NATIONAL PARKS AND WILDLIFE SERVICE – NSW

Fire Management Strategy

Asset Protection Zone – “Dunes Resort” – Sussex Inlet South

Conjola National Park
Narrawallee Creek Nature Reserve

September 2007

Department of **Environment & Climate Change** NSW

Fire Management Strategy
for
Conjola National Park
and
Narrawallee Creek Nature Reserve

This Fire Management Strategy has been placed on public exhibition, and members of the public, either individually, or as representatives of community interest groups, and government authorities have commented on it.

Enquiries concerning this Fire Management Strategy may be forwarded to:

The Fire Management Officer
NSW - National Parks and Wildlife Service
PO Box 707
Nowra
NSW 2541

or e-mail – **sc.fireplans@environment.nsw.gov.au**

Regional Manager
South Coast Region
NSW National Parks and Wildlife Service

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1. INTRODUCTION

1.1 Scope and purpose of this fire management strategy

This plan describes the strategies that the National Parks and Wildlife Service (NPWS) will apply to meet fire management obligations under the Rural Fires Act 1997, National Parks and Wildlife Act 1974 and Threatened Species Conservation Act 1995 in both Conjola National Park and Narrawallee Creek Nature Reserve between July 2005 and June 2010

This strategy has been prepared in accordance with policies and procedures set out in the NPWS Fire Management Manual (NPWS, 2001 and as revised), the NPWS Strategy for Fire Management (NPWS, August 2003), Draft Plan of Management for Conjola National Park (Draft Oct 2005) and Plan of Management for Narrawallee Creek Nature Reserve (July 2006)

This strategy is supported by:

- Regional Fire Management Works Schedules which are revised annually and list the fire management activities and works proposed for each financial year (July ,one year to June the next year)
- Bush Fire Operational Maps which identify fire suppression advantages, nearby assets and sites of natural, cultural and community values to be protected. These maps are reviewed periodically.
- NPWS South Coast Region – Regional Incident Procedures, which detail bush fire preparedness and response procedures. These are revised annually.

This Strategy is also supported by reference maps, Geographic Information System (GIS) and other databases maintained at the NPWS South Coast Region office at Nowra. This plan is to be integrated with the Bush Fire Risk Management Plan prepared by the Bush Fire Management Committee (BFMC) for the Shoalhaven Fire District. The NPWS is an active member of this BFMC and seeks to work cooperatively with fellow committee members and the community to achieve coordinated fire management and suppression across the Shoalhaven.

The NPWS South Coast region would like to acknowledge the extensive and valuable input provided by the community, neighbours, RFS members and other agencies during the consultation, compilation and review for this plan.

1.2 Fire Management Objectives

Consistent with the statutory obligations and policies described in the NPWS Strategy for Fire Management the fire management objectives for Conjola National Park and Narrawallee Creek Nature Reserve are:

- Reduce the occurrence in the reserve of unplanned fire caused by people,
- Contain, and where achievable, suppress unplanned fires occurring in the reserve,
- Minimise the potential for the spread of bushfires from the reserve,
- Limit the potential spread of fires into the reserve,
- Protect people and property in, or immediately adjacent to, the reserves from bushfires occurring in the reserve,
- Manage fire regimes to sustain all species and processes known to occur naturally within the reserve and thereby avoid possible extinction or unnatural change,
- Protect from damage by bushfire all Aboriginal sites, historic places, and culturally significant features which are known to exist within the reserve,
- Promote awareness of the reserves natural and cultural values that may be under threat from inappropriate fire regimes or suppression activities.

1.3 Description of the Reserve

1.3.1 Location and Terrain

This strategy applies to the following reserves: Conjola National Park, and Narrawallee Creek Nature Reserve.

The reserves are some 130km from Sydney on the NSW South Coast. They lie between the Princes Highway and the coastline some 30km south of Nowra and adjoin the settled areas of Sussex Inlet, Swanhaven, Berrara, Bendalong and Lake Conjola. (see Map 1)

Conjola National Park includes the catchments of Swan Lake and Berrara Creek. Also included are parts of the catchments of Tullarwalla Lagoon / St. Georges Basin to the north and Lake Conjola to the south.

Narrawallee Creek Nature Reserve adjoins the estuarine reaches of Narrawallee Creek and Inlet as well as the smaller catchment of Pattimores Lagoon just to the south of Lake Conjola village.

In addition to the 11,982 hectares within the reserves, this plan also considers bush fire fuels, assets, and fire control advantages that are outside but are continuous with, or adjacent to, those in the reserve.

Topography within the reserve varies from coastal dunes, wetlands and estuaries rising to steep sided gullies to flatter sandstone or shale ridgetops of generally low elevation.

1.3.2 Fire Weather and History

The climate predominant over Conjola National Park and Narrawallee Creek Nature Reserve is temperate including a strong maritime influence that interacts with the continental weather patterns. Whilst the latter overall trends are more predictably forecast, the variability of the more localised effects such as the summers coastal 'nor-easters' and 'southerly busters' and their characteristic sudden wind changes can present difficulties for fire suppression. Similarly, the deteriorating fire weather conditions associated with hot dry continental winds usually preceding the passage of frontal systems may be exacerbated over the reserves by the downstream turbulence caused by prominent sandstone escarpments just to the west. This again may lead to sudden change in wind speed and fire behaviour.

Regional rainfall is variable both annually and seasonally with a recorded average of approximately 1250mm. This rainfall is summer dominant and often results from thunderstorm activity. As such the rainfall can be quite variable across the landscape. This variability needs to be monitored when prescribing 'burning off' conditions or considered when using regionally based fire weather indexes. The summer storms can also present dangerous fire weather conditions for firefighting crews.

The area is subject to periodic drought both regionally and as part of larger trends such as 'El Nĩno'. These trends can result in drying out the soils and vegetation making more fine fire fuel available than usual as well as promoting intense fire behaviour as observed in the prolonged drought and exceptional summers of 2001/2002 and 2003/2004. Under such conditions, fire behaviour makes control very difficult and can easily compromise the usually sufficient protection measures.

Most recorded wildfire arises from suspected deliberate ignition or escaped fire with the only identified "natural" cause being occasional lightning strikes. Fire caused by electrical arcing and pole cross-arm ignition is also considered locally significant along supply easements. Most of the suspected deliberate events originate from access routes and adjacent to settled areas. Recorded major fire runs across the reserve are west to east either originating near or crossing the Princes Highway from the west.

Fire history records for the reserves are maintained by the NPWS. For the period before establishment of the reserves, records are collated from former land management and fire suppression organisations, research findings and historical records. The period and detail of these records are limited but can provide basic information on causes of ignition extent and frequency. Though limited, this history is also sufficient to assess indications for biodiversity conservation and some aspects of fire mitigation over the life of the Fire Management Strategy.

Fire history and related information is available to managers via Geographic Information Systems and organisational records. Fire history for a period up to ten years prior to the publication of the Fire Management Strategy is mapped on the supporting Operational Maps as an aid to assessing possible fire behaviour and developing suppression tactics. This fire history presentation is updated annually on operational maps to be used by managers and shared with other emergency authorities. This FMS does not include a presentation of fire history as it is anticipated the FMS will cover a period of at least five years and therefore may not reflect a current appraisal of prescribed burning and wildfires.

From the available records it appears that large areas of Conjola National Park and Narrawallee Creek Nature Reserve have been burnt more frequently than is indicated for the maintenance of biodiversity. This could have resulted in the promotion of more fire prone vegetation. This fire history presents challenges for the maintenance of the reserves' biodiversity, protection of adjacent assets and community understanding of fire management options and decisions.

1.3.3 Natural and Cultural Heritage

The vegetation of the reserves is both diverse and fire-prone. This diversity includes taller forests on elevated shale areas and sheltered drainage lines north of the Bendalong Road, significant blackbutt forests on ancient dune landforms near Sussex Inlet, drier open forest fand heaths along ridgetops and important littoral and dune vegetation along estuaries and foreshores.

The reserves include a number of rare and threatened plant species such as *Galium australe*, *Pultenea villifera,* and *Cryptostylis hunteriana*. The reserves also contain a number of Endangered Ecological Communities (EECs) such as Bangalay sand forest and Swamp Oak floodplain forest. Particular management strategies to protect Threatened plant species or Endangered Ecological Communities are outlined in Table 7.

The landforms and vegetation of the reserves include the habitats of a diverse range of fauna. Of particular note are the populations of arboreal mammals as well as shorebirds and waders using the foreshore and estuarine areas.

Over a dozen threatened species have been recorded in and around the reserves. These include the Masked Owl - *Tyto novaehollandiae,* Green and Golden Bell Frog - *Litoria aurea,* Grey Headed Flying Fox - *Pteropus poliocephalus,* Osprey - *Pandion haliateus* - Yellow Bellied Glider - *Petaurus australis,* Squirrel Glider- *Petaurus norfolcensis,* Sooty Owl - *Tyto tenebricosa,* Powerful Owl - *Ninox strenua,* Large -footed Myotis - *Myotis adversus* and Common Bentwing Bat - *Miniopterus schreibersii.* A number of these species may be considered at threat if inappropriate fire regimes prevail or unsuitable fire management strategies or control options are applied. Such species include the Glossy Black Cockatoo - *Calyptorhynchus lathami*. Specific fire management strategies for affected threatened fauna species are outlined in Table 7.

The evidence of Aboriginal use and sites of cultural significance are found across the reserves with concentrations of recorded occupation sites along creeklines and foreshores. As with remnants of early historic use, few of these are vulnerable to further fire but may be vulnerable to fire suppression activities such as the use of earthmoving machinery. The most prominent historic site is a monument to the 'Walter Hood' shipwreck north of Bendalong and the silica mining tramway formation at Narrawallee Creek. Protection measures and suppression options for these assets are detailed in Table 8.

The reserves have been the site of considerable mining and forestry activity including the legacy of a complex vehicle access network that is undergoing assessment of suitability and maintenance for public use, fire management and rehabilitation.

Whilst all access routes may have some usefulness for fire management, only those tracks primarily maintained by the NPWS for fire suppression are specifically listed in this strategy and shown on operational maps.

1.3.4 Infrastructure, assets, and economic values

There are few community infrastructure assets or NPWS developed areas within the reserves. Major assets include the aerial power supply feeder lines to the communities of Sussex Inlet, Berrara, Bendalong, Manyana, and further down the south coast. These routes traverse extensive bushland including the reserves and may be vulnerable to intense fire. The consequent effects of loss of service on communication, water and sewerage services can pose a significant problem.

The reserves virtually surround the villages of Sussex Inlet, Swanhaven, Berrara, Bendalong, Cudmirrah and Lake Conjola. The predominant uses of these settlements are holiday and residential accommodation including supporting commercial areas and service industries. The seasonal fluctuation of population and absentee ownership presents particular problems for community information, preparedness and neighbour interaction with regard to bush fire.

A longstanding concern to the community is the singular vehicular access routes to these settlements that may be readily compromised by bush fire. Apart from reserve appreciation and enjoyment, a few vehicle access routes across the reserves are regularly used for commuting by local communities. These routes also raise concerns about public safety during fire outbreaks and possible source of illegal ignitions e.g. Blackbutt Road.

A number of community service infrastructure facilities are located within the reserve. These include a communications tower located at 12-Mile Peg (Cudmirrah Trig) near the Princes Highway and another co-located with a water reservoir on Shoalhaven City Council managed land near Fishermans Paradise. There are numerous underground telephone cables including fibre optic routes as well as water pipelines, water pumping station at Fishermans Rock and a sewerage pipeline.

A number of rural subdivisions adjoin the reserves with many containing a large proportion of natural vegetation. Most of the portions within these subdivisions are of sufficient size to accommodate measures to protect existing dwellings - without the demand to modify adjacent reserve lands. The scattered placement and access to these assets presents particular challenges for fire suppression and protection.

There are also considerable areas adjoining the reserves that have the potential for further subdivision or development. At present some of these areas are naturally vegetated and are included in planning for fire management zones and strategies especially where they adjoin built up areas. Current legislation and guidelines include the need to address the risk from bush fire in design and approval processes. This should lessen the expectation and consequent effect of further demands for fire protection to take place within the reserves.

Whilst the NPWS will undertake its responsibilities to reasonably limit the possible spread of bush fire from adjacent lands, it cannot be expected that fire management regimes and conservation outcomes on existing reserves will be altered to accommodate future adjacent development. Consistent with planning requirements of the Rural Fires Act, development options for these lands will need to recognise the inherent risk from bush fire in such landscapes and continue to include sufficient protective design options.

1.3.5 Recreational Use and Facilities

Most of the reserves recreational use is focussed on the coastal fringe and along public access routes through or adjacent to the reserve. This use is highly seasonal over summer and holiday periods and largely emanates from the adjacent settlements of Sussex Inlet, Swanhaven, Berrara, Lake Conjola and Bendalong. These towns and villages are often swelled with visitors or non-permanent residents unfamiliar with the locality and the associated fire risks.

Recreation uses of the reserve include foreshore and waterway use for beach activities, fishing, vehicle based touring and informal bushwalking.

Visitor use facilities are located north of Bendalong at the Walter Hood shipwreck memorial, the Haven, and a number of other trackheads and carparks e.g. Conjola Beach. Visitor use is spread across these tracks and along the foreshores and beaches of the reserves.

There are several implications for fire management from this dispersed and seasonal use. These include

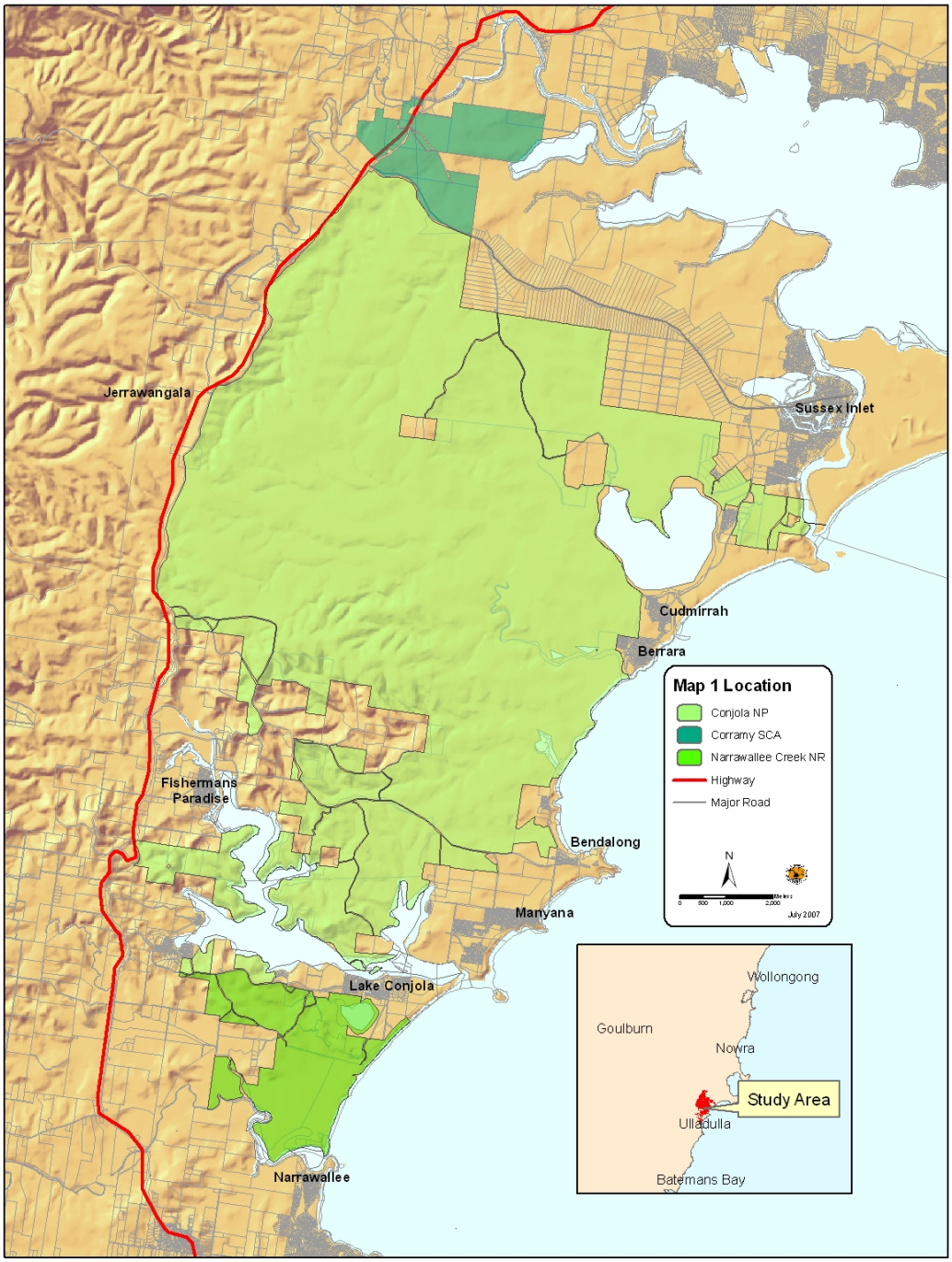
- the primary need to consider visitor safety in fire suppression response,
- Communication of risks and appropriate response for casual visitors,
- Preparedness information and preparation for adjacent neighbours and communities, and
- Opportunities for unplanned ignition from the dispersed use and access network.

