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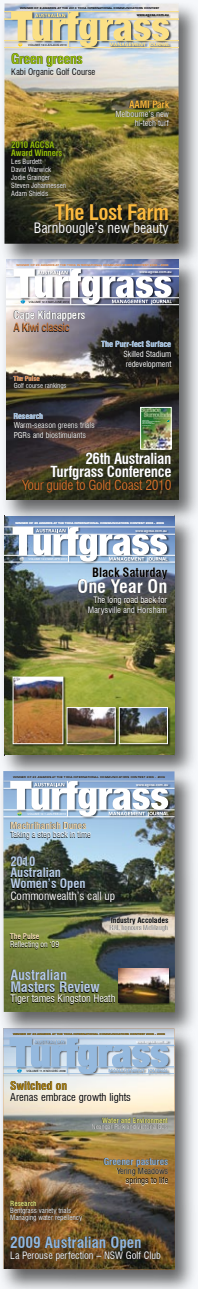

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COVER PHOTO: THE VICTORIA GOLF CLUB: One of the Melbourne sandbelt's famed courses, The Victoria Golf Club will host the 2010 Australian Masters in mid-November. Pictured is the par 3 16th. **Photo:** *Brett Robinson.*

RESEARCH

Getting to the core of carbohydrates 38

US researchers have examined the effects of coring on rates of photosynthesis and whole plant respiration and quantified carbohydrates in creeping bentgrass roots and leaves during summer.

WATER MANAGEMENT

Water reclamation project to revive Curlewis 46

Curlewis Golf Club near Geelong is about to follow in the footsteps of Sydney's Pennant Hills Golf Club by installing a sewer mining plant. Superintendent Rob Bradley outlines the project which will help revive the club.

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Contributors to Australian Turfgrass Management Volume 12.5 (September-October 2010)

Dyson Appleyard (VGA); Rob Barnes (Kogarah GC); Rob Bradley (Curlewis GC); Stephen Chapman (Barossa Valley GC); William Cheatley (Traralgon GC); Rob Christie (Marysville CGBC); Glenn Cross (Mt Lawley GC); Shaun Cross (Byron Bay GC); Mark Couchman (Cromer GC); Jeremy Cutajar (VGCSA); Peter Dernoeden (University of Maryland, US); Peter Donkers (Long Reef GC); Robin Doodson (Sanctuary Cove GC); John Duncan (Jamberoo GC); Idris Evans (The Western Australian GC); Jinmin Fu (Wuhan Botanical Garden); Shane Greenhill (Sorrento GC); Casey Groves (Sunraysia Daily); Rob Halsall (G&BS Australia); Kirsty Herring (Cooroy GC); Mark Jennings (Box Hill GC); Adam Lamb (Barwon Heads GC); Steve Lewis (TGCSA); Peter Lonergan (GCSAQ); Ben Matheson (Proserpine GC); John Neylan (AGCSA); Andrew Peart (AGCSATech); Eddie Ruis (Portland GC); Rob Savedra (Wesley College); Daryl Sellar (Turfwise); Sam Sherriff (SAGCSA); Michael Smith (Scotch College); Steve Smith (Katoomba GC); Dave Thomson (Bermagui CC); Ian Todd (Victoria GC); Brad Tucker (Whittlesea GC); Ling Urquhart (Bargara GC); Brock Weston (TGAA ACT); Darren Wilson (Wembley Golf Complex/GCSAWA); Craig Wright (NSWGCSA); Leigh Yanner (The National GC).

Doing things differently

Don't expect much sense out of me after this edition. By the time you read this my wife Katherine will be just about to pop out our second and I'll be gearing up to become the sleep-deprived wretch that I was some four years ago when the 'Hurricane' (our first, Kristian) changed my life forever.

As all second-time-around parents know, in the long (very long) months leading up to the birth of number two you can't but help reflect back on what you would do differently and what you'll change when raising the second. As much as it may surprise, I have many and varied shortcomings – no, being a Kiwi is not one of them – and a few of those have been graphically highlighted in the early years of fatherhood.

For a start I will remember to be more vigilant when strapping bub into the high chair so as to prevent he/she plummeting head first onto the tiled kitchen floor at six months of age. I will also remember to make sure that junior's hands are clear of the garage door hinge when I shut it. I will learn to laugh and not fly off the handle after finding poo smeared all over the walls and carpet of our rented unit. I will not let the father-in-law sign up number two as an Essendon member the day after he/she is born. And, I will remember Mother's Day (oh yes, never again)! I could go on and on until the end of the page but you get my drift.

