

**Distribution, abundance and taxonomic status of  
*Typhonium* species (Araceae) in the east Kimberley.**

**Report pertaining to:  
\$2000 BANKWEST LANDSCOPE CONSERVATION VISA CARD GRANT**

T.Handasyde, A.N.Start and C.Done

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## Background

The following background is based on that which was submitted in the original funding application for the Bankwest Landscape Conservation Visa Card Grant:

*Typhonium* appears to be a diverse but poorly collected genus in Australia where there are seventeen named species (Hay *et al.* 1999). Florabase records three species in Western Australia, two of them described in the past ten years (1993, 1999). They are:

- *Typhonium liliifolium* F.Muell. North Kimberley (collected from Mitchell Plateau and Kalumburu; 5 specimens held in the WA Herbarium)
- *Typhonium nudibaccatum* A.Hay. North Kimberley (collected from Mitchell Plateau; 7 specimens held in the WA Herbarium)
- *Typhonium peltandroides* A.Hay, M.D.Barrett & R.L.Barrett. North Kimberley (collected from Beverley Springs Station; 2 specimens from one location held in the WA Herbarium). *Status: Priority One.*

Typhoniums are tuberous, perennial plants that, in the Kimberley region, are only apparent above ground in the wet (summer) season.

Two fruiting specimens of *Typhonium* sp. (ANS 1468 & ANS 1469; Figs 1 & 2) were collected from a small area of black soil in December 2001. The collection site (Site 1; Fig 10 & 12) was on King Location 599 in the Ord River Irrigation Area. The collections were made during a preliminary flora survey of the area, which is subject to an application to sub-divide (Appendix 1).

Material from both collections was sent to Dr Alistair Hay<sup>1</sup>, who is currently revising the Araceae for a forthcoming volume of *Flora of Australia* (Hay pers. comm.). His preliminary assessment, based on the strikingly different leaf forms is that the collections represent two undescribed species. However, it is possible that one dimorphic species is involved (Hay, personal communication to ANS). Determination of their taxonomic status will require flowering material.

Further searches were made at the original collection site and

- Less than 20 immature plants of one entity were found (Appendix 2). Live tubers were sent to Dr Hay (Figs 3–5).
- The other entity is still known only from the original collection.

Given that

- These specimens are the only Typhoniums reported from the East Kimberley
- They grow on private land which the owner wishes to subdivide into rural small-holdings and
- They probably represent one (perhaps two) undescribed species
- Much of the black soil in this area has been cleared for irrigated agriculture and there are still proposals to enlarge the irrigated area
- Vegetation of black soils in the Kununurra area is relatively well known and the fact that no Typhoniums have previously been collected in the area suggests rarity

their conservation status should be treated conservatively and there is an urgent need for more information on their status.

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<sup>1</sup> Royal Botanic Gardens, Sydney

## **Aims.**

The aims of this project, as defined in the proposal, were to:

- Collect flowering material to send to Dr Hay so as to determine the taxonomic status of these entities and, if they are undescribed taxa, to provide adequate material for type descriptions. (Note: Types, if relevant, and duplicate specimens will be lodged at the Western Australian Herbarium).
- Further survey the vicinity of the known colony to:
  - better define the size of the known population(s).
  - better define habitat requirements and associated species. (The fern-ally, *Ophioglossum costatum* (Fig 6) occurs at the same site. The Western Australian Herbarium has no records of this species for the East Kimberley. Thus it is possible that this site supports a unique community that may also be threatened).
  - Identify other areas of potentially suitable habitat and survey them for additional populations. If additional populations are located, associated species will also be recorded.

## **Methods.**

Work commenced in early November 2002 when Tricia Handasyde (TH) and Chris Done (CD) made a pre-wet season visit to the site where the specimens were located in 2001. They met with Mr John Kirby, the owner of this land (King Locations 599 - Mr Kirby is also lessee of adjoining King Location 781). It was agreed that, after sufficient rain to trigger emergence of Typhoniums, TH would make regular searches and monitor progress of any plants she found. However, by 26 November Mr Kirby had decided that he would no longer permit access: presumably he feared that the presence of these plants could hamper his plans to subdivide. Because their taxonomic status is unclear (acquisition of sufficient material to determine their taxonomic status being a primary objective of the project) it would have been difficult to oblige Mr. Kirby to allow access to the site.

The habitat in which the original plants were found (Site 1) is readily discernable on aerial photographs (Fig 10). It consists of 'fingers' of grey self-mulching clay (Sherrard 1993) locally known as 'black-soil'. The 'fingers' occupy shallow, nearly-linear depressions probably formed by in-filling of a dendritic paleo-drainage system, imposed on an alluvial bar of friable red soils.

Aerial photography encompassing both sides of the Ord River was used to locate other areas of potentially suitable habitat. All areas thus located (Table 1) were on Ivanhoe Station for which permission had already been received to undertake searches for Typhonium. The use of aerial photography was supplemented by observations from fixed-wing aircraft on two occasions and local knowledge of black soil occurrences in the region.

As it was not possible to access Site 1 as planned, the search for Typhoniums was focused on the self-mulching clay 'fingers' to the west of the Kirby properties (Figure 10). This habitat was analogous to and continuous with that of Site 1. Eight searches were undertaken in this area between November 2002 and February 2003 (the last 3 trips were to check on the progress of specimens at Site 2). Additionally five other areas of potentially suitable habitat were identified, two of which were visited (Table 1).

## Results

Table 1 lists sites where *Typhonium*s were located and other areas thought to have potential as *Typhonium* habitat.

Location	Notes	AMG co-ordinates Zone 52 (AGD84)
<b>Site 1.</b> Kirby's property (King Location 599).	Both <i>Typhonium</i> forms present in 2001 (original collection site).	465658, 8260161
<b>Site 2.</b> Ivanhoe Station - west of the Kirby boundaries.	2 mature and 6 juvenile <i>Tyophonium</i> sp. located between 464883, 8258469 and 464882, 8258520.	Immediate vicinity of 464880, 8258500
Black soil 'fingers' west of King Locations 599 and 781 (the Kirby properties).	The 2002/3 search was concentrated along the black soil 'fingers' west of the Kirby properties.	General vicinity of 464880, 8258500
Ivanhoe Station - approx. 1km west of Ivanhoe Homestead.	Inspected for suitability as habitat prior to sufficient rain for <i>Typhonium</i> emergence (24/11/02). Accessible in wet season by foot from Parry Creek Road (Power-pole 59).	General vicinity of 464700, 8265300
Ivanhoe Station - approx. 3km SSW of Ivanhoe Homestead.	Possibly suitable habitat. Depression area noted from the air. Accessible in wet season by foot from Parry Creek Road. Not inspected.	General vicinity of 464200, 8262900
Ivanhoe Station – just north of Ivanhoe Homestead.	Possibly suitable habitat. Geoff Warriner (manager of Ivanhoe Station) mentioned this black soil patch just north of the homestead, on the track in. Not inspected.	General vicinity of 465700, 826550
Between Ivanhoe homestead and Frank Wise Institute of Tropical Agriculture.	Possibly suitable habitat. Linear blacksoil formations visible from the air and aerial photographs. Vicinity of abandoned landing ground. Accessible in wet season by foot from Parry Creek Road. Not inspected.	Vicinity of 467330, 8268300
Limestone Bore, Carlton Hill Station	Gilgai-ing black soil derived from limestone. Area visited 13/12/02. Being 20km north of the Ord River and not accessible in the wet season would be a low priority for surveying.	Vicinity of 471500, 8298500

Table 1. *Typhonium* location sites and additional areas identified as potential *Typhonium* habitat.

On 2 February 2003, *Typhonium*s were found in the self-mulching clay 'fingers' to the west of the Kirby properties (Site 2, Table 1; Fig 10-12). The population of eight plants was growing in self-mulching clay but well back from the edge of surface water. It consisted of two advanced but sterile individuals that were 15 and 20 cm tall, both with 4 leaves. The remaining six plants were just emerging from the ground. The larger plants were of the broad-leafed form (Type 1, Fig 1), which was the common form at Site 1. The juveniles were too small to determine with certainty which form they represented.

Ten days later (12 February), the site had dried out significantly and none of the plants had developed any further. A further nine days later (21 February) the plants were desiccating and by April above ground parts were dead and almost impossible to locate.

The vegetation at Site 2 (Figs 7-9) comprised scattered *Bauhinia cunninghamii* (Caesalpiniaceae) trees (some immature) and the shrub *Carissa lanceolata* (Apocynaceae). Associated species were *Panicum decompositum* (Poaceae), *Rhynchosia minima* (Papilionaceae), *Commelina* sp. (Commelinaceae) and *Boerhavia* sp. (Nyctaginaceae). Several specimens of immature *Ophioglossum costatum* (Ophioglossaceae) were growing approximately 15m north of the *Typhonium*s.

