CORRIDORS AND CORE HABITATS FOR KOALAS PROJECT

Project activities, outcomes and reports

A. Establish Harvest Exclusion Zones

Project Activities 1 & 2

1. *Undertake supplementary fieldwork to that previously conducted by the EPA, to finalise the design of a harvest exclusion zone for protecting core koala habitat.*
2. *EPA to work with Forests NSW to create harvest exclusion zones in these forests, legislating these changes under the Eden Integrated Forestry Operations Approval (IFOA) with a review in 2016 informed by results from monitoring and linked management actions.* Relevant Project Outcome: *Protect & enhance 2,800 ha of high conservation value koala habitat in the Murrah, Mumbulla and Bermagui State Forests by creating harvest exclusion zones to help the small koala population stabilise*

Survey results from project (see Section E, below) highlighted difficulty establishing zones that would effectively protect the population. Consequently, on 30 October 2015, the NSW Cabinet Standing Committee on Resources and Land Use approved the dedication of four Flora Reserves in the Eden Management Area, covering 11,800 ha of the Murrah, Mumbulla, Tanja and Bermagui State Forests[1], and thus logging was excluded from the whole area.

Interim working plan[2] for the new reserves developed and implemented in 2016.

Final Working Plan[3] developed by Murrah Reserves Steering Committee. Currently awaiting sign-off by DPI and OEH CEO's.

B. Lidar mapping

Project Activity 3

To ensure that Forests NSW has capacity to support the implementation of these measures, LiDAR mapping and a timber market study will be conducted to assess the suitability of alternative timber supply from other suitable areas of State Forests.

Lidar mapping and timber market study undertaken by FNSW, providing the basis of the allocation of $2,200,000 by NSW Environmental Trust FNSW to fund timber harvesting from areas to the north of the coastal forests study area.

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[1] Blair Nial (2015). Cabinet in confidence communication with Minister for Environment, Mark Speakman

[2] Office of Environment and Heritage (2016a). Murrah Flora Reserves Numbers 187, 188, 189, 190 Interim Working Plan Mumbulla, Tanja, Murrah and Bermagui State Forests. Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[3] Office of Environment and Heritage (2016b). Murrah Flora Reserves Draft Final Working Plan. Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

C. Silviculture restoration

Project Activity 4

The EPA will work with Forests NSW and conduct a vegetation assessment to assess the effectiveness of the regrowth and vegetation in the area for the benefit of the koala population and the broader forest values. Where the vegetation in these areas could be enhanced to provide greater opportunity for regeneration of appropriate koala browse species, a Silviculture Restoration Plan will be developed.

Plan developed to establish a pilot rehabilitation and research project in which both the regeneration of preferred koala browse species and reduced fuels are achieved at <7 degraded forest sites located within the SENSW coastal forests koala study area[4], [5]. Implemented in 2015-16.

Scoping Report[6] Review of Environmental Factors completed 2017[7] and on-ground works implemented at 30 X research plots trialling varying combinations of treatments including: a) thinning non-target species regrowth; b) application of fire; c) raking to expose mineral earth; and, d) direct seeding using seedballs in plots where both seed trees do and do not occur.

D. Census of the koala population in South Gippsland

Project Activity 5

The EPA will work with the Victorian Government to conduct a census of the koala population in South Gippsland to assess its suitability as a source for a translocation into the NSW far south coast population. If suitable, this project will include translocating a small group of koalas into NSW (see map for Release Site) to boost the region's population. substantial monitoring program will be implemented which builds on the Office of Environment and Heritage's South-east NSW Koala Survey and Monitoring Program completed in 2008[8].

Feasibility study

Investigation by Phillip and Allen[9] recommending source population for translocation be from the Strzelecki Ranges, South Gippsland, Victoria where there is a large, resilient and genetically diverse population of koalas that is sustained by the same eucalypt species to those predominating in the Tantawangalo section of the South East Forests National Park.

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[4] Chris Allen (2015). *Rehabilitating Koala Habitat in Degraded Forest: Proposal for a Pilot Project in the Coastal Forests Koala Study Area.* NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[5] Tom Reid (2016). Koala habitat restoration monitoring protocol (Draft). NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[6] Chris Allen (2016). *Scoping Document for Rehabilitating Koala Habitat*. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[7] Envirokey (2017). Review of Environmental Factors (Final) Proposed Koala Habitat Rehabilitation, South East NSW Coastal Forests. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[8] Office of Environment and Heritage (2012). Commonwealth Government Clean Energy for the Future Biodiversity Fund Application *Corridors and core habitat for koalas on the NSW Far South Coast. Receipt Number LSP-945029-1202*.

