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Tree-clearing:

the hidden crisis of animal welfare in Queensland

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Front cover

A koala and her joey seek refuge on a bulldozed log pile, near Kin Kin Queensland

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EXECUTIVE SUMMARY

Habitat destruction is a major driver of extinction of wildlife. Over 120 Australian vertebrate species have ended up on the national threatened species list due in large part to bulldozing of their bushland habitats.

But behind this conservation crisis lies a largely unacknowledged crisis of animal welfare. Tens of millions of wild animals each year suffer injuries, deprivation and death due to the bulldozing of their forest and woodland habitats, also known as tree-clearing, land clearing or deforestation.

This report shines a light on this hidden crisis of animal welfare in Queensland – by presenting information about the likely numbers and fates of wild animals afflicted by tree-clearing, identifying law and policy gaps that allow their welfare to be disregarded, and recommending policy to alleviate the crisis.

EASTERN AUSTRALIA BEING RECOGNISED AS ONE OF 11 GLOBAL DEFORESTATION FRONTS

Bushland destruction has recently resurged in Queensland due to weakening of the *Vegetation Management Act 1999* by the former Newman state government. Tree-clearing rates have more than tripled, with nearly 300,000 hectares of forests and woodlands, both mature and immature, bulldozed in 2014-15, the latest year for which data are available. This has led to Eastern Australia being recognised as one of 11 global deforestation fronts, the areas which on current trends will account for 80% of all global forest losses up to 2030.

WWF-Australia estimates clearing in Queensland kills about 34 million native mammals, birds and reptiles every year, comprising 900,000 mammals, 2.6 million birds and 30.6 million reptiles.

But this underestimates true numbers of animals affected. In particular, the legacy impacts of clearing due to fragmentation and degradation of the remaining habitat are likely to be even more severe because they are ongoing and affect subsequent generations. This is exemplified by koalas, of which more than 10,000 were admitted to the four wildlife hospitals in southeast Queensland from 2009 to 2014, mainly due to dog attacks and vehicle collisions, more than 10 times the numbers directly affected by clearing.

The enormous extent of suffering and death caused makes tree-clearing the single greatest animal welfare crisis in Queensland. Yet it is largely unmonitored and unstudied, and neglected in wildlife policy and law.

Although we can be confident that animals losing their habitat to destruction likely all die, we know little about their specific fates. Many die on the site of clearing – some quickly if they are crushed by machinery or falling trees, for example, and others more slowly from injuries, starvation or exposure. Others die as they flee from clearing – in collisions with cars, fences or powerlines, killed by predators or due to injuries or deprivation. Larger and more mobile animals like birds and kangaroos may make it to remaining habitat but their chances of survival are low because it is more than likely that remaining habitat is already fully occupied. Overcrowding leads to elevated conflict, stress, hunger and disease risks for immigrants and residents.

In very few instances, animals are removed prior to or during clearing by fauna salvage services (known as spotter/catchers in Queensland) or rescued if they happen to be found injured or sick nearby. RSPCA Queensland records show that rescues of forest-dependent wildlife more than tripled from 2011 to 2016, a rise attributed in part to higher clearing rates. Relocated or released wildlife also face the problem that the habitat into which they are relocated likely does not have sufficient resources to support immigrants.

Although fauna salvage could save many more wild animals, most tree-clearing operations proceed without any requirement for it, and salvage services are not bound by adequate training and practice requirements.

There is no law requiring those who bulldoze bushland in Queensland to reduce their impacts on animal welfare. Tree-clearing and conservation laws are silent on animal welfare impacts of habitat destruction. Queensland's animal welfare law does not regulate actions not directed at the wild animals themselves, such as habitat destruction. Perversely, someone bulldozing trees can injure and kill thousands of wild animals with impunity, but if they step out of the bulldozer and intentionally shoot a native animal without a permit, they could be prosecuted.

FOUR MAJOR CHANGES ARE NEEDED TO ALLEVIATE THE ANIMAL WELFARE CRISIS DUE TO TREE-CLEARING.

Strengthen laws to stop excessive clearing
The reform of most urgent importance is to greatly curtail the destruction of bushland habitats and native wildlife by strengthening the *Vegetation Management Act* and tree-clearing codes.

Mandatory fauna salvage
Fauna salvage should be mandatory for tree-clearing projects, consisting of pre-clearing surveys of native animals and the relocation of animals at risk to suitable habitat with proven capacity to absorb the immigrant animals. Spotter/catchers engaged in fauna salvage work also should be professionally trained, independent and bound by a code of practice, and standard operating procedures. The current draft code of practice for tree-clearing should be finalised and adopted to minimise animal welfare impacts through, for example, use of appropriate machinery, restrictions on the timing of clearing and fauna salvage.

Receiving habitats must have capacity to absorb salvaged fauna
Relocations of salvaged fauna should be permitted only where the proposed receiving habitat has been surveyed and shown to have capacity to absorb the immigrants. Those destroying habitats should be required to fund regeneration of replacement wildlife habitats as an offset.

Enhanced funding for research and wildlife rescue services
Studies are needed to quantify the consequences of clearing for animals of different species, while wildlife rescuers, hospitals and veterinary clinics need greater financial support, especially in under-served rural areas.

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Orphan koala joey held by wildlife carer, Loganholme, Brisbane. She was found in a paddock sick and alone.

1. INTRODUCTION

Bulldozing of bushland, also known as tree-clearing, land clearing or deforestation, is treated mainly as a conservation issue under Queensland's laws and policies.

Focused on species and ecosystems, the law that restricts tree-clearing (the *Vegetation Management Act 1999*) ignores animal welfare and has no provisions to prevent killing of animals as a result of clearing operations. The law that is supposed to prevent killing of native animals (the *Nature Conservation Act 1994*) also ignores animal welfare and has loopholes that fail to prevent killing of protected native animals by bulldozing of habitat. The state's animal welfare law (the *Animal Care and Protection Act 2001*) likewise offers little protection for wild animals whose habitat is bulldozed. The focus of regulation is on humane treatment of animals in captivity.

The lack of legislative safeguards to prevent or alleviate the suffering and death of wild animals caused by destruction of their habitat is a major gap in Queensland laws.

The conservation crisis of population decline and extinction resulting from habitat destruction can be regarded as the cumulative result of an animal welfare crisis – composed of the suffering of a multitude of individual animals experiencing injury, deprivation and death. These welfare and conservation crises form a continuum, since population declines result from the accumulation of individual misfortunes.[1]

While we can accurately report on the extent of bushland bulldozed in Queensland, and can estimate numbers of animals losing their habitats as a result, we have only a fragmentary picture of their fates and the suffering they experience following habitat destruction.

