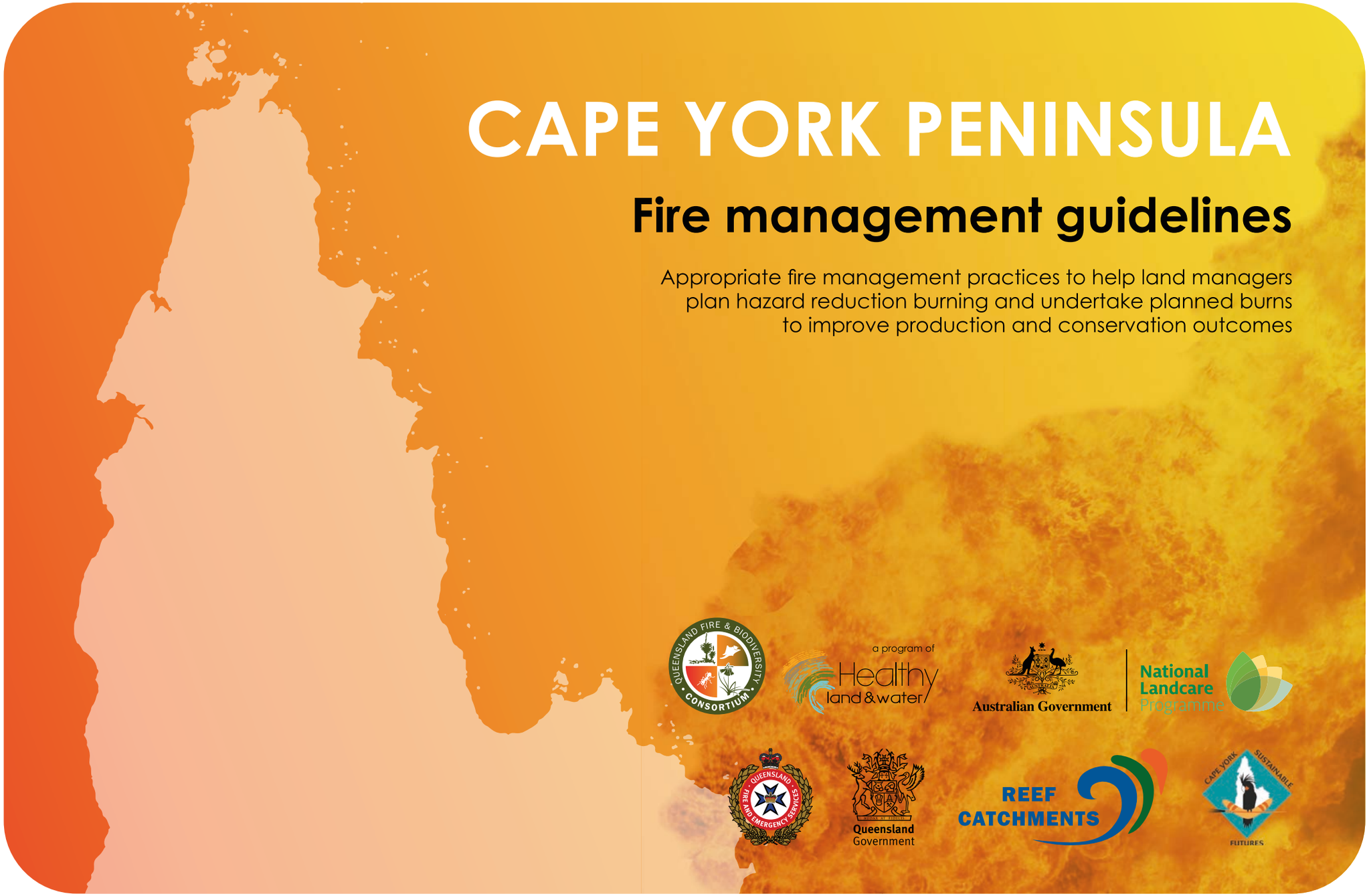
CAPE YORK PENINSULA

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



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Introduction

Fire management across Cape York Peninsula has changed in recent years. Satellite imaging shows that many large and intense dry season wildfires have occurred over the last decade. There is concern that a drier and hotter climate may further increase these fires and associated economic and environmental impacts. Rural communities recognise the threat of these fires and their effects on life, property, productivity, and the environment.

Cape York Natural Resource Management (NRM) is one of 12 regional NRM groups in Queensland and looks after most of the Cape York Peninsula region. Their aim is to help people care for the natural environment while promoting the sustainable use of natural resources in Cape York Peninsula. In collaboration with Northern Gulf Regional Management Group and Terrain NRM, they form the North Queensland NRM Alliance. For more information, visit capeyorknrm.com.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 Cape York were developed by Reef Catchments. They have been updated by the QFBC, in partnership with the 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 Cape York region. Information about why and how to burn is presented for the 15 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.

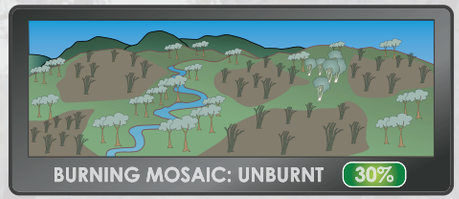
HIGH intensity fire has a flame height of typically > 3 m in height, with a fire front moving faster than walking speed.

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.

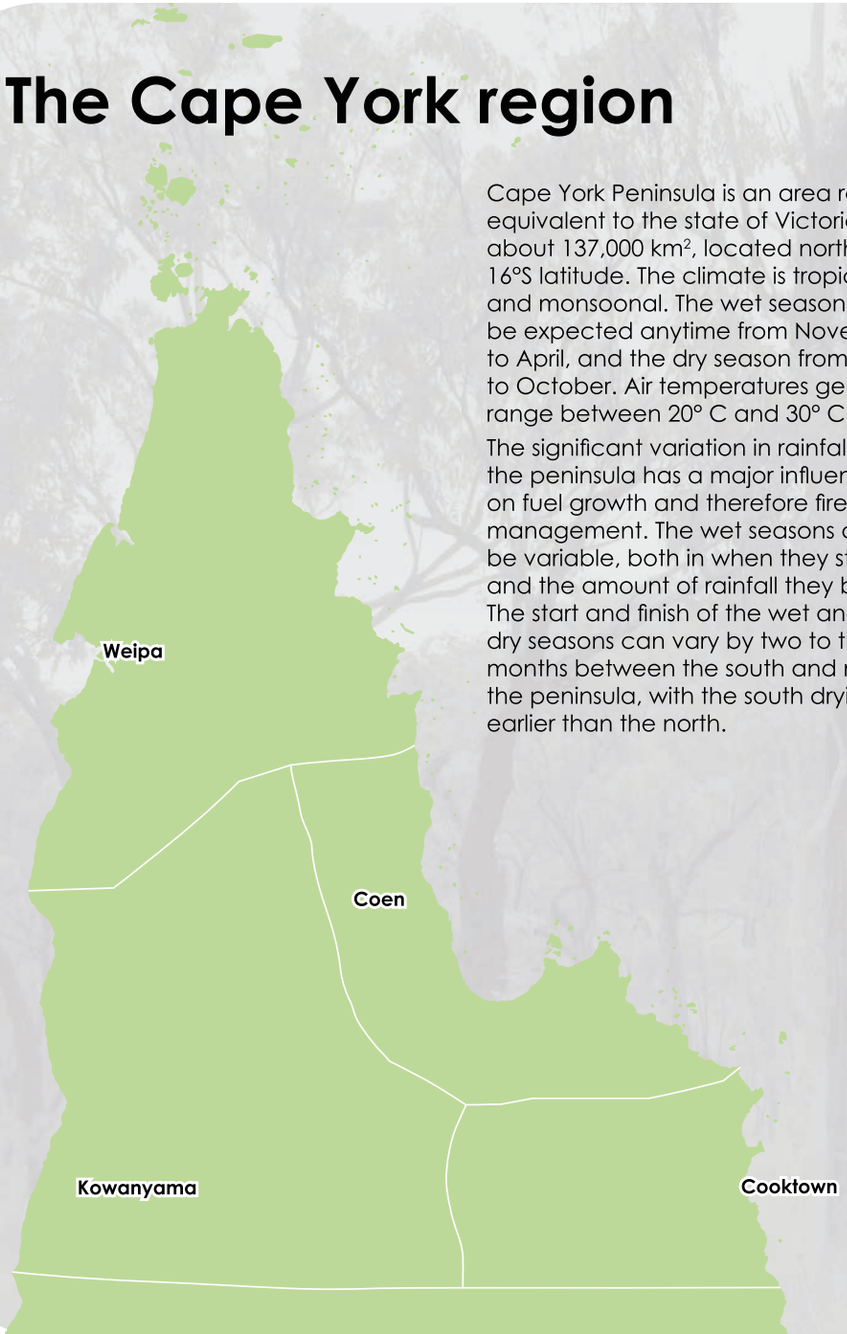
Different ignition techniques are required for different circumstances. Multiple spot ignitions are typically used for conservation purposes, whereas drip torch lines produce a more thorough burn for hazard reduction purposes adjacent to infrastructure. When backburning in advance of a wildfire under 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.

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 Cape York region



Cape York Peninsula is an area roughly equivalent to the state of Victoria, about 137,000 km^2, located north of 16°S latitude. The climate is tropical and monsoonal. The wet season can be expected anytime from November to April, and the dry season from May to October. Air temperatures generally range between 20° C and 30° C.

The significant variation in rainfall across the peninsula has a major influence on fuel growth and therefore fire management. The wet seasons can be variable, both in when they start and the amount of rainfall they bring. The start and finish of the wet and dry seasons can vary by two to three months between the south and north of the peninsula, with the south drying out earlier than the north.