1.3.6 Summary of Key Fire Issues

There are a number of key fire management issues across areas including these reserves. Of note are:

- The fragmented nature of neighbouring urban settlement throughout fire-prone bushland to the north and east of the reserves. Associated with this is the complex mix of land ownership and management along the urban / bushland interface.
- The ‘single-road-in-and-out’ vehicle / emergency access to these communities.
- The vulnerability of key infrastructure and routes across bushland to these urban areas. e.g. power supply, water supply, communications.
- The dispersed arrangement of access and dwellings in rural subdivision areas, e.g. Sussex Inlet Road and various isolated properties.
- The planning for and development of bushland areas adjacent to the reserves and nearby settlements having regard to bush fire risk.
- The considerable biodiversity found in these areas that may be at risk from inappropriate fire regimes, i.e. too frequent fire.
- The need to encourage greater community understanding of the implications of fire management for biodiversity and the limits of achievable fire protection under certain fire weather conditions
- The high incidence of ‘unplanned fire’ arising from arson or careless use of fire.

Map 1 –Map and Location of Reserves



2. BUSHFIRE RISKS

2.1 Introduction

The large number and complexity of assets of all types in and around the reserves means it is not realistically possible to implement active fire management strategies to protect all assets that could be damaged by extreme wildfire events or inappropriate fire regimes. Bush fire risk analysis has been undertaken to identify those assets most at risk from fire of higher intensity and therefore most in need of the application of active fire management strategies.

For the purpose of this strategy, bush fire risk is defined as the chance of a bush fire or inappropriate fire regime occurring and causing damage to assets within or adjacent to the reserve.

'Assets' include life and property, cultural heritage – such as historic or aboriginal sites, and natural heritage – such as flora, fauna and natural ecosystems.

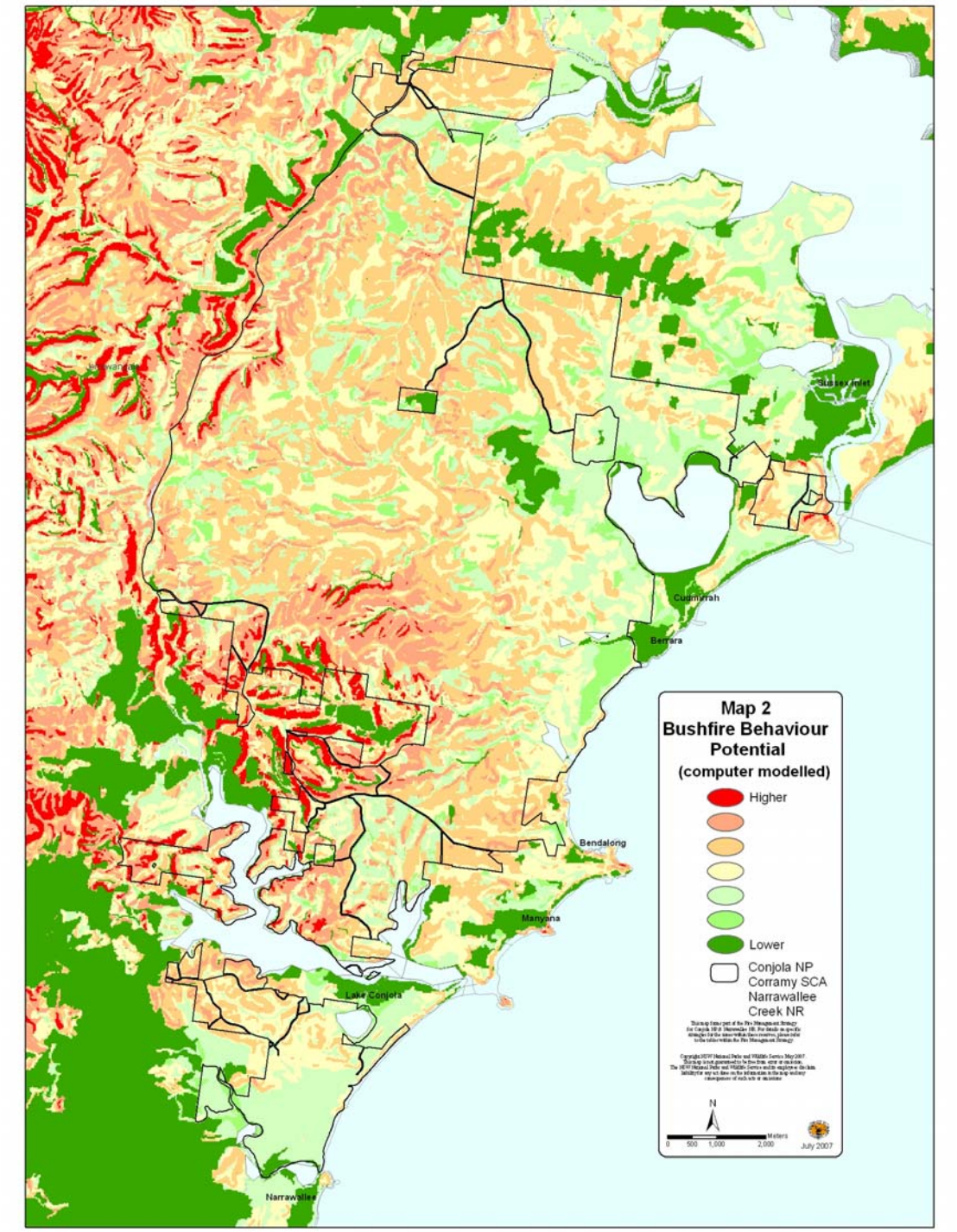
The method of grading the bush fire behaviour potential and consequent risk of damage is described in the *NPWS Approach to Fire Management Planning (NPWS Aug 2003)*. Whilst these methods are based on available climatic, vegetation and terrain data, it is again stressed that periods of extreme fire weather and prolonged drought will considerably increase the potential behaviour and damage from bush fire. Under these exceptional conditions the potential risk to the community's property, natural and cultural assets will therefore increase significantly.

This risk assessment method has been applied to the area within and adjacent to Conjola National Park and Narrawallee Creek Nature Reserve. Life and property, natural and cultural assets within these areas have been sorted into one of the following fire potential / risk classes - *higher, moderate,* or *lower*.

This strategy will focus on all assets within or adjacent to the reserves where identified in areas of **higher** bush fire potential.

These assets within areas of **higher** potential for bushfire impact have been illustrated in Map 2 and identified in the following sections.

Map 2 – Potential Bush Fire Behaviour map



2.2 Life and Property

Based on the criteria set out in the *NPWS Approach to fire Management Planning (NPWS 2003)*, there are few specific locations within Conjola National Park and Narrawallee Creek Nature Reserve where life and property are identified within areas at 'higher' risk from bush fire.

Nevertheless, as has been demonstrated in events of extreme fire weather coupled with prolonged drought, there can be exceptional fire behaviour that can readily breach commonly accepted fire mitigation measures. (e.g. Sussex Inlet – January 2002). Under such circumstances, bush fire fuels not normally available such as in swampy areas may carry intense fire whilst the incidence of spot fires can increase at considerable distances.

The risk of life and property damage is exacerbated where there is a concentration of people and assets such as the interface between built-up areas and adjoining bushland. Similarly, key community infrastructure located within fire prone areas is also vulnerable and damage to such facilities may have significant effects on wide areas not directly concerned with fire events. Such sites in and around Conjola National Park and Narrawallee Creek Nature Reserve have been identified within Tables 1a, 1b &1c. (see Map 2 & Tables 1a, 1b, 1c. and Operations Map)

Table 1a. - Sites near Conjola National Park and Narrawallee Creek Nature Reserve identified at higher risk from bush fire.

(using criteria for fire risk factors in NPWS Strategy for Fire Management 2003)

Map ID	Feature / Location	Tenure
T 92	Dwellings – Wayfarer Drive – Sussex Inlet	Private
T 83	Dwellings - Sussex Inlet	Private
T 82	Dwellings – Sussex Inlet Holiday Resort – Sussex Inlet	Private
T 10	Dwelling – east of Mella Mella Bay – Conjola Lake	Private
T 168	Dwelling – west of Princes Hwy -12 Mile Peg – near Wandandian Creek	Private

Though many assets do not directly adjoin the reserves, in places there is a continuum of bushland from the reserves to areas near the assets. In such areas the NPWS will support the cooperative approach to managing bush fire risk currently being promoted by the Shoalhaven Bush Fire Management Committee of which the NPWS is a member.
Such sites include areas listed in Table 1b:

Table 1b, Locations near Conjola National Park and Narrawallee Creek Nature Reserve where detailed cooperative planning for asset protection will be required.

Feature ID	Feature / Location	Tenure
T108	Urban / bushland interface -Medlyn Avenue subdivision, - Sussex Inlet	Private
T92	Urban / bushland interface – Wayfarer Drive – Sussex Inlet	Private
T104	Urban / bushland interface – northern Swanhaven	Private
T114	Urban / bushland interface – west Cudmirrah	Private
T120	Urban / bushland interface – west Berrara	Private
T2	Urban / bushland interface – North Bendalong	Private
T124	Urban / bushland interface - Bendalong	Private
T17	Urban / bushland interface – Lake Conjola	Private
T183, T64	Dwellings on rural residential allotments south of Sussex Inlet Road	Private
T139	Dwellings isolated within in-holdings in the reserves	Private

There are also a number of community infrastructure assets within or near the reserves that may be vulnerable to fire.

Such sites include:

Table 1c, - Community Infrastructure within or near the reserves vulnerable to fire

Feature ID	Feature / Location	Tenure
T66	Communications Tower – 12 Mile Peg (Cudmirrah Trig) – Mondayong Road	Nat. Parks & Wildlife Service
T78	Communications Tower – west Conjola Lake – Fishermans Paradise (on Shoalhaven City Council managed land but surrounded by the reserve)	Private and Shoalhaven City Council
T191	Water Pumping Station and electricity supply – Fishermans Rock - Berrara	Shoalhaven City Council
T5	Sewage Treatment Plant – Medlyn Avenue – Sussex Inlet	Shoalhaven City Council
T192	Communications Tower – Medlyn Avenue – Sussex Inlet	Telstra
U277,U395, U487, U246	Electricity supply feeder lines – south of and parallel to Sussex Inlet Road, east of and parallel to the Princes Highway, Sussex Inlet – Berrara – Bendalong route,	Integral Energy,
	Visitor Facilities within the reserves	Nat. Parks & Wildlife Service
	Sewerage Treatment Plant – Lake Conjola	Shoalhaven City Council
	Sewerage Treatment Plant, Bendalong	Shoalhaven City Council

2.3 Cultural Heritage

Although there are a large number of aboriginal cultural sites within Conjola National Park and Narrawallee Creek Nature Reserve not all sites are at risk from bush fire. Based on the criteria set out in the *NPWS Approach to fire Management Planning (NPWS 2003)*, an assessment of the type and location of recorded Aboriginal and Historic cultural sites was undertaken.

A variety of sites have been recorded in the reserves including stone tool scatters, axe grinding grooves, middens and scarred trees, indicating widespread use of the landscape. No recorded sites were assessed as being directly vulnerable from the effects of bush fire in areas of higher fire potential within Conjola National Park or Narrawallee Creek Nature Reserve. However, a significant threat to sites in all areas can arise from fire protection works or fire suppression operations such as disturbance created by vehicles, earthmoving plant, cutting down trees and creation of hand tool lines.

To limit the risk of this disturbance a number of areas including cultural sites that could be vulnerable to pre-season or fire control operations have been identified on Operational Maps. Operational guidelines for firefighters and planners aimed at avoiding such disturbance are also included.

The types of site are not indicated but all sites that are indicated on maps are considered at risk from usual methods of creating control lines. The operational maps have been referred to relevant interests and the information is provided with permission. **(These maps are not for wider circulation to non-operational personnel.)**

NB - Not all cultural sites can be indicated due to respect for the site sensitivity or non-fire protection priorities. Where operations are planned, - especially in areas near indicated sites or along routes not previously used, - then planning and operational staff should allow time and resources for preliminary assessment by suitably knowledgeable personnel.

It is stressed that the indicated site locations may only be approximate. Where there may be limited options for control routes in areas that may compromise an indicated site, then field personnel should seek appropriate guidance from skilled and relevant personnel. During fire protection works or suppression operations in proximity to the indicated sites, or when sites may have been discovered, these concerns should be promptly relayed to the relevant supervisor, Divisional Commander and Incident Management Team. Where disturbance is likely, alternative methods or firefighting tactics should be considered or - where possible - works delayed until appropriate assessment is completed.

It is recognised that there will at times be circumstances where quick action is required under certain conditions to implement control measures. Where possible and if safer success of control is likely, then unnecessary disturbance should be avoided and control options less likely to disturb sites should be employed e.g. the use of hose lays and wetlines as opposed to earthmoving machinery at a particular site.

Where likely strategic control options are identified beforehand then these should be assessed and mapped as time and resources allow in non-operational periods. These options are to be recorded in databases available to incident planning teams and where suitable marked on operational map upgrades.
Similarly, those historic cultural assets at risk from control operations may be identified on operational fire maps and strategy options identified.

There is also a risk of disturbance to such cultural assets as a result of routine maintenance of the fire management features proposed in this strategy. Each zone will be assessed for the effects of maintenance activities on both cultural and natural values as part the preparation of the Fire Management Works Schedule (Sect. 3.7)

If there is any doubt as to the appropriate measures to be taken or should further cultural assets be identified then avoid all disturbance where possible and contact a NPWS representative or office.

Table 2 – Cultural sites considered at higher risk from bush fire

NB No specific sites have been identified at higher risk from bush fire potential – Table 2 is reserved for possible sites identified during ongoing operations and maintenance works assessments, sites survey and evaluation in the reserves. The sites included here are considered particularly vulnerable to fire suppression activities.

