Umina Coastal Sandplain Woodland Endangered Ecological Community

Restoration and Rehabilitation Management Plan

June 2007

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Plan preparation

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Foreword

The Bushcare Group of the Umina Campus of Brisbane Water Secondary College is active in remnants of Umina Coastal Sandplain Woodland (UCSW), an Endangered Ecological Community (EEC) located on the Central Coast of New South Wales. Issues involving damage to the EEC prompted the group to approach the Biodiversity Conservation Section of the Department of Environment and Climate Change to fund fencing and to assist with advice as to how best manage the sites.

UCSW EEC is extremely limited in extent, consisting of only approximately 14ha, scattered across small and isolated patches. Threats to the community include clearing for development, weed invasion, fragmentation, lack of knowledge of the significance of the community and too-frequent fires.

This plan is intended to assist land managers, landowners, other bushcare groups, individual community members and others to identify and prioritise management actions for rehabilitation and regeneration of UCSW, across its extent. It contains a list of recommended management actions and information on identification of the community, weed species and treatment techniques and information to include in a community awareness program.

This plan does not constitute the recovery plan for UCSW EEC under the *Threatened Species Conservation Act* 1995 (TSC Act) but contributes to the implementation of actions identified in the Threatened Species Priority Action Statement (PAS).

1. Background

Rationale for plan

The Brisbane Water Secondary College Umina Campus Bushcare Group is active in remnants of Umina Coastal Sandplain Woodland (UCSW) at the school campus. Issues involving damage by students prompted the group to approach the Biodiversity Conservation Section of the Department of Environment and Climate Change to fund fencing and to assist with advice as to how best manage the sites. This plan is intended to assist with the management of UCSW at the campus, as well as accross the extent of UCSW.

The plan is also intended to assist land managers, landowners, other bushcare groups, individual community members and others to identify and prioritise management actions for UCSW Endangered Ecological Community (EEC).

It is considered that this document may provide assistance with seeking funding for rehabilitation, regeneration and community awareness and education programs for UCSW.

Scope of plan

The scope of the plan is to provide actions and priorities for rehabilitation and regeneration of UCSW. The aim of the plan is to provide guidance and recommendations for management of the community, both at a general level and with additional site specific recommendations where applicable.

A brief site assessment was undertaken for each site of UCSW EEC. Therefore, management issues, threats and weed species present at each site are not extensive, however provide an indication of the major issues affecting the community.

This plan does not constitute the recovery plan for UCSW EEC under the *Threatened Species Conservation Act* 1995 (TSC Act) but contributes to the implementation of actions identified in the Threatened Species Priority Action Statement (PAS). The PAS can be accessed at http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx. The recovery plan requirements for this community will met by the Central Coast Pilot Biodiversity Management Plan (CCP BMP). This plan will provide background information to inform the CCP BMP.

Conservation and legal status of Umina Coastal Sandplain Woodland

UCSW was listed by the NSW Scientific Committee in December 2002 as an Endangered Ecological Community under the TSC Act as it is considered likely to become extinct in nature if threatening processes currently acting on the community are not reduced.

As an EEC, UCSW is protected under the *Threatened Species Conservation Act* 1995. It is an offence to damage the habitat of a threatened species, population or ecological community. Approval is required for any works undertaken within the habitat of a threatened species, population or ecological community that may impact upon its habitat. This may include a licence to undertake bush regeneration activities.

Previous studies undertaken

Several studies have been undertaken on various aspects of the UCSW.

The woodland was identified and described as early as the 1950's by Burges & Drover (1952), as part of a soil landscape study. Broad-scale vegetation mapping by Benson & Howell (1994) of the Sydney 1:100,000 map sheet include Umina Coastal Sandplain Woodland as part of the vegetation described as Coastal Dune Forest (map unit 9t).

Regional mapping (NPWS 2000) did not distinguish between the vegetation occurring on the Umina

Sandplain with that present on other coastal sandbodies. All remnant vegetation on sand in this area was included within the Coastal Sands Apple-Blackbutt Forest.

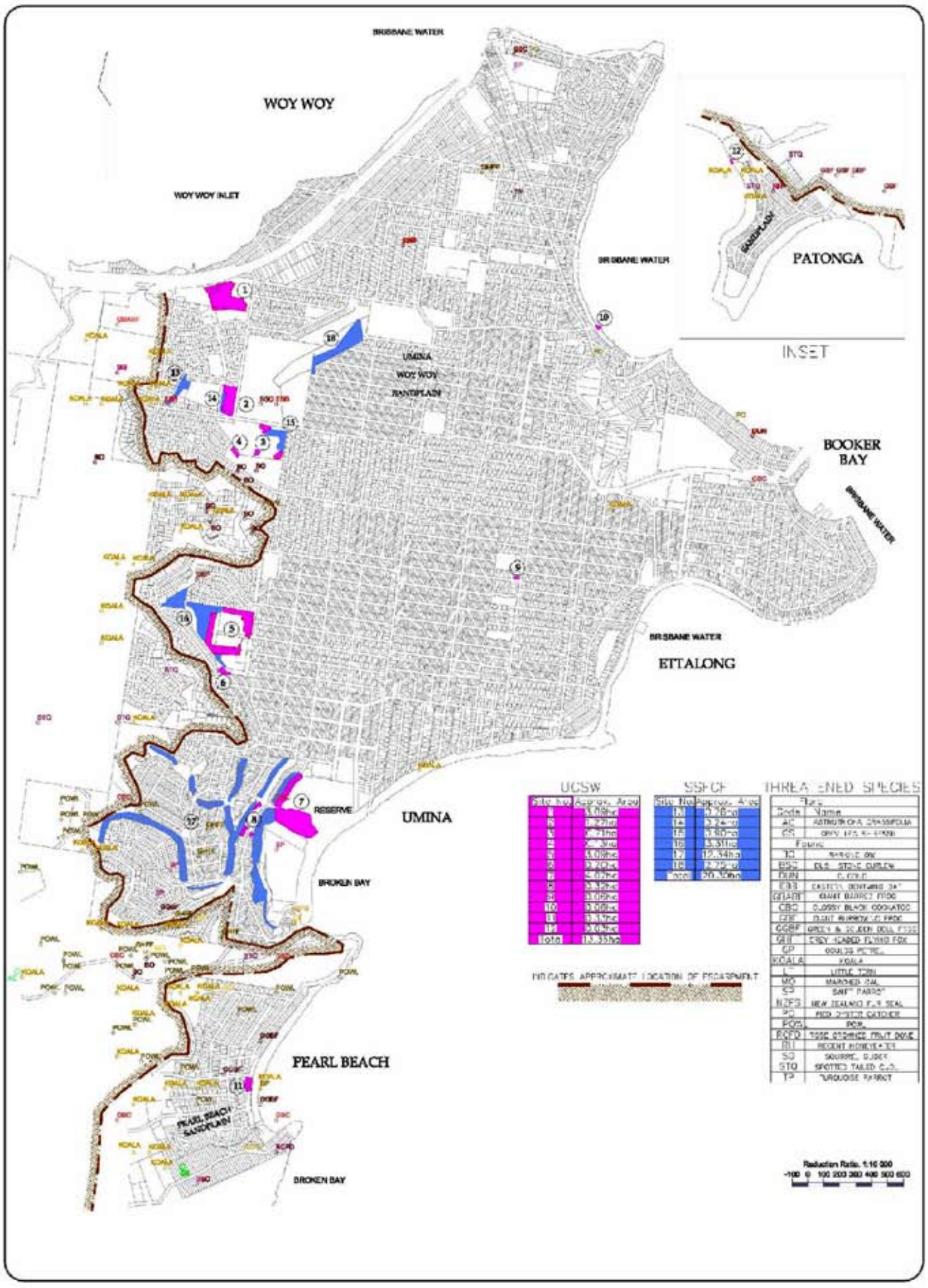
More recent mapping and assessment of UCSW has been undertaken by Payne (2003a), Payne (2003b), Bell (2004), and Payne (2006). These reports focus on the assessment of a development proposal at one of the UCSW sites, but also contain useful background information on the ecology and management issues of the woodland at a broader level.