The fire season is described in five parts:

1. The wet season, nominally December to mid April, provides 80% of the annual rainfall and most of the grass growth.

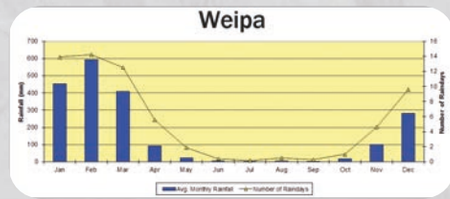
2. Early dry season, depending on the wet, is usually May and June, when the country and vegetation starts to dry out and grasses cure. Property protection burning starts, often with the added benefit of concentrating cattle grazing within the most recently burnt patches, which can also help in mustering.

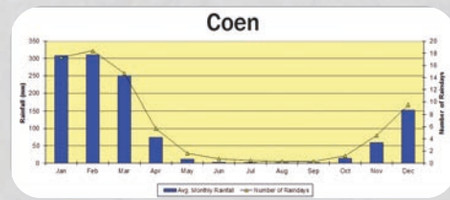
3. Mid dry season, normally July and August, is when most grasses are cured and the country has dried out. At this time of year, planned burns should consider the increasing risk of hotter and drier days ahead.

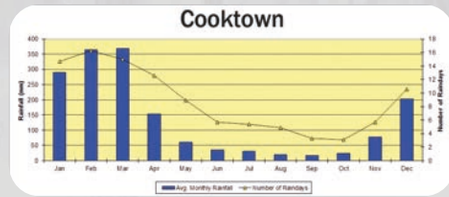
4. Late dry season is generally September – October (often into November), and the time of dry lightning strikes and wildfires.

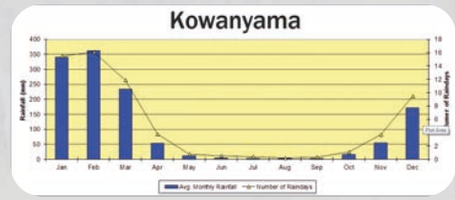
5. Storm season, normally November into early December. The first storms provide the opportunity to use fire proactively again. Soil moisture increases and the risk of fire escaping decreases, so fire is used broadly before the vegetation becomes too wet.

Four rainfall zones have been identified to represent the variable rainfall areas across Cape York. These are Weipa (2,000 mm average rainfall), Coen (1,200 mm average rainfall), Kowanyama (1,275 mm average rainfall), and Cooktown (1,650 mm average rainfall).









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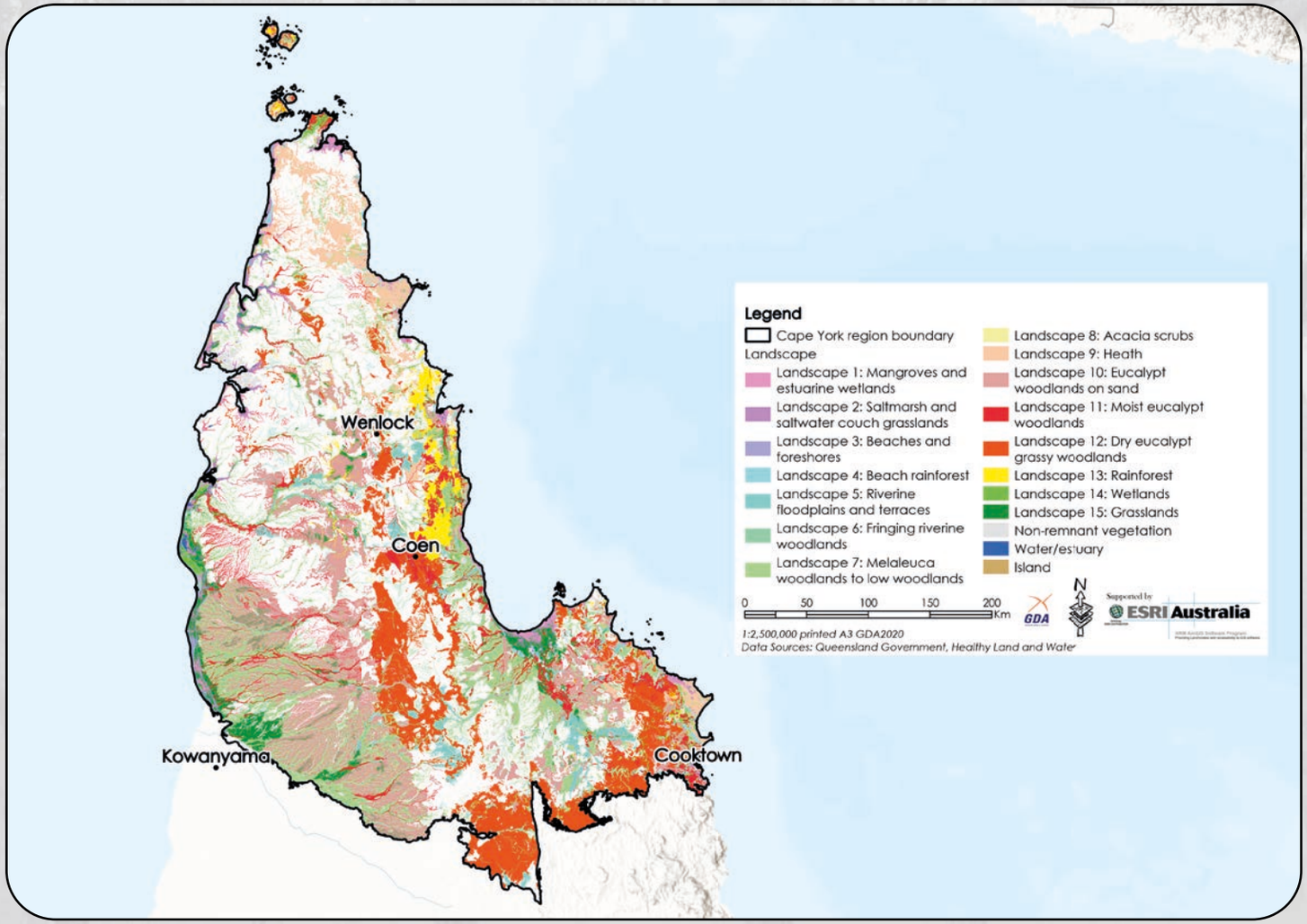
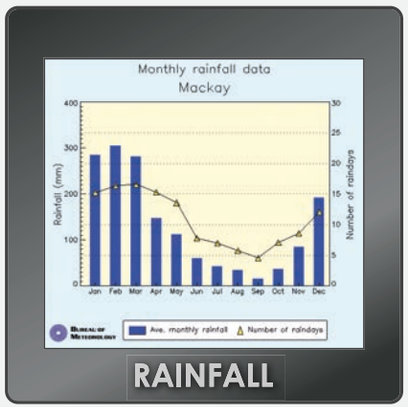
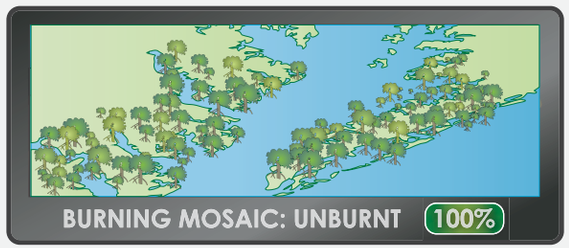
Landscapes of Cape York



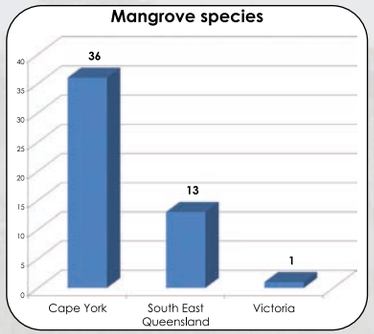
Mangroves and estuarine wetlands

Communities of primarily mangroves, as well as saltwater couch, spinifex, *Lepturus* spp., and various shrubs on sand and dunes and in estuarine wetlands.





Mangroves and estuarine wetlands



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

Regional Ecosystems

3.1.1	3.1.2	3.1.3
3.1.4	3.1.5	3.1.6
3.1.7	3.2.30	

Hazard reduction

Mangroves are regularly inundated by high tides that maintain high soil moisture and growth throughout the year. They do not present a fire risk and in fact, can be useful as 'green firebreaks'. However, exceptional periods of dry weather can cause late season fires to burn into these areas, resulting in scorching and loss of fringing mangroves. Firebreaks should not damage mangroves. It is best to use early season burning in adjacent areas to reduce fuel loads, preventing movement of wildfire.

Wildfire hazard reduction relies on management at a landscape level rather than individual property or vegetation boundaries. Mangroves can help to manage risk, but take care that this does not damage these areas.

Production

Mangroves are critical to fisheries – they are breeding and nursery grounds for many North Queensland fish species. These species are critical for recreational and commercial fishing industries. Damage to mangroves, including from fire, reduces their ability to provide breeding and nursery habitat, and in turn, the amount of fisheries production an area can provide.

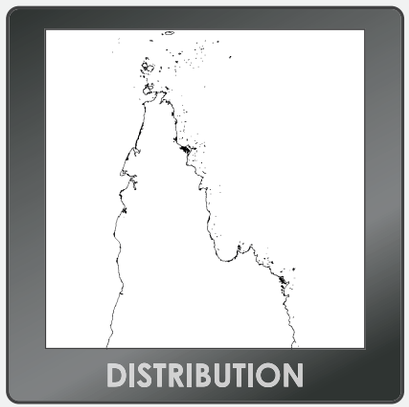
This can result in increased areas of bare soil, limiting the production value for both fisheries and stock.

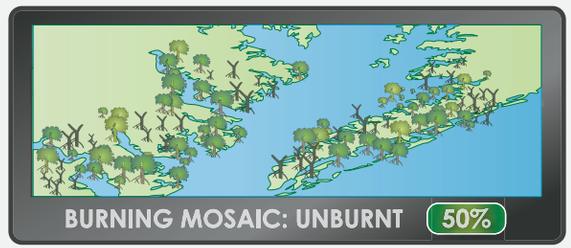
Conservation

Apart from their values to coastal fisheries, mangroves provide essential habitats for a range of conservation-dependent species. Minimising fire and other disturbance within these areas provides significant benefits for migratory and resident shorebirds, seabirds and the threatened water mouse (*Xeromys myoides*).

