

A Brief Study on the Effect of Ground Scalping and Direct Seeding on the Cumberland Plain – July 2019

ABSTRACT

For more than three years, exercises of ground scalping and direct spreading of native plant seeds have been undertaken on selected plots on the Cumberland Plain. This method of restoration has been undertaken in other States for a little longer period.

The method is presented as a viable means (both economically and in terms of on-ground results) to recover native ground cover on a degraded landscape.

A recent presentation at the Cumberland Plain Conservation Plan Community Reference Group promoted ground scalping and direct seeding as a consideration in delivery of the Cumberland Plain Conservation Plan.

This brief study provides an analysis of four of the several plots on the Cumberland Plain where ground scalping and direct seeding has been undertaken. It arises as a consequence of the author having received reports of failings of the method which are not being presented in forums where the method is being promoted.

THE STUDY

The author of this study was invited by qualified and experienced practitioners of conservation on the Cumberland Plain to join them in Winter 2019 to inspect three (3) sites where plots were scalped some three to four years ago. For a fourth site, I did not inspect but a well qualified and experienced person has given me an analysis of the result of the ground scalping and direct seeding method employed there.

On three of the plots transects were established and the ratio of bare earth, native vegetation and exotics was identified. On the fourth plot no transect was necessary because of the condition of all the plot.

Scheyville National Park

The ecological community predominant in this National Park was Cumberland Plain Woodland but past uses of the land introduced and permitted establishment of exotic ground covers. The location for trial of ground scalping and direct seeding looks to have once been a parade ground and sports field.

Half the area of the field was scalped and the other half remained overgrown with a mix of exotic ground cover and native ground cover with an area of regenerating native trees. The area surrounding the field was a mix of native ground cover, native trees and exotic ground cover.

A transect extending 50 metres through the centre of the scalped and direct seeded plot produced the following result:

<u>Bare Ground & Litter</u>	<u>Native Species</u>	<u>Exotic</u>
63%	13%	25%

Percentages rounded to nearest % across the three categories.

For this study *Cynodon dactylon* (Couch Grass) is regarded as an exotic species. It is recognised that some people regard it as a native species. However, there is insufficient evidence to say it is a native of the Cumberland Plain. Further, it is a species which smothers native species and reduces an area to a monoculture once established.

As can be seen, three to four years after scalping and direct seeding approximately 63% of the area of the plot is

a mix of bare earth and litter with most of that being bare earth.

See photo underneath taken in the centre of the plot showing part of the largest area of bare earth:



I expect that early photographs of the vegetative growth after scalping and direct seeding would have shown an abundance of native ground cover albeit no more than the extent of native species diversity directly seeded. That is because of the initial weight of native seed over exotic seed on the plot after scalping and seeding.

However, the abundance of exotic ground cover nearby and surrounding the plot would be the source of reintroduction of the exotic species within the plot. Also, *Cynodon dactylon* rhizomes can be rooted deeply in the soil and remain in the soil after scalping only to re-establish within the plot.

Given those considerations, the plot looks to have deteriorated. In terms of the greater ratio of exotic plant species to native species. The exotic species were dominated by *Cynodon dactylon*, (Couch Grass), *Setaria gracilis* (Slender Pigeon Grass) *Eragrostis curvula* (African Lovegrass) *Hypochaeris radicata* (Flatweed)

The photo underneath shows established *Cynodon dactylon* in one of several locations active with stolon extension:



As indicated, there is native ground cover but the diversity is limited to little more than a handful of species present. The dominant native species at time of inspection in Winter 2019 was *Calotis cuneifolia* (Burr Daisy) with some extent of *Themeda triandra* (Kangaroo Grass).

The photo underneath shows an area of native ground cover (but not devoid of exotic species present):



Plot Summary Comment

Without constant follow-up weeding the plot has commenced returning to something resembling its previous state immediately prior to scalping because of the prevalence and quantity of exotic plants surrounding the plot. There is potential, however, for a monoculture of exotic ground cover because of the amount of bare earth available for *Cynodon dactylon* to extend and dominate.

