Submission on the Remake of the Interim Forest Operations Approvals for NSW Coastal Forests.

Mick Harewood, July 2018

The remake of the IFOAs for coastal NSW forests into one approval for the coastal regions seems to have the main consequence of intensification of logging operations in the north coast forests. This will likely render these forests, over time, into the kind of young regrowth forests now extant in most of the Eden Region; suitable for pulpwood production perhaps but subject to serious fire risk and with little prospect of sustainable sawlog production for the foreseeable future.

The independent review of the NSW regional forest agreements (Ewan Waller, April 2018) used the Montreal Process framework of Criteria and Indicators of Ecological Sustainability to report on the progress toward Ecologically Sustainable Forest Management in the coastal forest regions (Waller, 2018, pp105-122). I propose to structure this submission under the Montreal Process suite of indicators adopted by the Montreal Implementation Group (MIG) in order to illustrate some of the implications of intensification of logging for other coastal region forests.

Indicator 1.1.a. Area of forest by forest type and tenure.

All rainforest types in the Eden Region are now subject to severe degradation by feral deer incursion. Fallow deer populations have grown exponentially as deer farms have failed and ridiculous limits on hunting during the rutting season have applied. Deer eat the bark of many rainforest understorey plants and consume regenerating seedlings. Sambar deer eat a wide variety of rainforest shrubs, vines and trees. Effective control measures are urgently required.

Indicator 1.1b Area of forest by growth stage.

Nearly all of the State Forests estate and much of the National Parks estate, in the Eden Region has been transformed by intensive logging into even-aged regrowth, with few surviving older trees. Although logging prescriptions were in place for part of the time in an attempt to provide older habitat and seed trees throughout the logged areas, many of these have not survived due to changes in the water table (reduced evapotranspiration following logging leading to saturated soils and subsequent wind-throw of isolated retrained trees, a phenomenon particularly noticeable in riparian areas), intensive post-logging burns and wildfires such as the Timbillica fire of November 1980. (46,000 hectares in 6 hours from a smouldering bark dump lit months before).

Intensive logging can result in the regrowth being at risk of increased wildfire damage because the vertical continuity of fuels means fires more readily become crown fires. I the case of Silvertop Ash dominated forests in the Eden region, young regrowth tends to regenerate as a multi-stemmed coppice from the surviving root system, thus setting back stand development for decades. This is likely to occur in stands of Blackbutt (*E.pilularis*) and Silvertop Stringybark *(E.laevopinea*) on the north coast.

Indicator 1.1c Area of forest in protected categories.

Proposals to decrease the width of streamside buffers are likely to have a severely detrimental effect of the availability of suitable habitat for many forest-dependent species. Streamside buffers have the highest site quality and nutrient levels. Proximity to surface water is extremely important for small birds, particularly those dependent on regular preening of plumage for the efficiency of flight in, for example, catching insects on the wing. Streamside buffers tend to have the best-developed shrubby understorey, vital for providing nest sites for many small birds essential for forest ecosystem health.

Indicator 1.2.b: The status of forest dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment.

The 1994 Environmental Impact Statement (SFNSW) relied on unpublished research by Kavanagh and Bampkin (eventually published in 1995) to assert that only three forest dependent species were significantly affected by intensive logging (from memory, the Greater Glider, Sugar Glider and the White- Throated Nightjar.) This paper used weak non-parametric statistics to compare species abundance in logged and unlogged areas. This may have been justified for some species of very low (surveyed) abundance (e.g. Koalas) but it may have led to a "Type A" error (failure to find an effect when there was one present) in the case of Yellow-Bellied Gliders, for example.

Another problem with the research of Kavanagh and Bampkin was that, for the coastal forests, there were so few unlogged areas in NSW that sites in Victoria had to be sampled, thus biasing the sampling to cooler environments.

The yellow-bellied glider is important for forest health because of its consumption of psillid insects at night. Bell minors harass other birds during the day and "farm" psillid insects for lerp (sticky exudate) production. (see, for example, Loyn et al, 1983)

Indicator 2.1.a: Native forest available for wood production, area harvested, and growing stock of merchantable and non-merchantable tree species

The net area of log landings and snig tracks after intensive logging has been estimated at 12 to 19% of the coupe for the Eden region (see, for example, Bridges, 1983)

Future wood production on these bare and heavily compacted areas is negligible. The nature of log extraction, using upslope snigging without supporting the front end of an oldgrowth log on wheels maximises the impact of logging operations on the site. The method of log extraction actually decreases the area of productive forest by a significant amount.

Indicator 2.1.c: Annual removal of wood products compared to the volume determined to be sustainable for native forests, and the future yields for plantations.

In the CRA/RFA for Eden, the annual sawlog removal was set at 20,000cubic meters per annum for the 20 years of the RFA. No serious attempt was made to quantify the likely rate of regrowth of sawlogs following the 20 year period of the RFA.

