# ATTACHMENT E:
# REPORT ON FROG SURVEYS OF BARNWELL ROAD HOLDINGS

**- Dr Conrad Hoskin**

# Surveys for endangered frogs and other wildlife on Barnwell Road Holdings

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## Executive Summary

A number of State (NCA) and Federally (EPBC Act) listed endangered species occur in the Kuranda area, including the Kuranda Tree Frog (*Litoria myola*), the Australian Lacelid frog (*Litoria dayi*), the Mistfrog (*Litoria rheocola*), the Southern Cassowary (*Casuarius casuarius*), the Northern Quoll (*Dasyurus hallucatus*), and the Myola Palm (*Archontophoenix myolensis*).

Wildlife surveys were conducted across the property 'Barnwell Road Holdings', with a particular focus on endangered frog species.

89 vertebrate species were detected during the surveys (21-27/01/2016, 25-27/03/2016, 01-03/05/2016), including a diverse frog fauna of 15 species.

In regards to frogs, the habitat of greatest significance on the property is streams and the rainforest associated with these. The property has a diverse assemblage of rainforest frogs, including the endangered species, the Kuranda Treefrog (*Litoria myola*).

The property contains important populations and breeding areas for *Litoria myola*. *Litoria myola* was recorded on three streams on the property: Owen Ck, Haren Ck and a small unnamed creek in the center-north of the property. The locality of these populations is covered in detail herein. *Litoria myola* occurs in the north-west sector of the property, in lots 22N157227, 2RP703984 and 17N157227.

A fourth creek on the property, the small creek downstream of the dam, would almost certainly have had *Litoria myola* until recently. However, sedimentation downstream from the dam has filled this creek in and made it unsuitable for *Litoria myola*. The former extent of *L. myola* on this creek is estimated herein.

The Australian Lacelid frog (*Litoria dayi*) was not detected on the property. It is present at nearby sites in the Myola area, and potentially suitable habitat is present on the property. However, the surveys were conducted during a poor wet season (with little stream flow) and it was not possible to adequately survey these areas of habitat for this species. Further surveys are required for *Litoria dayi* in the areas highlighted herein.

A number of *Archontophoenix* palms were located along the streams and these likely represent *Archontophoenix myolensis* (given the close proximity to known stands). *Archontophoenix myolensis* is an endangered species under the EPBC Act.

Time and access limitations precluded surveying the drier forests in the south-west of the property (lots 131N157491 & 290N157480). The endangered Northern Quoll (*Dasyurus hallucatus*) may occur in this area given the habitat type and proximity to known records.

## Background

A number of species in the Kuranda area are listed as threatened at the State (Qld NCA) and Federal/Commonwealth (EPBC) level. Two endangered species are entirely restricted to the Kuranda/Myola area—the Kuranda Tree Frog (*Litoria myola*) and the Myola Palm (*Archontophoenix myolensis*). The Kuranda Tree Frog is restricted to about 10 breeding streams that enter the Barron River between Kuranda and Kowrowa. The most significant stand of the Myola Palm occurs on Warril Ck, with scattered records in nearby areas along the Barron River. Both the Kuranda Tree Frog and the Myola Palm are listed as Endangered at the Queensland (NCA, 2014a; NCA, 2014b) and Federal (EPBC, 2016a; EPBC, 2016b) levels. Other Endangered species known from the Kuranda area include the Australian Lacelid frog (*Litoria dayi*), the Mistfrog (*Litoria rheocola*), the Southern Cassowary (*Casuarius casuarius*), and the Northern Quoll (*Dasyurus hallucatus*). These four species are also all listed as Endangered under the State (NCA) and Federal (EPBC) legislation. The legislation associated with these Acts impacts how developments can proceed in areas containing threatened species; hence thorough surveys are required.

## Objectives

1. To survey Barnwell Road Holdings for wildlife, with a particular focus on endangered frog species.
2. To identify species, habitats and areas on the property of particular conservation concern.

## Methods

Survey design was based on desktop assessment of the property using Google Earth. Overlays of the property and plot boundaries, broad habitat types (including mapping of remnant and non-remnant vegetation, and past clearing), and drainage lines (creeks and gullies) were used to determine the distribution of survey effort.

On the 21st January 2016 I met with Simon Danielsen for an extended site visit to discuss the objectives and visit various parts of the property. This extended for much of the day and Simon showed me particular habitats and access points to various parts of the property.

The surveys were then conducted in three blocks: (1) seven consecutive nights from the 21st to the 28th of January 2016, (2) two nights from the 25th to the 27th of March 2016, and (3) two nights from the 1st to the 3rd of May 2016. Each day I spent some hours at the site in the afternoon marking access to sites I was to survey that night, and doing opportunistic surveys for reptiles, birds, mammals, and palms. Frog surveys began at approximately 6 pm each night and typically extended to midnight. Additional site visits were conducted during the days to survey reptiles, birds, and tadpoles.