Just as I am reflecting as we enter spring – after which must be said has been a lovely wet winter down here in Melbourne, the wettest I've certainly experienced since arriving in Australia – you can be guaranteed that one superintendent in particular will be ruminating as well. In fact for Victoria Golf Club superintendent Ian Todd there hasn't been a week go by in almost eight years when the spectre of one day in 2002 doesn't enter his thoughts.

I had barely hopped off the plane from the UK when the events of the 2002 Australian Open tournament unfolded and while not being in the industry then I can clearly remember the headlines and the ramifications it had. Now with the 2010 Australian Masters set to tee off in two months time, the first major tournament Victoria has hosted since that Open, it is still evident having caught up with Ian recently that the events of that fateful first round still cut deep for him and the crew, almost half of which remain today.

Looking back at my predecessor's preview of that tournament as part of my research for this edition's cover story, the headline in ATM Vol 4.5 read 'Victoria Golf Club – Hard and Hungry'. Needless to say I don't think poor Phil had intentionally wanted to put the mockers on Ian and his team, and hopefully our look at what has transpired in the years since the 2002 Open in this edition won't do the same.

Certainly the impression that I got from spending some time with Ian is that there is a definite resolve within the crew to showcase their course and reinstate it in the eyes of the golfing public as one of this country's great layouts, which it rightly is. Last year's Masters at Kingston Heath was a huge success and this year's tournament is guaranteed to be even bigger and there is no better opportunity for Victoria to firmly put the past behind it.

In the intervening years there have been a number of subtle changes made to the course and the work undertaken by Ian and his team, in conjunction with the club's designers, has certainly pushed some boundaries, especially the revegetation work which is nothing short of impressive. I'm sure we all wish Ian and his crew the best of luck for their preparations for this year's Masters and during tournament week. Hopefully by then number two will be sleeping 11 hours a night and I'll be awake enough to catch all four rounds. Enjoy the read.

Brett Robinson,
Editor

JOHN NEYLAN, AGCSA GENERAL MANAGER

Fail to plan or else plan to fail

As we wait impatiently for spring to approach after a 'real winter' – well, here in Victoria at least – and reflect on what we have been doing over the past nine months, we turn our heads towards the year ahead and start planning for the next cycle of AGCSA activities.

We have completed our six month planning review to see what we have achieved on our action list, understand why we did not manage to complete some tasks and to set a few more actions for the remainder of the year. As part of this process the board will be taking part in a planning day with staff so that we can focus on the needs of the membership of the AGCSA and wherever possible to undertake some new initiatives. This review will be across all areas including:

- Research;
- Technical services;
- Education and accreditation;
- Promotion of the association and the greenkeeping profession;
- Australian Turfgrass Management Journal and AGCSA website;
- Resource materials; and
- Trade partners

As part of this process the board will be speaking to members to get their general thoughts and ideas of where the association is at and where it should be heading. Once we have completed this process we will be surveying all our members.

In recent times we have had a good response to various surveys regarding the conference, our publications and other issues such as the use of soon-to-be-banned chemicals. We appreciate the feedback that we get (both complimentary and critical) as it helps to provide the future direction of the AGCSA.

It is also very important to remember that at any time if you have a concern please contact either myself or one of the board members. We would prefer to hear about your concerns directly so that we can deal with them as quickly and practically as possible.

As we move through this planning process we also realise that we need to undertake an internal review of how we manage the AGCSA. With all sorts of governance issues that surround associations, our auditors have pointed out to us that we need to tighten up on a few areas. In particular we need to get all our policies and procedures completed.

To this end it is a timely reminder for all clubs and course superintendents to make sure that all their procedures are in place, both in the maintenance area and in the clubhouse. Planning is a critical part of managing any organisation, club or business and I know what it is like to get caught up in the day-to-day activities. However, it is essential that it is done.

Education and training continues to be at the forefront of our minds and we continue to encourage members to take any opportunity for further training that may present itself. In recent times we have provided accreditation points for industry-sponsored seminars that are being taken around the countryside. These seminars have engaged very experienced, knowledgeable and well respected scientists that understand the practicalities of maintaining high quality turf areas.

The AGCSA will be running more water management workshops in September and October with a focus on regional areas and we also plan to undertake some 'walk and talk' days also in regional areas. These days will involve some short presentations on key turf management issues followed by a course walk and chat about turf and

then an open slather discussion forum. These days will be informal and open to current members and those who we hope to be future members.

With the annual conference recently finished, it is an opportune time for AGCSA superintendent, assistant superintendent and sports turf manager members who attended the conference to join the AGCSA Accreditation Programme (AAP).