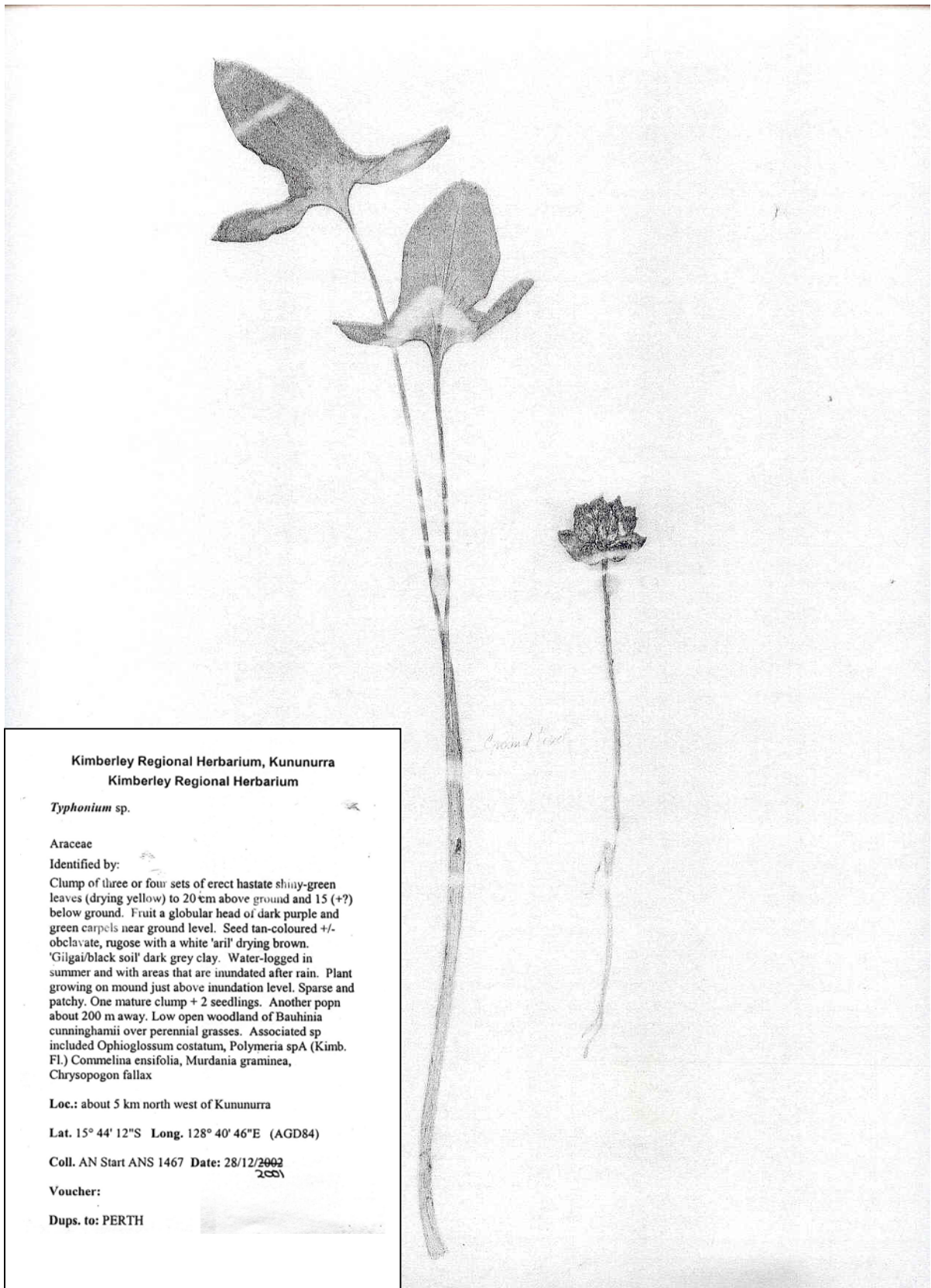


Figure 1. *Typhonium* specimen 'type 1' as collected at Site 1 in 2001 (photocopy of Herbarium specimen).

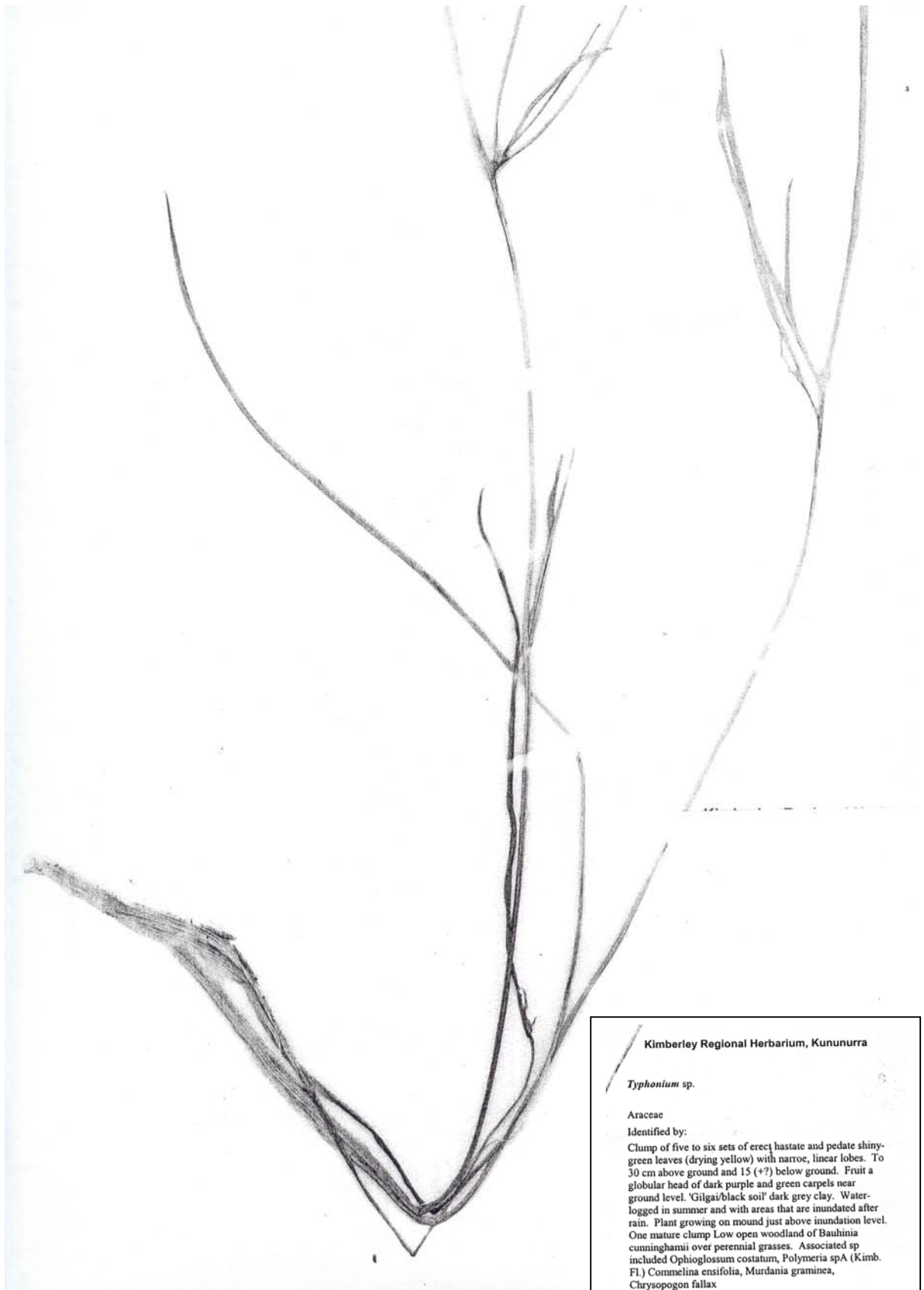


Figure 2. *Typhonium* specimen 'type 2' as collected at Site 1 in 2001 (photocopy of Herbarium specimen).

Kimberley Regional Herbarium, Kununurra

*Typhonium* sp.

Araceae

Identified by:

Clump of five to six sets of erect hastate and pedate shiny-green leaves (drying yellow) with narrow, linear lobes. To 30 cm above ground and 15 (+?) below ground. Fruit a globular head of dark purple and green carpels near ground level. 'Gilgai/black soil' dark grey clay. Waterlogged in summer and with areas that are inundated after rain. Plant growing on mound just above inundation level. One mature clump Low open woodland of *Bauhinia cunninghamii* over perennial grasses. Associated sp included *Ophioglossum costatum*, *Polymeria* spA (Kimb. Fl.), *Commelina ensifolia*, *Murdania graminea*, *Chrysopogon fallax*

Loc.: about 5 km north west of Kununurra

Lat. 15° 44' 12"S Long. 128° 40' 46"E (AGD84)

Coll. AN Start ANS 1468 Date: 28/12/2002  
2002

Voucher:

Dups. to: PERTH, RBG Sydney





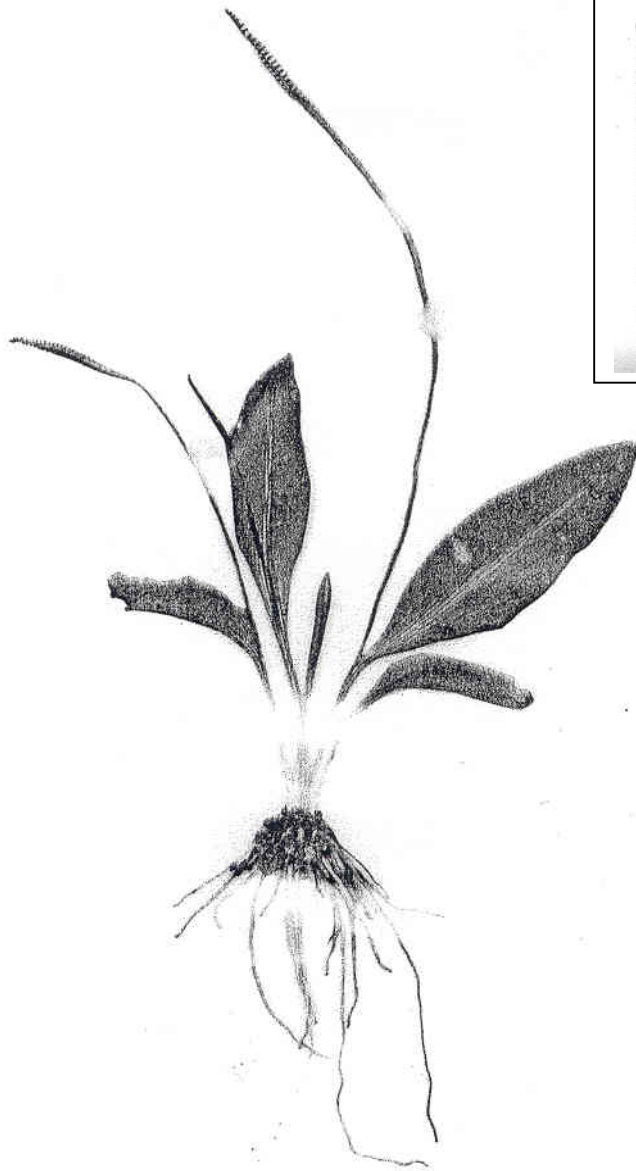
Figure 3. *Typhonium* sp. 'type 1' as collected at Site 1 in 2001.



Figure 4. *Typhonium* sp. 'type 1' as collected at Site 1 in 2001.



Figure 5. Corms of *Typhonium* sp. (type 1) collected at Site 1 in 2001.



Kimberley Regional Herbarium, Kununurra

*Ophioglossum costatum* R.Br.

Ophioglossaceae

Identified by: AN Start

09/01/2002

Erect clumps of paired sterile and fertile apetiolate fronds arising from whitish tuber 'Gilgai/black soil' dark grey clay. Water-logged in summer and with areas that are inundated after rain. Plant growing on mound just above inundation level. Low open woodland of *Bauhinia cunninghamii* over perennial grasses. Associated sp included *Typhonium* sp., *Polymeria* spA (Kimb. Fl.) *Commelina ensifolia*, *Murdania graminea*, *Chrysopogon fallax*

Loc.: about 5 km northwest of Kununurra

Lat. 15° 44' 12"S Long. 128° 40' 46"E (AGD84)

Coll. AN Start ANS 1471 Date: 09/01/2002  
2001

Figure 6. *Ophioglossum costatum* as collected on 09/01/2001 (photocopy of Herbarium specimen).





Figure 7. Site 2. *Typhonium* 'Specimen 1' was found close to the Bauhinia tree at the right hand side of the photo.



Figure 8. Site 1. Close up of location where *Typhonium* sp. was found (as for Figure 9).



Figure 9. Site 1. Location where *Typhonium* sp. was found (as for Figure 8).



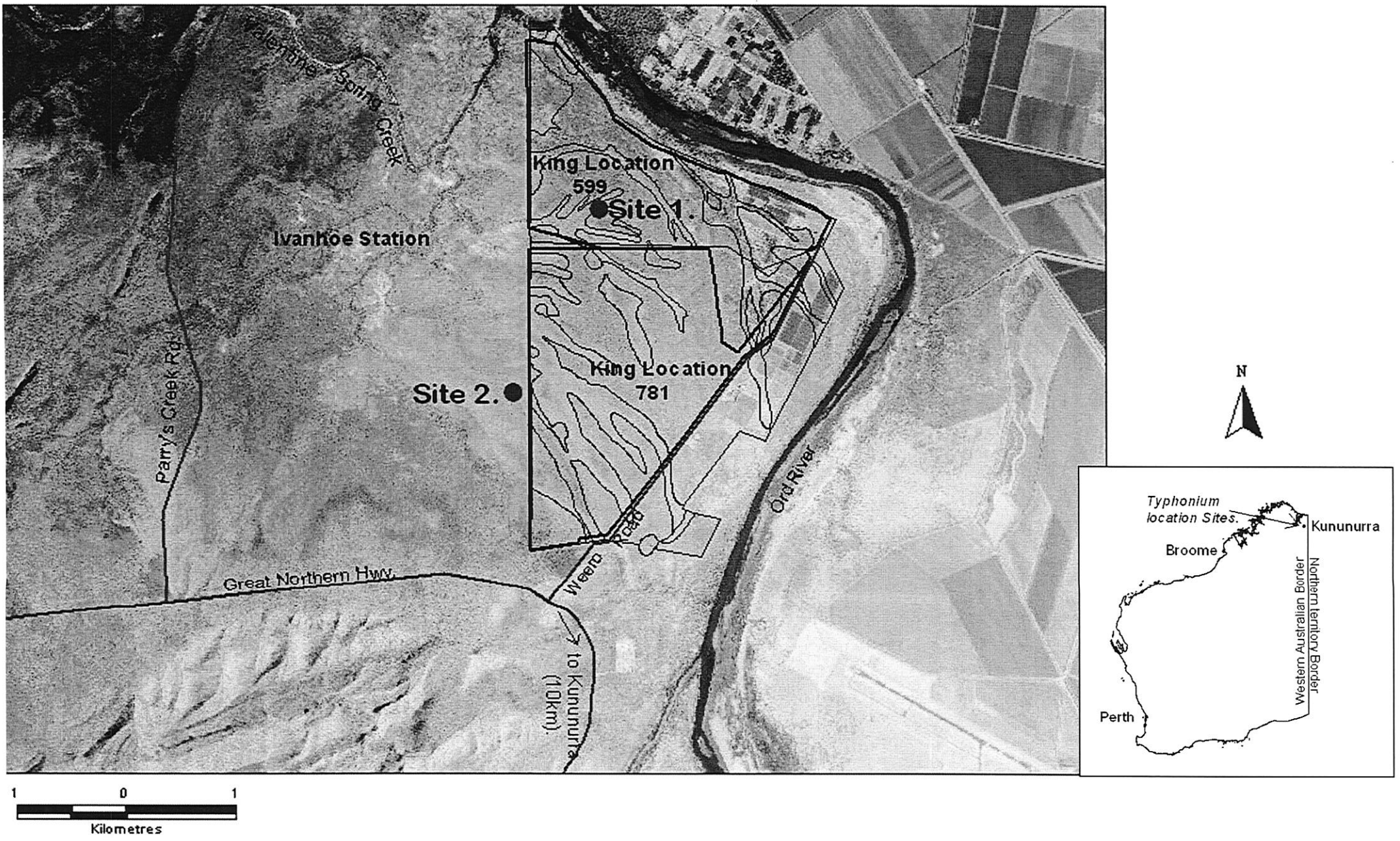


Figure 10. Typhonium location Sites 1 and 2. Note black soil 'fingers' as delineated for King Location 369 & 599 (Sherrard 1993). (Aerial photograph – DOLA 1999).

