Report

To

District Court

Re

Appeal Number: D6/2011

Appellant: Trenton Alexander Hindman

Respondent: Cameron James Sargent

Dr W. H. Burrows FTSE

Woodland Ecologist

26 March 2013

SUMMARY

This Report comments on Expert witness reports prepared to inform the Magistrates Court in Charleville in the matter of a charge of unlawful land clearing brought against Trenton Hindman in November 2011 (Case ID No: 3680-2009_Hindman). The land in question is located on 'Alpha', Wyandra. It comprises Lot 4 on Plan: P533 and Lot 2 on Plan: P5353. This property is a Grazing Homestead Perpetual Lease (two contiguous blocks). The Purpose of the Lease is for grazing and agriculture.

Grazed woodlands are in a continual state of flux. Therefore, the first part of this Report sets out to give the Court a broad appreciation of woody plant dynamics on eastern Australian grazing lands. Examples from 'Alpha' itself are provided whenever possible, along with insights obtained from research carried out on nearby properties in south-west Queensland and north-west NSW.

The purpose of this review is to help the Court understand that any environmental harm (itself challengeable) that may have arisen as a result of Mr Hindman's actions was no more than transitory, because of the inherent resilience of the woody systems typical of the 'Alpha' landscape. This is coupled with the fact that the predominant overstorey trees were left intact (not cleared). Photographic evidence presented shows the cleared areas are now well on the road to full recovery (March 2013).

Three specialist Reports were submitted to the Magistrate's Court. The first assessed the identification and mapping of Regional Ecosystems (REs) as they applied to the areas cleared on 'Alpha'. The Senior Botanist responsible for this Report seems to have changed the RE designation of the major block cleared (north central Lot 4) three times between 2006 -11. This same area appears to have undergone another name change between 2011 and 2013.

It was apparent that there was also no consistency between the various Reports in the nomenclature and area of REs identified as being present before the clearing took place. The second Report (Vegetation and Flora Impacts) identified eight different REs as being cleared. The third Report (Biodiversity Impacts) only listed six for the identical land area. Further, the second Report listed three REs not recognised by the third Report, while the latter included one RE not listed in the second. It was noted that this confusing picture arose even though the nominated experts (and authors of the respective Reports) were employed by the same State government department.

The reader of the RE Map Assessment Report is left more perplexed. The Senior Botanist made a field inspection of 'Alpha' in October 2011 (about two years after the last clearing episode). After this he determined that **both** the

cleared and uncleared areas on ‘Alpha’, where poplar box trees comprised the undisturbed predominant canopy, each supported the definition of “remnant vegetation” (as set out in the Schedule of the Vegetation Management Act 1999). This leaves the reader to ponder what was actually cleared? It was concluded that the manner in which REs and remnant vegetation are defined needs revisiting. It is also suggested that sampling methods employed by the Senior Botanist also require re-evaluation.

The Vegetation and Flora Assessment Report pointed out that all the REs disturbed on ‘Alpha’ were classified as being ‘Not of Concern’ at the time of clearing. Further, **no** species listed under either State or Commonwealth Conservation Acts were known or predicted to occur within 20 km of the Lots on Plan in question.

None of this good news deterred the Senior Botanist from making sweeping generalisations about impending environmental disaster due to Mr Hindman’s activities. After compiling his litany he also noted that “a range of other effects” (?) was also likely. But he failed to document any of these theoretical disasters as occurring on ‘Alpha’ itself. Perhaps in forlorn hope he did note that clearing “may” have removed suitable habitat. Unfortunately the Magistrate accepted the Senior Botanist’s unsupported opinions in concluding that ‘clearing of the land has had an adverse ecological impact’. It is suggested that this contention is simply destroyed by examining recent photographs tended in the following pages of this Report, or by visiting the site in 2013.

The Biodiversity Report was under even greater difficulty to identify undesirable outcomes from Mr Hindman’s unlawful efforts to keep his Grazing Homestead Perpetual Lease fit for Purpose i.e. grazing and agriculture. This was because the authors appear to rely on a desktop assessment carried out in their Toowoomba office, without actually inspecting ‘Alpha’ or the subject land. The effectiveness of this desktop procedure is highlighted by the comment in the Report that “a number of (non-existent - WHB) canals run through the property”.

Any doubt about the ability of the cleared REs on ‘Alpha’ to rapidly recover after disturbance was dispelled by this Report which noted that 365 ha of the area cleared during the first clearing episode (2007), was “re-cleared” in 2009. It is suggested that this resilience in the woody vegetation does not indicate it is removed or ‘lost’, from the simple action of a one or two pass disturbance.

Like the Senior Botanist the ‘Biodiversity’ authors seemed hard pressed to document real examples of problems generated by the ‘Alpha’ clearing. So they assessed the “possible environmental impacts associated with the clearing” and “species that may have been affected”. And to magnify the

undesirable outcomes they appear to have attributed multiple effects to each cleared RE, claiming on each occasion that the area affected was additive. Hence, while only 675.7 ha were cleared in 2007, the suggested area to be detrimentally effected on this same area of clearing totalled 2018.3 ha!

Again, in similar manner to the Senior Botanist's conundrum, no records of protected wildlife species and no areas of threatened species habitat were identified for 'Alpha'. However this did not deter the Biodiversity team who decided to infer the presence of flora and fauna.

