

| | MAP 1: FIRE HISTORY |
|---------------------|--|
| | The pre-European fire history of the Reserve is not well known. Traditional fire practices of Aboriginal people in NSW have not been well researched and are therefore poorly understood. |
| Ignitions | There have been no recorded ignitions for the reserve, in the records held by Office of Environment and Heritage (OEH), or the Rural Fire Service. However, lightning strikes during dry electrical storms have been the major cause of fires within Yass LGA. The majority of these storms occur between November and February. |
| Prescribed Burns | There have been no recorded prescribed burns for the reserve, in the records held by OEH, or the Rural Fir Service. |
| Wildfire | There are no records of wildfire within the reserve or the surrounding area, in the records held by OEH. There is some evidence of fire scarring and bark charring indicating past fires have occurred within the reserve (>25 years). |
| Fire Frequency | The limited records that do exist for this area show that the incidence of fire is low. |

| | THREATENED FAUNA MANAGEMENT | | | | | | | | | | | | | |
|--------------------|------------------------------|-----------|------|--------|-----|---|------|-------|-------|-------|---|---|---|---|
| Common Name | Colombidio Nome | TSC | | | | | Vulr | nerab | le Pe | eriod | | | | |
| Common Name | Scientific Name | Schedule | 7 | F | М | Α | М | ٦ | J | Α | s | 0 | Z | D |
| Gang-gang Cockatoo | Callocephalon fimbriatum | V | _ | 1 | 1 | | | | | | _ | | _ | |
| Varied Sittella | Daphoenositta chrysoptera | V | _ | | | | | | | / | _ | _ | | |
| Scarlet Robin | Petroica boodang | V | _ | | | | | | | | | | | |
| | Threat | ened Faun | a Gu | ideliı | nes | | | | | | | | | |
| | | | | | | | | | | | | | | |

- Minimise size and intensity of wildfires, and manage to produce mosaic burn patterns. Fire patchiness is likely to be an important factor in providing a mosaic of structurally diverse vegetation. If prescribed burns are necessary, avoid implementation during spring and early summer. When planning prescribed burns, refer to the periods of vulnerability of species likely to be located within the burn area, and develop appropriate mitigation measures for their protection. • Avoid prescribed fire during times of prolonged drought.
- Minimise introduction of high intensity fires during prescribed burning and backburning operations. • Avoid damaging/felling hollow-bearing and known nest/feed trees when establishing control lines, mopping up and during prescribed burning. If habitat trees are located on control lines remove fuel from base of tree, prior to prescribed burning or backburning. During mop up activities try to extinguish fire rather then felling trees.

SUMMARY GUIDELINES FOR THE PROTECTION OF NATURAL HERITAGE

- Minimise size and intensity of wildfires, and manage to produce mosaic burn patterns. • Except for asset protection, fire should only be applied in response to a demonstrated loss of biodiversity. • Fire will be introduced in accordance with the biodiversity fire regime thresholds. • Avoid implementation of prescribed burns during spring and during times of prolonged drought. Minimise introduction of
- high intensity fires during prescribed burning operations. Avoid damaging/felling hollow-bearing and nest/feed trees when establishing control lines, mopping up and during prescribed burning. During mop up activities try to extinguish fire rather then falling tree. If habitat trees are located on
- control lines remove fuel from base of tree, prior to prescribed burning or backburning • Avoid mechanical disturbance and construction of roads and trails within known locations of Yass Daisy. • Avoid the use of fire suppression chemicals within 50m on known locations the Yass Daisy, and within 100m of streams and riparian environments.

