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Bushfire Risk Management in Road Reserves

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From the Roadside Conservation Committee

Roadside vegetation plays an important role in the conservation of Western Australia's plants and animals. In heavily cleared landscapes, the vegetation in the road reserve acts as a wildlife highway, enabling animal movement between large patches of bush. It also provides essential habitat. In some areas rare animals, such as the Carnaby's cockatoo, breed in the hollows of roadside trees. In addition, more than 50 per cent of threatened plants have at least one population on a roadside, and some species depend on roadside vegetation for their continued existence.

The Forest Biome (Pyro-region)

Forests occur across the most densely populated region of Western Australia and have very different vegetation, soils, landforms and climates when compared to Was other Biomes, e.g.,:

- Loamy soils, higher rainfall: karri (and marri) and tingle species with often tall, dense understorey
- Poorer lateritic soils: jarrah and marri with low shrubby understorey
- Wet, loamy gullies: bullich and blackbutt with dense understorey
- Holocene dunes: low woodland of banksia and peppermint
- Swamps: tea-tree, paperbark and sedges
- Open jarrah and wandoo woodlands in the east

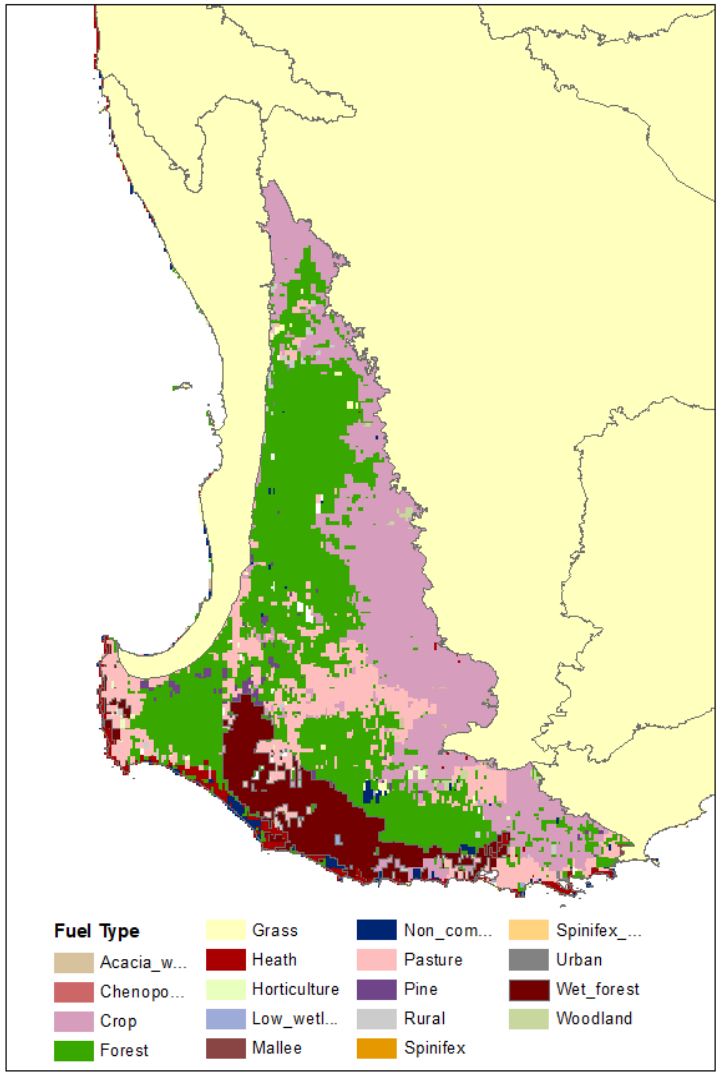
Forests can be broadly classified into high flammability and low flammability habitats.

1. High flammability habitats: burn even under mild weather conditions, or low fire danger ratings, because they contain continuous, dry fuels. These include upland forests, woodlands and some heath vegetation complexes. These habitats form the greater part of most forest landscapes.

2. Low flammability habitats: usually only burn under warmer, drier conditions because they either stay damp for a longer period or the fuels are sparse or discontinuous. These include rock outcrops, peat swamps, riparian zones and some heath vegetation complexes. While characterised as low flammability, these habitats can burn with high intensity under higher fire danger rating conditions. Fire sensitive species are found in the low flammability habitats.

Fire is essential to cue germination, to temporarily reduce competition and seed predators, and to prepare a nutritious seed bed for developing seedlings. Generally, about 60-70% of plants in the jarrah forest will re-sprout after fire while 30-40% depend upon seed. This ratio is reversed for karri forests and wandoo woodlands.