Feature / Location	Tenure
Fishermans Rock and environs – near Berrara	NPWS
Silica tramway and remnant artefacts	NPWS
Washerwomans Creek Scarred Tree	NPWS
Charcoal Pits - Bendalong Rd	NPWS

2.4 Natural Heritage

Based on the criteria set out in the *NPWS Approach to fire Management Planning (NPWS 2003)*, there are many vegetation communities in Conjola National Park at higher risk from inappropriate fire regimes. (see Table 3)

Given the recent extensive fire events across Conjola National Park including the single large wildfire event of December/January, (2001-2002) where 92% of the park was burnt, many of the complex and diverse vegetation communities found within the reserve are at risk from being burned too frequently (*overburned*). Therefore longer-term biodiversity values may be at risk.

Conversely there are a few communities in both reserves where the time since fire exceeds the indicated thresholds and may require fire to be introduced in order to conserve biodiversity (*underburnt*).

Given the widespread nature of the recent wildfires (2001-2002) most of the vegetation community types contain recently burned areas that although within the desirable thresholds, are *vulnerable* to being 'overburned' if fire is introduced too soon after the recent events.

Most of these biodiversity concerns related to fire frequency are addressed in the strategies to manage fire within the Heritage Management Zones (HMZs) where a range of 'times-since-fire' can be managed for. To better identify appropriate and site-specific fire regimes within the reserves, eight fire monitoring plots have recently been established a variety of vegetation types including a focus on rare or threatened plant species.

Within Strategic Fire Advantage Zones (SFAZs) where a closer watch may be kept on bush fire fuel conditions, fire may be introduced towards the lower end of the required thresholds.

In Asset Protection Zones (APZs) fuel conditions are most closely monitored and provided there are not specific identified communities, habitats or species at risk, lower thresholds may be exceeded where fire is considered the best way to manage fuel conditions.

In summary, as at January2005 - and considering the total area of both reserves - over 85% of the vegetation had been recently burned within the past six years. Approximately 15% of these burnt areas have been 'overburned' i.e. subject to fire too soon since the last event. A further 25% of the vegetation within these burnt areas may be vulnerable if fire is applied again within the next two to three years.

Of the areas not recently burnt, 6% of the reserve vegetation may require the application of fire to conserve biodiversity and just 5% is left both unaffected by overburning and not vulnerable to the risk of new fire (that is, if fire was to occur, or not to occur, within the next few years, the vegetation would remain within appropriate fire regime or 'time-since-fire' limits).

Importantly, the whole of some of the reserve vegetation communities have been overburned.

By way of further explanation, although a vegetation community may currently be within the recommended biodiversity thresholds for time since fire, or outside those thresholds – either burned too frequently or infrequently enough - it may also be considered 'vulnerable' if subject to fire again within the next five years. Alternatively a vegetation community currently within the thresholds may become *vulnerable* within the next five years where <u>not</u> burned - as the time-since-fire exceeds the upper thresholds.

Table 3 identifies those vegetation communities in the reserves and their area. It also lists the percentage of that area that has been over or underburned, i.e. where biodiversity is at risk from inappropriate fire regimes. The table broadly shows that due to large-scale fire events in the past decade, the application of fire with prescribed burning or the spread of wildfire will need to be monitored closely.

This information will be reviewed annually in light of the past seasons fire history – both wildfire and prescribed burning. The upper and lower biodiversity thresholds for time since fire for each vegetation community within the reserve are then considered and the areas where fire should be excluded or avoided and areas where fire may need to be introduced to maintain biodiversity are determined.

Managers are aided in this complex assessment by the use of computer based Geographic Information Systems, field survey and ongoing research into fire regimes and management.

Apart from asset protection areas where vegetation may be directly modified by slashing or subject to repeated fire in order to limit available bush fire fuel, the aim is to maintain a range of age classes (times-since-fire) across all the vegetation communities within the reserves. Similar concepts are now applied within environmental assessments for burning proposals in bushland areas outside reserves.

Table 3. Biodiversity at threat within the reserves.

Vegetation Communities within the reserves affected by inappropriate fire regimes	Total Area affected (ha.)	% Affected by in-appropriate fire regimes*
paperbark shrubland	113.50	100
moist forest tending to dry	0.06	100
bangalay open forest/swamp oak forest/woodland+rushland/forbland	0.31	100
Ruppia forbland	0.94	100
blackbutt open forest	1.06	100
southern coastal hind dune/headland scrub	13.31	91
blackbutt-bloodwood open forest	91.00	86
bangalay open forest	1.19	83
banksia-teatree closed shrubland	4.50	71
blackbutt-turpentine tall open forest	17.25	68
paperbark shrubland (swampland)/swamp oak forest/woodland+rushland	0.19	60
blackbutt open forest-ironwood closed forest	80.25	56
ecotonal coastal swamp forest - *Casuarina glauca* - *Eucalyptus botryoides*	0.38	50
scribbly gum-casuarina open forest	0.06	50
blackbutt-turpentine open forest/tall open forest	1.31	45
paperbark shrubland (swampland)	2.81	31
blackbutt-turpentine tall open forest/blue gum tall open forest	44.50	23
bangalay open forest/closed forest (rainforest)	196.94	19
swamp oak forest/woodland+rushland (& saltmarsh)	387.19	18
coastal lowland sub tropical/littoral rainforest	0.25	16
blue gum tall open forest	52.81	13
woollybutt-paperbark woodland ^	1.88	100
coastal headland heathlands	3.19	-
swamp oak forest/woodland+rushland/forbland (saltmarsh)	2.56	-
bloodwood-peppermint open forest/woodland	7.94	-
dry forest dominant./moist forest	0.25	-

* Percentage of vegetation community currently affected by inappropriate fire regime i.e. burned too frequently or infrequently enough to sustain biodiversity. NB: Given recent fire history, most of these vegetation communities indicated are affected by too frequent fire. This indicates that the interval between fires has been insufficient. (As at Nov 2005)

^ This is an example where all the limited area of this vegetation community observed within the reserves (only 1.88 ha) has been burned at too frequent intervals (i.e. 100% affected by inappropriate fire regimes), and all of this community is at risk of not being able to sustain itself if fire is applied within the next 2-3 years

3. BUSH FIRE RISK MANAGEMENT STRATEGIES

3.1 Introduction

The fire management strategies identified and illustrated in maps 3 to 4 in this plan will be implemented over the life of this plan and have been designed to reduce the bush fire risk to assets within and adjacent to the reserves (as outlined in section 2 of this strategy)

A Fire Management Works Schedule for works to apply these strategies is prepared and reviewed annually. (see section 3.7 of this strategy)

3.2 Fire Management Zones

Conjola National Park and Narrawallee Creek Nature Reserve - and in some cases the adjoining areas - have been divided into fire management zones according to the zoning system described in the *NPWS Approach to fire Management Planning (NPWS 2003)*. These zone types are Asset Protection Zones (APZ), Strategic Fire Advantage Zones (SFAZ) and Heritage Management Zones (HMZ). Where possible the boundaries of fire management zones have been defined by fire control 'advantages' or useful operational boundaries. e.g. roads, water, or areas of low bush fire behaviour potential.

It should be noted that the width of Asset Protection Zones – APZs as described may vary according to specific site conditions and the consideration of setbacks for existing dwellings (at July 2003) as outlined in the guidelines *Planning for Bushfire Protection (2001) (or as revised.)*

Operational and asset protection planning may sometimes indicate that logical fire management zone boundaries should extend beyond the reserve onto other land tenures. The strategies proposed in this plan are limited to the reserve only and do not imply appropriate fire management directions for other land tenures or adjacent bushland.

It should be noted that the preparation of these NPWS strategies also considers fire management activities undertaken on adjacent lands. For example, where there is a continuum of bushland from the reserve to nearby dwellings, slashed breaks put in place adjacent to those assets are more effective than a break along the reserve boundary some distance away. Current planning legislation requires that proposals for new developments in bush fire prone areas consider bush fire hazard in appropriate building standards and layout of subdivisions.

To aid community understanding of cooperative bush fire risk management in these areas adjoining the reserve, this strategy may show these fire protection works by other agencies where known at the time. These works may vary according to fire management and seasonal requirements.
The enclosed maps may also identify who manages bushland areas adjacent to the reserve to assist neighbours to seek information on bush fire mitigation activities being undertaken. If unsure as to ownership of adjacent lands, neighbours should enquire with the Shoalhaven City Council. Enquiries about bush fire risk on lands adjacent to the reserve should be directed to owner/manager of the property or the Rural Fire Service.

During the life of this strategy, the NPWS will endeavour to seek agreement, compromise, or consistent definition of strategies in these overlap areas so that a common understanding of fire management expectations may be understood by the community, neighbours, land managers and firefighters alike. The NPWS or neighbours may seek the assistance of the Shoalhaven Bush Fire Risk Management sub-committee – (SBFMC) - to facilitate these matters.

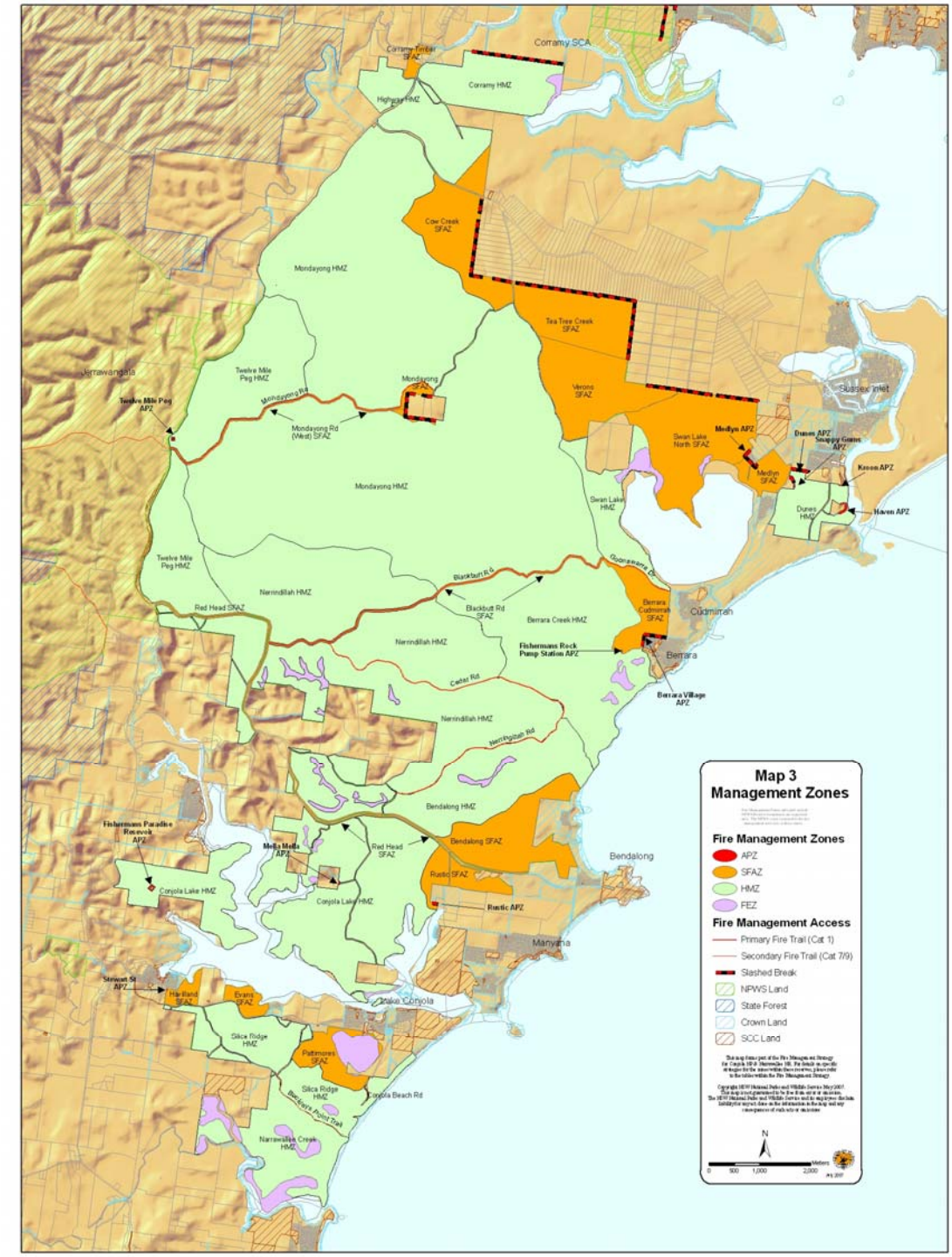
As the same zoning system is used, the NPWS South Coast Region will be submitting this fire management plan, these zones and their applied strategies for inclusion as part of the Shoalhaven Bush Fire Risk Management Plan. This planning contribution and works commitment by the NPWS becomes part of the overall strategy for the Shoalhaven community to better understand and live with the risks associated with bush fires in this region.

It should be noted that Heritage Management Zones – (HMZs) used by the NPWS are the equivalent of Land Management Zones (LMZs) used in the 2000 Bush Fire Risk Management Plan for the Shoalhaven. This Bush Fire Risk Management Plan will be reviewed in the near future.

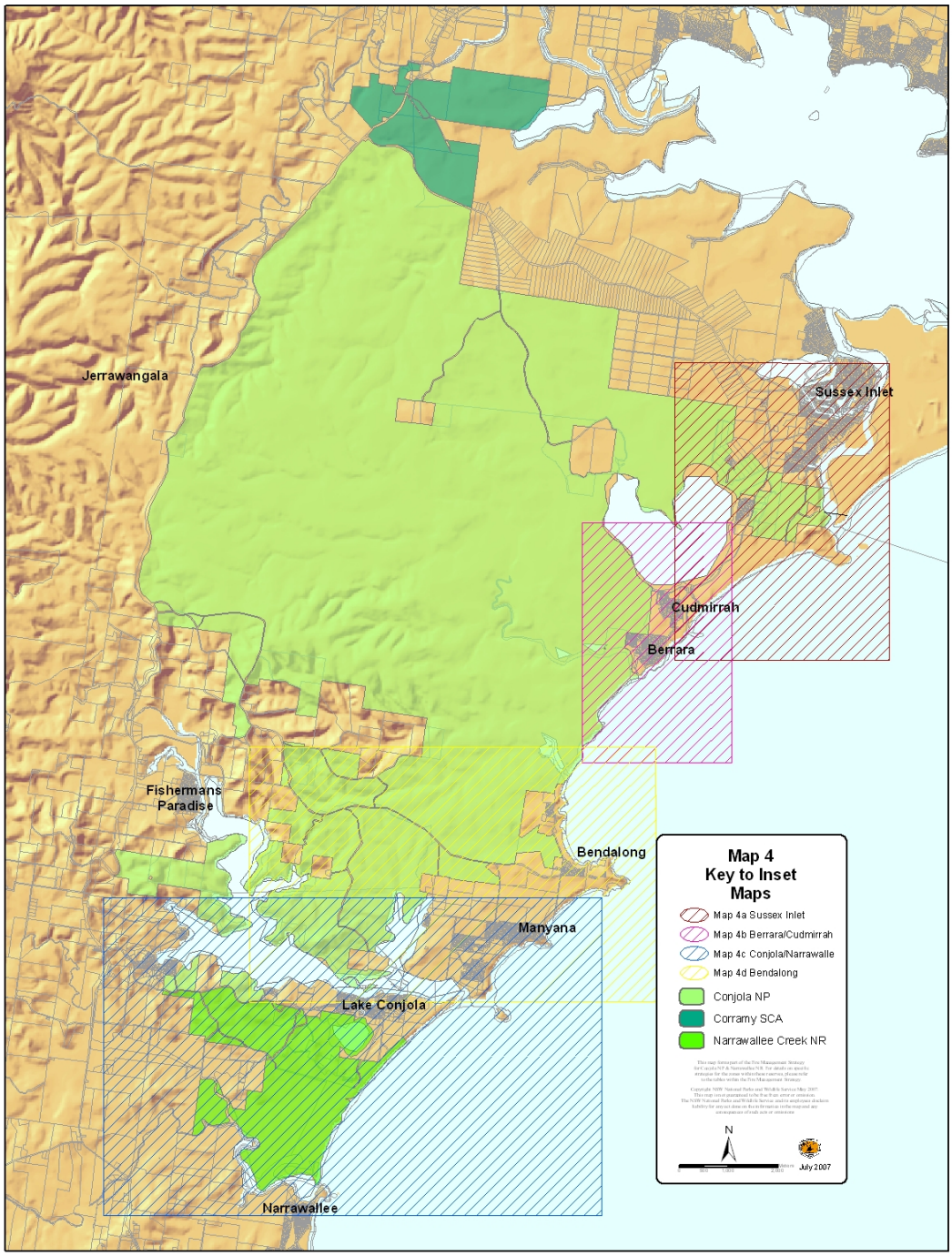
The “advantage”, referred to in Strategic Fire advantage Zones (SFAZs) is the advantage to fire managers and firefighters if fire is managed in these zones according to the strategies suggested.

