



2009 Bushfire
Recovery Program
Public Land
2012 Update



Published by the Victorian Government Department of Sustainability and Environment
Melbourne, February 2012.

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Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

Print managed by Finsbury Green

Printed on recycled paper

ISBN 978-1-74287-141-7 (print)

ISBN 978-1-74287-142-4 (online)

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Minister's Foreword

Victoria's forests, parks and reserves are integral to the health and wellbeing of our communities. Residents and visitors to our State cherish the many recreational opportunities and unique flora and fauna we offer.

The magnitude and intensity of the 2009 bushfires tragically impacted families and communities and caused significant damage to the environment, community infrastructure and private property.

Our affected communities have shown remarkable resilience as Victoria continues to recover from the devastating 2009 bushfires, including those of Black Saturday.

After every large fire event there are new opportunities, recreation sites have been rebuilt and modernised and native plants not seen in some areas for many years are again flourishing.

While the impacts of the 2009 bushfires can still be recognised our parks, forests and reserves are again open for business.

The Department of Sustainability and Environment, Parks Victoria and Catchment Management Authorities have worked alongside dedicated volunteers, local councils and other State and Commonwealth agencies to provide the help and resources needed to support the recovery of Victorian communities and the environment.

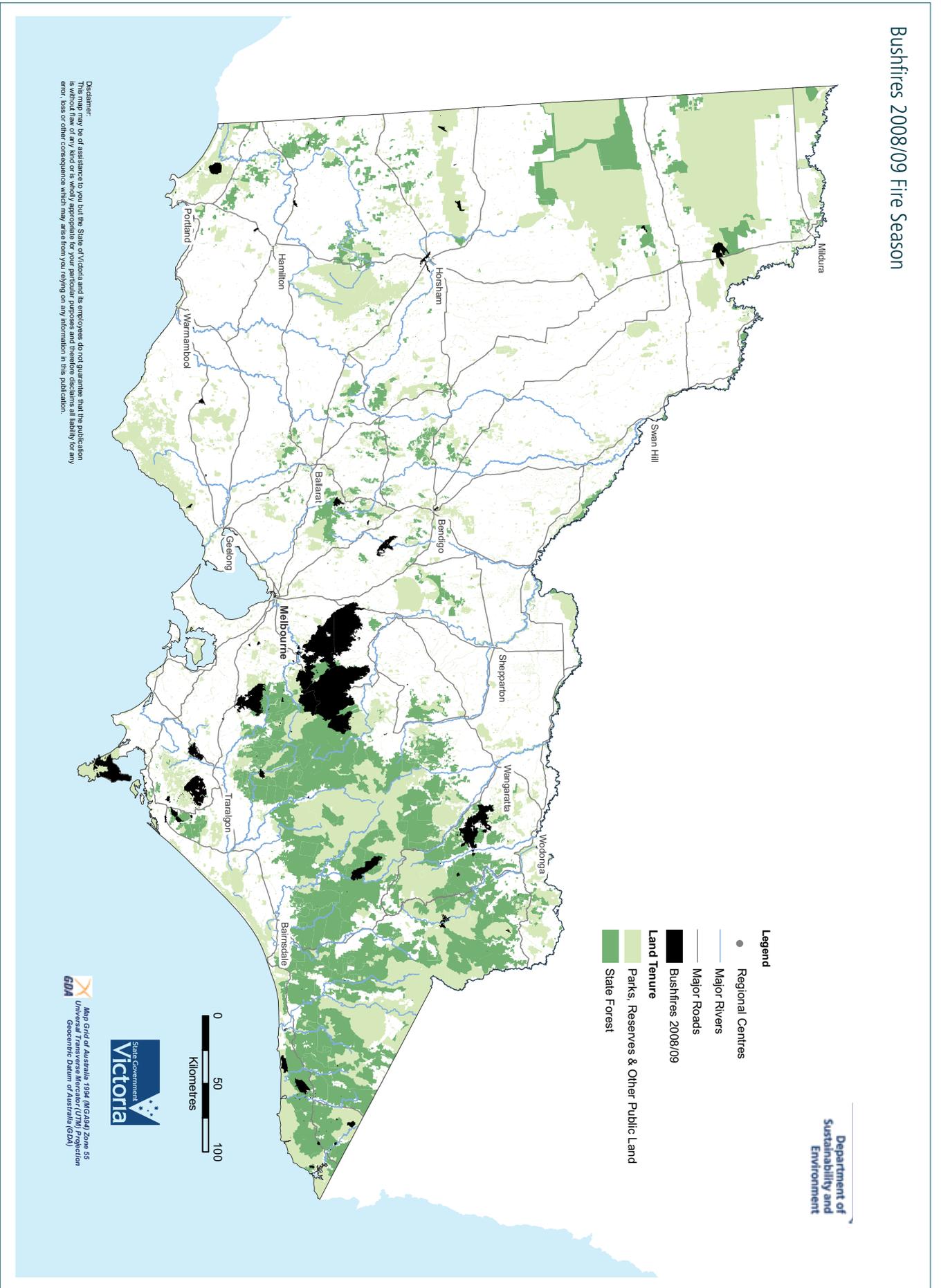
This report details the work completed by these agencies over the past two and a half years to assist the recovery of our communities, our environment and our economy.

On behalf of the Victorian Government, I commend and sincerely thank everyone at every level who contributed to this crucial and ongoing work.

Hon Ryan Smith

Minister for Environment and Climate Change

Bushfires 2008/09 Fire Season



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Map G14 of Australia, 1994 (MGS2494) Zone 55
Using Geocentric Datum of Australia (GDA)
GDA



Introduction

In February 2009, Victoria experienced the worst bushfires in Australia's history. The 'Black Saturday' bushfires, as they became known, burnt 406,337 hectares of land, 173 lives were lost and 78 communities were affected. It was a sad day for the nation; the loss was profound. The fires required a major recovery and rebuilding program to assist devastated communities and this included a program to rehabilitate and restore public land and its assets.

Immediately following the Black Saturday fires, the State and Commonwealth Governments agreed to establish a single authority to manage the very large and complex recovery process. The Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) was set up to advise governments, coordinate efforts and to develop an overarching plan for restoration and recovery of regions, towns and communities affected by the bushfires.

As well as supporting people and communities to recover, the Victorian Government – through the Department of Sustainability and Environment (DSE) and Parks Victoria (PV) – had the responsibility for recovery efforts on public land that was impacted by the fires, and to assist on private land.

A total of 284,510 hectares of public land were burnt. Fires affected 70 parks and reserves spanning an area of approximately 101,780 hectares and 167,250 hectares of state forest. Many significant commercial and recreational assets were either destroyed or severely damaged. A further 15,480 hectares of other, smaller parcels of public land were also impacted (for example unused public roads,). The fires caused more than \$25 million worth of damage to assets on public land.

There were 14 main bushfires in the summer of 2009. Table 1 below indicates the fires and the hectares of public land burnt, including the parks, reserves, state forests and Crown land reserves that were affected.



Photo credit: Jo Antrobus

Table 1 – The main 2009 bushfires and hectares of Public Land burnt

| Fire | Area burnt TOTAL | Private | Public Land TOTAL | Parks and reserves | State forest | Crown land |
|--|---------------------|----------------|----------------------|-----------------------|----------------|---------------|
| Kilmore East – Murrindindi North | 171,640 | 39,790 | 131,850 | 22,530 | 103,807 | 5,450 |
| Kilmore East – Murrindindi South | 86,520 | 24,900 | 61,620 | 40,640 | 19,150 | 1,830 |
| Beechworth – Library Road | 33,830 | 12,430 | 21,400 | 3,060 | 15,700 | 2,640 |
| Bunyip Ridge Track | 26,440 | 7,540 | 18,900 | 7,800 | 10,960 | 140 |
| Wilsons Promontory National Park – Cathedral | 24,490 | 0 | 24,490 | 24,490 | 0 | 0 |
| Churchill – Jeeralang | 24,470 | 16,670 | 7,800 | 1,130 | 2,540 | 4,130 |
| Dargo – White Timber Spur | 14,340 | 10 | 14,330 | 0 | 14,330 | 0 |
| Redesdale – Coliban Park | 9,510 | 9,090 | 420 | 300 | 60 | 60 |
| Delburn Complex | 6,460 | 4,600 | 1,860 | 120 | 520 | 1,220 |
| Muskvale – Hogans Road | 2,658 | 1,198 | 1,460 | 0 | 1,460 | 0 |
| Horsham – Remlaw Road | 2,240 | 2,230 | 10 | 10 | 0 | 0 |
| East Tyers – Thomson | 1,780 | 0 | 1,780 | 1,660 | 120 | 0 |
| Won Wron | 1,365 | 0 | 1,365 | 0 | 1,365 | 0 |
| Eaglehawk – Barcwell Street | 594 | 500 | 94 | 0 | 94 | 0 |
| TOTAL | 406,337 | 118,958 | 287,379 | 101,740 | 170,169 | 15,470 |



In October 2009, VBRA released *Rebuilding Together – A Statewide Plan for Bushfire Reconstruction and Recovery* that outlined a \$193 million recovery package to assist in the reconstruction and recovery process for fire-affected communities.

VBRA allocated over \$60 million to DSE from the recovery package to fund recovery works on public land. DSE implemented these works through the department, PV and catchment management authorities (CMAs). This funding was aligned to three of VBRA's pillars detailed in *Rebuilding Together*. The allocation was as follows:

Reconstruction

\$24.25 million to replace and restore state-owned facilities in fire-affected towns (e.g. Steavenson Falls, Lady Talbot Scenic Drive, Grand Ridge Rail Trail, Marysville Caravan Park, Pomborneit Recreation Reserve, Marysville Caravan Park and Kinglake Wilderness Park) and to restore and enhance tourist facilities in fire-affected areas and re-open National Parks (e.g. repair and replacement of visitor facilities at Wilsons Promontory National Park and Bunyip State Park, replacing the Kinglake National Park Visitor Centre and works depot, restoring visitor facilities at Yarra Ranges National Park, and repairing key visitor infrastructure at the Cathedral Range State Park). This allocation was supplemented by insurance funding.

The Reconstruction program involved more than rebuilding. It aimed to improve the way in which products and services are delivered and utilized by the entire community. Thus, in many cases the reconstruction of facilities on public land were not just about replacing the existing structure, but actually improving and modernising them to provide for the future needs of communities, and support tourism recovery.

Economy

\$8.85 million to rebuild the Lake Mountain Alpine Resort. A further \$2.033 million was assigned to the rebuilding of the Kinglake National Park office and depot; and \$1.797 million for restoring and enhancing tourist facilities in Kinglake National Park, Toorourrong Reservoir Park and Cathedral Range State Park.

The 2009 bushfires had a significant impact on many businesses with tourist numbers declining dramatically for many months after the fires. The aim of several recovery projects was to attract visitors back to the areas where the fires had gone through by restoring and enhancing tourist facilities and re-opening parks, forests and reserves once it was safe to do so, often before the facilities had actually been rebuilt.

Environment

\$27.194 million to rehabilitate the environment by performing erosion control and public safety works on public land, controlling pests and weeds on public land, regenerating forests, restoring waterways and catchments and protecting threatened species.

Although fire is a natural event and native plants, animals and ecosystems have adapted over time to recover from fire, the natural environment still needed a major helping hand after the 2009 bushfires. Fires put many aspects of the environment at risk or in a vulnerable position. Some already threatened flora and fauna species were certainly put at further risk of extinction.

The natural environment provides many social, economic and environmental benefits for humans. It is integral to people's health and wellbeing; a great place to exercise, enjoy the fresh air and generally relax and 'escape'. Being able to visit and observe the recovery of parks and forests was particularly important for fire-affected communities, so government action and support for environmental recovery was critical.

Fortunately, our natural environment is resilient. Just months after the fires, new growth was evident, but in some areas it will take years for the flora and fauna communities to recover.

DSE and PV had two main rehabilitation and recovery functions:

1. Fire rehabilitation and emergency stabilisation

This included the rehabilitation of fire suppression activities/works on public land, such as restoration of temporary firebreaks. It also included emergency stabilisation measures undertaken to protect life, property and natural values after the fires. It was critical that this work started as soon as practical after fire suppression activities were complete. With major, large fires, this rehabilitation work sometimes starts before the fire is completely contained.

2. Fire recovery (post-emergency)

This phase encompasses the mid to long-term recovery of both the natural environment and the public land estate. From July 2009, DSE and PV transitioned into the recovery phase, focussing on the longer-term restoration of fire-affected public land. Activities undertaken were designed to have long lasting effects.

The main goal of the *DSE/PV Bushfire Recovery Plan for Public Land* was the recognition that the natural environment plays a critical role in the physical, psychological and economic recovery of individuals and communities. DSE and PV were committed to supporting these processes and providing access to public land as quickly as possible once damaged buildings and hazards had been cleared.

The *Bushfire Recovery Plan for Public Land* was developed in accordance with the *Code of Practice for Fire Management on Public Land (2006)*. This code applies to all public land in Victoria. Its purpose is to promote the effective and integrated management of fire and fire-related activities on public land. The code outlines the statewide standards for fire management on public land in Victoria. Rehabilitation works were also carried out in accordance with this code.

The purpose of the plan was to outline a range of immediate and longer-term projects to recover the impacts of these bushfires on public land. Specifically, the plan outlined projects to: protect and restore water quality and historic and indigenous cultural sites; protect vulnerable plant and animal species; and rebuild visitor facilities and public infrastructure on fire-affected public land.

The key objectives of the program were to:

- Ensure the safety of staff and the community
- Increase the level of involvement of the community in the management of the public land
- Restore access to all public land for the social and economic wellbeing of the community
- Preserve the natural values of our public land
- Protect the cultural values – both material and spiritual – of the country
- Ensure that the resources allocated to the program are wisely and efficiently used

The DSE/PV Recovery Program's implementation plan detailed actions to be undertaken by DSE, PV and the CMAs to assist the recovery of communities, the environment, heritage and industries in fire-affected regions.

The Recovery Program ran until June 30 2011 with a small remainder of work scheduled for completion by the end of 2011. Recovery operations on public land were overseen by a project control board representing DSE, PV and Melbourne Water. A senior DSE executive chaired this board. Implementation was managed through a recovery management board that met regularly to review the progress of projects.

DSE and PV worked with partner agencies such as CMAs, Melbourne Water, the Department of Primary Industries, and the Country Fire Authority, as well as local government councils, environment groups, community and volunteer groups and other non-government organisations. After nearly two and a half years of work, and some additional difficulties such as major flooding in the northern parts of the State, considerable work has been done and the signs of recovery can be seen.

The recovery program on Victoria's public land was a partnership between the State and Commonwealth Governments. The Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) coordinated all recovery efforts. The public land recovery program was delivered by Parks Victoria (parks and reserves) and the Department of Sustainability and Environment (state forests and other public land). The work was funded by the Victorian and Commonwealth Government's *Rebuilding Together – A Statewide Plan for Bushfire Reconstruction and Recovery*. Additional funding was provided by the Commonwealth Government's Caring for Our Country program through Catchment Management Authorities.

Short Term Recovery

Emergency Stabilisation and Assistance to Landholders

After major bushfires a number of high-priority emergency stabilisation actions on Public Land that are required to reduce threat to life, property and the environment. One example, trying to stop soil movement when it rains heavily after a fire and clearing up damaged buildings and contaminated material. Another is repairing roads and bridges to allow access to parks and forests, so fire agencies are able to respond to future emergencies and visitors are able to return.

Fire management agencies are often required to construct fire control lines to protect life and property as part of the effort to contain and control bushfires. These must be rehabilitated as practically and quickly as possible in order to minimise erosion. Sometimes rehabilitation occurs whilst fires are still burning as a way of using resources efficiently and keeping firefighters nearby in case a bushfire flares up.

Around 3300 kilometres of control lines were constructed during the 2009 bushfires, so it was a big task to carry out rehabilitation works over such a large area.

Trees that aren't completely burnt are often left in a precarious or dangerous state so it is important to check if any trees pose a risk to life or property. Dangerous burnt trees must be removed and clean-up operations must be carried out soon after fires.

Another casualty of the fires was the boundary fences between public and private land.



Rehabilitated control line in forest



Rehabilitating control lines

In an effort to stop the spread of the 2009 bushfires, fire management agencies constructed more than 3300 kilometres of control lines. Around 1800 kilometres were on public land and 1500 kilometres were on private land.

The purpose of a control line is to create a mineral earth break to contain and limit the spread of a fire. The size of a control line can vary from man-made rakehoe trail – perhaps less than a metre – to 20-metre breaks that are created by a grader or bulldozer. Fire control lines are sometimes created specifically to protect houses, farm buildings and other assets.

In total, more than 400,000 hectares of land were burnt in the bushfires, necessitating 3300 km of control lines – the distance from Melbourne to Broome. Control lines are sometimes constructed in advance of a fire or adjacent to the fire, in case there is a wind change.

In order to reduce erosion and stabilise soil, the topsoil needs to be restored to a state similar to how it was before the fire. This is particularly important near waterways to reduce run-off of sediments that may adversely affect water quality. Topsoil also contains seed and living 'runners' that help to re-establish the vegetation, so it is important to re-spread the topsoil as quickly as possible before the seed germinates.

Timely rehabilitation of control lines on private land aims to prevent and minimise potential erosion, protect water quality and encourage the regrowth of native vegetation.

Rehabilitating control lines also helps to provide habitat connectivity and security for native wildlife, particularly for small animals that are not inclined to cross large clearings.

The Department of Sustainability and Environment (DSE) and the Country Fire Authority (CFA) worked with landowners to rectify any control lines that were created on private property. Excavators, dozers and graders were used to reform the disturbed ground to return it to the original land profile. Grass seed was provided to many landowners to help regenerate control lines. On steep slopes, additional measures were used to prevent erosion, including runoffs and mounding of the soil to direct water on to the adjacent undisturbed ground.

Rehabilitation work was completed by October 2009, with some control lines on public land left in place because of their potential to protect assets from future bushfires. In some instances, additional rehabilitation works were carried out if areas required further treatment, or the original work had been unsuccessful.



Control line after rehabilitation

The Cascades, Wallaby Creek before the fire, after the fire and one year on



Creating a control line with a bulldozer



A road drainage line treated to BAER recommendations

Repairing and replacing fences

Around 1500 kilometres of boundary fences between public and private land were also a casualty of the 2009 bushfires. The majority of this fencing was covered by insurance and any fences that were damaged as a result of firefighting activities were repaired by the fire agencies.

The Victorian Government reimbursed the insurance excess for private landowners to a maximum of \$400 on all insured Crown land forest and park boundary fences destroyed or damaged by the bushfires or firefighting efforts.

The government worked with the Victorian Farmers Federation (VFF), which activated its network of members, volunteers and staff across the state to help restore boundary fences. By the end of June 2009, more than 5000 volunteers had worked the equivalent of 36,500 hours on clean-up and repairs to around 1500 kilometres of boundary fences on nearly 800 properties. There were around 130 insurance claims, totalling close to \$48,000.

Expert assistance from the US

During the February 2009 bushfires, three Burned Area Emergency Response (BAER) teams were requested and deployed from the United States. They were needed to assess the fire and fire suppression impacts across the landscape and identify emergency stabilisation and rehabilitation priorities.

The teams conducted fire severity mapping using satellite imagery and prepared reports for each of the major fires; which formed the basis for immediate emergency rehabilitation works and provided information for regional recovery and rehabilitation plans.

Emergency stabilisation works included assessing and removing dangerous trees along roads and tracks, maintenance of critical infrastructure such as fire access tracks and roads, and soil stabilisation works to protect water catchments. Silt traps were installed to reduce the impacts of the fires on water quality and control erosion.

Once emergency stabilisation works were completed it was possible to re-open some parks and forests, allowing tourists to return to the areas, and helping to boost local economies.

Following the success of the BAER teams' work, DSE trialled Bushfire Rapid Assessment Teams (Bushfire RRATs) during the 2009 bushfire season. A Bushfire RRAT has personnel from all key Victorian Government agencies involved with fire management on Public Land: the Department of Sustainability and Environment, Parks Victoria, VicForests, the Department of Planning and Community Development (Aboriginal Affairs Victoria) and Melbourne Water. This ensures that all aspects of land management are covered.

The Bushfire RRATs have a similar role to the BAER teams – to rapidly assess major risks to life and property, infrastructure and the environment following bushfires.

Using a systematic process, the Bushfire RRATs provide practical solutions and approximate costs to mitigate these risks. This then sets the direction for rehabilitation priorities and informs long term recovery actions.

The 2009 trial proved successful and three permanent Bushfire RRATs have since been established and other states are following in Victoria's footsteps. NSW and ACT fire fighting agencies have sent team members to Victoria for training and have established their own rapid risk assessment teams.

Even our US counterparts are impressed with the way the Bushfire RRATs are operating and are taking on board some of the improvements the Victorian teams identified. There is continued collaboration and information sharing, which benefits both Australian and US fire fighting agencies, and bushfire management.

Providing clean, safe water and replenishing water supplies

The smoke and ash from the February 2009 fires infiltrated and contaminated rainwater tanks on many private properties that had no access to town water and reticulated water services. The rainwater tanks were their primary supply of water.

DSE developed a program to ensure communities impacted by the 2009 bushfires had access to fresh, clean safe drinking water following the fires.

Under normal conditions, the cost of tank filling and cleaning is met by the property owner. However, these were not normal circumstances. In the wake of the fires, DSE, in conjunction with water corporations, provided a free temporary water tank cleaning and water carting service in and around the Kinglake area.

The water replacement program was instigated so that no-one would go without fresh clean safe drinking water. To ensure this happened, five community water-filling tanks were installed around Kinglake within the fire area. Drinking water was available free to people impacted by fires.

Free drinking water was also made available at the three temporary village sites (Kinglake, Flowerdale and Marysville) for people living in or near to those villages.

