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Immediate and longer-term responses of conservation NGOs to the 2019–20 wildfires

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Summary

Conservation non-government organisations (NGOs) were a critical part of the emergency response to the 2019–20 wildfires, and they remain integral to ongoing post-fire conservation actions. In this chapter, five on-ground conservation NGOs outline the immediate and longer-term activities that they implemented, and the key lessons they took from the experience of the 2019–20 wildfires. Four key themes about the fire responses recur across their accounts:

1. *Collaboration*: The genuine and constructive collaboration that emerged during the 2019–20 wildfires was a signature of the overall emergency response. It was possible because Australia's conservation NGOs have spent many years developing relationships with landholders and managers, Indigenous groups, governments, natural resource management (NRM) groups, and the public, and were able to activate these networks extremely effectively, when it mattered most.
2. *Connection with the public*: NGOs have large supporter bases with existing communication lines. These engagement structures were critical for sharing information about the fires and their impacts, and what was being done to support wildlife. The engagement structures also provided immediate avenues for the public to donate funds to the recovery effort, helping them feel they were contributing to the recovery effort.
3. *Evidence*: conservation NGOs advocated an evidence-based national emergency response; they contributed data to local and national-scale prioritisations; they collected new data; and they used data and other information to communicate with their supporters and the general public.
4. *Planning*: when time is limited and stakes are high, a quality existing plan guides managers through the crucial first steps after an ecological disaster.

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Introduction

Conservation non-government organisations (NGOs) are involved in a wide spectrum of activities, such as *ex situ* actions (e.g. seed storage, captive breeding), animal rescue and rehabilitation, advocacy, research, habitat restoration and on-ground conservation management delivery. In this chapter, we focus on the latter part of that spectrum: NGOs with a heavy focus on practical on-ground conservation management describe their response to the 2019–20 wildfires, including the immediate actions they undertook, how the wildfires have shaped their long-term planning and operations, and the key lessons they have taken away from the ecological disaster. The chapter profiles five organisations, but we recognise that many other conservation NGOs also contributed to the response to these wildfires.

The five NGOs vary greatly in the geographic scale at which they operate, from Kangaroo Island Land for Wildlife, which operates solely on that island, to Bush Heritage Australia and the Australian Wildlife Conservancy, both national organisations with substantial landholdings that focus on science-based conservation management, to BirdLife Australia and WWF-Australia, which are both linked to international organisations, and incorporate a mix of management, research and advocacy objectives. Despite this diversity of scale and focus, the five examples given here share recurrent messages about the importance of collaboration and public engagement, of using evidence to inform an emergency response, and of the value of being prepared.

BirdLife Australia

BirdLife Australia is a national NGO whose purpose is to conserve Australia's native birds and their habitats. We work towards this by drawing on our scientific capability, our collective knowledge and experience in bird conservation, and our extensive network of collaborators and supporters. As the 2019–20 wildfire season began to unfold, BirdLife realised the need for collaboration, for using data to prioritise the response, and for communicating with the public. The organisation rapidly mobilised its resources to achieve those immediate needs.

Immediate response

BirdLife was part of the environmental NGO network that came together in late 2019 to develop a common agenda for wildfire response. The NGO network developed a joint statement on the need for a nationally coordinated wildlife and ecosystem recovery effort. The network's collaborative efforts and urgent call for an evidence-based national response probably contributed to the formation of the Australian Government's Wildlife and Threatened Species Bushfire Recovery Expert Panel. The Expert Panel played a fundamental role in guiding a coordinated national response to the impacts of the fires on biodiversity (see Chapter 22). Its series of communiques and work to identify and prioritise both the species most at risk of long-term impacts and the management actions needed to recover them continues to influence wildfire recovery work. The transparency of the panel's work gave the conservation sector confidence that national priorities, including for funding, were based on science rather than politics. After this, government agencies, scientists, environmental NGOs and community groups came together in regional workshops to develop a shared understanding of the impacts of the fires and plan for recovery. This collaborative approach was a hallmark of the national wildfire response, which allowed organisations to identify gaps in their collective knowledge and planned response, and reduce the risk of duplication while maximising the value of limited resources.

