CAPRICORN COAST

Fire management guidelines

Appropriate fire management practices to help land managers plan hazard reduction burning and undertake planned burns to improve production and conservation outcomes

QUEENSLAND FIRE & BIODIVERSITY CONSORTIUM

a program of Healthy land & water

QUEENSLAND FIRE AND EMERGENCY SERVICES

Queensland Government

REEF CATCHMENTS

FLS Fire & Landscape Strategies

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Introduction

The bushfire risk on the Capricorn Coast has increased in recent years. The damage caused by Cyclone Marcia in 2015 increased the fuel load for the area. This higher fuel load, combined with a drier and hotter climate, could further increase the incidence of bushfires and associated economic and environmental impacts. Rural communities recognise the threat of these fires and their effects on life, property, productivity, and the environment.

The Fitzroy Basin Association (FBA) is one of 12 regional groups for Natural Resource Management (NRM) in Queensland, and looks after the Central Queensland region. Their aim is to grow a sustainable, productive and profitable Fitzroy region. FBA has an outstanding reputation locally across Queensland and nationally for developing and delivering effective and efficient programs that work with local community, stakeholders and investors to protect the region's natural assets. For more information, visit fba.org.au.

The Queensland Fire and Biodiversity Consortium (QFBC) is a collaborative network of land managers and stakeholders who are committed to improving fire and biodiversity management, supporting applied fire research, facilitating partnerships and building land manager and landholder capacity. Through education, community engagement and applied research, the QFBC builds the capacity of land managers and private landholders across Queensland. The QFBC is a program of Healthy Land & Water, the peak environmental group for South East Queensland. For more information visit www.fireandbiodiversity.org.au.

The original fire management guidelines for Capricorn Coast were developed by Fire & Landscape Strategies. They have been updated by the QFBC, in partnership with Queensland Fire and Emergency Services (QFES), volunteer rural fire brigades and fire wardens. Together, these groups have taken up the challenge of providing the best information available on fire management and planning in the region. These fire management guidelines are the culmination of extensive discussions with experienced fire wardens, members of volunteer rural fire brigades and other respected fire managers and fire scientists.

These guidelines are intended to be used by volunteer rural fire brigades and landholders, who are the front line fire managers in rural communities. They are intended to be used to help land managers plan hazard reduction burning and undertake planned burns for improved production and conservation outcomes.

Using these guidelines

The purpose of these guidelines is to support fire management decisions in the Capricorn Coast region. Information about why and how to burn is presented for the 17 landscapes across the region. These landscapes are based on vegetation that require similar fire prescriptions. It is important to note that the information provided is simply a guide for typical situations, and there will be circumstances where a different approach is appropriate.

Five important factors to consider when planning for fire management are:

- **Fire frequency** – how often should an area be burnt?
- **Fire intensity** – how hot does the fire need to be?
- **Fire season** – what time of year will usually provide the desired conditions for a planned burn?
- **Burning mosaic** – the pattern and percentage of ground fuel remaining unburnt after a fire.
- **Ignition technique** – how a fire can be implemented to achieve its purpose.

Other important factors to consider are fuel loads, wind speed, temperature, humidity, fuel curing, slope and aspect.

These guidelines are not intended to account for all circumstances. Annual, seasonal and even daily conditions can vary dramatically. Plan ahead and carry out burns when conditions are suitable. Often, it is preferable to begin burning in the mid afternoon, when the temperature will soon drop and humidity is increasing, so that conditions will become milder as the fire spreads. Always obtain and adhere to conditions of a permit from your fire warden.

Each landscape has a dashboard with recommendations for each fire factor.

Fire frequency describes how often a fire burns through an area. An 'area' could be a paddock, a block contained between tracks, a hill or a catchment between creeks.

A large area may receive annual or biennial fires that burn different patches. It is important to note that a fire frequency of every two years does not mean the entire block is completely consumed every two years. It means that some fire is implemented biennially within an area.

GREEN Under most circumstances the number of years between burns should fall within the GREEN range. This range is generally considered appropriate for hazard management, production and conservation outcomes.

ORANGE Under some circumstances there may be a need for more or less frequent fire, but this should fall within the ORANGE range. Generally, this would occur as a 'one off' (e.g. two fires in three years to reduce a lantana infestation or to thin excessive wattle saplings that germinated after a wildfire).

RED Generally, it would be considered undesirable for fire frequency to fall within the RED range. For example, long periods of time between fires would result in undesired vegetation thickening and loss of pasture productivity.

NOTE: Frequency is defined by 'typical years' and can be misleading (e.g. in times of drought or particularly high rainfall). A typical year would be defined by having received ± 20% of the local average annual rainfall.

This symbol indicates landscapes where burning is generally not recommended.

Fire season describes times of the year with particular weather conditions that impact fire, including rainfall, temperature, wind patterns and humidity.

Burning operations need to take into account annual variations in weather, however general seasonal patterns are useful for planning fires.

GREEN Under most circumstances the desired conditions will be available within the GREEN season/s.

ORANGE Desired fire conditions will sometimes fall within the ORANGE season/s. Specific requirements for a particular burn will vary under different circumstances (e.g. storm burning requires relatively high soil moisture).

RED Under most circumstances, conditions within the RED range of seasons will result in damaging fire and/or fire that is difficult to control.

Fire intensity describes the rate of heat released by a fire. This increases with the amount of fuel consumed and the speed of the fire front (i.e. a fast moving fire with a high fuel load will create a high intensity fire). Flame height also gives a rough indication of intensity. Fire severity is a related concept which takes into account impacts on vegetation, such as canopy damage.

LOW intensity fire has a flame height of typically < 1 m, with a fire front moving slower than walking speed.

MODERATE intensity fire has a flame height of typically 1 m to < 3 m, with a fire front moving at around walking speed.

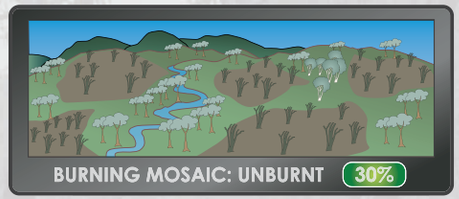
HIGH intensity fire has a flame height of typically > 3 m in height, with a fire front moving faster than walking speed.

GREEN Under most circumstances the fire intensity should fall within the GREEN range.

ORANGE Under some circumstances there may be a need for more or less intense fire, but this should fall within the ORANGE range.

RED Under most circumstances, fire intensities in the RED range will result in damaging fire and/or fire that is difficult to control.

Burning mosaic describes the pattern and proportion of burnt and unburnt fuels produced by a fire. A patchy, mosaic burn can be very effective in reducing the intensity and spread of future wildfire, without risking the complete loss of pasture grasses, soils, nutrients and unburnt habitat.



Unburnt patches retain mature plants which provide continuous seed supply, allowing seedlings to recruit in burnt areas. Patchily burnt mosaics will also protect the land from weed infestations or environmental damage that sometimes results from complete removal of the ground layer across large areas.

The intended burn mosaic often differs between fires for hazard reduction and conservation burning. For example, hazard reduction burns near infrastructure typically aim for a higher proportion of ground fuel consumed versus burns for conservation purposes.

Ignition technique describes the way a fire is ignited, which has a considerable effect on fire behaviour.

A fire lit from a continuous drip torch line rapidly reaches its maximum rate of spread and can produce a high intensity fire with a thoroughly burnt ground layer and canopy scorch. In contrast, a fire lit from several well-spaced spot ignitions is much slower to reach its maximum rate of spread and generally produces fingers of less intense fire with more unburnt patches.

Different ignition techniques are required for different circumstances. Multiple spot ignitions are typically used for conservation purposes, whereas drip torch lines produce a more thorough burn for hazard reduction purposes adjacent to infrastructure. When backburning in advance of a wildfire under high fire danger conditions, a fire line produced by spaced spots of ignitions can be easier to contain than a solid drip torch line. However, the spots will not create a burnt-out firebreak as quickly.

Where a fire is initially ignited is particularly important. For example, lighting from the top of a ridge to burn downslope, or from against the edge of a watercourse or scrub, may be necessary to protect fire sensitive vegetation from an intense fire. Multiple fires can be ignited in the same area on different days through a season to manage fuel consumption (ignite the drier fuels first), spread the duration of green pick (fresh grass regrowth) and extend the production of grass seeding.

Diagrams of the various ignition techniques are provided at the end of these guidelines.

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Australian Government

This project received grant funding from the Australian Government.

Thank you to the review team: Dr Paul Williams (Vegetation Management Science), Kira Andrews (Reef Catchments), Neil Kelso (QFES) and Dr Diana Virkki (Healthy Land & Water).

The Capricorn Coast region

The Capricorn Coast is a large area covering 2.6 million ha of the coastal plain from just north of St Lawrence, to south of Gladstone, and extending out to the coastal ranges west of Mount Morgan.

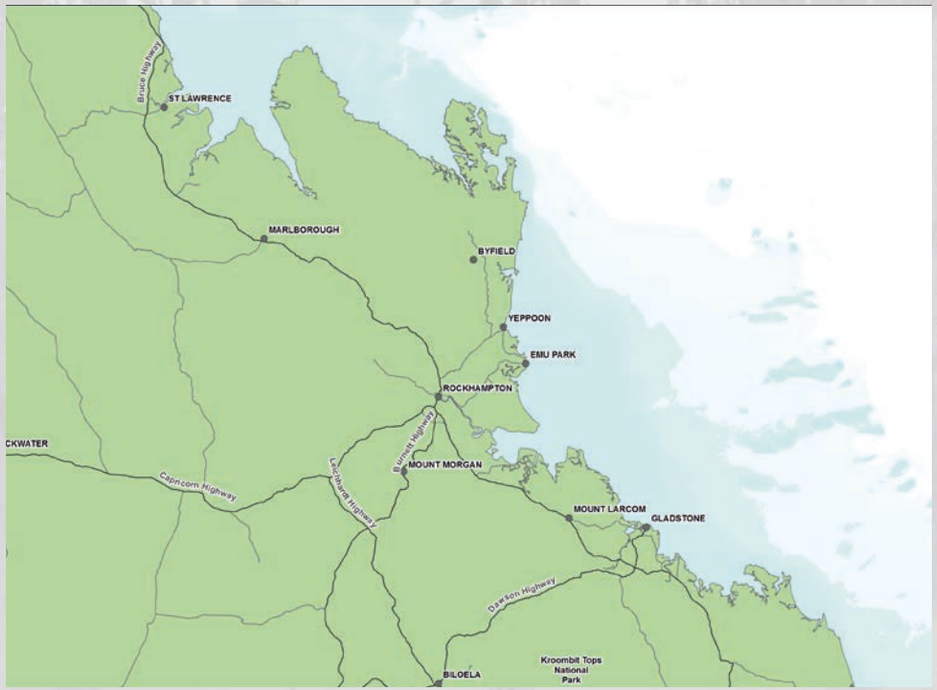
The area is the junction of the Central Queensland Coast (CQC), Brigalow Belt (BB) and South East Queensland (SEQ) bioregions, which causes a complex variation of landforms, soils, plants, birds and fauna.

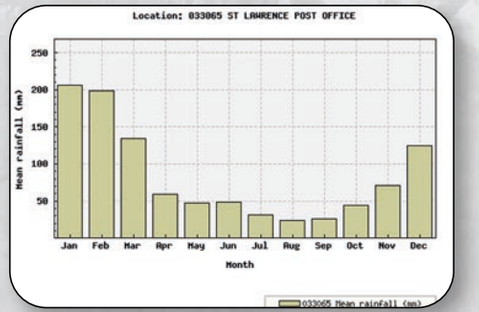
Some landscapes will have two main pictures due to variation in the vegetation type from the different bioregions. The rainfall also varies from the tropical Central Queensland Coast, through the dry tropics of the Brigalow Belt, and into the subtropical South East Queensland (see charts below).

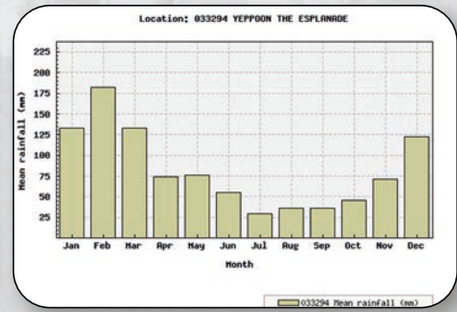
The area has been cleared for agriculture, pine plantations and improved pastures for grazing, with the coastal residential and rural residential areas expanding in recent years to service mining areas to the west. The variation in land use reflects the diversity of the natural landscapes.