In a similar way, this plan refers to the number of “slashed breaks” that the NPWS maintains. (see Table 10). These may also serve the function of a “Radiation Zone” mentioned in the *NPWS Approach to fire Management Planning (NPWS 2003)* but are more easily identified locally as “slashed breaks”.

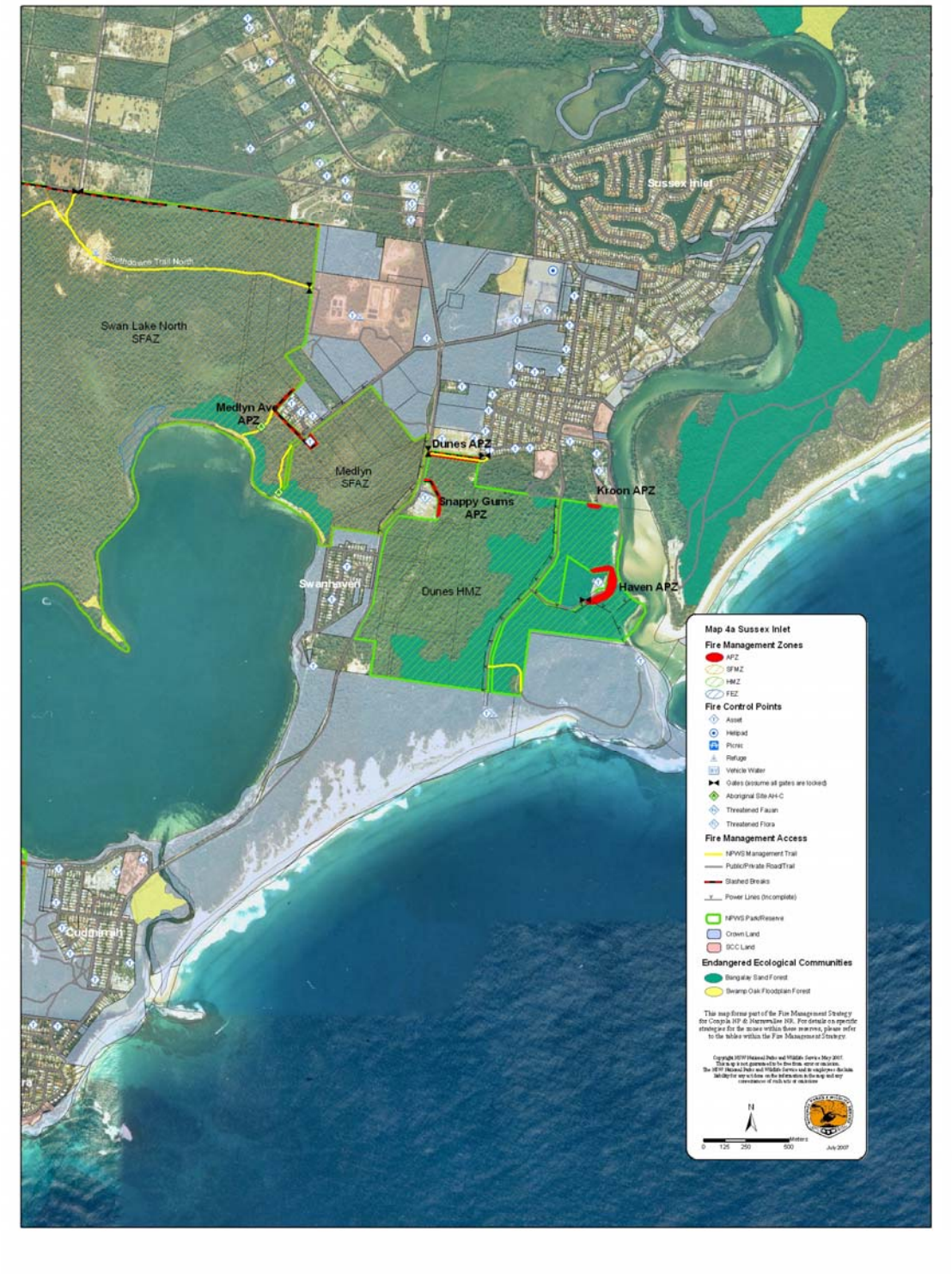
Map 3. Fire Management Zones – Conjola National Park & Narrawallee Creek Nature Reserve



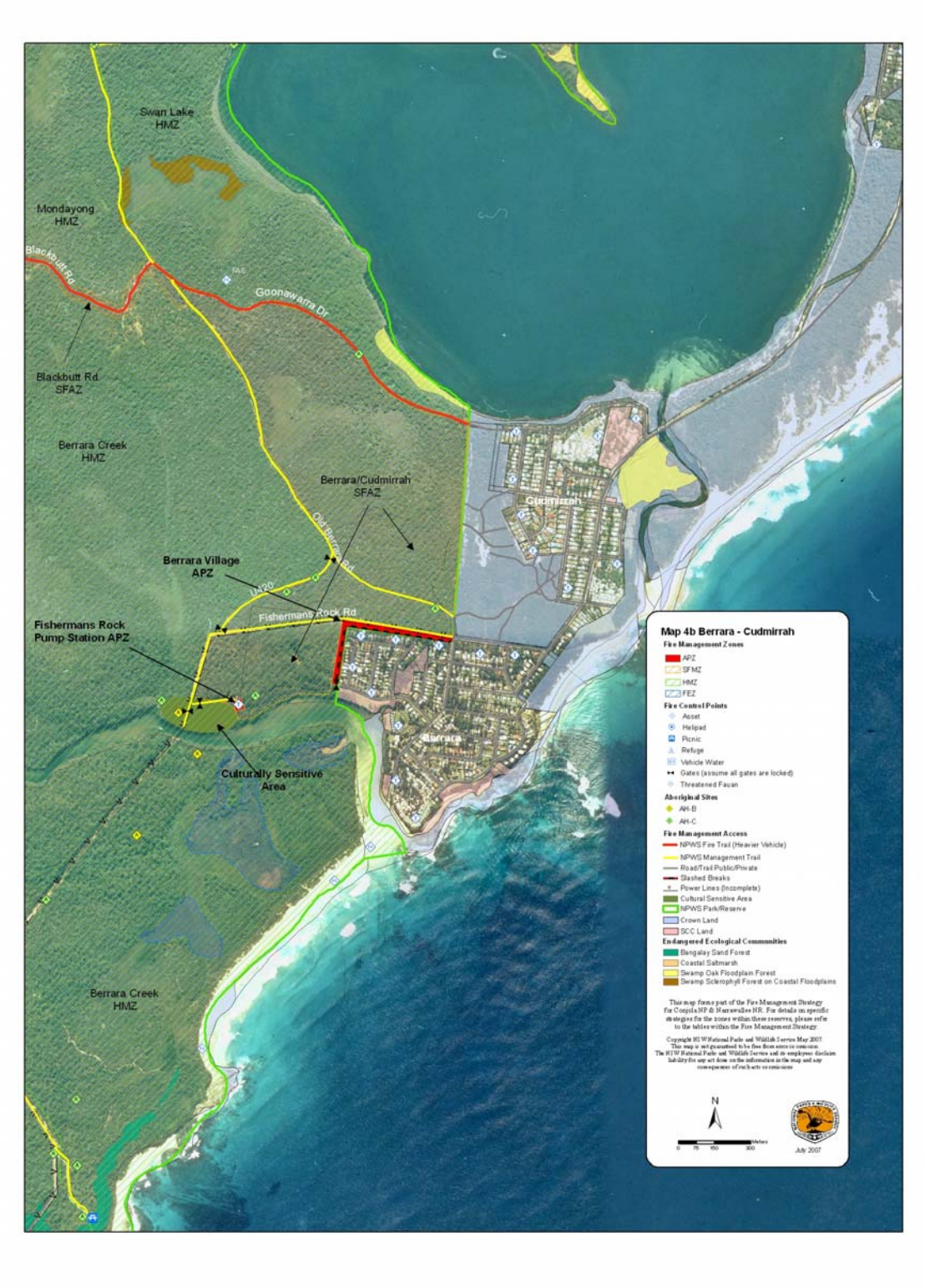
Map 4 –Detailed Fire Management Zone Maps - Key Map



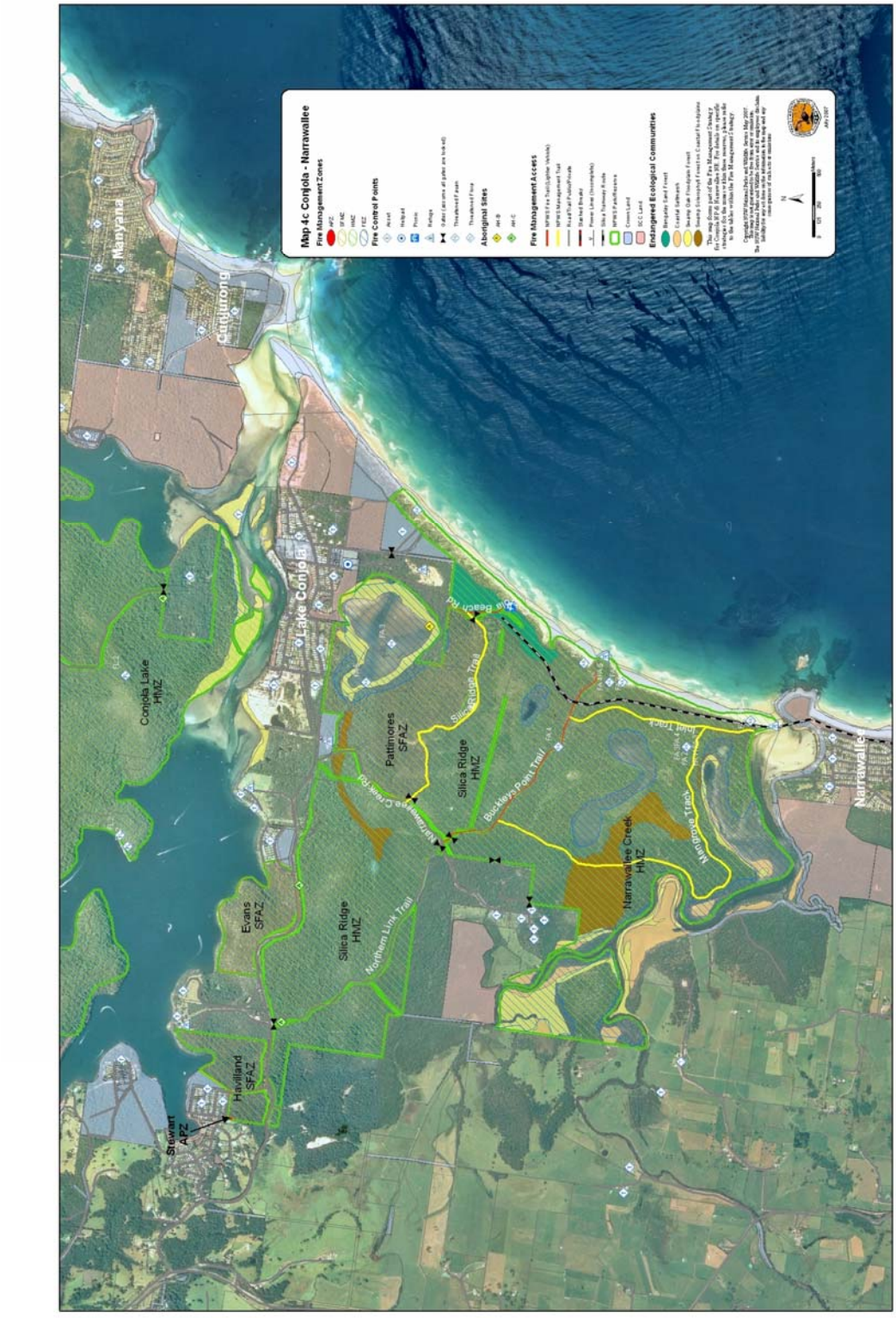
Map 4a – Detailed Bush Fire Management Zone Map - Sussex Inlet area



Map 4b – Detailed Bush Fire Management Zone Map – Berrara & Cudmirrah



Map 4c – Detailed Bush Fire Management Zone Map – Conjola / Narrawallee



Map 4d – Detailed Bush Fire Management Zone Map – Bendalong

3.2.1 Asset Protection Zones (APZs)

Twelve asset protection zones have been identified within and around Conjola National Park and Narrawallee Creek Nature Reserve. (see Maps 3 to 4) The primary fire management objective for asset protection zones is the protection of life and property that may be achieved by applying the strategies as outlined in Table 4 below. Note that the slashed breaks described in Table 10 also contribute to the protection of life and property.