Alternatively if people had their own water container, free drinking water was available to collect via standpipes provided by Goulburn Valley Water at two locations at Marysville and Buxton.

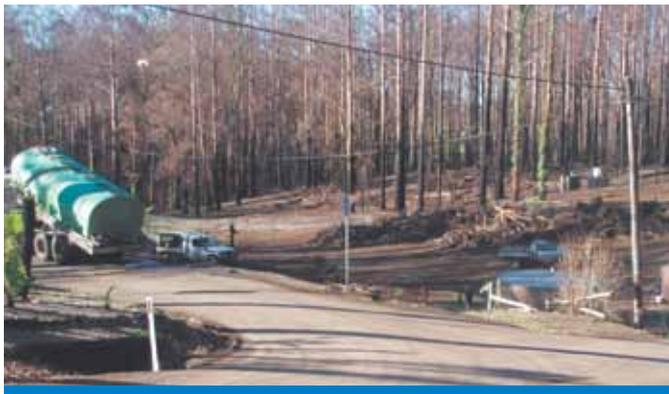
It was originally anticipated that this service would last for a matter of days, but it continued on for five months due to the ongoing need. Many people didn't have access to their properties until quite some time after the fires were extinguished and it was safe to return.

More than 1000 properties had their rainwater tanks cleaned and around 1500 properties received a one-off delivery of 5000 litres of water. The total cost was around \$600,000.

By providing rainwater tank cleaning and drinking water delivery, community water tanks, free drinking water at the temporary villages and drinking water available at standpipes, the fire impacted-communities had access to drinking water.

Left: Water being delivered to a property

Right: A burnt water tank



Water replacement for dams and tanks used for fire fighting

Prior to the summer of 2008/09, fire fighting agencies anticipated and were ready for a long and difficult fire season. Preparation included identifying areas and water points across the state where it is feasible to gather water for a first attack on a bushfire, or to gather water for a sustained attack on a long-running bushfire.

DSE and CFA fire fighters have legislative powers to take water from any waterway or water source for fire fighting purposes. Large volumes of water were needed to fight the 2009 bushfires and in some circumstances came directly from private property owners' dams and tanks, as well as water catchment reservoirs.

The fire agencies knew that people were concerned about water because of the prolonged drought. There was already a shortage of water in many parts of the state. However, farmers and communities understand that water is essential for fire fighting, and everyone needed to work together to get through the bushfire season.

DSE and CFA's main priority during the fire season was to save lives and property.

Fire fighting helicopters and Elvis the Airplane got water from farm dams, as did fire trucks and tankers. Erickson Airplanes are a very valuable fire fighting tool in Victoria – they can carry up to 9000 litres of water or foam (the equivalent to a backyard swimming pool), are very fast with a cruising speed of 200 km/h and can be refilled from a dam or reservoir in under a minute. Most importantly, they can drop water very accurately to help protect homes and buildings that are threatened by fire.

After the fires were contained, the aim was to replace essential water within 48 hours of the need being established. Private landowners were required to make an application to DSE or CFA. Only water for essential use was replaced. This included water needed to immediately sustain:

- the health of affected residents and pets
- the health and productivity of their stock, and
- agricultural and horticultural crops, permanent and intensive industries.

In the months following the bushfires, more than 5 million litres of water was delivered to private landowners where water had been used for fire fighting. Local government and water authorities helped to facilitate this process.



Protecting Melbourne's waterways and water supply

Around 30 per cent of Melbourne's water catchments had some degree of bushfire damage after the February 2009 fire. Most of this was in the Wallaby Creek, O'Shannassy and Maroondah catchments. Melbourne's two most important water storage catchments – the Upper Yarra and Thomson – were largely unaffected.

In total, around 940 kilometres of waterway – about 10 per cent of all waterways in the Port Phillip and Westernport region was affected by the bushfires.

Melbourne Water is the government authority responsible for managing Melbourne's water supply catchments (in conjunction with DSE and PV) as well as having responsibility for removing and treating the city's sewage and managing rivers, creeks and major drainage systems throughout Port Phillip and the Westernport regions.

Melbourne Water established a Bushfire Recovery Coordination Team to manage short-term and long-term recovery issues. The key priorities were:

- protecting drinking water quality and supply; and
- protecting the health of fire-affected waterways.



Culvert risers help to slow water down at road crossings, which allows silt to drop out of the water. Once a grass cover is achieved the risers are removed and the stream is able to reset, thus stabilising the soil. This photo shows a culvert riser operating during a high rainfall event, New Years Eve, 2009.

Water supply infrastructure

From late February through to April 2009, Melbourne Water assessed the damage to infrastructure caused by the fire in catchment areas and prioritised the works to repair or replace.

Damage to water supply infrastructure included roads, bridges, aqueducts, weirs, security gates, signage, and storage tanks. Historic buildings were also destroyed in the Wallaby Creek catchment. Some catchment areas experienced increased soil erosion following rainfall events. The Maroondah aqueduct system escaped major damage, however fallen trees and landslides initially caused some blockages. This was rectified quickly.

Impacts on waterways

Intense bushfires can have significant impacts on waterways in a number of ways. The February 2009 fires impacted rivers and creeks through loss of vegetation, fallen and burnt vegetation in the water, increased sediment and erosion, reduced water quality, and loss of habitat for birds, animals and fish.

Wallaby Creek water supply catchment sustained considerable damage and rains soon after the fires caused soil movement. This required extensive rehabilitation work to ensure that water quality was not compromised

Conversely, the rain did help waterways to start their gradual recovery from the bushfire. Grass and vegetation started to grow and form a natural barrier, reducing the likelihood of ash and sediment run-off.

Water quality and sediment control

Overall, there was no impact to the quality of drinking water provided to Melbourne as a result of the bushfire, which was the major concern. Melbourne Water undertook rehabilitation work over the remaining months of 2009 to reduce erosion and sediment run-off and increased water quality monitoring to ensure that the Melbourne's drinking water continued to be of the highest quality.

The sediment control works predominately consisted of installing silt traps in drainage lines and constructing and maintaining drainage structures on roads and creek crossings to reduce the chance of roads being 'washed out' after rainfall events. Large floating silt curtains were also installed in some reservoirs to further reduce any impact.

Catchment regeneration

The fires created many open spaces in the vegetation which allowed more sunlight in and added nutrients to the surface soils. Native regeneration and eucalypt seedling germination occurred quickly after the fires, but there was also an opportunity for weeds to spring up. Melbourne Water worked in collaboration with DSE and PV, local government and landholders to prioritise weed control to protect waterways, significant natural values and encourage native vegetation to regenerate.

Native and pest animals

Monitoring animals – both native species and pest animals – was also an important recovery activity for Melbourne Water. Through regular monitoring it was possible to identify management changes or intervention if needed. Melbourne Water surveyed fish, platypus, frogs and macro-invertebrates within and downstream of fire-affected waterways for many months after the fires

Additionally, Melbourne Water assisted in fox control programs to help protect native animals from predation by foxes.

Assisting private landowners

Melbourne Water worked with private landholders to repair and rebuild fences that bordered land and vegetation adjoining waterways and to rehabilitate burnt riparian vegetation.

Melbourne Water has an ongoing Stream Frontage Management Program that supports landowners in many ways to protect, improve, and manage their stream frontages. After the fires, funding assistance was provided for riparian fencing as well as support for riparian rehabilitation and revegetation.

The future

Two and half years on from the February 2009 bushfires, Melbourne Water continues to keep a close watch on the health of the waterways and associated flora and fauna. Considerable insight was gained about ecological response to bushfires of significant magnitude, which will contribute to Melbourne Water's future planning for long-term water quality, water supply and river health management.

Waterways surveyed in fire-affected areas outside of the water supply catchments, considered to be drought-stressed and in poor or moderate condition prior to the fires indicated less resilience to the impacts of the bushfires, with noticeable changes in fish fauna at particular sites.

Preliminary observations indicated that waterways identified as being in good condition prior to the fires and which were not suffering from prolonged drought conditions, appear to have provided a buffer for aquatic fauna such as fish and platypus against the immediate impacts of bushfires.

Bushfire recovery is a multi-pronged process that involves many activities: water quality, revegetation and water quantity monitoring, hydrological modelling, onground catchment works, support to flora and fauna, scenario planning and much more. There are many issues to deal with and it is a complex job.



Turbid flows at Steeles Creek after the 2009 bushfire



DSE and VicForests staff loading seed into a helicopter

Re-seeding our forests from the air

The whirr of helicopter blades was a regular sound over thousands of hectares of Victoria's forests for several months after the 2009 bushfires.

A specially equipped helicopter dispersed 3500 kilograms of eucalypt seed onto nearly 4500 hectares of Mountain Ash, Alpine Ash and Messmate forest that was severely burnt by the fires and lacked the capacity to self regenerate.

Unlike many eucalypt species, Mountain and Alpine Ash are easily killed by intense fire and generally only regenerate from seed. If the trees are less than 15-20 years old they carry very little seed and require artificial seeding for the eucalypts to regenerate. Fortunately, a strategic seedcrop assessment completed after the fire in older Ash forest stands indicated good seed crops present, meaning those areas should regenerate with eucalypts naturally.

Forest managers from DSE used seed that VicForests had previously collected and stored prior to the fires. VicForests continued to collect seed after the fire to replace seed in store that had been sown and DSE is working to increase seed stocks.

In the autumn months following the fires, seed was collected from unburnt Mountain and Alpine Ash state forests around the state. This involved contractors climbing trees to cut off branches, which were then stripped of their seed capsules (gumnuts). The seed capsules were then taken to extraction centres and placed in a kiln to heat and tumble the capsules until they opened, allowing the seeds to fall out.

Ash seed is about the size of a pinhead. From this grows the largest tree in the southern hemisphere.

More than 200 forest coupes harvested for timber over the past 20 years near Marysville, Kinglake, Alexandra, Bunyip and Dargo were re-sown before mid-winter 2009. It was vital that the aerial seeding was done quickly because the ashbed created by the bushfires was ideal for germination. Seed also needed to be sown while seasonal conditions were conducive to germination. Growing seedlings help to prevent the soil being washed into nearby creeks and rivers in the future.

This was the single largest aerial sowing program ever undertaken in Victoria and cost approximately \$1.5 million. Aerial seeding is the most cost-effective, time-efficient and successful method to regenerate these forests with eucalypt after bushfire.

DSE conducted Established Seedling Surveys 18 months after the sowing program that demonstrated very positive results. So far 3500 hectares have been surveyed and eucalypt establishment has generally been very successful.

There are some small areas where seedlings have not established. This is mostly in areas where lyrebirds have scratched the germinants out of the soil as they emerged, or due to heavy competition with other plant species such as Giant Mountain Grass.

In some areas where eucalypts did not grow, nursery propagated seedlings were hand-planted in spring 2010. In other areas, a retreatment program started in February 2011. This program created a seedbed for sowing eucalypt seed onto the sites.

Overall the sowing program was a great success. It will contribute to habitat, biodiversity and soil conservation values while providing native timber resources for Victoria into the future.

The sowing and retreatment programs also contributed to regional economies by employing a number of regionally-based forestry personnel. This diverse group included DSE and VicForests management and technical staff, and forest contractors with specialist skills in forest surveying, seed collection, aerial seeding and large plant operations.



Many roads to and within Victoria's parks and forests were closed after the bushfires

Throwing open the 'doors' – re-opening parks and forests to the public

Victoria's parks and forests are enjoyed by millions of people each year for a range of recreational activities such as bushwalking, four-wheel driving, camping and canoeing. Our wonderful parks and forests are a favoured destination for thousands of visitors at times like Easter and school holidays.

The 2009 bushfires burnt around 400,000 hectares of land. Though this was not Victoria's largest fire in terms of hectares burnt (the Alpine Fires in 2003 burnt nearly 1.2 million hectares of public land), more than 287,000 hectares of public land were affected.

Sadly, some of the state's most popular parks were severely impacted by the fires. At Kinglake, 96 per cent of the national park was burnt and at nearby Cathedral Range State Park, 92 per cent burnt. At spectacular Wilsons Promontory National Park, the bushfire went through more than half the park and 80 per cent of Tidal River's water catchment was burnt.

Fire-affected areas were immediately closed to the public until they could be made safe. The reasons for closure included: hazardous trees, limbs and fallen timber; damaged roads and tracks, bridges, signs, recreation sites and facilities; unstable soils and stream crossings and the potential presence of hazardous materials or substances, such as Copper Chrome Arsenate (CCA) and asbestos.

DSE and PV officers inspected burnt areas of parks and forest to assess the level of damage and arrange for repairs and replacement of roads, tracks and bridges, walking tracks and visitor facilities.

Some parts of parks and forests could be re-opened fairly quickly once any risk to human life had been removed or mitigated. At Wilsons Promontory, the park was re-opened on 21 March, in time for Easter holiday-makers (although some areas were still closed). Further repair, restoration and revegetation work was completed in spring so that most of the park was open for the busy summer visitor season.

Where possible, public land was re-opened before all facilities were rebuilt so that people, especially those from the surrounding communities, could re-establish their connections with the parks and forests and observe their recovery.

In Gippsland, 46 per cent of the Bunyip State Park was affected by fire. Closer to Melbourne, 38 per cent of the Yarra Ranges National Park was burnt.

The Kinglake National Park and Bunyip State Park were closed to visitors for many months after the fires as there was so much restoration work to be done.

In total, around 6000 kilometres of roads and tracks needed repair work, but by the end of October 2009 extensive work had been done to reopen as many roads and tracks to the public as possible.

Re-opening of parks, forests, roads, tracks and visitor facilities was a staged process and only occurred once DSE and PV were confident that areas were safe and necessary immediate recovery work had been completed.

2 Mid to Longer Term Recovery

Protection and Restoration of Catchments and Waterways

Major bushfires like the 2009 fires have an impact on water quality and quantity, at least immediately after the fire.

Sometimes nothing can be done to prevent water quality issues after bushfires. However, there are ways to mitigate the risks that may mean water quality and water quantity are not as badly affected.

Post-fire soils actually repel water, which leads to short term, increased run-off, leaving catchments and streams vulnerable to erosion and flood events. Loss of vegetation and nutrient run-off also contribute to reduced water quality.

Initially, it is important to stabilise the catchments and treat any vegetation debris (log jams) in waterways and sediment that is compounding the problem. Then, fences are rebuilt or replaced and revegetation works done along waterways for long term recovery.

In Victoria, Catchment Management Authorities (CMAs) are responsible for managing river health, regional and catchment planning, and waterway, floodplain, regional drainage, salinity and water quality management. This means that after bushfires they have to implement works and activities to minimise impacts to river health and recovery of catchment and waterway condition. A lot of work was done to ensure that water quality did not become an issue of concern for communities and landholders recovering from the fires.

Bushfires affect water quality and quantity

Immediately after a bushfire, the loss of vegetation exposes soil to wind and water, making the soil more susceptible to erosion. Fire also heats up the soil, burning its organic material so that rain runs off it rather than soaking in.

This all leads to soil, ash and nutrients flowing into streams because the burnt vegetation alongside waterways (called riparian vegetation) cannot act as a buffer.

During subsequent rainfall events, soil, ash and nutrients will enter waterways, impacting on water quality. Additionally, stream temperatures can rise from lack of vegetative cover affecting aquatic life.

As the surrounding vegetation regenerates, the new growth helps to stabilise the soil, which then reduces run-off and erosion so that water quality can return to pre-fire conditions.

Impacts of fires on waterways

Changes to water flow and water yield

In the short-term, the loss of vegetation after a bushfire will result in increased run-off and localised flooding when it rains. River flow depths are exacerbated by the build-up of debris of fallen burnt trees and partly burnt timber, and a build-up of sediment from the erosion of bare river banks, with a consequential risk of localised flooding in some instances.

In the medium term, as vegetation slowly re-establishes, there is a decline in water yield as more water is taken up by younger rapidly growing plants. Reduced water yield, combined with sediment and degraded water quality can have significant impacts on stream ecosystem.

Increased erosion

The loss of vegetation cover and subsequent exposure of bare earth, coupled with the construction of control lines across waterways, contributes to increased erosion, particularly from steep slopes. Mass movement of topsoil is possible. The land is therefore very vulnerable to significant soil erosion from rainfall run-off, causing large amounts of soil to be deposited downstream into waterways and floodplains.

There can also be considerable change to the landscape – gullies can be reduced to bed rock and debris in waterways can alter flow patterns which cause bed and bank erosion.



Increased debris

Increased branches and leaves and partly burnt trees are carried downstream after fires. Accumulated debris poses a major risk of damage to public infrastructure such as bridges and CMA assets such as water quality monitoring equipments and instream structures, as well as to waterways from increased erosion from debris impact and deflected stream flows. Accumulations of debris can, in some situations, contribute to river breakaways with serious consequences of damage to private property and by-pass of existing infrastructure.

Litter decomposition poses a risk to water quality from reduced dissolved oxygen with potential for fish to die.

Increased sediment

Increased sediment deposition in waterways and on floodplains from catchment and waterway erosion following vegetation burn, reduces habitat for fish and interferes with the breeding behaviour of a number of species.

Degraded water quality

For many months after a fire, poor water quality from increased nutrients and depleted oxygen levels, combined with increased sediment loads can cause major adverse impacts on receiving waters that supply water catchments and provide water for domestic, and in many regions, commercial water users.

Increased nutrient levels can lead to algal blooms in these receiving waters, which can pose health risks for people, stock, wildlife and domestic animals. Dead stock in waterways can also be a significant threat to water quality if not removed quickly after a fire.

Over time, the amount of sediment and 'dirty' water steadily declines after each rain event until water quality eventually returns to pre-fire levels, however major floods can upset this process.

Burnt riparian fencing and vegetation

Burnt riparian fencing poses a risk of increased erosion and increased sedimentation into waterways and significant risk to riparian and waterway health as a result of unrestricted stock access to previously protected frontages. The loss of a riparian vegetation buffer poses a threat to water quality from sediment and nutrient-laden catchment flows directly entering waterways.

Stream alignment and stream stabilisation

Burnt or partly burnt timber structures and damaged rock chutes pose a threat to waterway stability in the shorter term and the whole of river system in the longer term and need to be replaced or repaired urgently after a fire.

Increased weeds

Fire and soil disturbance from fire suppression activities creates an ideal environment from significantly reduced vegetation, for weeds to prosper. Infestation of common riparian weeds such as broom, blackberries and willows is rampant after a fire, which impacts on the health of riparian vegetation and the waterways.



Photo credit: Alluvium

A severely degraded waterway

Fire recovery work helps protect river health in the North East

In the wake of devastating fires around Beechworth, Stanley, Rosewhite and Mudgegonga in February 2009, the North East CMA worked with landholders, DSE, DPI and local government councils in the region to restore and protect river health.

Rehabilitation of waterways was a crucial part of the bushfire recovery effort in Victoria's north-east.

As an initial commitment, the Victorian Government allocated \$357,000 to the North East CMA for immediate rehabilitation work on fire-affected waterways, including the removal/location of burnt timber accumulating in waterways and construction of silt traps to reduce entry of silt into waterways.

Post-fires the CMA river health team responded to more than 70 requests from landowners for restoration of fire-related damage to waterways, gullies and riparian fencing.

CMA staff conducted inspections of the waterways affected by the fires to determine the extent of damage and determine how to best implement the recovery program and also support landholders as part of the ongoing recovery effort. The Victorian Government allocated \$600,000 for this recovery phase.

The North East CMA completed works on Havilah Creek, Barwidgee Creek, Happy Valley Creek, Jacksons Creek, Sandy Creek and Myrtle Creek. This worked included removing severe blockages throughout approximately 20 kilometres of waterways, caused by burnt willows that had collapsed into streams. This was then followed by reinstating large wood as grade controls and restoring habitat using timber provided by the Alpine Shire that had been salvaged from burnt roadsides.

Additionally, the North East CMA helped DSE to repair containment lines and access routes that were constructed adjacent to waterways and across waterways during the fires.

Together with DSE, the North East CMA rehabilitated these areas, particularly by building run-off lines and replacing debris on the cleared areas to prevent future erosion and silting up of waterways.

In terms of future planning, the CMA also assisted with development of an emergency stabilisation and rehabilitation plan for the Ovens district. Water quality was a critical component of this plan.

Assessing the fire damage to waterways in the Goulburn Broken

A total of 188,000 hectares of land was burnt in the Goulburn Broken Catchment in the 2009 bushfires; affecting a significant area of the upper Goulburn River catchment between Kilmore/Wandong and Alexandra.

Fire intensity fluctuated widely across the fire-affected areas, which meant that the impacts on natural and built assets were highly variable.

In April 2009, the Goulburn Broken CMA did an assessment of the fire-related damage on priority rivers systems. The priority streams were the Big, Rubicon, Taggerty, Steavenson, Acheron, Murrindindi and Yea Rivers; and the King Parrot, Sunday and Dry Creeks. Some minor tributaries were also assessed.

The principle aim of the initial assessment was to develop an on-ground works program (including emergency works) for the CMA to implement. The Victorian Government provided \$800,000 for the initial response of emergency works and \$1.2 million for the recovery program.

Members of Landcare networks and staff from DPI began working with the community immediately after the fire was contained. Several field days, focusing on issues that were foremost in the minds of landholders, were held at locations across the burnt area to maximise community participation. These field days resulted in a rapid uptake of works on private land.

Landcare groups played a major role in managing sensitive issues such as illegal clearing and in organising 500 volunteers to do everything from fencing to installing nest-boxes. They worked alongside the Goulburn Broken CMA on many of its projects, including erosion and weed control, debris and sediment management, and revegetation. The Goulburn Broken CMA employed nine local people from fire-affected areas to join their three work crews and provide guidance on a range of local rehabilitation programs.

