Roadside Conservation Committee

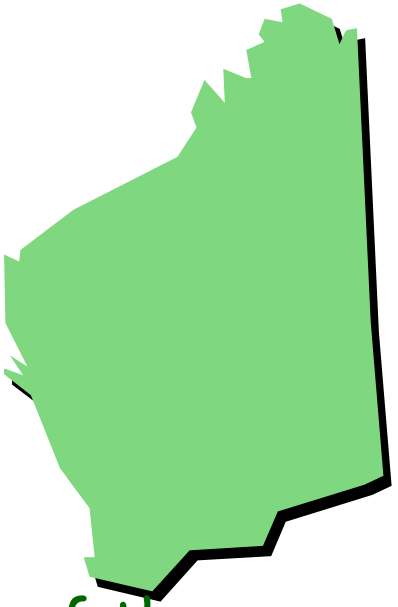
Conservation in Transport Corridors

Conservation in Transport Corridors

Roadside Conservation Committee

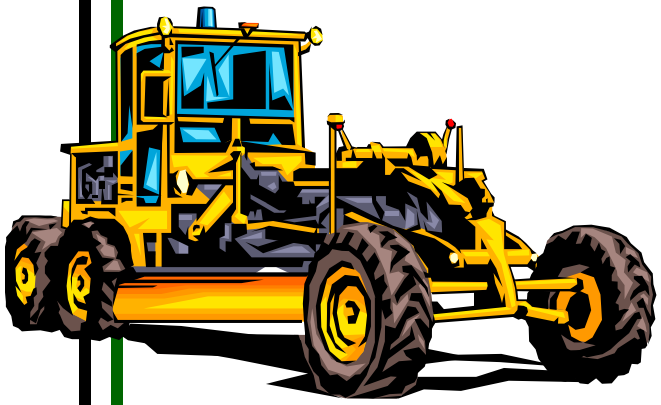
Extent of roadsides

The combined length of roads in Australia is equivalent to > 40 times around the equator



19 % of these roads are located in Western Australia and their management is mainly shared by three agencies

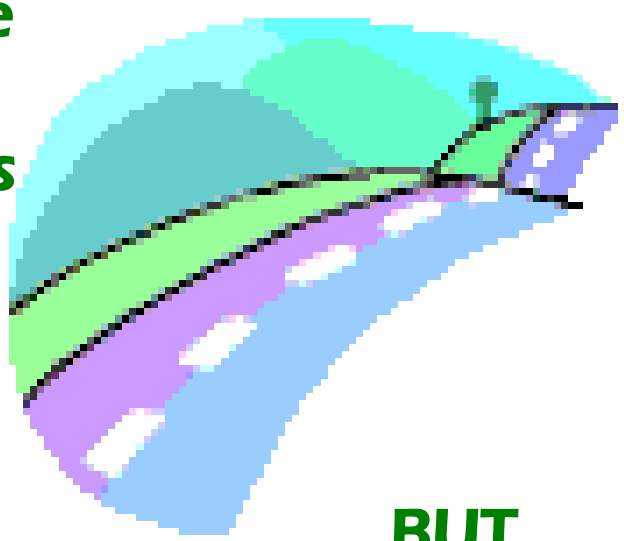
Road managers in WA



Main Roads	> 17,000 km
DCLM	> 30,000 km
LGA's	130,000 km
→ S J Shire	492 km sealed
	136 km unsealed

Roads and Roadsides

The viability of Western Australia is dependant on the safe and effective movement of people and goods by roads and rail



.....BUT road reserves have other values

Sustainability of Roadside Values

The sustainability of remnants within road and rail sides depends on the ability of managers to maintain their road reserves in a manner that is sensitive to the values present.

Sustainability needs to be incorporated in all aspects of road or rail projects from planning to construction and maintenance

Good Roadside Management

requires interaction with

ALL stakeholders

Remember the 4 C's !

Communication

Consultation

Co-operation

Compromise

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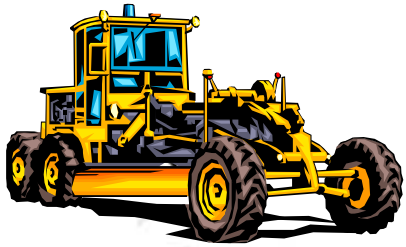
Good management requires that ALL issues are considered



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Values

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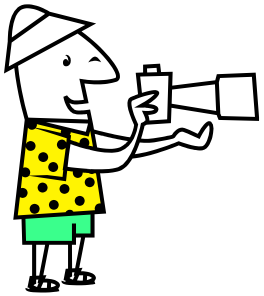
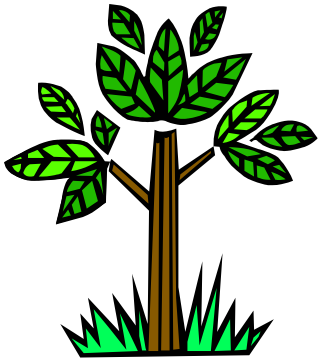
Values

Why is conservation in transport corridors important?





Road and rail sides are important because they contain :

- functional
- biodiversity
- cultural
- tourism and ;
- agricultural values

Declared Rare Flora

WA currently has 351 species of declared rare flora of these more than 100 are known from roadside populations.

Caladenia huegelii

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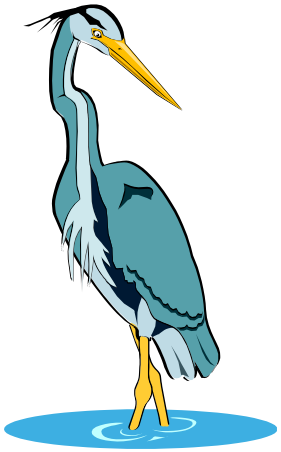
11 species of DRF are known from the Shire of Serpentine Jarrahdale and 3 of these are found in road reserves

Declared Rare Flora, 2001 by Tenure

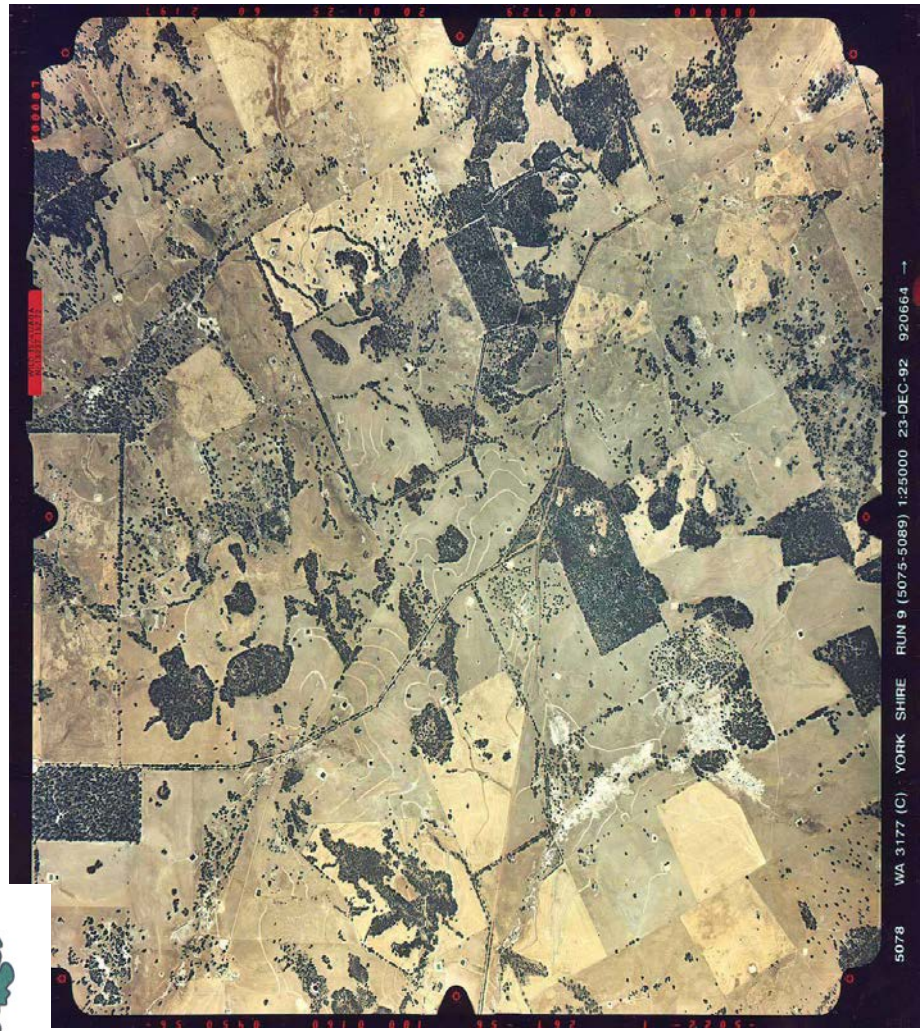
TENURE	% POPS	% PLANTS
Conservation Reserves	27.5	44.9
State Forest	4. 3	1. 5
Local Government	24.3	12.0
Main Roads	4.8	1.1
Railway Reserves	3.0	0.4
Other Vested Crown Land	3.3	2.5
Other Unvested Crown Land	11.9	28.2
Private	20.0	9.5

Biodiversity

- provide habitat for many native species of plants, mammals, reptiles amphibian and invertebrates



Wildlife Corridors



Roadsides link the landscape providing corridors for the movement of wildlife

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Tourism values

- ***High conservation value road verges provide an important basis for our tourism industry***

