

Curramore Wildlife Sanctuary Ecohealth Report 2021



Summary

Australian Wildlife Conservancy (AWC) has implemented an Ecological Health Monitoring Program (Ecohealth) across Curramore Wildlife Sanctuary (Curramore) to measure changes in the status and trend of conservation assets, and threats to those assets. Metrics from the program are reported in annual Ecohealth Reports and Scorecards. This is the Ecohealth Report for 2021. Values of metrics derived in this report were based on data collected during surveys carried out between 2016-2021. The complete set of metrics and their values are summarised in the accompanying Ecohealth Scorecard.

During October and November in 2021, thirteen Ecohealth indicators were assessed at Curramore from 3 spotlighting transects for mammals and 1 transect for Tusked Frog; 3 call playback surveys for nocturnal birds; two call playback surveys targeting Black-breasted Button-quail; and 108 camera trap nights (12 sites) targeting Long-nosed Potoroo.

The spotlighting survey for the Tusked Frog detected more individuals in 2021 (13 individuals) compared with 2016 (1 individual). Five arboreal mammal species were sighted during the spotlight surveys with a species richness of 2.3 species per transect. Three nocturnal birds were detected in the call playback survey with a species richness of 1.3 species per site. No Black-breasted Button-quail or Long-nosed Potoroo were detected in 2021. The presence of both of these threatened species on Curramore is yet to be confirmed.

A total of 50 vertebrate species were recorded in 2021, comprising 14 mammals, 25 birds, 2 reptiles and 9 amphibians. A total of 242 vertebrate species are now confirmed for Curramore Sanctuary (35 mammals, 149 birds, 40 reptiles, 18 frogs). Of these, 7 species are listed as 'threatened' under either federal or state legislation (3 mammals, 2 birds, 1 reptile, 1 amphibian).

No surveys for threat indicators were conducted in 2021. There was no prescribed burning conducted and no wildfires occurred.

Contents

Introduction.....	1
Curramore Wildlife Sanctuary	1
Climate and weather summary	3
Methods	4
Monitoring and evaluation framework	4
Key threatened and iconic species.....	4
Vertebrate assemblages and surveillance species.....	5
Indicators and metrics	5
Survey types and history	7
Survey design and methods	8
Targeted Arboreal Mammal Survey	8
Nocturnal call playback surveys	9
Targeted Tusked Frog Survey	10
Targeted Button-quail Survey	11
Targeted Long-nosed Potoroo Survey.....	12
Analysis methods.....	13
Results	14
Key threatened and iconic vertebrates.....	14
Koala.....	14
Tusked Frog	14
Plumed Frogmouth.....	14
Vertebrate assemblages and surveillance species	14
Mammals (assemblage)	14
Long-nosed Potoroo	14
Arboreal mammal guild.....	14
Birds.....	15
Black-breasted Button-quail.....	15
Nocturnal bird guild	15
Reptiles.....	15
Frogs	15
Threat indicators	15
Fire.....	15
Discussion	16
Acknowledgments	16
References	16

Document citation: Howe A, Diete R, Palmer A, Watson A, Pierson J, Joseph L, Kanowski J (2022) Curramore Ecohealth Report for 2021. Australian Wildlife Conservancy, Perth, WA.



*Threatened Tusked Frog (Adelotus brevis) calling from Little Cedar Creek on Curramore in November 2021.
Andrew Howe/AWC*

Introduction

Australian Wildlife Conservancy (AWC) currently owns, manages, or works in partnerships across 31 properties in Australia, covering almost 6.5 million hectares, to implement our mission: *the effective conservation of Australian wildlife and their habitats*. AWC relies on information provided by an integrated program of monitoring and research to measure progress in meeting its mission and to improve conservation outcomes.

AWC's Ecohealth Monitoring Program has been designed to measure and report on the status and trends of species, ecological processes and threats on each of these properties (Kanowski et al. 2018). Data from the monitoring program are used to address the following broad questions relevant to our mission:

- 'are species persisting on a property?'
- 'are habitats being maintained?'
- 'are threats below ecologically-significant thresholds?'

For threatened and iconic species, including reintroduced species, AWC's monitoring program aims to obtain more detailed information related to their conservation management; for example, data on survival, recruitment, condition, distribution and/or population size.

The structure of the Ecohealth Program is as follows. AWC's Monitoring and Evaluation framework provides guidance on the development of the Ecohealth Monitoring Plans for each property managed by AWC: these plans describe the conservation values and assets of each property, the threats to these assets, and the monitoring program that will be used to track their status and trend, and to evaluate outcomes. Annual survey plans and schedules are developed to implement these plans. The outcomes of these surveys are presented in annual Ecohealth Reports and summary Ecohealth Scorecards.

This document is one of a series of annual Ecohealth Reports for Curramore Wildlife Sanctuary (referred to here as Curramore). The companion Ecohealth Scorecard presents the indicators and their metrics in a summary format.

Curramore Wildlife Sanctuary

Curramore is located in south-east Queensland, Australia and is 200 ha in extent (Figure 1). The Sanctuary is within the traditional lands of the Gubbi Gubbi people on the western escarpment of the Maleny plateau (Figure 1). While the plateau has been extensively cleared, the steep escarpment on which Curramore is situated remains mostly forested, with elevation ranging from 200 m at the Mary River Valley near Conondale to 660 m near the summit of Donavan's Knob. The geology is predominantly acid volcanics (rhyolite and microgranite), with smaller areas of basalt (Figure 2). The sanctuary encompasses most of the headwaters of Little Cedar Creek, a tributary of the Mary River.

The vegetation communities on Curramore can be grouped into four broad vegetation types: rainforest, wet sclerophyll forest, dry sclerophyll forest and regrowth (Figure 2; Stanton 2004). Rainforest includes simple to complex microphyll to notophyll closed forests with or without prominent Bangalow Palms (*Archontophoenix cunninghamiana*). Wet sclerophyll forest encompasses various types of tall eucalypt open forest, often dominated by Flooded Gums (*Eucalyptus grandis*), Brush Box (*Lophostemon confertus*) and Tallowwood (*E. microcorys*), with an understorey ranging from sedges and shrubs, the introduced weed lantana (*Lantana camara*), to rainforest palms. Dry sclerophyll forest consists of grassy eucalypt woodlands with Grey Gum (*E. propinqua*), White Mahogany (*E. acmenoides*), Grey Ironbark (*E. paniculata*), Tallowwood, Brush Box and Pink Bloodwood (*Corymbia intermedia*). Regrowth vegetation includes lantana, and regrowth following the treatment of lantana, which is mostly various species of acacia, eucalypts and dense stands of rainforest pioneer plants such as Pencil Cedar (*Polyscias murrayi*) and Native Ginger (*Alpinia caerulea*).