A Bushland Management Plan was prepared for Burrawang Reserve (Railway and Hillview Streets), one of the largest remnants of UCSW, in 1992 (McDonald 1992). This plan assesses the flora, fauna, recreational values and management issues that were operating for this reserve, and proposes management recommendations. Significant recommendations included: formalising access to the reserve using bollards, fencing and brush-matting; installation of interpretational and directional signage; establishment of a public awareness program; bush regeneration and appropriate landscape planting; rubbish removal and modification to drainage works.

The Brisbane Water Secondary College Umina Campus Bushcare Group has drafted a rehabilitation plan (Snell 2005). This plan maps in detail the patches of native vegetation on the Umina Campus site and lists management issues and recommendations for each patch. Recommendations include: strategic fencing; bush regeneration and appropriate landscaping and education.

The mapping used to locate and assess UCSW patches in this report is by Payne (2006). This mapping identifies 12 patches of UCSW ranging in size from 0.03ha to 4.07ha, with a total community extent of only 13.36ha.

Figure 1 Location of Umina Coastal Sandplain Woodland (from Payne 2006)



2. Description of Umina Coastal Sandplain Woodland

The Umina-Woy Woy Sandplain is a geomorphological feature comprising a series of dunes and swales interspersed by swamps and creeks. The sandplains are derived primarily from material of the Hawkesbury Sandstones, but sandstones and shale-derived material from the Narrabeen series is present as well.

UCSW is described by the NSW Scientific Committee as a low woodland dominated by Bangalay (*Eucalyptus botryoides*) and Rough-barked Apple (*Angophora floribunda*) with a diverse understorey of shrubs such as Coast Banksia (*Banksia integrifolia*), Saw-tooth Banksia (*Banksia serrata*), Burrawang Palm (*Macrozamia communis*), Prickly Acacia (*Acacia ulicifolia*), Sweet Wattle (*Acacia suaveolens*) and Forest Oak (*Allocasuarina littoralis*). The NSW Scientific Committee's determination of UCSW is provided in Appendix 1.

Umina Coastal Sandplain Woodland has been recorded on coastal sands on the Woy Woy Peninsula at Umina and Pearl Beach. The woodland was first described in the 1950's by Burges & Drover (1952) who described it as dominated by Bangalay and Rough-barked Apple, occurring from immediately behind the beach up to approximately two km from the beach. They described the soils of the woodland as iron podsols and distinguished them from humus podsols which occur further away from the beach.

Although the species list is quite extensive for UCSW (see Appendix 2), it is important to note that not all species listed need be present at a site for the remnant to be UCSW. For example, at the Hillview Street site, the canopy tree Bangalay is absent, but there are many other species typical of USCW for much of the site to be determined as such. Given that many remnants are very small, very few species may be present at any one site.

At the time of the Scientific Committee's determination, UCSW was known from only three small areas at Umina; at Umina Oval, McEvoy Oval and Umina High School and at a tiny remnant at Little Patonga Beach.

There has been some debate on how to define UCSW, and therefore locate this community on the ground. Work by Bell (2004) indicates that the definition of UCSW as listed in the Scientific Committee Determination needs some revision. Using vegetation statistical analysis, Bell (2004) determined that all dry open forest or woodland on the Umina Sandplain represents one vegetation community, namely UCSW, which is distinctly different from all other coastal sand vegetation in the region. This report supports this view.

Under the revised community definition, UCSW consists of a canopy dominated by Rough-barked Apple, but with the occasional presence of any of the following: Bangalay, Red Bloodwood (*Corymbia gummifera*), Smooth-barked Apple (*Angophora costata*), or in slightly wetter sites Swamp Mahogany (*Eucalyptus robusta*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*). Under the canopy, a small tree layer of Saw-tooth Banksia and Forest Oak is typical, and may also support White Sally (*Acacia floribunda*), Coast Banksia, or Blueberry Ash (*Elaeocarpus reticulatus*). The shrub layer often supports Burrawang Palm, Spiny-headed Mat-rush (*Lomandra longifolia*), Blue Flax Lily (*Dianella caerulea*) and Bracken Fern (*Pteridium esculentum*), with some sites also supporting impressive stands of *Xanthorrhoea arborea*. A list of native species that have been recorded in UCSW is provided in Appendix 2.

Significance of the community

According to the NSW Scientific Committee and Bell (2004), the UCSW represents a community which is unique to the Umina coastal plain within the Gosford Local Government Area. Where now only tiny remnants exist, UCSW would have been much more extensive across the Umina-Woy Woy sandplain prior to clearing for residential development. It is estimated that less than 10% of the community's estimated original cover remains.

UCSW intergrades across the Umina sandplain with Swamp Sclerophyll Forest on Coastal Floodplain, also an EEC.

It is important to note that, regardless of whether a vegetation community is defined as an EEC or not, given the extent of clearing across the Umina – Woy Woy Sandplain, all remnant native vegetation in this vicinity has conservation significance.

3. Threats

UCSW has been extensively cleared for suburban development and there are no surviving remnants within conservation reserves. Remnants are very small which increases the impact of threatening processes.

Threats to the community include: further clearing and fragmentation for urban development; weed invasion; rubbish dumping; unapproved track creation; mowing and slashing; too-frequent fire; lack of knowledge of the significance of the vegetation community; sand extraction; and a lowering of the water table by extraction for domestic use.

Urban development

There is significant development pressure on undeveloped land in the Umina-Woy Woy area due to the limited amount of land remaining that is suitable for development. One of the better condition patches of UCSW is currently threatened by development, and other areas are not adequately protected from development.

