Weed Monitoring Guidelines

9 March 2011

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			Originator	Checked	Approved
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1. INTRODUCTION

The guidelines incorporate best practice methods currently used in weed management in arid areas and are designed to address the goals and objectives of the Fortescue Metals Group (Fortescue) in relation to weed management.

In addition, the implementation of the monitoring guidelines will address the conditions outlined in the Minister for Environment Statements 690, 707 and 721 that require commitments for weed management in the Fortescue operations area.

By adopting these guidelines a consistent monitoring approach can be applied across all of the Fortescue Operations.

These guidelines describe the:

- Goals and objectives of the weed monitoring program;
- Rationale underpinning the monitoring design;
- Approach to data management, reporting and review.

1.1 OBJECTIVES

The objectives of these Weed Monitoring Guidelines are to enable Fortescue project sites to develop weed monitoring programs which:

1. Develop and maintain an understanding of existing weed populations in Fortescue exploration, construction and operational areas; and

2. Assess the effectiveness of weed management techniques intended to prevent the introduction of new weed populations and the spread of existing weed populations in Fortescue exploration, construction and operational areas.

1.2 LIMITATIONS

Although the methodologies presented in this document are the result of a review of previous work in the area, they will continue to evolve. Fortescue will incorporate improvements to the methods presented as further knowledge is gained and these methods are used more extensively.

The limitations of monitoring methods must be acknowledged when assessing the effectiveness of weed management techniques across Fortescue project areas.

2. MONITORING

2.1 MONITORING SITE SELECTION

The number of sites to be selected for monitoring depends on the number and type of weed communities present on site. Where the number of communities is relatively small, all sites could potentially be monitored. Where large numbers of communities are present, representative sites should be selected.

Before selecting a site for monitoring, the following maps and data should be reviewed:

- Infestation maps: these may be simple GPS points on a topographic map;
- Aerial maps detailing roadways, waterways, wells or bores;
- Initial inspection data (this could be first hand information stored in a diary or from a completed monitoring form from the initial inspection);
- Relevant photos of the weed site.

After reviewing all of the available data, the following rules can be used to select the number and location of monitoring sites:

1. Resources available
2. Expertise of the people carrying out the monitoring
3. The questions you want to answer
4. The likely disturbance to those monitoring points
5. Ease of access for personnel and equipment
6. Time constraints
7. Seasonal limitations
8. Ability to replicate the site to provide valid comparisons
9. Sufficient sites to provide for a suitable control site/sites.

2.2 MONITORING SITE DESIGN

Photopoints

Photopoints are a photographic record of change occurring over time taken from the same point each time. They are a simple and effective monitoring method.

Setting up a photopoint:

- Place a permanent marker such as a stake or star-picket at the point from where you will take the photo each time.
- Take the picture with the same camera and same settings each time (rest the camera on the stake so they are taken at the same height and use distinctive objectives as focal points).
- Take photos as frequently as required to reflect changes at the site, but ensure photos are taken at the same time each year to make valid comparisons.
- Label each photo with the date, location and the reason for taking the photo (e.g. annual monitoring).

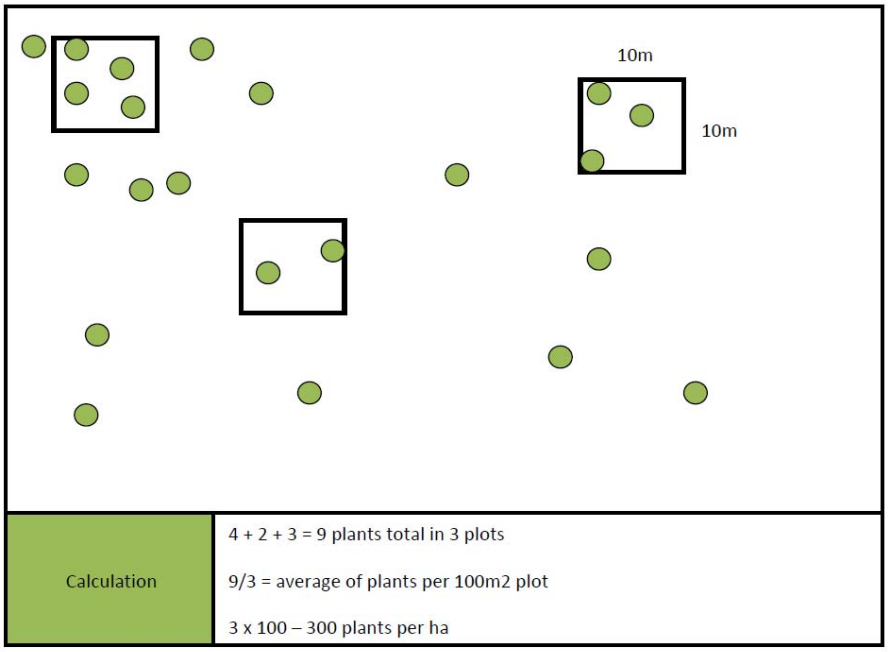
Measuring Density

Density is defined as the number of individual plants per unit area. Density is a good measure to determine the changes in a plants population before and after treatment. Measuring density by age or plant size classification will reflect the changes at those sites even further.

1) **Quadrats**

- Mark out 3 or more plots (quadrats) of 10mx10m (plots should be located randomly over the site)
- Count the number of plants within the plots (break them in to age classification if this is possible).
- Multiply the average number of plants in the plots by 100 to get the number per hectare.

Figure 1: Calculating Density Using Plot Counts



2) **Plot Transects**

Plots are often placed along sample lines called transects. Transects are commonly 100m long, and are placed 10-50m apart parallel to each other. Using multiple transects will give you results that are more representative of your entire site.

- Mark out the 100m transects keeping them parallel to one another (10m-50m apart)
- Using a 2m x 2m plot frame (easily made using some pvc pipe) place plots at intervals along the transect.
- Count the number of plants within the plot (Break them in to age classification if this is possible).
- Average the number of plants in each of the plots and convert to a density measure (i.e. individuals per square metre or individuals per hectare)

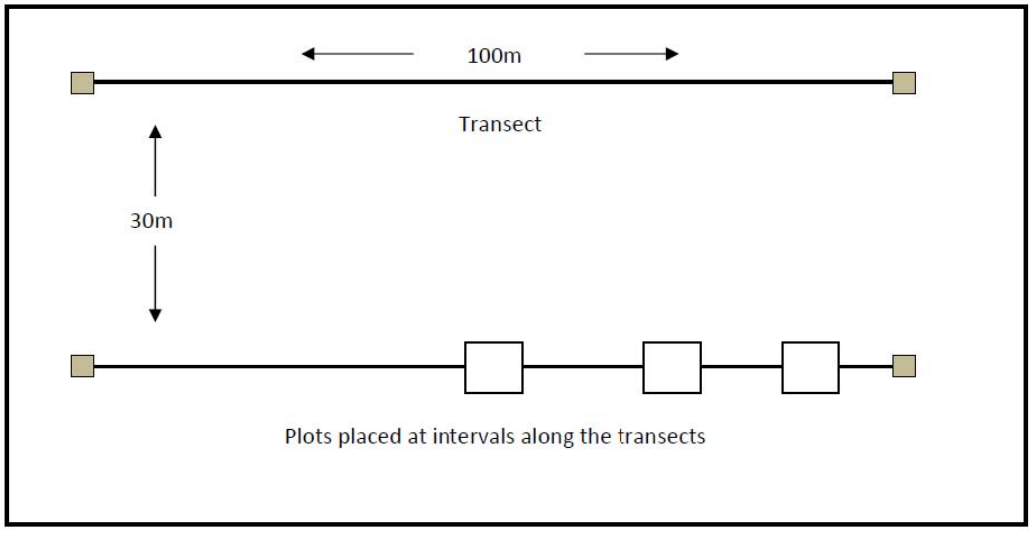


Figure 2: Calculating Density Using Plot Transects

2.3 MONITORING PARAMETERS RATIONALE

The parameters have been set to provide for simple, effective monitoring systems that are easily replicated in the field by staff with varying skill levels. The data provided by these systems will allow for simple but quantitative data that can map change in the weed populations over time.

2.4 MONITORING PARAMETERS ASSESSMENT METHODS

The assessment methods described below can be used to identify changes in weed populations:

1. Visual assessment of photographic evidence looking at % of ground cover, canopy cover or standing stem count of plants visible;

2. Statistical comparison of plant density based on plant numbers per m2 or plants per hectare;

3. Plant population composition changes (only where plots have been assessed by the number and age of the plants within the sample plot).

2.5 DATA MANAGEMENT, ANALYSIS AND INTERPRETATION

In the future, data collected from monitoring parameters described above will be used to assess the effectiveness of the weed control programs being undertaken. For this reason,

data collection storage and analysis as well as interpretation are crucial to monitoring success. In the short term, general trend lines and the data from additional research projects within Fortescue's Operations, as well as other scientific literature can be used to make better informed decisions on what ecological significance level might be for changes in monitoring parameters.

Data collection and storage

All data collected will be stored on the corporate EMS & BMS systems. All hard copy monitoring forms, herbarium samples, field diaries and spray records are to be kept by the individual mine site based departments.

2.5.1 Data analysis and interpretation

All data analysis and interpretation should be quantifiable. Refrain from making definitive statements or using words that are open to interpretation. Where populations have not been visible/recorded for a period of time, never be tempted to use the term "eradicated", instead opt for terms like "zero density" or "historic".

2.6 MONITORING FREQUENCY

Sites should be monitored as frequently as possible, especially during the growing season, but at the very least be inspected and controlled annually. For sites where specific research or trials are being conducted monitoring should be conducted on a monthly basis.

3. REPORTING

Reporting on site based activities should occur monthly with the full 12 months activities reported on in December of any given year.

Results will be summarised in the Annual Environmental Report.

4. REVIEW AND REVISION

These Monitoring Guidelines will be reviewed every two years, or when significant additional information comes to hand. Upon review, the document will be revised where appropriate and the revision status will be updated in accordance with Fortescue's document control procedures.

	ENVIRONMENT	PROCEDURE	204-00-EN-PP-0004
	Weed Control		

OVERVIEW

Weeds are usually opportunistic plant species that are not native to an area. Once introduced, they often thrive, competing with native species. Seventeen species of weeds have been recorded across Fortescue's project areas. Of these, four have been identified for control and eradication from Fortescue's project area. These species are Ruby Dock (*Acetosa vesicaia*), Kapok Grass (*Aerva javanica*), Mexican Poppy *(Argemone ochroleuca)* and Verano Stylo (*Stylosanthes hamata*). Other weed species may also require control from time to time.

The aim of this procedure is to ensure the appropriate identification and control of weed species found across Fortescue's project area.

SCOPE

This procedure is relevant to all Fortescue sites and activities, and applies to all staff and contractors.

