Practical & cost effective ways to manage biodiversity on Golf Courses

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Talk Structure

Ways to enhance biodiversity of golf courses

- Barriers and opportunities to biodiversity & habitat restoration
- Making it happen – how to improve biodiversity habitat
- The future potential of urban golf courses
  - How to be an ambassador for biodiversity

Many golf courses have significant biodiversity assets

(and are famous for it)

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The Royal Melbourne Golf Club

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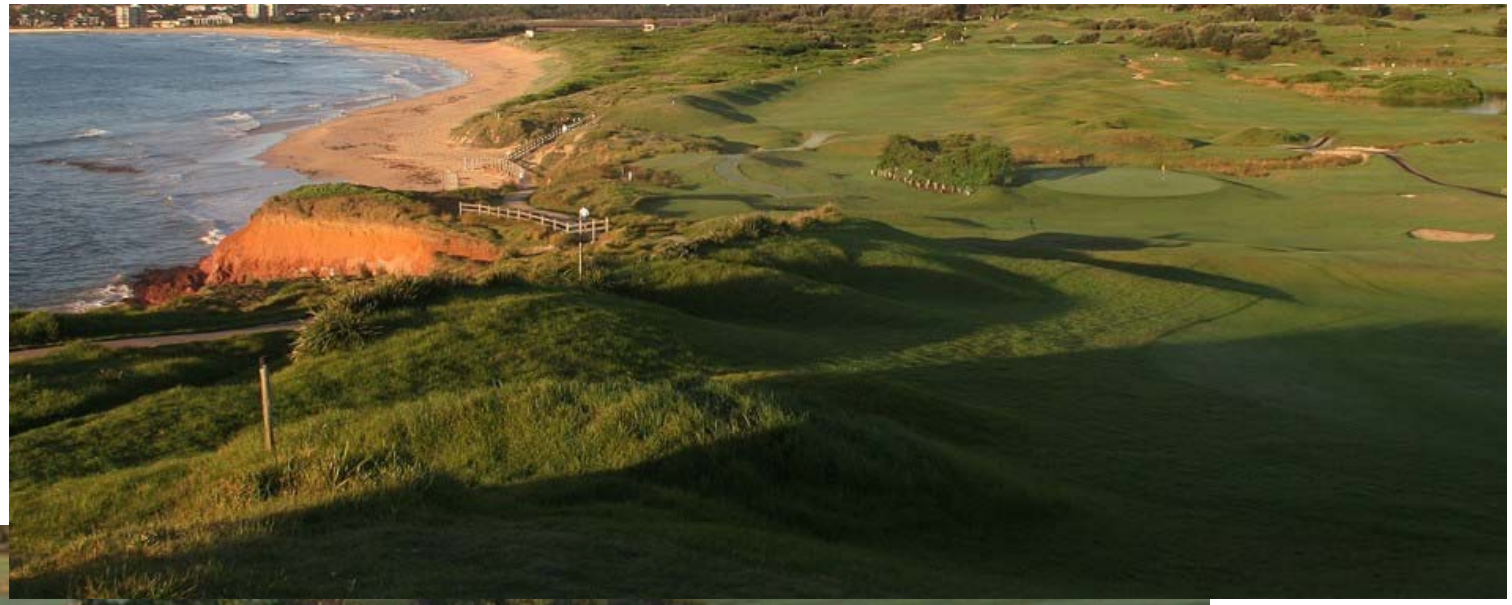
Long Reef Golf Club



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NSW Golf Club

What are the barriers to creating more habitat and how much does it cost??

How much does it cost to manage habitat?

To understand the real constraints you face we interviewed superintendents:

- Interviewed a range of golf course superintendents
  - Public and private courses
- Interviewed 9 different people May-June 2014
- Interviews went for up to an hour

How much does it cost to manage habitat?

Interview Questions

- Used images of 6 main types of 'out of play' areas:
  - What activities do you do in each (mowing, spraying etc)?
  - How much time does this take per hectare?
  - How many people & how many times a year is this done?
  - What do you think are the biggest costs, versus the biggest benefits of this area?
  - If you had a choice would you have more of this habitat?

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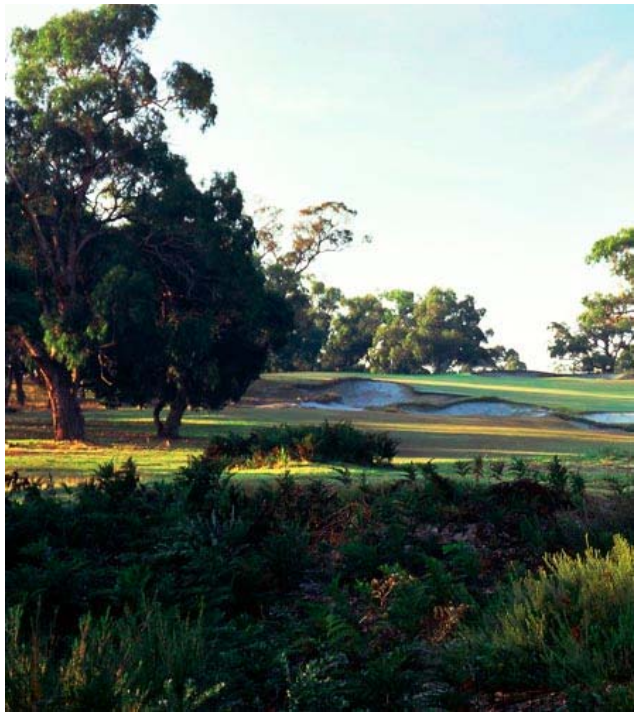
How much does it cost to manage habitat?