Each frog survey consisted of walking a pre-defined section of a creek or gully (sometimes as short as 100 m, but typically in the order of 500 m to 2 km). Some nights consisted of surveying one long section of creek, while other nights consisted of surveying multiple

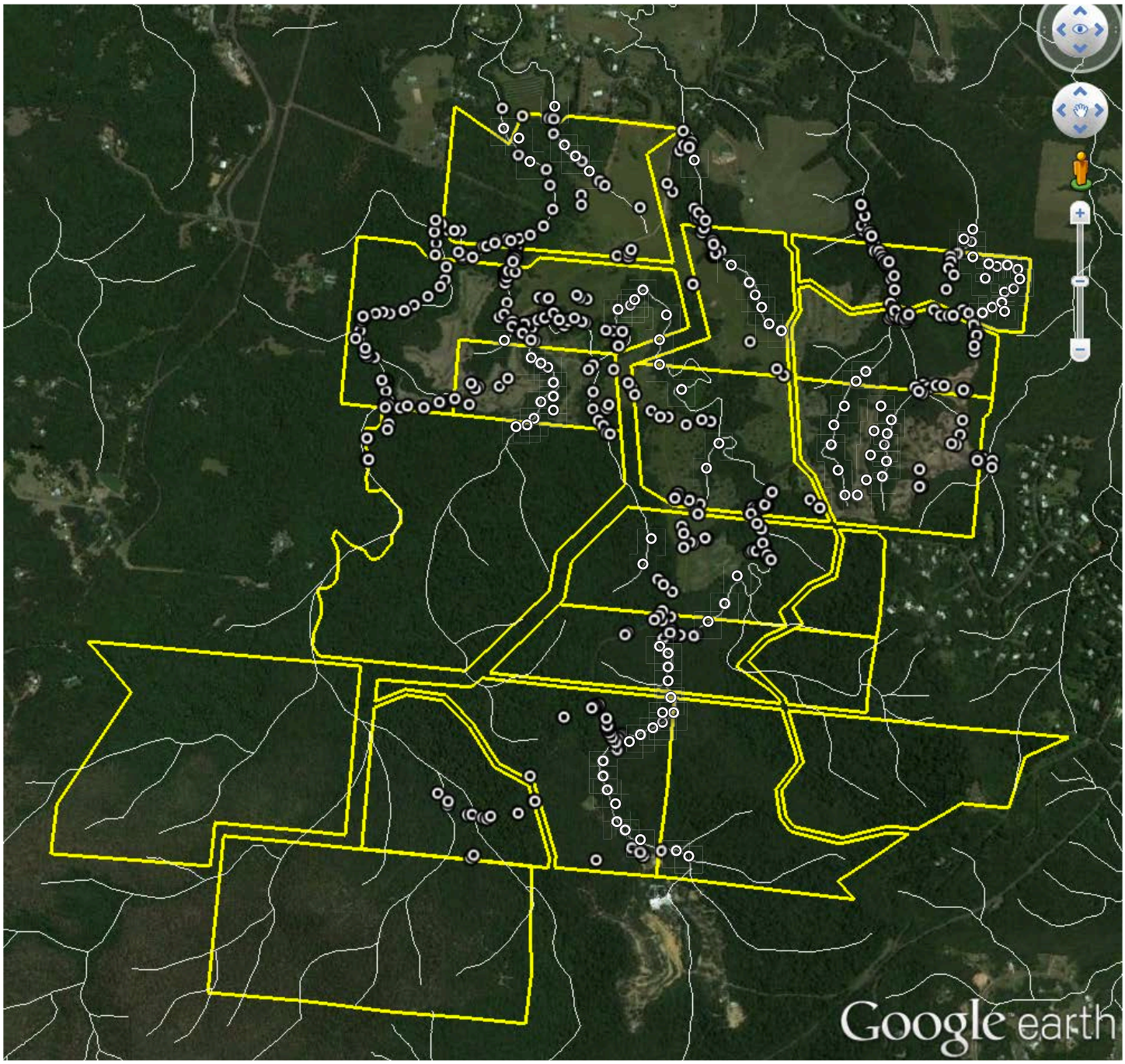


**Fig. 1. An indication of survey effort across the property.** White symbols are derived from marked sites and a subsample of track logs from the surveys. More survey effort occurred in the northern half of the property.

shorter sections. Each survey was performed by walking up the middle of a creek or gully searching for frogs and other wildlife in two ways: (1) listening for frog calls (which are distinctive for each species), and (2) using a low power head-torch to look for animals, particularly by eyeshine (even small frogs have eyeshine). Regular forays were made away from the creekline to survey for wildlife in the rainforest surrounding the creeks and gullies.

All surveys were performed by myself, with one or two volunteer helpers. All species identifications were by myself. Incidental records of wildlife were also obtained while driving around the property or walking into sites. The location of sites and species records was recorded using a Garmin 60CSX GPS unit. For threatened species and incidental records, a GPS point was taken when they were detected, whereas more common species were generally recorded as present between regularly marked points along the creeks.

Conditions were dry through much of the survey period; there were some moderate showers but the wet season total was very low. Therefore, stream levels were generally low; some large streams that would typically flow in the wet season were not flowing; and small gullies were dry. Larger streams were targeted because they were carrying water, but smaller creeks and gullies were also searched in the hope of finding foraging frogs. Conditions were too dry to survey a number of small gullies. Conditions were also not suitable for surveying for the Australian Lacelid Frog (*Litoria dayi*), which generally only calls along streams during wet periods when they are flowing well. Further targeted surveys are required to cover these gaps in knowledge for the property.