BirdLife could rapidly estimate impacts of the 2019–20 wildfires on Australia's birds because we curate Birdata (the Atlas of Australian Birds), one of Australia's largest biological databases containing millions of records submitted over more than three decades. While the fires were still burning, our analytics team began estimating the spatial overlap between the fires and the geographical distribution of more than 371 bird taxa – a crucial first step in identifying those birds at increased risk of extinction due to the fires. In December 2019, we began communicating our concerns about fire-affected birds to our collaborators and our extensive and diverse network of supporters. We launched a wildfire appeal to raise funds that allowed us to commence wildfire response work and recruit a Bushfire Response Coordinator to secure further funding and coordinate wildfire recovery work over the longer term.

BirdLife was one of the first organisations to conduct on-ground population surveys after the fires. Kangaroo Island emerged as a high priority for BirdLife, with most of its 17 endemic bird subspecies estimated to have over 50% of their distribution impacted by the fires. While desktop analyses provided important insights into likely fire impacts, ground-truthing was needed to validate these estimates, so we conducted comprehensive surveys of both burnt and unburnt habitat in the western half of Kangaroo Island (Fig. 24.1). Establishing a network of sites for regular, standardised monitoring has provided a baseline for measuring the post-fire response of Kangaroo Island bird populations and guided ongoing recovery actions on the island.

Longer-term response

BirdLife has prioritised wildfire recovery across many of its ongoing programs to support the recovery of birds identified by the Expert Panel as in most urgent need of management

Fig. 24.1. Bird surveys by the BirdLife Australia team shortly after the 2019–20 wildfires, at Cape Du Couedic, Kangaroo Island. (Photo: Tom Hunt)

action. Our approach to recovery has been guided by existing recovery work and national recovery plans. Two examples are a project to trial the 'seeding' of gum trees with mistletoe to provide a food source for regent honeyeaters (*Anthochaera phrygia*), and a project to translocate western ground parrots (*Pezoporus wallicus flaviventris*) to establish a second population as insurance from future fires. Our ability to respond to impacts of the fires on previously secure but less-studied species, such as red-browed treecreepers (*Climacteris erythrops*) and gang-gang cockatoos (*Callocephalon fimbriatum*), has been hampered by a lack of information on the ecology, distribution and abundance of these species. Without sufficient data collected before the fires, there is no baseline against which to measure changes since the fires, nor the effectiveness of wildfire recovery actions. Expert elicitation processes have provided rough estimates in the absence of data, but impacts of the fires cannot be accurately measured for many species. This highlights the urgent and ongoing need to monitor animal populations, in order to generate data and information enabling the detection of and response to population declines, including those caused by wildfires.

Key lessons

- Pre-existing, strong linkages with collaborators in universities, governments organisation and other environmental NGOs, and the ability reach a large network of supporters, volunteers and community groups, were both important in the 2019–20 wildfire response. A national rapid response plan could facilitate and mobilise similar collaborative action on a greater scale.
- A team of experts who used science to guide nationally coordinated priorities for wildfire response was critical. Members of the next Expert Panel could be identified now to facilitate rapid establishment after the next major catastrophe.
- We urgently need more data and information on the ecology, distribution and abundance on many species. Many birds have likely become threatened as a result of impacts of this single wildfire season. However, there are insufficient data and information to guide the recovery of these species. Australia must invest in long-term monitoring of populations and research aimed at understanding the ecology of our native biodiversity.
- For threatened species, up-to-date national recovery plans enable rapid and targeted wildfire recovery actions.

Bush Heritage Australia

Bush Heritage Australia is an independent not-for-profit organisation that buys and manages land, and works in partnerships with others, to conserve our magnificent landscapes and irreplaceable native species forever. Some of our reserves are located within the regions that were heavily affected by the 2019–20 wildfires.