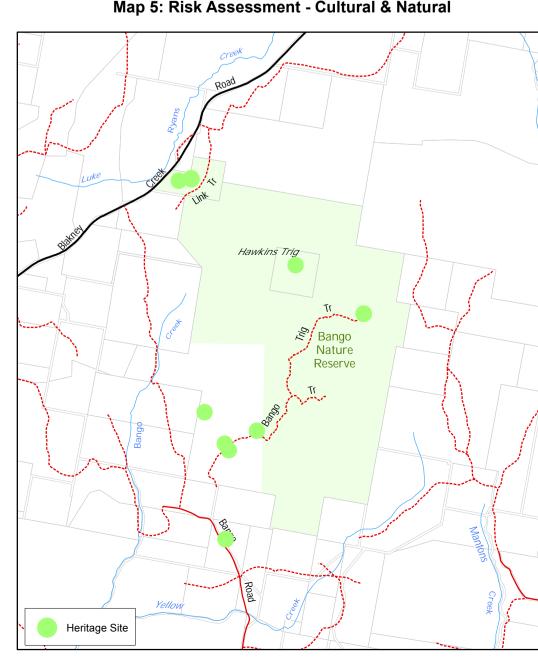
MAP 5: CULTURAL HERITAGE Key Guidelines OEH Cultural Heritage Databases must be accessed during incidents and in planning for hazard reduction burning or other works to ensure new records are considered. Aboriginal site information from AHIMS is sensitive and subject to a Memorandum of Understanding. Site data must be used appropriately Identified sites will be protected. Protection measures will be addressed in impact assessments and operational plans for Where possible, trained officers will provide advice on site protection methods.

A thorough survey of Aboriginal cultural heritage has not been conducted within the reserve and there are no recorded sites held by OEH. Therefore there is no certainty that there are sites that can be damaged by fire. Unrecorded sites may occur across the landscape, especially in riparian areas, along Cultural Heritage
Cultural Heritage
During wildfire operations, efforts will be made to survey for Aboriginal sites ahead of earthmoving ridges and rock outcrops. Encourage survey of Aboriginal sites after fires when site visibility is increased. Inspect affected sites after wildfire and apply erosion works where necessary.

The only site identified within the reserve is the Hawkins Trig site (rock cairn with set post established in 1887). Other sites may exist that have not been recorded on OEH databases. Any new sites should be identified, entered into OEH Historic Heritage database and protected during fire suppression and prescribed burning programs. During wildfire operations, prevent the use of earthmoving equipment and or ground disturbance within 20 metres of the cairn site (Trig).

Inspect sites after wildfire, assess and plan works where necessary. Update fire operations maps with new records when identified. Mines and Kilns marked off the reserve are included on the operations map for fire fighter and operator Use caution in areas with identified sites and, where possible, keep to official trails to prevent potential

Map 5: Risk Assessment - Cultural & Natural



Map 2: Vegetation Communities See table below fo legend

| М | AP 2: VEGETATION COMMU | NITIES | | |
|---|--|------------------------------------|-----------------------|--------------------|
| Vegetation Class (Keith, 2002) | Vegetation Community Description | Vegetation Group (Gellie, 2005) | Reserve (GIS) Ha's | % Reserve Cover |
| Southern Tablelands Grassy Woodlands | Tablelands and Slopes Box-Gum Woodlands | 92 | 94.98 | 21.58 |
| Upper Riverina Dry Sclerophyll Forests | Stringybark - Box - Gum Woodland | 114 | 340.06 | 77.28 |

The vegetation on the higher parts of the Reserve is predominantly a mixture of Scribbly Gum (E.rossil), Brittle Gum (E. mannifera), Broad-leafed Peppermint (E. dives) and Red Stringybark (E. macrorhyncha). The canopy is usually 8-15 metres high. The mid layer consists of saplings between 1-6 metres high and 5-10% cover. The understorey is mainly grassy, to 0.2 The vegetation in creeklines and on the lower parts of the Reserve grades into Yellow box (E. melliodora) and Apple box (E.

saplings and Silver wattle (Acacia dealbata), 2-6 m high and 5-10% cover. The understorey in the lower parts is predominantly grassy to 0.2 m high, and up to 50% cover.

