Fire management
IN THE TASMANIAN WILDERNESS
WORLD HERITAGE AREA
Monitoring and Reporting System for Tasmania’s National Parks and Reserves

This report is a product of the Tasmanian Government’s management effectiveness Monitoring and Reporting System for Tasmania’s National Parks and Reserves. An important component of the system is evaluated case study reports on the monitored effectiveness of selected projects/programs in achieving their objectives. For information on Tasmania’s Monitoring and Reporting System see this report on the Parks and Wildlife Service website.

MONITORING AND REPORTING SYSTEM FOR TASMANIA’S NATIONAL PARKS AND RESERVES

EVALUATED CASE STUDY REPORT

PERFORMANCE ARENA: 3. MANAGEMENT OF THREATS, RISKS AND IMPACTS

Key Performance Area: 3.4 Fire management

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Cover photo: Planned burns, such as this fire at Lower Hutt Plains in March 2015, are an important component of strategic fire management for asset protection, fuel reduction, and ecological objectives in the Tasmanian Wilderness World Heritage Area.

Photo: Paul Black
Evaluation report
Fire management in the Tasmanian Wilderness World Heritage Area

Note: Since this report was finalised, multiple fires have broken out across Tasmania during January 2016 as a result of dry lightning strikes. Some of these fires are affecting the Tasmanian Wilderness World Heritage Area. Future editions of this report will examine the impacts and implications of these fires for management.

This report examines the performance of fire management in the Tasmanian Wilderness World Heritage Area (TWWHA) and concludes that the Parks and Wildlife Service is applying allocated resources wisely and without wastage. Nonetheless fire management continues to be a particularly challenging and uncertain area for management. Over the period since 2004, there have been no deaths or injuries as a result of fire in the TWWHA, and only minor losses of built assets (such as track infrastructure). Small areas of fire-sensitive vegetation burnt and some forest peats were lost. Major advances were made in bushfire risk management capability as a result of the Bushfire Risk Assessment Model (BRAM), and fire planning and operational procedures also improved. There is some indication that lightning-caused fires may be on the increase, and there are ongoing concerns that the risk of landscape-scale fires continues to pose a serious threat to the TWWHA, particularly to fire-sensitive vegetation.

Introduction

About the threat or issue

Fire has been a natural and persistent phenomenon in southwest Tasmania for millions of years. Human use of fire over thousands of years has also played a role in shaping the present-day vegetation. Fire in the landscape can be a healthy and positive factor provided it occurs at the right frequency, intensity, places and times; otherwise it can be a destructive force.

Public safety is the primary consideration and obligation in fire response. An important component of the Parks and Wildlife Service (PWS) fire management program for the Tasmanian Wilderness World Heritage Area (TWWHA) is the suppression of any bushfires that pose a threat to public safety and/or other values located inside the TWWHA or on adjoining lands. Some of the values considered at risk from bushfires include:

- People – e.g. visitors to the TWWHA and neighbours;
- natural and cultural features;
- houses, built structures;
- cars, bridges, telecommunications towers;
- fences, livestock, pets, crops; and
- forest plantations and production native forest in adjoining properties.
Often in a large fire, management of public safety (locating and removing bushwalkers and preventing further access) is the only management action that can be undertaken until the fire has run its course. Fire management for the TWWHA also involves:

- risk assessment and fire management planning;
- planned burning to reduce the risk of landscape-scale, destructive bushfires occurring, and/or to support biodiversity conservation objectives including the protection of fire sensitive natural values;
- the use of fire for habitat management of fire-dependent natural values such as montane grasslands and suitable habitat for fauna (e.g. for the endangered orange bellied parrot).
- other actions and planning that contribute to the prevention of destructive bushfires. For example, this includes building and maintaining infrastructure assets such as fire trails, water holes and fire towers; deploying detection flights and the pre-emptive placement of fire-fighters and aircraft at critical times; and investigating the causes of all fires.
- research that builds the foundation of knowledge and understanding for sound evidence-based adaptive management of fire to better achieve objectives.

**What natural or cultural values are affected?**

Inappropriate fire regimes can impact flora, fauna and geoconservation values. The use of fire is also an important cultural value for Aboriginal people, who have used fire for many thousands of years in their interactions with the landscape.

While some vegetation types recover well after fire, some types of vegetation are threatened with destruction by bushfires, especially by large bushfires occurring in summer months. These fire-sensitive vegetation communities can take hundreds or even thousands of years to recover following a bushfire. Fire-sensitive vegetation communities in the TWWHA include rainforest, native conifers, and alpine vegetation with sensitive species including pencil pines, Huon pines, King Billy pines, myrtle-beech, deciduous beech, and sphagnum.