Cultural values of road & rail sides

- **often contain sites of historical or cultural significance**

Land management values

- Roadsides are easier to maintain and are generally less fire prone than introduced vegetation
- also provide shelter for stock and adjoining land
- help with drainage and erosion control

Natural Resources

- If no alternative source is available they can be a source of seed for revegetation projects (CALM permit required)

- The harvesting of firewood and wildflowers from roadside is contrary to RCC policy

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Legislation

- Wildlife Conservation Act
- Soil and Land Conservation Act
- Agriculture and Related Resources Act
- Public Works Act
- *Environmental Protection Act
- Dividing Fence Act
- Heritage Act
- Aboriginal Heritage Act
- CALM Act
- Local Government Act
- Bush Fires Act
- Utility Provider Act
- Main Roads Act

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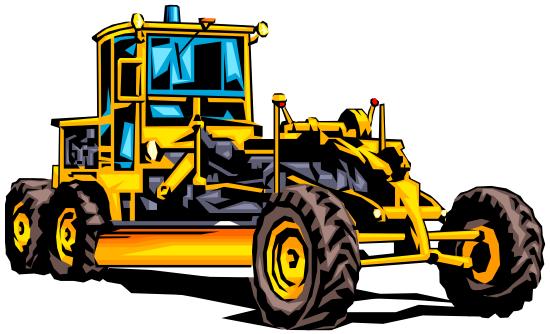
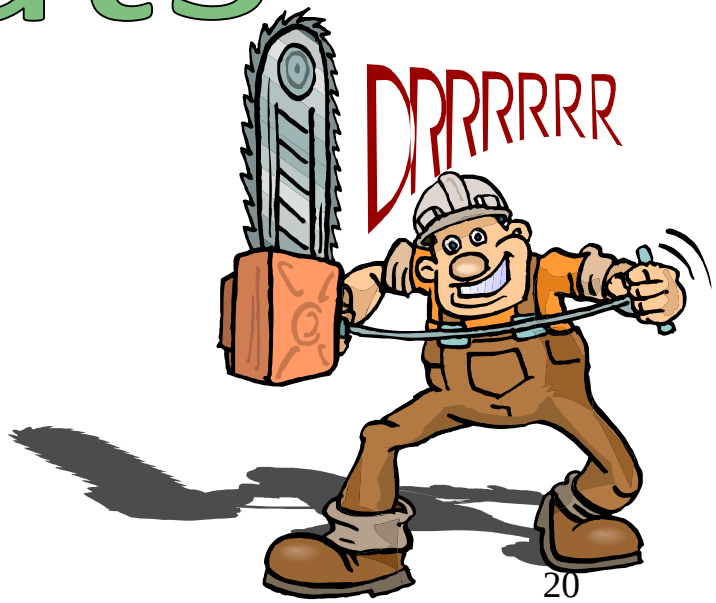
Threats





Fenceline Clearing

- Approval for clearing for fence lines is required

- **Heavy** penalties for clearing without approval are now in force

Roadside Conservation Committee

Weeds

- many weeds present a greater fire threat than native vegetation

- weed roots undermine the stability of the road by allowing water penetration

Environmental Weeds

are a threat to native flora and fauna:

- compete for space and nutrients and smother our native plants
- dominate an area, reducing the number of native plant types and numbers.
- this in turn reduces the number and types of fauna the vegetation can support.

Weeds **decrease** our **biodiversity**

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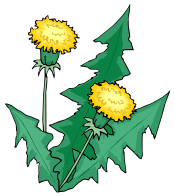
FIRE = Weeds = FIRE
FIRE
Disturbance of roadside
increase in weeds
increase in flammability
increase in culmulative fuel availability
increase in continuity of fuel bed
Roadside Conservation Committee

Minimise roadside FIRE hazard

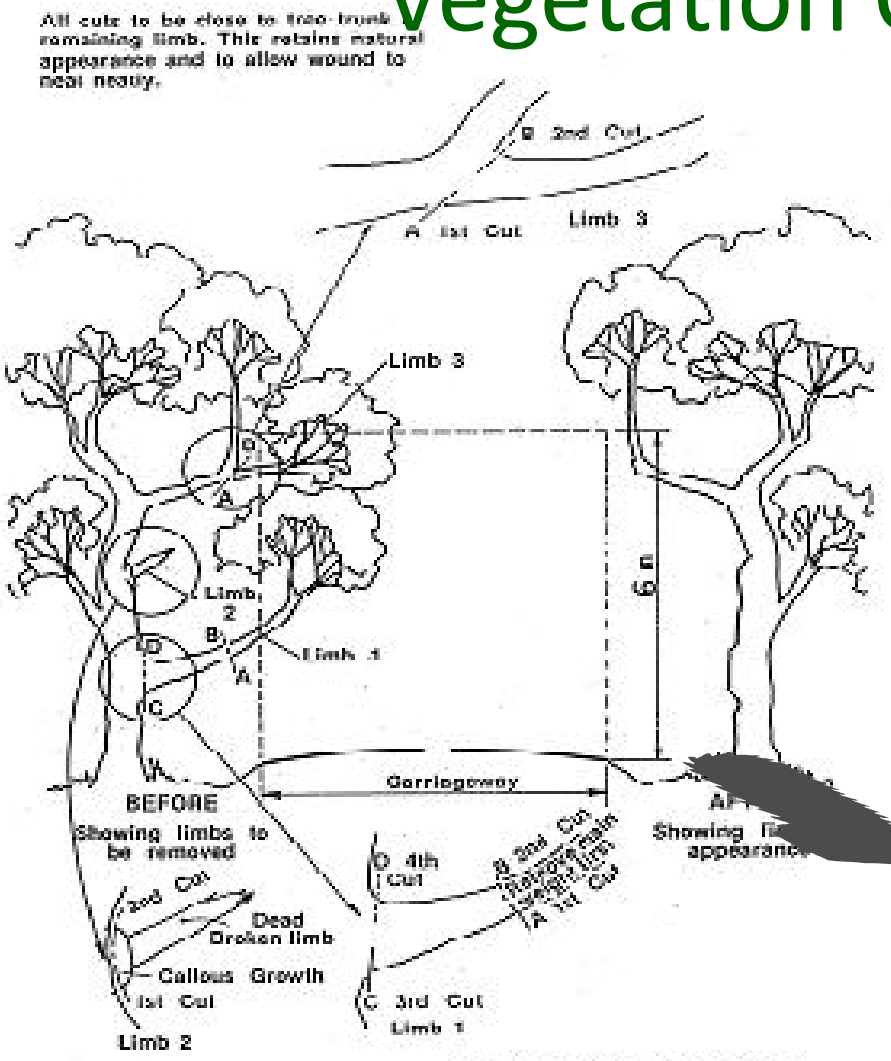


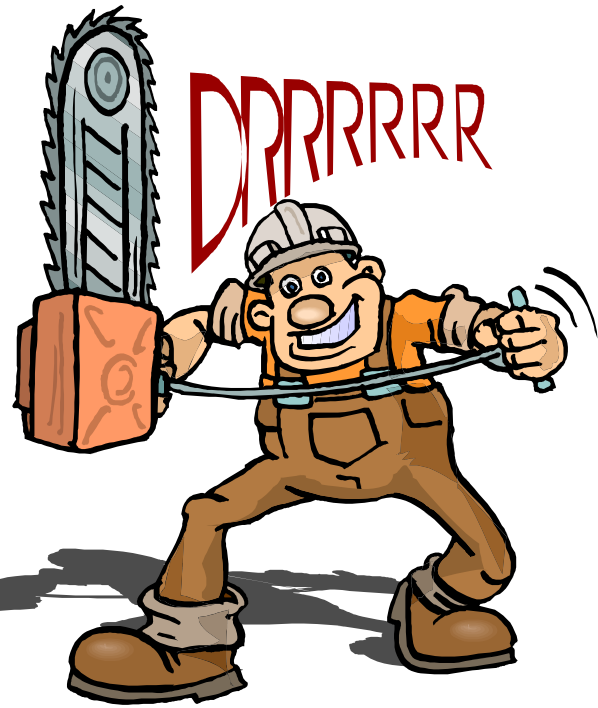
- Control invasion and spread of weeds
- Keep soil disturbance to a minimum
- Manipulate fire frequency and seasonality
- to encourage native vegetation
- Use mowing or herbicides to reduce fuel loads
- Revegetate disturbed areas to reduce weed infestations

Stay within the Construction or Maintenance Zone

- Inappropriate maintenance activities that result in the unnecessary removal of roadside vegetation are expensive and often increase weeds, fire and hazardous conditions

Vegetation Control





Vegetation Control

- Inappropriate vegetation control results in poor public relations

Work Practice

❖ Roadside conservation values can be degraded by poor roadside maintenance practice.