Table 4. The specific fire management objectives and strategies to be applied in each of the Asset Protection Zones (Maps 3 -4)

Conjola National Park APZs

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		

CN A1	4a	**Medlyn Avenue APZ - NPWS section**	**1.28**		• To aid in the protection of dwellings and occupants adjoining the bushland surrounding the Medlyn Avenue subdivision – (NW of Swanhaven) from the threat of bushfires.
					• To aid firefighters in the protection of life and property in these adjoining areas.
					  • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.
					  • To provide an operational boundary for fuel management burning in the adjacent Swan Lake North SFAZ
						• Maintenance of a slashed break in that part of Conjola National Park that is within 30 metres of the existing residences (2003) along the western, southern and eastern boundaries of Medlyn Avenue subdivision.
						• Enable clear access for firefighters and limit available fire fuels by clearing rubbish, gardening debris and removal of property from the APZ.
						• Seek cooperation of local RFS brigades in the monitoring of APZ fuel conditions, and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access.
						• Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required prior to October

		- adjoining Crown Lands	• For information on fire management on adjoining Crown Lands please contact Dept. of Crown Lands			

Conjola NP – APZs continued

Zone ID	Map/ s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN A2	4a	**Snappy Gums APZ** - NPWS Section	**1.52**		• To aid in the protection of adjoining dwellings and occupants of the Snappy Gums Caravan Park - Swanhaven - from the threat of bushfires. • To aid firefighters in the protection of life and property in these adjoining areas. • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.	• Where feasible, maintain a slashed break or fuel reduced area along the eastern and northern boundary in that part of Conjola National Park that is within 30 m of the existing residences (2003) in the Snappy Gums Caravan Park. • Enable clear access for firefighters and limit available fire fuels by clearing rubbish, gardening debris and removal of property from the APZ. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required. • Site within reserve is on steep relict sand dunes and extent of works will need to be limited to avoid instability and erosion. • Seek cooperation of local RFS brigades in the monitoring of APZ fuel conditions, and the assistance of facility occupants and management in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access.
		- adjoining Private Property areas	• For contact details of Private Property owners/managers – enquire at Shoalhaven City Council			

Conjola NP – APZs continued

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN A3	4a	**Dunes APZ** - NPWS section	**1.54**		• To aid in the protection of adjoining dwellings and occupants on the southern side of the Dunes Resort – south of Sussex Inlet - from the threat of bushfires. • To aid firefighters in the protection of life and property in these adjoining areas. • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland.	• Maintenance of a slashed break adjacent to the Dunes Resort in that part of Conjola National Park that is within 30m of the existing residences (2003) in the resort. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required prior to October • Seek the assistance of RFS in monitoring of APZ fuel conditions
		- adjoining Crown Lands	• For information on fire management on adjoining Crown Lands please contact Dept. of Crown Lands			

Conjola NP – APZs continued

Zone ID	Map/ s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **A4**	**4a**	**Kroon APZ** - NPWS section	**0.54**		• To aid in the protection of adjoining dwelling and occupants • To aid firefighters in the protection of life and property at this site.	• Confirm reserve boundary and APZ size requirements of existing dwelling at site. Identify options and extent of fuel management activities within the reserve. Site within reserve is on steep relict sand dune and extent of works will need to be limited to avoid instability, erosion and impacts on EEC's. • If required, integrate protection obligations with any works undertaken by neighbour within the APZ required for dwellings. e.g. slashing verges of entrance road (road not in Conjola NP). • Annual bush fire fuel assessment and monitoring for maintenance and fuel management works required prior to October

Conjola NP – APZs continued

Zone ID	Map/ s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **A5**	**4a**	**Haven APZ** - NPWS section	**1.89**		• To aid in the protection of adjoining dwellings and occupants of the Sussex Inlet Holiday resort – The Haven - from the threat of bushfires. • To aid firefighters in the protection of life and property at this site. • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland	• Maintenance of slashed break along southern side of resort access road within Inner Protection Area of APZ. • Determine location of park boundary and assess requirements for any APZ works within reserve to complement works on private property • Seek cooperation of local RFS brigades in the monitoring of APZ fuel hazard. • Zone is sited in parts on steep relict sand dunes and extent of works will need to be limited to avoid instability, erosion and impacts on EEC's.

Conjola NP – APZs continued

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **A6**	**4b**	**Berrara Village APZ** - NPWS section	**1.74**		• To aid in the protection of adjoining dwellings and occupants on the northern and western side of Berrara from the threat of bushfires. • To aid firefighters in the protection of life and property in these adjoining areas. • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland. • To provide an operational boundary for fuel management burning in the adjacent Berrara/Cudmirrah SFAZ	• Maintenance of a slashed break in that part of Conjola National Park that is within 30m of the existing residences (2003) along **Lakeway Avenue, Sundowner Avenue** and **Berrara Rd**. • Enable clear access for firefighters and limit available fire fuels by clearing rubbish, gardening debris and removal of property from the APZ. • Seek cooperation of local RFS brigades in the monitoring of APZ fuel conditions, and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required by October.
		- adjoining Crown Lands	• For information on fire management on adjoining Crown Lands please contact Dept. of Crown Lands			

Conjola NP – APZs continued

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN A7	4b	**Rustic APZ** - NPWS section	**0.51**		• To aid in the protection of adjoining dwellings and occupants of the Rustic Caravan Park from the threat of bushfires. • To aid firefighters in the protection of life and property at this isolated site. • To provide a fuel reduced area from which firefighters can undertake fuel management in adjoining bushland. • To limit the spread of fire onto adjacent lands.	• Maintenance of a slashed break in that part of Conjola National Park that is within 30m of the existing residences (2003) within this establishment. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required. • Avoid disturbance to margins of Lake Berringer.
CN A8	4d	**Mella Mella APZ** - NPWS section	**0.12**	0.27	• To aid in the protection of adjoining dwellings and occupants on an inholding within Conjola NP at the eastern end of Mella Mella Bay- Conjola Lake from the threat of bushfires. • To aid firefighters in the protection of life and property at these isolated sites.	• Confirm reserve boundary and APZ requirements of existing dwellings at sites adjacent to reserve boundary. If required, integrate any protection obligations with neighbour who has already undertaken extensive works on site. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required. • Consider enabling a maintenance agreement with neighbour to permit limited contiguous work on reserve.

Conjola NP – APZs continued

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **A9**	**4c**	**Stewart Place APZ** - NPWS	**0.25**		• To aid in the protection of adjoining dwelling at **No. 2 Stewart Street** - Conjola Lake - from the threat of bushfires. • To aid firefighters in the protection of life and property at this site adjoining bushland in Conjola NP • To provide an operational boundary for fuel management burning in the adjacent Havilland SFAZ	• Maintenance of a slashed break and /or fuel managed zone to the south east of dwelling. • Annual bush fire fuel and slashed break assessment for maintenance and fuel management works required. • Consider enabling a maintenance agreement to permit limited APZ work by neighbour on reserve .

Conjola NP – APZs continued

Zone ID	Map/s	APZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
Infrastructure APZs,						
CN **A10**	**4**	**Fishermans Paradise Reservoir APZ** - NPWS to coordinate	**0.73**		• To aid in the protection of adjoining assets and infrastructure – Water supply and communications infrastructure - from the threat of bushfires.	• Assess strategies for inholding/infrastructure owners to implement asset protection works as a condition of access permission to the site across the surrounding Conjola National Park. (Shoalhaven City, Vodaphone, Optus) • Assess such protection measures that may affect the reserve as per 'Planning for Bush Fire Protection 2003'or as revised.
CN **A11**	**4**	**12 Mile Peg APZ** - NPWS to coordinate	**0.35**		• To aid in the protection of adjoining assets and infrastructure – i.e. communications infrastructure - from the threat of bushfires.	• Confirm site management responsibilities and assess strategies for inholding/infrastructure owner to implement asset protection works as a condition of access/occupancy within Conjola National Park.
CN **A12**	**4b**	**Fishermans Rock Pump Station APZ** - NPWS to coordinate	**0.12**		• To aid in the protection of adjoining assets and infrastructure – water supply - from the threat of bushfires.	• Assess protection works and strategies with infrastructure owners to implement appropriate asset protection works. • Enable these works by conditional permit or fees for services as required within the surrounding Conjola National Park. (Shoalhaven Water, Integral Energy) • Assess such protection measures that may affect the reserve.

3.2.2 Strategic Fire Advantage Zones (SFAZs)

Seventeen Strategic Fire Advantage Zones have been defined within the reserves (Maps 3 to 4). Primary fire management objectives in Strategic Fire Advantage Zones are to reduce the occurrence of human caused unplanned fires in the reserves and to limit the spread of fire within, from and into the reserves.

Strategic Fire Advantage Zones also contribute to limiting the possibility of extinction of species which are known to occur naturally within the reserves i.e. - conserving biodiversity. This may be achieved by affording some measure of control over the spread of unplanned fires that might otherwise result in fire regimes that can lead to the extinction of species. This will be achieved by implementing the strategies prescribed in Table 5 in each SFAZ.

Note that the slashed breaks described in Table 10 and the tracks and roads maintained for fire management purposes – Table 11- also serve an important role in preventing the spread of wildfire within, from, and into the reserves. There are also zones within adjacent reserves that may complement the fire management planning in these reserves. An example here is the decision to not put an SFAZ on the eastern side of the Princes Highway within Conjola National Park. For operational utility it is better to manage fuels on the western side of this corridor, so appropriate zoning and fuel management strategies will be described in the fire planning for the adjacent Morton National Park. The Shoalhaven Bush Fire Risk Management Plan may complement this strategy where private lands are identified.

The ownership/management of bushland areas adjoining the reserve areas may be indicated on maps of the zones. Enquiries about fire management activities on these areas should be directed to the owners or concerns passed on to the Rural Fire Service.

Strategic Fire Advantage Zones (SFAZs) are similar in purpose to Strategic Fire Advantage Zones (SFAZs) used in the Shoalhaven Bush Fire Risk Management Plan. The SFAZs described in this Fire Management Strategy for Conjola National Park and Narrawallee Creek Nature Reserve will be proposed for inclusion as SFAZs within that plan.

The following tables identify each Strategic Fire Advantage Zone and outline the objectives and strategies to be applied in that zone. Maps 3 to 4 show the location and extent of these zones.

Table 5. The specific fire management objectives and strategies for each of the Strategic Fire Advantage Zones (Maps 3-4)

- **Conjola Nat. Park SFAZs**

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S1	4	**Tullarwalla SFAZ NPWS section**	41.54		• To assist in the strategic control and containment of bush fires between Sussex Inlet Road and north to join Tullarwalla Lagoon • To restrict the movement of fires between neighbouring lands and NPWS managed areas	• Undertake burning under prescribed conditions where required within the reserve as indicated by fire hazard assessments and biodiversity maintenance requirements. This will focus on sequential burning of non-adjacent areas to the east of the cleared north-south powerline easement in order to provide a fuel reduced area joining the upper reaches of St Georges Basin across Sussex Inlet Road and linking with SFAZs south of properties along Sussex Inlet Road. The effectiveness of this strategy relies on cooperative works with adjoining land managers to the north and east. • Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates , information signs, identified water points, etc.
		Crown Land and Private property adjoining	• Contact Department of Lands or private property owners for details of fire management activities			

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S2	4	**Corramy Timber SFAZ** NPWS	**15.56**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires to the west of properties near the Princes Highway southwest of the Wandandian Creek bridge. • To complement asset protection and bush fire fuel management works undertaken on adjoining properties • To restrict the movement of fires between neighbouring lands and NPWS managed areas.	• Undertake burning under prescribed conditions where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements. As there is a considerable area of riparian vegetation in this area these activities will focus on strip burning west off property boundaries and the west side of the Princes Highway south to the Sussex Inlet Road. • Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of boundary slashed breaks where required for prescribed burning. advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, helipads etc. • Seek cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions. • Maintain cooperative management and communication with adjoining landholders so that effective risk management is maintained across the SFAZ and adjoining lands and along the west side of the Princes Highway.

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **S3**	**4**	**Cow Creek SFAZ** NPWS	**234.67**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires to the south of properties along Sussex Inlet Road and west of Old Berrara Road • To complement asset protection and bush fire fuel management works undertaken on adjoining properties • To restrict the movement of fires between neighbouring lands and NPWS managed areas.	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions • Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions - see Tables 10 & 11. • Seek improvement for the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power-poles - Wandandian to Sussex Inlet – (Integral Energy) Enable these activities by conditional permit where required within the reserve. • Restrict unauthorised vehicle access along identified closed access routes in order to help limit arson, rubbish dumping, and avoid damage to tracks that may prevent ready access by emergency vehicles. Undertake a pre-season review of key fire access tracks and other advantages with advice on conditions to local and regional fire emergency agencies. • Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates , information signs, identified water points, helipads etc. • Seek cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and. the assistance of neighbours in reporting unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land owners so that effective bush fire risk management is maintained across the SFAZ and adjoining lands and along the section of Old Berrara Road adjoining the SFAZ (Shoalhaven City)

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S4	4	**Tea Tree Creek SFAZ** - NPWS	**240.19**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires to the south of properties along Sussex Inlet Road. • To complement asset protection and bush fire fuel management works undertaken on adjoining properties. • To restrict the movement of fires between neighbouring lands and NPWS managed areas. • To avoid damage arising from fire management operations and maintenance to drainage line and estuarine vegetation within zone	• Undertake burning under prescribed conditions where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements. Constraints include the protection of the estuarine vegetation along the Tea Tree creek corridor. • Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions e.g. Kubota Track see Tables 10 & 11. • Seek improvement for the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power-poles – south of Sussex inlet Rd– (Integral Energy) Enable these activities by conditional permit where required within the reserve. • Restrict unauthorised vehicle access along identified closed fire access routes in order to help limit arson, rubbish dumping, and avoid damage to tracks that may prevent ready access by emergency vehicles. i.e. maintain gates where installed. • Undertake a pre-season review of key fire access tracks and other advantages with advice on conditions to local and regional fire emergency agencies. • Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, helipads etc. Continued /…

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
• **Tea Tree Creek SFAZ** continued						
CN **S4**	**4**					• Seek cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in reporting unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land owners so that effective risk management is maintained across the SFAZ and adjoining lands and along the Old Berrara Road (Shoalhaven City)

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S5	4	**Verons SFAZ** - NPWS	275.18		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires to the south of properties along Sussex Inlet Road and west of Verons Estate subdivision. • To complement asset protection and bush fire fuel management works undertaken on adjoining properties. • To restrict the movement of fires between neighbouring lands and NPWS managed areas.	• Undertake burning under prescribed conditions where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements. Constraints include identified areas zoned for environmental protection (under LEP) and the estuarine vegetation of Tea Tree Creek. • Maintain identified fire access routes and slashed breaks within the SFAZ and adjoining properties for use under appropriate conditions e.g. Kubota Track see Tables 10 & 11. In this area the break cannot be located along property boundaries due to terrain and environmental constraints. Liaison re access and breaks to be maintained with neighbours. • Seek improvement for the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power-poles – south of Sussex inlet Rd– (Integral Energy) Enable these activities by conditional permit where required within the reserve. • Restrict unauthorised vehicle access along identified closed fire access routes in order to help limit arson, rubbish dumping, and avoid damage to tracks. • Undertake a pre-season review of key fire access tracks and advise conditions to emergency agencies via BFMC. Continued/…

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
• Verons SFAZ continued						
CN S5	4	**Verons SFAZ** - NPWS	**275.18**			• Review annual fire management works program following a post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points etc. • Seek cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in reporting unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land owners so that effective risk management is maintained across the SFAZ and adjoining lands and along the Old Berrara Road (Shoalhaven City) and Verons Estate

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S6	4	**Mondayong SFAZ** - NPWS	20.49		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires between Mondayong private properties and fire access routes to the north, south and west of the inholdings. • To complement asset protection works within the Mondayong properties.	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions • Prepare a slashed break (min. 3m wide) adjacent to the property fence line when required as a boundary to fuel management burning within the reserve. This slashed line extends west from Mondayong Road on the northern boundary to the west, south, and then east to Slatybox Road on the southern boundary. (See Table 10) • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages around the zone such as slashed areas, information signs, fire access routes etc. • Maintain cooperative management and communication with inholding landowners / occupiers so that effective risk management is maintained across the SFAZ and adjoining lands i.e. Mondayong private properties.

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S7	4,4a	**Swan Lake North SFAZ** - NPWS	367.85		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires • To complement asset protection zones and works in the vicinity of Medlyn Avenue and on Verons Estate properties. • To restrict the movement of fires between NPWS and neighbouring lands and vice versa. • To avoid disturbance from fire management operations to estuarine vegetation.	• Undertake bush fire fuel management where required within the SFAZ as indicated by fuel hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Fuel management burning will be limited to areas along access routes and possibly limited use of aerial incendiary ignition in order to prevent damage to areas of Wet Heath vegetation and the estuarine vegetation of Swan Lake, and Teatree Creek where fire should be excluded. • Maintain identified fire access routes and slashed breaks within the SFAZ for use under appropriate conditions e.g. east - west track and slashed break along reserve boundary south of Verons estate - see Tables 10 & 11. • Restrict unauthorised vehicle access along identified closed fire access routes in order to maintain their effective condition. • Undertake a pre-season review of key fire access tracks and advise conditions to fire emergency agencies. • Review annual fire management works program following a post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire access tracks, slashed areas, gates, information signs etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining neighbours and land managers to enable effective risk management across the SFAZ and adjoining lands – Private, DoCL and Shoalhaven Water.

