Yakka skink

Egernia rugosa

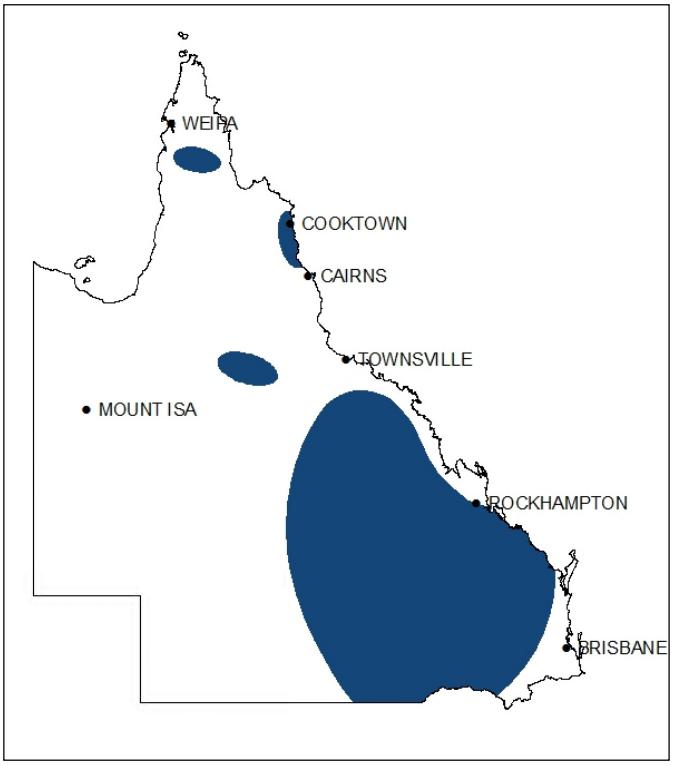
Vulnerable (*Nature Conservation Act 1992*) | Ecological Sciences, Queensland Herbarium


Photo by Dan Ferguson

Identification

Egernia rugosa is a large, robust skink (snout-vent length (SVL) from 90 to 300 mm and weight from 10 to 430 g; unpub. data) with a thick tail roughly as long as its body and short stocky legs. Adults have a broad, dark brown to almost black mid-dorsal stripe running from nape to base of the tail; individual scales within this mid-dorsal region may be variegated with paler shades of brown. Pale dorso-lateral stripes border the mid-dorsal stripe on each side. These are rarely absent. The flanks and sides of tail are most frequently mottled with various shades of brown, fawn, cream and orange-brown scales, although the flanks of some individuals can be more uniform. (Wilson and Swan 2013; Cogger 2014).

Juveniles tend to have more extensive variegated patterning of shades of orange-brown, cream and tan covering the flanks, tail and dorsal surface. The broad dark mid mid-dorsal and pale dorso-lateral stripes often found in adults are less distinct, being disrupted by pale cream or tan flecks or spots (whole scales or trailing edge of the scale). These pale flecks almost form pale bands in very young animals, particularly on the tail and flanks. As they age the adult patterning becomes more obvious with the broad dark mid-dorsal and pale dorso-lateral stripes first developing on the nape as the pale flecks and spots darken.Throats of adults and juveniles are white to cream or pale yellow with black spots and discontinuous reticulation along scale sutures. Throat pattern often much bolder in juveniles. Remaining ventral surfaces immaculate white to cream or pale yellowish orange. (Wilson and Swan 2013; Cogger 2014).



Scales in 26 to 30 rows at mid-body (Cogger 2014; DoE 2014) with > 3 (usually 4 or 5) obvious blunt keels on dorsal and caudal scales, the largest on the two mid-dorsal scale rows (Cogger 2014). These keels can be absent in juveniles, developing as they age (unpub. data). Two, usually 3 large ear lobules (Cogger 2014). The iris is orange-red to red-brown.

Distribution

Egernia rugosa is endemic to Queensland, although records close to the Queensland – New South Wales (NSW) border suggest it is also present in northern NSW (DoE 2014; Wilson and Swan 2013; WildNet 2014).

The core distribution of *E. rugosa* covers the Brigalow Belt (North and South) and much of the eastern half of the Mulga Lands (Eddie 2012), also extending into Southeast Queensland and Desert Uplands Biogeographic Regions (WildNet 2014). In northern Queensland the distribution is poorly known with scattered records in several locations, including in the Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographic Regions (DoE 2014; Wilson and Swan 2013; WildNet 2014).