Roadsides are a priceless community asset

Mundijong Road Flora Reserve

The longest stretch of the original Pinjarra Plain vegetation

Roadside Conservation Committee

References

- ***City of Albany - Code of Best Practice for Works*** on Council Controlled Land (including Roadsides)

- **Western Australia Roadside Handbook**

  Roadside Conservation Committee

- **Environmental Guidelines for Road Construction and Maintenance Works**

  Roadside Conservation Committee

Contacting the RCC

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Michael Roberts

Technical Officer — **vegetation clearance documentation management plans**

93340570 — **michaelr@calm.wa.gov.au**

David Lamont

Executive Officer — **weed control, work practice, vegetation control, policy and ecological management**

9334 0423 — **davidl@calm.wa.gov.au**

Roadside Conservation Committee

Fire Management Guidelines for roadsides and other Local Government land

Guidelines for Fire management

Roadside Conservation Committee

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Benefits of Weed Control

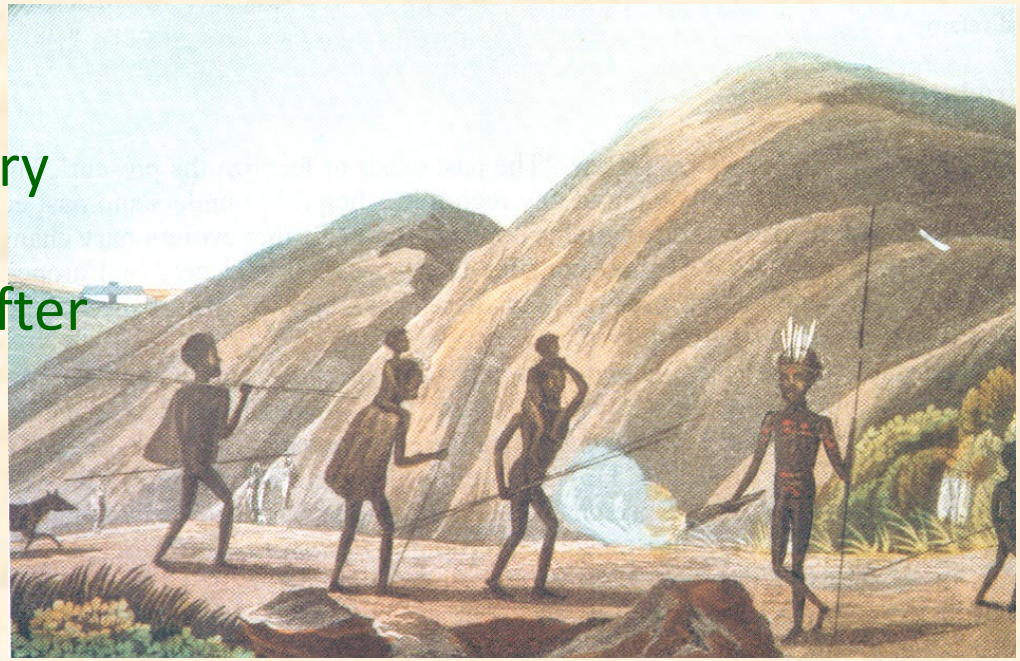
- The economic benefits of weed control in the drains and shoulders are:

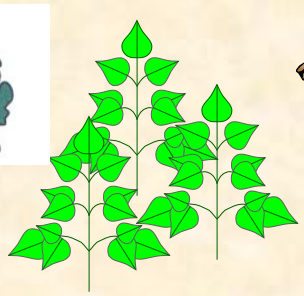
- Reduced need for grading
- Reduced loss of shoulder material
- Reduced need for drain cleaning and mowing
- Reduction in road failures due to water ponding and soft shoulders

Aboriginal use of FIRE

Aboriginals were know to use fire well before European settlement. The main reasons were to:

- cleanup their country
- attract wildlife to after fire regrowth





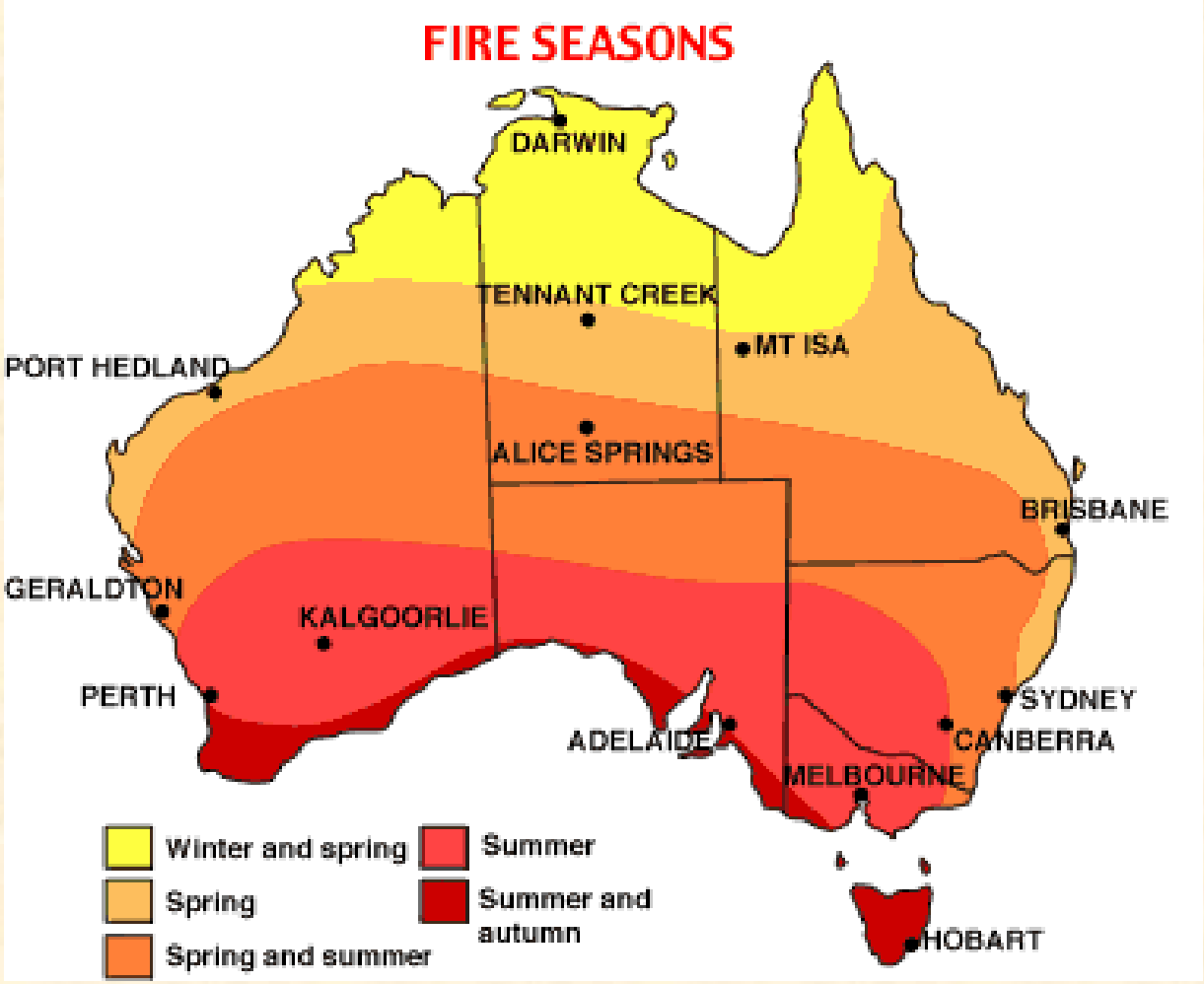
Fire and the Biota

Fire is a natural component of the Western Australian environment.

Most flora and fauna has developed strategies to cope with reoccurring fire.

However this response is dependant on many factors.

Fire is a major disturbance factor and often allows weeds to establish and out compete native vegetation.


FIRE SEASONS
DARWIN
TENNANT CREEK
MT ISA
PORT HEDLAND
ALICE SPRINGS
BRISBANE
GERALDTON
KALGOORLIE
PERTH
SYDNEY
ADELAIDE
CANBERRA
MELBOURNE
HOBART
Winter and spring
Spring
Spring and summer
Summer
Summer and autumn

