Proposal to include *Acer Negundo* in the Greater Sydney Regional Strategic Weed Management Plan with Containment Target

The Plant: *Acer negundo* (Box Elder) is a large deciduous exotic tree from North America commonly planted in home gardens for shade and foliage. It is fast growing and a prolific producer of highly viable winged seeds on the female plants. It grows particularly well in wet areas such as drains, riverbanks and sheltered areas between buildings.

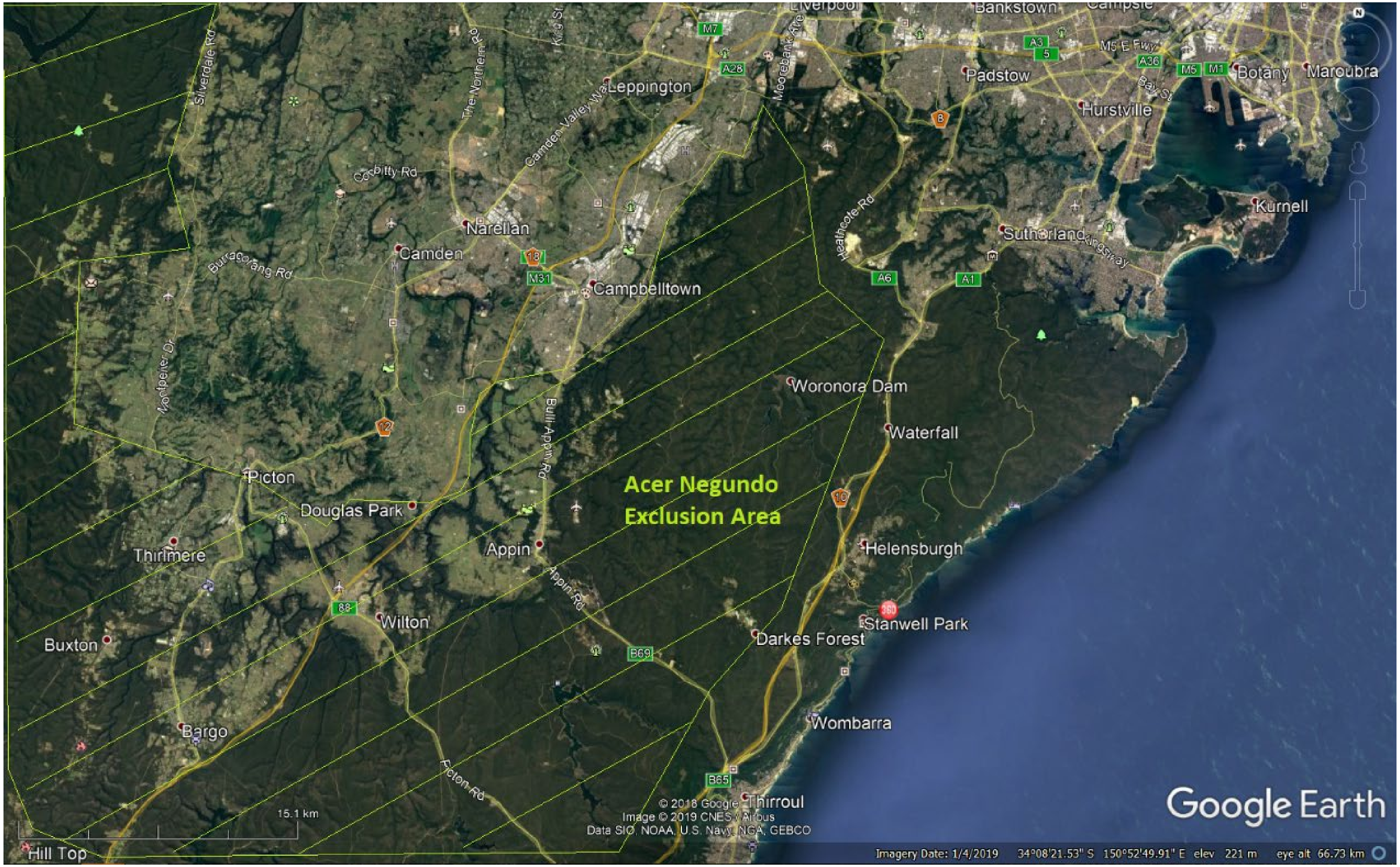
The Problem: *Acer negundo* is spreading rapidly from garden specimens into drains and natural waterways. The Nepean River catchment below Menangle weir is already heavily infested with this weed as well as many others and is beyond being practically controllable. The Upper Nepean River and Georges River catchments however only contains scattered individuals or small patches, often amongst high quality native vegetation, which are still at a controllable level if targeted action is undertaken without delay. The bulk seed germinates *en masse* under good conditions, particularly bare gravel beds, and grow rapidly to reach 3m+ in 3 years under these conditions. This has the potential to significantly alter the hydrology of these creeks and rivers. The trees also form dense canopy shading out most other species in summer but offer little protection to the soil from winter rains leaving it exposed to erosion. Bulk organic matter entering waterways following autumn leaf drop also has the potential to cause water quality issues from nutrient loading and reduction in dissolved oxygen levels.