Weed invasion

Weed invasion and spread is one of the most significant threats to the ongoing viability of UCSW. Weeds can dominate native vegetation and prevent native species from germinating and growing.

Most weed species that occur in UCSW have originated from suburban gardens by accidental spread of seed and plant material, as well as by deliberate dumping of garden waste.

Common weed species in UCSW include Ground Asparagus (*Asparagus aethipicus*), Lantana (*Lantana camara*), Bitou Bush (*Chrysanthemoides monilifera*), Five-leaf Morning Glory (*Ipomoea cairica*), Yellow Bells (*Tecoma stans*), Vasey Grass (*Paspalum urvillei*), Farmer's Friends (*Bidens pilosa*), Feathertop (*Pennisetum villosum*), Coreopsis (*Coreopsis lanceolata*) and Panic Veldtgrass (*Ehrharta erecta*). A full list of weed species recorded in UCSW is provided in Appendix 3.

Figure 2 Ground Asparagus invasion - a significant weed in UCSW

Rubbish dumping

Rubbish dumping is prevalent in most remnants of UCSW. This ranges from littering with rubbish such as take-away food containers, dumping of garden refuse and disposal of car bodies.

The resulting impacts of rubbish dumping include poor aesthetics, which adds to the sense of a lack of value of the bushland environment, physical damage to vegetation, and the spread of weeds.

Unapproved track and trail creation

Significant damage has been done to remnants of UCSW from uncontrolled access and the creation of tracks and trails through remnants. The most significant damage is caused from trail bikes leaving existing tracks. Inappropriate adventure play activities by children, such as making cubby houses, also causes considerable damage in some locations.

Destruction from uncontrolled recreational use is continuing to be a major problem.

Many remnants of UCSW are being increasingly fragmented by the creation of unauthorised trails. These trails are made primarily by trail bikes and bicycles. While it is recognised that bushland in the Umina area is a significant open space requirement, it is considered that formalisation of

tracks will continue to allow access for enjoyment and recreation while providing protection for the remnant patches of UCSW from ongoing degradation. Formalisation of tracks may be undertaken in a low key manner simply by placing dead branches along the edges of tracks such as is currently being undertaken by bushcare workers, or may include strategic placement of bollards.

Figure 3 Newly-created unapproved trail through UCSW. Trails of this nature continue to degrade UCSW by preventing regeneration of new plants and physical damage to existing vegetation.

Mowing and slashing

Mowing and slashing, where it encroaches on remnants of UCSW, is both preventing regeneration and damaging existing vegetation in remnants of UCSW. At particular risk are understorey species, as mowing prevents the germination of seedlings, resulting in ongoing depletion of the native soil seed bank.

Mowing and slashing is done by both private residents and Council workers that are unaware of the significance of the vegetation, and also where boundaries of native vegetation and cleared areas are not clearly evident.

Too-frequent fire

Anecdotal reports indicate that deliberately-lit fires were very frequent, as often as every year, particularly in some of the larger remnants of UCSW. Although fire is a natural component of the ecology of UCSW, if this type of vegetation burns too frequently, plants do not have enough time to germinate, flower and set seed, and therefore the soil seed bank will become depleted over time.

At the Burrawang reserve, the frequency of deliberately-lit fires has decreased dramatically due to the presence of active bushcare work. This has had a dual benefit in terms of having an active presence in the bushland area, as well as giving the bush a sense of being "looked after", thus engendering a better attitude to caring for the area.

Vandalism

Both deliberate and accidental vandalism which causes damage to vegetation is a significant issue for UCSW. Vandalism is in part incorporated into three of the above threats, namely; rubbish dumping, unapproved track and trail creation and too-frequent fire.

Pumping of ground water

A proposal exists to pump ground water from the aquifer on the Umina-Woy Woy peninsular. This proposal has the potential to lower the level of the water table, which may impact upon the ongoing viability of UCSW vegetation, which is a ground water-dependant community.

Lack of knowledge of significance of community

Many of the threats to UCSW, such as track and trail making, rubbish dumping, vandalism and slashing result from a lack of knowledge of the significance of the woodland. This lack of knowledge is within the general community as well as land managers such as Council grounds staff.

Figure 4 A lack of defined edges between woodland and recreation areas is resulting in mowing and slashing damaging native vegetation.

4. Description of sites

Mapping by Payne (2006) has identified 12 sites of UCSW, totalling 13.36ha. The sites range in size from 0.03ha to 4.07ha. They are fragmented and often linear, offering large edge/area ratios, which makes them extremely vulnerable to disturbances, weed invasion and other incursions.

Eleven of the 12 sites mapped by Payne (2006) were visited for this study, and are identified using the numbering adopted by Payne. Below is a description of the features of each site, including tenure, size and threats. Management recommendations and their priority for each site are listed in Table 1.

Site 1 Burrawang Reserve

Location:

Railway and Hillview Streets, Woy Woy

Tenure:

Department of Lands, managed by Gosford City Council.

Size:

3.09ha

Threats:

One of the main threats to this site is due to a lack of restricted access thus resulting in damage to vegetation. Trail bikes in particular are causing significant damage by creating new tracks through existing vegetation and also preventing regeneration of native species.

The site has been used as a dumping area, including a large number of car bodies. With the encouragement of the bushcare group, Council have removed all but one of the car bodies.

Prior to active management in the reserve by the bushcare group, fires occurred in the remnant annually. There has now not been a fire in the reserve for five years.

Weed invasion is a significant threat in this reserve, although substantial weed removal and regeneration works have been undertaken by the Bushcare group. Weeds in this area include Mother of Millions, Lantana, Pelargonium, Fishbone Fern, Wandering Jew, Panic Veldtgrass, Shivery Grass, and Black-eyed Susan. Lantana removal in the area has resulted in excellent regeneration of native species.

Some works by Council, such as mowing, slashing and periodic clearing of the drain on the western boundary, continue to have an adverse impact on UCSW vegetation in the reserve.

Comments:

A Bushland Management Plan has been prepared for this reserve (McDonald 1992), and partially implemented. Active community bush care is assisting significant areas of habitat to be restored and regenerated, both of UCSW and other bushland communities.

The threatened Glossy Black Cockatoo has been observed at this site feeding on Forest Oak seeds.

Site 2 – Hillview Street

Location:

Corner Hillview Street and Veron Road, Umina.

Tenure:

Privately owned by the Catholic Church.

Size:

1.28ha

Threats:

The major threat to this site is the current development proposal for an aged care facility. This proposal will result in removal and modification of part of the UCSW on the site.

Weeds are present in this area, although most of the remnant is in relatively good condition. The most dense weed invasion occurs in the areas adjacent to the houses in the north of the site. Weeds present include Ground Asparagus, Tacoma, Camphor Laurel and Lantana.

Minor rubbish dumping is occurring in the remnant.