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **S8**	**4,4a**	**Medlyn SFAZ** - NPWS sections (southwest to Swan Lake, southeast to Springs Rd.)	**58.58**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires • To complement asset protection zones surrounding Medlyn Avenue properties and north Swanhaven. • To restrict the movement of fires between neighbouring lands and NPWS managed areas i.e. the vacant Crown Land north of the Justfield Drive properties	• Undertake bush fire fuel management where required within the SFAZ as indicated by fuel hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions Constraints include the estuarine vegetation and margins of Swan Lake. • Maintain identified fire access routes and slashed breaks within the SFAZ for use under appropriate conditions e.g. north-south slashed break along reserve boundary north from Medlyn Ave - see Tables 10 & 11. • Seek improvement for the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power poles. – (Integral Energy) Enable these activities by conditional permit where required within the reserve. • Restrict unauthorised vehicle access along identified closed fire access routes in order to help limit arson, rubbish dumping, and avoid damage to tracks that may prevent ready access by emergency vehicles • Undertake a pre-season review of fire access tracks and other advantages with advice on conditions to local and regional fire emergency agencies. Continued /….

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
• Medlyn SFAZ continued						
CN **S8**	**4,4a**	**Medlyn SFAZ** - NPWS sections (southwest to Swan Lake, southeast to Springs Rd.)	**58.58**			• Review annual fire management works program following a post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land tenures so that effective risk management is maintained across the SFAZ and adjoining lands – Dept of Crown Lands and Shoalhaven Water

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S9	4b	**Berrara – Cudmirrah SFAZ** - NPWS section (west of Berrara & Cudmirrah between Swan Lake and Berrara Creek - within Conjola Nat. Park)	108.42		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires • To complement asset protection zones to the north west of Berrara & Cudmirrah • To restrict the movement of fires between neighbouring lands and NPWS managed areas i.e. the Crown Land west of Cudmirrah.	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Constraints include the estuarine vegetation of Berrara Creek where fire should be excluded, aboriginal sites near Fishermans Rock and nearby visitor sites. • Improve the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power-poles Berrara / Bendalong – (Integral Energy). Enable these activities by conditional permit where required within the reserve. • Within this SFAZ, maintain fire access routes (as identified in table 11) for use under appropriate conditions. Where required, restrict unauthorised vehicle access along identified and closed fire access routes to help limit arson, rubbish dumping, and to maintain access conditions for emergency vehicles. • Undertake a pre-season review of fire access tracks and other advantages with advice on conditions to local and regional fire emergency agencies. • Review annual fire management works program following post-season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates , information signs, identified water points, helipads etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land tenures so that effective risk management is maintained across the SFAZ and adjoining lands

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S10	4d	**Bendalong SFAZ** NPWS section (north, west and south of the Crown Lands surrounding North Bendalong Village - west to Boundary Road and north of Bendalong Road - within Conjola National Park)	252.02		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires • To complement asset protection zones - North Bendalong village. • To restrict the movement of fires between neighbouring lands e.g. Crown Land and adjacent Conjola National Park	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Constraints include the estuarine vegetation of Nerrindillah and Washerwomans Creeks • Improve the protection of essential infrastructure within the SFAZ i.e. Slashing along powerline routes and around power poles Berrara / Bendalong – (Integral Energy) Enable these activities by conditional permit where required within the reserve. • Maintain identified fire access routes within the SFAZ for use under appropriate conditions - see Table 11. • Restriction of unauthorised vehicle access along identified closed fire access routes to help limit arson, rubbish dumping, and to maintain access conditions for emergency vehicles • Undertake a pre-season review of fire access tracks and other advantages with advice on conditions to local and regional fire emergency agencies. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates, information signs, identified water points, helipads etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land tenures so that effective risk management is maintained across the SFAZ and adjoining lands i.e. DoCL and adjacent APZs.

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN **S11**	**4d**	**Rustic SFAZ** - NPWS sections (west of entrance road off Bendalong Road to creek) (east of entrance road and south of Bendalong Road) -within Conjola National Park	**89.16**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires between Bendalong Road and Lake Berringer • To complement asset protection zones near the Rustic Caravan Park and adjacent property.	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Constraints include the estuarine vegetation along margins of Berringer Lake. • Maintain lower fuel levels adjacent to access road to improve its usefulness as a strategic fire suppression advantage and safer use under appropriate conditions. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fuel reduced zone either side of the access track, slashed areas, information signs, identified water points etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining land tenures so that effective risk management is maintained across the SFAZ and adjoining lands i.e. Crown Land to east of access road and immediately west of the caravan park entrance.

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S12	4c	**Evans SFAZ** - NPWS section (– west of Evans and Prior Streets to Sandy Point)	32.92		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires north of the Lake Conjola entrance road and west of Evans St. • To complement adjacent APZs • To restrict the movement of fires between neighbouring lands and NPWS managed areas • To avoid disturbance to estuarine areas arising from fire management activities	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Care to be taken to avoid the introduction of fire into estuarine vegetation near Conjola Lake. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, slashed areas, gates , information signs, identified water points, helipads etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining neighbours so that effective risk management is maintained across the SFAZ and adjoining lands i.e. Evans – Prior APZ - (Neighbours and Shoalhaven City)

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S13	4c	**Havilland SFAZ** - NPWS section Conjola National Park west of Sandy Point to boundary and adjoining Stewart and Havilland Streets – Conjola Park)	**27.88**		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires. • To complement adjacent APZs • To restrict the movement of fires between neighbouring lands and NPWS managed areas	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements - by burning under prescribed conditions. Care to be taken to avoid the introduction of fire into estuarine vegetation near Conjola Lake. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as slashed areas, information signs, identified water points, etc. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining neighbours so that effective risk management is maintained across the SFAZ and adjoining (Neighbours and Shoalhaven City)
		Shoalhaven City section (east of Havilland Ave. and boat ramp access road –- Conjola Park)	• Contact Shoalhaven City Council for details on fire management activities in this area			

Conjola Nat. Park SFAZs continued

Zone ID	Map/s	SFAZ Name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
"Strip" SFAZs						
CN S14 CN S15 CN S16	4	**Mondayong Road (west) SFAZ** **Blackbutt Road SFAZ** **Red Head SFAZ**	**22.44** **38.25** **52.00**		• To improve the usefulness of Mondayong Road (west), Blackbutt fire access track and Bendalong Road as strategic fire suppression advantages and provide for safer fire suppression operations under appropriate conditions.	• Undertake bush fire fuel management adjacent to Mondayong Road (west), Blackbutt Road and Read Head Road for a depth of approximately 100m by a pattern of strip burning non-adjacent sections following an assessment of fire hazard and biodiversity maintenance requirements. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as fire access tracks, information signs, identified water points, etc.

Narrawallee Creek Nature Reserve SFAZs

Zone ID	Map/s	SFAZ name	Zone Area (ha)		Specific Objectives	Strategies
			in reserve	outside reserve		
CN S17	4c	**Pattimores SFAZ** NPWS section (- south of Waste Transfer station east to Pattimores Lagoon)	137.95		• To reduce fire intensity and spotting distance and to assist in the strategic control and containment of bush fires south of Lake Conjola Village near residences and Services Club. • To protect the fragile wetlands associated with Pattimores Lagoon	• Undertake bush fire fuel management where required within the SFAZ as indicated by fire hazard assessments and biodiversity maintenance requirements (within reserve) - by burning under prescribed conditions. • Review annual fire management works program following post season assessment of bush fire fuel, fire history, biodiversity thresholds and the condition of fire control advantages within the zone such as slashed areas, information signs, identified water points, etc. • Careful application of fire is required to protect the estuarine vegetation and identified wetlands of Pattimores Lagoon. • Seek the cooperation of local RFS brigades in the monitoring of SFAZ fuel and access conditions and the assistance of neighbours in watching for unauthorised use that may lead to arson, rubbish dumping or compromise emergency vehicle access. • Maintain cooperative management and communication with adjoining neighbours so that effective risk management is maintained across the SFAZ, adjoining bushland and APZ (Shoalhaven City)

3.2.3 Heritage Management Zones (HMZs)

Twelve heritage management zones have been defined within and around the reserves. (Maps 3 to 4) The primary management objectives in heritage management zones are to prevent the extinction of all species which are known to occur naturally within the reserves – i.e. conserve biodiversity – and to protect Aboriginal and historic heritage sites.

Except where noted otherwise, these objectives will be achieved by:

- Containing and where achievable, suppressing bushfires. and where necessary, conducting prescribed burns to maintain fire regimes within biodiversity thresholds specified in Table 6.

- Implementing the threatened species and cultural heritage management guidelines specified in Table 7 and 8 in locations where threatened species and cultural heritage sites are known or likely to occur

When manipulating fire regimes (by suppressing fires and conducting prescribed burns) to conserve biodiversity within these heritage management zones, managers will take account of the status of fire regimes across all fire management zones in the reserves. This should ensure regard for the maintenance of biodiversity within the reserves and particularly applies to Asset Protection and Strategic Fire Advantage Zones where fire is more likely to be deliberately introduced. Due to the emphasis on fire protection aspects in these zones, fire frequency and other strategies prescribed for these areas may see the possibility of an adverse impact on biodiversity within these zones.

As can be seen from Table 6 the vegetation types and communities within these reserves are both diverse and complex. The information on vegetation types comes from a number of sources over a number of surveys as land has been added to the reserves. One of the important objectives for reserve management will be to reassess these vegetation classification systems to provide a uniform appreciation of vegetation complexity across the reserves. This work is currently in progress.

From records, the only observed “natural” cause of fires is occasional lightning. Within HMZs - after careful consideration of potential fire weather and behaviour, safety and protection issues, biodiversity maintenance requirements or cultural assets and values at risk, - it may be possible to prevent unnecessary damage or disturbance arising from suppression operations on a “naturally” caused fire by using existing containment lines and features. The decision making process for such consideration is described within section 4.6 of the NPWS Fire Management Manual - Natural Area Fire Management. (www.nationalparks.nsw.gov.au)

Further explanation of the purpose and function of Heritage Management Zones is detailed in the NPWS / DECC Strategy for Fire Management (2003) available via the NPWS / DECC website. (www.nationalparks.nsw.gov.au)

Table 6. Fire regimes to be applied to vegetation in Heritage Management Zones in order to sustain biodiversity.

These regimes are time and frequency thresholds in which fire events may not compromise biodiversity within the listed vegetation types. (Adapted from Bradstock et al, 1995, and Keith, 1996.)
Fire regimes outside these thresholds - e.g. too frequent fire - are predicted to cause significant declines in species populations especially if they prevail over more than 50% of the vegetation type in the area.

Veg'n. Class ID	Vegetation communities	Approx. area in reserves	Biodiversity Thresholds – Fire Frequency		
			Minimum Fire interval	Maximum Fire interval	Notes
a	Bloodwood-peppermint open forest/woodland	1	7	30	
	Coastal complex disturbed	3			
	Coastal complex woodland	85			
	Sedgeland (swampland)	27			
b	Scribbly gum-*Allocasuarina* open forest	47	5	40	
	Scribbly gum-Teatree – open woodland/open shrubland	19			
	Severely disturbed forest	98			
	Woollybutt-paperbark woodland	2			
e	Bangalay open forest	26	7	30	
	Bangalay open forest/Swamp oak forest/woodland+rushland/forbland (edge saltmarsh)	11			
	Blackbutt open forest	80			
	Blackbutt open forest-Ironbark closed forest	4			
	Blackbutt-Bloodwood open forest	1			
	Blackbutt-Peppermint tall open forest	2			
	Blackbutt-Turpentine open forest/tall open forest	6			
	Blackbutt-Turpentine – tall open forest	12			
	Blackbutt-Turpentine – tall open forest/Blue Gum – tall open forest	7			
	Bluegum tall open forest	8			
	Coastal lowlands – cycad dry shrub dry forest – *Corymbia maculata*	1075			

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Table 6. - Fire regimes to be applied to vegetation in Heritage Management Zones - continued

Veg'n. Class ID	Vegetation communities	Approx. area in reserves	Biodiversity Thresholds – Fire Frequency		
			Minimum Fire interval	Maximum Fire interval	Notes
e	Coastal sands shrub/fern forest - *Eucalyptus botryoides / Banksia serrata*	246	7	30	
	Dry forest	936			
	Dry forest dominant./woodland	181			
	Lowland dry shrub forest - *Corymbia gummifera / Syncarpia glomulifera*	5634			
	Northern coastal hinterland heath shrub dry forest - *Corymbia gummifera*.	4561			
	Northern coastal sands shrub/fern forest – *Eucalyptus pilularis / Banksia serrata*	2925			
	Northern hinterland shrub dry forest - *Syncarpia glomulifera*	5			
	Scribbly gum-Bloodwood - woodland/heathland	22			
	Southern coastal hind dune/headland scrub & southern coastal dune scrub	103			
	southern hinterland shrub/herb/grass riparian forest - *Angophora floribunda*	48			
	Spotted gum tall open forest	1			
f	Coastal wet heath swamp forest - *Casuarina glauca / Melaleuca ericifolia*	588	7	35	Crown fires should be avoided in the lower end of the interval range
	Dry forest dominant/moist forest	163			
	Ecotonal coastal swamp forest - C*asuarina glauca / Eucalyptus botryoides*	64			
	northern coastal lowlands swamp forest - *Eucalyptus robusta*	20			
	Paperbark shrubland (intermittent swampland)	3			

Table 6. - Fire regimes to be applied to vegetation in Heritage Management Zones - continued

Veg'n. Class ID	Vegetation communities	Approx. area in reserves	Biodiversity Thresholds – Fire Frequency		
			Minimum Fire interval	Maximum Fire interval	Notes
f (cont.)	Paperbark shrubland (swampland)/swamp oak forest/woodland+rushland	9	7	35	Crown fires should be avoided in the lower end of the interval range
	Riparian acacia shrub/grass/herb forest -	21			
	South coast swamp forest complex - C*asuarina glauca*	661			
	Swamp oak forest/woodland+rushland (edge saltmarsh)	5			
	Swamp oak forest/woodland+rushland/forbland (edge saltmarsh)	3			
g	Banksia-Teatree closed shrubland	26	8	30	
	Banksia-Teatree closed shrubland/coast wattle open shrubland / spinifex grassland	1			
	Coast wattle open shrubland/spinifex grassland	17			
	Coastal headland heathlands	7			
	Northern coast and hinterland moist heath	15			
	Northern coastal tall wet heath	574			
	Paperbark shrubland	0			
	Southern coastal dune scrub complex & coastal dune herb/grassland	354			
h	Moist forest	90	25	200	Crown fires should be avoided in the lower end of the interval range
	Moist forest tending to dry	97			
	Northern foothills moist shrub forest - *Corymbia maculata / Eucalyptus pilularis*	3973			
i	Bangalay open forest/closed forest (rainforest)	3	n/a	n/a	Fire should be avoided (# - Whilst these communities are definitely not considered fire prone, they are included as part of the overall statistical appreciation of the reserves vegetation communities as an indication to managers of their proportional extent)
	Coastal hinterland ecotonal gully rainforest	184			
	Coastal lowland sub tropical/littoral rainforest	146			
	Lilly-pilly closed forest (warm temperate rainforest)	0			
	Mangrove estuarine low forest #	123			
	Mudflats/saltmarshes #	83			
	Ruppia forbland #	69			

Table 7. Threatened Species – specific fire management strategies to be applied in the reserve.