Fire Regime

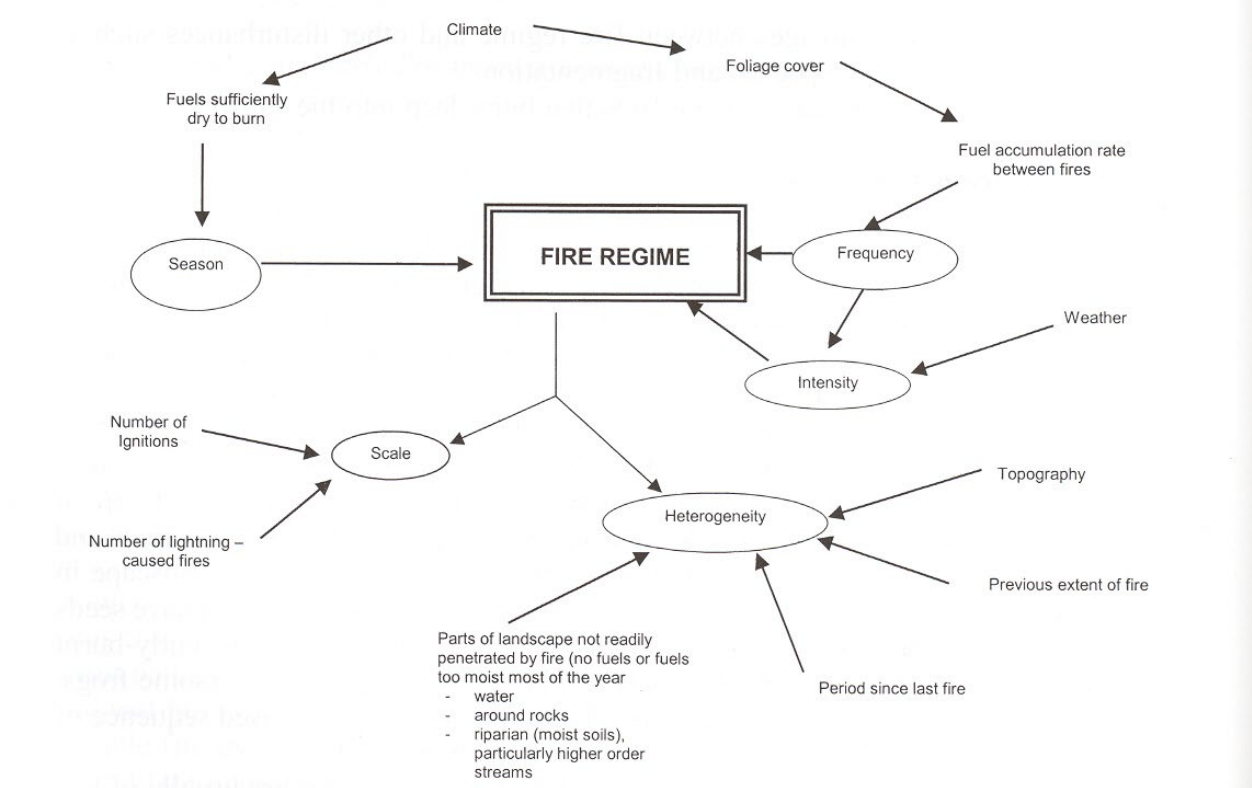
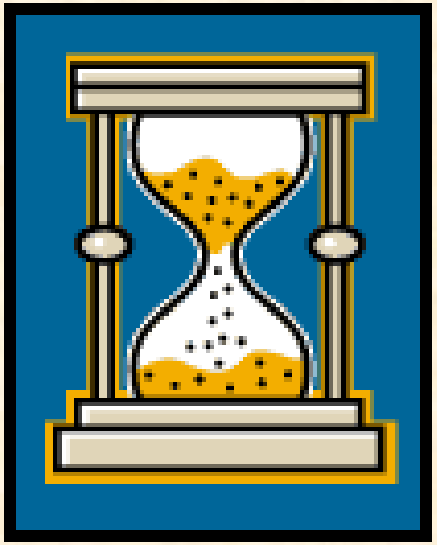


Figure 1. Conceptual diagram demonstrating environmental and other influences on the component elements of fire regime.

Abbott & Burrow 2003

Frequency

The period of time between successive fires



Seasonality

The time of the year the fire occurs.

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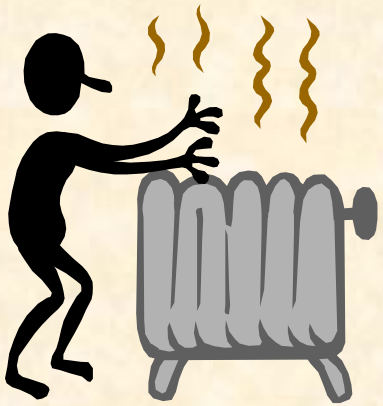
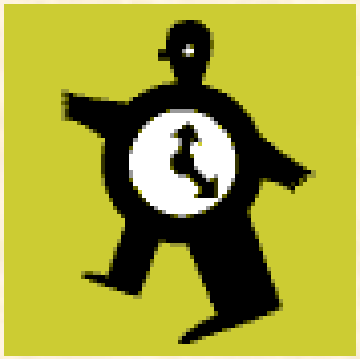
Intensity / Duration

The effect of the fire in terms of:

- **the rate of heat output and,**
- **the length of time that fire/heat is sustained**





Plants reproductive strategies in response to FIRE

In order for Australian plants to cope with the reoccurrence of fire they have developed two basic reproductive strategies:

- re seeding
- re sprouting

Seeders

Many native plants are able to survive or recover from fire by, ***germinating from seeds*** stored on the plant or in the soil,

Sprouters

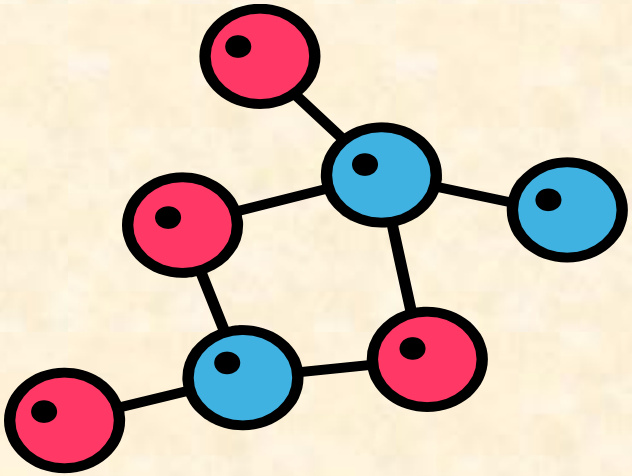
Re-sprouting from epicormic shoots is a common method of post fire regenerating employed by plants

Sprouters, lignotubers

Many plants sprout from below ground root swellings known as lignotubers

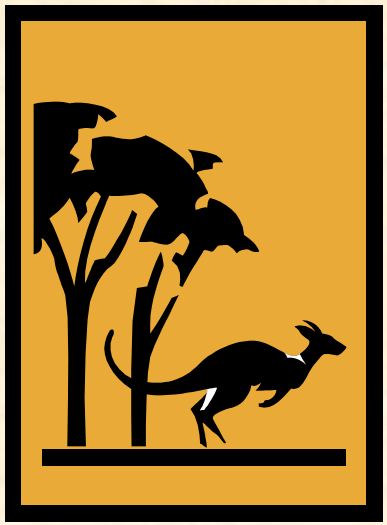
Fire effects on soil

Fire can have some important effects on soil chemistry, its structure, soil microbes and fauna.



Fauna response to Fire

Invariably fire can cause many species to perish and in prescribed fire situations it is important that patches of unburnt bush are retained within or in close proximity to the target area for food and habitat.




FIRE = Weeds = FIRE
FIRE
Disturbance of roadside
increase in weeds
increase in flammability
increase in culmulative fuel availability
increase in continuity of fuel bed
Roadside Conservation Committee

The Threat Test

Is there a heavy loading of highly flammable fuel

NO
Do not burn

YES
Is there property at risk from fire starting in the roadside

NO
Do not burn

YES
Can the property be adequately protected in any other way, e.g. fire breaks, herbicides

YES
Do not burn

NO
Are there any other methods of reducing fire threat from roadside, e.g. mowing

YES
Do not burn

NO
Seek expert advice from CALM or FESA

Fire Management Planning

- Fire management is an important component of managing native vegetation .

- Provision for the control and mitigation of wildfire and use of prescribed fire are integral components of a fire management plan

Fire management

- Let it burn
- Suppress it
- Change the fuel

When to use FIRE

- Under some circumstances fire can be used to advantage as an initial stage for recapturing control of established stands of perennial weeds.

- The use of fire should only be contemplated provided it is SAFE , not destructive to existing native vegetation and conforms with Local and State legislation with regard to fire.

- Fire can also be used to reinvigorate native vegetation

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Minimise roadside fire hazard

- Control invasion and spread of weeds
- Keep soil disturbance to a minimum
- Manipulate fire frequency and seasonality to encourage native vegetation
- Use mowing or herbicides to reduce fuel loads
- Revegetate disturbed areas to reduce weed infestations

Post Fire Rehabilitation

The control of wildfire can often result in extensive earthworks.

Every effort should be made to rehabilitate affected areas as they are prone to colonisation by weeds and can alter drainage and cause subsequent erosion

Fire

Contacting the RCC

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Michael Roberts

Technical Officer

vegetation clearance documentation

management plans

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michaelr@calm.wa.gov.au

References

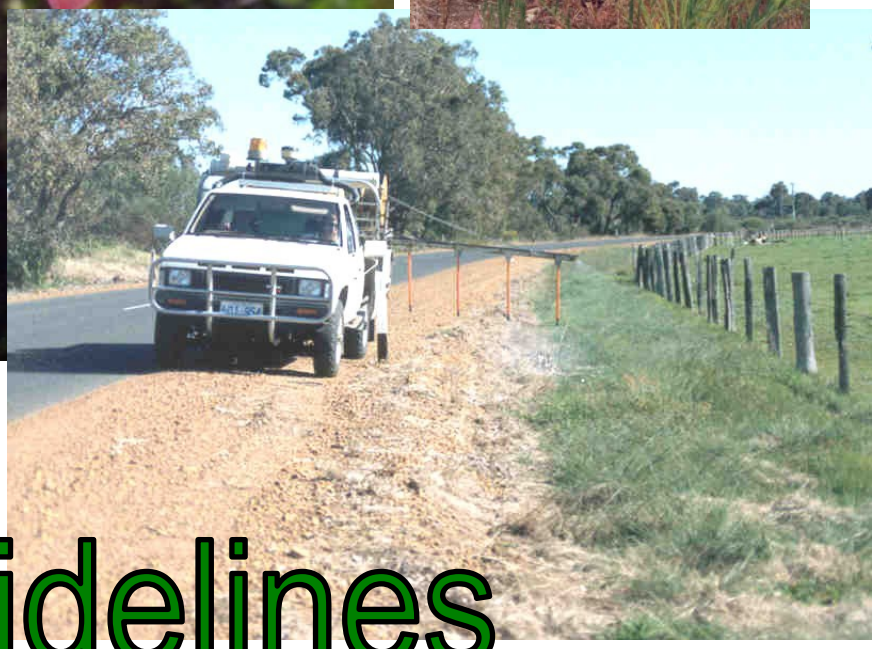
For further advice on all matters regarding fire management contact your local CALM office or FESA

2003 Abbott I & Burrows N (eds.)

Fire in ecosystems of south-western WesternAustralia: impacts and management.