AAP members only need to attain 30 points over a two-year period to remain accredited and with upwards of 17 points available if you attended the Gold Coast conference, it makes sense if you're not currently a member to join. The AGCSA Accreditation Programme aims to:

- Promote the profession;
- Build a culture of career-long training;
- Reward those that achieve a high industry standard and actively stay updated;
- Give programme members 'an edge' when negotiating pay rates or seeking employment; and
- Give clubs a clear choice when employing course maintenance staff.

Points can be earned through attending the annual conference, sanctioned education days and formal TAFE courses. Further points can be collected by attending education days and workshops hosted by the various turf related or state associations or at sanctioned industry trade days. Members who gain education at tertiary institutions, hold multiple association memberships, conduct research or trials, publish papers or articles, give professional presentations or deliver sessional teaching are also eligible for additional points.

MEMBERSHIP UPDATE

Welcome to all new members of the AGCSA and thank you to all members who have renewed their membership; we hope that you enjoy the benefits that come with the joining the industry's peak body.

For all who would like to become a member of the AGCSA, please complete the application form opposite or apply online via our website www.agcsa.com.au. For those who have not yet renewed their membership, your renewal pack will be despatched and the associated benefits will be reinstated as soon as your membership fees have been processed. Please also remember to update your apprentices' details to ensure they receive their free AGCSA membership.

If you are yet to receive your renewal reminder or if you have any questions regarding your own or your staff's membership, please contact Lyndel on (03) 9548 8500 or at info@agcsa.com.au.

LYNDEL CONWAY
AGCSA MEMBERSHIP COORDINATOR

AGCSA

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SA - South Australian Golf Course Superintendents Association	$75
TAS - Tasmania Golf Course Superintendents Association	$60
WA - Golf Course Superintendents Association of Western Australia	$110
VIC - Victorian Golf Course Superintendents Association	Please call 9645 4394

THE NEXT GENERATION (STUDENT MEMBERSHIP)

Victoria heads back to its roots

The 2010 JBWere Australian Masters continues its tour of the Melbourne sandbelt come November with Victoria Golf Club set to host the likes of Garcia, Villegas and Woods who returns to defend his first title on Australian soil. While there will be plenty of discussion about the contenders, the course is set to come under intense scrutiny given the events which transpired last time Victoria hosted a major tournament. However, as ATM editor Brett Robinson discovers there is a real resolve within the club to put the past firmly behind it and showcase the impressive work which has been undertaken to the course in the intervening years.

Resolve. Look the word up in the Collins, Oxford or Macquarie and a number of definitions are offered. In the first instance it means 'to decide or determine firmly', 'to express formally', 'to make up one's mind'. Its alternative meaning is 'to dispel, 'bring to an end', 'settle', 'conclude'. Come November both meanings of the word will have particular significance for one group of turf management professionals.

It has been eight years since Victoria Golf Club was last in the national golfing spotlight and few will forget the events surrounding the 2002 Australian Open. Of those hit hardest by that tournament, you can place Victoria's course superintendent Ian Todd firmly at the top of the list.

Those who know Todd will appreciate that he is a pretty optimistic character, the sort of chap who looks at the cup half full rather than half empty, but even the most optimistic can turn pessimist and the events of the 2002 Open have certainly had a far-reaching impact.

Now into his fifteenth proud year as Victoria's chief custodian, Todd finds himself gearing up for one of the most important tournaments of his career. With the likes of Woods, Garcia and Villegas all confirming their presence, the 2010 JBWere Australian Masters this November has all the hallmarks of being bigger than last year's event which saw more than 107,000 spectators flock to Kingston Heath.

Already the mainstream golfing press is talking up the Masters as redemption for Victoria, but the club doesn't see it as putting right the wrongs of the past. Rather the tournament will provide a grand opportunity for Todd, his dedicated maintenance team and the club as a whole to reinstate Victoria's reputation as one of the sandbelt's most challenging and naturally spectacular layouts.

Many aspects of the course have changed since the 2002 tournament and Todd is hoping that most will be pleasantly surprised at how these alternations have improved the playing surfaces and their natural surroundings.

"My aim has always been to get Victoria to a place where I think it can get to and this tournament will help that," says Todd, who will preside over his third major tournament after preparing the course for the 1999 Australian PGA Championships and 2002 Open. "I love the place. It's one of my favourite courses in the world and I have a real affection for the course and the club and I want the tournament to promote that to the golfing community and industry. And I think it deserves it.

"I haven't sat down with crew and talked about the 2002 Open as yet. We've certainly talked intermittently about the Masters and that will obviously increase as the tournament gets closer. But I don't have to say too much to get the guys pumped up; they know how important this tournament is for us and the club.

