

LORD OF THE WEEDS



COMPETITION
REMNANT BUSHLAND AT MANLY
SELECTIVE CAMPUS, NORTH CURL
CURL

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INTRODUCTION

Manly Selective Campus, of the Northern Beaches Secondary College, North Curl Curl, is situated within Warringah Council, north of Sydney. A small area of remnant bushland is situated within MSC, bounded on the north by Makim Street and Headland Road, on the east by properties fronting Calder Street, and on the south and west by the school oval and surrounding areas (see right), of the type known as Coastal Sandstone Heath. It covers an area of about 7070m², and

lies on an area of steep rocky ground. It is one of only three examples of its type east of Pittwater Road in Warringah, however this area has become greatly disturbed and infiltrated by various weeds, and is often used as a dumping ground for rubbish, leading to its diminished significance. Of principle concern is the large numbers of Radiata Pines (*Pinus radiata*) that have entered the site, all offspring of a group of five pines planted close to the bushland when the school was moved to its current site in 1954. These and others planted on the southern side of the site have become very much a part of the school image, however their offspring are not wanted or needed. This area urgently needs to be returned to its natural state, to increase flora and fauna diversity within the bushland, thus helping to protect native species, increase its significance to the area, make the remnant stand out as an area that preserves the once abundant heath habitat, instead of as a rubbish tip and a weed infested area, and increase student pride in owning one of the few examples of sandstone heath within the suburban environment. This investigation plans to do this by locating and identifying the weeds in bushland, discover how they affect it and how they can be managed, and thus how to restore the bushland.



SATELLITE IMAGE OF MANLY SELECTIVE CAMPUS.

IDENTIFICATION OF WEEDS

There are five main weeds to be found in the remnant bushland at MSC. They have been chosen as they are the ones that are the most prolific and the most detrimental to the bushland's existence, cutting off sunlight and nutrients to the indigenous plants. Three are listed on the Noxious Weeds List, created for the Noxious Weeds Act, 1993, while the others are listed on Warringah Council's Environmental Weeds Register. The 5 weeds are Radiata Pine - *Pinus radiata*, Asparagus Fern - *Asparagus densiflorus*, Lantana - *Lantana camara*, Pampas Grass - *Cortaderia selloana*, and Cotoneaster - *Cotoneaster glaucophyllus*.

Radiata Pine - *Pinus radiata*

A native to California, this tree can grow up to 40 metres high. It is not listed on the official Noxious Weeds List for NSW, however it is on Warringah Council's Environmental Weeds Register, and has done extensive damage to the bushland at MSC. A single tree holds both male and female 'flowers,' with the female flowers becoming the familiar pinecone once fertilised. The winged seeds within, once released, are able to travel very far, up to 2-3 kilometres. Radiata pine is grown throughout Australia in plantations for its wood and its relatively fast growth, leading to its continued spread. Because of this growth, the tree has the ability to spread quickly. It drops its needles so that they cover the ground in a thick layer to smother any other competing plants. They are also highly acidic, meaning that



RADIATA PINES AT MSC.



few other plants can survive close by to a radiata pine. In the remnant bushland at MSC, the radiata pines are generally found in the outer areas to the south (see distribution map below). This is because all the pines in the bushland have spread out from the five originals close by. Of the five weeds, Radiata pine is the most prolific. While it stops any competing trees growing up around it with its thick and acidic layer of needles, it also reduces the growth of any smaller plant life around it, thereby destroying quite completely a formerly native environment.

Asparagus Fern - *Asparagus densiflorus*

This plant is from South Africa, and was introduced as a hardy garden plant. Having escaped from the garden into the bush, it now wreaks havoc on native bushland, smothering native plants by just growing over

them, restricting their access to sunlight and eventually killing them. In a worst-case scenario, asparagus fern can become so entrenched in an area that it becomes the only low-level plant in that area. Thankfully, it has not yet reached this point of infestation at MSC. It is listed on the Noxious Weeds List as being a category W4c weed, meaning that it cannot be sold, propagated or knowingly distributed, and must be prevented from spreading to adjoining properties. It has small, white or light pink flowers that develop into numerous bright red berries, containing four black seeds each. These berries are very

attractive to birds, meaning that this weed is easily spread. It grows rapidly forming a dense thorny undergrowth. At MSC, asparagus fern can be found all round the edges of the remnant bushland, in small clumps on the southern side, but in larger masses on the northern and eastern edges. Being very hardy, the asparagus fern can quite easily deal with the thick layer of pine needles on the ground. If the infestation is left alone, particularly on the northern side, the asparagus fern has the capability of completely destroying all other lower lying plant life in the area.