Arguably, the current large-scale bulldozing of bushland is Queensland's greatest animal welfare crisis, affecting tens of millions of wild animals every year and going largely unmonitored and unstudied, the effects invisible to most people, and neglected in wildlife policy and law. While many domestic animals and pets may also suffer cruelty and neglect, legislative protections and the vigilance of the RSPCA have considerably improved the welfare of domestic animals. Only recently have the welfare consequences of tree-clearing started to receive attention after long being neglected.[2]

The purpose of this report is to shine a light on the animal welfare crisis from tree-clearing in Queensland, so that the vast scale of wild animal suffering and death becomes acknowledged and better understood. Because the focus of this report is animal welfare rather than conservation, the fate of all native vertebrate animals is considered important, regardless if the species is threatened or common.[3] We present information about the extent of clearing in Queensland and the estimated numbers of animals losing their habitat. We review current knowledge about the likely fates of these animals, and identify the gaps in laws and policies that allow their welfare to be disregarded. Finally, we recommend changes to alleviate the animal welfare crisis due to clearing.

We believe there will be strong public support for these changes, for cruelty and animal suffering, whether intentional or not, is abhorrent to most Australians. The wildlife welfare crisis adds to the compelling conservation reasons for the state government to act urgently to stop the large-scale bulldozing of Queensland's bushland.

300,000 HA
WAS CLEARED AT LAST COUNT IN 2014-15

RISING HABITAT DESTRUCTION

Bulldozing of bushland has become rampant in Queensland once again. Large-scale clearing of mature woodlands and forests was banned in 2006 and protection was extended in 2009 to high-value regrowth bushland.[4] However, during 2012-2014 these major milestones were largely overturned by the Newman-LNP state government through changes to the *Vegetation Management Act 1999* (VMA), which regulates tree-clearing in Queensland, and its implementation.[5]

Rates of clearing have since resurged. From 2010-11 to 2014-15 (the latest for which data are available) the annual destruction of bushland more than tripled: from 26,000 to 114,000 ha of mature bushland and from 66,000 to 182,000 ha of regrowth. Nearly 300,000 ha was cleared at last count in 2014-15. Figure 1 shows how the annual extent of tree-clearing has been shaped by law and policy changes.

A GABBA-SIZED AREA CLEARED EVERY 3 MINUTES

Most tree-clearing in Queensland overlaps mapped habitats of threatened species. Despite this, most of it proceeds without any attempt to seek approval under threatened species laws. The enforcement of state and federal nature and biodiversity conservation laws appears to have been minimal.[6]

The weakening of controls over habitat destruction in Queensland together with recent similar changes in New South Wales[7] have led to eastern Australia being listed as one of 11 global deforestation fronts.[8] These are the areas which on current trends are predicted to account for 80% of all forest losses up to 2030. Australia is the only developed nation in this ignominious list.

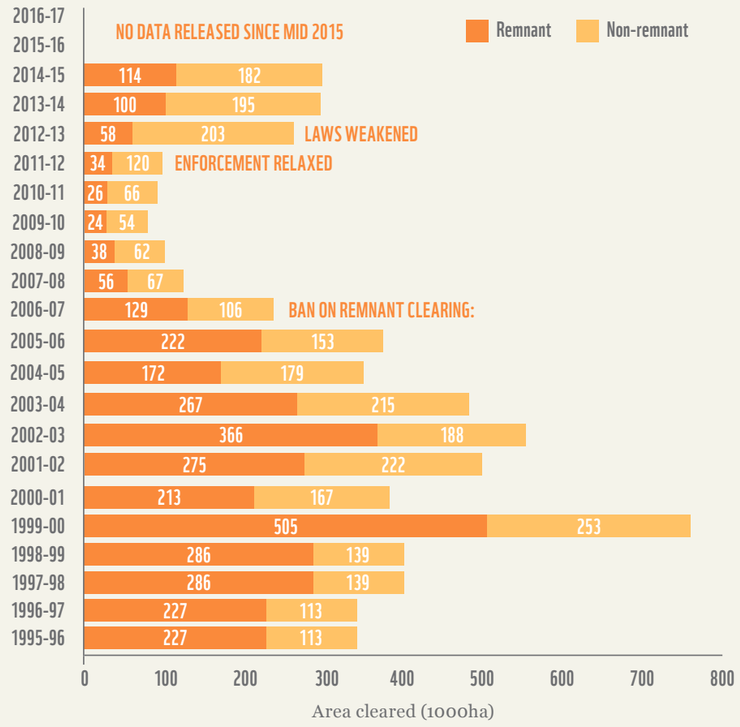

Figure 1: A history of tree-clearing rates and key policy changes in Queensland. Data are only released 1-2 years after clearing occurs, and the latest available figures are for from 2014-15. Data source: Queensland Government Statewide Landcover and Trees Study (SLATS) reports[9]

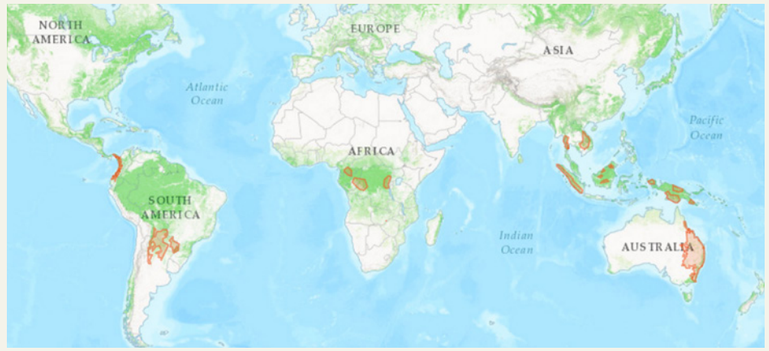

Figure 2: Deforestation fronts. The 11 places shaded in brown, including Eastern Australia, are where more than 80% of deforestation is expected to occur between 2010 and 2030, based on current trends. Source: WWF International

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Bulldozing Cape York

This intact forest on Cape York Peninsula was bulldozed in 2015 to grow sorghum and grain crops

Clearing near Roma. Queensland

The machine shown here is deadly for wildlife because it both pushes trees over and mulches them, not allowing animals any time to escape.

© SUE GEDDA / WWF-AUS

The legacy effects of tree-clearing, which including the fragmentation of habitat into 'islands' with barriers such as roads between them, may ultimately cause many more injuries and deaths than the original clearing

2. LIVES LOST

In the late 1990s an estimated 100 million mammals, birds and reptiles were killed each year due to the large-scale bulldozing of mature bushland in Queensland, comprising:[10]

- over 2.1 million mammals, including 342,000 possums and gliders, 29,000 bandicoots and 19,000 koalas,
- 8.5 million birds, such as cockatoos, treecreepers, thornbills, robins and flycatchers, and
- 89 million reptiles, such as snakes, goannas, dragons, skinks and geckos.

Eminent scientists recently updated these figures based on current rates of clearing, using the same methods, but also including advanced stage regrowth bushland as well as mature bushland. Advanced regrowth is likely to support high animal densities and species diversity, as high as mature bushland for some wildlife groups in some habitats. An estimated 34.1 million native mammals, birds and reptiles are losing their habitats each year to bulldozers, comprising:[11]

- 0.9 million mammals,
- 2.6 million birds, and
- 30.6 million reptiles.