Benefits of having this vegetation

- Great for biodiversity
- Conservation of native vegetation communities
- Used for seed collection
- Provides a frame for the hole, guides the golfer
- Looks good
- Low maintenance, eventually self-sustainable
- Provides a buffer

Barriers and constraints

- Complaints about impact on play
  - But wide spacing between plants can reduce this
  - Small areas can have a big impact on biodiversity
- Not enough space on site for tall vegetation
  - Possible to add low vegetation
  - Possible to add long rough along wide fairways
- Convincing the board it's a good idea
  - Poor general environmental literacy



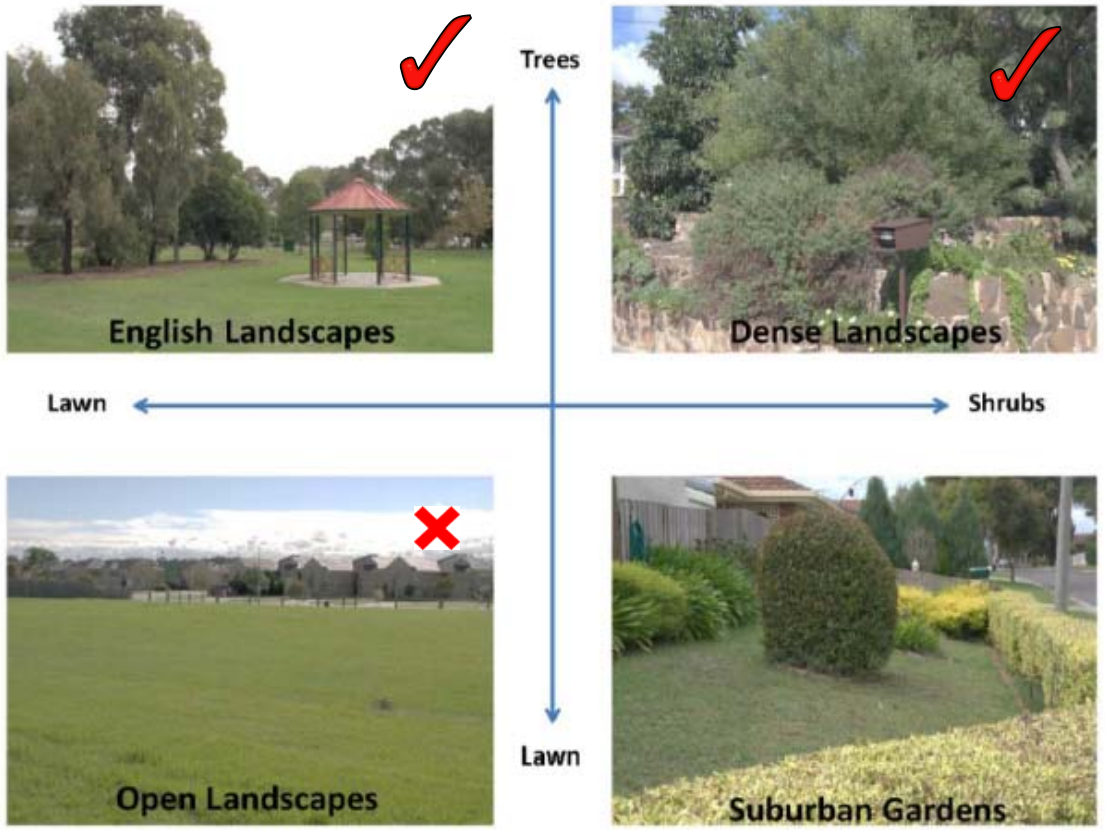
We also asked residents in the surrounding suburbs what sorts of vegetation they prefer in green spaces

What do people think about urban vegetation?

- How much people value vegetation, and what type of vegetation do people prefer to see?
  - **Value** (the priority assigned to a particular thing: biodiversity, recreation, production)
  - **Preference/attitude** (how much people ‘like’ something)

