

**Sydney's 1994 Bushfires - The effects of these and other bushfires on Australia's herpetofauna.**

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**General Information;**

Having resided in Melbourne for the last 8 years, I've been unable to observe first-hand the effects of recent bushfires on Sydney's herpetofauna (Melbourne is about 890 km by road from Sydney). However, as a former long-term resident of the Sydney area I am familiar with the scenario presented by bushfires in and around Sydney. Speaking to people from Sydney and reading media reports, the damage as a result of these most recent fires has been substantial.

The statistics are as follows;

**Date of fires** - early January 1994

**Cause of most fires** - most were deliberately lit by arsonists during hot weather

**Location of fires** - most were within 250 km of the Sydney metropolitan area, many being on the immediate fringes and in suburbs. A large number were also on the far north coast of New South Wales. At least 136 separate fires in total.

**Damage** - Dozens of houses, many millions of dollars, 4 deaths.

In firefighting, the firefighters place greatest emphasis on the protection of lives and property. Loss of bushland itself is not regarded as a major problem and thus large tracts are allowed to burn unchecked until houses are approached. To control the fires a number of methods are used. In terms of it's environmental effect, backburning is perhaps the most significant.

In backburning a controlled burn is lit from a given line (often the edge of a property or house/s in a suburban street) so that the flames or fire front burn towards the oncoming fire. In theory these two fires meet and with nothing else left to burn the fire burns itself out. In some cases around Sydney, including the 1994 Royal National Park fire, the fires resulting from backburning actually caused more damage than the original fires they were meant to combat.

A huge part of Kurringai Chase (including West Head) to Sydney's north was burnt out as a result of the 1994 fires. Likewise for the National Parks along Sydney's Middle Harbour, Port Hacking, parts of the Blue Mountains, Lane Cove River National Park and Royal National Park. Over 90% of the Royal National Park was blackened by the fires, making it the worst recorded fire in its history.

The reason why these particular fires were so widespread and severe are many. Some key reasons are presented below. Bushfires (mainly deliberately lit) have been a part of Australian life since white settlement (and before). It would be rare to go anywhere in Australia and see tree trunks that haven't been blackened at some stage by bushfires. Contrary to popular belief the bushland does recover after a bushfire, although how the recovery takes place depends on a number of factors, including severity of the burn, plant species in the area and presence or absence of grazing.

In and around Sydney most areas of bush, including the National Parks, seem to have major bushfires about every 7 to 9 years. In the few areas that get annual burn-offs, such as parts of Terry Hills (near the Belrose end) that get so-called control burns most years in winter, the ground cover build up is so minimal that there is little risk of major bushfire ever occurring (those areas usually have a drastically altered wildlife composition, reduction in species diversity and far more introduced weeds instead of native grasses).

Having said the above, there was an unusually long gap in the periods when many bushland areas including most National Parks around Sydney had major bushfires and so the "fuel" build-up (dead leaves, etc.) was greater than usual and hence the fires were greater in fury than usual. For example, the last major fire in the western half of the Royal National Park was in the late 1970's. The last major fire in the parts of Kurringai Chase and Middle Harbour National Park that meet at Mona Vale Road was about 1980. Thus these areas had been building up "fuel" for over ten years. Excluding the summer of 1992-93 which was fairly typical of Sydney and N.S.W. summers, the previous few summers (since 1988-89) have been generally much wetter and cooler than usual. Thus there has been much less opportunity for the bush to dry out and be conducive to burning. Coupling this with the added growth over that time and drying this summer (which has had more hot spells than usual) the fuel build-up is much higher than usual and so the fires burn more severely. The only thing that is difficult to explain is what prompted so many nutcases to go around deliberately lighting fires during the hot weather. I can only guess that once someone lights such a fire and it is reported in the media, others with the same tendencies do likewise.