ACCOUNTABILITIES

Head of Environment:	auditing of performance; review and revision of procedures.
Environmental Coordinator:	specialist advice; training support;
Site Environmental Officers:	implementation and monitoring.
Weed Management contractors:	implementation, as directed by Site Environmental Officers.

PROCEDURE

Training

Weed spraying is only to be undertaken by appropriately qualified and certified persons.

Planning

Prior to carrying out weed control, the following information is to be considered, and recorded on the weed spray log (attached):

- Are the climate and weather conditions appropriate? Herbicide application should not be conducted in strong winds and must not be applied during or immediately prior to rainfall.
- Are there any features adjacent to the target weeds that may be impacted? In particular, where weeds are adjacent to surface water drainage, care must be taken to ensure that herbicide does not contaminate surface water. Also, where there is significant flora in the vicinity, care must be taken to ensure that these species are not affected by the herbicide.
- Where on the site does the weed to be targeted occur (easting and northing)?
- What is the approximate size and density of the infestation?
- What is the most appropriate weed control method to apply?
- What professional advice has been sought (if necessary)?

Weed Control

Details of the weed occurrence and the proposed control method are to be reported to a supervisor prior to commencing weed control. Also, occupational health and safety hazards are to be identified, risks assessed and reported to a supervisor.

Preparation

When using chemicals it is essential that careful planning occurs and that all operations comply with the regulations for herbicide handling and application.

- Correct PPE (personal protection equipment) must be worn when handling and using chemicals.
- All chemicals by law must have a MSDS (Medical Safety Data Sheet) attached to them. This also gives information about correct mixing levels and handling procedures. DO NOT USE A CHEMICAL WITHOUT READING THE MSDS.
- Weed control methods are specific to the particular weed species which is to be targeted. The control method recommended for each weed species found across Fortescue's project areas is shown in the Weed Register. Professional advice on appropriate weed treatments should be sought as necessary.
- Treatments are to be prepared according to supervisor's instructions and manufacturer's guidelines (MSDS).

Herbicide Application

- Always follow the manufacturer's guidelines for application method and concentration.
- Always operate from downwind to upwind of weeds.
- Spray as evenly as possible.
- Do not apply a higher volume than necessary.
- Do not apply at a higher pressure than needed to obtain good coverage.
- Spray weeds at the correct size or stage of growth.
- Spray weeds when they are actively growing (weeds should not be sprayed when they are under stress).

Hand pulling weeds:

If hand pulling weeds, wear gloves as sap from some species may cause skin irritation.

Equipment Storage

- When spraying has been completed, equipment must be washed out in the correct wash down area to avoid contamination.
- All chemicals must be appropriately stored as follows:
    - Store in accordance with the MSDS for the chemical.
    - Store away from foodstuffs, seeds or fertilisers.
    - Keep herbicides in their original labelled containers.
    - Seal containers adequately and store in relatively cool conditions.

Performance Indicators

The aims of weed control activities on site are to ensure that:

- existing infestations do not increase in size; and
- there are no new infestations resulting from Fortescue's activities.

Weed Control

MONITORING

Monitoring and recording will be undertaken by Site Environmental Officers. The Spraying Log (attachment) is to be completed correctly and maintained on site.

Inspections by the Site Environmental Officer.

Review of the weed register.

ATTACHMENTS

Weed Register
This provides a picture, description, biological information and locations of the nine weeds that are found on the Fortescue tenements.

Spraying Log
Record of all plants that have been sprayed which can be used for further reference.

DEFINITIONS

The following terms are commonly used in herbicide applications and could be found on MSDS:

- Contact - kills only plant tissue to which it has been applied. Old or well established annual plants may grow back after such treatments.
- Systemic herbicide - kills a wide range of plants.
- Broad Spectrum - kills only a particular type of plant, eg grasses.
- Non-residual (knockdown) - kills existing plants but has no effect on subsequent germinates.
- Residual - remains active in soil for sometime (may kill germinating seeds (pre-emergent) and susceptible plants).
- Post-emergent - applied directly to established plants and/or soil.
- Pre-emergent - applied to the soil before the weed germinates, killing germinating seedlings (pre-emergent herbicides will also kill susceptible native seedlings).

REFERENCES

CRC Weed Management (2004) *Introductory Weed Management Manual*, Department of the Environment and Heritage

Fortescue (2006) *Pilbara Iron Ore and Infrastructure Project, Weed Hygiene and Management Plan*, E-SA-RP-0106-1145.

Weeds Australia website: www.weeds.org.au/

REVIEW

This procedure is to be reviewed annually by Fortescue Environment Department. The controlled electronic copy of this procedure will be available to all employees via the Fortescue intranet. Printed copies will remain valid for 14 days from the date of print.

Attachments

Weed Spray Log

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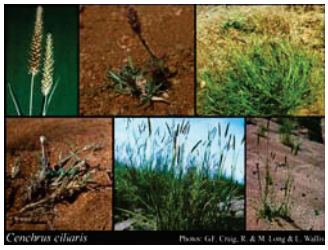
Weed Spraying Log

Date	Technician Name	Weed Species	Size/density of infestation (approx)	Easting	Northing	Weather conditions	Adjacent sensitive features	Chemical Used	Comments

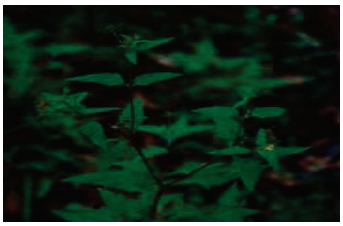
Weed Spraying Log

Date	Technician Name	Weed Species	Size/density of infestation (approx)	Easting	Northing	Weather conditions	Adjacent sensitive features	Chemical Used	Comments

Weed Spraying Log

Name	Image	Name	Image
Ruby Dock (*Acetosa vesicaria*)		Whorled Pigeon Grass (*Setaria verticillata*)	
Kapok Grass (*Aerva javanica*)		Beggar's Tick (*Bidens bipinnata*)	
Mexican Poppy (*Argemone ochroleuca*)		Pig Melon (*Citrullus colocynthis*)	
Verano Stylo (*Stylosanthes hamata*)		Buffel Grass (*Cenchrus ciliaris*)	
Spiked Malvastrum (*Malvastrum americanum*)		Feathertop Rhodes grass (*Chloris virgata*)	

Name	Image	Name	Image
Awnless Barnyard Grass (*Echinochloa colona*)		Native Thornapple (*Datura leichhardtii*)	

Name	Image	Name	Image
Indian weed (*Sigesbeckia orientalis*)		Black Berry Nightshade (*Solanum nigrum*)	
Cobblers Peg (*Bidens pilosa*)		Birdwood grass (*Cenchrus setigerus*)	
Red Natal (*melinis repens*)		Date Palm (*Phoenix dactylifera*)	
Mesquite (*Prosopis spp*)		Parkinsonia (*Parkinsonia aculeata*)	

Burrgrass *(Cenchrus echinatus)*			

Note: Those weeds bordered in red are to be targeted for control and/or eradication

Ruby Dock (Acetosa vesicaria)

Description

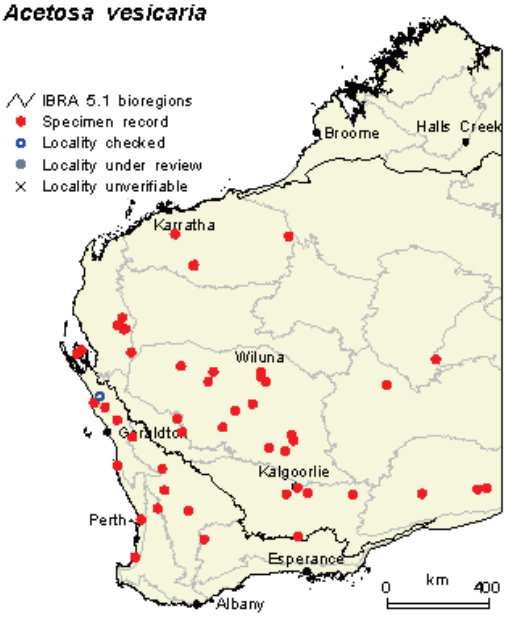
An erect, stout, fleshy, hollow-stemmed annual herb. Between 0.2 - 1 m high with red/pink flowers July – September. Found in sandy alluvial soils along roadsides and disturbed areas.

Acetosa vesicaria

Acetosa vesicaria

Distribution

The regional distribution of the species is shown opposite. Distribution across Fortescue's project area includes 1 at Christmas Creek and 3 along the Rail Corridor (See Figure 1).



Map by Paul Gioia, WA Herbarium. Current at April 13, 2006

History/Biological Info

The species was historically used for minesite rehabilitation. It is an extremely invasive weed which can spread both seed and vegetation material.

Comments / Control methods

This species is a **high priority** for eradication and subsequent control.

Manual removal (i.e. hand pulling) can be used for small stands or individuals. Recommended chemical control is low concentrations (20mL in 10L of water plus 0.25% wetting agent) of hormone based herbicides, such as 2,4-D amine, or Glyphosate when actively growing.

The species distribution is to be monitored, and the timing and type of control exercises to be recorded in the attached Weed Spraying Log.

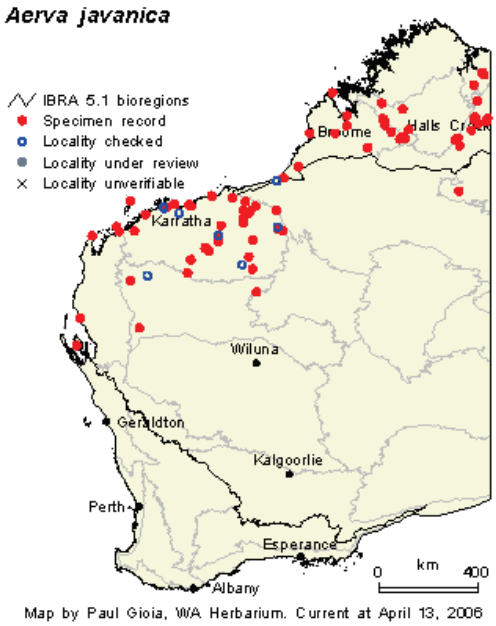
Kapok Grass (Aerva javanica)

Description

An erect, much-branched perennial herb. Between 0.4 - 1.4 m high with white flowers January-October. Found in sandy soils.

Distribution

Regional distribution of the species is shown opposite. Distribution across Fortescue's project area includes 2 at Christmas Creek, and 7 along the Rail Corridor (See Figure 2)



History/Biology Info

Found in heavily grazed creek lines with buffel grass and disturbed areas.

Comments / Control methods

This species is **Medium to high priority** for control and eradication.

Recommended control methods: solarisation, hand pulling for small plants, slash to remove flowering heads prior to seed set or foliar spray (Glyphosate 950mL in 10L) when actively growing prior to flowering.

The species distribution is to be monitored, and the timing and type of control exercises to be recorded in the attached Weed Spraying Log.