A major objective of this survey was to determine whether the endangered Kuranda Treefrog (*Litoria myola*) occurs on the property. This involved stream surveys to detect males, and then extrapolating from these areas of known presence to estimate the extent of habitat likely used by the species. *Litoria myola* was identified by male call (the definitive form of identification) and by sight (to a trained eye, males are smaller and more slender than the similar species *Litoria serrata*, and females are also smaller than *Litoria serrata* females). Males were targeted because they occur in low vegetation along streams and they call, whereas females are harder to find because they typically occur away from streams up high in trees, and they don’t call.

## Survey results

Survey effort focused on creeklines, particularly in the northern half of the property (Fig. 1). 89 vertebrate species were detected in the survey period, comprising 10 species of mammals, 54 species of birds, 10 species of reptiles, and 15 frog species (Appendix 1).

All 15 frog species are breeding on the property, as determined by the presence of calling males. The frog fauna consisted of 8 species of rainforest frogs and 7 frog species more typically associated with open forest or disturbed habitats. The rainforest frogs consisted of 6 stream-breeding species (*Litoria myola, Litoria serrata, Litoria jungguy, Litoria xanthomera, Mixophyes coggeri, Rana daemeli*) and two species (*Austrochaperina pluvialis* and *Cophixalus ornatus*) that breed on land.

The property has a nearly full compliment of the rainforest frogs that occur in the Kuranda region. The Mistfrog (*Litoria rheocola*) and the Australian Lacelid (*Litoria dayi*) were not

detected. *Litoria dayi* is known to occur at sites 1.5 km and 1.8 km from the property. The property has potentially suitable habitat for *Litoria dayi*, particularly on Haren and Owen Creeks (Fig. 4), but weather conditions during the survey period were not suitable for determining whether the species is present or not.

*Litoria myola* was recorded on three streams on the property: Owen Ck, Haren Ck and a small unnamed creek in the center-north of the property (Figs 2 & 3). All *Litoria myola* were found in the north-west sector of the property, in lots 22N157227, 2RP703984 and 17N157227. *Litoria myola* is generally present at good density along the sections of stream marked in green on Figure 3. Based on the number of frogs detected during the surveys, I would coarsely estimate that 100-200 *Litoria myola* adults are present on the property. However, weather and stream conditions were not ideal during the surveys, so this estimate is coarse and the actual number may be more. The core *Litoria myola* habitat on the property is along lower Owen Creek up to the Owen/Haren junction and at least 1 km upstream of this junction on Owen Ck and at least 500 m upstream on Haren Ck (Fig. 3). This Owen/Haren population would appear to be the third largest breeding population of this species.

The majority of *Litoria myola* found were males, which is typical because males call from rainforest vegetation along the streams. Female *Litoria myola* are very hard to detect because they use the surrounding forest and avoid the streams unless they are breeding. Several breeding females were seen along Owen Ck, three of which were carrying eggs and one of which was in amplexus [breeding] with a male. A female was also seen on Haren Creek. There wasn't sufficient time to survey the surrounding forest to search for females but, based on my knowledge from other areas around Kuranda, the females will be using rainforest up to at least 100 m from the streams (and probably considerably further). Therefore stream buffers for this species need to be at least 100m wide from either side of the creek, and at least 100 m upstream from any known *L. myola* points. The breeding pair of *Litoria myola* found during the survey were found in amplexus on Owen Ck and would have laid a clutch of eggs that night. Possible *Litoria myola* tadpoles were found along stretches of all three creeks on which *Litoria myola* adults were found but these tadpoles couldn't be distinguished with confidence from the co-occurring species *Litoria serrata*.

*Litoria myola* is restricted to downstream sections of streams flowing into the Barron River, so the areas it was found on the property fit the broader distributional pattern. The most upstream records of *Litoria myola* on each of the streams will be broadly indicative but not precisely accurate. The species could no doubt be found further upstream of the most upstream records on each of these creeks with more survey effort, particularly under wetter conditions. Based on the known records and the habitat along the creeks, I have buffered the upstream limits of *Litoria myola* in yellow on the map (Fig. 3). *Litoria myola* could reasonably be expected to occur in these yellow shaded areas. Further surveys under more ideal weather conditions would refine upstream limits more accurately.

A fourth creek on the property, the small creek downstream of the dam by the homestead, would almost certainly have had *Litoria myola* until recently (marked in red shading on Figure 3). However, sediment from dam construction and the eroding dam wall has filled this creek for hundreds of meters downstream of the dam and the habitat is no longer suitable for *Litoria myola* breeding. The reasons I can be fairly sure this creek had *Litoria myola* are: (1) It is within the typical distance *Litoria myola* occurs upstream from the Barron River; (2) The creeks on either side have *Litoria myola* up to at least this point; and

(3) Assessment of the size and structure of the creek, and associated vegetation, enables me to make an educated estimate of how far upstream they would have bred on the creek. In the adjacent un-named creek, *L. myola* extends to within 300 m of the head of the creek. Using this as a benchmark, I have estimated an upstream extent of the former occurrence of *L. myola* on the creek below the dam (see Figure 3). Remedial works have begun regarding the sediment issue in this creek, and these are ongoing.