The more one read the Biodiversity Report the less one was inclined to take it seriously. So calling one of the REs a 'floodplain community' no doubt conjured up more emotive images than the locally descriptive 'claypan', but going on to say the affected area is subject to "floods of varying duration and intensity" was a sure final signal that the authors were out of their depth. I concluded that desktop assessments, not accompanied by field inspections, have no place in Court proceedings of this nature.

The nub of this matter is that, while Mr Hindman removed understorey shrub and sub-canopy plants on his lease without a permit, he did not interfere with the predominant overstorey canopy. Further, based on my field inspection 16 months after his Court proceedings, it is my considered opinion that there would have been strong evidence of recovery in the disturbed vegetation at that time. The reason this early recovery was not detected by the Senior Botanist was because of a deficiency in his sampling methodology. And since the Biodiversity experts did not carry out a field inspection before submitting their report, any inferences they have made on the state of the vegetation are largely irrelevant.

I believe that any competent and experienced ecologist would have ensured he/she actually visited the site before making inferences about the resilience of the disturbed Regional Ecosystems. Such a qualified person would not have been concerned.

Formal requirements for expert report

In preparing this report, I confirm that:

1. I understand my duty to the court and have complied with that duty; and

2. I have not been given, nor accepted any instructions to adopt or reject a particular opinion in relation to any issue in this Report, or otherwise in relation to this matter.

Introduction

I received a request from Phillip Sheridan on 25 January 2013 to critique expert Reports tended to the Magistrate's Court in Charleville with reference to a charge of unlawful clearing of native vegetation brought against Trenton Alexander Hindman and Zephanie Fiona Hindman.

The land in question is described as Alpha Station, Wyandra, Lot 4 on Plan: P533 and Lot 2 on Plan P5353, Local Government of Paroo. The Case ID was 03680-2009_ Hindman.

I was also asked to conduct an inspection of the subject land and to draft my own report on the impact of the clearing of the land. I might add that I would not have offered any comments or opinions on the expert Reports, without first undertaking a field inspection as a matter of course.

The following Report combines all the responses to Phillip Sheridan's requests within the one document, so as to minimise unnecessary overlap. Additional information is provided to assist the Court in understanding the ecology of grazed woodlands and especially the dynamics of the tree and shrub layer.

Instructing Documents

I was provided with copies of three expert Reports prepared by Andrew Franks, Senior Botanist, Queensland Herbarium (Regional Ecosystem Map Assessment + Environmental Impact Assessment – Vegetation and Flora) and Dr Geoff Lundie-Jenkins and Clare Davies, DERM, Toowoomba (Environmental Impact – Biodiversity). Trent Hindman also provided me with copies of all relevant explanatory documents e.g. latest regional ecosystem maps, satellite imagery, aerial photos, field photo points etc. A copy of the Magistrate's decision was also provided.

I have had no previous association with the owners of 'Alpha', apart from a short meeting with Trent Hindman, when I was asked to impart my experience and knowledge of green turkey bush control, based on my long term study of this plant.

Qualifications

B. Agr. Sc. (U. of Q.) [1964]

M. Agr. Sc. (U.of Q.) [1972]

Ph. D. (ANU) [1977] – Environmental Biology, RSBS

I am an elected Fellow of the Australian Academy of Technological Sciences and Engineering, an Hon Senior Fellow, Central Queensland University, and a past appointed Fellow of the Australian Institute of Agricultural Science and Technology and of the Tropical Grassland Society of Australia. I am a past President of the Australian Rangeland Society and the Tropical Grassland Society of Australia; as well as being a recipient of the Cattleman's Union, Industry Research Medal and a Centenary Medal for 'services to Australian society in the field of ecology'.

Experience

I have over 40 years research and development experience studying pasture development, pasture management and woodland ecology/development in Queensland's grazing lands (selected publications reflecting this history and relevant to my expertise are listed in Appendix 2). For 16 of those years I was based at the Charleville Pastoral Laboratory (last 4 as OIC – 35 staff including 4 PhD's). During this time I carried out or assisted in extensive ecological and pasture R&D in south west and central west Queensland i.e. in harsh environments similar to that at 'Alpha'. For the final 24 years of my working career I was based in Rockhampton, where I led research teams studying grazing management of buffel grass pastures (Brigalow Research Station), grazing management of native pastures (Galloway Plains, Calliope) and sustainable development/management of native woodlands (Wandobah, Dingo). Along the way I served a stint in 1997 as Acting Director, Tropical Beef Centre, Rockhampton (A joint venture of CSIRO/QDPI/CQU with 6 campuses and 97 staff – 15 PhD's).

I commenced long term monitoring of woody vegetation in SW Queensland in 1965 (Burrrows and Beale 1969)[1]. In 1982 I was commissioned by QDPI, in conjunction with Dr J.C. Scanlan, to Report on Tree and Shrub Regrowth Problems in CW Queensland, and particularly in the Shires of Barcaldine, Blackall, Isisford, Jericho and Tambo. Again in 1982 I initiated and remained leader (until retirement in 2004) of a group responsible for detailed monitoring of Queensland's grazed woodland resources utilizing the TRAPS system (Back *et al*. 1997, 1999). The TRAPS network now comprises ca. 130 permanent sites located throughout Queensland's wooded grazing lands, including on properties nearby to 'Alpha'.

[1] Citations throughout this document are detailed in the Reference listings at the end of the report and/or included in my personal publication list (see Appendix 2).