Healthy mangroves also help to filter excess nutrients and sediment from stormwater runoff, which stops them from entering adjacent coastal ecosystems and coral reefs. This provides further benefits for fisheries and other valuable assets.

Saltmarsh and saltwater couch grasslands





Saltmarsh and saltwater couch grasslands

Barramundi (*Lates calcarifer*).

Hazard reduction

Saltmarsh and saltwater couch grasslands are regularly inundated by high tides that maintain high soil moisture and ensure continual green growth throughout the year. Because of this, these areas rarely represent a fire hazard risk. Risk 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 it does not represent a high fire hazard. However, in many areas, Guinea grass and other exotic grasses have invaded, which 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 fuel hazard reduction strategy is to remove these grasses using herbicide such as glyphosate.

Production

Fire does not improve pasture productivity and can lead to a loss of important nutrients. Saltmarsh and saltwater couch grasslands are important filters that reduce the amount of sediment and nutrients moving into coastal waters, particularly after fires and other disturbances in upstream areas.

Because of high salt levels in the soil, weed infestations are rarely a problem in saltwater couch grasslands, so burning for weed control is usually unnecessary.

Saltwater couch is a perennial grass, and pasture condition is strongly dependent on normal tide cycles.

These grasslands offer viable feed during the dry season, but avoid overgrazing. Fire should be used in the neighbouring vegetation to prevent tea tree encroachment.

Conservation

Apart from their values to coastal fisheries, saltmarsh and saltwater couch grasslands provide essential habitats for a range of conservation-dependent species.

In this landscape, high intensity fires may damage samphire plants, but saltwater couch is tolerant of moderately regular fire.

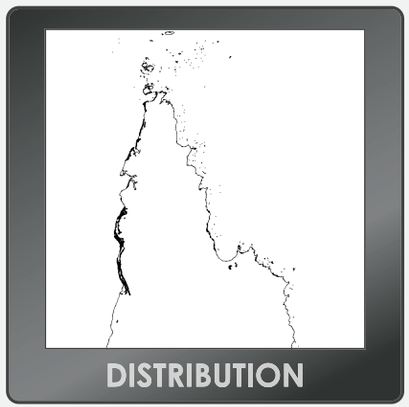
Targeted burning can be useful to reduce encroachment by melaleuca species from neighbouring vegetation or invasion by rubber vine. However, minimising fire and other disturbance within these areas provides significant benefits for migratory and resident shorebirds, seabirds and the threatened water mouse (*Xeromys myoides*). Use low intensity mosaic burning to ensure unburnt patches and habitat remain.

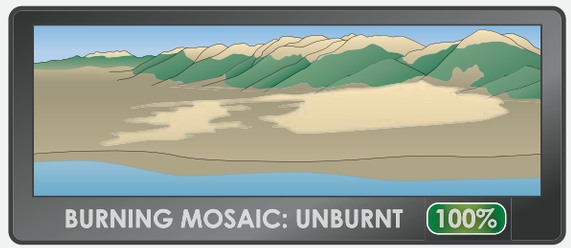
Regional Ecosystems

3.2.24 3.2.25 3.2.26
3.2.32

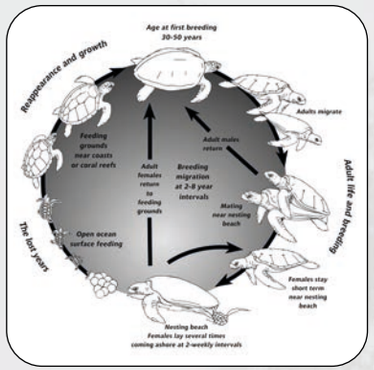
Beaches and foreshores

Beach she-oak, spoon tree, northern lancewood, lady apple. May also contain Moreton Bay ash and Clarkson's bloodwood, often as a canopy tree.





Beaches and foreshores



Turtle life cycle.

Hazard reduction

Burning is not recommended in coastal dune systems and adjacent buffer zone, unless for rehabilitation or protection purposes in special circumstances. Exotic grass infestations such as Guinea grass are common along the edges of coastal dune vegetation. Many introduced grasses are favoured by disturbance and rapidly regrow after fire, often accumulating similar fuel loads in as little as one season.

Landowners in some areas may want protection burning to reduce hazards in hind dune areas. Use fire only to gain initial control of weedy areas as part of a long-term weed management strategy. Burn with low intensity fire no more than once every 3 – 5 years, ensuring good soil moisture is present (e.g. after 50 mm of rain).

Avoid regular or repeated burning. Do not burn in dry conditions when wildfire risk is high. Exotic grasses and other weeds are best managed by using a registered herbicide when the plant is actively growing. Exotic grasses are easily killed after fire with minimal herbicide use.

Production

Clearing and introduction of exotic pasture species, coupled with impacts of stock, can severely affect fragile dune systems.

Exotic species can outcompete natives in disturbed areas and create higher fire risks. Open dune grasslands supporting native grasses, such as black speargrass, tolerate a low intensity fire every 3 – 7 years.

Conduct planned burns only when the grassy layer is expected to rapidly regenerate. Burn with good soil moisture and when there is a good chance of follow up rain.

Avoid regular or repeated burning because loss of groundcover and soil nutrients will encourage weeds and less favourable grasses.

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 are highly sensitive to fire. Even very low intensity fires will cause death and consequent beach erosion. Loss of these trees also reduces shading and causes dune sand to become hotter. Because the gender of marine turtle hatchlings is dependent on nest temperatures, these changes can alter the sex ratio in turtle populations.

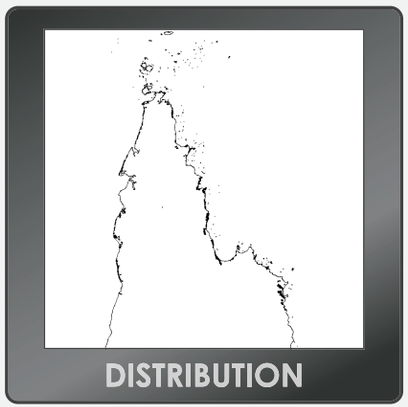
Regional Ecosystems

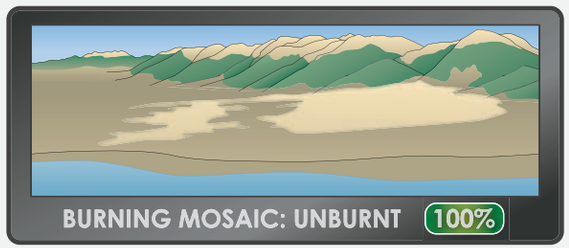
3.2.5 3.2.6 3.2.34

Beach rainforest

Landscape 4

Complex vegetation often with vines. Main species are Wongai plum, damson, batwing coral tree, Australian almond and various fig species.





Beach rainforest

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

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

Regional Ecosystems

3.2.1	3.2.2	3.2.11
3.2.12	3.2.13	3.2.28
3.2.29		

Hazard reduction

The native groundcover within beach rainforest does not accumulate large amounts of fuel and therefore does not represent a fire hazard. However, infestations of exotic grasses and weeds can significantly increase hazardous fuels along disturbed edges of this landscape.

Hazard reduction burning is generally not suitable in coastal areas because Guinea grass and other exotic grasses (e.g. grader grass) quickly increase their biomass after fire, often reaching a similar fuel load in as little as one season. An effective long-term strategy is using a registered herbicide to reduce fuel hazards where required. Apply when grasses are actively growing, preferably before the dry season.

Production

The beach rainforest areas are very small and do not offer any grazing value. They are better managed for conservation values, which in turn will protect adjacent country from erosion.

Disturbance from stock and feral pigs can encourage spread of lantana and other weeds into otherwise intact areas. To reduce long-term disturbance, manage stock access and provide shade and watering points away from beach scrub and foreshores.

Reducing weed impacts by means other than fire around boundaries and in degraded areas will protect and facilitate recovery of these sensitive coastal areas.

Conservation

Fire is a key threat to remaining areas of beach scrub (rainforest on sand dunes) – a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act (1999)*. Beach scrubs and foreshores are key habitats for many rare and threatened plants and animals and migratory birds. Foreshores are breeding sites for marine turtles and shorebirds, such as the beach stone-curlew (*Burhinus neglegtus*).

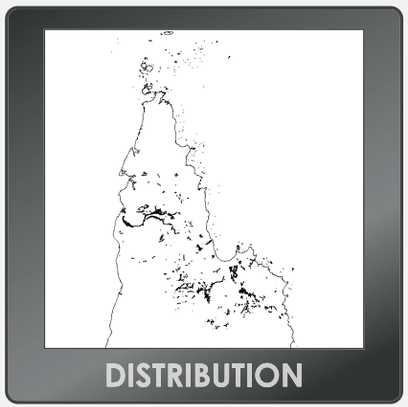
Disturbance of these habitats is commonly due to careless campfire escapes, 4WD and pedestrian tracks, and stock trampling, which leads to weed invasions and higher fire risk. **Weed management, rather than fire management, should be used to protect and rehabilitate remaining areas**. This will protect coastal habitats and wildlife such as the orange-footed scrubfowl (*Megapodius reinwardt*).

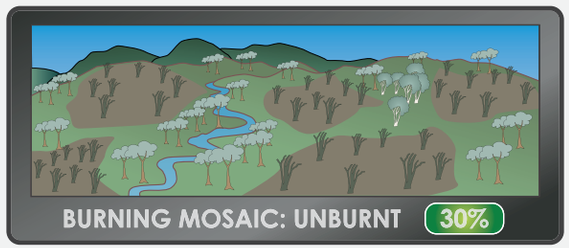
Very careful use of fire in adjacent fire-prone landscapes is needed to reduce the chance of an intense fire running into beach rainforest. Check that there is little to no scorch into beach scrubs and foreshores as an indicator of successful fire management.