Time constraints and unfavourable weather conditions (too dry) precluded surveying some key sections of streams or gullies. The section of Haren Ck that flows through the three road crossings requires further surveys for *Litoria myola* to better determine abundance and upstream limits. Sections of potentially suitable habitat for *Litoria dayi* were identified on lower and mid Haren Ck, Owen Ck, and an upper tributary of Warril Ck (Fig. 4), and these require targeted surveys when the creeks have more flow. *Litoria dayi* occurs nearby in the Myola area, and is a difficult species to detect when not breeding during dry conditions.

A number of *Archontophoenix* palms were located along the streams (Fig. 5). These are likely to be the endangered *Archontophoenix myolensis* given the close proximity to known stands on Warril Ck and nearby areas of the Barron River, and because they are growing in boggy stream-side locations typical of *Archontophoenix myolensis*. *Archontophoenix myolensis* is poorly surveyed for around Kuranda, in part due to similarity to *Archontophoenix alexandrae* (they differ in aspects of growth form and characteristics of the fruit and seed). Identification of the palms located on the property is problematic because only immature individuals were found. A botanist that has expertise in local *Archontophoenix* may be able to identify these immature individuals.

The remnant forest in the southern half of the property was not surveyed in detail due to time constraints and access limitations. However, from the time I spent in this habitat it is clear that it is high quality rainforest with a mature structure. This habitat will contain a good diversity of fauna and flora and certainly appears suitable for Cassowary (either for resident birds or as a corridor for movement of adults and subadults). The remnant forest also buffers the downstream sections of the streams, in terms of maintaining natural water flow, water quality and sedimentation characteristics. It therefore contributes directly to the viability of downstream populations of *Litoria myola* and, potentially, *Archontophoenix myolensis*.

Some of the areas mapped as non-remnant forest are in an advanced state of regeneration, and contain much of the rainforest wildlife expected for this region. I observed areas of high quality regrowth in the north-west (lot 22N157227), west (lot 2RP703984), north-east (lot 17N157227), and east (lot 18N157227) of the property.

The focus of my surveys was frogs in the remnant and non-remnant rainforest vegetation on the property. Time and access constraints precluded wildlife surveys of the drier forest areas of the south-west sector of the property (lots 131N157491 & 290N157480). The habitat on these lots may be suitable for the Northern Quoll, which occurs in sclerophyll forests in the region.