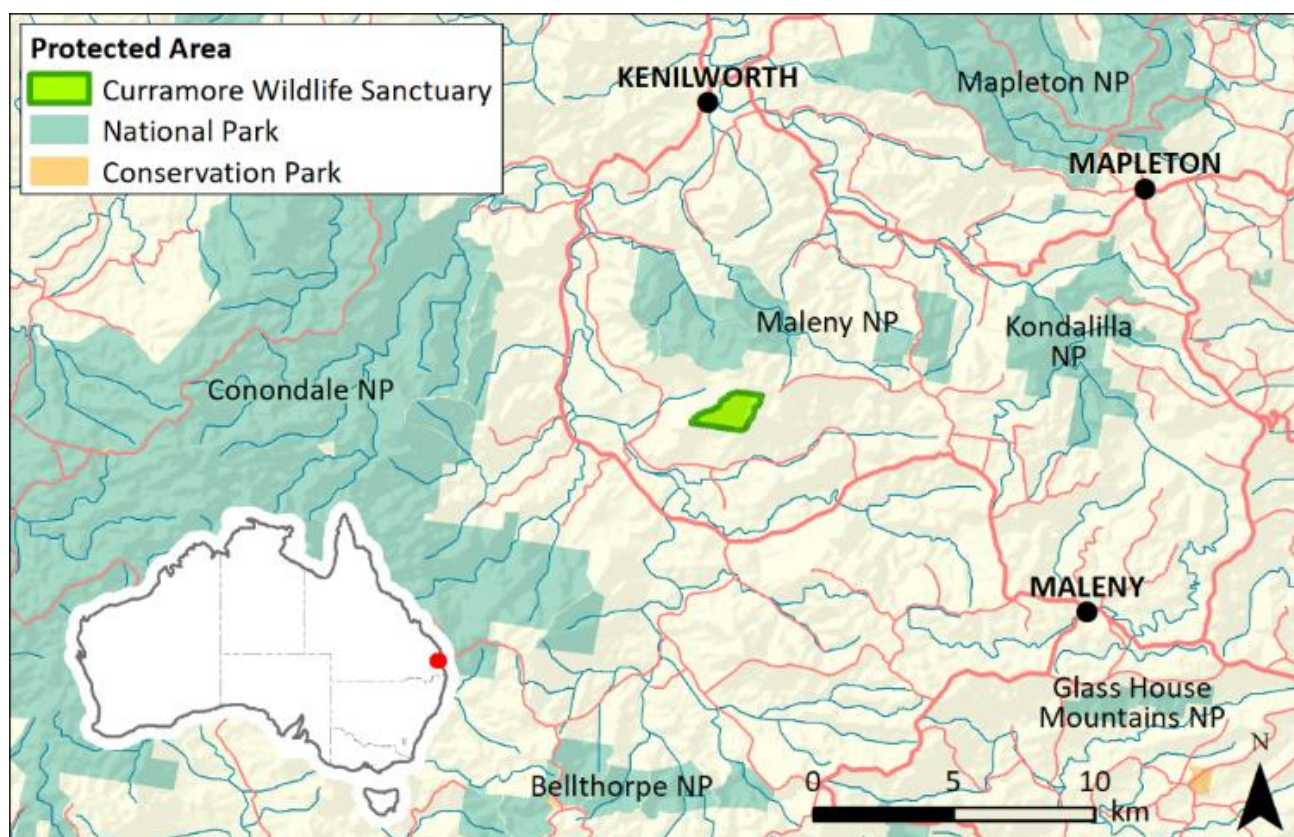


Figure 1. Location and regional context of Curramore.

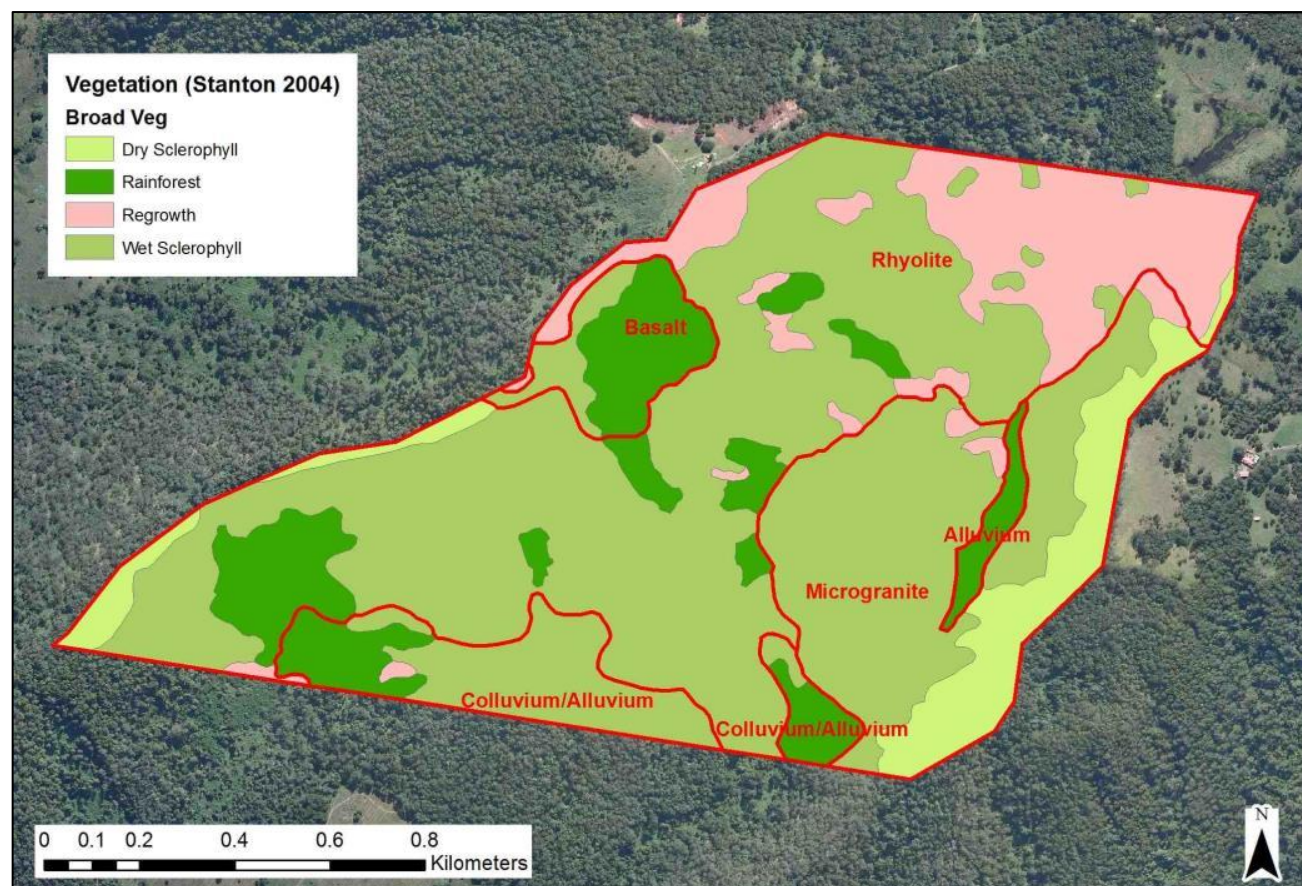


Figure 2. The vegetation and geology of Curramore. Geology boundaries are represented by the red lines and text; coloured areas represent vegetation types (Stanton 2004).

Eight vertebrate species listed as threatened under Commonwealth and/or Queensland legislation are known to occur on Curramore (three birds, three mammals, one reptile and one frog; Table 1). An additional six threatened vertebrate species are considered 'very likely', 'likely' or 'possible' to occur and continue to be a focus of surveys on the sanctuary (Table 1). In addition to AWC's Ecohealth survey program on Curramore, external researchers have undertaken studies on lantana and its effects on reptile diversity (Virikki et al. 2012) and of the endangered Maleny Freshwater Crayfish (*Euastacus urospinosus*; Hurry et al. 2015).

Table 1. Threatened vertebrate species that are confirmed or likely to occur on Curramore.

Scientific name	Commonwealth (EPBC)*	Queensland (NCA)**	Likelihood
Spotted-tailed Quoll (<i>Dasyurus maculatus maculatus</i>)	Endangered (SE mainland population)	Endangered	Possible
Koala (<i>Phascolarctos cinereus</i>)	Endangered (combined populations of Qld, NSW and the ACT)	Endangered	Confirmed
Greater Glider (<i>Petauroides volans</i>)	Vulnerable	Vulnerable	Confirmed
Long-nosed Potoroo (<i>Potorous tridactylus tridactylus</i>)	Vulnerable	Vulnerable	Very Likely
Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>)	Vulnerable	-	Confirmed
Red Goshawk (<i>Erythrorhynchus radiatus</i>)	Vulnerable	Endangered	Confirmed
Plumed Frogmouth (<i>Podargus ocellatus plumiferus</i>)	-	Vulnerable	Confirmed
White-throated Needletail (<i>Hirundapus caudacutus</i>)	Vulnerable	Vulnerable	Confirmed
Powerful Owl (<i>Ninox strenua</i>)	-	Vulnerable	Likely
Glossy Black Cockatoo (<i>Calyptorhynchus lathami</i>)	-	Vulnerable	Possible
Black-breasted Button-quail (<i>Turnix melanogaster</i>)	Vulnerable	Vulnerable	Possible
Three-toed Snake-tooth Skink (<i>Coeranoscincus reticulatus</i>)	Vulnerable	-	Confirmed
Tusked Frog (<i>Adelotus brevis</i>)	-	Vulnerable	Confirmed
Pearson's Tree Frog (<i>Litoria pearsoniana</i>)	-	Vulnerable	Likely

* Conservation status under the *Environment Protection and Biodiversity Conservation Act 1999*

** Conservation status under the *Nature Conservation Act 1992*

Climate and weather summary

Curramore is located on the western escarpment of the Maleny Plateau and the Blackall Range in south-east Queensland. The region is classified as subtropical and is characterised by hot, wet summers and cool, dryer winters. Even though rainfall occurs throughout the year, the majority falls over the summer months (Figure 3). Because of the variety in topography and elevation on Curramore, annual rainfall ranges from 1,200 mm in the lower elevations to 2,000 mm on the plateau.

