IN THE SUPREME COURT OF VICTORIA
AT MELBOURNE
COMMON LAW DIVISION
VALUATION, COMPENSATION AND PLANNING LIST

S CI 2020 00373

BETWEEN

WOTCH INC

Plaintiff

and

VICFORESTS

Defendant

JOINT EXPERT REPORT OF DR CRAIG NITSCHKE AND DR ANDREW SMITH

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Filed on behalf of:	Plaintiff	
Environmental Justice Australia		Ph: (03) 8341 3100
Level 3, 60 Leicester Street		Fx: (03) 8341 3111
CARLTON VIC 3053		Code: CR009995
Email: danya.jacobs@envirojustice.org.au		Ref: Danya Jacobs

Setscan Pty.Ltd. trading as:
austeco
Environmental Consultants
ABN: 12 060 423 314

Joint Report

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in requirement of being an expert witness for:

WOTCH Inc v VicForests | Supreme Court of Victoria Proceeding No. S ECI 2020 00373

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Prepared and Written by:

Dr. Craig R. Nitschke
Associate Professor
School of Ecosystem and Forest Sciences
The University of Melbourne
Phone: 03 9035 6855
Email: craign@unimelb.edu.au

&

Dr. Andrew P. Smith
Setscan Pty.Ltd
PO Box 4130 Elanora Qld 4221
Ph. 07 55983952
Email:setscan@gmail.com
Mobile: 0402432622

Conclave

We, Associate Professor Craig Nitschke and Dr. Andrew Smith, expert witnesses for WOTCH Inc v VicForests | Supreme Court of Victoria Proceeding No. S ECI 2020 00373, held a conclave on February 8, 2022. We discussed points of agreement and disagreements arising from our respective reports to the court on the impacts of proposed timber harvesting at 64 coupes on the Southern Greater Glider (GG). We agree that current harvesting practices are not ecologically sustainable, cause severe declines in GG populations at coupes scales and require significant modification. While both of us have come to very similar conclusions about the fine-scale impacts of the proposed timber harvesting on GG we have reached different conclusions about the broad-scale (landscape, regional, state) impacts of logging. We attribute this primarily to differences in methods of risk assessment. Smith used an approach (Third report Part 2, para 11) which takes into account the cumulative effects of past as well as current and future logging, including the likelihood that any surviving glider populations will continue to decline over the next 40-80 years (and fail to recover) due to the effects of fragmentation and isolation, ongoing habitat tree decline, and the possibility of ongoing future logging. Nitschke used an approach (Part 2 Report, page 5-7) which considered broadscale impacts in terms of the immediate extent of habitat loss on the 64 coupes relative to the extent of habitat remaining at state and national scales based on an assumption that harvesting would continue to 2030 then halt.

Areas of Agreement

Ecologically Based Silviculture

We agree that current practices of largely even-aged management applied to areas of forest containing greater gliders or observed greater glider habitat (i.e., contain hollow bearing trees (HBTs) and foraging habitat) is inappropriate and that management requires the application of different silvicultural systems. These new silvicultural systems will require significant improvements in methods of coupe planning, pre-logging survey, habitat tree selection and protection, tree felling, and forest regeneration.

We agree that all timber harvesting in Mixed Species and other forests dominated by tree species that withstand fire and re-sprout should be undertaken by low intensity selective harvesting that maintains a minimum 60% of a tree basal area within and dispersed across the harvest area (see Smith Report 1 para 23). We agree that a narrow focus on protection of type 1 HBTs and small retained habitat patches is not sufficient to maintain GG and that management must consider retention and recruitment of a wider range and density of habitat trees – inclusive of nesting and foraging trees, larger and better targeted areas of retained habitat patches, and linkage of retained habitat by wide corridors (≥100 m in width) to a network of reserved GG habitat located in optimal fire and climate (i.e., drought, hot nights) refuge areas largely associated with gullies and sheltered aspects. HBTs must be maintained at or above a threshold that sustains average or higher glider densities (i.e., > 5 GG suitable HBTs/ ha). Retained forest should be the most structurally and floristically suitable GG habitat on the coupe or the area with the highest observed density and concentration of GG. A minimum threshold of 40% coupe area retention should be applied to all coupes with increases up to 100% in high conservation value stands that are ecological mature (i.e., pre 1900 Ash forests), , fire or gully refuges, and the unburnt Bendoc region of East Gippsland. Multi-cohort Ash forests, i.e., stands with more than one living senescent tree with hollows/hectare must be managed with the objective of maintaining the existing multi-cohort structure; > 60% retention including retention of all ecologically mature trees should be applied. This recommendation applies to multi-cohort stands not located in areas that act as fire (i.e., areas subject to lower frequency and/ or lower severities of fire) and climate/ drought (i.e., cooler and wetter areas within landscapes) refugia and stands that are not defined as ecologically mature or old-growth. Stands/ patches that meet these definitions should be subjected to 100% protection.