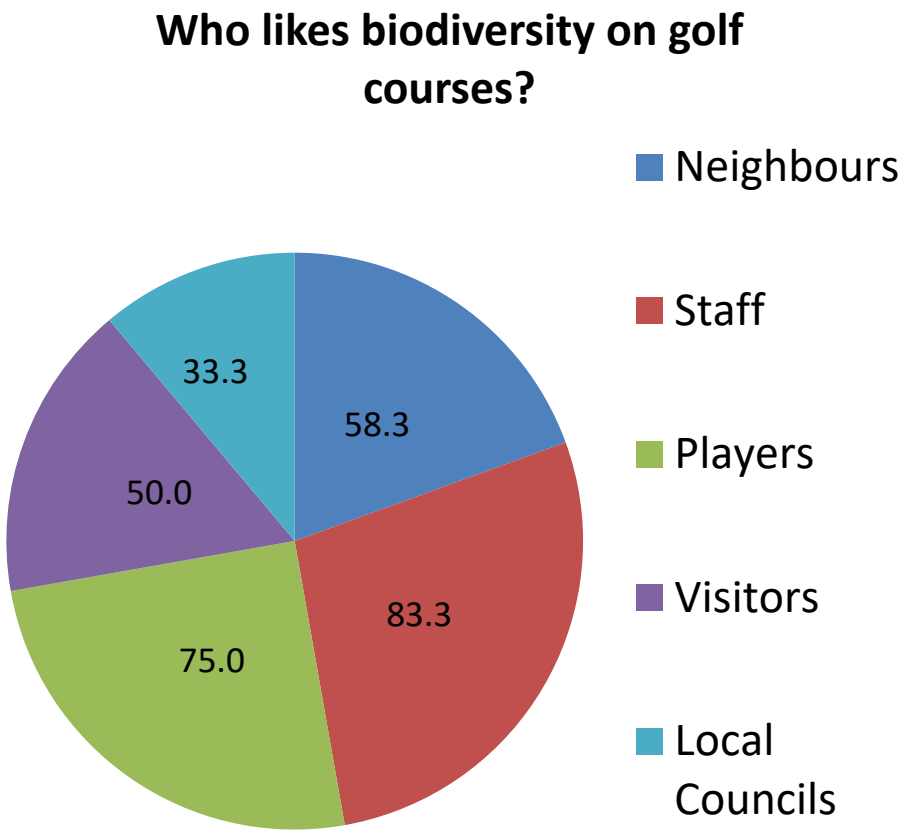
Values and preferences for vegetation

- Social surveys of residents (750 surveys, n=159)
- Many people value nature & native plants and ***prefer dense vegetation***
- This means that dense vegetation could become a bigger part of our green spaces



We asked superintendents from across Australia:

- Who likes biodiversity?
- Why?
- What don't people like?
- What is the hardest thing to manage?



Benefits of having biodiversity

- Cheaper Maintenance
- Improves aesthetics (colourful flowers)
- Attracts people (e.g. tourists)
- Makes the club look proactive & improves image
- Reduced water use
- Makes people value the course more

Barriers and constraints

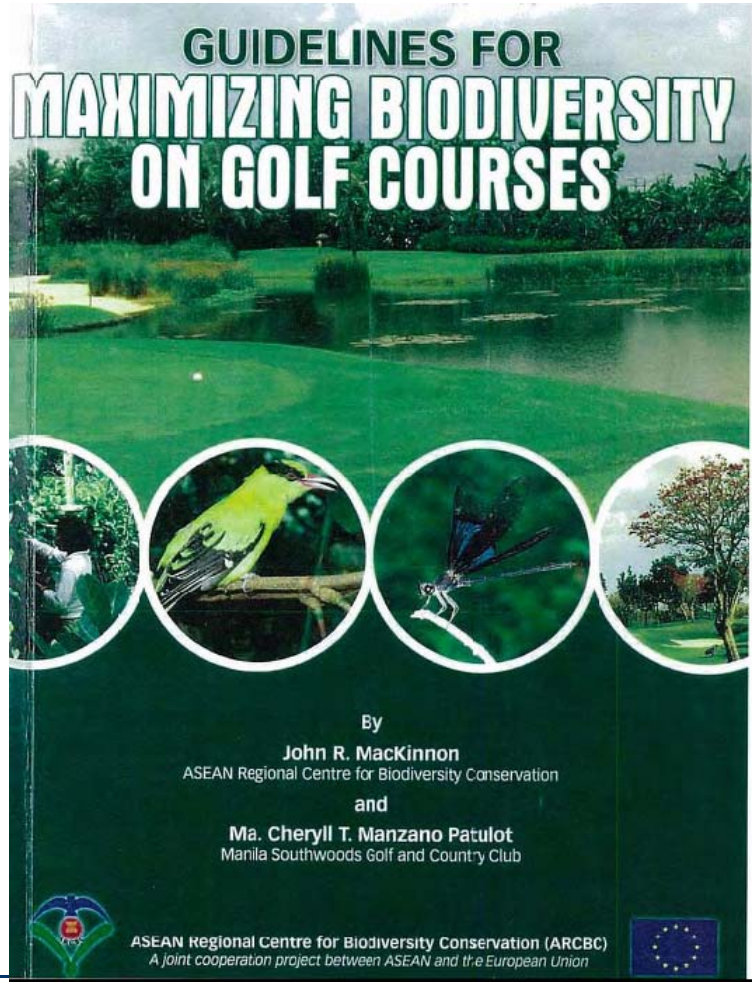
- **Establishment of plants**
- **Costs to manage pests and weeds**
- **Lack of specialist knowledge**
- Lack of time
- Funding
- Lack of environmental literacy among members
- Large trees and OHS

How to improve biodiversity values?