Wollondilly and Campbelltown Councils previously received WAP funding to undertake *Acer negundo* control works as part of the Upper Nepean River Regional *Acer negundo* Action Partnership Project. This project successfully delivered targeted control in upper catchment waterways significantly reducing the abundance of *Acer negundo* in these waterways until funding was pulled based on the opinion of certain organisations further downstream who advocated that the weed be considered widespread and therefore ineligible for funding.

Campbelltown Council was able to continue funding the project from internal budgets for a number of years however Wollondilly Council was unfortunately not in a financial position to do so. This has resulted in a resurgence of young *Acer negundo* plants in Wollondilly waterways which will be reaching sexual maturity over the next 12 months.

The Proposal:
1) To include *Acer negundo* in the Greater Sydney Regional Strategic Weed Management Plan with a containment target, creating an exclusion zone in the Upper Nepean, Georges River and Lake Burragorang catchments as depicted in the map below.
2) For the agencies involved to apply for WAP funds were required to relaunch the above mentioned Partnership Project and broaden the control area to include Georges River and Lake Burragorang catchments.

A Weed Risk Assessment has been prepared focusing on the proposed exclusion area as the "land use" for the purpose of the WRA. This WRA delivers an "eradication" target if the weed is considered "scattered" throughout the geographic area or a "destroy infestations" target if the weed is considered "widespread" throughout the geographic area. Either case supports this proposal for *Acer negundo* to be included in the regional plan with a containment target.


Acer Negundo
Exclusion Area
Liverpool
Bankstown
Campsie
Padstow
Botany
Maroubra
Leppington
Hurstville
Kurnell
Sutherland
Narellan
Camden
Campbelltown
Woronora Dam
Waterfall
Picton
Douglas Park
Appin
Thirlmere
Helensburgh
Wilton
Stanwell Park
Buxton
Darkes Forest
Wombarra
Bargo
Thirroul
Hill Top
15.1 km
© 2018 Google
Image © 2019 CNES / Airbus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth
Imagery Date: 1/4/2019 34°08'21.53" S 150°52'49.91" E elev 221 m eye alt 66.73 km

Weed (Scientific name)	**Acer Negundo**	
Region	**South West Sydney**	
Management Area	**Upper Nepean, Lake Burragorang and George**	
Landuse	**1. CONSERVATION AND NATURAL ENVIRONMENTS**	
Assumptions	**Main ar risk areas are riparian areas, drainage lines, stromwater infrastructure and watter supply dam margins**	

Invasiveness	Score	Total		Source and comments
Q1. What is the ability of the weed to establish amongst existing plants?		2.0	Seedlings establish within open vegetation or weeds	Can establish in partially shaded habitats (Mędrzycki 2007). Can invade riparian vegetation (Carr, Yugovic & Robinson 1992). Pers Obs A Burgess
Q2. What is the weed's tolerance to average weed management practices in the land use?		0.0	Less than 5% of weeds survive	Foliar spray, stem inject, cut/paint, hand pull and basal bark spraying all very effective methods when undertaken with correct method and herbicides Pers
Q3. What is the reproductive ability of the weed in the land use?		2.0		First fruits after 10 years (Möllerová 2005). Maturity reported in five years (Sachse 1992). While there is dispute to when the species can reproduce the minimum is still five years or more. - Vic DPI WRA. Pers Obs suggest aprox 4-5 years for first major fruit set - (A Burgess 2019). Female trees can produces up to 30,000 seeds (Mędrzycki & Pabjanek 2001).
(a) Time to seeding	0.0		>3 yrs/never	
(b) Annual seed production	2.0		High	
(c) Vegetative reproduction	1.0		Infrequent	
Q4. How likely is long-distance dispersal (>100m) by natural means?		2.0		Wind dispersed seeds may be carried more than 50 m, and seed can survive at least six weeks in water (Mędrzycki 2007). With water as a dispersal agent, seeds are capable of being dispersed distances greater than 1 km (Vogt, Rasran & Jensen 2004). Seed is dispersed by wind and water. Plants are also still available in trade (Blood 2001). Seeds can be transported by vehicles along roads (Von Der Lippe & Kowarik 2007).
(a) Flying animals	0.0		Unlikely	
(b) Other wild animals	0.0		Unlikely	
(c) Water	2.0		Common	
(d) Wind	2.0		Common	
Q5. How likely is long-distance dispersal (>100 m) by human means?		2.0		Plants are also still available in trade (Blood 2001). Seeds can be transported by vehicles along roads (Von Der Lippe & Kowarik 2007).
(a) Deliberate spread by people	2.0		Common	
(b) Accidentally by people and vehicles	1.0		Occasional	
(c) Contaminated produce	0.0		Unlikely	
(d) Domestic/farm animals	0.0		Unlikely	
Total		5.3		