Immediate response

The 2019–20 fire season began for Bush Heritage as it did for almost everyone in Australia – suddenly and early. In September 2019, a fire from unknown sources spread towards the eastern boundary of Yourka Reserve in far north Queensland. It burnt through ~1000 ha (~3% of the reserve) until it was successfully suppressed.

Knowing that this would be a bad fire season, Bush Heritage had prepared its reserves for possible fires. Prescribed burns had been completed earlier in the season on our own and some neighbours' properties, strategic fire breaks put in place, and bushfire response

plans reviewed. As the Yourka and nearby blazes occurred so early in the season, we were able to direct all necessary staff and resources to them and, as a result, the blazes were contained relatively quickly. But as more and more fires broke out on, or threatened, Bush Heritage reserves over the summer, personnel and resources were spread thin.

From November 2019 to late February 2020, six more Bush Heritage reserves were burnt in New South Wales, Queensland and Western Australia. Of those, Scottsdale and Burrin Burrin reserves in New South Wales were worst affected. Burrin Burrin (411 ha) is east of Canberra on Ngunawal, Ngarigo, Walbanga, Ngambri and Walgalu country. In November 2019, lightning sparked the North Black Range fire near Braidwood which burnt through the majority of Burrin Burrin, impacting the understorey through to the canopy and destroying many hollow-bearing trees. During this period, invaluable communication from our neighbours informed our initial response.

Scottsdale (1328 ha) is on the Murrumbidgee River south of Canberra, on Ngunnawal country, where we focus on restoring 300 ha of cleared grassy box woodlands and temperate grasslands. It has a dedicated reserve manager and field officers and significant infrastructure and equipment. On 1 February 2020, when the Clear Range fire breached Scottsdale's boundary, road closures prevented staff from entering the area. The Scottsdale Bushfire Response Plan proved an important tool for staff during this time. It helped decision making by outlining what actions should be taken if no staff were on site. Approximately 70% of Scottsdale was burnt, including 90% of the revegetation area (Fig. 24.2), the

Fig. 24.2. Burnt revegetation on the valley floor of Bush Heritage's Scottsdale Reserve, Ngunnawal country, in New South Wales, after the 2019–20 wildfires. (Photo: Phil Palmer/Bush Heritage Australia)

Murrumbidgee River corridor, and the steep, west-facing slopes of the high country. We also lost many large old-growth trees due to fire and fire suppression activities.

In the immediate aftermath of both the Scottsdale and Burrin Burrin blazes, our priorities were to determine fire extent and severity, and the impact on flora and fauna. Initially we used satellite fire-mapping tools, and then on-ground evaluation. Safety assessments were carried out, access tracks cleared, and supplementary feeders and watering stations deployed to support surviving wildlife such as greater gliders (*Petauroides volans*) on Burrin Burrin. Motion sensor cameras at each food and water station monitored wildlife and feral predator activity. This information informed the development of long-term recovery plans for both reserves.

There had been ~15 000 tree guards on Scottsdale; removing the melted plastic was a priority, and was achieved through the tireless work of many volunteers. Ngunnawal Traditional Owners came on Country to record and map the cultural values that were revealed where vegetation had once been. Heavy rains soon after the fires improved the survival prospects of Scottsdale's revegetation, but the rains also exacerbated erosion and promoted a flush of broad-leafed weeds. By this point, COVID-19 restrictions prevented us from calling on our volunteers to help with weed control. Instead, the Australian Association of Bush Regenerators generously carried out targeted spraying in high-quality grassland sites.

Longer-term response

Bush Heritage's long-term response has been multi-faceted. Our teams are now better resourced thanks to wildfire recovery support. We are more actively using fire for hazard reduction and conservation, and we have engaged Traditional Owners to carry out cultural burning programs across additional reserves. Wildfire response training has been expanded to staff that are not field-based, increasing the number of personnel available to support fire-fighting activities.