NB these observations are not all the Threatened Species identified within the reserves. These are the threatened species considered at risk from inappropriate fire regimes or unplanned fire management and suppression activities. These strategies are derived from NPWS (1999), (2000a), 2000b), and Hunter and Alexander (2002) and may be updated periodically by NPWS / DECC and published on the Rural Fire Service website.

Map ID	Strategies		Species	Species status (1,2,3)
Flora				
FL 1	FL-A	Avoid earthmoving disturbance	*Cryptostylis hunteriana,*	Vulnerable 1 (1)
FL 2	FL-B	Avoid fire, No slashing, trittering or tree removal	*Pultenaea villifera*	Rare 3 (3RC) (1)
FL 3	FL-A	Avoid earthmoving disturbance	*Galium australe,*	Endangered1 **(3)**
FL 4	FL-C	Avoid fire, No slashing, trittering or tree removal	*Wilsonia rotundifolia*	Endangered1 **(1)(3)**
FL 5	FL-C	Avoid fire, No slashing, trittering or tree removal	*Syzygium paniculatum*	Vulnerable 3 **(1)** 3Vci **(2)**
FL 6	FL-C	Avoid fire, No slashing, trittering or tree removal	*Wilsonia backhousei*	Vulnerable **(3)**
FL 9	FL-C	Avoid fire, No slashing, trittering or tree removal	*Pultenaea villifera var. villifera*	Rare 3 **(1)** 3RC **(2)**
Other Threatened species – Flora – listed within the reserve – no specific fire management indications as yet				
FL 5			*Grevillea macleayana*	Rare 3 **(1)** 3RC **(2)**

(1) as per Threatened Species Conservation Act 1995
(2) as per ROTAP classification 1995
(3) as per Environment Protection and Biodiversity Conservation Act 1999 (Aust. Government)

Table 7. Threatened Species – specific fire management strategies to be applied in the reserve. - continued

Map ID	Strategies		Species		Species status (1,2)
Fauna					
FA 1	FA-A	Avoid the use of firefighting foams near watercourses and wetlands	*Litoria aurea*	Green and Gold Bell Frog	Endangered1
FA 2	FA-B	When introducing fire for biodiversity maintenance or bush fire fuel management, use a lower intensity mosaic pattern for ignition and final planned extent. Avoid ignition of *Allocasuarina* thickets	*Calyptorhynchus lathami*	Glossy Black Cockatoo	Vulnerable (1)
FA 3	FA-C	Avoid introduction of fire or disturbance to roost sites – these may be seasonal in various locations as feeding patterns change. There is a preference to moister sheltered gullies and rainforest sites. Sites evident by noise, smell, and flight patterns at dusk. Report sightings so that operational strategies may limit disturbance.	*Pteropus poliocephalus*	Grey-headed Flying Fox	Vulnerable (1)
FA 4	FA-D	Avoid introduction of fire or to possible roost sites incl. 'habitat' trees – e.g. by extinguishing, avoid felling, clear around or not backburning older or dead trees with hollowed trunks and openings along the sides of control lines - where possible and practicable. No slashing or trittering.	*Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat (small, insectivorous)	Vulnerable 1
FA-5	FA-D	Avoid introduction of fire or to possible roost sites incl. 'habitat' trees – e.g. by extinguishing, avoid felling, clear around or not backburning older or dead trees with hollowed trunks and openings along the sides of control lines - where possible and practicable. No slashing or trittering.	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	Vulnerable (1)
FA-6	FA-D	Avoid introduction of fire or to possible roost sites incl. 'habitat' trees – e.g. by extinguishing, avoid felling, clear around or not backburning older or dead trees with hollowed trunks and openings along the sides of control lines - where possible and practicable. No slashing or trittering.	*Mormopterus norfolkensis*	Eastern Freetail-bat	Vulnerable (1)

(1) as per Threatened Species Conservation Act 1995
(3) as per Environment Protection and Biodiversity Conservation Act 1999 (Aust. Government)

Table 7. Threatened Species – specific fire management strategies to be applied in the reserve. - continued

Map ID	Strategies		Species		Species status (1,2)
FA-7	FA-E	No slashing. trittering or tree removal	*Petaurus norfolcensis*	Squirrel Glider	Vulnerable (1)
FA-8	FA-E	No slashing. trittering or tree removal	*Petroica rodinogaster*	Pink Robin	Vulnerable (1)
FA-9	FA-E	No slashing. trittering or tree removal	*Potorous tridactylus*	Long-nosed Potoroo	Vulnerable (1)
FA-10	FA-E	No slashing. trittering or tree removal	*Climacteris picumnus*	Brown Treecreeper	Vulnerable (1)
FA-11	FA-F	No fire around known roost sites, No removal of trees	*Myotis adversus*	Large-footed Myotis	Vulnerable (1)
FA-12	FA-G	No burning around known nesting sites at any time. No slashing. trittering or tree removal	*Ninox connivens*	Barking Owl	Vulnerable (1)
FA-13	FA-G	No burning around known nesting sites at any time. No slashing. trittering or tree removal	*Ninox strenua*	Powerful Owl	Vulnerable (1)
FA-14	FA-G	No burning around known nesting sites at any time. No slashing. trittering or tree removal	*Tyto novaehollandiae*	Masked Owl	Vulnerable (1)
FA-15	FA-G	No burning around known nesting sites at any time. No slashing. trittering or tree removal	*Tyto tenebricosa*	Sooty Owl	Vulnerable (1)
FA-16	FA-H	Avoid fire, No slashing. trittering or tree removal	*Ixobrychus flavicollis*	Black Bittern	Vulnerable (1)

(1) as per Threatened Species Conservation Act 1995
(3) as per Environment Protection and Biodiversity Conservation Act 1999 (Aust. Government)

Table 7. Threatened Species – specific fire management strategies to be applied in the reserve. - continued

Map ID	Strategies		Species		Species status (1,2)
Other Threatened species – Fauna – listed within the reserve – no specific fire management indications as yet					
FA-30			*Dasyurus maculatus*	Spotted-tailed Quoll	Vulnerable (1)
FA-31			*Haematopus fuliginosus*	Sooty Oystercatcher	Vulnerable (1)
FA-32			*Haematopus longirostris*	Pied Oystercatcher	Vulnerable (1)
FA-33			*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	Endangered (1)
FA-34			*Lathamus discolor*	Swift Parrot	Endangered (1)
FA-35			*Lophoictinia isura*	Square-tailed Kite	Vulnerable (1)
FA-36			*Neophema pulchella*	Turquoise Parrot	Vulnerable (1)
FA-37			*Pandion haliaetus*	Osprey	Vulnerable (1)
FA-38			*Petaurus australis*	Yellow-bellied Glider	Vulnerable (1)
FA-39			*Scoteanax rueppellii*	Greater Broad-nosed Bat	Vulnerable (1)
FA-40			*Sminthopsis leucopus*	White-footed Dunnart	Vulnerable (1)
FA-41			*Sterna albifrons*	Little Tern	Endangered (1)
FA-42			*Thalassarche melanophris*	Black-browed Albatross	Vulnerable (1)
FA-43			*Thinornis rubricollis*	Hooded Plover	Endangered (1)
FA-44			*Xanthomyza phrygia*	Regent Honeyeater	Endangered (1)
FA-45			*Callocephalon fimbriatum*	Gang-gang Cockatoo	Vulnerable (1)

(1) as per Threatened Species Conservation Act 1995
(3) as per Environment Protection and Biodiversity Conservation Act 1999 (Aust. Government)

Table 7. Threatened Species – specific fire management strategies to be applied in the reserve. - continued
Endangered Ecological Communities (EECs) - known to occur within the reserve.

Map ID	Strategies	Status (1), (3)	Strategies	
			Specific fire strategies #	Other fire management activities
EEC-1	Bangalay Sand Forest of Sydney Basin Bioregion	EEC	Thresholds 7-30 years	No slashing, trittering or tree removal
EEC-2	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	EEC	Thresholds 7-35 years	No slashing, trittering or tree removal
EEC-3	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	EEC	Thresholds 7-35 years	No slashing, trittering or tree removal
EEC-4	Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	EEC	Avoid fire	Avoid disturbance

(1) as per Threatened Species Conservation Act 1995

(3) as per Environment Protection and Biodiversity Conservation Act 1999 (Aust. Government)
These strategies are taken from overall fire/biodiversity thresholds for the reserves vegetation communities. They are NOT listed within specific hazard reduction conditions as per the NPWS / DECC maintained conditions available from the RFS website.

Table 8. Cultural Heritage strategies for fire management to be applied in the reserves

As detailed in section 2.3 there were no cultural sites in the reserves at risk within areas of higher fire potential. Nevertheless most known sites are vulnerable to fire suppression and management operations. Below are the strategies relevant to sites identified within the reserves. In all cases a precautionary approach should be adopted where activities are undertaken away from formed tracks or roads. Skilled assistance should be sought in guiding these operations.

Site ID	Fire Management Strategies	Site Types
Aboriginal Heritage Sites		
AH-A	• As far as possible – protect site from fire • Do not cut down trees • Use of foams, wetting agents and retardants is acceptable	Sites affected by fire itself e.g. possible artefacts of flammable materials such as scarred or carved trees.
AH-B	• As far as possible – protect site from fire • Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites. • Avoid water bombing, which may cause ground disturbance.	Sites less affected by fire but prone to disturbance by suppression operations e.g. - stone arrangements, ceremonial rings, rock engravings, rock art, grinding grooves.
AH-C	• Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites. • Avoid water bombing, which may cause ground disturbance. • Site may be burned by bushfire, backburn or prescribed burn without damage	Sites least affected by fire itself but still prone to disturbance by fire suppression operations. e.g. - burial sites, artefact scatters, middens.

Historic Heritage Sites

NB. There is only one known site of recorded historic significance in Conjola Nat. Park i.e. the Walter Hood Monument north of Bendalong. This feature and site is not considered at threat from fire and requires no specific fire management strategy.

In Narrawallee Creek Nature Reserve the formation and remnant sleepers of the silica tramway south to Bannister Head need to be protected from possible disturbance by fire and firefighting operations.

Should other sites be confirmed, the following strategies may be applied depending on the site vulnerability to fire and suppression effects.

Site type **HH-A**	• As far as possible – protect site from fire • Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites. • Avoid water bombing, which may cause ground disturbance. • Use of foams, wetting agents and retardants is acceptable	Flammable but structurally unsound sites including buildings with low structural integrity
HH-B	• As far as possible – protect site from fire • Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites. • Water bombing, use of foams, wetting agents and retardants is acceptable	Flammable and structurally sound sites including buildings, wooden fences, signs, stock rails, etc e.g. silica tramway formation, tree stumps from former logging operations – Narrawallee Ck. NR
HH-C	• Avoid all ground disturbance including the use of earthmoving machinery, handline construction and driving over sites. • Avoid water bombing.	Sites which are not flammable but are structurally unsound including dry stone walls e.g. charcoal pits off Bendalong Rd. – Conjola NP

Table 9. Heritage Management Zones – area, fire regimes and fire management strategies.

As outlined in section 3.7, survey work to uniformly assess the vegetation classes across these reserves was being undertaken as this strategy was in preparation. Once completed, the fire regimes appropriate to the revised classifications will be reassessed and applied to the zones below. Extensive tables and mapping tools are available to managers indicating the vegetation types to be found in each zone, the status and area of each type with regard to fire history, biodiversity thresholds and current vulnerability. These are used to determine which areas should be protected from wildfire or subject to prescribed fire in order to maintain biodiversity.

Zone ID	Map/ s	Zone Name	Zone Area		Area each Biodiversity Threshold class (see Table 6)							Threatened Species Guide-lines (Table 7)	Cultural Asset Guide-lines (Table 8)	Overall Strategies
			inside reserve	outside reserve	a	b	e	f	g	h	i			
CN L1	**4**	**Corramy HMZ**	249.3				226	10		13	0.3			• Suppress bushfires and implement prescribed burning as appropriate to maintain fire regimes within the biodiversity thresholds as specified in Table 6. • Implement threatened species fire management strategies as specified in Table 7. • Implement cultural asset protection strategies as specified in Table 8
CN L2	**4**	**Highway HMZ**	579.4				429	16.4	134					
CN L3	**4**	**Mondayong HMZ**	3655.06		0.31	2.25	2692	22.5	289	533	116			
CN L4	**4a**	**Dunes HMZ**	135.81			0.61	133	1.31	0.84		0.05			
CN L5	**4,4b**	**Swan Lake HMZ**	810.3		1	7.5	606	189	2.8	2.6	1.4	FA-B,		
CN L6	**4**	**Twelve Mile Peg HMZ**	746.				500	4.2	8.3	227	6.5	FL-A,		
CN L7	**4,4b**	**Berrara Creek HMZ**	821.53		0.1	0.13	678	88	48	7.3		FL-B,		
CN L8	**4,4d**	**Nerrindillah HMZ**	1935.9				1436	1.2	20.8	415	62.9	FL-B, FA-A,		
CN L9	**4,4d**	**Bendalong HMZ**	613				483	21	2	103	4.0			
CN L10	**4,4c 4d**	**Conjola Lake HMZ**	1020.12				486	22	0.12	495	17	FL-A, FL-B		
CN L11	**4,4c**	**Silica Ridge HMZ**	465.68		0.25		404	39	22		0.43	FA-A,	HH-B	
CN L12	**4,4c**	**Narrawallee Creek HMZ**	354.03		0.23		95	76.5	169		13.3	FA-C, FA-D	HH-B	

NB Within some zone areas, biodiversity thresholds are not assigned e.g. estuarine areas within the zone.

3.3 Strategic fuel management areas – Slashed Breaks

Table 10 lists the specifications for slashed breaks to be maintained during the life of this plan.

Slashed Breaks provide an area of modified vegetation that may reduce fire intensity and enable fire control operations under suitable conditions. Generally slashed breaks are a feature of Asset Protection Zones, aid in the protection of boundary fencing and infrastructure, or supplement the effectiveness of certain key fire trails or access routes.

Slashed breaks will be maintained where indicated within individual APZ notes (section 3.2.1) and as mapped. This includes periodic inspection as to bush fire fuel state and condition of identified fire access routes. Inspection will be undertaken at the end of the fire season to determine works required. Additionally, inspection will be undertaken prior to the fire season to confirm conditions and identify any contingent works required.

The NPWS will be progressively reviewing the slashed breaks listed and mapping their extent and access conditions as an aid to fire operations and maintenance. This information will be made readily available via the Shoalhaven Bush Fire Management Committee.

Generally, slashed breaks will keep understorey vegetation mostly below knee height. Selective regrowth of overstorey species may be permitted to maintain effective cover and reduce wind speed across the zone. Smaller separated patches of regrowth may be designed for site-specific habitat management values. Wetlands, rainforests or margins of creeklines will be avoided in the preparation of slashed breaks.

The maintenance of slashed breaks not forming part of an identified APZ within this strategy nor adjacent to existing dwellings (@ July 2003) cannot be guaranteed to meet similar APZ standards. Therefore these slashed breaks cannot be relied on to form part of any future APZ considerations for new developments adjacent to the reserve.

As stated in zoning descriptions the minimum extent for slashed breaks as part of Asset Protection Zones will be derived *from Planning for Bush Fire Protection 2001 (and as revised).* NB This refers to dwellings in place prior to the introduction of supporting legislation in July 2003. Since that time each development proposal within identified bush fire prone areas must be individually assessed for bush fire protection measures including areas within the property. Otherwise the NPWS will maintain the width as indicated in the slashed break tables.

Enquiries as to slashed break maintenance within Conjola National Park and Narrawallee Nature Reserve should be directed to the local NPWS Area office at Ulladulla.

