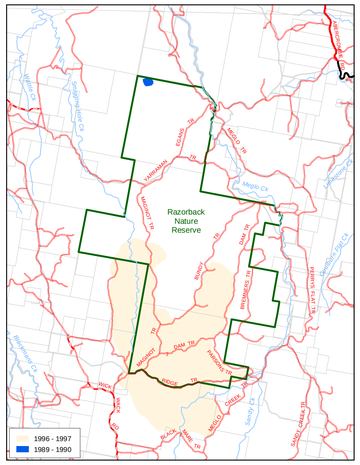
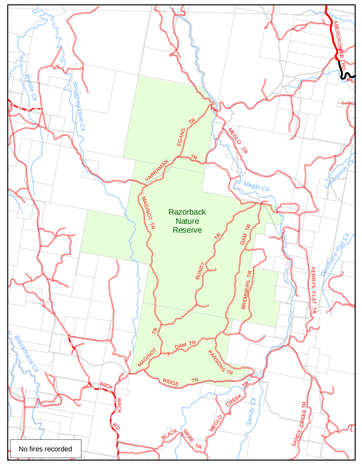
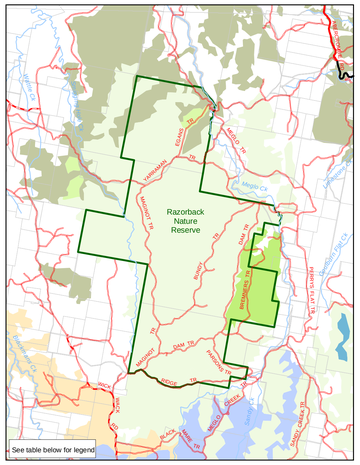
Map 1: Fire History - Wildfire



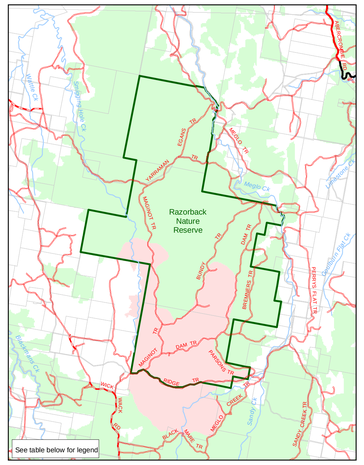
Map 2: Fire History - Prescribed Burns



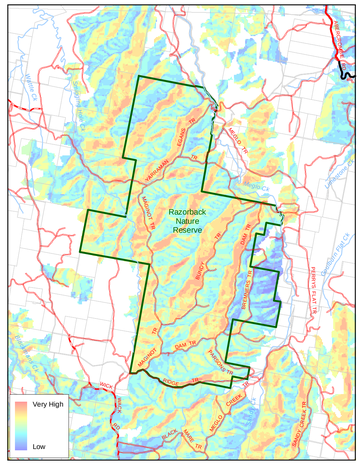
Map 3: Vegetation Communities



Map 4: Vegetation Threshold Analysis



Map 5: Bushfire Behaviour Potential



South West Slopes Region
Razorback Nature Reserve
Fire Management Strategy 2007

Scale: Works Program map 1:50000, Location map 1:900000, other maps 1:70000
Version: August 2007

This Map should be used in conjunction with air photos and ground reconnaissance during incidents and the development of incident action plans.

MAPS 1 & 2: FIRE HISTORY

Ignitions	There are limited records of ignitions within the reserve, however, lightning strikes during dry electrical storms have been the major cause of fires within the northern half of Crookwell Shire. The majority of these sto rms occur between November and February.
Prescribed burns	The only recorded prescribed burn carried out by the NPWS was in autumn 1997 to clear windrows along some of the fire trails. The prescribed fire escaped containment lines and resulted in a wildfire burning a total of 1300 ha of the reserve and neighbouring land.
Wildfire	There are few records of wildfire within the reserve or surrounding area. In the 1989-1990 fire season, a lightning strike in the northwest of the reserve burnt approximately 5 ha. An escaped hazard reduction burn in 1997 burnt approximately 735 ha in the south of the reserve as well as areas off reserve on private land and in state forests.
Fire Frequency	The few records that do exist show that the incidence of fire for the reserve and surrounding areas is low. Further research is required to determine if earlier fire events have occurred on the reserve.

BIODIVERSITY MANAGEMENT GUIDELINES

Guideline 1:
Consecutive fires should be a minimum of 20 years apart in any area.

Justification
- A minimum 20 year interval will ensure post-fire maturity and reproduction of most perennial components and obligate seed regenerators. Dillwynia species found in the reserve need between five to eight years to grow to adult size and a further period in which to establish a soil seed bank. Extended droughts may further slow this process.
- Ensure post-fire maturity and reproduction of many fauna species.

Guideline 2:
A range of post- fire ages younger and older than approximately 40 years should be present in each of the reserves' vegetation types (including ages around the upper identified vegetation management thresholds).

Justification
- Ensures a range of age classes for a diversity of flora and fauna species.

Guideline 3:
At least 50% of the each of the reserves' vegetation types should be unburnt for more than 40 years.

Justification
- Dominance of understorey by shrubs should decline after this time interval.
- Long period since fire enables development of a diversity of vegetation and habitat types for fauna. Recovery of vegetation post-fire is very slow in the reserve due to the poor, shallow soils and harsh climate.
- Ensures that much of the reserves' soil will have fully restored nutrient levels to sustain vegetation.

