





# Putting the on **sting** feral bees

Feral bees can displace native bee species, reduce pollination of native wildflowers, lead to an increased risk of diseases affecting commercial beekeeping and take over tree hollows from threatened black-cockatoos and other native animals. New research offers hope for their control.

by Jacqueline Hay and  
Mary-Anne Clunies-Ross

Australia has a very high proportion of species found nowhere else on the planet (known as endemism), resulting from millions of years of isolation from other continents. South-western Australia is an area of particular significance and has been recognised globally as one of 34 biodiversity hotspots. It is the only area in Australia to be recognised in this way.

Biodiversity hotspots are biologically significant ecosystems that have high levels of natural diversity (large numbers of native and endemic species of plants and animals), coupled with a high degree of threat to that diversity. Threats to biodiversity in the south-west include land clearing, climate change (see pages 54–61), altered fire regimes, salinity, plant pathogens such as *Phytophthora cinnamomi* and introduced animals and weeds (see pages 39–43). According to the World Conservation Union (IUCN), introduced animals are, after land clearing, the second most significant threat to native and endemic species.



### Another feral menace

Feral animals—introduced animals living in a wild or untamed state—are generally escaped domesticated animals that have become wild, such as rabbits and pigs, or other animals such as foxes and cane toads. They have the capacity to reduce biodiversity through predation of native species, aiding in

*Previous page*

**Main** A feral bee feeds on nectar.  
*Photo – Wade Hughes/Lochman Transparencies*

**Inset** Feral honeybees swarming.  
*Photo – Jiri Lochman*

**Left** Feral beehive at Stockyard Gully Reserve on the Turquoise Coast.  
*Photo – Ann Storrie*

**Below** Feral honeybee.  
*Photo – Babs and Bert Wells/DEC*

the spread and establishment of weeds, and by competing for food and nesting sites. However, another animal—an insect—is now also having a detrimental impact on WA's biodiversity.

The European honeybee or feral bee was introduced to WA in the 1840s for the production of honey, wax and to assist in pollinating crops. By the 1930s, honey production had increased dramatically because improved transport had enabled apiarists to travel throughout the State following seasonal flowering cycles or nectar flows. However, due to the natural ability of honeybees to swarm or abscond, unmanaged feral colonies are now widespread and exist in almost every part of WA that gets reliable rainfall, or is close to permanent water sources.

### Swarming and absconding

Reproduction by swarming involves division of the colony, where the majority of the workers, together with the new or old queen, leave the hive to search for a new home. Absconding, which is slightly different, involves a colony abandoning its nest as a result of disturbance or a lack of food and water. To abscond, the colony forms a swarm that includes all workers and all viable adult queens, which then locates an appropriate nest space and reestablishes itself.

Swarms generally become established in suitable tree hollows, although they may choose to live in nest boxes and in buildings. Feral bees are also known to establish colonies underground and in caves. Colonies are classed as feral when people no longer manage them.



**Right** Native bee on everlasting.

**Below right** Native beehive.  
Photos – Babs and Bert Wells/DEC

### Feral versus managed bees

Feral and managed bees are the same species, but differ in their appearance and behaviour. Feral bees are generally darker in colour and are essentially wild and unrestrained honeybees. Differences in behaviour between feral and controlled bees are a consequence of circumstances and lifestyle.

Managed bees are always provided with water and are regularly moved into new areas that have rich supplies of nectar and pollen. In contrast, feral bees may live in areas where food and water are scarce at certain times of the year, leading to more aggressive behaviour and an increased tendency to swarm. Feral bees are usually considered a nuisance during hot weather when water sources have dried up and large numbers of bees will often exploit artificial sources of water, such as taps, sprinklers and stock watering troughs. Feral bees can also become a problem when there is little or no nectar and pollen available from native flowering plants, causing them to search for alternative foods such as stock feed.

Feral colonies are commonly weaker and smaller than those of managed bees. Because their hives are not actively managed by people and cleared of honey on a regular basis, they lack the desire of managed bees to store honey. The poor quality and production of honey from feral colonies makes them of little value to commercial honey producers.

Feral bees also represent a considerable risk to the commercial beekeeping industry: should an exotic disease or hive parasite that affects honeybees be introduced to WA the existence of feral colonies would enable it to spread more easily.

### Native species versus the invaders

Australian plants, and their native insect and bird pollinators, have evolved largely in the absence of social bees and may therefore be vulnerable to pressures from feral bees.



The pollination of a flower occurs when pollen is transferred from the anthers to the stigma. Due to their size and foraging behaviour, feral bees are not as efficient as native bee species at pollinating some flowers. In fact, they may destroy some Australian native flowers, and harvest nectar without pollinating the flower at all, causing no seed to be set.