Riverine floodplains and terraces

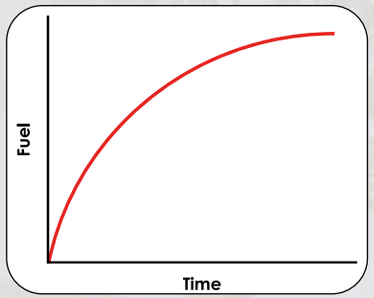
Landscape 5

Alluvial floodplains with open woodlands of Clarkson's bloodwood, Molloy red box, Moreton Bay ash, and ironbarks, often associated with Cooktown ironwood.





Riverine floodplains and terraces



Fuel accumulation over time.

Red goshawk (*Erythrotriorchis radiatus*) (© James Watson, The University of Queensland).

Regional Ecosystems

3.3.16	3.3.24	3.3.25
3.3.30	3.3.36	3.3.37
3.3.45	3.3.46	

Hazard reduction

This landscape is most common on the Mitchell and Archer River floodplains, Lakefield, and Oyala Thumotang (formerly Mungkan Kandju) areas. It can accumulate maximum fuel in as little as three years of above average rainfall.

Hazard reduction should generally be undertaken when fuels accumulate beyond grazing capacity in the appropriate seasons. Use early season burns to protect against late season wildfires. Usually, they are best started near natural or constructed breaks to reduce the area burnt to protect property.

To help rapid regeneration of groundcover, burn with good soil moisture. Avoid burning any more frequently than every 3 – 5 years. It is also possible to reduce high fuel loads by effectively managing grazing along vegetation boundaries between the woodlands and riverine fringes in the dry season.

Production

Alluvial floodplains have soils that retain water to a higher extent than surrounding country. This often prevents access earlier in the season for fire management and grazing.

Alluvial floodplains hold good grass coverage, particularly sorghum and kangaroo grass. Manage grazing pressure so that these grasses maintain their vigour.

Part of the management regime for these pastures can include late season storm burning to reduce vegetation thickening by removing seedlings and suckers.

Generally, light such fires after floods, as they are often associated with germinating seeds and vegetation beginning to thicken.

Conservation

Fire management on floodplains and terraces should consider the need to protect conservation and other values both in this landscape and in adjacent vegetation, such as fringing riverine woodlands. Small patch mosaic burns will protect the diversity of habitats needed to support a range of species. Burning alluvial flats broadens the firebreak properties of watercourses, which helps break up fire across the wider landscape

The grass layer of alluvial woodlands often contains exotic grasses and herbaceous weeds. Prioritise burning for conservation in alluvial woodlands with native grasses, such as reed and kangaroo grasses, to maintain good condition.

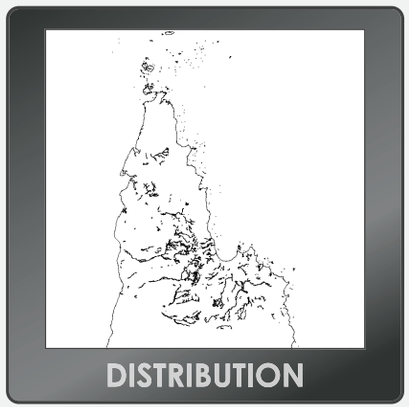
Listed as endangered in Queensland, the red goshawk (*Erythrotriorchis radiatus*) uses nesting trees near permanent water in these communities, where prey species such as small birds and mammals are abundant.

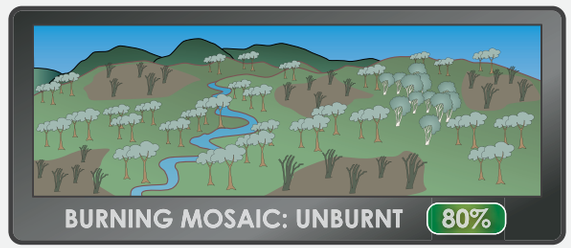
Habitat modification has been the biggest threat to this species, including fires that remove nesting trees and reduce the amount of available prey. Suitable nesting trees are taller than 20 m, in an intermediate density of forest or woodland within 1 km of permanent water. Burning only with good soil moisture will help protect these old trees.

Fringing riverine woodlands

Landscape 6

Silver-crowned paperbark, weeping paperbark with blue gum, swamp mahogany, Leichhardt, cluster figs and spoon tree.





Fringing riverine woodlands

Before chemical control.

After chemical control.

Hazard reduction

Managed correctly, riparian zones can often act as useful firebreaks in planned burning and wildfire response.

Riparian vegetation is often fire sensitive, so avoid hot fires whenever possible because they will reduce the usefulness of these areas in managing fire. Burning can often be used for initial control over woody weed infestations.

In this landscape, burn with good soil moisture; use a moderate backing fire to manage vegetation thickening. Use fire every 4 – 5 years as more frequent fires can damage the understorey composition.

In Cape York, aerial incendiary is a proven method to burn against fringing riverine woodlands early in the season as it enables easy access to large areas of the landscape. Hazard reduction will lessen the impact of late season wildfires.

Production

Riparian zones do not offer much in terms of pasture quantity. However, the impacts of grazing, particularly trampling from cattle accessing shade or water, can be a concern and create poor drinking water quality.

In the surrounding flats and floodplains, periodic use of fire will produce green pick, reducing grazing pressure in the riparian area.

Conservation

Rubber vine infestation is a serious weed threat in this landscape. Fire can be used for initial control of rubber vine as it reduces the size and vigour of plants and kills seedlings. However, high intensity fires will damage trees. This strategy is made more effective by following up with chemical control (pictured left). Other common threats include feral pigs, heavy grazing and intense fires. Well-planned burns can help protect native riparian vegetation from hot fires.

The spectacled hare wallaby (*Lagorchestes conspicillatus*) is an important species that inhabits riparian zones. They use old growth tussock grass and other thick vegetation as nests, which are removed by too frequent fire. This wallaby's diet is composed mostly of forbs and other broad-leaved vegetation in the pastures, rather than grasses.

These food items are more common in recently burnt areas. Thus, the best habitat for this species is long unburnt riparian areas adjacent to flats and floodplains that are periodically burnt.

Spectacled hare-wallaby (*Lagorchestes conspicillatus*).

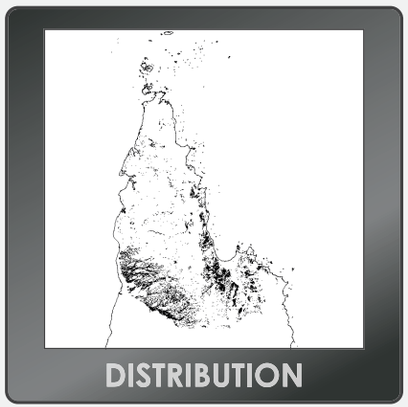
Regional Ecosystems

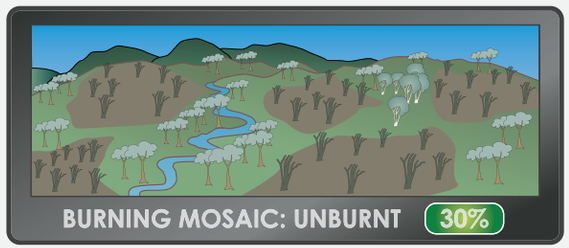
3.3.10 3.3.11

Melaleuca woodlands to low woodlands

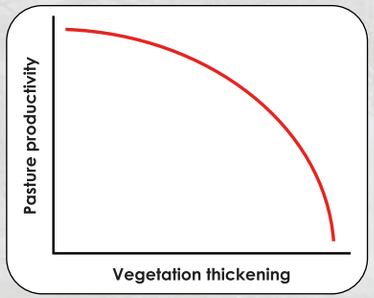
Landscape 7

Predominately broad-leaved tea tree with black or yellow tea tree present, often with a sparse to mixed shrub layer in the taller stands.





Melaleuca woodlands to low woodlands



Vegetation thickening vs. pasture productivity.

Star finch (*Bathilda ruficauda*).

Regional Ecosystems

3.3.13	3.3.42	3.3.43
3.3.47	3.3.48	3.3.49
3.3.50	3.3.51	3.3.52
3.5.13	3.5.14	3.5.15
3.5.16	3.5.17	3.5.18
3.5.27	3.7.6	3.10.16
3.11.18		

Hazard reduction

Tea tree (*Melaleuca* spp.) woodlands are an extensive part of Cape York. Storm burning and at the end of the wet season or as soon as possible after the wet season on property and vegetation boundaries is the initial priority for hazard reduction. In this landscape, tea tree will 'sucker' after dry season fire or too frequent fires, which often thickens the vegetation, increasing future fuel hazard.

Protection burns should be against natural features, such as riverine scrubs or watercourses, to reduce the area burnt early and therefore reduce the risk of vegetation thickening. In Cape York, aerial incendiary is a proven method for lighting mosaic burns early in the season, as it enables easy access to large areas of the landscape.

Production

Wanderrie grass, which has only moderate grazing value, is the common pasture found among the tea tree. When tea tree woodlands are managed to avoid overgrazing and thickening, the more valued perennial sorghum and cockatoo grasses may grow.

In this landscape type, a hot backing fire after the first storm can remove suckers and keep the vegetation more open, making it more productive for grazing. Spelling or reduced grazing for a season may be needed to build up enough grass fuel for such fires.

Early in the dry season, protection burns can be used during storm burning to break up the size of the area burnt. As part of property fire planning, it is important to allow several years between storm burns to prevent thickening of tea tree. Grazing and fire should be used collaboratively to manage fuel loads on a 3 – 5 year rotation, depending on the extent of the wet season.

Conservation

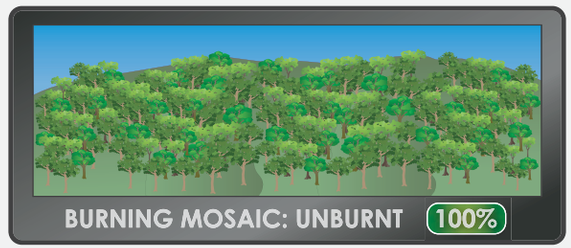
Tea tree woodlands can range from low and sparse to tall. To manage these vegetation types, burn while there is adequate soil moisture. A moderate to hot fire in dry conditions promotes suckering and thickening.