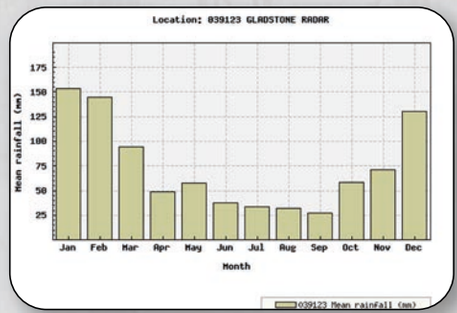
These guidelines aim to provide fire regimes for different landscapes that address three primary rationales for fire management: burning for hazard reduction; primary production; and conservation.

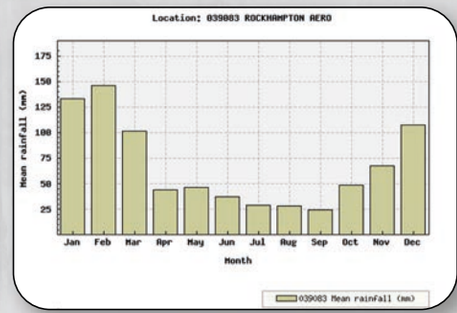
It is hoped that the guidelines will promote discussion among neighbours on the timing and use of fire in their landscapes, and lead to better fire management outcomes for the Capricorn Coast.



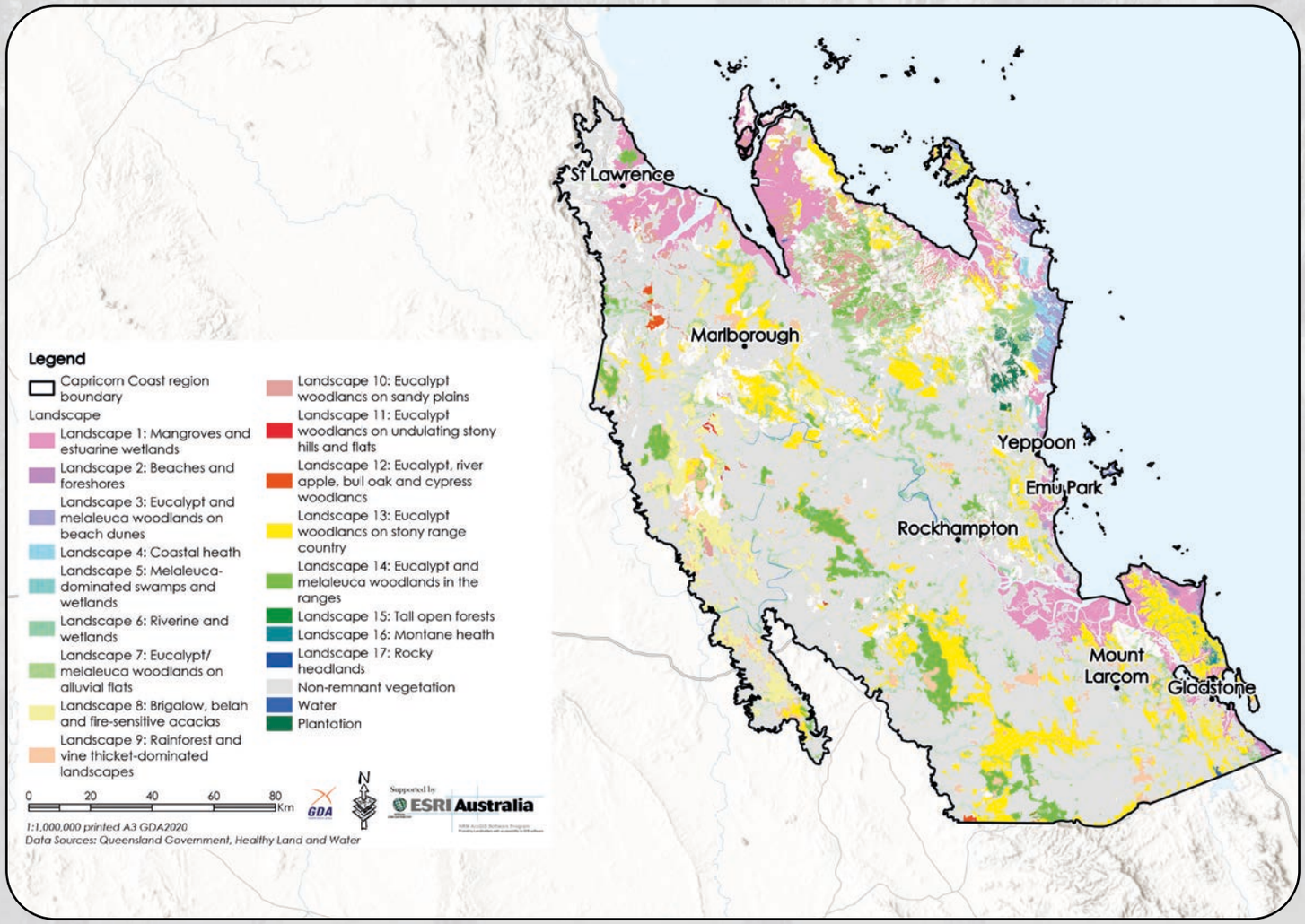








Landscapes of the Capricorn Coast



Landscapes are groupings of vegetation types within the Capricorn Coast. The above photograph has four main landscapes:

- The top of the rock is *Landscape 17: Rocky headlands*.
- At the bottom of the cleft, in the centre of the rock face is a dark green patch, which is *Landscape 9: Rainforest and vine thicket-dominated landscapes*.
- Around the rest of the base of the rock is *Landscape 14: Eucalypt and melaleuca woodlands in the coastal ranges*.
- The trees above the sand are coastal she-oak, which is *Landscape 2: Beaches and foreshores*.

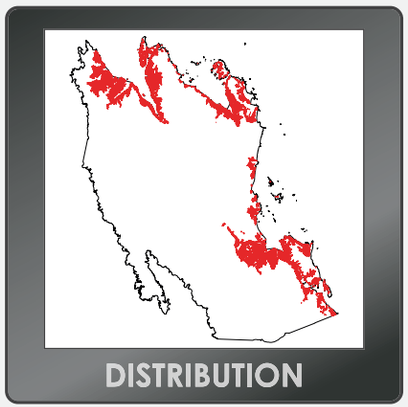
These fire guidelines are intended to be viewed at the landscape scale rather than a single, small property view. Similarly, a fire regime is a sequence of fires over time rather than a single event.

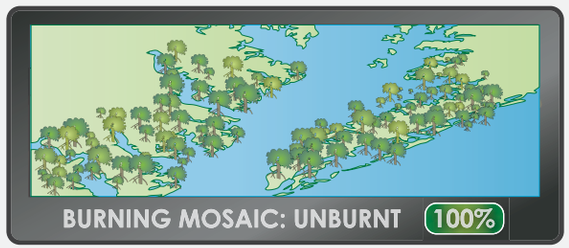
Mangroves and estuarine wetlands

including saltwater couch and saltmarsh flats

Landscape 1

Mangroves, saltmarsh, saltwater couch, saltpan vegetation, and fringing melaleuca forests and pandanus.





Mangroves and estuarine wetlands

including saltwater couch and saltmarsh flats

Barramundi (*Lates calcarifer*).

Beach stone-curlew or thick-knee (*Burhinus neglegtus*) (© Rosanne Houley, Fire & Landscape Strategies).

Regional Ecosystems

8.1.1	8.1.2	8.1.3
8.1.4	8.1.5	11.1.1
11.1.2	11.1.3	11.1.4
12.1.1	12.1.2	12.1.3

Hazard reduction

Saltmarsh and saltwater couch grasslands are regularly inundated by high tides, which maintains high soil moisture and ensures continual green growth throughout the year. As a result, these areas rarely represent a fire hazard risk, which is further minimised by the fact that the grasslands rarely accumulate large amounts of fuels and tend to be broken up by patches of saline clay and sparse saltmarsh.

The native groundcover within fringing melaleuca woodlands and forests is also saltwater couch, and this does not represent a high fire hazard. However, in many areas, Guinea grass and other exotic grasses have invaded. They can accumulate high fuel loads that pose a fire risk in the dry season.

Guinea grass and many other exotic grasses tend to quickly increase their biomass after fire, often reaching a similar fuel load in as little as one season. The most effective long-term fire hazard reduction strategy is to remove these grasses using an approved herbicide such as glyphosate.

Production

Mangroves are well-known habitat and nurseries for fish and crustaceans. More recently, it has become obvious that saltwater grassland and saltmarsh are critical feeding areas for many fish and crustacean species during high tide periods. A decrease in pasture biomass through fire or overgrazing will reduce the habitat value and, therefore, fisheries production.

Saltwater couch, high in protein and digestible, can be highly productive as cattle fodder. However, if grazed, take care to manage stock during higher tides because the wet soil will easily become rutted, which can result in more salt retention after high tides and eventual scalding. This can create large areas of bare soil, limiting the production value for fisheries and stock.

Conservation

These wetlands are important for the conservation of numerous species, including migratory and resident shorebirds and the water mouse (*Xeromys myoides*). Careful land management to maintain production values will also retain conservation values and benefit these species.

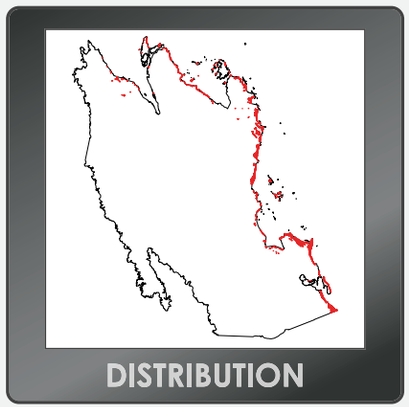
Maintaining these wetlands in a healthy condition by carefully managing grazing and avoiding fire will also help them filter excess nutrients and sediment from water runoff, preventing impact on coastal fringing reefs, seagrass beds, and the wildlife they support.

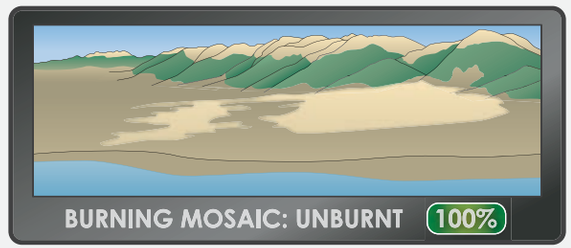
Water mouse or 'false water rat' (*Xeromys myoides*) (© Derek Ball, Wildmob).

Beaches and foreshores

including ‘beach scrub’

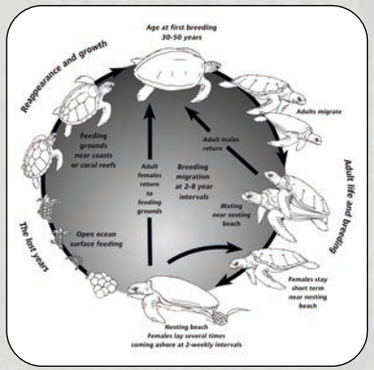
Landscape 2





Beaches and foreshores

including ‘beach scrub’



Turtle life cycle.

Bush stone-curlew (*Burhinus grallarius*) (© Rosanne Houley, Fire & Landscape Strategies).

Regional Ecosystems

8.2.1	8.2.2	8.2.5
8.2.6	8.2.10	8.2.14
11.2.2	11.2.3	12.2.2
12.2.11	12.2.14	

Hazard reduction

Coastal dunes are poor in nutrients, high in salt, exposed to other marine influences, and rarely accumulate sufficient fuel to support anything but a low intensity fire. Fuel reduction burns are better conducted within adjacent eucalypt and melaleuca woodlands.

In some cases, exotic grasses and weeds can make quite large fuel loads. Control of these invasive species is best done by applying herbicide because even very low intensity fire kills fire-sensitive canopy trees, such as beach she-oaks. Reducing weed impacts around buffers and in degraded areas by means other than fire will protect and facilitate recovery of these sensitive coastal areas.

Production

Many remaining areas of beach scrub are islands in a sea of cleared land. Remaining foreshore vegetation is the only buffer between land and sea. While undisturbed foreshores and beach scrubs are fairly resistant to weed invasions and the associated fire risk, smaller patches and disturbed areas are more vulnerable.

Disturbance by 4WD, stock trampling and feral pigs can encourage the spread of lantana and other weeds into otherwise intact areas. Managing stock access and providing shade and watering points away from beach scrub and foreshores will reduce the impacts of disturbance in the long term.

Conservation

Beach vegetation, such as she-oak woodlands, can effectively bind dune sands, which reduces erosion. Grasses and shrubs disrupt wind, cutting its speed at ground level, causing windblown sand to fall and replenish dunes.

Beach vegetation and she-oaks, in particular, are highly sensitive to fire. Even low intensity fires will cause death and consequent beach erosion. The loss of these trees also reduces shading and causes dune sand to become hotter. Because the sex of marine turtles is dependent on nest temperature, these changes can alter the sex ratio in turtle populations.

