratiola peruviana
* Parentucellia latifolia
* Parentucellia viscosa

Selaginellaceae
Selaginella gracillima

Stylidiaceae
Stylidium longitubum
Stylidium mimeticum
Stylidium petiolare

Thymelaeaceae
Pimelea imbricata var. major

Xanthorrhoeaceae
Xanthorrhoea preissii

System 6 Update: Flora List part M17, Ellen Brook Nature Reserve
(extracted from the Swan Coastal Plain database, Ellen sites 1 - 7)

Anthericaceae
- Borya scirpoidea
- Caesia micrantha
- Sowerbaea laxiflora
- Thysanotus manglesianus
- Thysanotus patersonii
- Thysanotus sp. manglesianus/patersonii scps
- Thysanotus thyrsoideus

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- Quinetia urvillei
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- Isolepis marginata
- Isolepis oldfieldiana
- Isolepis sp. scps
- Isolepis stellata
- Lepidosperma angustatum

Lepidosperma eastern terete scps (BJK&NG 232)
Lepidosperma sp. scps
Schoenus humilis
Schoenus odontocarpus
Schoenus spp. scps
Schoenus tenellus
Schoenus unispiculatus

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Hibbertia commutata

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Drosera glanduligera
Drosera heterophylla
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Drosera sp. scps
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Dampiera linearis
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Haemodoraceae
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Haemodorum simplex
Tribonanthes australis
Tribonanthes uniflora

Hydatellaceae
Trithuria bibracteata

Hypoxidaceae
Hypoxis glabella
Hypoxis occidentalis

Iridaceae
* Hesperantha falcata
* Homeria flaccida
* Romulea rosea
* Watsonia sp. scps

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Juncaginaceae
Triglochin procerum

Lentibulariaceae
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Polypompholyx tenella scps
Utricularia dichotoma

Linaceae
* Linum trigynum

Lobeliaceae
* Monopsis debilis

Menyanthaceae
Villarsia capitata

Mimosaceae
Acacia saligna

Myrtaceae
Eucalyptus calophylla
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Kunzea recurva
Melaleuca lateritia
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Oxalis perennans

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* Lotus suaveolens
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Viminaria juncea

Philydraceae
Philydrella pygmaea

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* Avena fatua
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* Briza minor
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Danthonia setacea
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* Ehrharta longiflora
Microlaena stipoides
Neurachne alopecuroidea
* Pentaschistis airoides
Polypogon tenellus
Stipa compressa
Stipa elegantissima
Stipa flavescens
Stipa semibarbata group scps
* Vulpia bromoides
* Vulpia myuros
* Vulpia sp. scps

Primulaceae
* Anagallis arvensis

Proteaceae
Dryandra nivea
Hakea erinacea

Proteaceae
Hakea lissocarpha
Hakea varia

Ranunculaceae
Ranunculus sessiliflorus var. sessiliflorus

Restionaceae
Leptocarpus canus
Loxocarya flexuosa

Rhamnaceae
Trymalium floribundum

Scrophulariaceae
Gratiola peruviana
* Parentucellia latifolia
* Parentucellia viscosa

Selaginellaceae
Selaginella gracillima

Stylidiaceae
- Stylidium longitubum
- Stylidium mimeticum
- Stylidium petiolare

Thymelaeaceae
- Pimelea imbricata var. major

Xanthorrhoeaceae
- Xanthorrhoea preissii

BJ 501 + BS 400

System 6 Update - Floristic Community Type Mapping Information **DRAFT ONLY**

AREA INFORMATION

System 6 Area (C or M) or Update Area (Update)

Conservation Area
Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No
Other
Proposed Conservation Areas
Local Government
Reserve No
Other

Conservation Area

Nature Reserve
Reserve No
National Park
Reserve No
Local Government
Reserve No
Other

AREA

Total Area	hectares
Completely Degraded	hectares
comments:	

AREA MAPPED FLORISTIC UNITS

Boundaries: System6 CALM

Units	Site (Condition) Code	Bound	Area (ha)	Area(ha)

