

# Review and advice for the Species-specific Management Plan (SMP) for *Niemeyera whitei*

D. Binns  
Draft 20 Sep 2021

This report is presented in three sections: review of the SMP, discussion of conservation objectives and recommendations. The review refers to the SMP dated 16 March 2020.

## 1. Review of SMP

My review is in the context of the SMP satisfying the broad, in-principle, objective of maintaining the viability of the species. I note that the CIFOA regulatory documentation does not explicitly describe what is meant by viability of a species. My review comments relate to the relevant sections of the SMP as listed below.

### *Section headed 'Objectives'*

The listed five dot-point objectives are all potentially relevant to the general objectives of protecting the species and maintaining its viability. However, the SMP lacks explicit conservation objectives based on a practical interpretation of what is meant by these general concepts. Without such explicit objectives, it is not possible to assess the extent to which a monitoring program is likely to be effective. It is also difficult to assess the context for, and relevance of, the dot-point objectives as stated. Objectives listed as second to fourth dot points relate to statements under the heading 'Conservation and management issues' and these statements could be formulated as explicit objectives if considered appropriate. Alternative development of explicit objectives is discussed further below, under 'Discussion'.

The first dot point objective is somewhat arbitrary and in particular, lacks context and justification, apart from a general requirement to protect the species. Without a more explicit conservation objective, there is no rationale to indicate whether it is likely to be either necessary, or sufficient, to maintain the viability of the species.

### *Sections headed 'Distribution and abundance' and 'Ecology and biology'*

Although no data are presented (and most likely, suitable quantitative data do not exist or are very limited) and accepting that information is derived mostly from casual field observations, these sections provide an adequate description of the characteristics of the species in the context of the SMP.

### *Section headed 'Conservation and management issues'*

The SMP makes several untested predictions or assumptions. Although untested, these predictions or assumptions seem feasible based on the little available data and casual observation. The second to fourth SMP dot point objectives relate to these predictions or assumptions, but this is not made explicit. Depending on the development of alternative explicit conservation objectives, it may be appropriate to specify the predictions and assumptions in this section as quantitative objectives against which the effectiveness of the SMP may be assessed.

The SMP implies that the number of *N. whitei* is likely to decline in areas affected by harvesting and post-harvest burning. If the assumption regarding recruitment requirements is accurate, this implication seems reasonable and suitably precautionary.

### *Section headed 'Requirements'*

As they are described in the SMP, distribution surveys alone may be too haphazard to obtain reliable quantitative estimates of the total population size of the species within State forest. They almost certainly will not allow quantitative estimates of confidence levels. It is unlikely that opportunistic surveys of reserves will allow any extrapolation to estimate total population size in reserves, but they will provide at least an estimate of the minimum size of reserved populations. For quantitative estimates of population size and degree of uncertainty, it is preferable that a more strongly structured sampling approach be used, which may include, or be integrated with, pre-operational surveys.

SMP Exclusion Zones will certainly provide additional protection and will reduce the extent of any short term population decline caused by harvesting. However, depending on population sizes and harvest impacts (for which accurate data does not currently exist), they may not be necessary, or may not be sufficient, to achieve particular (currently unstated) conservation objectives.

### *Section headed 'Monitoring'*

Depending on explicit conservation objectives and results of distribution surveys, monitoring of harvest impact may or may not be necessary or may require a different focus. If it is found to be necessary, the stated method of measuring trees in four plots at each site is not ideal because the trees may be too close to be considered strictly spatially independent in respect of harvesting impacts. In that case, plots rather than trees are the sample units and the effective sample size is the four plots at each site (or total 12 plots across all sites). Alternatively, if individual trees are regarded as independent and each tree is considered a sample unit, the sample size is 20 trees at each site or 60 trees across all sites. The confidence level from four plots is lower than that from 20 trees. In either case (plots or trees as sample units), sample intensity may or may not be adequate to detect the desired effect size at an acceptable confidence level. For example, based on a binomial distribution, with twenty trees, if 70% are observed to be damaged or killed by harvesting, the actual proportion damaged or killed lies within the range 46% to 88%, at a confidence level of 95%. For 60 trees, the range is 57% to 81%. Put another way, a sample of 20 trees gives a power of 60% to detect an hypothesised decline of 30%, relative to the alternative hypothesis that the decline is 50% or higher. For 60 trees, the power to detect a 30% decline is 92%.