In addition to the above I was leader of a CRC for Greenhouse Accounting team studying the time course of vegetation change in Queensland's grazing lands, utilizing stable carbon isotope techniques. The first definitive publication from this work (Krull *et al*. 2005) unambiguously established that gidgee trees in Mitchelll grass communities of the Longreach district were recent (post WWII) invaders and not endangered remnants as had been previously mapped by Regional Ecosystem classifiers in EPA. Just before I retired I helped initiate a large quantitative study to investigate the extent and time course of tree thickening on grazing lands within the Burdekin (including Belyando) river catchment. This study utilizes the distinctive stable carbon isotope ratio signatures of tropical grasses and woody plants respectively, to establish their relative site occupancy over recent decades/centuries.

Although retired I continued to publish the results of my past woodland studies in the scientific literature up until 2009. (see Appendix 2)

Methodology

To bring myself 'up to speed' I perused my extensive library of scientific publications relevant to the ecology and management of grazed woodlands in Queensland and adjacent States. This included publications emanating from the time I was stationed in Charleville 1964 – 1980, as well as relevant historic publications such as the Royal Commission (1901) To Inquire into the Conditions of Crown Tenants – Western Division of NSW. Pertinent documentation relevant to Queensland's Regional Ecosystem Assessment and Mapping program was also consulted.

After obtaining this renewed perspective I arranged to inspect cleared and undisturbed sites on 'Alpha' in conjunction with Trent Hindman. During this inspection I also consulted with Don Moody, a station hand/manager on 'Alpha' from 1955 – 71to get recollections of the vegetation during that timeframe and up to the present day. I also consulted with David Adcock who leases land on the western boundary of 'Alpha' and who is a long term resident of the Wyandra district.

Since natural resources should be assessed without recourse to tenure or other administrative boundaries, sites along the Charleville – Wyandra and Wyandra – Boatman – Morven roads were also examined where thought relevant. I also drew on research information obtained from various properties in the mulga lands and which I was familiar with (Appendix 1).

This Report was then compiled after thorough review of the expert Reports tended to the Magistrate's Court.

REPORT

Background: 'Alpha' is a property of c.16,187 ha (40,000 ac) situated c.10 km east of Wyandra. The property comprises two juxtaposed blocks described as Lot 4 on Plan P533 and Lot 2 on Plan P5353, Wyandra. The current tenure is a combined Grazing Homestead Perpetual Lease (GHPL 15/1534; GHPL 15/1550) - originally issued in 1979. The Purpose of the Lease, as described in the 1979 lease document, is for grazing and agriculture. In meeting the purpose of the lease a leaseholder needs to be cognisant of his Duty of Care and the Land Act 1994 (as of 19 Feb 2013) provides details of all reasonable steps to be undertaken in relation to the lease of the land, viz.:

a) avoid causing or contributing to land salinity that –
    (i) reduces its productivity; or
    (ii) damages any other land;
b) conserves soil;
c) conserves water resources;
d) protects riparian vegetation;
e) maintains pasture dominated by perennial and productive species;
f) maintains native grassland free of encroachment from woody vegetation;
g) manages any declared pest;
h) conserves biodiversity.

All of these factors are important, but location, topography, soils, vegetation etc, relevant to a particular GHPL, render each point of lesser or greater moment when applied to individual leases. For example, the flatness of the land (< 1-2% slope) comprising the 'Alpha' holding and its location in a climatic zone where evapo-transpiration exceeds mean annual rainfall, ensures salt in the soil profile would not be mobilised, even if it were present. Likewise, 'Alpha' has no obvious drainage lines (what appear to be so, on aerial photos, are artesian bore drains no longer in use) - so the protection of riparian vegetation is not applicable to this lease.

I will return to this theme of a lessee's Duty of Care later in this Report. But since many of my subsequent comments are predicated on the Court having a sound appreciation of vegetation dynamics in grazed woodlands (e.g. as represented by the present vegetation on 'Alpha' station), I first need to provide the Court with an overview of vegetation change in the grazed woodlands of eastern Australia, which followed the introduction of domestic livestock. The implications for ecosystem structure and processes will also be discussed. [Wherever possible, information sources which place this information in an 'Alpha' context will be cited].

Understanding woodland dynamics: The noted historian, Geoffrey Blainey (1982) reported in his book, 'Triumph of the Nomads', that without aboriginal fires the grassy woodlands that occupied much of the fertile crescent in south-eastern Australia would have been scrubland or forest at the time of European occupation. Yet, he

chronicled, a period of fifty years was sufficient to change the character of this savanna country when fires were suppressed by Europeans and their livestock. Blainey concluded that "the widespread ring barking, that was carried out at the **turn of the twentieth century,** occurred within the increased tree density. The landholders were attempting to re-establish the original carrying capacity!", he said.

A witness told the Royal Commission (**1901**) into the plight of western NSW grazing lands that - "Generally speaking the Cobar-Byrock region was open box-forest country *(not too dissimilar in structure to the original 'Alpha' block)*, with an occasional cypress pine tree upon it". However following the arrival of Europeans and their domestic stock there was "a cessation of bush fires that formerly occurred periodically. This afforded the noxious scrub a chance of making headway". [There was a follow-up Interdepartmental Inquiry (1969) into the same area and problems – nothing had improved since 1901]. Today this now dense shrub-woodland is a distinctive feature in all satellite images of Australia.