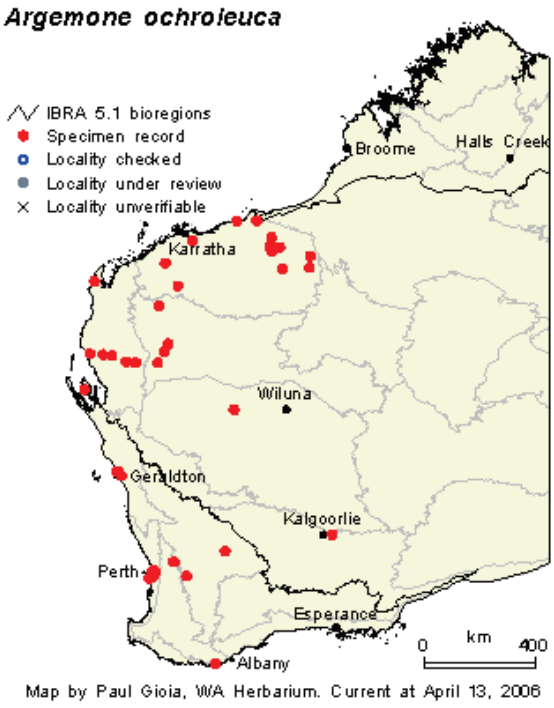
Mexican Poppy (Argemone ochroleuca)

Description

An erect, glaucous annual herb. Between 0.2 – 1 m high. Spiny with yellow latex. White/cream flowers February – March / July – November. Found in red/brown clay loam along creeks and riverbanks.

Distribution

Regional distribution of the species is shown opposite. Distribution across Fortescue's project area includes 3 along the Rail Corridor (See Figure 3).



History/Biological Info

This species is classified as a Noxious Weed in Western Australia Found in large creek beds and can form dense stands in gravelly creek beds. Is known to be very difficult to eradicate because of the long dormancy period of its seeds.

Comments / Control methods

This species is **high priority** for control, particularly where it occurs outside of creek lines.

Control of young plants can be achieved by solarisation, hand pulling and repeated slashing prior to seed set. Chemical controls include; hormone-based herbicides (2,4-D amide) for young plants in bushland and Glyphosate in non-selective areas'. The species distribution is to be monitored, and the timing and type of weed control exercises to be recorded in the attached Weed Spraying Log.

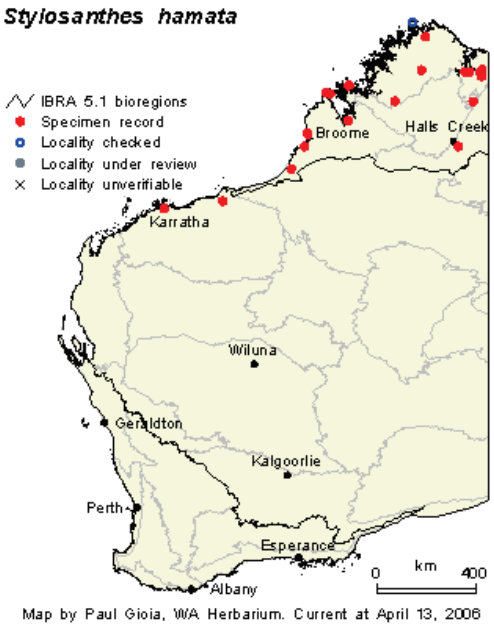
Verano Stylo or Caribbean Stylo (Stylosanthes hamata)

Description

An erect or decumbent herb or shrub. Approximately 0.7 m high with yellow flowers. Found April - December in sand loam soils, particularly along creek beds and disturbed areas.

Distribution

Regional distribution of the species is shown opposite.
One specimen has been found to the north of Fortescue's project area.



History/Biological Info

Historically introduced from South America. Seeds from May through to September.

Comments / Control methods

High priority for eradication and subsequent control especially in the Fortescue Valley.

Small plants and infestations can be controlled by hand pulling. Recommended chemical control: foliar spray with glyphosate (10mL in 1L of water).

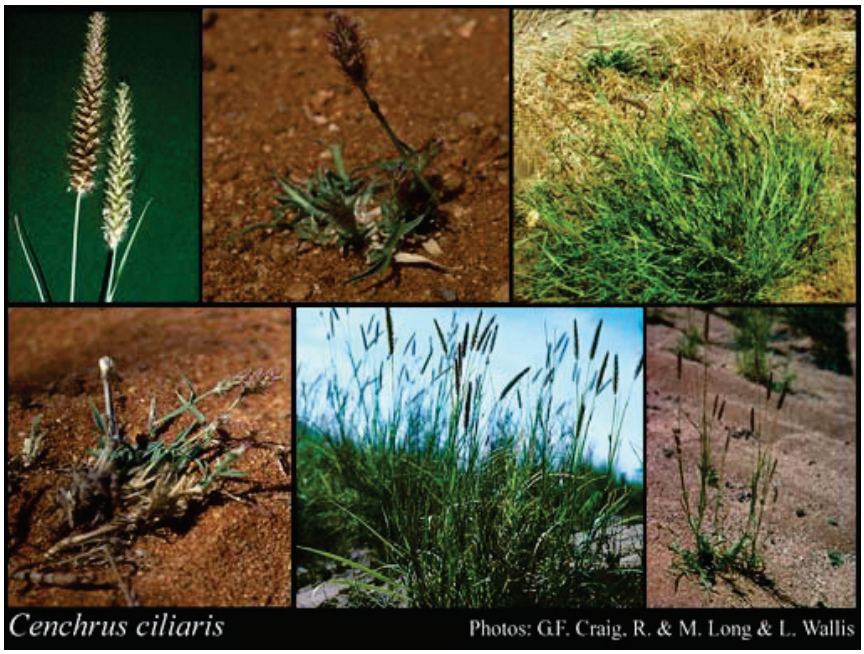
The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is

to be recorded in the attached Weed Spraying Log

Buffel Grass (Cenchrus ciliaris)

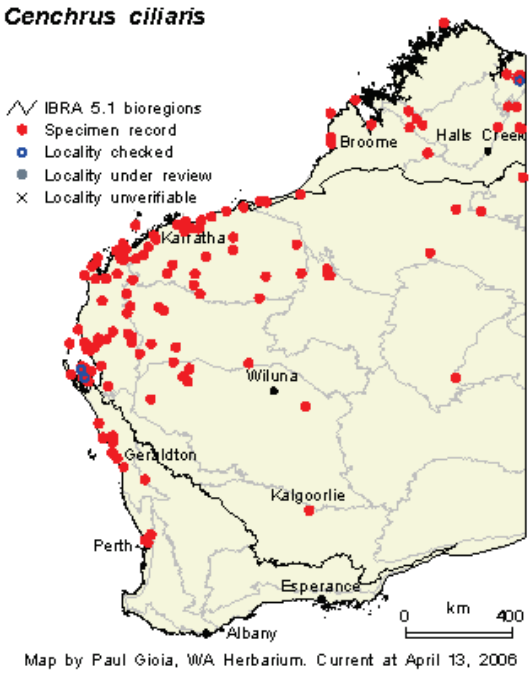
Description

Tufted or sometimes stoloniferous perennial found between February – October. Grass-like or herb approximately 0.2 - 1.5 m high, with purple flowers. Found in red or brown sand and stoney red loam.



Distribution

Regional distribution of the species is shown opposite. The species is wide spread over most of the Tenements.
Distribution across Fortescue's project area includes 6 at Christmas Ck, 6 at Cloudbreak and 41 along the Rail Corridor (See Figure 4)



Map by Paul Gioia, WA Herbarium. Current at April 13, 2006

History/Biological Info

The species was historically introduced as fodder by pastoralists. It releases chemicals which inhibit the growth of other species.

Comments / Control methods

While it is desirable to minimise spread, control and eradication are not practicable, and are not expected by DEC.

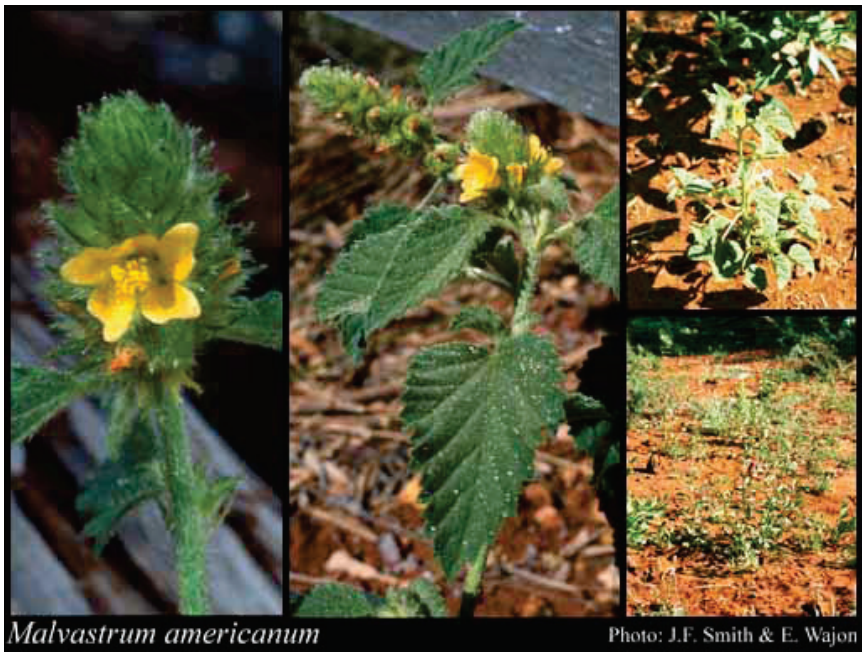
It is difficult to control using manual methods due to vigorous growth once it is established in an area. Foliar spray with Fusilade ® or Glyphosate (20mL/10L) when actively growing is recommended.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Spiked Malvastrum (Malvastrum americanum)

Description

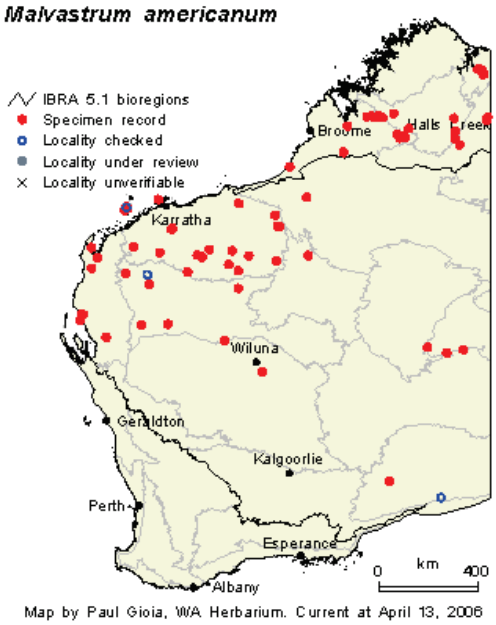
Erect perennial, herb or shrub, approximately 0.5 - 1.3 m high, yellow flower, April-June. Found in orange/red/yellow sands, black/brown clay or alluvial cracking clays along drainage lines.