The loss of fire-sensitive vegetation from the TWWHA that has occurred over the past 200 years is still visually evident in the landscape in many areas. From the available evidence, it seems most likely that these fires were largely human-caused. An imperative for management of the TWWHA today is to prevent the remaining fire-sensitive vegetation from being damaged by bushfires.

While any occurrence of fire in fire-sensitive vegetation is destructive, even fire-adapted vegetation communities and their associated fauna can be damaged by inappropriate fire regimes — that is, by fires that are too frequent, or too infrequent, in the wrong season, or fires that are the wrong size or intensity.

Some types of vegetation (such as this King Billy pine) and organic-rich soils are particularly vulnerable to fire. Irreplaceable natural values that have taken hundreds to thousands of years to form can be lost in a single bushfire.

Photo: Glenys Jones
In addition to burning vegetation, bushfires can also burn accumulated layers of partially decomposed organic matter that has built up into extensive beds of organic-rich soils. These organic soils are widely distributed throughout the TWWHA. When soil conditions are dry, any fire on organic soils is likely to ignite a smouldering fire in the ground. This can destroy entire soil profiles that have accumulated over many thousands of years, leaving behind a remnant soil that is unable to support the ecosystem that was present before the fire. Organic soil fires can be extremely difficult to extinguish. Consequently, organic soil fires can and do burn for many months if there is insufficient rainfall to saturate the soil and extinguish the fire. Organic soil fires are a major source of ignition for new above-ground bushfires because they can act as a continuous ignition source during a summer season.

**Background to management**

While the TWWHA contains considerable fire-sensitive vegetation, it also has large areas of fire-adapted and fire-dependent vegetation which has expanded over thousands of years in response to Aboriginal patterns of fire use. Research findings suggest that fires under Aboriginal management were mostly high frequency, low intensity fires in buttongrass moorlands, with fewer fires in other vegetation types.

Under early European management, patterns of fire management changed, and some fire-sensitive communities were intentionally burned to increase accessibility. Very large bushfires occurred in southwest Tasmania in 1850, 1897/98, 1933/34 and 1960/61 and are considered to have been responsible for major losses of fire-sensitive vegetation in what is now the TWWHA.

The 1992 Management Plan for the TWWHA prohibited management-initiated fires in areas zoned as Wilderness Zones, with the exception of habitat management burns which could only be undertaken for the purpose of maintaining the habitat of rare or endangered species such as the orange-bellied parrot. In other zones of the TWWHA, and if provided for in an approved fire management plan, management-initiated fuel reduction burns were allowed in fire-adapted communities including moorlands, dry sclerophyll forest and woodland, heathlands and grasslands.

The current 1999 management plan for the TWWHA opened the door to greater planned use of fire as a management tool, including in the Wilderness Zone. It was recognised that the environmental context for fire management in the TWWHA was one of increasing risk of loss of values from an inappropriate fire regime due to a combination of the changing climate, an absence of fire in fire dependent vegetation, and increasing fuel hazard. For example there are extensive areas of old growth buttongrass moorland with high fuel loads throughout the TWWHA. Because of the complex role of fire in TWWHA ecosystems, planned burning program is required to achieve the range of management objectives.

The performance of fire management in the TWWHA was reported in the *State of the TWWHA Report No. 1* (PWS 2004:62-68). The focus of this report is on the management period since 2004.

**Overall management goal**

The overall goal of this program is:

- To minimise the risk of destructive bushfires in the TWWHA while maintaining the area’s outstanding natural and cultural heritage values.

Key desired outcomes for the TWWHA include:

1. People and assets protected from fire
2. No loss of fire-sensitive vegetation or other high conservation values in the TWWHA
3. Prevention of fire damage to land and assets neighbouring the TWWHA from fires originating in the TWWHA.
4. Fire-dependent natural values are maintained through appropriate fire regimes.
PWS has the following general responsibilities and objectives in relation to fire management:

- to protect people from fire – visitors, neighbours, staff and all;
- to protect values on neighbouring properties from fires that spread from reserved land and Crown land;
- to protect the conservation values of reserves (particularly fire-sensitive vegetation and species for which bushfire is a threat) and support ecological objectives through appropriate fire regimes;
- to provide a safe work environment for staff and firefighters (including from other agencies) engaged in fire suppression operations on reserved land.