In the NW of the reserve adjacent to Blakney Creek Road patches of Yass daisy (Ammobium craspedioides) occur in the understorey. The plant is listed as Vulnerable on the NSW Threatened Species Conservation Act.

pridgesiana) with Argyle apple (E. cinerea). These forests are taller and reach 15-20 metres. The mid layer consists of

Bango- PLANNING @ Aug 2012

| MAPS 2 and 5: SIGNIFICANT COMMUNITIES | | | | | | |
|---------------------------------------|--|--|--|--|--|--|
| Vegetation Community | Significant Flora Management Guidelines & Considerations | | | | | |
| Box Gum Woodland (potential) | Around the boundaries of the Reserve there are areas of Box Gum Woodland which is an endangered ecological community (EEC) listed under the NSW Threatened Species Conservation Act. There is potential for this EEC to occur within the reserve, particularly on the lower slopes or in drainage lines. | | | | | |

| Group | Common Name | Scientific Name | Status | Guidelines |
|-------|----------------|---------------------------|--------|---|
| | Yass Daisy | Ammobium craspedioides | V | If identified, implement protection strategies during fire suppression and management activities. Minimise mechanical disturbance and construction of roads and trails within known locations. Do not use fire suppression chemicals within 50m of known locations of this species. The species should be monitored to ensure weed species do not interfere with plant recovery. |

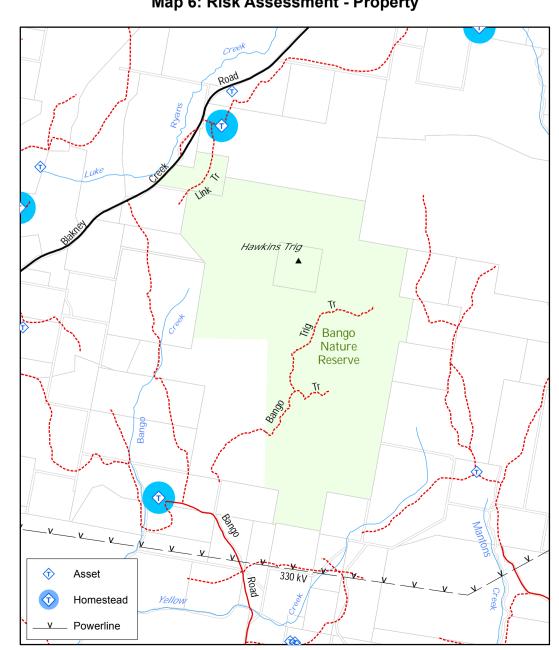
Austral Toadflax (Thesium australe). This species will be managed in accordance with the biodiversity fire thresholds for the vegetation community in which they

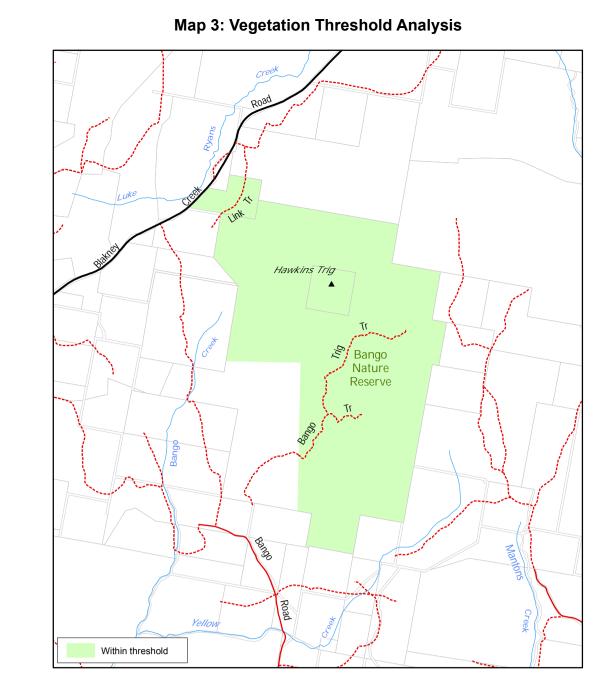
The following flora species are listed on the TSC Act and potentially occur in the habitats described for Bango NR:

Regionally Significant Plant Species There are no Regionally Significant Plant Species recorded in or nearby Bango NR.