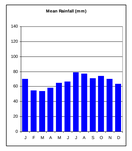
KEY BIODIVERSITY PROVISIONS

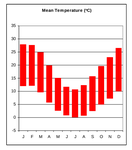
The various responses of reserve flora and fauna to fire suggest that, for biodiversity management;

- Fire should be excluded from a large proportion of the area burnt in 1997 (HMZ 2).
- Any burning required for strategic purposes should not be applied between early spring and mid summer due to impacts on various threatened bird species.
- Strategic burns should be restricted in area, low-moderate in intensity and at a low enough frequency to maintain understorey habitat components for the range of threatened fauna in the reserve.
- Wildfires should be kept as small as possible and managed to reduce fire intensity where possible to limit both direct and indirect impacts on threatened fauna.
- Fire should only be applied in response to a demonstrated loss of biodiversity.

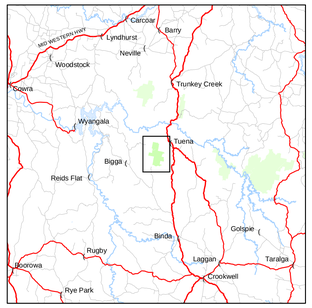
RESOURCE INFORMATON

Department of Environment and Climate Change	- Parks and Wildlife Group, National Parks and Wildlife Service. - South West Slopes Region, Queanbeyan Area
Rural Fire Service	- Southern Tablelands Zone (Bush Fire Management Committee)
Government Areas	- Hume Federal Electorate. - Burrinjuck State Electorate. - Upper Lachlan Local Government Area
Other Agencies	- Pejar Aboriginal Land Council - Lachlan Catchment Management Authority





Location



Fauna Management Considerations

Species	TSC Act Schedule or Significance	Management Considerations
Gang Gang Cockatoo	Vulnerable	The species inhabits mountain forests preferably with Eucalyptus assemblages that support Acacia understorey. May move to lower altitudes during colder months. Species is hollow dependent for breeding. Avoid fires during the breeding season (September - March). Crown fires could result in loss of food and nesting sites. Avoid high intensity burns. Avoid damaging/felling hollow-bearing trees when establishing control lines or mopping up.
Diamond Firetail	Vulnerable	Inhabit open woodland and forest. Nest and roost in shrubs and canopy from August-January so is vulnerable to fire in this period.
Brown Treecreeper	Vulnerable	Live in woodland and dry open forest. 80% of diet consists of ants, so widespread, frequent fires are detrimental. Nest in hollows and tree stumps so fires removing these are detrimental.
Eastern Bentwing Bat	Vulnerable	Caves are the primary roosting habitat, but also use abandoned mines and man-made structures (colonies may number 100-150,000). Form discrete populations centred on a maternity cave that is used annually. Birth and rearing of young occurs in spring and summer, so fire and other disturbances will be detrimental during this time. At other times of the year, populations disperse around a 300 km range of the maternity caves. Cold caves are used for hibernation in southern Australia. As this species hunt in forested areas, catching moths and other flying insects above the tree tops, intense fires that scorch the canopy may impact on foraging habitat. The reserve is well within this species range and is likely to be used as a foraging site.
Regent Honeyeater	Vulnerable	Dry eucalypt woodlands and dry sclerophyll forests dominated by box and ironbark eucalypts. Feeds on nectar of Eucalypts and other native species with mature trees offering the most reliable nectar source. Avoid burning during breeding season (August - January). Avoid removing winter flowering eucalypts with greater than 60cm diameter when establishing new infrastructure (e.g. temporary utilities, rerouting of trails).
Koala	Vulnerable	No recent records, however have been recorded in the area. Relies on abundance of mature food trees. Home range size varies from 2-15ha. Breeding season January to March. Avoid medium to high intensity prescribed fires in areas of known distribution or in low open forests with known forage tree species. If possible, protect known populations during wildire. Avoid placing infrastructure (eg temporary utilities, rerouting trails in known population areas).
Booroolong Frog	Endangered	Booroolong frog has been recorded within 5km of park boundary. No foam or other fire fighting chemicals should be used within 50m of watercourses.
Marbled Gecko	At limit of known distribution	An arboreal species, the marbled gecko is at the limit of its known distribution in Razorback Nature Reserve. Breeding season September- November. High intensity or repeated fires will impact on shelter sites for this species
Nobbi Dragon	At limit of known distribution	Regionally rare and at limit of its known distribution. This species is often found in shrubs and low vegetation. Breeding Season September- November. High intensity or repeated fires may impact on shelter sites for this species.

Vegetation Management Thresholds

A significant number of species within the reserve are able to regenerate after fire by sprouting from buds in the branches, trunk or roots. However there are a number of species which are killed by fire but regenerate from seed either stored in the soil or shed from the plant during the fire event. Such species require a minimum amount of time after fire to reach reproductive maturity and to build up a seed bank.

Based on the species observed within the Reserve to date, and those recorded on the NPWS fire response database, vegetation communities within the reserve may experience species decline if;

- Fires occur less than 10 years apart and more than 90 years apart for Tablelands Dry Sclerophyll Grass Forest and Western Slopes Grass/Herb Dry Forest
- Fires occur less than 15 years apart or more than 110 years apart for Northern Tablelands Acacia Herb/Grass Dry Forest, Western Slopes Shrub/Herb/Grass Dry Forest, Eastern Tablelands Shrub/Grass Moist Forest.

Given the lack of knowledge on ecosystem functioning without fire, and allowing for droughts and severe frosts followed by good rain acting as triggers for both germination and resprouting in this area, the upper limits of these thresholds are untested. Fire should only be introduced into the reserve for ecological purposes, if there is demonstrated biodiversity decline.