Observations of honeybees harvesting nectar of bottlebrushes (*Callistemon* species) have shown that honeybees only contact the stigma on about 4 per cent of visits, whereas native birds such as honeyeaters contact

the stigma on more than 50 per cent of visits (based on more than 8000 visits). Furthermore, a honeybee visiting a native flower may remove pollen that has been deposited on the stigma by a preceding native pollinator, so the flower may not be pollinated and seed set will not occur.

In contrast, feral bees can be excellent pollinators of exotic or introduced flowering plants and therefore aid in the spread or establishment of undesirable weeds.

Feral bees are highly efficient foragers, capable of harvesting more than 80 per cent of the available nectar stocks in some



**Above** Forest red-tailed black-cockatoo nesting in a tree hollow.  
 Photo – Tony Kirkby



**Left** Honeycomb of the feral European honeybee.  
 Photo – Sallyanne Cousans

### Tree hollows—a valuable resource

A particular concern is the disturbing rate at which feral bees are taking over hollows in trees and evicting native birds and mammals that depend on hollows for nesting space, shelter and protection. The larger tree hollows take an average of 250 years to form, and are thus an extremely valuable resource in the south-west. The ongoing loss of tree hollows represents a huge risk to obligate hollow nesters (animals that will only nest in the hollows of live or dead standing trees) such as brushtail possums, parrots, owls and many other birds and reptiles. The risks to WA's three species of black-cockatoos are severe, as they are particularly susceptible to the ongoing loss of nesting hollows. Black-cockatoos are obligate nesters that are long-lived, slow to mature, require relatively large hollows and have a low annual reproductive output.

### Threatened black-cockatoos

The Water Corporation and the WA Museum have established a joint conservation program known as Cockatoo Care (see 'Cockatoos in crisis', *LANDSCOPE*, Summer 2005–2006). The objectives of the Cockatoo Care program are to research the distribution, ecology and threats to the survival of each of these black-cockatoos as well as undertake habitat enhancement, feral bee research and community awareness and involvement.

Research by the WA Museum showed that, over a five-year period, feral bees took over an average of 20 per cent of nesting hollows used by forest red-tailed black-cockatoos (*Calyptorhynchus banksii naso*), Carnaby's cockatoos (*Calyptorhynchus latirostris*) and Baudin's cockatoos (*Calyptorhynchus baudinii*), all of which are threatened. All three species are endemic to the south-west and the loss of nesting hollows could significantly reduce their distribution and numbers, threatening them with possible extinction.

### Developing a feral bee control strategy

Currently, the control of feral bees is done on a hive-by-hive basis. This is costly, time consuming and cannot be

plants. This presents enormous potential for adverse interactions and may result in a competitive displacement of native pollinators from native wildflowers. Feral bees also compete with managed bees for floral resources, which could lead to reduced commercial honey yields.

**Right** Commercial beehives at Beekeepers Nature Reserve.  
Photo – Ann Storrie

**Below right** Feral honeybee.  
Photo – Babs and Bert Wells/DEC



undertaken on a wide scale. Research recently developed in New Zealand has examined a range of techniques capable of controlling feral bees.

In New Zealand, researchers have developed specially-designed bait stations, containing sugar syrup mixed with a small amount of pesticide. The pesticide is a slow-acting poison, capable of killing bees through both contact and ingestion. Feral bees visit the bait stations, take up the solution, return home and deliver the pesticide to the hive.

Results of the New Zealand study demonstrate that the method is effective, with bees attracted to baits promptly and in large numbers. It is estimated that if approximately 10 per cent of the bees in a colony visit a bait station and consume the poison, the entire colony will die. Although the results of the New Zealand study are promising, additional research is required to develop a safe and efficient control method that is appropriate for use in the Western Australian environment.

As a result, the Department of Environment and Conservation (DEC) has joined forces with the Water Corporation to conduct important research into the development of procedures to control feral bees in WA. The main aim of the strategy is to reduce feral bee populations in areas where they are having a negative impact on native plants and animals, particularly black-cockatoos, and on visitor safety at high-value recreation sites.

### Research and baiting trials

Researchers will investigate the ecology of feral honeybees and how their behaviour is influenced by specific environmental conditions that may affect the development of procedures for their control. They will also try to ascertain if this control program

poses any risks to native animals and determine how to reduce these risks to acceptable levels.

The study will examine the most effective method to attract bees, the average size and strength of a feral colony and the number of colonies or bees that visit particular bait stations. It will need to establish the volume of bait that is required and consumed by feral bees. It will also attempt to determine the distances travelled by feral bees to

a bait station and hence the density of bait stations needed to treat a specific area. Finally, it will investigate how long it will take to kill feral bee hives in a specific area and how often hives or areas will need to be treated to keep them free from feral bees.