Beach scrubs are key habitats for many rare and threatened species. Reducing disturbance and weed management (rather than fire management) should be used to protect coastal habitats and wildlife, such as the bush stone curlew (*Burhinus magnirostris*) and orange-footed scrubfowl (*Megapodius reinwardt*).

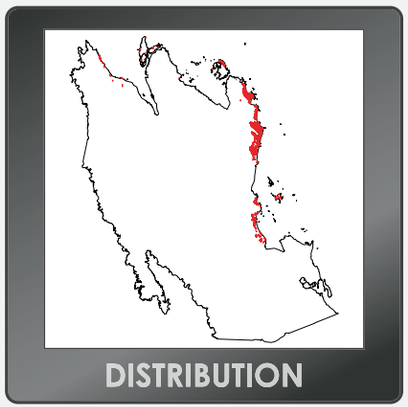
Orange-footed scrubfowl (*Megapodius reinwardt*) (© Rosanne Houley, Fire & Landscape Strategies).

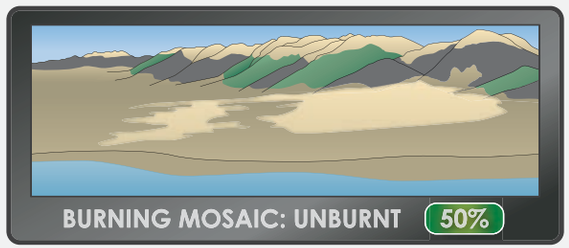
Eucalypt and melaleuca woodlands on beach dunes

Landscape 3

including associated wetlands in dune swales

Woodlands of Moreton Bay ash, poplar gum, paper bark, Queensland peppermint with wattles, weeping tea tree and coastal banksias as a shrubby understorey and/or sedges and grasslands on coastal dunes.





Eucalypt and melaleuca woodlands on beach dunes

Landscape 3

including associated wetlands in dune swales

Brush-tailed phascogale (*Phascogale tapoatafa*).

Hazard reduction

Vegetation on the back of beach dunes can pose a threat to people and adjacent infrastructure, including campgrounds. Some fuel reduction will likely be needed, especially where exotic grasses, such as Guinea grass, have built up. A low intensity fire with good soil moisture (e.g. shortly after a storm) followed by patch herbicide spraying of the recovering exotic grass tussocks should provide good results. Planned burning should not be any more frequent than every three years.

Native grasses generally do not accumulate large amounts of fuel compared to exotics, so control of weed grasses will reduce the need for hazard reduction burning and therefore long-term management costs. Wetlands and swamps may be used as firebreaks while holding water because they retain green vegetation even when the surrounding areas become flammable.

Production

Clearing and introducing exotic pasture species, coupled with the impacts of stock, can severely damage fragile dune systems. It typically causes an increase in weeds, such as rubber vine. Generally, these areas do not support productive pastures. Grazing pressure simply produces a reservoir of exotic weeds that spread into more valuable grazing lands nearby. If weeds such as rubber vine are present in significant densities, fire can be used to gain initial control.

Rubber vine seed, seedlings and young plants are fire sensitive. Fire will shrink larger plants, allowing more efficient and cost-effective follow up chemical control. The longer the stems are heated by fire, the better the result will be. For best results, use a moderate intensity backing fire and burn with good soil moisture.

Conservation

In general, fire should be used only for regeneration of native grasses, herbs and canopy trees, weed control and fuel hazard management. Carefully monitor vegetation responses. Some areas contain a native grass layer, especially kangaroo grasses. Regular low intensity fires will benefit this habitat.

Coastal landscapes support a diverse range of plants and animals, but some habitats are vulnerable to disturbance. Some areas may be supporting beach scrub pioneer species in the understorey and will naturally revert to beach scrub – actively exclude fire from these areas. For weed management, burn to gain initial control of weeds with follow up spraying with a suitable herbicide.

The brush-tailed phascogale (*Phascogale tapoatafa)*, a small carnivorous mammal, nests between June and September. The nests are often made of dry strips of bark, fur and feathers in hollows, stumps and under logs. They forage for insects and will tear bark away to access hidden prey. Soil moisture and low intensity fires will help protect their nests.

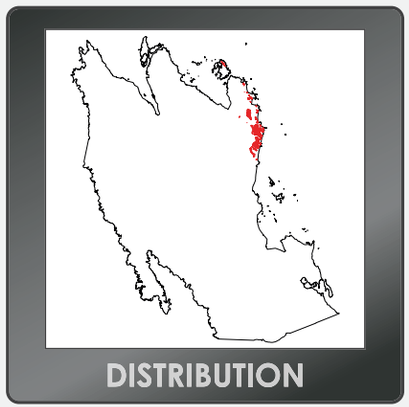
Use a low intensity fire no more than once every 4 – 6 years and burn with good soil moisture. Four indicators of successful fire management include germination of canopy trees species, maintained native grass density, fauna abundance and reduced exotic grass dominance.

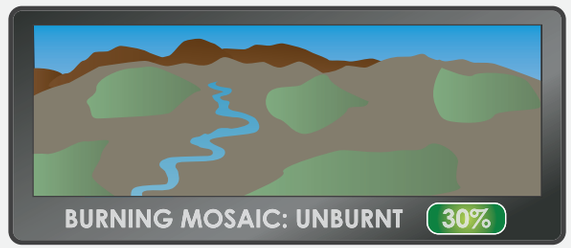
Regional Ecosystems

8.2.8	8.2.9	8.2.13
11.2.1	11.2.4	11.2.5

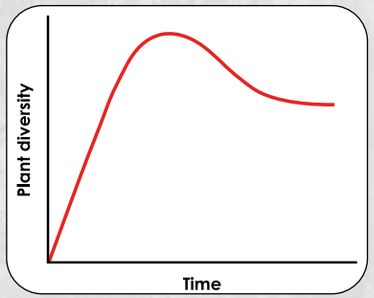
Coastal health

Mixed vegetation of tea trees, brush box and swamp mahogany, banksias, hakeas, black she-oak, grass trees to open sedge and grass lands. Coastal heath can be wet and swampy or dry in the sand dune system.





Coastal health



Plant diversity over time.

Hazard reduction

Coastal heaths are highly flammable because of the density of surface and elevated fuels and the abundance of oil glands in plant leaves. After the wet season, the sandy profile and strong coastal winds can dry out soils rapidly. Wet heaths can be swampy, often with standing water and a peat layer underneath. The peat layer is old plant material and when dry, it will readily combust and smoulder for weeks. Long unburnt coastal heath can burn with high fire intensities and be very difficult to suppress. In the Capricorn Coast region, heath grows adjacent to some residential areas.

Hazard reduction activities should be planned around the heath fuel load, age since last fire, soil moisture and wind. Indications of the time since last fire include the development of old dead plants in the canopy, abundant seed on plants, and a thick layer of dead material within the heath. Generally, the frequency of burning should not be less than three years to allow seed-bearing plants to mature and set seed before the next fire.

Plan to burn from the wet season until the mid dry season. Do not burn wet heath unless standing water is present because a peat layer fire could start. Peat can smoulder for long periods, spreading fires by burning under breaks. A series of ignitions may be needed to get the heath burning, but be aware – when heath is alight, it will burn with moderate to high intensity.

Production

Heath does not offer any opportunity for broadscale production of horticulture or grazing. In some areas, there are small apiary and wildflower assets that benefit from regular burning, but this would not generally override or contradict hazard reduction or conservation priorities.

Conservation

To maintain a diverse heath in good condition, regular fire is necessary. After ten years without fire, large shrubs and dense sedges and ferns smother small heath plants. Burning removes old dormant growth and stimulates fresh shoots, flowering and seed germination of a wide range of plants. Fire is important for releasing seeds from capsules and breaking seed dormancy.

Examples of plants of the Capricorn Coast region that require regularly burnt heath (e.g. every 3 – 5 years) are Christmas bells and tiny wattle. Flowering of heath plants provides food for birds and is most abundant around 3 – 8 years after fire.

When burning, it is critical to ensure the soil is moist to promote rapid plant regrowth and prevent excessive fire intensity. Dry coastal heath will be best burnt during the wet season through to the early dry because the sand mass does not retain high moisture levels. Plan to burn wet coastal heath from the early to mid dry when standing water is present to prevent a peat fire in the ground layer.

Take note of likely changes in wind speed and direction, which are common in coastal environments. Burning that leaves significant unburnt patches is tricky in heath because of its flammability. Start lighting fires near the end of the wet season when the fire will not travel extensively, and continue ignitions weeks later.

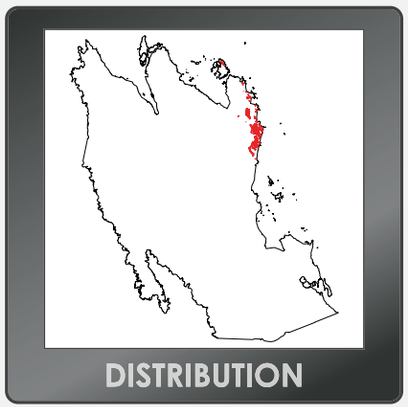
Regional Ecosystems

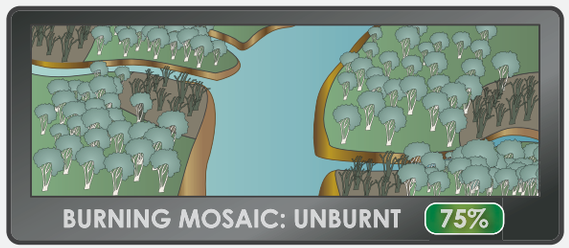
8.2.3a 8.2.3d 8.2.4a
8.2.4b

Melaleuca-dominated swamps and wetlands

Landscape 5

Melaleuca (paperbark) swamps and sedge lands in low lying coastal areas.





Melaleuca-dominated swamps and wetlands

Regional Ecosystems

8.2.4c	8.2.7	8.2.11
8.2.12	8.3.13a	8.3.13b
11.3.27	12.2.15	12.3.5
12.3.6	12.3.12	

Hazard reduction

Paperbark swamps produce a very high fire hazard and grow adjacent to residential areas. Swamps and wetlands can act as natural firebreaks in the wet and very early dry season while standing water remains. However, they will carry fires of very high intensity in the mid to late dry season. Spotting embers from paperbark trees can cause a fire to jump breaks or land on roofs, igniting buildings.

Disturbance may cause exotic grasses and weeds to grow around the wetland fringes and where water flow has been altered. Ponded pasture grasses can dominate wetter areas. Guinea grass, olive hymenachne and para grass can fuel intense damaging fires. In residential areas adjoining these wetlands areas (interface zone), the high fuel load of exotic grasses in combination with paperbark can cause intense flare-ups as the fire burns to the tops of the trees. Interface zone areas need separation between the houses and vegetation roads or fire lines and fire protection zones where the edge fuels are reduced more regularly than the rest of the swamp or wetland area.

Regular burning to protect property or control weeds is necessary but must be carefully managed. Protection zones should be burnt every 3 – 6 years. It is important to keep fire intensity as low as possible because high intensity fires in paperbark forests during dry conditions will promote a dense thicket of paperbark saplings, increasing the subsequent fire hazard. Night burning is useful to minimise fire intensity in swamps. Fire can reduce weed infestations temporarily, but it is crucial to burn while moist to reduce fire intensity and risk.

Production

Many areas of coastal paperbark swamps are grazed, although pasture development is limited as they may be inundated for 3 – 6 months of the year. Some areas of coastal melaleuca swamps have been modified to establish ponded pastures. These areas commonly include para grass or olive hymenachne, a Weed of National Significance, which can completely choke out wetlands. Heavy dry season grazing can reduce the extent and density of weeds when fire risk is the greatest. Burning to reduce infestations can be effective. It is best done in conjunction with grazing to reduce fuels and damage to wetlands. Burning in land adjacent to melaleuca swamps should ensure hot fires do not scorch edges or intrude into the wetlands.

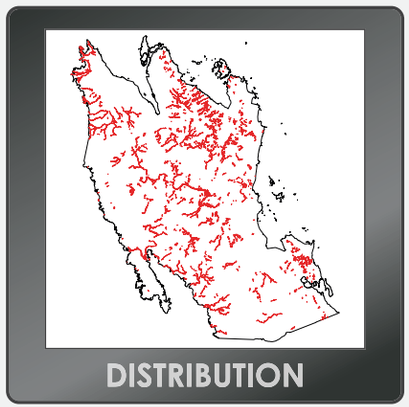
Conservation

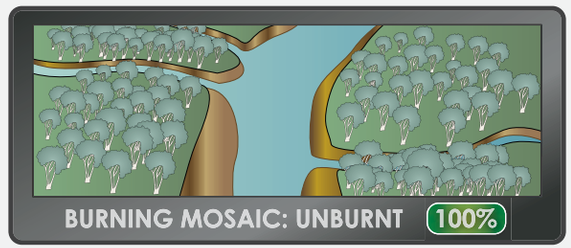
Swamps and wetlands play key roles in water filtration, feeding nectivores with seasonal nectar, and providing shaded roosts in the daytime. Sedgelands are diverse and provide an open wetland ecosystem. Sedgelands and paperbark (i.e. melaleuca) swamps often intermix but areas of open sedgeland are disappearing due to invasion and thickening of paperbarks. This reduces sedge diversity, alters hydrology, and increases fire hazard. Regular burning under moist conditions with some standing water is important for maintaining open sedgelands. Fire can reduce the density of ponded pastures, e.g. para grass. Then post-fire herbicide spraying is a good way to reduce para grass and olive hymenachne.