CULTURAL HERITAGE

Key Guidelines

- Identified sites will be protected
- DEC databases for cultural heritage will be accessed during incidents and in planning for prescribed burning or other works to ensure new records are considered. Aboriginal site inform ation from AHIMS is sensitive and subject to a Memorandum of Understanding. Site data must be used appropriately.
- Where possible, trained officers will provide advice on site protection methods.
- Fire management activities will comply with all conservation management plans.

Aboriginal Heritage	There are no known Aboriginal sites recorded within the Reserve, however sites are highly likely to be present. Due care should be exercised if earth moving operations are carried out.
Historic Heritage	No historic sites have been recorded within the Park, however the reserve is adjacent to an extensive historic gold mining area and similar remains may occur within the Reserve.

Note: Cultural heritage sites are based on data recorded on AHIMS and HHIMS databases a nd field data recorded as at September 2006.

MAP 3: VEGETATION COMMUNITIES & THRESHOLDS

Veg Group	Vegetation Description	% of Reserve
90	Northern Tablelands Acacia Herb/Grass Dry Forest	6
109	Widespread Tablelands Dry Shrub/Tussock	Off Park
114	Tablelands Dry Shrub/Tussock/Grass Forest	85
120	Western Slopes Shrub/Herb/Grass Dry Forest	<1
121	Western Slopes Grass/Herb Dry Forest	8
122	Northern Tablelands and Slopes Dry Shrub/Grass Forest	Off Park
201	Lower Abercrombie Dry Shrub Callitris Forest	Off Park

Note: Vegetation for the Southern Forests (Gellie, 2005).

Vegetation Management Considerations

The reserve is dominated by dry sclerophyll forest of various associations of scribbly gum, red stringybark long-leaved bundy, broad leaved peppermint, brittle gum and red box. A sparse shrub layer includes red anther wallaby grass, *Hibertia obtusifolia*, *Styphelia triflora*, prickly tea tree, lomandra spp and *Pultenaea procumbens*. Small patches of other vegetation communities such as yellow box, Blakelys red gum and white box usually occur on deeper soils, and it is assumed their fire history and fire management guidelines are similar to the main vegetation community.

Response to aspect of fire regime	Impact
Repeated short interval fires	
- reduce the number of seeding species by killing the plants before seed set occurs. - deplete the energy in the buds of resprouting plants, leading to plant death.	Depending on the length of the interval, repeated fires might lead firstly to the loss of long-lived shrubs, short-lived shrubs and finally herbs and perennial grasses.
Long fire intervals	
- fail to provide fire as a trigger to stimulate resprouting, or germination of species - adult plants may then die of old age - however, germination and resprouting may be triggered by drought, frost and animal disturbance.	Long fire intervals may reduce biodiversity across other triggers initiate germination and resprouting. Locally, germination of fire sensitive species has been observed after drought breaking rain, suggesting this is a key trigger.
Moderate to high intensity fire	
- causes significant damage to resprouting plants, enabling the germination and establishment of seedlings.	Moderate to high intensity fire may cause domination by seeder species such as Cassinia and Daviesia .
Low intensity fire	
- causes little damage to resprouting species that then out-compete germinating seedlings for water and nutrients.	Low intensity fire may cause domination by resprouting shrub species.
Spring fire	
- may reduce germination due to moisture stress - may be followed by death of seedlings in the hot, dry summers experienced in the area.	Spring burning may lead to a dominance of resprouting species.
Autumn fire	
- moisture levels may be sufficient to enable successful resprouting and germination of plants. Seedlings may be killed by subsequent frosts	Autumn prescribed burning may maintain a mix of seeder and resprouting species, depending on frost severity.
Drought	
- In this area may prevent germination of plants until over 50 mm of rain falls after a fire. - Recovery of resprouting plants will also be slowed.	Fire applied in a drought cycle may lead to local extinctions of seeders. Slower rates of germination and resprouting will also contribute to erosion and nutrient losses.
A small fire	
- may lead to selective overgrazing of plants by herbivores.	A small fire may lead to the local extinction of palatable species. This is particularly an issue in box-gum woodland communities.

MAP 4: VEGETATION THRESHOLD ANALYSIS

Threshold	Vegetation Group	% of Reserve	Interpretation & Management Guidelines
Overburnt	N/A	0	- According to the vegetation regime thresholds, two consecutive fires have been recorded too close together and the area is overburnt. - Additional fire in this area will lead to adverse fire regimes and may threaten community biodiversity.
Vulnerable	N/A	0	- Will be overburnt if the area burns before the end of 2007. - Fire should be avoided for this year and until another analysis of thresholds is modeled to reassess threats.
Recently burnt	114, 121	28	- Time since fire is less than the threshold intervals, but will be considered OK after 2007 if the area doesn't burn. - Fire this year will push this vegetation into the vulnerable class. - A minimum 20 year fire interval should be put in place.

Underburnt	N/A	0	- May require fire after 2007 for Asset protection, strategic or biodiversity reasons.
			- Planned fire may be introduced for fuel reduction burning for asset and strategic protection programs, ecological purposes and unplanned fire events may be allowed to burn if
			  - The vegetation community demonstrates a loss of biodiversity
			  - conditions are suitable
			  - the intensity meets vegetation, flora and fauna community requirements
			  - >50% of any vegetation community group in any threshold across the reserve is classed as Ok, Almost Underburnt and Underburnt.