Prior to the 2019–20 wildfires, Bush Heritage had already begun investigating the effects of climate change on our reserves and incorporating Bureau of Meteorology long-range weather forecasts into planning. We have now shifted our focus to detecting environmental conditions that may lead to extreme events so that we can take pre-emptive action. For example, we are collaborating with researchers to develop remote sensing technology that will alert us to low soil moisture levels and develop innovative responses. We are also exploring options to improve the ecological resilience of these landscapes, so that they have a greater chance of withstanding and recovering from future disturbance.

Key lessons

The wildfires showed us that the future we have been preparing for is here, and that now is the time to be engineering solutions that will help protect our landscapes. We need to be combining our skills and knowledge with that of others, including Traditional Owners, to foresee risks, alleviate the drivers of these extreme events, and actively heal Country.

Australian Wildlife Conservancy

Australian Wildlife Conservancy (AWC) is the largest private owner and manager of land for conservation in Australia, protecting endangered wildlife across more than 6.5 million ha. AWC's hands-on approach and expertise in on-ground management and surveys enabled us to act quickly to support front-line conservation efforts and

help reduce the impacts on wildlife. None of AWC's properties were impacted by the 2019–2020 wildfires, giving us full capacity to help other organisations with the recovery effort.

AWC offered emergency on-ground assistance to conservation organisations and land holders, and established long-term management to support vulnerable wildlife in the most impacted regions. The immediate response included implementing emergency management to protect and recover highly vulnerable species, and undertaking ecological assessments, providing strategic advice and regional coordination of post-fire recovery work. Longer-term projects have included research to identify critical refuges for wildfire affected species; improve designs of emergency artificial shelters to protect vulnerable species from predation; as well as develop strategic processes to predict and plan for future changes in fire regimes.

Immediate response

Emergency management

In the wake of the 2019–20 wildfires, AWC deployed teams of trained staff to conduct emergency response management. This work included reducing the impacts of introduced predators to protect vulnerable species from predation in areas where the natural protection was removed by the fires. When fires consume dense vegetation, ground-dwelling mammals, birds and reptiles are left exposed and highly vulnerable to predation (McGregor *et al*. 2014), as well as to food and water shortages (Andersen *et al*. 2012), increased competition with native and exotic species (Tuft *et al*. 2011), and other environmental factors such as adverse weather (Hale *et al*. 2016). After fire, vegetation can take months to recover, and the scale and severity of the 2019–20 wildfires meant that few unburnt refuges were available in the landscape (Collins *et al*. 2021; Legge *et al*. 2022). To address these immediate risks to wildlife, artificial refuge tunnels were deployed in fire-affected areas, including Kangaroo Island and Wollombi Valley.

On Kangaroo Island the nationally endangered Kangaroo Island dunnart (*Sminthopsis griseoventer aitkeni*) had more than 95% of its habitat burnt. AWC responded rapidly to save this at-risk species and, together with Kangaroo Island Land for Wildlife and the Doube family, completed construction of a 14 ha feral predator-free refuge to protect surviving Kangaroo Island dunnarts (Fig. 24.3). This original fence was later extended into a 370 ha area in which dunnarts can re-establish their population without the threat of feral

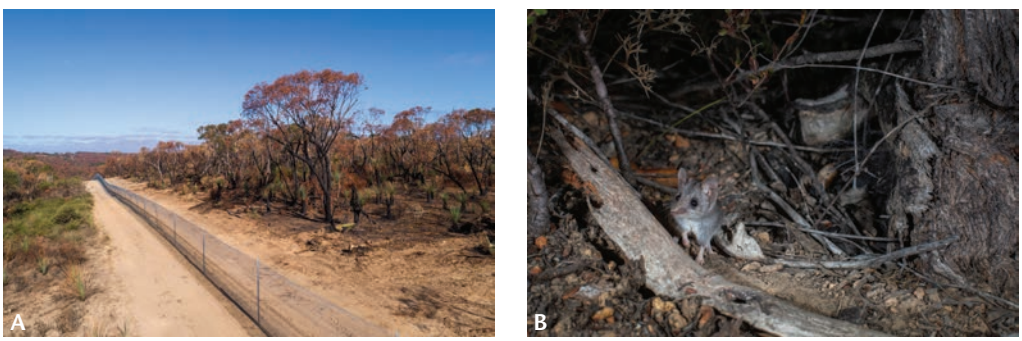

Fig. 24.3. The cat exclusion fence (A) built to protect 14 ha of habitat of Kangaroo Island to protect the Kangaroo Island dunnart (B) after fire. (Photos: Brad Leue/AWC)

cats. The fenced exclosure will also support other ground-dwelling threatened species, providing them with a safe area to regenerate their own populations.