Habitat loss inevitably leads to suffering and death. The more mobile animals – non-nesting birds and large mammals and reptiles like wallabies and goannas– may escape, but they can survive only where there is capacity in other habitats to take them in. Usually, there is very little or no excess carrying capacity, leading to increased deaths of immigrants or existing residents.[12]

These estimates of animals killed due to clearing are likely to be far less than the actual numbers killed, because they do not include:

- frogs (due to a lack of data on frog densities),
- indirect losses – for example, of aquatic animals whose habitats are degraded by sediment pollution from clearing, loss of riparian shade and altered stream hydrology,
- animals killed during repeat clearing of immature bushland, and
- ongoing losses of animals due to the legacy fragmentation and degradation effects of past clearing.[13]

The legacy impacts of clearing due to fragmentation and degradation may be even more severe than the effects of the original clearing because they are ongoing and affect subsequent generations. This is most obvious when habitat is broken up by roads or clearings and animals moving across exposed ground face a high risk of injury and death whenever they move between remaining bushland patches.

These enormous numbers of wild animals suffering and dying from tree-clearing – about 34 million a year in Queensland alone – without any legislative safeguards to protect their welfare, means that habitat destruction through tree-clearing probably counts as Queensland's and possibly also Australia's single largest crisis of animal welfare. Domesticated animals may also suffer from inhumane rearing practices or ill treatment, but their plight has been recognised to the extent that they come under animal protection legislation in a way that wild animals do not.

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Cassowaries in north Queensland face high ongoing risk of injury and death due to the break up and development of their coastal rainforest habitat. Vehicle collision is responsible for 74% of deaths, and dog attacks for 18% of deaths. The current population numbers only 1,500-2,500.[i]

ANIMALS AT RISK

Most of the tens of millions of vertebrate animals killed each year by tree-clearing are those that that live or nest in trees or logs, require the shelter of trees, or depend on nectar, fruits, leaves or arboreal insects.

Mammals

Queensland's bushland, now much diminished by past clearing, hosts dozens of native mammal species that suffer and die when trees are bulldozed – among them: koalas, quolls, bats, antechinus, dunnarts, phascogales, bandicoots, native rodents, possums and gliders. Close to a million mammals are estimated to die each year from clearing.

KOALA

Koalas – Australia's largest tree-dwelling animal – are one of the most visible victims of tree-clearing. Once common and widespread, they were recently listed as vulnerable to extinction in Queensland and NSW in response to population collapses due to forest destruction and fragmentation, and disease.[i] Koalas depend on certain eucalypt species for food, and on many other tree species for shelter. Because they have to go to ground to move between trees, they are highly vulnerable to the effects of habitat fragmentation. Many die from being hit by cars and attacked by dogs or livestock due to the increasing distances between suitable trees and between habitat patches. Isolated populations of koalas die of starvation when they are unable to access new habitat patches.

FEATHERTAIL GLIDER

Gliders and possums are the most populous forest dwellers and their lives are almost entirely spent in the trees, eating leaves, fruit, flowers, nectar and insect prey. Although some possums have been able to adapt to life in the older, greener suburbs, the gliders have not been so fortunate. This feathertail glider is still reasonably common but several gliders like the mahogany, the yellow-bellied and greater gliders are now threatened due to habitat destruction.

SPOTTED-TAILED QUOLL

Queensland's two quoll species have suffered major population declines from clearing of their forest habitats. This endangered species – the tiger-spotted quoll (*Dasyurus maculatus*) – needs large areas of mature forest, with a home range that can exceed 500 hectares. They often make their dens in tree or log hollows. Clearing exposes them to other threats such as vehicles, feral animals, and poison baits.

INLAND FOREST BAT

Queensland's forests and woodlands are rich in bat species, ranging from insect-hunting microbats that weigh only a few grams to nectar-eating flying-foxes with metre-long wingspans. Although flying-foxes can live in urban areas, the large-scale loss of mature woodlands leads to regular mass starvation events and greater reliance on human-planted foods, leading to persecution in urban areas and killing by orchardists.

Birds

Birds can often fly away when trees are bulldozed, but their eggs and chicks may die, when their nesting sites are destroyed. Just because birds can more readily reach new habitats than can non-flying mammals and reptiles does not mean they survive clearing. In a study of clearing of Amazonian forest, birds were found to move into uncleared patches, resulting in increased densities in those remnants. But many quickly died and the densities in the remnants soon returned to pre-clearing levels, showing they had already been at their carrying capacity and could not absorb immigrants from cleared areas.[14] An estimated 2.6 million birds a year lose their habitat and die due to tree-clearing in Queensland.

BROWN TREECREEPER

Birds such as treecreepers and lyrebirds are mature bushland specialists that cannot survive elsewhere. Brown treecreepers (*Climacteris picumnus*, shown here) rarely cross forest gaps of more than 80 metres.[ii] They nest in tree hollows and often breed communally, with subordinate males helping feed nestlings.

NANKEEN KESTRELS

Tree-clearing deprives many birds, including cockatoos, parrots, owls, kingfishers, treecreepers and some raptors, of the hollows they need for nesting. Destruction of hollow-bearing trees by excessive fire or 'thinning' also degrades habitat values even in seemingly intact forests. It takes decades for hollows to form in eucalypts. These are nankeen kestrels (*Falco cenchroides*). Although adults are likely to escape bulldozers, their chicks will not.

SCARLET HONEYEATER

One of the major impacts of tree-clearing is loss of food for nectar-eaters such as honeyeaters, lorikeets and flying-foxes. A NSW study found that in a good flowering year a mature spotted gum forest may produce 35,000 kilojoules worth of nectar per hectare each night, with each flower offering 5 mg of sugar.[iii] Old regrowth forest produced nine times as much sugar as recently logged forest and twice as much as 15-20 year old regrowth. Because nectar production varies a lot between seasons and years, many birds such as this scarlet honeyeater (*Myzomela sanguinolenta*) travel widely to find food.

Reptiles and frogs

Australia has a particularly rich fauna of bushland reptiles.[15] One of the most heavily cleared forest types, the endangered brigalow forests of central Queensland, also has the highest numbers of threatened reptile species in Australia.[16] Reptiles dominate the numbers of animals killed by clearing, with about 31 million lost annually due to recent clearing. Large numbers of frogs also die due to bushland destruction and silting up of streams and wetlands, but we are unable at this stage to estimate numbers.

GOLDEN-TAILED GECKO

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Reptiles are the most abundant vertebrate animals in Australian bushland. Almost every tree and log harbours geckos and skinks, often sheltering behind bark or in crevices. Smaller reptiles such as this golden-tailed gecko (*Strophurus taenicauda*) are unlikely to survive tree-clearing because the distance to suitable habitat is typically too far for them to travel without starving or being eaten. Golden-tailed geckos shelter under loose bark and in hollow limbs in open woodlands, mostly in the heavily cleared Brigalow Belt.