[9] Steve Phillips and Chris Allen (2012). Koala conservation in the south-east forests: an assessment of the need for and feasibility of a population augmentation program. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548

Koala population census, East Gippsland

Field survey managed by OEH using the RG-bSAT method was undertaken over 3,525ha within the Strzelecki ranges study area and was completed in May 2014 [10],[11]. The study confirmed that population occurs at medium densities (0.25 ± 0.07 koalas ha-1), with substrate and the abundance of preferred food tree species identified as the key factors influencing koala density, and the estimated koala population size within the 3,525 ha assessed by the field survey program was estimated to be in excess of 800 individuals, thus being of a sufficiently large enough size to accommodate the removal of 21 animals without impacting on either the short or long-term viability of the population.

Translocation proposal

The translocation proposal[12] developed by OEH, seeking approval to reintroduce koalas into the Tantawangalo section of the South East Forests National Park in south eastern NSW.

Chlamydia prevalence study

Seven swab samples were analysed[13]. Five of these returned positive for *Chlamydia pecorum* from samples taken from the animals' urogenital tract. No evidence of *Chlamydia pneumonia* was identified. Of the pellet samples, six returned positive for *Chlamydia*, five of which correlated with the swab results. In the first sequencing attempt the *Chlamydia OmpA* gene was extracted from five pellet samples. Two different genotypes were identified.

University of Sydney review of translocation proposal

A review of the proposal by the Koala Health Hub (Sydney University)[14] concluded: *Based on the high prevalence of chlamydia infection in the Strzlecki Ranges and the less than 100% sensitivity of currently available diagnostic tests, we conclude that this population of animals is not an appropriate source for augmentation efforts into Tantawangalo. Additionally, given that the chlamydia status of the koalas in SENSW is not known, it must be considered a possibility that local animals could be a source of Chlamydia for introduced animals. Therefore, koala translocation from Campbelltown should not be undertaken until the chlamydial status of the koala population in SENSW is determined and found to be negative.*

[10] Steve Phillips and Chris Allen (2014). Strzelecki Ranges Koala Survey. Corridors and Core Habitat for Koalas Project. November 2013-April 2014. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[11] Chris Allen (2015). *Koala distribution, abundance, habitat and chlamydia Prevalence studies in the Strzelecki Ranges. Corridors and Core Habitat for Koalas Project. November 2013 – May 2015.* NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[12] Office of Environment and Heritage (2015b). *Translocation proposal for the re-introduction of koalas into the Tantawangalo section of the South East Forest National Park, NSW.* Principal Investigators: Chris Allen; Rob McKinnon & Dr Stephen Phillips. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

[13] Allen (2015). Strzelecki Ranges study

[14] David Phalen, Damien Higgins and Mark Krockenberger M (2015) *Review of the Koala Augmentation Proposal for the South East Forests of New South Wales*. Koala Health Hub the University of Sydney.

E. Survey and monitoring

Project Activity 6:

> *Intensive monitoring will be conducted every 3 years in the Primary Area and Release Site to assess population trends. Broader monitoring will occur elsewhere in the region in Year 2 and Year 6 to track the species' regional status.* Project Outcome: *Implement a site-specific monitoring program for koalas in the Primary Area, to detect changes and inform forest management over the 6 years remaining under the Regional Forest Agreement and to determine long term management arrangements.*

Surveys

2012-14: Survey to assess koala distribution, abundance and tree species preferences at >1,000 grid-sites across 30,000 ha study area using the Regularised Grid-based Spot Assessment Technique (RGb-SAT) method (Office of Environment and Heritage 2015)[15]. Data entered into SENSW koala database.

ikoala

Analysis of results and development of ikoala[16]; a programming tool linked to koala database and the statistical package 'R', providing the capacity to automatically generate reports on koala distribution, activity levels and tree species and size-class preferences

Comparative analysis of 2007-9 and 2012-14 data

Adamack et al (2016)[17] investigated the extent the foundational datasets from this and previous surveys could contribute to a koala population monitoring program.

Detectability Study

Gruber & Aaron Adamack 2014[18] undertook an experiment to estimate the overall detection probability of koala faecal pellets when searched for using the RGb-SAT method to help calculate confidence levels that could be attributed to results from a monitoring program.

Monitoring program

The existing SENSW koala database was upgraded to enable electronic uploading of tree species, and size class preference data, as well as those of fuel-loads, canopy condition, stand density and age-class at each grid-site.

