

Desert eagles: wedge-tailed eagles at Lorna Glen

Introduced predators are not the only threat to native mammals being reintroduced into their former habitats as part of conservation efforts: native predators such as wedge-tailed eagles also prey on the newly released animals. Studies in the arid rangelands region are examining the relationship between these majestic birds of prey and reintroduced species.



by Simon Cherriman

In 2010 the then Department of Environment and Conservation began reintroducing several species of threatened mammal into a 1,100-hectare fenced enclosure at Lorna Glen proposed conservation park. The aim was to provide a safe haven, free from wild dogs and feral cats, for threatened wildlife so they could build up sufficient numbers to help recolonise the broader landscape of the rangelands region. But introduced mammals are not the only predators which pose a threat to their survival. Our largest avian predator, the wedge-tailed eagle (*Aquila audax*), is also known to feed on medium-sized mammals. An investigation into eagle ecology has provided some interesting findings on this species at Lorna Glen.

Restoring mammal fauna

Lorna Glen is a 240,000-hectare former pastoral lease property situated across the boundary of Western Australia's Gascoyne and Murchison



biogeographic regions. The property was purchased by the state government in 2000 for conservation and is jointly managed by its traditional owners the Martu people, and the Department of Parks and Wildlife (see 'Into the wild: restoring rangelands fauna', *LANDSCOPE*, Winter 2009). Initially, the project focused on fauna reintroductions following intensive control of introduced predators, particularly cats (*Felis catus*). The reintroductions were largely successful for the common brushtail possum (*Trichosurus vulpecula*) and bilby (*Macrotis lagotis*), which have now established at Lorna Glen. However, predator-

vulnerable species such as rufous hare-wallaby, or mala (*Lagorchestes hirsutus*) did not survive trial translocations in 2008, and the decision was made to construct the fenced enclosure, intended as a 'soft-release' pen—a breeding enclosure for animals before they are released into the wider Lorna Glen habitat. Golden bandicoots (*Isodon auratus*) and boodies (*Bettongia lesueur*) were released into the enclosure in 2010, followed by rufous hare-wallaby and Shark Bay mice (*Pseudomys fieldi*) in 2011, and these have been breeding successfully since.

Some of the initial reintroductions were threatened or failed for a number of reasons, including predation by feral cats and wild dogs, failure to find sufficient food, exposure following wet and cold periods, and predation by birds of prey. The initial translocation of rufous hare-wallaby in 2008 was not successful, primarily due to cat predation and starvation, and early observations of a second release inside the enclosure in 2011 indicated raptors may have had some impact on the survival of founder animals. Even though rufous hare-wallaby were translocated from Trimouille Island where they were known to be predated by white-bellied sea eagles (*Haliaeetus leucogaster*), they were still observed to rest during the day in locations with limited cover, making them easy pickings for local raptors. Department staff had recovered rufous hare-wallaby and boodie carcasses with fur meticulously plucked and entrails removed, suggesting raptors were responsible. But which species were the culprits?



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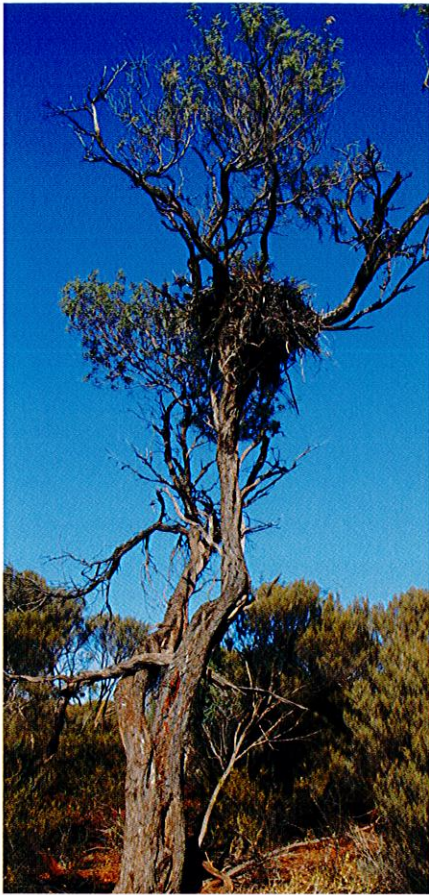
Main Wedge-tailed eagles make their nests from a high vantage point to survey the surrounding landscape.

Photo - Simon Cherriman

Inset Simon Cherriman fitting a GPS backpack to a wedge-tailed eagle chick.