South-east Queensland and Curramore suffered extended drought conditions receiving well below average annual rainfall in five of the seven years prior to 2021 (Figure 4). In 2021, a La Niña weather system increased the chance of above average rainfall across northern and eastern Australia. This was experienced at

Curramore with October's rainfall totalling 208 mm, compared to the long term mean of 119 mm (Figure 3; Bureau of Meteorology 2021).

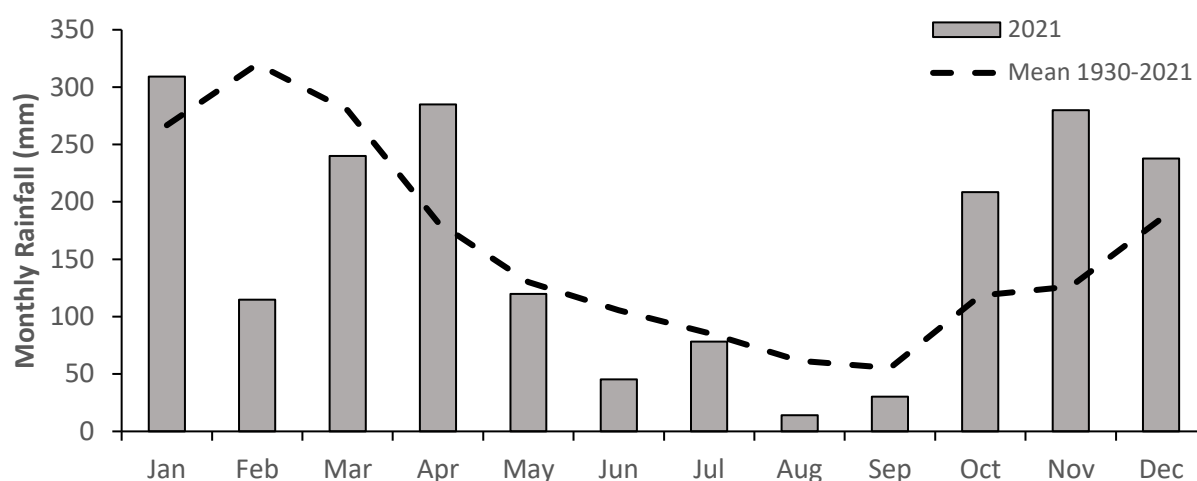


Figure 3. Monthly rainfall at Maleny, 1930-2021. Dashed line = average across all years 1930-2021.

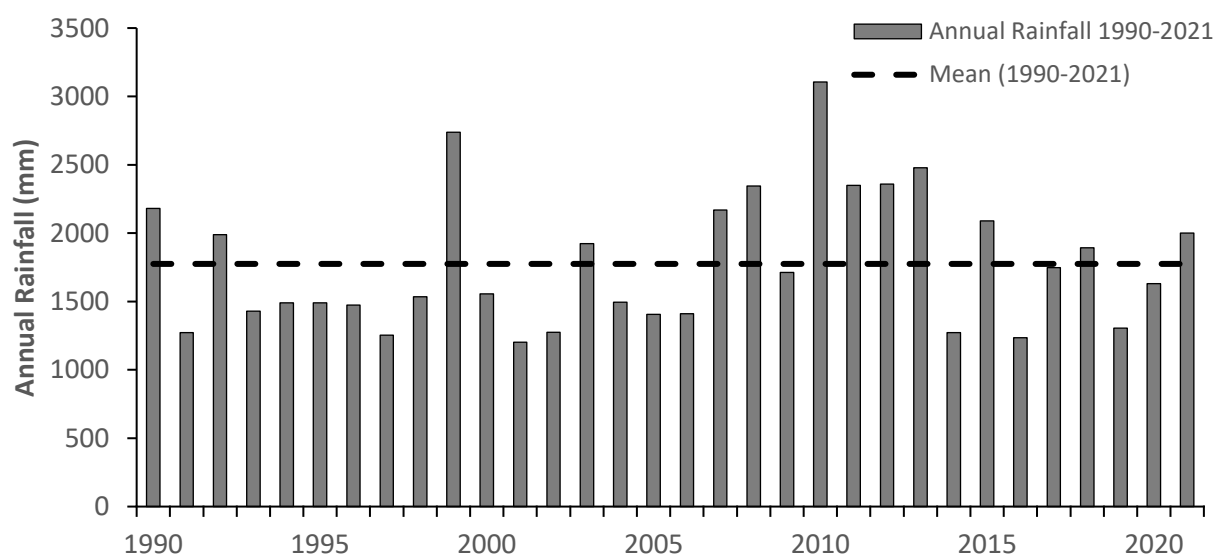


Figure 4. Annual rainfall at Maleny, 1990-2021. Dashed line = average across all years from 1990-2021.

Methods

Monitoring and evaluation framework

Curramore's Ecohealth Monitoring Program has been designed to measure and report on the status and trends of selected biodiversity and threat indicators on the property, using metrics derived from data collected through a series of purpose-designed surveys. Where possible, outcomes are evaluated against performance criteria relevant to each species, guild or assemblage.

Key threatened and iconic species

The Ecohealth program is focused on species of high conservation value, including threatened and 'iconic' species (e.g., regional endemics, species with high public profile and other species of conservation importance).

because of the role they play in an ecosystem, etc.). *Conservation Plans* will be developed for these species to ensure early detection of any serious issues that arise and to trigger timely responses. These plans will specify metrics to monitor outcomes for target species against nominated performance criteria.

Vertebrate assemblages and surveillance species

AWC's mission involves the conservation of all wildlife, not only threatened or reintroduced species. For this reason, AWC's monitoring program extends to surveillance monitoring of faunal assemblages (mammals, birds, reptiles, frogs). The monitoring program aims to address questions relevant to the conservation of assemblages.

At the most basic level, the program seeks to establish whether all species that are known to occur on the property are persisting on the property (i.e., 'are all species present?').

With increasing information, the monitoring program can address more detailed questions relating to conservation of assemblages, such as 'have species maintained their distributions or abundance?' However, the boom/bust conditions of most Australian environments can lead to large variations in the numbers of individuals in a population and the habitats or sites occupied by a species – these variations may not necessarily be informative in relation to the conservation of a species at a property over the long term.

AWC is currently working on developing an evaluation framework for surveillance monitoring of faunal assemblages. At present, we will continue to present data on a range of metrics relating to indicator species and guilds.

Indicators and metrics

On Curramore, 42 biodiversity (species and guilds) indicators have been selected for monitoring (Table 2). Ten of these indicators were surveyed for in 2021, including three key threatened and iconic species and seven vertebrate assemblages or surveillance species (Table 2).

Threat metrics are selected to monitor the status and trends of weeds, introduced predators and herbivores, and fire regimes. Six threat indicators have been selected for monitoring, comprised of 4 introduced vertebrates, lantana, and fire (Table 3).

Table 2. Biodiversity indicators and metrics for Curramore.