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[15] Office of Environment and Heritage (2016). *2012–14 Koala survey report in coastal forests of south-eastern NSW – Bermagui/Mumbulla area.* Corridors and Core Habitat for Koalas Project, Office of Environment and Heritage, Merimbula. http://www.environment.nsw.gov.au/publications/nativeanimals/koala-survey-bermagui-mumbulla-160233.htm

[16] Bernd Gruber, Veronika Vy˘sn´a & Aaron T. Adamack (2014). SENSW Coastal Forests Koala Survey 2012-2013 Analysis of occurrence, activity and tree preference – Report. University of Canberra, ACT

[17] Aaron Adamack, Veronika Vysna & Bernd Gruber (2016). *Comparison of Koala Surveys in South-Eastern NSW Coastal Forests 2007-2009 & 2010-2013 Analysis of occurrence, activity and tree preference –Report.* University of Canberra, ACT.

[18] Gruber & Aaron Adamack 2015. *Koala Poo Survey.* University of Canberra. ACT

The monitoring program was initiated, based on the report by Bernd Gruber & Aaron Adamack (2016)[19]. The study area was subdivided into 5 sub areas (Figure 1) and a monitoring program focussing on one sub-area per annum was implemented. This aimed to assess approximately 100 grid-sites per year, selected to maximise potential of robust statistical analyses, and providing a sampling regimen of approximately 500 grid-sites per koala generation (6 years). The report above indicated that a 30% change in occupancy would be detected with 90-95% confidence with this program. Selected grid-sites were assessed in two sub areas in 2015-16 with a preliminary report prepared by Allen (2017)[20].

Broader regional survey

RGb-SAT surveys also undertaken in Kooraban NP and the Yurammie, Tantawangalo and Mogilla sections of the South East Forests National Park to: a) inform fire management; b) undertake assessment of potential release sites; follow up on reported sightings and/or the finding of pellets.

Genetic studies by Koala Health Hub (Sydney University)

To inform management of these populations, the study aimed to gain information on the following:

- Disease status (Chlamydia and KoRV infection prevalence)
- Genetics- Sex ratio and Genetic diversity
- If samples permit, home range size

Key technical outcomes of the study[21] were:

- advances in obtaining useable DNA over a greater range of scat quality;
- advances in assays for use on highly fragmented DNA from more aged scats;
- quantified sensitivity of chlamydial PCR for various levels of scat quality;
- confirmed concordance of fresh scat-based and swab-based chlamydial qPCR.

Key ecological outcomes were:

- *Chlamydia pecorum* appears likely to be absent from Mumbulla population (approx. 80% certainty) but is present in Kooraban, Bermagui, and Murrah State Forest.
- The 100% prevalence of Koala retrovirus A, typical of Qld and NSW koalas, extends to this population. Unable to comment on presence/ absence of KoRV B.
- Observed sex ratio approx. 3:4 if joeys excluded. Three female-joey pairs identified.
- Some, but limited, mitochondrial DNA diversity within Mumbulla, with absence of genotypes from nearby Southern Tablelands and Mallacoota, but similarity to a genotype from Tubbut, Vic; suggestive of past founder effects and/or genetic drift in Mumbulla population.

F. Threat management

Project activity 7

[19] Bernd Gruber & Aaron Adamack (2016). Draft report to inform the sampling effort of the Koala monitoring programme around Bega. University of Canberra. ACT

[20] Chris Allen (2017), *Koala Monitoring in SENSW Coastal Forests -Preliminary results and some reflections.* Office of Environment and Heritage, Merimbula.

[21] Damien Higgins, David Phalen, Andrea Casteriano, Mark Krockenberger (2017). *Management of Small, Isolated, Coastal Population of Koalas in Southeast New South Wales: Final Report*. June 2017. Koala Health Hub, The University of Sydney.

Establish a collaborative land management group involving Forests NSW, OEH/EPA, Catchment Management Authorities, private land owners and the indigenous community to assess and improve threat abatement programs and fire management. Project Outcome: P*repare and implement a best practice threat abatement plan and fire management regime across all tenures.*

Wild dog and fox control program undertaking ground-baiting using buried 1080 meat baits reviewed and extended.

Agency/community consultation and report[22] reviewing Strategic Fire Advantage Zones in existing Bega Valley Bushfire Risk Management Plan and proposing adaptions to reflect known distribution of koalas and improve their protection against wildfire.

Fire simulation modelling[23] using the PHOENIX RapidFire fire behaviour simulator to compare fuel treatment strategies that meet the twin objectives of reducing wildfire risk to human settlements and a fire sensitive endangered species, the koala (*Phascolarctos cinereus*).

Most cost-effective option identified in Bentley and Penman (2016) adopted as the Murrah Landscape Fire Management Strategy[24].