"I'm a big believer in 'fail to plan, plan to fail' and we have been trying to put all the infrastructure type things into place since we found out we were hosting the Masters. I have had a number of conversations with (superintendent) Martin Greenwood at Kingston Heath in this regard to get an indication of the things to watch out for and to see, if given the chance again, what he would have done differently.

"If there is anything that the 2002 Open has done, it has made me more aware of what could go wrong. I've always had a reasonably optimistic outlook but I now think of the worst case scenario rather than the best. From a turf point of view, we will focus heavily on presentation and hopefully that will showcase the course, and all who play and watch will appreciate its beauty."

REINSTATING CHARACTER

As if to purge the memories of 2002, Todd and his team have thrown themselves head-long into a

One of the Melbourne sandbelt's most famed courses, Victoria Golf Club will play host to the 2010 JBWere Australian Masters from 11-14 November

mountain of course improvement works, the likes of which are gradually helping to recapture some of its former glory. Old aerial photos dating back to the mid-1930s have been used to help shape a modern interpretation of the course which was initially devised by William Meader, Oscar Damman and Dr Alister Mackenzie in 1927.

Some of the work, in particular the recontouring and resurfacing of greens surrounds and tee areas, started prior to the last Open. However, it has been over the past eight years that other projects, including the reconfiguring of Victoria's menacing bunkers and the implementation of a groundbreaking revegetation programme, which have brought the most significant change. Almost every hole – with the exception of the par 5 9th – has been tweaked in some shape or form in the intervening years.

The most notable change comes no sooner than stepping off the practice putter. Played as a long par three in 2002, the 1st is now a short par four measuring just 233m. The bunker complex has been shifted across to the left with the rough down the right hand side planted out with indigenous vegetation.

The new bunkers have been kicked up to make them more in the golfer's face and the front of the green has been opened up. In doing so it has made the hole fit in with the philosophy of the rest of the course, being more strategic than penal, and the pros will need to shape the right shot in order to set up an opening eagle chance.

The tee shot to begin the inward journey also presents a new challenge. A championship tee has been constructed adjacent to the clubhouse terrace, adding 40m to the par four hole and bringing the fairway bunkers on the right into play. Holes 1 and 10 will play as crossover holes during the Masters, but once the tournament has finished the new tee will most likely only be used for special events such as club championships and pennant matches.

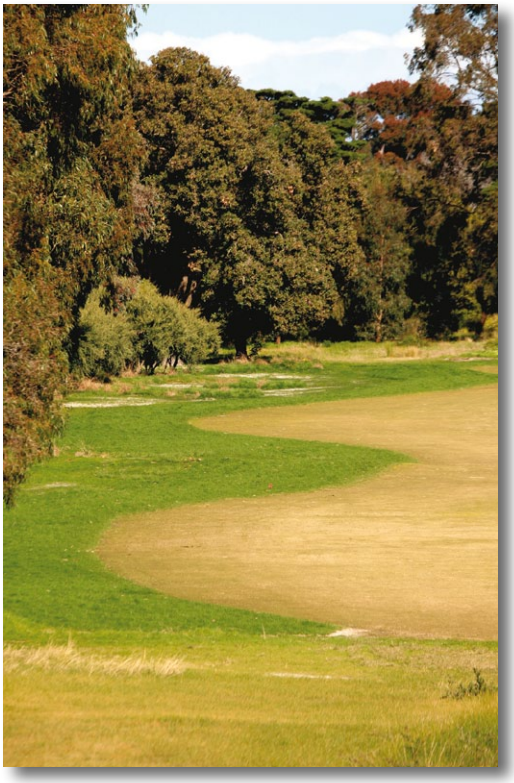
Further out on the course, the uphill par three 14th has also been modified considerably. Poor turf issues have been addressed by incorporating Santa ana couch oversown with fescue, recontouring the rise, while the front left bunker has been extended back towards the tee to improve aesthetics.

The par 5 17th has also changed in nature due to the construction of the club's new irrigation dam. As well as pushing the tee back, fairway contours have been reshaped in order to accommodate the dam, while fairway bunkering down the left has also been refined.

The roughs have received particular attention in recent years and a number have been planted out with fescue, while on a few holes – 10 and 12 for instance – extra length has been added by pushing tees back.

Now into his 15th year as Victoria Golf Club course superintendent, Ian Todd will preside over his third major tournament at the club after preparing the course for the 1999 Australian PGA and 2002 Australian Open

Right and below: Victoria's roughs have received particular attention in recent years and a number have been planted out with fescue and indigenous species



Elsewhere, many bunkers have received a tweak in order to improve aesthetics and recreate the arresting nature of Victoria's famed hazards. As Todd explains, Victoria was designed with large imposing bunkers in mind, a feature which was lost somewhat during the latter half of last century.