Comments:

The site is currently subject to a development application for an aged care facility. As part of the

development proposal, a bushland management plan has been prepared. This plan recommends protecting areas of the UCSW on site as well as strategic bush regeneration.

Sites 3 and 4 – Brisbane Water Secondary College, Umina Campus

Location:

Veron Road, Umina

Tenure:

Public land (Department of Education)

Size:

0.71ha and 0.13ha

Threats:

These patches are degraded primarily from fragmentation, weed invasion and a lack of controlled access. The vegetation is suffering ongoing damage, mainly by students who regularly use the patches as a short cut for bikes and walking, and also as an adventure playground. New tracks continue to proliferate throughout the area, resulting in ongoing damage to the vegetation.

Weed invasion is a significant threat to the site. Widespread environmental weeds such as Lantana are present as well as garden escapes from neighbouring landholders using the site as a dump for garden waste. Weeds at this site include Buffalo Grass, Kikuyu Grass, Busy Lizzy, Wandering Jew, Blackberry, Mother of Millions, Avocado, Ground Asparagus, Senna and Panic Veldtgrass. At the Umina college Campus, ongoing germination of weed seeds, in particular, Tacoma and Camphor Laurel from adjacent street trees, within UCSW is a threat to the viability of the community, as well as creating additional work requirements for volunteers maintaining regeneration sites.

Some patches of UCSW at these sites consist of remnant canopy trees only, where mowing and slashing is preventing the understorey from regenerating. Some large Bangalay trees appear to be dying at the patch near the bike yard, and old Saw-tooth Banksias are falling over.

Rubbish dumping is significant in this area and has resulted in degradation of the vegetation on site.

Erosion is prevalent on the creekbanks, particularly where student tracks exist.

Inappropriate activities by contractors, such as dumping of dirt within native vegetation on the site, have contributed to degradation of the area. In addition, some landscaping works conducted near the undercover learning area have used species that are not native to the site. This can introduce different plant genetic stock to UCSW, which can cause further reduction of the health of the woodland in the long-term through the potential introduction of plants not best suited to the ecosystem.

Comments:

The P & C Bushcare group is active at this site and is doing valuable rehabilitation work such as weed removal and strategic fencing. Fencing that has already been undertaken at the front of the campus site is responding well with significant regeneration of native species such as banksias and wattles. A project is being investigated to fence off other remnants of UCSW to prevent ongoing damage.

The endangered Bush-stone Curlew is known to visit the site.

Site 5 McEvoy Oval

Location:

Fringing McEvoy Oval, Umina.

Tenure:

Public land (managed by Gosford City Council)

Size:

3.09ha, broken into linear patches.

Threats:

The remnants are very thin, consisting largely of a fringe of vegetation around the playing field, leaving the remnant very susceptible to weed invasion and physical damage. For example, there are significant patches of Ground Asparagus and Lantana, as well as Senna, Turkey Rhubarb and Mickey Mouse plant. Lantana is quite dominant around the edges of the patches.

Many tracks dissect the bushland areas, and rubbish dumping is prevalent.

Saw-tooth Banksia regeneration is very limited, leaving mostly old Banksias many of which are senescencing.

Comments:

No bushcare group is active in this area. There are a considerable amount of weeds and rubbish still throughout the area.

Site 6 Greenhaven Drive Playground

Location:

Behind playground, corner Greenhaven Drive, Umina

Tenure:

Public land (managed by Gosford City Council)

Size:

0.20 ha

Threats:

The understorey of the site appears to have been cleared at one stage, being mostly absent and predominantly consisting of exotic grass species. Weeds present include Kikuyu, Jacaranda, Coreopsis and Norfolk Island Pine (planted).

Comments:

The site is fenced with a simple post and wire fence on two sides adjacent to the playground, making the area relatively inaccessible and thus effectively minimising disturbance. The other perimeter backs on to a creekbank and behind that are houses, thus the site is relatively well protected.

Site 7 Umina Oval

Location:

Southern and western boundary of Umina Oval, near Ocean Beach. This site includes Kahibah Creek and parts of the Umina Caravan Park.

Tenure:

Public land (managed by Gosford City Council)

Size:

4.07ha

Threats:

There is significant degradation of UCSW at this site caused by weed invasion, including several hard-to-control weed species such as Turkey Rhubarb, Thunbergia, and Coral Trees. Other weeds present include Senna, Kikuyu, Buffalo Grass, Lantana, Ground Asparagus, Mickey Mouse Bush, Bitou Bush and Morning Glory.

Rubbish dumping is degrading the site, as is informal track creation.

Mowing and camping in the caravan park is resulting in ongoing degradation and gradual attrition of the woodland. All Grass Trees have disappeared since 1989 when a description of the community was first prepared.

Comments:

Detailed recommendations are presented in a Bushland Plan of Management for Gosford City Council for the Mt Ettalong Floodway, which incorporates the Umina oval and Ettymalong Creek. A Bushcare group is undertaking regeneration works in the UCSW on the western boundary of the oval adjacent to the watercourse, however, no work is being done in the largest patch of UCSW on the southern boundary of the oval.

There is a significant opportunity at this site to use UCSW species for landscaping and expansion of the remnant into currently cleared areas.

Site 8 Drainage reserve near Umina Oval (Etta Road)

Location:

Patches along watercourse adjacent to Mt Ettalong Road

Tenure:

Public land (managed by Gosford City Council)

Size:

0.32ha

Threats:

Weed invasion is significant in this remnant given its narrow and fragmented nature. Weeds include Senna, Fishbone Fern, Cape Gooseberry, Lantana, Tacoma, Coral Trees, Wandering Jew, Watsonia, exotic grasses, Morning Glory,

Rubbish dumping, including garden waste, is prevalent at this site, due in part to the close proximity of houses.

Comments:

This site is a mixture of Swamp Sclerophyll Forest and USCW.

Site 9 Britannia Street

Location:

Corner Britannia Street and Springwood St

Tenure:

Private property

Size:

0.06ha

Threats:

The small size of this remnant multiplies the impacts of disturbances. Weeds, mowing and rubbish dumping are the primary threats. Weeds include Buffalo Grass and Ground Asparagus.

Comments:

This site occupies the corner of a house lot, and only the most rudimentary features of UCSW remain. Few native species are present at the site, and the understorey has been cleared.

Site 10 Brisbane Waters

Location:

On edge of Brisbane Water in waterfront reserve

Tenure:

Public land (managed by Gosford City Council)

Size:

0.06ha

Threats:

Mowing and weed invasion.

Comments:

This patch consists of a few remnant UCSW tree species with primarily mown understorey.

Site 11 Pearl Beach

Location:

End of Pearl Beach Drive, between beach and watercourse at Pearl Beach.

Tenure:

Public land (managed by Gosford City Council) and private property

Size:

0.33ha.

Threats:

Weed invasion, largely from garden escapes. There is also the potential for erosion given the close proximity of this patch to the beach front.