| Asset | Vulnerability | Risk Mitigation |
|---------------------------------------|---|--|
| Private properties/ farm buildings | Vulnerable to fire coming from the reserve, particularly under the influence of westerly winds. | Participate in the development and where appropriate implementation of fire management proposals regarding asset protection, through the Southern Tablelands Bushfire Management Committee. Maintain access trails within the reserve for use in fire suppression. Respond to unplanned fire events as soon as possible. Implement annual fire management work schedule. All fires reported or known to occur within the reserve will be reported to the RFS. Provide media briefing/releases to communicate strategies and updates of fire activity to those potentially affected. |
| Visitors to the Reserve | Vulnerable to impact from fire within the reserve. | As above. If a fire breaks out, check for visitors (preferably by air) and give clear evacuation directions if required. Reserve closure may be implemented during periods of very high fire danger, when the reserve is threatened by fire, or wher a fire is actually burning in the reserve. Reserve Fire Bans, such as a ban on solid fuel, can be considered. |
| Reserve Assets | There are currently no identified assets within reserve. | Not applicable. |

Map 6: Risk Assessment - Property





| | MAP 3: STATUS OF FIRE THRESHOLDS | | | | |
|--|--|--------------|---|--|--|
| Threshold | Vegetation Community | % of Reserve | Interpretation & Management Guidelines | | |
| Below Minimum Frequency Threshold | N/A | 0 | The inter fire intervals have been too short. In these areas, species and populations sensitive to short fire intervals may experience a decline in abundance to a point where they risk local extinction. Protect from fire as far as possible. | | |
| Within Frequency Threshold | Tablelands and Slopes Box-Gum Woodlands and Stringybark - Box - Gum Woodland | 100 | Fire history is within the threshold for the vegetatio community. Fire is neither required or to be avoided. | | |
| Above Maximum Frequency Threshold | N/A | 0 | Where the age of a vegetation community is greate than the maximum fire interval for the community. If fires continue to be excluded, a decline in biodiversity may result through the senescence of plants and their seed banks. Long-unburnt areas are, however, ecologically significant, as there may be relatively few areas represented. Consider implementing an ecological burn or allow the area to burn under suitable conditions. | | |

| Note: The thres | shold analysis is derived from | vegetation com | munity thresholds | s and recorded fire histor | y. In the event of fire, t | th |
|------------------|--------------------------------|-----------------|---------------------|----------------------------|----------------------------|----|
| analysis must be | e performed again to establish | n new threshold | s. Fire history for | the Reserve is unknown | , therefore all vegetation | n |
| communities are | considered within threshold. | | | | | |

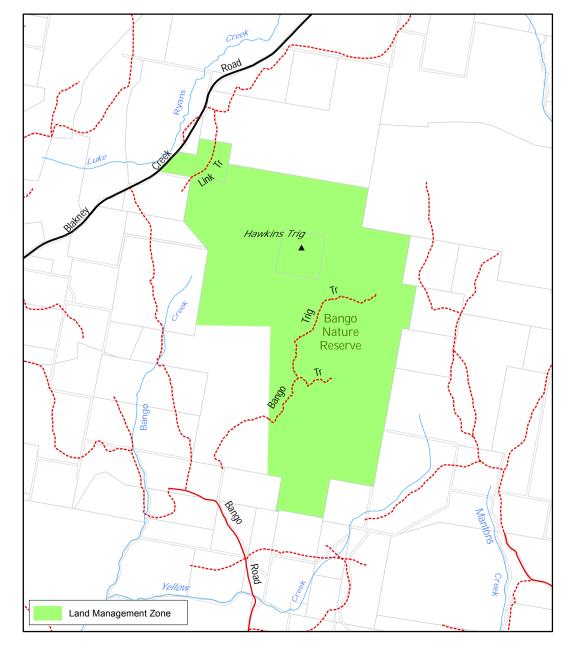
| Vegetation Class (Keith 2002) | Vegetation Community Description | Minimum Fire Interval | Maximum Fire Interval | Fire History Evaluation | Guidelines |
|---|--|-----------------------------|--------------------------|-------------------------------|---|
| Southern Tablelands Grassy Woodlands | Tablelands and Slopes Box-Gum Woodlands | 5 | 50 | 100% within threshold | A decline in biodiversity is predicted if 3 or more consecutive fires occur with int – fire intervals of < 7yrs. Given the lack of knowledge of ecosystem function without fire, the upper limits of these thresholds are untested. Fire should only be introduce into the Reserve for the protection of assets, and ecological purposes if there is a demonstrated biodiversity decline. Long-unburnt areas are ecologically significant, as there may be relatively for areas represented. Too frequent fires may promote fire tolerant shrubs. |
| Upper Riverina Dry Sclerophyll Forests | Stringybark - Box - Gum Woodland | 5 | 40 | 100% within threshold | As above Minimum interval of 10 years should apply in the Southern Tablelands region. |