At the beginning of the Integration phase of the Comprehensive Regional Assessment of forests (CRA), State forests representatives put up a GIS data layer which showed where the multi-aged forest sawlog resource was located. Conservation representative pointed out that considerable areas of the mapped forest had already been logged for sawlogs. State Forests came back the next day with a plan to bring forward logging of fire regrowth areas to supply sawlogs during the last 3 years of the 20-year RFA.

Since this time, some areas of Koala habitat in the Murrah and Mumbula forests have been withdrawn from logging and replacement sawlogs will be drawn from forests further to the north with a subsidy using funds from the EPA Environmental Trusts accounts.

On ABC radio on 13/2/2018 (ABC Rural), Alan Richards for Blue Ridge Hardwoods said that sawlogs from the Eden region would run out by 2031. This seems wildly optimistic. Perhaps he meant to say 2021?

In any event, the policy of mining out the oldgrowth /multi-aged forest sawlog resource without taking into account the rate of regrowth of sawlogs from the cut areas has inevitably lead to a hiatus in sawlog supplies, perhaps for many decades. This would have occurred irrespective of the changes in land tenure that occurred following the Interim Assessment Process (IAP) and RFA, due to the unrealistically high sawlog quotas allocated in the earlier years of management for woodchips and sawlogs (e.g. 83,000cubic meters per annum cited in the 1982 Eden Native Forest Management Plan) (FCNSW 1983).

It has long been known that regrowth forests produce wood that is subject to collapse when sawn at a youngish age.

This leaves the Eden region forests as a pulp farm for the next 20 years or so. The few jobs there are at Blue Ridge (?17) will go unless sawlogs can be sourced from outside the region. Harvesting of pulp is by excavator based machines so there are not very many jobs in the bush.

Implementing more intensive logging in the northern coastal forests is likely to lead to a similar shortfall in the sustainable production of sawlogs in the future. While intensive logging of oldgrowth forests might result in an increased rate of accumulation of total biomass in the dense regrowth, the rate of accumulation of sawlog sized trees seems to be significantly diminished. Perhaps it is too early to tell (48 years since woodchipping commenced at Eden is nowhere near long enough to re-grow sawlogs) but a sustained yield of sawlogs is clearly impossible from the Eden region for many decades.

On low site-quality areas, regrowth stands seem to get into a “locked” condition, where no dominant trees can emerge from the even-aged regeneration. This can be exacerbated by devastating wildfires, which result in coppice regeneration of multiple stems from surviving root systems.

Low intensity selective logging may be followed by a reduced rate of germination and growth in the early years following logging, (see for example the early reports on “Silvicultural Systems” research in Victoria) but the ultimate rate of regrowth of potential sawlogs is likely to be greater than that observed with intensive logging because regrowth stands are not grossly overstocked with stems that will die out before they can yield a commercial return.

Indicator 3.1.b: Area of forest burnt by planned and unplanned fire

The 1994 Environmental Impact Statement on Forest operations in the Eden Region (SFNSW) sets out an ambitious fuels management regime for the Eden region forests subject to logging for sawlogs and woodchips. Staff cuts and a diminished window of opportunity for prescribed burning have meant that a lot less regrowth forest is treated than may have once been envisaged.

Following the 1986 (Federal) EIS on Woodchip Exports Beyond 1989, Cheney, Gould and Knight (1992) studied fuel types in regrowth forests in order to develop a prescribed burning guide. They found little difference in fuel loads between different areas of regrowth forest of a similar age, but important differences in fuel structure. They divided fuel types based on bulk density, that is:

surface fuels (the dense litter on the ground)

near-surface fuels (grasses, ferns and trailers and the dead litter caught up in this layer)

shrub layer fuels.

In the relatively mild conditions chosen for prescribed burning, they found that the only fuel parameters of importance were near-surface fuel height (or percent cover, the two being correlated) and near-surface dead fuel moisture content.

These findings have important implications for fire management policy in the regrowth forests. While in extreme fire weather, all fine fuel types may become important, and are apparently consumed, the major driver of fire rate of spread in the earliest stage of wildfire development is likely to be the very dry and perfectly aerated near-surface dead fuel component.

Given that some plants like bracken-fern (*Pteridium Sp*.), wallaby grass (*Danthonia* species) and wire grass (*Tetrarrhena juncia*) are real pyrophiles (that is, they respond rapidly to burning by growing back faster than many competitors), repeated prescribed burning may actually increase the near-surface fuel component over time.

Another finding by Cheney et al was that about 10% of the crop trees were damaged by a prescribed burn to the extent that bark at ground level might no longer be an effective barrier to the entry of fungi or termites. The proposal to burn regrowth at 5 to 7 year intervals (1994 EIS) would likely result in few crop trees surviving undamaged until their eventual harvest.