- *Typhonium* sp. (1-11)
- ⊗ *Bauhinia cunninghamii*
- × *Ophioglossum costatum*

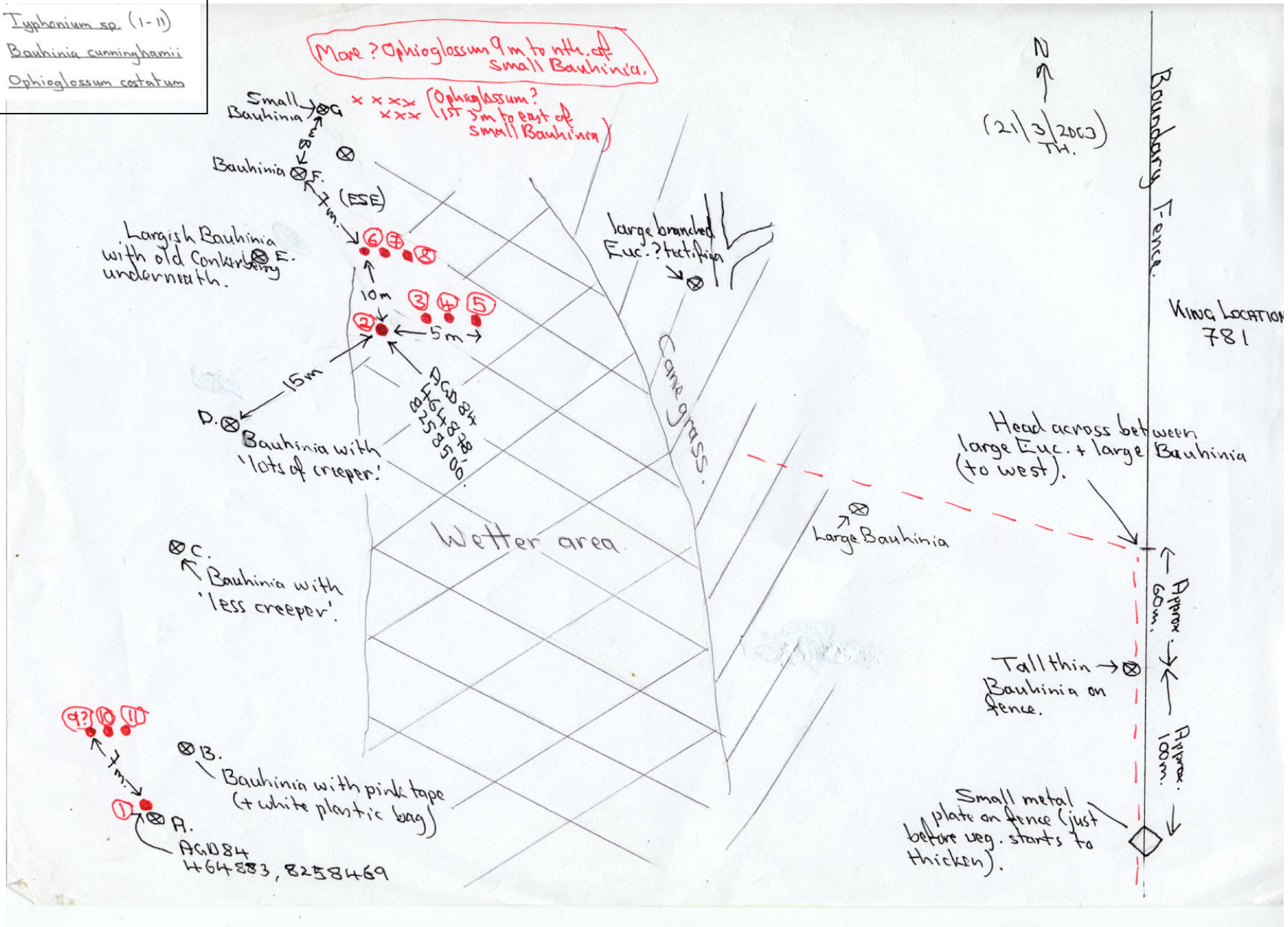


Figure 11. 'Mud Map' of Site 2 on Ivanhoe pastoral lease (location of *Typhonium* found in 2003).



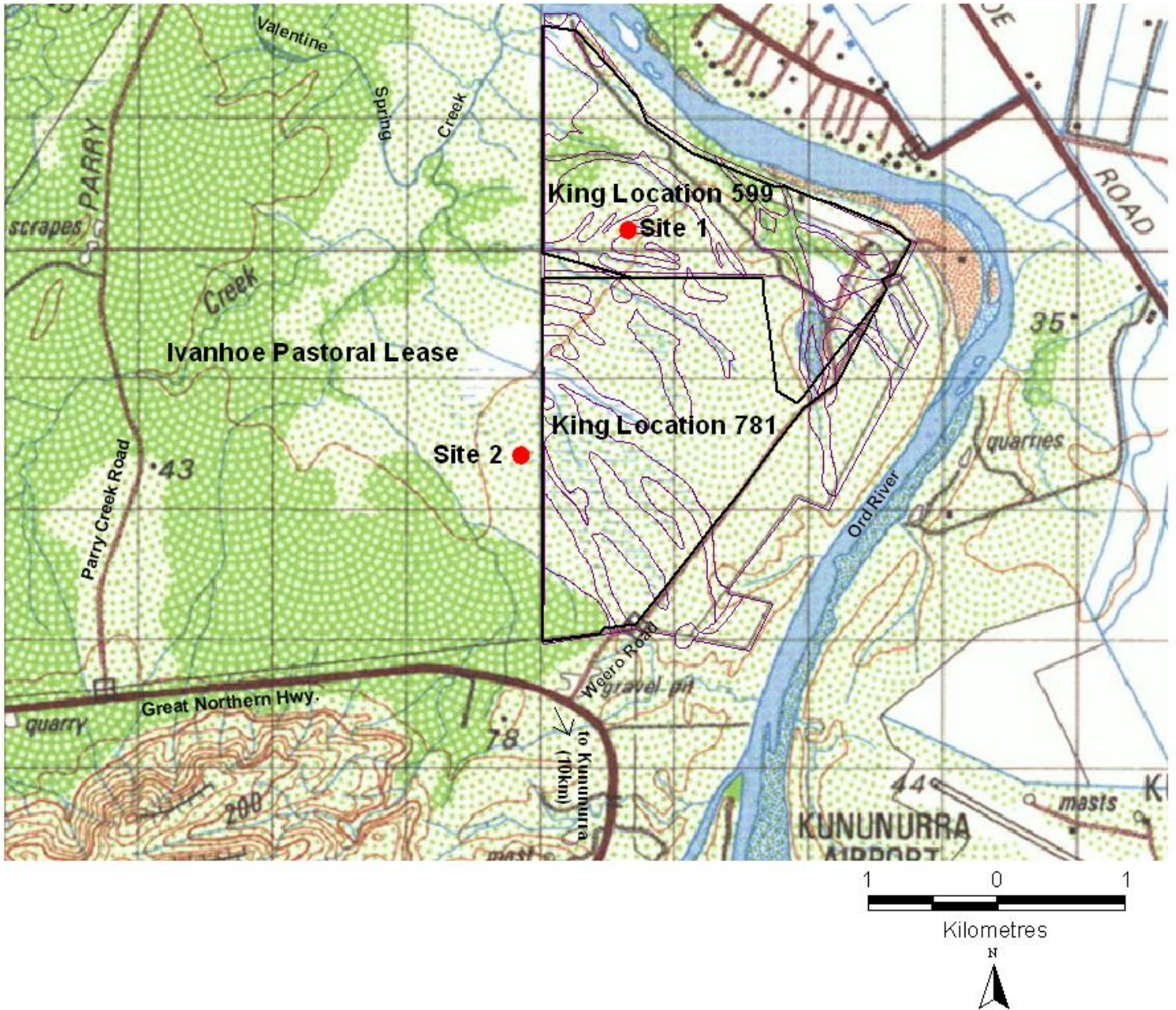


Figure 12. Section of 1:100,000 topographic map (Kununurra 4666, Royal Australian Survey Corps 1991) with Typhonium collection Sites 1 and 2 and King Location 599 and 781 boundaries.

**Kimberley Research Station  
Monthly Rainfall (mm)**

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Sum
1968/69	79	0	0	3	113	138	146	507	267	0	0	0	1253
1969/70	0	0	0	22	18	111	59	148	28	42	0	0	429
1970/71	0	0	10	0	77	63	141	112	112	17	0	0	532
1971/72	0	0	0	125	28	211	86	153	147	57	0	0	806
1972/73	0	0	1	17	91	56	141	32	226	73	12	8	657
1973/74	0	14	10	50	229	118	229	263	283	60	3	0	1258
1974/75	0	0	0	36	100	116	175	161	130	60	0	0	777
1975/76	0	0	7	84	26	120	145	238	161	33	0	0	815
1976/77	0	0	0	4	32	93	145	164	154	19	0	0	610
1977/78	0	0	0	12	58	155	173	206	60	18	2	13	697
1978/79	30	0	0	38	136	90	250	118	173	0	39	0	872
1979/80	0	2	14	43	18	90	174	355	76	27	2	0	800
1980/81	0	0	0	7	66	102	166	145	49	12	6	0	554
1981/82	0	0	1	56	149	57	312	259	222	0	0	0	1056
1982/83	0	0	1	8	42	65	93	199	314	30	0	0	751
1983/84	0	0	1	33	47	36	304	83	169	6	0	0	680
1984/85	0	0	1	29	44	117	124	218	64	19	0	7	622
1985/86	0	0	0	8	79	91	351	80	117	31	0	6	762
1986/87	26	0	0	7	10	30	340	239	33	14	0	0	700
1987/88	0	0	1	7	61	323	176	38	188	14	0	0	808
1988/89	0	0	5	15	100	257	94	88	259	57	0	0	874
1989/90	0	0	0	0	54	149	114	70	93	22	10	0	511
1990/91	0	0	0	0	23	129	189	221	4	25	0	0	592
1991/92	2	0	3	1	150	59	94	147	93	21	0	0	569
1992/93	0	0	1	7	45	72	347	231	42	0	20	14	780
1993/94	0	0	0	0	21	90	159	314	134	0	0	0	719
1994/95	0	0	1	0	19	237	250	272	207	153	5	0	1143
1995/96	0	0	0	18	60	134	144	192	144	134	0	0	827
1996/97	0	0	0	22	30	296	250	251	42	0	2	0	893
1997/98	0	0	7	10	39	181	192	118	42	41	1	0	631
1998/99	1	0	15	50	78	184	271	222	266	95	0	0	1180
1999/00	2	0	0	74	141	217	191	331	466	243	0	0	1665
2000/01	0	0	0	50	22	261	237	366	326	2	0	1	1264
2001/02	0	0	27	40	247	240	185	352	14	1	0	0	1105
2002/03	0	0	0	0	104	82	44	301	*53	18	0	7	609
2003/04	0	0	6.1	6	48.8	240	238	134**					
<b>Mean</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>21</b>	<b>66</b>	<b>135</b>	<b>198</b>	<b>199</b>	<b>129</b>	<b>44</b>	<b>8</b>	<b>3</b>	<b>810</b>

\*mainly first week of March.

\*\*records until 18/02/04 only.