Key threatened and iconic vertebrates

Indicator	Survey name	Survey method	Metric/s
Mammals			
Koala (<i>Phascolarctos cinereus</i>)	Targeted Arboreal Mammal Survey	Spotlighting	Abundance, occupancy
Birds			
Plumed Frogmouth (<i>Podargus ocellatus plumiferus</i>)	Targeted Nocturnal Bird Survey	Call playback	Abundance, occupancy
Frogs			
Tusked Frog (<i>Adelotus brevis</i>)	Targeted Tusked Frog Survey	Spotlighting	Abundance, occupancy

Vertebrate assemblages and surveillance species

Indicator	Survey name	Survey method	Metric/s
Mammals			
Assemblage richness	All mammal surveys	Spotlighting, camera trapping, standard fauna survey (cameras and live trapping), incidentals	Number of species
Small-medium mammals (<5.5kgs)			
Rainforest mammal guild	Standard Trapping Survey	Live trapping	Occupancy, richness

Indicator	Survey name	Survey method	Metric/s
Dry forest mammal guild	Standard Trapping Survey	Live trapping	Occupancy, richness
Subtropical Antechinus (<i>Antechinus subtropicus</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Common Planigale (<i>Planigale maculata</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Northern Brown Bandicoot (<i>Isoodon macrourus</i>)	Standard Trapping Survey	Camera trapping	Abundance, occupancy
Long-nosed Bandicoot (<i>Perameles nasuta</i>)	Standard Trapping Survey	Camera trapping	Abundance, occupancy
Long-nosed Potoroo (<i>Potorous tridactylus tridactylus</i>)	Targeted Long-nosed Potoroo Survey	Camera trapping	Abundance, occupancy
Red-legged Pademelon (<i>Thylogale stigmatica</i>)	Standard Trapping Survey	Camera trapping	Abundance, occupancy
Fawn-footed Melomys (<i>Melomys cervinipes</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Bush Rat (<i>Rattus fuscipes</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Arboreal mammals			
Arboreal mammal guild	Targeted Arboreal Mammal Survey	Spotlighting	Occupancy, richness
Common Brushtail Possum (<i>Trichosurus vulpecula</i>)	Targeted Arboreal Mammal Survey	Spotlighting	Abundance, occupancy
Short-eared Brushtail Possum (<i>Trichosurus caninus</i>)	Targeted Arboreal Mammal Survey	Spotlighting	Abundance, occupancy
Large herbivores			
Swamp Wallaby (<i>Wallabia bicolor</i>)	Standard Trapping Survey	Camera trapping	Abundance, occupancy
Bats			
Yellow-bellied Sheath-tailed Bat (<i>Saccolaimus flaviventris</i>)	Bat Survey	Bioacoustic recordings	Abundance, occupancy
Eastern Horseshoe Bat (<i>Rhinolophus megaphyllus</i>)	Bat Survey	Bioacoustic recordings	Abundance, occupancy
Little Bent-winged Bat (<i>Miniopterus australis</i>)	Bat Survey	Bioacoustic recordings	Abundance, occupancy
Gould's Long-eared Bat (<i>Nyctophilus gouldi</i>)	Bat Survey	Bioacoustic recordings	Abundance, occupancy
Golden-tipped Bat (<i>Phoniscus papuensis</i>)	Bat Survey	Bioacoustic recordings	Abundance, occupancy
Birds			
Assemblage richness	All bird surveys	Spotlighting, call playback, bird survey transect, incidentals	Number of species
Wet sclerophyll forest guild	Standard Bird Survey (undertaken by Birds Sunshine Coast)	Bird survey transect	Richness
Dry sclerophyll forest guild	Standard Bird Survey (undertaken by Birds Sunshine Coast)	Bird survey transect	Richness
Black-breasted Button-quail (<i>Turnix melanogaster</i>)	Targeted Button-quail Survey	Call playback	Occupancy
Australian Logrunner (<i>Lopholaimus antarticus</i>)	Targeted Logrunner Survey	Call playback	Occupancy
Black-faced Monarch (<i>Monarcha melanopsis</i>)	Targeted Monarch Survey	Call playback	Occupancy
Variegated Fairy-wren (<i>Malurus lamberti</i>)	Targeted Fairy-wren Survey	Call playback	Occupancy
White-throated Treecreeper	Targeted Treecreeper Survey	Call playback	Occupancy

Indicator	Survey name	Survey method	Metric/s
(<i>Cormobates leucophaea</i>)			
Nocturnal birds			
Nocturnal bird guild	Targeted Nocturnal Bird Survey	Call playback	Occupancy, richness
Greater Sooty Owl (<i>Tyto tenebricosa</i>)	Targeted Nocturnal Bird Survey	Call playback	Occupancy
Reptiles			
Assemblage richness	Standard Trapping Survey	Standard fauna trapping, incidentals	Number of species
Rainforest reptile guild	Standard Trapping Survey	Live trapping	Occupancy, richness
Dry sclerophyll forest reptile guild	Standard Trapping Survey	Live trapping	Occupancy, richness
Elf Skink (<i>Erotoscincus graciloides</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Murray's Skink (<i>Silvascincus murrayi</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Garden Skink (<i>Lampropholis delicata</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Rose's Shadenskink (<i>Saproscincus rosei</i>)	Standard Trapping Survey	Live trapping	Abundance, occupancy
Other reptiles			
Lace Monitor (<i>Varanus varius</i>)	Standard Trapping Survey	Camera trapping	Abundance, occupancy
Frogs			
Assemblage richness	All frog surveys	Targeted Tusked Frog Survey, standard fauna trapping, incidentals	Number of species

Table 3. Threat indicators and metrics for Curramore.

Indicator	Survey name	Metric/s	Performance criteria
Feral predators			
Cat (<i>Felis catus</i>)	Standard Camera Survey. Methods under development for 'population size' metric.	Abundance, occupancy	TBD
Fox (<i>Vulpes vulpes</i>)	Standard Camera Survey. Methods under development for 'population size' metric.	Abundance, occupancy	TBD
Feral herbivores			
Deer (<i>Cervus</i> spp.)	Standard Camera Survey	Abundance	TBD
Cattle (<i>Bos taurus</i>)	Standard Camera Survey	Abundance	TBD
Weeds			
Lantana (<i>Lantana camara</i>)	Targeted Weed Survey (lantana)	Extent of infestation (ha), shoot frequency, occupancy.	TBD
Fire			
Fire	Fire Scar Analysis	Area burnt (ha) planned Area burnt (ha) unplanned	TBD

Survey types and history

To monitor biodiversity and threat indicators, our survey teams conduct surveys repeated every 3-5 years.

For key threatened and iconic species, three surveys are undertaken:

- Targeted Arboreal Mammal Survey for Koala (*Phascolarctos cinereus*)
- Targeted Nocturnal Call Playback Survey for Plumed Frogmouth (*Podargus ocellatus plumiferus*)
- Targeted Spotlighting for Tusked Frog (*Adelotus brevis*)

For vertebrate assemblages and surveillance species, eleven surveys are undertaken:

- Standard Fauna Survey
- Targeted Long-nosed Potoroo Survey
- Targeted Bat Survey
- Standard Bird Survey
- Targeted Nocturnal Call Playback Surveys
- Targeted Button-quail Survey
- Targeted Logrunner Survey
- Targeted Monarch Survey
- Targeted Fairy-wren Survey
- Targeted Treecreeper Survey
- Targeted Arboreal Mammal Survey

To monitor threats, 3 surveys are undertaken:

- Standard Camera Survey
- Targeted Weed Survey (lantana)
- Fire Scar Analysis

No surveys for threats were undertaken at Curramore in 2021. Five of the ecological surveys were conducted in 2021 (Table 4). The methodology is described and results of these surveys and computations are reported on in this document.

Table 4. Survey history and effort for Ecohealth surveys on Curramore presented in this report.