Using the old aerial photos as a template, a number of bunkers have been consolidated. On 18 for example the three left hand side fairway bunkers have been joined up. Similarly, on 11 there are now two large traps either side of the green, while on 6 the two left hand greenside bunkers have been merged and an island constructed.

As well as reconfiguration, Todd, in conjunction with the club's design consultants, has dabbled in different aesthetic touches around the outside of some fairway bunkers to create a more instant traditional effect. Called 'chunking', rather than turfing the edges a bobcat is used to 'chunk' them, creating an effect whereby the fescue edges look like they have been there forever and a day. On other holes some bunkers have been planted out with indigenous vegetation to provide yet another different look and feel.

"Overall I think these changes make Victoria a much more presentable and aesthetically pleasing course," says Todd. "From a playability point of view I don't think it has changed that much. Basically the bunkering has just been tweaked to give them a more 'Victoria Golf Club' feel and greater consistency in the shaping.

"We started the programme of broadening surrounds of greens that run into tees some 10 years ago, getting rid of the long rough between and making the complexes flow. We cut greens surrounds and tee areas the same height so we have that seamlessness of cut. It's more of a subtle thing that you don't really notice until it's pointed out to you, but it has been well accepted by the members."

LIQUID GOLD

Water management issues have also been to the fore in recent years and like its illustrious neighbour Royal Melbourne a great deal of effort has been made to secure Victoria's future water requirements. After enduring severe summers in the mid-2000s, the first integral component was the construction of a new 36.4 megalitre storage dam on the right hand side of 17 in 2007.

Starting in early 2009, the second stage saw a major resistivity survey undertaken of the whole course. Initiated by a couple of members, the survey involved bouncing electric current through the soil at various locations around the course. Although not giving an indication of the quality of water, the survey helped to pinpoint five areas that would most likely yield bore water.

To date the project has literally struck gold. Victoria has ended up getting 4.5l/s out of three bores (1.5l/s each), two of which have been commissioned (on holes 3 and 8) while the third on 6 will be commissioned following the Masters. Water quality from the new bores has been better than expected and the deep bore on 6 is running at around 400ppm. Once commissioned it will bring the number of Victoria's production bores to eight.

"The resistivity project has been great," says Todd. "It came about through a couple of geologists within the membership who gave up their time and devoted themselves to the project. They approached the club and said they would like to give it a go, so we have worked in together and it has proven to be successful.

FACT FILE – VICTORIA GC

Founded: 1903
Location: Cheltenham (current course was opened in 1927)
Designed by: William Meader, Oscar Damman and Dr Alister MacKenzie
Championship length: 6278m
Current Australian ranking: 10 (2010 Australian Golf Digest)
Tournament history: Australian Open (2002, 1981 and 1961), Australian PGA (1999).
Superintendent: Ian Todd
Assistant: Tay Wilson
Foreman: Shaun Lehane
Course maintenance staff: 16
Greens: Suttons mix (maintained at 2.0mm-2.5mm year round)
Fairways: Santa ana
Tees: Santa ana/fescue/*Poa*
Water sources: Eight bores
Major projects: Revegetation project across whole course, bunker reconfiguration, incorporation of fescue roughs, tee and surrounds resurfacing and recontouring. Construction of 36.4ML dam (Sept 2007).
Did you know... course superintendent Ian Todd played six games for the Melbourne Football Club during the 1981 VFL season, kicking one goal.

"While we haven't fully addressed our water management issues, we now have the flexibility that we didn't have in the past and an insurance that we aren't going to lose vital areas of turf during the height of summer. What we did learn when building the dam over those really severe summers was just how resilient the Santa ana is. It didn't get water for 60 straight days and I thought we were going to lose turf, but it was remarkable how it bounced back. It sort of went into summer dormancy."

VISION REALISED

Of all the projects Victoria has embarked on, however, it's the course's out of play areas which have undergone the most dramatic and pleasing transformation in the eyes of Todd. Although not without controversy, over the past five years an incredibly intensive revegetation programme has been instigated to further restore the course back to the glory of its 1930s image.

Just as the character of the course's bunkers are being reinstated, old photos of that era clearly show many areas of low growing indigenous vegetation interspersed with sandy wastes which gave the course a naturally rugged appearance. The aim of the revegetation programme has been to recreate that character and huge amounts of poor quality tree and shrub species have been removed which has enabled the indigenous seedbank to regenerate and thrive.