Table 2. Rainfall records for Frank Wise Institute of Tropical Agriculture (Kimberley Research Station), 1968 – 2003 (Department of Agriculture records). Shaded block is approximate duration of the ‘wet season’.

## Discussion

Rainfall for November and December 2002 and January 2003 was well below average (Table 2). The self-mulching clay soils were sufficiently wetted by the beginning of January for *Crinum angustifolium* (Amaryllidaceae), to grow from their subterranean bulbs. However by mid February these were starting to dry off without flowering. All the east Kimberley Typhonium plants that have been located to date have been growing in self-mulching clay soils that become saturated in summer. Mostly these plants have been situated on the margins of small seasonally inundated ponds. It appears the rainfall during the wet season of 2002/3 was insufficient to allow the new population to reproduce and in fact most specimens didn't even produce mature leaves.

In the monsoonal tropics, Typhoniums are perennial herbs that reduce to dormant corms during the dry season. It is interesting to note that in 2001/2, at the original collection site (Site 1), two plants had born fruit, while at the same time, several developing plants were (presumably) still too under-developed to flower. It is not clear whether the presence of two distinct developmental stages (noted at both Site 1 and 2 but in different years) reflects staggered breaking from dormancy or the presence of seedlings. Either way it appears that the leaves appear above ground at different times.

The associated vegetation is structurally and floristically similar at both Sites 1 and 2: a notable feature (because there are no other records of the species from the east Kimberley) is the presence of *Ophioglossum costatum*.

Fairly extensive survey work was undertaken for the environmental impact assessment of Ord Stage 2 (Ecologia Environmental Consultants, 1997&1999) including wet season vegetation surveys on black soils. However, it is perhaps not surprising that Typhoniums have not previously been collected on the black soils of the east Kimberley as they:

- are only visible above ground for a restricted period of time during the wet season
- grow in wet and boggy conditions that are difficult to access in the wet season
- are not necessarily easy to see due to dense surrounding grass cover
- appear unable to reproduce in drier years.

It is possible that the Typhoniums found in the East Kimberley are quite specific in their habitat requirements. Inspections by air and of aerial photography were unable to locate any country with the pattern of self-mulching clay 'fingers' that is evident on the Kirby properties and the adjacent country on Ivanhoe Station (Figure 9). There are however some areas of patchy self-mulching clay that are worthy of further inspection (Table 1).

A second population of Typhoniums (Site 2) has now been located. Unfortunately the taxonomic status of the plants has not yet been resolved due to an absence of flowering material. It appears that the unusually dry 2002/3 wet season resulted in no plants reproducing in the one known and accessible population (Site 2). Living material in Sydney has not yet flowered (Hay personal communication to TH).



**Conclusions.**

It is likely that Typhoniums are more widespread in the system of shallow, paleo-channel in-fills in which the two small populations (Site 1 and Site 2) were located. Nevertheless the system is small, and atypical of black soil occurrences in the region. Four additional areas of potentially suitable habitat have been identified (Table 1), but these also are small.

Given that:

- The two forms of Typhonium recorded in the east Kimberley are still known from one and two populations respectively (and in the former case, one plant)
- The two known populations collectively contain less than thirty plants and most of these are juveniles
- The populations occur close to one another on an unusual and restricted formation
- The larger population is situated on land which is subject to a subdivision application. If the latter is approved this Typhonium population is likely to be threatened by draining and clearing

it is highly likely that the east Kimberley Typhonium(s) are rare and as such warrant further work.

**Acknowledgements**

We are grateful to Geoff Warriner, Manager of Ivanhoe and Carlton Hill pastoral leases, for permission to work on these properties. Alistair Hay, Royal Botanic Gardens, Sydney, provided advice and encouragement and is also attempting to grow both entities to enable taxonomic determinations to be made. John Moulden assisted with fieldwork and found the first plant on Ivanhoe Station. Mike Nunweek and Noel Schoknecht, Department of Agriculture, provided much appreciated assistance with mapping products.

**Epilogue.**

The above report completes the work funded under the BANKWEST LANDSCOPE CONSERVATION VISA CARD GRANT. TH was away from the Kimberley region for much of the 2003/4 wet season. On her return in February 2004 TH revisited Site 2 and re-located last year's 'first located specimen' and an additional specimen. Both of these were at a similar state of maturity as those found in 2003. She was unable to locate further specimens at this time.

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Appendix 1.

**Preliminary assessment of the flora and  
vegetation on parts of King Location 599  
(revised).**

**2002**

**Report To  
Kirby Rural Developments**

**By**

**A.N. Start<sup>2</sup> and C. Done<sup>3</sup>**



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<sup>2</sup> Principal Research Scientist.

<sup>3</sup> Kimberley Regional Manager

Department of Conservation and Land Management PO Box 942 Kununurra Western Australia 6743.

## **Introduction**

The Department of Environmental Protection (DEP) has requested information on the vegetation of parts of King Locations 599 which are subject to an application to sub-divide. The information will be used by the DEP to determine the level of environmental impact assessment required before consideration of the application can proceed. This report provides a preliminary assessment of the status and conservation value of vegetation and flora of the area.

## **Materials and methods**

### **Background Materials**

Available background materials included an enlarged aerial photograph<sup>4</sup>, a Land Capability Classification map<sup>5</sup> a description of soil types and their profiles<sup>6</sup> and a photo-enlargement of the 1:50 000 Topographical map<sup>7</sup> which marks tracks and fence-lines, some of which are not visible on the aerial photograph. Many fence-lines were slashed to facilitate vehicle access just prior to the survey and a reconnaissance of the area was made to verify fence locations and select representative sampling sites.

### **Project area**

The project area is situated on the west bank of the lower Ord River and mostly comprises a massive point bar and an adjacent flood plain. The Ord River's riparian zone is not included within the project area.

### **Land use capability.**

Four land-use capability types are mapped. The first two (both suited to agriculture or horticulture) are largely developed and are mostly external to the project area. The third is described as *Unsuitable for irrigated agriculture or horticulture; coarse sand, swamps, stony surfaced soil*. Within the project area it comprises an annually inundated depression (which is a seasonal swamp) and an area of steeper gradients traversed by an incised creek line. This area, in the northwest corner, of the project area appears to have been severely eroded in the past. The majority of the project area is classified "*Suitable for only limited horticultural activities and some irrigated agriculture. Very careful management and extensive drainage required.*"

### **Surface Hydrology**

There are three components to the surface hydrology of the project area.

1. Water drains directly into the river from the riverine side of a levee along the northern boundary. Aerial photography indicates that there has been significant erosion of this slope but vegetation cover is considerably more extensive now than it has been (Chris Done personal observation). Most of the other levee soils have been developed and they are outside the project boundary.

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<sup>4</sup> Ord River Irrigation Scheme - Run 11, Frame 5005. Flown 26/07/99. Scale 1:20 000. Western Australian Department of Land Administration

<sup>5</sup> Unpublished map prepared by the WA Department of Agriculture 30/06/93. Scale 1: 20 000

<sup>6</sup> Unpublished report prepared by the WA Department of Agriculture

<sup>7</sup> 'Deception Range' (Sheet 4666 3)

2. At some time in the past a channel was scoured across the point bar by river flood waters "cutting the corner". The upstream portion has subsequently been occluded by riverine deposits but the lower portion persists as a paleo-channel evident as a series of depressions that are visible on the aerial photograph because of the relatively dense stands of trees that encircle them. The seasonal swamp, which is the uppermost and largest, thus occupies the head of a shallow basin that trends north, then northwest into the river channel.
3. Although the majority of the area inland of the levee and paleo channel appears flat, water evidently flows generally northwest to west along a series of shallow depressions which are hardly perceptible on the ground until they develop into distinct, incised creek lines near the western boundary. The creek margins (like the riverine slope of the levee to their north) have been significantly eroded (see below) at some time in the past but are redeveloping vegetative cover. Beyond the western boundary of the project area, these creeks join Valentine Creek, which empties into the Ord.

### **Soils**

The distribution of the principal soil types are closely related to the surface hydrology and are described in relation to the three hydrological areas defined above. References to Type numbers refer to the unpublished Department of Agriculture report. Types iv and v do not occur in the project area.

1. The levee is capped by fine, pale loams (probably similar to Type iii) that blend into red soils inland (see 3, below). On the riverine side, the slope has been significantly eroded exposing red soils. Although these scars are evident on the 1999 aerial photography, there has been substantial recovery of vegetation cover in recent years (Chris Done, personal observation)
2. The seasonal swamp and the adjacent paleo-channel contain heavy grey clay soils (Type vi).
3. Most of the area is mantled by a friable red soil complex (Type ii) but water-worn pebbles on eroded surfaces and in a creek line on the western boundary (only one was examined) indicate that underlying deposits contain some coarser materials. The shallow depressions that provide drainage across the red soils, , are occupied by heavy, cracking, grey clays (type i). They are delineated on the land-use capability map although they are not distinguished in the accompanying key.

### **Vegetation sampling**

Vegetation and principal floristic components of the project area were studied by sampling quadrats and by three supplementary methods.

1. Quadrats. Floristic composition of the three hydrological/soil units was examined by listing all species present in seven 50x50 m quadrats. The quadrat sites were selected to represent friable red soils (2), clay soils in drainage depressions traversing the former (2), levee loams (2) and an incised creek line (1) (Table 1 and Figure 1). Exotic species have been flagged with an asterisk (\*).

