

(a). “ . . . There is little doubt that much prime habitat for Koalas has been removed in the south east region and that the Koala population now present is persisting at low numbers. Despite this, the Committee continues to have difficulty with the issue of where the population’s boundaries lie. Under the TSC Act a population means “a group of organisms, all of the same species occupying a particular area”. The Committee must first be satisfied that a population can be identified to be occupying a particular area before considering whether it meets the additional criteria for listing as an endangered population. The Committee appreciates the difficulty of specifying population boundaries where animals are sparsely distributed and in very low density, and also accepts the imprecision of habitat modelling alluded to in your recent advice. The Committee would welcome your interpretation of how the nominated population could be shown to be restricted to a particular area.

An interpretation of how the nominated population could be shown to be restricted to a ‘particular area’ comes from the results of targeted surveys and verified reports of Koalas from the general public. This interpretation considers the removal of much prime Koala habitat on ‘arable’ land to be a catalyst for land degradation that reduced the quality of the remaining habitat. Despite the fact that some ‘prime’ habitat remains on ‘arable’ lands there appears to be no evidence to demonstrate that these areas have supported any Koalas over the past century.

“ In reality, it is highly unlikely that undetected populations occur outside the various large moratorium areas. Moratorium areas are instituted as a measure to protect species in areas where they are known to occur and where operations would otherwise take place. Therefore, a regional database is the only means to determine where the moratorium areas would be placed. The database is, of course, much larger than the EMA, taking into account animal populations throughout their range.”
State Forests of NSW, Report to the Minister for Urban Affairs and Planning on EIS, submissions June 1995.

“ The LSA has excluded 26,000 ha (identified by SFNSW and NPWS) specifically for Koalas; thus the main known areas of Koala occurrence are excluded from the proposal under these moratorium areas. Logging operations are therefore unlikely to impinge on forest regularly occupied by Koalas and, for the same reason, conditions recommended in the present assessment for this species are unlikely to have a major affect on the timber resource over the life of the present proposal.”
Department of Urban Affairs and Planning, Environmental Impact Assessment Report for the Eden Management Area 1994 EIS, September 1995

It would appear that during the eight (8) years since these statements, no solid evidence has been located to demonstrate the existence of a ‘sparsely distributed’ or ‘very low density population’ of Koalas in the south east. The only evidence suggests that although the moratorium areas for Koalas were correctly placed, the recommended conditions have failed to protect Koalas and that first the Yurammie and then the Murrah populations have declined.

The NPWS has recently released their statewide approach to the recovery of Koalas¹. With regard to the south coast the NPWS suggest “ . . . *The remaining populations are small, highly fragmented and disjunct, occupying areas of secondary habitat*’ and “ . . . *there is no evidence of breeding koalas on the south coast except in the Bermagui area.*”

There seems to be some agreement that a degree of soil fertility combined with the occurrence of suitable eucalyptus trees are the major factors contributing to Koala occurrence and population density. If it is assumed, because ‘primary’ Koala feed species remain, that a loss of soil ‘fertility’ on the ‘arable’ lands, in the thirty years (30) post ‘clearing’ led to reduced habitat quality and the extinction of Koalas in these areas. It seems reasonable to assume that a similar process on the more sensitive ‘non-arable’ land, over a similar timeframe could achieve a similar outcome.

The Scientific Committee has previously suggested that “ . . . *The area occupied by the remaining population is large enough that threats might be expected to impact on only a fraction of the population at any time*” and “ . . . *With respect to Koala health in the nominated area and outside (tablelands area), the implication could be drawn that habitat quality is poor and contributing to a declining population.*”

As indicated in the nomination, a phenomenon that would have had an impact on a ‘sparsely distributed’ or ‘high density’ Koala population in the south-east occurred during a short dry spell in early 1998. A more recent ‘official’ drought has resulted in the death or canopy ‘browning’ in millions of trees along the south coast².

It seems likely that, given the scale of these unprecedented events, there would be an adverse impact on many native species, particularly when eucalyptus trees in refuge areas along gullies and streams are generally stressed and subject to bell-miner assisted dieback.

A recent paper³ suggests rural and forest eucalyptus dieback could be a consequence of increased soil moisture and soil fertility (nitrogen), creating unfavourable conditions for eucalyptus roots. The authors suggest increased shelter for Koalas, in the ‘mesic’ understorey and increased nutrient content in tree foliage may explain ‘overbrowsing’ by Koalas in Victoria and South Australia, as these conditions “ . . . *may increase the reproductive vigor of Koala populations.*” A decrease in burning regimes is proposed as the reason for ‘moist’ soils and ‘mesic’ understorey development.

Although this paper was published before the recent drought, the authors’ report the increasing spread of ‘mesic’ eucalyptus dieback (pp 97-98) along the south coast and confirm this problem is increasing in most coastal forests in NSW.

¹ NPWS (2003) Draft Recovery Plan for the Koala, New South Wales National parks and Wildlife Service, Hurstville, NSW.