Paperbark swamps are dynamic ecosystems, and the timing of fire, and wet and dry seasons plays a key role in these dynamics. Paperbark germination is enhanced by fire, and occasional fires will maintain recruitment of trees into the canopy. Paperbark saplings regrow from the base of stems after fire, and trees reshoot from the stem and branches when the fire is not too intense. To maintain the integrity of paperbark wetlands, a fire every 5 – 10 years is recommended. Fire intensity should be low to moderate, and patchy. Do not use fire retardants (foams and powders) as they damage the ecology of these sensitive areas. Varying the season, intensity, and frequency of planned burning promotes diversity and a range of different vegetation ages.

Riverine and wetlands

Melaleuca (paperbark), river oak and lowland rainforest fringing forests along creeklines, freshwater wetlands and sedgelands.





Riverine and wetlands

Hazard reduction

Burning is not generally recommended in vegetation fringing watercourses, unless for specific management outcomes. Riparian vegetation does not accumulate much fuel. It can act as a firebreak in a wildfire, and will be more effective if weeds and grasses do not dominate. Disturbance by fire and other means (e.g. machinery or stock trampling) encourages weed infestations and higher fire risk. Common exotic grasses can rapidly regrow, accumulating very hazardous fuel loads after fire.

As riparian and wetland vegetation is fire sensitive, it can be damaged by even low intensity fires. Burning is sometimes used to gain initial control over weed infestations. If used, fire should not be allowed to burn into vegetation; instead, ignite along the edges because a backing fire will reduce the risk of harming fringing vegetation. Burn with good soil moisture to retain groundcover, and do not burn more than once every 3 – 5 years. Riparian and wetland vegetation may need active protection from wildfire in the dry season, by slashing or grazing along edges.

Production

Fencing off creeklines and wetlands and providing offstream watering points protects creek banks and reduces erosion. However, seasonal pulse grazing can reduce grassy fuel hazards and flood damage by reducing the height of long grasses along the watercourse.

Ponded pasture grasses represent the greatest threat to freshwater habitats, as they can completely choke waterways, even when being grazed. Hymenachne, a Weed of National Significance, and para grass can build up very large fuel loads and severely damage riparian vegetation if burnt in the dry season. Heavy late dry season grazing of ponded pastures reduces the risk of intense fire and is useful before wet season flooding, when grazed patches can drown. Fire can be used to gain control of these grasses, but take care to reduce fire intensity to protect fringing vegetation. Burn only when fuels are moist, and check scorching of fringing canopy trees as an indicator of success.

Conservation

Ideally, vegetation within riverine channels should not be burnt. Instead, burn the adjacent alluvial eucalypt woodlands from riparian edges so that only small fires of low intensity enter the riparian zone. Clearing of vegetation fringing wetlands and water courses has been extensive, and most remaining areas are heavily affected by weeds. Weed management, rather than fire management, will help maintain or rehabilitate these areas.

Riparian and wetland vegetation provides many benefits, including protection against soil erosion, maintenance of aquatic habitats and fishery stocks, and habitat for many migratory birds, and threatened species such as the rufous owl.

To prevent the spread of weeds, reduce disturbance of creekside and wetland edges and adjacent buffers. Common disturbances include feral pigs, uncontrolled or heavy grazing, regular or intense fire, and machinery damage.

Well-planned burns in surrounding fire-prone vegetation can help protect riparian vegetation from hot damaging fires. Indicators of successful fire management include weed-free buffers and creek edges, and riparian trees not being scorched by surrounding fires.

Regional Ecosystems

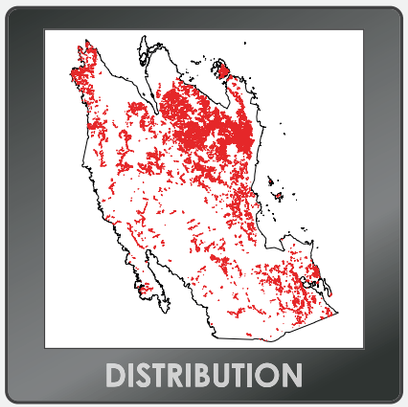
8.3.1	8.3.3	8.3.4
11.3.3	11.3.25	12.3.1
12.3.7		

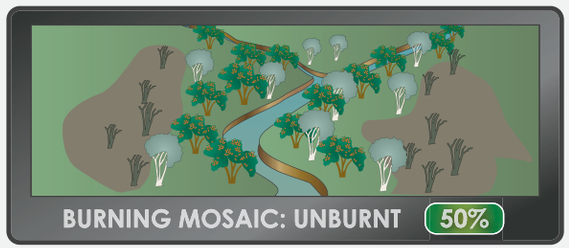
Eucalypt/melaleuca woodlands on alluvial flats

including grassy flats

Landscape 7

Variable woodlands to grassy woodlands with poplar box, bloodwood, blue gum, black tea tree and gum-topped box. Native pastures are predominately blue grass, black speargrass or pitted blue grass.

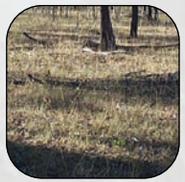




Eucalypt/melaleuca woodlands on alluvial flats

Landscape 7

including grassy flats



1 t/ha

2 t/ha

3 t/ha

4 t/ha

Regional Ecosystems

8.3.2	8.3.5	8.3.6
8.5.5	8.5.7	8.9.1
11.3.2	11.3.4	11.3.9
11.3.26	11.3.29	11.3.31
11.3.36	11.3.38	12.3.3
12.3.11		

Hazard reduction

This is an important landscape for planned burns to protect adjacent fire-sensitive vegetation, such as 'in channel' riverine woodlands. Burning for production and conservation outcomes would be expected to also help to protect property for this landscape by breaking the area up progressively into a mosaic of burnt and unburnt areas when fuels have cured sufficiently after the wet season. Secure boundaries early and then use a series of smaller fires rather than broadscale burning.

Topography and prevailing winds can be used with smaller burns over several months within the secured boundaries. Aim to burn no more than 50% of a paddock or property in one year – coordinate boundary burns with neighbours to prevent frequent low intensity fires and the associated risks of woody thickening and weed infestations.

Production

This landscape is productive country where the fire frequency will be directly related to grazing pressure. In more heavily grazed areas, a good balance of trees and grass is achieved from a moderate intensity fire every 4 – 6 years.

Destocking for a period before the planned burn will help to increase fuel loads in more heavily grazed paddocks to reach the moderate intensity needed to kill tree suckers. Lighter grazed areas benefit from a low to moderate intensity fire every 2 – 4 years to remove old grass. Restrict grazing post-fire, when pastures are in the early stage of growth to enable them to achieve vigour.

In this landscape, soil moisture is a critical factor for planned burning – early dry or storm season burns will give the best results. Burning during the dry season will harm the soil by removing the mulch layer and grass seed store.

Vegetation thickening or an increase in lantana can occur in heavily grazed areas that are not burned periodically. To control woody regrowth and dense weed infestations, a hotter fire (from fuel loads of 2 t/ha or greater) may be needed. Controlling tree thickening by fire is difficult once the regrowth is above potential flame height.

Conservation

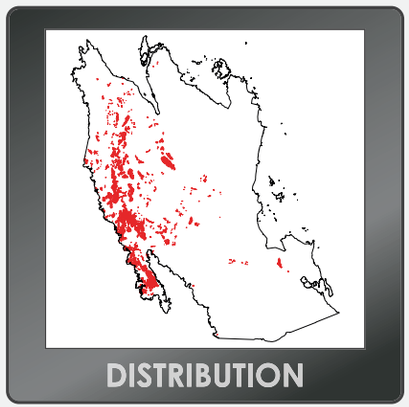
In this landscape, controlling weeds and woody regrowth is a major focus of planned burns and is particularly important to maintain natural grasslands. Small-scale patchy burns, from spot ignitions as the country dries out, gives a good variation in fire intensity and time since last burn.

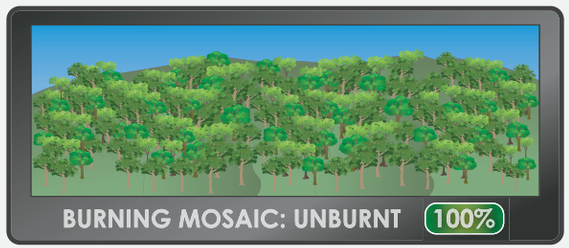
Identifying and retaining habitat trees, such as mature blue gums, will help conserve significant species (e.g. gliders), and will provide seed trees for regeneration.

To protect old trees and promote grass abundance, burn only when there is good soil moisture and aim to vary the time of burning from early dry to storm season as conditions allow. Indicators of successful fire management include a diverse grass layer, standing hollow bearing trees, and an open woodland vegetation structure.

Brigalow, belah and fire-sensitive acacias

Brigalow, belah, lancewood, blackwood and rosewood and other associated shrublands.





Brigalow, belah and fire-sensitive acacias

Low intensity fire damage to Brigalow stand.

Dead leaves still attached to trees indicates a low intensity fire.

Regional Ecosystems

11.3.1	11.4.3	11.4.9
11.7.2	11.9.1	11.11.1
11.11.13	11.11.14	11.11.16
11.12.21		

Hazard reduction

In this landscape, Brigalow, belah and the other fire-sensitive acacias are not a fire threat because they do not develop a significant fuel load. With minimal leaf drop and fuel accumulation, they do not encourage fire into the stand.

In a typical season they can form part of a natural firebreak system that can be used in property fire management planning. Late dry season wildfires in drier years can damage this vegetation type.

To protect these fire-sensitive communities, reduce fuel hazard in the adjacent eucalypt communities when soil moisture is high. Use natural features or wind direction to burn away from the edge of the brigalow to ensure minimal damage from planned fires. Creating a mosaic fire pattern as the adjacent country dries out will improve protection from late season wildfires and retain patches of pasture for grazing.

Production

These vegetation communities offer little production value. They generally have a sparse groundcover and provide minimal pasture for grazing.

Acacias return nitrogen to soil, and some regrowth is often retained to help soils recover their nutrient status. Cattle often ‘camp’ within these systems, which can destroy the shrub layer through trampling. The risk is that exotic grasses such as buffel grass will invade the edge, causing fire to encroach and damage the acacias. A low intensity fire will still cause significant damage and death in adult stands of these acacia species. Watering points should be outside this vegetation type.

Conservation

Fire should be excluded because these vegetation communities are fire sensitive. The biggest fire-related threat is drawing fire into these acacia communities by exotic grasses, primarily buffel grass. Reducing the abundance of buffel grass and ensuring any fires are low intensity and preferably outside acacia communities is a priority.

Brigalow and associated acacias are soft-seeded so do not require fire for germination. Brigalow and associated trees and shrubs will sucker from their well-established roots after damage from low to moderate fires. High intensity fires will kill the entire plant.

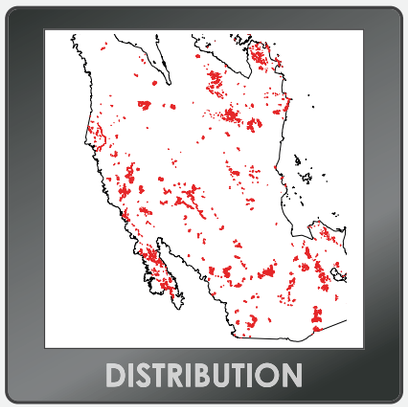
Larger species, such as brigalow, blackwood, and belah, can all be killed by even a low intensity fire. These species are long lived and soft-seeded and rely on high rainfall years for germination. Seeds of very few species, such as lancewood, can tolerate a low intensity fire, but they can take up to 20 years to fully mature. If a fire does go through a lancewood area, ensure the landscape remains fire free for at least 20 years.

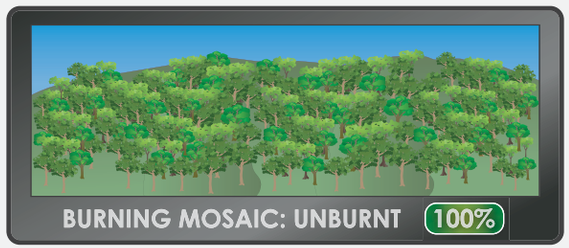
For these areas, fire protection should be provided by fuel reduction burns early in the dry season in the adjoining eucalypt communities. It will often need several attempts over several weeks as the country dries out, creating a fine-scale mosaic. Use wind direction, topography and time of day to light away from the brigalow rather than burn up to it. Mechanical breaks can also be used.