Comments:

This patch is in reasonable condition, with few weeds, apart from a few garden escapes around the edges of the patch (e.g. Pelargonium). The remnant is partially fenced on the western boundary, offering protection from disturbances such as inappropriate access.

Site 12

Location:

Patonga

Tenure:

Unknown

Size:

0.03ha

Threats:

Unknown

Comments:

This patch was not visited.

5. Management recommendations

The following table lists recommended management actions for each site. Priority for management actions is divided into high, medium and low priority. These priorities may change depending on opportunities that may arise, such as funding sources for particular projects.

Some general recommendations apply to all sites. These include actions such as weed control and bush regeneration, and a community awareness program. Other recommendations are site specific.

Action	Description	Priority	Sites	Potential responsible parties
1. Control and formalise access	• Access within UCSW patches to be formalised. In some areas it will be adequate to bollard off areas to restrict access by bicycles, trail bikes, etc and prevent damage by slashing or mowing. This will have the added benefit of encouraging the use of appropriate tracks, while designating areas where native vegetation can be regenerated. • It is recommended that McDonald (1992) be consulted with regards to the location of tracks and those recommended for closure. If further detail is required, it is recommended that a map be prepared marking tracks to be retained and the appropriate location of bollards and fencing. • Install fences or barriers in appropriate locations. A simple barrier such as bollards will be adequate to stop mowing and access by most students in certain areas. In other areas, such as near the bike racks, more substantial fencing may be required. • Fence off public reserve at caravan park to minimise impacts of camping	High High Med	1, 3, 4, 5, 7 1 3 & 4	GCC, Bushcare groups, DET
2. Protect from development	• UCSW should be protected from development, fragmentation and clearing, for example, through appropriate environmental protection zoning.	High	All sites	GCC, DoP DECC,
3. Rubbish removal	• Continue to remove rubbish. • Enforce litter laws by the appropriate authority.	High High	All sites	GCC, Bushcare groups, DET

Action	Description	Priority	Sites	Potential responsible parties
4. Weed control and regeneration	• Weed control programs to encourage native regeneration should be continued or commenced, giving priority to category 1 weeds as listed in Appendix 3. • Implement the recommendations of McDonald (1992). • Remove pest street tree species (e.g. Tacoma, Camphor Laurel) that are near remnants of UCSW	High High Low	All sites 1 3, 4	GCC, Bushcare groups, DET
5. Community awareness and education	• Undertake a community awareness program highlighting the significance of UCSW. Refer to Appendix 4 for some suggestions of information to include in such a program. • Provide interpretive signs at the major accesses to the reserve, for example, at the playground. Signs can highlight the significance of the bushland remnant, some of the native flora and fauna species present and what can be done to assist with conserving and protecting the area. • Install interpretive signs at prominent locations adjacent to UCSW patches.	High High High	All sites 1	GCC, Bushcare groups, DECC, DET
6. Fire management	• Promote an appropriate fire interval for UCSW (a minimum of 10 years). • Assist with the prevention of deliberately-lit fires by promoting a presence in the reserve as well as educating the community on the importance of protecting the bushland from too-frequent fires.	High	All sites 1	GCC, Bushcare groups, DECC, DET
7. Drainage maintenance	• Review the need to periodically clear the drainage easement, or the methods used to clear the easement. Investigate vegetation cropping as per McDonald (1992) as a more appropriate alternative.	High	1	GCC
8. Management plans	• Continue to implement the recommendations of McDonald (1992) for the Burrawang Reserve. • Prepare and adopt management plans for those Council reserves where none exist. Plans to include specific actions for protection and recovery of UCSW. • Prepare a bushland management plan for Umina Campus site for adoption by DET, including actions for the protection and recovery of UCSW.	High Med Med	1 5, 10 3 & 4	GCC, Bushcare groups, DET, DECC
9. Umina Campus environment committee	• Re-activate school environment committee to promote environmental activities, including the protection, regeneration and promotion of UCSW.	Med	3 & 4	DET

Action	Description	Priority	Sites	Potential responsible parties
10. Revegetation & strategic replantin	• Investigate linking patches of native vegetation where possible. • Undertake strategic replanting with local endemic species in grassy degraded areas. • Replant Saw-tooth Banksia in areas where old Banksias are dying and new Banksias are not recruiting. • Select species for revegetation works from those listed in Appendix 2, and within this list, be restricted to those species found on, or close to, each site. • Promote planting of species native to the Umina Sandplain, in particular, those species that occur in UCSW, in parks and gardens in the Umina-Woy Woy area.	Med Med Low High Low	3, 4, 5, 7 1, 3, 4, 6, 7 5 All sites Umina/ Woy Woy	
11. Appropriate landscaping	• Plant species native to the local area to enhance cleared areas. Plantings ideally should be undertaken in clumps to encourage natural regeneration and to delineate open space from planted areas. Local seed and cuttings should be used to preserve genetic integrity of the woodland. Refer to Appendix 2 for a species list. • Plant local native species around Nambucca Drive playground.	Med Med	1, 3, 4, 5, 7 1	GCC, Bushcare groups, DET
12. Erosion control	• Put erosion control measures in place in watercourse, such as restricting access and replanting with appropriate species.	Med	3, 4	DET, Bushcare groups
13. Start a bushcare group	• Promote the establishment of a bushcare group for McEvoy Oval.	High	5	GCC, Bushcare groups
14. Protect from mowing and slashing	• Protect remnants of UCSW from encroachment and damage from mowing and slashing.	High	1, 3, 4, 5, 7, 9, 10	GCC, caravan park managers, general community
15. Undertake appropriate environmental assessment	• Ensure that proposals that may impact on UCSW have undergone appropriate environmental assessment, for example, extraction of ground water.	High	All sites	GCC, developers

GCC = Gosford City Council; DET = Department of Education and Training; DECC = Department of Environment and Climate Change; DoP = Department of Planning

References

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Burges, A.& Drover, D.P. (1952) *The rate of podzol development in sands of the Woy Woy district N.S.W.* Australian Journal of Botany 1:83-95.

McDonald, T. (1992) *Management Plan for Bushland Reserve, Railway and Hillview Sts, Woy Woy.* Prepared for the Central Coast Branch of the Australian Conservation Foundation.

NPWS (2000) *Vegetation survey, classification and mapping – Lower Hunter and Central Coast Region.* A project undertaken for the Lower Hunter and Central Coast Regional Environmental Strategy, Sydney Zone, NPWS.

Payne, R. (2003a) *Mapping of endangered ecological communities: Umina-Woy Woy Sandplain*

Payne, R. (2003b) *Umina Coastal Sandplain Woodland Survey, Hillview Street Umina Beach.* Report for Gosford City Council.

Payne, R. (2006) *Species Impact Statement for Everglades Retirement Garden, corner Hillview and Veron Road, Woy Woy.* Volume 3.