Almost Underburnt	N/A	0	- Planned fire may be introduced for fuel reduction burning for asset or strategic protection programs and unplanned fire events may be allowed to burn if
			  - The vegetation community demonstrates a loss of biodiversity
			  - conditions are suitable
			  - the intensity meets vegetation, flora and fauna community requirements
			  - >50% of any vegetation community group in any threshold across the reserve is classed as Ok, almost underburnt and underburnt.

OK	90, 114, 120, 121	72	- Areas which thresholds have been assigned to, which don't fall into one of the above categories. - Fire is neither required or to be avoided. - Fire should only be applied in areas if a loss of biodiversity is demonstrated. - Where possible, maintain >50% of any vegetation community group across the reserve as Ok, Almost Underburnt and Underburnt.
Unknown/ No Regime Assigned	N/A	0	- The fire history is too short to determine whether it is underburnt or over burnt. - Areas that do not have a threshold assigned to them or there is missing data, limiting the modelling capabilities in DECC GIS.

Note: The threshold analysis is derived from vegetation community thresholds and recorded fire history (including fire frequency and intervals). Some vegetation communities may have "No Fire" regimes applied, due to sensitivity to fire and may be represented in the vulnerable threshold. All vegetation communities should be monitored and planned fire should only be applied if a loss of biodiversity is demonstrated. In the event of fire in this reserve, the analysis would have to be performed again to establish new threshold values.

MAP 8: FUEL LANDSCAPE

Date and Status (number of sites assessed)	Site Sampling	Tonnes per Hectare	Comments
October 1998 Unburnt (n = 16)	Minimum	4.34	Fuel survey conducted two years after escaped hazard reduction burn in 1997. Sites in this class reflect forest that has remained unburnt over the known fire history of the reserve.
	Maximum	17.07	
	Average	10.4	
October 1998 Burnt (n = 9)	Minimum	4.25	Sites in this class fall within area burnt by 1997 hazard reduction burn.
	Maximum	16	
	Average	7.47	

Analysis of Landscape Fuels

Fuels are highly variable across the landscape reflecting complex interactions between vegetation type, aspect and position in the landscape. The dry sclerophyll forest characteristic of much of Razorback Nature Reserve s upports an average fuel loading that falls within the 10 - 14 tonnes p/ha. The most recent data for fuel within the reserve dates from October 1998. This was carried out two years after the escaped hazard reduction burn of 1997. Measurements from unburnt sites within the park showed an average of 10.4 tonnes. It is likely that those sites measured in unburnt forest would be at equilibrium (fuel input equals that being lost through decomposition and decay) with minor variations above and below this due t o drought or increased rainfall.

The ground cover in the south of the reserve consists largely of scattered davesia species and red anther wallaby grass (tussock). Along watercourses there is a mid-storey of silver wattle that can be dense in places. Ove r time this will senesce.

In the north of the park there is a scattered ground cover of Cassinia (dogbush) and red anther wallaby grass.

The low canopy height characteristic of much of the forest within the reserve and an average ground cover of 30% me ans that there may be crowning under very high to extreme conditions.

MAP 5: BUSHFIRE BEHAVIOUR POTENTIAL

Vegetation Fuel Hazard Rating (under moderate conditions)
The ratings and modelling in this section of the plan are specific to the reserve and map view area. The information within the map view area is not for comparison with other reserves across the broader landscape managed by the NPWS South West Slopes Region.

Rating	Vegetation Description	% of Reserve
Low	Cleared or Partly Cleared	<1%
Moderate	Riparian Acacia Shrub/Grass/Herb Forest Western Slopes Grass/Herb Dry Forest Tablelands Dry Grassy Forest Northern Slopes Dry Grass Woodland	8%
High	Northern Tablelands Acacia Herb/Grass Dry Forest Widespread Tablelands Dry Shrub/Tussock Western Slopes White Box Dry Grass Woodland Northern Tablelands and Slopes Dry Shrub/Grass Forest	6%
Very High	Tablelands Dry Shrub/Tussock/Grass Forest Western Slopes Shrub/Herb/Grass Dry Forest Lower Abercrombie Dry Shrub Callitris Forest	85%

Aspect Bushfire Behaviour		Slope Bushfire Behaviour	
Rating	Aspect in degrees	Rating	Slope in degrees
Low	80 - 200	Low	0 - 10 degrees
Medium	30 - 80 & 200 - 240	Medium	10 - 20 degrees
High	10 - 30 & 240 - 260	High	20 -30 degrees
Very High	260 - 10	Very High	>30 degrees

Analysis of Bushfire Behaviour Potential

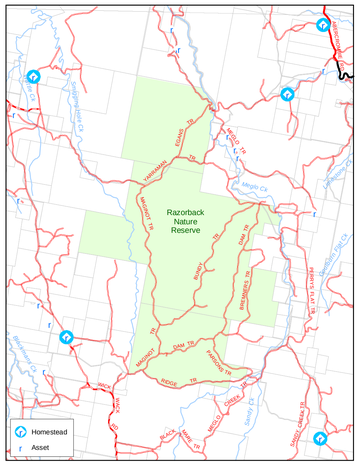
Bushfire behaviour at any position in the landscape reflects

- Site attributes such as vegetation type, slope, aspect (can affect fuel levels, structure and moisture content)
- Fire weather attributes such as temperature, relative humidity, wind direction and wind speed. While these characteristics are difficult to predict, analysis of local weather data shows that bad fire weather days are generally associated with winds from the north-west to west. These winds have been incorporated into the fire behaviour potential model.