GOULD'S MONITOR

© BRUCE THOMSON / WWW.AUSWILDLIFE.COM

Large reptiles such as monitors lose shelter and food when bushland is cleared and may not survive the competition with other monitors if they escape to other habitats. This species, Gould's monitor (*Varanus gouldii*), lives in open woodlands and preys on almost anything smaller than itself.

Aquatic animals

Clearing in waterways or wetlands also kills fish, turtles, frogs that live there.
Other aquatic animals – including nearshore marine animal such as dugongs – may suffer and die due to tree-clearing, when it causes streams to become polluted with sediment, or alters stream hydrology or microclimate. Habitat conversion to new land uses may then continue to degrade aquatic habitats – through pollution by agrichemicals for example.

CRUCIFIX FROG

© BRUCE THOMSON / WWW.AUSWILDLIFE.COM

Many frogs suffer and die from bushland clearing. They are highly susceptible to heat and dehydration after clearing. Some species live far away from permanent water. These are crucifix frogs (*Notaden bennettii*), denizens of black soils in semi-arid areas. They burrow into the soil, emerging weeks or even years later after heavy rain to breed in temporary ponds.

SAW-SHELLED TURTLE

© LORRAINE HARRIS

Turtles may not seem like obvious victims of tree-clearing, but can suffer from the resultant reduced water quality (turbidity and pollution) and damage to or weed invasion of riparian vegetation.[iv] In some cases they are killed directly when clearing includes the destruction of wetlands or streams. This is a saw-shelled turtle (*Myuchelys latisternum*).

3. IMPACTS ON WILDLIFE WELFARE

What happens to the more than 34 million mammals, birds and reptiles whose habitats are bulldozed each year in Queensland?

Ecologists tell us that virtually all must die – killed by the act of bulldozing or falling timber, or later as a consequence of losing their habitat – but we know little about their specific fates and about the suffering they experience. Here we outline their likely fates, what is known about the welfare impacts of clearing, and the limitations of current efforts to rescue wildlife prior to or after clearing.

WILD ANIMAL DEATHS DUE TO TREE-CLEARING

During clearing or shortly after

A large proportion of animals inhabiting a site are killed during clearing or subsequently die on site. In a study from Western Australia with fauna spotter/catchers employed to catch and move animals while clearing was underway, 39% of mammals, reptiles and frogs (of those detected) died during clearing.[17] The proportion of animals detected by fauna spotters is typically low however. In a comparison case study by the same researchers, 62 animals were located per hectare by fauna spotter/catchers systematically locating, trapping, catching and moving animals prior to clearing, more than three times the number of animals detected while clearing was underway in a second case study by the same authors (17 animals per hectare).[18] These projects did not include survey for or capture of birds.

During clearing some animals die quickly if they are crushed by machinery or falling trees, for example, but many others die slowly over days or weeks, from injuries, starvation or exposure. Animals left behind in the cleared landscape are highly exposed and vulnerable to predators. Some wild animals die when log piles are burnt or chipped into mulch by machines.

Despite the deployment of spotter catchers, these animals were killed during clearing or had to be euthanased.

© NATHAN BIGNELL / FEATHERTAIL PHOTOGRAPHY

These plumed whistling ducks (*Dendrocygna eytoni*) are escaping from clearing around a creek on the Sunshine Coast

While escaping

Many animals can flee from clearing, particularly the more mobile ones such as birds, macropods and goannas. An unknown fraction of these die on the way – in collisions with vehicles, fences or powerlines, taken by predators, or due to injuries, exposure, starvation, dehydration or disease. If the clearing is extensive or other habitat patches are distant, many animals, particularly the small and young, will die before being able to reach new habitat.

Rescued

An unknown but likely small fraction of animals injured because of clearing may be discovered and rescued by spotter/catchers working on site in those cases they are present, otherwise by community volunteers or the RSPCA. These animals will usually be taken to a wildlife hospital or veterinary clinic. Only about a third of those rescued and treated recover sufficiently to be released, however.[19] Many wild animals taken into care may be victims not of current clearing but of the higher mortality risks facing animals in the degraded, fragmented habitats that remain after clearing. However, most clearing in Queensland occurs in rural areas with no requirement for wildlife surveys, salvage or relocation and virtual absence of wildlife rescue services.

ONLY ABOUT ONE THIRD
OF RESCUED AND TREATED ANIMALS RECOVER SUFFICIENTLY TO BE RELEASED

After escape or release

The larger and more mobile animals that flee clearing may reach remaining habitat patches, and some salvaged, rescued and rehabilitated animals may be released into remaining habitats. However, most such habitats are already occupied by other animals of the same or similar species, which are likely to defend their territories against newcomers and compete with them for food and other resources. There is unlikely to be sufficient food or shelter for both the existing inhabitants and the immigrants since most habitats have little or no excess carrying capacity.[20] This means that the immigrants, or the residents they displace, will die because of conflicts or from being pushed out into marginal or degraded habitats with insufficient food, shelters and refuges. Only a small fraction of immigrants or displaced residents who end up injured or ill may be rescued and taken into care.

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These animals were rescued by spotter catchers before or during clearing, mostly in urban or peri-urban bushland sites being developed for residential or commercial projects.

AFFLICTIONS AND INJURIES

Although some animals are killed quickly during clearing and others escape, many suffer injuries and deprivation that cause considerable suffering before death. The types of injuries sustained during clearing operations are well described in the draft code of practice for spotter/catchers in Queensland.[21] We know very little about the prevalence of different injuries and afflictions however, because most clearing is not monitored, and bushland animals rescued and taken to wildlife hospitals are not a representative sample of wildlife suffering from tree-clearing. Also, most animals rescued are from peri-urban areas, injured by collisions with cars or dog attacks (see section 4), likely the legacy effect of past clearing.

© BRIANO / WWF-AUS

These galahs were injured when their nest hollow was destroyed during tree-clearing. Tree-clearing deprives many birds – including cockatoos, parrots, owls, kingfishers and treecreepers – of the hollows they need for nesting. Destruction of hollow-bearing trees by excessive fire or 'thinning' can also significantly degrade habitat values even in a seemingly intact forest. It takes decades for hollows to form in old eucalypt trees.

© ENDEAVOUR VETERINARY ECOLOGY

X-ray of koala with leg fracture from vehicle strike, southeast Queensland. The koala was from the Moreton Bay region and had orthopaedic repairs on their broken limbs and was luckily able to be released.

Trauma

Traumatic injuries caused by clearing include fractures, lacerations, external and internal haemorrhage, and organ damage from direct crushing (by machinery, falling timber, earth and rocks) or from falling out of trees (nestlings and other dependent young animals).

Animals that take refuge in log piles after clearing are at further risk of traumatic injury and death if the logs are chipped by machinery, as frequently occurs in urban developments.

Mobile animals such as birds and macropods may suffer traumatic injuries as they flee and are exposed to traffic, entanglement in fencing and powerlines, higher than natural levels of attacks by dogs, cats and other predators, or by livestock.[22] Higher than natural levels of injuries may result from fights with other animals due to crowding into remaining forest patches.