Appendix 1 - Scientific Committee Determination Advice - Umina Coastal Sandplain Woodland

The Scientific Committee, established by the *Threatened Species Conservation Act*, has made a Final Determination to list the Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion as an ENDANGERED ECOLOGICAL COMMUNITY in Part 3 of Schedule 1 of the Act. The listing of Endangered Ecological Communities is provided for by Part 2 of the Act. The Scientific Committee has found that:

1. The Umina Coastal Sandplain Woodland is the name given to the ecological community recorded on coastal sands on the Woy Woy peninsula from the local government area of Gosford (within the Sydney Basin Bioregion) that is characterised by the following assemblage of species.

Acacia elata	*Acacia floribunda*
Acacia irrorata	*Acacia longifolia*
Acacia suaveolens	*Acacia ulicifolia*
Adiantum aethiopicum	*Allocasuarina littoralis*
Allocasuarina torulosa	*Angophora floribunda*
Aotus ericoides	*Banksia ericifolia*
Banksia integrifolia	*Banksia serrata*
Billardiera scandens	*Bossiaea ensata*
Breynia oblongifolia	*Caesia parviflora*
Cassytha glabella	*Cayratia clematidea*
Cheilanthes sieberi	*Clematis glycinoides*
Clerodendrum tomentosum	*Commelina cyanea*
Cymbopogon refractus	*Dianella caerulea*
Dodonaea triquetra	*Duboisia myoporoides*
Echinopogon ovatus	*Elaeocarpus reticulatus*
Entolasia stricta	*Eriostemon australasius*
Eucalyptus botryoides	*Eucalyptus paniculata*
Eustrephus latifolius	*Exocarpus cupressiformis*
Glochidion ferdinandi	*Glycine clandestina*
Gompholobium latifolium	*Gonocarpus teucrioides*
Hakea sericea	*Hardenbergia violacea*
Hibbertia scandens	*Hibbertia vestita*
Imperata cylindrica	*Isolepis nodosus*
Kennedia rubicunda	*Lasiopetalum macrophyllum*
Leptospermum polygalifolium	*Leptospermum trinervium*
Lomandra longifolia	*Macrozamia communis*
Melaleuca quinquenervia	*Monotoca elliptica*
Notelaea longifolia	*Pandorea pandorana*
Persoonia levis	*Persoonia linearis*
Phyllanthus hirtellus	*Pittosporum revolutum*
Platysace lanceolata	*Podocarpus spinulosus*

Pomax umbellata	*Pseuderanthemum variabile*
Pteridium esculentum	*Rapanea variabilis*
Restio tetraphyllus	*Sarcopetalum harveyanum*
Smilax glyciphylla	*Stephania japonica*
Themeda australis	*Veronica plebeia*
Viola hederacea	*Xanthorrhoea arborea*
Xylomelum pyriforme	

2. The total species list of the community is considerably larger than that given above, with many species present in only one or two sites or in very small quantity. The species composition of a site will be influenced by the size of the site, recent rainfall or drought condition and by its disturbance (including fire) history. The number of species, and the above ground relative abundance of species will change with time since fire, and may also change in response to changes in fire regime (including changes in fire frequency). At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers. The list of species given above is of vascular plant species, the community also includes micro-organisms, fungi, cryptogamic plants and a diverse fauna, both vertebrate and invertebrate. These components of the community are poorly documented.

3. Umina Coastal Sandplain Woodland has been recorded from the local government area of Gosford (within the Sydney Basin Bioregion).

4. Umina Coastal Sandplain Woodland is a low woodland dominated by trees of *Eucalyptus botryoides* and *Angophora floribunda* with a diverse understorey of sclerophyllous shrubs species including *Banksia integrifolia, Banksia serrata, Monotoca elliptica, Macrozamia communis, Acacia ulicifolia, Platysace lanceolata, Acacia suaveolens* and *Allocasuarina littoralis.*

5. Umina Coastal Sandplain Woodland has been recorded on coastal sands on the Woy Woy Peninsula at Umina and Pearl Beach. The woodland was described in 1952 by Burges & Drover (1952) who described *Eucalyptus botryoides* as predominating immediately behind the beach with *Angophora floribunda* predominating for up to 2 km from the beach. They described the soils as iron podzols and distinguished them from humus podsols with *Angophora costata* which occurred further away from the beach. Umina Coastal Sandplain Woodland occurs on soils of the Woy Woy Soil Landscape (Chapman & Murphy 1989). Umina Coastal Sandplain Woodland is part of the vegetation described as Coastal Dune Forest (map unit 9t) in Benson & Howell (1994).

6. Umina Coastal Sandplain Woodland is currently only known from three small areas at Umina; at Umina Oval, McEvoy Oval and Umina High School and at a tiny remnant at Little Patonga Beach. The total area still surviving in 2002 is estimated at less than 2 ha. Understorey has been removed for the occurrence at Pearl Beach.

7. Umina Coastal Sandplain Woodland has been extensively cleared for suburban development and remnants are not within conservation reserves. Remnants are very small and threatened by mowing and slashing, weed invasion, sand extraction and modified fire regimes. Weed species include *Lantana camara, Chrysanthemoides monilifera, Ipomoea cairica, Paspalum urvillei, Bidens pilosa, Pennisteum villosum, Coreopsis lanceolata* and *Ehrharta erecta*.

8. In view of the above the Scientific Committee is of the opinion that Umina Coastal Sandplain Woodland in the Sydney Basin Bioregion is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate. Gazettal date: 06/12/02.

Benson, D.& Howell, J. (1994) The natural vegetation of the Sydney 1:100 000 map sheet. Cunninghamia 3(4): 679-787.

Burges, A.& Drover, D.P. (1952) The rate of podzol development in sands of the Woy Woy district N.S.W. Australian Journal of Botany 1:83-95.

Chapman, G.A. & Murphy, C.L. (1989) Soil landscapes of the Sydney 1:100 000 sheet. Soil Conservation Service of N.S.W., Sydney.