Boundaries determined by use of

aerial photograph	ELLEN BROOK NR WA 3166 C METRO RUN 16 No: 5203 TWIN SWAMP WA 3166 C METRO RUN 15 No: 5224
orthophoto	
vegetation map	
soil map	

M17 Ellen Brook and Twin Swamps Wildlife Sanctuaries, Upper Swan

Friends Advocate Management

Other Names J&B Martyn Reserve

Specific Study/studies Miscellaneous studies

Flora

Vegetation Map	1	2	3	
Flora list	1	2	3	4

Significant Taxa done / suitable / doubtful

Fauna

Mammals	1	2	
Birds	1	2	RAOU
Reptiles and Amphibia	1	2	Recovery Plan for Short Knecked Tortoise
Invertebrates	1	2	

Vegetation Condition Map Sites Comment

Disturbance Factors Comment Management

Swan Coastal Plain Floristic Survey

AHC: National Estate- Listed / Interim / Notified National Trust: Heritage Classification

Notes

M17 Ellen Brook and Twin Swamps Wildlife Sanctuaries, Upper Swan		
M17.1 Ways and means of providing a protective buffer around Nature Reserves A27620 and A27621 be sought through the planning procedures.	Unresolved Issues	CALM is liaising with DPUD and the land owners to achieve the intent of this recommendation. Ellen Brook Conservation Group has an interest in this area.

General

LM • Gerard Kuchling (general Fauna)
• Tortoise Information

GH • Dieback plans at Wanneroo
Hygiene Plans 1989
Sampling / interpretation
Graham Ellis Smith
copies Kelmscott / Wanneroo
Most Ellenbrook uninterpretable.

SHEET 1: System 6 - REPORT Information Search Date 3/6/94

Please circle the appropriate response or respond in the space provided.

J7

Area M/7 Name Ellenbrook, Twin Swamps

(1) Title Recovery Plan, Short necked Tortoise – Kuchling (?) to prepare RPP – soon to be released.

(2)

(1) Published/Unpublished Date ? 1992 ish

Author/s KUCHLING G.

Location of Publication Perth Zoo(?) CALM / EPA

Purpose (why was the report prepared?) Discusses Short necked Tortoise + M/ment issues including M17 I think

Government ✓

Corporate

Community Group

Management Plan

Soils			
Units	mapped	described	referenced

Landscape		
Features	described	referenced

Flora								
Vegetation Map								
Units				Site based (no)				
Mapped								
Veg Units	Comparable Heddle *et al*			Compared Heddle *et al.*	Unit not mapped by Heddle *et al.*			
Flora list								
Timing	%completion				Significant Taxa			
	Trees	Shrubs	Herbs	Sedges	Weeds	DRF	CALM Priority	Other

Fauna					
Timing	%completion		Significant Taxa		
	Mammals	Birds	Sched1	Sched2	Other
	Reptiles	Invertebrates			

Vegatation Condition				
Site based	Mapped	Units		
Disturbance Factors				
Phytophthora	observed		Other	incidental
	tested			itemised

Notes

I have the Plan but couldn't lay my hand on it quickly!

SHEET 2: System 6 - VERBAL Information Search Date 3/5/94

Area M/7 Name	Ellenbrook N.R.		
Source	Swan Coastal Plain Flora Survey (see general)		
Purpose (why was the study done?)			
Government			
Corporate			
Community Group			
Management Plan			
Publication Planned	Yes	No	Date
Planned Location			

Soils		
Units	described	referenced

Landscape		
Features	described	referenced

Flora				
Vegetation Map				
Units			Site based (no)	10 x 10 (7)
Mapped				
Veg Units	Comparable Heddle *et al*	Compared Heddle *et al*	Unit not mapped by Heddle et *al*	
Flora list				
Timing	%completion		Significant Taxa	
	Trees Shrubs Herbs Sedges	Weeds	DRF CALM Priority	Other

Fauna			
Timing	%completion		Significant Taxa
	Mammals	Birds	Sched1 Sched2 Other
	Reptiles	Invertebrates	