In the 12 months following the fire, more than \$6 million from various funding initiatives was committed to fire recovery operations in the region. All landholders in the burnt areas were contacted or had access to specialist advice and community support. More than 800 hectares of critical habitat were protected and habitats for 15 threatened species affected by the fire were improved. Weeds were controlled on 400 hectares.

The magnitude and speed of the response was only possible because of community networks such as Landcare. The Upper Goulburn Landcare Network coordinated 790 volunteers from 15 diverse organisations.

Works to ease the impacts of heavy rains

In March after the 2009 bushfires, the Goulburn Broken CMA set up early warning systems to allow authorities to respond quickly if heavy rain in the months after the fires washed ash and sediment into waterways.

Increased rainfall after bushfires has the potential to make a significant impact on rivers and streams.

Goulburn Broken CMA worked with partner agencies Goulburn-Murray Water, Goulburn Valley Water, DSE, DPI and the Environmental Protection Authority (EPA) to monitor water quality and flows to manage the impacts on water supplies.

The CMA also analysed scenarios to determine downstream impacts and assess possible management options in the regulated Goulburn River.

With little riparian vegetation remaining in many areas, including the King Parrot Creek and the Rubicon, Acheron and Yea Rivers, there was no natural filter to prevent sediments and pollutants entering the waterways.

Man-made barriers were installed at key locations to prevent silt and ash entering waterways in the event of low flows or rainfall.

Communities in bushfire-affected locations were encouraged to report major water quality changes to the EPA, GVW or Goulburn Broken CMA.

Bushfire recovery in the Goulburn Broken region was impacted by the significant flood events in September and December 2010, and again in January and February 2011. It is expected that recovery programs will be completed in 2011.



North East CMA River Health Operations Manager, Peter Sacco, inspected fire damage at Barwidgee Creek, Mudgegonga in February 2009 following fires in the area

Revegetation and restoration work helps to improve the health of Traralgon Creek

More than 39,000 trees and understorey species were planted along the banks of Traralgon, Jeeralang, Flynn and Stony Creeks in the 18 months after the fires as part of the West Gippsland CMA's bushfire recovery program.

Using a diverse range of indigenous seedlings sourced from local seed banks, the West Gippsland CMA worked with landholders to revegetate creek banks and riparian zones that were damaged by the February 2009 bushfires.

Before the revegetation work took place, the recovery program focused on stabilising and repairing the eroded and fire-damaged creek banks throughout the area.

Making use of the large fallen logs and loose rocks, the West Gippsland CMA operations team also constructed riffles in the river and creek beds to re-establish the sequences of the water that were disturbed by the fires. Riffles are constructed to act like mini rapids and help to aerate the water and contribute to healthy aquatic life.

The riffles will help to reduce the velocity of the water and provide a natural shelter and food source for fish species.

After the structural repair work was completed, sections of fire-damaged waterways were re-fenced, reducing the chance of erosion and provided existing native plant species with a chance to regenerate.

An abundance of weeds, including blackberries and thistles, re-emerged following the fires. This required West Gippsland CMA to increase its weed maintenance efforts in the area.

Unfortunately, the weather conditions following the fires were ideal for weed growth, so a lot of effort went into weed control before the revegetation work could begin. This made sure that the new vegetation had a better chance of survival.

The revegetation work helps to improve river health by reinforcing the banks, reducing nutrient and sediment runoff and providing denser habitat for native animal species.

In partnership with private landowners, ongoing willow reduction work also continued throughout the year along the Traralgon Creek, helping to improve the connectivity, flow and health of the waterway.

The West Gippsland CMA was initially allocated \$250,000 for emergency response and \$570,000 for recovery works.

Photo credit: Simon Dallinger



Photo credit: Simon Dalinger

North East CMA crews used a mix of river health expertise and heavy equipment to rehabilitate areas burnt during the 2009 bushfires. In conjunction with DSE, CMA crews built runoff lines and replaced debris on cleared areas to prevent future erosion and silting up of waterways

Restoring CMA Waterway Assets

The 2009 bushfires burnt about 64 kilometres of riparian fencing, mainly in the Goulburn Broken catchment.

The land alongside waterways (called riparian land) is critically important to river health for soil stability, sediment and nutrient capture, as well as providing food and habitat for aquatic and terrestrial wildlife.

Recovery of vegetation along stream frontages following the bushfires was crucial because the lack of riparian vegetation meant there was little buffer to stop soil and debris from entering into the waterways. Burnt riparian land also requires protection from livestock.

Catchment Management Authorities, in partnership with private landowners, repaired or replaced burnt riparian fences in order to keep stock away from the waterways that were trying to recover from the bushfires.

For example, the Goulburn Broken CMA offered private landholders an \$8 per metre subsidy for fencing along waterways burnt in the February 2009 fires, maximising government investment.

Some of the water quality monitoring sites on waterways in the bushfire areas were also impacted. Monitoring water is always important, but it was even more critical after the bushfires, when water quality and waterway health were compromised.

The Victorian Government's Bushfire Recovery Program funding supported additional monitoring equipment for water quality measurements including dissolved oxygen, turbidity, flow and sediment loads.

The Goulburn Broken CMA modified 10 water quality monitoring sites on key unregulated streams by installing additional equipment to provide real time data. The data was provided to rural water authorities for quality of potable water supply and to other agencies also for the purpose of water quality information.

Protecting a township from post-bushfire flooding

Soon after the 2009 bushfires, the West Gippsland CMA identified the need to assess the risks associated with post-bushfire run-off so that the CMA and other stakeholders could determine what recovery actions were required. In particular, there was potential for flooding in the township of Traralgon because of the after-effects of the fires specifically from accumulation of burnt debris in Traralgon Creek.

The CMA engaged expert consultants to assess the effects caused by changes in the response of fire-affected catchments to rainfall that could potentially impact critical built and natural assets within waterways. The consultants also identified practical and effective mitigation options or precautions that the CMA and other stakeholders could undertake to reduce the risk of flooding and protect infrastructure.

The February 2009 Churchill-Jeeralang bushfire burnt 21,622 hectares of forest in several catchments including the Traralgon Creek catchment and a further 10,637 hectares of private land.

Public and private infrastructure in Traralgon – the La Trobe Valley's largest regional centre – were at risk of serious flooding if there were major rainfall events after the fires, which can be common after a large bushfire. The Burned Area Emergency Response teams did flood flow modelling as part of their work and recommended a number of activities that could lessen the potential of a major flood.

After major bushfires, significant amounts of woody debris can be washed into waterways – tree limbs, wooden fence posts, and even entire burnt trees with potential for increased flooding, river erosion and impact on river health, when rain does fall.

In the case of the Traralgon Creek, much of the woody debris was removed from the channel and stockpiled on the adjacent floodplain; the intention being to clear the channel so that flow would be less impeded.

However, these stockpiles presented problems in themselves. A heavy rainfall event could have mobilised these debris piles causing them to block bridges and increase the potential of flooding to the township of Traralgon.

The West Gippsland CMA used much of the cleared debris to create 11 log structures to help prevent bank erosion, reduce soil mobilisation, protect adjacent private land and create habitat for fish and other aquatic life.

The CMA also constructed three grade controls, which are like a ramp in a waterway that decreases the slope of the creek bed. These helped to prevent bed erosion at critical sites along the Traralgon Creek where significant changes in the grade of the bed were evident.

Following the consultants' recommendations, the Latrobe City Council installed culvert risers in existing culverts in the Traralgon Creek to reduce the risk of them getting blocked and causing flooding over roads (riser pipes are inserted into the culverts to sieve out debris and allow passage of water).



Large pieces of woody debris lie across the channel in the Traralgon Creek

3 Built Assets on Public Land

The 2009 bushfires affected 70 parks and reserves totalling more than 77,000 hectares. An additional 170,169 hectares of state forest were also burnt and affected.

Many visitor and recreational facilities were either destroyed or badly damaged by the fires.

The Department of Sustainability and Environment (DSE) and Parks Victoria (PV) had the initial tasks of assessing the damage and then identifying what needed to be replaced and how. In many cases, insurance claims were made to cover the cost or partial cost of rebuilding.

Visitor facilities that needed to be repaired or replaced included picnic tables, barbeques, toilet blocks, camping grounds, information shelters, car parks, viewing platforms and lookouts, walking tracks, hand rails, signs and information boards.

Rebuilding visitors facilities in parks and forests

Many valuable visitor facilities on public land were damaged or destroyed in the 2009 bushfires.

The types of assets that were burnt and needed to be replaced included: picnic tables and shelters, barbeques, signs, viewing platforms, toilets and huts, and information shelters – all facilities that are important when visiting a park or forest.

Without these types of facilities, our parks and forests would be less accessible for visitors. All of these features enhance the 'outdoors experience' and contribute to visitors' enjoyment of Victoria's wonderful natural environment.

Some of the statistics surrounding what DSE had to replace are pretty amazing ... 100 barbeques, 118 picnic tables, nine information shelters and four picnic shelters, 33 car parks, 170 metres of boardwalk, 20 toilet blocks, 427 walking track signs and repair 102 kilometres of walking tracks.

Two years after the fires, about 85 per cent of the visitor asset replacement program had been completed. Some major assets are not yet finished, but will be completed by the end of 2011.



Setting out and the opening of the horse yards

Restoring part of Marysville's heritage

Apart from minor assets like signs and picnic tables, there were also some major visitor assets that were burnt and needed repair or replacement after the 2009 fires.

At Marysville, the Andersons Mill Visitor Area has been fully restored following near destruction in the bushfires. A historic former site of one of the town's largest timber mills, Andersons Mill is renowned for its horse yards, which have been rebuilt through the combined efforts of horse riding clubs around Victoria and DSE. Andersons Mill is a key stop on the 5330 kilometre long Bicentennial National Trail, which traverses the Great Dividing Range from Healesville in Victoria, to Cooktown in Queensland.

Andersons Mill is a place for families, campers, horse riders and bushwalkers alike, and is emblematic of what Marysville offers visitors. The newly constructed facilities at Andersons Mill include the horse yards, toilet block, picnic tables, fireplaces, improved campsites and visitor information signs.



Remembering our timber and hydro-electric history

The Rubicon Valley Historic Area has a long and rich history of timber harvesting and hydro-electricity generation. Situated about 150 kilometres north east of Melbourne near Taggerty in the Rubicon State Forest, much of the Historic Area was burnt in the Murrindindi Mill bushfire.

Rubicon Valley is the site of Victoria's first hydro-electric power scheme, and features a network of wooden tramways that connected sawmills to the edge of the forest. A two-foot gauge steel tramway connected the forest to the township of Alexandra to carry sawn timber, first by steam engine and then diesel engine.

The 1939 'Black Friday' bushfire destroyed much of the sawmills and associated tramways. Damage to the hydro scheme was largely restricted to wooden stave pipes and rail lines that had buckled from the heat, while all four trestle bridges required replacement.

The 2009 bushfire was similarly unkind to the Rubicon Valley Historic Area. Although the fire cleared vegetation and unearthed some interesting historic relics, it burnt the heritage-listed Beech Creek Trestle Bridge.

In the months immediately after the fire, staff from DSE and PV, along with volunteers from the Light Rail Research Society of Australia, inspected, photographed and documented the historic sites whilst the ground was clear and before vegetation regrew.

Then came the task of planning the replacement of the 44 m long, 9.5 m high Beech Creek Trestle Bridge. Prior to the fires there were already plans to refurbish the bridge and bring it back to its former glory. Now the rebuild is a major project that will cost around \$400,000. The original specifications will be used except for modern, concrete footings. Roading works and the rebuilding will occur over the summer of 2011/12 when it is not too wet.

In early 2012, the nine-trestle bridge will be ready to admire again and tell some of the tale of the Rubicon's history.



Trestle bridge before and after the fires



The new bridge over Wombat Creek

Getting back on the road and over the bridge

There are nearly 50,000 kilometres of roads and tracks across Victoria's public land estate. Some roads and tracks are used regularly by visitors and recreational users, such as four-wheel drivers and motorbike and horse riders. Others are fire access trails that are mainly used by public land managers to conduct fuel reduction and ecological burning.

Statewide, nearly 6000 kilometres of roads and tracks needed repair work after the bushfires. Significant works on some tracks such as the removal of dangerous trees, reinstatement of road signs and replacement of bridges and major crossings were still required at that time, but by early 2011, almost everything was complete.

Before bridges could be repaired or replaced the roads had to be fixed. This wasn't just a matter of re-grading. In many circumstances, to cater for increased water run-off as a result of the loss of vegetation, new drainage and culverts had to be installed, replaced and erosion control measures installed.

Engineers assessed burnt bridges to determine the best replacement or repair options and then DSE had to fulfil all planning requirements before new bridges could be designed and constructed.

All bridges being replaced will meet the current Australian Standards, which in many cases makes them considerably more expensive to rebuild than the previous design and construction methods. Meeting these standards is very important though, as bridges need to be safe for all vehicles.

All destroyed bridges were replaced with concrete or concrete and steel composite structures, which are more likely to survive potential future fires and flood events, and also handle the increasing load requirements.

The major rain and flood events that occurred in late 2010 and early 2011 restricted access to some construction sites, putting some projects behind schedule. All works should be completed by the end of 2011.

The cost to repair and replace bridges and major crossings totalled more than \$4.8 million and it took many months to complete the works.

Spotting future fires

The bushfires in February 2009 destroyed the Mount Gordon fire spotting tower situated just a few kilometres outside of Marysville. It was important to re-build this tower to the new Australian Standards and ensure it was ready for the 2010 fire season.

The new tower was built and opened in February 2010. It is 20 metres tall and offers a 360-degree view above the forest canopy. The tower will play a vital role in the early detection of fires across the Marysville area.

The tower monitors the area between the Black Range; Blue Range and Cathedral Ranges, encompassing the townships of Narbethong, Granton, Marysville, Buxton and Taggerty.

A range of communications equipment is attached to the tower, including mobile phone dishes, and CFA and State Emergency Service (SES) repeaters. There is also a base station for the local community radio station, which is an important source of information for local residents and visitors, particularly during summer.

Extensive consultation was undertaken throughout the design process to ensure that the new fire tower suited the needs of the DSE fire operations group.

The new Mt Gordon fire tower is one of a network of 70 across the state.



Mount Gordon tower after the fires, and being rebuilt

Rebuilding Kinglake National Park for the 21st century

Virtually no part of the Kinglake National Park was left unscathed by the bushfires in 2009. Approximately 98 per cent of the park was burnt, including the park office and most visitor facilities.

Kinglake National Park is the largest national park close to Melbourne with more than 22,000 hectares of tall forests, fern gullies and rolling hills, an extensive network of walking tracks, and excellent vantage points offering scenic views.

Prior to the 2009 fires, around 100,000 visitors enjoyed the park every year. It was particularly popular for sightseeing, picnicking and short walks to Masons Falls or the Jehosaphat Gully Picnic Area. Other visitors enjoyed bushwalking, mountain bike riding and horseriding on trails in various parts of the Park and a small basic camping area was located at The Gums site in the Wombelano Block.

After initial bushfire assessment, PV set about the massive task of rehabilitating the natural environment and rebuilding infrastructure.

Starting in December 2009 PV conducted some limited guided public access to the park to allow locals and other interested visitors a chance to witness the regeneration that was taking place. Rangers took people on tours of Masons Falls and Mt Sugarloaf.

In the wake of the fires and loss of facilities, PV identified the need for careful planning for the future use and needs of the park. Over the summer of 2009/10, PV gathered information from community workshops, carried out site analyses and spoke with various groups from the local and broader communities to develop a set of strategic directions for visitor use and facilities.

These strategic directions were the foundation for developing a master plan for the national park. The purpose of the plan is to set out a 15-year framework for protecting the important conservation values of the park and to strategically plan the replacement of major visitor facilities and to improve the linkages between the different blocks of the park.

Whilst the plan was being developed and the future of major visitor facilities being determined, some of the park's minor built assets and visitor amenities were repaired, rebuilt and re-opened.

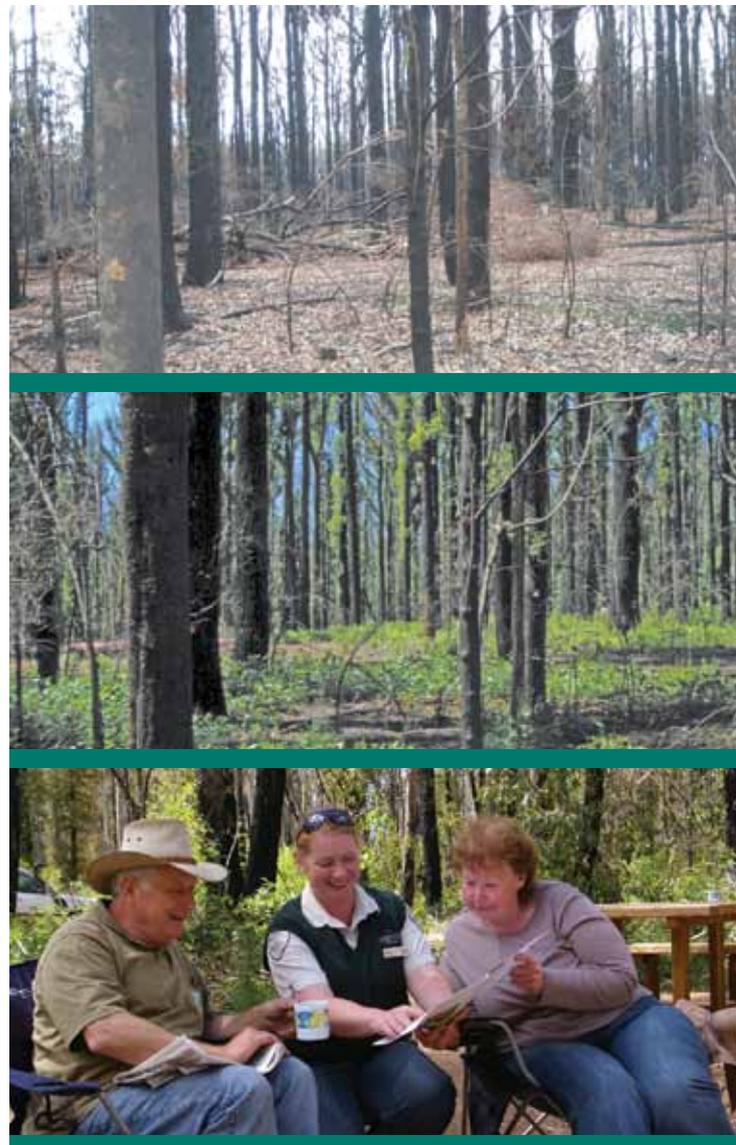
The popular Frank Thomson Reserve re-opened in March 2010 offering views across the fire-affected area to the Melbourne city skyline. The car park was re-established and a new gas barbecue installed.

Rebuilding works at The Gums Camping Area were completed by October 2010. The rebuild included extra picnic tables, installation of 11 wood barbecues and one gas barbecue, more campsites, new car park with 30 spaces, generous parking bays for long vehicles and vehicles with trailers, and a new toilet. Access to the Wombelano Waterfalls was also improved.

The new Cicada Circuit Walking Track provides a short walking loop starting at The Gums and returning to the camp site after travelling through surrounding bushland. Also rebuilt was Blackfish Way between The Gums and Island Creek Picnic Area, where visitors can now enjoy a new picnic area with tables, car park, toilet and walking tracks to explore the area.

Kinglake's premier visitor site, Masons Falls Picnic Area, will be totally rebuilt to a new design that is identified in the master plan. The new facilities will be built to an improved standard and with better layout. Improved accessibility will be an important feature of the rebuilt site.

Jehosaphat Gully Picnic Area remains closed for restoration works and improvements to accessibility of the picnic area and the walking loop. The master plan will guide the detailed redevelopment of this site as well.



Before and after the bushfire at Masons Falls
Kinglake National Park ranger explains to campers the new improved facilities at The Gums camping area

Getting The Prom re-opened to visitors

Wilsons Promontory, affectionately known as “The Prom”, the southernmost point of the Australian mainland, is arguably the most loved national park in Victoria. Its 130-kilometre coastline is characterised by granite headlands, mountains, forests and fern gullies. Tidal River, 30 kilometres inside the park boundary, is the hub for tourism and recreation.

On Sunday 8 February 2009 – the day after Black Saturday – a dry lightning storm passed over Wilsons Promontory and ignited a major bushfire that burnt close to 50 per cent of the park (25,300 hectares) over the following five weeks.

The park contains the largest coastal wilderness area in Victoria and is such a popular destination for campers and bushwalkers that there is a ballot system for camping spots at Tidal River during peak holiday times.

Immediately after the fire the entire park was closed to visitors whilst urgent rehabilitation work was done.

Before replacing and rebuilding tracks and other built infrastructure, PV arranged for erosion control works at locations that were at high risk of erosion damage. Together with the help of Conservation Volunteers Australia coir logs were installed on hills that had been severely burnt as a way of controlling erosion. It took five to six weeks of work at three different locations but was worthwhile as these areas regenerated well with minimal topsoil loss.

Areas of the park that were unburnt, including Tidal River, were re-opened in time for the Easter school holidays in 2009. Some popular walking tracks like Lilly Pilly Gully Walk and Whisky Bay Track remained closed for repair.

The reconstruction of the Whisky Bay Track that leads to the beautiful beach at Whisky Bay was a complex task. A new retaining wall was constructed along a section of the track that runs just above Whisky Creek. This was historically a troublesome site susceptible to erosion during storms, so the new wall was designed to withstand storms and ensure visitors safety.

Nature however had other plans and the most severe storm on record – a one in 300-year event – destroyed the entire track in March 2011. The site will be repaired under a new storm and flood recovery program.

Indigenous community groups that have strong traditional associations with Wilsons Promontory were involved in completing a cultural heritage plan for the area and identifying a new alignment for the Whisky Bay Track, which will reduce the impact on cultural heritage sites.