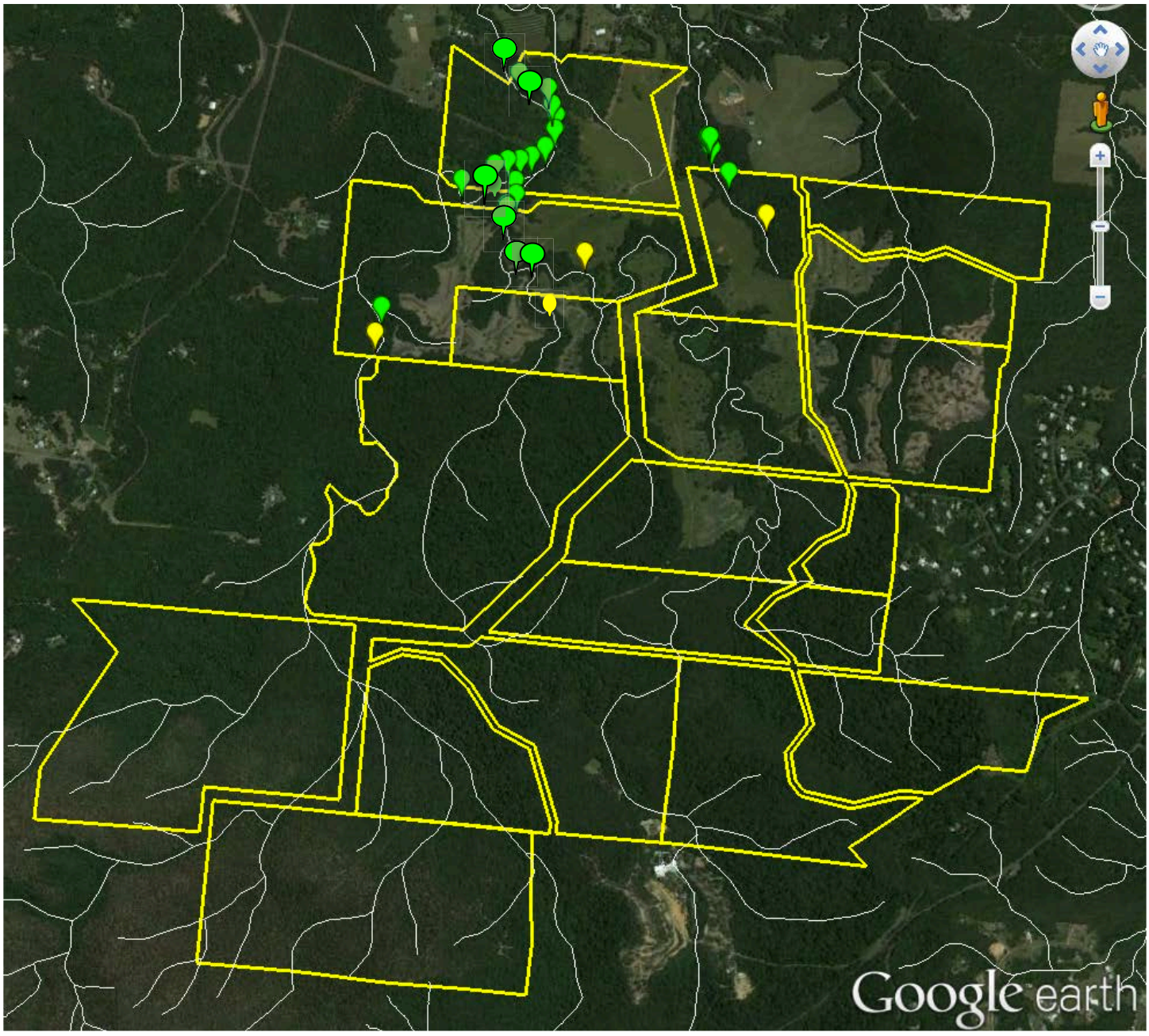


**Fig. 2. *Litoria myola* records.** *Litoria myola* records are shown as green symbols. Estimated potential upstream extents of *Litoria myola* are shown as yellow symbols.

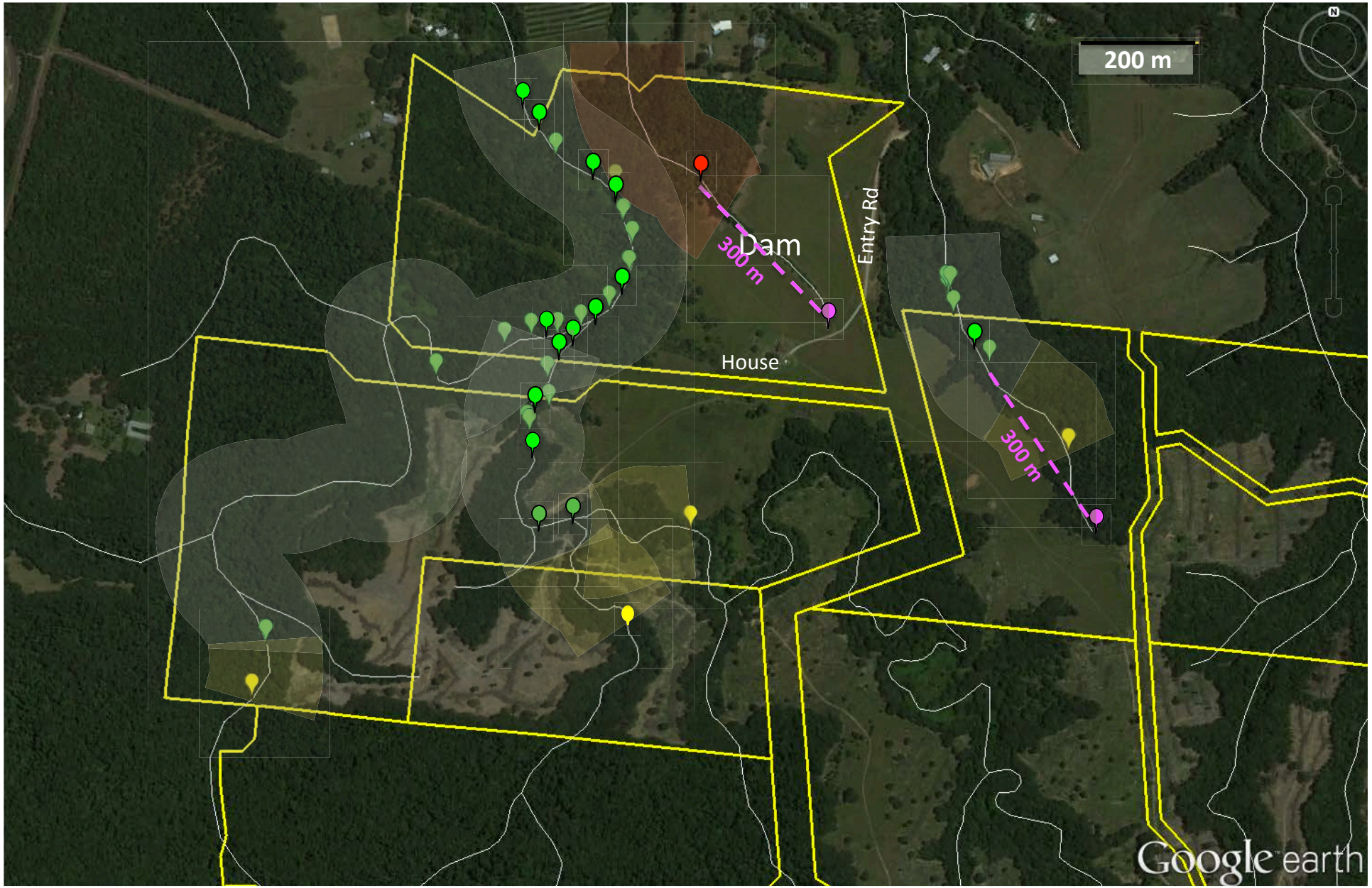


**Fig. 3. Close-up of *Litoria myola* records.** *Litoria myola* records are shown as green symbols. Transparent green shading shows a buffer of approx. 100 m wide on either side of stretches of creeks where *Litoria myola* was detected. Estimated potential upstream extents of *Litoria myola* are shown as yellow symbols, with a 100 m buffer (yellow shading) on either side of the creeks. The red shaded area is a creek that probably had *Litoria myola* but is now filled with sediment from the dam. The red symbol within this shading shows the potential former upstream extent of *L. myola* on this creek. This was determined as 300 m downstream from the top of this creek, which is the same distance as *L. myola* occurs from the top of the adjacent small creek (pink symbols and dashed lines).