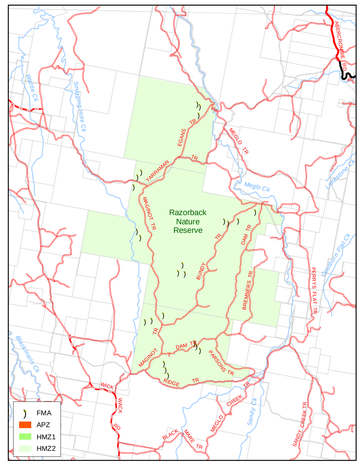
Razorback nature reserve has a main north/south oriented ridgeline and a number of parallel ridgelines and gullys, which run along a north-west/south-east axis and contain steep north-west facing slopes. These slopes receive a large amount of incident solar radiation and fuels are therefore likely to be drier. These slopes also directly face the direction that adverse fire weather could be expected to come from.

The north-west aspect, close proximity of one ridge to another and the high proportion of rough barked species on the ridges means that spotting potential from the top of one ridge to another is high.

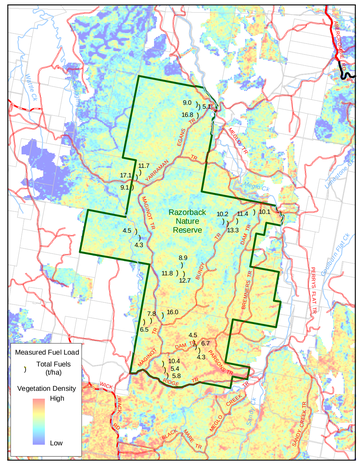
Map 6: Risk Assessment - Property



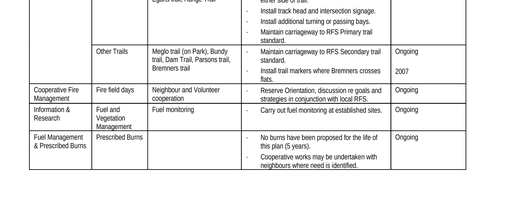
Map 7: Bushfire Management Zones



MAP 8: Fuel Landscape



Works Program 2007 - 2012



MAP 6: RISK ASSESSMENT - LIFE & PROPERTY

Asset	Vulnerability & Impacts	Risk Mitigation
Reserve Assets	- There are no identified assets within the reserve.	- Provide guidelines in the event assets are constructed within the reserve.
Other assets (including private property or other lands adjacent to the reserve)	- Property assets may be damaged by fire escaping the reserve	- Maintain access trails within the reserve that will assist in fire fighting efforts. - Participate in fire management proposals through RFS Zone Bush Fire Management Committee meetings. - During the fire season rapidly respond to all unplanned fires to minimise potential spread to private lands.

MAP 7: BUSHFIRE MANAGEMENT ZONES

Management Zone	Definition	Management Guidelines
Asset (APZ)	Life, property and commercial assets in high Bushfire Behaviour Potential risk areas on DEC estate.	- Assets should be evaluated annually to measure potential hazards and or increased threats. - Works program to follow Risk Assessment (Life and Property) Guidelines.
Heritage 1 (HMZ1)	Areas of high priority natural and cultural conservation value. It identifies areas of 'recorded' cultural and natural assets. This zone is important for the protection of cultural heritage and the conservation of some species habitat to prevent declining numbers or extinctions.	- Heritage areas should be assessed annually to determine potential hazard, threats and thresholds to cultu ral heritage, threatened species and vegetation communities. - Prescribed fire may be applied in these areas if appropriate for the protection of cultural heritage or for ecological principles.
Heritage 2 (HMZ2)	This zone identifies areas of significance for natural and cultural features across the broader landscape. This generally means 'parts of the reserve that have not been surveyed and or have no records of significant features or threatened species'.	- These heritage zones should be monitored to determi ne threats to biodiversity and managed in accordance with conservation policy and principles. - Implement programs and or recovery plan guidelines (where they exist).
Fuel (FMA)	Fuel Monitoring Areas are localities for monitoring fine surface fuel, grasses, shrubs, dead and down material and ecological health. These areas monitor the affects of fuel management programs, and vegetation responses to fire regimes (particularly imposed regimes) and provide information required to determine increases in available fuels.	- Monitor as per fuel monitoring program to identify changes in the fuel landscape, which may indicate an increase or decrease in risk. - Monitor to improve management knowledge of ecological responses and health and identify undesirable changes in vegetation communities. - Where fuels exceed 15t/ha, quantify fuel landscape and consider fuel management program initiation.

WORKS PROGRAM

Activity	Category	Name, Area or Detail	Proposed Works	Schedule
Reserve Trails Maintenance	Key Management Trails	Yarraman trail (between junction of Magmot and Egans), Magmot trail, Egans trail, Range Trail	- Chemical fuel reduction 1m each side of trail. - Removal of saplings and trimming of canopy of mature trees to Cat 1 tanker height for 1m either side of trail. - Install track head and intersection signage. - Install additional turning or passing bays. - Maintain carriageway to RFS Primary trail standard.	2007 Ongoing as required
	Other Trails	Meglo trail (on Park), Bundy trail, Dam Trail, Parsons trail, Brenners trail	- Maintain carriageway to RFS Secondary trail standard. - Install trail markers where Bremners crosses flats.	Ongoing 2007
Cooperative Fire Management	Fire field days	Neighbour and Volunteer cooperation	- Reserve Orientation, discussion re goals and strategies in conjunction with local RFS.	Ongoing
Information & Research	Fuel and Vegetation Management	Fuel monitoring	- Carry out fuel monitoring at established sites.	Ongoing
Fuel Management & Prescribed Burns	Prescribed Burns		- No burns have been proposed for the life of this plan (5 years). - Cooperative works may be undertaken with neighbours where need is identified.	Ongoing

South West Slopes Region
Razorback Nature Reserve
Fire Operations Map
2007

Version: August 2007

This Map should be used in conjunction with air photos and ground reconnaissance during incidents and the development of incident action plans.