Left Lorna Glen is a former pastoral lease now managed for conservation.

Photos - Judy Dunlop



Wedge-tailed eagles

Although wedge-tailed eagles had often been observed at Lorna Glen, especially in the vicinity of the fenced enclosure, and a couple of old nests had been found, little was known of the species' ecology. Were they permanent residents or just occasional visitors? How many eagles were present? Did they prey on reintroduced mammals? What other animals might they eat in this arid landscape?

Given their size, wedge-tails were certainly capable of taking medium to large reintroduced mammals, and had been documented doing so at other conservation reserves including Dryandra Woodland near Narrogin and Karakamia Wildlife Sanctuary in the Perth hills. But the extent to which this occurred at Lorna Glen was unknown. Given that eagles are an important native component of rangelands ecosystems, any information on their biology would be very useful in the context of the mammal reintroductions. Therefore, research into their ecology began in late 2011, with the aim of answering such questions and painting a more detailed picture of eagles at Lorna Glen.

The search begins

Like many birds of prey, eagles are known to form long-term breeding pairs which occupy permanent territories. As long as the environment provides enough food and contains trees suitable as nest sites, eagles can establish these territories in a variety of habitats. While pairs may be observed perched in tall trees early in the morning, they spend much of their day soaring high on thermals and are not easy to locate or observe. Therefore, the best place to start a landscape-scale study is by searching for their nests.

Although locating a nest among a quarter of a million hectares of mulga scrub may seem like a needle-in-a-haystack task, wedge-tails build very large stick structures, usually placed in sturdy forks of tall trees, making them quite conspicuous, even from several kilometres away. Nest searching is best conducted by finding a prominent viewing point from which to survey the surrounding plains, and scanning with binoculars. This can be done from the top of hills or breakaways, the roof of a vehicle (being sure to

Above left Tall gidgee trees are the preferred nest site for wedge-tailed eagles at Lorna Glen.

Above These eaglets are only a few days old and have a great view over the mulga plains.

Photos – Simon Cherriman

remain safe), or sometimes from tall trees. In this way, large tracts of land can be surveyed systematically.

Once an eagle nest has been spotted, a GPS unit can be used to record a compass bearing and project an approximate site location of the nest, provided the observer can estimate its distance. Then, using a vehicle to access the nearest point via road, the nest is approached on foot and its exact location recorded. Other information is also gathered, including the nest tree species, nest height and whether the nest is being used. Additionally, the area in close proximity to the nest site is searched for prey remains such as bones, fur and feathers left by eagles after feeding. Prey remains and pellets (indigestible material regurgitated by eagles) are collected and placed into bags for later identification and analysis in the laboratory.



Left An adult wedge-tailed eagle launches from its massive nest at Lorna Glen.
Photo – Simon Cherriman

Below left DPaW's Neil Hamilton with a captured wedge-tailed eagle.
Photo – Gill Basnett

Bottom left A track cuts through the scrub at Lorna Glen.
Photo – Simon Cherriman

Many nests

Surveys for eagle nests have been conducted during several field trips to Lorna Glen since October 2011, the most comprehensive of which occurred in August 2012 during the breeding season. As we became more familiar with the landscape, we were able to predict new sites to focus our searches, with some confidence that nests would be found. It was very exciting to visit a previously unsearched area, and shortly after, spot a new nest and watch a huge female wedge-tail launch into the air, confirming the nest's occupancy.

Fifty-eight nests were located around Lorna Glen, and a strong pattern emerged regarding their locations. It is known that eagles show preference for a prominent nest site, enabling them to see prey from a long distance and remain vigilant to any would-be predators. All but two nests found were built in gidgee (*Acacia pruinocarpa*) trees, a species which prefers stony soil and often occurs on higher ground. Gidgee trees are much taller than nearby trees and shrubs and, due to their preference for rocky slopes, they are the most abundant suitable tree that offers a view over the surrounding landscape. Interestingly, no eagle nests were located in river red gums (*Eucalyptus camaldulensis*), which form tall belts lining drainage lines in the low-lying areas. Also, despite significant searching, no nests were found in areas composed of spinifex with taller marble gums (*E. gongylocarpa*). The absence of eagle territories in these two habitats suggests that abundance of suitably sized prey is too low here, as the tall trees would provide ample nest sites. Perhaps the presence of several other raptors in these areas, such