2001 FESA

(Draft) Fire Management Guidelines in Roadsides.



Guidelines for weed management

Roadside Conservation Committee

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Suggested Reading

Guidelines for Weed Management

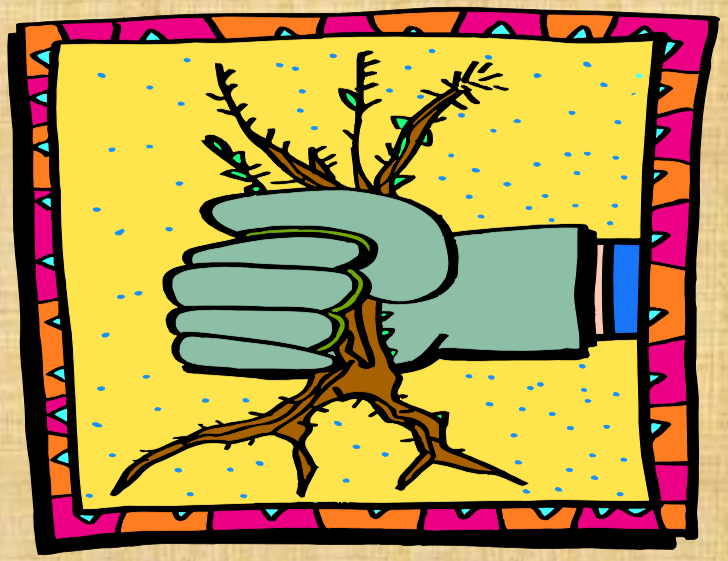
What is a weed ?

The National Weed Strategy

" a plant that has the potential to have a detrimental effect on economic social or conservation values ".

What makes a plant a weed

Most of the plants that become weeds here come come from countries with a similar climate as ours, e.g. Mediterranean counties or South Africa



Where do weeds come from?

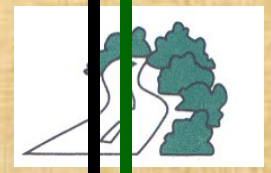
Many weeds have escaped from gardens.

Some plants were introduced for agricultural or dust control purposes e.g. Love grass & veldt grass, and have become weeds along roadsides and in bushland.

The cost of weeds

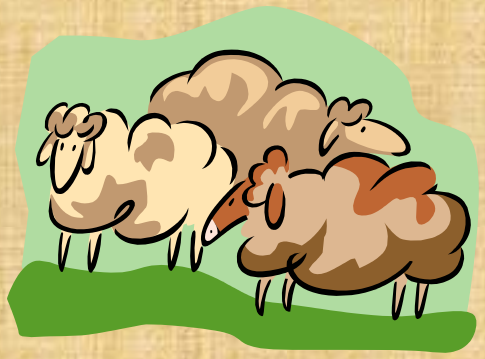
More than 10% of the 10,000 species of flowering plants in WA are introduced and have the potential to become weeds.

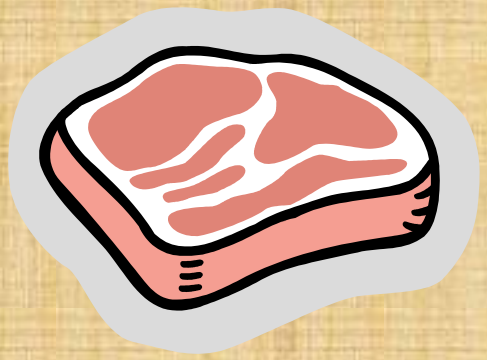
In 1995 Australia spent $452 million on herbicides for weed control.



The effects of weeds

In agriculture they reduce yield or contaminate crops, poison stock, reduce carrying capacity, downgrade wool quality, taint milk and meat



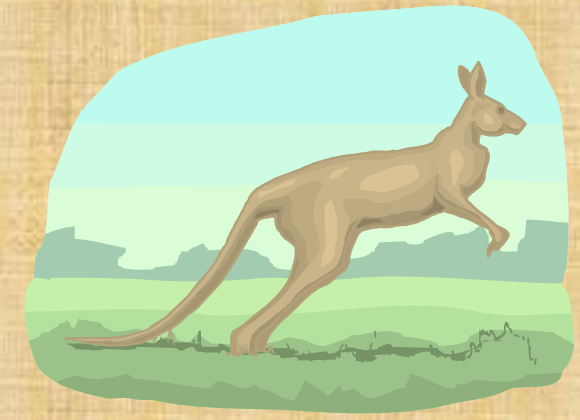


The effects of weeds

In waterways water weeds can reduce oxygen and cause algal blooms to prosper with negative effects to native aquatic fauna

The effects of weeds

Weeds in bush land areas inhibit regeneration, affect nutrient recycling, change fire characteristics, alter fauna resources, displace native fauna.



Don’t make a problem !

Windrow of love-grass spoil that provides ideal habitat for rabbits

Weed categories

Environmental weeds impact on natural ecosystems such as roadsides and bushland.

Agricultural weeds impact on production of food, wood, etc.Declared weeds are required under law to be controlled by the property owner.

Sleeper weeds are plants that are not yet considered weeds but are likely to become so.

Are there any sleepers in your

local area?

Report sightings of strange or unusual plan

Environmental Weeds

Environmental **weeds are a threat to our native flora and fauna:**

Compete for space and nutrients and smother our native plants

Dominate an area, reducing the number of native plant types and numbers, this in turn reduces the number and types of fauna the vegetation can support, so as weeds take over, many birds, animals and insects disappear as they lose their natural food source.

That is weeds decrease our biodiversity

Roadside Weeds

Weeds in the roadside and shoulders greatly increase the cost of road maintenance and the replacement of weeds with native vegetation can reduce these costs.

FIRE = Weeds = FIRE

FIRE

Disturbance of roadside

increase in weeds

increase in flammability

increase in culmulative fuel availability

increase in continuity of fuel bed

Fire and Weeds

Many weeds present a greater fire threat than native vegetation .

- **Many are annuals, they build up a huge biomass that dies off in summer leaving a highly flammable roadside,**
- **Some thrive after burning, presenting an even greater fire risk,**

  eg. Lovegrass

Something good about Weeds ?

They can help hold soil together and prevent wind and water erosion.

Lovegrass and Watsonia provide habitat for bandicoots, protecting them from foxes

Not

Weeds won't just go away, plan to control them

Develop a Weed Action Plan

1. Carry out site assessment.
2. Set Objectives based on available resources.
3. Develop and implement an action plan to achieve objectives.
4. Monitor performance and change action as required.

Benefits of Weed Control

- The economic benefits of weed control in the drains and shoulders are:

- Reduced need for grading
- Reduced loss of shoulder material
- Reduced need for drain cleaning and mowing
- Reduction in road failures due to water ponding and soft shoulders

Controlling Weeds

Is expensive

don't let plants become weeds

dealing with a few plants is the easiest and cheapest way to manage weeds.

Practice hygiene

don't spread weed seeds into areas that are **NOT** infested

work in clean areas first; clean down in infested areas.

Minimise disturbance

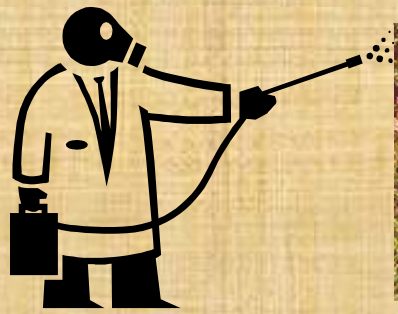
weeds easily invade areas disturbed by fire, machinery, etc. Replace weeds with local native vegetation

Chemical Vegetation Control

The use of chemicals to control unwanted vegetation is more critical than other methods and results will be unsatisfactory unless applied correctly.

The factors governing success are

- Type of herbicide used
- Weather conditions
- Application method
- The growth stage of the vegetation

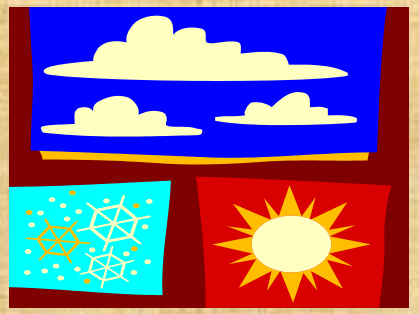


Type of Herbicide

It is important that the herbicide used is registered for the weed it is being used on and that it is used at the correct rate.

Care should be taken when using herbicides are used in water catchment area

Weather



Weather can have a major effect on the success or otherwise on herbicide spraying.

Rain can have a negative effect and render spraying ineffective as herbicides like glyphosate relies on dry foliage application.

Exessive heat will reduce the effectiveness of foliage applied herbicides.

Wind drift and direction will effect the correct placement of herbicides and can cause the spray drift to non target areas.

Method of Application

There are 3 main ways that herbicides are applied:

- In pellet form (e.g. soil steriliser along fence lines.
- Manual application (e.g. painted on to stumps), and
- delivery by spray nozzles (hand or multi boom)

The latter method is by far the most common way of application but to be effective a number of factors need to be considered.