Appendix 2 - List of native species that occur in Umina Coastal Sandplain Woodland

(sources: Scientific Committee Determination Advice, Bell (2004) and Payne (2006)

Scientific Name	**Common Name**
Acacia brownii	Heath Wattle
Acacia elata	Cedar Wattle
Acacia floribunda	White Sally
Acacia irrorata	Green Wattle
Acacia longifolia	Coast Wattle
Acacia maidenii	Maiden's Wattle
Acacia suaveolens	Sweet Wattle
Acacia ulicifolia	Prickly Moses
Acronychia oblongifolia	Common Acronychia
Adiantum aethiopicum	Maiden Hair Fern
Allocasuarina littoralis	Black Sheoak
Allocasuarina torulosa	Forest Oak
Alphitonia excelsa	Red Ash
Amperea xiphoclada	
Angophora costata	Smooth-barked Apple, Sydney Red Gum
Angophora floribunda	Rough-barked Apple
Aotus ericoides	
Astrotricha floccosa	
Balaskion tetraphyllum	Restio
Banksia ericifolia	Heath-leaved Banksia
Banksia integrifolia	Coast Banksia
Banksia serrata	Saw-tooth Banksia; Old Man Banksia
Banksia spinulosa	
Billardiera scandens	Apple Berry; Snotberry; Apple Dumplings
Blechnum campheldii	Water Fern
Bossiaea ensata	
Bossiaea heterophylla	
Breynia oblongifolia	Coffee Bush
Caesia parviflora	Pale Grass-Lily
Cassytha glabella	
Cassytha pubescens	
Cayratia clematidea	Slender Grape
Cheilanthes sieberi	Forest Fern
Cissus hypoglauca	Water Vine
Clematis glycinoides	Headache Vine
Clerodendrum tomentosum	
Comesperma ericinum	Matchheads
Commelina cyanea	Native Wandering Jew
Corymbia gummifera	Red Bloodwood
Cymbopogon refractus	Barbed Wire Grass
Dampiera stricta	

Scientific Name	**Common Name**
Desmodium rhytidophyllum	
Desmodium varians	Slender Tick-trefoil
Dianella caerulea	Blue Flax Lily
Dichelachne crinata	Longhair Plumegrass
Digitaria ramularis	
Dodonaea triquetra	Hop Bush
Duboisia myoporoides	Corkwood
Echinopogon caespitosus	Hedgehog Grass
Echinopogon ovatus	Forest Hedgehog Grass
Elaeocarpus reticulatus	Blueberry Ash
Endiandra sieberi	Hard Corkwood
Entolasia marginata	Bordered Panic
Entolasia stricta	Wiry Panic
Eragrostis brownii	Brown's Lovegrass
Eriostemon australasius	
Eucalyptus botryoides	Bangalay
Eucalyptus paniculata	Grey Ironbark
Eucalyptus robusta	Swamp Mahogany
Eustrephus latifolius	Wombat Berry
Exocarpus latifolius	Broad-leaved Ballart; Broad-leaved Native Cherry
Glochidion ferdinandi	Cheese Tree
Glycine clandestina	
Glycine microphylla	
Gompholobium latifolium	Golden Glory Pea
Gonocarpus tetragynus	
Gonocarpus teucrioides	
Goodenia hederacea	
Goodenia heterophylla	
Hakea sericea	
Hardenbergia violacea	False Sarsaparilla
Hibbertia diffusa	A guinea flower
Hibbertia fasciculata	A guinea flower
Hibbertia obtusifolia	A guinea flower
Hibbertia scandens	Climbing Guinea Flower
Hibbertia vestita	A guinea flower
Hybanthus monopetalus	Slender Violet-bush
Hydrocotyle laxiflora	Stinking Pennywort
Hydrocotyle peduncularis	Pennywort
Imperata cylindrica	Blady Grass
Isolepis nodosa	Knobby Club-rush
Kennedia rubicunda	Red Kennedy Pea
Lasiopetalum macrophyllum	
Leptospermum polygalifolium	A tea tree
Leptospermum trinervium	A tea tree
Livistona australis	Cabbage Tree Palm
Lomandra longifolia	Spiny-headed Mat Rush
Macrozamia communis	Burrawang Palm

Scientific Name	**Common Name**
Maytenus silvestris	Narrow-leaved Orange Bark
Melaleuca quinquenervia	Broad-leaved Paperbark
Microlaena stipoides	
Mitrasacme polymorpha	
Monotoca elliptica	
Monotoca scoparia	
Notelaea longifolia	Native Olive
Oxalis perennans	
Pandorea pandorana	Wonga Vine
Parsonsia straminea	Common Silkpod
Paspalidium distans	
Patersonia glabrata	
Patersonia sericea	
Persoonia levis	Broad-leaved Geebung
Persoonia linearis	Narrow-leaved Geebung
Phyllanthus hirtellus	
Pittosporum revolutum	Hairy Pittosporum
Pittosporum undulatum	Sweet Pittosporum; Native Daphne
Platysace lanceolata	
Podocarpus spinulosus	
Polyscias sambuccifolia	Elderberry Panax
Pomaderris ferruginea	
Pomax umbellata	
Poranthera microphylla	
Pseuderanthemum variabile	Pseuderanthemum
Pteridium esculentum	Bracken Fern
Rapanea variabilis	Muttonwood
Ricinocarpus pinifolius	Wedding Bush
Sarcopetalum harveyanum	Pearl Vine
Schelhammera undulata	
Smilax glyciphylla	Native Sarsparilla
Stephania japonica	Snake Vine
Synoum glandulosum	Scentless Rosewood
Tetratheca ericifolia	
Themeda australis	Kangaroo Grass
Vernonia cinerea	
Veronica plebeia	Trailing Speedwell
Viola hederacea	Native Violet
Xanthorrhoea arborea	Grass Tree
Xanthorroea resinifera	Grass Tree
Xanthosia pilosa	Flannel Flower
Xylomelum pyriforme	Woody Pear

Appendix 3 - Weed list and recommended control methods

The following table lists all naturalised exotic species (weeds) recorded in UCSW remnants.

Common Name	Scientific Name	Weed category	Control method
Arum Lily	*Zantedeschia aethiopica*	1	Remove rhizomes and seeds
Ground Asparagus	*Asparagus aethiopicus*	1	Remove rhizomes and fruits from site
Coreopsis	*Coreopsis lanceolata*	2	Hand removal, remove seed heads from site
Beach Pennywort	*Hydrocotyle bonariensis*		Spot spray 1:100 glyphosate
Bitou Bush	*Chrysanthemoides monilifera ssp. rotundata*	1	Cut and paint stems at base, remove vegetation and seeds from site
Black-eyed Susan	*Thunbergia alata*	1	Hand removal, remove all plant parts from site
Buffalo Grass	*Stenotaphrum secundatum*	2	Spot spray
Camphor Laurel	*Cinnamomum camphora*	1	Hand pull seedlings; scrape and inject stem with herbicide on large plants
Canna Lily	*Canna indica*	1	Remove rhizomes and seeds
Fleabane	*Conyza* sp.		Hand pull and remove seed heads
Coral Tree	*Erythrina x sykesii*	1	Stem inject trees, remove branches from site
Farmer's Friends	*Bidens pilosa*		Hand pull and remove seed heads
Fishbone Fern	*Nephrolepsis cordifolia*	1	Remove rhizomes and all plant parts
Geranium	*Pelargonium* sp.	3	Remove from site
Ground Asparagus	*Asparagus densiflorus*	1	Remove rhizomes and fruits from site
Indian Hawthorn	*Rhaphiolepis indica*		Hand pull seedlings; cut and paint mature plants
Kikuyu	*Pennisetum clandestinum*	2	Spot spray
Lantana	*Lantana camara*	1	Manual removal of small plants; cut and paint large stems. Leave large cut plants in situ for habitat and as a barrier to disturbance.
Broad-leaved Privet	*Ligustrum lucidum*	1	Hand pull seedlings; cut and paint mature plants
Mickey Mouse Bush	*Ochna serrulata*	1	Hand pull seedlings; cut and paint mature plants
Morning Glory	*Ipomoea purpurea*	1	Hand pull small infestations remove from site; cut large vines and remove from site and spot spray regrowth
Mother of Millions	*Bryophyllum delagoense*	1	Hand pull and remove from site
Orange Lily	*Watsonia meriana*	1	Hand pull and remove bulbs from site