² The 1998 event occurred after 3 months (Jan-March). The current drought began with below average rainfall in May 2002 and continued until above average rainfall in mid February 2003. In the six (6) weeks before the rain the sky along the south coast was almost constantly ‘blackened, by the smoke from fires to the west. This seems likely to have significantly reduced solar radiation during this period and may have limited the dieback.

³ Eucalypt dieback in eastern Australia: a simple model. (2002) Vic Jurskis and John Turner, Australian Forestry, Vol 65, No.2 pp 87-98

In response to a question regarding the significant damage to trees throughout the south east during the drought the NPWS (J.Dawson, pers.comm) suggest:

- *Some of the agricultural areas of the Bega Valley where E.terticornis is the predominant species. In addition to the dry weather the contributing factors are probably related to agricultural activities (clearing, soil compaction, higher nutrient levels), declining numbers of insectivorous species, together with the increased spread of the noisy miner (Myzantha melanocephala).*
- *In patches within regrowth areas around the fringes of the valley areas. Predominantly this appears to be in forest previously cleared for agriculture. The patches most affected in at least some areas appear to be on north facing ridges with skeletal soils. The location suggests that stress from lack of water is a prime contributory factor.*
- *Patches of forest that are further away from forest edges. To date, insufficient information has been collected about drought related dieback in these areas to be able to provide further comment.*

Local residents have observed that the ‘patches’ of forest outside the Bega Valley subject to dieback during the drought extend across tenures from between Ulladulla and Batemans Bay in the north to the Victorian border in the south.

It seems reasonable to suggest that dieback in forests with a “xeric’ understorey on ridges and slopes may reflect too little water and dieback on lower slopes and in gullies too much water.

Descriptions of soil limitations⁴ indicate soil fertility is closely connected to dispersion, ‘ . . . Dispersible clays are often highly erodible. The soils readily disperse into their constituent parts in water. Soil dispersion is often associated with high levels of exchangeable sodium on the clay fraction.’ There is a widespread occurrence of stony, sodic and dispersible soils along the south-east coast.

Little (1994) found increase sodium and decreased calcium at depth in soil samples from the Murrah area (see Attachment 1). These indicators of dispersible soils are frequently coupled with a high gravel component that does not retain water.

Changes to soil conditions can occur when bio-diversity is reduced, forest structure is changed, ground cover is reduced or soils are disturbed or compacted. In steep forested catchments where the dominant flow of water is through the soil, increased infiltration is likely to upset the ‘natural’ chemical balance in soils.

On ridges and slopes increased water infiltration through soils can adversely impact on soil materials, particularly sodium that disperses clay aggregates. It seems likely that these changes have occurred over much of the ‘non-arable’ land in the south east since the last major drought in the early 1980’s. During this time the south –east was

⁴ Soil Landscapes of the Bega-Goalen Point 1:100000 Sheet. Tulau, M.J. (1997) Department of Land and Water Conservation, Sydney

‘officially’ drought declared for a total of thirty three (33) months although dieback was not evident.

Under these changed conditions, soil physical properties particularly those related to water retention, such as Field Capacity, Permanent Wilting Point (PWP), Available Water Capacity (AWC) and Hydraulic Conductivity change and the period of dry weather required to produce leaf wilting and browning, decreases.

Water not retained in soils of the upper catchment increases soil moisture levels at lower topographies. The eroded materials from upstream increase soil ‘sodicity’ at lower topographies, limiting the availability of soil derived nutrients and placing eucalyptus trees under stress.

The outcome is increasing psyllid populations that provide habitat for bell-miner colonies and the development of a ‘mesic’ understorey or swamp. As previously mentioned, these changes can be observed in ever expanding areas of lowland and riparian forests along the length of the NSW coast.

In the absence of any ongoing assessment of the impact on soils of current management, adverse changes can be observed only when the trees start to die during periods of dry weather. As this has occurred twice in the past five (5) years, sub-surface erosion is likely to increase as a result. In combination with predictions of global temperature increases, it seems likely that future droughts will have a similar if not greater impact on native forests.

“ In compiling this report it has been reinforced that reliable prediction of erosion hazard requires an assessment of the hydrology of the area under consideration. Forest hydrology is often very different from that of agricultural land and rangeland areas due to the effects of, for example, large differences in rooting zone and time interval between harvests. In adapting or adopting methods it is strongly suggested that emphasis be put on identifying the local hydrologic regimes and related erosion processes. It must be concluded from the available data that the range and distribution of hydrologic regimes in the south east forest region of New South Wales are currently unknown.

Most methods reviewed in this report are implicitly specific to a single hydrological regime and very significant errors of prediction will result if the assumed regime is not dominant in areas to which the method is applied. For example, if Hortonian overland flow is assumed, then high erosion hazard may be predicted for disturbed forest areas using MSLE. In reality the dominant path of water may be deep subsurface flow which results in high erosion hazard areas being confined to convergences in the topography and lower landscape positions (such as riparian zones) . . . The shift to the consideration of sustainability of land use requires that the local movement of sediment and subsequent effects on the soil resource receive more emphasis.