That raises the question as to whether it might have been more economical or no more costly to have employed standard bush regeneration technique over time to achieve a better native ground cover than what is likely to eventuate through scalping and direct seeding.

Western Sydney University (Ham Common) Londonderry

Prior to intensive agricultural use the ecological community predominant in this location would have been Cumberland Plain Woodland tending to Alluvial Woodland. Past agricultural uses of the land introduced and permitted establishment of exotic ground covers.

A portion of the Common was scalped and direct seeded.

On the northern and eastern side of the plot is an area extensively dominated by *Eragrostis curvula* (African Lovegrass). To the western and southern sides is a mix of native canopy and native ground cover along with exotic ground cover.

No photos were collected of this plot but it can be said that the bare ground component at this site is more evenly distributed across the plot and greater than at the Scheyville plot.

A previously established transect of near 50 metres in the plot was used to assess the ratio of bare ground/litter, native species and exotic species.

The result was as follows:

<u>Bare Ground & Litter</u>	<u>Native Species</u>	<u>Exotic</u>
68%	1%	29%

Percentages rounded to nearest % across the three categories.

As can be seen, three to four years after scalping and direct seeding, the plot is approximately 68% is a mix of bare earth and litter with most of that being bare earth.

I expect that early photographs of the vegetative growth after scalping and direct seeding would have shown an abundance of native ground cover albeit no more than the extent of native species diversity directly seeded. That is because of the initial weight of native seed over exotic seed on the plot after scalping and seeding.

However, the abundance of exotic ground cover surrounding the plot would be the source of reintroduction of the exotic species within the plot.

It was evident that a regime of chemical spraying of *Eragrostis curvula* (African Lovegrass) has been employed over time since direct seeding of native species. There is an abundance of dead tufts of grass which I presume are the sprayed remains of re-emerging *Eragrostis curvula*. There is evidence the chemical spraying has distorted the foliage of re-emerging *Acacia* species.

The chemical spraying may also be a contributor to the higher extent of bare earth here than at Scheyville NP.

There is also an abundance of the herb *Acetosella vulgaris* which is considered a native to Europe and does well on acidic, sandy soils in heaths and grassland.

Native species of ground cover is next to nothing.

Plot Summary Comment

Even with constant follow-up weeding (with potentially long term ill effect of chemical spraying) the plot is returning to an exotic species dominated condition as applied prior to scalping because of the abundance of exotic plants surrounding the plot.

That raises the question again as to whether it might have been more economical or no more costly to have employed standard bush regeneration technique over time to achieve a better native ground cover than what is likely to eventuate through scalping and direct seeding.

Wianamatta Nature Reserve

The ecological community immediately surrounding the plot chosen for scalping and direct seeding would best be classified as Castlereagh Scribbly Gum Woodland.

The vegetation surrounding the is plot almost all native vegetation.

No transect was established because of the lack of need. It was a small plot of perhaps less than half hectare.

The following ratio of bare ground, native species and exotic species was found:

<u>Bare Ground</u>	<u>Native Species</u>	<u>Exotic</u>
>99%	<1%	0%

Here underneath is a photo of the plot in Winter 2019:



As can be seen, after three to four years, little or no vegetation of any kind has returned. The plot and bare ground extends beyond the pre-existing tree and immediately surrounding native vegetation in the centre rear of the image.

Plot Summary Comment

The scalping and direct seeding was a complete failure at this plot.

Parrott Farm, Narellan

The ecological community predominant in this area was Cumberland Plain Woodland but past practices of the adjoining golf course and concealed community dumping introduced exotic plant species to what was chosen as a plot for scalping and direct seeding of native species. It is significant to note that the immediately adjoining bushland is highly intact Cumberland Plain Woodland with little exotic species present. As such, conditions prevailed which would aid additional dispersing of native seed into the plot by natural means.

