NSW SCIENTIFIC COMMITTEE

Preliminary Determination

The Scientific Committee, established by the *Threatened Species Conservation Act* 1995 (the Act) has made a Preliminary Determination to support a proposal to list the Wollemi Pine, *Wollemia nobilis* W.G. Jones, K.D. Hill & J.M. Allen as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act and as a consequence, to omit reference to *Wollemia nobilis* W. Jones, K. Hill & J. Allen from Part 1 of Schedule 1 (Endangered species) of the Act. Listing of Critically Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Wollemia nobilis* (the Wollemi Pine) was listed as endangered at the inception of the *Threatened Species Conservation Act* in 1995. At the time of listing the Critically Endangered category did not exist. Since this original listing the plant pathogen *Phytophthora cinnamomi* has been found in the wild population and threatens the long-term survival of the species. In addition, the species has recently been assessed by IUCN as critically endangered (Thomas 2011). Consequently, the Scientific Committee has undertaken a review of the conservation status of the species to inform the current listing status of the species under the *Threatened Species Conservation Act* 1995.

2. *Wollemia nobilis* (family Araucariaceae) is described on PlantNET (Royal Botanic Gardens and Domain Trust accessed October 2014) as: "Trees to 40 m high; trunk to 1 m diam.; bark densesly (sic) covered with dark brown nodules or tubercles. Leaves on leading shoots, arranged in 5–8 spiral rows, narrow-triangular, 3–10 mm long, keeled, acute, pungent; leaves on juvenile lateral shoots (growing horizontally away from the leading shoots) spirally distichous, linear to narrow-triangular, leathery, rounded or obtuse, upper surface deep green, lower surface glaucous, 2–8 cm long, 2–5 mm wide; leaves on adult lateral shoots arranged in 4 regular vertical rows, narrow-oblong, leathery, rounded, dull pale to mid-green, 1–4 cm long, 4–8 mm wide. Male cones to 10.9 cm long, 19 mm diam. Female cones 5–8 cm long diam. Seeds pale brown, 4–6 mm wide including the wing."

3. *Wollemia nobilis* is endemic to NSW and is restricted to four small patches in a single location in Wollemi National Park. It grows "in warm temperate rainforest typical of the canyons in the Blue Mountains and Wollemi National Parks (Benson and Allen 2007). The species is thought to have declined over millions of years in a similar pattern to other members of the Araucariaceae in response to changes in climate, the evolution and dominance of angiosperms and probable impacts of increasing fire frequency and intensity (DEC 2006). *Wollemia nobilis* has been successfully propagated, is available commercially and an *ex situ* living collection and seed bank are maintained by the Royal Botanic Gardens Trust Sydney (DEC 2006).

4. The geographic distribution of *Wollemia nobilis* is very highly restricted. The extent of occurrence for *W. nobilis* is 4 km^2 based on a minimum convex polygon enclosing all known occurrences of the species, the method of assessment recommended by IUCN (2014). The area of occupancy (AOO) is estimated to be 4 km^2 based on a single 2 x 2 km grid cell, the scale recommended for assessing AOO by IUCN (2014).

5. *Wollemia nobilis* is long-lived with a multistemmed tree habit (Hill 1997, DEC 2006, Benson and Allen 2007). A growth ring analysis of an individual fallen stem suggested the stem was some 400 years old (Banks 2002) and the plant from which the stem fell is still alive and another stem has become the apical dominant. Mature plants produce both male and female cones and seed release

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occurs annually, although there is some variation in the number of cones produced (Zimmer *et al*. unpubl.). The species maintains a very slow growing juvenile bank of plants (which themselves are predicted to live for many decades) and new recruits from each annual seed fall help to maintain this juvenile bank (Zimmer *et al*. 2014). These juvenile plants would be expected to have accelerated growth should any canopy gaps occur in their habitat. No persistent soil seed bank is evident. Dispersal of seeds occurs locally by wind and gravity, but there may be occasional longer distance dispersal by water or by movement of cones by cockatoos.

6. Fewer than 100 mature individuals are known in the wild (DEC 2006) and the estimated total number of mature individuals is considered to be very low. Fewer than 300 juvenile plants also occur in the wild (Zimmer *et al*. 2014).

7. While fire severity and frequency are considered to be factors in the historical decline of the Araucariaceae (including *Wollemia*), *W. nobilis* occurs in areas that periodically burn and virtually all mature individuals show extensive fire scarring. The presence of a large root bole, epicormic buds (Burrows *et al*. 2003) and multiple replacement stems (Hill 1997), suggest that individual plants can survive a fire. The sensitivity of the species to frequent fire or high severity fires is unknown, although Zimmer *et al*. (in press) demonstrated the capacity of juvenile plants to resprout epicormically after experimental burning. Given the flammability of the litter of *W. nobilis*, Zimmer *et al*. (in press) suggest lower severity fires may play a role in favouring *W. nobilis* juveniles over angiosperm competitors in rainforest.

8. *Wollemia nobilis* is known to be susceptible to the plant pathogen *Phytophthora cinnamomi* (Bullock *et al*. 2000) which is present at the largest remaining site for the species. *Wollemia nobilis* individuals have shown symptoms of the disease on their foliage, leading to branch dieback and death and stem death. To date, no individuals have died. There is no comprehensive control treatment for this pathogen but treatment by injection of phosphonate into infected trees has been trialled to enhance the survival of individuals. Work is also underway on the most effective way to apply phosphonate in the wild. Unauthorised visitation to the wild site is a threat as it may result in the introduction of new pathogens and the spread of *P. cinnamomi* across the wild population. An increase in fire frequency or fires of a severity that scorch all above ground stems is likely to be detrimental to the species. "Infection of native plants by *Phytophthora cinnamomi*" is listed as a Key Threatening Process under the NSW *Threatened Species Conservation Act* 1995.

9. *Wollemia nobilis* W.G. Jones, K.D. Hill & J.M. Allen is eligible to be listed as a Critically Endangered species as, in the opinion of the Scientific Committee, it is facing an extremely high risk of extinction in New South Wales in the immediate future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation* 2010:

Clause 7 Restricted geographic distribution and other conditions

The geographic distribution of the species is estimated or inferred to be:

(a) very highly restricted,

and

(d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:

(a) an index of abundance appropriate to the taxon, or

(b) the geographic distribution, habitat quality or diversity, or genetic diversity.

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Clause 8 Low numbers of mature individuals of species and other conditions
The estimated total number of mature individuals of the species is:
(a) very low,
and
(d) a projected or continuing decline is observed, estimated or inferred in either of the key indicators:
(a) an index of abundance appropriate to the taxon, or
(b) the geographic distribution, habitat quality or diversity, or genetic diversity.

Professor Michelle Leishman
Chairperson
Scientific Committee

Exhibition period: 12/12/14 – 06/02/15 Proposed Gazettal date: 12/12/14

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