Distribution

Regional distribution of the species is shown opposite.

The species is widespread along drainage lines in Fortescue's tenements. Distribution across Fortescue's project area includes 4 at Christmas Ck, 41 along the Rail Corridor and 5 at Cloud Break (See Figure 5)



History/Biological Info

Clayey plains in the Fortescue Valley Abundant in some habitats particularly in good seasons

Comments / Control methods

Control or eradication is not practicable, and is not expected by DEC.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

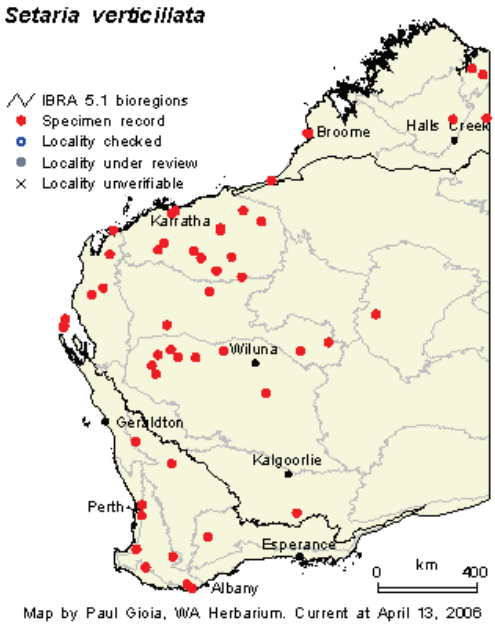
Whorled Pigeon Grass (Setaria verticillata)

Description

A loosely tufted annual, grass-like or herb. Approximately 0.1 - 1.3 m high, December- June. Found in sand, clay, or loam soils.

Distribution

Regional distribution of the species is shown opposite. The species is widespread along drainage lines in tenement areas Distribution across Fortescue's project area includes 3 at Christmas Creek, 3 at Cloudbreak and 15 along the Rail Corridor (See Figure 6).



History/Biological Info

Located in creeklines and mulga groves. Highly abundant during good rainfall seasons.

Comments / Control methods

It is desirable to minimise spread but control and eradication not practicable. No expectation for control from DEC.

The species distribution is to be monitored, and (if implemented)

the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

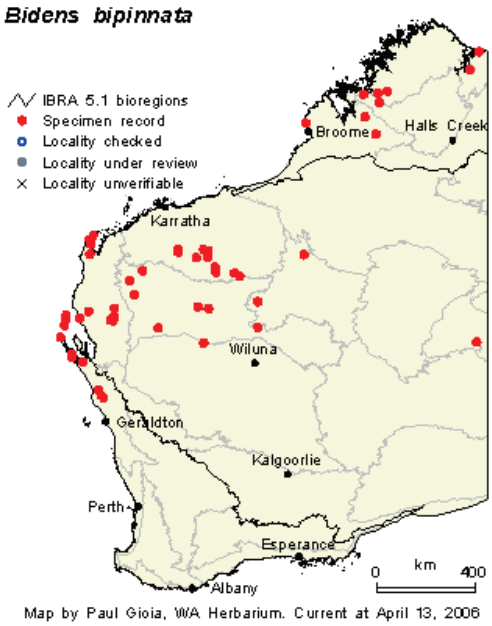
Beggar's Tick (Bidens bipinnata)

Description

An erect annual, herb, approximately 0.1 - 0.9 m high, with yellow flowers. Found March –September in alluvium clay, loam over sandstone or limestone, particularly along creeks.

Distribution

Regional distribution of the species is shown opposite. Distribution across Fortescue's project area includes 8 at Christmas Creek, 5 at Cloud Break and 33 along the Rail Corridor. (See Figure 7)



Map by Paul Gioia, WA Herbarium. Current at April 13, 2006

History/Biological Info

Can be very dense after good rains, especially in shaded areas and outcrowd native species

Comments / Control methods

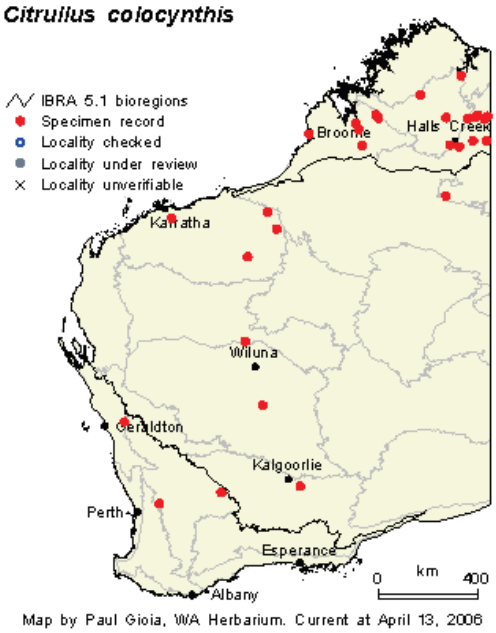
Control and eradication is not practicable. No expectation for control from DEC.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Pig Melon (Citrullus colocynthis)

Description

A trailing perennial herb or climber, with yellow flowers. Found January – October in sandyloam clay soils, in disturbed areas.



Map by Paul Gioia, WA Herbarium. Current at April 13, 2006

Distribution

Regional distribution of the species is shown opposite.
Distribution across Fortescue's project area includes 1 at Christmas Creek, and 8 along the Rail corridor.

History/Biological Info

Abundant in creeklines after heavy rains

Comments / Control methods

Control and eradication is not practicable, and not expected by DEC.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

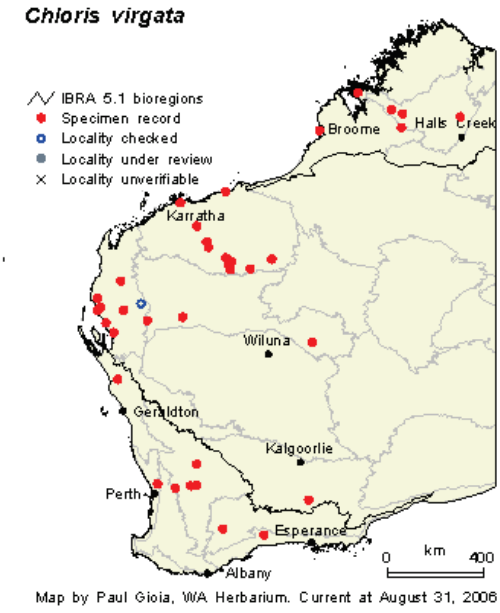
Feathertop Rhodes grass or Windmill grass *(Chloris virgata)*

Description

An annual, grass-like or herb, 0.15 – 0.95 m high, with green/purple flowers. Found April – May/September in clay and sand soils, particularly sand dunes.

Distribution

Regional distribution of the species is shown opposite. This was recorded at 2 sites in creeklines in the rail corridor, and a single location near Weeli Wolli Creek.



History/Biological Info

Historically introduced from tropical Africa.

Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

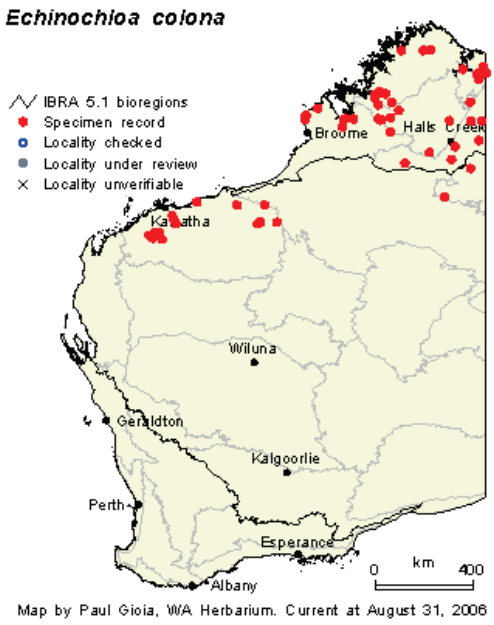
Awnless Barnyard Grass *(Echinochloa colona)*

Description

A tufted annual, grass-like or herb. Approximately 0.2 – 0.9 m high, with green/purple flowers. Found February – July in black sand and/or black clay. Particularly found near watercourses and swamps.

Distribution

This weed is found in creeklines in the Pilbara but is not abundant. Regional distribution of the species is shown opposite. Recorded as scattered individuals from 2 creeks within the rail corridor.



Map by Paul Gioia, WA Herbarium. Current at August 31, 2006

Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

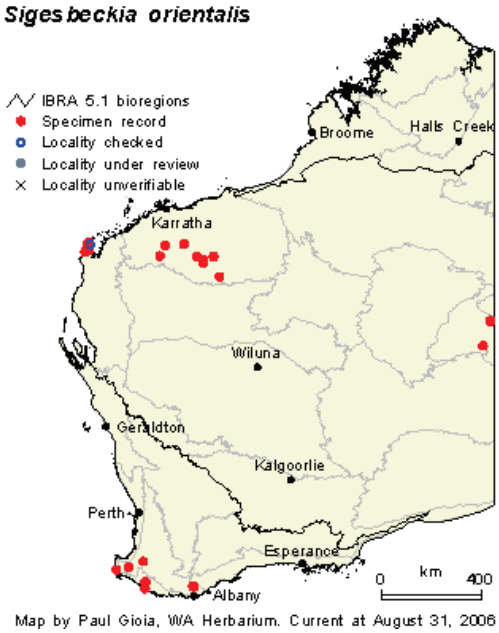
Indian weed (Sigesbeckia orientalis)

Description

Erect, slender annual, herb, 0.15–1 m high. Fl. yellow, Jan–Dec. Loamy soils over limestone or granite. Rocky gullies, limestone ranges, creek beds.

Distribution

This is an occassional weed of creeklines in the Pilbara but is not abundant. Regional distribution of the species is shown opposite. A single specimen was recorded in a gorge within Fortescue's project area.



Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

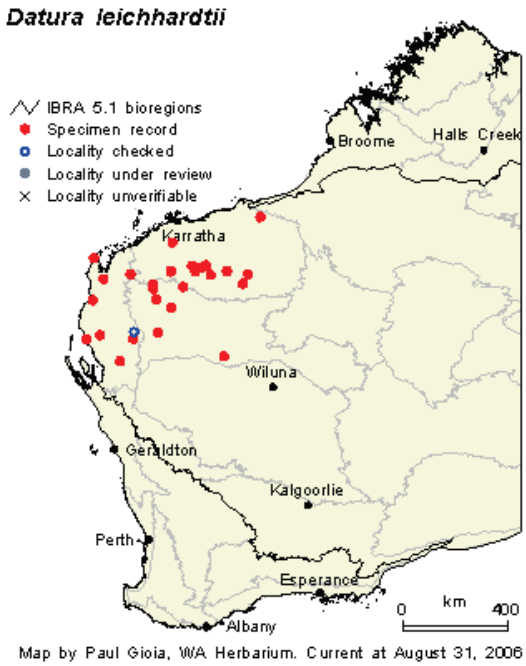
Native Thornapple (Datura leichhardtii)

Description

A stout annual, herb. Approximately 0.2 – 1 m high, with white flowers. Found June – October in alluvial soil, particularly along watercourses. Despite its name, it is not a native plant.

