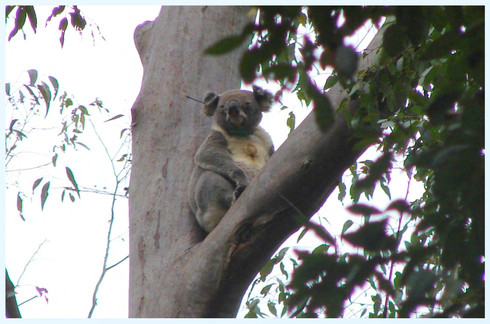

Investigation of the impacts of roads on koalas

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Figure 1: Study area, Bongil Bongil National Park, approx. 20 km south of Coffs Harbour, NSW (photo courtesy of the NSW Roads & Traffic Authority).

Introduction:

Koalas occurring adjacent to the Pacific Highway at Bongil Bongil National Park (formerly Pine Creek State Forest; Figure 1) have been monitored periodically since 1999. The objective of the project is to examine the impacts of roads on koalas by monitoring a number of koalas within 500 m of the highway, prior to, during and after the construction of a major upgrade. The upgrade involved the clearing of approximately 65 ha of vegetation during construction of a new four-lane section of road to replace the previous two-lane highway and included the construction of fauna underpasses, a fauna overpass (Figure 2) and fauna exclusion fences. Methods include radio-tracking, scat surveys, infra-red camera surveillance and examination of road-kill data. The original schedule involved each phase being of two years duration and each phase being implemented consecutively over the six-year period from 2000, but was varied to accommodate changes to the construction schedule. The current schedule is as follows:

- Phase One - 2 years prior to construction (September 2000 - September 2002);
- Phase Two - 2 years during construction (September 2006 - September 2008); and
- Phase Three - 2 years after construction (September 2008- September 2010).

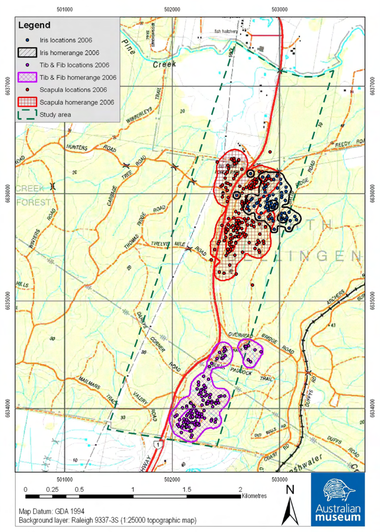
The project has recently entered the final "post construction" phase.

Figure 2: Aerial photograph of the fauna overpass within the study area.

The results so far:

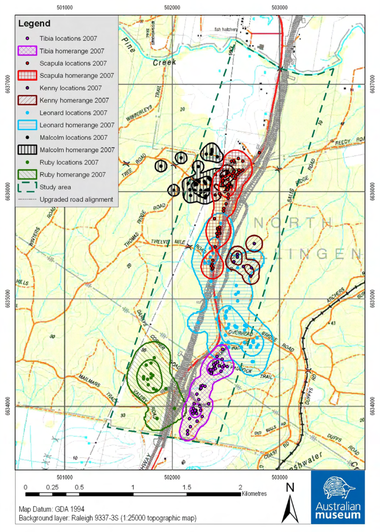
1. Impacts on individual koalas

The home range of at least one radio-collared Koala has been affected and the displacement may have resulted in a "domino-effect", with increased competition for habitat, territorial disputes, and increased stress levels for resident Koalas. There is some evidence to suggest that mortality of three of the experimental animals may be related to such territorial disputes. However, this needs to be explored further; there is no direct evidence, post-mortem results were inconclusive and there are a number of plausible explanations that are not related to the construction work. Conversely, the home range of at least one female Koala appears to have been largely unaffected by the construction of the new highway (see Figures 3 and 4).



Home ranges of radio-collared Koalas during September 2006-07 (Figure 3; above right) and September 2007-08 (Figure 4; right).

Note: the home range of "Scapula" was restricted following installation of fauna exclusion fencing when vegetation clearing for the new highway occurred. Mortalities during 2007 included "Kenny", "Leonard" and "Malcolm" — all male Koalas with home ranges overlapping with Scapula. The home range of "Tibia" remained similar from 2006-07 to 2007-08.



2. Reduced road-kills

A number of measures were implemented during construction to avoid or minimise direct impacts on Koalas. Some of these, in particular the extent of fauna exclusion fences, were revised in October 2007 following the occurrence of a number of road-kills within the study area and observations of Koalas within or adjacent to the construction site. The data indicate that the number of road-kills in October 2007, although relatively high, was consistent with some previous years. Only one road-kill has been recorded since the installation of more extensive fauna exclusion fencing in late October 2007 (Figure 5).