Survey name	Effort	Description/comment	Previous surveys
Arboreal Mammal Survey	3 x 30-45 minute spotlighting surveys	In 2021, three transects were established	2021 was the first survey
Targeted Long-nosed Potoroo Survey	108 trap nights (12 sites x 8-10 trap nights per site)	Targeted Survey using Camera Traps (one camera per site)	2021 was the first survey
Nocturnal Bird Survey	2 x 5 minute call play back and 5 minutes of active listening	In 2021, three nocturnal call playback sites were established	2021 was the first survey
Targeted Button-quail Survey	2 x sites	Call playback for Black-breasted Button-quail	2021 was the first survey
Targeted Tusked Frog Survey	1 x hour survey	A transect along Little Cedar Creek is walked at night where frogs are detected via spotlighting and calls	2016 – 1 x hour survey

Survey design and methods

Targeted Arboreal Mammal Survey

In 2021, 3 spotlighting transects were designed and established to monitor the arboreal mammals on Curramore (Figure 5). These ranged in length from 520 m to 1200 m and were limited by the extent of designated habitat they were intended to survey. Each spotlighting transect was completed in 30-45 minutes. One transect intersects dry sclerophyll forest dominated by ironbarks and grey gums (*Eucalyptus* spp.), bloodwoods (*Corymbia* spp.) and acacias (*Acacia* spp.). The second transect dissects wet sclerophyll forest and small patches of rainforest with a Flooded Gum dominated canopy, and the third transect, also in wet sclerophyll forest, has a Brush Box dominated canopy. This methodology changed from 2016 due to access being cut in some areas and new transect paths having to be created. It was also determined that one transect from 2016 was too dense in vegetation for spotlighting, as the canopy was severely obstructed from view by mid-story vegetation and therefore this historical transect was removed.

The survey began at a minimum of 30 minutes after dark. Whilst walking the transect, teams of two ecologists scanned the vegetation, using LED Lenser head torches, from the top of the canopy, through the main trunk and mid story, all the way to the lower story of vegetation. Animal eye shine or movement was used to detect mammal species. Once an animal was located, it was identified to species level. Data recorded included: date, time, weather conditions, GPS location of each detection, species identification, number of individuals and method of detection (e.g. seen/heard).

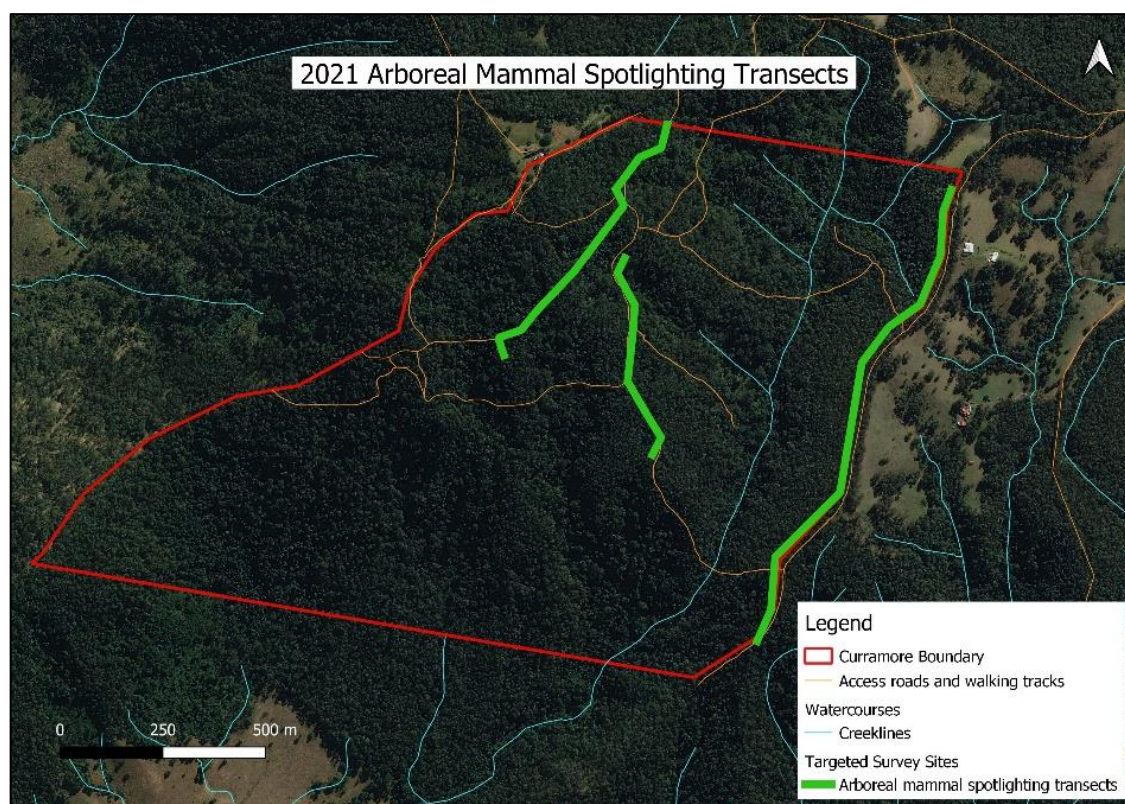


Figure 5. Location of arboreal mammal spotlighting transects undertaken at Curramore in 2021.

Nocturnal call playback surveys

In 2021, 3 sites were established for call play back for nocturnal species. These will be monitored every 3-5 years. These sites are located roughly halfway along each of the spotlighting transects (Figure 6). Site 1 is in dry sclerophyll forest along the sanctuary's eastern boundary, the second and third sites are both in wet sclerophyll forest. The vegetation types are described in the Arboreal Mammal Spotlighting methods section.

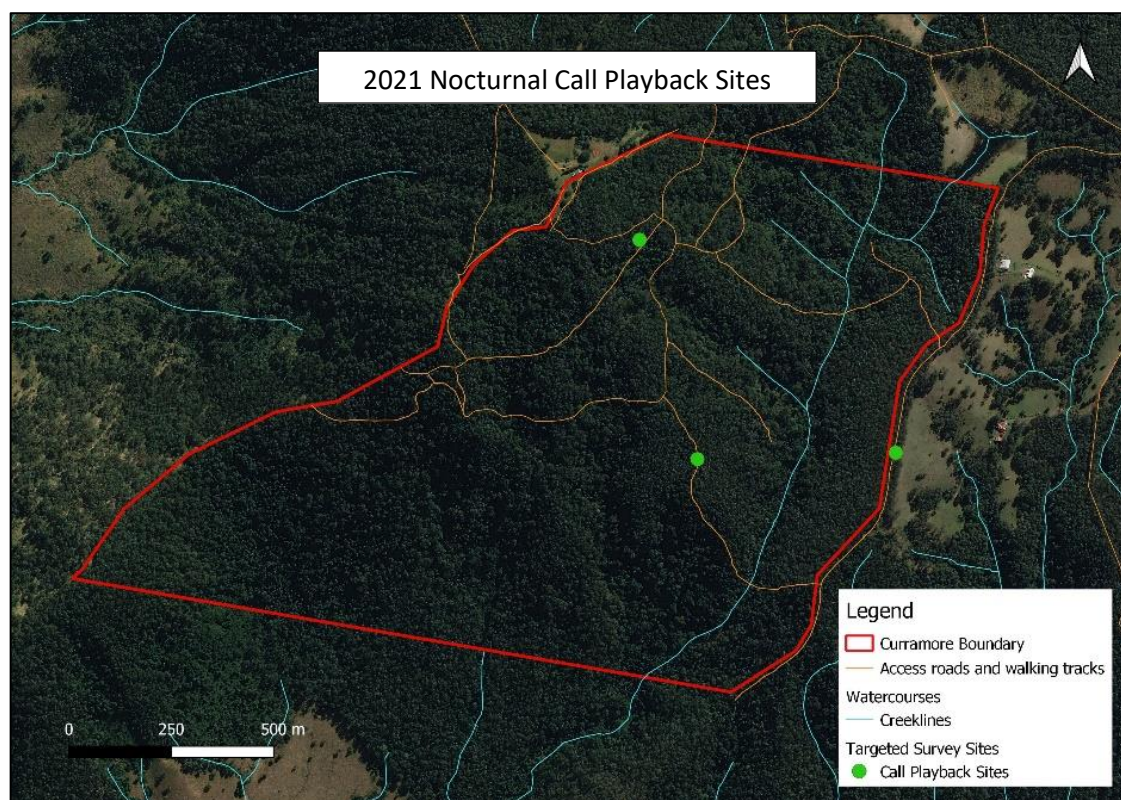


Figure 6. Location of nocturnal call playback surveys undertaken at Curramore in 2021.