The retention-based thresholds must be applied within an appropriate silvicultural system that emulates the impacts of wildfires on forests. This will vary by forest type. In Montane Ash dominated stands (*Eucalyptus regnans* and *E. delegatensis*) the application of even-aged silviculture (clear fell, seed tree, RRH, VR1 and VR2) can occur outside of greater glider habitat; however, a maximum of 1/3 of the harvested area only should be subjected to stand replacing disturbance. Adaptive Silvicultural Systems based on HBTs must still be practiced in these areas to provide habitat for other fauna species. Retention base silviculture should be applied that promotes the conservation of HBTs and development of multi-aged stands in the remaining 2/3 of the harvested area.

In mixed species forests, dominated by resprouter eucalypts, uneven-aged silviculture must be applied. Uneven aged silviculture refers to single or small group (not more than 20 m diameter) tree selection, applied across the coupe according to stand structure. As natural stand-level mortality rarely exceeds 40% following severe wildfire in these forests, a 60% tree basal area retention level is appropriate. This level of retention has been shown to sustain resident Glider populations after selective logging (Smith Report 2 para 56; Nitschke Report Part 1 Q9, P14). HBTs and recruitment trees need to be selected for retention and maintained at similar or higher levels to those in Ash forest because habitat trees are slower growing and subject to more frequent fire in Mixed Species forests. Some localized mixed species stands dominated by tree species known to be unsuitable for Gliders (e.g. *E. sieberi*) and in which Gliders are found to be absent, may be harvested by gap selection where larger gap felling (up to 50 m in diameter) and aggregated retention of at least 40% of coupe area linked to gully corridors and local reserves by retained patches and strips. **Any silvicultural prescriptions in mixed species stands that generate even-aged stands are ecologically inappropriate and do not constitute the practice of ecologically-based management and therefore sustainable forest management.**

<u>Harvesting Impacts at Local (Coupe) Scales</u>

We were initially in disagreement on the severity of impacts at local scales on a number of coupes which Dr. Nitschke reported as “maybe or unlikely” to support Gliders (Smith report 3 part 2 para 48) but which were reported by Wotch surveys to contain GG populations. We are now agreed that while there may be some variation in the magnitude of impact on different coupes, depending on habitat type and proximity to unlogged reserves, that current harvesting practice is likely to cause severe immediate declines in GG abundance on all logged coupes with known GG populations and habitat.

<u>Impacts of Selection Harvesting</u>.

We are both agreed that GG generally persist in forests that have selectively logged at low intensity. Smith notes that this is especially true of forests in north-eastern NSW where there is no pulpwood market and harvesting is limited to removal of mature sawlogs. Smith also notes that there is considerable flexibility in the way in which selection harvesting can be applied and has recommended specifications (Smith Report 1 para 23) that could be applied to ensure that forests remain structurally suitable for Gliders after harvesting. We area also agreed that while selective harvesting may limit Glider declines and allow for glider recovery over time at the coupe scale, this does not exempt selectively logged coupes from planning at broader scales that retains a minimum area of protected and retained unlogged forest at the coupe scale linked to corridors and reserves designed to sustain viable Glider populations at broad scales.

Effects of Fragmentation and Isolation

We agree that cumulative harvesting and the interaction of extensive harvesting with fires has the potential to cause severe GG habitat loss and degradation of over extensive continuous areas, and to disrupt vital population processes including genetic exchange, dispersal, and natural patterns of population contraction-expansion between refuges and sinks after fires and droughts. These broadscale impacts are likely to occur where residual patches of glider habitat are small and isolated from other patches. In these areas we agree that recovery of greater gliders will require longer time periods (> 50-60 years) compared to landscapes where a mosaic of connected patches of greater glider habitat remains and the distance between regrowth forests and mature forests containing greater glider habitat is < 300 m.

Harvesting Impacts at Broad Scales

Despite arriving at different conclusions about the magnitude and severity of harvesting impacts at landscape scales we agree that there is uncertainty around the cumulative impacts of harvesting on greater gliders beyond the coupe-scale. To resolve this uncertainty, we strongly advocate for a local-landscape planning approach that addresses issues of patch size, connectivity and isolation within a 1 and 5 km radius of a coupe or aggregation of coupes to better quantify the cumulative and long-term impacts of proposed harvesting on glider populations. This landscape planning approach will need to consider past and planned harvesting as well as past fire histories and be updated if a fire occurs between planning and operations. A critical component for the landscape-planning approach to work is the application of ecologically appropriate silviculture and the retention of critical biological legacies (HBTs and forage habitat) at the coupe-scale. These legacies will contribute to the recovery of gliders in regrowth areas and promote the movement of animals through the landscape matrix.