Distribution

This plant was removed from the declared plant list in the eastern Pilbara in 2004. Regional distribution of the species is shown opposite. Recorded once during the Fortescue study on the eastern flood plain of Weeli Wolli Creek.



Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

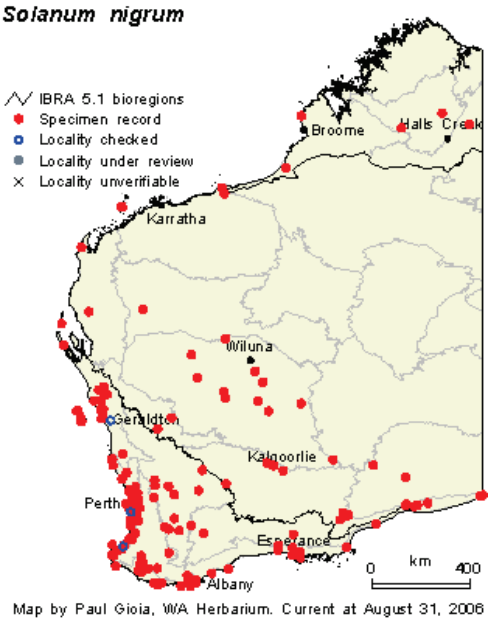
Black Berry Nightshade *(Solanum nigrum)*

Description

An erect perennial, herb or shrub (short-lived), 0.3 – 0.8 m high, with which flowers. Found January – December.

Distribution

Regional distribution of the species is shown opposite. Recorded in the rail corridor on the northern Abydos Plain.



Comments / Control methods

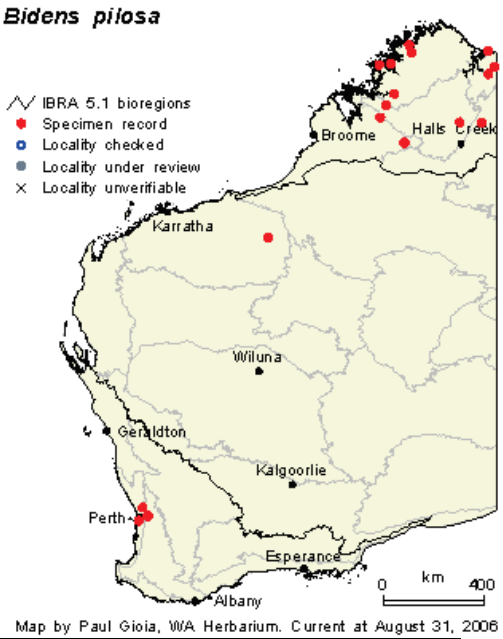
Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Cobblers Peg *(Bidens pilosa)*

Description

An erect annual herb, 0.2 – 2.5 m high, with yellow flowers. Found February – June in peaty clay, sandy loam and/or alluvium. Particularly found along drainage lines and lateritic screes.



Distribution

Regional distribution of the species is shown opposite. The species was recorded during the flora survey conducted at Cloud Break.

Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Birdwood grass *(Cenchrus setigerus)*

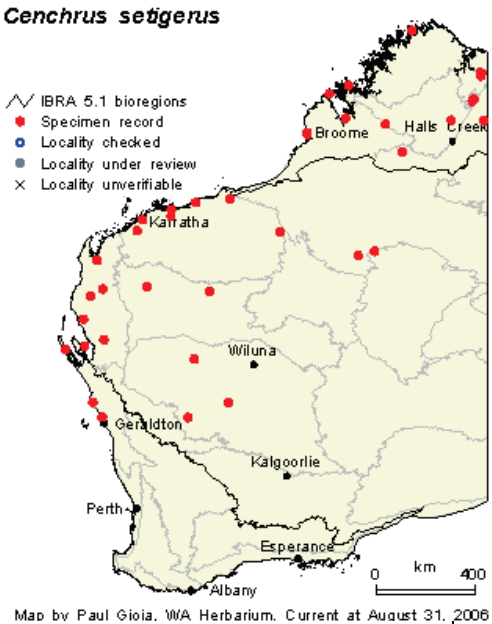
Description

A close relative of buffel grass. It is a slender, tossocky perennial grass, spread from seed or from underground runners, with purple flowers from February to October.

Distribution

Regional distribution of the species is shown opposite.

Recorded from 8 sites along the rail corridor and numerous times in the vicinity of the mines.



History/Biological Info

The weed was introduced as fodder species by pastoralists.

Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

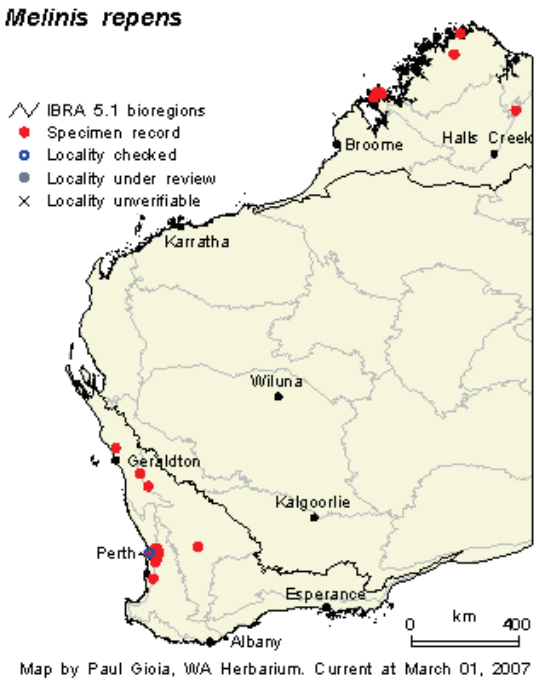
Red Natal Grass *(Melinis repens)*

Description

Red Natal Grass is a native of Africa. It flowers throughout the year and can be distinguished by its red flowers, although the flowers can also be white.

Distribution

Red Natal has not been identified on Fortescue's mining leases.



History/Biological Info

The weed is a native of Africa which has been introduced to Australia.

Comments / Control methods

Not identified on Fortescue's sites to date, so no need for control.

If identified the species distribution is to be monitored and weed control is to be implemented. The timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Date Palm *(Phoenix dactylifera)*

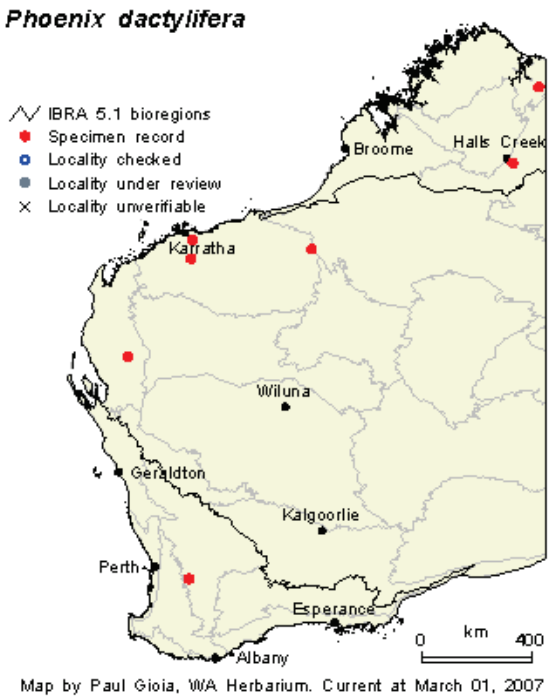
Description

Perennial tree-like palm. Generally 0.4 – 8 m high. Flowers from July to September. Is known to particularly grow at the edges of permanent pools and water courses.

Distribution

Regional distribution of the species is shown opposite.

Not currently identified within Fortescue's tenements.



Comments / Control methods

Low priority for control and eradication.

The species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Mesquite *(Prosopis spp)*

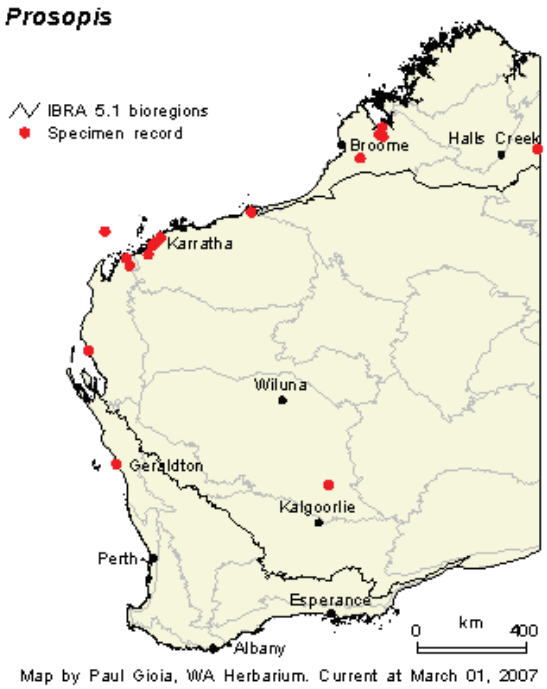
Description

Woody leguminous shrubs or trees. Four species and several hybrids referred to as Mesquite. Long-lived plant, with some plants over 100 years old. Extensive root system. Produces pods which are palatable and nutritious to livestock.

Distribution

Regional distribution of the species is shown opposite.

Not currently identified within Fortescue's tenements.



History/Biological Info

Introduced in the late 1800's, early 1900's for use as shade, fodder and onamendtals.