Ecological assessments, strategic advice and coordination

Assessing the impact of the fire on threatened wildlife and identifying refuge areas were vital post-fire actions. AWC deployed science staff to conduct emergency post-fire ecological surveys and deliver strategic advice with several land management, conservation and environmental research organisations, including the Wollombi Landcare (16 private properties) and South Endeavour Trust (two properties), Science for Wildlife (sites in the Kanangra-Boyd National Park), Australian National University (searching for any remaining unburnt habitat of the Critically Endangered regent honeyeater through the Wolgan, Widden and Capertee Valleys of New South Wales) and Kangaroo Island Land for Wildlife (see the next section). These surveys covered birds, mammals, amphibians and introduced predators. Survey results including species inventory lists, and strategic advice was provided to all collaborators through reports and contributions to recovery plans.

Longer-term response

AWC is investing in projects to improve post-fire emergency response management and identify refuges for highly vulnerable species.

Improving emergency response

Since the 2019–20 wildfires, AWC has collaborated on research projects investigating the effectiveness of different post-fire wildlife artificial refuges and supplementary provisions. This includes examining the effectiveness of refuge islands, biodegradable habitat pods, refuge tunnels (as deployed on Kangaroo Island and Wollombi), nest boxes, and supplementary feeding and watering stations. The results from these projects will enable us to design an effective post-fire template for wildlife support.

Identifying wildlife refuge

To aid future planning, AWC is conducting research to identify priority locations for conservation projects to protect three fire-affected threatened species: koalas (*Phascolarctos cinereus*), long-nosed potoroos (*Potorous tridactylus*) and long-footed potoroos (*Potorous longipes*). Species distribution modelling is being used to map current, historical and projected future distributions under climate change. Model outputs will be combined with other relevant information (scale, land tenure, management feasibility) to assist AWC to locate areas where work may help conserve the species.

Key lessons

- AWC is developing a Climate Change Adaptation Strategy to address the projected risks of extreme fire events across AWC properties, and to prioritise future acquisition and partnership projects.
- AWC will continue to implement best practice fire management across our estate to maintain ecosystem resilience, as well as enhance planning for operational responses to extreme fire events.
- Climate refugia may be targeted for management actions as well as acquisitions.

While future ecological disasters brought about by climate change are inevitable, we hope that AWC and the Australian community are all ready to support wildlife and ecosystems, and ensure their survival into the future.

Kangaroo Island Land for Wildlife

Kangaroo Island Land for Wildlife (KI LfW) is a private conservation NGO that works with landholders and project partners to deliver long-term conservation management for Kangaroo Island's biodiversity, across private bushland properties.

KI LfW has worked with private landholders since 2017 to survey for the nationally Endangered Kangaroo Island dunnart, based largely on sampling protocols recently developed for this elusive species by Hohnen *et al*. (2019). When the presence of dunnarts is confirmed, we identify threats and prioritise management actions at those sites. KI LfW developed a 5-year Conservation Action Plan (CAP) in 2019 for the Kangaroo Island dunnart and other threatened species, identifying feral cat predation, *Phytophthora cinnamomi* infestations and catastrophic fire as the main threats.

Everyone living and working on Kangaroo Island knew that the pristine bushland we all loved was a ticking time bomb. Dry lightning in late 2019 catalysed the island's most devastating wildfires ever recorded. We witnessed first-hand the obliteration of the west end of Kangaroo Island, one of South Australia's biodiversity hotspots. During these relentless wildfires, over 95% of the range of the Kangaroo Island dunnart was burnt, most of it severely. As well as the loss of habitat, the fires took human lives, homes, livelihoods and stock and left a landscape of emptiness, despair, sadness and anger.