Habitat

Macrohabitat

Egernia rugosa is known to occur in a broad range of open forest, woodland and low shrub land vegetation types, predominantly on firm but friable soils but are also known to occur less frequently in rocky environs (DoE 2014; WildNet 2014; unpub. data). Core habitat throughout the Brigalow Belt and Mulga Lands, where highest numbers have been detected so far (unpub. data), include the following broad vegetation types (Eddie 2012; DoE 2014; WildNet 2014; unpub. data):

- Poplar box (*Eucalyptus populnea*) woodland
- Mulga (*Acacia aneura*) woodland
- White cypress pine (*Callitris glaucophylla*); usually in association with eucalypt species such as *E. populnea, E. melanophloia* or *Corymbia tessellaris*
- Ironbark (typically *E. melanophloia*) woodland
- Disturbed, treated and cleared areas of suitable habitat, grazed or ungrazed, where suitable microhabitat features (see below) still remain

Within the Brigalow Belt and Mulga Lands *E. rugosa* has been recorded far less frequently from:

- Brigalow (*A. harpophylla*); usually where soils are conducive to tunnel erosion
- Bendee (*A. catenulata*)
- Belah (*Casuarina cristata*)
- Lancewood (*A. shirleyi*)
- Buloke (*Allocasuarina luehmannii*)

Habitat preferences in the north (Einasleigh Uplands, Wet Tropics and Cape York Peninsula Biogeographic Regions) are poorly known with *E. rugosa* highly likely to occur in a broader range of habitats than is currently known:

- Spotted gum (*C. citriodora*), granite ironbark (*E. granitica*), blotchy ironbark (*C. stockeri*) and *E. portuensis* open forest on granite hillslope (Mulder *et al.* 2014)
- Deciduous vine thicket – open forest/woodland ecotone (WildNet 2014)
- White's ironbark (*E. whitei*) (ALA 2014)

Microhabitat

Egernia rugosa colonies often occupy burrows and cavities under and around structures such as large logs, log piles, tree stumps, grass tussocks, and in some habitats partly buried rocks (TSN 2008; Eddie 2012). They also frequently modify tunnel erosion/sink holes, root cavities and abandoned animal burrows (e.g. rabbit warrens) (TSN 2008; Eddie 2012). In cleared, grazed or treated habitats, the species will persist where these shelter sites remain intact, making use of stick-raked timber piles and road construction spoil heaps. They can however occur in burrow systems without a structure, especially where grazing is absent or light where burrow destruction by trampling is minimised. *E. rugosa* are also known to inhabit areas in and around human structures such as sheds, houses, loading ramps and old building rubble piles. They will construct a burrow where there is suitable substrate (Eddie 2012).

Seasonal and timing considerations

While evidence of *E. rugosa* colonies can be detected at any time of year, detectability increases during the warmer, drier months of the year when activity levels at the burrow complex increase. The increase in activity begins with increased temperatures around mid-September to early October (Brigalow Belt and Mulga Lands) and is evidenced by burrow entrances, basking platforms and local paths/trails becoming obviously worn from use. Communal latrine sites will also be more detectible during these times.

Dense ground cover may obscure evidence of colonies, so where possible, surveys should be carried out during periods of reduced ground cover (i.e. spring and early summer). Heavy rainfall will also obscure evidence of the presence of *E. rugosa* colonies, washing away freshly excavated dirt and worn areas around burrows and degrading the integrity of scats in the communal latrine. Therefore it is recommended surveys for signs should be conducted at least two weeks after heavy rainfall. Conversely, the first sunny days following good rain are ideal times to conduct distant observation surveys of suitable microhabitat features and trapping of unconfirmed burrows, as *E. rugosa*, like many other reptiles, are often highly active in this period.

Recommended survey approach

The following survey techniques, undertaken by experienced observers (a demonstrated ability to detect evidence of *E. rugosa*), at appropriate times will confirm the presence of *E. rugosa* where there are large active colonies. Colonies with inherently low activity such as (1) burrows of individuals, (2) small, newly established groups or (3) colonies that have suffered recent mortality are more difficult to detect, even for highly experienced observers.

Standardised trapping techniques such as pitfall and funnel trap arrays and Elliott or cage trapping are not sufficient to detect the presence of *E. rugosa* in suitable habitat, unless the array is deployed within 3m of a colony (unpub. data); this is not a recommended practice, particularly with pitfall trapping.