Other authors (e.g.Phil Zystra, Wollongong University) have emphasised the importance of a vertical continuity of fuels in increasing the risk of crown fires and spotting potential. This has obvious implications for the young regrowth that develops following intensive logging.

In practice, the ambitious fuels management program outlined in the 1994 Environmental Impact Statement for the Eden region seems to have fallen by the wayside following staff cuts and the realisation that the window of opportunity for safe burning is rather limited. Post-logging burning and some limited strategic burning to protect assets/settlements seem to be the priority.

Priorities for the National Parks and Wildlife service seem to be similarly focussed on asset protection and community risk, with staff cuts a similar constraint.

As the climate warms, all temperate forests will become subject to a more destructive wildfire regime. I would be foolish to make intensive logging protocols more widespread. This would result in larger areas of dense regrowth which are undoubtedly subject to more severe wildfire damage and arguably more difficult to treat with prescribed fire without inflicting excessive damage to potential crop trees.

Indicator 4.1.a: Area of forest land managed primarily for protective functions

The design of streamside buffers has been discussed by Bren (1999) who pointed out the logic of widening buffers at the head of drainage lines to take into account the contributing area of catchment upslope. However, his figure 1 “Oblique view of the model catchment” resembles a bent piece of weldmesh, unlike any natural catchment seen in mountain forests. Therefore his “divergent” zone does not really exist in first order stream catchments in nature, although there may be something like a divergent zone in alluvial floodplains. A more realistic analysis would use a model like TOPOG, which divides up catchments into pixels bounded by two contours and two lines at approximately right angles to the contours. TOPOG solves the Richards equation for each pixel thus assessing the contributing area for a range of antecedent wetness conditions (see, for example, Vertessey et al, 1993).

Streamside buffers can only capture suspended sediments in overland flows from disturbed areas if they are actually areas of infiltration. If, due to antecedent wetness and/or a large upslope contributing area, a streamside buffer becomes an area of exfiltration overland flow during a rain event, it cannot possibly capture suspended sediments.

The design of streamside buffers should not be compromised by the desire to increase sawlog production. Streamside buffers should be widened in the heads of gullies and in other areas where a credible model such as TOPOG suggests the buffer may become an area of exfiltration overland flow.

There is an obvious relationship between the intensity of logging and the width of streamside buffers necessary to protect water quality. Bosch and Hewlett (1982) reviewed world -wide literature to conclude that where about 20% of the forest canopy is removed , there will be a significant increase in water yield. Logging intensity at greater than 20% canopy removal on any catchment scale is likely to increase streambank erosion should a significant rainfall event occur before the re-establishment of catchment vegetation. Hydrological studies in the Tantawangalo Catchments at Glenbog (Lane and Mackay, 2001) showed that, in the catchment treated by selective logging for potential sawlogs only, stormflow runoff remained elevated for at least as long as in the catchment treated by intensive logging for sawlogs and woodchips. One reason for this might be that the killed roots of large trees removed for sawlogs appear to become “pipes” as they decay, thus facilitation sub-surface stormflow.

The Tantawangalo Catchment studies featured a significant rainfall event during the logging phase (December 1989) which would have undoubtedly resulted in significant streambank erosion and bedload sediment accretion and transport. However, no sediment studies from these catchments have been published, to my knowledge. I did see an internal report comparing “percentiles” of turbidity in water samples from the logged and unlogged catchments. Just how one is meant to interpret this data, in the absence of date on the absolute levels of turbidity, is a mystery.

Logging intensity should not exceed 15% canopy removal in the catchment of any mapped (1:25,000 scale) stream in any year. Further logging might occur when the catchment hydrology has returned to the pre-logging condition, perhaps after 10 to 20 years. However, the effects on wildlife and fuels management are other considerations.

Indicator 4.1.b: Management of the risk of soil erosion in forests

The use of heavy machinery and upslope snigging of oldgrowth logs in the Eden forests has maximised the impact of log extraction on soils and maximised the fuel use. Snig tracks tend to follow ridge lines then deviate towards gullies and away from the ridge. This causes overland flow along the snig tracks to rapidly leave the ridge and head towards the gully until intercepted by a cross bar.

Soil forming processes only occur in the presence of sufficient warmth and moisture to sustain plant and microorganism growth. By using heavy logging machinery to bare and compact skeletal forest soils and conducts water more rapidly down the catchment, logging operations decrease site quality and are likely to decrease future productivity.

The export of eroded soil from catchments has been assessed by sampling streams for turbidity. Because of the phenomenon of exhaustion, elevated turbidity can only be expected in the first significant rainfall event following logging disturbance (see, for example, Lacey et al 1999). However, Cornish (1989) used fortnightly grab samples to assert that intensive logging in the Murrah and Mumbulla forests did not significantly increase stream turbidity. During the study period, there was widespread intensive logging and a number of significant rainfall events. However, many of the sample sites could only be accessed by low-level stream crossings which were impassable during many rain events. Thus, the sampling record was biased towards dry weather, and most significant pollution events would have been missed.