Vegetation Condition			
Site based	Mapped	Units	
Disturbance Factors			
Phytophthora	observed	Other	Incidental
	tested		itemised

Notes

SHEET 2: System 6 - VERBAL Information Search Date 3/5/94

Area M 17 Name	Twin Swamps NR			
Source	Swan Coastal Plain Floristic Survey (see general)			
Purpose (why was the study done?)				
Government				
Corporate				
Community Group				
Management Plan				
Publication Planned	Yes	No	Date	
Planned Location				

Soils		
Units	described	referenced

Landscape		
Features	described	referenced

Flora						
Vegetation Map						
Units				Site based (no)	10x10 (11)	
Mapped						
Veg Units	Comparable Heddle *et al*		Compared Heddle *et al.*		Unit not mapped by Heddle et *al.*	
Flora list						
Timing	%completion				Significant Taxa	
	Trees	Shrubs Herbs	Sedges	Weeds	DRF	CALM Priority Other

Fauna			
Timing	%completion		Significant Taxa
	Mammals	Birds	Sched1 Sched2 Other
	Reptiles	Invertebrates	

Vegetation Condition				
Site based	Mapped	Units		
Disturbance Factors				
Phytophthora	observed		Other	Incidental
	tested			Itemised

Notes

System 6 - REPORT Information Search Date 5/94

Please circle the appropiate response or respond in the space provided.

Area M17 Name Ellen Brook Nature Reserve
Title

Author: Burbidge A.A.
Date: 1967
Title: The biology of south-western Australian tortoises
Source: PhD thesis, UWA

Author: Burbidge A.A.
Date: 1981
Title: The ecology of the Western Swamp Tortoise Psuedemydura umbrina (Testudines: Chelidae)
Source: Australian Wildlife Research 8: 203-223

Author: Burbidge A.A.
Date: 1984
Title: A very rare Australian : the western swamp tortoise
Source: In: Vertebrate Zoogeography and Evolution in Australasia. M. Archer G. Clayton (eds) pp. 401 - 405. Hesperian Press, Perth.

Author: Burbidge A.A. Kuchling G. Fuller P.J. et al.
Date: 1990
Title: The western swamp tortoise
Source: Western Australian Wildlife Management Program No. 6

Author: Burbidge A.H. Leicester K. McDavitt S. Majer J.D.
Date: 1992
Title: Ants as indicators of disturbance at Yanchep National Park, Western Autralia.
Source: Journal of the Royal Society of Western Australia 75: 89-95

Fauna			
Timing	%completion		Significant Taxa
	Mammals	Birds	Sched1 Sched2 Other
	Reptiles	Invertebrates	

Vegatation Condition		
Site based	Mapped	Units
Disturbance Factors		
Phytophthora	observed	Other Incidental
	tested	itemised

Notes

BS 301

DEP SYSTEM 6 UPDATE SUBMISSION SURVEY SHEET B.J. KEIGHERY 2/96

BUSHLAND AREA 12 (west side of Twin Swan) **SITES** YES/NO

DATE 5.6.98 **RECORDERS** Natalie + Anna

Observations edge transects

Geographic Location	Latitude	S Longitude	E
Reference Map			

Photograph	Photographer's Name	Photo No 20

Transect of landscape units (draw in transect incorporating features listed and any other relevant unit)

dunes
dry/wet flats
sumplands
uplands
type

Soil - surface		**sub -soil**
Exposed rock	type	% area

FLORA/VEGETATION (list dominant and significant plants below, see over for vege association descriptions)

Eucalypts	*E. calophylla*	*E. wandoo*	*E. marginata*	*E. todtianna*	*E. rudis*	
	E. decipiens	*E. drummondii*	*E. haematoxylon*	*E. lanepoolei*	*E. gomphocephala*	
	E. accedens	*E. patens*	*E. laeliae*	*E. megacarpa*		
Sheoaks	*Allocasuarina fraserana*		*Casuarina obesa*			
Banksia	*B. attenuata*	*B. menziesii*	*B. prionotes*	*B. illicifolia*	*B. grandis*	*B. littoralis*
Melaleuca	*M. preissii*	*M. rhaphiophylla*	*M. lanceolata*	*M. cuticularis*		
Others	*Callitris preissii.*					
Mallees	Eucalypts	*E. argutifolia*	*E. petrensis*	*E. decurva*	*E. foecunda*	*E. latens*
SIGNIFICANT SPECIES						
						(see over for vegetaion descriptions)