This map is based on Land and Property Information Standard 1:25000 Topographic Map Series.
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OPERATIONAL GUIDELINES

ACTIVITY	OPERATIONAL GUIDELINES
Command, control and firefighting arrangements Fire Response (FMM 4.1 & 4.2)	- First fire personnel of any agency on site may assume control of the fire, but must ensure the relevant land management agency is promptly notified. - On arrival of other fire agencies, the initial incident controller will consult with the other agencies on the ongoing command, control and incident management team requirements as per the relevant BFMC Plan of Operations. - The use of earth-moving equipment, retardants and aerial suppression must be approved by a senior NPWS officer.
Aircraft Operations (NPWS FMM 4.4 & 4.8)	- Aerial water bombing and aerial ignitions are permissible in this reserve, however can only be used and commenced on the instruction of the incident controller or senior NPWS officer. - Water bombing operations should support containment operations by aggressively attacking flanks, hotspots, spot-overs and head fires where required. - Where possible, foams should be used to increase the effectiveness of water, however limit use within 50m of watercourses and dams. - The use of water bombing aircraft without the support of ground based suppression crews should be limited to specific circumstances as determined by the senior NPWS officer. - Ground crews must be briefed and alerted to aerial ignition and water bombing operations
Back burning (NPWS FMM 4.8)	- All backburning operations must be planned and approved by a senior NPWS officer. - All crews must be briefed on the sequence and safety precautions of the operation. - Generally, burning should commence when the humidity rises in late afternoon or early evening and spotting is minimal. With a low FDI, burning may be safely undertaken during the day. - Where practicable, clear 1m radius around dead and fibrous barked trees adjacent to containment lines prior to burning, or wet down these trees as part of the backburn ignition preparation.
Control lines (NPWS FMM 3.9)	- Existing constructed or natural fire control advantages should be used, wherever possible, to contain bushfires. - Trails that comply with the Bush Fire Coordinating Committee Policy 1/03 "Fire Trails" are identified on this operations map. - As a minimum, management trails identified on the operations map are maintained to a standard to provide access to Category 9 vehicles, unless otherwise indicated. - Dormant trails may be used as a strategic control line during an incident, however may need some mechanical work to clear regenerating vegetation and fallen timbers.
Earth moving machinery (NPWS FMM 4.3)	- Strategies involving earth-moving equipment must be approved by the senior NPWS officer before implementation. - Earth-moving equipment must be supervised and guided by an experienced NPWS officer or a person recognised to be appropriately experienced. - All earth-moving equipment employed in fire operations must be accompanied by a support vehicle that has equipment available to contact support personnel in an emergency. Plant involved in direct or parallel attack must be accompanied by either a slip-on or a fire tanker for safety purposes. - At the commencement of shifts, all operators and guides must be briefed on safety consideration and actions to prevent damage to sensitive natural and cultural heritage. - Where possible, control lines running along valley areas should be constructed 20-50 from gullies to avoid severe erosion.
Fire suppression chemicals (NPWS FMM 4.9)	- Wetting and foaming agents (surfactants) are permitted for use in wildfire suppression. - Use of retardants must be authorised by the senior NPWS officer. - Retardants should be ammonium sulphate based and should not be used where reasonable alternatives are available. - As far as possible, exclude the use of surfactants and retardant within 50m of watercourses and dams. - Use surfactants and retardants where natural advantages provide the most effective applications of the chemicals.
Post fire rehabilitation (NPWS FMM 5.1)	- The rehabilitation process should be addressed during the incident, in the Incident Action Plan.
Smoke management (NPWS FMM 3.4)	- The potential impacts of smoke and possible mitigation tactics must be considered when planning for wildfire suppression and prescribed burning operations. - Where smoke has the potential to be a hazard on local roads or highways the police, RTA, local shire council and relevant media must be notified. - Monitor local roads and access for smoke hazards and install road safety/warning signs where necessary. Traffic control must comply with RTA Traffic Control at Worksites Manual requirements.
Transmission lines (Powerlines)	- May cause danger to ground personnel through smoke conduction of electricity through the air - Contact the relevant authority to turn the power off prior to back burning operations under lines
Water supplies	- Access to water supplies on private property will be negotiated prior to use, except according to S44 provisions - Arrangements may be made to replace water used after the fire, as required.

SUPPRESSION STRATEGIES

FFDI	OPERATIONAL GUIDELINES
Current Low - Mod & Forecast Low - Mod	- Undertake direct, parallel or indirect attack along existing containment lines. - Where practicable, consider maximising the fire area in accordance with the requirements of any proposed prescribed burns in the fire planning strategy and Bushfire Management Committee agreements.
Current Low - Mod & Forecast High or >	- In order to minimise the fire area and secure the flanks as soon as possible, undertake direct, parallel or indirect attack along the closest containment lines. - Pay particular attention to the flank on the next predicted down wind side. - Consider fall back containment strategies
Current High or > & Forecast High or >	- Undertake indirect attack along existing or newly constructed containment lines. - Secure and deepen containment lines along the next predicted downwind side of the fire. - Allow sufficient time to secure containment lines to avoid wasted effort and potential failure. - Prepare and implement fall back containment strategies.
Fire Advantages	- Streams in the reserve are intermittent and should not be regarded as passive control lines under normal conditions - Reserve trails may function as fire advantages

Note: Always ensure there is sufficient time to secure containment lines prior to the fire impacting upon them.