Management actions and significant events

Over the management period since 2004:

- Strategic Fire Management Plans have been prepared for each PWS Region (available on DPIPWE Intranet under Fire Management). Development of these plans includes a process for identifying fire management zones, and a bushfire risk assessment. The latter is produced using a GIS tool called the ‘Bushfire Risk Assessment Model’ (BRAM). The BRAM also provides a useful way of identifying spatially the assets at risk in the TWWHA, both natural and human-made.
- A fire management strategy was prepared for ecological burning of montane grasslands (available on DPIPWE Intranet under Fire Management).
- PWS improved the timeliness of bushfire detection and initial attack on days when forecast thunderstorms may produce dry lightning.
- Many bushfires in the TWWHA were successfully suppressed by PWS fire-fighters, thus limiting damage to fire-sensitive natural values.
- Very large lightning fires occurred in the TWWHA in 2007 and 2013. Fortunately these fires caused relatively minor damage to fire-sensitive vegetation.
- Planned burning activity in buttongrass increased, most notably in 2011 when nine planned burns were completed with a total of 14,870 ha treated.
- Planned burning to achieve ecological objectives was undertaken in buttongrass and montane grasslands.
- The Fuel Stove Only policy in the TWWHA continued.
- Flora, fauna and geoheritage monitoring programs were established to assess the role of fire in buttongrass moorlands and montane grasslands, and to identify rainforest fire risk factors.

In addition to the above fire management activities, significant research effort has gone into investigating the impacts of fire on TWWHA ecosystems, and how fire may be used with the greatest ecological benefit. Much of this research has been undertaken or supported by the (former) Resource Management and Conservation Division² of DPIPWE. Research activities and publications over the reporting period include:

**Central Plateau:**

- Ongoing soil erosion on the Central Plateau in response to the 1960’s fires (Storey and Comfort 2007).

**Buttongrass Moorland:**

- Buttongrass Moorland Workshop held July 2007 (Balmer 2010)
- Fire response of soil mites of buttongrass moorland (Green 2009).
- Response of birds to post fire succession in buttongrass moorland (Chaudhry 2010).

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1 PWS operates with three organisational management regions for the state: North, South and Northwest Regions.
2 Now the Natural and Cultural Heritage Division of DPIPWE

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Department of Primary Industries, Parks, Water and Environment

4
Buttongrass moorland vegetation recovery following fire (Storey and Balmer 2010).


Effects of fire on geomorphology and hydrology of small streams in buttongrass moorland (pre-fire report Storey and Betts 2011).

Impacts of the 2013 Giblin River fire investigated through
(i) desktop reviews
   ▪ flora (Rudman et al 2013)
(ii) field surveys
   ▪ stream fauna (Davies, Cook et al. 2015)
   ▪ stream geomorphology (Storey in prep.)
   ▪ buttongrass moorland soils (Storey in prep.)

Research projects that have begun but are not yet completed include:

- The impacts of planned burning on flora diversity in montane grasslands
- Small mammal succession following fires in montane grasslands
- Impact of fire on a rare syncarid crustacean living in pools in moorland: *Allanaspides hickmani*.

Lower Hutt Plains fire, March 2015. This fire is a good example of an unbounded planned burn using the prescriptions for unbounded moorland burning in Marsden-Smedley 2009. These prescriptions use the soil dryness index as an indicator of when moorland will burn when wet scrub and other vegetation types will self-extinguish. This photo illustrates the fire self-extinguishing when it contacts the wet scrub line in the foreground of the photo. The photo also demonstrates the technique of using a backing fire* to reduce the intensity of the fire on the slopes. Notice that in the foreground of the photo, the fire is burning into the wind rather than with the wind as would normally be the case. The wind is a southerly, blowing from right to left of the photo, and the fire is burning to the south, from left to right. This technique also reduces the intensity of the fire and generally ensures that the wet scrub line that is being used as the downwind boundary for the unbounded burn contains the burn within planned boundaries.

* A ‘backing fire’ refers to when a fire is spreading slowly down-slope or into the wind.

Photo: Paul Black
Monitored results for performance indicators

<table>
<thead>
<tr>
<th>Performance Indicators (and how they are monitored)</th>
<th>Targets or Limits (and how performance is assessed)</th>
<th>Monitored Results (detected over the management period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESSURE INDICATORS³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Number and area of fires (planned fires and unplanned bushfires) in the TWWHA

**Monitoring**
All fires are mapped and recorded in a database and GIS.

**Target or Limit**
No target established
Assessment of performance
Tracking only

**Results**
There has been no clear trend in the number of planned or unplanned fires in the TWWHA over the last decade (see Figure 1 and Figure 3), although trends may become more apparent over a longer timeframe.

However the area burnt by unplanned bushfires has increased significantly in the decade to 2012-13 compared to the decade before: 13,639 ha for 1993-94 to 2002-03 compared to 88,232 ha for 2003-04 to 2012-13. See Table 1 and Figure 2. Three lightning ignitions account for most of this increase in the more recent decade. See Map 2.

The actual number of bushfires (i.e. total fires minus planned burns) has changed little in the inter-decade comparison, with 37 fires from 1993-04 to 2002-03 and 43 from 2003-04 to 2012-13. Refer to Map 2.

The number of planned fires has increased slightly in the most recent decade compared to the earlier one, but the total area burnt by planned fires has trebled in the same decade comparison. See Figure 3 and Table 1. The average size of planned burns has increased from 212 ha to 487 ha in the comparison of the earlier and more recent decade. See Table 1.