Requirements for Glider Protection and Recovery

We agree that greater gliders (as a population and not individuals) persist within landscapes that are impacted by timber harvesting only where key habitat elements are recruited, protected, retained and persist over time including the following:

1) Retained habitat patches linked with retained habitat within coupes (minimum of 40% retention at coupe-scale) to provide a reserve network of sufficient size (> 130 ha) and suitable location (in fire/climate refuges and gullies) to promote the maintenance of viable populations for 40-60 years or more after logging to reduce the cumulative impact of future fires and climate change;
2) Habitat Trees, including recruitment trees and habitat trees (of all types including HBT 1,2,2a, and 3; suitable forage species). HBTs that are selected, must be protected and maintained at a minimum density (5/ha) necessary to sustain average or higher Glider densities (in competition with other hollow users);
3) Uneven-Aged (old growth) Forest Structure, retention of uneven-aged forest structure (including a minimum stocking of large trees) in selectively logged Mixed Species forests and two thirds of Ash forests;
4) Corridors and Reserves, of sufficient size and pattern to maintain Glider dispersal and gene flow across all adjacent coupes via permanent and effective wildlife corridors that incorporate local fire and climate refuges and linked with larger expanses (> 1000 ha but preferably > 2000

ha) of suitable habitat located in national parks and regional reserves (including large special protection zones with suitable habitat).

Areas of Disagreement

It was clarified during the conclave that we have approached the assessment of the broad-scale (landscape to State) assessment of the risks posed by the harvesting of the 64 coupes using different methods and relying of different assumptions and different spatial and temporal constraints.

Nitschke assessed the impact as negligible (in all regions except East Gippsland) based on the extent of habitat loss on the 64 coupes assuming that gliders will survive and rapidly re-colonize regrowth habitat and that harvesting will continue until 2030 then halt. Nitschke also argues that the impacts of timber harvesting are reversible over time as greater gliders have been observed in regrowth forests, provided the occurrence of HBTs within regrowth and/ or mature forest adjacent to these regrowth forests.

Smith based his conclusion (that proposed harvesting of the 64 coupes could have a severe landscape scale impacts on GG populations throughout all timber production forests) on the fact that current timber harvesting policies and practices do not satisfy any of the agreed requirements for GG protection and recovery (listed above and see Report 2 part 2 para 54-55,61-65, Appendix 1 para 13), and on empirical data which shows that GG density in small, isolated populations are at risk of declining to zero over a period of 40 -60 years after logging and before surrounding regrowth reaches an age suitable for re-occupation.

<u>Ongoing Glider Decline at Landscape Scale after Cessation of Harvesting</u>.

We were initially in disagreement on the age at which intensively logged regrowth forest becomes suitable for re-occupation by GG. After discussion we are now in substantial agreement that uniform aged ash regrowth will need to be more than 40 years of age before it is suitable for re-occupation by GG and promote survivorship and reproduction hat in turn facilitates the recovery of GG density. GG density will further increase with stand age and basal area, more than doubling by the time forests are > 100 years of age.

We were also initially in substantial disagreement on the capacity for GG populations in small isolated, habitat patches retained on logged coupes to survive and recover within the 40-60 year wait period before surrounding regrowth forest becomes habitable. We are now in agreement that glider populations in retained isolated patches (< 64) ha in area are at extremerisk of extinction over longer time periods (40-60 years) and that large patches (> 130 ha) are required to reduce the risk of patch extinction due to isolation effects; (Smith report 3 para 21, Figure 6), and therefore that habitat patches retained after logging need to be substantially larger (at least 40% of coupe area), linked to other retained patches on adjoining coupes, and linked to large (> 130 ha.) nearby (< 1 km) protected reserves and refugia in gullies and sheltered aspects via effective wildlife corridors, in order to avoid the risk of ongoing decline.