## During the fire;

There are commonly reports of animals (including reptiles) dying during bushfires. In mid-November 1974, Honorary Ranger Tony Butz found four adult and one subadult Diamond pythons, *Morelia spilota*, as a group when he was fighting a low-intensity bushfire in a National Park immediately adjacent to the Hawkesbury River north of Sydney. These snakes were found moving away from the downhill moving fire front and were believed to be fleeing the flames (Hoser, 1980).

Although many animals clearly die during bushfires, my own observations lead me to believe that the mortality rate is nowhere near as high as most people seem to think. Few, if any, species are usually wiped out from an area (in the long term) by bushfires. There are a number of reasons for this. Birds and mammals seem able to flee a fire front, being able to move back as soon as it is safe to do so. Smaller animals that may not flee the flames, such as reptiles and frogs, are able to hide away from the heat in the tops of trees that may escape the flames, and in holes, rock crevices, etc.. Although some animals clearly die in the flames, many don't (Fyfe, 1980). I am not aware of the publication of reptile mortality figures for fires in percentage terms, but even allowing for a 75% mortality (which I find unlikely) the ability of the remainder to repopulate the area is clearly there.

I have attended bushfires in a number of areas, including around Sydney, usually with a view to capture reptiles fleeing from the fire front. Surprisingly few do! Clearly the majority go to ground and wait out the flames. Sydney's bushland is well endowed with rocks, rock outcrops and other hiding spots that would clearly be a safe haven from the flames, making the need to flee a fire front less essential. I have observed Spinifex (*Triodia* sp.) fires in relatively flat areas in northern Australia and seen far more reptiles fleeing a given area than in an area such as Sydney. One of the reasons is obviously the relative lack of safe hiding places within the burning area. On my herpetological travels I have noted that relatively flat areas burnt frequently are often more devoid of reptiles than similar less frequently burnt areas, particularly when there are large grazing mammals present. This is particularly true for central and arid Australia. In early 1983 I noted that a burnt area just west of Shay Gap (Western Australia), along the Goldsworthy Road, had far less herpetofauna than nearby unburnt areas. However, what happens after the fire could be as important as the fire itself.

## After the fire;

After a bushfire there is far less ground cover and hiding spots for small, cryptic animals such as reptiles. Thus, these animals become easy targets for birds and other predators.

A week after a fairly severe bushfire in the Waterfall area of the Royal National Park in the late 1970's I observed reptiles in the burnt out area. What surprised me was how many there were. Numbers seemed to be as high as ever. Due to the size of the area burnt, and the short time frame involved, I discounted the theory that most of the animals could have migrated into the area from outside, or had fled flames, returning immediately thereafter. However, I did note a larger than usual number of birds of prey in the area. Clearly the remaining reptiles had become an easy target for predators. Perhaps more reptiles would die in the aftermath of the fire as a result of becoming prey than during the fire itself? These features of bushfire ecology need studying.

Even during the most severe of bushfires, including the one at Waterfall, there are usually some areas untouched by the flames. This is particularly so for hilly, rocky and well-watered areas, such as around Sydney. Winds change direction, flames jump over a creek missing some of the border vegetation and so on. All these areas represent a safe haven for the slowest and most stupid of animals, in theory helping to ensure the survival of enough individuals to maintain a population. Obviously, forest dwelling species can't survive in an area denuded of trees (by a fire), but they can migrate back into the area from adjoining suitable habitat, provided that the latter exists. In terms of the recent bushfires in Sydney, that has become a problem. Because some areas of bush are completely surrounded by densely populated suburbs and the bush itself is virtually totally burnt out, the species wiped out in these areas are unlikely to ever return. That is because there are no "corridors" of entry. Fortunately for reptile lovers, few if any reptiles will be affected in this way by the recent bushfires. For some of the mammals, including some (now believed exterminated) Koala, *Phascolarctos cinereus*, populations, the picture isn't as good. Permanent local extinctions are likely.

#### Other notes;

The heat tolerance of many species is often underestimated. Again this is an area in need of further research. In 1981 I burnt a spinifex bush near Shay Gap (Western Australia). While the bush was in flames a previously unseen adult male Ant-hill python, *Bothrochilus perthensis*, appeared to move from the flames in the bush to where I was standing, some distance away from the heat of the flames. I caught the snake and it was apparently unharmed and lived in captivity without incident for some time before being stolen.