Impacts	Score	Total		Source and comments
Q1. Does the weed reduce the establishment of desired plants?		3.0	> 50% reduction	Can form monocultures (Sachse 1992). Large specimens and thick stands create dense shade which dradstically reduces establishment of native plants underneath Pers obs (A Burgess 2019) Leaves contain inhibitors
Q2. Does the weed reduce the yield or amount of desired vegetation?		2.0	10 - 25% reduction	
Q3. Does the weed reduce the quality of products, diversity or services available from the land use?		?	Do not know	
Q4. What is the weed's potential to restrict the physical movement of people, animals, vehicles, machinery and/or water?		3.0	High	Can form monocultures (Sachse 1992). Dense stands can restrict access for people, vehicles, large animals and can interfere with water flows pers obs (A Burgess 2019)
Q5. What is the weed's potential to negatively affect the health of animals and/or people?		?	Do not know	wind pollinated, possible allergen
Q6. Does the weed have major positive or negative effects on environmental health?		3.0		Displace more desireable native food/habitat species while providing little feed value. Leaf shed creates nutrient load in water in autumn and may affect disolved oxygen levels. Dense shade in summer prevents growth of understory/groundcover plants, leaving ground exposed to erosion from winter rains pers obs (A Burgess 2019)
(a) food/shelter	1.0		Major negative effect	
(b) fire regime	0.0		Minor or no effect	
(c) altered nutrient levels	1.0		Major negative effect	
(d) soil salinity	?		Do not know	
(e) soil stability	1.0		Major negative effect	
(f) soil water table	?		Do not know	
Total		7.4		

Potential Distribution				
Q1. Within the geographic area being considered, what is the percentage area of land use that is suitable for the weed?		8.0	60-80% of land use	considering only riparian and drainage areas for the purpose of this WRA, over 60-80% of these areas would be at risk of invasion by Acer Negundo. We have observed it growing in a wide range of riparian habitats, both disturbed
Comparative weed risk score		314		
Weed risk category		Very high		

Control Costs	Score	Total		
Q1. How detectable is the weed?		1		
(a) Distinguishing features	0		always distinct	
(b) Period of year shoot growth visible	0		> 8 months	
(c) Height at maturity	0		> 2 m	
(d) Pre-reproductive height in relation to other vegetation	2		below canopy	
Q2. What is the general accessibility of known infestations at the optimum time of treatment?		1	medium	roadside and drainage specimens easily accessed. Difficult access to plants already in natural waterways however it is achievable and we have successfully undertaken treatment in these areas for a reasonable cost (A
Q3. How expensive is management of the weed in the first year of targeted control?		3		
(a) Chemical costs/ha	2		medium ($100-$249/ha)	
(b) Labour costs/ha	3		high ($250-$500/ha)	
(c) Equipment costs	1		low	
Q4. What is the likely level of participation from landholders/volunteers within the land use at risk?		0.0	high	Majority of the target areas are public land. Both Councils involved have a high level of participation. State government agencies have shown a high level of initail engagement. Expecting a moderate response from private
Total		4.2		

Persistence	Score	Total		
Q1. How effective are targeted management treatments applied to infestations of the weed?		0	very high	previous control programs have shown high level of control by standard techniques (A Burgess 2019)
Q2. What is the minimum time period for reproduction of sexual or vegetative propagules?		0	>2 years	First fruits after 10 years (Möllerová 2005). Maturity reported in five years (Sachse 1992). While there is dispute to when the species can reproduce the minimum is still
Q3. What is the maximum longevity of sexual or vegetative propagules?		1	2-5 years	Germinating power of seed is reported to reduce quickly (Möllerová 2005). This is presumably less than 5 years.
Q4. How likely are new propagules to continue to arrive at control sites, or to start new infestations?		2.0		once main source trees have been killed it is expected only occaisional reinfestation will occurr. It appears the larger infestations within riparian areas have come from a small number of in stream trees which originated from outside the riparian areas (A Burgess 2019)
(a) Long-distance (>100m) dispersal by natural means	1		occasional	
(b) Long-distance (>100m) dispersal by human means	1		occasional	
Total		2.7		

Current distribution			
Q1. What percentage area of the land use in the geographical area is currently infested by the weed?	**0.1**	<1% of land use	Considering that 60-80 percent of riparian areas within the proposed exclusion zone are suitable habitat, the amount of land currentoly infested is very low, (A Burgess 2019)
Q2. What is the number of infestations, and weed distribution within the geographic area being considered?	**1.0**	scattered	It is a relatively common plant within the geographical area, particularly in gardens, however the number of instances of weedy infestations is still quite low.
Total	**0.9**		
score	**10**		
Feasibility of coordinated control category	Very High		
Management priority category	**Eradication**		
Calculation of overall uncertainty score	6%		
Response	**Submit Assessment**		
Positive Impacts	Shade in gardens. Easy money for nurseries.		
References/Other comments			

It is a relatively common plant thtoughout the two shires, and eradication is not a feasible or rational target with the lower nepean river already very heavily infested. It is a much different story in the upper nepean and georges river catchments with only a few isolated patches identified. control of these infestations is very feasible with urgent action and a relatively small investment could result in keeping hundreds of kilometers of river clear of this weed. failure to act now inevitably result in these waterways becoming heavily infested beyond a controllable level within 5 years. we are observing a large number of seedlings reaching a size where they will produce large amounts of seed over the next 2 years.

http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/invasive_box_elder