CLOSEUP OF LANTANA



LANTANA AT MSC.

Lantana – *Lantana carama*

Lantana originates from South America, and was introduced into Australia in the 1850's. It is classified as a category W2 weed in the Noxious Weeds List, which means that it must be fully and continuously suppressed and destroyed. Therefore, to leave it untouched in the remnant bushland would be violating the Noxious Weeds Act. The flowers of the type of lantana at MSC

are pink and yellow (see picture left), a common form of the weedy variety of lantana. While there appears to be only one flower per stem, the 'flower' is really a bunch of small tubular flowers tightly packed together. The fruit is black, and only contains one seed, but because of the numerous flowers per bush, can spread easily via birds.

Lantana can also spread by stems touching the ground and developing new roots, which results in large stands of lantana able to grow very quickly.



The plant can reach a staggering 15 metres high in some places; however, in the remnant bushland the average height of the thickets is only around 2 metres. The 'weedy' form of lantana must

not be mistaken with the cultivated form, which has been hybridised to not produce many or any fruits. There are also slight differences in shape between the two. The lantana in the remnant bushland is generally placed further back from the edge than the other weeds; it has infiltrated further into the remnant bushland. This may be because it cannot survive as easily as the other weeds on the fringes as it becomes very conspicuous and is removed immediately.



PAMPAS GRASS AT MSC.

Pampas Grass – *Cortaderia selloana*

Also originating from South America, all *Cortaderia* species are listed on the Noxious Weeds List as a category W2 weed, and therefore must be fully and continuously destroyed. Pampas grass grows tussocks about one to two metres high, with feathery seed heads perched on the top of long stems about 3 metres long. Its leaves have serrated edges. The specimens at MSC almost certainly came from a garden plant, as they are an ornamental form of pampas grass. Male and female pampas grass plants both bear seed heads. Male seed heads are light purple and arranged slightly differently

from the female seed head, which is more cream coloured. When the seed head were present, it was observed most of the pampas grass plants at MSC were female, which perhaps explains why, of the 100,000 seeds released by each seed head, there are still only a few within the remnant bushland. However, if left to its own devices the pampas grasses would start producing more plants as more male plants took root. When large amounts of pampas grass are present, they can completely choke out any other vegetation present. Because of the huge number of seeds and their small size, pampas grass seeds can travel great distances up to almost 10 kilometres. The pampas grass is found around the western side of the remnant bushland at MSC, implying that the seeds were blown in from the west rather than the east. While some of the plants are easy to locate on the edge of the bushland, others are located further in, harder to find. The pampas grass shouldn't be confused with the much smaller native grasses found in the centre of the bushland.

EXAMPLE OF PAMPAS GRASS SEED HEADS

Cotoneaster – *Cotoneaster glaucophyllus*

Cotoneaster originates from China, and is a common ornamental shrub. It is not on the Noxious Weeds List, but it is on Warringah Council's Environmental Weeds Register. Cotoneasters can grow to four metres in height, and have small, white clusters of

flowers, which turn into bright red berries, or pomes, which contain two yellowish,



EXAMPLE OF COTONEASTER BERRIES



COTONEASTER AT MSC.