Surveys began a minimum of 30 minutes after dark and began with 10 minutes of active listening at each site. If a nocturnal bird call was heard and identified to species, it was recorded. After this initial active listening period, 5 minutes of call playback for each species was undertaken and this was then followed by another 5 minutes of active listening per species. In addition to the two nocturnal bird species used as indicators (Greater Sooty Owl, *Tyto tenebricosa tenebricosa*) and Plumed Frogmouth we also played other nocturnal bird calls (Barking Owl, *Ninox connivens connivens*; Powerful Owl, *N. strenua*) to establish the assemblage of nocturnal birds for the sanctuary. In addition, we used call play back to gain incidental records for Yellow-bellied Glider, *Petaurus australis australis* and Koala), although metrics for the Koala was only derived from spotlighting transects.

Calls were played through a Bluetooth speaker at 85% max volume for the clearest projection through the forest. The species order used in call playback are listed below:

- 1) Koala
- 2) Yellow-bellied Glider
- 3) Plumed Frogmouth
- 4) Greater Sooty Owl
- 5) Barking Owl
- 6) Powerful Owl

This order was chosen with the largest predator (Powerful Owl) being last so as not to influence the behaviour of their mammalian prey species (e.g., Yellow-bellied Glider).

Targeted Tusked Frog Survey

This survey, first undertaken in 2016, was designed to assess the occupancy and relative abundance of the threatened Tusked Frog. Surveys commenced on the spotlighting transect of Little Cedar Creek (Figure 7) at least 30 minutes after dark. The transect is 870 m in length and took 1 hour to complete. LED Lensor head torches were used to scan the creek as well as the banks and small pools adjacent to the creek. Calls of Tusked Frog were used to direct search efforts along the creek line. Once an individual was located by sight or call the date, time, weather conditions, GPS location of each detection, species identification, number of individuals and method of detection (e.g., seen/heard) were recorded. No specimens were handled to identify this species.

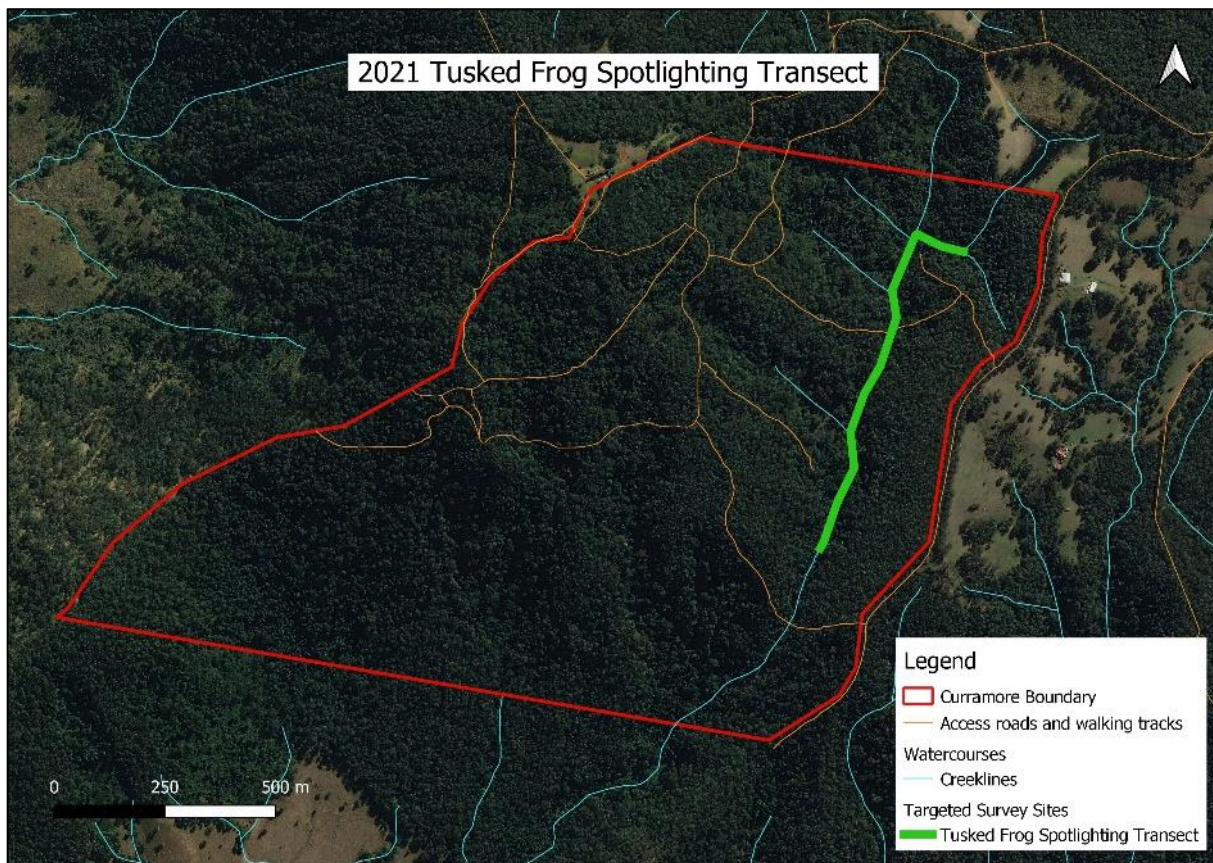


Figure 7. Location of Tusked Frog spotlighting transect along Little Cedar Creek, undertaken at Curramore in 2021.

Targeted Button-quail Survey

Call playback was used to survey Black-breasted Button-quail (*Turnix melanogaster*) at two sites in November 2021 (Figure 8). These sites were chosen because AWC staff found platelet-like scratchings in potentially suitable habitat (rainforest and wet sclerophyll forest). At each site, 10 minutes of continuous call playback from a Bluetooth speaker at 85% max volume was undertaken using the female contact call. Once finished, 5 minutes of active listening was undertaken to detect a response. Black-breasted Button Quail are thought to respond to call playback throughout the year, but more readily during the breeding season (September to March).