Scientific research shows that a minimum recommended fire interval for forest habitats is 5 to 7 years, depending on rainfall, based on the slowest maturing plant species and to allow seed bank replenishment. Maximum fire interval for fire sensitive species is about 40 years.



Fuel Structure

- When managing fire, we manage fuel load arrangement and continuity (both horizontal and vertical)

Threats to roadside vegetation

The long thin nature of road reserves leaves them highly vulnerable to Edge Effects, i.e., increased exposure to:

- Traffic,
- Light,
- Water,
- Wind,
- Weeds,
- Nutrient (fertilizer run off),
- Dust,
- Herbicides and insecticides (overspray),
- Increased grazing pressure (livestock, ferals and wildlife),
- Loss of species
- Impaired ecological processes
- Pathogens (dieback)
- Fire, and
- Management actions (slashers, flails , saws etc.)

Frequency of disturbance

- Many species are destroyed or impaired by fire (mallets, banksias, goldfields trees etc).
- These species need to be able to grow to produce viable quantities of seed between fires, (e.g. At least 15 year for many banksias and some eucalypts. If fire happens more frequently these species are lost.
- Fragmentation and loss of species means that when a species is lost to an area it usually cannot return.
- When these species are lost, they are replaced by short lived and flammable species such as disturbance opportunistic shrubs and grasses.
- In this way overmanaging fuel loads in many systems actually increases fire risk.

Contemporary Fire Regimes

As a rule of thumb that minimum interval should be twice the juvenile period of the most fire-sensitive species (e.g., >6 years in Jarrah forest, >15 years in Banksia woodland). If fire frequency exceeds this interval, then species will be lost from that environment. Those species that are lost, will be replaced by species with a shorter life cycle (i.e., weeds and native opportunists).

Analysis of reserves in the Wheatbelt by Parsons and Gosper (2011) determined the average time between fires from 1983 to 2004 was:

- 339 years in small remnants 100-500 ha
- 67 years in large remnant >500ha
- 40 years east of the clearing line.
- About 80% of Wheatbelt nature reserves <500ha

Surface water runoff and channelling

- Water runoff from hard paved or compacted surfaces greatly increases the amount of water channelled into surrounding soils and vegetation.
- This fast-moving water promotes the growth of weeds, and other bushfire fuels, and is a major cause of soil erosion, it also carries chemicals and other pollutants into nearby wetlands and water supplies.
- Native vegetation stabilises surrounding soils, increasing resilience to soil erosion and (through shading, uptake of nutrients and water) repressing weed development.
- Surface water runoff represents a major risk to roads and surrounding infrastructure (e.g., signs, barriers, recreational areas, fences, pipelines, power supplies, telecommunication cables, water points etc.)

Fauna issues

Excess weed and grass growth caused, by surface water runoff, attracts grazing animals and the animals that prey upon them, including:

- Livestock,
- Goats,
- Emus,
- Rabbits,
- Kangaroos,
- Eagles

and in more arid areas,

- Camels,
- Brumby's and Donkeys.