Diurnal search

Searching for evidence of the presence of *E. rugosa* is the only reliable survey method as this species is especially wary and will rapidly retreat to shelter if they detect movement. Searching should focus on microhabitat features within the suitable macrohabitats listed above (BBR workshop 2010; DoE 2014). Observers are looking for indications of several things:

- Excavated soil mounded at burrow entrances that is either well-worn and compacted from activity, or is loose and recently excavated, often with visible tracks. Colonies usually have multiple burrow entrances around a structure or over a relatively small area.

- Very worn, compacted and/or polished basking areas, typically close to an area of retreat (e.g. burrow entrance, edge of log, top of a log near a hollow or crevice). These basking areas are usually exposed to sun mid-morning or, more frequently, the late afternoon.
- A communal latrine site. Large active colonies will usually have multiple latrines, typically within a few metres of a burrow entrance or shelter site (e.g. log), often with worn trails leading to them. Juveniles will sometimes have a separate latrine. Latrines can be in an open area or, more frequently, concealed under sticks, branches, grass tussocks or inside large hollow logs. Generally, latrines can be located by searching within a few metres of burrow entrances, looking for (1) high concentrations of scats in a small area indicating likely communal use and (2) worn trails or pathways leading away from burrows to these latrines. Note that latrines may not be evident at every colony, even very active ones.

Once suspected signs of *E. rugosa* activity have been detected, confirmation of their presence needs to be made as burrows and activity can be confused with many burrowing species including *Varanus* spp. (goanna) and *Pogona* spp. (bearded dragons) activity or other *Egernia* like species (e.g. *E. striolata, Liopholis modesta* and *E. stokesii*). Methods to confirm the presence of *E. rugosa* include:

- Location of a latrine with scats containing large bluntly keeled scales (> 3, usually 4 or 5 keels), as *E. rugosa* eat shed skin. Other *Egernia* species also use latrine sites (Chapple 2003), however, scales in the latrine with more than three large blunt keels are definitive of *E. rugosa*.
- By distant observation with binoculars or spotting scope, particularly as the morning temperatures increase and during the late afternoon, prior to dusk, when activity levels are highest (Eddie, 2012). Scanning from a suitable vantage point can also be employed to survey areas with abundant potential microhabitat, such as abandoned rabbit warrens, extensive tunnel erosion, large habitat logs or clusters of logs, stick-raked log piles and along road verges where there are heaped log or spoil piles.
- By shining a torch down burrows and nearby hollow logs, both during the day and at night. *Egernia rugosa* are often active on warm nights and can be found sheltering inside hollow logs or close to the burrow entrance.
- Devices such as videoscopes or borescopes used to investigate burrows, hollows and pipes can also be used. Any such device should be inserted carefully to avoid damage to the burrow or the occupants and any disturbance should be kept to a minimum. Typically an articulating device will be required to successfully navigate the burrow system. Non-articulating devices are usually inadequate, finding burrow turns difficult to navigate and often damage the burrow walls.

Failing detection using passive methods, trapping can be utilised to confirm presence. Trapping methods are outlined in detail below.

Camera trapping

Passive Infra-Red (PIR) camera traps can be utilised to confirm the presence of *E. rugosa*, although triggering is not always reliable. PIR sensors require a difference between ambient temperature and the animal's body temperature, in combination with movement (Meek *et al.*, 2012). Whilst PIR cameras will not always trigger on *E. rugosa* activity, they will capture images frequently enough to confirm their presence. PIR sensitivity should be set to the highest setting to maximise detection probability. The alternative is to use the camera in time-lapse mode, taking regular photos of sunning positions and area's surrounding burrows every 5 to 10 minutes. This will generate large numbers of photos.

During warmer months, four nights camera trapping will generally be sufficient to detect activity of an *E. rugosa* colony. Multiple cameras should be set up to cover the most utilised burrow entrances, the latrine sites and any suspected basking positions.

Funnel, Elliott and cage trapping

Trapping *E. rugosa* is very successful, however should be avoided unless necessary. Camera trapping for confirmation of presence should be used in preference to physical trapping.