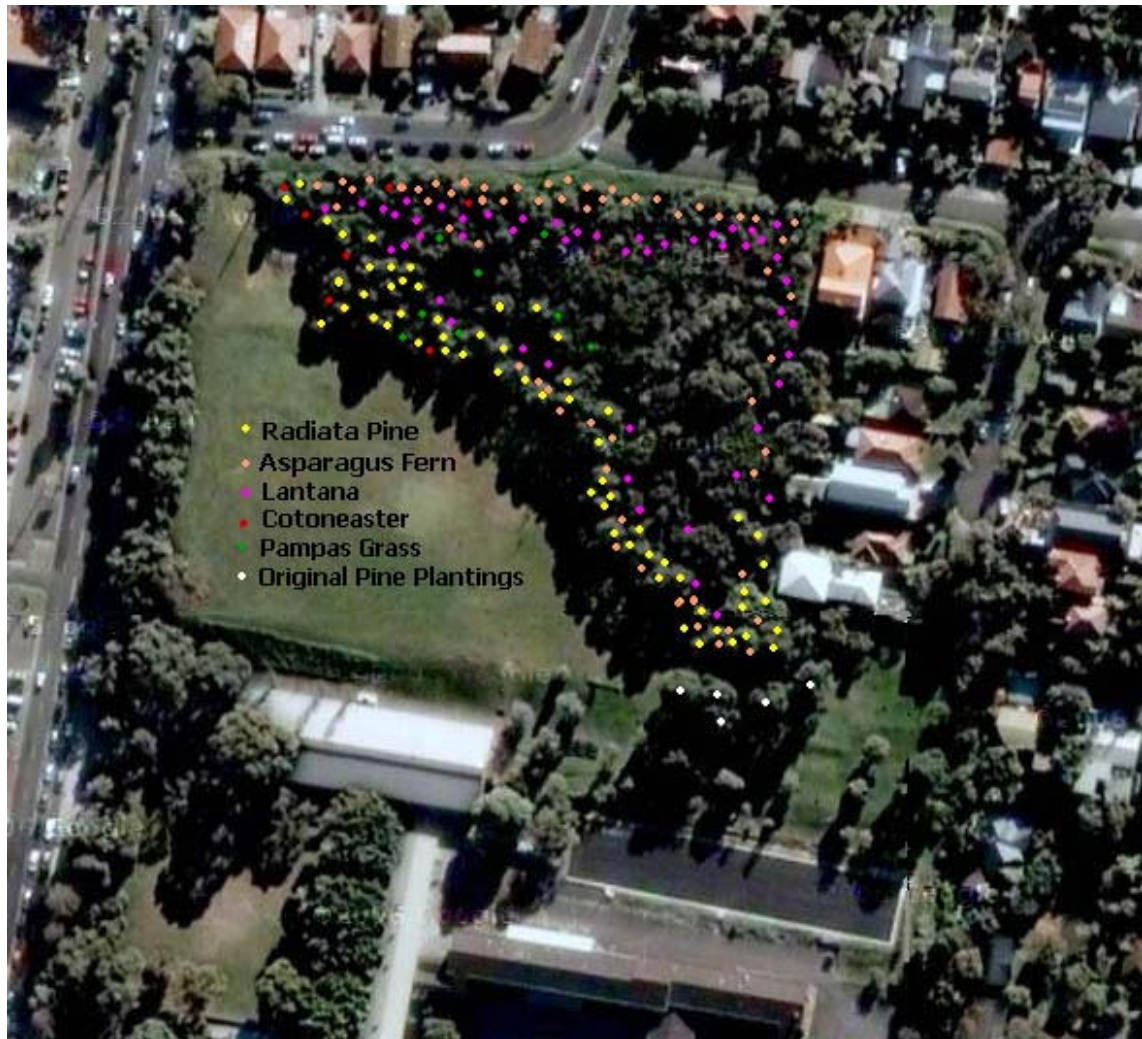
flattened seeds. The upper surface of the leaves are smooth, while underneath they are hairy, with a slightly woolly texture. They are spread by birds because of their attractive seeds. While there are far fewer cotoneaster bushes than any of the other weeds, they still have the ability to drown out the surrounding plants, and will continue to spread if they are left alone. The cotoneasters, like the pampas grass, are all located in the western corner of the bushland, which suggests that they have been moving steadily eastward.

While the weeds have not completely infiltrated the bushland as of yet, it is only a matter of time, and if something is not done soon all chances of saving this piece of sandstone heath will be lost.

MANAGEMENT STRATEGY

In order to completely manage and revitalise the remnant bushland at MSC, a variety of management options need to be considered, and integrated if needed.

