

SAVING THE SPOTTED-TAILED QUOLL

A LANDHOLDER'S GUIDE





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About this guide

This guide provides landholders, natural resource managers and the public with advice about the spotted-tailed quoll (*Dasyurus maculatus*) – mainland Australia's largest carnivorous marsupial.

Australia's four native quoll species were among the first mammals noticed by European naturalists, who called them 'native cats'. Unlike cats, quolls are vital apex predators in Australian ecosystems.

Fewer than 10,000 spotted-tailed quolls now remain in the wild, and the species is endangered on the mainland.

While the problems and solutions advised in this guide are based on current research, we recognise there is much to learn about these secretive marsupials. As a result, there is also much you can do to prevent further decline in quoll populations or distribution.

We hope this guide inspires you to watch out for quolls and report any sightings.

More importantly, we hope it helps you manage vegetation and agricultural production in ways that will enhance biodiversity and help secure a future for these feisty endangered marsupials.



SAVING THE... SPOTTED-TAILED QUOLL

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As its name implies, the spotted-tailed quoll (right) is the only quoll species to have a spotted tail. It is also the most robust. At 4–7 kg, males weigh more than double the average western or eastern quoll, and many times the weight of the tiny northern quoll.

The spotted-tailed quoll is patchily distributed along Queensland's coast – from the Atherton Tablelands to the Daintree in the north, and in regions of South East Queensland. It also occurs in eastern New South Wales, Victoria and Tasmania, where a stockier type has been isolated from mainland populations for 13,000 years.

*Australia's four
quoll species have
all declined
drastically since
1788.*



THE PROBLEM

Spotted-tailed quolls, or 'tiger quolls', are so shy and so infrequently seen in Queensland that it is difficult for researchers and conservationists to estimate how many individuals remain. In many parts of their former range, sightings have not been reported for years.

Spotted-tailed quolls are fawn to rufous in colour, with uneven white spots from the shoulder to the tail, and a pale to creamy face and underbelly. Females weigh just 2 kg on average – half the size of males.

YOU CAN HELP BY... REPORTING QUOLL SIGHTINGS



Breeding starts in late April. After 21 days' gestation, up to six tiny 'neonates' latch onto teats within a loose pouch on a female spotted-tailed quoll's belly (above). They suckle for eight weeks, after which they are left in a den. Juveniles disperse in midsummer, at 18 weeks of age, reaching sexual maturity at 12 months of age.

Spotted-tailed quolls superficially resemble cats, minks, or ferrets, but they are native marsupials that are unrelated to placental mammals.

The spotted-tailed quoll is cat-sized, but it has a more elongated body, shorter legs, and a long, tapering tail covered in irregular white spots.

Males occupy large home ranges of 300–1000+ ha, which overlap the smaller ranges of several females. Despite the overlap,

quolls are mostly solitary, coming together only to mate. While predominantly nocturnal, quolls are occasionally active by day.

Although quolls are nimble climbers, they prefer to shelter on the ground, moving every 1–4 days between up to nine den sites.



Quolls are fastidious, using regular latrine sites near dens. Scats (above) may contain fur, bone, feathers, and even beetle and cicada shells. Scats have a curly, rope-like appearance and a natural musky odour.

Quolls are occasionally seen basking outside their den sites by day in winter.

Dens, scats & tracks

Fallen logs, burrows and tree hollows make suitable dens, but rocky caves and crevices offer better protection and may be preferred. Most dens reveal scarce evidence of occupancy. Scats on rocks, or latrine sites ('poo piles') near caves, may indicate a quoll's presence.

Quoll tracks (below) show five toes, claws, and rounded pads on the forefeet, with striated pads for grip on the hind feet, which are usually longer than 5.5 cm.

Their musky, rope-like scats are not unlike fox scats, as their diets overlap. Quolls are thought to avoid areas where foxes are abundant. However, quolls' superior climbing ability enables them to carve out a 'vertical niche', dining on mammals in the treetops.