### **Table 1.**

Location and representation of the seven 50x50 m quadrats used to determine the characteristic flora of the project area.

Site	Soil type	Topography	AMG:
BS 1	cracking grey clay ("black soils")	narrower (almost imperceptible) drainage line in a flat landscape	465583 8259782
BS 2	cracking grey clay ("black soils")	broader, (almost imperceptible) drainage line/inundating hollows	465633 8260165
RS 1	friable red soil	almost imperceptibly higher ground in a flat landscape	465024 8260687
RS 2	friable red soil	almost imperceptibly higher ground in a flat landscape	465869 8259774
LL 1	fine, pale loam	flat levee crest	465952 8260659
LL 2	fine, pale loam	flat levee crest	adjacent to LL 1
CK 1	red soils with coarser material including pebbles	incised creek bed and adjacent moderate valley slopes	465224 8260830

2. Aerial photography. The distribution pattern and density of trees was ascertained from examination of the aerial photograph.

3. Opportunistic observations. After sampling the quadrats, all slashed fence lines were driven and any species not represented in any quadrat were noted. (Most grasses and smaller herbs would have been overlooked).

4. The seasonal swamp. Plants seen during a cursory visit to the seasonal swamp were noted. (We were advised that the vegetation of the seasonal swamp is being assessed as part of a separate study by environmental scientist, Mr. Lindsay Stephens from Landform Research).

## Results

### Vegetation

At this time of year many grasses and herbs have not yet flowered. Although most species were identifiable, no doubt others were overlooked. For the most part the project area is a savanna grassland consisting of a very open woodland over perennial grasses. Tree density appears greater on the red soils and those parts of the levee that had not been severely eroded. Canopy density was considerably greater about the creek line near the western boundary and around the margins of the seasonal swamp and other depressions on the paleo-channel. Basic descriptions of the vegetation at each quadrat site is shown in Table 2.

**Table 2.**

Basic descriptions of the vegetation at of each quadrat.

Site	Vegetation
BS 1	Very open low woodland of (mostly sapling) <i>Bauhinia cunninghamii</i> (on clays) and <i>Eucalyptus tectifica</i> (on marginal red soils) over perennial grasses, <i>Themeda</i> and <i>Heteropogon</i> respectively.
BS 2	Very open low woodland of <i>Bauhinia cunninghamii</i> over perennial grasses, <i>Dichanthium</i> and <i>Chrysopogon</i> . Some depressions are inundated in summer.
RS 1	Very open low woodland of <i>Eucalyptus tectifica</i> and <i>Bauhinia cunninghamii</i> over sparse shrubs, perennial grasses including <i>Sehima</i> and <i>Heteropogon</i> . Some recovering erosion patches
RS 2	Very open low woodland of <i>Eucalyptus tectifica</i> , <i>Corymbia confertiflora</i>

	and <i>Adansonia gregorii</i> (Boab) over sparse shrubs perennial grass, (principally <i>Themeda</i> ) and leguminous herbs (notably <i>Christia</i> )
LL 1	Very open low woodland of <i>Eucalyptus tectifica</i> , <i>Corymbia confertiflora</i> and <i>Brachychiton diversifolius</i> over dense patches of woody herbs (* <i>Hyptis</i> ), vines (* <i>Passiflora</i> ) and perennial grasses principally <i>Heteropogon</i> )
LL 2	Very open low woodland of <i>Eucalyptus tectifica</i> , <i>Corymbia confertiflora</i> and <i>Brachychiton diversifolius</i> over dense patches of woody herbs (* <i>Hyptis</i> ), vines (* <i>Passiflora</i> ) and perennial grasses principally <i>Heteropogon</i> )
CK 1	Open tall woodland of <i>Eucalyptus tectifica</i> and <i>Corymbia confertiflora</i> over mid-dense, diverse low woodland and tall shrubland over perennial grass (principally <i>Heteropogon</i> ). Sparse herbs in the creek bed.

### Floristic composition.

Table 3 summarises the floristic composition of the area

#### Table 3.

The total numbers native and exotic ferns, monocotyledons (grasses etc) and dicotyledons (broad-leafed plants) recorded in the project area.

	Ferns	Monocots	Dicots	All Species
native	1 (100%)	21 (84%)	93 (83%)	115 (83%)
exotic	0 (0%)	4 (16%)	19 (17%)	23 (17%)
Total	1	25	112	138

A More detailed summary is provided in Appendix 1 while full species lists are provided in Appendices 2 and 3.

### Discussion

Generally, the vegetation and floristic composition of the area are common on this section of the lower Ord River flood plain but in this preliminary assessment community associations have not been compared with those in other areas. Several features are worth comment.

**Condition.** The generally good condition of the area was indicated by good cover of perennial grasses, fairly high species diversity and lack of the signs of multiple, severe fires in recent years. Areas with significant slope appear to have been severely eroded in the past but those we saw have considerably improved vegetation cover, albeit with an exotic component.

**Diversity.** The species diversity of the project area is relatively high, reflecting the range of soil types and variety in surface hydrology. Some species that tolerate a wide range of environmental conditions occurred on most soil types in the project area, but many species showed clear preferences (Appendices 2 and 3). In this preliminary study we have not analysed community composition in relation to soils or other factors but some examples are clear to the casual observers. Eg. Eucalypts were generally absent from the black soils where the characteristic tree was *Bauhinia* (*Bauhinia cunninghamii*). Darwin Box (*Eucalyptus tectifica*) typified the red soils while Coolabahs (*E. microtheca*) River Gums (*E. camaldulensis*) and Ghost Gums (*Corymbia bella*) only grew round the seasonal swamp..

It is worth noting that a large number of species were only recorded in two of the most restricted habitats, the seasonal swamp environs and the incised creek (site CK 1). However, all these species are wide spread elsewhere in the region.

**Weeds.** Exotic plants (weeds) occurred throughout the area but did not dominate most sites. Areas where weeds did dominate the non-tree vegetation included the seasonal swamp (where there was a well developed weed complex) and loam soils of the levee where Hyptis (*\*Hyptis suaveolens*) and Stinking passionfruit (*\*Passiflora foetida*) were the most vigorous invaders. Levee soils adjacent to Weero Road were also heavily weed infested. Caltrop (*\*Calotropis procera*) being the most obvious because of its size and distinctive colour, but there were many other species, some of which were not encountered elsewhere. Some exotic species (eg. Stylo, *\*Stylosanthes hamata*) have probably been introduced for pasture improvement. Stylo was dominant species on a regenerating scald near the CK 1 site where it performed a useful function. Buffel Grass (*\*Cenchrus ciliaris*) was seldom encountered.

Two exotic tree species were widespread. At present they appear sparse but one, Neem (*\*Azarichta indica*) occurred in 4 of 7 quadrats and at the seasonal swamp suggesting that it is well established. The fact that most quadrat records were of saplings growing under native tree species (seed is spread by bowerbirds) may explain their relative "invisibility". The other, Raintree (*\*Albizia lebbek*<sup>8</sup>) was recorded only once in a quadrat (its seed are not bird dispersed and it tends to grow in more open sites where it is readily visible). Nevertheless, like Neem, it has serious weed tendencies and is spreading rapidly in the Kununurra area. Other potentially serious tall shrub/small tree weed species that were present included Leucaena (*\*Leucaena leucocephala*) and Parkinsonia (*\*Parkinsonia aculeata*). Leucaena was noted at only one site (off the track to sites LL 1 & 2) while the latter was rare except around the seasonal swamp where it was abundant.

### **Rare species.**

No species listed on the State's threatened or priority lists were recorded. However, the presence of *Typhonium* sp. (Araceae - the Arum Lily family) is interesting and may be significant. Three species have been recorded from Western Australia, all in the North Kimberley. This is the first record of the genus in the East Kimberley. The species has not been determined but specimen details have been forwarded to Alistair Hay (Royal Botanic Gardens, Sydney) who is revising the family for a definitive treatment in a forth-coming volume of Flora of Australia.

Two fruiting specimens with markedly different leaf shapes were collected (ANS 1468/9; Figures 2, 3a and 3b) at Site BS 2 where they were located in an area that would be inundated for periods in summer, most vegetation being confined to the tops of mounds.

Before the significance of this record can be ascertained the plant's identity and status in the Northern Territory need to be determined. Further field work to determine its abundance at the site and occurrence elsewhere in the Kununurra area may be warranted. If so, these actions should be undertaken by CALM.

### **Conclusion**

For the most part, this area supports a flora that is diverse but well represented in the region. The presence of one species, *Typhonium* sp. is significant as the first Western Australian record for genus outside the North Kimberley. Determining its identity and status in the

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<sup>8</sup> This species occurs naturally elsewhere in the Kimberley but the "weedy" form is introduced to Australia



Northern Territory will be the first step in ascertaining the significance of this record. The seasonal swamp is interesting for two reasons. Firstly, its vegetation (although heavily weed infested) is distinctly different from the Ord's riparian vegetation because it is seasonally inundated and not exposed to scouring effects of river flow events. Secondly, its geomorphological origin as a paleo-channel scoured across a point bar is unique on this section of the lower Ord.