Traumatic injury causes a high level of pain and suffering and a high likelihood of death. Of koalas admitted to hospital with fractures, for example, only 2% could be released back into the wild. The others died or had to be put down.[23]

Burns

In rural areas, log piles are often burnt after clearing. Any animals sheltering in those logs are likely to be burnt to death or suffer burns as they escape.

Deprivation and exposure

Deprivation suffered by animals due to clearing include suffocation, starvation, dehydration, heat exposure and heat stroke.

Burrowing animals or those lying stunned or injured on the ground during clearing may be buried alive and suffocated or trapped under timber or earth as it is moved around by machinery.

Small animals suddenly left in a treeless environment may be unable to reach other habitat in time to avoid predation, starvation, dehydration or heat stroke. This is a high risk for young and orphaned animals, including pouch marsupials and nestlings.

Starvation or exposure also occurs when animals flee to other habitats, where they would often face overcrowding, conflict and exclusion or expulsion.

Stress

Even in the absence of traumatic injury and pain, animals will experience mental anguish and stress from losing shelter and food sources, and by being forced to flee.[24] If they arrive alive and uninjured at suitable new habitat, they can still face stress from over-crowding and conflict with resident animals. The vertebrate stress response is adaptive until it reaches a point of overload when it becomes debilitating. At that point, immunity may be compromised, resulting in infection and illness.[25]

Disease

Traumatic injuries, especially lacerations, greatly increase the risk of infection. Animals that survive their injuries are likely to suffer secondary infections. Food shortages, exposure and increased stress also lead to increased disease risk.
A recent review found that of 19 relevant studies, 53% reported an association between destruction and degradation of habitat and disease prevalence in wildlife.[26] Mechanisms include increased disease transmission rates due, for example, to immigrants encountering other animals hosting pathogens they are not adapted to (or vice versa), by overcrowding in remnant patches, or by reduced genetic diversity.

Log piles burned after clearing for which no wildlife survey, salvage or permit is required near Miles, Queensland.

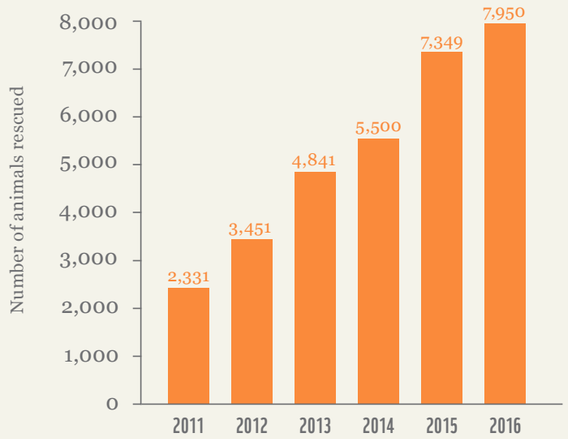


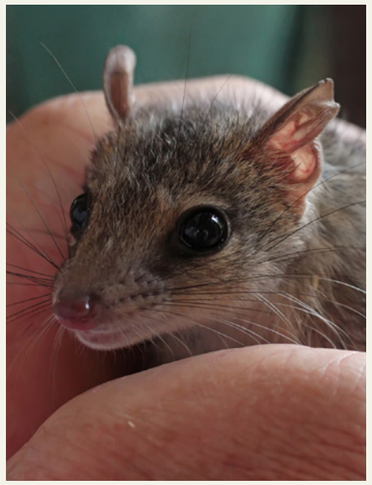
Figure 3: The rise in rescues of bushland-dependent animals. Source: RSPCA Qld

3X RESCUES OF FOREST-DEPENDENT SPECIES MORE THAN TRIPLED

RSPCA Queensland records show that rescues of forest-dependent species more than tripled from 2011 to 2016

WILDLIFE RESCUE, REHABILITATION AND RELEASE

Since the 2012-13 weakening of tree-clearing controls, wildlife rescuers and hospitals in Queensland have reported a rise in wildlife rescued after being found injured, orphaned or afflicted in other ways.[27] RSPCA Queensland records show that rescues of forest-dependent species more than tripled from 2,331 in 2011 to 7,950 in 2016 (Fig 3).[28] RSPCA attributes much of this increase to increasing habitat destruction.[29] Another contributing factor may be an increased rescue effort, as discussed below in section 4.



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Northern quoll in care

This young male northern quoll (*Dasyurus hallucatus*) was reared by a wildlife carer and will be released back into the wild.

The main reasons for animal rescues, if known, are shown in Table 1. Surprisingly, because they are highly mobile, birds dominate the list, accounting for 72% of all rescues. Gliders and flying-foxes are particularly susceptible to entanglements, collisions with windows or electrocution. Vehicle strikes (including machinery and trains) are a major cause of injury of ground-moving animals such as wallabies, koalas and echidnas, but also, surprisingly, for night birds and cockatoos. Predation, mostly by dogs and cats, is a major cause of injury in most groups. However, information about causes is usually lacking. In two-thirds of cases the reason for rescue was either unknown or not stated (Table 1).

Only a small number of rescued bushland animals (256 in total) were reported as injured due to a falling tree – 178 birds, 32 gliders and 2 koalas. The lack of rescues clearly attributable to clearing does not imply that few animals are injured or killed as a result of clearing, however. Rescue records are inevitably biased because most rescues are in urban or peri-urban areas. Of the nearly 90,000 rescue records held by RSPCA Queensland that could be pinned down to an address, nearly half are in the Brisbane metropolitan area and 90% are in just six southeast Queensland local governments areas – Brisbane, Gold Coast, Ipswich, Logan, Moreton Bay and Redlands. Most such rescues are likely to be a consequence of the habitat fragmentation and degradation resulting from past clearing and habitat conversion to roads, housing and farms, bringing animals into contact with vehicles, powerlines, and domestic animals.

The reality is that most clearing happens on private properties in rural areas far from the public gaze, and beyond the reach of most wildlife rescue services. Outside the major urban centres wildlife rescue and care services are scarce. Rural veterinary services may be assisting injured wildlife, but no statistics on admissions and outcomes are presently available.

Despite the best efforts of carers, veterinarians and wildlife hospitals, on average only about one third of animals brought into care are successfully rehabilitated and released back into the wild. Most die or must be put down.[30]

The success of treatment depends greatly on the severity and type of injury sustained. Fractures or other traumatic injuries have a low success rate. For example, only 2% of koalas admitted with fractures recover sufficiently to be released back to the wild.[31]

Released animals can face the same problems as escaped animals due to the limited capacity of most receiving habitats to absorb immigrants. Much depends on the quality of habitat, the extent to which there is excess population capacity, and the method of relocation. A 2009 review of Australian vertebrate wildlife translocations (prepared for conservation purposes) found only about half were successful.[32] A worldwide review of translocations found even lower rates.[33] This is surprising considering that these conservation translocations involve careful planning, and the receiving habitats were known to be uninhabited by that species (because it had never been present or was extinct there) or known to have depleted numbers and abundant capacity to accept immigrants. Indeed, this is the very purpose of most such translocations, to bring animals back to places from which they have been lost or to create new colonies where they were not previously present, to reduce extinction risk.