Immediate response

When possible, we moved ahead of the unstoppable inferno to rescue cameras and cat traps, but often all we could do was recover destroyed survey equipment from the burnt areas. We assisted landholders, many of whom were more devastated by the loss of their bushland and wildlife species than that of their own homes.

The wildfires burnt 12 of 13 sites known to support Kangaroo Island dunnarts. The fire left very few unburnt patches of vegetation in its wake. We quickly set camera traps within these few unburnt patches. The first patch (of 8 ha) was a known Kangaroo Island dunnart locality at Western River. Within 2 days, we detected a dunnart on camera, as well as other species such as southern brown bandicoot (*Isoodon obesulus obesulus*), southern emu-wren (*Stipiturus malachurus halmaturinus*), heath goanna (*Varanus rosenbergi*) and Kangaroo Island echidna (*Tachyglossus aculeatus multiaculeatus*), all competing for food and shelter in this small refuge. We also detected feral cats. With the elation of finding Kangaroo Island dunnarts came a deep sense of responsibility and urgency to protect these survivors.

We immediately commenced feral cat control using cage traps and Felixer® grooming traps, removing over 10 feral cats from this tiny patch of vegetation within a week. We knew a cat exclusion fence was the only way to mitigate rapid reinvasion by more feral cats. With our partners Australian Wildlife Conservancy (AWC) and the Doube family private landholders, within 6 weeks of the fire we built a feral cat exclusion fence around this unburnt habitat.

We searched for other unburnt patches in the western end of Kangaroo Island with helicopter surveys, funded by the Foundation for Australia's Most Endangered Species (FAME). We set up camera traps for Kangaroo Island dunnarts at many of these sites, followed up by cat control and shelter tunnel installations if Kangaroo Island dunnarts were detected.

While there was considerable attention and fundraising for the koala, an introduced and abundant species on Kangaroo Island, we sought to highlight the dire plight of all species affected by the fires. We also communicated the need to control feral cats beyond

Fig. 24.4. Kangaroo Island dunnart discovered in feral cat stomach. (Photo: Georgeanna Story)

the fenced area post-fire. For example, in the months following the fire we documented that 7% of feral cats within the fire scar had preyed on Kangaroo Island dunnarts (Fig. 24.4), highlighting the need for continued effort to ensure persistence of the species on the island.

Longer-term response

We are extending our private land conservation engagement program while maintaining focused conservation effort in three existing management zones. As well as the Western River Refuge (with cat exclusion fencing), we are also working in the Church Rd Management Zone (which was severely burnt), and in the North West Conservation Alliance Zone (an unburnt 4000 ha area of 10 private properties, known to have Kangaroo Island dunnarts). This effort includes feral cat control and monitoring; surveys for threatened vertebrates, invertebrates, and flora; fire management planning; *Phytophthora* mapping, treatment and hygiene; feral pig control; and weed management. Post-fire, our conservation program has grown from two staff to 10, following investment from not just AWC and FAME, but also the Federal Government, WWF-Australia, Prague Zoo, and Zoos SA. Our next hurdle will be securing funds to continue the conservation effort into the future.

Key lessons

- Planning processes such as conservation action planning can help managers plan immediate response and management actions.
- NGOs can play a key part in emergency responses. For example, the Western River Refuge, a collaboration between NGOs and private landholders, was constructed in 6 weeks.

- We need to improve how we manage fire on Kangaroo Island, which has had two severe wildfires since 2007, with the next large fire potentially only years away. While the Kangaroo Island dunnart survived the 2019–20 wildfires, without efforts to manage fire in the landscape it is unclear whether it will survive the next wildfire event.

WWF-Australia

WWF-Australia is one of Australia's most trusted conservation organisations. For more than 40 years, WWF-Australia has worked to protect threatened species and habitats, meet the challenge of climate change, and build a world where people live in harmony with nature.