In his award winning book, 'A Million Wild Acres' Eric Rollls (1981) writes evocatively of the settlement history of the nearby Pilliga Scrub in NSW – He observed "The cypress pines came up 10,000 to the hectare ---- 'One year the stockmen saw the little pines just to the top of the horses hooves' one man told me, 'The next year the pine tops brushed their boots as they rode. And a year or two after that – those old stockmen used to ride at ten past ten, knees cocked up from the saddle like wings – well, they had to jam their knees in hard behind the pads or the pines would have pushed them backwards out of the saddle. Soon they just mustered their stock and got out. There was no room for grass to grow.'"

Jim Gasteen's father took up a soldier settlement block in the Bollon district soon after World War 1. In 1986 Jim wrote (Gasteen 1986) that the ensuing decades were very dry and "in the absence of competition from ground layer species, and a lack of fires because there was nothing to burn, inedible shrubs, mulga, cypress pine and eucalypt seedlings began to colonise the open spaces. By the late **1930's** shrub regrowth had reached such proportions that some three year old ringbarked areas were so unusable, and so uneconomic to treat, that the usual follow-up treatment of suckering had to be abandoned – some of it still, 40 or 45 years later

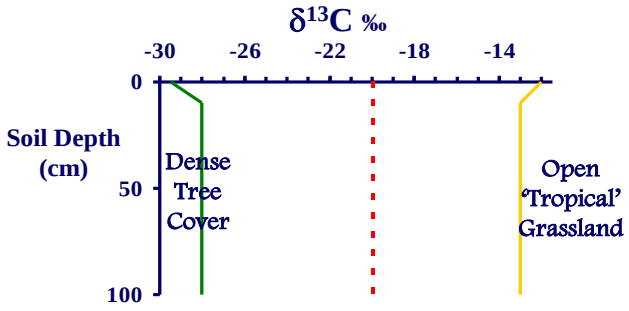
Gasteen's property was 'Thrushton' (140 km east of 'Alpha'). It was acquired by the National Parks & Wildlife Service and set aside in the late 1980's to preserve 'the pristine mulga forest'. The open woodland of World War 1 soldier settlement days had been replaced by dense mulga, as tellingly depicted in an aerial photo published by Dr Rosemary Purdie (1986).

This was the fate of all the mulga country east of the Warrego river. Purdie was a prominent Australian ecologist contracted to the Queensland Herbarium at the time

of writing the article in which this photo appears. She goes on to assert that "as a result of land use the mulga region ecosystems can in no way be described as 'pristine' – that is, identical with their pre-Aboriginal or pre-European state".

Hard scientific evidence, compelling photo sequences and the aerial photo record for 'Alpha' itself – backed up by the earliest survey records for the station, when the land was opened for closer settlement in 1895 - support Purdie's assertions, and provide a telling record of vegetation change. Consider:

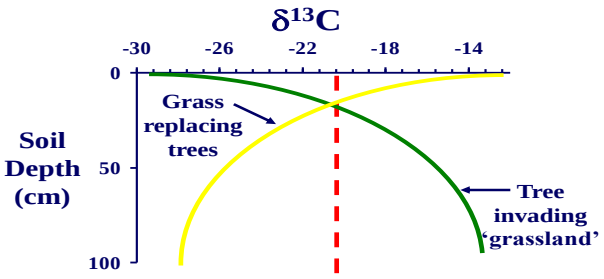
INARGUABLE EVIDENCE FOR VEGETATION CHANGE IS NOW PROVIDED VIA STUDIES OF SOIL CARBON



The ratios of the stable carbon isotopes $^{13}C/^{12}C$ (expressed as $\delta^{13}C$) provide diagnostic signatures which can be used to differentiate organic carbon derived from trees/shrubs and tropical grasses. [It is a tree-grass DNA test if you like]. Woody plants possess the C3 photosynthetic pathway ($\delta^{13}C$ range = -27 to -32‰ {per ml}, whereas vegetation of tropical/sub-tropical zones is typified by grasses with the C4 pathway ($\delta^{13}C$ range = -13 to -17‰).

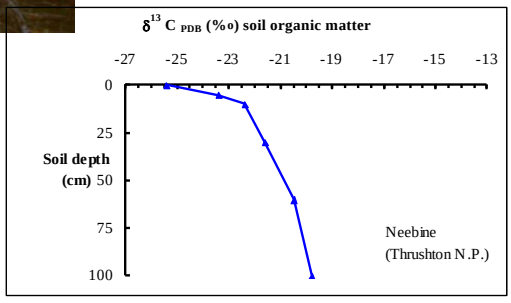
If woody plants have been long term constituents of the landscape the $\delta^{13}C$ signature of the soils beneath them should reflect this and fall within the –27 to –32‰ range. However if C3 trees and shrubs had displaced C4 grasses: (i) the soil $\delta^{13}C$ value would be less negative than –27 to –32 ‰ (ii) the degree of departure from the expected ratio would decrease as time of site habitation by woody plant increases, and (iii) the soil $\delta^{13}C$ values would become less negative along the chronosequence (Tieszen & Archer 1990). Queensland studies have recently confirmed that analysis of bulk soil organic carbon $\delta^{13}C$ signatures, along a soil depth gradient, provides a good approximation of the vegetation changes over time.