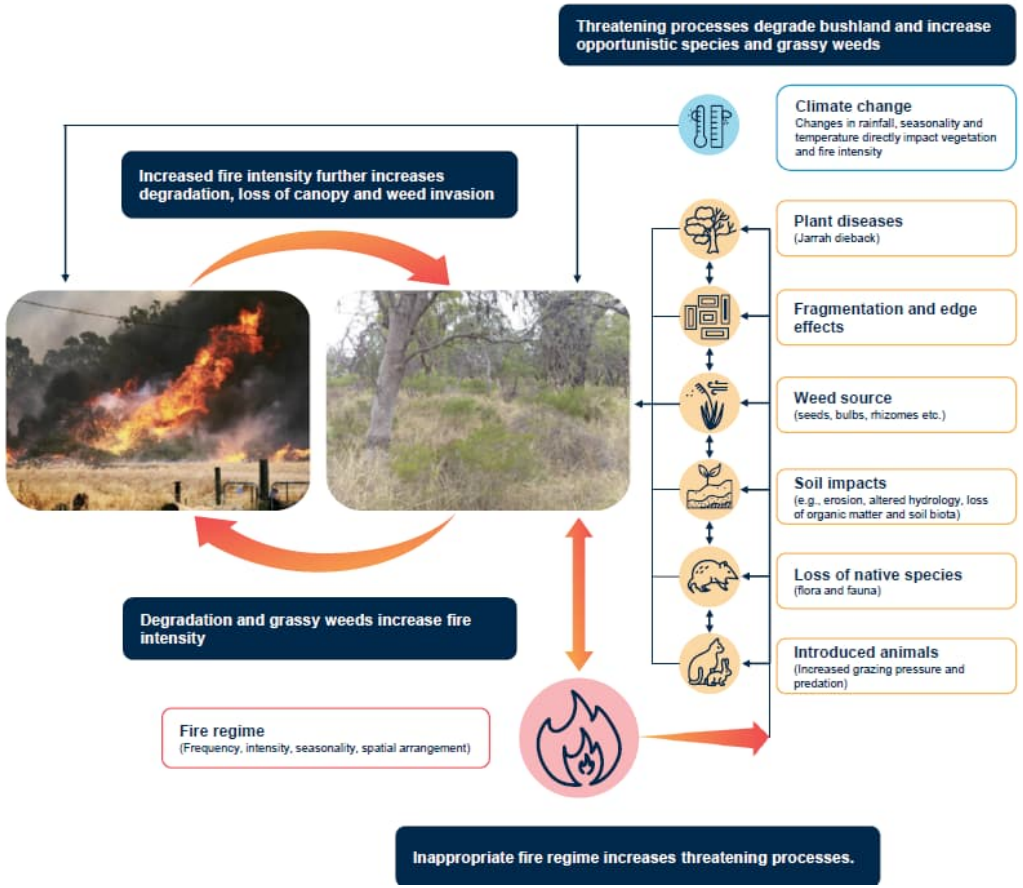
These animals have a major impact on native vegetation and can represent a serious risk to traffic.

In *good quality* Forest systems, fuel continuity is relatively high.

We acknowledge that this is not always the case

- Vegetation management is never simple.
- Never hesitate to ask a Subject Matter Expert (BTS Ecologists and regional DBCA conservation staff)

Compound affects



Fires Rarely Start in, Roadside Veg.

- Nor are they usually carried by it

So how do we manage?

By addressing the following questions:

- What **needs** to be protected?
- What are the **actual** threats?
- What are our **biodiversity assets** and what are their requirements?
- Are our actions and **effective and sustainable** means of protecting assets?
- What are the **consequences** of our actions?
- Can we change our approach and activities?
- Are subject matter experts available?
- What resources are available?
- Always monitor and apply adaptive management principles.

Planning considerations

1. Define treatment objectives	• What is the purpose of the treatment? • To what extent does it complement other mitigation actions?
2. Identify environmental and cultural assets that may be impacted by treatments	• Use available data sources to identify assets. • Refer to mitigation mapper.
3. Determine the vulnerability and value of the asset	• What is the level of threat? • What are the potential consequences of the activity?
4. Minimise impacts to environmental assets	• Will the treatment cause any unacceptable environmental harm, such as affecting rare or protected species or communities? • Can these impacts be minimised? • Have previous treatments caused environmental harm? • Can this previous harm be ameliorated? • Seek ecological guidance.
5. Minimise impacts to cultural assets	• Could heritage values be affected by disturbance treatments? • Engage with TOs to determine appropriate management actions.
6. Consider the structure and condition of the site-specific vegetation.	• What is the fuel structure of the vegetation? • What are suitable treatments for each vegetation type? • Are plant pathogens (e.g., dieback) present? • What weeds are present? • How are these weeds best managed? • Is fauna (e.g., rabbits, pigs, camels, livestock, kangaroos) an issue and determine how these species can be effectively managed? • What activities can be undertaken to mitigate above impacts?
7. Consider soils	• Are the soils subject to compaction, erosion or an acid sulphate risk?
8. Consider topography	• Have landscape factors such as slope, aspect and hydrology been taken into account to determine machine and treatment suitability?
9. Consider hydrology	• Is the site a wetland or groundwater recharge area? • Does it feed onto a wetland or recharge? • Following treatment will water flow into a reserve or farmland? • Is the area to be treated vulnerable to erosion?
10. Determine vulnerable infrastructure.	• Will infrastructure assets (e.g., pipelines, power poles, fences, buildings, water points, parking bays, tourist sites) be impacted? • How can these impacts be minimised or mitigated?
11. Catalogue resources	• Are suitable machines, and appropriately skilled project staff available to undertake the work? • Have all stakeholders, traditional owners, and specialist technical advisors been identified and consulted?
12. Environmental approvals process	• Refer to the environmental approvals process flow charts on BRMS
13. Determine appropriate management actions	• After considering all the above, determine the most effective and sustainable management actions.


What do we want the future to look like?