1. Understand what you have
2. Protect and enhance remnant vegetation where possible
3. Manage out of play areas for biodiversity
4. Add species specific interventions

Understanding what you've got

- Flora and fauna surveys
  - Consultants
  - Local naturalists
  - Interested members / employees (fauna sighting log book)
  - Government databases
- Vegetation management plan
- Use of guidelines



Protect and Enhance Remnant Vegetation

Box 3. Greening the greens

Five golf courses in eastern Sydney contain substantial areas of ESBS. Some clubs are progressing well with restoration and management programs (See Appendix S1). New South Wales Golf Club and Bonnie Doon Golf Club, for example that have active management programs and have had good success in restoring ESBS.

Bonnie Doon Golf Course has a number of high quality remnants, some of which have been under bush regeneration treatment for many years, along with a range of other management and restoration initiatives (See Appendix S1). An accidental fire in 2007 produced very favourable germination of ESBS species and reinvigorated existing stands of vegetation. Bush regeneration is now being carried out by staff and volunteers, including Club members, which has generated interest and cultural change within the Club (Fig. 7).

NSW Golf Course at La Perouse has 12.96 ha of high quality, diverse ESBS remnants, with linkages to Botany Bay National Park, which has 10 ha of ESBS. A wildfire in 1998 improved the condition of some of the remnants so the Club adopted fire as an ecological and management tool. An ongoing fire strategy has been in place since 2006, with the Club working in collaboration with the Office of Environment and Heritage (OEH) and Botany Bay National Park. In addition, contract bush regeneration works have been ongoing without inte
excessive wattle germination a

Figure 7. Bush regeneration at Bonnie Doon Golf Course being carried out by staff and volunteers, including Club members (Photo. Gary Dempsey).

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Sand Heathland

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Masters student Lee Wilson looked at remnant vegetation communities and their restoration potential

Now into its second year, the joint AGCSA-University of Melbourne study looking at the biodiversity and carbon benefit of urban golf courses continues to gather some interesting data. As part of the project, University of Melbourne team member Lee Wilson examined the quality of remnant vegetation on nine of the project's participating golf courses and how it compared to that found in nearby nature reserves.

Remnant refuges

Golf courses can make a substantial contribution to maintaining biodiversity in our cities as they often contain important patches of remnant vegetation. However, despite the fact that golf courses are some one of the largest patches of green space in urban areas, there is very little information about the types of remnant vegetation golf courses contain as compared to nearby patches of protected remnant vegetation in the surrounding urban landscape.

In 2012, I joined a research team at The University of Melbourne investigating the biodiversity and carbon benefits of urban golf courses and other green spaces throughout the south east of Melbourne. My role in this research group was to undertake a project that compared remnant vegetation on golf courses to remnant vegetation in nearby nature reserves.

This study is helping to improve our knowledge of how golf courses can, and do, provide habitat for indigenous plants and vegetation communities and the potential for restoration of remnant vegetation to improve vegetation quality and extent.

vegetation community or non-indigenous. The nine golf courses surveyed were Victoria GC, Kingswood GC, Spring Valley GC, Peninsula Country GC, Frankston GC, Woodlands GC, Sandhurst Club, Settler's Run G&CC and Ranfurlie GC.

The diversity and abundance of the remnant vegetation communities located in golf courses was then compared to those in nature reserves and following the study three key findings can be presented. These are:

- Remnant vegetation on golf courses has a distinctly different composition to that in nature reserves;
- Site management history and size greatly influenced remnant vegetation quality; and
- The remnant vegetation on golf courses has high restoration potential.

COMPOSITION

Patches of remnant vegetation on golf courses and in nature reserves contained a similar total

species recorded on the golf courses were absent in the reserves.

SITE SIZE AND MANAGEMENT HISTORY

The plant species present and the quality of the remnant vegetation at each golf course were strongly influenced by site land-use history, the area of the remnant vegetation patch and management practices.

Site history: Most golf courses are located on land that was used for other purposes prior to becoming a golf course, such as cattle grazing, agriculture and horticulture. Most of the nature reserves, however, had not been used intensively for other purposes prior to becoming a site for conservation.

A strong link was identified between the quality and composition of vegetation with site history. Not surprisingly, the reserves and golf courses that contained areas of high quality indigenous vegetation, such as Frankston GC, were located on sites that had not been used intensively prior to their establishment. These sites contained more indigenous plant species and populations of indigenous orchids such as Donkey orchids (*Diuris* sp.), Sun orchids (*Thelymitra* sp.) and Greenhood orchids (*Pterostylis* sp.).

The golf courses and reserves that had been used for other purposes contained more degraded vegetation (i.e.: they contained fewer indigenous species, more exotic species and few or no orchid species). It is likely that the impacts of grazing and agriculture led to the degradation of original indigenous vegetation. Although the vegetation is in poorer condition today, restoration activities such as revegetation with indigenous species will improve the quality of the vegetation over time.

Area of vegetation: A strong link was identified between the area of remnant vegetation and the composition of vegetation. Most remnant vegetation on golf courses is located in small, fragmented sections such as the areas between the fairways. In contrast, the vegetation in reserves is generally found in larger patches (lower perimeter:area

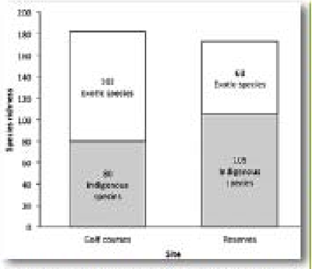

Figure 1. The number of plant species in remnant vegetation on golf courses and nature reserves within the surveyed areas

Opposite page: University of Melbourne researcher Lee Wilson compared patches of remnant vegetation on golf courses to those in nearby nature reserves as part of the biodiversity project

undulatum) and blackberry (*Rubus fruticosis*). These weed species can grow in very high densities and outcompete populations of indigenous vegetation. The competition between indigenous and weed species can lead to a decline in the quality of vegetation over time as indigenous species are lost.