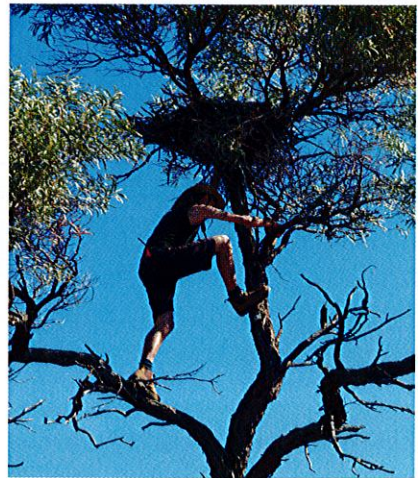




Above Simon and DPaW's Neil Hamilton collecting prey remains.
 Photo - Gill Basnett



Above right Crested pigeons are often eaten by wedge-tailed eagles in arid Australia.
 Photo - Simon Cherriman



Right Inspecting a wedge-tailed eagle nest.
 Photo - Gill Basnett

as black-breasted buzzards (*Hamirostra melanosternon*) and whistling kites (*Haliastur sphenurus*), whose nests are especially common along drainage lines, also acts as a deterrent.

Finding such a large number of eagle nests at Lorna Glen was a pleasing result. This confirmed that wedge-tailed eagles were breeding residents. In addition, the age of many nests indicated the population had been present for many years; some nests were almost certainly decades old. Nests were usually found to occur in clusters, with each cluster representing one territory belonging to an adult pair of eagles. During the breeding season, most territories were found to be occupied. This was confirmed by the presence of one active nest in each territory, lined with fresh leaves, or containing eggs or chicks, together with the observation of adult birds nearby.

The spacing of many territories was surprisingly uniform in some parts of the property, with simultaneous active nests occurring about five kilometres apart. This pattern became clearer when approximate territory boundaries were plotted on a map. Such spacing might

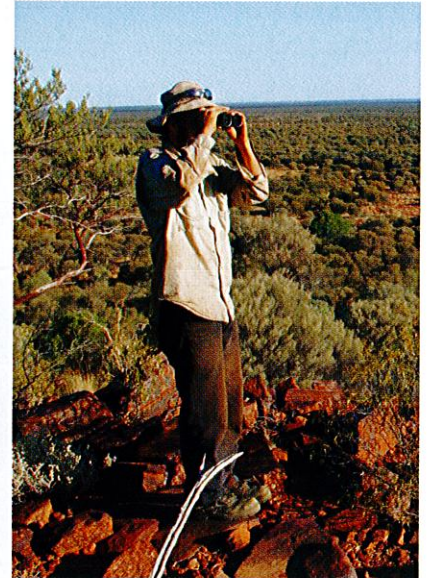
be explained by eagle territoriality. In a fairly flat landscape, neighbouring pairs will tolerate each other as long as they remain a certain distance from each other's nests.

Varied diet

Large quantities of prey remains, mostly in the form of bones, were collected from nests across the landscape. More than 900 individual prey fragments were analysed. These were compared with skeletal material from a reference collection in order to identify which animals the wedge-tailed eagles had preyed upon. The most frequently eaten animals at Lorna Glen were the pouch young of macropods

(either red kangaroos, *Macropus rufus*, or euros, *M. robustus*), and large goannas such as the yellow-spotted monitor (*Varanus panoptes*). Many birds occurred in the eagles' diet too, including the Australian bustard (*Ardeotis australis*), emu (*Dromaius novaehollandiae*) chicks, crested pigeon (*Ocyphaps lophotes*) and galah (*Eolophus roseicapillus*). Smaller reptiles such as the centralian bluetongue (*Tiliqua multifasciata*) and thorny devil (*Moloch horridus*) were also eaten.

Several threatened mammals were recorded in the diet of one eagle pair.



Above left Euros provide a reliable food source for wedge-tailed eagles.

Above Eagle nests can be located by scanning the mulga plains with binoculars from a prominent location.

Left An assortment of prey fragments collected from a wedge-tailed eagle nest in the breeding season.

Photos - Simon Cherriman

This was not surprising, as their nest was situated only a kilometre from the fenced enclosure. Remains from this nest suggested the birds had eaten one boodie, one rufous hare-wallaby and at least four golden bandicoots. The exact identity of the rufous hare-wallaby was able to be confirmed because this animal had been marked with a microchip which, amazingly, was extracted from within a regurgitated eagle pellet. The eagle must have swallowed the microchip while tearing flesh from the wallaby's body. This example demonstrates how wildlife forensics can be used to form clear pictures of ecological relationships. We can imagine an adult grasping this mammal with iron-gripping talons,

carrying it to its nest and feeding it to a developing nestling.