Multi Nozzle Boom Spray

The benefits of this method of application are:

- **Accurate application**
- **Lower carrier rates**
- **Control of drift**
- **Lower cost**

Growth Stages of Vegetation

For optimum effect herbicides need to be applied at the correct growth stage of the vegetation being sprayed

Mechanical Control

- Mowing and slashing can be utilised

Biological Control

Biological Control is a method of weed control where natural organisms e.g. insects, fungi, are used to control weeds..

Contacting the RCC

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Michael Roberts

Technical Officer

vegetation clearance documentation

management plans

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michaelr@calm.wa.gov.au

SPNAME	CONSVCODE	POPID1	POPID2	DATUM	GDA94LAT
Acacia horridula	3	4	A		-32.37933878
Verticordia plumosa var. pleiobotrya	R	1			-32.30461630
Baeckea tenuifolia	3	4			-32.29711607
Verticordia lindleyi subsp. lindleyi	4	10			-32.36461721
Drosera occidentalis subsp. occidentalis	4	22	A		-32.35933886
Baeckea tenuifolia	3	2			-32.24878237
Acacia horridula	3	1			-32.36545013
Acacia horridula	3	5			-32.38628329
Verticordia plumosa var. pleiobotrya	R	3			-32.31267194
Caladenia huegelii	R	31	B		-32.34906187
Anthotium junciforme	4	4			-32.29850512
Anthotium junciforme	4	5			-32.29544956
Drosera occidentalis subsp. occidentalis	4	20	B		-32.36545004
Verticordia plumosa var. pleiobotrya	R	6	C		-32.21961515
Tetraria australiensis	R	10		GDA94	-32.29888889
Verticordia lindleyi subsp. lindleyi	4	25			-32.35933925
Verticordia plumosa var. pleiobotrya	R	2			-32.29656048

GDA94LONG	PURPOSE1	DISTRICT
116.00065564	VER	PEH
115.95343227	VER	SWA
115.96509878	VER	SWA
115.93343333	VER	SWA
115.97509981	VER	SWA
115.95148689	VER	SWA
115.96815548	VER	SWA
116.00148909	VER	PEH
115.95343241	VER	SWA
115.90093314	VER	SWA
115.95315439	VER	SWA
115.95065435	VER	SWA
115.97565546	VER	SWA
115.97037525	VER	SWA
115.96944444	VER	SWA
115.94315544	VER	SWA
115.96732099	VER	SWA

LOCATION

700 meters east along Scrivener Road from junction with South West Highway. Plants situated on the steep ro
Kargotich Rd, 0.8 km south of Mundijong Rd.
Small linear remnant along Mundijong Rd, ca 2 km W of the intersection with South West Hwy.
East side of the junction of Karnup and Punrack Rds, Serpentine.
Between Hall Rd and the Railway line, at 250 m N of Karnup Rd, Serpentine.
Abernethy Rd, Oakford.
Serpentine, About 1 kilometer east of South West Hwwy on Scrivener Road. . Coordinates for this and July 19
Population extends from south of Scrivener Road and west to the Serpentine National Parks western boundary
Kargotich Rd, south of Randell Rd. Road verge.
ca 800m W of Rowe Rd & Hopelands Rd T-jnc. 10m N of track on N road res.
SE side of Mundijong Rd - Kargotich Rd intersection, Mundijong.
40 m S side of Mundijong Rd at 200 m W of Kargotich Rd intersection, Peel Estate.
E side of Hall Rd, 400 m S of Karnup Rd, Serpentine. Between Hall Rd and the railway line.
From 250 to 530m west along Abernethy Rd from Hopkinson Rd, on south and north sides of road.
Mundijong Rd, Mundijong. 150-250m E of Webb Rd on southern side of road within flora/road reserve.
South verge of Karnup Rd, ca 0.45 km west of the junction with Rapids Rd.
Mundijong Rd, between 550 and 580m east of the junction with Kargotich Rd.

VESTING	PURPOSE1	POPSIZE	SURVEYDATE	NOTIFIEENAME	SHIRE
SHI	VER	250	1996-06-12 00:00:00		108
SHI	VER	0	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
SHI	VER		1992-01-20 00:00:00		108
SHI	VER		1988-12-27 00:00:00		108
SHI	VER	21	1990-11-27 00:00:00		108
SHI	VER		1981-03-23 00:00:00		108
SHI	VER		1976-12-07 00:00:00		108
SHI	VER	800	1991-07-02 00:00:00		108
SHI	VER	0	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
SHI	VER	1	1990-09-25 00:00:00		108
SHI	VER	44	1990-12-04 00:00:00		108
SHI	VER	299	1990-12-04 00:00:00		108
SHI	VER	18	1990-11-27 00:00:00		108
SHI	VER	39	1999-12-08 00:00:00	Shire of Serpentine-Jarrahdale	108
MRD	VER	50	2001-12-03 00:00:00	MRWA,Shire Serpent./Jarrahdale	108
SHI	VER		1995-11-09 00:00:00		108
SHI	VER	326	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108

SHEETNO	LATDEG	LATMIN	LATSEC	LONGDEG	LONGMIN	LONGSEC
11239	32	22	50.0	115	59	57.0
16286	32	18	21.0	115	57	7.0
7896	32	17	54.0	115	57	49.0
6169	32	21	57.0	115	55	55.0
6318	32	21	38.0	115	58	25.0
7897	32	15	0.0	115	57	0.0
11215	32	22	0.0	115	58	0.0
11261	32	23	15.0	116	0	0.0
16284	32	18	50.0	115	57	7.0
4050	32	21	1.0	115	53	58.0
5912	32	17	59.0	115	57	6.0
5913	32	17	48.0	115	56	57.0
8770	32	22	0.0	115	58	27.0
16280	32	13	15.0	115	58	8.0
18625	32	17	56.0	115	58	10.0
8653	32	21	38.0	115	56	30.0
16285	32	17	52.0	115	57	57.0

SPNAME	CONSVCODE	POPID1
Acacia lasiocarpa var. bracteolata long peduncle variant(G.J.Keighery 5026)	1	1
Verticordia lindleyi subsp. lindleyi	4	2
Stylidium longitubum	3	7
Synaphea odocoileops	1	2
Acacia horridula	3	4
Acacia horridula	3	4
Verticordia plumosa var. pleiobotrya	R	1
Tetraria australiensis	R	8
Drakaea elastica	R	23
Caladenia huegelii	R	24
Drosera occidentalis subsp. occidentalis	4	22
Baeckea tenuifolia	3	4
Acacia oncinophylla subsp. oncinophylla	3	1
Acacia horridula	3	4
Acacia horridula	3	4
Acacia horridula	3	4
Drakaea elastica	R	22
Verticordia plumosa var. pleiobotrya	R	7
Lasiopetalum pterocarpum	R	1
Lasiopetalum pterocarpum	R	1
Acacia lasiocarpa var. bracteolata long peduncle variant(G.J.Keighery 5026)	1	4
Diuris purdiei	R	5
Drakaea elastica	R	23
Tetraria australiensis	R	1
Verticordia lindleyi subsp. lindleyi	4	10
Grevillea pimeleoides	4	2
Acacia horridula	3	4
Verticordia plumosa var. pleiobotrya	R	6
Verticordia plumosa var. pleiobotrya	R	6
Andersonia saxatilis	1	2
Andersonia saxatilis	1	3
Lasiopetalum pterocarpum	R	1
Drosera occidentalis subsp. occidentalis	4	22
Aponogeton hexatepalus	4	7
Baeckea tenuifolia	3	2
Grevillea pimeleoides	4	1
Acacia horridula	3	1
Drosera occidentalis subsp. occidentalis	4	20
Drakaea elastica	R	7
Anthotium junciforme	4	3
Drosera occidentalis subsp. occidentalis	4	23
Lambertia multiflora var. darlingensis	3	7
Acacia horridula	3	4
Acacia horridula	3	5
Verticordia plumosa var. pleiobotrya	R	4
Verticordia plumosa var. pleiobotrya	R	3
Lasiopetalum pterocarpum	R	2
Drakaea elastica	R	24
Schoenus pennisetis	1	1
Schoenus pennisetis	1	2
Dillwynia dillwynioides	3	3
Tetraria australiensis	R	5
Tetraria australiensis	R	5
Verticordia plumosa var. pleiobotrya	R	7
Lasiopetalum pterocarpum	R	1

Caladenia huegelii	R	31
Anthotium junciforme	4	4
Anthotium junciforme	4	5
Anthotium junciforme	4	10
Tetraria australiensis	R	7
Drosera occidentalis subsp. occidentalis	4	20
Verticordia plumosa var. pleiobotrya	R	6
Tetraria australiensis	R	10
Pimelea rara	4	9
Caladenia huegelii	R	31
Anthotium junciforme	4	7
Dillwynia dillwynioides	3	4
Verticordia lindleyi subsp. lindleyi	4	25
Lambertia multiflora var. darlingensis	3	4
Acacia horridula	3	4
Trichocline sp.Treeton(B.J.Keighery & N.Gibson 564)	2	6
Verticordia plumosa var. pleiobotrya	R	6
Verticordia plumosa var. pleiobotrya	R	2
Tetraria australiensis	R	11