Golf courses and nature reserves that contained higher quality vegetation generally removed weed species, revegetated areas with indigenous species and used controlled fire to maintain vegetation health. Controlled fires are particularly important for natural heathland vegetation in areas containing sand-based soils. Fires maintain plant diversity by removing dense populations of indigenous and weed species and allowing other indigenous species to re-generate from seeds stored in the soil. I am confident that increased efforts in management practices that promote indigenous plant diversity would improve the quality of vegetation on golf courses.

RESTORATION POTENTIAL

Few patches of remnant vegetation on golf courses contained high quality or highly degraded vegetation. Most golf courses contained remnant vegetation that was moderately degraded but had a strong potential for restoration.

Most courses contained abundant populations of common indigenous species such as coastal tea tree (*Leptospermum laevigatum*) and bracken

The study has shown that golf courses can play a significant role in the conservation of vegetation communities that are under pressure from continued urbanisation

Project team member and PhD student Alessandro Ossola measures the height of vegetation

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Remnant vegetation on golf courses vs reserves:

- The remnant vegetation on golf courses has high restoration potential
- Site management history and size greatly influence remnant vegetation quality
- Future restoration efforts should consider
    - Size
    - Fire
    - Active management

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Techniques to manage your out-of-play vegetation for fauna

Restoring native vegetation communities

- Courses can be altered to return them to a more natural state, including:
  - Revegetating with native plants
  - Encouraging natural regeneration via:
    - Reducing mowing
    - Fire
    - Weed removal

Using Fire for Restoration

- Native vegetation often requires fire to stay healthy
- Stimulate soil seed bank = cheap restoration
- Needs skills to manage

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Restore Biodiverse Rough?

Grassy Groundcover Research Project

The focus of the GGRP is the *reestablishment* of *complex* grassland or grassy understorey onto lands with an *agricultural history* by *direct seeding*

Funded by Greening Australia, CMA's

Paul Gibson-Roy, John Delpratt

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Restore Biodiverse Rough?

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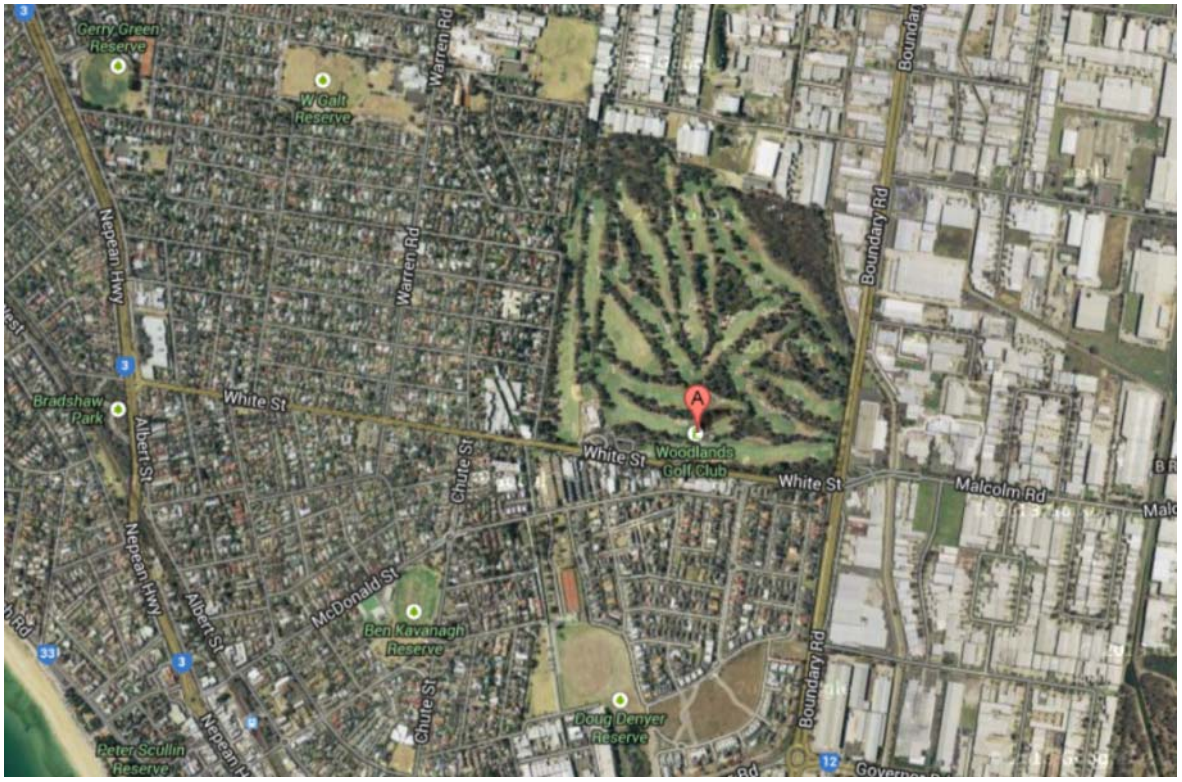
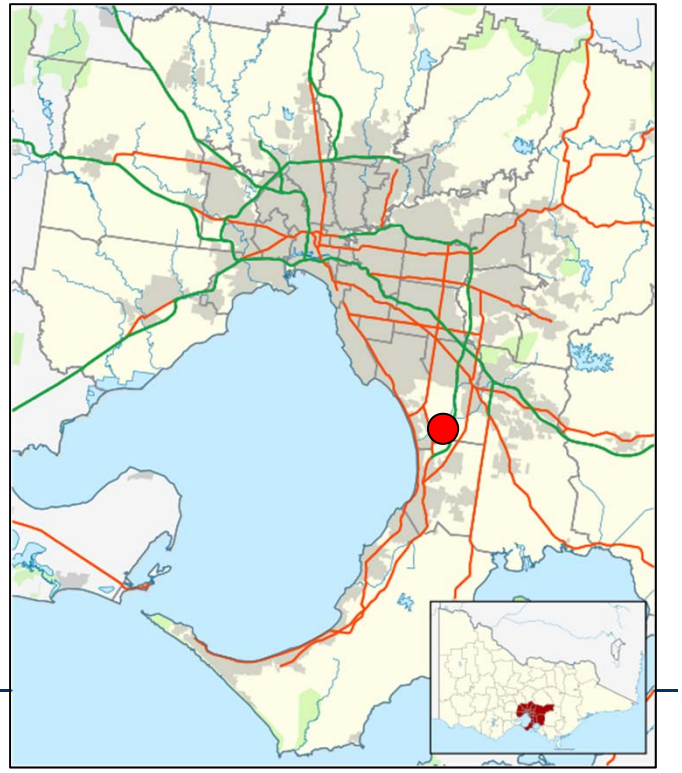
Case Study