2. Causes of bushfires in the TWWHA

**Monitoring**
The cause of every fire is determined and included in the database record and GIS.

**Target or Limit**
No target established
Assessment of performance
Tracking only

**Results**
The cause of bushfires in the TWWHA has changed significantly in the last 20 years. In the decade from 1993-94 to 2002-03, lightning caused only 15% of the total area burnt by unplanned bushfires. By contrast, in the more recent decade to 2012-13, 99% of the total burnt area by bushfires was caused by lightning. See Table 1.

Just three lightning strikes account for 89% of the 88,232 ha burnt by bushfires in the last decade. These three large bushfires (Reynolds Creek and Cracroft River fires in February 2007 and Giblin River fire in January 2013) have had a very significant impact on the TWWHA. See Map 2.

Table 1 shows the area burnt and the number of bushfire events, broken down by cause of fires, for the period 2003-04 to 2012-13.

³ ‘Pressure indicators’ relate to activities, processes and/or agents that are considered to pose a threat of degradation to reserves or reserve values (either directly or indirectly).

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Department of Primary Industries, Parks, Water and Environment
### 3. Trends in fire risk profile of the TWWHA

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Target or Limit</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective review of fire trends and causes (by PWS specialists in Fire Management)</td>
<td>No target established</td>
<td>There is some indication in the trend of unplanned fires that lightning may be an increased threat to the TWWHA (see Figure 2 and Table 1). However, it is still too early to be sure of a trend, with less than 25 years of reliable data.</td>
</tr>
</tbody>
</table>

### CONDITION INDICATORS

### 4. Loss or damage to significant values

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Target or Limit</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial photographs, satellite images, field and air observations and analysis by GIS.</td>
<td>No catastrophic loss or major impacts to values classified in BRAM5 as Moderate, Major or Extreme consequence.</td>
<td>Fire-sensitive vegetation—rainforest, conifers and alpine vegetation—have been burnt by bushfires, but how much has not been accurately quantified. Any losses to values classified as Moderate, Major or Extreme are not considered catastrophic. In general terms, relatively small areas of fire-sensitive vegetation have been burnt in the last decade, and only a small percentage of the total area has been burnt. Most of the area that has been burnt is buttongrass (which is fire adapted). Some degradation of organic soils has occurred as a result of the large lightning-caused fires. There was also minor damage associated with an escaped planned burn on the Sentinel Range. Only the Gibling River fire (January 2013) has been assessed in any detail and no more than 1% of that burnt area was comprised of fire-sensitive vegetation (Rudman et al 2013). Some minor combustion of organic soils has been observed (Storey in prep.).</td>
</tr>
</tbody>
</table>

### 5. Trends in the achievement of identified target fire regimes for ecological objectives

<table>
<thead>
<tr>
<th>Monitoring</th>
<th>Target or Limit</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>No target fire regimes have yet been determined.</td>
<td>Modelling to guide spatial regimes for moorland fire that will mitigate loss of fire sensitive assets was published in King et.al. 2006 and 2007. Buttongrass moorland age was strongly skewed to long unburnt until the late 2000s when the Reynolds Creek, Cracroft and Gibling River wildfires burnt an extensive tract of moorland vegetation. This has produced a more balanced distribution of moorland age (see Map 3). However spatially these fires are clustered in the region between Lake Pedder and Port Davey. In other regions, long unburnt moorland remains dominant.</td>
</tr>
</tbody>
</table>

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4 ‘Condition indicators’ relate to the condition of reserves or reserve values (e.g. natural or cultural resource assets and features).

5 BRAM = Bushfire Risk Assessment Model
### Performance Indicators (and how they are monitored)

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>Targets and/or Limits (and how performance is assessed)</th>
<th>Monitored Results (detected over the management period)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTHER INDICATORS (e.g. social or economic)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 6. Deaths from bushfires (per 10 years)

- **Monitoring**: Fire records.
- **Target**: Zero
- **Results**: No deaths have occurred over the past decade (and longer period since the TWWHA management plan 1999 came into effect) as a result of bushfires in the TWWHA

### Supporting evidence

#### Data on planned and unplanned fires in the TWWHA

![TWWHA Bushfires](image)

**Figure 1. Unplanned bushfires in the TWWHA from 1993-94 to 2012-13.** The figures for ‘Total Area Burnt’ data do not include the portion of fire boundaries that were outside the TWWHA. Unattended / abandoned campfires not included because data only available from 2009-10 onwards.
Figure 2. Lightning fires in the TWWHA from 1993-94 to 2012-13. The figures for ‘Total Area Burnt’ data do not include the portion of fire boundaries that were outside the TWWHA.