Very well shaded traps can be deployed near the burrow entrances and at the latrine. Unbaited funnel traps work exceptionally well during the warmer months, with 72% of surveys targeting known colonies in the Brigalow Belt capturing at least one animal during 4 days/3 nights of trapping (n = 32; unpub. data). The first 24 hours of trapping is typically the most successful with 68% of all *E. rugosa* captures (n = 59) in this period (unpub. data). Whilst adult *E. rugosa* at maximum SVL will readily squeeze through the ring in commercially available funnel traps, this ring can be cut and expanded to more easily accommodate these larger individuals (hot glue can be placed over the cut wire to remove sharp edges). Traditionally, traps should be checked in the early morning and then regularly throughout the day. When using funnel traps to target *E. rugosa* we recommend checking traps very early, around dawn, to remove any nocturnal by-catch and then leave the traps undisturbed until a mid-morning check. Exact timing of trap checks will depend on season and daily temperatures but should aim for shortly after the radiant heat of the day starts to accelerate (primary period for basking in larger reptiles). Traps should be checked every few hours following the mid-morning check; with more frequent checks being required during warmer temperatures. Again, the last few hours before dusk the traps should ideally remain undisturbed, checking in the evening to maximise trapping success and remove capture animals prior to colder overnight temperatures.

Baited Elliott-style or cage trapping has historically been employed to capture *E. rugosa* at burrow entrances, however extreme care should be exercised for several reasons, including; animals being injured by the mechanism; extreme temperatures during the day (heat, even when shaded), and night (cold); and, ants attracted to the bait may cause irritation and more severe problems for trapped animals. Taping two, type ‘A’ Elliott-style traps together or using the larger type ‘B’ traps can reduce the risk of injury. If using Elliott-style traps to target *E. rugosa* they should be extremely well-shaded, checked more frequently than funnel traps and should be closed and removed during periods of high temperature, unless insulation is known to keep internal trap temperatures cool enough to prevent heat stress and mortality. We do not recommend using Elliott-style or cage traps to target *E. rugosa*.

Survey effort guide

The recommended level of effort outlined below is based on data collected by observers with extensive experience researching *E. rugosa.* Even experienced herpetologists have difficultly reliably detecting the presence of *E. rugosa,* so surveys should be undertaken by those with a demonstrated ability to detect this species. The recommended level of effort below may provide reasonable opportunities to detect *E. rugosa*, particularly if large active colonies are present in the project area (see recommended survey approach).

The suggested effort is considerable given the species is wide-spread, highly cryptic and found in a broad range of habitat types. Therefore, based on the precautionary principle, if it is not feasible to invest this quantity of survey effort, with suitable habitat and microhabitat present in the survey area, then *E. rugosa* should be assumed to be present.

Minimum effort within suitable habitat during optimal conditions			
Survey technique	**Effort per survey period**	**Effort per survey**	**Number of survey periods**
Diurnal Search	20 mins searching per hectare Search 20% of suitable habitat when 50 ha or more (e.g. 10 ha per 50 ha); OR 40% when less than 50 ha present (e.g. 2 ha per 5 ha of suitable habitat)	Single search	1 survey
Distant Observation	20 mins scanning suitable microhabitat, conducted 3 times on separate days. Scans should be conducted where abundant microhabitat features occur	3 days, 20 mins per day	1 survey
Camera Traps*	12 camera trap nights per colony	4 nights	1 surveys
Funnel Traps*	60 trap nights per colony	4 nights	1 surveys
e.g. Three camera traps for 4 consecutive nights; 10 funnel traps set for 4 consecutive nights at each potential colony. *Only at areas identified during diurnal search that have not been confirmed.			

Ethical and handling considerations

Diurnal searches

- There are no ethical concerns with this technique as it is a passive diurnal search with no need to roll logs, rocks or any other habitat.
- Gloves should be worn when handling scats and other animal signs to reduce exposure to zoonotic diseases.

Camera trapping

- Camera setup should not interfere with burrow, latrine or basking positions.

Funnel trapping

- Traps must be thoroughly checked early in the morning and regularly throughout the day.
- Always provide shelter over the top of the funnel traps to reduce exposure (heat and cold). We recommend at least 70% shade-cloth however silver roof insulation or vegetation (dense leafy branches, grass tussocks) are alternatives. Do not trap if temperature extremes are expected or close traps before temperature become a problem.
- Consider weeds and pathogens when using equipment in multiple locations as these can be transported and spread via dirty traps.

- Take care when checking funnel traps as they may trap venomous animals such as snakes and spiders; personnel should be trained in the removal of venomous snakes.

Elliott-style or cage trapping

- Is not recommended to target *E. rugosa* due to ethical concerns.
- Traps heat up very quickly in the sun, even when well shaded (no air flow). Clear traps at dawn to remove nocturnal by-catch and then very frequently throughout the day. Trap temperatures should be closely monitored and immediately closed when they begin to heat.
- Ants attracted by bait can be a problem so locate traps away from obvious ant nests and be vigilant for ant activity. Once ants have located a baited trap it should be closed and removed.
- Consider weeds and pathogens when using equipment in multiple locations.

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Citation

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