Rainforest and vine thicket-dominated landscapes

Landscape 9

A great variety of rainforests and vine thickets from drier vine scrubs and rainforest in lower altitudes and exposed coastal hills to complex vine forests on high mountain plateaus.





Rainforest and vine thicket-dominated landscapes

Bottle tree with recovering shrubs.

Edge of brigalow scrub with dead trees showing fire damage from fires entering the stand.

Regional Ecosystems

8.3.10	8.11.2	8.12.3
8.12.11	8.12.17	11.3.11
11.4.11	11.5.15	11.8.3
11.8.13	11.9.4	11.10.8
11.11.5	11.11.18	11.11.21
11.12.4	12.11.4	12.11.12

Hazard reduction

Generally, rainforests and vine thickets will not burn unless exotic grasses draw fire into a thicket or during drought conditions. Rainforest and vine thicket edges provide persistent, effective firebreaks, and are highly valued during wildfires.

It is important to burn surrounding fire-prone landscapes in a mosaic patch-style to break up fuels and wildfire front and to protect rainforest and vine thickets. Avoid exposure to fire when conditions are hot and dry because fire scorch can cause weed infestations on the edge, increasing fire risk and reducing integrity of rainforest and vine thickets edges.

Some lantana and grass burning may be justified along margins to gain initial control of weeds, but follow up control is essential to effectively reduce fuel loads over time. Burn with good soil moisture to ensure fire does not intrude into rainforest or vine thickets.

In areas of high fuel load, burn with no or very low wind. Burning small patches is less hazardous than a continuous line. Good practice is to ignite from rainforest edge at the top of ridges. Allow the fire to burn downhill to reduce its intensity.

Production

Rainforest and vine thickets support little to no grassy understorey, so there is no viable grazing production. Disturbance facilitates weed invasion, so restrict access to stock into the closed forest. Lack of regular burnback fire allows rainforest species to spread out into adjacent areas of open forest and woodland. To reduce rainforest invasion, burn surrounding fire-prone communities to maintain species and canopy composition with an open understorey.

Conservation

Many rare and threatened plant species exist on the edge of rainforest or vine thickets and are susceptible to repeated fires.

Fires damage the edge by scorching, which opens the canopy and allows exotic grasses, such as buffel grass and guinea grass to invade, making the edge more susceptible to future fires. Intervention against this damaging cycle of exotic grass invasion, then fire, then more grass invasion, is needed.

Grazing is the best option to fight these invasions because it reduces the grass and therefore the fuel load. After grazing, maintain the edges with herbicide and promote natural regeneration.

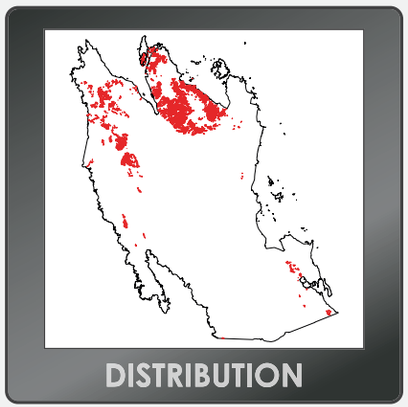
Protection burns should be in adjacent fire-adapted vegetation. Take care to direct fire away from the scrub edge rather than let it burn up into the scrub. In wildfires, try to allow the fire to come down the slope, rather than light from the bottom.

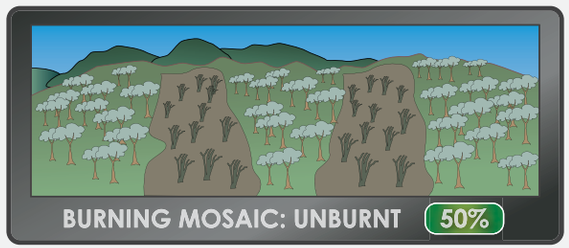
Eucalypt woodlands on sandy plains

including woodlands on lower slopes and associated grasslands

Landscape 10

Open woodlands with a shrubby or grassy understorey containing ironbark, bloodwood, broad-leaved tea tree and poplar box.

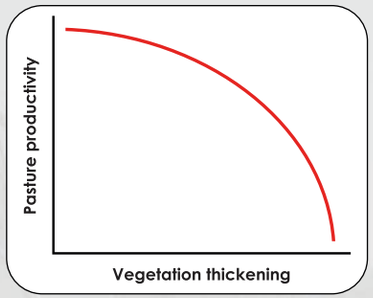




Eucalypt woodlands on sandy plains

Landscape 10

including woodlands on lower slopes and associated grasslands



Vegetation thickening vs. pasture productivity.

Squatter pigeon (*Geophaps scripta*) (© Rosanne Houley, Fire & Landscape Strategies).

Regional Ecosystems

11.4.2	11.5.2	11.5.3
11.5.8	11.5.9	11.5.12
11.9.9	12.5.1	12.5.4

Hazard reduction

This landscape is often braided by creeklines and gullies with some standing water or at least high soil moisture during the early part of the dry season. These can be helpful in early dry season burns that produce a patchy mosaic of burnt and unburnt fuels.

Fires that burn about 40 – 50% of the total area break up continuous fuels, which will reduce the spread of late season wildfire. Avoid burning too frequently or in the same place such as along a track or road edge because it can favour weeds.

Production

These woodlands usually have a grassy understorey but may develop a shrub layer. The landscape is used extensively for grazing, and therefore productivity is closely linked to periodic fire management. In more lightly grazed areas, fire can be used to remove old grass and freshen the pasture every 3 – 5 years.

In heavily grazed areas or where fire has not been used for extended periods, softwood scrub species may have encroached. In these instances, a reduction in grazing to build a suitable fuel load (about 2 t/ha) will be needed to carry a fire of sufficient intensity to remove the trees and shrubs causing thickening.

Fire should be used when soil moisture levels are relatively high, such as early in the wet season or straight after the first rains of the storm season when follow up rain is imminent, to ensure pasture grasses recover quickly. Burning in a dry year will not give a return in grazing value – instead, thickening or woody weed invasion is probable.

Conservation

Burning only when the soil is moist is crucial to enable quick recovery of grasses and to avoid excessive loss of habitat features, such as hollow trees and fallen timber.

To manage these woodlands for conservation purposes, consider the needs of each habitat type. For example, areas with a shrubby understorey will need a greater proportion of unburnt patches to ensure some unburnt mature shrubs survive.

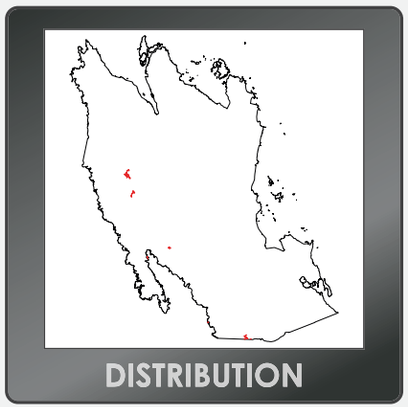
This landscape is important habitat for squatter pigeons *(Geophaps scripta)*, which prefer a longer undisturbed ground layer for nesting. They feed on a range of grass seeds, legumes, herbs, insects, and occasionally fallen acacia seeds.

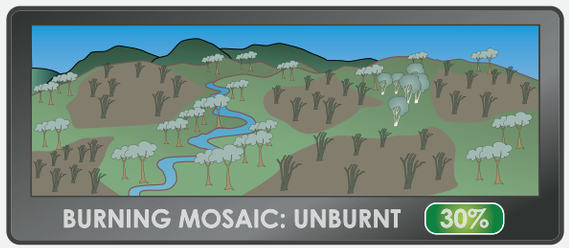
A range of fires of varying intensities and sizes resulting in different vegetation ages or time since fire will most benefit the squatter pigeon. This will help maintain a mix of areas that range from grassy to a dense shrub understorey. The squatter pigeon can be an indicator of good fire management that retains robust pastures over the long term. Their continued persistence in the landscape is a direct result of good pasture and fire management that retains robust pastures over the long term.

Eucalypt woodlands on undulating stony hills and flats

Landscape 11

Variable woodlands of ironbark, poplar box, spotted gum or gum-topped box. May have a shrubby or grassy understorey, including false sandalwood and wattles. Main grass species include blue grass and forest blue grass.





Eucalypt woodlands on undulating stony hills and flats

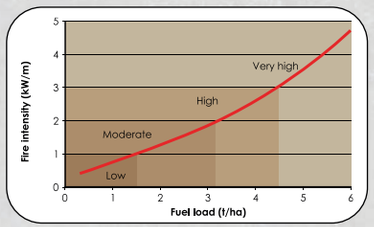
Landscape 11

1 t/ha

2 t/ha

3 t/ha

4 t/ha



Regional Ecosystems

11.8.4 11.9.2 11.9.9

Hazard reduction

This landscape has an undulating topography, often with flats and rolling hills. This enables construction of fire lines to create separation from other vegetation types on steeper slopes or more erodible soil types. In the Capricorn Coast, this landscape is often the buffer zone between the fire-adapted flats and the fire-sensitive brigalow and associated acacias (Landscape 8).

Hazard reduction burning should begin as soon as the landscape will carry a fire. Aim for a low to moderate fire intensity with about 30% remaining unburnt. A varied approach to hazard reduction burns is better than burning the same boundary lines repetitively.

Production

The woodlands can have a grassy or shrubby layer, with the former having better native grass grazing value. Managing stocking rates and longer term grazing pressures is important in this landscape due to the risk of overgrazing palatable grasses, which leads to an overall degradation of the pasture.

Always burn with good soil moisture after spring rains or storms, or during the wet season, so that the grasses can respond before the woody regrowth. While fire is important to remove rank grass and stimulate new growth, the paddock should be spelled after burning to allow grasses to shoot and regain vigour.

In a paddock of severe regrowth and suckers, the paddock may need to be spelled to build up enough fuel to kill the regrowth. In some cases, a high fire intensity may be needed to reduce thickening.

To achieve a high intensity fire, a fuel load of 2 – 3 t/ha is required. Fire frequency in grazed lands should be about 5 – 8 years.

Conservation

Grasslands and grassy woodlands benefit from a low to moderate fire every 3 – 5 years. Regular fire helps prevent thickening with a moderate fire after spring rains or storms keeping the country open. The boundary between shrubby and grassy understorey in parts of this landscape will often reflect the seasons.

Fire is also an important tool in the control of woody weeds and regrowth. Use fire before the crown of the regrowth exceeds the flame height to ensure good thinning is achieved.

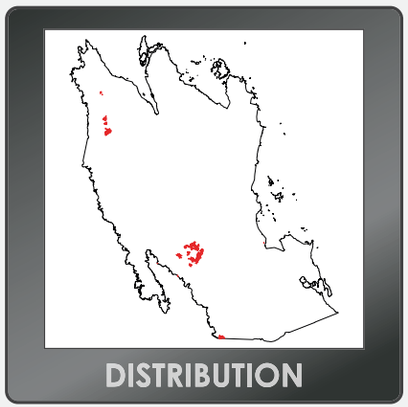
In wetter years, the grasslands will grow a lot of fuel, and in the drier years, the shrubby layers will expand into the grasslands. Fire regimes rather than a single fire will ensure that both types are resilient.

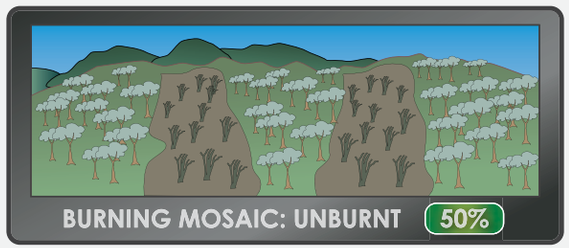
The bark litter, fallen branches and trees are particularly important habitat for lizards and skinks. Use a series of fires to create a fine-scale mosaic rather than a single fire to retain the litter layer as habitat for reptiles.

Eucalypt, river apple, bull oak and cypress woodlands

Landscape 12

An open woodland that can have a grassy or shrubby understorey. Main species include spotted gum, river apple, ironbark, bull oak and/or cypress. Grass trees, false sandalwood and wattles may be present.





Eucalypt, river apple, bull oak and cypress woodlands

Landscape 12

Canopy fire damage to eucalypts.

Fuel load increased by cypress thickening.

Regional Ecosystems

11.10.1	11.10.3	11.10.4
11.10.7	11.10.13	

Hazard reduction

Topography, terrain and slow fuel buildup can naturally protect some of these areas from most wildfires. Property planning should focus hazard reduction burning on less erodible soil types that are easier to access. A low intensity fire every 3 – 6 years will reduce fuel loads to a manageable level for wildfire control.