Over the past five years an intensive revegetation programme has been instigated at Victoria to further restore the course back to its former glory. Pictured is the par three 7th which has become a centrepiece of works to date

The revegetation programme had its roots some 10 years ago, with Todd initially getting a couple of horticultural experts in to help identify between 15-20 core indigenous species (see table on page 10) to act as a base for future revegetation works. Despite showing promising indications early, plantings became sporadic due to the minimal resources at his disposal and with the programme not progressing at the rate he would have liked, Todd decided to up the ante.

Approaching the club with a firm vision in mind, Todd impressed upon his management that a significant revegetation programme was something the club needed to embrace, not only for the aesthetic betterment of the course but also from an environmental and community benefit as well.

MASTERS CLASS – VICTORIA PREPARES FOR THE ONSLAUGHT

Normally a par 72 with back-to-back par fives to complete both inward and outward nines (pictured is the 17th), Victoria will play as a par 71 for the Masters with the 8th hole becoming a 448m par four

With Melbourne's wettest winter since 1996 having just past, Victoria Golf Club superintendent Ian Todd will be hoping for Bureau of Meteorology predictions of an early and warmer than normal spring to come true as the club gears up to host the 2010 JBWere Australian Masters.

The Bureau is forecasting warmer conditions throughout Victoria, Tasmania and the southeast of South Australia during spring thanks to warm conditions prevailing in the Indian and Pacific Oceans, and should that eventuate it will give Victoria's Santa ana couch fairways a nice kick start to the growing season.

"Now that we have some water, I can't remember the last time the fairways were looking as good after last summer," says Todd. "We put out granular fertiliser applications in autumn to try and get them as healthy as possible and we'll do the same at the start of spring. Traditionally in spring we have always gone out with Dynamic Lifter but we won't be doing that this year because it can get a bit messy.

"What we would really like to achieve is a quick green up, get some vigour in the grass and then let it go back to its natural state, slightly off green with a brown tinge to it. I'm mindful of trying not to produce anything like Kingston Heath last year because at this stage our fairways are nowhere near as good as Martin's. The aesthetics of the course is an important aspect and the colour of the fairways seem to blend in well with the roughs when allowed to fade out a little."

Having been at Victoria for the past 15 years, Todd is very much a student of turf management's old school and makes a point not to over manage Victoria, rather working with Mother Nature to enhance its reputation as one of the sandbelt's most testing challenges.

"You have a play around with different products from time to time and see what works best, but you still go back to your basics and knowing what works for you and what doesn't," says Todd. "That's something that only experience brings.

"For instance we played around a bit with paclobutrazol on the greens going back five years. We found it was marginally successful, but on these older type bentgrasses (Suttons mix) the recovery period is quite long and something that you don't really want to go through during summer.

"Although we ended up reducing the amount of *Poa*, and you could actually call it reasonably successful, the quality of the putting surfaces on the greens was generally poor and the feedback we got wasn't great.

"We've certainly changed our practices with the tournament coming up and we have given the greens a couple of applications of ethephon for *Poa* seedhead suppression and we'll probably go out with light rates of endothal to keep the *Poa* in check. We'll be verti-draining for sure and will give them a couple of light dusts to try and get the surface as smooth and consistent as possible.

"We cut greens at 2.0mm-2.5mm year round and I don't think that will change much for the tournament. The greens are 80-year-old push ups and still provide a great true surface and you don't have to do a lot to them to get them up for a big event like this."

Normally a par 72 with back-to-back par fives to complete both inward and outward nines, Victoria will play as a par 71 for the Masters with the 8th hole becoming a 448m par four. The club's practice facilities will be used for the hospitality area and like the 2002 Australian Open the practice range will be at the neighbouring Cheltenham Golf Club.

"I'm a big believer in 'fail to plan, plan to fail' and so far everything seems to be falling into place," says Todd. "The wet winter has probably been of benefit to the course and providing we get a quick and warm spring we will be looking good for the tournament.

"The course won't play too differently from the 2002 Open, but a lot will be dependent on the weather. If it blows a bit it will play tough. I'm not too concerned about course records.

"We are a 6200m course which is at the mercy of technology, but in the right conditions it will still provide a stern test. I'm just hoping that the players enjoy the course as much as I do and hopefully Tiger will be in the final group come Sunday."

Seeing merit in their superintendent's vision, the club increased expenditure from $3000 to nearly $20,000 which enabled Todd to buy in an enormous amount of stock. The benefit came in the seasons following with the crew able to harvest seed and propagate from those initial purchases.

What presents today is a testament to how a dedicated and targeted revegetation programme can enhance and beautify the golf course landscape. The project started by focusing on carries from tees to fairways with progress spreading to areas behind bunkers, in secondary roughs and out of play areas. Perhaps the most striking and recent example of what the project has achieved is on the 165m par three 7th where the entire right hand side from in front of the tee right up to and behind the green has been cleared, regenerated and planted out.