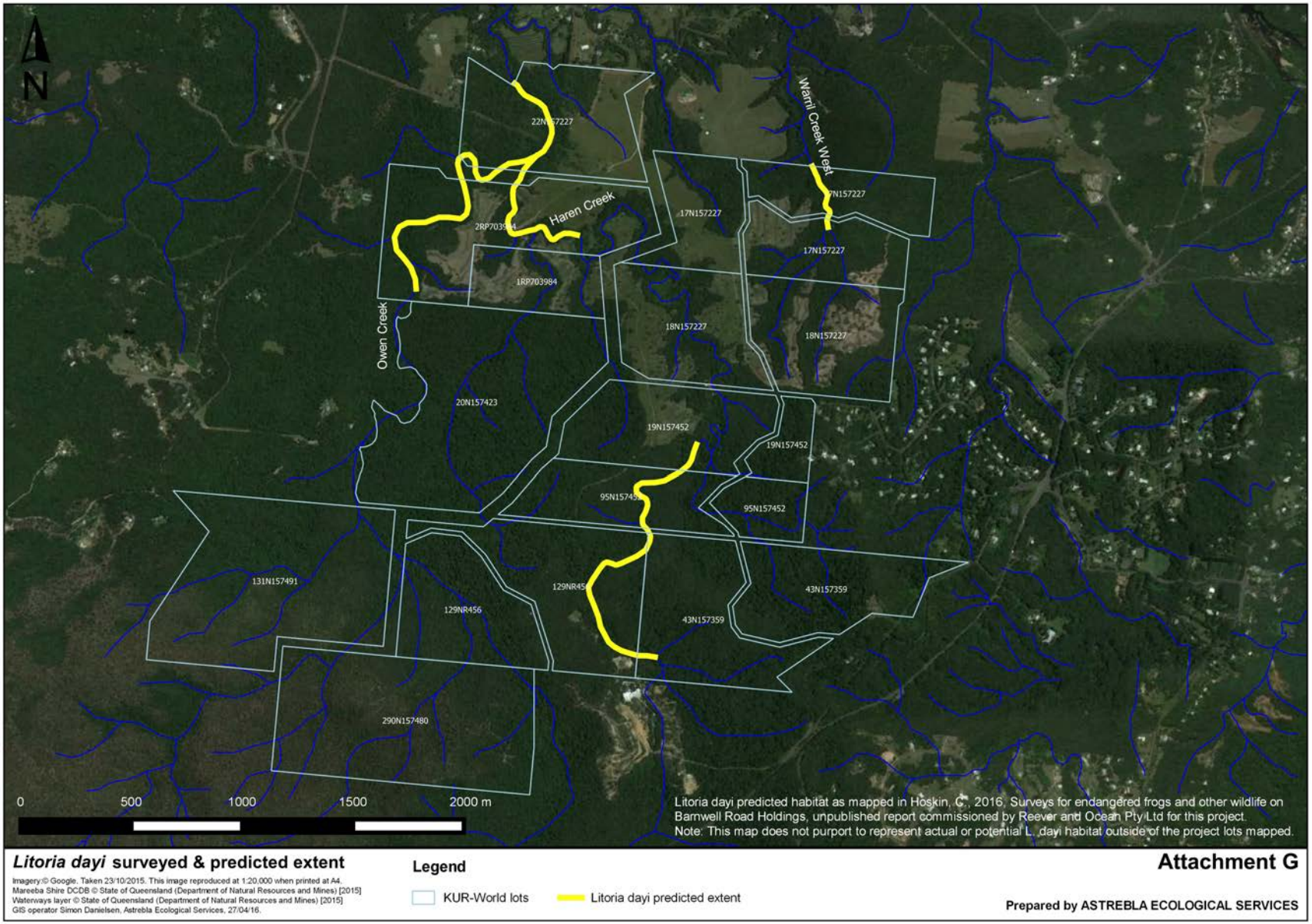


**Fig. 4. Potential habitat for the Australian Lacelid frog (*Litoria dayi*).** Sections of creek marked in yellow are of potentially suitable habitat for *Litoria dayi*, based on habitat use at nearby sites in the Myola area.
Map prepared by Simon Danielsen (Astrebla Ecological Services), in consultation with Conrad Hoskin (JCU)