FIRE SEASON INFORMATION

The critical fire season occurs between mid November and February, when seasonal conditions have the highest potential to sustain fire.
Periods of prolonged drought may extend the fire season.
During these times fires may exhibit high intensity behaviour in windy conditions and exceed current rate of spread indices.
Any proposed prescribed burning should take into consideration the impact of treating areas recovering from drought to protect natural and cultural values.
During the fire season prevailing winds during the day are from the northwest.

LIFE & PROPERTY GUIDELINES

Visitor safety (NPWS FMM 3.6)	- Visitors in or adjacent to the fire ground will not be permitted unless authorised by the Incident Controller. The presence of visitors should be reported to the incident controller immediately, who will arrange for an evacuation if necessary. - 'Park closed' or 'smoke hazard' signs must be placed in areas used by visitors prior to undertaking prescribed burning. - Notify media that wildfire or prescribed fire exists within the reserve/area.
Asset Protection (FMM 4.10)	There are no identified assets on the reserve.

HERITAGE MANAGEMENT ZONE GUIDELINES

ZONE	GUIDELINES (WITHIN THE ZONE)
HMZ 1	Where possible; - Contain fires to small areas and lower potential intensity. - Avoid the use of earth moving machines. - Avoid the use of suffactants/retardants within the zone. - Avoid felling large and hollow bearing trees during 'mop up' activities. - Prescribed fire should be avoided, unless required for ecological purposes.
HMZ 2	Where possible; - Minimise the potential for fire to spread and or contain to existing control lines. - Prescribed fire or other fuel manipulation program may be applied to the area to reduce potential risks. - Wildfires occurring in areas programed for prescribed burning (ie. SFMZ) and where weather conditions are favourable, the fire may be contained within the program treatment area. - Manage fire to produce mosaic (patchy) burn patterns (where weather conditions permit). - Earthmoving equipment may be used to contain fire. - Retardants and foams may be used to suppress fire, however minimise use within 50 m of water courses and dams.

CULTURAL HERITAGE GUIDELINES

THEME	GUIDELINES
Aboriginal & Historic Heritage (FMM 4.11)	- Brief personnel involved in control line construction and vehicle based fire suppression operations on site locations and the required management strategies for site protection. Include in Incident Action Plans. - Liaise with the relevant heritage officer and or representative where considered necessary.
Scarred trees ◈1	- Clear fuels, with hand tools, from tree base and/or foam base to 3m up tree trunk. - Do not clear or fell trees. - Where possible, avoid new trail construction within 20m of trees and construct trails on the advancing fire side of the tree. - Hazard reduction or back burning operations should minimise the potential threat of radiant heat on the tree.
Rock arrangements, rock engravings, bora rings, etc ◈2	- Avoid new trail construction or ground disturbance within close proximity of site. Where possible, ensure site is protected by constructing trails or hand tool lines on the advancing fires side. - Clear, by hand, excess fuels from the site. - Avoid direct attack methods (including aerial water bombing) at known sites. Surfactants and retardants in aerial line drops may be used adjacent to, but not directly on sites. - Hazard reduction or back burning operations should minimise the potential threat of radiant heat and smoke (carbon deposition) on sites.
Art sites and over-hangs ◈3	- Avoid new trail construction or ground disturbance within close proximity of site. Where practicable, ensure site is protected by constructing trails or hand tool lines on the advancing fire side. - Clear, by hand (whipper snippers, brush cutters, mowers), excess fuels from the site. - Avoid direct attack methods on sites. - Avoid aerial water bombing, use of foams and or retardants at known sites. Use of foam or aerial line drops may be used adjacent to, but not directly on sites. - Hazard reduction or back burning operations should minimise the potential threat of radiant heat and smoke (carbon deposition) on the site.
Open camp sites ◈	- Avoid ground disturbance at or within close proximity of the site (30m). Earthmoving blades should be raised in these locations to avoid damage to sites on trails, unless a "Consent to Destroy" has been attained. - Avoid direct attack methods (including aerial water bombing) at known sites. Use of foam or aerial line drops may be used adjacent to, but not directly on sites.
Historic Heritage	None recorded.

FMM - contains extracts from NSW National Parks and Wildlife Service Fire Management Manual (December 2004).
For the purposes of public exhibition, some information will not be displayed due to obligations under the Freedom of Information Act 1989, Privacy and Personal Information Protection Act 1998, regulations and amendments, and Memorandum of Understanding between the Department of Environment and Climate Change and Aboriginal Communities.