**Appendix 1.**

The total numbers native and exotic ferns, monocotyledons (grasses etc) and dicotyledons (broad-leafed plants) recorded in the project area.

		BS 1	BS 2	RS 1	RS 2	LL 2	LL 1	CK 1	Seasonal Swamp	Other
<b>FERNS</b>	<b>native</b>	0	2	0	0	0	0	0	0	0
	<b>exotic</b>	0	0	0	0	0	0	0	0	0
	<b>Total</b>	0	2	0	0	0	0	0	0	0
	<b>% exotic</b>	0	0	0	0	0	0	0	0	0
<b>MONOCOTS</b>	<b>native</b>	8	10	10	4	6	3	5	5	0
	<b>exotic</b>	1	1	2	0	1	0	1	4	0
	<b>Total</b>	9	11	12	4	7	3	6	9	0
	<b>% exotic</b>	11	9	17	0	14	0	17	44	0
<b>DICOTS</b>	<b>native</b>	32	17	34	35	15	26	43	7	8
	<b>exotic</b>	6	4	9	3	6	8	7	12	3
	<b>Total</b>	38	21	43	38	21	34	50	19	11
	<b>% exotic</b>	16	19	21	8	29	24	14	63	27
<b>TOTAL</b>	<b>native</b>	40	29	44	39	21	29	48	12	8
	<b>exotic</b>	7	5	11	3	7	8	8	16	3
	<b>Total</b>	47	34	55	42	28	37	56	28	11
	<b>% exotic</b>	15	15	20	7	25	22	14	57	27

**BS 1** = Black Soil Site 1

**BS 2** = Black Soil Site 2

**RS 1** = Red soil Site 1

**RS 2** = Red soil Site 2

**LL 1** = Levee Loam Site 1

**LL 2** = Levee Loam Site 2

**CK 1** = Creek Line Site 1

**seasonal swamp** Not systematically sampled.

**Other** Species noted within the study area but not recorded on any plot or at the seasonal swamp

**APPENDIX 2. MONOCOTYLEDONS (Grasses etc) and FERNS**

(BS 1 includes 2 spp on adjacent track that were not in the plot)

Family	Species	BS 1	BS 2	RS 1	RS 2	LL 1	LL 2	CK 1	Seasonal swamp	Other	TOTAL BS1-CK1
<b>FERNS</b>											
Marseliaceae	Marselia sp		1								1
Ophioglossaceae	Ophioglossum costatum R.Br.		1								
<b>TOTAL</b>		0	2	0	0	0	0	0	0	0	1

**MONOCOTS**

Araceae	Typhonium sp1		1								1
Commelinaceae	Commelina ciliata Stanley	1									1
Commelinaceae	Commelina ensifolia R. Br.	1	1	1			1	1			5
Commelinaceae	Murdannia graminea (R.Br.) G. Brueckner	1	1	1	1	1	1				6
<i>Cyperaceae</i>	<i>Cyperus (white flower ANS 1470)</i>		1								
Haemodoraceae	Haemodorum ensifolium F.Muell.					1					1
Orchidaceae	Cymbidium canaliculatum R.Br.								1		0
Poaceae	*Cenchrus ciliaris L.			1					1		1
Poaceae	*Cynodon dactylon (L.) Pers.								1		0
Poaceae	*Echinochloa colona (L.) Link	1	1						1		2
Poaceae	*Urochloa mosambicensis (Hackel) Dandy			1		1		1	1		3
Poaceae	Aristida holathera Domin			1							1
Poaceae	Chrysopogon fallax S.T. Blake	1	1	1				1			4
Poaceae	Dichanthium fecundum S.T. Blake	1	1								2
Poaceae	Digitaria ciliaris (Retz.) Koeler			1		1			1		2
Poaceae	Digitaria ctenantha		1								1
Poaceae	Eriachne obtusa R. Br.		1	1	1	1					4
Poaceae	Heteropogon contortus (L.) P. Beauv. Ex Roemer & Schultes	1		1	1	1	1	1			6
Poaceae	Panicum decompositum R. Br.		1								1
Poaceae	Pseudoraphis spinescens(R.Br.) Vick.								1		0
Poaceae	Sehima nervosum (Rottler) Stapf.			1				1			2
Poaceae	Sorghum plumosum (R. Br.)P. Beauv.	1		1							2
Poaceae	Sorghum stipodeum (Ewart & J.White)C.Gardner & C.E.Hubb.		1								1
Poaceae	Themeda triandra Forssk.	1		1	1	1		1			5
Poaceae	Urochloa piligera (F. Muell. ex Benth.) R. Webster								1		0
Poaceae	Urochloa pubigera (Roem. & Schult.) R.D.Webster								1		0
<b>TOTAL</b>		9	11	12	4	7	3	6	9	0	

*italics* = spp added subsequent to the report presentation to John K.

**APPENDIX 3. DICOTYLEDONS**

Family	Species	BS 1	BS 2	RS 1	RS 2	LL 2	LL 1	CK 1	Seasonal swamp	Other	TOTAL BS1-CK1
Amaranthaceae	<i>Achyranthes aspera</i> L.	1		1				1	1		3
Amaranthaceae	<i>Gomphrena canescens</i> R. Br.							1			1
Amaranthaceae	<i>Ptilotus fusiformis</i> (R.Br.)Steud.				1			1			2
Anacardiaceae	<i>Buchanania obovata</i> Engl.							1			1
Apocynaceae	<i>Carissa lanceolata</i> R.Br.	1	1	1	1	1	1	1			7
Apocynaceae	<i>Wrightia saligna</i> (R.Br.) F. Muell. ex Benth.							1			1
Asclepiadaceae	* <i>Calotropis procera</i> (Aiton) W.T. Aiton		1	1	1	1	1	1			6
Asclepiadaceae	<i>Cynanchum</i> spp							1			1
Asclepiadaceae	<i>Gymnanthera oblonga</i> (Burm.f.)P.S.Green				1						1
Asteraceae	* <i>Bidens bipinatifida</i> L.			1			1		1		2
Asteraceae	* <i>Emilia sonchifolia</i> (L.) Wight	1		1			1				3
Asteraceae	* <i>Tridax procumbens</i> L.	1	1	1	1	1	1	1	1		7
Asteraceae	<i>Pterocaulon serrulatum</i> (Montr.) Guillumin		1								1
Asteraceae	<i>Pterocaulon sphacelatum</i> (Labill.) F. Muell.	1	1	1	1			1			5
Asteraceae	<i>Pterocaulon verbascifolium</i> (Benth.)F.Muell.				1						1
Bignoniaceae	<i>Dolichandrone heterophylla</i> (R. Br.) F. Muell.	1				1		1			3
Bombacaceae	<i>Adansonia gregorii</i> F. Muell.				1						1
Boraginaceae	<i>Ehretia saligna</i> R.Br.						1	1			2
Boraginaceae	<i>Heliotropium</i> spp	1						1			2
Caesalpiniaceae	* <i>Parkinsonia aculeata</i> L.								1	1	0
Caesalpiniaceae	* <i>Senna occidentalis</i> (L.) Link						1				1
Caesalpiniaceae	<i>Bauhinia cunninghamii</i> (Benth.)Benth.	1	1	1		1	1	1			6
Caesalpiniaceae	<i>Senna venusta</i> (F. Muell.) B. Randell									1	0
Capparaceae	<i>Cleome viscosa</i> L.	1									1
Cochlospermaceae	<i>Cochlospermum fraseri</i> Planch.			1	1		1	1			4
Combretaceae	<i>Terminalia canescens</i> (DC.)Radlk. in T.Durand									1	0
Convolvulaceae	<i>Bonamia media</i> (R.Br.)Hallier	1	1	1			1	1			5
Convolvulaceae	<i>Ipomoea diversifolia</i> R.Br.	1		1							2
Convolvulaceae	<i>Ipomoea eriocarpa</i> R.Br.				1						1
Convolvulaceae	<i>Polymeria</i> sp.A Kimberley Flora(T.E.H.Aplin et al.418)	1		1							2
Curcubitaceae	<i>Cucumis melo</i> L.	1	1	1							3
Euphorbiaceae	* <i>Euphorbia heterophylla</i> L.									1	0