GENERALISED RESPONSES



So if we analyse the soil $\delta^{13}C$ profile beneath a vegetation community of unknown history we can deduce that history by interpreting the pattern of $\delta^{13}C$ changes with increasing depth. For example a pattern similar to the green line would imply that trees are invading grasslands or thickening up, compared with a more open woodland structure in the past. A pattern similar to the yellow line would imply that tropical grasses had replaced a previously closed woodland.

INTERPRETING UNKNOWN VEGETATION HISTORY

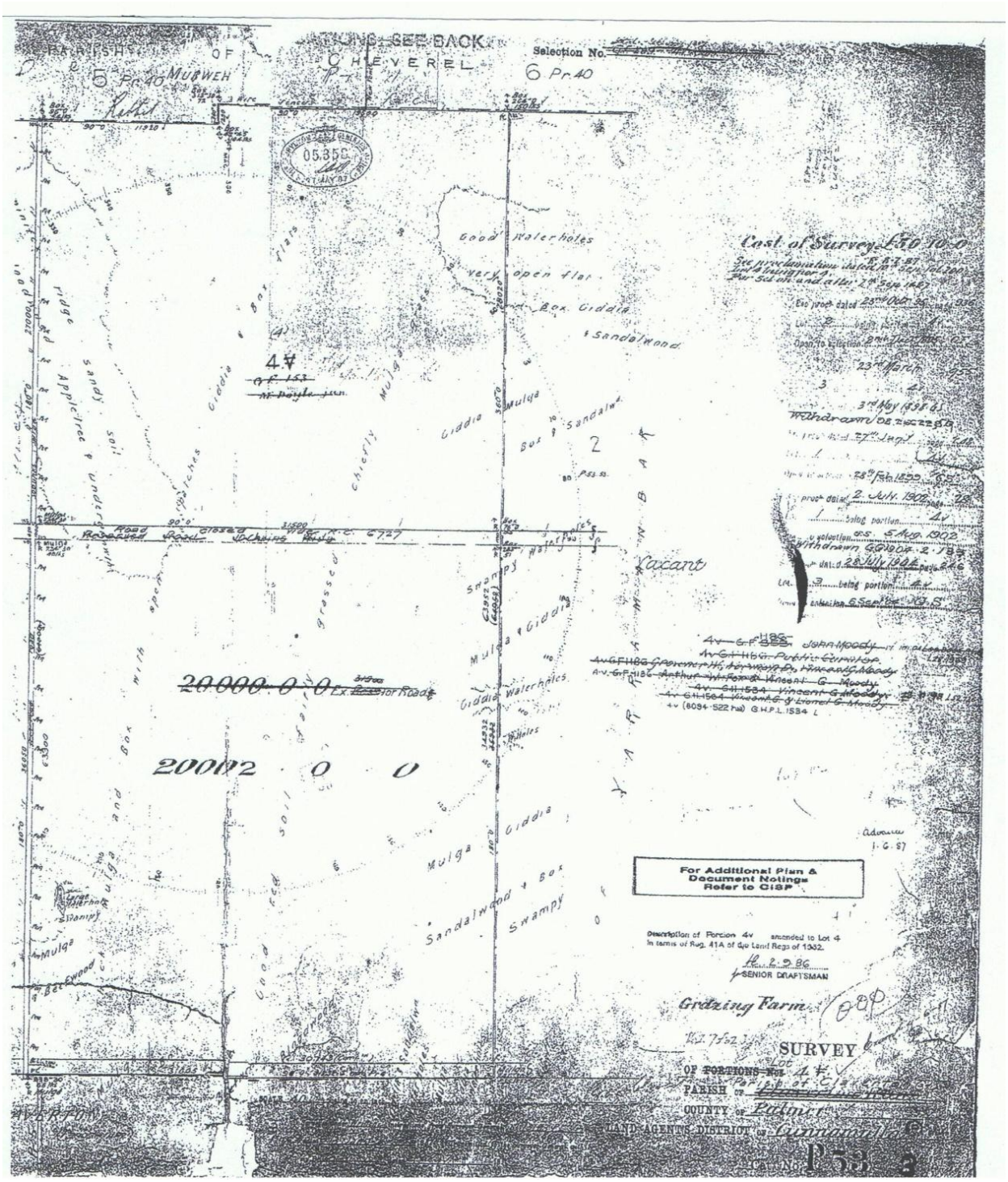


The photo depicted here and showing dense mulga, is from Thrushton National Park near Bollon. The $\delta^{13}C$ profile (mean of 6 samples) indicates that mulga (*Acacia aneura*) has certainly increased ('thickened up') at this site, reinforcing Jim Gasteen's personal history of the property, as detailed on page 9.

‘Wongalee’ is a grazing property 40 km east of ‘Alpha’. The photo sequence below again emphasizes the invasive nature of mulga in this district.