Vegetation Condition - Keighery 1994 (Trudgen 1993) (show range and indicate predominant class)

1 = 'Pristine' (Excellent)
2 = Excellent (Very Good)
3 = Very Good (Good)
4 = Good (Poor)
5 = Degraded (Very Poor)
6 = Completely Degraded

Specific aspects of disturbance

partial clearing

weeds (list):

selective removal of species: timber cutting mowing fire grazing dieback %area

fire frequency:

'enrichment plantings' (list)

animal impact: horse foxes rabbits cats dogs goats pigs overgrazing by native mammals

soil movement: mining dumping rubbish dumping roadworks

changes in water regimes: flooding drainage watering nutrient influx

Tracks: fire breaks walk trails off road vehicle use animal tracks

Service corridors: SEC Main Roads Water Authority. Telecom

Other

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70-100%	MID-DENSE 30-70%	SPARSE 10-30%	VERY SPARSE 2-10%
Trees >30m Trees 15-30m Trees 5-15m Trees <5m	Dense Tall Forest Dense Forest Dense Low Forest A Dense Low Forest B	Tall Forest Forest Low Forest A Low Forest B	Tall Woodland Woodland Low Woodland A Low Woodland B	Open Tall Woodland Open Woodland Open Low Woodland A Open Low Woodland B
Mallee tree form Mallee shrub form	Dense Tree Mallee Dense Shrub Mallee	Tree Mallee Shrub Mallee	Open Tree Mallee Open Shrub Mallee	Very Open Tree Mallee Very Open Shrub Mallee
Shrubs >2m Shrubs 1.5-2.0m Shrubs 1.0-1.5m Shrubs 0.5-1.0m Shrubs 0.0-0.5m	Dense Thicket Dense Heath A Dense Heath B Dense Low Heath C Dense Low Heath D	Thicket Heath A Heath B Low Heath C Low Heath D	Scrub Low Scrub A Low Scrub B Dwarf Scrub C Dwarf Scrub D	Open Scrub Open Low Scrub A Open Low Scrub B Open Dwarf Scrub C Open Dwarf Scrub D
Mat plants Hummock Grass Bunch grass >0.5m Bunch grass <0.5m Herbaceous spp.	Dense Mat Plants Dense Hummock Grass Dense Tall Grass Dense Low Grass Dense Herbs	Mat Plants Mid-Dense Hummock Grass Tall Grass Low Grass Herbs	Open Mat Plants Hummock Grass Open Tall Grass Open Low Grass Open Herbs	Very Open Mat Plants Open Hummock Grass Very Open Tall Grass Very Open Low Grass Very Open Herbs
Sedges >0.5m Sedges <0.5m	Dense Tall Sedges Dense Low Sedges	Tall Sedges Low Sedges	Open Tall Sedges Open Low Sedges	Very Open Tall Sedges Very Open Low Sedges
Ferns Mosses, liverwort	Dense Ferns Dense Mosses	Ferns Mosses	Open Ferns Open Mosses	Very Open Ferns Very Open Mosses

VEGETATION (describe each unit of vegetation using dominants and life form/height class and canopy cover according to the Muir codes above)

(2)

Melaleuca preissiana 12 –

oc. NF

Regelia inops 1.5 – 1.8 70%

Xyris? 40 – 60

Hypocalymma

Dasypogon bom 25 – 40

Tiny sedge 25

on edges = ~~Acacia saligna~~ Banksia ilicifolia

Fauna comments

Adjacent bushland (refer to aerial photograph)

back from the edge

Our little Western Swamp Tortoise, the rarest on the planet, was teetering on the edge of extinction not long ago. Now, through inspiring human commitment and patience, there are more than 300 'swampies', and the spectre of oblivion is receding. text by **Ian Williams**

as the first winter rains sweep across the Perth coastal plain from the Indian Ocean hedonists curl up in a warm spot for a few months while others are pleased with everything the change of season brings.