The scale of Australia's wildfires during 2019–20 was unprecedented and catastrophic. The national wildfire response framework that WWF-Australia established in January 2020, with the input of our Eminent Science Group, aimed to:

- *respond*, urgently, to the needs of fire-affected wildlife and landscapes;
- *protect and restore* what remains and intervene to mitigate the risk of future fires; and
- *future-proof* Australia's landscapes, drawing on innovative techniques, leading climate science and Indigenous knowledge.

To support this framework, WWF-Australia launched a global fundraising campaign. Supporters responded generously, giving more than $50 million to the Australian Wildlife and Nature Recovery Fund. Below, we share examples of activities under the aims listed above.

Immediate response

Due to the outstanding fundraising outcome, WWF-Australia could mobilise response teams to care for stricken wildlife. We conducted extensive searches for injured animals, utilising detection dogs, thermal imaging drones, and rapid assessment field surveys. We supported veterinary and wildlife shelters with funds for training, equipment and supplies. We also partnered with organisations to deliver food supplies to surviving animals, prioritising areas where threatened species were most at risk. A partnership with the NSW Government, Woolworths and Foodbank Australia saw tens of thousands of sweet potatoes and carrots dropped by helicopter into national parks to help threatened brush-tailed rock-wallabies (*Petrogale penicillata*) persevere until natural food sources became available (Fig. 24.5).

Overall, WWF-Australia partnered with more than 40 wildlife rescue and care organisations across wildfire zones in each fire-affected state and territory. Support was also extended to boost the capacity of seed banking and salvage initiatives to recover threatened flora.

Animals impacted report

In January 2020, WWF-Australia helped inform the world that an estimated 1.25 billion native animals had been impacted by Australia's wildfire disaster. This early estimate was led by Professor Chris Dickman (University of Sydney). By February, we had commissioned scientists to complete a more detailed and final estimate. The shocking findings generated headlines across the globe, helping people to grasp the magnitude of the crisis. Nearly 3 billion animals were killed or displaced by the fires, including 143 million mammals, 2.46 billion reptiles, 180 million birds and 51 million frogs (see Chapter 12).

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Fig. 24.5. WWF-Australia partnered with Foodbank Australia and Woolworths Supermarkets to help make an immediate impact on the lives of vulnerable native wildlife in fire-affected areas by supplying fresh food as a part of the NSW Government's aerial food drop program. The food drop targeted brush-tailed rock-wallabies in the Blue Mountains, impacted by the Gospers Mountain fire in December 2019. (Photo: WWF-Australia/Veronica Joseph)

Post-fire surveys: two examples

In September 2020, WWF-Australia released a report (Phillips *et al*. 2020) that found the wildfires resulted in the loss of ~71% of koalas across six locations in northern New South Wales. The koala occupancy declines at the six fire grounds varied from 34% near Port Macquarie to a probable 100% loss in an area south of Taree. This study informed the activation of WWF- Australia's Koala's Forever Program, which has the ambitious target of doubling the number of koalas in eastern Australia by 2050.

August 2021 brought good news for one of Australia's rarest mammals, the silver-headed antechinus (*Antechinus argentus*). There were fears this endangered species, first described by science in 2013, had been pushed to the brink by the 2019–20 wildfires. Fortunately, the tiny marsupial was found surviving in burnt forest in Bulburin National Park in Queensland. With WWF-Australia support, Dr Andrew Baker and Stephane Batista (Queensland University of Technology) trapped 21 silver-headed antechinuses during field work. Despite those positive results, concerns remain for this species' survival.

Longer-term response

Landscape protection and climate-ready restoration

When developing our wildfire response framework, we wanted to ensure value was afforded to not only the trees that burnt, but also to those still standing. With this in

mind, we launched a partnership with the Environmental Defenders Office called 'Defending the Unburnt'. This partnership aims to secure six unburnt areas of forest across Queensland, Victoria and New South Wales identified as highly valuable threatened species habitat.