Catch them on camera

Setting up an infra-red or wildlife-survey camera along a creek or near a dam or waterhole may be your best hope of detecting a quoll's presence. If you do see a quoll, send a description of the sighting, the postcode, and your contact details to quoll@wildlife.org.au, and share any photos on our Facebook wall at www.facebook.com/QuollSeekersNetwork/

Listen to quoll noises at www.wildlife.org.au/spotted-tailed-quoll

THE SOLUTIONS...

- » Look for a spotted tail less bushy than a fox's.
- » Look for a bare pink nose and an elongated body.
- » Search for piles of 'twisty' droppings near rocks, caves or logs.
- » Identify five-toed tracks with longer back feet.
- » Calmly investigate disturbances in chook pens.

Vocalisations include low-pitched hisses, screeches, and a soft cp-cp-cp mums make to young.



THE PROBLEM

Quolls are forest-dependent. They rely on mature or old-growth forests with plenty of tree hollows, logs, canopy cover and complex vegetation.

Since European settlement, clearing for development and agriculture has reduced quoll habitats and contributed to a 50% to 90% decline in populations.

YOU CAN HELP BY... RETAINING HABITAT



Spotted-tailed quolls inhabit rainforest, vine forest, open and closed eucalypt forest, coastal heath and woodlands.

Destruction of habitat and shelter sites has played a large role in the decline of spotted-tailed quolls. Their habitat requirements include tree canopy cover and fallen logs for ease of movement, rocky dens or tree hollows that shelter prey mammals and birds, and access to clean water. Retaining these features increases the chance of saving endangered quolls.

As large, opportunistic 'hypercarnivores', spotted-tailed quolls must frequently patrol their territory to find enough

food to survive. They search hollows for gliders and birds by day, scavenge roadkilled wildlife at dusk, and hunt for rabbits, wallabies, bandicoots and possums by night.

In the absence of enough forest, heathland, or woodland to conceal prey, hungry quolls must travel further to hunt. This increases the risk of spotted-tailed quolls encountering poison baits, raiding chook pens, or coming into contact with invasive predators, vehicles or humans.



Add nest boxes

While revegetation is occurring, simple artificial nest boxes make good temporary homes for the hollow-dwelling possums, gliders and birds quolls prey on. Nest boxes are best placed high in eucalypts. Be sure not to disturb any nesting fauna; the less human contact, the better.



For tips on how to build a safe nest box, visit www.wildlife.org.au/how-to-build-a-nest-box

THE SOLUTIONS...

- » Protect old forest and trees that have hollows.
- » Leave fallen logs.
- » Don't clear more than what is needed for hazard reduction or weed control.
- » Revegetate with native trees that hollow out.
- » Place nest boxes in eucalypts.

Replace hollows

Tree hollows in eucalypts take at least 120 years to form. Hollows in introduced plantation trees, such as pines, are less suitable shelter because they attract a different mix of insects, birds and mammals at lower population densities.

To ensure stable populations of hollow-dependent wildlife in the future, we need to urgently replant native eucalypt species, such as blackbutt, box, tallowwood, manna gums, river red gums, and scribbly gums, which hollow with age.

Never chop up hollow logs for firewood or use them as garden edging. They are vital shelter and den sites for quolls.





THE PROBLEM

Roads, housing developments, and cleared pastoral land carve up quoll habitat into patches, which increases quolls' risk of vehicle strikes and predation by dogs, foxes and cats. Fragmentation also isolates individuals, forcing them to travel further to mate and putting spotted-tailed quoll populations in danger of inbreeding and extinction.

Roads that cut through forests can be fatal for wildlife, but they are also places where people come into contact with quolls, so be sure to report any sightings.

YOU CAN HELP BY... CREATING 'QUOLLIDORS'

Surviving just 3-5 years in the wild, spotted-tailed quolls have a limited time in which to mate and pass on their genes.

Loss of connectivity occurs when land is strictly fenced off, burned, or extensively cleared, forcing quolls to travel through open country where they face attack from dingoes, dogs, foxes, cats or humans.

Link-up leafy patches

Quolls move up to 19 km a week, traversing many habitats. Males are especially active during mating season, as females enter oestrus at any time from early Autumn, each mating with several males. Juveniles disperse in mid-January to find their own 300-1000+ ha range in which to hunt and mate.