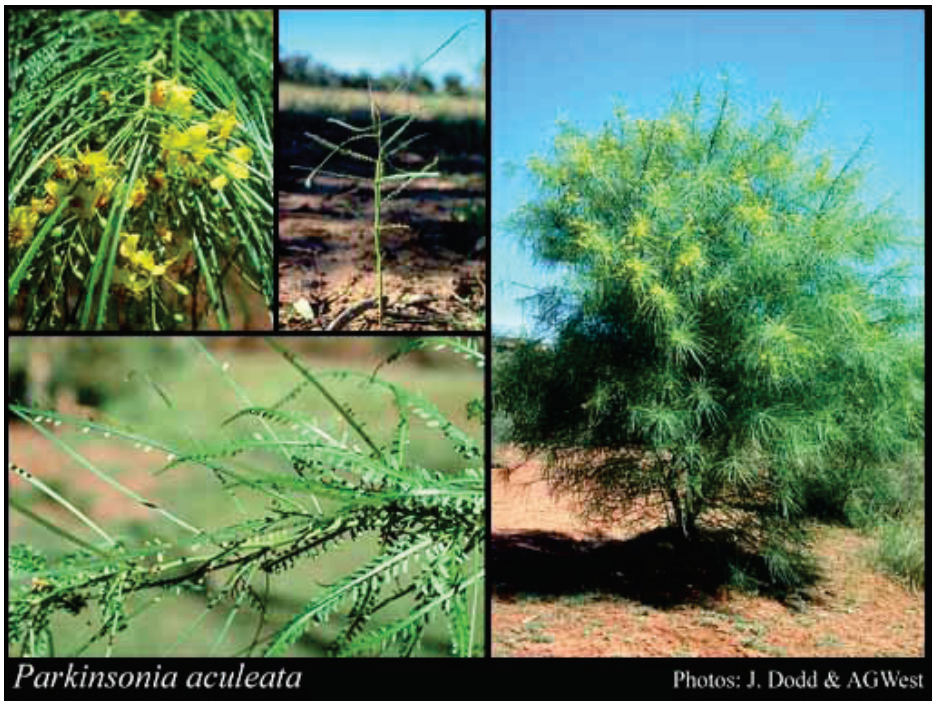
Comments / Control methods

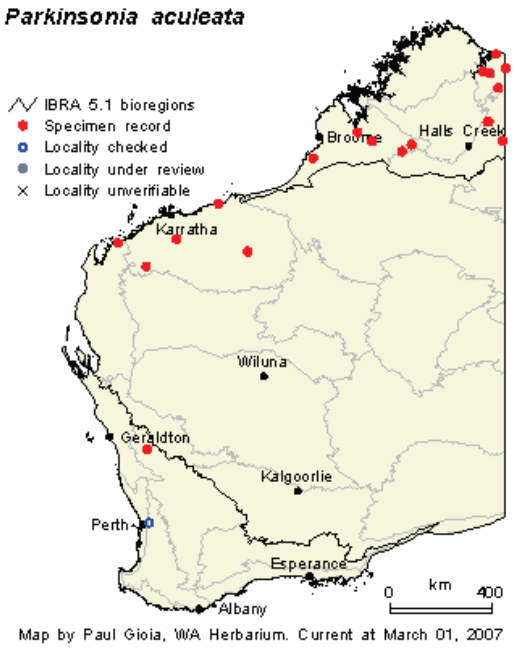
If identified on Fortescue's tenements the species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Parkinsonia *(Parkinsonia aculeata)*

Description

Spiny shrub or tree which grows up to 8 m high. Yellow flowers between March and December. Prefers Sandy or clayey soils, often along watercourses.





Map by Paul Gioia, WA Herbarium. Current at March 01, 2007

Distribution

Regional distribution of the species is shown opposite.

Not currently identified within Fortescue's tenements.

Comments / Control methods

If identified on Fortescue's tenements the species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Burrgrass *(Cenchrus echinatus)*

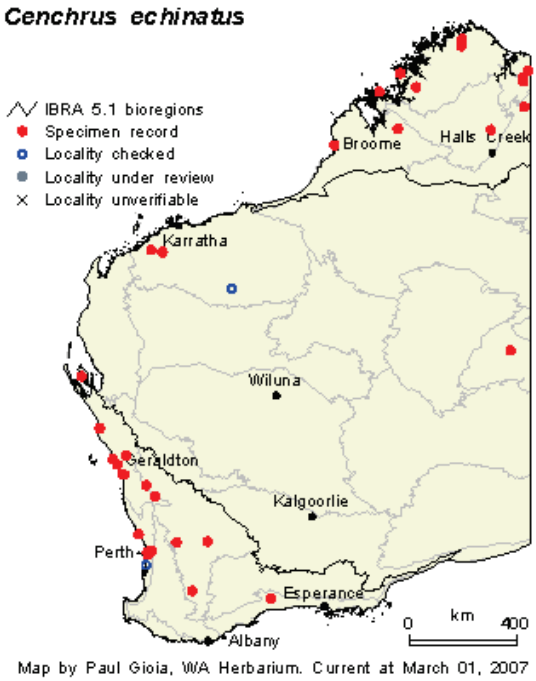
Description

Sometimes rhizomatous, tufted annual grass-like herb. Generally 0.1 – 1.2 m high. Green flowers between January and August. Grows in sand, red loam or black peaty clay.

Distribution

Regional distribution of the species is shown opposite.

Not currently identified within Fortescue's tenements.



Comments / Control methods

If identified on Fortescue's tenements the species distribution is to be monitored, and (if implemented) the timing and type of weed control exercises is to be recorded in the attached Weed Spraying Log

Ruby Dock *(Acetosa vesicara)*

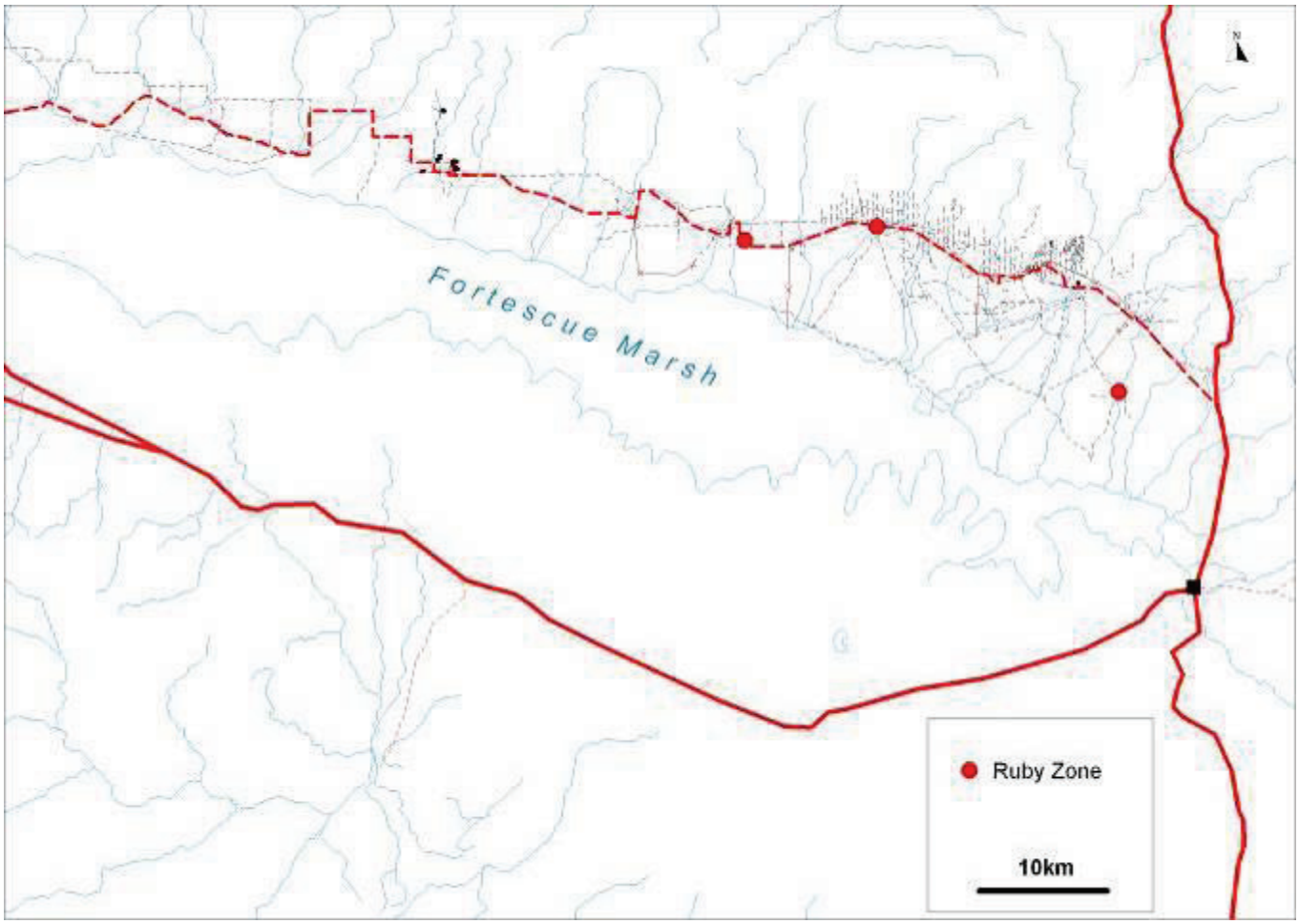


Figure 1. Distribution of Ruby Dock *(Acetosa vesicara) across the project area.*