Figure 3. Planned fires in the TWWHA from 1993-94 to 2012-13. The figures for ‘Total Area Burnt’ data do not include the portion of fire boundaries that were outside the TWWHA.
Table 1. Planned fires and causes of bushfires from 1993-94 to 2012-13

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number of fires</th>
<th>Total area burnt (ha)</th>
<th>% of total area burnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned burn</td>
<td>34</td>
<td>45</td>
<td>7,201.0</td>
</tr>
<tr>
<td>Lightning</td>
<td>17</td>
<td>30</td>
<td>2,079.8</td>
</tr>
<tr>
<td>Undetermined cause</td>
<td>7</td>
<td>3</td>
<td>2,805.3</td>
</tr>
<tr>
<td>Arson</td>
<td>6</td>
<td>5</td>
<td>393.0</td>
</tr>
<tr>
<td>Escape planned burn</td>
<td>5</td>
<td>1</td>
<td>8,319.6</td>
</tr>
<tr>
<td>Accident</td>
<td>2</td>
<td>2</td>
<td>41.4</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>2</td>
<td>0.0</td>
</tr>
<tr>
<td>Unattended/ abandoned campfire*</td>
<td>27</td>
<td>4.9</td>
<td>20,840</td>
</tr>
</tbody>
</table>

* Data on unattended / abandoned campfires have been only been recorded since 2009-10.

Map 1. Unplanned bushfires and planned fires in the northern TWWHA from 2003-04 to 2012-13
Map 2. Unplanned bushfires and planned fires in the southern TWWHA from 2003-04 to 2012-13
Map 3. Buttongrass age since fire in the TWWHA (as at 2014). Note the large expanses of long unburnt moorland, and the concentration of younger aged moorland in the area between Port Davey and Lake Pedder.
Outcomes

Table 2: Expected and actual outcomes

<table>
<thead>
<tr>
<th>Expected outcomes</th>
<th>Actual outcomes/outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. GOAL AND KEY DESIRED OUTCOMES</td>
<td></td>
</tr>
<tr>
<td>Overall management goal:</td>
<td>The risk of bushfires in the TWWHA is being actively managed through innovative risk management tools including the Bushfire Risk Assessment Model (BRAM).</td>
</tr>
<tr>
<td>• To minimise the risk of destructive bushfires in the TWWHA while maintaining the area’s outstanding natural and cultural heritage values.</td>
<td></td>
</tr>
<tr>
<td>Key desired outcomes for the TWWHA include:</td>
<td>Over the management period since 2004:</td>
</tr>
<tr>
<td>(i) People and assets protected from fire</td>
<td>(i) No deaths have occurred and no people have been injured as a result of fire in the TWWHA. There were some relatively minor losses of built assets which affected track infrastructure including duckboarding, footbridges and cross-drains.</td>
</tr>
<tr>
<td>(ii) No loss of fire-sensitive vegetation or other high conservation values in the TWWHA</td>
<td>(ii) Small areas of fire-sensitive vegetation have been burnt by lightning-caused bushfires. These were mostly Nothofagus rainforest with some small islands of western alpine heathland, Eucalyptus nitida over rainforest, coniferous rainforest, and Eucalyptus obliqua over rainforest. There was also some loss of forest peats during the Giblin River fire in 2013.</td>
</tr>
<tr>
<td>(iii) Prevention of fire damage to land and assets neighbouring the TWWHA from fires originating in the TWWHA.</td>
<td>(iii) There has been no fire damage to land neighbouring the TWWHA as a result of fires originating in the TWWHA.</td>
</tr>
<tr>
<td>(iv) Fire-dependent natural values are maintained through appropriate fire regimes.</td>
<td>(iv) Two main fire dependent ecosystems are buttongrass moorlands and montane grasslands. Some progress has been made at reintroducing fire to buttongrass moorland. There are no known significant losses of conservation value due to a lack of fire within moorlands. In montane grasslands, experimental burning has commenced, but has yet to restore biodiversity lost due to a long unburnt period.</td>
</tr>
</tbody>
</table>

B. OTHER ANTICIPATED OUTCOMES/IMPACTS

None identified

C. UNANTICIPATED OUTCOMES AND/OR LEGACY

Development of the Bushfire Risk Assessment Model (BRAM) has provided an important tool which has improved management capability for identifying high risk areas, informing appropriate mitigation measures, and reporting on post-fire assessments of impacts.
Assessment and commentary on management performance

Table 3: Assessment of management performance

<table>
<thead>
<tr>
<th>LEVEL OF PERFORMANCE</th>
<th>EFFECTIVENESS</th>
<th>EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To what extent did the project achieve its objectives?</td>
<td>To what extent was the project delivered on time and on budget? Were resources, including time and effort, used wisely and without wastage?</td>
</tr>
<tr>
<td>Great result</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfactory/Acceptable result</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsatisfactory/Unacceptable result</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KEY:  
- Great result
- Satisfactory/Acceptable result
- Unsatisfactory/Unacceptable result

Comments on management performance

Summary statement on performance
Assessment of the performance of fire management is particularly difficult and uncertain. There is general consensus within PWS that the resources allocated for fire management have been used wisely and without wastage. However there are ongoing concerns that the risk of landscape-scale fires continues to pose a significant threat to the TWWHA and its natural values, particularly fire-sensitive vegetation.