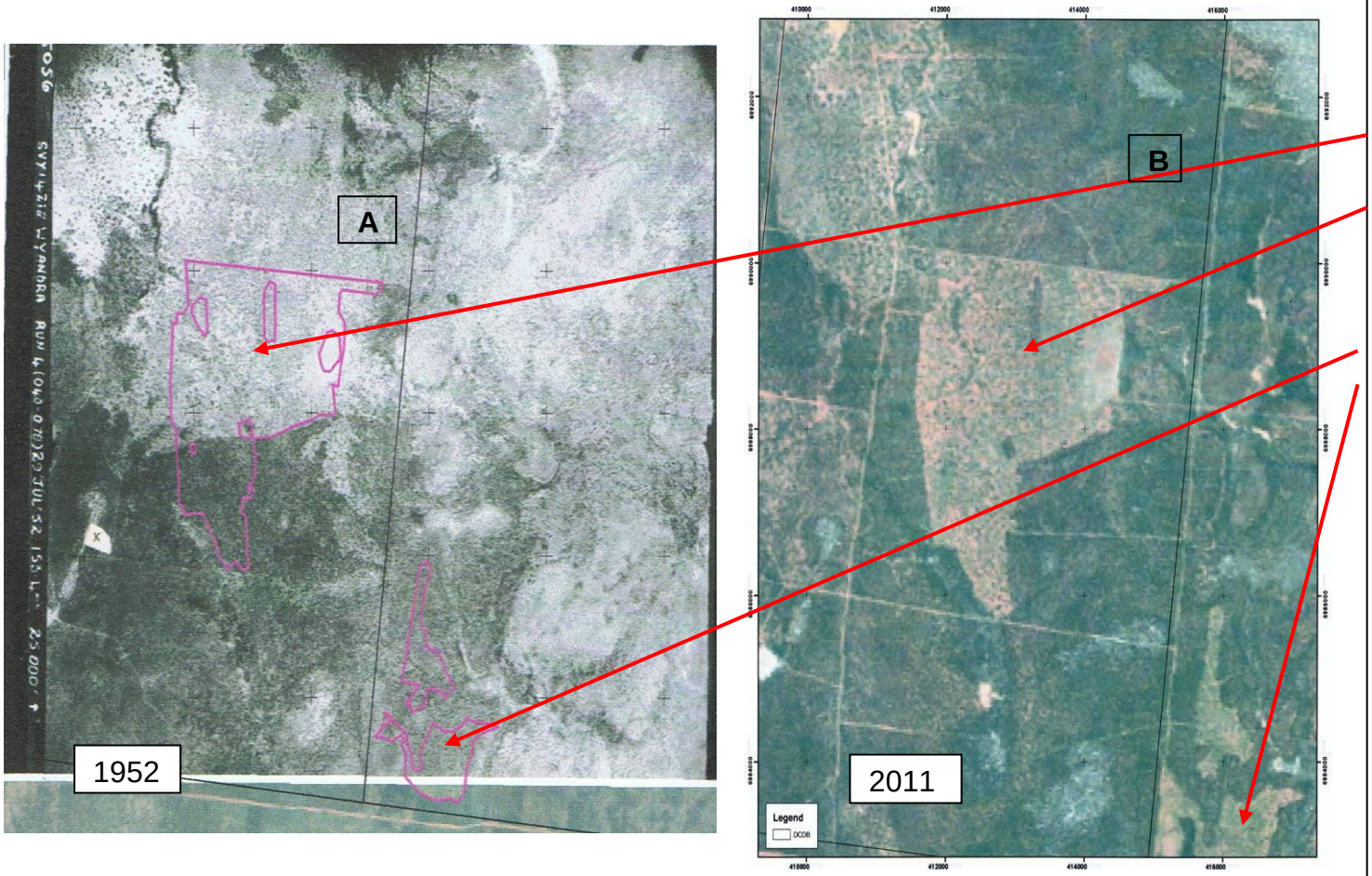
This analysis would be incomplete without evaluating the available record for ‘Alpha’ itself. The earliest description available to me was made in 1895, when the western half of ‘Alpha” (Lot 4) was released for settlement as a “Grazing Farm”. [At that time the adjacent Lot 2 remained vacant Crown land].

Annotations on the plan show that the south west corner of the block carried thick mulga, as it does in 2013; but indicate that the northern half of the block was characterized by “open patches of gidgee and box flats” and “fairly well grassed, chiefly mulga grasses”. There is no mention of the presence of native shrubs such as green turkey bush or *Senna* species in this area, and annotations noting the presence of (false) sandalwood appear specific to swampy patches on the eastern boundary. It should be noted that if woody shrubs dominated the understorey (as they did for example in 2006) it is reasonable to expect that the 1895 Lot 4 surveyors would have indicated this as “undergrowth” – as they described the woody shrubs present on the Spinifex ridge at that time [see original survey on p. 13].



Original 1895 descriptive survey of Lot 4, 'Alpha' station, Wyandra

Again the earliest aerial photo of 'Alpha' available to me was a 1952 image taken from 20,000 feet. This clearly shows that the northern 'half' of 'Alpha' was then still characterized by a very open (presumably box tree) woodland with a well grassed ground layer similar to the 1895 survey.



For the most part tree/shrub cover in 1952, appears to visually match that on the areas cleared in 2007-09, and is similar to that described by the initial property survey in **1895**! Clearing in this 'park-like' fashion (leaving scattered box trees) seems to have essentially **restored** the original structure of the vegetation. The demarcation in the 1952 image between 'open' vegetation in the north and denser vegetation in the south was due to the maintenance of a fire break along an access track. (Don Moody, pers. comm. 7.3.13). [Moody was a station hand/manager on 'Alpha' from 1955-1971].This demarcation is no longer present in the uncleared areas in the 2011 image.