Wildlife corridors (or 'quollidors'), which link suitable habitat, den sites, and shelter trees, give offspring a fighting chance to reach sexual maturity. If quolls cannot travel to mate, inbreeding may result in an 'extinction vortex' – having too few unrelated mating pairs to keep the species free of genetic defects or disease.

Along with creating new wildlife corridors, you can protect existing links between habitat by following best-practice fire regimes and reporting illegally lit blazes, removing and reporting weed species, staying alert for tree diseases such as myrtle rust, and revegetating creek lines.



Burn responsibly

Bushfires speed up hollow formation, but if they are too hot or too extensive, they catastrophically destroy vegetation and decimate native species. Old-growth forest, especially, may take many centuries to regenerate, and the floral and faunal species mix

may never be the same. Controlled, permitted hazard reduction in woodlands and forested habitats should take corridors into account. Burns must be legal, lit only on low fire danger days, and monitored to ensure hollows, corridors, and forests are safely preserved.

Suitable habitat takes centuries to form, but a single out-of-control fire can reduce it to ashes in minutes.

THE SOLUTIONS...

- » Leave vegetated corridors between habitats and create more corridors with native tree-planting programs.
- » Control burn only with permits, and monitor fire speed and intensity.
- » Manage invasive weeds and report any tree disease.



Quolls are so secretive they are rarely seen out in the open. Well-vegetated corridors connecting patches of dense forest, woodland, and heathland allow them safe passage.



THE PROBLEM

Invasive carnivores, such as the red fox, dogs, and cats (feral or domesticated) both compete with and prey upon spotted-tailed quolls. Another foreign invader that contributes to quoll mortality is the toxic cane toad, which poisons quolls that attempt to eat it. Measures designed to control invasive species may also accidentally harm quolls.

YOU CAN HELP BY... CONTROLLING FERALS

Feral dogs, cats and foxes bear much responsibility for the plight of spotted-tailed quolls and other medium-sized native mammals. These invasive species compete with quolls for prey and shelter, and prey on juvenile quolls.

Fight the feral invasion

Controlling feral species is an important part of land management and conservation in Australia. Exclusion fencing, shooting, and trapping can help you limit feral carnivore numbers.

While semi-feral urban cats may be trapped in wire 'treadle type' box traps, ferals and foxes often evade capture. Fox whistles, tuna oil, and feathers hung from bushes are effective attractants. All traps

should include alert systems to ensure animals are attended to quickly. Padded or offset laminated jawed traps may work where cats or foxes have been seen, but should be avoided if quolls are known to be present.

Quolls have some natural immunity to 1080 baits, but doses for dingoes and foxes must be carefully managed to avoid harming smaller female or juvenile quolls, and strychnine baits should never be used.

Only authorised persons can supply 1080 baits to permit-holders. For more information about poison baiting, contact your local council or Biosecurity Queensland on 13 25 23 or www.biosecurity.qld.gov.au.

Research has shown that feral rabbits are common prey for quolls, although foxes usually out-compete quolls for this food source.

Cane toads were introduced to Queensland in 1935 in an unsuccessful attempt to biologically control cane beetles.



Trap and remove toads

Toxin-secreting cane toads have become deadly pests across most of northern Australia. Prior to their introduction, Australia had no true *Bufo* toad species. Native frog-eating carnivores, such as juvenile spotted-tailed quolls and the northern quoll, are not adapted to consuming

toad poison and usually die if they eat toads. Toadimators® or traps with UV light lures can be used to trap toads, but follow humane disposal methods from www.environment.gov.au/biodiversity/invasive-species/publications/can001-methods-field-euthanasia-cane-toads.



Feral cats kill millions of native birds and mammals annually. Locking pets in at night prevents them from wandering, nocturnally hunting wildlife, or going feral.



THE SOLUTIONS...

- » Microchip and desex pets, and keep them locked in at night.
- » Control fox, feral cat, and wild dog populations by using humane baiting, trapping, or shooting.
- » Catch and humanely dispose of cane toads.

YOU CAN HELP BY... REDUCING HUMAN CONTACT

THE PROBLEM

Human interaction, intended or not, alters how native species behave and interact.