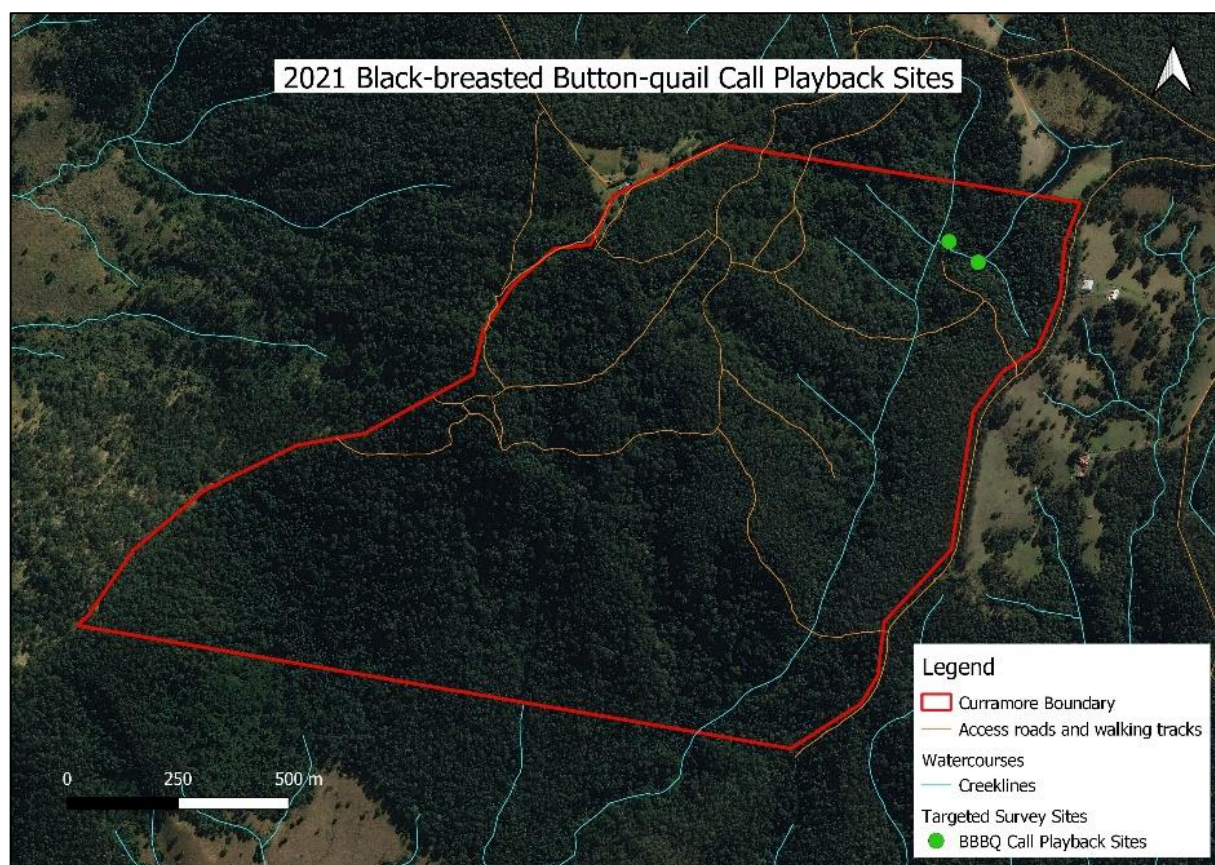


Figure 8. Location of Black-breasted Button-quail call playback sites undertaken at Curramore in 2021.

Targeted Long-nosed Potoroo Survey

To determine the presence of Long-nosed Potoroo (*Potorous tridactylus tridactylus*) on Curramore (a species which has not been detected on the sanctuary but has been located within 1 km), 12 camera traps were deployed along the ecotone between the dry and wet sclerophyll forest on the eastern side of Little Cedar Creek (Figure 9). Reconyx white flash camera traps were deployed at a height of 50 cm (to the top of the camera) with the bait positioned 1.5 m from the camera. Camera traps were baited with a mixture of peanut butter, oats and truffle oil formed into large balls. The bait was housed in a PVC container and attached to the ground with a metal peg. Camera traps were deployed in two groups in a linear fashion along the ecotone from north to south. The first group comprised 8 cameras deployed 50 m apart; the second group comprised 4 cameras also deployed 50 m apart. They were collected after 8-10 days. Camera trap settings were: 3 photos per trigger, Rapid fire (no lag between pictures), no wait time between triggers and high sensitivity.

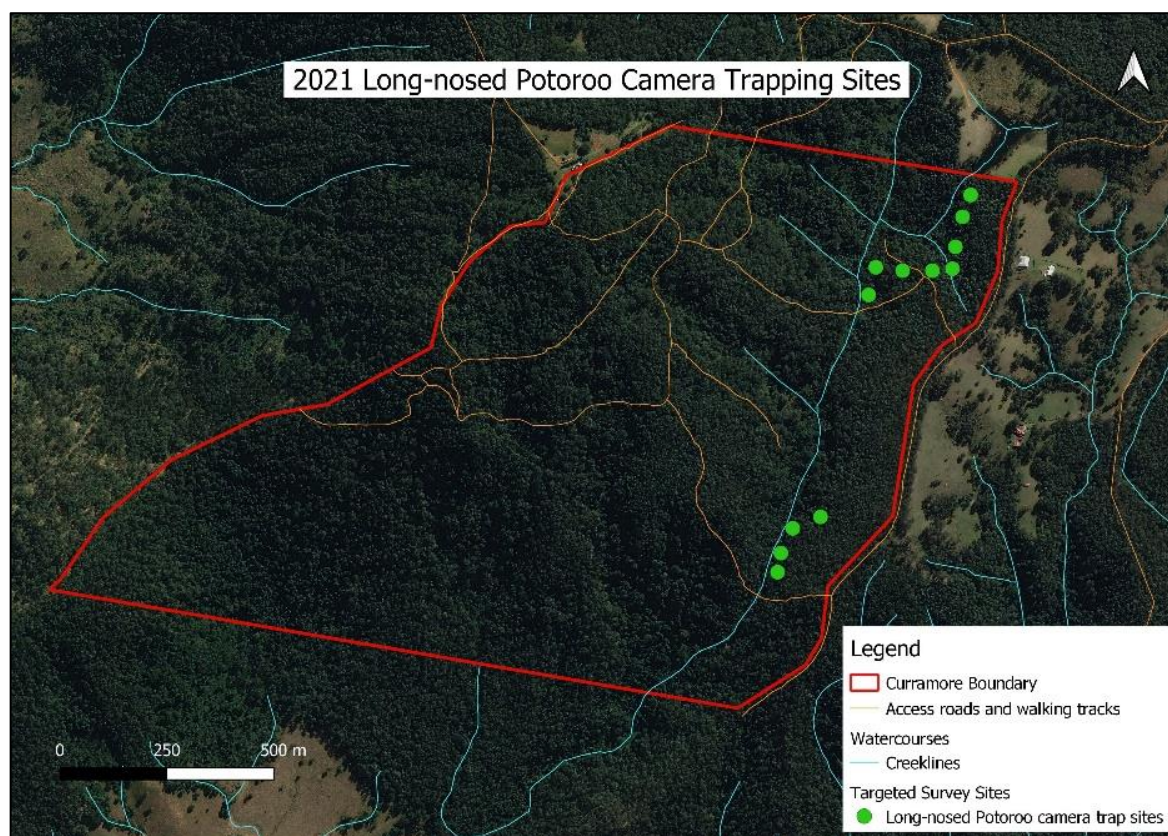


Figure 9. Location of Long-nosed Potoroo camera trapping sites undertaken at Curramore in 2021.

Analysis methods

Most Ecohealth metrics are common across the indicator species for Curramore. Unless noted otherwise, the metrics are calculated as set out in Table 5.

Table 5. Metrics and associated calculations for Curramore.

Indicator/s	Metric	Survey data sources	Description	Analysis summary/calculation
Mammals, birds, frogs	Abundance	Targeted Arboreal Mammal Survey Targeted Nocturnal Bird Survey Targeted Tusked Frog Survey Targeted Long-nosed Potoroo Survey	A measure of activity, either number of detections per 100 trap nights, or per site	No. individuals of each species recorded at each survey site/ total number of survey sites Calculations are restricted to habitats where each species or guild is likely to occur
Mammals, birds, frogs	Occupancy	Targeted Arboreal Mammal Survey Targeted Nocturnal Bird Survey Targeted Tusked Frog Survey Targeted Long-nosed Potoroo Survey Targeted Black-breasted Button-quail Survey	A measure of distribution; the proportion of sites where the species was recorded using a particular technique.	Number of sites at which the species was recorded/ number of sites surveyed) [x 100 if reporting as a %] Calculations are restricted to habitats where each species or guild is likely to occur

Indicator/s	Metric	Survey data sources	Description	Analysis summary/calculation
Arboreal Mammal Guild	Richness	Arboreal Mammal Spotlighting Survey	A measure of diversity; average number of species per site	Average number of species recorded at each site.
Nocturnal Bird Guild		Nocturnal Call Playback Survey		

Results

Key threatened and iconic vertebrates

Koala

Four individual koalas were detected during the Arboreal Mammal Spotlighting Surveys in 2021. The average abundance of the Koala for 2021 is 1.3 animals/transect. Two out of three transects recorded koalas; the occupancy of the Koala at Curramore in 2021 is 66%.

Koalas are large, arboreal mammals that have bright eye shine and loud bellowing calls during the mating season, which makes them easily detectable. Koalas are believed to occur across the entire sanctuary and therefore all 3 spotlighting transects were used in the analyses.

Tusked Frog

Thirteen individuals of this threatened species were recorded during the 2021 targeted Tusked Frog Survey. Prior to this survey, 1 individual was observed in 2016. Increased detections in 2021 could have resulted from the warm and wet weather experienced during the survey and also targeting this species during peak breeding season when call activity is highest.