Woodlands Golf Club





Woodlands Golf Club

- Important course in the region
  - Large areas of native plants
  - Heathy vegetation communities
  - Local strong-hold for some birds e.g. Grey-crowned Babbler
- Flora and Fauna Management Plan & Tree Management Plan
- Dedicated ‘Vegetation Manager’ in the ground staff

Woodlands Golf Club

Active vegetation management undertaken includes revegetation:

Carry improvement program:

- Scraped off the top soil layer to remove weeds
- In the ‘Damp-sands Herb-rich/ Heathy woodlands’ vegetation community
- Revegetation included targeted native species

Woodlands Golf Club

- Middle tee and top layer (300mm) removed
- Native sand added

- Native biodiversity seed mix sown
- Bracken chunked in along path
- Tube stock and hykos/cells planted
- Carry roped off and signage used to encourage golfers to use path

- Area monitored as it matures, add plants as required
- Selective herbicide used to keep Native Couch grass under control
- Regular hand weeding for continued maintenance

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Woodlands Golf Club

Active vegetation management undertaken includes ecological burns:

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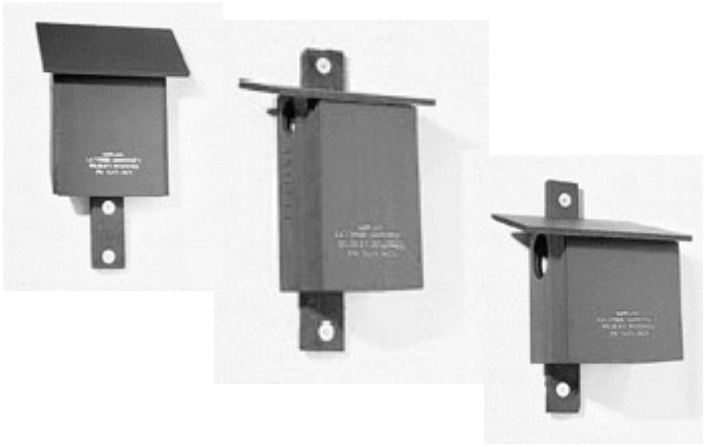
Species Specific Habitat Restoration

Nest Boxes

- Provide the hollows that many native animals need but can't find in the urban landscape
- Many different types available
- Designed to suit the species
  - Bats
  - Birds
  - Possums



- Pest species colonising nest boxes may be a problem ie. bees, Indian mynas

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Artificial Hollows

Coarse Woody Debris (logs etc)

Logs are important because they:

- Provide shelter for nesting and refuge from the environment.
- Foraging sites for many different animal species.
- Sites for water infiltration, nutrient capture and fungi growth.
- Assist organisms move through the landscape.