References

CCH Commissioned Reports

Aron Adamack, Veronika Vysna & Bernd Gruber (2016). Comparison of Koala Surveys in South-Eastern NSW Coastal Forests 2007-2009 & 2010-2013 Analysis of occurrence, activity and tree preference –Report. University of Canberra, ACT

Bernd Gruber, Veronika Vy˘sn´a & Aaron T. Adamack (2014a). *SENSW Coastal Forests Koala Survey 2012-2013 Analysis of occurrence, activity and tree preference – Report*. University of Canberra, ACT

Bernd Gruber, Veronika Vy˘sn´a & Aaron T. Adamack (2014b). *Strzelecki Ranges Koala Survey 2012-2013 Analysis of occurrence, activity and tree preference – Report*. University of Canberra, ACT

Bernd Gruber & Aaron Adamack (2016). *Draft report to inform the sampling effort of the Koala monitoring programme around Bega.* University of Canberra. ACT

Damien Higgins, David Phalen, Andrea Casteriano, Mark Krockenberger (2017). *Management of Small, Isolated, Coastal Population of Koalas in Southeast New South Wales: Final Report*. June 2017. Koala Health Hub, The University of Sydney.

David Phalen, Damien Higgins and Mark Krockenberger M (2015). *Review of the Koala Augmentation Proposal for the South East Forests of New South Wales* Koala Health Hub the University of Sydney

[22] Chris Allen (2014). Corridors and Core Habitat for Koalas Project: Reducing the threato f fire on koalas in the SENSW Coastal Forests. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548. September 2014.

[23] Paul Bentley and Trent Penman (2017). *Is there an inherent conflict in managing fire for people and conservation?* International Journal of Wildland Fire 2017, 26, 455–468 http://dx.doi.org/10.1071/WF16150 School of Ecosystem and Forest Sciences, University of Melbourne, Creswick, Vic. 3363, Australia.

[24] Office of Environment and Heritage (2016). Murrah Landscape Fire Management Strategy. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Envirokey 2017. Review of Environmental Factors (Final) Proposed Koala Habitat Rehabilitation, South East NSW Coastal Forests. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Paul Bentley and Trent Penman (2017). *Is there an inherent conflict in managing fire for people and conservation? International Journal of Wildland Fire 2017, 26, 455–468* Steve Phillips and Chris Allen (2012). *Koala conservation in the south-east forests: an assessment of the need for and feasibility of a population augmentation program.* NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548

Steve Phillips and Chris Allen (2014). *Strzelecki Ranges Koala Survey -July 2014. An interim report.* NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

http://dx.doi.org/10.1071/WF16150 School of Ecosystem and Forest Sciences, University of Melbourne, Creswick, Vic. 3363, Australia.

Internal Reports

Chris Allen (2014). *Corridors and Core Habitat for Koalas Project: Reducing the threat of fire on koalas in the SENSW Coastal Forests.* NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548. September 2014.

Chris Allen (2015a). *Koala distribution, abundance, habitat and chlamydia Prevalence studies in the Strzelecki Ranges. Corridors and Core Habitat for Koalas Project.* November 2013 – May 2015. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Chris Allen (2015b). Rehabilitating Koala Habitat in Degraded Forest: Proposal for a Pilot Project in the Coastal Forests Koala Study Area. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Chris Allen (2016). *Scoping Document for Rehabilitating Koala Habitat*. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Office of Environment and Heritage (2012). Commonwealth Government Clean Energy for the Future Biodiversity Fund Application *Corridors and core habitat for koalas on the NSW Far South Coast. Receipt Number LSP-945029-1202*.

Office of Environment and Heritage (2015a). *Translocation proposal for the re-introduction of koalas into the Tantawangalo section of the South East Forest National Park, NSW*. Principal Investigators: Chris Allen; Rob McKinnon & Dr Stephen Phillips. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548. September 2014.

Office of Environment and Heritage (2016a). *Murrah Flora Reserves Numbers 187, 188, 189, 190 Interim Working Plan Mumbulla, Tanja, Murrah and Bermagui State Forests*. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Office of Environment and Heritage (2016b). Murrah Flora Reserves Draft Final Working Plan. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Office of Environment and Heritage (2016c). *2012–14 Koala survey report in coastal forests of south-eastern NSW – Bermagui/Mumbulla area*. Corridors and Core Habitat for Koalas Project, NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548. http://www.environment.nsw.gov.au/publications/nativeanimals/koala-survey-bermagui-mumbulla-160233.htm

Office of Environment and Heritage (2016c). Murrah Landscape Fire Management Strategy. NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.

Tom Reid (2016). Koala habitat restoration monitoring protocol (Draft). NSW Office of Environment and Heritage PO Box 656 Merimbula NSW 2548.