We also joined forces with Greening Australia, launching a partnership with the goal to mainstream innovative, nature-based solutions to build nature's resilience in a changing climate. The partnership will test, validate and scale practical climate-ready restoration approaches, designed by eminent scientists from across Australia. The partnership will centre around three key areas:

1. increased resilience of Australia's flora and fauna through habitat 'renovation';
2. long-term resilience of the ecosystem services that nature provides to people; and
3. strategic actions to mitigate climate-induced risk.

Future-proofing Australia

Due to changing climate, Australia's wildfire seasons are now starting earlier, lasting longer and causing more damage. Consequently, WWF-Australia decided to embed climate mitigation, adaptation and resilience requirements into our wildfire response framework, and explicitly communicate the need to mitigate warming. Projects funded through the 'future-proofing' arm include:

- strengthening policy: working with governments to strengthen climate policy and nature protection laws;
- species adaptation and resilience: supporting long-term conservation efforts for Australia's wildlife;
- harnessing Indigenous knowledge: ensuring that Indigenous-led projects secure the greatest percentage of funds allocated via our Australian Wildlife and Nature Recovery Fund; and
- innovating: exploring and implementing innovative 'future proofing' solutions.

WWF-Australia also ran an Innovate to Regenerate Challenge, which called for innovative ideas to help regenerate Australia after the 2019–20 wildfires. One of the winners to receive funding was an Indigenous Traditional Agriculture Knowledge Hub established near Mallacoota on the farm owned by author Bruce Pascoe. The hub is reintroducing native farming practices and developing a blueprint for Aboriginal food production that returns economic benefits to Indigenous people.

Regenerate Australia

In an effort to ensure that the 2019–20 wildfires serves as a watershed moment for Australia, WWF-Australia has launched a long-term campaign called 'Regenerate Australia'. Regenerate Australia is our bold vision to rehabilitate and restore wildlife and habitats impacted by the fires, articulating the need to increase investment in climate mitigation, adaptation and resilience measures. This will require collaboration and innovation on an ambitious scale. We don't underestimate the shift needed to Regenerate Australia. Science tells us we must do more in this decade to ensure the precious landscapes and wildlife we cherish can continue to thrive. Fortunately, it is achievable.

Key lessons

- Engage widely. Working with Australia's eminent scientists to develop WWF-Australia's wildfire response framework was a key component of the success of the

Australian Wildlife and Nature Recovery Fund. Engaging directly with governments to share insights and scope response interventions was also key.
- Mobilise support. To date, WWF-Australia has committed more than $35 million dollars across more than 150 projects, in collaboration with more than 200 partners to deliver our wildfire response efforts. This would not have been possible without WWF-Australia supporters at home and abroad.
- Plan for the future. We will deepen our focus on innovation and continue to prioritise community and Indigenous-led solutions that are best positioned to drive regenerative benefits for both people and nature.

With thanks to our partners (for a full list see https://www.wwf.org.au/what-we-do/bushfire-recovery/how-your-donation-is-making-a-difference/partners).

Conclusion

The key lessons noted by each of the five NGOs share key messages about future collaborations, gathering and use of evidence, planning, communicating, and future-proofing that can be distilled into the following recommendations.

Recommendations

- **Nurture collaboration**: Relationships between universities, landholders and managers, Indigenous groups, government agencies, NRM groups and the public, need to be developed and maintained at all times, so they can be activated easily during ecological emergencies, and factored into national response plans.
- **Build evidence**: Data gaps on species' ecology, distribution and abundance hamper emergency responses. Long-term monitoring and enhanced research and survey effort are needed to inform future responses to ecological disasters.
- **Use evidence**: Be ready to engage teams of experts to help embed science into future emergency responses.
- **Plan and prepare**: Keep recovery planning and emergency response planning strategies and documents up to date; consider the forecasts of how fires and fire responses are likely to be affected by climate change.
- **Communicate widely**: Conservation NGOs are valuable conduits of information with the public, including during ecological emergencies.
- **Future-proofing**: We need to improve the ecological resilience of landscapes to prepare for a future with a greater frequency of large-scale wildfires.

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