"The idea was to start the programme out small, not only for us to get comfortable with it but also to demonstrate to the members what we were trying to achieve," says Todd. "We started in the most visible areas and although there were some concerns early on I think now it has finally gained support and acceptance, this past year in particular.

"It was a vision we had a long time ago and I think the membership is starting to see and understand that now which is very pleasing. There were so many areas that were overgrown with poor tree species – mahogany gums and even coastal tea tree. Everyone knows tea tree is invasive and it actually chokes out the indigenous grasses and the seedbank, but once you cut it back and leave the area for 12 months what comes up is amazing.

"What we actually found is the tea tree kept the spray tanks away from some of those areas. That meant the heavy base chemicals couldn't get into some of the roughs areas and when we cut it all back the indigenous seedbank was still viable and flourished.

"I think it (the project) has been a tremendous success. We now have an enormous amount of stock in the ground, a lot of resource to draw on and now we are starting to finetune areas where we can incorporate sandy waste areas with the indigenous vegetation. Although I have never been there, I have always admired Pine Valley and Hell's Half Acre. To me that's a blueprint of what we are trying to achieve but with our own indigenous vegetation.

The revegetation project started in the most visible areas, such as carries from tee to fairway, and despite some early concerns the programme has finally gained support and acceptance throughout the club

COMMON NAME	BOTANICAL NAME
Broom Spurge	*Amperea xiphoclada*
Grass Trigger plant	*Stylidium graminafolium*
Wallaby grass	*Austrodanthonia caespitosa*
Small Flower Wallaby grass	*Austrodanthonia setacea*
Coast Spear grass	*Austrostipa mollis*
Prickly Spear grass	*Austrostipa stipoides*
Weeping grass	*Microlaena stipoides*
Kangaroo grass	*Themeda traindra*
Guinea flower	*Hibbertia prostrata*
Showy Bossiea	*Bossiaea cineria*
Knobby Club sedge	*Ficinia nodosa*
Wattle Mat rush	*Lomandra filiformis*
Long Purple flag	*Patersonia occidentalis*
Pale Flax lily	*Dianella longifolia*
Coast Sword sedge	*Lepidosperma laterale*

The revegetation programme had its roots some 10 years ago with 15-20 core indigenous species identified, including hibbertias (above) and sword sedge (below)

A significant amount of work has been undertaken to clear vegetation and improve access in roughs and in and around tea tree

"We tend to stick to a list of about 15 core plants which we have tried to promote. I love the hibbertias, ampereas and grass trigger plants which are fantastic when they are in flower. We have played around with silky and prickly tea trees, sword sedge, egg and bacons as well as wallaby grasses. We use some lomandra more as a bulking plant and we have also used bracken quite a bit. Although some members don't like the bracken, it performs a purpose in that it is easily transplanted, it's natural and it's cost-effective. You just have to be careful where you put it.

"Looking back we are really happy with what we have achieved, although there is still a lot of work to be done and hopefully something that we'll continue for 10, 20 even 50 years to come. A lot of these indigenous areas have been transformed from areas which had high concentrations of Parramatta grass and now you can't even compare the two from a visual and playing point of view as well."

Of course the concern with the Masters approaching is that a lot of that impressive work will literally be trampled underfoot. With the prospect of crowds in excess of 100,000, Todd is acutely aware of the likelihood of damage and has already had a number of roping discussions with IMG to ensure sensitive areas, like the 7th, are protected.

"I went over to Kingston Heath after last year's tournament and walked around the course with Martin and the damage didn't seem to be so great," recalls Todd. "In fact those areas which were trampled, a lot of the seed was dispersed into the ground. With a little bit of rain or irrigation they came back pretty quick, so I'm pretty confident our areas will bounce back."

PRESSING AHEAD

Following the completion of the Masters, the work is set to continue for Todd and his crew in their quest to further enhance the course. The revegetation programme will continue to expand with plans to address the carries on 2 and 10. There are also talks of resurfacing the 12th green as well as pushing the 5th green back and bringing the top tees further in from the course boundary. One of the club's big failings, according to Todd, is its practice facilities and that will become a prime focus in the 12 months after the Masters, while couch encroachment on the greens is another issue on the hit list.

For now though the focus is well and truly on the Masters and the prospect of the hordes of golfing fans streaming to the Cheltenham course come the second week of November. Todd is confident of where preparations are at and the crew, which will increase in size slightly, is ready to step up into tournament mode.