Winter rains bring a smile to the face of Perth Zoo's Dean Burford for very special reasons to do with preserving our natural heritage.

Burford has been a keeper at Perth Zoo for the past 17 years. But in the last ten years he has looked after just one species, the Western Swamp Tortoise. This is Australia's most endangered reptile and the rarest tortoise on Earth. There are more Western Swamp Tortoises alive at Perth Zoo than in the wild.

With the completion of another successful breeding season there are now over 200 of them at Perth Zoo. Numbers living in the wild now stand at around 120. This is an amazing improvement on the time when total numbers fell to as low as 25.

Winter rain means that the ephemeral swamps at Ellen Brook and Twin Swamps nature reserves north-east of Perth will be filling and the Zoo bred animals that were released last September will be coming out of their Summer and Autumn period of torpor known as aestivation.

Once thought to be extinct, this smallish, short-necked tortoise, affectionately known as a 'Swampie', when fully grown is not much larger than the ubiquitous Big Mac. It may take as long as ten to fifteen years for them to reach maturity.

It's unusual for a zoo keeper to be responsible for just one species, explains Dean. The only others animals at Perth Zoo that have such one to one attention are the elephants.

"We're partners in a threatened species recovery team, which has been in place since 1987," says Dean. "This species is regarded as critically endangered by the World Conservation Union so it's really important to have a thorough understanding of the tortoises and their husbandry."

A Western Swamp Tortoise specimen was taken back to Europe by an Austrian scientist around 1840. It went into some drawer at the museum in Vienna and it wasn't until 1901 that an Austrian, Siebenrock described the species.

As development and farming encroached on its natural habitat in the Swan Valley area, recorded sightings of the tortoise weren't made for over fifty years. The species was believed to be extinct.

Perth boy Raydon Gates came to a fair in 1953 where the kids were encouraged to bring pets and animals. Western Australian conser-

below: **Dean Burford checks one of this year's hatchlings.**

vationist Vince Serventy was at the same gathering. Serventy was quite surprised by the short-necked tortoise that Raydon had brought.

It was first thought that this was a new species as the Oblong or Long-necked Tortoise was the only type commonly seen in the Swan Valley and coastal plain area. It was described as a separate species. Some time later it was realised that it was in fact the same species that Siebenrock had identified back in 1901. The Western Swamp Tortoise first came to Perth Zoo around 1960. While it was hoped that they would breed, little was known about their peculiarities, and there were certainly no scientific principles involved in the process apart from putting male and female together and hoping for a result.

They were on public display at that time in rather crude concrete ponds. Breeding was haphazard and very few of the young went on to reach maturity.

Once the true threat to the species was understood it was realised that it was not appropriate to have animals on exhibit that were in such imminent danger of extinction. In 1988 a recovery team grew out of the determination of five organisations to work towards saving the species. These were CALM, Perth Zoo, the University of Western Australia, Environment Australia and the World Wide Fund for Nature. Burford is quick to praise the efforts and tireless work of the recovery team to save the tortoise.

Dr Gerald Kuchling, a Research fellow at UWA has used his knowledge of the reproductive physiology of tortoises coupled with ultra-sound techniques to increase the breeding success.