POPID2	DATUM	GDA94LAT	GDA94LONG	PURPOSE1	DISTRICT
		-32.27461631	115.92454295		SWA
		-32.23211551	115.95148661		SWA
		-32.43517406	115.89176795		SWA
		-32.23628102	116.05148645	FOR	PEH
A		-32.37933878	116.00065564	VER	PEH
G		-32.37378313	116.00315554	NPK	PEH
		-32.30461630	115.95343227	VER	SWA
		-32.29906034	115.98176544	UNK	SWA
B		-32.34572853	115.89871087		SWA
		-32.33878411	115.89037744		SWA
B		-32.35933886	115.97509981	RRE	SWA
		-32.29711607	115.96509878	VER	SWA
		-32.36545005	115.97454436		SWA
B		-32.37933878	116.00065564	NPK	PEH
E		-32.37656095	116.00232225	NPK	PEH
F		-32.37517204	116.00232223	NPK	PEH
		-32.26739296	116.01120929		SWA
A		-32.24878233	115.95426467	DRA	SWA
A	GDA94	-32.36972222	116.00944444	NPK	PEH
C	GDA94	-32.37000000	116.00472222	NPK	PEH
		-32.34878428	115.88565539		PEH
		-32.21128245	115.90981970		SWA
A		-32.34795078	115.89871091		SWA
		-32.30211566	116.00370989	CFF	SWA
		-32.36461721	115.93343333	VER	SWA
		-32.42850494	116.08704515	NPK	PEH
C		-32.37656095	116.00260003	NPK	PEH
D		-32.22017073	115.96870860	DRA	SWA
B		-32.22017077	115.96565305		SWA
	GDA94	-32.32861111	116.11472222	FOR	PEH
	GDA94	-32.27250000	116.16916667	FOR	PEH
D		-32.35658333	116.01583333	NPK	PEH
A		-32.35933886	115.97509981	VER	SWA
		-32.29045028	115.88676552		SWA
		-32.24878237	115.95148689	VER	SWA
		-32.39822695	116.07676689	NPK	PEH
		-32.36545013	115.96815548	VER	SWA
A		-32.36545004	115.97565546	RRE	SWA
		-32.18100419	115.92231916		SWA
		-32.36545003	115.97648880	RRE	SWA
		-32.22961484	116.00481978	REC	SWA
		-32.26878182	116.01482041		SWA
H		-32.37517204	116.00232223	NPK	PEH
		-32.38628329	116.00148909	VER	PEH
		-32.36100533	115.99315535	OTH	PEH
		-32.31267194	115.95343241	VER	SWA
T	GDA94	-32.40000000	116.08333333	NPK	PEH
		-32.34406172	115.90871082		SWA
		-32.22822596	116.00287532	OTH	SWA
		-32.22933706	116.00481978	REC	SWA
		-32.32517244	115.92398824		SWA
A		-32.26878181	116.01537597		SWA
B		-32.26128173	116.01537584		SWA
B		-32.24878233	115.95426467		SWA
B	GDA94	-32.36972222	116.00833333	NPK	PEH

B		-32.34906187	115.90093314	VER	SWA
		-32.29850512	115.95315439	VER	SWA
		-32.29544956	115.95065435	VER	SWA
		-32.35711663	115.97371088	RRE	SWA
		-32.36739447	115.97843327	PFL	SWA
B		-32.36545004	115.97565546	VER	SWA
C		-32.21961515	115.97037525	VER	SWA
	GDA94	-32.29888889	115.96944444	VER	SWA
		-32.42878285	116.07676740	FOR	PEH
A		-32.34100626	115.89843301		SWA
		-32.43211734	115.98482323		SWA
		-32.35045122	115.86426658		SWA
		-32.35933925	115.94315544	VER	SWA
		-32.23072600	116.00176425	UNK	PEH
D		-32.37850541	116.00287784	NPK	PEH
		-32.21850361	116.00454182	REC	SWA
A		-32.21989294	115.96926415		SWA
		-32.29656048	115.96732099	VER	SWA
	GDA94	-32.36722222	115.97138889	REC	SWA

LOCATION

Approx. 1.6km E of King Rd on Leipold Rd, between drain and road reserve. (6km WNW of Mundijong).
Abernethy Rd, Oakford. Between Kargotich Rd and the Railway line.
Yangedi Swamp. 0.6 km N of Elliot Rd, at ca 1.5 km E of the junction with Yangedi Rd.
5 km ESE of Byford on both sides of Nettleton Rd. Gordon Forest Block - SF 22.
700 meters east along Scrivener Road from junction with South West Highway. Plants situated on the steep ro
Serpentine National Park. Population is situated 75 meters at 50 degrees from population 4H.
Kargotich Rd, 0.8 km south of Mundijong Rd.
Mundijong townsite, ca.200m W of Paterson Rd on Mundijong Rd, woodland beside tennis courts.
Lowlands Farm. 1km west of T-junction of Hopelands Rd & Rowe Rd, then ca 400m north of southern boundar
Lowlands farm. ca 1km SW of shed.
Between Hall Rd and the Railway line, at 250 m N of Karnup Rd, Serpentine.
Small linear remnant along Mundijong Rd, ca 2 km W of the intersection with South West Hwy.
Serpentine, Spring Valley Road
700 meters east along Scrivener Road from junction with South West Highway. Plants extend from population
Serpentine National Park. Population is situated 86 meters at 37 degrees from the north east corner of loc. 171
Serpentine National Park. Population is situated 185 meters north along fireline from the north east corner of lo
West side of South Western Highway, ca 900m south of Norman Road. Ca 250m west & then 150m north.
Kargotich Rd, east side. Ca. 200m north of Gossage Rd, between the last power pole from Gossage Rd and th
Serpentine National Park, north bank of river at base of weir, adjoins large Pool to the west & is 75m drownstre
Serpentine National Park, 100m west of bridge over the Serpentine River leading to second carpark. 5m north
Lowlands; Serpentine River.
NW side of Thomas Rd, 900m SW of Anketell Rd. Lot 112.
Lowlands Farm. 1km west of T-junction of Hopelands Rd & Rowe Rd, then ca 150m north of south boundary o
NR No.23012, Watkins Rd, Mundijong.
East side of the junction of Karnup and Punrack Rds, Serpentine.
Serpentine National Park. W side of the track to Lucy Brook, 400 m north of Kingsbury Dr. The track runs north
Serpentine National Park. Population is situated 65 meters at 24 degrees along the fireline from the north east
From 250 to 600m west along Abernethy Rd from Hopkinson Rd, in the deep drain line ca. 8m from road in the
Lot 2 Abernethy Rd, Byford. This block starts ca. 490m west from Hopkinson Rd; plants in scattered groups thr
Mundlimup SF. Jarrahdale Rd, 9.15 km W of Albany Hwy. Around the fringes of Blue Rock. Herbarium Record
Chandler SF. Albany Hwy, 10.9 km SE of Canning Dam Rd. S side of Hwy, around E & S fringes of granite out
Serpentine National Park, approximately 500m east of the main falls swimming pool area. Plants are located o
Between Hall Rd and the Railway line, at 250 m N of Karnup Rd, Serpentine.
ca 250m WNW of Mundijong Rd & Duckpond Rd jnc.
Abernethy Rd, Oakford.
Serpentine National Park. Ca. 2.8 km NNE of Spencer Rd along Snake Brook.
Serpentine, About 1 kilometer east of South West Hwwy on Scrivener Road. . Coordinates for this and July 19
E side of Hall Rd, 400 m S of Karnup Rd, Serpentine. Between Hall Rd and the railway line.
200m south west of the Rowley Rd and Nicholson Rd junction. Loc 694 Lot 1.
400 m S of Karnup Rd on Hall Rd, Serpentine. Between Hall Rd and the Railway line.
Brickwood Reserve, Byford. Between Soldiers and Turners Rds. N of small creek and 0.9 km SSW of Byford S
W side of South Western Hwy, Lot 23, ca 1.1 km S of the junction with Norman Rd.
Serpentine National Park. Population is situated 445 meters north along fireline from the north east corner of lo
Population extends from south of Scrivener Road and west to the Serpentine National Parks western boundary
Serpentine Cemetery, corner of Gordon Rd and South-West Hwy. Plant is 18m at 150 degrees (south-south-ea
Kargotich Rd, south of Randell Rd. Road verge.
Serpentine National Park (28862), plants were translocated 8.5km from populations 1A, 1B & 1C.
Lowlands Farm. Ca 600m north of southern boundary of Farm, north of T-junction of Hopelands Rd & Rowe R
Between Turner Rd and Mead St on track past Aged Peoples Home.
Brickwood Res.No.17490, adj. to Soldier Rd, track along E boundary of res just N of small creek.
N side of Lowlands Rd, at approx 2.25 km W of the junction with Rapids Rd. N of residence.
W side of South Western Hwy, at ca. 1km S of the junction with Norman Rd, then into Lot 23 just N of dwelling
W side of South Western Hwy, at ca. 0.5km S of the junction with Norman Rd, then into Lot 22.
Kargotich Rd, east side. Ca. 200m north of Gossage Rd, between the last power pole from Gossage Rd and th
Serpentine National Park, 20m east along the upper walk trail from the southern junction of the large water pip

ca 800m W of Rowe Rd & Hopelands Rd T-jnc. 10m N of track on N road res.
SE side of Mundijong Rd - Kargotich Rd intersection, Mundijong.
40 m S side of Mundijong Rd at 200 m W of Kargotich Rd intersection, Peel Estate.
Between the railway line and the junction of Summerfield and Gull Rds, Serpentine.
Lambkin NR No.32352, corner of Leslie St & Hardy Rd, Serpentine; (is probable that species also occurs on V
E side of Hall Rd, 400 m S of Karnup Rd, Serpentine. Between Hall Rd and the railway line.
From 250 to 530m west along Abernethy Rd from Hopkinson Rd, on south and north sides of road.
Mundijong Rd, Mundijong. 150-250m E of Webb Rd on southern side of road within flora/road reserve.
Karnet Block. 850m N along Spencer Rd from jnc with Kingsbury Dr & 35m W to plant.
Lowlands farm. 1km W of T-jnc of Rowe & Hopelands Rd then 400m N of S bdy of farm. W of fence.
Keysbrook - Mandurah Rd.
Seasonal wetland adjoining Hymus Swamp. Ca 2 km N of Karnup Rd, at approx 1 km W of the junction with Ya
South verge of Karnup Rd, ca 0.45 km west of the junction with Rapids Rd.
Nettleton Rd, at 2.3 km SE from the junction with South Western Hwy.
Serpentine National Park. Population is situated 95 meters north along the parks western boundary from the no
Brickwood Reserve, Byford.
Lot 0 Abernethy Rd, Byford. Block is at corner of Abernethy and Hopkinson Rds.Plants in scattered groups thro
Mundijong Rd, between 550 and 580m east of the junction with Kargotich Rd.
Serpentine Sports Reserve (27453) bushland (near Paul Robinson Park).