Key factors contributing positively to management performance
- Development of the Bushfire Risk Assessment Model (BRAM)
- Increased staffing capacity for fuel reduction burning
- Change in procedures in response to changes in fire risk resulting in faster initial attack on remote bushfires

Key factors limiting or threatening management performance
- Limited PWS budget and fire-fighting resources for fire management in the TWWHA6.

Suggestions for improving management performance
There is a pressing need for TWWHA management to continue to develop and implement strategies to model and mitigate the risks posed by bushfires in the TWWHA. Increased budget allocation would support PWS to progress implementation of the PWS strategy for mitigating risks (see below).

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6 Recent increases in government funding for fuel reduction burning in Tasmania are focused on community protection and have little bearing on fire management in the TWWHA.
Lessons learnt and/or additional comments
PWS Manager Fire Operations (Adrian Pyrke) provided the following additional comments.

Fire regimes may be changing
The fire data for the TWWHA from the past 20 years suggest that the fire regimes in the TWWHA are changing, both from planned and unplanned fires. The causes of unplanned fires have changed. Arson was considered the main threat to the TWWHA in the 1990s but in the last 10 years it was a minor threat (Table 1). Fires started by dry lightning now appear to be the main threat to the TWWHA. However, it is too early to know whether a shift in climate may be contributing to a long-term increasing trend in dry lightning activity in summers.

Risk of landscape-scale fires continues
The three very large lightning fires, two in 2007 and the one in 2013, are an ominous sign of the bushfire threat. While PWS has successfully suppressed numerous lightning fires in the past decade, the weather conditions that led to the three large fires are likely to remain a challenge in the future: dry lightning followed quickly by a sustained period of severe fire weather.

The risk of landscape-scale fires continues to threaten TWWHA natural values, particularly fire-sensitive vegetation. There is a pressing need for PWS to continue to develop strategies to mitigate these risks.

Although a view may be put that lightning fires are natural and therefore the impact of these fires should be considered natural, PWS does not support this view for the following reasons. Firstly, these lightning fires may not be entirely natural if human-induced climate change is a contributing factor. Climate research and trends over the next few decades will assist in resolving this question. Secondly, there is a legacy of destruction and loss of fire-sensitive vegetation and organic soils in the TWWHA since European settlement. The fire regime during this period was not natural and differed from the Aboriginal fire regime. In the current era, any source of ignition must be considered in the above context. It is not desirable to lose any more fire-sensitive vegetation to bushfires, regardless of the source of ignition.

The lightning fires of the last 10 years have burnt only a very small percentage of the total extent of fire-sensitive vegetation in the TWWHA. Typically these fires burn buttongrass and stop at boundaries with forest because the latter is usually damper and therefore less flammable than buttongrass. It is known, however, that on rare occasions in summer, bushfires in Tasmania will burn all vegetation types at a landscape scale including rainforest. The last occasion documented was the Savage River fire in 1982. Therefore, every summer there is a risk that even the fire-sensitive forests will become sufficiently dry to burn. So while the impact of lightning fires on TWWHA’s natural values over the past 10 years has so far been relatively benign, this may be just a matter of good luck.

Planned burning activity has increased
Over the past decade, there has been an increase in planned burning activity across the TWWHA as a whole, with a shift towards larger planned burns and unbounded burning of extensive buttongrass plains. However, autumn 2011 was the only season in which the planned burning program was actually achieved in the TWWHA.

Progress on PWS strategy for mitigating risks to fire-sensitive vegetation
The PWS strategy to mitigate the risk of dry lightning causing damage to fire-sensitive vegetation involves several elements:

(i) improve dry lightning forecasting;
(ii) improved understanding of fire behaviour and flammability of fire-sensitive vegetation;
(iii) early fire detection and faster initial response;
(iv) more fuel reduction burning.
Progress on the above elements is summarised below.

(i) Dry lightning forecasting

The Antarctic Climate and Ecosystems Cooperative Research Centre is currently undertaking research into climate change and the implications that this has for dry lightning in Tasmania. At the time of writing, no results are as yet available.

(ii) Fire behaviour and flammability of fire-sensitive vegetation

A PhD student at the University of Tasmania is investigating the flammability of Tasmanian rainforest, with the aim to better understanding the conditions under which rainforest will burn. This project is supported by funds from PWS, Forestry Tasmania and the Tasmania Fire Service. The project has recently been completed and the thesis published (Styger 2014).