CONTACT PHONE NUMBERS

NATIONAL PARKS AND WILDLIFE SERVICE	
SWS Queanbeyan Area Office (B/H)	6299 2929
SWS Queanbeyan Area Office Fax	6297 8408
SWS Queanbeyan Area Workshop	6297 8601
Incident Answering Service (A/H)	1800 629 104
SWS Regional Office - Tumut (B/H)	6947 7000
OTHER ORGANISATIONS	
State Forest - Batemans Bay	4478 9101
Wildcare (24 Hr)	6299 1966

RURAL FIRE SERVICE	
Yass Fire Control Centre	6226 3100
Crookwell Fire Control Centre	4832 0263
Brigade - Bigga	4835 2261
- Tuena	4834 5222
State Operations (24 hrs)	8741 5400
COUNCILS	
Upper Lachlan Council	4830 1000
Cowra ALC	6342 4808
Pejar ALC	4822 3552

EMERGENCY SERVICES 000	
POLICE - Crookwell	4832 1044
- Bigga	4835 2422
- Tuena	48345245
AMBULANCE	13 12 33
SES Crookwell	4832 0049
Fire Brigade - Crookwell	4832 1601
NEIGHBOUR INFORMATION	
Consult SWS Region databases	

RADIO COMMUNICATIONS

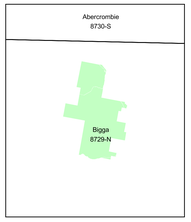
AGENCY/RESOURCE	CHANNEL	MRX FREQ.	MTX FREQ.	NOTES
NPWS (VHF)	**1**	MRX 77.5125	MTX 80.0125	Snowy Mountain- may be marginal in some areas of this reserve.
NPWS (VHF) FIRE GROUND	**17**	82.3875	82.3875	Channel to be determined by ground crews, crew leaders, Division commanders etc. Any changes will be noted in IAP.
	18	79.8375	79.8375	
	19	79.9625	79.9625	
RFS (PMR)	**89**	MRX 419.9375	MTX 410.4875	Consult with RFS to determine primary communications during an incident.
	59	MRX 414.6875	MTX 405.2375	
RFS (UHF) CB	**18**			Bigga Brigade
	20			Tuena Brigade

AIRCRAFT COMMUNICATIONS (Fire Communication Traffic Advisory Frequencies F-CTAF)		
119.10 Mhz	State wide	
120.80 Mhz	State wide	
122.80 Mhz	State wide	
123.45 Mhz	Pilots (chit chat) "The Numbers" channel	
128.70 Mhz	State wide	
132.75 Mhz	State wide	

Unauthorised and inappropriate use of Aviation Channels is a criminal offence

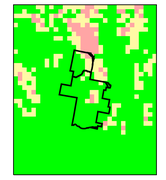
Mobile Phone Coverage- generally, the coverage is very good, however may be marginal in valleys and hill shadow areas.

Air Photo and Map Index



Radio Coverage

Channel 1



Good Poor Nil

N

SCALE 1:25 000

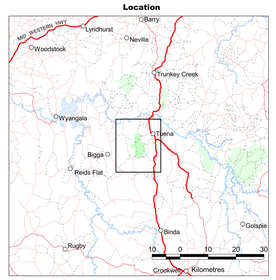
1 0 1 2

Kilometres

Projection: AMG 66 - Zone 55
Grid Numbers are given in full at the South West corner of the map.

NOTE: THIS MAP IS NOT GDA COMPLIANT

Location



Razorback Nature Reserve - Waypoints

Name	Description	Easting	Northing	Longitude	Latitude
Bremners Trail	Remote Helipad, Waterpoint - Helicopter, Waterpoint - Vehicle	711800	6228800	149°17' 42"	34°03' 36"
Magnot Trail	Remote Helipad	708500	6228920	149°15' 33"	34°03' 34"
Meglo Creek	Waterpoint - Helicopter	712700	6227530	149°16' 18"	34°04' 16"
Razorback Dam	Waterpoint - Vehicle	709080	6225820	149°15' 58"	34°05' 15"
Rockdale	Airstrip	711860	6236290	149°17' 37"	33°59' 33"
Smigging Hole Ck	Waterpoint - Helicopter, Waterpoint - Vehicle	708270	6228010	149°15' 25"	34°04' 04"
South West Corner	Remote Helipad	707960	6225260	149°15' 15"	34°05' 34"
The Burnt Hut	Airstrip	711570	6233900	149°17' 28"	34°00' 51"
Whick Whack No. 1	Waterpoint - Helicopter, Waterpoint - Vehicle	706560	6226650	149°14' 49"	34°04' 50"
Whick Whack No. 2	Waterpoint - Helicopter, Waterpoint - Vehicle	707250	6227380	149°14' 45"	34°04' 25"
Wick Wack Airstrip	Airstrip	707170	6226190	149°14' 43"	34°05' 04"
Wick Wack Staging Area	Staging Area	707600	6225100	149°15' 03"	34°05' 38"
Wrens Nest	Airstrip	715970	6228310	149°20' 25"	34°03' 49"
Yarraman No. 1	Airstrip	704700	6232460	149°13' 02"	34°01' 42"

Base Camp
Control Centre
Staging Area
Airbase
Water Point - Helicopter
Water Point - Vehicle
Water Point - Helicopter/Vehicle
Helipad
Refuge Area
Escape Route

Farm Dam
Spotheight
Survey Landmark
Gate
Locked Gate
Homestead Complex
Asset
Threatened Fauna
Threatened Flora
Asset Buffer Zone

BFCC Standard Trail
Primary
Secondary
Dormant
Management Trail
Cat 1
Cat 2
Cat 7
Cat 9
Other Roads
Sealed Road
Main Unsealed Road
Minor Unsealed Road
Trail
Dormant Trail

Walking Track
Railway
Landing Ground
Gas Pipe Line
Major Power Line (With Voltage)
Minor Power Line
State Border
100m Contour
20m Contour
Cadastre
River
Creek
Drainage Line

Waterbody
DECC Estate - HMZ1
DECC Estate - HMZ2
Other DEC Estate
Crown Land
State Forest
Timber Plantation
Wooded Area
Karst Area
Recently Burnt Area