For this plot transects in Winter 2018 and Winter 2019 reveal interesting results as follows:

Winter 2018

<u>Bare Ground & Litter</u>	<u>Native Species</u>	<u>Exotic</u>
29%	15%	57%

Winter 2019

<u>Bare Ground & Litter</u>	<u>Native Species</u>	<u>Exotic</u>
15%	34%	51%

The following comments are made:

1. Notwithstanding a statistical improvement in native ground cover and reduction of bare ground and exotic ground cover the statistics show an unimpressive statistic for a plot that was direct seeded with native species and exclusion of exotic species some three to four years ago.
2. Contrary to expectations the Parrott Farm site is about as weedy in 2019 as it was in 2018. Weed cover is dominated by *Cynodon dactylon* (Couch) which constitutes 27% (Winter 2018) and 28% (Winter 2019) of total ground cover in it's own right.
3. The native cover has *increased*. This is due almost entirely to a single species *Atriplex semibaccata* which accounts for 26% total cover in its own right and a whopping 73% of all native cover. *Atriplex* is a coloniser in degraded native pasture. It is considered locally native by PlantNET and most (but not all) botanists. Either way while the species diversity is still OK the bio-diversity (i.e. Shannon index) has plummeted. Where previously the site had a modest mix of species effectively it now has a *monoculture*.
4. It's also worth noting that the three most successful species are those which were not present in the surrounding and very diverse Cumberland Plain Woodland at Parrott Farm, but were in the standard seed mix. These are *Chloris truncata*, *Capillipedium spicigerum* and *Atriplex semibaccata*.

I have provided hereunder a monitoring photo point:



Picture 1 is taken in April 2016 from the most successful part of the scalp.



Picture 2 is the same scene as above but taken in July 2019



Picture 3 is the same patch with monoculture of *Atriplex semibaccata* with reddish hue and straw-hued *Cynodon dactylon*.

Plot Summary Comment

The Parrott Farm example shows this may be a useful tool but ***only in very particular and limited circumstances***. I feel very strongly that it must only come after rather than compete with the need for conservation (priority 1) and restoration of existing bushland (priority 2). I also feel that if it is to be used Greening Australia and other practitioners need to understand that the method requires around 10 times the maintenance effort (and cost) than currently undertaken, and by methods very different to the broad acre selective-herbicide spray currently undertaken at Londonderry.

There was a good initial result at Parrott Farm but the later ~30% *Cynodon dactylon* (Couch) cover is not a good outcome and makes it very difficult to do anything with now because of the tenacity of that exotic species so dominantly established.

OVERALL ANALYSIS

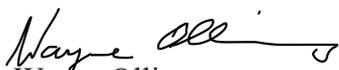
Early photographs of plots showing scalping and direct seeding restoration both in promotion events and in this study indicate success. However, the geology of Wianamatta Nature Reserve has shown risk for complete failure of the method. Further, the three other plots shown in this study indicate deterioration after early positive signs. So much so that the three other sites should presently be considered a failure in light of the glowing way scalping and direct seeding is promoted and in light of what is the 'fruit' of the method after three to four years.

A greater cost needs to be factored in to employ weed control than is promoted and to achieve success.

The question then arises as to whether standard bush regeneration practice would achieve a similar or better outcome than has occurred at the study sites.

The extent of surrounding exotic species plays a part in ongoing weed problems. That suggests the scalping and direct seeding method might produce a better outcome as landscaping for the projects like the Western Sydney Airport where the immediately surrounding area would not be exotic ground cover but concrete or bitumen.

Not for a moment should scalping and direct seeding be contemplated as an alternative to preserving intact or reasonably intact stands of threatened ecological communities. Further, the experience with Castlereagh Scribbly Gum Woodland at Wianamatta Nature Reserve precludes scalping and direct seeding being a suitable investment to offset this and potentially other ecological communities.


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