<u>Reversibility and Time to Recovery</u>

Initially we disagreed on the capacity of GG populations to recover after proposed logging and the time required for recovery. Smith concluded that there would be slow or negligible recovery based on the observed loss of habitat trees after logging (Report 3 part 2, para 62-64), the unsuitability of young regrowth forests maintained on short rotations as habitat, and the inability of GG to survive in small isolated (<130 + ha) retained unlogged forest patches for the long period of time (50-80 years) required for regrowth forest to reach an age suitable for reoccupation. Nitschke assumed a more rapid and eventual recovery of GG populations based on the results of several cited studies which claimed that gliders persisted in small (2-5 ha.) isolated forest patches and observed gliders in regrowth forest at a very young age (5-20) years. On detailed examination of these sources Smith (Report 3 para 19-30, part 2 para 1-10, 23-24, 37) found that occurrence of GG in small isolated patches reported by one study was incorrect as the patches were connected by a network of corridors. Data from other studies of GG in isolated patches show that GG have close to zero probability of surviving 40-60 years in isolated fragments smaller than 64 hectares in size (third report para 21 Figure 6), are very poor dispersers rarely disperse further than 1.2 km to find unoccupied habitat, and that regrowth forests need to be 40-60 years of age before they are re-occupied by Gliders and used as a habitat patch (i.e., allows survivorship, reproduction and movement). The observations of GG in 5-20 year regrowth in the paper cited by Nitschke (Critique, page 17) suggests the GG can, but rarely, use this for movement between habitat patches. The work cited by Nitschke (Critique, page 17) on GG in 11-year-old regrowth post-fire is dependant of the occurrence of HBTs and the juxtaposition of these multi-cohort regrowth stands with mature forests. Nitschke's point is that GG can use younger regrowth forests provided critical habitat elements are present within these stands and the adjacent landscape. We are now substantially agreed that GG populations are most likely to be eliminated from logged forests where their habitat is retained only in small isolated patches within coupes and the surrounding landscape. GG are unlikely to survive long enough to recover in the future unless:

a) Intensively logged forests are excluded from re-harvesting within 60 years, or longer in less productive forest, to allow sufficient time for regrowth to reach an age suitable for re-occupation;
b) Regrowth forests contain the appropriated amount of biological legacies (HBTs) and forage habitat and are located adjacent (< 300m) to mature forests that are GG habitat;
c) Habitat tree marking, protection, retention and recruitment standards and practices are significantly increased and improved in logged forest to ensure HBT survival in regrowth forests for 120+ years; and,
d) all retained unlogged habitat patches in coupes are of appropriate size and directly linked to retained patches in adjacent coupes by designated and protected wildlife corridors and connected to nearby (within 1 km) retained patches of permanently protected unlogged GG climate and fire refuge habitat more than 130 hectares in size.

<u>Climate Variability and Change</u>

Nitschke views a changing climate as a current and future driver of greater glider distributions supported by observations (Nitschke Part 1, Page 2), modelling, and reports of greater glider loss in areas without timber harvesting or fires pre-2019 (Nitschke Part 1, Page and Nitschke – Critique Page 13). Wagner et al., (2020) cited by Nitschke (Part 1, Page 2), found increasing aridity and night time temperatures had a significant impact on GG distributions and that these metrics have changed since the 1980s. These changes correlate with a reduction in GG observations in East Gippsland. There is uncertainty however at the extent of climate driven decline across the greater gliders entire range with evidence suggesting that this is a currently a greater driver at low to mid elevations where climate is warmer and drier more than in areas with cooler temperatures and higher rainfall. Irrespective of the exact nature of the current impact of climate change and potential future impacts, the broad-scale nature of climate change on greater gliders must be considered in the assessment of changes in greater glider populations but also in forest management and planning. The impact of a changing climate highlights the need to maximise the conservation of greater glider habitat and populations in areas where glider occurrence and abundance is high.

Smith agrees that some reported Glider declines at low elevations could be explained by localized response to recent droughts but considers the role of high temperatures and the effects of climate in general in Victoria to be uncertain and speculative at this time, due in part to the risk of confounding between temperature and other environmental variables (especially rainfall and productivity) and in part to other factors (Report 2 para 23-25, Report 3 part 2 paras17, 53). Gliders are nocturnal and can potentially avoid the direct effects of high temperatures behaviourally by limiting activity at night and by selecting very large cool well insulated tree hollows for shelter during the day (Report 3 Part 2 para 17). As many of these large trees have been removed by timber harvesting over the past 80 years Smith considers that logging and loss of HBT will be a key driver and compounding factor in any glider decline in response to drought and high temperatures. Gliders evidently survived historical hot dry periods (1870-1890) in Victoria before the introduction of broadscale timber harvesting, and currently persist in much hotter climates in south-east Queensland, but some Victorian populations may not be genetically adapted to survive future droughts and hot periods in combination with the effects of logging, especially where it has removed more productive forest in wetter refuge habitat in gullies and sheltered aspects at low elevations.

While we disagree on the relative importance of logging and climate in recent Glider declines we agree that current forest management does not address the risks posed by the interactions between climate change, drought, fire and timber harvesting at both the stand and landscape-scales and that this omission could contravene the intent of the precautionary principle where timber harvesting is conducted in a manner that does not prioritize the identification and protection of fire, climate and drought refuge areas at local or regional scales.