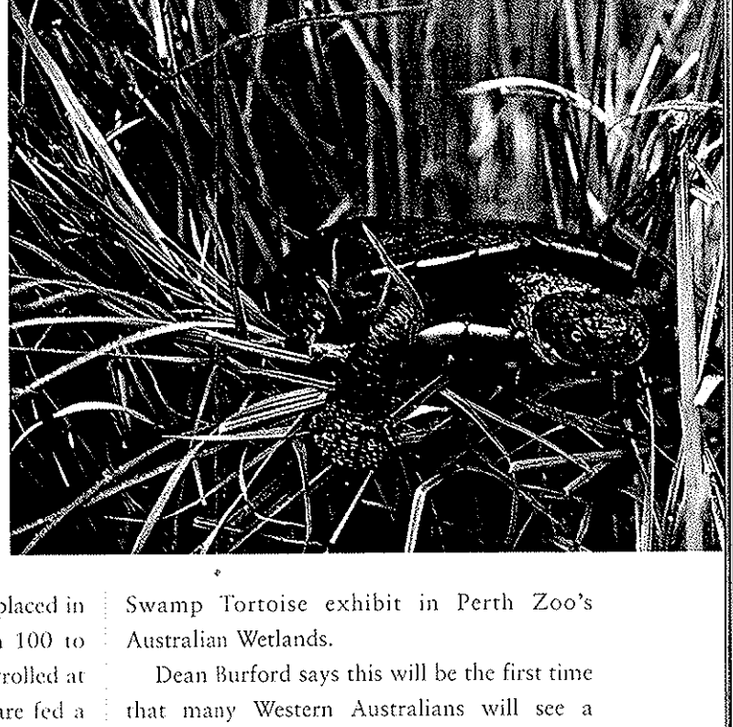
CALM staff led by Dr Andrew Burbridge have invested enormous effort in securing safe habitat into which Zoo-bred specimens can be released. While foxes and cats were perhaps the major risk to the tortoise's survival, efforts by CALM have now seen these predators greatly reduced.

Back at the Zoo, the annual lifecycle of the Western Swamp Tortoises is geared to closely resemble the situation in the wild.

The behaviour of aestivation, the period of summer and autumn dormancy that is a feature of the Western Swamp Tortoise's life cycle, is carefully copied at Perth Zoo. Adults are moved from their simulated swamps to aestivation holding pens from December to June while juveniles aestivate from February to May.

Perhaps one of the difficulties in breeding them is their once-a-year cycle. If it was just up to the males there would perhaps be a population explosion. They are active copulators, the problem is that females ovulate once a year in September.

The female digs a hole to lay her eggs with her front feet. They are the only species of tortoise in the world to dig with the front feet. She lays her clutch of up to six eggs in a sandy sheltered spot and that is the last she has to do with them.



At the Zoo they are collected and placed in incubators. Incubation can last from 100 to 180 days in a temperature that is controlled at either 24 or 29 degrees. Hatchlings are fed a diet of invertebrates; mosquito larvae, backswimmers, brine shrimp and black worms for the first year of their life.

Since 1994, September each year has been the month when Zoo-bred tortoises are released back to the wild. Some are fitted with small mobile transmitters resembling a car phone aerial. This is super glued to the carapace or upper shell. This presents no difficulty for the animal and provides Dr. Kuchling and CALM scientists with valuable information regarding the wild population's behaviour.

Burford regards the work that the Zoo is doing in conjunction with its recovery team partners as a demonstration of the true value of zoos. "Because they attract hundreds of thousands of visitors each year they have the ability to be powerful educators", he said.

On World Environment Day, June 5, Environment Minister Cheryl Edwardes opened the Water Corporation Western Swamp Tortoise exhibit in Perth Zoo's Australian Wetlands.

Dean Burford says this will be the first time that many Western Australians will see a Western Swamp Tortoise. While they may not have the impact of a tiger or an elephant, Burford feels that the message will be strong and unmistakable. With co-operation between community and conservation agencies like CALM and Perth Zoo, species can be rescued from the threat of extinction.

Dean rates the Western Swamp Tortoise reintroduction story right up there with some of the more high profile re-introductions of zoo-bred animals. He cites the Przewalski's Horse and the Arabian Oryx as two species that have enjoyed high profile returns to their former native range after being bred back from the brink of extinction through zoo breeding programs.

"If we are prepared to let a species die out without a fight then the habitat that supported the animal will also go. What could we possibly tell our children? It's about saving our heritage," he affirms. ★

left: **hatchling emerges from the shell**
above: **a Western Swamp Tortoise**

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5203 WA 3166(C) METRO REGIONAL AREA & EXT. RUN 16 (5121-5214) 1:20000 11-DEC-92 920676