Much more research is required before fire behaviour (e.g. rates of spread and intensity) can be predicted in rainforest or wet eucalypt forest with any degree of accuracy in the way that it is routinely done for dry eucalypt forest or buttongrass.

(iii) Early fire detection and fast initial response

The PWS in the last five years has become more proactive at preparing detection flights and initial attack fire crews by helicopter to rapidly assess and suppress lightning fires. This strategy has had some success; however, three very large bushfires still occurred. Limitations on the effectiveness of this strategy include:

- many lightning storms occur with little or no prior warning from forecasts (e.g. Packers Spur fire 2007);
- weather conditions can be too turbulent to permit safe flying soon enough to suppress fires while they are small;
- the sheer remoteness of southwest Tasmania;
- lightning fires can grow rapidly to a size for which Tasmanian suppression resources are insufficient to be effective (e.g. Reynolds Creek fire 2007);
- PWS has limited fire-fighter capacity, if already deployed to other fires in the state then preparedness for new ignitions is compromised (e.g. Giblin River fire 2013).

(iv) Fuel reduction burning

Given the above limitations to suppression effectiveness, fuel reduction burning has the best chance of preventing fire damage to fire sensitive-vegetation. Evidence for this has been published from a PhD project that received funding from the PWS (King et al 2006; King et al 2008). The PWS has commenced preparation of a strategy for a program of increased fuel reduction burning in buttongrass. This strategy is not yet complete; and PWS does not at present have the budget or resources to implement this strategy.

Difficulty in establishing meaningful targets

It is difficult under current circumstances for the PWS to establish meaningful targets for the impact of bushfires on fire-sensitive natural values, or for fire regimes. The reasons for this include:

- the future trend for dry lightning caused fires is difficult to predict;
- suppression and fuel reduction burning resources available to the PWS for fire management within the TWWHA are very limited; and
- the fire damage from bushfires to fire-sensitive vegetation cannot be quantified with any degree of accuracy.

Mapping of fire scars in the TWWHA over the past 20 years has improved significantly. The fires that burn treeless vegetation and stop at forest boundaries (and this includes most fires in the
TWWHA) are routinely mapped with a high degree of accuracy and the records kept in GIS. Satellite imagery is used if available. At a minimum, fire scars are mapped with GPS from helicopters. However, improved monitoring of bushfire impacts is required that depends on better fire mapping and better analysis of burnt vegetation types. This involves investment in high resolution satellite imagery followed by interpretation and analysis in GIS. There is a need for research to identify the most cost effective method to map fire boundaries in rainforest because the burnt scar is not always visible from aerial imagery the way it is for other vegetation types. While TASVEG is a very useful mapping tool for land management, it does not have the degree of accuracy required to detect where fires have burnt rainforest or conifers. Thus each significant fire requires careful interpretation of aerial photos and satellite images plus ground-truthing to determine whether or not fire-sensitive forests have burnt.

Determination of desired fire regimes (e.g. fire interval thresholds) is needed for the various vegetation types of the TWWHA. Fire sensitivity is documented in a general sense (e.g. Pyrke and Marsden-Smedley 2005) and proposed fire interval thresholds are under development by the Natural and Cultural Heritage Division. Once these are finalised, monitoring and reporting against targets can commence.

**Investment in this project**

Resources allocated by the Parks and Wildlife Service to fire management in the TWWHA comprise:
- Each of the three PWS regions has a Fire Management Officer and Fire Operations Officer.
- The Fire Management Section has a fire crew of 12 fire-fighters at Lutana, 6 at Lutana, 6 at Scottsdale plus 6 specialist fire staff in the Hobart Office. From Autumn 2014, an additional 6 person crew were located at Prospect and Lutana to undertake fuel reduction burning.
- Approximately 140 fire-fighters in total, inclusive of rangers, field officers and other regional staff.
- PWS Fire Management Section has a recurrent budget of approximately $1.8 million.
- Fire-fighting equipment – fire tankers, remote fire pumps etc.
- Additional expenditure for fire suppression is funded directly from the Tasmanian government Treasury, for example, for helicopter hire, overtime, meals, accommodation and allowances.
- PWS does not separate the fire management budget into TWWHA and non-TWWHA expenditure; however the proportion of the above resources dedicated to TWWHA fire management is approximately a third to a half of the total.

Resources allocated by the Resource Management and Conservation Division to fire research and management since 2004 has included:
- Salary (average 0.2 FTE for 10 years) and operating costs for the fire and small stream geomorphology monitoring project
- Staff time (average 0.5 FTE per year) for developing inputs to the BRAM
- Staff time during wildfires for identifying vulnerable assets
- Staff time contributing to planned burn planning and post burn assessment
- Staff time (0.2 FTE for one year) for review of fire regime recommendations for natural value conservation.