Barton et al (2009) Conserving ground-dwelling beetles in an endangered woodland community: multi-scale habitat effects on assemblages diversity. Biological Conservation , 142, 1701-1709

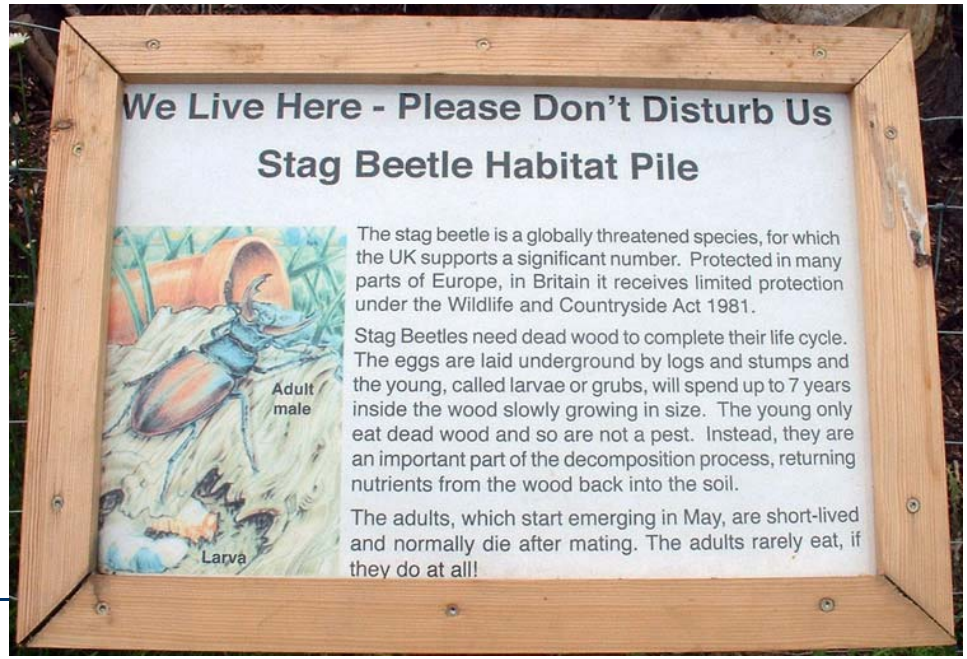
Retain leaf litter

Important for:

- Invertebrates
- Predators of Invertebrates
- Water infiltration
- Seed germination

Insect Banks

- Piles of decaying wood provide important beetle habitat rare in urban areas



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Bee Hotels

- Native bees nest in hollows twigs and soil
- We can create habitat

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Lizard Lounges

- Use materials that absorb heat
- Place in sunny areas

Way forward and future potential of urban golf courses

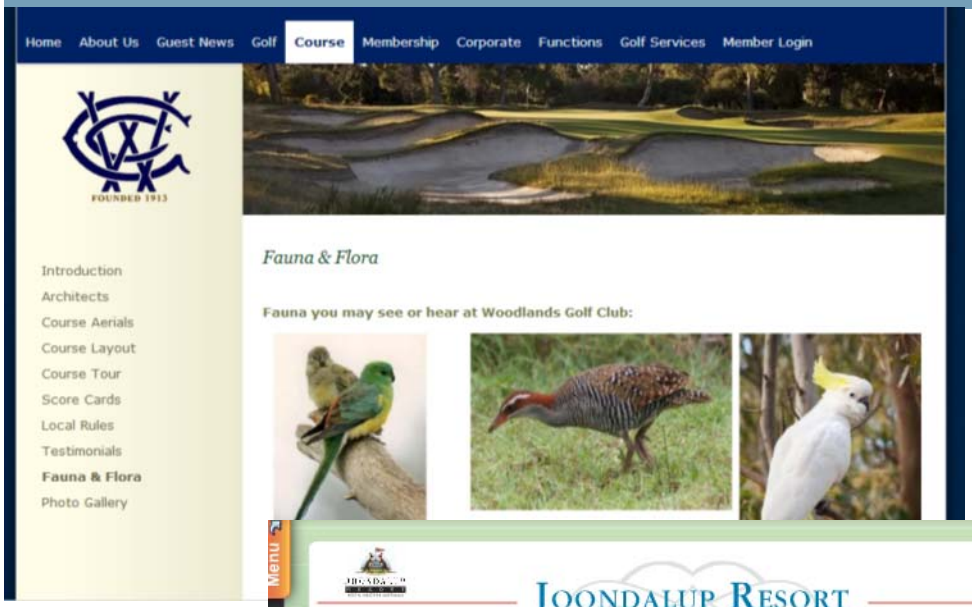
How to get people other than golfers to care??

Engagement and education:

You probably already do this……

- Staff training
- Newsletters & member educational material
- Walk and talk days
- Websites

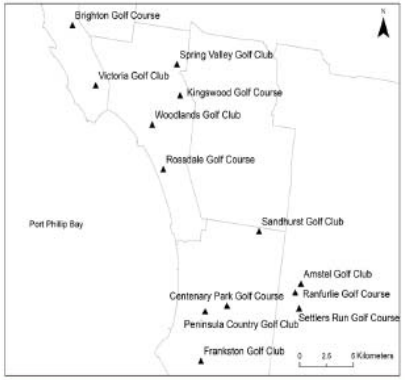
Engagement and education



Biodiversity values in south-east Melbourne

Keeping it Green readers will be aware that the University of Melbourne has commenced a major scientific study into the biodiversity and carbon benefits that golf courses provide within our cities. The study is to be run over the next 3 years, surveying has already begun and this is the first of a series of newsletters to let participating clubs and their members as well as the greater golfing community know what we have found.