Spotted-tailed quolls are drawn to the scent of carrion, and their nocturnal activities may bring them into contact with cars. Hungry quolls might also raid chicken coops, become trapped in animal enclosures or be mistaken for cats, foxes or ferrets and shot.

As their habitat continues to shrink, spotted-tailed quolls are increasingly forced to coexist with one of the world's most prolific predatory mammals, and one that has already made related dasyurids extinct – us!

Educating yourself about the role quolls play as apex predators, and taking precautions on the roads and in securing your livestock and pets, will prevent negative interactions with quolls.

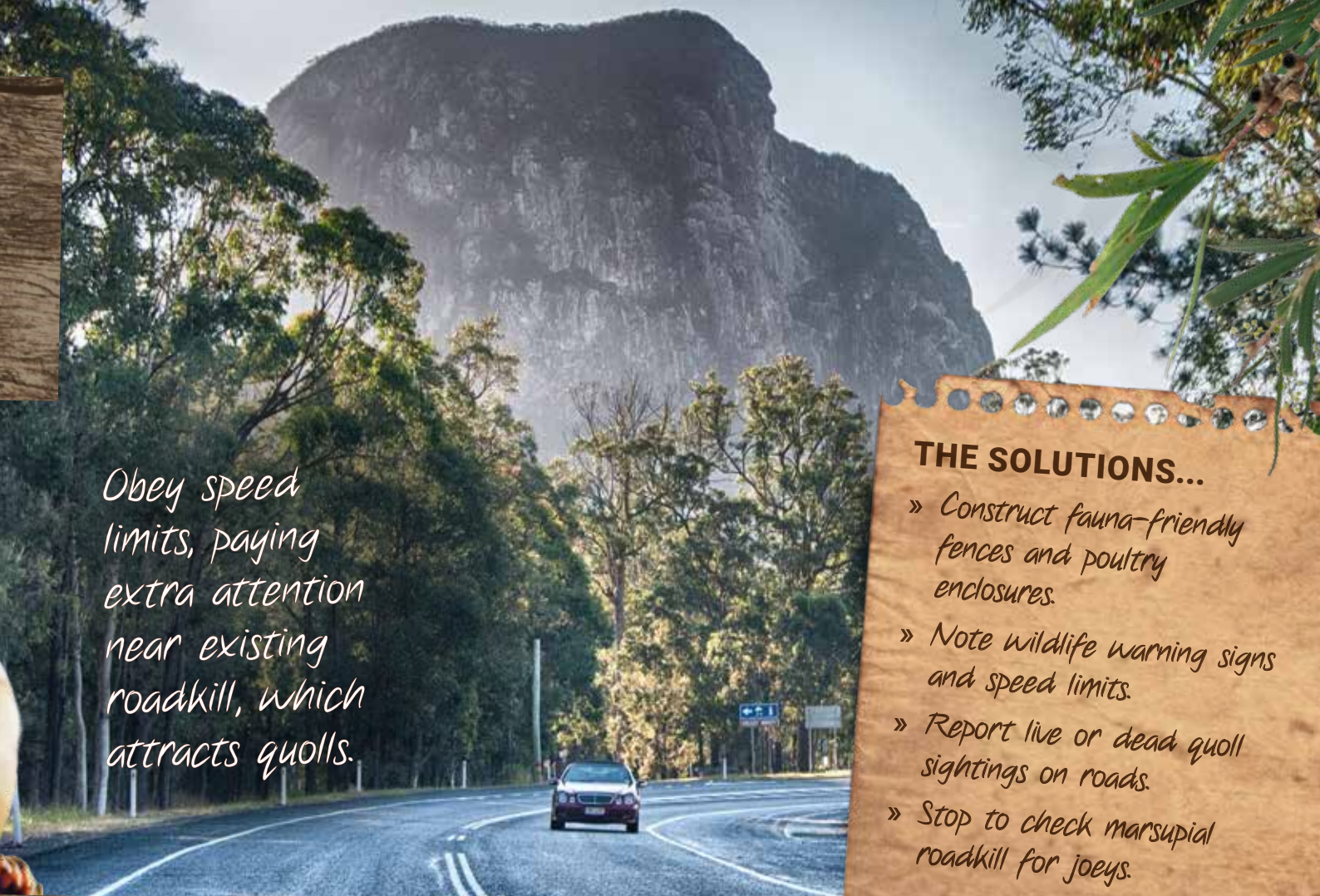


Quolls are known to scavenge carrion and roadkill and will also dig up and consume baits.