The small, remote Johnny Souey campsite is to be repositioned after input and consultation with these Indigenous groups so that cultural heritage can be better managed.

At Tongue Point the construction of approximately 450 metres of low boardwalk through heathland was nearly completed at the time of the March 2011 flood. The intention of the low boardwalk was to minimise the impact of pedestrian traffic and enhance revegetation of this sensitive area, however completion was put on hold after the heavy rainfall.



Realigning Whisky Bay Track at Wilsons Promontory

By the end of 2010, the majority of visitor facilities had been repaired and replaced. Visitor numbers were back to normal after an initial increase immediately after the fire. People were obviously keen to see the damage and the recovery of the natural environment.

Unfortunately, the major flood in 2011 and closure of access roads meant limited access for some months and more major repair and recovery work. (Sometimes, the best of intentions and good work can be undone by nature).



The new facilities at Lawsons Falls picnic area in the Bunyip State Park

Bunyip State Park re-opens

On 4 February 2009 – several days prior to Black Saturday – a fire in the Bunyip State Park burnt 7,640 hectares or 46 per cent of the park. The fire burnt for four weeks before it was contained. As well as affecting flora and fauna, the fire damaged or destroyed much of the park's infrastructure and visitor facilities.

Bunyip State Park is only 65 kilometres east of Melbourne, near Gembrook and not far from Pakenham and the township of Bunyip. The park is characterised by a diversity of flora, fauna and landscapes, including rugged bushland. The park has a number of popular walks, including a short walk to Lawson Falls, the only waterfall within the park, and other day walks of varying lengths. There are also many tracks and trails for trail bike and four-wheel drive enthusiasts.

The park gets its name from the first people to live in the area, the Balluk-William Clan of the Woirworung (Yarra Yarra) Aboriginal people, who believed the bunyip – a dark furry animal with a round face, small ears and fiery eyes that glow in the dark – was an inhabitant.

The challenge at Bunyip State Park has always been to manage the park's biodiversity values with the needs of recreational users and amenity of neighbours.

A major rehabilitation and restoration program enabled 95 per cent of the park to be re-opened within 12 months of the fire, including the popular Dyers picnic ground, Forest Road trailbike unloading area and Nash Creek camping area.

The park's extensive network of trail bike and four-wheel drive tracks were repaired and improved with better drainage and re-surfacing. Extensive drainage and upgrade works on Forest and Tea Tree Roads brought these roads up to contemporary standard.

The work on the roads and tracks didn't stop once the improvements were done, as they continued to require maintenance until the surrounding land stabilised and the rate of erosion returned to normal.

New toilets and facilities were installed at Forest Road trail bike unloading area and Nash Creek camping area.

Lawsons Falls picnic ground was redesigned to improve its layout and was reopened by the end of 2010.

Representatives for the Wurundjeri, Gunai Kurnia, Bunurong and Boonwurrung Traditional Owner groups worked in consultation with the archaeologists to develop a Cultural Heritage Management Plan to guide the asset replacement works at Lawson Falls.

Members of Bushwalking Victoria and the Friends of Bunyip State Park assisted park staff in track clearing and maintenance to re-open the Freemans Mill walking track.

Grand Ridge Rail Trail – back on track

The Grand Ridge Rail Trail in the Strzelecki Ranges in Gippsland is a very popular trail for walkers, cyclists and horse riders. Winding 13 picturesque kilometres between Mirboo North and Boolarra, it travels continuously along the site of the former railway track. The trail is rich in historical significance and natural beauty.

The February 2009 Delburn fire caused the trail to be closed because it destroyed vegetation, bridges, signs, fencing and visitor facilities such as picnic tables.

The Victorian Government, through the Regional Infrastructure Development Fund, provided \$1.6 million to rehabilitate the trail so that it can once again be an iconic multi-use recreational trail and tourism attraction for the region.

The redevelopment included two major bridge upgrades along the trail, as well as removal of dangerous trees, drainage works, resurfacing, landscaping and revegetation, and new signage.

The two new bridges are a feature of the rail trail. The triple-span, steel-arched bridges – each 66 metres in length – are more user-friendly than the previous bridges because they eliminate steep ascents and descents on either side. They are also much friendlier for mobility-impaired users and less dangerous for bike riders; making the restored trail accessible for everyone.

A Traralgon-based construction firm built the two new bridges on site with a local Mirboo North engineering company fabricating the steelwork.

The new bridges were installed and trail works completed in May 2011.

Three new information signs were installed along the trail – one at Mirboo North, one at Darlimurla and one at Boolarra – which highlight the historical significance of the rail trail. The entrance sign at Boolarra was also upgraded.

A project control board and steering committee with representatives from DSE, the trail's Committee of Management, local councils and other key local interested parties, oversaw the project, ensuring that there was plenty of local input into the redevelopment.

Steavenson Falls – helping to attract visitors to Marysville once again

The 2009 bushfire hit Steavenson Falls with such ferocity that it left all facilities destroyed or severely damaged. As one of Marysville's main tourism attractions, it was important to get the Scenic Reserve safe and opened again to help bring tourists back to the area.

First opened in the 1860s, Steavenson Falls is located just five minutes drive from Marysville and is one of Victoria's most spectacular waterfalls. Before the February fires, people flocked to the Steavenson Falls Scenic Reserve to see the water tumbling 84 metres down over rocks into the valley.

The intensity of the bushfires caused significant damage to visitor facilities and vegetation at the falls, its surrounding walks and the scenic Lady Talbot Drive. The only salvageable piece of infrastructure was the hydro-electric generator that powered the lighting that lit up the Falls at night.

The area was immediately closed after the fires due to public safety concerns, and progressively, over the following two years DSE has rolled out a \$2.8 million rehabilitation and redevelopment program.

Major works either completed or underway include managing the dangerous fire-affected trees and erosion control, construction of an improved capacity carpark, toilet block, shelters, pathways, handrails and stairs, new viewing platforms and night-time floodlighting.

By December 2009 partial access was possible. A free shuttle bus service from Marysville operated on the weekends over summer, giving residents and tourists the opportunity to witness forest regeneration and gain an insight into how the natural environment is truly adapted to fire. Visitors could access a new platform over the pool at the very base of the waterfall. All other sections of the reserve remained closed at that time for safety reasons and to allow recovery works to continue.

The DSE Fire Recovery team attended several forums throughout 2009 and 2010 as a way of keeping the local community informed of progress. Stakeholders were encouraged to contribute their input about the future of the Scenic Reserve. The DSE team attended meetings of the Steavenson Falls Committee of Management and other stakeholder groups including Mystic Mountains Tourism, and the Marysville and Triangle Development Group. DSE also held a stand at the Marysville Expo in May 2010 and displayed plans and photos of the recovery works at the Falls.

In September 2010, the Scenic Reserve was opened for weekends and holidays and by Christmas time, the installation of a new 12m long footbridge at the base of Falls was completed. This new footbridge has a special bowed design to allow people to stand on the footbridge and admire the Falls without blocking the bridge for passing visitors.

The upgrade of the 4 kilometre Treefern Gully Walking Track that links the Falls with Marysville was completed and the track re-opened in April 2011. All of the bushfire recovery works at the Scenic Reserve are due for completion by the end of 2011.

Lake Mountain – ready for the new experience

The bushfires on 7 February 2009 caused considerable damage at the Lake Mountain Alpine Resort. As the closest alpine resort to Melbourne, Lake Mountain is the premier family snow play destination in the state. Located adjacent to the Yarra Ranges National Park and with 37 kilometres of groomed cross-country ski trails, and access to over 2400 hectares of skiable terrain in the National Park, Lake Mountain is one of Victoria's premier cross-country ski resorts. Despite the effects of the fires, there were 130,000 visitors to the resort in the 2010 snow season.

The fires burnt much of the forested area and almost all of the resort's buildings were destroyed, except the main day visitor centre and administration building.

Lake Mountain Alpine Resort is fundamental to Marysville's economy and an 'anchor' for tourism in the broader region so it was critical to rebuild the resort and support local communities.

Through the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) Statewide Plan, a \$9.2 million package of projects was identified to rebuild winter infrastructure and develop new summer experiences at Lake Mountain Alpine Resort.

Extensive work was undertaken so that the resort could open for 2009 winter season. Temporary buildings were delivered to serve as toilets, Ski Patrol and kiosk and damaged wooden trail features and bridges were rebuilt.

Construction of an extensive new visitor centre and public shelter is on schedule, with the building due to be completed before the start of the 2011 snow season. A large new combined workshop, storage area and Ski Patrol facility was finished in late 2010. Major landscaping works are underway, aimed at restoring the tranquil mountain atmosphere of the resort so valued by its visitors.

The 'New Lake Mountain Experience' as the recovery program is called, will help recreate Lake Mountain as the key destination for the region, again attracting private investment in accommodation and services in the surrounding towns. It will not just be about winter recreational opportunities; there will be a focus on nature-based tourism.

This recovery program will help to retain loyal winter visitors and encourage new summer visitors. It is enhancing the resort's attractiveness as a year-round destination and adds to the strong events calendar planned for the region for the longer term, contributing to the local economy and providing new jobs in the Marysville area.

Community support for the bushfire recovery efforts at Lake Mountain Alpine Resort has been strong and consistent, demonstrating the close connection between the resort and the surrounding towns, and the critical importance of the recovery efforts to the region's social and economic well-being.

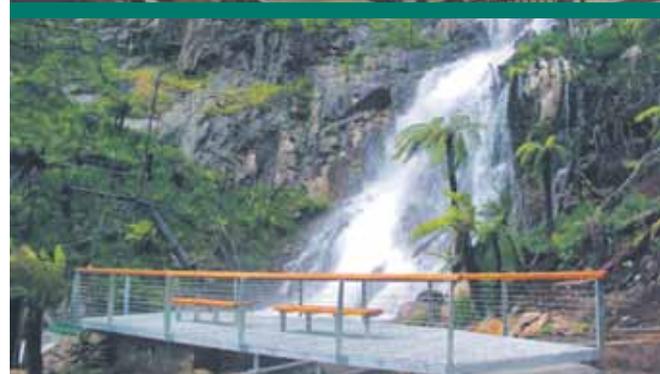
The Grand Ridge Rail Trail was virtually destroyed in the 2009 bushfire.

Rebuilding of the Grand Ridge Rail Trail.

Fabrication of one of the new steel arched bridges.

The new viewing platform at the base of Steavenson Falls is a great way for visitors to appreciate the true magnificence of the falls and the surrounding landscape.

The new visitor centre at Lake Mountain.





The new Blackwood Suspension at Murrindindi Scenic Reserve



The DSE and PV staff work hard to create the new Summit Walk which will allow visitors to walk through a beautiful valley to get to the Mt Disappointment summit

Murrindindi Scenic Reserve – a camper’s paradise

A popular destination for more than 30,000 campers every year, the Murrindindi Scenic Reserve was severely burnt in the February 2009 fires, with most of its vegetation and camping ground infrastructure destroyed. All 100 individual campsites – grouped into eight different camping areas – had to be closed to the public due to safety concerns.

Before Black Saturday, the Murrindindi Scenic Reserve was a showpiece camping ground, but the fire damage was so severe that there was little more than scorched earth remaining.

Located just 80 kilometres north-east of Melbourne, the Murrindindi Scenic Reserve is known for its picturesque streams and walking tracks that provide a special environmental experience for both day visitors and campers.

DSE developed an extensive restoration and rebuilding program that cost more than \$2 million. The features were extensive repairs and upgrades to walking tracks, new camping facilities, including picnic shelters, barbecues, camping areas, toilet blocks, and carparks.

New infrastructure has been constructed along the four main walking tracks including two suspension bridges, six footbridges, stairs located at Wilhelmina and Murrindindi Cascade Falls and a new viewing platform.

Stage one of the Murrindindi camping areas upgrades was opened for the 2010 Melbourne Cup Day weekend.

Stage 2 and 3, including the last of the camping areas and the opening of the popular walking tracks, is planned for July 2011.

Throughout the redevelopment, the local community was kept abreast of plans and progress through a series of information sessions and local media outlets.

The vegetation of the Scenic Reserve showed remarkable powers of recovery, helped by plenty of rain in late 2010. Typified by ancient tree ferns (believed to be up to 200 years old) their canopies had bright green new fronds, despite blackened trunks.

Walkways to recovery at Mt Disappointment

About two-thirds of the forest at Mt Disappointment was burnt in the 2009 bushfires, destroying virtually all the existing visitor facilities.

Close to the township of Broadford and just 65 km from Melbourne, Mt Disappointment State Forest is well known for its walking tracks and is a popular destination for day-trippers and campers.

After immediate works were completed such as removal of hazardous trees near visitor areas, walking tracks and forests roads, DSE developed a restoration program that would achieve the long-term vision for Mt Disappointment as a high quality day and camping experience for visitors.

The \$1 million program has seen the construction of new campsites and visitor facilities and repair to walking tracks. To enhance the bushwalking experience, three new steel footbridges along the Sunday Creek Reservoir were built which was a vital part of getting popular walking tracks re-opened.

Other activities enjoyed by visitors include four-wheel driving, trail bike riding and fishing.

The revitalised camping areas were ready for 2011 Easter holiday-makers and all other aspects of the program were due to be finished by that end of that year.

Supporting Licensed Tour Operators after the bushfires

Following the 2009 bushfires, Parks Victoria saw the need to support Licensed Tour Operators (LTOs) severely affected by the fires by offering them paid contract work on specific fire recovery projects in parks and state forest, as their businesses were unable to operate in the closed and damaged parks and forests.

Nine LTOs expressed interest in the program and were hired to deliver a range of works between August 2009 and June 2010. The work done by these tour operators was very valuable and contributed to the restoration and re-opening of public land across the fire-affected area.

The Australian Government provided funding through the Jobs Fund as part of a broader \$10 million package to encourage tourists back to regions economically affected by the 2009 bushfires.

There were two main objectives of this initiative:

1. to support LTOs while they adjusted their businesses to the changed situation after the fires, and
2. to utilise the LTOs significant knowledge and expertise about the public land where they operate their tours.

Projects were identified that would encourage visitation and support businesses and regions suffering from a downturn in activity due to the impact of the bushfires.

The projects were diverse and occurred throughout the fire-affected areas of Victoria.

This LTO program was modelled on a similar program implemented in Victoria's alpine areas in 2007 after the Great Divide Fire. The program certainly assisted LTOs displaced from their normal areas of operation by the fires. It provided important income to supplement their business revenue, which had been impacted due to the fires.

Feedback from LTOs involved was very positive and helped these businesses to retain staff and get through a challenging time. Eighteen months after the 2009 fires most of the affected public land was open, due in part to the hard work of the LTOs that participated in the program. Furthermore, the direct stimulus PV provided through this program helped operators keep staff and navigate through a difficult period.

The program cost just over \$136,000 and provided 2350 hours worth of work across 10 different parks.

All participating LTOs were still operating 18 months after the fires. The program has also fostered a closer working relationship between LTOs and PV staff, which is a great outcome.

Kaykaze Adventure Experiences (KAE) is a Melbourne-based company that provides outdoor opportunities for corporate and school groups.

KAE staff worked on projects in both Bunyip State Park and Yarra Ranges National Park. Their work included repairing and installing signage, walking track maintenance and installing drainage. They contributed a total of 262 hours work to the fire recovery program.

Adventure Guides Australia (AGA) offer recreational and educational adventure experiences and operate largely in the Mt Buffalo area. AGA worked with Kaykaze Adventure Experiences on projects in both Bunyip State Park and Yarra Ranges State Park. Their work included repairing and installing signage, walking track maintenance and installing drainage.

Mountain-Top Experiences (MTE) is a four-wheel drive operator based in the Walhalla area; they operate training, tours and also provide accommodation.

MTE assessed heritage sites in the Walhalla Historic Area and the Baw Baw National Park under PV's cultural heritage component of the fire recovery program. The assessment proved valuable, uncovering mines and the Fear Not Creek mining settlement that had been overgrown and lost for many years and that were not previously listed on Victoria's Heritage Register. MTE completed 211 working hours.

Add-Venture Rafting (operating as Rafting Australia) based out of Corryong, provides rafting trips along many rivers in the state's north-east.

Add-Venture Rafting undertook a risk assessment of the Thomson River rafting site and provided local PV staff with treatment options. They also did work to de-snap the rafting site due to the specialised nature of the work.

Add-Venture provided a total 750 hours of work and their specialised skills were of great assistance with this project.

Taggerty Tours is a bushwalking and four-wheel drive tour company based in Taggerty. They operate tours throughout the region catering for small groups and individuals.

Taggerty Tours was contracted to work on track maintenance and marking across Cathedral Range State Park. They completed 214 hours of work on the project.

Switchfoot Surf Coaching (SSC) is a company based in Ocean Grove that specialises in surfing tuition.

SSC assisted Greencorp with boardwalk construction in the fire-affected parts of Wilsons Promontory National Park and provided 38 working hours.



Photo credit: Daniel Brown



Photo credit: Janette Currie



Add-Venture Rafting surveying the Thomson River.
PNL 4wDriving constructing exclusion fence, Buxton Silvergum Reserve.

Bush Experiences is based in Mansfield and offers a range of adventure-based tourism products.

Bush Experiences worked on track maintenance and marking at Cathedral Range State Park. Brian Westley, owner of Bush Experiences, helped organise and supervise volunteers who assisted in opening many of the parks fire-damaged walking tracks. Altogether, Bush Experiences provided 88 working hours on the project.

PNL 4WDriving is a Melbourne-based four-wheel driving company that provides 4WD training and tours around the state.

PNL 4WDriving completed a 4WD track assessment in State forest in the 'triangle' area between Marysville, Buxton and Narbethong.

Works to reopen the tracks included track clearance, survey and reporting of areas of concern.

PNL also completed a second round of work constructing a grazing exclusion fence in the Buxton Silvergum Reserve to protect the regeneration of the endangered Buxton Silvergum. This project was undertaken in conjunction with the Commonwealth Government's 'Caring for our Country' grant program which funded the materials.

The Outdoor Education Group (OEG) is an Eildon-based company that provides outdoor activities to school groups.

OEG completely threw themselves into their project and six employees completed walking track maintenance and re-marking work in the Cathedral State Park in just two weeks. In total their staff completed 227 working hours.

Rebuilding community assets

Pomborneit Recreation Reserve

In February 2009 a fire in the west of Victoria destroyed about 75 per cent of the Pomborneit Recreation Reserve's infrastructure, worth \$67,000.

Situated on the Princess Highway between Colac and Camperdown, the 'Rec Reserve' is the heart of Pomborneit – home to the cricket team and venue for cricket league competition matches. It is a vital location for community social get togethers and special occasions. It is also a strategic filling station for CFA tankers and the site of World War I and World War II monuments. The reserve is public land, managed by an elected Committee of Management of local people.

Fortunately, the main pavilion building wasn't severely damaged, but the cricket practice nets and oval fence were damaged and the oval turf very nearly destroyed. Critical infrastructure such as the bore head, pipes, pumps, electrical wiring, tank and stand were destroyed as was the stormwater plumbing to toilets and the pavilion as well as the pump shed, tank and stand.

After the fire, DSE quickly repaired important water infrastructure so that the reserve could continue to be used during the cricket season as a way of immediately boosting community morale.

DSE, the local Corangamite Shire Council and the Committee of Management worked together to ensure planning and construction proceeded in a logical sequence to everyone's mutual benefit. All work was completed within 12 months and the Pomborneit community is now enjoying improved facilities.



Oval's turf and soil structure destroyed by bushfire February 2009



Oval's rehabilitation completed by October 2009 ready for the cricket season.

More than just a hall

Australia Day 2011 was a fitting occasion for the community of Callignee in Gippsland to come together to celebrate the opening of their new multi-use facility that replaces the old hall, the former school building and the local CFA fire station that were destroyed by fire in February 2009.

The opening of the new Callignee Community Centre was a major step in the recovery of the small community.

Like many halls and CFA stations in small rural communities, the previous facilities played a major role in bringing people together.

The new centre is a community hub, containing a public hall, a large community kitchen, foyer, community meeting space with kitchenette and storage, a preschool area, CFA station and club rooms for the recreation reserve.

Part of the rebuilding included realigning Old Callignee Road, which separated the former Callignee Hall site and the community oval. Now the two sites are connected and safety improved with no need to cross the road.

It was fitting that the opening event was held on Australia Day – a traditional day for communities to celebrate together – because the Callignee Community Centre project relied heavily on partnerships between the community and government agencies.

The \$3.1 million project was overseen by a steering committee. The committee included community members, DSE and other government agency representatives. The committee was led by Latrobe City Council which is now responsible for managing the facility with the community committee.

The new Community Centre is being well used and is strongly valued by the local community and will be for many years to come.



The facilities at the new Community Centre at Callignee are vastly improved and provide a vital hub for the community

4 Restoration of the Natural Environment

There were 14 major fires that started on or around 7 February 2009. Although fire is a natural part of the environment and most of our flora and fauna species have adapted to fire and will recovery naturally. However, the major 2009 fires did put the long-term survival of a number of flora and fauna species and ecological communities at risk and burnt vast tracts of native forest.

Within the 400,000 hectares of land burnt, there were 27 flora and fauna species in the fire area that are listed as threatened or vulnerable under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

The first step towards the restoration of the natural environment was to get a full picture and understanding of the area that was burnt. It was clear that the intensity of the fires varied and that would influence how the environment was likely to recover.

The Department of Sustainability and Environment (DSE) and Parks Victoria (PV) used previous data and information to review and determine what natural assets and populations of fauna and flora were at risk, which led to identifying what needed to be done to support recovery.

Some recovery activities were urgent such as the temporary relocation of endangered native fish species to safe refuges because the waterways were so polluted with ash and silt. Other actions were done over a number months following the fires, such as pest plant and animal control; and Landcare groups doing revegetation work.