Table 10. Strategic fuel management zones – Slashed Breaks (SB)'s– specifications and objectives

Slash-ed Break ID	Map/s	Fuel Management Area / Slashed Break Name / Location	Specifi cations	Zone	Tenure	Fire management Objectives
Existing Slashed Breaks – fuel management areas to be maintained by NPWS / DECC						
U73	**Map 4 & Ops, Map**	**Cow Creek SB** - south Sussex Inlet Rd.	10-15m	SFAZ	NPWS	Protect adjacent property - Forms slashed break on property boundaries west of Old Berrrara Rd, - fence protection – boundary for adjacent fuel management zone – broken at creek crossings – upgrade progressively
U84	**Map 4 & Ops, Map**	**Kubota Trail SB** – south Sussex Inlet Rd.	10-15m	SFAZ	NPWS	Protect adjacent property - Forms slashed break on western/southern boundary of "Verons" estate, fence protection and boundary for fuel management zone
U264	**Map 4a & Ops, Map**	**Sewage Treatment Plant Boundary SB** – West Sussex Inlet	10-15m	SFAZ	NPWS	Forms slashed break on perimeter of Sussex Inlet Sewage Treatment Plant & south/eastern sections of "Verons" estate, - provides fence protection and boundary for fuel management zone
U717	**Map 4 & Ops, Map**	**Mondayong boundary Slashed Break**	3-10m	SFAZ	NPWS	Protect adjacent property - Forms slashed break on property boundaries north, west and south of Mondayong property, - fence protection. Refreshed when fuel management is undertaken in adjacent SFAZ.
U86	**Map 4a & Ops, Map**	**Medlyn Ave SB** - Swanhaven	20-25m	APZ	NPWS	Protect adjacent property - Forms SFAZ Boundary - Village protection
U254	**Map 4a & Ops, Map**	**Snappy Gums SB** - Swanhaven	10-15m	APZ	NPWS	Protect adjacent property - APZ Boundary - Adjoins Caravan Park

Table 10 continued.

Slash-ed Break ID	Map/s	Fuel Management Area / Slashed Break Name / Location	Specifications	Zone	Tenure	Fire management Objectives
U253	**Map 3a & Ops, Map**	**Dunes South SB** – Sussex Inlet	20m	APZ	NPWS	Protect adjacent property - APZ Boundary - adjoins Caravan Park
U518	**Map 4b & Ops, Map**	**Sundowner Ave SB** - Berrara	20-25m	APZ	NPWS	Protect adjacent property - APZ Boundary - Village protection
U66	**Map 4b & Ops, Map**	**Lakeway Ave SB** - Berrara	20-25m	APZ	NPWS	Protect adjacent property - APZ Boundary - Village protection
U74	**Map 4b & Ops, Map**	**Park Boundary SB** - Cudmirrah	20-25m	SFAZ	NPWS	Forms western boundary to Dept of Crown Lands section of West Cudmirrah SFAZ.
N249	**Map 4 & Ops, Map**	**Northern Boundary Fence SB** – Tullarwalla Lagoon	10-15m	SFAZ	NPWS	Protect adjacent property – along reserve boundary – to west of Tullarwalla Lagoon
-	**Map 4d & Ops, Map**	**Rustic SB** – west of Manyana	10-15m	APZ	NPWS	Protect adjacent property - APZ Boundary - adjoins Caravan Park

3.4 Fire management access – Tracks and Roads

Tracks and roads provide access for firefighting vehicles and may be used to contain lower intensity fires or enable lower intensity backburning to contain larger wildfires or prescribed burns.

The network of tracks and roads in both these reserves are a result of historic use and past land management practices. Suitability of tracks for fire management or suppression alone is not considered in this strategy. Existing tracks have been accepted and assessed for their advantage to fire suppression based on their current condition and position. Over time, the strategic and operational assessment of this network may identify options for fire access that better reflect local fire patterns, changes in adjacent land use and fire management objectives as set out in this plan. Such assessment will need to be part of a landscape-wide approach to these issues such as the current Bush Fire Risk Management planning being undertaken for the Shoalhaven.

Where changes may be necessary to the network as committed to in this strategy, then a formal community advice, consultation and revision process is undertaken.

Not all tracks or roads are maintained as 'fire trails', though most vehicle access routes may provide some fire suppression advantage depending on the terrain, track status, crew competency, equipment, fire behaviour, weather conditions, and the task for which the route is to be used. These and other factors need to be considered by fire crews and planning teams prior to the use of a route for fire operations. Following this assessment, some routes will require works to prepare them to a sufficient standard for the proposed operation. The time and resources required to undertake this preparation also need to be considered within operational planning.

Not all routes or tracks can or will be maintained to all weather 2wd standard for fire suppression operations at all times. The economic, resource, and environmental consequences for this are presently unacceptable. As a member of the Shoalhaven Bush Fire Management Committee the NPWS has identified those routes of higher strategic significance for fire operations for which the NPWS is responsible. Along with the maintenance of slashed breaks in asset protection zones, the NPWS will give priority to those tracks and roads of higher strategic significance in the preparation of works programs and commitment of available resources.

Table 11 lists the tracks and routes that will be maintained primarily for fire management purposes during the life of the strategy. i.e. **'fire trails'**

Roads and tracks classified as Category 1 will be maintained to a standard sufficient to allow the passage of Category 1 fire tankers (4WD Heavy Tanker up to a 3500 litre capacity), Roads and tracks classified as Category 9 will be maintained to a standard sufficient to allow the passage of a Category 9 fire tanker (4WD Ute/Cab-chassis up to 400 litre capacity).

Where tracks have been identified in this strategy as Fire Trails (primarily retained for fire management purposes) they will be signposted at entrances and important junctions with the track name. The NPWS is committed to maintaining these identified routes at the nominated capacity wherever resources and conditions allow. The NPWS will inspect these routes as part of land management operations and report on their condition to the Shoalhaven Bush Fire Management Committee prior to each bush fire danger period.

Additionally, where conditions may limit or close the route for the intended capacity, the NPWS will advise other fire authorities as soon as conditions are reported to and confirmed by the NPWS. The NPWS looks to other authorised users and fire authorities to advise the NPWS when intending to use the restricted network and to report on track conditions.

NB. Whilst the NPWS makes the above commitments to maintaining fire fighting vehicle capacity on listed fire trails – **ALL tracks should be assessed prior to their use as to their suitability and safety for the intended fire operation**.

Other tracks and roads shown on maps within the reserves are not primarily maintained for fire purposes but may have usefulness in fire management or suppression operations. Access to these tracks however may be limited at times during the life of the strategy as priority will be given to maintenance of the tracks identified in Table 11. The fire vehicle categories for these tracks are as assessed when the strategy was compiled.

Tracks made or upgraded beyond routine standard as a result of fire suppression operations will be stabilised and rehabilitated as soon as practicable after the fire and may not be listed or marked on future maps. Where strategically useful these routes may be indicated on operational maps or recorded as possible control options for future operations.

Some of the roads and tracks listed in Table 11 and illustrated on Map 3 are used for management purposes only and are not open for public use by vehicle. The NPWS makes keys for access to such tracks available via the RFS to be kept in Shoalhaven RFS fire tankers and other emergency service vehicles.

Many of the tracks within Conjola National Park and Narrawallee Creek Nature Reserve whilst primarily designated for fire management purposes are currently available for vehicle access by visitors (@ March 2007).

Whilst this unrestricted use of the fire management tracks may be considered sustainable under current levels of use and climatic conditions, if such use compromises the routes usefulness as a fire access track at the identified standard then general vehicle use by the public may need to be limited. There is a formal process for advising the community and consulting relevant interests if this is required.
Otherwise, routes that may be used for vehicle access by visitors are described in the final and Draft Plans of Management for the reserves.

NB. Not all tracks within or around the reserve depicted on published topographic or guide maps may exist, not all are located where marked, or may be accessible in the indicated condition. The NPWS will seek more accurate depiction of these features in subsequent map editions.

The Fire Trails listed in Table 11 are depicted on Map 3 – Fire Management Zones, detailed maps in section 4 within this strategy and on the supporting Operations Map that may be viewed at the NPWS Ulladulla Area office.

Table 11. The Tracks and Roads that will be maintained for fire management within Conjola National Park and Narrawallee Creek Nature Reserve

i.e. “Fire Trails” under the Bush Fire Coordinating Committee guidelines

Map ID	**on Map/s**	**Road / Track “Fire Trail” Name**	**Firefighting Vehicle Category**	Tenure	Comments
Existing Roads / Tracks / Routes –					
U484	3, Ops	Mondayong Road West	Cat 1/2	NPWS	
U67	3, Ops	Blackbutt Road	Cat 1/2	NPWS	
U71	3, Ops	Cedar Rd	Cat 1/2	NPWS	
U81	3, Ops,**4b**	Goonawarra Drive	Cat 1/2	NPWS	
U88	3, Ops,**4d**	Nerringillah Rd	Cat 1/2	NPWS	
U2	Ops,**4c**	Buckley's Point Track	Cat 7/9	NPWS	
U1	3, Ops,**4c**	Conjola Beach Rd	Cat 7/9	NPWS	
‘Ops’ refers to Operational Maps supporting this plan that are made available to local RFS brigades, Emergency Control Centres and land management agencies. **.**					

3.5 Information, Cooperation, and Enforcement

The NPWS will undertake the following during the life of this strategy:

- Participate within the Shoalhaven Bush Fire Management Committee (BFMC) and its sub-groups and functions to better provide an integrated and cooperative approach to fire management and suppression in the reserves and surrounding communities.

- Support the Shoalhaven BFMC, the RFS, Shoalhaven City Council and other agencies to increase the awareness of fire, to improve property and personal preparedness in the surrounding communities and encourage residents and visitors to report fire outbreaks or arson.

- Participate and maintain communications with RFS Brigades adjacent to the reserves in order to improve shared operations, training, community liaison and the monitoring and reporting of fire management access, bush fire fuel conditions and other fire management issues of concern to the community.

  These RFS brigades and communities include:

Sussex Inlet	Bendalong
Berrara / Cudmirrah	Lake Conjola
Wandandian	Cunjurong Point
Milton	Fishermans Paradise

- Assist landholders /occupiers and other agencies to undertake prescribed burns on private property and public lands adjacent to the reserves where this burning will help protect assets on neighbouring property from bush fires that may exit the reserves or may assist in limiting fires entering the reserves from adjacent lands. These cooperative works should be undertaken where resources allow and do not conflict with essential fire management activities being undertaken at the same time within the reserves

- Develop a cooperative approach to the maintenance and monitoring of slashed breaks and fire management tracks especially where they link with breaks and access managed by other agencies, occupants and property owners. Where appropriate, to describe this approach within Memorandums of Understanding for all jointly managed and maintained breaks and access routes.

- Investigate all fires within the reserves that appear to have been deliberately lit and actively pursue this investigation and legal action in cooperation with other agencies against those responsible where evidence permits.

- Assess visitor or access sites and where considered appropriate erect signs to advise reserve visitors of restrictions on use of fire, bush fire danger, fire reporting, or where required, actions that may need to be taken in the event of fire.

- Advise visitor centres and appropriate media outlets of the status of current fires or visitor restrictions within the reserves.

3.6 Research and Monitoring

At the time of preparation of the draft strategy a comprehensive review of the vegetation mapping for the reserves was being undertaken. Some of this data has already been used to better define the appropriate fire regimes. The revised information will also be used to indicate where fire may need to be applied or where fire should be avoided in order to conserve biodiversity.

This survey will also define which communities in the reserves may be the site of vegetation monitoring plots that will contribute to the knowledge of vegetation response to fire and the accumulation of bush fire fuels. There are a number of these sites across the South Coast Region.

As Species Recovery Plans are prepared for threatened species identified within the reserve, implications for fire management will be incorporated in site and species management strategies in Table 7.

The effect of fire regimes on the promotion and extent of weed populations within the reserve will need to be monitored. This is especially relevant where areas may be subject to repeated fire outside recommended biodiversity thresholds i.e. APZs, or areas where fire is normally excluded e.g. dune formations. Other sites that may require monitoring are areas disturbed by fire risk management activities e.g. slashed breaks along the urban/bushland interface. Fire suppression operations or areas undergoing post-fire rehabilitation may also require specific attention. This monitoring will be part of the pest species management strategies for the reserve.

Within the relatively minor areas committed to Asset Protection Zones there will necessarily be considerable change to the structure and floristics of vegetation as a result of repeated slashing or burning outside biodiversity thresholds. These activities can also adversely affect soil stability or cultural values. Where these activities may result in adverse effects on nearby threatened species, endangered ecological communities or cultural values, site specific monitoring may need to be implemented and alternative practice to limit bush fire hazard recommended. Consideration may also need to be given to monitoring the effects of changed access and use of the reserve as a result of clearing APZs.

3.7 Fire Management Works Schedule

From all the above strategies a priority list of fire management works has been assembled and is reviewed annually. These works programs are advised to the Shoalhaven District Bush Fire Management Committee annually as part of the NPWS contribution to cooperative bush fire risk management across the community.

The fire management works schedule for all agencies for the current financial year may be viewed during business hours at the Shoalhaven RFS office at the Shoalhaven Emergency Management Centre – Albatross Road Nowra, the NPWS South Coast Region Office - Nowra or at NPWS Area offices at Flat Rock Rd. - West Nowra, Coller Rd. – Ulladulla, and Fitzroy Falls. To discuss works proposals for areas of concern it is best to contact your local NPWS Area office that will be managing the program.

The fire management works schedule indicates the works proposed in the present financial year and the indicated tasks over the following four years. The works for the present financial year indicate those activities that the NPWS has budgeted for and committed to its overall works programs along with other management tasks. Each year this program is reviewed with consideration of the following factors:

- seasonal conditions,
- available resources,
- the achievements of the past works year
- fire history of the previous season,
- biodiversity and risk management indications, and
- the indicated program over the next four years

Some of the tasks require appropriate conditions in order to be completed eg prescribed burning. Opportunities for suitable conditions are limited and highly variable according to seasonal weather patterns and drought cycles.

Similarly the limited opportunities for prescribed burning may be used by higher priority works of the same type eg burning in asset protection zones may displace biodiversity burning in remoter areas where timing is less critical. In all cases the NPWS provides explanation to the district Bush Fire Management Committee where works cannot be achieved or where works may need to be deleted, eg where a summer wildfire overtakes a prescribed burning proposal. In most cases, works not completed are automatically carried forward into next years program.

It should be noted that much of the works indicated within the zone strategies for Conjola National Park and Narrawallee Creek Nature Reserve– especially those related to asset protection and along the urban-bushland interface - have been implemented and improved since 2001. This is part of the NPWS commitment to assess and initiate appropriate fire strategies and works across its reserves and within cooperative fire management frameworks. This applies especially to newer reserves transferred to the NPWS as part of the Southern Regional Forest Agreement.

Contact details NPWS South Coast Region

for Conjola National Park and Narrawallee Creek Nature Reserve

Ulladulla Area
Coller Rd
Ulladulla
Ph. 02 4454 9500 Fax 02 4454 4921

Other NPWS sites in the South Coast Region:

Nowra Area
Flat Rock Rd.
West Nowra
Ph 02 4428 6300 Fax 4428 6399

Highlands Area
Nowra Road
Fitzroy Falls
Ph 02 4887 7274 Fax 02 4887 7372

South Coast Region Office
55 Graham St PO Box 707
Nowra Nowra NSW 2541
Ph. O2 4423 2170 Fax 02 4423 3122

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Department of Environment and Climate Change
National Parks and Wildlife Service
Head Office - 43 Bridge Street Hurstville
South Coast Region Office – 55 Graham Street Nowra
Nowra Area – Flat Rock Road – West Nowra
Ulladulla Area – Coller Road – Ulladulla
Highlands Area – off Moss Vale Road – Fitzroy Falls