Euphorbiaceae	*Euphorbia hirta L.								1		0
Euphorbiaceae	Euphorbia coghlanii Bailey	1	1	1	1						4
Euphorbiaceae	Flueggea virosa (Roxb. Ex Willd.) Voigt			1			1	1			3
Euphorbiaceae	Phyllanthus maderaspatensis L.	1						1			2
Euphorbiaceae	Phyllanthus virgatus Poir.						1	1			2
Euphorbiaceae	Phyllanthus <i>trachygyn</i> e				1						1
Euphorbiaceae	Sauropus spp		1		1						2
Goodeniaceae	Goodenia sepalosa Benth.						1				1
Goodeniaceae	Goodenia <i>af. malvina</i> (ANS 1463)	1	1								2
Goodeniaceae	Goodenia <i>af lamprosperma</i> (ANS 1464)	1									1
Lamiaceae	Hyptis suaveolens (L.) Poit.			1		1	1	1	1		4
Lauraceae	Cassytha capillaris Meisn. in A.DC.									1	0
Lecythidaceae	Planchonia careya (F.Muell.)Knuth in Engl.							1			1
Loranthaceae	Amyema sanguinea (F. Muell.) Danser							1	1		1
Malvaceae	*Sida acuta Burm.f.			1					1		1
Malvaceae	Abutilon andrewsianum W. Fitzg.			1	1						2
Malvaceae	Gossypium australe F.Muell.				1						1
Malvaceae	Hibiscus meraukensis Hoichr.	1		1							2
Malvaceae	Hibiscus pentaphyllus F. Muell.				1	1	1				3
Meliaceae	*Azarichta indica Juss			1		1	1	1	1		4
Menispermaceae	Tinospora smilacina Benth.	1		1	1		1				4
Mimosaceae	*Acacia farnesiana (L.) Willd.	1				1	1	1	1		4
Mimosaceae	*Albizia lebbeck (L.) Benth.		1								1
Mimosaceae	*Leucaena leucocephala (Loam.) De Wit									1	0
Mimosaceae	Acacia holoserecia Cunn. ex Don							1			1
Moraceae	Ficus opposita Miq.	1	1	1	1	1	1	1			7
Myrtaceae	Corymbia bella K.D.Hill & L.A.S.Johnson								1		0
Myrtaceae	Corymbia confertiflora (F.Muell.)K.D.Hill & L.A.S.Johnson	1			1	1	1	1			5
Myrtaceae	Corymbia polycarpa (F.Muell.)K.D.Hill & L.A.S.Johnson								1		0
Myrtaceae	Eucalyptus camaldulensis Dehnh.								1		0
Myrtaceae	Eucalyptus microtheca F. Muell.								1		0
Myrtaceae	Eucalyptus pruinosa Schauer in Walp.									1	0
Myrtaceae	Eucalyptus tectifera F.Muell.	1	1	1	1	1	1	1			7
Myrtaceae	Eucalyptus terminalis (F.Muell.)K.D.Hill & L.A.S.Johnson			1							1
Myrtaceae	Melaleuca minutifolia F.Muell.			1							1
Myrtaceae	Melaleuca nervosa (Lindl.)Cheel							1			1
Oleaceae	Jasminum didymum G.Forst.							1			1
Oleaceae	Jasminum molle R.Br.							1			1

Papilionaceae	*Clitoria ternatea L.				1				1	1		2
Papilionaceae	*Macropetalum atropurpureum (DC.) Urban						1					1
Papilionaceae	*Stylosanthes hamata (L.) Taub.	1		1					1	1		3
Papilionaceae	Aeschynomene indica L.	1	1							1		2
Papilionaceae	Alysicarpus spp	1							1			2
Papilionaceae	Christia australasica (Schindl.)Meeuwen	1		1	1				1			4
Papilionaceae	Crotalaria medicaginea Lam.							1				1
Papilionaceae	Crotalaria montana Roth.	1	1	1	1							4
Papilionaceae	Crotalaria novae-hollandiae DC.						1	1				2
Papilionaceae	Flemingia spp (sterile)			1	1							2
Papilionaceae	Indigofera colutea Burm.f.) Merr.				1							1
Papilionaceae	Neptunia dimorphantha Domin	1		1	1							3
Papilionaceae	Nomismia rhomboidea (Benth.)Pedley			1								1
Papilionaceae	Rhynchosia minima (L.)DC.	1	1	1				1	1			5
Papilionaceae	Tephrosia spp								1			1
Papilionaceae	Uraria cylindracea Benth.	1			1			1	1			4
Papilionaceae	Vigna lanceolata Benth.	1	1	1	1			1	1			6
Papilionaceae	Zornia prostrata S.T. Reynolds and A.E. Holland				1							1
Passifloraceae	*Passiflora foetida L.	1	1	1	1	1	1	1	1	1		7
Pedaliaceae	Josephinia eugeniae F.Muell.										1	0
Portulacaceae	Portulaca filifolia F. Muell.								1			1
Proteaceae	Grevillea dimidiata F.Muell.			1								1
Proteaceae	Grevillea erythroclada W.Fitzg.										1	0
Proteaceae	Hakea arborescens R.Br.			1		1	1	1				4
Rubiaceae	Gardenia spp				1	1			1			3
Rubiaceae	Psydrax pendulina S.T.Reynolds ms	1										1
Sapindaceae	Dodonaea physocarpa F.Muell.			1								1
Scrophulariaceae	Stemodia spp		1									1
Solanaceae	Physalis minima L.										1	0
Solanaceae	Solanum lucani F. Muell.										1	0
Sterculiaceae	*Melochia pyramidata L.	1										1
Sterculiaceae	Brachychiton diversifolius R. Br.				1	1	1	1				4
Sterculiaceae	Brachychiton tuberculatus (W.Fitzg.)Guymer				1		1					2
Sterculiaceae	Corchorus sidoides F.Muell.			1	1		1	1				4
Sterculiaceae	Waltheria indica L.			1	1	1		1				4
Tiliaceae	*Corchorus aestuans L. ?									1		0
Tiliaceae	Grewia retusifolia Kurz	1	1	1	1	1	1	1				7
Verbenaceae	Clerodendrum floribundum R. Br.						1					1
Violaceae	Hybanthus aurantiacus (Benth.)F.Muell.								1			1

Violaceae	Hybanthus ennaspermus (L.) F. Muell	1		1	1	1		1			5
Vitaceae	Cayretia trifolia (L.) Domin	1		1	1		1	1			5
Zygophyllaceae	Tribulopsis pentandra R.Br. in Sturt				1						1
<b>TOTAL</b>		38	21	43	38	21	34	50	19	11	

**SUMMARY**

93 native species

19 exotic species

112 species

BS 1 includes 8 spp on adjacent track that were not in the plot

## Appendix 2.

### **Typhonium sp. (Araceae) on King Location 599. Supplement to Kirby Report**

#### ***Collection of material.***

While undertaking a preliminary flora survey on part of King Location 559 in late December 2001 (Start and Done 2002) we collected two fruiting specimens (ANS 1468 & ANS 1469, Figs 2, 3a & 3b in Start and Done 2002) of *Typhonium* sp (Araceae ~ Arum lily family). They differed substantially in leaf shape, but had (at least superficially) similar fruits.

Both specimens were sent to Dr Alistair Hay, Royal Botanic Gardens, Sydney<sup>9</sup>. Dr Hay, who is the world expert on Australasian species of this group, is currently revising it for a forthcoming volume of *Flora of Australia* (Hay in prep.). His initial impression, based on the different leaf forms, was that the collections represented two species both 'new to science'. However, it is possible that one dimorphic species is involved. If so, and given such morphological variation in leaf form, the specimens may represent new forms of a previously described taxon. (Hay, personal communication to ANS)

At Dr. Hay's request, we returned to the site (BS2) to collect live material to be grown in the Royal Botanic Gardens. We failed to locate additional plants in the original survey quadrat at BS2 (on the north side of the fence line) but did locate about ten immature, plants, all with a leaf form similar to ANS 1468, on the south side of the fence. As with the original collections, they were growing in water-logged black soil on the margins of puddles. Live plants were sent to Dr Hay.

We searched some other black soil sites (not on King Location 559) for *Typhonium*s, without success. However, our efforts were far short of a comprehensive or systematic survey.

#### ***Status of Western Australian Typhonium species.***

There are seventeen species of *Typhonium* in Australia (Hay *et al.* 1999) with three named species known from Western Australia (Florabase). They are:

- *Typhonium liliifolium* F.Muell. North Kimberley (Mitchell Plateau and Kalumburu, 5 specimens in the Western Australian Herbarium)
- *Typhonium nudibaccatum* A.Hay. North Kimberley (Mitchell Plateau, 7 specimens in the Western Australian Herbarium)
- *Typhonium peltandroides* A.Hay, M.D.Barrett & R.L.Barrett. North Kimberley (Beverley Springs Station, 2 specimens from one location, both in the Western Australian Herbarium.)

The King Location collection is the first Western Australian record of any *Typhonium* species outside the North Kimberley biogeographic region. However, *Typhonium*s are poorly known. Two of the species recorded from Western Australia have been named in the past ten years (1993, 1999). They are tuberous perennial plants that, in this region, are only apparent above ground in the wet season. Thus, they may be more diverse and more

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<sup>9</sup> A duplicate of ANS 1468 is lodged in the Kimberley Regional Herbarium, Kununurra and a leaf of ANS 1467 is held by AN Start in field notebook 12: p109.)



widespread than current records indicate. However, until that is known to be so, their status should be treated conservatively. The conservation status of *T. peltandroides* is Priority 1<sup>10</sup>. The others are not listed as Declared Rare or Priority species.

Flowering material is needed for a conclusive determination of the taxonomic status of the King Location specimens. This may be obtainable from the live material in the Royal Botanic Gardens, Sydney, but if not, it will need to be obtained from the collection site. If it is an undescribed taxon, it is likely to be placed on the Priority One list.

#### References

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Start A.N and Done C. 2002. "Preliminary assessment of the flora and vegetation on parts of King Location 559." Unpublished report to Kirby Rural Developments. Department of Conservation and Land Management Kununurra.

A.N. Start

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<sup>10</sup> Priority 1. Poorly known Taxa. Taxa that are known from few (generally <5) collections which are under threat, either due to small population size, or being on lands under immediate threat e.g. ....Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey (Anon. 1999)