Thickening in tea tree woodlands, and especially of tea trees in adjacent grasslands, has contributed to the decline of many bird species that are iconic in Cape York. This is particularly the case for granivorous (seed-eating) birds such as the golden-shouldered parrot (*Psephotellus chrysopterygius*), star finch (*Bathilda ruficauda*), Gouldian finch (*Chloebia gouldiae*), and buff-breasted button quail (*Turnix olivii*).

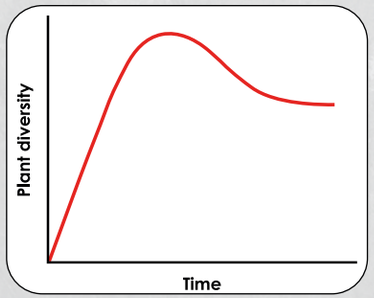
The decline in these species is partially a result of the loss of perennial pastures, such as cockatoo grass, that these birds rely on during parts of the year. In addition, extensive late season fires destroy most of the seed reserves that have fallen to the ground. These birds find it difficult to access seeds in thick pastures, so areas that have been 'patch burnt' make better foraging areas.

Acacia scrubs

Three main types are lancewood, fish poison tree and the arid peach/black plum. Most of the understorey contains juvenile-dominant species.



Acacia scrubs



Plant diversity over time.

Hazard reduction

Acacia scrubs, primarily lancewood thickets on scarps, are geographically small but can be useful as part of the natural firebreak system because they support only sparse fuels in the ground layer and are relatively fire resistant. Early season burning adjacent to the scrubs can reduce fuels, offering protection later in the season.

Late season wildfires can damage these scrubs and reduce their effectiveness as firebreaks. Where there has been wildfire damage, early season burning in surrounding areas is best for the next few years to allow the scrubs to recover.

Production

Acacia scrubs offer little production value. In heavier black soils, they can provide some native sorghum but generally, their sparse pastures are unproductive.

Conservation

Acacia scrubs often grow in small patches in a broader vegetated landscape, particularly lancewood on scarps. However, from a conservation perspective, they often support species that are not found elsewhere.

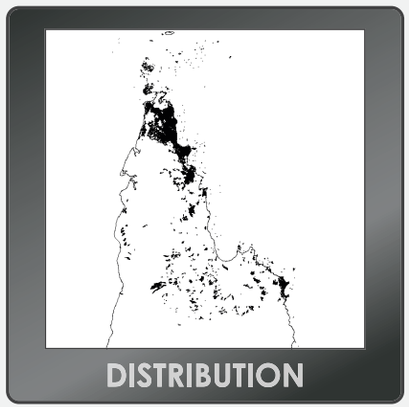
Lancewood is killed by intense fires that scorch its canopy, but tolerates low intensity trickling fires and/or high intensity fires. Lancewood germinates seedlings in response to fire, but needs a decade before the canopy is re-established.

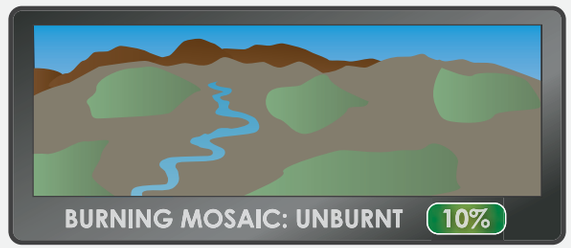
Although they rarely support high fuel loads, mid to late dry season wildfires can kill edge trees, resulting in a gradual reduction of the stand over subsequent fire events. **Generally, don't target lancewood thickets for burning**. Instead, burn in adjacent eucalypt woodlands to protect lancewood from hot late season fires.

Regional Ecosystems

3.7.2

Heath


DISTRIBUTION

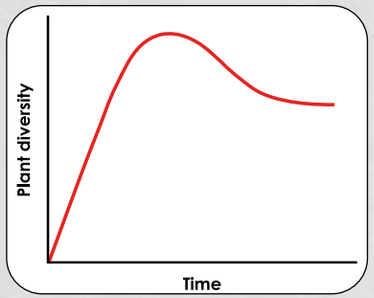

BURNING MOSAIC: UNBURNT
10%


LOW
MODERATE
HIGH
FIRE INTENSITY °C


WET
EARLY DRY
MID DRY
LATE DRY
SEASON


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
BURN FREQUENCY YEARS

Heath



Plant diversity over time.

Hazard reduction

Heath is a complex vegetation type that will usually burn completely or not at all. The best hazard reduction strategy is to not place infrastructure in heath areas because of the volatility of the vegetation in adverse conditions. If infrastructure is present, reduce hazards in adjoining vegetation types.

Burning heath for hazard reduction should start in the mid dry season. Planned burns should target small sections, where possible, using natural features such as depressions, drainage lines or vegetation change to break the country into small areas.

Production

Heath does not offer any opportunity for broadscale production in horticulture or grazing. There are small apiary and wildflower assets, but they would not generally override hazard reduction priorities.

Conservation

Heaths on Cape York Peninsula are concentrated on sandy soils. Most heath plants survive fire by regrowing shoots, but some shrubs, such as *Grevillea pteridifolia* and *Jacksonia thesioides*, are killed, with fire-promoted germination.

Regular fire is important to maintain a healthy heath – it removes rank old vegetation and stimulates fresh growth and recruitment. In the long absence of fire, heath plant diversity will likely decline due to the loss of short-lived herbs and small shrubs.

Burning with good soil moisture is important for helping retain some unburnt patches and keeping topsoil organic matter. Topographic features and the associated changes in soil moisture can be used to divide the area to achieve a mosaic of fire intervals.

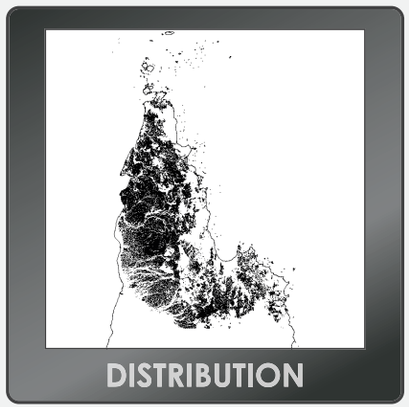
Regional Ecosystems

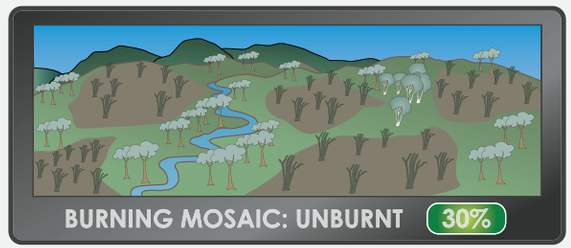
3.2.15	3.2.16	3.2.18
3.2.19	3.2.20	3.2.21
3.2.22	3.2.23	3.2.31
3.3.33	3.3.53	3.3.54
3.3.55	3.5.19	3.5.28
3.5.32	3.10.12	3.10.13
3.10.14	3.10.17	3.10.18
3.10.19	3.11.19	3.12.16
3.12.23	3.12.26	3.12.27
3.12.28	3.12.31	3.12.33
3.12.34	3.12.38	

Close up of heath vegetation.

Eucalypt woodlands on sand

Main eucalypts are Darwin stringybark (messmate), Clarkson's bloodwood and Melville Island bloodwood on ridges. May contain yellow jacket and ironbark species.





Eucalypt woodlands on sand


1 t/ha


2 t/ha


3 t/ha


4 t/ha

Regional Ecosystems

3.2.8	3.2.9	3.2.10
3.3.26	3.3.27	3.3.31
3.5.1	3.5.2	3.5.6
3.5.7	3.5.8	3.5.9
3.5.10	3.5.11	3.5.12
3.5.23	3.5.24	3.7.4
3.7.5	3.9.2	3.9.4
3.10.7	3.10.8	3.10.21
3.11.4	3.11.13	3.12.12
3.12.13	3.12.15	

Hazard reduction

In this landscape, the presence of free-draining sandy soils normally means it dries earlier than surrounding areas. Thus, wildfires often start in this landscape.

To protect property, burn breaks close to boundary lines or areas of accidental ignition risks, such as roads and camping areas. The type of hazard reduction burning should be diverse – consider other fuel management options such as slashing on rotation. Another strategy is to burn on one side of a natural feature one year and then burn on the other side in alternate years.

Production

Early dry season protection burns can concentrate cattle grazing within the most recently burnt patches and help in mustering. These early burns not only protect against late season wildfires taking pasture from cattle, they also ensure fuel is available for storm burning in adjacent areas. Storm burning is the most effective way to manage vegetation thickening and reduce weeds.

There is often value in planning and coordinating the use of fire at a broader landscape scale to gain maximum benefit of the storm season in neighbouring properties.

The best interval between fires is 2 – 3 average seasons. Longer or shorter intervals can thicken vegetation and make undesired changes in the mix of annual and perennial grasses. Note that once suckers get higher than about two metres, fire is much less effective at treating thickening.

Conservation

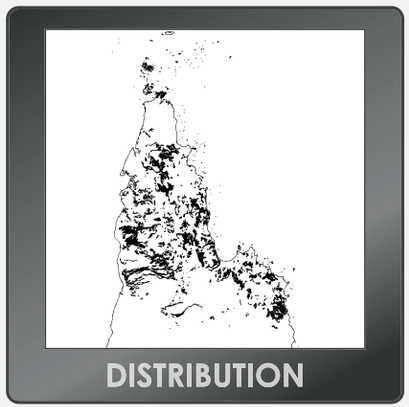
This landscape is one of the most geographically extensive on Cape York, with the larger part used for cattle grazing. Most of this area is burnt frequently by planned fire to help manage pasture, with woodlands not purposely burnt being killed in high intensity late season wildfires.