of known flora response to fire using plant vital attributes, and including compatibility of known fauna requirements, for identified broad vegetation formations (Kenny et al, 2004). Vegetation communities as outlined in Map 2 have been classified into formations to determine the appropriate biodiversity threshold guidelines. These thresholds, while accounting for some key flora and fauna variables, do not account for the whole variability in the landscape. Therefore such thresholds must be used with caution (Kenny et al, 2004). Interpretation of the thresholds should be done in association with local knowledge, detailed survey and planning associated with prescribed burn proposals and utilising the results of local monitoring programs (Kenny et al, 2004). It is noted that there is very little data available on the response of fauna species to fire regimes and therefore more attention should be paid to fauna species at the local level when considering applying the thresholds.

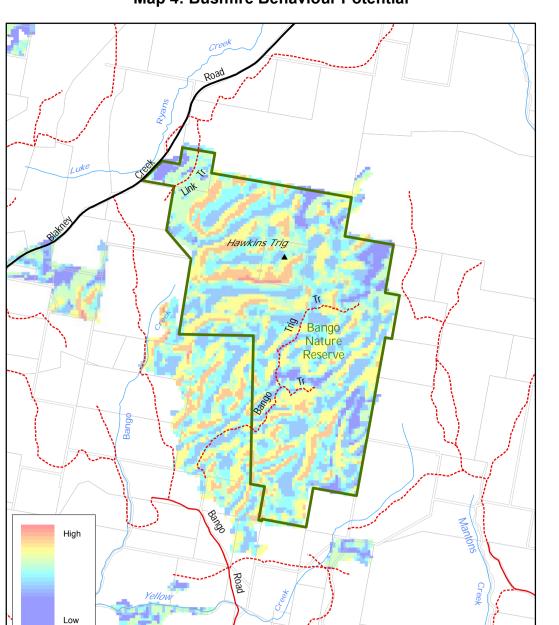
| MAP 7: E | BUSH FIRE MANAGEMENT ZONES - DEFINITIONS |
|---|---|
| Asset Protection Zone (APZ) | The purpose of APZ is to protect human life, property and highly valued public assets and values. Provide fuel reduced areas around assets. |
| Strategic fire Advantage Zone (SFAZ) | To provide strategic areas of fire protection advantage which will reduce the speed and intensity of bushfires, reduce the potential for spot fire development, and aid containment of bushfires to existing management boundaries. |
| Land Management Zone (LMZ) | The objective of land management zones are to protect natural and cultural heritage, and to reduce the likelihood of spread of fires. |
| | DARK RUSH FIRE MANAGEMENT ZONES |

| | (LMZ) | reduce the likelihood of spread of fires. | |
|------|---|--|---|
| | | PARK BUSH FIRE MANAGEM | ENT ZONES |
| Zone | Guidelines | | Actions |
| LMZ | produce a mos conditions perr • Attempts can buse of incendia • Fire suppression fire, however, included in the suppression lines, and withing and trails withing and trails withing the suppression of the | and intensity of wildfires, and manage to saic burn pattern, where weather mit. be made to increase burn patchiness by aries, retardant, water bombing etc. on chemicals may be used to suppress minimise use within 100m of drainage in 50m of known Yass Daisy locations. It is included in the construction of roads in known locations of Yass Daisy. The trees and minimise felling large and trees during mop up activities. | Prescribed fire will be used where deemed necessary for asset protection or ecologica purposes. Assess cooperative fire management programs with adjacent landholders and implement where appropriate, in consultation with Southern Tablelands BFMC. Establish monitoring program to identify are where vegetation community is senescing to lack of fire. |