The only other record of a reintroduced mammal came in the form of a bilby skull, recovered from an eagle nest relatively near the centre of the property. Bilbies have successfully spread throughout the landscape at Lorna Glen and their diggings were frequently observed during eagle nest surveys. While the presence of threatened mammal remains at nests does not prove beyond doubt they were killed by eagles, preference for 'portable' live prey during nesting suggests this is most likely the case.

As well as threatened mammals, wedge-tail eagles were found to prey upon introduced animals

including numerous European rabbits (*Oryctolagus cuniculus*), both near the pen and across the broader landscape. The bones and fur of two feral cats were also identified from two separate nests, showing the eagles are performing useful tasks by helping control these pests.

Relating food to nesting

One of the most interesting finds of the study so far is that only one pair of wedge-tails at Lorna Glen successfully reared young. This was the same pair whose territory largely overlaps with the fenced enclosure where native mammals such as boodies and golden bandicoots are increasing in abundance. Such an abundant native food source, complemented by other vertebrates from outside the pen such as birds and reptiles, enabled the eagles to catch enough prey to supply their chick with plenty of food, and therefore fledge successfully.



Above Surveying an eagle's nest at Lorna Glen.

Photo – Simon Cherriman

All other nesting pairs, despite their breeding attempts, occurred in areas where the landscape is not yet productive enough to support successful eagle breeding. When Lorna Glen was managed as a pastoral lease, numerous bores throughout the property supplied permanent water and probably enabled macropods and rabbits to breed continuously. This provided eagles with a reliable food source but, together with other landscape changes, meant that their diet became simplified and relied heavily on rabbits and on kangaroos, a native species but one whose population had increased well beyond natural levels.

When management shifted to conservation, the bores were turned off in order to re-establish natural conditions. The declines in rabbits and kangaroos which followed probably reduced the eagles' capacity to breed in the short term, but the shift in eagle diet observed at the pen is a

good indicator that eagles can readapt to consume native food and breed successfully.

We know from previous research by CSIRO in the 1970s that adult wedge-tail pairs demonstrate a strong attachment to their territory, and will remain there permanently, either not attempting to breed in years of drought, or nesting unsuccessfully in marginal years. This information comes from a study conducted in an area where the eagles' diet consisted almost entirely of one prey animal, the rabbit, whose abundance was linked directly to annual rainfall. In such a simplified ecosystem (where native mammals are largely extinct), the eagles' breeding success is strongly linked to introduced rabbits. Lorna Glen was probably once very similar to this; however, the gradual shift in ecosystem composition from one or two introduced mammals to several natives has the potential to provide eagles with a varied food source, and perhaps help them breed more successfully. Time will tell and ongoing research is needed to detect any trends.

After the first year of this study, a great deal of information has been

gathered on wedge-tailed eagles at Lorna Glen. Known nest sites can now be visited during the breeding season to monitor their use, and the eagles' breeding success and diet over time. It will be fascinating to determine whether, as reintroduced mammals recolonise Lorna Glen, they are taken as food more commonly, restoring native predator-prey relationships in this arid landscape.

Simon Cherriman has researched, filmed and photographed wedge-tailed eagles for nearly 15 years. His small business, Insight Ornithology, specialises in bird research, photography and education, and aims to inform and inspire others about the Australian natural environment. Simon can be contacted by email (aquila84@inet.net.au).

The author would like to thank those who helped with the nest-searching component of the research at Lorna Glen, often in very hot conditions: Gill Basnett, Jeff Turpin, Michael McDonnell and Daniel Hunter. Keith and Rhonda Skelly, Tony Woods and Rowena Connolly provided logistical support, and Judy Dunlop provided useful comments on the article.

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Publishing credits

Executive editor Zoran Jovanovic.

Editors Samille Mitchell, Joanna Adele.

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Design and production Lynne Whittle, Gooitzen van der Meer, Peter Nicholas, Tiffany Taylor.

Illustration Gooitzen van der Meer.

Cartography Promaco Geodraft.

Marketing Cathy Birch.

Phone (08) 9334 0296 or fax (08) 9334 0432.

Subscription enquiries

Phone (08) 9219 8000.

Prepress and printing Advance Press, Western Australia.

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August 2013

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ISSN 0815-4465

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

Published by the Department of Parks and Wildlife (DPaW), 17 Dick Perry Avenue, Kensington, Western Australia.

Visit DPaW online at www.dpaw.wa.gov.au.



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