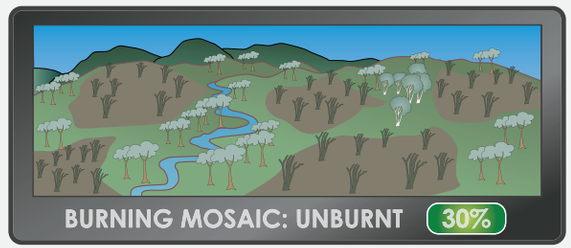
Where cattle are not grazed (i.e. in conservation reserves), planned burning should be particularly patchy to account for the needs of species that do not thrive in areas burnt often.

Planned burning should use many natural features (i.e. drainage lines, moisture gradients, fire-resistant vegetation) to create mosaics of burnt and unburnt vegetation to help foster perennial pasture species, thus making seed reserves available to threatened bird species.

Moist eucalypt woodlands

Tall canopy consisting of poplar gum, Molloy red box, shiny-leaved box, Darwin stringybark, pink bloodwood, Clarksons bloodwood, Cooktown ironwood, Moreton Bay ash and other eucalypts and corymbias. Sublayer may consist of tea trees, paperbarks, acacias, cocky apple, allocasuarinas, and a ground cover of grasses including black speargrass, giant spear grass, and kangaroo grass. Often occurs on alluvial and coastal plains.





Moist eucalypt woodlands

Landscape 11


1 t/ha


2 t/ha


3 t/ha


4 t/ha

Regional Ecosystems

3.2.7	3.3.8	3.3.15
3.3.17	3.3.18	3.3.20
3.3.21	3.3.22	3.3.23
3.3.28	3.3.29	3.3.69
3.5.5	3.5.21	3.5.22
3.5.25	3.5.26	3.5.31
3.8.3	3.10.15	3.11.5
3.11.6	3.11.12	3.11.15
3.11.17	3.12.7	3.12.8
3.12.9	3.12.17	3.12.18
3.12.19	3.12.37	

Hazard reduction

In these communities, mosaic burning is critical to ensure that extensive wildfires do not become uncontrollable in the Cape York region.

Burn during the dry season every 3 – 5 years when conditions are suitable or after storms. Traditional burning coincides with the first storms because follow up rain is likely to help groundcover to regenerate quickly.

Ensure patches are not burnt annually as this can promote weed invasion. Management should ensure adequate control of weeds after a fire. Reducing weedy fuel hazards before burning can be beneficial to the outcomes of a planned fire.

Production

For grazing areas, burn every 3 – 5 years when conditions are likely to maintain pasture condition. Pasture recovers faster when soil moisture is sufficient to stimulate regrowth of the tussock.

Burning a few days after rain towards the onset of the wet season is recommended. Fire exclusion will expand the rainforest, which gradually shades out pastures. This in turn prevents planned burning, enabling more rainforest expansion at the expense of pasture productivity and thus grazing value. Spell country and/or increase the time between fires to allow sufficient fuels to accumulate to carry a moderate intensity fire.

Fire is an effective way to control lantana and rubber vine infestations. Avoid burning when conditions are very dry because fires are hard to contain and can remove the mulch layer of the soil, which will delay the response of pasture grasses and can cause woody weed invasion.

Conservation

These communities provide habitats for many species endemic to the region. Tree species, such as various eucalypts that are associated with permanent water, and a dominant grassy undergrowth are important for the endangered star finch (*Bathilda ruficauda*). These grasses provide adequate feeding options and create a niche for foraging.

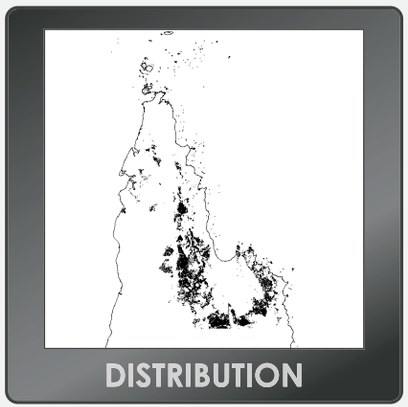
The vulnerable yellow-bellied glider (*Petaurus australis*) exists only on the western fringe of the Wet Tropics World Heritage Area. It is imperative to burn with good soil moisture to ensure that tall eucalypts remain healthy after fire because gliders use them for sap-feeding and nesting hollows.

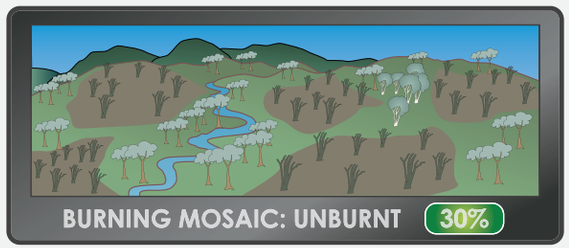
Where areas with a grassy understorey are present, a moderate intensity fire every 2 – 5 years is recommended. Maintain a permanent mosaic of burnt/unburnt vegetation to ensure long-term availability of diverse animal habitats. Ensure that adjacent vegetation communities that are fire sensitive are protected.

Dry eucalypt grassy woodlands

Landscape 12

Mixed ironbark and bloodwood species. May include lemon-scented gum. Main grass species are generally spear grass and kangaroo grass.





Dry eucalypt grassy woodlands

Northern quoll (*Dasyurus hallucatus*).

Hazard reduction

As the dry season progresses and soil moisture decreases, fire intensity and the difficulty in controlling wildfire increases. This vegetation type generally occurs on the slopes, hills and ranges. It can be at high risk from wildfires because travelling uphill makes fires more intense.

Early season hazard reduction is needed to break up the country and provide a buffer from wildfires. Topography can make access difficult in places, therefore aerial ignition is the primary method of broadscale hazard reduction. It also offers the opportunity to light ridge tops, creating a downhill moving fire that is less intense than an uphill fire.

A consideration with aerial ignition is the amount of range country that should be burnt in any area. Alternatively, surrounding foothills and flats can be burnt early to provide protection.

Production

The drier ranges offer good grazing, with large areas of black speargrass and kangaroo grass. In the wet season, cattle tend to congregate on the higher, drier ground, therefore protecting this vegetation from wildfire is a high priority.

The grasses tend to be robust and benefit from storm burning every 3 – 5 years, depending on seasons and stocking rates. Storm burning in the drier eucalypt country may require some whole-of-property planning to ensure that the resulting green pick is not overgrazed during the following wet season.

A fire after the first storm will maintain a good balance of trees and grass. With fire intervals longer than five years, a dense shrub layer or thicker regrowth will likely develop.

Conservation

In this landscape, planned burning should involve regular patchy fires to ensure a mosaic of different vegetation types and time since fire.

In the mid to late dry season, rangelands are prone to widespread intense wildfires – a key threat to biodiversity. Fires in dry conditions can promote excessive wattle sapling recruitment that thickens up the woodland structure, which reduces grass cover.

Overly intensive fire causes loss of vegetation cover and directly threatens gliders, owls, and the mature hollow-bearing eucalypts they depend upon. Rocky outcrops and scarps are essential habitat for the endangered northern quoll (*Dasyurus hallucatus*). In typical years, it will be too dry to burn from September to mid November, which is also the season when juvenile quolls are most vulnerable to fire.

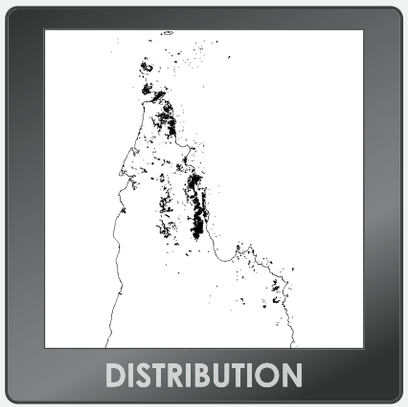
In potential or known quoll habitat, small-scale patch burns are best. Burn with good soil moisture – either storm burn, or just after the wet season as the country dries out.

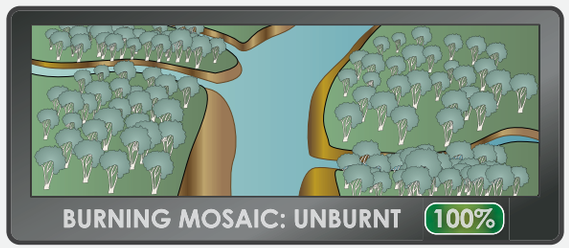
Regional Ecosystems

3.7.3	3.10.6	3.10.9
3.10.10	3.10.11	3.11.7
3.11.8	3.11.9	3.11.10
3.11.11	3.11.14	3.12.10
3.12.11	3.12.14	3.12.24

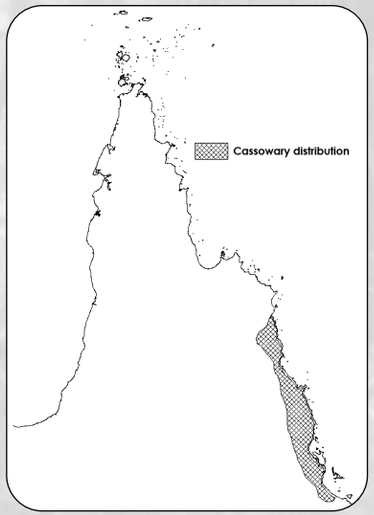
Rainforest

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 mountain plateaus.





Rainforest



Cassowary distribution in the Cape York region.

Regional Ecosystems

3.3.7	3.3.38	3.3.39
3.3.40	3.3.68	3.5.3
3.5.4	3.5.20	3.7.1
3.8.1	3.8.2	3.8.5
3.10.2	3.10.3	3.10.5
3.11.1	3.11.2	3.11.3
3.12.1	3.12.2	3.12.3
3.12.4	3.12.5	3.12.6
3.12.20	3.12.21	3.12.22
3.12.35	3.12.36	

Hazard reduction

Rainforest edges provide persistent effective firebreaks and are highly valued during wildfires. It is important to burn surrounding fire-prone landscapes in mosaic patches to break up fuels and wildfire fronts to protect rainforest.