VESTING	PURPOSE1	POPSIZE	OWNERDATE	NOTIFIEENA	SHIRE
SHI			1982-08-05 00:00:00		108
UNK			1981-03-23 00:00:00		108
PRI			1995-11-28 00:00:00	J Brickwood	108
LFC	FOR		1984-08-15 00:00:00		108
SHI	VER	250	1996-06-12 00:00:00		108
CC	NPK	9	1996-06-25 00:00:00		108
SHI	VER	0	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
UNK	UNK		1996-06-23 00:00:00		108
PRI		2	1990-09-25 00:00:00		108
PRI		12	1991-07-28 00:00:00	Mr MF Richardson	108
RAI	RRE	21	1990-11-27 00:00:00		108
SHI	VER		1992-01-20 00:00:00		108
			1976-07-18 00:00:00		108
CC	NPK		1996-06-12 00:00:00		108
CC	NPK	12	1996-06-20 00:00:00		108
CC	NPK	5	1996-06-20 00:00:00		108
PRI		0	1996-11-28 00:00:00	Mr and Mrs A Perrett	108
SHI	DRA	30	2000-03-28 00:00:00	Shire of Serpentine-Jarrahdale	108
CC	NPK		2000-01-18 00:00:00		108
CC	NPK	10	2000-12-19 00:00:00		108
			1992-08-13 00:00:00		108
PRI		30	1987-10-15 00:00:00	Mrs L F Njoo	108
PRI		3	1990-09-25 00:00:00	Mrs M. Richardson	108
CC	CFF	1000	1993-01-19 00:00:00		108
SHI	VER		1988-12-27 00:00:00		108
CC	NPK		1990-09-23 00:00:00		108
CC	NPK	102	1996-06-13 00:00:00		108
SHI	DRA	26	1999-12-08 00:00:00	Shire of Serpentine-Jarrahdale	108
PRI		2301	1999-12-08 00:00:00	B & C Tobia	108
CC	FOR	300	2002-05-30 00:00:00		108
CC	FOR	45	2002-05-30 00:00:00		108
CC	NPK	5	2003-10-08 00:00:00		108
SHI	VER	21	1990-11-27 00:00:00		108
UNK		150	1992-08-10 00:00:00		108
SHI	VER		1981-03-23 00:00:00		108
CC	NPK	50	1990-07-08 00:00:00		108
SHI	VER		1976-12-07 00:00:00		108
RAI	RRE	18	1990-11-27 00:00:00		108
PRI		0	1988-09-15 00:00:00		108
RAI	RRE	221	1990-12-04 00:00:00		108
SHI	REC	82	1990-11-27 00:00:00		108
PRI			1995-11-01 00:00:00		108
CC	NPK	18	1996-07-08 00:00:00		108
SHI	VER	800	1991-07-02 00:00:00		108
SHI	OTH	1	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
SHI	VER	0	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
CC	NPK		2001-06-15 00:00:00		108
PRI		1	1990-09-25 00:00:00		108
BAP	OTH	20	1990-11-27 00:00:00	Ken Ridge	108
SHI	REC	10	1990-11-27 00:00:00	Shire of Serpentine-Jarrahdale	108
PRI			1994-06-15 00:00:00		108
PRI		100	1996-08-02 00:00:00	Mr & Mrs A. Perrett	108
PRI		100	1996-08-02 00:00:00	Mr & Mrs A. Perrett	108
PRI		30	2000-03-28 00:00:00	Mr and Mrs F Giannini	108
CC	NPK		2000-01-18 00:00:00		108

SHI	VER	1	1990-09-25 00:00:00		108
SHI	VER	44	1990-12-04 00:00:00		108
SHI	VER	299	1990-12-04 00:00:00		108
RAI	RRE		1985-02-01 00:00:00		108
CC	PFL	100	1996-04-21 00:00:00	Telstra Corp.	108
SHI	VER	18	1990-11-27 00:00:00		108
SHI	VER	39	1999-12-08 00:00:00	Shire of Serpentine-Jarrahdale	108
MRD	VER	50	2001-12-03 00:00:00	MRWA,Shire Serpent./Jarrahdale	108
LFC	FOR	1	1992-01-24 00:00:00		108
PRI		1	1990-09-25 00:00:00		108
UNK			1977-11-16 00:00:00		108
PRI			1994-06-15 00:00:00		108
SHI	VER		1995-11-09 00:00:00		108
UNK	UNK		1981-09-18 00:00:00		108
CC	NPK	40	1996-06-14 00:00:00		108
SHI	REC		1992-12-29 00:00:00		108
PRI		2974	1999-12-08 00:00:00	B & C Tobia	108
SHI	VER	326	1999-11-24 00:00:00	Shire of Serpentine-Jarrahdale	108
SHI	REC		2001-12-03 00:00:00	Shire Serpentine/Jarrahdale	108

SHEETNO	LATDEG	LATMIN	LATSEC	LONGDEG	LONGMIN	LONGSEC
5152	32	16	33.0	115	55	23.0
6161	32	14	0.0	115	57	0.0
8572	32	26	11.0	115	53	25.0
9770	32	14	15.0	116	3	0.0
11239	32	22	50.0	115	59	57.0
11257	32	22	30.0	116	0	6.0
16286	32	18	21.0	115	57	7.0
17255	32	18	1.0	115	58	49.0
3955	32	20	49.0	115	53	50.0
4048	32	20	24.0	115	53	20.0
6319	32	21	38.0	115	58	25.0
7896	32	17	54.0	115	57	49.0
10987	32	22	0.0	115	58	23.0
11243	32	22	50.0	115	59	57.0
11251	32	22	40.0	116	0	3.0
11255	32	22	35.0	116	0	3.0
15325	32	16	7.0	116	0	35.0
16287	32	15		115	57	10.0
16753	32	22	11.0	116	0	34.0
16756	32	22	12.0	116	0	17.0
18523	32	21	0.0	115	53	3.0
1153	32	12	45.0	115	54	30.0
3954	32	20	57.0	115	53	50.0
3997	32	18	12.0	116	0	8.0
6169	32	21	57.0	115	55	55.0
11135	32	25	47.0	116	5	8.0
11248	32	22	40.0	116	0	4.0
16279	32	13	17.0	115	58	2.0
16281	32	13	17.0	115	57	51.0
19289	32	19	43.0	116	6	53.0
19290	32	16	21.0	116	10	9.0
20956	32	21	23.7	116	0	57.0
6318	32	21	38.0	115	58	25.0
5184	32	17	30.0	115	53	7.0
7897	32	15	0.0	115	57	0.0
11134	32	23	58.0	116	4	31.0
11215	32	22	0.0	115	58	0.0
6316	32	22	0.0	115	58	27.0
3932	32	10	56.0	115	55	15.0
5911	32	22	0.0	115	58	30.0
6320	32	13	51.0	116	0	12.0
8725	32	16	12.0	116	0	48.0
11259	32	22	35.0	116	0	3.0
11261	32	23	15.0	116	0	0.0
16283	32	21	44.0	115	59	30.0
16284	32	18	50.0	115	57	7.0
20955	32	24	0.0	116	5	0.0
3956	32	20	43.0	115	54	26.0
5202	32	13	46.0	116	0	5.0
5203	32	13	50.0	116	0	12.0
7851	32	19	35.0	115	55	21.0
8569	32	16	12.0	116	0	50.0
8570	32	15	45.0	116	0	50.0
16288	32	15		115	57	10.0
16754	32	22	11.0	116	0	30.0

4050	32	21	1.0	115	53	58.0
5912	32	17	59.0	115	57	6.0
5913	32	17	48.0	115	56	57.0
5920	32	21	30.0	115	58	20.0
8567	32	22	7.0	115	58	37.0
8770	32	22	0.0	115	58	27.0
16280	32	13	15.0	115	58	8.0
18625	32	17	56.0	115	58	10.0
3692	32	25	48.0	116	4	31.0
4049	32	20	32.0	115	53	49.0
5916	32	26	0.0	115	59	0.0
7852	32	21	6.0	115	51	46.0
8653	32	21	38.0	115	56	30.0
8718	32	13	55.0	116	0	1.0
11249	32	22	47.0	116	0	5.0
11835	32	13	11.0	116	0	11.0
16282	32	13	16.0	115	58	4.0
16285	32	17	52.0	115	57	57.0
18630	32	22	2.0	115	58	17.0