DSE and PV identified 31 specific projects aimed to help fire-affected plants, animals and ecological communities to recover. Most of these projects were completed by June 2011 and the results were very positive. Projects ranged from direct action to protect species through to controlling weeds and predator animals, which reduced the threats or risk to recovery.

Of the 400,000 hectares of land burnt approximately 170,000 hectares were State forest. The majority of this area recovered naturally via seedling growth or regrowth on trees that weren't too severely burnt. However, around 4500 hectares of immature Mountain or Alpine Ash forest needed remedial assistance and were re-sown by DSE.

Twenty-seven Landcare-related projects were funded with the proceeds of scrap metal recycling from the burnt areas. The Recycling for Recovery Program provided \$1.584 million to Landcare and other community environmental groups for rehabilitating the environment in the bushfire-affected communities.

Mapping the extent and severity of the fires

After the devastating summer fires of 2009, DSE moved swiftly to establish the exact extent and severity of the damage.

In some parts of our parks and forests, much vegetation and wildlife had been destroyed, along with fences and other assets. Other fire-affected locations escaped with scorching and relatively minor damage.

After any major fire, it is vital to work out which areas are affected and to what extent, in order to plan effective fire recovery and salvage operations. Only by gaining accurate data is it possible to assess any environmental impacts and trends.

Knowledge of fire location and its severity is also important for all those involved in the management of our waterways, land, forests and biodiversity. With all these goals in mind, in March 2009, DSE began the major task of gathering data on the location, size and strength of the fires.

The first step was for DSE's specialised mapping division to acquire 'before' and 'after' satellite images of the fire affected areas. The satellite images were then overlaid and analysed to detect changes in visible light and infrared energy reflected by the different burnt and unburnt forest vegetation. Finally, this information was used to classify and map areas according to their different burn severity levels.

These images were then compared with satellite images taken before the fires so the location and extent of each fire and its approximate perimeter could be determined. This process showed that nearly 403,000 hectares of land had been burnt, including 117,000 of private land, 286,000 hectares of parks, reserves, state forests and other public land.

The existence of LANDSAT/SPOT data from similar fire mapping projects carried out by DSE after the 2003 and 2006/7 fires means that there is now a consistent data record spanning an ecologically and possibly climatically significant timeframe.

But mapping the location of the fires was just one element of this project. In order to understand the true impact of the fires, it was also necessary to assess their severity at different locations.

And the only way to do this was by getting out in the field.

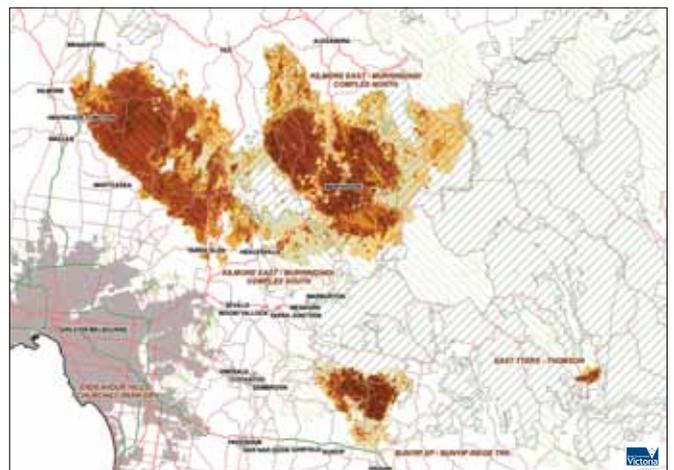
In all, 800 sites across Victoria were assessed for fire damage. At each, the GPS location was noted, together with the details of the percentage of crown scorch, canopy burn and understorey burn. A range of simple understorey measurements was also undertaken.

Data collected from this fieldwork was then combined with data provided by satellite and digital aerial photographs to produce a complete picture of the extent and severity of damage caused by the fires.

The information gathered is of great importance to many stakeholders, including DSE, PV and VicForests, who will use it to help plan vital rehabilitation works, such as seed collection, soil stabilisation, revegetation, asset rebuilding and salvage harvesting.

The fire severity maps are available to DSE and PV staff via internal websites.

External stakeholders can access the maps via mapshare programs – like Forest Explorer at www.dse.vic.gov.au



Long-term monitoring of the forest and its flora and fauna

A research team from The Australian National University has been working in the montane ash forests of the Central Highlands of Victoria since 1983 and as part of that work they have established a set of 161 long-term monitoring sites on which extensive data on vegetation cover, birds and mammals have been gathered.

The February 2009 wildfires burned 64 of the 161 sites and extensive field-based research commenced soon after to carefully document post-fire ecological recovery and this work has continued since then through support of DSE.

Work on small mammal assemblages has shown that although large numbers of animals were killed in the wildfires, small refugial populations of the Bush Rat and Agile Antechinus were common in many burnt landscapes, including those subject to very high severity fire. In the past year there has been a steady increase in populations of both species, although there has been a recent invasion of the exotic House Mouse in some areas.

Populations of arboreal marsupials have been monitored on both burnt and unburnt sites and while some species like the Greater Glider and Yellow-bellied Glider appear to have been lost from sites subject to high-severity wildfire, populations of others like the Mountain Brushtail Possum have remained unchanged. Indeed, at one field study site, all individuals in a radio-collared population survived an extremely high severity fire and then underwent a number of radical changes in social and other behaviour in response to changes in the abundance of key resources like the availability of nest sites in large trees with hollows.

Monitoring of bird populations has revealed that a number of bird species have been lost from burnt sites but others such as the Flame Robin has increased dramatically and have remained at very high levels of abundance since February 2009. Other species that previously were not recorded in montane ash landscapes prior to the fire like the Masked Woodswallow and Red-capped Robin occupied burnt areas for less than a year and have not been observed there since.

Considerable work has been also completed on the post-fire recovery of native vegetation, including trees, shrubs and tree ferns and in particular the status of large trees with hollows that are critical nest and den sites for many species of cavity-dependent animals. Populations of these trees on burned sites have been severely reduced, especially those that were dead and decayed prior to the fire. However, radio-tracking research is demonstrating that some species of animals are using the smaller numbers of remaining trees more intensively than they were during the years preceding the 2009 bushfires.

Other work has focused on the extent of plant species germination following fire and is indicating that in formerly old-growth stands, tree species like Mountain Ash germinate in intensive swarms and grow rapidly – many of these plants are already two metres tall. Other plant species like Myrtle Beech and Musk Daisy Bush are recovering rapidly through extensive epicormic sprouting.

Forest recovery

The 2009 bushfires burnt approximately 170,000 hectares of state forest. The majority of this area is expected to recover through natural regrowth, but less than three per cent of this total burnt area included Ash forest stands that had been harvested in the past 20 years and needed remedial regeneration works to restore eucalypts in the forest. These forest areas were characterised by immature Mountain Ash and Alpine Ash which take between 15-20 years to produce viable seed. If a fire occurs before the trees are 20 years old, the forest needs intervention; in this case it was a major aerial re-seeding program.

From April to mid-winter 2009 aerial seeding was conducted to assist the regeneration of almost 4,500 hectares of Ash forests.

In the Bunyip State forest fire area approximately 40,000 seedlings were hand-planted and fertilised during spring of 2010 and in the Murrindindi fire-affected area there was another 3000 seedlings planted.

The areas that were hand-planted had been identified as requiring 'topping up' from Preliminary Stocking Surveys (PSS) that were performed by contractors in the preceding months. Contractors surveyed 551 hectares in total.

PSSs are conducted to identify and delineate areas that require rehabilitation or additional planting. The PSS is usually carried out within 9–12 months of site preparation/sowing. Early monitoring of germination indicated dense regeneration.

A follow-up Established Seedling Survey (ESS) may be required. If evaluation of the regeneration operation has indicated a good probability of success, an ESS should be the only survey required. In the Murrindindi fire area, 707 hectares were surveyed during the summer months.

Forest managers from DSE and VicForests are pleased with the natural and artificial regeneration, which was very successful. However, some smaller sites did not regenerate sufficiently after the initial seeding program, mostly due to heavy competition with other species. Some of these sites were hand-planted in spring 2010 and others were cleared to create a seed bed and sown with seed in autumn and winter 2011.



Epicormic growth

Protecting our threatened flora and fauna species

DSE and PV scientists identified 26 specific projects in the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) recovery program to assist threatened species and habitats to recover after the 2009 bushfires.

A full list of these projects plus five other projects aimed at controlling pest plants and predator animals that threaten species in the post-fire situation can be found in Appendix 2.

A similar process and list of priorities was also developed for the Caring for Our Country recovery program.

Projects involved urgent action to protect a range of fire-affected national and state listed vulnerable or endangered species. Projects aimed to determine the status of key populations following the fires and then implement appropriate actions to protect them and monitor their recovery.

Many projects got local people and communities involved in a range of activities such as helping to monitor and record sightings of species, the hard work of installing new nest boxes for Leadbeater's possums and helping in threatened fish surveying and waterway habitat restoration.

Below are just a few examples of the work done by DSE, PV and other stakeholders to maintain our state's precious biodiversity.

Saving Victoria's faunal emblem

The 2009 bushfires burnt extensive areas of the habitat for Victoria's endangered faunal emblem, Leadbeater's Possum. Before the fires, scientists had estimated that the population of this tiny marsupial may be fewer than 3000 individuals, with the species only found in a 70 x 80 km area of Victoria's Central Highlands.

One of the first recovery actions was to provide shelter for the few possums that survived high intensity fire at Lake Mountain where many natural hollows and nest boxes used to study the population were destroyed. Only two possum colonies (family groups) containing six individuals survived but the quick replacement of nest boxes provided shelter for survivors and additional nest sites as the population recovers. The boxes will provide an opportunity to measure the rate of population recovery at the site over time.

Infra-red cameras were set up to monitor the nocturnal activity of these six surviving possums as they came and went from their new replacement nest boxes. Given the fire had severely reduced food availability, in 2009 and 2010, PV with assistance from Healesville Sanctuary and Friends of Leadbeater's Possum, also set up carefully rationed supplementary feeding stations for each colony to help the possums through the winter months of snowfall. Supplementary feeding had never been attempted with the species before and the possums quickly become accustomed to it.

The program received outstanding volunteer assistance and commitment from Friends of Leadbeater's Possum, who willingly trudged or skied almost 10 km through the snow twice a week to maintain the food supply for the possums.

Spreading the word about efforts to save Victoria's faunal emblem has also been a feature of this recovery project. The Museum of Victoria held a display in its foyer between November 2010 and April 2011 and in the January school holidays there was a special Leadbeater's Possum Youth Day event for young children to learn more and join in a range of fun, possum-related activities.

Leadbeater's Possum was first described in Victoria in 1867, but by the 1920s it was thought to be extinct. After more than 50 years without a sighting, miraculously, it was rediscovered in 1961 near Marysville. So 2011 marks the 50th anniversary of the species' rediscovery. The Melbourne Museum, PV, Friends of Leadbeater's Possum and other stakeholders celebrated this occasion at an event in April, 2011.

In addition to ongoing population monitoring, during April 2011, genetic sampling of the surviving possums at Lake Mountain and Mount Bullfight was undertaken to determine the immediate genetic decline arising from the fire, how representative the surviving animals are of the pre-fire genetic diversity which had been sampled in 2006 and 2007 and also to compare the genetic diversity between Lake Mountain and the nearest alpine plateau at Mount Bullfight.

The surviving possums at Lake Mountain were also micro-chipped to enable the survival and feeding habits of individuals at the supplementary food to be monitored. The chips will allow each individual's visitation patterns to the feeder stations and nest boxes to be logged and analysed.



Middle and right: A stand of fire-killed Ash with regenerating seedlings

To continue to support these possums while their sub-alpine habitat recovers, PV and Friends of Leadbeater's Possum will continue to provide a carefully rationed supplementary food supply during winter 2011.

With a helping hand, these possums will hopefully be the founders for population recovery in years to come as the plateau is re-colonised.

DSE has contributed statistical analysis of the impact of the fires on Leadbeater's Possum habitat. The analysis used fire severity mapping and pre fire information including the extent of ash forest types and ages and the area placed in a permanent reserve system in 2008.

Key findings show that 45% of the permanent reserve system, which contains most of the best habitat for Leadbeater's Possum, was burnt. Approximately half of the reserve area burnt was at high intensities where survival rates of animals are expected to be low. There is evidence, at one sub alpine habitat location, that Leadbeater's Possums have survived where fire burnt at lower intensity but so far, there has not been any evidence to show that Leadbeater's Possums have survived in Ash eucalypt forest habitats regardless of fire intensity. Across all ash forest within the range of Leadbeater's possum, 36.2% was burnt. Similar to the reserve system results about half of this area was impacted by high severity fire.

Leadbeater's Possums are notoriously difficult to detect using conventional survey methods. Deakin University, in conjunction with Zoos Victoria and PV, worked hard to develop a camera trap protocol to improve scientists' ability to locate the species. Researchers can then conduct targeted surveys in fire-affected habitats, including the permanent reserve system, to establish where populations persisted following the 2009 bushfires.

The success and practicality of using remote cameras to locate Leadbeater's lay in identifying a tantalizing food source that could routinely lure these elusive possums in front of the camera. Work is continuing to find a reliable method. Full results of the survey work will be published and posted on the DSE external web site at www.dse.vic.gov.au during 2011.

Recording the impacts on Victoria's rare or threatened plants

Approximately 120 rare or threatened plant species were burnt in the 2009 bushfires. Many are only found in Victoria and some, are only found within the perimeters of the fires and nowhere else. In the East Kilmore-Murrindindi fire area (193,470 hectares of public land burnt) alone there were more than 40 such rare and threatened species. In scientific terms these plants are known as VROT (Victorian Rare or Threatened) Plants.

DSE's ecologists had the task of determining what the consequences of the fires were on these plants. They had to assess what sort of management measures were needed immediately and in the future to protect and conserve these precious species.

Thanks to previous work after other major bushfires, the ecologists had good techniques for post-fire surveying and were confident that they could identify species to prioritise on the basis of their distribution and an understanding of their regenerative response.

A risk analysis helped focus on the species most at risk due to the impacts of the fires.

The surveying work is now complete and vital new information has been recorded in a variety of scientific databases. Government agencies and public land managers can now identify those rare or threatened plants species with a status of 'at risk' at a landscape scale.

In total 60 species were identified ranging from well known plants such as Spinning Gum and Alpine Wattle to the, only recently listed, *Pomaderris vacciniifolia*.



Left: A new nest box for the Leadbeater's Possums at Lake Mountain
Right: Microchipped Leadbeater's Possum under anaesthetic

Left: Pomaderris close-ups
Right: Planting out the cultivated Shiny Nematolepis seedlings

Survival of the rarest

A slender flowering shrub endemic to Victoria, thought to be on the brink of extinction, has somehow survived the 2009 bushfires and is actually flourishing. In 2006, scientists conducted a survey and discovered only about 140 mature plants of the *Pomaderris vacciniifolia*, or Round-leaf Pomaderris as it is commonly known.

The species was listed under *Victoria's Flora and Fauna Guarantee Act 1988* just prior to the February 2009 fires, but populations of the plant in the Chum Creek area of the Yarra Valley and Castella were almost completely burnt and there were fears for its long-term survival. A site at Toolangi was the only known remaining location with a substantial unburnt population.

After the fires, fencing to keep out browsing animals such as rabbits was erected around the populations at Chum Creek. By early 2010, hundreds of new seedlings had sprouted from the germinated seed and the surviving plants were also doing well.

Bushfire Recovery funding was provided to the Yarra Ranges Council for protection activities such as working with local private landowners to make them aware of the threatened species as they were replacing their burnt fences.

The Commonwealth Government's Caring for our Country program also provided some funding for the protection of this species.

Post-bushfire surveying by ecologists engaged by DSE and PV discovered other unknown populations in the Kinglake National Park and the Pauls Range State Forest. Grazing exclusion fencing was also erected around some of these sites and the newly-found populations are being closely cared for and monitored by DSE and PV staff.

Populations of unburnt *Pomaderris vacciniifolia* were identified along roadsides in the Murrindindi Shire and signs were erected to help protect the plants and raise awareness of its plight. The Shire worked in consultation with Healesville Environment Watch Inc and DSE to inform residents and stakeholders, such as electricity distributor SP Ausnet and council work crews, to ensure that any roadside works are undertaken in a way that protects remaining plants. VicRoads also undertook protection works on State-managed roadsides.

In addition, two new populations were identified by DSE on private property in the Kinglake Central area following community weed identification tours. The tours were organised by PV and the local Upper Goulburn Landcare Network to raise awareness of significant endemic native species, such as the *Pomaderris vacciniifolia*, and potential threatening impacts of weeds on regenerating native vegetation.

Across the board, at all sites where the *Pomaderris vacciniifolia* is growing or recovering, there is ongoing threat and surveillance monitoring being undertaken to protect these plants. Wildfire remains a significant threat to these populations. Another wildfire before these regenerating plants mature and are able to set seed will have much more devastating impacts on the long term viability of the already burnt populations.

The outlook for the plant's survival in the absence of another bushfire or negative human impact is now looking good with excellent regrowth at all locations and protection measures in place.

Shining on

One of Victoria's rarest small trees, the Shiny Nematolepis, has made a very promising recovery after the 2009 bushfires. Prior to the fires it was thought to exist in only one location in the O'Shannassy catchment of the Yarra Ranges National Park. The fires destroyed all of the mature plants at this site (approximately 400).

Fortunately, post-fire surveying of the area by PV staff uncovered a second population about 7 km away that was not as severely burnt and where 12 mature plants managed to survive and are hanging on.

Smart, forward thinking by scientists and public land managers had anticipated the potential for fire to threaten the survival of this species and they had taken precautionary steps.

In 2008, horticultural staff from the Royal Botanic Gardens collected cuttings and cultivated them for future replanting. Little did they know at the time that it could be a 'do or die' situation.

In May after the fires, 137 cultivated seedlings were planted at five different locations in the Upper Yarra catchment and fenced off to protect them from deer browsing. The most recent check-up in January 2011 indicated that around 80 per cent of the plantings have survived to date.

On top of this, it seems the 'Shiny Nem' is pretty hardy and its seeds can cope with intense fire. Masses of seedlings have germinated at both sites, and with the assistance of protection measures, are set to grow up strong and tall. In December 2010, the 12 mature plants flowered, enabling the seed bank to begin to be replenished on a small scale.

In January 2011, 40,000 seeds were collected by the National Herbarium of Victoria and added to the Royal Botanic Gardens Millennium Seed Bank to ensure a representative collection of viable seed is secure – just in case the wild populations are destroyed.

DSE and PV engaged a consultant to prepare a management plan for the species that identifies the key threats to the plants and protection actions such as deer exclusion fencing. It also includes a population monitoring regime for the next five years which is a pivotal time for the species as the seedlings approach reproductive (seed producing) maturity.

The consultant has also recommended that the status of Shiny Nematolepis should be upgraded to critically endangered as a direct result of the impacts of the 2009 fire on the species.

So, thanks to the helping hand of researchers, land managers and volunteers there are many activities helping to conserve this species for the future.

Saving 'Nemo'

Known endearingly as 'Victoria's Nemo', the endangered Barred Galaxias looks to have successfully survived the 2009 bushfires thanks to the helping hand of scientists and volunteers.

These fish are found in only 12 key small populations in the upper Goulburn River catchment, the only place they exist worldwide. Recovery actions have been vital for the survival of this rare species because 90 per cent of its known habitat was affected by either the 2009 or 2006 bushfires.

Shortly after the February 2009 fires, scientists from DSE's Arthur Rylah Institute (ARI) went on a rescue mission to collect the small numbers of remaining tiny, striped fish from fire-affected creeks near Marysville, Kinglake and Lake Mountain, safely depositing them in aquariums at ARI's Heidelberg labs.

The intention was to release these fish back into the waterways after the water quality had improved and associated vegetation recovered.

In addition to keeping the survivors alive, scientists also took on the task of artificially breeding new young.

In the meantime, volunteers from the Australian Trout Foundation and Marysville Youth Incorporated set about restoring Leary's Creek next to Gallipoli Oval in Marysville so that the fish had a healthy habitat to return to.

Breeding the fish in captivity was a first and required lots of tender, loving care by dedicated scientists who spent weeks anxiously watching as eggs developed and hatched. Then there was another six weeks of feeding and regularly changing aquarium water to ensure they grew up to be healthy young adult fish.

About 1400 young fish have successfully been raised and released back in to the streams where their eggs and parents came from in December 2010.

Combined with the 'saved' fish that have been released back into creeks at several locations, the outlook for the survival of the Barred Galaxias is looking good.



Releasing the saved Barred Galaxias back into a waterway

Pest plants and animals – another threat to recovery

Another element to protecting vulnerable native plants, animals and ecosystems after bushfires is to reduce the risk of the threats posed by weeds and introduced predator animals.

Controlling weeds might not be at the forefront of people's minds when they think of bushfire recovery, but it is critical to stop weeds from out-competing the new growth of fire-affected native plants.

Likewise, reducing the impact of predators such as foxes and feral cats helps to protect native animals in fire-affected areas where habitat was severely reduced and there is few places to hide and not much to eat!

DSE and PV developed strategic control programs for both weeds and predator animals as a way of assisting the recovery of flora and fauna in many of the 2009 bushfire areas.

Halting the spread of weeds

After fires, invasive plants (weeds) can flourish in the exposed soil due to less competition from the native vegetation that was burnt. This obviously hinders the recovery of the plants that should be growing in their natural environment.

Fires also spread weed seeds far and wide so invasive species easily crop up in new locations and cause more problems for ecosystems. The establishment of new weeds can, in some cases, result in localised extinction of threatened native plant populations. Rampant weeds also means less habitat for wildlife.