Biological control would not be economical or work well in the small environment of the remnant, and so this option had to be discarded.



DISTRIBUTION MAP OF WEEDS IN THE REMNANT BUSHLAND.

Physical removal is the management option most suited to the remnant bushland, as most of the weeds are situated on edges of the bushland, giving open areas for manoeuvrability.

Chemical control should be used as little as possible in favour of physical removal; however, in some cases this is simply not viable.

Small radiata pine seedlings and saplings can be easily removed by simply pulling out the seedlings, and chopping down the saplings, removing the root systems to ensure there is no regrowth. However, professional tree loppers must remove the larger specimens. Before this, it should be determined if all or only some of the pines will be removed. If the cut is made low on the trunk, so there is only a low stump remaining, this will prevent regrowth by the pine. The dead roots of the pines will serve to keep the soil together and prevent erosion until other plants have begun to grow up. Care should be taken not to damage the 5 original pines, as they have significant historical significance for the school. However, because these 5 pines must be retained, this means that pine seedlings must be removed continuously from the site, perhaps once every year in order to let natural selection cut down the number of seedlings. This could be undertaken by junior PE or Geography classes, or by the P&C. Once the trees have been removed, all the pines needles must be gathered up and destroyed, to allow the growth of new plants. However,

the removal of the other weeds must take place before or just after this to ensure they do not capitalise on the absence of the pines.

Asparagus fern must be dealt with carefully, as simply pulling out the stems will not prevent regrowth from the base. The central area of the root system, or rhizome, must be removed to prevent this; the removal of the smaller roots and the small tubers connected to them is not needed; they simply store water. The removal would be best carried out by a large number of people, lessening the burden and quickening the process. This could be organised as a school or P&C event. Vigilance must be taken to make sure that if berries are present, they must be bagged and destroyed to prevent seedlings. After the asparagus fern is removed, it is still important to check for new seedlings every so often that had not yet germinated or have been deposited from other areas. This can be done less often after several years, having prevented the regrowth of seedlings. Asparagus fern does not respond to chemical control.

Lantana is harder to manage, as its entire root system must be removed. Any flowers or berries must be bagged and destroyed. When the plants are located closer to the edges, they can be removed physically, but further in this becomes almost impossible. Lantana found far into the bushland cannot easily be removed to ensure there is no regrowth while it is alive. Therefore, chemical control must be utilised. This can either be in the form of foliar spraying, or applied to the base of each stem. While the latter is more time consuming, it prevents herbicide from landing on other plants.

Pampas grass situated on the edge of the bushland can be removed with a mattock, but great care should be taken to carefully bag any seed heads present. It must be made certain that the root system has been entirely removed, otherwise regrowth will occur. Once removed, the pampas grass can be left upside down until it dies. For a while afterwards, pampas grass seedlings must be searched for and removed. With the specimens found further into the bushland, it is not as easy to physically remove the plants, and herbicide can be used. For pampas grass, glyphosate is recommended. Great care should be taken not to allow the herbicide to get on surrounding plants that should not be eradicated. The leaves should be cut so that a one metre high stump is left. Then, as many of the cut leaf ends should then be painted with herbicide as possible.

Cotoneaster's branches should be cut off down to the trunk. The ground around the base of the plant should be cleared and a horizontal cut as close to the ground as possible should be made. Herbicide needs to be applied to the stump 20-30 seconds after the cut is made, otherwise it will not be absorbed. This prevents regrowth. An example of herbicide to be used in this case is Triclopyr. Again, if berries are present they must be bagged and not allowed to fall. Because of the fewer numbers of cotoneaster compared to the other weeds, it is unlikely that many more plants will grow after these have been removed. However, vigilance still must be taken to make sure this doesn't happen.

The rubbish found in the remnant bushland can be removed by ordering in a skip bin and organising help to systematically remove the rubbish from the bush, to be placed in bags and then taken to the tip.