Comparison of 1952 aerial photography image on left, with a 2011 satellite image (right). The approximate location of the areas cleared in 2007-09 is superimposed in pink on the 1952 image. Woody vegetation cover was much more open in 1952 and the extent of tree/shrub thickening from 1952 to 2011 is very obvious. For example, compare the northern (top) half of both images (A cf. B) and note the increased woody plant cover (>>30%?) on 'Alpha' over time. [Scales of both images are only approximately equal].

It is of interest to the woodland ecologist that the south-west corner of 'Alpha' appears to have maintained a dense mulga forest since the time of initial survey in 1895. This forest has a tree basal area of c. 14m^2/ha (measured with a forester's dendrometer on 7.3.13). However that in no way implies that all of the property would have supported the same mulga population density, and there is no evidence to warrant such a conclusion. In their early explorations both Mitchell (1848) and Leichhardt (1847) noted that brigalow occurred in dense stands but was also often found in 'patchy plain' formation. In 1938 Dr Stan Blake reported that - "brigalow scrub is slowly but surely extending its range, many changes having taken place within the memory of living men. Both grassland and *eucalyptus* forest have been invaded and replaced. All stages of this invasion can be seen, and in some older scrubs, box (tree) stumps are to be found".

More recently Judith Wright inspected the diaries of early settlers in the Dawson river country and in her book "The Cry for the Dead" noted that " by1885 the country of the upper Dawson had changed a great deal since Leichhardt had crossed it. Wattle scrubs (probably lancewood?) were spreading on the sandstone country, while brigalow was invading those open downs which Leichhardt had seen".

Acacias invading tropical grasslands are easy to pick up since the change in vegetation structure is so stark, and soil chemical ($\delta^{13}C$) signatures can provide inarguable evidence for the switch in any event (Krull *et al*. 2005). But it is harder to be dogmatic about tree thickening in the eucalypt woodlands because trees have always been a component of these savanna communities, although at a much lower density than in today's so called 'remnants' (see Domin 1911). Still, long term vegetation monitoring at permanently positioned sites (Burrows *et al*. 2002), and aerial photo interpretation (Fensham *et al*. 2003) all endorse appreciable increases in woody cover, at least since World War 2.

An analysis of pollen sediments from Lake Dunn, which is in the centre of the Desert Uplands, has been used to identify vegetation change and in particular, the grass to tree ratio over the last **120** years. These results were compared to the historical record, rainfall data, and grain size distribution, using lead isotope dating to establish a depth-time relationship. It was found that a significant increase in Myrtaceae (eucalypt family) pollen occurred from the early 1950's, reflecting a change from continuous grass with scattered trees, to a near continuous scrub (Sim et al. 2004). These trends have been confirmed further to the north and east in the Burdekin catchment in another study of stable soil carbon isotope signatures (Krull et al. 2007). Evidence of woody plant thickening was found, over similar timeframes to the Sims et al. study, on 60-70% of the 44 randomly selected woodland sites.

I could detail many other examples of demonstrable vegetation thickening that have greatly altered the structure and composition of our vegetation on grazing land - vegetation which nevertheless is now commonly designated as 'remnant' by officialdom and conservationists, both within and outside of government. So there

are publications documenting the disappearing grassy balds of the Bunya mountains (Fensham and Fairfax 1996); the replacement of wet sclerophyll forests in north Queensland by invading rainforest (Harrington and Sanderson 1994); the loss of grasslands in Cape York to invading *Melaleuca* trees (Crowley and Garnett1988), and the dramatic increase in eucalypt cover (Sharp and Whittaker 2003) in alluvial zones of the Victoria River, Northern Territory. The list goes on and on, and is backed up internationally by a very extensive scientific literature reporting similar phenomena, wherever hunter gatherer societies have been displaced by Europeans and their domestic livestock (Van Auken 2000). And the universality of this response strongly points to altered fire regimes and livestock grazing as the prime agents of change (Scholes and Archer 1997), both in Australia and overseas, rather than higher rainfall patterns or CO_2 concentrations in the atmosphere, as some conservationists now want to claim.

Given the tree cover has convincingly thickened in the 'intact' (uncleared) woodlands of eastern Australia, since the commencement of grazing with domestic livestock, it is not surprising that woody understorey shrubs (especially those with unpalatable foliage) have increased as well. This is very well detailed in Jim Noble's (1997) great read "The Delicate and Noxious Scrub". In this book Jim concentrates on examples from the Box – Mulga areas of north west NSW and south west Queensland. Although there are some species differences, common understorey shrub genera include *Eremophila, Dodonaea and Senna (Cassia)*. The shared problem of most species in these genera is that their populations have expanded aggressively on grazing lands, since grazing first commenced and fire incidence concomitantly declined (Royal Commission 1901).

These understorey shrubs (represented most prominently by species in the above genera on 'Alpha'), are commonly referred to as "woody weeds" in Queensland and "invasive native species or scrub" (INS) in NSW. These descriptions provide the context in which such plants are usually perceived by landholders and agriculturalists. These shrubs undoubtedly inflict a severe impact on sustainable land management, as well as the lessee's ability to demonstrate his "Duty of Care" to the land, as set out in the Land Act 1994.