Plan burns when fuel loads are moderate (less than 2 t/ha) to create a mosaic of 30% – 50% burnt. Plan burns around good soil moisture, during the wet season or at the end of summer. High moisture content will protect the soil mulch layer. Fire management in adjacent landscapes in the intervening years should provide long-term protection from late season wildfires burning uphill into this vegetation type.

Production

This landscape takes in some of the less fertile scarps, plateaus and tableland. The understorey can be shrubby or open and grassy. Traditionally, it is used as cattle breeding country.

In a wetter year, it can produce a reasonable amount of grass, but it is not that productive or palatable. The soils tend to be phosphorus deficient and prone to erosion. Fire is primarily used to control thickening of the understorey – otherwise, this landscape would not be targeted for burning. A low to moderate fire within a 5 – 6 year cycle would be sufficient to maintain open woodlands with grass.

The topography and terrain should be used to burn in patches to achieve a mosaic of 50% burnt. It is important to burn with good soil moisture, either at the end of the wet season or after the first storm. After burning, reduce grazing pressure to allow grass recovery.

Conservation

This landscape is prime glider habitat. The key features they need to survive are mature, hollow bearing trees and open woodlands not affected by thickening. It can take up to 60 years to produce a tree hollow that may form a suitable glider nest. Thus, in planned burning and wildfire protection, it is crucial that these older trees with hollows are protected.

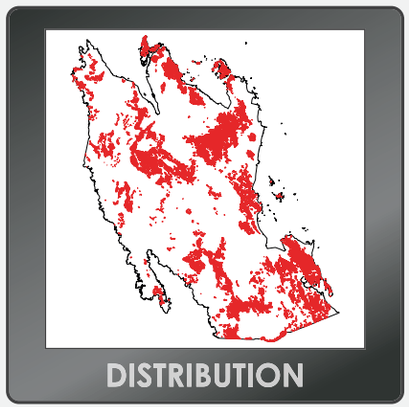
Fire management should occur late in the wet or early in the dry season as soon as the country will carry a fire. Aim for a fine-scale mosaic of patchy burns by burning in conditions that will provide a low to moderate intensity fire. To achieve this, light in the mid afternoon where there is a moderate fuel load that is only sufficiently cured to carry a patchy fire.

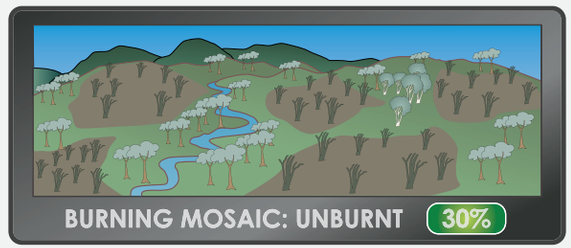
In the shrub layer, some plants will be obligate seeders – plants that can only regenerate after fire from seed. They need unburnt patches to allow unburnt mature plants to survive. Regular low intensity fires maintain healthy mature cypress pine stands, but high intensity fire kills cypress pines. Conversely, regular fire will reduce the expansion of cypress if it is invading adjacent open eucalypt forest. Cypress thickening in the understorey will increase the fuel load and subsequent fire behaviour in dry years, resulting in canopy fires with heat that can kill mature eucalypts.

Eucalypt woodlands on stony range country

Landscape 13

Grassy woodlands and open forests of ironbark, bloodwoods, Moreton Bay ash, spotted gum, yellow stringybark or white mahogany. There may be grass trees, cycads, wattles, and/or hibiscus in the understorey.





Eucalypt woodlands on stony range country

Landscape 13

Areas long unburnt will lose key species. This grass tree area is being overcome by vines and shrubs.

Hazard reduction

This vegetation type generally occurs on slopes, hills and ranges, and is common across the Capricorn Coast. This landscape can be at high risk from wildfires because of its elevated position in the landscape. Fire running uphill is more intense and moves faster than fire burning down slope. Hazard reduction burning early in the dry season will help to break up the country and provide a buffer from wildfires.

Landscape-scale hazard reduction planning is the best approach to managing fire in this landscape. Fire control lines to target specific areas with a history of wildfire may need to extend across several boundaries. If bordering improved pastures, this landscape will be burnt first to protect pasture. Aim to burn 70% of a property or patch per year when soil moisture is good. In this landscape type, storm burning is also useful to manage vegetation thickening. A moderate intensity fire after the first storms is ideal.

Production

Cattle use the range country as spelling during the wet season or late winter feed. The season of grazing will dictate the burning season. Cattle prefer certain grasses, leaving less palatable grasses to seed. Over time, this will change the composition of grasses in the pasture. A controlled burn removes all the old grasses evenly.

Grazing pressures and seasonal variation will dictate the need for fire, however, a low to moderate intensity fire when there is good soil moisture, every 3 – 7 years, is common.

Burn from the top down, allowing the fire to creep or wander around the ridge system following fuel loads. Thickening (particularly of wattles) can be an issue after a wildfire. Reduce stocking to build a fuel load and conduct a storm burn before the wattle grows above flame height.

Conservation

Planned burning should aim to promote patchy fires to ensure a mosaic of different vegetation types and time since fire across the landscape. Rangelands are prone to widespread intense wildfires in the mid to late dry season, which is a key threat to biodiversity. Too frequent intense fire destroys vegetation cover and directly threatens gliders, owls, and the mature hollow bearing eucalypts they depend on. On the other hand, frequent low intensity fire while the soil is moist helps maintain habitat trees.

In this landscape, a lack of fire can also lead to sapling thickening, shading, loss of tussock grasses and grass trees. Aim to burn every 3 – 5 years, lighting downhill with good soil moisture.

In areas with a wildfire history, burn as soon after the wet season as a fire will carry. In areas where it is difficult to introduce fire, aim to burn during the storm.

Healthy grass tree ridge with good grass cover.

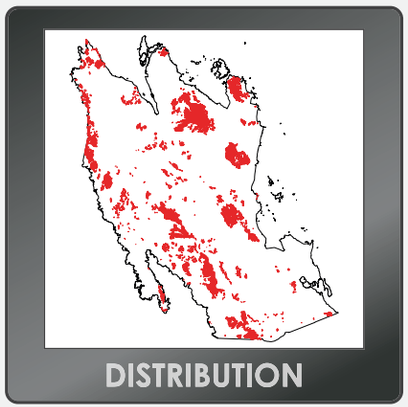
Regional Ecosystems

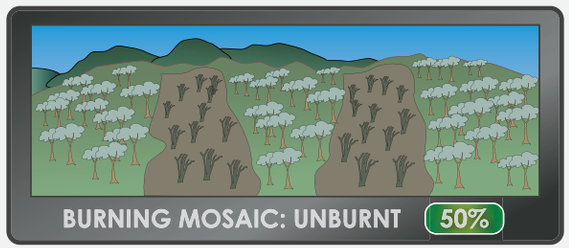
8.11.3	8.11.4	8.11.6
8.11.8	11.11.3	11.11.4
11.11.7	11.11.9	11.11.10
11.11.15	11.11.20	12.11.1
12.11.6	12.11.7	12.11.9
12.11.14	12.11.17	12.11.18
12.11.19	12.11.20	

Eucalypt and melaleuca woodlands in the ranges

Landscape 14

Grassy woodlands to open forests of the coastal ranges of ironbark, Moreton Bay ash, spotted gum, bloodwood and tea tree generally in a mixed canopy. There may be a shrubby understorey of acacia, tea tree and/or she-oaks.





Eucalypt and melaleuca woodlands in the ranges

Landscape 14

Hazard reduction

Mount Archer has good local examples of this landscape, as do most of the coastal ranges in the Capricorn Coast. In this landscape, focus hazard reduction on early burning of breaks to stop or reduce wildfires late in the dry season. This can be achieved with a series of early dry season patch burns over a few weeks. The topography dictates that most wildfires will be uphill, which increases fire intensity. Strategic burning from ridgelines can provide a good breakup of the fuel load at the landscape level to reduce wildfire spread later in the season.

Areas that have been affected by late dry season wildfires can have a mass seeding of wattle. This understorey shrub layer can reach 3 – 5 metres in a seven year period. Under adverse wildfire conditions, it can create a highly intense subcanopy fire. This in turn can lead to very dangerous crown fire conditions. Vary fire regimes to leave some areas unburnt for seven years, while burning enough area to protect against late dry season wildfires.

Production

The grassy understorey of the woodlands and the grasslands associated with this landscape provide good native pasture grazing. A low to moderate intensity fire after the wet season or following storms can remove old grass and even out the pasture composition. A series of patchy fires is better than a single, large fire because it enables a staggered recovery of grasses.

Fires should be lit from the tops of ridges and allowed to burn downhill to ensure a low fire intensity. Fires lit uphill will be more intense and slow the recovery of grasses, increasing the risk of erosion.

This landscape can also provide good pole and saw log timbers. Forest production areas are generally burnt before logging for access and to enable top disposal fires of the tree heads to encourage regeneration. After logging, fire may be used for thinning the regeneration (or not used until regeneration is above flame height).

A backing or downhill fire will kill the regrowth more effectively than an uphill fire.

Conservation

In this landscape, the composition of trees, grasses and herbs is highly diverse. The woodlands and forests of this landscape have either a grassy or shrubby understorey.

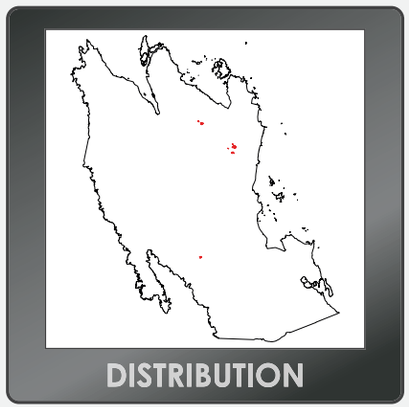
The grassy understorey needs fire at intervals of 4 – 7 years to keep it open. The shrubby understorey benefits from a patchily burnt landscape to allow some shrubs to remain unburnt. Be aware that the boundaries of shrublands and grasslands will naturally fluctuate to some degree. The key thing to remember is that they are both important for conservation and should be retained in the landscape.

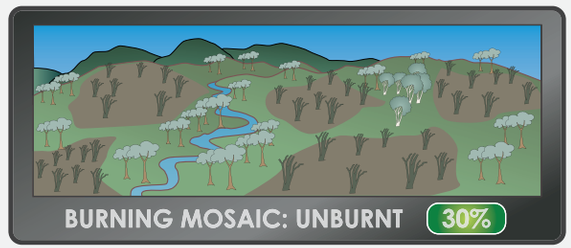
Regional Ecosystems

8.12.5	8.12.7	8.12.12
8.12.20	8.12.22	8.12.32
11.12.1	11.12.6	11.12.9
11.12.13	11.12.17	12.12.3
12.12.5	12.12.7	12.12.12
12.12.21		

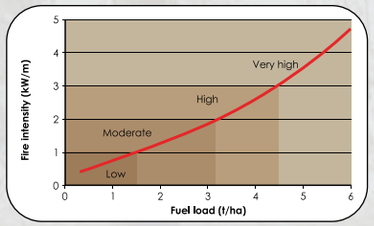
Tall open forests

Tall open forests of turpentine, spotted gum, white mahogany, red stringybark and bloodwood, with a sparse to dense shrub layer.





Tall open forests



Hazard reduction

These tall forests are confined to the Polygon and coastal ranges in the Byfield area. The forests may have a sparse or dense shrub layer that will influence fuel accumulation and arrangement. The Turpentine forests develop a dense shrub layer. Tall open eucalypt forests can naturally accumulate very large fuel loads and support widespread high intensity fires. Protection areas are best managed by regularly burning small areas with good soil moisture, and managing weed impacts post fire. Aim to burn a patch once every 3 – 6 years, with fuel loads as an indication of frequency. Repeated disturbance will promote weed invasions.

Burn only when conditions are suitable – vary the season of burning to account for fuel and soil moisture levels. Avoid burning in very dry conditions because the fire risk is extreme. In this landscape, later season fires are acceptable as vegetation can take longer to dry out than surrounding woodlands. Plan to burn in late winter or after the first storms when follow up rain is likely. This will allow groundcover to recover quickly.

Areas long unburnt, dense lantana, and rank grasses can carry intense fires due to the heavy fuel load. Burning lantana after a frost (which may defoliate plants) can have a better kill rate. Burning with good soil moisture can also be effective. Reducing weedy fuel hazards on the edges with approved herbicide is often a good option either before or after fire.

Production

The tall open forests on fertile soils are productive timber forests. Fire management would include a pre-logging fuel reduction burn across the intended logging area. The logging debris is burnt post-harvest when canopy trees are carrying mature seed. The timing of these fires is planned around rainfall, with the focus on ensuring good regeneration of the logged area. The fire can be intense in patches and is designed to stimulate seed fall into the prepared ash bed. Generally, fire would then be excluded until regeneration is above flame height.