Map 7: Bushfire Management Zones



Map 4: Bushfire Behaviour Potential



| he ratings a | nd modelling | Rating (under moderate conditions g are specific to the Reserve. The info couthern Ranges Region. | • | • | | |
|--------------|--------------|---|------------|----------------------|--|--|
| Rating | Vegetation | on Description | | % of Reserve | | |
| Low | Nil | Nil | | | | |
| Moderate | Nil | Nil | | | | |
| High | Tableland | Tablelands and Slopes Box-Gum Woodlands | | | | |
| Very High | Stringyba | rk - Box - Gum Woodland | | 77.3 | | |
| | Aspect B | ushfire Behaviour | Slope Bush | fire Behaviour | | |
| Ratii | ng | Aspect in degrees | Rating | Slope in degrees | | |
| Lov | v | 80 - 200 | Low | 0 - 100 | | |
| Mode | rate | 30 – 80 & 200 - 240 | Moderate | 10 - 20 ⁰ | | |
| Hig | h | 10 - 30 & 240 -260 | High | 20 -300 | | |
| Very F | High | 260 - 10 | Very High | >30° | | |

ANALYSIS OF BUSHFIRE BEHAVIOUR POTENTIAL Bushfire behaviour at any position on the landscape reflects:

- Site attributes such as vegetation type, slope, aspect and elevation (can affect fuel levels, structure and moisture • Fire weather attributes such as temperature, relative humidity, wind direction and wind speed. While these characteristics are difficult to predict, bad fire weather days are generally associated with winds from the north-west to
- The reserve generally consists of the forested slopes of Hawkins Trig (790m). The northern and western slopes within the reserve have the highest fire behaviour potential, due to their steepness and exposure to both afternoon sun and drying north westerly to westerly winds through summer.

The reserve is surrounded by cleared grazing country. During periods of high fire danger a grass fire could be expected to travel quickly from a point of ignition before entering the reserve. The change in fuels would result in a slowing of the rate of spread allowing the fire to spread through the reserve. Typically grass fires could be expected from the north or west. Lower fire behaviour is found on the more sheltered southerly aspects, or with more gently undulating slopes, for example, north of Yellow Creek. The fuel moisture levels are generally higher, thus mitigating fire behaviour under moderate conditions. However, during extended drought periods or severe fire weather conditions all vegetation communities have the potential to support extreme fire behaviour.

References

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NPWS (2004). Guidelines for ecological sustainable fire management. NSW Biodiversity Strategy. Bushfire Research Unit, Biodiversity Research and Management Division. NSW Government, National Parks and Wildlife Service. NPWS (annual). Fire Management Manual. Office of Environment and Heritage, NSW. RFS. Standards for Asset Protection Zones. NSW Rural Fire Service document.

MAP 8: FUELS AND FIRE BEHAVIOUR

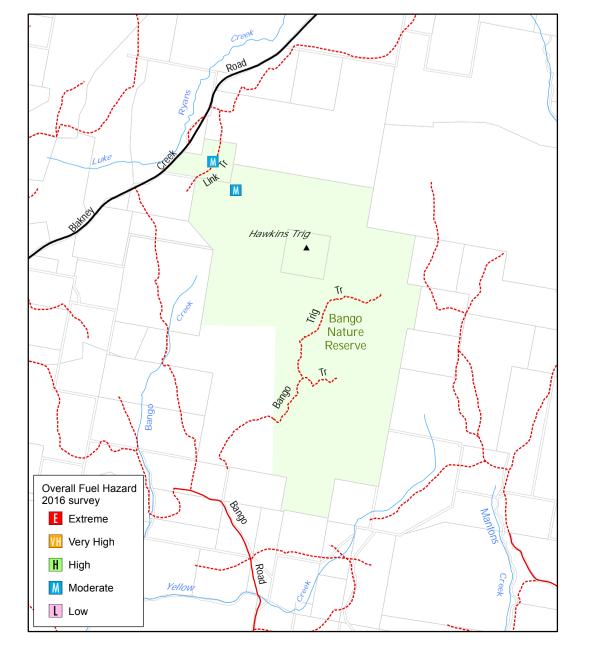
Fuel Landscape Analysis

Fuels are variable across the reserve reflecting complex interactions between vegetation type, aspect and topography. Limited visual fuel sampling was conducted in Winter 2016 at sites within the reserve. The assessment approach applied was to determine the Overall Fuel Hazard (OFH) rating (McCarthy et al., 1999). Rather than only considering surface fine fuel loads (t/ha), this assessment considers the fuel complex, and particularly the bark and elevated fuels – bark and elevated fuels being the fuel elements principally responsible for both first attack failure and also for general suppression difficulty. The major findings of the fuel sampling program were:

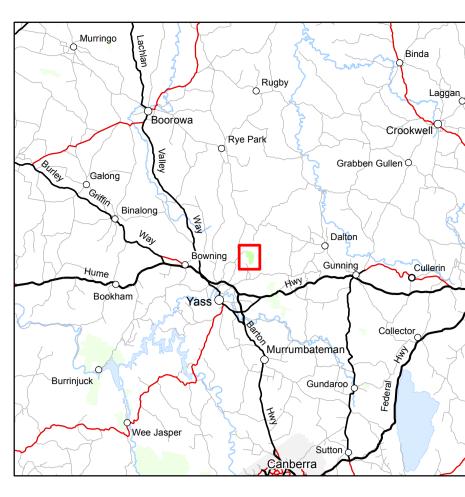
- OFH is moderate.
- Sheltered qully communities carry high levels of biomass, which generally equates to high fuel loads. They are also usually located in low fire prone areas due to their topographic position, aspect and are moisture environments. Therefore fuel loads in gully communities may not necessarily be reduced, even in some wildfire
- Communities dominated by red stringybark or ribbonbark have a high to very high bark hazard rating which increased the OFH rating. This is generally due to long periods where communities have been unaffected by fire. These sites had variable surface and elevated fuel hazard ratings. To reduce the bark hazard a high intensity prescribed burn would be required. This may have the negative outcome of replacing a grassy understorey with a regenerating shrub layer, therefore increasing the elevated fuel rating. High elevated fuels can impede access for earth moving equipment and fire fighters and increase future fire intensities.

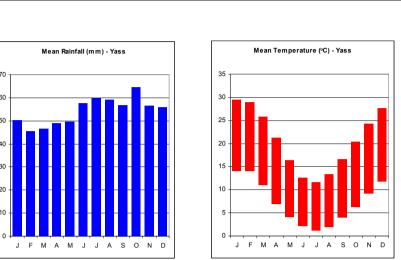
f an area is within biodiversity threshold and there is a risk to life and property, temporary fuel monitoring sites will be located within that area to determine whether prescribed burning or other method of asset protection is required. Management options should be discussed with the Southern Tablelands Bushfire Management Committee.

Map 8: Fuels & Fire Behaviour



Location





Southern Ranges Region Bango **Nature Reserve Fire Management Strategy**



Scale: Works Program map 1:18000, Location map 1:900000, other maps 1:35000 ISBN: 978-1-76039-499-8, OEH2016/0567, Version: October 2016 This Map should be used in conjunction with air photos and ground reconnaissance during incidents and the development of incident action plans. Copyright National Parks & Wildlife Service. These data are not guaranteed to be free from error or omission. The National Parks & Wildlife Service and its employees disclaim iability for any act done on the information in the data and any consequences of such acts or omissions.

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Resource Information

Bango Nature Reserve is located approximately 10km north of Yass on the southern tablelands of NSW. Bango NR (408.5 ha) was gazetted in August 2010 and is referred to in this plan as the Reserve. The reserve is characterised by Hawkins Hill (790m) and connecting ridges, surrounded by undulating land cleared for

This strategy has been prepared in accordance with the policies and procedures detailed in the NPWS Fire Management Manual (NPWS, annual) and relevant legislation. NSW National Parks and Wildlife Hume Federal Electorate Office of Service, Parks and Wildlife Group.

Burrinjuck State Electorate Environment Alpine-Queanbeyan Area, and Heritage Yass Valley Shire Council Southern Ranges Region Southern Tablelands Zone Rural Fire South East Local Land Services Service Bango Brigade **Organisations** Onerwal Local Aboriginal Land Council