On the up side, bushfires burn all mature weed plants and so after fire, if emerging weeds are sprayed when they are young it is possible to significantly reduce the weed population and eliminate seed stored in the soil.

Eradicating new and emerging weeds and controlling established weeds in bushfire areas that contain threatened native flora and vegetation communities was an important recovery action for DSE and PV.

By keeping a close watch on high-risk pathways of invasion and by protecting key areas, the risk from weeds can be reduced.

By treating weeds in fire-affected areas, native vegetation has the opportunity to re-establish. Chemical sprays and manual removal techniques were used to treat occurrences of weeds over more than 40,000 hectares of land across the state in fire-impacted areas.

A complex mapping process was used to determine where weed control would be most valuable with key weeds targeted including: English and Cape Broom, Himalayan Honeysuckle, Foxgloves and English Holly.

A number of endangered species, such as Round-leaf Pomaderris Silky Golden-tip and Gully Grevillea have benefited from the weed control work.

Following the control phase, project staff, botanists and volunteers will monitor and survey the treated areas to gauge the success of treatments.

Photo credit: Simon J Niccol

Discovering a new weed at Kinglake

Discovering a tall, unusual looking orchid near Kinglake was not a pleasant surprise for Parks Victoria Ranger Natalie Brida.

Found in Strathewen, on a fire containment line constructed in February 2009, the plant was unfamiliar to Natalie, who eventually identified it as an exotic weed, the South African Weed Orchid (*Disa bracteata*).

The weed was not known to be widespread in north east Victoria, although there are several known infestations of the orchid in western and south western Victoria.

The orchid originates from South Africa, and has been found in parts of Western Australia, South Australia, and most recently Victoria. It grows readily in competition with a wide range of other flora, including grasses, and it invades bushland and pastures. It loves to grow in disturbed sites such as ashbeds from the bushfires.

While only one plant was found, the reproductive processes of this particular orchid may conceal its impact for several years. Unlike threatened native orchids, *Disa bracteata* is self-pollinated, meaning each plant produces tens of thousands of airborne seeds – making it exceptionally difficult to control.

Seeds may be blown many kilometres and can remain viable for up to seven years.

Ranging from 30 to 50 cm in height, South African weed orchids lay dormant for much of the year and sprout in early spring. The plant stem resembles a greenish-brown asparagus spear, and carries between 20-60 flowers.

Local residents in the Kinglake area were encouraged to report sightings of plants resembling South African Weed Orchid to DSE or PV.

Weed control walkabout

In January and April 2011, landholders in the Kinglake area took part in "Is this a weed?" tours to learn to identify the different plants that have regenerated since the 2009 bushfires.

Staff from DSE, PV and Murrindindi Shire together with the Kinglake and Upper Goulburn Landcare Network ran the two guided tours to help locals identify weeds and native plants.

Tour participants investigated garden escapees like Sycamores, Holly, Cotoneaster and Ivy that grow readily on roadsides that are also the homes of valuable threatened species like the Silky Golden Tip.

The bushfires provided good conditions for fire-dependent native vegetation to regenerate, but also ideal conditions for weeds to grow.

Left: The South African Weed Orchid will possibly out-compete with a wide range of native flora, if not controlled

Right: Community members on 'Is this a weed' tour



Alternative to herbicides and manual labour

Not all weeds need to be controlled through herbicides or manual methods. In some cases, there is a biological answer.

As part of the DSE and PV bushfire recovery strategic weed control efforts, a biological control program was funded to protect native species and ecosystems at risk in the 2009 fire-affected areas from the invasive weed species Tutsan (*Hypericum androsaemum*).

Tutsan (*Hypericum androsaemum*) establishes in virtually undisturbed bushland and then competes strongly with native species.

The Tutsan Rust (*Melampsora hypericorum*) is a highly effective biological control agent that has destroyed extensive stands of Tutsan in the Otways, Dandenong Ranges and in Gippsland.

Samples of the tutsan rust spores were collected from a range of sites in the Otway, Strzelecki and Dandenong Ranges during February 2011. These were assessed for spore viability, mass reared and then shipped for inoculation of tutsan that is regrowing within and adjacent to the fire-affected locations in Victoria.

DSE will engage a science honours student to collect important information on tutsan and tutsan rust variability. The student will develop and apply molecular techniques to identify variability in both host and rust populations. Tutsan plants from the bushfire-affected areas will be cultivated and inoculated with rust collected from the four collection sites. The level of infection will determine compatibility of rust strains for particular host populations and help evaluate the field release program. Such information will be critical in evaluating the success and impacts of the tutsan rust program.



Tutsan infected with Tutsan Rust

Stopping the foxes dead in their tracks

After the 2009 bushfires DSE and PV reviewed previous efforts to control predator animals after other major bushfires and decided to do it differently this time.

The key principle was to target effort (time, money and other resources) at locations and species that would result in the greatest benefits.

Scientists at the DSE Arthur Rylah Institute built on existing research and developed new maps showing the distribution of where 'at risk' species are located across the state and then overlaid these with maps that showed the level of intensity of the fires. Using the fire severity index and the species distribution models they determined the likely impact on biodiversity and identified priority areas for predator control.

Species at risk included Brush-tailed Phascogale, Spot-tailed Quoll, White Footed Dunnart, Southern Brown Bandicoot and Broad-Toothed Rat.

Foxes were the target predator as they are the main threat to many, small ground-dwelling native animals and even some animals that live in the trees but forage on the forest floor.

Contractors carried out the baiting program using 1080 fox baits in the identified priority locations.

This major fox baiting program covered approximately 240,000 hectares of National Park, State parks and forests across a number of fire areas including Beechworth, Kilmore-Murrindindi, Bunyip and Thompson-Tyers. The baiting program involved DSE, PV and Catchment Management Authorities and employment of local contractors.

The strategic, prioritised approach to fox control was followed up with monitoring and evaluation that aimed to determine the effectiveness of the program.

The way this program was conducted is set to be a model for future predator control programs, particularly the comprehensive monitoring and evaluation which will help scientists and land managers protect our native animal species and maintain or perhaps even boost our biodiversity.



Native animals are threatened by predators like foxes

Caring for our bushfire-affected country

The Commonwealth Government provided an additional \$10.8 million for Victorian bushfire recovery projects through its Caring for our Country Program which funds environmental management. Funding assistance was given to community and non-government organisations and landholders to undertake bushfire recovery works that fitted into Caring for our Country national priority areas.

Catchment Management Authorities (CMAs) in the bushfire areas consulted with community groups, non-government organisations, local government and individual landowners to develop regional packages of recovery works on both public and private land.

In all regions, the CMAs funded applications for grants for private land based on needs identified by the community such as Landcare groups. The applications also had to clearly identify the priority environmental assets that would benefit from the proposed works, for example weed control to improve the quality of habitats that support threatened species.

Two rounds of funding were available – the first for 2009/10 and the other for 2010/11. The two rounds enabled initial project establishment, rapid assessments, mapping, planning and coordination and then moving into full-scale on-ground works.

Recovery in the Port Phillip and Westernport Region

The Caring for our Country Program allocated a total of \$2.5 million for bushfire recovery works in the Port Phillip and Westernport region. About 70 per cent of the funding was directed to projects aimed at assisting environmental recovery on private land.

Two years on from Black Saturday, the funding had gone towards:

- 261 grants to landholders
- 80 kilometres of fencing erected to protect 836 hectares of native vegetation
- 748 hectares of native vegetation treated for weeds
- 394 hectares of native vegetation treated for pest animals, and
- 42 hectares of woodland corridors replaced.

Funds were also provided to local government in the bushfire-affected areas of the City of Whittlesea, Yarra Ranges Shire Council and Nillumbik Shire Council and Baw Baw Shire Council to employ staff to visit properties burnt in the fires and help landowners develop property recovery plans.

These site visits were really appreciated by landowners who had so much to cope with. Often a walk around the property, a chat and the chance to have questions answered alleviated their concerns, and in many instances the issues were fairly minor and could be easily resolved.

Tackling post-fire weeds

The exposed soil after bushfires is ripe territory for weeds to grow. It can be very easy for various types of weeds to flourish and outcompete regenerating native plants in the post-fire environment.

In the Shire of Nillumbik on Melbourne's north-western edge, Blackberry was seen as potential threat to the recovery of the natural environment after the 2009 bushfires. It is regarded as one of the worst weeds in Australia because of its invasiveness and potential for economic and environmental impacts.

With Caring for our Country funding made available via the Port Phillip and Westernport CMA around 80 fire-affected property owners had blackberries sprayed in a variety of contexts from riparian zones to pasture. With assistance and/or a visit from a Nillumbik environmental planning team member, the property owner mapped the location of the blackberries using an aerial photograph with marked contours. For many property owners this represented a new skill and a new way of looking at land management planning. An agreement was also put in place whereby landowners undertook to do follow-up blackberry control works for the next two years.

Black Saturday Land and Environmental Recovery DVD

With Caring for our Country funding, the Port Phillip Westernport CMA developed a series of short documentaries focusing on land and environmental recovery after the Black Saturday bushfires. The videos address some of the common land management issues that private land holders could expect to face in the years following a bushfire.

The six parts of the series focus on native vegetation, weeds, native fauna, erosion, farm productivity and community recovery. Each part includes accounts of their experiences from local landholders affected by the Black Saturday fires and experts in land management.

You can watch the series online via YouTube or it is accessible on the CMA's website www.ppwcm.vic.gov.au



Post-fire weed control along waterways

Weed control works along waterways burnt in the 2009 bushfires were one priority for the Goulburn Broken CMA.

With Caring for Our Country funding, the Goulburn Broken CMA employed contractors to control re-emerging weeds on all major waterways for two seasons.

The CMA achieved excellent results with the contractors during the summer of 2009/10 and so further control works were done in early 2011 on priority weeds along the fire-affected waterways.

The re-emergence of blackberry, broome and willow was widespread after the bushfires so the opportunity for a follow-up season of weed control was important, enabling the weeds to be reduced to levels that landholders could manage into the future.

Private landholders played a major part through their cooperation and commitment to controlling these weeds along the waterways.

Work was done along the Steavenson River, Acheron River and the Dabyminga Creek, Dry Creek Creek, King Parrot Creek, and Sunday Creek.

The Goulburn Broken CMA received nearly \$5 million in funding through the Caring for Our Country program.

Rejuvenating burnt creeks

A major priority for the North East CMA after the 2009 bushfires was to restore waterways that had been severely burnt so that water quality and quantity were protected.

In August 2009, the CMA worked with Conservation Volunteers Australia (CVA) to revegetate a number of sites along the Barwidgee Creek at Mudgegonga and Havilah Creek at Rosewhite.

CVA volunteers helped to reinstate native trees and aquatic plants along these burnt-out waterways in an effort to address erosion, improve water quality and to re-establish wildlife corridors.

Additionally, the North East CMA fenced out many sites along both creeks to prevent trampling and erosion damage by livestock.

This important environmental repair work was funded through the Australian Government's Caring for our Country Victorian Bushfire Recovery Package.

Many of the volunteers were from Melbourne and some were even from overseas. The project gave people from outside the North East region an opportunity to appreciate the damage caused by the fires and lend a helping hand in the recovery effort.

Photo credit: Natalie Ord



CVA volunteers help to make nesting boxes

Supporting landowners affected by fires in the North Central Region

In the North Central region of Victoria, three separate fires burnt through 13,000 hectares and impacted many private landowners. The North Central CMA received \$370,000 in funding through the Caring for our Country program to help rehabilitate fire-affected areas. Seventy per cent of these funds were directed for work on private land and 30 per cent for Public Land.

The North Central CMA contracted a facilitator to support landowners to develop applications for funding because people who were trying to put their lives and property back together after the fires were struggling to adequately prepare applications. This was an important way of supporting fire-affected communities and it helped them to recover a sense of empowerment to actively rehabilitate and restore their properties.

The CMA provided grants to 18 private landholders in the Redesdale fire-affected area and works done were:

- nearly 55 hectares of land fenced to protect and enhance native vegetation
- almost 40 hectares of regional controlled weeds treated
- 84 hectares of revegetation
- rabbit control
- habitat management for the Brush-tail Phascogale – a nationally significant species.

Recycling for Recovery

Recycled metal from more than 3000 properties damaged or destroyed after the 2009 bushfires proved to be a source of additional money for environmental reconstruction and community recovery projects.

The Victorian Government hired construction company Grocon who spent four months on the massive clean-up effort, resulting in 11,650 tonnes of steel being recycled. It was decided that the best way to return these funds to the community from the recycling was to provide it to Landcare groups to rehabilitate land.

The *Recycling for Recovery Program* provided \$1.584 million for projects in bushfire affected areas that helped to strengthen the capacity of these communities to recover.

Landcare and environmental management groups submitted proposals and 27 projects were funded. Initially, in July 2010, eight community groups received funding for small projects valued at \$5000 or less.

In September 2010, the remaining \$1.53 million was distributed to 19 groups for major Landcare-related projects including:

- Revegetation and targeted weed control by South West Goulburn Landcare
- Ovens and Kiewa landscape restoration project by the Mudgegonga Landcare Group
- Implementation of community environment recovery action plans by the Nillumbik Natural Environment Recovery Working Group, and
- Protecting biodiversity on private land by the Whittlesea Agricultural Society Landcare Group.

All projects are due to be completed by the end of 2011 and will have greatly assisted Landcare groups and community environmental groups to get back on their feet with natural resource management works in their local areas.

(See Appendix 3 for a full list of projects)



Gathering up the metal for recycling from properties that were burnt in the bushfires

5 Restoration and Protection of Cultural Heritage

Bushfires can have an upside – allowing us to see what’s been hidden underneath vegetation and undergrowth for decades. Sometimes, a rich cultural heritage is revealed; increasing our knowledge and fostering community involvement in the protection and management of cultural sites.

After the February 2009 bushfires, Department of Sustainability and Environment (DSE) and Parks Victoria (PV) took the opportunity to undertake a major cultural heritage program – for both Indigenous and early post-Contact settlement – in key fire – affected areas.

DSE and PV worked with Traditional Owners and local historical groups to carry out field surveys, assess known cultural heritage sites for fire-related impacts, and identify ways of managing these places.

Indigenous Cultural Heritage – a joint venture

A landmark project between the Taungurung Clans Aboriginal Corporation and the Wurundjeri Tribe Land Compensation and Cultural Heritage Council was a feature of DSE and PV’s efforts to protect Indigenous cultural heritage after the 2009 bushfires.

The fire complex that started near the Hume Highway on Black Saturday and swept across the Mt Disappointment State Forest, the Wallaby Creek catchment and into the Kinglake National Park burnt a total of 186,000 hectares in parks, reserves and state forest. It joined up with a second fire that started at Murrindindi which went as far north east as the Cathedral Ranges and south to Paul’s Range State Forest near Toolangi.

The fire-affected area overlapped the border of the Traditional Lands of the Taungurung and the Wurundjeri people. For thousands of years, this land was cared for by Taungurung and Wurundjeri ancestors and marks the site of important creation stories, ceremonial areas, camp sites, travelling routes and named places. The land’s natural resources – plant, animal and stone – provided the clans with food and materials for everyday survival.

The fires caused immeasurable damage to the Country of the Taungurung and Wurundjeri, but it also presented a unique opportunity for ‘rediscovering’ Indigenous cultural places that will help to tell the story of how the Traditional Custodians lived on the land.

DSE and PV approached this project in an entirely new way, to acknowledge a shared responsibility, and promote a spirit of genuine collaboration and inclusiveness between the Taungurung and Wurundjeri, and public land management agencies during fire recovery on public land.

The project was set up with a steering group with representatives from DSE, PV, Melbourne Water, Taungurung Clans and Wurundjeri Land Council. Two project managers – one from Taungurung and one from Wurundjeri – were responsible for operational activities. This meant important employment opportunities plus valuable skill and knowledge building for them and their communities.

The project managers engaged archaeologists to help survey key areas of Kinglake National Park, Mt Disappointment State Forest, and Cathedral Range State Park. They organised ‘on-Country’ meetings with the Taungurung and Wurundjeri groups and local public land management agencies and documented the values of Country that makes these areas so special to their Community.

The Wurundjeri project manager also oversaw rehabilitation works at Plenty Gorge Parklands (in accordance with a Cultural Heritage Permit).



The findings from the surveys have led to new opportunities for documenting the history and culture of the Taungurung and Wurundjeri people, and have in turn assisted public land management agencies in gaining a greater understanding of how these values can be acknowledged and protected.

The success of the project has been to demonstrate how, by enabling the direct involvement of Traditional Owners, opportunities for genuine partnerships based on knowledge and information-sharing with the agencies responsible for the management of public land in Victoria can be created.

Revealing The Prom's Indigenous secrets ...

The Wilsons Promontory National Park has a long history of Aboriginal occupation, with evidence of its use dating back at least 6500 years. Following the February 2009 fire, PV took the opportunity to learn more about Wilsons Promontory's Indigenous history so that in the future cultural heritage sites could be better managed and Traditional Owners could be more involved in their management.

PV appointed specialist consultants to undertake a comprehensive search of the Victorian Aboriginal Heritage Register in order to prioritise areas for surveying and then conduct the surveys. In addition extensive consultation was undertaken with the Traditional Owner groups – the Boonwurrung, Bunurong and Gunaiikurnai communities, who were able to provide information about their connection to this Country.

During the fieldwork, 45 previously registered Aboriginal heritage places were located and assessed for fire-related impacts. An additional 37 previously unknown places were identified and fully recorded, significantly expanding the knowledge and understanding of the Indigenous history of Wilsons Promontory.

The involvement of the Traditional Owners enabled PV to update and expand the cultural record of Wilsons Promontory and to develop detailed recommendations for ongoing conservation and cultural interpretation of these significant sites.

A significant management change to one part of the park was possible thanks to the Indigenous cultural heritage survey and the recovery works after the fire. At Picnic Point and Johnny Souey Cove the post-fire assessment revealed a better picture of the previously known Indigenous sites. To improve the protection of these sites, PV worked with archaeologists and the Traditional Owners to identify a more appropriate, walking track alignment between Whisky and Picnic Bays and an alternative camp site location near Johnny Souey Cove. This new track provides a magnificent view of Whisky and Picnic Bays with a new viewing platform, so it's a good result for park visitors as well as protecting important cultural heritage values.



Indigenous surveying along Tongue Point Track at Wilsons Prom



Stone tool artefact found during Indigenous surveying at Wilsons Prom



Work shed excavation site at the former Mount Hunter Tin Mine, Wilsons Promontory National Park

The Prom's early post-contact/European history

Wilson's Promontory also has a rich early settlement history that includes sealing and whaling, coastal and geological surveying, prospecting, timber milling, pastoral runs and fishing and game hunting.

For example, arguably one of the more interesting episodes took place in 1887 when the Great Southern Railway linking Dandenong to Altona was constructed and it was decided that two new tourist townships were needed on the Promontory. Accordingly, on 5th July 1889, there was a proclamation for the establishment of two settlements – at Yanakie and Seaforth, situated near Freshwater Cove south of Mount Singapore.

In June 1892, the Seaforth residential sites were put up for auction and 15 of them were sold. But none of the investors ended up using the properties, so in 1910 the Government acquired the land and in 1928 finally rescinded the township of Seaforth.

Little now remains to show that Seaforth ever existed except the name of the rise above Chinaman's Beach where George Smith's hotel once stood: "Pub Hump". Smith had hoped to purchase the freehold block on which he had built his pub but was apparently outbid so moved the building to Port Welshpool where one of his daughters ran it as a store. Although significantly modified, the historic building still exists and for years was used as the Port Welshpool post office and residence of the postmistress.

After the 2009 fires, archaeologists found some remarkable evidence associated with the Seaforth Inn at its original site.

Mining was also attempted on the Singapore Peninsula. In 1866, the Chancellor Gold Mine and Quartz Crushing Company worked a claim over a 25-acre area, but this proved unsuccessful and operations ceased in 1870. However, in that same year tin ore was discovered near Corner Inlet. After World War I, the increased demand for tin resulted in a call for extensive mining to take place in the area.

One of the most exciting results of this archaeological survey was discovery of the accommodation site for the Mount Hunter mine manager and his staff along Tin Mine Creek. The small settlement consisted of rough weatherboard huts, including a blacksmith forge, a store and explosives magazine. The rediscovery of this site allowed the archaeologists to properly place it on a map and record its extensive archaeology. Before this, the site was believed to have been located nearly 1.5 km further to the east.

The results of the assessment survey and registration of new sites increases PV's knowledge and understanding of the Indigenous and early European settlement history of the area and will help with the future management of this iconic and highly significant National Park.

Unearthing early European settlement history

Archaeologists and history buffs spent many days carefully walking through fire-damaged parks and forests in the months after the February 2009 bushfires. Joining them were Licensed Tour Operators whose income and businesses were impacted because of the fires.

The hunt was on for post-settlement heritage sites. They were making inspections and determining what sort of rehabilitation work might be needed for these places, and importantly, recording what damage the fires had done, and possibly even discovering new historical riches.

Together, DSE and PV developed a systemic process for undertaking initial impact and risk assessments to historic sites in the fire areas. Because there was less vegetation than usual, it was easier to discover previously unknown heritage sites and examine the sites that were formally registered on the state's heritage list.

As well as the direct impacts of fire on these heritage values, the assessors also had to look out for erosion and slippage of sites due to rain after the fires and impacts associated with fire suppression efforts and subsequent rehabilitation work. Pilfering of cultural artefacts was also a potential problem because they can be seen due to loss of vegetation.

Sites were affected in various ways depending on the nature and intensity of the fires. Most of the known heritage values within the fire areas consisted of ruins, remnants of workings and machinery, modified landforms and exotic vegetation plantings. They relate largely to early settlement, the timber industry, mining and the development of water-use infrastructure. These heritage sites may not look like much, but they nevertheless embody historic values and give glimpses and an appreciation of another era when life was very different from today.