Automated sampling of paired catchments has been attempted at Yambulla and Tantawangalo. Equipment failures and a wildfire at Yambulla have meant that limited data are available. No results on water quality or bedload sediments have been published from the Tantawangalo studies.

Rainfall simulator experiments have attempted to evaluate the effectiveness of erosion control measures like crossbars on snig tracks. (Croke, 1997). Study site have often been chosen close to ridge-top roads in order to facilitate the supply of water by tankers. The general conclusion from rainfall simulator experiments that turbid runoff generated on snig tracks is absorbed into the general harvest area near the outlet of crossbars assumes that the general harvest area is an area of infiltration. Lower down the slope in logged catchments, antecedent rainfall higher up may make much of the general harvest area (and any streamside buffer) an area of exfiltration overland flow. Thus the conclusions from rainfall simulator experiments have to be interpreted in the light of the locations of the study site in the particular catchment and the antecedent wetness.

Indicator 4.1.c: Management of the risks to soil physical properties in forests

The organic matter content in forest soils is generally reduced by frequent prescribed burning. The extent and frequency of prescribed burning in the Eden region appears to be far less that that envisaged in the 1994 environmental impact statement, perhaps due to staff cuts and the smaller window of opportunity for burning in the regrowth forests.

The effectiveness of prescribed burning in managing wildfire risk should be carefully evaluated. Newman (cited in Raison et al, 1997) estimated equilibrium fine fuels of 10tons/ha in the Eden forests and a re-accumulation of fine fuels to 8.8 tph after 3 years following prescribed burning.

The Bushfire fire fighters manual states that in forest fires, ground attack is generally not attempted if the flame height is in excess of 1.5meters. Using the fire behaviour model developed by

MacArthur, it is obvious that in severe fire weather, the fuel loads need to be near zero in order to have a reasonable chance of containing wildfires.

Cheney (1986) (in his section on fire risk in the Harris-Daishowa EIS on Woodchip Export from Eden beyond 1989)has pointed out that prescribed burning has other benefits than just fine fuel reduction, such as reducing loose flakey bark on trees and some of the shrub layer fuels, as well as staff training opportunities. However, prescribed burning can also favour the development of "pyrophiles" such as bracken fern, wallaby grass, and wire grass. These significantly contribute to the near surface fuel component identified by Cheney , Woods and Knight as the only fuel component of significance in their prescribed burning guide for the Eden regrowth forests.

Indicator 4.1.d: Management of the risks to water quantity from forests

A number of studies have shown that when catchments with deep soils and baseflow dominated hydrology are intensively logged or burnt, the regrowth resulting uses up more water by evapotranspiration than the oldgrowth it replaces (see Kuczera, 1985, Lane and MacKay, 2001, Cornish 1993, reviewed by Vertessey, 1999)). These catchments are of great economic significance because of the importance of flow-duration into warm and dry periods.

This effect can be minimised by limiting the intensity of logging to, say, 15% of the catchment area in any period of, say, 10 to 15 years.

Indicator 4.1.e: Management of the risks to water quality in forests

See discussion under 4.1.a and 4.1.b.

For evidence of impact see effects of logging in the Bemboka (<u>not</u> Brogo) catchment in Growns, 1998). In brief, logged catchments showed a reduced macroinvertebrate diversity in receiving streams.

Indicator 5.1.a: Contribution of forest ecosystems and forest industries to the global greenhouse gas balance

State Forests of NSW has never produced a credible whole of cycle carbon balance for its operations.

The Kyoto protocol assumes a forest is immediately converted to CO_2 when it is logged. This is not literally true but nevertheless a great deal of CO_2 is released in the logging and post-logging burning process. The average life of paper is just a few years and less than 10% of the wood from the Eden forests ends up in a sawn timber product that may have a life of decades.

The transfer of timber production to plantations grown on previously cleared land may exacerbate global warming due to a decrease in albedo from, for example, exotic pine plantations.

Substitutes for wood in construction (steel, reinforced concrete, aluminium, plastics) probably all have a worse greenhouse impact, so it is important to quantify all of these impacts.

<u>**Conclusions.**</u>

The Eden region has been subjected to intensive logging of forests since 1969. This has resulted in significant impact on wildlife, catchment values, site quality in forests, the risk of wildfire damage and the loss of extensive areas of beautiful oldgrowth. Many potential sawlogs have been turned into woodchips and the sawlog supply is close to exhaustion, with no prospect of replacement from the regrowth forests for many decades. To extend intensive logging to the north coast of NSW would be stupid.

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