According to a vegetation survey conducted by P & J Smith Ecological Consultants in 1999, there are 4 plant species with the remnant bushland of regional significance; a number of plants of *Crowea saligna* (Wax Flower), a couple of *Eucalyptus umbra* (Broad-leaved White Mahogany), a couple of *Acacia elongata* (Swamp Wattle) of the variety *dilatata*, and a single *Tetraria capillaris* (Hair-sedge). The Wax Flower plants are considered significant because the species is entirely restricted to the Central Coast region, although within this region it is fairly common. The Broad-leaved White Mahogany trees are at the southern end of their distribution. Both the Swamp Wattle and Hair-sedge are locally uncommon and cannot be found in either of the nearby Garigal or Ku-ring-gai National Parks. Because of their significance, these plants should be located in order to ensure the removal of weeds and revegetation process does not disturb them.

The survey also shows high numbers of the native plants *Kunzea ambigua* (Tick Bush) and *Pittosporum undulatum* (Pittosporum), which indicates a long history of disturbance and an absence of bush fires. In order to help the recovery of the bushland further, the thinning out of some of the Tick Bush and Pittosporum plants would be beneficial to increase the number of species within the bushland. Research should be undertaken in order to discover whether or not a small burn should be undertaken to allow germination of some native seeds found in the soil. If this were to take place it would be done in winter and be highly controlled, and not conducted close to the properties adjoining the bushland.

After all this has taken place, but not too long afterwards, a revegetation program must occur. The species used should consist of plants already found within the site, such as *Allocasuarina distyla* (Scrub She-oak) or *Banksia ericifolia* (Heath-leaved Banksia), especially those that should be common in normal coastal sandstone heath environments but are uncommon or nonexistent in the remnant bushland. If possible, the four plants of regional significance should be encouraged, and extra plantings could be put in. A path or paths could be put through the bushland, in a way to cause the least disturbance to the bushland as possible, to allow people to see the revitalised bushland, as opposed to the badly made tracks that are present now. However, issues with visibility between students and teachers would have to be met. To act as a visual continuity between the five radiata pines and the bushland, a group of *Allocasuarina littoralis* (Black She-oak) could be planted on the south-eastern edge of the bushland. Low-lying ferns, grasses and herbs should not be forgotten either, as they will take the place of the once rampant asparagus fern. A vegetation map could be used to decide where to plant what species, and in what configuration and numbers, in order to obtain the best survival rates.

MERITS OF STRATEGY

The strategy presented is the best for the revitalisation of the bushland at MSC, as it not only outlines the best ways to remove the currently rampant weeds, but also sets out how to go beyond this and help return the bushland to its original state. With the weeds gone and added plantings, biodiversity will certainly increase, and the area will become more attractive to native fauna, thus increasing animal numbers as well. Its appearance, after the intermediate stage between weed removal and revegetation, will also be far better,

without the many pine needles and rubbish choking up plants and rock crevices, and will have a generally lighter atmosphere with the heavy canopies of the radiata pines removed. It will lend a more natural feel to the bushland, through the removal of the garish colours of the asparagus fern, lantana and cotoneaster. If it were deemed viable to undertake a small burn, this would release seeds that have been dormant in the soil for many years, allowing more natives to grow. The other natives planted would help the bushland to act naturally again, and help stock up low levels of some species, and increase biodiversity even within species. If easy to access path/s were put through the heath, people would really be able to appreciate the work put into managing the weeds and revegetating, and it would be an area to be able to relax in, a little bit of wilderness right next to the school. The strategy would require funding from the school and grants from various sources in order to be put into place, but once the weeds are removed and the indigenous vegetation put in, little more money needs to be spent on it. All that would be needed, as a follow-up, would be to have some junior classes in Geography (as part of education about weeds) or PE (as a part of exercising and fostering the idea of community service) to go out occasionally (once every 6 or 12 months) to go searching through the bushland for wayward weeds. This would have to be more intense in the first few months and year following the removal of weeds, but once the seed banks of the weeds are beginning to be used up, this process becomes far easier and is to prevent seeds from outside the bushland from germinating, rather than seeds that are already there.

VARIOUS PHOTOS AND MAPS



RADIATA PINE SEEDLING ON THE EDGE OF THE BUSHLAND.



LANTANA THICKET ON NORTHERN SIDE OF BUSHLAND.



AN AREA OF THE BUSHLAND USED BY TEENAGERS, RESULTING IN LARGE AMOUNTS OF

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