Conservation

It is essential to prioritise fire management in tall forests, retaining a grassy understorey. A moderate intensity patchy burn every 3 – 5 years is recommended to keep the grasses in good condition. Burn with soil moisture because dry fires promote thickening of wattles and some rainforest trees. If there is no fire for five years, grasses will begin to thin out. Where practical, plan for an occasional hot fire – storm burning is recommended to reduce risk of escape into the surrounding landscape.

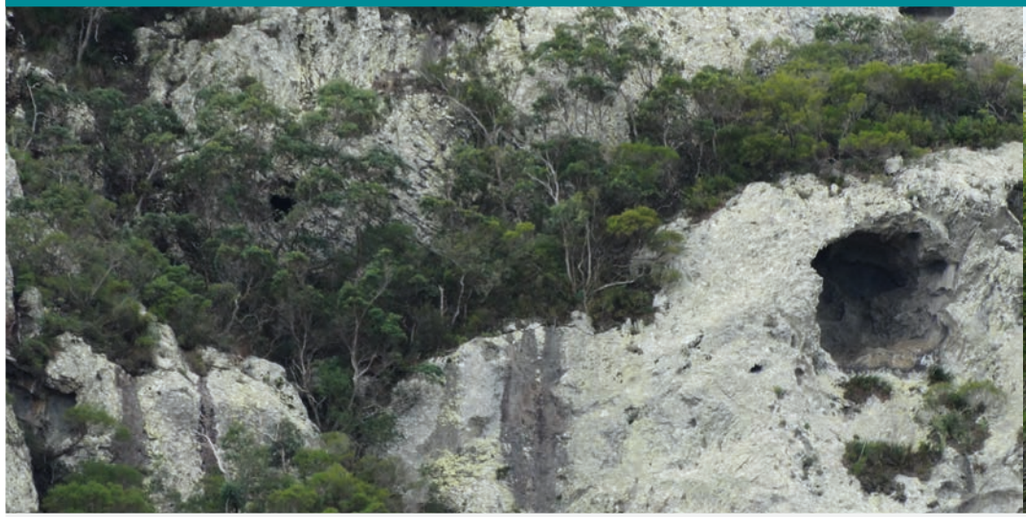
Aim to protect mature hollow bearing trees by only burning with good soil moisture. Yellow-bellied gliders (*Petaurus australis*), powerful owls (*Ninox strenua*), and glossy black-cockatoos (*Calyptorhynchus lathami*) are dependent on these habitats. Over a decade, a dense scrubby understorey may develop to the point that the forest will not burn unless in extreme conditions. Intense dry season fires are a key threat to these habitats.

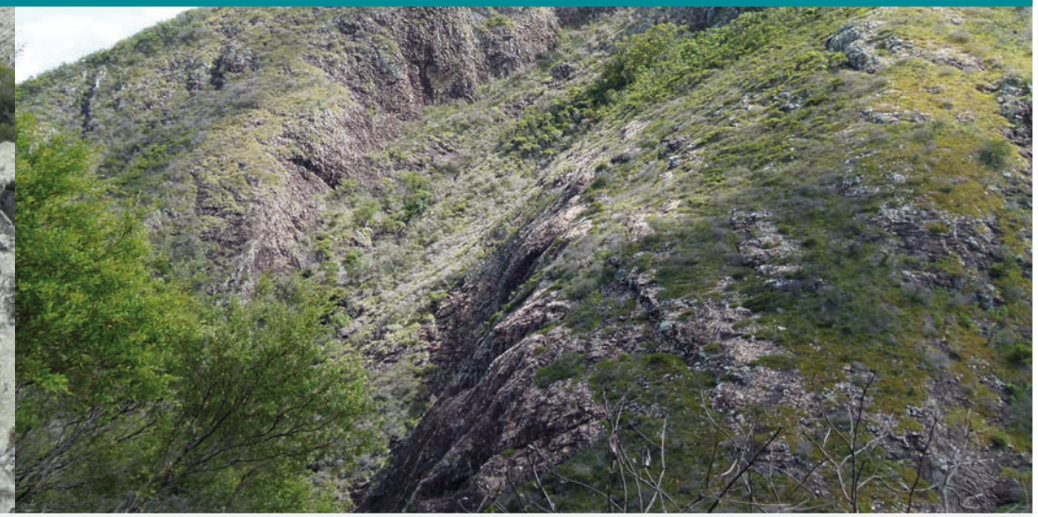
Protect adjacent rainforest or semi-evergreen vine thicket edges from the impacts of hot fire. Carefully planned patch mosaic burning in adjacent woodlands may reduce severity and extent of wildfire by breaking up the fuel load and reducing the potential fire front.

Regional Ecosystems

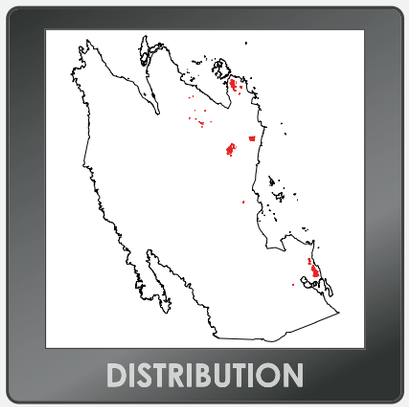
8.12.31 11.10.2

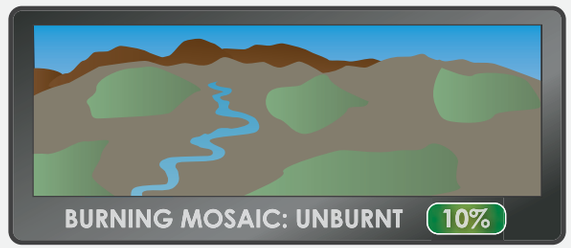
Montane heath



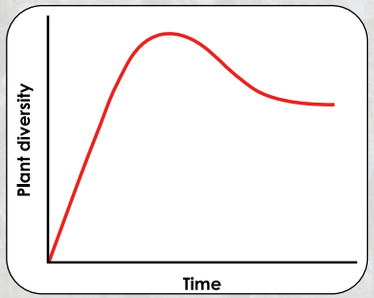


Shrublands to heathland of mixed species, many only found in these landscapes.





Montane heath



Plant diversity over time.

Hazard reduction

Heath is a diverse vegetation type that will usually burn completely or not at all, at any given point in time. The remoteness of this landscape limits infrastructure hazard. Burn heath for hazard reduction in the mid dry season, as these areas often retain moisture for longer and may not be capable of carrying fire until this time.

Planned burns should target small sections where possible, using natural features such as rocky outcrops, depressions, drainage lines, or less flammable vegetation, to break the country up into small burnt areas. Often, there is a series of ledges that provide an opportunity to burn one and leave the others above and below for another year. This provides important shelter for the mammals and reptiles that rely on this landscape. Aerial ignition is a good way to get fire into these areas at the right time.

Production

Heath and shrublands do not offer any opportunity for production in horticulture or grazing. They generally grow on rocky scarps in the mountains, so grazing access is limited.

Lantana infestations can grow on outcrops, and a slow-moving, moderate intensity fire will help control this invasive species. Ensure there is soil moisture and a suitable fuel load (3 t/ha), and be prepared to light a second follow up fire.

Low intensity fires do little to promote regeneration and are generally unachievable in heath because of its uniform fuel characteristics.

Conservation

It is essential that fires are lit only when there is good soil moisture in the landscape, which typically means end of wet season and storm burning. This allows fires to burn only a proportion of the montane heath areas, which have some protection from rocky outcrops. For best results, light small scattered fires from the tops of slopes in vegetation adjacent to rock outcrops. Downhill fires will help keep fire intensity in the moderate range, which will promote plant recruitment.

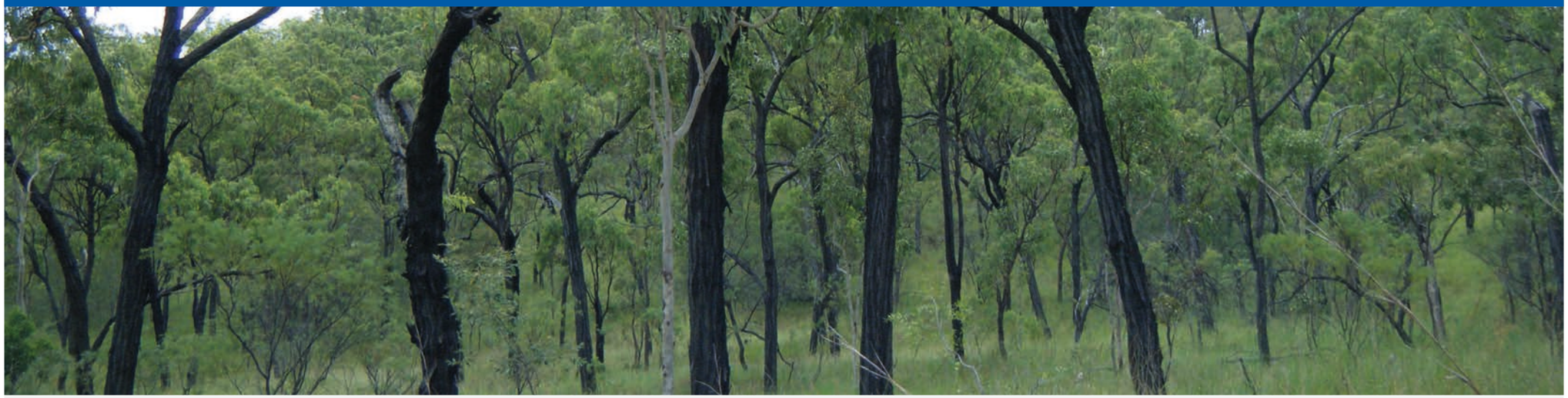
Heath diversity reduces over time after fire because many species are short lived. The aim of heath fire management is to promote regeneration of species, without being too frequent to allow the opportunity for plant species to mature and develop seed. A range of smaller burns in a mosaic pattern with intervals of about 5 – 14 years should help maintain heath communities.

Topographic and landscape features, such as rocky outcrops, and the associated changes in soil moisture, can be used to divide the area to create a mosaic of fire intervals.

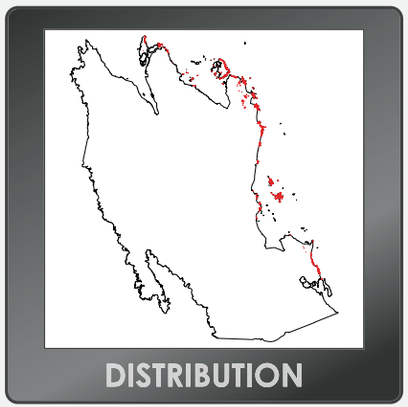
Regional Ecosystems

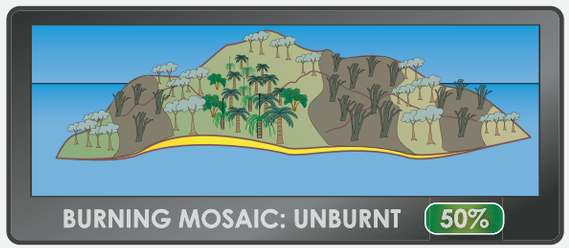
8.11.7	8.12.10	8.12.29e
11.12.14	11.12.18	12.11.21

Rocky headlands



Grassy headlands through to heath shrublands, with a mix of acacia, banksia, brush box and Moreton Bay ash.





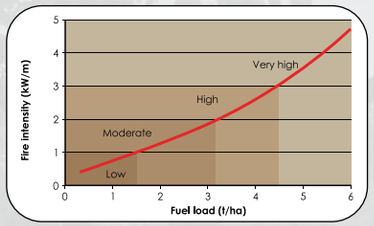
Rocky headlands

1 t/ha

2 t/ha

3 t/ha

4 t/ha



Regional Ecosystems

8.11.9	8.11.10	8.11.12
8.12.13	8.12.14	8.12.29
12.12.19		

Hazard reduction

Where they are in good condition, shrubby areas of this landscape would generally not be targeted for burning.

Some of the grassy headlands adjoin fire-sensitive vegetation, with little separation between the types. Aim to burn the grassy areas every three years to provide wildfire protection for the fire-sensitive areas. Unfortunately, coastal headlands can be infested with introduced grasses and lantana, which promote hotter fires and rapidly regrow after fire. More disturbed areas are often affected by weeds. Disturbance can be from repeated past fires, vehicle tracks and animals.

In the Yeppoon to Emu Park areas of the Capricorn Coast, some headlands have housing infrastructure. Hazard reduction burning may be needed against housing and larger areas of fire-adapted vegetation. Fuel loads of 1.5 t/ha are needed to ensure fire intensity is low to moderate. Larger fuel loads will increase fire intensity and the chance of fire spreading.