Similarly, I burnt a number of spinifex bushes in the Newman (WA) area of Western Australia and Barrow Creek, Northern Territory, and while finding lizards emerging from these bushes, I was always surprised to see these animals often running through the flames without apparent ill effects.

In late 1978, Ron Sayers and myself collected reptiles in the immediate vicinity of a disused railway line between Charters Towers and Townsville (Queensland). The area was grassy with scattered trees, and a low intensity grass fire was going through the area. We observed a number of Storr's monitors, *Varanus storri*, running through the flames of the fire-front without ill effect. This was usually in response to our chasing them around the low rocky outcrops in the area.

In 1988 I spent three days attempting to catch a 2 metre adult male Lace monitor, *Varanus varius*, that had taken refuge at the top of a large tree in suburban Turramurra. Attempts to smoke the lizard out of the tree were useless. On a number of occasions flames and smoke have been used to extract reptiles from rock crevices and logs. I have had no success in attempts to burn Cunningham's skinks, *Ergenia cunninghami*, (Sydney sandstone form) and Sydney's Rosenberg's monitors, *Varanus rosenbergi*, from rock crevices in the Dural area of outer northwest Sydney. I did manage to smoke an adult Eastern Brown snake, *Pseudonaja textilis*, from a hollow log between Nevertire and Nyngan in western New South Wales. In that case it was clearly the smoke running up the log, rather than the heat, which made the snake choose to flee.

After bushfires the vegetation clearly goes through a change in vegetation regime. Some plants regenerate quickly while others take many years longer to regenerate. As the vegetation pattern varies, so too does the reptile composition. Around Sydney I've noted Bearded dragons, *Pogona barbatus*, appearing to have a preference for recently burnt bushland over adjacent unburnt areas. However, when many hundreds of square kilometres are burnt at a time in one place, I doubt that it would be possible for the local Bearded dragon population to be able to significantly capitalise on their newly formed preferred habitat.

Death Adders, *Acanthophis antarcticus*, hiding in leaf and other ground litter would seem to be prime candidates for high mortality rates in bushfires. However, they seem to survive in reasonable numbers. In the case of this species this also seems to be dependant upon two things. Not too frequent burning of the area and no grazing by domestic stock such as cattle. Now that the West Head area has been severely burnt for the first time in at least 15 years it will be interesting to see the effect on local snake populations, including Death Adders. Due to the extremely hilly and rocky terrain of the area and the lack of grazing animals, I'd suggest that any long term damage on numbers of this or other reptile species in the area as a result of bushfires would be minimal.

Grasslands in parts of Northern Australia get burnt annually and yet tree-dwelling reptiles such as Frilled Dragons, *Chlamydosaurus kingii*, seem to survive in sufficient numbers each year. Rick Shine of the University of Sydney has just completed a major study of this species. He presented a paper on them at the recent (December 93 to January 94) Second World Congress of Herpetology.

#### References;

Fyfe, G., 1980. The effect of fire on lizard communities in Central Australia. *Herpetofauna (Australia)*, 12 (1), pp 1-9.

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#### Galapagos Fire!

One of the islands in the Galapagos archipelago, Isabela Island, has been hit by near uncontrollable bush fires, prompting grave concern for the giant tortoise population. A number of these unique creatures are known to have already been killed by the fires, though rescue and fire-fighting attempts were set into action as promptly as possible.

The fire on the island was reputedly less than six miles south of the Sierra Negra volcano, a known nesting site. A message sent out on the computer modem network "Internet" stated that rescuers were attempting to evacuate tortoises from the island to ships awaiting offshore. Once the fires had been extinguished the tortoises could be returned.

If anyone has any further details, including how long the fires raged for, how many tortoises perished and how many were eventually rescued, which organisations were involved, etc., please let me know as I would like to publish more concise details.

Kevin J. Hingley - Editor.