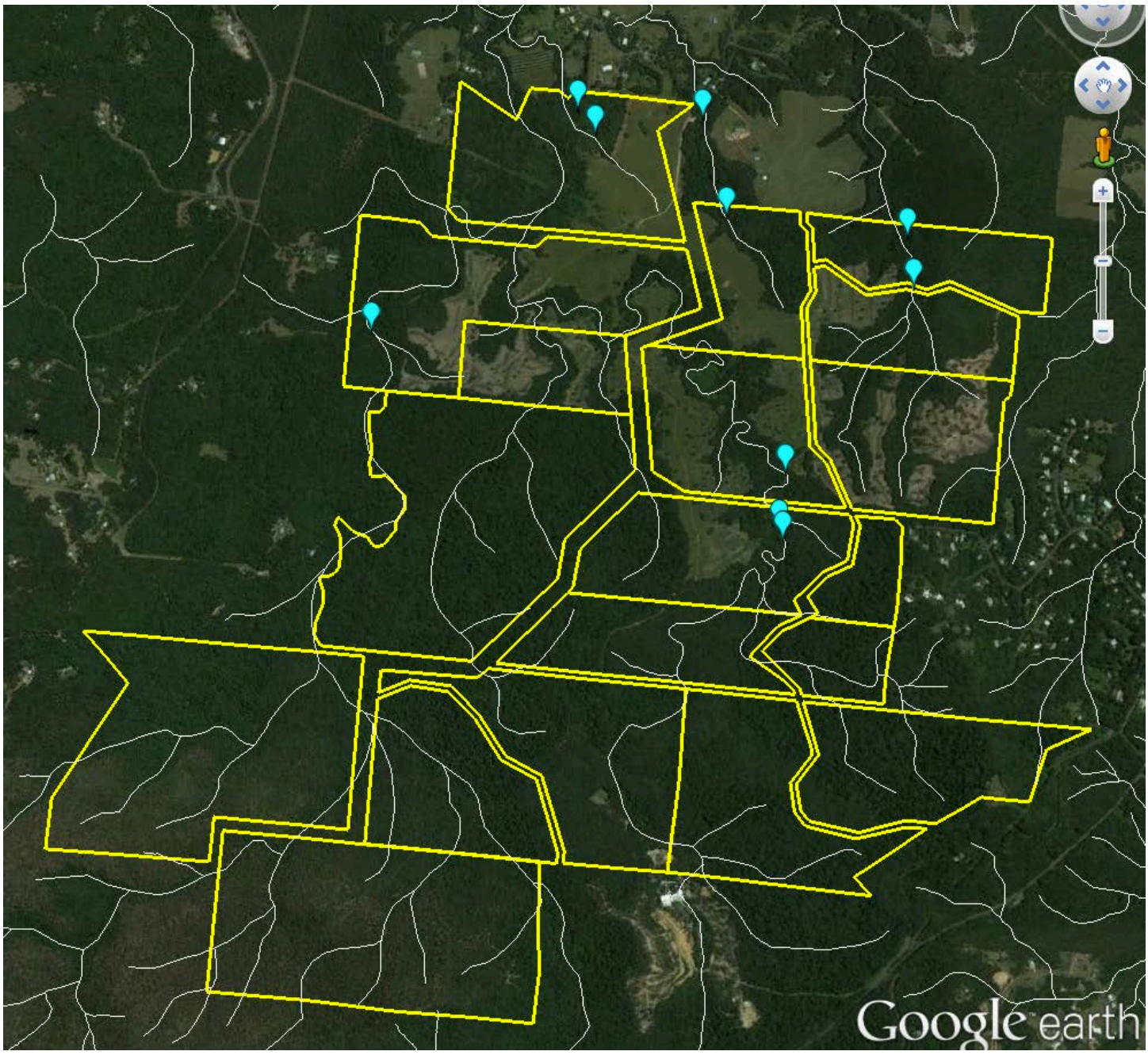


**Fig. 5. Palm records.** Blue symbols show where palms were encountered during the surveys. These palms may be *Archontophoenix myolensis*.

## Suggested actions for further surveys of endangered species

Determine the upstream limits of *Litoria myola* on the three streams it is known to occur (i.e., resolve the areas shaded yellow in Figure 3).

Perform targeted surveys for *Litoria dayi* in identified areas of potentially suitable habitat on Haren Ck, Owen Ck, and upper Warril Ck (Fig. 4).

Resolve the identity of the *Archontophoenix* palms on the property.

Perform targeted surveys for Northern Quolls in lots 131N157491 and 290N157480.

## References

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## List of tables, figures & data files provided