In contrast, for almost all clearing in Queensland, there is no requirement for assessment of the capacity of receiving habitats to absorb relocated animals. Exceptions are rare.[34] Survival rates of relocated or escaping wildlife are therefore, expected to be low.

Table 1: Numbers of rescues for bushland-dependent animals and dominant reasons, if known, from RSCPA Queensland records for the whole of state, Jan 2011-May 2017, ordered by prevalence.

Group	Rescues	Main reason if known
Bushland birds	9,589	orphaned 8%, predators 7%
Owls, night birds	4,236	vehicles 12%, orphaned 9%
Cockatoos, corellas, galahs	2,860	vehicles 8%, predators 5%
Flying-foxes	1,747	entanglement 26%, orphaned 10%
Wallabies	1,583	vehicles 26%, orphaned 10%
Goannas, dragons	1,195	predators 15%, vehicles 10%
Gliders	832	predation 13%, orphaned 11%, entanglement 8%
Koalas	722	vehicles 21%, disease 14%
Emus, cassowaries, curlews, bustards	496	orphaned 7%, vehicles 4%
Echidnas, platypuses	405	vehicles 29%, predators 7%
Bandicoots	319	predators 17%, vehicles 10%

CASE STUDY: KOALAS IN SOUTHEAST QUEENSLAND

The majority of koala rescues and hospital admissions are not the result of current clearing, but the legacy of past clearing and conversion of forests to suburbs and farms with scattered fragmented forest patches, where koalas are continually exposed to car strikes and domestic animal attacks.

Over the six years from 2009 to 2014, more than 10,000 koalas (over 1,600 annually) were admitted to the four wildlife hospitals in southeast Queensland.[35] These numbers are much greater than the estimated 600 koalas losing habitat to tree-clearing in the same region during the peak of clearing in the mid-1990s.[36] About 179 koalas lost their habitat during 2013-15 in southeast Queensland, roughly one-tenth of the annual hospital admissions.[37]

Just over a quarter (27%) of the koalas hospitalised from 2009 to 2014 were rehabilitated and released back into the wild.[38] Rehabilitation is largely unsuccessful for serious injuries. Trauma injuries represented 38% of all hospital admissions.[39] Of koalas admitted with fractures (84% from car strikes), only a tiny 2% could be rehabilitated and released. The rest died or had to be put down.[40]

The enormity of these numbers is highlighted by the fact that the entire estimated population of koalas in southeast Queensland was just 15,000 in 2010 (see inset graphic).[41] The severe impacts of the injuries, illness and death suffered by koalas in southeast Queensland are reflected in recent population collapses over the 18 years from 1996 to 2014:

- 80% decline in the Koala Coast (Bayside, Logan and Redlands) population; and
- 54% decline in the Pine Rivers population.[42]

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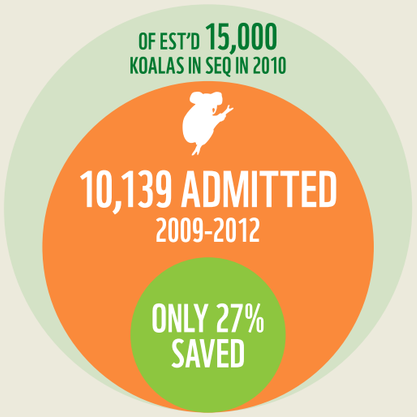
Koala released back into the wild



Post-relocation/release success however, seems to be relatively high for koalas. Nearly 100% of rehabilitated koalas released on the Gold Coast into a large area of intact habitat (Canungra Military Area) survived during a one-year study in the mid-1990s. Male koalas released into a smaller Gold Coast reserve, already at high densities, were less successful.[43] Rehabilitated koalas affected by bushfires in NSW had a 60% survival rate three years after release. Unlike clearing however, fire does not permanently destroy koala habitat.[44] In a recent study in the Moreton Bay region, of 28 koalas translocated to a site confirmed to be below capacity, 17 were still alive two years after translocation and mortality rates were similar to those of resident koalas.[45]

These results suggest that koala populations in large intact bushland tracts of southeast Queensland are below carrying capacity, most likely because of the high prevalence of chlamydia infections, which reduce fertility.[46] Although this makes it easier to relocate koalas for the time being, it is no cause for celebration that koalas have become so depleted in otherwise intact habitats. The ongoing destruction of habitat in southeast Queensland will mean fewer suitable translocations sites in future.

As with other species of wildlife, our knowledge of the fate of koalas is highly biased toward peri-urban areas and southeast Queensland. Information from rural areas is sorely lacking. We do know that severe population declines have also occurred in the sparsely populated southwest mulga lands due to drought and tree-clearing.[47] In rural central Queensland, one study documented at least 62 koalas killed on roads from 2009-2011. [48]

4. REDUCING IMPACTS

Apart from reducing the extent of clearing, the main ways to reduce the suffering and death caused by tree-clearing are to remove and relocate wildlife prior to clearing (salvage) and to rescue and treat afflicted wildlife during and after clearing.

WILDLIFE SALVAGE

Wildlife survey, salvage and relocation of animals prior to tree-clearing should substantially reduce the number of animals suffering and killed as a result, provided the salvage and clearing activities are conducted well and there are sufficient suitable habitats with capacity to absorb relocated animals. There is surprisingly little information on how effective wildlife salvage has been. Only one relevant paper consisting of two case studies from Western Australia was discovered in our literature review (also mentioned above in section 3).[49]

- In the first case study, in an open wattle and banksia shrubland, an average 61 native mammals, frogs and reptiles per hectare were found in intensive surveys prior to clearing. All were captured and relocated nearby. Non-native animals were euthanased.[50]
- In the second case study, in a coastal wattle shrubland, spotter/catchers were engaged only while the clearing was under way. They detected 17 animals per hectare, far fewer than found by systematic survey in the first case study, 1.4% of which were mammals. Of the animals detected, 27% were killed during clearing, and 12% had to be put down because they were injured or considered unlikely to survive relocation, while 61% were relocated. There was no monitoring of post-relocation survival in either case study.[51]

  Death rates were higher for some animals, particularly goannas and snakes (53%), and for some machinery types over others (normal dozers, graders and loaders accounted for 41%; excavators and swamp-dozers for 24%). Many reptiles were recovered from the 158 termite mounds at the second study site, and they enjoyed a much higher survival rate (91%) due to the careful dismantling of the mounds.[52]

OF THE ANIMALS DETECTED, 27% WERE KILLED DURING CLEARING

Although wildlife salvage and appropriate machinery use can prevent many injuries and deaths during tree-clearing, the use of wildlife salvage services called 'spotter/catchers' in Queensland is highly inadequate.