For these reasons, it is important to assess, stabilise, preserve and record the post-fire remnants of these sites. Very rarely would anything be reconstructed.

Altogether, 156 historic sites were assessed throughout fire-affected areas in the Bunyip State Park, Wallhalla Historic Area, Wilsons Promontory National Park and the Steels Creek mining area in Kinglake National Park. Thirty-one of these were previously unrecorded or unknown historic archaeological sites. Information and data from the assessments were added to the Victorian Heritage Register and will help DSE and PV to manage the sites more effectively in the future.

Making sites safe

Much of the work that was done at cultural heritage sites after the 2009 bushfires actually revolved around making the sites safe for visitors.

For example, the Bracewell Street fire in Bendigo revealed not only historic mining artifacts dating from Liddell's Pyrites Works in the 1880s but also contaminated calcine sands. The entire area was treated (hydromulched) to stabilise the sand while a permanent solution was found. At the Cambarville Sawmill Historic Township site in the Yarra Ranges National Park asbestos was found and removed.

Other projects related to the removal of asbestos, covering of exposed rubbish dumps and extensive glass middens on historic sites, as well the installation of risk management signs near mining sites where tunnels and shafts had been exposed.

Averting more damage

The 2009 bushfires destroyed what little was left of the flammable remnant fabric of many historic sites. What hard archaeology remained was further threatened by erosion, tree fall and pilfering.

The assessment process identified threats where works could be prioritised to mitigate these threats. Diversion channels and sandbagging were installed in some instances and chainsaw crews dealt with the many trees that had the potential to, or were already, impacting on sites.

Pilfering is always a difficult issue to address. It's impossible for public land management agencies to keep a close eye on heritage sites across their area of responsibility, particularly in remote areas. Education is often the best way to encourage people to respect the moveable archaeology of historic sites. For this reason, generic historic site protection signs were installed at sites where pilfering was seen as a potential problem.



6 Education, Communication and Community Engagement

Apart from on-the-ground works on public land, the Department of Sustainability and Environment (DSE) and Parks Victoria (PV) also gave support to fire-affected communities in the difficult months after Black Saturday and the other bushfires of the summer of 2009.

Some bushfire-affected communities, such as Marysville, were heavily reliant on their surrounding public land and associated recreation and tourism.

Although, the Victorian Bushfire Reconstruction and Recovery Authority (VBRRA) took the lead on engaging with communities about reconstruction works and DSE, PV or Catchment Management Authorities (CMAs) engaged on specific issues relating to projects on public land.

DSE and PV did a range of activities to get local communities involved and understanding the recovery of public land. Educating the younger members of communities was important for helping them come to grips with what happened in their backyard.

It wasn't just local communities either that got involved; many people from far and wide came to lend a hand with recovery activities like cleaning-up creeks and replanting in parks and reserves.

DSE and PV also worked hard to keep the public informed of the progress of recovery work through their websites, newsletters, community information stands and many other actions.

School's in – learning about forests, fire and water

Seventy students from rural fire-affected communities converged on Rawson Village in June 2010 for a Forest Fire Water school camp to celebrate World Environment Day.

The Grades 5 & 6 students, from Cowwarr, Neerim South, Tanjil South, Labertouche, Jindivick, Yinnar South and Narracan primary schools spent three days learning about fire and forests and the relationships between them.

DSE organised the camp after running a successful pilot camp in 2009. More than 66 per cent of land in Gippsland is public land, which includes national and state parks and state forests. This means many Gippsland residents live close to forests and parks; so they are directly affected by the way they are managed.

Communities that better understand forests, how fire shapes them and how we manage them have a greater capacity to become involved with forest management. With this in mind, over the past 10 years DSE has sought ways to engage all members of communities, including children, to help them gain a greater appreciation of forest management and give them opportunities to be involved.

The 2010 Forest Fire Water school camp was a huge success thanks to the contribution of local agencies including the CFA, PV, West Gippsland CMA and Gippsland Water.

The camp had a different theme each day and the youngsters learnt about the interaction between forests, animals, plants, water and fire. A common message was that we need to use our natural resources wisely. They explored many ways to save, recycle and use our natural resources efficiently.

Activities included bushwalking, orienteering, water monitoring, night spotlighting, plant identification and fire behaviour measurement.

For many of the students who live in high bushfire risk areas in rural Gippsland where water resources are low, it was a very useful experience.

The three-day camp highlighted the fine balance that the natural elements require for sustained existence. It is hoped they will all have a better understanding and can apply their new knowledge about sustainability and conservation.

A similar camp will be run in 2011 so that more local Gippsland children can have fun while learning!



Green thumbs from Toolangi Primary School help with bushfire recovery

Students, teachers and parents from the Toolangi Primary School gave a helping hand to the recovery of the Murrindindi Scenic Reserve when they planted 1000 native seedlings to revegetate the Cassinia Camping Area that was devastated by the 2009 bushfires.

It was a day of hard work but also a day of learning about post-fire regeneration and revegetation. Students were very keen to assist in this project and their efforts were well rewarded with the visible difference they made to the area.

A mix of trees, shrubs and groundcovers were planted to beautify the area and add to the natural regeneration of the forest. The seedlings planted were grown from seed collected in the Toolangi State Forest.

The plants were provided as part of a special partnership between the DSE Toolangi Forest Discovery Centre and the Melbourne Museum. The growing seedlings are displayed at the Forest Gallery, a living forest display at the Melbourne Museum that highlights the flora, fauna and history of Victoria's mountain forests. Twice a year, seedlings from the Forest Gallery are donated to the Toolangi Forest Discovery Centre to be planted in the Toolangi area.

This tree planting day was a great opportunity for DSE to work with locals to restore the bushfire affected environment; it instilled a great sense of community.

The revegetation of the Murrindindi Scenic Reserve was part of a larger \$2.5 million project to restore and reconstruct camping facilities, including picnic shelters, barbecues, camping areas, toilet blocks, carparks, walking tracks and reserve roads.



Gippsland school students enjoyed the activities as part of the Forest Fire Water camp

A young student from Toolangi Primary School gets his hands dirty helping to rehabilitate the Murrindindi Scenic Reserve

Kinglake National Park Master Plan – involving the community about future directions

Through a community consultation process, a long-term master plan for Kinglake National Park was developed. The master plan looks forward to the next 15 years and seeks to achieve a balance between providing quality visitor experiences and conserving and protecting the park's natural values.

In coming to the master plan process, PV (with its own local staff heavily impacted by the fires) was mindful that local residents were dealing with a weight of emotional and practical issues. The process commenced at an Open Day for locals held in the park in October 2009. This was the first time people had been allowed back into the park since the February fires. The Open Day gave people a chance to reconnect with the park and to begin to understand the extent of damage to the park infrastructure.

An important consideration for Kinglake National Park is how it will best deal with the growing population of Melbourne's northern suburbs and nearby townships like Whittlesea. Providing enjoyable picnic and recreational facilities whilst protecting the special nature of the park is a key challenge in a time of population growth and climate change.

The management plan for the park that was developed in 1996 formed the basis for the master plan for rebuilding.

The approach taken for the consultation was to draw heavily on previous community workshops and to work through the local Community Recovery Committee and other existing community structures such as the *Mountain Monthly*, the local community newsletter, rather than add another commitment to people's already stretched schedules. Displays held at the community market and the Kinglake Farmers' Market provided the opportunity to 'drop in' and see the draft plans and talk with staff about ideas and concerns.



There were a number of different opportunities for people to learn more and ask questions about the Kinglake Master Plan

Through the development of the plan, parallels often arose between the regeneration of the forest and personal and community healing – new growth on tree ferns, new shoots on eucalypts and the return of certain bird species.

Common themes that emerged in working with local people were:

- the importance of the national park to local tourism as an income generator
- the importance of the national park as a backdrop to life in the Kinglake Ranges
- the potential for tracks that directly link the townships with the national park, to make the park more accessible for daily walks and exercise.

Given its proximity to an ever-expanding Melbourne, the park will play an increasing role in providing a place for recreation and relaxation. A number of people noted that The Gums campground was the first place they ever took their children camping – working on the idea that if everything turned to mud, they could be back home in an hour or so. Given an ageing population and community expectations for a sense of social equity, rebuilding will aim to make the popular sections of the park more accessible.

The master plan is aiming to make the park more accessible in many ways – to an increasing Melbourne population; to a broader cross-section of the community; and by making it easier to navigate between the four different blocks that make up the park.

The draft master plan was released in June 2010 and it will be finalised in early 2011. It was available on the PV website, and also displayed from June to July 2010 at the Kinglake library, Kinglake shops and in some Whittlesea shops.

Local residents and visitors were invited to have their say on various actions proposed in the draft including:

- a new lookout structure at Mt Sugarloaf
- a new downhill mountain bike track under the powerlines at Bowden Spur
- better linking tracks between the townships and the national park
- a new layout for the picnic area at Masons Falls
- more accessible walking tracks at key locations including Jehosaphat Gully
- a new camping area to complement 'The Gums' camping area.

Ultimately, the master plan will guide the reconstruction of the major visitor facilities in the park to ensure that they are able to serve the community well into the future.

Discovering and learning about forests

The Toolangi Forest Education Service, operated by DSE and based at the Toolangi Forest Discovery Centre, delivers forest education programs to around 8000 students each year.

Since February 2009, the Education Service has provided bushfire education programs to 2200 students from 25 schools from all over Melbourne.

Toolangi's bushfire programs have focussed on developing students' understanding of how the environment recovers after fire, the role of DSE in fire management and how to be prepared for bushfires at home or as a tourist to bushfire prone areas.

During a bushfire program at Toolangi, students walk amongst the tall Mountain Ash trees in Toolangi State Forest to learn how the forest environment is adapted to survive fire. Students measure fuel loads in burnt and unburnt Messmate forest to determine the bushfire risk of each area and examine the role of planned burning in fuel reduction and fire management. They also have an opportunity to meet some of the Department's fire crew, to hear stories of their experiences and see the equipment used in forest fire fighting.

As fire is a natural phenomenon in our forests and an important part of forest management, fire ecology and local bushfire history is also discussed widely in all forest programs at Toolangi.

Further information on forest education programs at Toolangi can be found on the DSE website www.dse.vic.gov.au and follow the links to 'Forests' and 'For Schools'.



St Andrews resident Paul Kitchell, who gave over 50 hours of his time to the Watsons Creek Biolink project, together with keen environmentalist and TAFE student Angela Skehan, planting seedlings

Healthy habitat and happy homes

After the 2009 bushfires, considerable habitat for native fauna was burnt, leaving vulnerable, small animals with little food and limited protection from predators.

A bushfire recovery project to revegetate 80 hectares of former farmland, which is now part of Kinglake National Park, into a healthy habitat for native fauna was kicked off in May 2010 and got lots of different people involved.

Known as the Watsons Creek Biolink, the project benefitted from the assistance of more than 460 individuals, volunteer groups, primary and secondary school groups, international students from the University of Melbourne and corporate volunteers, who joined with DSE and PV staff to lure native inhabitants back into the Kinglake National Park.

Since the February 2009 fires, Kinglake National Park has witnessed a vast reduction in its mammal numbers, particularly the Brush Tailed Phascogale and Common Dunnart. The Watsons Creek site connects the unburnt Warrandyte-Kinglake Nature Conservation Reserve with the adjoining Kinglake National Park.

So far, more than 1800 volunteer hours have gone into the project with lots more to come. Greenfleet has also joined in as a major partner providing equipment and ample supplies of plants, grasses, shrubs and trees. The Friends of Warrandyte State Park and Friends of Westerfolds have chipped in too with a very important contribution of 7000 eucalyptus seedlings that were raised from seed by volunteer groups.

The planting of these thousands of seedlings at Watsons Creek will create a biological link between the park and unburnt forest and provide a corridor of continuous vegetation to allow these animals to re-inhabit Kinglake National Park and facilitate their recovery.



Strath Creek Landcare members sorting stream material for Macquarie Perch eggs.



The Australian Trout Foundation were willing partners in the clean-up and replanting of vegetation along Leary's Creek at Marysville.

It's a bit fishy

Community members of all ages from Marysville and Flowerdale got involved with helping to protect native fish species after the 2009 bushfires. From Landcare groups through to youth groups, many people put up their hand to support bushfire recovery work and learnt more about why these fish are a valued part of our ecosystems and biodiversity.

Flowerdale's resilient threatened fish in King Parrot Creek

Flowerdale's King Parrot Creek is home to the nationally endangered Macquarie Perch. Once widespread throughout northern Victoria and the upper reaches of the Murray-Darling Basin, the species now exists in less than 10 known locations in Victoria.

With populations of the Macquarie Perch struggling to survive, the impact of the 2009 bushfires upon Flowerdale's King Parrot Creek population was nearly catastrophic.

Just after the fires, in March 2009, 35 Macquarie Perch were recovered from King Parrot Creek and relocated to a secure environment outside the fire zone with the help of the Department of Primary Industries (DPI), the Goulburn-Broken CMA and the local community.

After water quality and riparian vegetation had sufficiently improved, the fish were returned to King Parrot Creek in December 2009. Members of the Strath Creek Landcare Group helped to release the fish back into the creek and then they got involved in a project aimed at identifying key spawning areas and identifying the degree of existing and future sedimentation on these spawning areas.

The Landcarers pulled on their waders and helped researchers to set and check drift nets and then sort through the debris collected in the nets to find tiny Macquarie Perch eggs.

Ongoing monitoring of the Macquarie Perch population in King Parrot Creek will continue and the data will help the Goulburn-Broken Catchment Management Authority to support habitat for the species.

Weed removal for healthy habitat

The Flowerdale Fire Recovery Committee started up soon after Black Saturday as a way of giving the Flowerdale community a focus for their recovery activities.

One focus was on supporting the recovery of the King Parrot Creek through weed control. With funding from DPI's 'Adopt a Stream' program, the group got stuck into removing blackberry from the banks of the creek. Once the group learned of the presence of the Macquarie Perch and the suite of fire recovery actions happening to support the species in King Parrot Creek, members became powerful advocates for the fish, shaped their weed control program around the fish's needs and organised a community meeting to learn more about the species and the current recovery actions.

Fish researchers from DSE ran a number of field days and made presentations to local community groups including the Flowerdale Fire Recovery Committee and the Strath Creek Landcare Group to inform people about the need to manage weeds in the riparian zone, the importance of healthy waterways for native fish, and current research and on ground management actions.

Two years after the 2009 bushfires, the Flowerdale Fire Recovery Committee has now 'morphed' into a series of action 'Engines' and the Environment Engine continues to wage war on waterway weeds. In response to the strong community advocacy for the creek, the Goulburn-Broken Catchment Management Authority has allocated funding to develop a Management Plan for the King Parrot Creek that will identify values and threats for the creek and support an integrated action plan.

Native Fish Awareness Week launched in Marysville

Marysville is almost the southern most point of the mighty Murray-Darling Basin. The need to protect native fish species has probably never been so obvious than after the 2009 bushfires, when hundreds of kilometres of waterways were burnt and damaged and water quality dramatically reduced so that some threatened fish species were put at serious risk of extinction. Marysville became the hub for a series of fish recovery actions to support the nationally threatened Barred Galaxias.



School students from Alexandra enjoyed a day of fun activities at Lake Mountain

For that reason, Marysville was an obvious launch place for the Murray-Darling Basin Authority's Native Fish Awareness Week in November 2010. The week was an opportunity for river communities to learn more about rehabilitation efforts for native fish throughout the Basin.

Native fish populations across the Basin have declined by 90 per cent since European settlement of Australia. Threats to native fish include changes to water management, alien fish species, barriers to fish movement and overfishing.

At Marysville, DSE staff organised a great launch day of education and fun art and craft activities for local schoolchildren. Students from four local schools participated in a series of activity stations learning about native fish and riparian habitat. Younger students painted colourful Barred Galaxias fish onto blank shoe inner soles to create a huge school of fish which will form part of an art installation beside Leary's Creek; the creek which runs through Marysville township and is home to the threatened species. Children from the local kindergarten and Marysville Primary School also worked with local parents and members of the Triangle Arts Group to write a song about the Barred Galaxias, which was performed at the launch event for Native Fish Awareness Week.

Partnerships in rehabilitation

Traditionally there have been some misunderstandings and even hostility between some supporters of native fish and some of those who enjoy fishing for introduced trout in our waterways. Fires in Marysville affected both native fish and trout habitats and highlighted the fragility of the local Barred Galaxias population. The opportunity arose to bring together both parties and begin a process of working together with a constructive and positive approach.

Leary's Creek in Marysville, home to the Barred Galaxias, had a post-bushfire make-over thanks to the efforts of volunteers from the Australian Trout Foundation, staff from DSE and members of Marysville Youth Incorporated who put in plenty of hours planting indigenous trees, shrubs and grasses along the creek banks and re-aligning debris in the Marysville lake to provide improved fish habitat.

Participants shared a barbecue together afterwards, along with plenty of stories, and forged a stronger relationship which has led to a renewed, positive partnership approach.

Passing on knowledge to the next generation

Twenty-six children from Alexandra schools participated in a YMCA holiday program over the summer of 2010/11. They spent a day learning about some very special native animals that call Lake Mountain home.

DSE and PV staff hosted a number of activities, including demonstrations of techniques used to monitor the Barred Galaxias, Broad Toothed Rat, Alpine Bog Skink, Alpine Tree Frog, and Victoria's faunal emblem, the Leadbeater's Possum.

Passing on knowledge about these species to the next generation is highly important. Many of the children who attended the day live and play in the areas that are home to a number of these valuable species. With their imaginations sparked by new knowledge about rare species, the children made kites that featured the animals and then flew them high into the sky.

Lake Mountain Music Festival

Lake Mountain Alpine Resort threw open its 'doors' to music and environment lovers for the Lake Mountain Music Festival in March 2011. The line-up of music artists was terrific as was the information stand hosted by DSE and PV.

There were displays about local threatened species, including the Barred Galaxias or Victoria's Nemo as it is affectionately called. DSE and PV staff were happy to converse with visitors about the bushfire recovery efforts to protect these species and tell them about ways they could be involved or contribute. Making badges of little 'Nemo' was a hit with the children.

Locals also had the opportunity to provide feedback on the design concept for an interpretive bridge and signage about the Barred Galaxias planned for Marysville. Copies of the design concept and feedback sheets were also placed in the Rebuilding Advisory Centre building, DSE office and Information stand in Marysville, inviting community comment and involvement in the design process.

Website alerts people to closure of roads, tracks and recreational facilities

Public access into the parks and forests burnt in the 2009 bushfires had to be restricted in the months following the fires. Many roads, tracks and visitor facilities were closed because they were damaged, or in some cases, completely destroyed. Public safety was the paramount concern.

National and state parks and state forests are valued recreational destinations for many Victorians and tourists, but it was important not to put visitors' safety at risk.

Reasons for closure included: hazardous trees, limbs and fallen timber; damaged tracks, bridges, signs, recreation sites and other facilities; unstable soils and/or stream crossings; or the presence of hazardous materials or substances.

DSE and PV tried to open access as quickly and as practically as possible, taking into account safety considerations.

To assist visitors, DSE developed a public access interactive map to provide information regarding closures and anticipated re-opening dates of roads and visitor sites managed by DSE and PV.



The interactive website showing road and track closures www.dse.vic.gov.au/publicaccessmap

This interactive map, available via both the DSE and PV websites, provided locational information so that people wishing to visit or drive through could check on the status before going.

The map was updated regularly by local district staff as the road network, picnic, camping, walking, and other facilities were gradually repaired and/or reopened during 2009 and 2010. Some facilities are still closed due the extensive damage sustained, but work continues to reopen them.

Reporting and communicating progress

The Victorian Government's Bushfire Recovery Program for public land amounted to over \$90 million.

A major program like this needs diligent management and supervision. A recovery management board was established with representatives from relevant divisions within DSE, PV and Melbourne Water.

DSE and PV developed a plan to guide the recovery of public land in Victoria affected by the 2009 bushfires which was aligned with three of the pillars in the *Rebuilding Together – A Statewide Plan for Bushfire Reconstruction and Rebuilding* released by VBRRA in October 2009.

By helping public land, its flora, fauna, waterways and associated infrastructure to recover, DSE and PV, together with partner agencies, helped the communities impacted by the fires to recover.