Kapok Grass *(Aerva javanica)*

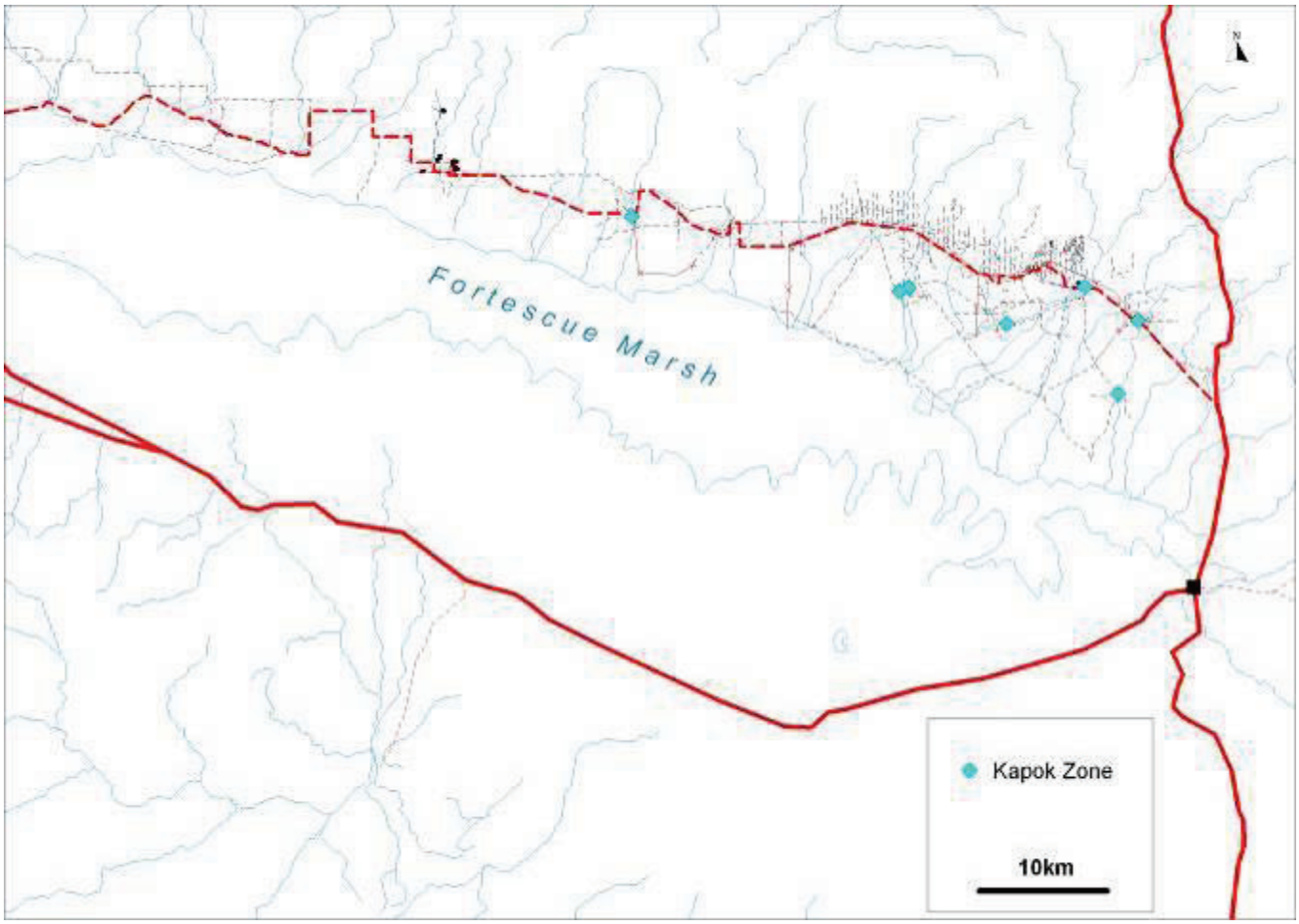


Figure 2. Distribution of Kapok Grass *(Aerva javanica)* across the project area

Mexican Poppy *(Argemone ochroeuca)*

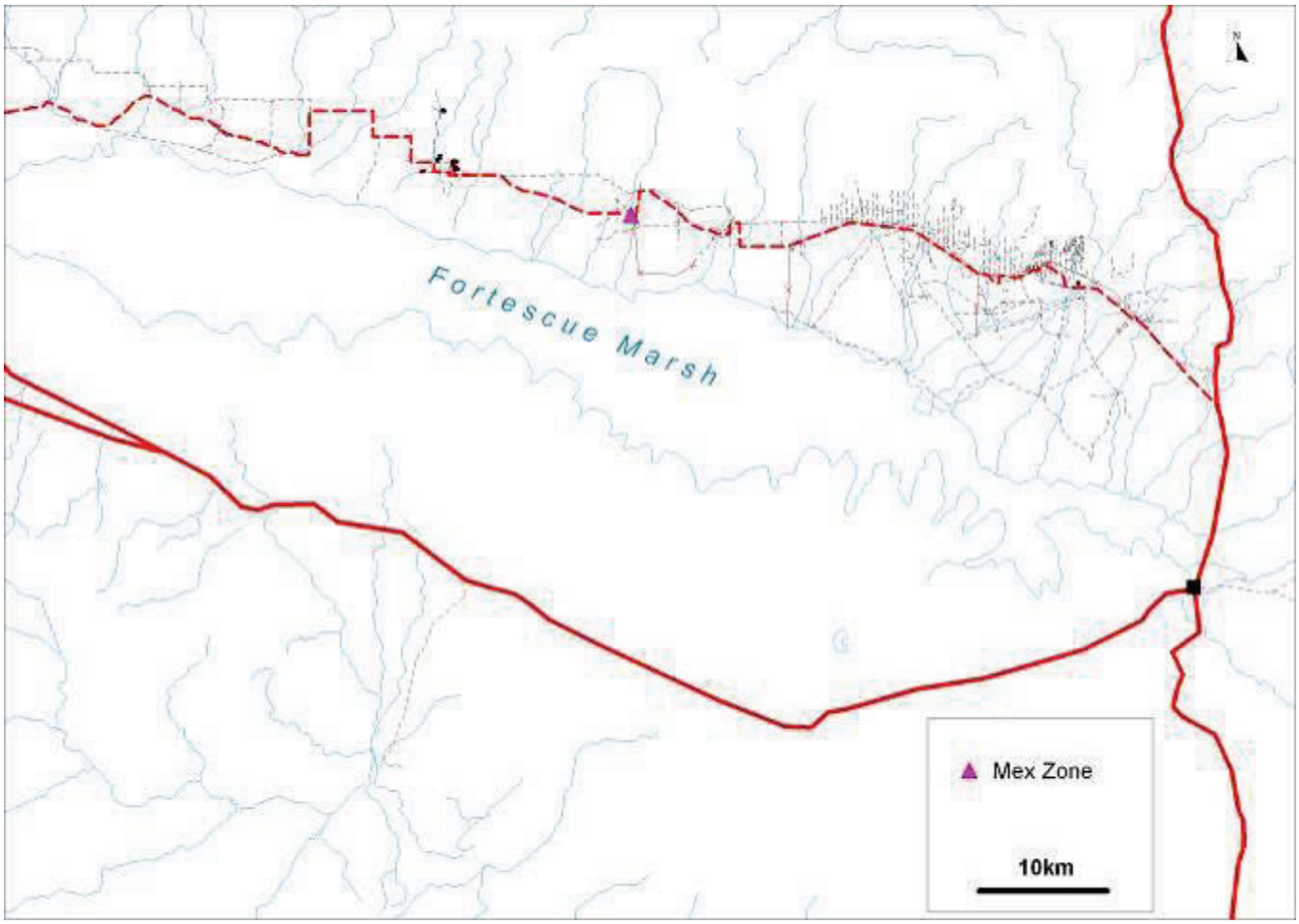


Figure 3. Distribution of Mexican Poppy *(Argemone ochroeuca)* across project area.

Buffel Grass *(Cenchrus ciliaris)*

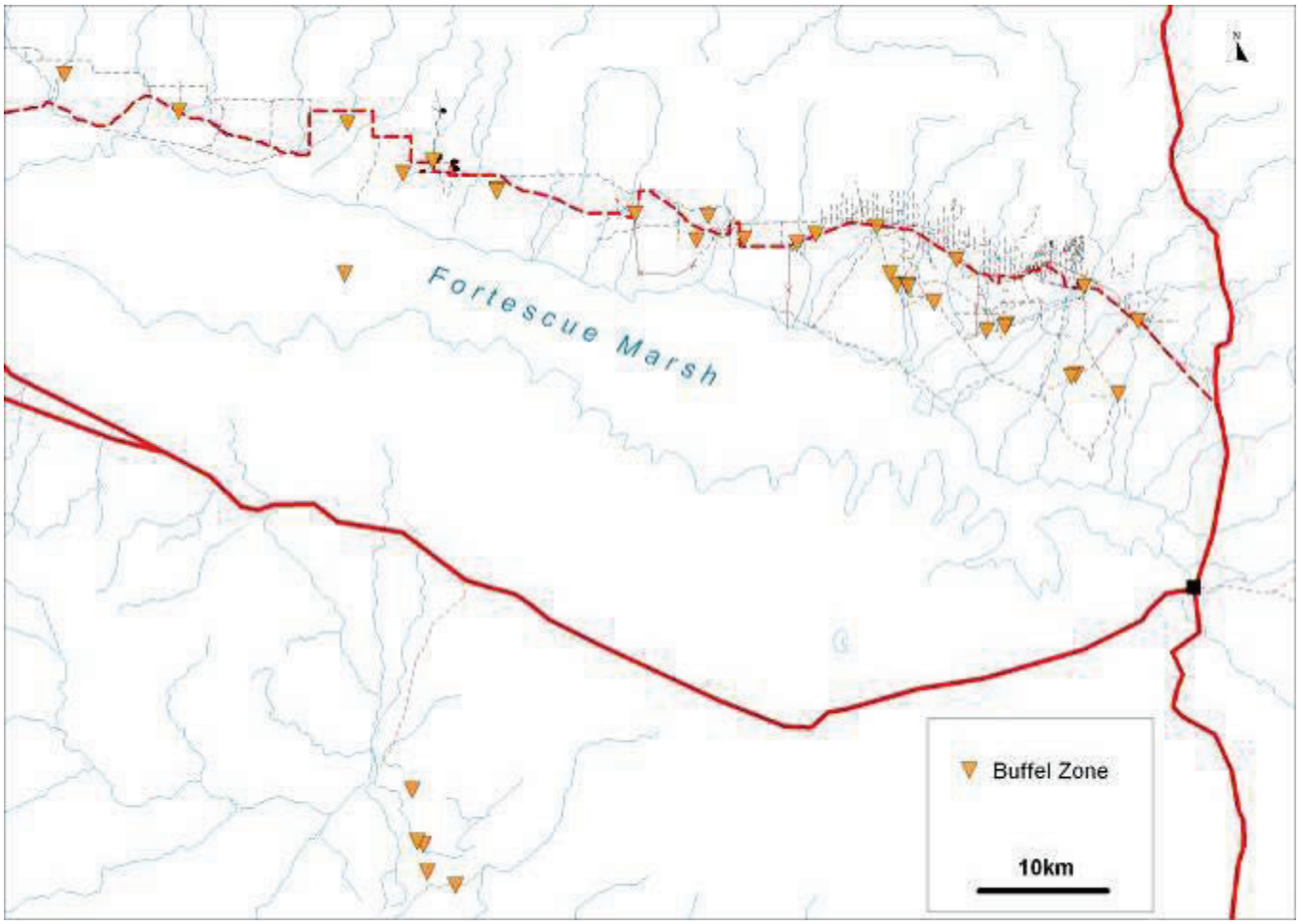


Figure 4. Distribution of Buffel Grass *(Cenchrus ciliaris)* across the project area