Although rainforests will usually not burn, scorching of rainforest edges can encourage grassy fuels and weeds to penetrate into the community. Fire may be used along margins to initially control weeds such as lantana, or to control rainforest expansion – however, be careful to ensure fire does not intrude into the rainforest.

In areas of high fuel load, burn with little or preferably no wind. Burning small patches is less hazardous than a continuous line. Good practice is to ignite from the rainforest edge at the top of ridges and hills to allow fire to burn downhill, thus reducing fire intensity.

Production

Rainforest supports little to no grassy understorey, thus there is no useful grazing production.

Disturbance encourages weed invasions, so it is preferable to restrict stock access into these communities. Lack of fire allows rainforest species to spread out into adjacent areas of open forest and woodland, thus reducing pasture productivity.

In adjacent eucalypt communities, burn to maintain species and canopy composition, with an open understorey to reduce undesired rainforest expansion. This will also provide mosaic patches to reduce the intensity of wildfires on the rainforest edge.

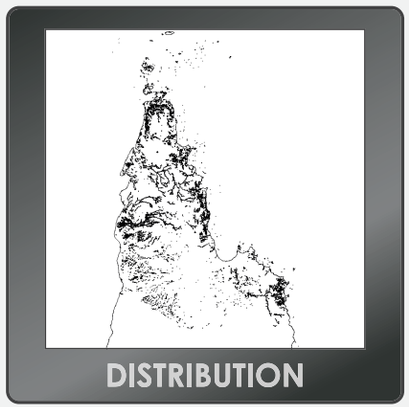
Conservation

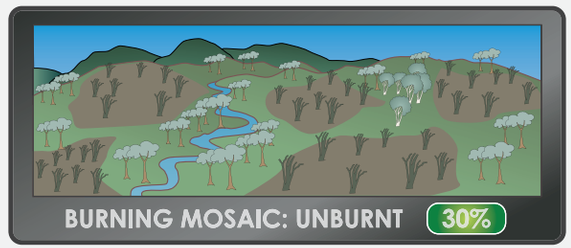
Where burning edges for weed control, ensure sufficient soil moisture is present and allow for follow up control. Avoid fire when conditions are hot and dry, as this will promote weed infestations, increasing fire risk and reducing integrity of rainforest edges.

On the rainforest edge, fewer disturbances of fire and weeds allows leaf litter to accumulate on the forest floor, increasing nutrients and providing habitat for various rainforest species.

The endangered southern cassowary (*Casuarius casuarius*), a resident of the larger rainforest blocks, seasonally relies on adjacent vegetation for food. Maintaining good rainforest and adjacent forest boundaries will help this important species to persist.

Wetlands


DISTRIBUTION

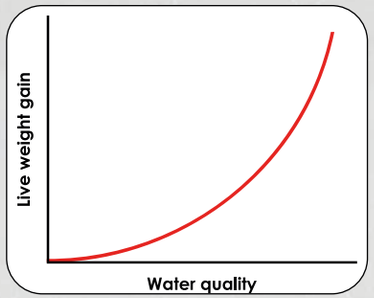

BURNING MOSAIC: UNBURNT
30%


LOW
MODERATE
HIGH
FIRE INTENSITY °C


WET
EARLY DRY
MID DRY
LATE DRY


1
2
3
4
5
6
7
BURN
FREQUENCY
YEARS

Wetlands



Water quality vs. live weight gain.

Regional Ecosystems

3.2.3	3.2.4	3.2.14
3.2.27	3.2.33	3.3.1
3.3.2	3.3.4	3.3.5
3.3.6	3.3.9	3.3.12
3.3.14	3.3.32	3.3.41
3.3.65	3.3.66	3.3.67
3.5.3	3.5.4	3.5.20
3.10.1	3.10.2	

Hazard reduction

At both landscape and property scales, wetlands act as firebreaks or a place to secure the ends of firebreaks from surrounding vegetation. Seasonal drying patterns will dictate whether they may be considered at risk from a wildfire when property fire plans are prepared. However, late in the dry season, wetlands can burn as their effectiveness as firebreaks declines.

Hazard reduction for wetlands should aim to separate the wetland from surrounding vegetation as soon as practical after the wet season. This may be by grazing, machinery, or early burns. This strategy will still allow fire control lines to be tied into the wetland area but will also protect valuable forage for later in the dry season.

Production

Grazing value of wetlands is important in the dry season as the surrounding pasture becomes less abundant and/or palatable. Consider protecting this resource with early season burning. Weed infestations established or made worse by grazing pressures can be at least partially controlled by fire.

Grazing on the gradually drying edges of wetlands provides a fuel-reduced buffer between the wetlands and surrounding grasslands. Late dry season grazing of ponded pastures reduces the risk of intense fire, and is useful before wet season flooding, when ungrazed patches can drown.

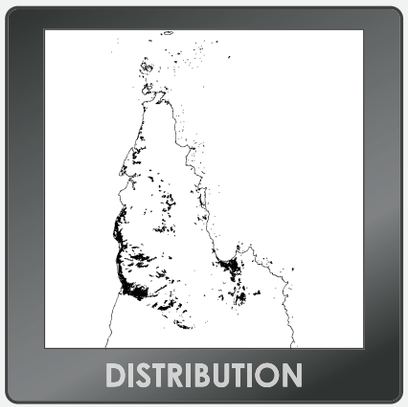
Wetland grasses also benefit from a low intensity fire every 4 – 5 years to remove rank older grass and stimulate fresh growth. However, take extra care to reduce fire intensity to protect fringing vegetation.

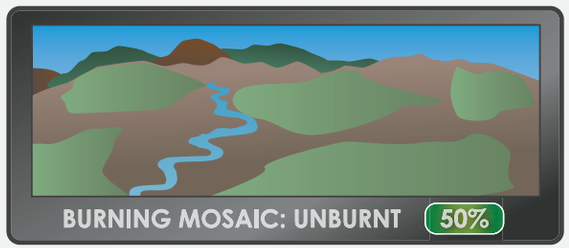
Conservation

Wetlands provide many services, including protection against soil erosion, and maintenance of aquatic habitats, fishery stocks and habitat for many migratory birds. Without grazing, hazard reduction burning is needed as early as possible to separate surrounding vegetation from the wetlands as a protection measure against late season wildfires. Avoid very dry conditions because a ground fire can develop in peat layers that can burn for long periods.

Ponded pasture grasses represent the greatest threat to freshwater habitats because they can completely choke out waterways, even when being grazed. Hymenachne, a Weed of National Significance, can build up very large fuel loads and severely damage riparian vegetation if burnt in the dry season. Reducing weedy fuel hazards with chemical control approved for use around waterways before burning can prevent this from happening.

Grasslands


DISTRIBUTION

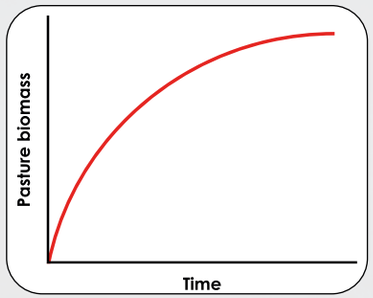

BURNING MOSAIC: UNBURNT
50%


LOW
MODERATE
HIGH
FIRE INTENSITY °C


WET
EARLY DRY
MID DRY
LATE DRY
SEASON


1
2
3
4
5
6
7
8
9
10
BURN FREQUENCY YEARS

Grasslands



Pasture biomass over time.

Golden-shouldered parrot (*Psephotellus chrysopterygius*).

Regional Ecosystems

3.3.56	3.3.57	3.3.58
3.3.60	3.3.61	3.5.29
3.5.30	3.8.4	3.9.5
3.9.7	3.9.8	3.12.29
3.12.30	3.12.32	

Hazard reduction

Grasslands are at risk of being completely burnt out by wildfires late in the dry season. Recovery to useful pastures can take several years.

Hazard reduction in grasslands is complicated by their susceptibility to invasion by woody species, particularly broad-leaved tea tree, caused partially by early dry season burning. Such burning is usually useful as a protection strategy against late season wildfires. Some thickening of vegetation on property boundaries may be seen as a compromise to protect most adjacent pastures.

Alternatively, the adjacent sand ridges can be burnt early as a protection measure.

Production

Grasslands have an active growing period over the wet season and then tend to dormancy toward the mid dry season. They contain important grasses for grazing such as native sorghums and kangaroo grass. Some grasslands have melon holes (waterholes interspersed in the soil) that support more palatable grasses into the dry season but can become overgrazed.

As a management tool, burning can create green pick elsewhere to take pressure off these areas. Do not burn grasslands when the grasses are actively growing because it can harm species composition and lead to a decline in grasslands grazing values.

Depending on rainfall, storm burning is important every 2 – 5 years to remove woody thickening and pasture composition.

Conservation

It is important to ensure that fires are typically only a few years apart, as when fires are absent, tea trees can invade. Burning in dry conditions can promote excessive tea tree sucker regrowth.

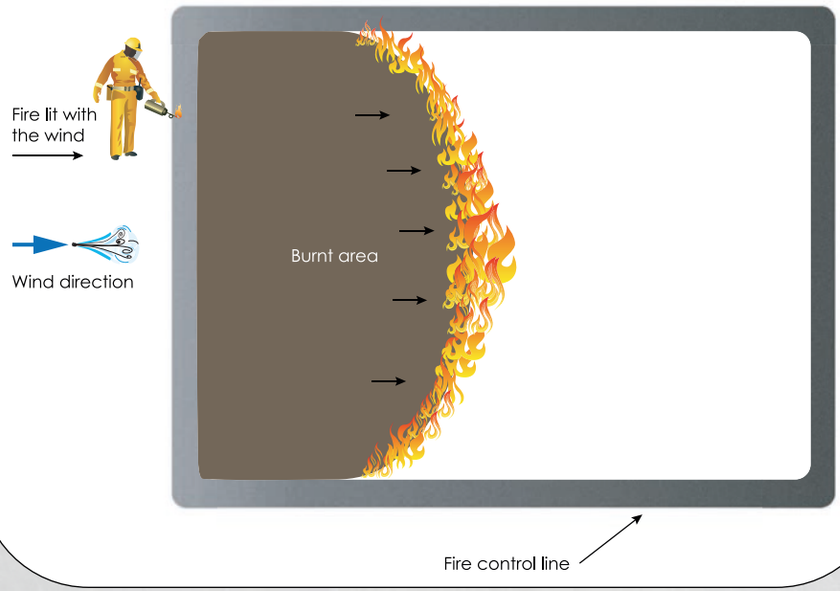
Burning with an appropriate mosaic every 2 – 5 years will ensure that there is an adequate variation in the distribution of fuel and age of grass. A good body of grass is important to generate enough heat in a backing fire to reduce tea tree encroachment. Storm burns will provide the moisture for healthy grass regeneration.