In the decade since this review, NSW legislation has not moved to consideration of sustainable land use and still only requires a pre-disturbance estimate of the potential soil lost as a result of surface sheet and rill erosion. The infinitely more complex forms of land degradation like ‘gully erosion’ and ‘mass movement’ that require data

on many environmental variables to determine potential impacts on the environment are not considered or 'legislated'.

With regard to the recovery of koalas, the NPWS (2003) state “ . . . *The recovery actions are aimed at updating, and facilitating the implementation of existing legislation to improve outcomes for Koalas and their habitat.*”

Unfortunately there is no existing legislation aimed at realistically or scientifically determining how human induced change to the environment are likely to impact on Koalas or their habitat. Under these circumstances, the notion of 'improved outcomes' for Koalas may be an illusion.

The NPWS suggest that “ . . . *In recognition of the small numbers of Koalas and the need to re-establish primary habitat a specific recovery plan for Koala in the south coast management area is in preparation.*”

However at a local level the NPWS has recently announced they have “ . . . *successfully completed a 7,000 ha. hazard reduction burn on the south eastern edge of Wadbilliga National Park.*” The manager of the NPWS Far South Coast Region indicated “ . . . *We will also look towards conducting further hazard reduction burning along the eastern side of Wadbilliga National Park.*” (Bega District News, 15 April 2003)

The eastern side of Wadbilliga National Park also forms the western side of the area occupied by the nominated population. The only area of formerly fertile soils in National Park in the area occupied by the nominated population is previously cleared land at Goalen head in Mimososa Rocks National Park. Although some replanting has been undertaken in this area, the NPWS still allow cattle from adjoining properties to graze the property.

In early 2001 an application was made for Natural Heritage Trust funding, to implement sustainable land management practises⁵ in the area occupied by the nominated Koala population. This application, although approved at the regional and state levels, was rejected by the NPWS on the basis that it was incompatible with their Koala recovery proposals.

The NPWS Koala recovery proposals fail to acknowledge what some consider⁶ is the urgent need to implement sustainable land management practises. It is suggested that Koalas are at high risk of becoming extinct in nature in New South Wales while these conditions prevail.

The fact that Koalas have survived in this area as long as they have seems likely to be due to the previous availability of suitable habitat and community pressure on the land

⁵ River Restoration Framework, Koehn, J.D., Brierly, G.J., Cant, B.L., and Lucas, A.M. A report for the National Rivers Consortium, December 1999.

⁶ Blueprint for a Living Continent, A way forward from the Wentworth Group of Concerned Scientists, November 2002, Convened by World Wildlife Fund Australia

management agencies. Although it may take some time to be certain, it seems these attempts may have been inadequate.

(b) *it is likely to be genetically, morphologically or ecologically distinct,*

Any Koalas remaining in the nominated area are likely to be genetically distinct from Koalas released at Mallacoota. The NPWS report no additional information has been obtained regarding the disease and genetic status of Koalas in the Numerella area.

(c) *it is otherwise of conservation significance*

The Scientific Committee has previously indicated that “. . . *In making their decision, however, the Committee does not wish to imply that the Koala population at Eden and Narooma is not of great conservation significance*”. While the Scientific Committee may have changed their opinion, it is suggested that Koalas in the south-east have retained their conservation significance.

ATTACHMENT 1

Supplement 1

The cation exchange capacity (CEC) represents the total negative charge. (These figures are expressed as centimoles per kilogram by chemists but this is very nearly numerically equivalent to coulombs per gram so you can think of it as a negative electric charge). This has to be balanced by an equal number of positive charges and these are supplied by the cations (or exchangeable bases) sodium, potassium, calcium and magnesium. Aluminium in solution can be a very powerful counter to sodium, i.e. it prevents dispersion of clay. However, it is usually not in solution and it tends to attach itself to fine clay particles that can still be dispersed by sodium. Magnesium is intermediate between sodium and calcium in its effect on dispersion. The atom has a high charge as does calcium but it is small and highly hydrated by sodium. Sodium as a percentage of the total charge (ESP) is the most sensitive indicator of dispersibility. Singer et al. found that the erodibility of one of their soils was increased by the presence of 2% ESP. This tends to be exacerbated by alkalinity and offset by high calcium. In the Murrah soils there is a deficit of cations which I shall call the unsaturated charge (see figures) and it makes up a big proportion of the total charge. In this case the negative charge is balanced by hydrogen (from water) and aluminium from the breakdown of clays.

Supplement 2

Most of the charge on the soil is associated with the clay which consists of tiny crystals too small to be seen under the microscope. There are several families of clay mineral and they vary in charge from kaolinite with 3-10 coulombs per gram to smectite with 100-150 coulombs per gram. The dispersibility of a soil is usually controlled by the clays and their response to the nature of their charge. The crystals attract one another and form larger particles that lead to stable aggregates resistant to erosion. Calcium and, to some extent, magnesium are conducive to the formation of stable aggregates; sodium is conducive to the break-down of these aggregates. Silt has no charge, there is very little particle interaction and silty soils will erode easily.

References

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