- **Rarely required:** The primary limitation, which could be easily addressed by legislative reform, is that spotter/catchers are not required for most tree-clearing in Queensland. They are only stipulated by some local governments as a condition of development approvals.[53]
- **No qualifications or protocols:** Spotter/catchers must obtain a permit to operate from the Queensland Department of Environment, but they do not need specific qualifications and there are no codes or standard procedures they are required to follow. A draft code of practice was developed in 2009, but nearly a decade later it remains 'under development'.[54]

- **Conflict of interest:** Spotter/catchers are employed as contractors or employees of the companies and individuals conducting the clearing and are answerable primarily to them. Although they are required to lodge 'return of operations' reports with the Department of Environment, these data are not collated or published and there is no established auditing process.[55]
- **Low detection rates:** Detection rates of wildlife by spotters engaged only during clearing are low. This is exemplified by the Western Australian case studies noted above. Intensive surveys and trapping by well-trained spotter/catchers prior to clearing achieve the highest salvage rates.[56] However, even the best surveys are inherently unable to detect all animals present. Typical spotter/catchers in southeast Queensland failed to detect 75% of koalas known to be present in a survey area, compared with 26-50% by koala specialists.[57] Detection success depended greatly on forest density.
- **Post-relocation outcomes ignored:** There are no requirements to ensure that receiving habitats for relocated animals have the capacity to absorb the relocated immigrants. Nor are there typically any requirements to monitor the success of relocated animals. Even the most thorough salvage operations will fail to mitigate animal suffering if they lead to overcrowding, conflict, dislocation, deprivation and death in the receiving habitat.[58]

Spotter catcher at work in southeast Queensland, shown at lower left.

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Rescued squirrel gliders (*Petaurus norfolcensis*) rescued from clearing on the Sunshine Coast.

© NATHAN BIGNELL / FEATHERTAIL PHOTOGRAPHY

Rescued water rat (*Hydromys chrysogaster*) rescued from clearing in north Brisbane.

WILDLIFE RESCUE

Australia has seen rapid growth of wildlife rescue and care services in recent decades. This may reflect rising concern among Australians for wildlife, but also reflect the worsening crisis of wildlife welfare caused in large part by past and ongoing habitat loss. It has placed a much greater burden (including financial) on wildlife carers, veterinary clinics and wildlife hospitals, some of which cost is borne by taxpayers. The Queensland Government recently boosted support for wildlife hospitals and rehabilitation services.[60]

Although the numbers of animal rescues are substantial (Figure 4), they are a tiny fraction of the animals estimated to be killed by habitat loss. The rescues documented by RSPCA Qld for the state (96,000 from January 2011 to May 2017) represent just 0.1% of the estimated 34 million mammals, birds and reptiles lost annually due to habitat destruction.

To improve the welfare outcomes for animals subjected to habitat destruction, there needs to be greater support for wildlife rescue and care services in the more remote rural areas subject to high clearing rates.

4. GAPS IN LEGAL PROTECTION

There is no law requiring those who bulldoze bushland to reduce the impacts on animal welfare and loss of life. Here we briefly identify deficiencies in the major laws of relevance to the animal welfare impacts of tree-clearing.

So-called 'thinning' on the western Darling Downs in 2017 turned a cypress/eucalypt forest (left), into a paddock with scattered trees (right) under the weak controls currently in place, with no wildlife survey or salvage, no offsetting and no permit required. The white patches are ashes left in the wake of burning of logs and foliage piles. Displaced animals taking shelter in those piles would have been burnt.

VEGETATION MANAGEMENT ACT 1999

The *Vegetation Management Act (VMA)* regulates clearing of bushland in Queensland. Under the VMA some types of clearing are exempt from any regulation, some must follow self-assessable codes but require no permit, and some require a permit.

- **Clearing exempt from regulation.** Many exemptions for certain types of small-scale clearing apply. Almost all immature and regrowth bushland is exempt. Clearing for mining or in state forests is regulated under other laws.[61]
- **Clearing under self-assessable codes.** Clearing of mature bushland for certain activities or in certain areas, primarily thinning, fodder harvest or forestry, does not require a permit if the conditions specified in codes are followed. The mis-named thinning code allows the bulldozing of forests into open paddocks with scattered trees. It is currently the largest source of clearing of mature bushland due to the weak codes currently in force. Before changes in 2013, all such clearing required a permit.
- **Development approval under the Planning Act.** Clearing for allowable purposes of 'high value agriculture' or urban or other developments require a development approval, in which case certain development assessment codes apply. Clearing of some classes of bushland may require offsetting of significant residual impacts (under the *Environmental Offsets Act 2014*). Residual impacts are those that remain after other impacts have been avoided and mitigated.

Maps of 'essential habitat' for threatened species play an important role in how these and the self-assessable codes governing clearing are applied. However, the current maps do not accurately reflect actual habitat and mostly consist of circles drawn around the historic locations of selected species.[62] Animal welfare impacts of clearing are not considered under the Act.

Key limitations

- Animal welfare is disregarded under the VMA.
- The current weakened VMA allows large-scale clearing of bushland through exemptions and loopholes, primarily the self-assessable codes for thinning and fodder harvest, without any general requirement to avoid, mitigate or offset wildlife injury, suffering and death.
- Avoid, mitigate and offset requirements only apply to certain regulated vegetation types, in the context of a development approval.

NATURE CONSERVATION ACT 1992

The *Nature Conservation Act (NCA)* provides a process by which native species are placed on 'protected species' lists. Although it provides for declarations of critical habitats for protected species, none have been declared. Under the NCA a species management program may be required if an action 'tampers' with a listed animal's breeding place. But breeding places must be shown to be occupied and in use for there to be legal liability. Also, actions not directed at the tampering that could not be reasonably avoided are exempt.[63]

Take (or killing) of wild animals requires a permit. However, it is a defence against prosecution that an action was not directed to take of the wildlife and the take could not be reasonably avoided.[64] This defence was invoked for the killing of flying-foxes on electrocution grids by orchardists claiming that killing them was incidental to agricultural production and could not be reasonably avoided. The court at first agreed with this argument, but the decision was overturned on appeal and the grids were ordered to be dismantled.[65] No statutory guidance has been issued by the regulator of the NCA for the meaning of 'reasonably avoided'.

The perverse result of this loophole is that someone can injure and kill countless wild animals with impunity by driving a bulldozer through wildlife habitat, but if they step out of the bulldozer and intentionally shoot one native animal without an appropriate permit they could be prosecuted.

The NCA is generally poorly enforced, although its third-party enforcement rights are a strength.[66]

Key limitations

- Animal welfare is disregarded under the NCA.
- The NCA has loopholes in effect exempting incidental killing of native wildlife caused by tree-clearing.
- There are no legal obligations for wildlife salvage except in very restrictive circumstances.
- The NCA is poorly applied and enforced regarding tree-clearing.

ANIMAL CARE AND PROTECTION ACT 2001

The *Animal Care and Protection Act (ACPA)* prohibits cruelty to all animals, and places a legal duty of care on people in charge of animals (in care or captivity) to meet those animals' needs in an appropriate way.

