Hairy Hazelwood (Symlocos haroldii) is a near threatened rainforest species listed under the Queensland Nature Conservation Act 1992 (NCA). It occurs fromBeenleigh to Maryborough and west to Yarraman, in Southeast Queensland and described as a shrub or small tree to eight metres in height. It is found in the lower to mid stratum of tall to very tall subtropical and dry rainforest habitats where it requires full to semi-shade and prefers fertile soils on moderate slopes, alluvial flood plains and swales within sandy coastal dunes.

In 2012, 25 Hairy Hazelwood specimens were identified within the footprint of the Bruce Highway upgrade between Cooroy and Federal, located in the Noosa Shire local government area (see Figure 1). Of the 25 individuals identified, 24 were sub-adults and juveniles and one mature individual. All specimens were located in mapped remnant vegetation (Regional Ecosystems 12.11.2/12.11.3) (Sattler and Williams, 1999), however the area when ground-truthed was considered disturbed, with thickets of Lantana (Lantana camara) present.

A clearing permit under the NCA was issued to remove the 25 Hairy Hazelwoods. The permit conditioned a program of propagation and transplantation, along with the identification and protection of a receiving site, and the development of an Offset Management Plan.

Receiving site preparation

Weed management work within the receiving site was undertaken prior to the transplantation activities. This targeted a number of common environmental weeds including camphor laurel (Cinnamomum camphora), corky passion vine (Passiflora suberosa) and broad-leaved paspalum (Paspalum manicatum). The removal of all understorey weeds occurred prior to planting activities, with specific emphasis on understorey camphor laurels. Retention of over-storey camphor laurels aimed to replicate an enclosed environment.

Propagation

Round one

Propagation material was collected in autumn 2012 from a population of greater than 20 Hairy Hazelwoods from within the Yurol Forest Nature Reserve. These individuals were located approximately three kilometres from the receiving site and impacted individuals, and occurred in an area of disturbed, wet sclerophyll forest. Branch tips (100 mm long) were taken from healthy Hairy Hazelwoods with sterilised secateurs. These were transported to the nursery after being wet down in the field and transported in a sealed container to reduce evaporation.

Approximately two-thirds of the cuttings’ lower leaves were removed. Cutting were then planted in a community tray with composted pine bark fines and placed on a heat mat (28 °C) under a misting system. After root development, approximately 60 cuttings were potted into tubes with slow release fertiliser. Potted plants were grown in 50% shade until autumn 2013, after a decline in plant health became evident (loss of vigour, eventual leaf drop and slow mortality) in late 2012.

Round two

As the planting program had a set timeframe and due to the low survival rate, a second nursery was engaged to undertake additional propagation activities.

Material for the second round was sourced in October 2012 from 14 of the impacted 25 Hairy Hazelwoods. The propagation material was collected in line with the first propagation activity. Six hundred cuttings were prepared, treated with Seasol and transferred into a hot house/propagation tunnel, with regular misting.
Despite a 95% cutting survival rate, only a 30% strike rate was observed by December 2012. A further two hundred cuttings were taken but again resulted in a low strike rate. Following this, an additional 320 larger cuttings (200 mm in length) were taken during 2013-14. The larger cuttings were observed to have a better strike rate than the 100 mm cuttings, with these cuttings moved to a 30% shade house in spring 2013. One hundred and fifty Hairy Hazelwoods were re-potted into mega-tubes in summer 2013. Once potted they received weekly tree and liquid plant tonic.

During all nursery phases, the Hairy Hazelwoods’ growth was slow and erratic. By early 2014 declining health was observed as a result of an unknown pathogen.

**Round three**

In late 2014, a third round of propagation commenced. Material was collected from the established individuals in the receiving site. This was undertaken in a similar manner to the other propagation activities, with the exception of humus from the receiving site being added to the potting medium and the cuttings planted directly into tubes. This potting medium inoculation aimed to add mycorrhizal fungi for increased cutting health and resilience. This stock was grown in the nursery for a shorter period, designed to reduce their susceptibility to the unknown pathogen(s).