Rosemary Purdie and Bill McDonald were prominent ecologists/botanists from the Queensland Herbarium who contributed a vegetation chapter to the WARLUS (Western Arid Region Land Use Study) Part 3 in 1990. This comprehensive land use report covers the mulga – box woodlands east of the Warrego river (including 'Alpha'), *inter alia.* The authors depicted the common woody vegetation responses when the overstorey trees were disturbed in the figure on the following page. While all the woody weed species listed by Purdie and McDonald (1990) are not present on 'Alpha', the responses to clearing are well represented by this diagram. Probably the key point being that after disturbance trees and shrubs rapidly "invade" (encroach) on these land systems [or regional ecosystems (RE's) as the vegetation-soil communities are described in today's vernacular (Sattler and Williams 1999)].

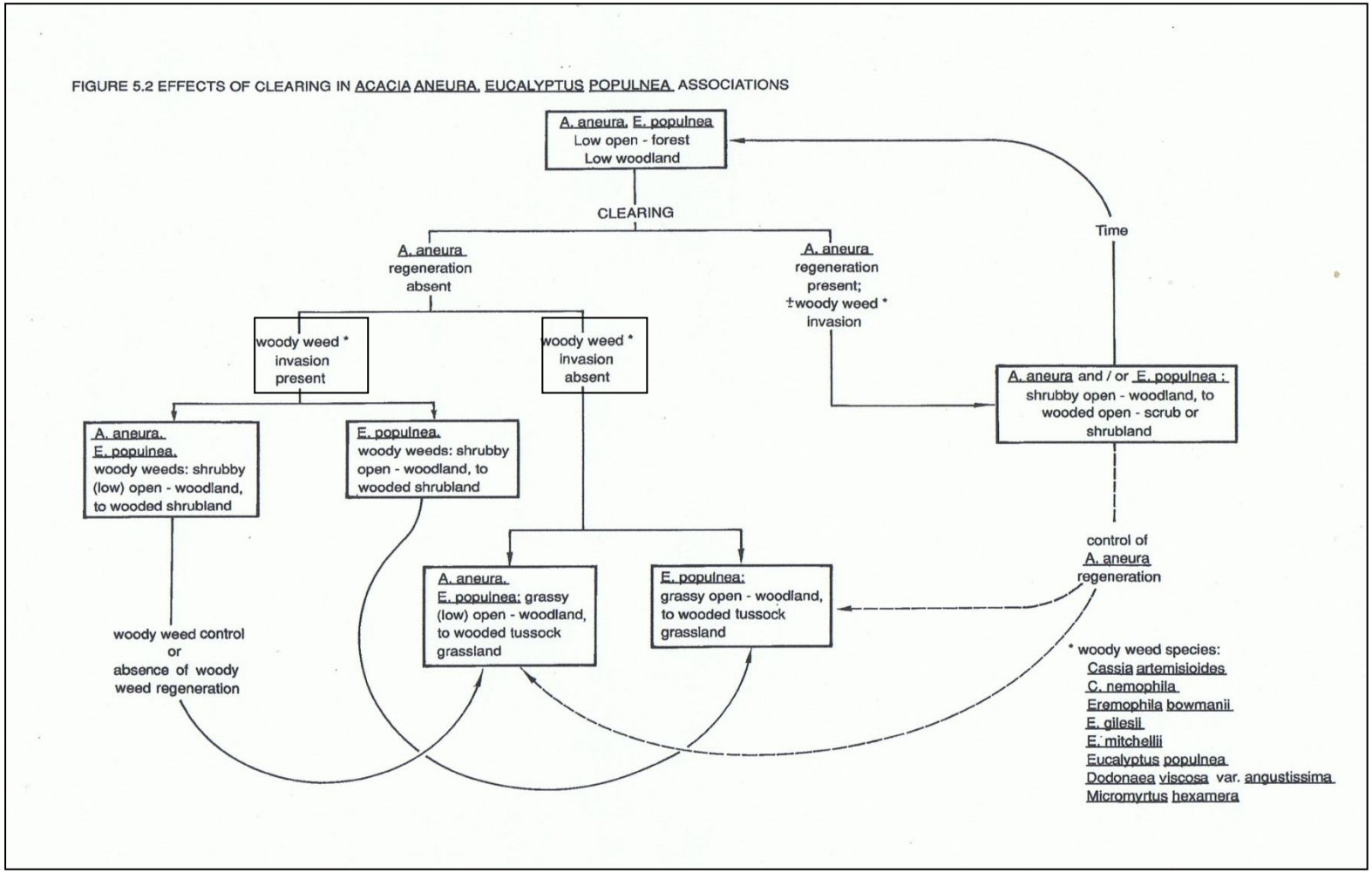


Figure 5.2 from Purdie and McDonald (1990)

[*Acacia aneura* = mulga

Eucalyptus populnea = poplar box]

Green turkey bush (*Eremophila gilesii)* is now widespread on ‘Alpha’. The two photos below starkly illustrate how this native shrub (woody weed) can impact on pasture production.

Green turkey bush inhibiting pasture at ‘Wallal’ – Charleville 1970. [This poplar box – mulga community is 60 km north of ‘Alpha’ and has a similar vegetation mix to it. Note good grass pasture in the left background of the same paddock in the absence of the shrub].

Same area on ‘Wallal’ (note same foreground “marker” trees in both images) in the absence of green turkey bush – 1972. Native grass production is now profuse. This grassy woodland state is similar to that mapped on ’Alpha’ in 1895 and apparent in the aerial photo taken in 1952. This poses the question - which vegetation structure best reflects the <u>original</u> plant diversity on ‘Alpha’?