In areas of high fuel loads, fire management should begin as soon as possible after the wet season to allow the moisture content of the fuel to reduce fire intensity. Burn downhill to keep fire intensity in the low to moderate range. Do not ignite other areas after back burn has self-extinguished as subtle changes in the soil and underlying parent material dictate where fire is needed.

Control of weeds and exotic grasses by means other than fire may be preferred in residential areas.

Production

These vegetation communities offer little production value.

Conservation

Some areas of grassland are being invaded by woodland or vine forest pioneers, while other areas remain open. Research is needed to determine the role of fire in maintaining vegetation types and optimum fire regimes.

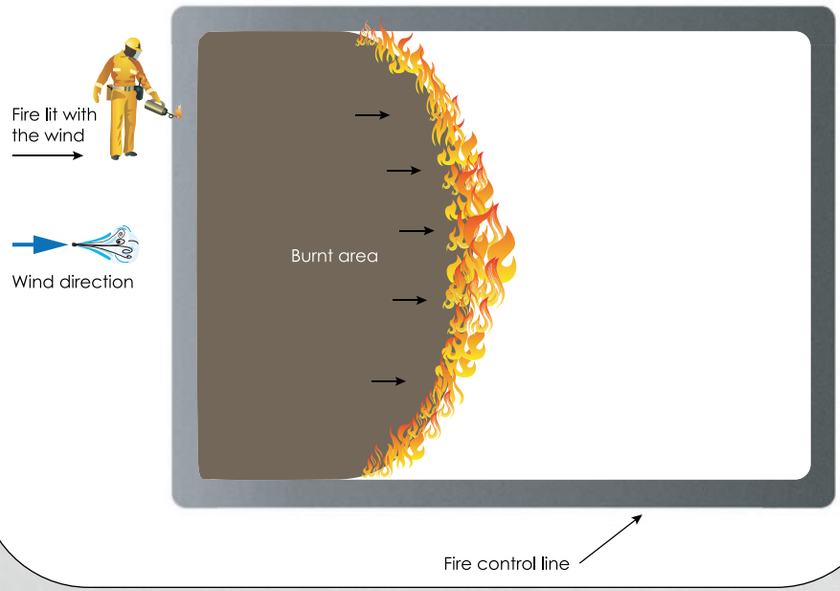
Maintain extent and area of grasslands, where they remain, by trialling burning every 4 – 6 years when there is good soil moisture, with a low to moderate intensity fire. Retain at least 50% unburnt. Burn downhill with a backing fire to maintain grasslands and reduce woody emergents. Monitor vegetation and adapt management depending on response to fire regimes.

Lantana can be managed by fire in the same way as other woody vegetation. Suitable fuel loads must be available – 2 – 3 t/ha is needed to reduce infestations. Burn when soil moisture conditions is good (i.e. after 50 mm or more of rain or the first storms). A downhill backing or zigzag fire of moderate intensity can suppress lantana by damaging the root and lower stem zone. Soil moisture is crucial for native grasses to respond quickly to fire disturbance and recover where the lantana has been.

Fire diagrams

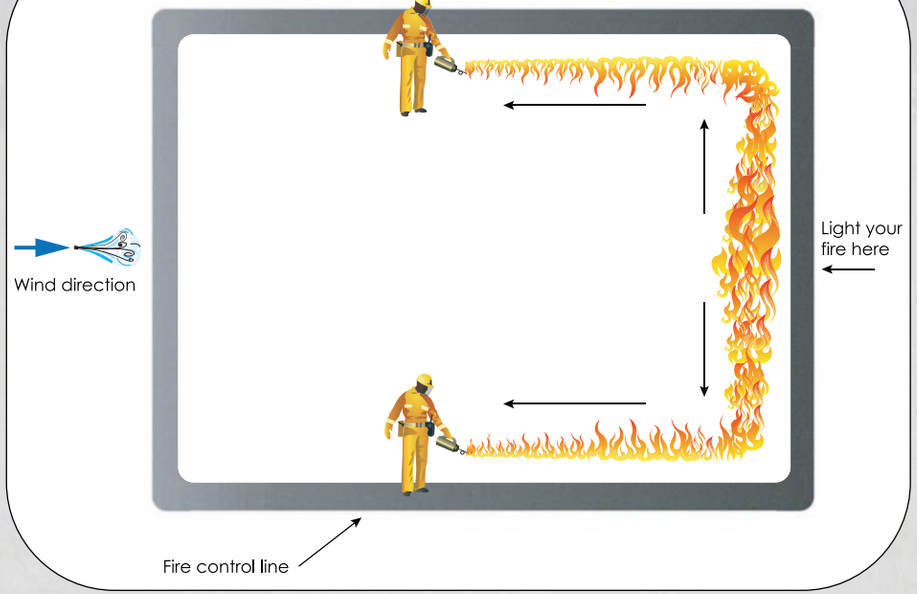
The following fire diagrams are provided to illustrate some ignition techniques for fire practitioners who are experienced in the lighting and use of fire. There are many variables that need to be considered prior to lighting a fire, including temperature, humidity, wind speed and direction, fuel type, amount of fuel and how cured or available to burn the fuel is, time of day and season, and the degree of difficulty to control the fire, which relates to number of people, water capacity and firebreaks required. All fires in Queensland greater than two metres in diameter require a *Permit to Light Fire* from a local Fire Warden appointed under the *Fire and Emergency Service Act 1990*.

Forward burning



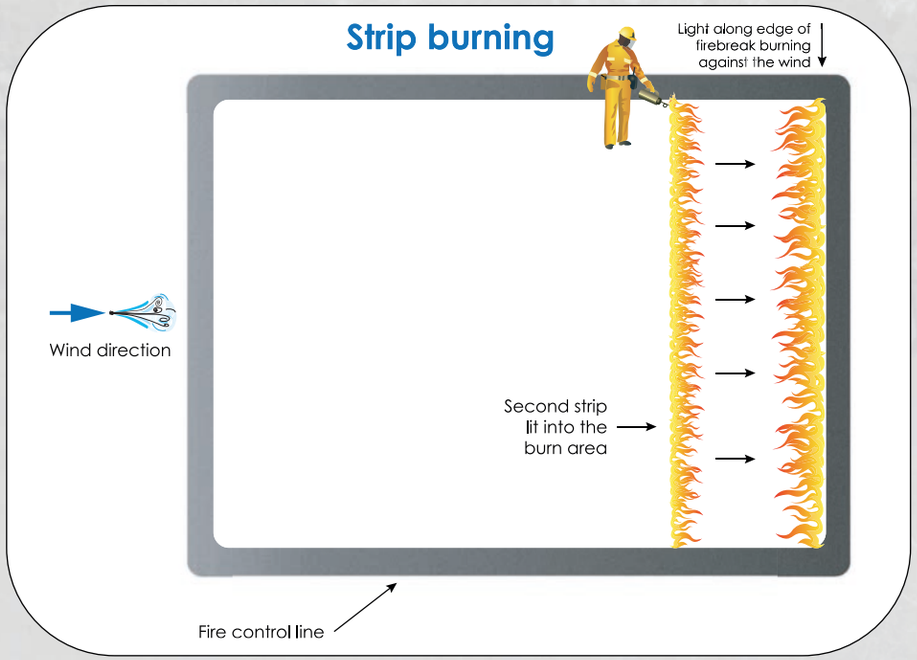
Forward burning can be used early in the season when conditions are still mild. A forward fire (lit with the wind) will move quickly over old grasses, removing only the dead material on the downwind side. A forward fire is also useful after storms to remove old dead material in damp conditions. The fire moves quickly across the fuel without too much heat applied to the grass crown, allowing the grasses to recover quickly. There will need to be a natural break such as a waterway or scrub edge or a constructed fire line, road or earlier burn to contain the fire.

Back burning



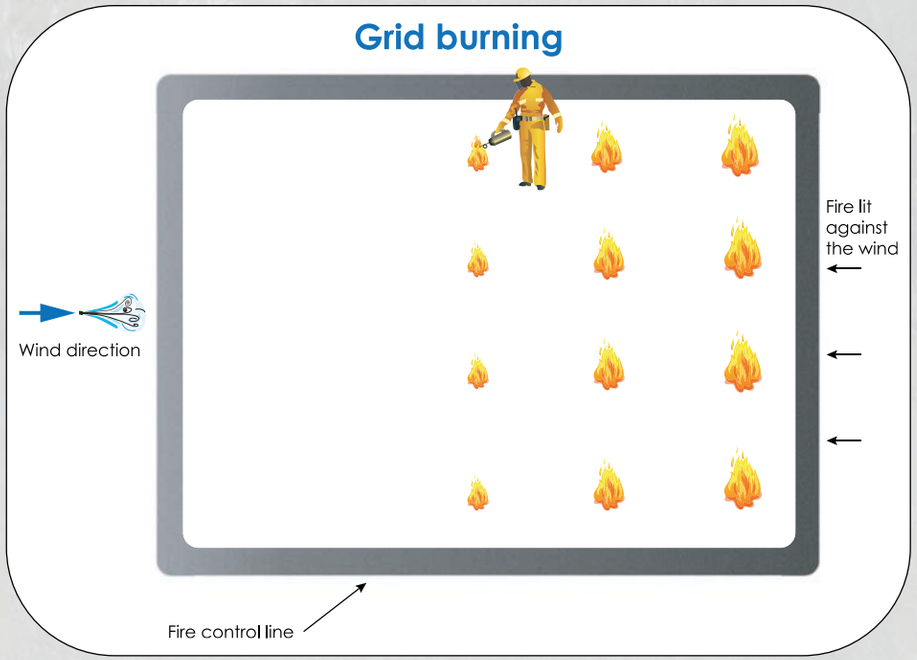
To secure a safe edge to a burn and/or to provide a slow-moving fire with maximum heat at the stem for killing woody weeds. The diagram shows the sides of the fire being brought down slowly to contain the fire.

Strip burning



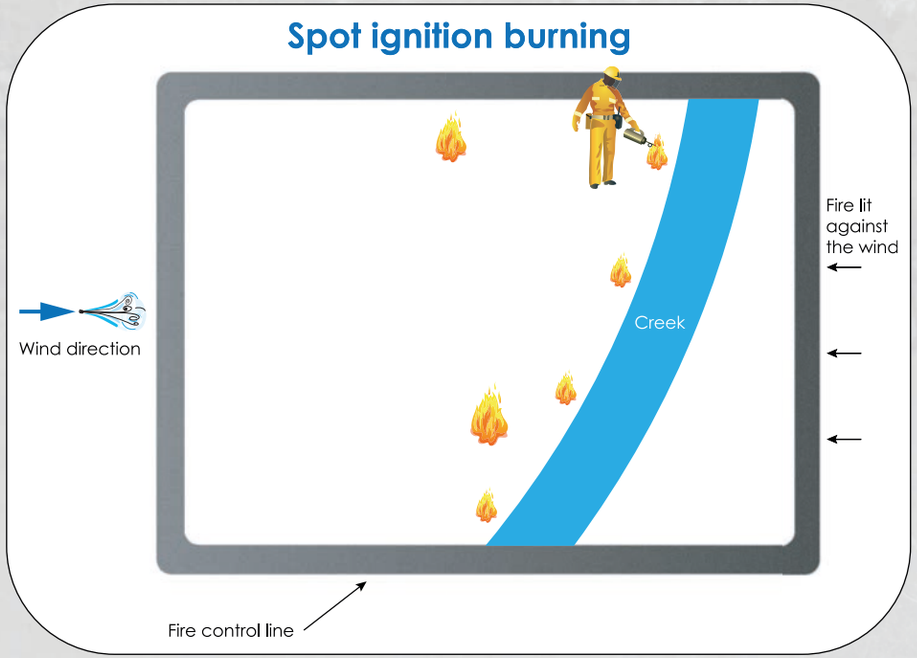
Strip burning is used to remove the fuel faster than a back burn would. It provides the advantage of the forward fire's heat and control by the backing fire being in front of the forward fire. This technique is useful in old slashed areas, cane trash, and areas with variable fuels where a backing fire may not carry through the variation in fuel loads.

Grid burning



A technique that uses a series of smaller fires to reduce scorch under the canopy or where a moderate fire is required in drier conditions. Each of the fires are impacted by the surrounding fires. A fire front will not develop because as each fire burns out, it reaches another fire's edge. Spacing of the fires is important, so start on the downwind edge and test the spacing to achieve the fire intensity required by observing the time and heat generated before the fires join up. Keep checking the spacing as the burn progresses.

Spot ignition burning



Spot ignition is lit while fuel and soil are sufficiently moist to ensure a patchy, low intensity fire. Spots of ignition can be positioned to burn away from the edges of sensitive vegetation (such as riparian forests and vine thickets) and to burn downslope from the tops of ridges.

Notes and sketches


QUEENSLAND FIRE & BIODIVERSITY CONSORTIUM
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REEF CATCHMENTS
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