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7 GIS = A Geographic Information System—a system for capturing, storing, managing, and presenting spatial or geographical data.
8 Now the Natural and Cultural Heritage Division of DPIPWE
Sources and acknowledgements

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Paul Black is the PWS State Fire Manager.
Photo: PWS

Adrian Pyrke was the PWS Manager Fire Operations from 2004 until he retired in 2014.
Photo: Adrian Pyrke

David Taylor was responsible for developing the Bushfire Risk Assessment Model, and was Acting Manager, Fire Operations during 2014.
Photo: PWS

Natural values specialists
Kath Storey (Fluvial Geomorphologist) and Tim Rudman (Senior Vegetation Scientist) - both of the Natural Values Conservation Branch of DPIPWE - provided inputs to this report in relation to fire research activities and findings related to natural values.

Evaluation Report
Glenys Jones (PWS Coordinator Evaluation) facilitated and managed preparation of this report. Dixie Makro (PWS Interpretation Officer – Publications) assisted with graphic design.

References and further information

Click on the links below for more information on the following topics:

- [PWS bushfire management and planned burns](#)
- [Tasmanian Wilderness World Heritage Area](#)
- [Performance monitoring, evaluation and reporting for Tasmania’s national parks and reserves](#)

References


PWS Planning and Evaluation
Department of Primary Industries, Parks, Water and Environment


Driessen, M. and J. B. Kirkpatrick (in prep) Are successional changes in moorland invertebrate assemblages following fire predicted by changes in environmental variables and functional traits? Hobart, Tasmania, DPIW.


Photo gallery

Planned burns
Three main types of planned burns are conducted in the TWWHA:

(i) asset protection burns
(ii) strategic fuel reduction burns, and
(iii) ecological burns for conservation objectives. The photos on this page show examples of each.

Asset protection burn at Red Tape Creek, April 2011. The objective for this burn was to provide asset protection for the camp ground on the edge of the Edgar impoundment in the foreground; duck boarding on the Mt Anne Circuit walking track in the middle ground; and the natural values of the Mt Anne massif in the background.

Photo: Paul Black

Strategic fuel reduction burn at Lower Hutt Plains, March 2015.

Photo: Paul Black

Ecological burn at Melaleuca Lagoon, April 2011. The objective for this burn was to improve foraging habitat for critically endangered orange bellied parrots which nest and forage in this area.

Photo: Paul Black
Planned burns at McPartlan Pass (top) and Edgar Dam (bottom), April 2011.
Photos: Adrian Pyrke
Sometimes planned burns escape. This highlights the need for contingency planning to contain escaped fires. In this case an ecological burn at Melaleuca escaped the planned boundary and was contained the next day using ground crews with hand tools supported with a water bombing helicopter. This risk was recognised during planning for this burn, and a contingency plan for this outcome was included in the burn plan. Melaleuca Lagoon fire, April 2011
Photo: Paul Black

Fuel reduction burns in moorlands generate a large amount of smoke. This column of smoke from the Giblin River strategic fuel reduction burn generated a column that reached 3,500m in altitude. The Parks and Wildlife Service participate in the Coordinated Smoke Management Strategy which aims to reduce the impact of smoke from fuel reduction burns on the community. This requires the agency to predict where the smoke will travel to with the forecast weather conditions and ensure that the amount of smoke that impacts the community is kept within agreed thresholds. This means that fuel reduction burns can’t be undertaken on some days as the weather conditions aren’t conducive to smoke dispersal. Giblin River strategic fuel reduction burn March 2015.
Photo: Paul Black
Equipment

Much of the burning in the TWHA is conducted using aerial incendiary machines. This requires a suitable aircraft, a pilot skilled in low level flying in marginal conditions and general fire operations, an incendiary machine, a bombardier to operate the incendiary machine and a navigator to direct the operations. This photo shows a Raindance R2 aerial incendiary machine set up in a B2 Squirrel helicopter.

Photo: Paul Black

Contingency planning is important part of conducting fuel reduction burning operations. As part of the standard contingency plans a long line and bucket is carried to enable a quick response to an escaped burn. This photo shows a B2 Squirrel helicopter with additional fire fighting gear including long line and bucket carried in a basket mounted on the side of the helicopter.

Photo: Paul Black
Lightning fires

The Packers Spur Fire was started by lightning on 16 November 2007.

Photo: Top image Paul Black; bottom PWS
Huon pine rainforest burnt by the Reynolds Creek lightning fire of February 2007.  
Photo: Jon Marsden-Smedley

The Cracroft lightning fire of February 2007  
Photo: Paul Black
The Giblin River lightning fire of January 2013 (both photos)
Photos: Adrian Pyrke