### *Section headed 'Management implications'*

This section does not indicate whether there actually are any management implications from the results of the survey and monitoring or whether there is any scope to modify conditions (to either more or less protection). For example, is there scope to change management conditions if results deviate from (currently unstated) thresholds for reservation or harvest impact?

### **Discussion of possible conservation objectives**

*Niemeyera whitei* is in the 'keep watch' category. This category indicates the species has been assessed as 'secure' for the next 100 years without targeted site-based management, although the rationale for making that assessment is not clearly documented. In that context, in order to assess whether CIFOA and SMP conditions are effective, the SMP needs a clearly-stated conservation objective (or objectives) beyond the 'keep watch' assessment.

If sufficient data were available to allow a quantitative analysis of the probability of extinction in the long term, one possible conservation objective would be to set a maximum threshold for that probability. In my view, sufficient data are currently not available to allow an accurate analysis of

this type for *N. whitei*. A simpler alternative is to specify a minimum reserved population size or a maximum population reduction (relative to a current baseline) due to harvesting, or both. These thresholds are essentially arbitrary, but may be guided by commonly accepted conservation thresholds such as those used for IUCN criteria. This is ultimately a management or regulatory decision, but I suggest that the thresholds of minimum total population size of 10 000 mature plants and maximum 30% decline in population size over ten years or three generations (whichever is the longer) be used as a guide to set a conservation objective. These are the thresholds for IUCN 'Vulnerable' status based on these two criteria. A conservation objective which just exceeds the population size and is just below the decline threshold implies a 'Near Threatened' species (generally consistent with the 'Keep Watch' category). An objective which uses a substantially higher threshold for population size (e.g. 20 000) and substantially lower threshold for decline (e.g. 20%) implies a 'Least Concern' species. Although the IUCN criteria and thresholds relate to total populations, it is open to discussion whether a decline threshold should be relative to the total population on all tenures, the population only on State forest or that on all public land. In making recommendations, I assume that, in considering the need to maintain viability of the species, reserved populations are included, but that populations on private land may not be included.

## **Recommendations**

Due to the limitations of existing quantitative data, I suggest the SMP should follow a stepwise process, with each step determining implementation of subsequent steps. However, it may be appropriate to take advantage of concurrent opportunities to obtain data which may be useful for later steps (e.g. simultaneous survey and monitoring), where such opportunities arise.

### **Step one:**

Determine an explicit conservation objective or objectives, by agreement among relevant parties.

### **Step two:**

Obtain quantitative estimates, with confidence levels, of total population size and population size in formal reserves and in broad categories of State forest management zones. This has the potential to consume substantial resources and needs to be done in the most efficient way possible. I suggest one possibility is to use existing locality data to develop potential distribution models (e.g. using MaxEnt) and then sampling the modelled distribution to validate and refine the models. Models should be developed across all tenures. Existing data are likely spatially biased to State forest, but I expect the distribution of records is less biased in environmental space. Bias in validation sampling of the modelled distribution should be minimised to the extent practicable, but depending on the conservation objectives and likely access constraints, sampling may not be practical or necessary on private land.

There is risk that models may not be as accurate as desired, reducing confidence in the final population estimates. As sampling proceeds, there needs to be periodic checking of results in relation to the level of accuracy required to satisfy conservation objectives, to ensure that resources used for sampling are kept within appropriate bounds.

**Step three:** Assess population size in reserves (including State forest reserves) and determine need for monitoring. This could be done based on lower confidence limits of population estimates and on estimates of decline using pessimistic or worst-likely scenarios of proportion of plants of *N. whitei* which are severely damaged or killed in intensively harvested areas. If pessimistic estimates are within bounds acceptable to achieve explicit conservation objectives, no further monitoring may be

required. Otherwise, the intensity of monitoring may be determined by the extent to which estimates deviate from acceptable bounds.