So far, trials have revealed a number of substances capable of attracting very large numbers of feral bees to bait stations. Preliminary trials have also demonstrated that remote bait stations

### Interesting facts

European honeybees have a highly developed social structure, with three main types of colony members: workers, drones and a queen. The queen bee is responsible for laying thousands of eggs per day, and is also capable of commanding colony members to perform specific tasks by releasing specific chemical messages known as pheromones. Drones are male bees that serve only one purpose—mating with the queen—while workers are responsible for a wide variety of tasks including feeding the queen and drones, defending or protecting the queen, and collecting floral resources such as nectar and pollen.





**Left** A native blue-banded bee feeds on nectar from a eucalypt flower.  
*Photo – Jiri Lochman*

**Below** DEC's feral bee project officer Jacqueline Hay conducting field trials.  
*Photo – Gareth Watkins*

do not appear to pose a significant threat to non-target species, such as insects and birds, through primary poisoning. The concentration of pesticide proposed for use is extremely low and poses minimal risk to larger animals if consumed. However, bait stations will be designed to exclude birds and mammals from consuming the bait.

While baiting cannot discriminate between the feral bee and the non-target commercial honeybee, DEC manages beekeeper access to all public land through the *Conservation and Land Management Act 1984* and *Standard Apiary Site Conditions*.

Apiary site permits are granted by DEC to apiarists who agree to abide by stringent environmental conditions that, when followed, ensure compliance with the department's management for dieback control and fire prevention, and reduce the risk of bees swarming. Permit holders must contact their relevant DEC district apiary site officer prior to placing or removing beehives within their permit area. Effective management of these sites by DEC will allow segregation between managed bees and those feral bees being targeted in control programs. DEC will also work in consultation with the beekeeping

industry to further eliminate risks to commercial bees, or reduce them to an acceptable level.

A standard operating procedures manual will be developed as part of this strategy, to address the rules and regulations that apply to the use of pesticides in Public Drinking Water Source Areas and occupational, health and safety guidelines.

It is hoped that the research will result in a safe and efficient method of controlling feral bees in WA. Feral bee control aims to preserve a more sustainable source of nectar and pollen for the beekeeping industry and minimise any impacts from a potential outbreak of disease.

If we can control feral bees we can lessen the threat to the survival of our unique black-cockatoos, and improve biodiversity values in the south-west by reducing the pressures faced by all of our native species, from the wildflowers and native insects to larger animals such as birds and possums.



Jacqueline Hay is the feral bee project officer with DEC's Species and Communities Branch at Kensington. If you would like to report the location of a feral beehive on public lands such as parks and reserves, contact Jacqueline on (08) 9423 0103 or by email ([jacqueline.hay@dec.wa.gov.au](mailto:jacqueline.hay@dec.wa.gov.au)). A GPS coordinate would be helpful, although specific details of the location would suffice.

Mary-Anne Clunies-Ross is the Cockatoo Care Coordinator at the Water Corporation in Leederville. She can be contacted on (08) 9420 2796 or by email ([mary-anne.clunies-ross@watercorporation.com.au](mailto:mary-anne.clunies-ross@watercorporation.com.au)).

- 51 Fiery learning  
Teachers and students can now find out more about the importance of fire to biodiversity.
- 54 Climate change and biodiversity  
How is the growing threat from climate change likely to impact on the diversity of WA's plants and animals?

## Regulars

- 3 Contributors and Editor's letter
- 9 Bookmarks  
*The Buccaneer's Bell*  
*Gascoyne Murchison Outback Pathways*  
*The Kimberley*
- 17 Endangered  
Burrowing crayfish
- 18 Feature park  
'Mundaring National Park'
- 62 Urban Antics  
Sandgropers

### Publishing credits

**Executive editor** Kaye Verboon.

**Editors** Carolyn Thomson-Dans, Rhianna King.

### Scientific/technical advice

Kevin Kenneally, Paul Jones, Keith Morris.

**Design and production** David Abel, Maria Duthie, Natalie Jolakoski, Tiffany Taylor, Gooitzen van der Meer.

**Illustration** Gooitzen van der Meer.

**Cartography** Promaco Geodraft.

**Marketing** Estelle de San Miguel.

Phone (08) 9334 0296 Fax (08) 9334 0432.

### Subscription enquiries

Phone (08) 9334 0481 or (08) 9334 0437.

**Prepress and printing** Advance Press, Western Australia.

© ISSN 0815 4465

*All material copyright. No part of the contents of the publication may be reproduced without the consent of the publishers.*

Please do not send unsolicited material, but feel free to contact the editors.

Visit NatureBase at [www.naturebase.net](http://www.naturebase.net)

Published by the Department of Environment and Conservation, 17 Dick Perry Avenue, Kensington, Western Australia.



Department of Environment and Conservation