The golden-shouldered parrot (*Psephotellus chrysopterygius*), a species endemic to the region, thrives on healthy grasslands for food, nesting and protection from predation. Irregular low intensity burning patterns can fail to regenerate grasses, resulting in an invasion of tea trees, which reduces the extent and quality of available grassland habitat. Tea trees enable predators to enter grassland areas and ambush parrot nests in termite mounds. Early dry season fires enable easy access to seeds for the golden-shouldered parrot.

Fire diagrams

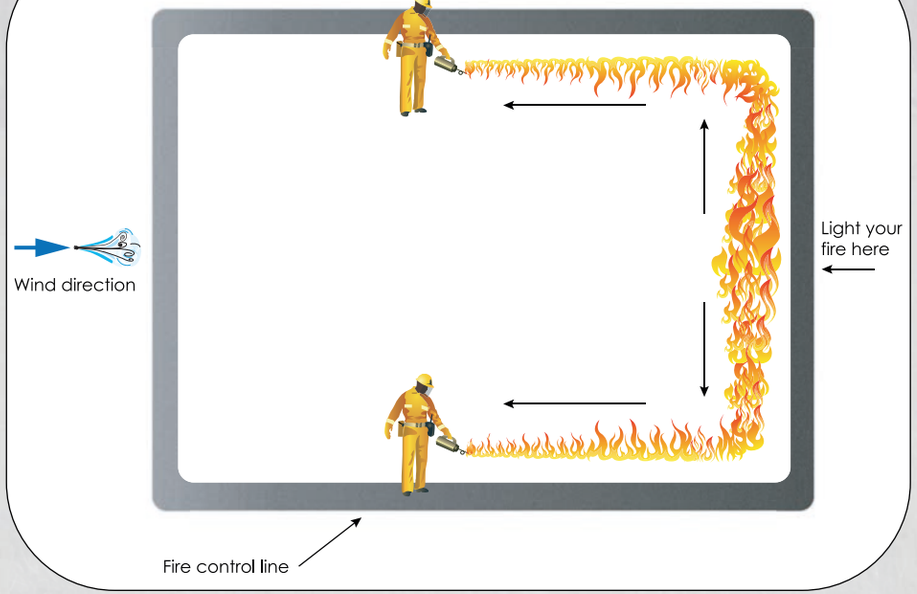
The following fire diagrams are provided to illustrate some ignition techniques for fire practitioners who are experienced in the lighting and use of fire. There are many variables that need to be considered prior to lighting a fire, including temperature, humidity, wind speed and direction, fuel type, 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



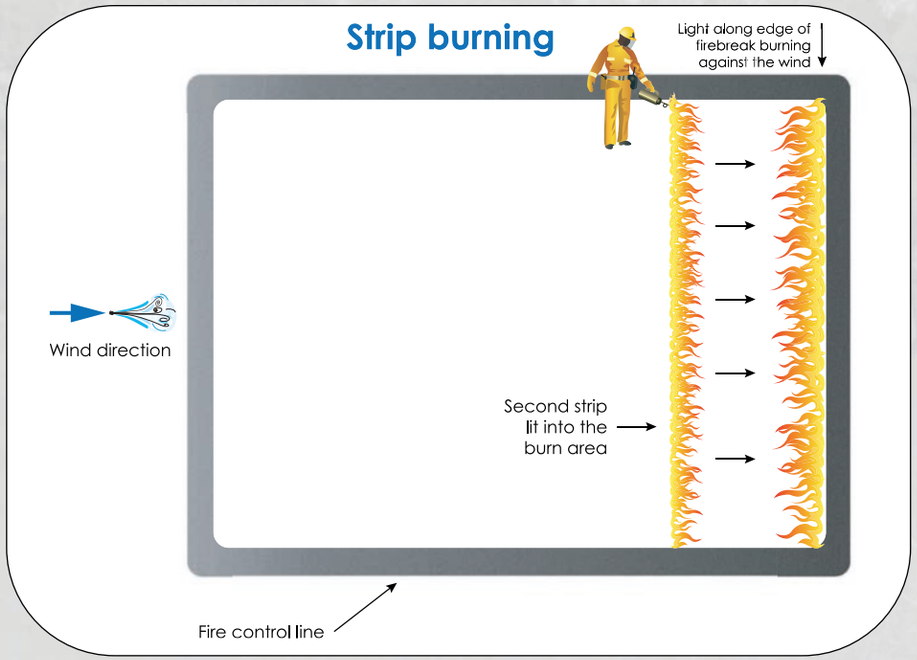
Forward burning can be used early in the season when conditions are still mild. A forward fire (lit with the wind) will move quickly over old grasses, removing only the dead material on the downwind side. A forward fire is also useful after storms to remove old dead material in damp conditions. The fire 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



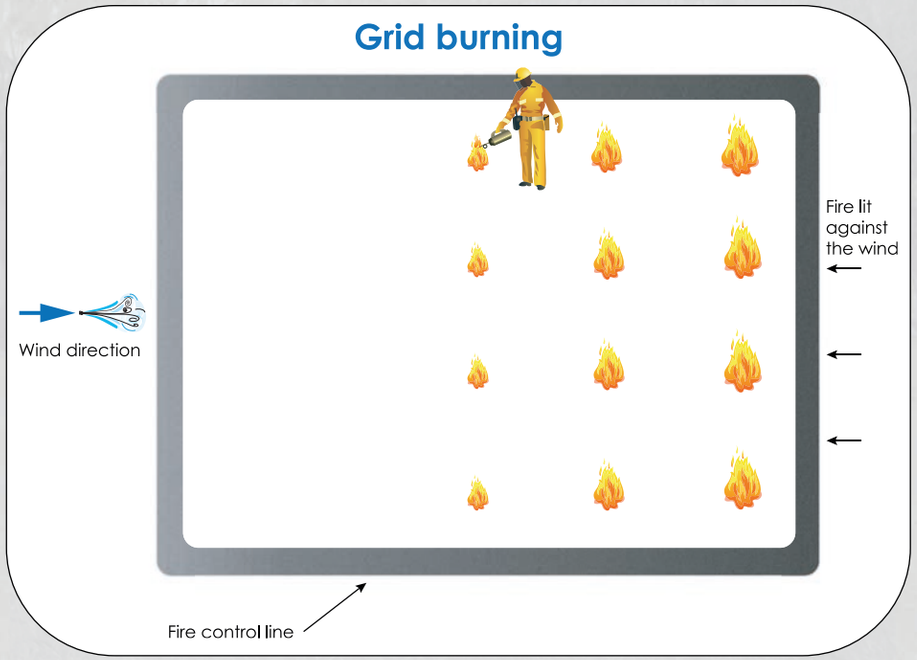
To secure a safe edge to a burn and/or to provide a slow-moving fire with maximum heat at the stem for killing woody weeds. The diagram shows the sides of the fire being brought down slowly to contain the fire.

Strip burning



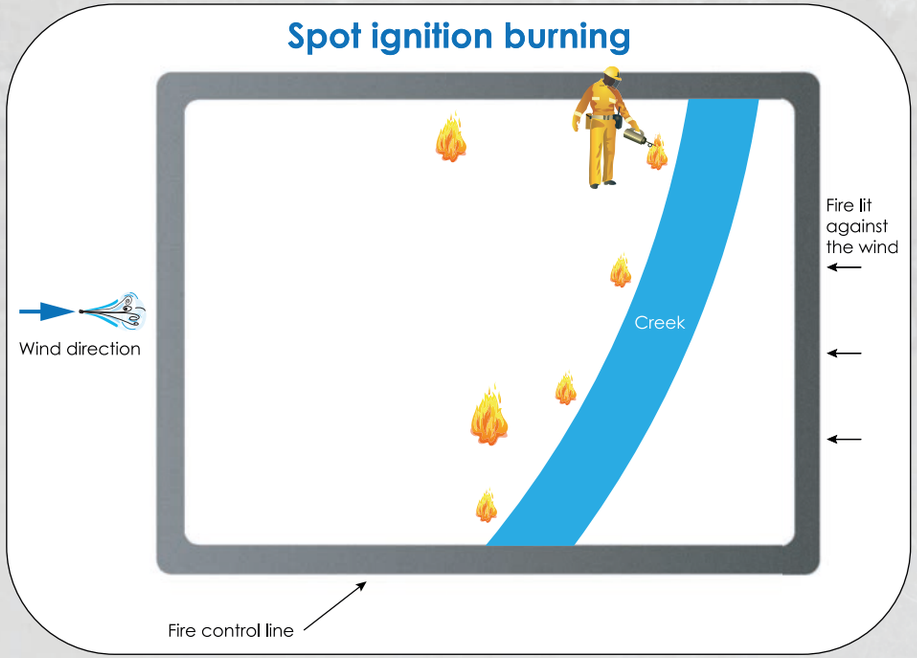
Strip burning is used to remove the fuel faster than a back burn would. It provides the advantage of the forward fire's heat and control by the backing fire being in front of the forward fire. This technique is useful in old slashed areas, cane trash, and areas with variable fuels where a backing fire 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
a program of
Healthy land & water
Australian Government
National Landcare Programme
QUEENSLAND FIRE AND EMERGENCY SERVICES
Queensland Government
REEF CATCHMENTS
CAPE YORK SUSTAINABLE FUTURES