**Plant out and maintenance**

In autumn 2014, 75 propagated Hairy Hazelwoods from the Round 2 propagation activities were planted, mulched and guarded at the receiving site. These plants were bucket watered at planting and holes were at least 50% larger than the container (90 mm x 150 mm) at 3-5 metre centres. Each plant received slow release fertiliser/soil conditioner at planting.

Supplementary planting of an additional 195 propagated Hairy Hazelwoods from Round 3 propagation activities occurred throughout summer and autumn 2015 and summer 2016, as plant losses from previous planting activities had occurred. These new plantings were undertaken in a consistent manner to those in autumn 2014, with the exception these plants were smaller but with sufficient root development (guided by their capacity to hold the potting medium when removed from a tube).

Maintenance of the site occurred after planting to reduce competition. Generally this involved removal of common environmental weeds present prior to planting. Due to limited accessibility, no watering activities occurred after plant out. Fire management was also considered during the maintenance phase, but no action was required.

Despite ongoing maintenance and monitoring of the Hairy Hazelwoods, the survival rate was extremely low, with only seven individuals remaining on the receiving site. Tree guards remain in place as plant size does not justify their removal.

![Figure 1. General location of Hairy Hazelwood activites.](image-url)
**Conclusion**

Qualified nursery and bush regeneration specialists undertook all activities, however the survival of Hairy Hazelwoods in all phases has been extremely poor. This program of works has faced challenges including significant plant losses due to unknown fungal pathogen(s) within the nursery setting, leading to smaller sized individuals planted at the receiving site. From observation, the fungal pathogen(s) affects the plant foliage most significantly. Watering regimes (field and nursery) also appear to influence the survival of Hairy Hazelwoods. The effect of water stress after plant out, with factors such as accessibility and topography, in combination with unseasonal dry weather seemed to have impacted the plants’ survival. The build-up of leaf litter around the plants at the receiving site between maintenance rounds may also have impacted the plants. However, none of these hypotheses have been tested and could be examined in future studies.

Mycorrhizal association appears to be extremely important for Hairy Hazelwoods. Planting stock establishment was improved when planted near existing Hairy Hazelwoods and improved resilience of cuttings observed when potting medium had humus from areas known to support Hairy Hazelwoods incorporated.

For future Hairy Hazelwood activities the following may improve results:

- Consistent watering within both the nursery and plant out locations, including protection from heavy, unseasonal rain events.
- Inoculation of potting medium with soil from locations with naturally occurring Hairy Hazelwoods.
- Potential use of Hairy Hazelwood seeds or physical translocation of impacted plants.

**References**


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**The Red Hot List of threatened plants – But which species do you choose?**

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Threatened plants tend to receive less attention than threatened animals, yet the loss of native plant species is as devastating and irreversible. This is why the Threatened Species Recovery Hub has dedicated a project to building a Red Hot List for Australia’s most imperilled plants. This article explains that while the task shares many similarities with the development of the animal list, focussing on plants comes with its own unique set of challenges.

Australia has many threatened plants; around 1150 species are listed as Endangered or Critically Endangered under State or Federal laws. That’s around 5% of our known plant species, and many of these are extremely vulnerable. For example, a fifth survive in only a single population, while 60% are known from five or fewer populations.

Think about that; the rarity and tiny distribution of many of these species make them highly vulnerable to human impacts and chance events. If the wrong patch of scrub is cleared for a development or a wildfire scorches an area, we could lose a species forever.

Fifty Australian plant species are presumed to have become extinct since 1788. The idea of the Red Hot List is to identify those plants that are on the edge and could go over if we don’t do something.

The aim is to highlight the plight of Australia’s most imperilled plant species (those at risk of extinction within the foreseeable future), identify and prioritise conservation actions, and alert community groups, scientists and landholders and managers.

**Developing a Red Hot List**

So, the first action here is to develop a concise statement of the state of play for the 1150 species of threatened plants currently listed in Australia. This will be done by gathering data from over 100 plant experts. This data includes information on current threats and population trends.
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