Spiked Malvastrum *(Malvastrum americaum)*

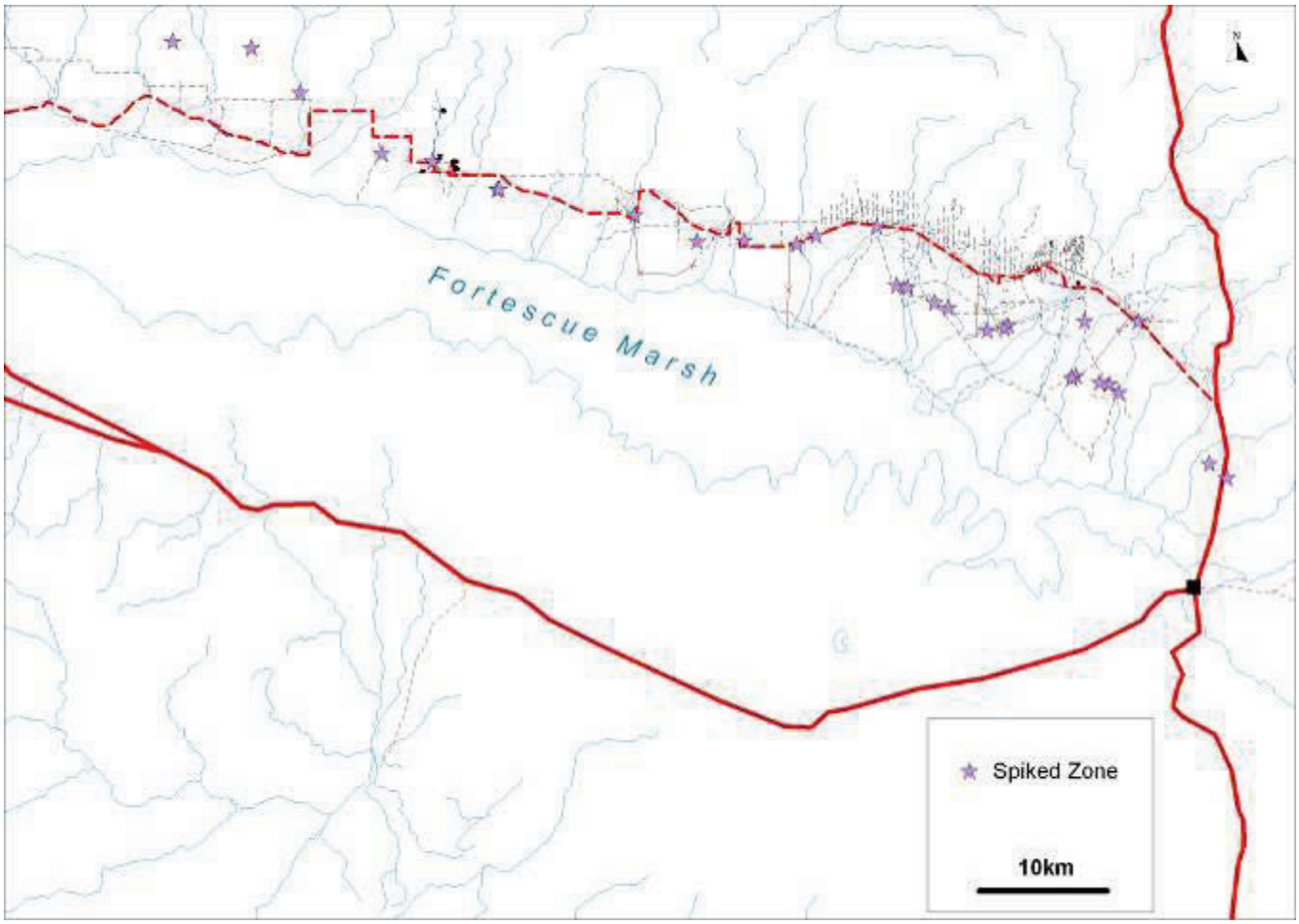


Figure 5. Distribution of Spiked Malvastrum *(Malvastrum americaum)* across the project area.

Pigeon Grass *(Setaria verticillate)*

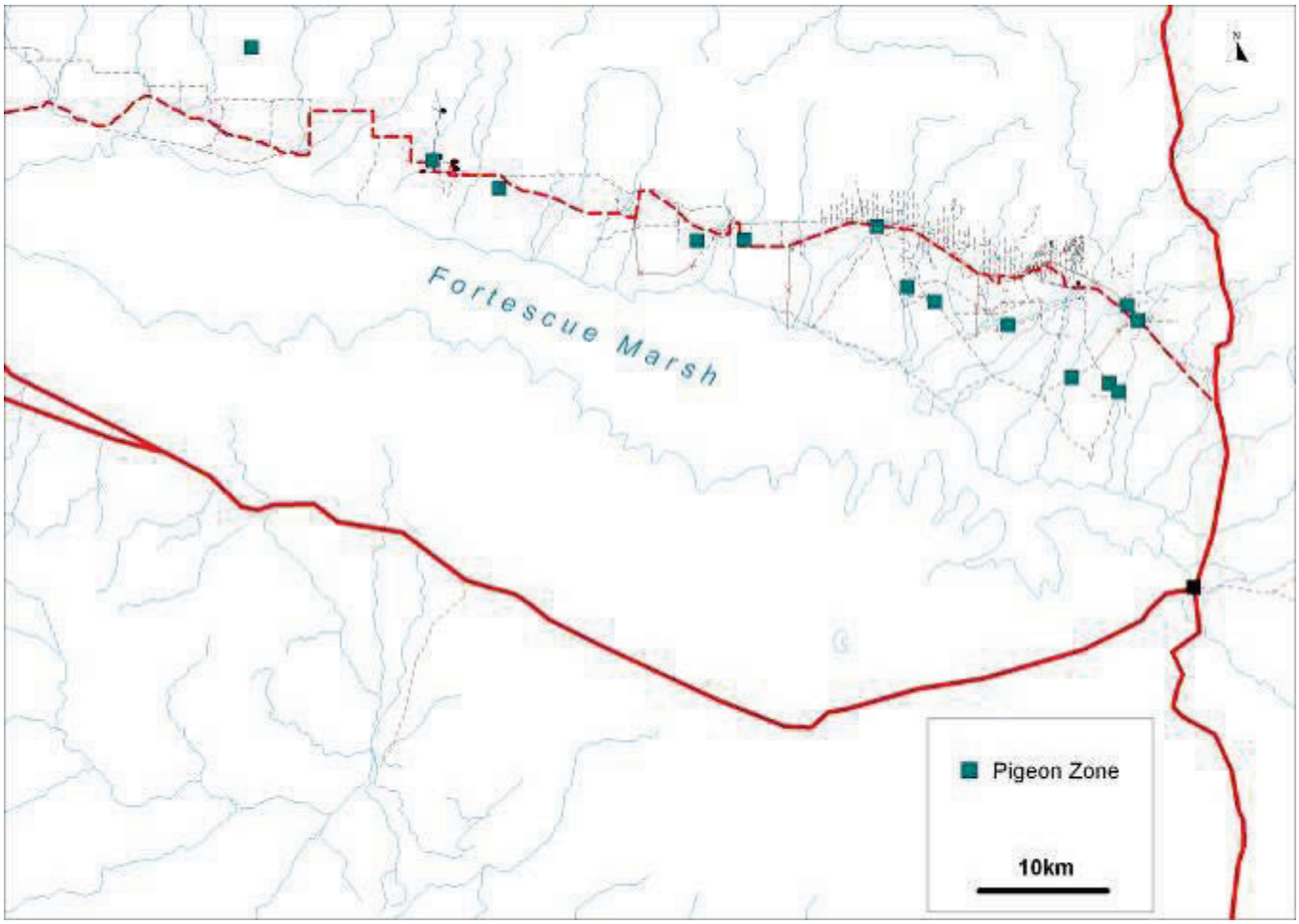


Figure 6. Distribution of Pigeon Grass (*Setaria verticillate*) across project area.

Beggars Tick *(Bidens bipinnate)*

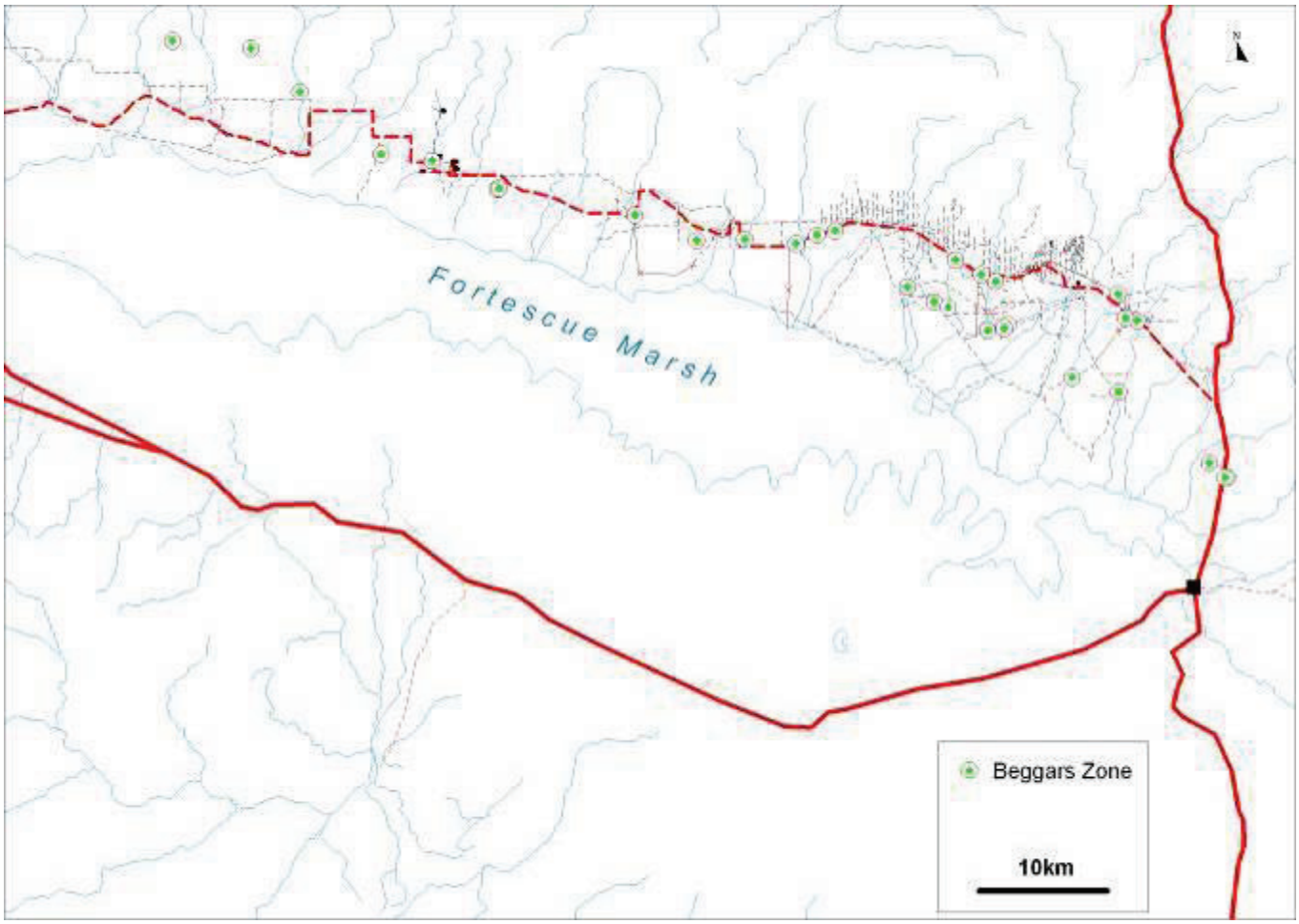


Figure 7. Distribution of Beggars Tick *(Bidens bipinnate)* across the project area

WEED HYGIENE

The purpose of this certificate is to demonstrate that each item of plant and equipment, including vehicles, has been inspected and certified as clean of soil or vegetative material that potentially carries weed seeds, prior to coming onto any FMG site. Any plant or equipment found to contain soil or vegetative material must be cleaned and inspected again prior to certification.

The vehicle/equipment described as: _____

Model / Make: _____

Registration No./Engine No. _____

Owned by: _____

has been certified as free of soil and vegetative material prior to entry to:

_____

Name: .....

Date: .....

Signed:.....

For more information about this certificate please contact the Manager Environment, Fortescue Metals Group Ltd, on +61 8 6218 8888.