Common Name	Scientific Name	Weed category	Control method
Panic Veldtgrass	*Ehrharta erecta*	2	Hand pull and remove from site or spot spray
Petunia	*Petunia* sp.	3	Hand pull
Red Natal Grass	*Melinis repens*		Hand pull and remove from site or spot spray
Senna, Cassia	*Senna pendula*	1	Hand pull seedlings, cut and paint mature plants. Remove seeds and plant material from site.
Shivery Grass	*Briza maxima*	2	Hand pull or spot spray, remove seeds from site
Turkey Rhubarb	*Acetosa sagittata*	1	Remove rhizomes and plant material from site
Umbrella Tree	*Schefflera actinosa*	1	Hand pull seedlings; cut and paint mature plants. Remove from site
Whisky Grass	*Andropogon virginicus*	2	Hand pull. Remove from site.
Yellow Bells	*Tecoma stans*	1	Hand pull seedlings, cut and paint mature plants. Remove seeds and plant material from site

Weed category: 1 = priority weeds for removal, 2 = moderate priority for removal, 3 = low priority for removal – remove when resources are available.

Appendix 4 - Suggestions for Community Awareness Program

The following provides some information on UCSW that may be useful to include in a community awareness program, or in interpretive signage. Further information may be found on the DECC threatened species web site at http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

What is Umina Coastal Sandplain Woodland

Umina Coastal Sandplain Woodland (UCSW) is a rare vegetation type that is unique to the Umina-Woy Woy area. It has always been a restricted vegetation type, but was once more extensive prior to the settlement of the Umina-Woy Woy area. It is now restricted to a few small remnants in the Umina area. Because of its uniqueness, small size and vulnerability to threatening processes, UCSW has been determined to be an Endangered Ecological Community.

What is an Endangered Ecological Community?

An ecological community is a group of plants and animals that occur together in a particular area. An Endangered Ecological Community is a particular community containing a group of plants and animals listed under the *Threatened Species Conservation Act* 1995 as being at risk of extinction unless threats affecting these areas are managed and reduced.

Endangered Ecological Communities are protected by law from damage and disturbance.

Where is UCSW found?

UCSW occurs only on the sandplain of the Umina-Woy Woy area. It mostly occurs as tiny, scattered remnants within a largely urbanised area. Significant locations are at Umina and McEvoy ovals.

Why is it important?

Only a small area (approximately 13ha) of the original distribution of UCSW remains, and these areas are highly fragmented. Much of the community is threatened by weeds, damage by trail bikes and vandalism, rubbish dumping, mowing and slashing, too-frequent fires and development.

Many remnants in the Umina-Woy Woy area are small and degraded by weeds, vandalism and rubbish dumping, but are still important remnants worthy of protection, restoration and conservation.

Description of UCSW

The tree layer

The most common trees occurring in the canopy of UCSW are Bangalay (*Eucalyptus botryoides*) and Rough-barked Apple (*Angophora floribunda*). There may also be a number of other tree species which occasionally occur such as Swamp Mahogany (*Eucalyptus robusta*) and Smooth-barked Apple (*Angophora costata*).

The shrub layer

The shrub layer is often made up of a diverse collection of shrubs such as Coast Banksia (*Banksia integrifolia*), Saw-tooth Banksia (*Banksia serrata*), Burrawang Palm (*Macrozamia communis*), Prickly Acacia (*Acacia ulicifolia*), Sweet Wattle (*Acacia suaveolens*) and Forest Oak (*Allocasuarina littoralis*).

The ground layer

The ground layer often contains plants such as Mat Rush (*Lomandra longifolia*), many native grasses and beautiful, delicate orchids.

What you can do:

There are many things that you can do to help with the protection, rehabilitation and conservation of UCSW. These include:

- Stay on established tracks in bushland areas.
- Prevent and report fires in bushland in the Umina-Woy Woy area.
- Join or start a bushcare group - contact Gosford City Council for details.
- Prevent further weed invasion and littering by disposing of your garden clippings and other rubbish appropriately.
- Use locally occurring native species in your garden.

Appendix 5 - Helpful Reference Texts

Auld, B. and Medd, R. (1987) *Weeds – an illustrated botanical guide* Inkata Press, Melbourne.

Buchanan, R. (1989) Bush Regeneration – *Recovering Australian Landscapes.* TAFE, NSW.

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Buchanan, R. (1988) *Common weeds of Sydney bushland (1988)* Inkata Press, Sydney.

Cropper, S. (1993) *Management of Endangered Plants.* CSIRO, Melbourne.

Fairley, A. and Moore, P. (1989) *Native Plants of the Sydney District* Kangaroo Press.

Harden, G. (ed) *Flora of NSW Vols 1 – 4* (1990-2002). NSW University Press.

Harden, G., McDonald, W. and Williams, J. (2006) *Rainforest Trees and Shrubs – A Field Guide to their identification.*

McLoughlin, L & Rawling, J. (1995) *Making Your Garden Bush Friendly* Rawling publishers.

Muyt, A. (2001) *Bush Invaders of South-East Australia.* Pub by RG and FJ Richardson, Meredith.

National Trust (1999) *Bush Regenerators Handbook* National Trust, Sydney.

Robinson, L. (1991) *A Field Guide to Native Plants of Sydney,* Kangaroo Press.

Appendix 6 - Other relevant web sites

Department of Environment and Climate Change (NSW) Threatened Species profiles:
http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

NSW Scientific Committee Determinations:
http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Final+determinations

Commonwealth Department of Environment and Water Resources Threatened Species web site:
http://www.deh.gov.au/biodiversity/threatened/species/index.html

Gosford City Council Bushcare program:
http://www.gosford.nsw.gov.au/environment/natural_areas/bushcare.html

NSW National Trust Bushland Management
www.nsw.nationaltrust.org.au/bushl1.html

Australian Association of Bush Regenerators
www.aabr.org.au

Greening Australian Bush Regeneration Fact Sheets
www.greeningaustralia.org.au

Umina Coastal Sandplain Woodland Endangered Ecological Community

Restoration and Rehabilitation Management Plan

June 2007

Department of **Environment & Climate Change** NSW