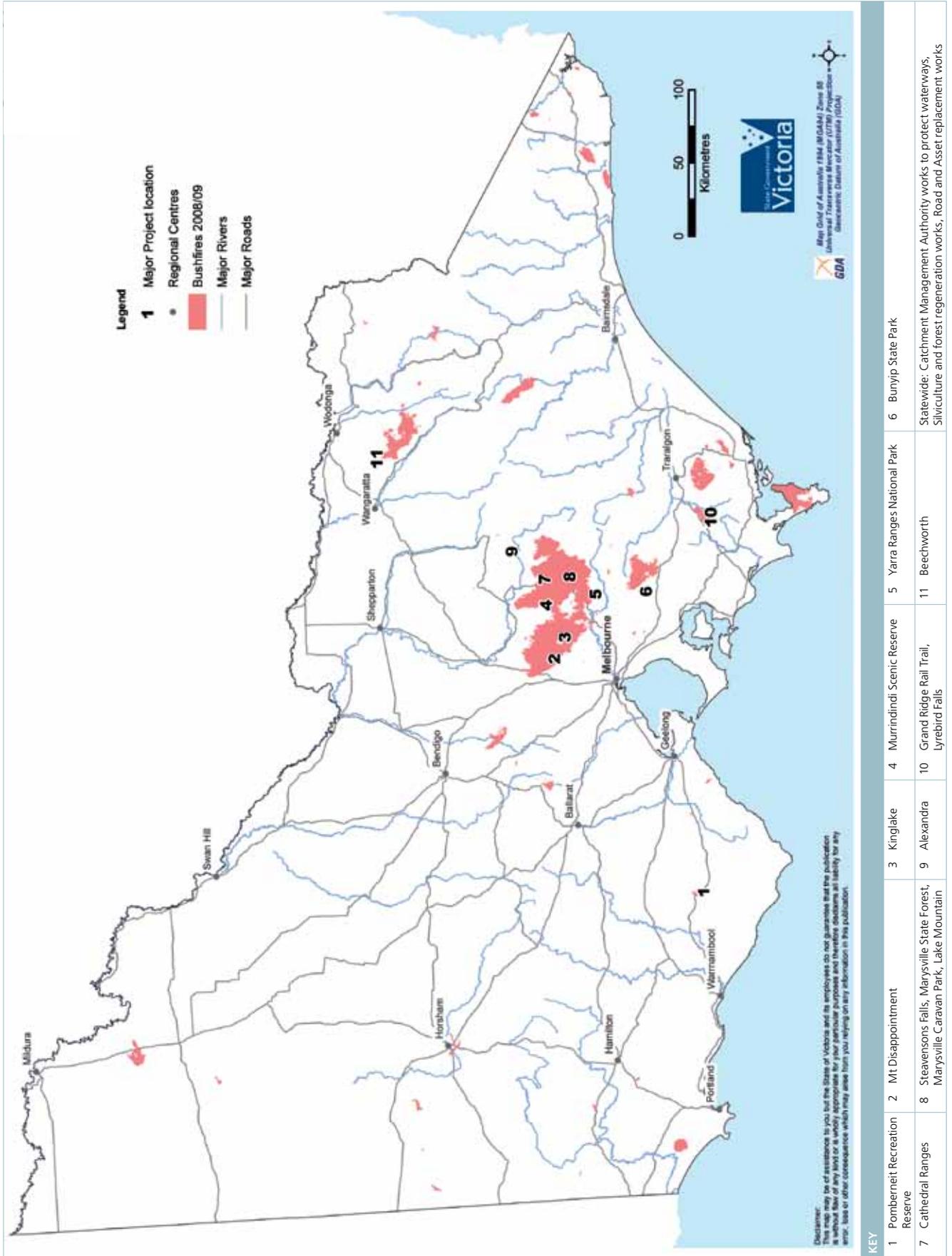
The recovery management board met on a regular basis to check on the status and progress of projects and works identified in the *Bushfire Recovery Plan for Public Land*. This group also oversaw the budget and expenditure of recovery projects to ensure that funding was being well spent within identified timeframes. In some instances, unavoidable circumstances such as the major Victorian floods in spring 2010 and summer 2011 held-up some projects or 'undid' some of the good work already done, but generally, projects and works were conducted well.

To keep stakeholders, bushfire-affected communities and members of the public informed about the progress of the recovery efforts on public land, DSE and PV developed a regular newsletter called *Regrowth*. This newsletter was available via the agencies' websites and was distributed via DSE and PV offices in the bushfire-affected areas. DSE and PV also contributed to VBRRA's major reports to the public for example, the 100 Day Report and the 24 Month Report (published February 2011).

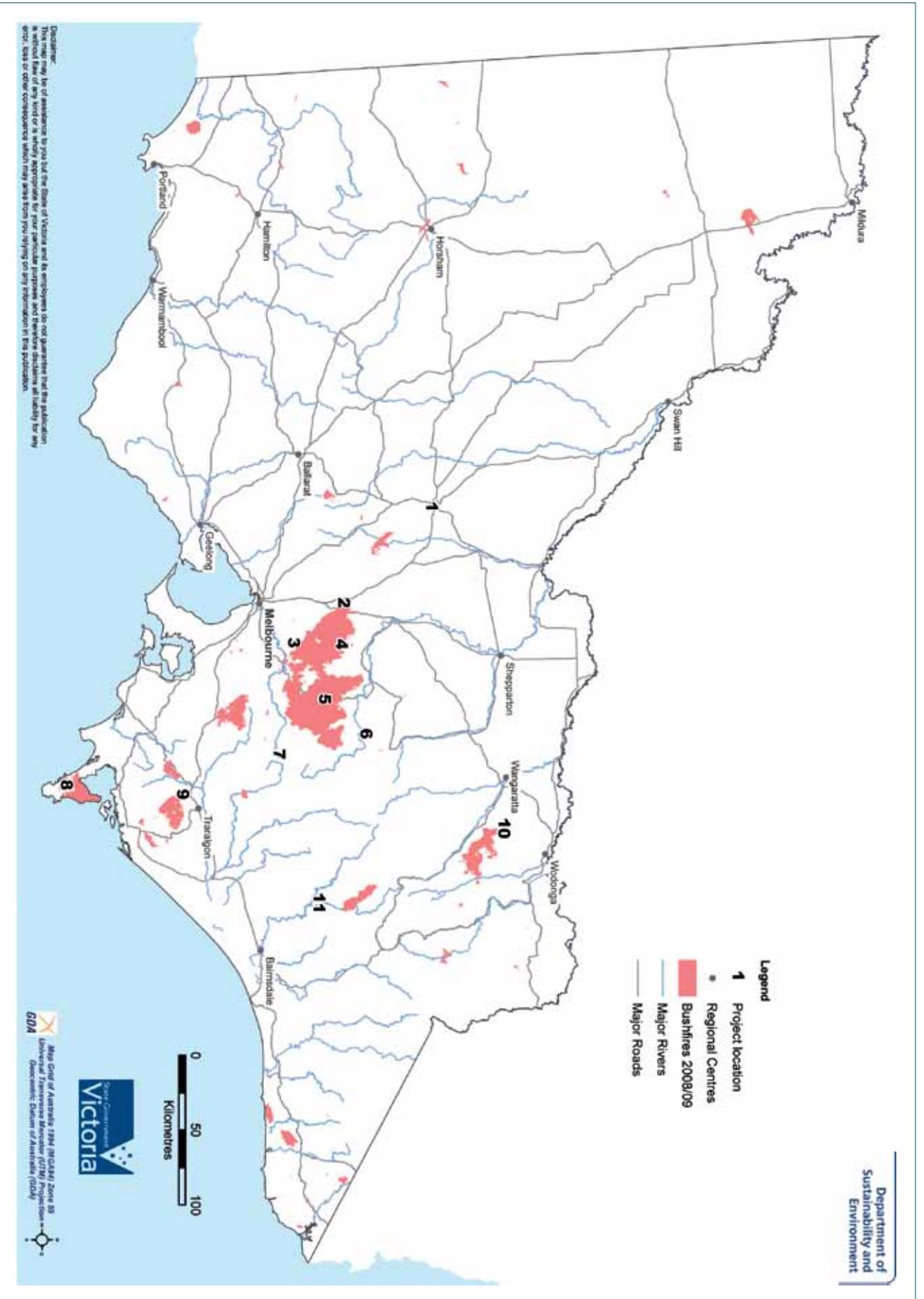


Appendices

Appendix 1 – Map of 2009 bushfires Major Projects



Appendix 2 – 2009 Bushfire Recovery Program Natural Values Projects



Accurate information on project locations will be published in natural values project reports which will be available at www.dse.vic.gov.au

Key (Appendix 2)

| Location | Project Title | Project Details |
|----------|--|---|
| 1 | Weed and Vegetation Management – Bendigo | This project is providing weed control and revegetation using local indigenous native species. Works will be on selected parcels of Public Land that were affected by fire in February 2009, at Bendigo. |
| 2 | Rainforest Recovery | This project will examine the impact of the 'Black Saturday' fires on cool temperate rainforest in the Victorian Central Highlands by re-sampling 120 fire affected sites where pre-fire ecological data were collected and 10 unburnt sites as controls. Cool temperate rainforest is a Flora and Fauna Guarantee (FFG) Act listed community in Victoria and provides critical habitat for a suite of rare and threatened species. |
| | Fire Impacts on Leadbeater's Possum | This project will assess the impact of the February 2009 Black Saturday bushfires on the nationally endangered Leadbeater's Possum, Victoria's State Faunal Emblem, and will identify necessary recovery actions in the wake of the fire. |
| | Fire Impacts on Threatened Toadlet Frogs | This project aims to gain a better understanding of the current status of Bibron's Toadlet and Southern Toadlet in 2009 bushfire-affected areas and to inform management of the species to enhance fire recovery. Surveys will be undertaken, in areas of known historic occurrence within and adjacent to areas burnt by the Kilmore East-Murrindindi fires, to assess the impact of the fire on survival and breeding success. |
| | Fire Recovery Photo Point Library | This project will create a library of photographs documenting recovery of fire affected threatened species and ecosystems. Photo points were established immediately post fire and these, with additional locations, will enable time-sequenced images to be collected. The information gathered will be shared with professionals and the public via the internet. |
| | Barred Galaxias – Establishing New Populations | Drought-impacted populations of the nationally endangered and state listed fish Barred Galaxias, from Lake Mountain to Mt. Disappointment, were burnt during the 2009 fires. These populations, representing 50% of the known range of the species, are now affected by post-fire sedimentation. The project aims to establish new populations from individuals collected at impacted sites to aid recovery and reduce the overall risk of extinction of recovering populations. |
| | Barred Galaxias – Improving Spawning Success | This project will identify key spawning areas of the nationally endangered and state listed fish Barred Galaxias in post-fire affected streams, determine the degree of impact of sediment on spawning habitat, and develop and implement in-stream management procedures to improve spawning success. Barred Galaxias undertake their entire life cycle in freshwater streams with highest spawning success occurring in undisturbed catchments where eggs are laid under rocks and cobbles. High levels of sediment influx into streams after fire and can smother and kills eggs in key spawning habitats. |
| | Fire and Sambar Deer Abundance | Browsing by deer is a potential threat to recovering plant populations in fire-affected areas. This project will evaluate the effects of five 2009 fires on the abundance of Sambar Deer by resurveying monitoring locations that were surveyed pre-fire. |
| | Strategic Predator Control | A number of native threatened fauna species are potentially at risk after the 2009 bushfires from increased predation by introduced carnivores, particularly foxes. The objectives of on-ground works is to minimise introduced predator numbers in the fire-affected areas, during the two year post-fire period when small mammals are most vulnerable. This project aims to achieve an intensive baiting and trapping program across Public Land. |
| | Myrtle Wilt – Post Fire Infection Patterns | This project will assess the levels and stages of myrtle wilt infection across fire affected areas and compare pre and post fire infection patterns utilising an established methodology (Cameron & Turner 1996), and investigate links to fire severity. Myrtle wilt study plots established in the 1990s (Cameron & Turner 1996) in the Central Highlands will provide additional detailed information on impacts of wilt and fire on cool temperate rainforest. |

| Location | Project Title | Project Details |
|----------|--|--|
| | Bushfire Impacts on Microbats | Using the level of bat foraging activity recorded by bat audio detectors, this study will assess the relative abundance of threatened and non-threatened microbat species in areas severely burnt in the 2009 fires. Fourteen species of microbat have previously been recorded from the area affected by the Kilmore East–Murrindindi fires. Very little is known of the impact of bushfire on microbats and this project is expected to provide a greater understanding of population levels and foraging requirements of microbats post fire. |
| 3 | Bio-link Revegetation – Kinglake National Park | The project involves revegetation of an 80 hectare biolink between Kinglake and Warrandyte State Park. The link will supplement fire-affected habitat of local fauna including Brush-tailed Phascogales. |
| 4 | Macquarie Perch Recovery – King Parrot Creek | This project aims to identify key spawning areas of Macquarie Perch in King Parrot Creek and determine the degree of existing and future sedimentation on these spawning areas. Macquarie Perch are a threatened native fish species listed under both state and national legislation. The King Parrot Creek Macquarie Perch population is one of only a few small, discrete populations of the species remaining in the Goulburn Broken Catchment. King Parrot Creek was heavily impacted by the 2009 fires, with both community and scientists now concerned about the ongoing effects of the 2009 fires on the future of this fragile population. |
| | Cave bats survey – Kinglake | This project will study the impact of fire on threatened cave-dwelling bat species. Bat researchers, with assistance from volunteers, will survey bats as they leave known cave sites in the Kinglake area. The information will be compared with pre fire data and help improve understanding of seasonal roosting behaviour of bats in the area and the effect of fire on these species. |
| | Threatened fish recovery and community | The project will enable members of local fire affected communities to participate in threatened fish recovery work. Participants will be able to engage in and better understand the challenges, risks and opportunities in the recovery of Macquarie Perch and Barred Galaxias populations. The project aims to establish long term commitment of individuals and organisations to the recovery of these nationally threatened fish. |
| 5 | Buxton Gum Recovery – Cathedral State Park | This project will survey and assess the recovery of fauna and flora species following the 'Black Saturday' bushfires in Cathedral Range State Park and Buxton Silver Gums Reserve. The project will support pest animal and pest plant programs. Special focus will be placed on supporting the recovery of the Buxton Silver Gum (endangered), Long-nosed Bandicoot, and Powerful Owl, (Flora and Fauna Guarantee Act listed species). |
| | Community Finding Fauna | The project will build the capacity of community members and groups to contribute to our knowledge and understanding of the survival and recovery of fauna in fire-affected areas. The project will provide resources (expert guidance and survey equipment) for Non-Government Organisations and local groups to contribute to organised searches for fauna. Information collected will help DSE research into the impacts of fire regimes on wildlife. |
| 6 | Fire Impacts on Spotted Tree Frog Recovery | The objective of this project is to assess the impact of bushfire on the Spotted Tree Frog and associated habitat values. The Spotted Tree Frog is a critically endangered species restricted to north east Victoria. Fire and its management are considered to be potential threats to remaining populations of the species; however the impacts of fire are not known. |
| | Dunnart survey – Buxton/Eildon area | Camera surveys used in project 12 (above) recorded either White-footed or Common Dunnarts (threatened and vulnerable status) for the first time in Cathedral Range State Park. This project will investigate further to determine that status of dunnarts in Cathedral State Park and nearby State Forest and other Parks. Local community groups will be asked to participate in the surveys. The project will make land management recommendations for areas where dunnarts are detected. |

| Location | Project Title | Project Details |
|----------|---|--|
| 7 | Post-fire Recovery of Subalpine Vegetation | This project will establish permanent plots to monitor soil and vegetation recovery, including the recovery of Environment Protection and Biodiversity Conservation (EPBC) Act and Flora and Fauna Guarantee (FFG) Act listed peatlands affected by the 2009 bushfires. It will also address the current large gap in post fire recovery of Snow Gum forests and will enable a useful, field-based understanding of subalpine vegetation recovery across the landscape. |
| | Fire Impacts on Sub-alpine Fauna | Sub-alpine regions affected by the Black Saturday fires, Lake Mountain Plateau and Mount Bullfight Nature Conservation Reserve, are confirmed pre-fire locations for a number of threatened fauna species including Alpine Tree Frog, Alpine Bog Skink and Broad-toothed Rat. These areas will be surveyed and the results from them will feed directly into on-ground management actions / protection measures to aid species' recovery and habitat regeneration at key localities. |
| 8 | Small Mammal Recovery at Wilsons Promontory | This project will monitor the effect of fire on the small mammal assemblage in Wilsons Promontory National Park. It will assess the influence of time since fire on abundance and use this information to better manage fire regimes within the park for the conservation of threatened species. |
| | Management of Feral Cats After Fire | There is limited understanding of the movement patterns of exotic predators, such as feral cats, following a large fire event. It is expected that these species could cause significant decline in wildlife species which survive the fire due to the reduction of protective vegetation cover and alternative prey. This project, to be undertaken at Wilsons Promontory, seeks to (a) collect highly accurate home range data on cats in the burnt and unburnt zone followed by (b) a large scale poison baiting exercise to determine whether the Curiosity® cat bait can be used effectively following large scale fire. The project will be linked to other work monitoring post fire populations of small mammals at risk of predation. |
| | Response of Orchids to the 2009 Bushfires | This project will document the range of responses displayed by orchids across all 2009 bushfire-affected areas. Nationally threatened orchids affected by the fires will be used as case studies. The project will also make recommendations for the ongoing management of each 'case study' species, and communicate results to local communities through the final report and at least two presentations. |
| 9 | Owl Recovery in South Gippsland | The project will re-evaluate large forest owl management areas in South Gippsland to determine whether owls persist in fire affected areas or return post fire. Presence of owls will also indicate more broadly the presence of prey species and reflect on the broader state of fire-affected ecosystems from a fauna perspective. The project builds on existing data over four years. |
| | Fire Impacts on Freshwater and Burrowing Crayfish | Gippsland has a diverse crayfish fauna, comprising spiny (<i>Euastacus</i> sp.) and burrowing (<i>Engaeus</i> spp.) crayfish. Ten species in these groups are threatened in the region. At least five of these species occur within the fire affected areas (Bunyip, Churchill and Cathedral fires) and others are likely to occur in the fire affected area. This project proposes (i) the development and implementation of a new survey method for <i>Engaeus</i> spp. to better define the distribution of these species and (ii) a survey of the fire affected area using the new method to determine the effect of fire on them. |
| 10 | Recovery of Fire-Sensitive Vegetation – North East Victoria | This project will measure the impact of the 2009 fires on Cypress-pine forest and woodland communities in north east Victoria. This vegetation community is sensitive to fire frequency and intensity and at risk of localised extinction or severe degradation as a result of recent fires. Soil and vegetation recovery will be monitored to guide management priorities. |
| 11 | Recovery of Dargo Galaxias | The project will assess survival and status of the Dargo Galaxias in the fire-impacted catchments and make recommendations for implementation of appropriate recovery actions which may include translocation, spawning support or sediment management. The Dargo Galaxias is a new species of fish in the process of being formally described. The species is restricted to a small area in the remote upper Dargo River system where it represents 100% of the native fish diversity in predator free reaches of small creeks. |

| Location | Project Title | Project Details |
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| Statewide | Recovery of Victorian Rare or Threatened (VROT) Plants | This project will evaluate the impact of the Black Saturday bushfires on the regeneration and conservation status of selected "at risk" rare or threatened plant species at a landscape scale. |
| Statewide | Strategic Weed Control | This project aims to protect high value biodiversity assets at risk from weed invasion. A strategic, integrated bio-security weed control program will be implemented across Public Land tenures to address competition from weeds directly resulting from fire disturbance. |
| Statewide | Development of a Field Guide to Manage Post Fire Weeds | This project will collate data on post-fire responses of various weed species in a practical manual for use by field practitioners, regional planners, friends and other volunteer groups, and for private landholders. It will include weed species' current distributions, individual species' responses to the post-fire environment and to the disturbances associated with fire suppression, and (most importantly) triage local weed floras to assist managers to focus on key risks. |

Appendix 3 – Recycling for Recovery Projects

| Project | Organisation | \$ |
|--|---|-----------|
| Holly control works within the Marysville Triangle | The Friends of Marysville Walks | \$5,000 |
| Purchase a trailer to carry weed control spray unit | South West Goulburn Landcare Network | \$5,000 |
| Native seed project | South West Goulburn Landcare Network | \$4,500 |
| Riparian bushland restoration on the Dry Creek | Sunday Creek Dry Creek Landcare Group | \$2,500 |
| Rejuvenation of Sustainable Landscapes Trail project | Sunday Creek Dry Creek Landcare Group | \$5,000 |
| Wandong Primary School garden – recovery works | Sunday Creek Dry Creek Landcare Group | \$5,000 |
| Vegetation enhancement works | Wandong-Heathcote Junction Community Group | \$5,000 |
| Restoration works on the Upper Plenty Community Recreational Area | Upper Merri Plenty Landcare Group | \$5,000 |
| Weerite perennial landscape recovery project | Lismore Land Protection Group & Weerite Landcare Group | \$30,000 |
| Managing Pest Plants and Animals on Private Land | Upper Goulburn Landcare Network | \$146,000 |
| Managing Your Patch of Bush | Upper Goulburn Landcare Network | \$100,000 |
| Fencers Without Boundaries | Upper Goulburn Landcare Network | \$109,000 |
| The Lorax Project | Upper Goulburn Landcare Network | \$144,000 |
| Habitat Management & Property Planning in the Kinglake Ranges | Kinglake Landcare Group | \$85,700 |
| Recycling for Recovery Volunteer Coordinator | South West Goulburn Landcare | \$100,000 |
| Revegetation Projects | South West Goulburn Landcare | \$90,000 |
| Targeted Weed Control | South West Goulburn Landcare | \$90,000 |
| Developing a Plan to Restore our Land and Community | Redesdale Fire Community Recovery Committee Land Management Committee | \$43,000 |
| Ovens and Kiewa Landscape Restoration Project | Mudgegonga Landcare Group | \$113,000 |
| Implementation of Community Environment Recovery Action Plans | Nillumbik Shire on behalf of Nillumbik Natural Environment Recovery Working Group | \$78,000 |
| Landcare Program for Bushfire Affected Communities in Yarra Valley | Yarra Valley & Dandenong Ranges Landcare Network | \$64,000 |
| Enhancing landscapes for community recovery | Westernport Catchment Landcare Network a subsidiary of Cardinia Environment Coalition Inc | \$113,000 |
| Protecting biodiversity on Private Land | Whittlesea Shire Council on behalf of Whittlesea Agricultural Society Landcare Group | \$20,000 |
| Reconnecting the community back to the environment | Upper Merri Plenty Landcare Group | \$5,000 |
| Local Landcare Fire Recovery – Yarram and Districts | Yarram Yarram Landcare Network | \$86,000 |
| Central Latrobe Bushfire Recycle Recovery Project | Latrobe Catchment Landcare Network | \$86,000 |
| Wimmera River Community Recovery Project | Wimmera River Improvement Committee | \$30,000 |

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A selection of reports from the 2009 Bushfire Recovery Program are listed below. Fire Recovery reports and other information on bushfire recovery can be found on the DSE website.

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