Plumed Frogmouth

Two individuals were detected during the call playback surveys in 2021. The average abundance was 0.67 animals/transect and occupancy was 66%.

Vertebrate assemblages and surveillance species

Mammals (assemblage)

Since 2019, 28 mammal species have been detected at Curramore from 57 confirmed, very likely or likely to occur. Missing species are mostly bat species (22) that required targeted surveys.

Long-nosed Potoroo

Long-nosed Potoroo were not detected from the camera trapping survey targeting this species. This species is yet to be detected on the sanctuary. Detections of this cryptic species have occurred recently (within the last 12 months) in the vicinity of Curramore in similar habitat. A dense understory with a sufficient food supply of truffles seems to be the key habitat features required by Long-nosed Potoroo and ongoing efforts will be made to detect this species.

Arboreal mammal guild

Arboreal mammals were detected on all three transects in 2021. The average species richness for the arboreal mammal guild is 2.3 species per transect. The species observed in 2021 included the Common Brushtail Possum (*Trichosurus vulpecula*), Short-eared Brushtail Possum (*Trichosurus caninus*), Koala, Sugar Glider (*Petaurus breviceps*) and Fawn-footed Melomys (*Melomys cervinipes*). Species that occur or are likely to occur on Curramore but were not recorded in the 2021 Arboreal Mammal Spotlighting Survey include Yellow-bellied Glider, Greater Glider (*Petauroides volans*), Broad-toed Feathertail Glider (*Acrobates frontalis*), Squirrel Glider (*Petaurus norfolcensis*), Eastern Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*) and Common Ringtail Possum (*Pseudocheirus peregrinus*).

Short-eared Brushtail Possum were recorded from the two transects that had suitable habitat for the species (i.e. in south-east Queensland, Short-eared Brushtail Possum is restricted to moist rainforests and wet

sclerophyll forests which usually occur at higher elevations along the ranges). Three individuals were recorded with an average abundance of 1.5 animals/transect and occupancy of 100%.

In contrast, the Common Brushtail Possum is only found in dry sclerophyll and only one transect was used in the analysis. Occupancy was 100% and abundance was 4 animals/transect. This species of possum is common across its range along the east coast and one of the most commonly observed species of arboreal mammal.

No Yellow-bellied gliders were detected in 2021 and are still yet to be confirmed for Curramore.

Birds

Since 2019, 49 bird species have been detected at Curramore from 150 confirmed or likely to occur. This low number of bird species recorded reflects the small amount of time the AWC ecologists are able to spend at Curramore. In January 2022, Sunshine Coast bird watching branch of Birds Queensland began monthly surveys of Curramore which will provide valuable data with respect to the bird assemblages found on the sanctuary.

Black-breasted Button-quail

No Black-breasted Button-quail were detected from either site in the targeted call playback survey. This species is yet to be detected on Curramore; however, recent observations have been made in the upper Mary Valley and hinterland area, as close as 5.2 km away. Surveys for this species will continue as land management activities continue to improve habitat quality on the sanctuary.

Nocturnal bird guild

Nocturnal birds were recorded at two of the three call play back sites in 2021. Three species (Plumed Frogmouth, Tawny Frogmouth (*Podargus strigoides*), Australian Boobook (*Ninox boobook*) were detected at the dry sclerophyll site. Plumed Frogmouth were found at one of the wet sclerophyll sites.

The average species richness for the nocturnal bird guild in 2021 is 1.3 species per site. A range of species are known to occur on Curramore that were not recorded in 2021 including Bush Stone-curlew (*Burhinus grallarius*), Powerful Owl, Eastern Barn Owl (*Tyto javanica*), Australian Masked Owl (*Tyto novaehollandiae*), Greater Sooty Owl, White-throated Nightjar (*Eurostopodus mystacalis*) and Australian Owlet Nightjar (*Aegotheles cristatus*).

Reptiles

Since 2019, 9 reptile species have been detected at Curramore from 50 confirmed, most likely or likely to occur. Missing species are mostly snakes (15 species) and small skinks, geckos and other lizards (27 species). This small number again represents undersampling, and we expect to record most species in the upcoming 2022 standard fauna survey.

Frogs

Since 2019, 9 frog species were detected of the 24 species known to occur at Curramore. This low number of species recorded reflects the small amount of survey time AWC ecologists have been able to spend at Curramore. In 2022, a Standard Fauna Survey will be conducted and an increase of frog species detections is expected.

Threat indicators

Fire

No prescribed burning was undertaken in 2020 or in 2021, and no unplanned fire entered Curramore during that timeframe. Very hot and dry conditions over that period across the majority of south-east Queensland led to total fire bans in most areas for most of the fire season. Due to the prevailing conditions, permits for prescribed burning were not being issued by the local fire warden. The last prescribed burn occurred at Curramore in 2017 and targeted the dry sclerophyll forest on the eastern side of the property.

Discussion

The Ecohealth monitoring program at Curramore provides useful information on the distribution, occupancy, abundance and trends of the species, guilds, ecological processes and threats on the sanctuary. As these surveys are repeated over the coming years, our understanding and confidence in these metrics will increase. The data presented in this report are in most cases baseline data and future surveys are expected to show trends in trajectory of species and guilds. The targeted Tusked Frog Spotlighting survey is the only survey where comparisons can be made of abundance over time and this has increased between surveys in 2016 and 2021. The detection rates of Koala in 2021 were encouraging with the species now listed as Endangered under Commonwealth and State legislation. This iconic species has been detected incidentally at Curramore over the years, however observing four individuals from the spotlighting surveys is a sign that Curramore is providing quality habitat for this species within a fragmented landscape.

The lack of detections of some species that were targeted in the 2021 surveys (i.e., Black-breasted Button-quail and Long-nosed Potoroo) reflects the low density and cryptic behaviour of these species that may require more survey effort over time to detect. South-east Queensland, and especially the Sunshine Coast, has undergone significant development within the last 15 years. This has resulted in increasing pressure on many rare and threatened species to persist in smaller patches of refugia and fragmented habitats. The outlook is promising for some threatened species such as the Black-breasted Button-quail and Long-nosed Potoroo which, although yet to be detected on Curramore, have been recorded from the local area within the last 12 months on private Land for Wildlife properties.

Acknowledgments

AWC acknowledges the Gubbi Gubbi people, the Traditional Custodians, of Gubbi Gubbi Country on which Curramore resides. We also acknowledge their continuing connection to land, culture and community. We pay our respects to Elders past present and emerging.

AWC's Ecohealth Program is only possible because of the generosity of AWC's supporters.

For their assistance in conducting Ecohealth surveys at Curramore in 2021, we particularly thank Emily Rush and Klaus Runde.

References

- Bureau of Meteorology (2021) *Daily Rainfall Maleny Denning Rd*. Accessed at www.bom.gov.au. Date 6th January 2021.
- Hurry C, Schmidt D, Hughes J (2015) Phylogeography and limited distribution of the endangered freshwater crayfish, *Euastacus urospinosus*. *Australian Journal of Zoology* 63, 236-244.
- Kanowski J, Joseph L, Kavanagh R, Fleming A (2018) Designing a monitoring framework for Australian Wildlife Conservancy, a national conservation organisation. In: *Monitoring Threatened Species and Ecological Communities* (Eds S Legge, DB Lindenmayer, NM Robinson, BC Scheele, DM Southwell, BA Wintle) pp 241-253. CSIRO, Melbourne.
- Stanton P (2004) *The Vegetation of Curramore*. Australian Wildlife Conservancy. Perth, WA.
- Virikki D, Tran, C, Castley, G (2012) Reptile responses to Lantana management in a Wet Sclerophyll Forest, Australia. *Journal of herpetology* 46, 177-185.

Copyright © Australian Wildlife Conservancy 2022

Images © individual photographers and AWC

All images, text and graphics in this Report are protected by copyright law.

Apart from fair dealing for the purpose of private study research, criticism or review, as permitted under the *Copyright Act 1968*, no part of this Report may be reproduced by any process or reused for any purposes whatsoever without prior written permission from AWC.

Enquiries should be made to John.Kanowski@australianwildlife.org