Aim of the project:
To understand the diversity of plants and animals in golf courses throughout south-east Melbourne. We visited 13 courses spanning from Brighton to Frankston during January – March 2012. The areas we visited are shown in the map below.



These golf courses represent some of Melbourne's oldest courses, including Frankston. They also include some of Melbourne's newest courses, like Settlers Run.

What bug is that?
So far we have looked at the diversity of insects within golf courses. To collect insects we used nets and traps, as seen in the pictures below. We have found over 70 species of native bugs and there could be up to 200 species of native bees in south-east Melbourne.

Above: PhD student, Luis Mata collecting insects using a sweep net.

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Biodiversity Values in South-east Melbourne

Australian Research Centre for Urban Ecology
Royal Botanic Gardens Melbourne

How to get people other than golfers to care??

But, what about…..

- Friends groups
- Marketing the course as an environment park?
- Opening it to the public once/month? E.g. to school groups
- Establishing bike tracks on perimeter
- Dog walking out of playing times
- Educational signage, phone apps or eco-art displays

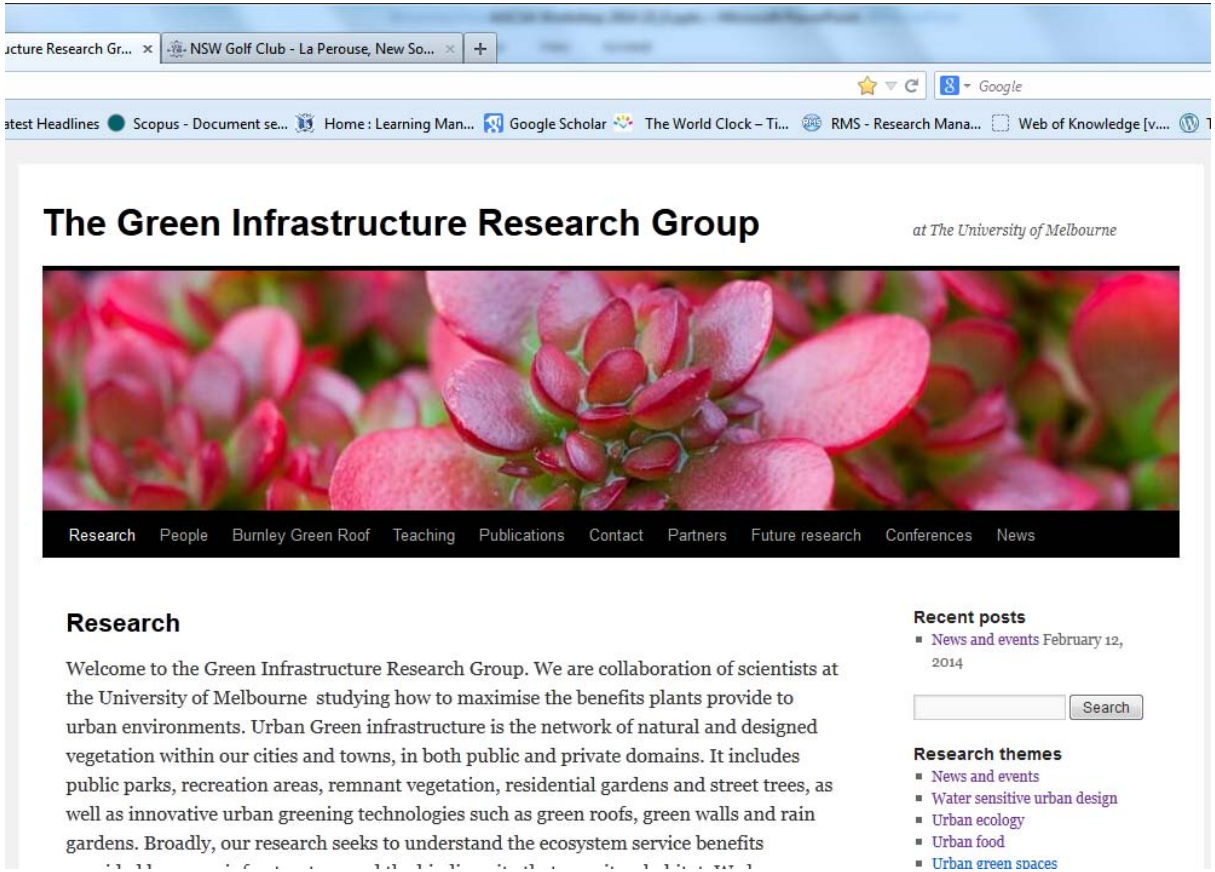
How can you use the information we have provided?

- To optimise biodiversity & carbon benefits in golf courses:
  - Which golf courses should be prioritised ?
  - Which biodiversity groups to monitor to provide evidence?
- Proof that urban golf courses are providing critical urban ecosystem services, e.g. biodiversity habitat and carbon storage

Future opportunities

- Opportunity to look at change from baseline data
  - Monitoring before and after restoration
- Opportunity to investigate optimal restoration:
  - Which techniques work best?
  - Where to do it?
  - Which indicator groups to monitor?
- Strategic urban green infrastructure planning
  - Spatial prioritisation of restoration works
  - What GCs to prioritise and where?

- www.thegirg.org



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Thanks!






Questions?

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