**Appendix 1.** Vertebrate species recorded on the property during the survey period.

**Figure 1.** Map of survey effort on the property during the survey period.

**Figure 2.** Map of *Litoria myola* records on the property during the survey period.

**Figure 3.** Detailed map of *Litoria myola* records, estimates of potential distribution, and suggested buffers.

**Figure 4.** Map of potentially suitable habitat for *Litoria dayi* on the property.

**Figure 5.** Map of palms located on the property during the survey period.

**Electronic file 1.** Vertebrate species list for the Barnwell property.

**Electronic file 2.** *Litoria myola* & palm locality records.

**Electronic file 3.** Survey site localities, and associated vertebrate data.

**Appendix 1. Vertebrate species recorded on the property during the survey period**

| Group | Scientific name | Common name |
|---|---|---|
| Frogs | *Austrochaperina pluvialis* | rain whistling-frog |
| Frogs | *Cophixalus ornatus* | northern ornate nursery-frog |
| Frogs | *Limnodynastes peronii* | striped marsh frog |
| Frogs | *Litoria caerulea* | Green tree frog |
| Frogs | *Litoria fallax* | Eastern sedge frog |
| Frogs | *Litoria gracilenta* | graceful tree frog |
| Frogs | *Litoria infrafrenata* | white-lipped tree frog |
| Frogs | *Litoria jungguy* | northern stony creek frog |
| Frogs | *Litoria myola* | Kuranda tree frog |
| Frogs | *Litoria serrata* | green-eyed tree frog |
| Frogs | *Litoria xanthomera* | orange-thighed tree frog |
| Frogs | *Mixophyes coggeri* | Cogger's barred frog |
| Frogs | *Rana daemeli* | wood frog |
| Frogs | *Rhinella marina* | Cane toad |
| Reptiles | *Carlia rubrigularis* | red-throated rainbow-skink |
| Reptiles | *Hypsilurus boydii* | Boyd's forest dragon |
| Reptiles | *Lampropholis coggeri* | rainforest sunskink |
| Reptiles | *Physignathus lesueurii* | eastern water dragon |
| Reptiles | *Ramphotyphlops polygrammicus* | north-eastern blind snake |
| Reptiles | *Saproscincus basiliscus* | pale-lipped shadeskink |
| Reptiles | *Saproscincus tetradactylus* | four-fingered shadeskink |
| Reptiles | *Stegonotus cucullatus* | slaty-grey snake |
| Reptiles | *Wollumbinia latisternum* | saw-shelled turtle |
| Birds | *Ailuroedus melanotis* | Spotted Catbird |
| Birds | *Alectura lathami* | Australian Brush-turkey |
| Birds | *Alisterus scapularis* | Australian King-Parrot |
| Birds | *Anthus novaeseelandiae* | Australasian Pipit |
| Birds | *Burhinus grallarius* | Bush Stone-curlew |
| Birds | *Cacatua galerita* | Sulphur-crested Cockatoo |
| Birds | *Cacomantis variolosus* | Brush Cuckoo |
| Birds | *Caprimulgus macrurus* | Large-tailed Nightjar |
| Birds | *Centropus phasianinus* | Pheasant Coucal |
| Birds | *Ceyx pusilla* | Little Kingfisher |
| Birds | *Chalcophaps indica* | Emerald Dove |
| Birds | *Cisticola exilis* | Golden-headed Cisticola |
| Birds | *Colluricincla megarhyncha* | Little Shrike-thrush |
| Birds | *Coracina lineata* | Barred Cuckoo-shrike |
| Birds | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike |
| Birds | *Coracina tenuirostris* | Cicadabird |
| Birds | *Cracticus quoyi* | Black Butcherbird |
| Birds | *Cyclopsitta diophthalma* | Double-eyed Fig-Parrot |
| Birds | *Dendrocygna eytoni* | Plumed Whistling-Duck |

| | | |
|---|---|---|
| Birds | *Eurystomus orientalis* | Dollarbird |
| Birds | *Geopelia humeralis* | Bar-shouldered Dove |
| Birds | *Geopelia striata* | Peaceful Dove |
| Birds | *Gerygone mouki* | Brown Gerygone |
| Birds | *Haliaeetus leucogaster* | White-bellied Sea-Eagle |
| Birds | *Hirundo neoxena* | Welcome Swallow |
| Birds | *Megapodius reinwardt* | Orange-footed Scrubfowl |
| Birds | *Meliphaga gracilis* | Graceful Honeyeater |
| Birds | *Meliphaga notata* | Yellow-spotted Honeyeater |
| Birds | *Neochmia temporalis* | Red-browed Finch |
| Birds | *Ninox connivens* | Barking Owl |
| Birds | *Ninox novaeseelandiae* | Southern Boobook |
| Birds | *Pachycephala simplex* | Grey Whistler |
| Birds | *Philemon buceroides* | Helmeted Friarbird |
| Birds | *Pitta versicolor* | Noisy Pitta |
| Birds | *Podargus papuensis* | Papuan Frogmouth |
| Birds | *Ptilinopus magnificus* | Wompoo Fruit-Dove |
| Birds | *Ptilinopus superbus* | Superb Fruit-Dove |
| Birds | *Sericornis magnirostra* | Large-billed Scrubwren |
| Birds | *Sphecotheres vieilloti* | Australasian Figbird |
| Birds | *Symposiarchus trivirgatus* | Spectacled Monarch |
| Birds | *Tanysiptera sylvia* | Buff-breasted Paradise-Kingfisher |
| Birds | *Todiramphus macleayii* | Forest Kingfisher |
| Birds | *Trichoglossus haematodus* | Rainbow Lorikeet |
| Birds | *Turnix maculosus* | Red-backed Button-quail |
| Birds | *Tyto tenebricosa* | Sooty Owl |
| Birds | *Vanellus miles* | Masked Lapwing |
| Birds | *Xanthotis macleayanus* | Macleay's Honeyeater |
| | | |
| Mammals | *Dactylopsila trivirgata* | Striped possum |
| Mammals | *Melomys cervinipes* | Fawn-footed Melomys |
| Mammals | *Nyctimene robinsoni* | eastern tube-nosed bat |
| Mammals | *Perameles nasuta* | Long-nosed Bandicoot |
| Mammals | *Pteropus conspicillatus* | spectacled flying-fox |
| Mammals | *Uromys caudimaculatus* | Giant White-tailed Rat |