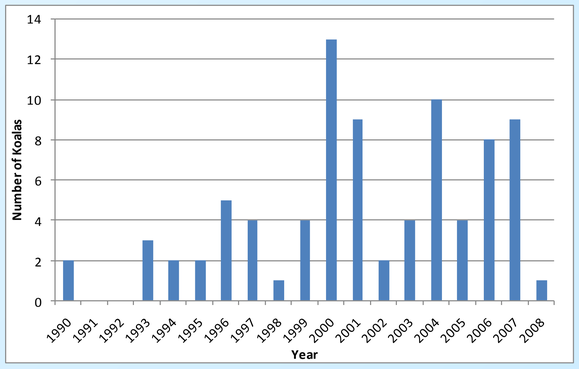


Figure 5: Koala road-kills within the study area from 1990 to 2008.

3. Remote camera surveillance

A remote camera surveillance system was completed in January 2009 to monitor use of the fauna movement structures by Koalas. This would also detect other fauna. Eight cameras were distributed as follows:

- Raleigh underpass (3 x 3 box culvert) – 2 cameras with passive IR (one at each end) and 2 treadle sensors on the "furniture" (one at each end);
- Infra 2 underpass (dedicated fauna underpass approx. 30 wide at base) – 2 cameras with passive IR (one on each side); and
- Overpass – 4 cameras with active IR (on two poles in the centre).

The underpass cameras have been operational since early December 2008 and the overpass cameras since early January 2009. Initial results indicate a range of native and introduced fauna utilising the fauna movement structures, including at least one koala (Figure 6).

Prior to 8 March 2009 the monitoring cameras obtained a total of 223 records covering 24 different species, including species of mammal, bird, reptile and frog. The most common species utilising the fauna movement structures was the Swamp Wallaby (*Wallabia bicolour*; 12 records; figure 7), Lace Monitor (*Varanus varius*; 40 records; Figure 9) and Torresian Crow (*Corvus orru*; 34 records). "Unidentified" small mammals were also common, with a total of 45 records. It appears that these small mammals were a combination of species from the genera *Antechinus*, *Rattus* and *Melomys*. Confirmed species within these genera include the Bush Rat (*Rattus fuscipes*), the introduced Black Rat (*Rattus rattus*). Two species of Bandicoot have been recorded including the Long-nosed Bandicoot (*Perameles nasuta*) and the Northern Brown Bandicoot (*Isoodon macrourus*). See Table 1 (right) for a complete species list.

The structures are only recently constructed and it is expected that monitoring during the Koala breeding season will provide more data on Koala use.

The overpass did not record as many species or record them as frequently as the Raleigh or Infra 2 underpasses. Possible reasons for this include the local wildlife needing time to habituate to the new structures and/or lack of vegetation on the overpass (plantings are still very young). It is expected further monitoring will provide more information in this regard.

Figure 6: Koala photographed at the Infra 2 underpass.

Table 1: Species recorded by the surveillance cameras prior to 8 March 2009:

- Swamp Wallaby (*Wallabia bicolor*) (Figure 7)
- Koala (*Phascolarctos cinereus*) (Figure 6)
- Ringtail Possum (*Pseudocheirus peregrines*)
- Short-beaked Echidna (*Tachyglossus aculeatus*)
- Long-nosed bandicoot (*Perameles nasuta*)
- Northern Brown Bandicoot (*Isoodon macrourus*)
- *Antechinus* sp.
- Black Rat (*Rattus rattus*)
- Bush Rat (*Rattus fuscipes*)
- *Melomys* sp.
- Long-eared Bat (*Nyctophilis sp.*) (Figure 8)
- Lace Monitor (*Varanus varius*) (Figure 9)
- Eastern Blue Tongue (*Tiliqua scincoides*)
- Common Tree Snake (*Dendrelaphis punctulata*) (Figure 10)
- Southern Boobook (*Ninox novaeseelandiae*)
- Australian Brush Turkey (*Alectura lathami*) (Figure 11)
- Australian Magpie (*Gymnorhina tibicen*)
- Toresian Crow (*Corvus orru*)
- Red Fox (*Vulpes vulpes*)
- Cat (*Felis catus*)
- Dog (*Canis lupis familiaris*)

Figure 7: Swamp Wallaby photographed at the Infra 2 underpass.

Figure 8: *Nyctophilis sp.* photographed at the Raleigh underpass.

Figure 9: Lace Monitor photographed at the Infra 2 underpass.

Figure 10: Common Tree Snake photographed at the Raleigh underpass.

Figure 11: Brush Turkey photographed on the overpass.