The ACPA is administered and enforced by Biosecurity Queensland. Police and RSPCA officers also have enforcement powers under the ACPA.[67]

Key limitations

- A person destroying wildlife habitat does not currently have a duty of care under the ACPA to the wild animals living in those wild habitats.
- The duty of care provision only has legal effect once a wild animal is rescued and taken into care.

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the Commonwealth's *Environment Protection and Biodiversity Conservation Act (EPBCA)* at least 126 terrestrial vertebrate species are listed as threatened due to tree-clearing, including 32 mammal and 51 bird species.[68] Any action likely to have significant impacts on such species must be referred for approval to the Commonwealth environment minister, or otherwise ruled by the regulator to not require approval. The proponent of the clearing bears the responsibility for referring actions. Less than 1% of clearing in Queensland has been referred for approval despite the extensive overlap with threatened species habitats.[69] In an unprecedented and welcome move, the regulator recently ordered the referral of clearing that had been approved under Queensland law.[70] The EPBCA does not consider animal welfare impacts.

Key limitations

- Animal welfare is disregarded under the EPBCA.
- The EPBCA is poorly observed and poorly enforced regarding Queensland tree-clearing.

CONCLUSION AND RECOMMENDATIONS

RSPCA Australia believes that animals must be treated humanely. Where humans make use of animals or interfere with their habitat, they should bestow a level of care befitting human dignity as rational, intelligent, compassionate beings, and a level of care merited by the nature of the animal as a sentient creature capable of responding to human care and attention.

Animals have an intrinsic value of their own and, accordingly, must be considered to possess the right to live in a way which enables them to have a positive life and to develop and enjoy their inherent qualities.

(Excerpts from RSPCA Charter)

From an animal welfare perspective, even when bulldozing of habitat has some reasonable purpose – such as to provide people with living and working space, extract resources or grow food – it is still imperative that all reasonable steps be taken to avoid injuring and killing wildlife, and to ensure that any unavoidable taking of life is done so humanely.

RSPCA policy recognises the rights of animals to a healthy, happy life, but also accepts that animal lives may be taken to meet human needs. The key tests in such cases are:

- that there be good justification for taking of life (ruling out killing for whimsy or entertainment); and
- that every reasonable effort be made to avoid unnecessary deaths; and
- that any deaths which prove to be necessary and cannot be reasonably avoided be done humanely without any cruelty or suffering.

Tree-clearing in Queensland fails all those tests – much of it is not well justified, and typically no effort at all is taken to avoid deaths and prevent suffering.

Tree-clearing is not going to stop, nor is the purpose of this report to argue that it should. However, it should be considerably curtailed and the extent greatly reduced to levels strictly necessary. For any clearing that is permitted, significant changes are needed to prevent and minimise animal suffering and death. This can be achieved through reasonable measures that are already employed, but only in limited circumstances at present.

Four major changes are needed to alleviate the animal welfare crisis due to current tree-clearing practices.

STRONGER TREE-CLEARING LAWS

The reform of most urgent importance – essential for both conservation and animal welfare – is to greatly curtail the destruction of bushland habitats and native wildlife by strengthening the *Vegetation Management Act* and the codes regulating tree-clearing.[71] The loophole in self-assessable codes which allows unlimited conversion of intact bushland to pastures with scattered trees, with no need for a permit, should be closed.[72]

To support stronger legal protections, additional funding will be needed for monitoring, auditing, administration and compliance activities by responsible agencies.

MANDATORY FAUNA SALVAGE

Loopholes in the *Nature Conservation Act* allowing unlimited injury and killing of wildlife without a permit (because it is not the intended purpose of the clearing) should be closed. All killing of native animals through intentional destruction of their habitat should require a permit that spells out the reasonable measures needed to minimise and mitigate animal suffering and death, should the clearing be permitted at all.

A draft code for tree-clearing operations was developed a decade ago.[73] This code should be finalised and adopted by the Queensland Government as soon as practicable. The code should be evidence-based, and aim to minimise animal welfare impacts through, for example, use of appropriate machinery and operating procedures, restrictions on timing of clearing (avoiding springtime nesting and breeding periods), and restrictions on the burning or chipping of log piles, as well as mandatory fauna salvage. Clearing operations should be subject to reporting and auditing requirements to guarantee adherence to the code.

Fauna salvage should be mandatory for all tree-clearing or habitat destruction for any purpose, including pre-clearing surveys of native animals and the relocation of animals at risk to suitable habitats with proven capacity to absorb the immigrants. This is particularly critical for clearing under self-assessable codes, which now represent the largest source of destruction of mature bushland.

Spotter/catchers engaged in fauna salvage work need to be well-trained, independent and bound by the statutory code of practice mentioned above, as well as by standard operating procedures. Fauna salvage operations should be subject to effective reporting and auditing requirements to guarantee adherence to the code.

RECEIVING HABITATS MUST HAVE CAPACITY TO ABSORB SALVAGED FAUNA

It is pointless and cruel to move wildlife from an area about to be cleared only to have them suffer and die after being relocated to overcrowded habitats that cannot sustain immigrants. Relocations should be permitted under the code of practice for tree-clearing operations only where the proposed receiving habitat has been surveyed and shown to have capacity to absorb the immigrants, and where relocations will not cause additional suffering from, for example, conflicts, starvation, excessive stress or the introduction of pathogens.

Proponents should also be required to fund regeneration or replacement of wildlife habitats as an offset. At present protection of existing intact habitats is accepted as an offset with no requirement to replace what is destroyed. Such an approach results in net habitat loss, increasing wildlife death and population decline.[74] Because there is a time gap between clearing and when an offset habitat to be regenerated can support relocated animals, clearing proponents would most likely end up engaging third party suppliers of regenerated habitats to meet this requirement.

FUNDING FOR ENHANCED RESEARCH AND WILDLIFE RESCUE SERVICES

At present our understanding of animal fates during and after clearing is rudimentary, with very few studies having been done on the outcomes for displaced populations of the different wild species. Studies using marked animals are needed to quantify the consequences of clearing for animals of different species. This should be a priority area for government funding to better characterise the animal welfare crisis of tree-clearing so as to better guide effective action to reduce the problem.

Most wildlife rescue, treatment and rehabilitation services are in urban or peri-urban areas, far from rural areas where most clearing occurs. Wildlife rescue and salvage services, hospitals and veterinary clinics need greater financial support, especially those in rural areas.

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62. Taylor, MFJ, 2015. Bushland destruction rapidly increasing in Queensland. WWF-Australia Briefing Paper.
63. Nature Conservation (Wildlife Management) Regulation 2006 Sect 332 (3) It is a reasonable excuse for a person to tamper with the breeding place if— (a) the tampering happened in the course of a lawful activity that was not directed towards the tampering; and (b) the tampering could not have been reasonably avoided.
64. NCA sect 97(4) It is a defense to a charge of taking or interfering with wildlife in contravention of subsection (2) to prove that— (a) the taking or interference happened in the course of a lawful activity that was not directed towards the taking or interference; and (b) the taking or interference could not have been reasonably avoided.
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Endnotes for photo captions

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