Predator-proof pens


Dietary studies show that mammals make up over 85% of a quoll's diet. Females and juveniles consume more invertebrates than males do, but reptiles and birds together comprise less than 3% of prey. Still, quolls may be lured by pet food, dog bones, compost, or the appeal of naive domestic fowl. Keeping livestock and pet food 'predator-proofed' deters quolls and encourages them to hunt mammals instead.



Obey speed limits, paying extra attention near existing roadkill, which attracts quolls.


THE SOLUTIONS...

- » Construct fauna-friendly fences and poultry enclosures.
- » Note wildlife warning signs and speed limits.
- » Report live or dead quoll sightings on roads.
- » Stop to check marsupial roadkill for joeys.



Quolls can bite through a single mesh layer, so add thicker or double-mesh walls that are buried at least 15 cm into the ground or in concrete. To build the secure pen shown at left, visit www.glenrac.org.au/admin/files/resources/1325643675_chook_house_fact_sheet_1.pdf

Secure pets and poultry



Attacks in hen houses are usually from foxes, but quolls have been trapped in chook runs and mistaken for cats, foxes or ferrets. Building sturdy chicken coops with concrete foundations, iron-clad roofs, and double-meshed walls that can't be dug under, chewed through, or climbed over prevents any accidental harm to endangered spotted-tailed quolls.

Fauna-friendly fencing

Entanglement in fencing or enclosures can also kill quolls. For general fencing purposes, avoid barbed or electrified wire and leave a 50 cm gap between the ground and the bottom rail or strand. Fences should be no higher than 1.2 m, and planting trees on either side will ease the passage of arboreal species like quolls and possums.

YOU CAN HELP BY... GETTING INVOLVED

Quolls are related to the Thylacine, which was hunted to extinction in the 1900s for eating poultry and livestock. Without urgent intervention and conservation measures, quolls may also go extinct in the wild within our lifetime.

Join land managers, zoologists, ecologists conservationists and volunteers who are already working together to monitor and survey spotted-tailed quoll populations across mainland Australia.

Camera surveys

Wildlife Queensland's Quoll Seekers Network places motion-sensor or infra-red cameras in areas where quolls are likely to be found.

Researchers can monitor quoll populations by setting up meat-based stations in front of camera traps (under permit).

Detection dogs

The use of wildlife detection dogs for locating the scats of cryptic Australian wildlife is gaining momentum and can reliably indicate the presence of spotted-tailed quolls.

If you have seen a quoll, we'd love to know. Send a description of the sighting, the postcode, and your contact details to quoll@wildlife.org.au

Below: Wildlife detection dogs Sparky and Lilly, from Carnarvon Canines, are highly trained to sniff out quoll scats in an area.





About the Quoll Seekers Network (QSN)

The Quoll Seekers Network was established in 2001 with the aim of becoming Queensland's central non-government body for collecting and disseminating information about quolls and their conservation. Since 2007, Wildlife Queensland's support of QSN has ensured ongoing data collection within the state and continued efforts to address the threats quolls face.

Working with landholders, natural resource managers, advocacy and government organisations, and the public, is a key component of Wildlife Queensland's communication and conservation strategies.

QSN welcomes those who wish to join the network, and membership is free. Email quoll@wildlife.org.au for a membership form and receive merchandise discounts and early notification of workshops and volunteer opportunities.

You can also support the work of Quoll Seekers Network through the adopt-a-quoll program (www.wildlife.org.au/shop/adoption/adopt-a-quoll/) or by purchasing quoll plush toys and posters from www.wildlife.org.au/shop.



Wildlife Queensland aims to advocate, protect and conserve Queensland's native terrestrial and marine animals and landscapes by educating and engaging communities, influencing decision-making, advancing solutions and connecting people and wildlife. www.wildlife.org.au

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