A couple of Todd's staff know exactly what to expect having been a part of the Kingston Heath crew for last year's Masters and in August Martin Greenwood stopped by Victoria to address the crew on his experiences and some of the things that he would have done differently in hindsight.

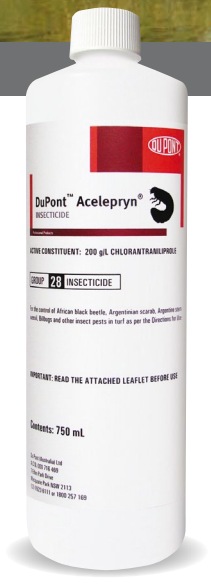
"Martin was fantastic," says Todd, who will preside over his third major tournament, after preparing the course for the 1999 Australian PGA and 2002 Open. "It was something that he really wanted to do. "He told the guys some of the major things to look out for and to be prepared for a fair bit of damage once all the infrastructure gets taken out. But the main thing he wanted to portray to the guys was the magnitude of the event and the scrutiny. Because of Tiger's presence everything gets looked at and so it should; that's what he brings to the table and we need to be prepared for that.

"Everyone at the club is certainly excited and potentially this year's Masters is going to be bigger because Camilo and Sergio signed up prior to Tiger confirming. It will be an interesting tournament, although there is a little bit of trepidation mixed in with that given the number of people that are likely to turn up and the damage that may occur.

"I think and I hope the players will be pleasantly surprised when they come here. More than anything I hope it's a feel good tournament. I'm really proud of the work we have achieved and we have a real resolve now to showcase that. The course is vastly different to when I started here 15 years ago and I'd like to think that it's a better course as well."

A lot of things live on a golf course. Grubs shouldn't be one of them.

(Or Argentine stem weevils, billbugs and caterpillars.)



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A super pilgrimage

PHOTOS BY IDRIS EVANS

As guests of the Toro company, seven Australian course superintendents, along with Toro representatives Peter Schumacher and Geoff Stephens, embarked on the trip of a lifetime to the 2010 Open Championship at St Andrews in July. As well as taking in one of the game's great majors, the party also had the opportunity to visit a number of Scotland's unique courses. Here Daryl Sellar, Mark Couchman, Adam Lamb, Leigh Yanner, Shane Greenhill, Robin Doodson and Idris Evans give some impressions of their journey to the spiritual homeland of golf.

In July, the Toro Company invited 70 turf management guests from around the world to attend the 2010 Open Championship at the home of golf St Andrews. Among the group was a contingent of seven Australian course superintendents including Idris Evans (Western Australian GC), Leigh Yanner (The National GC), Mark Couchman (Cromer GC), Shane Greenhill (Sorrento GC), Adam Lamb (Barwon Heads GC), Robin Doodson (Sanctuary Cove) and Daryl Sellar (Turfwise Consulting). They were accompanied by Toro representatives Peter Schumacher and Geoff Stephens.

As well as having the rare opportunity of walking inside the ropes while the St Andrews maintenance crew prepared the hallowed turf for the 150th anniversary tournament, following the Open the group embarked on a golfing tour. Courses visited, and played, included the century-old Lundin Links, Gleneagles (home to the 2014 Ryder Cup), Blairgowrie Golf Club and Turnberry, home to course superintendent Euan Grant who recently presented at the 26th Australian Turfgrass Conference on the Gold Coast.

For some it was their first trip to the home of golf and ATM asked all seven supers to put pen to paper and ruminate on some impressions they gleaned during their pilgrimage.

DARYL SELLAR

TURFWISE CONSULTING, SA

For some it's the Eiffel Tower, for others it's Disneyland. For me, the opportunity to attend The Open at St Andrews was an opportunity of a lifetime and, frankly, one I never thought I'd get. The great thing about this trip was that everyone was there to make the most of it; to take in as much detail as they could and we all appreciated how great the experience was.

St Andrews is an amazing place. Golf aside, the sense of history throughout the town engulfs you. Everywhere you look there is a story to be told and a healthy reminder of how young Australia is. But there is an ever present reminder of the significance the game of golf has played in the more recent history of the past 500 years or so. Golf shops seem never more than 20 paces apart and even the fashion houses have a golf flavour to their range.

St Andrews played host to the 150th anniversary of the Open Championships in July with the Toro company inviting 70 guests from around the world to take in course preparations and the tournament

For all the fame and history, the Old Course just sits at the edge of the town. There are no formal gates, no regal driveway; it's just there, innocently awaiting the next fourball to nervously play from the 1st tee into the vast expanse of fairway that 'no-one could miss' and then the 18th green welcoming them back some four hours later.

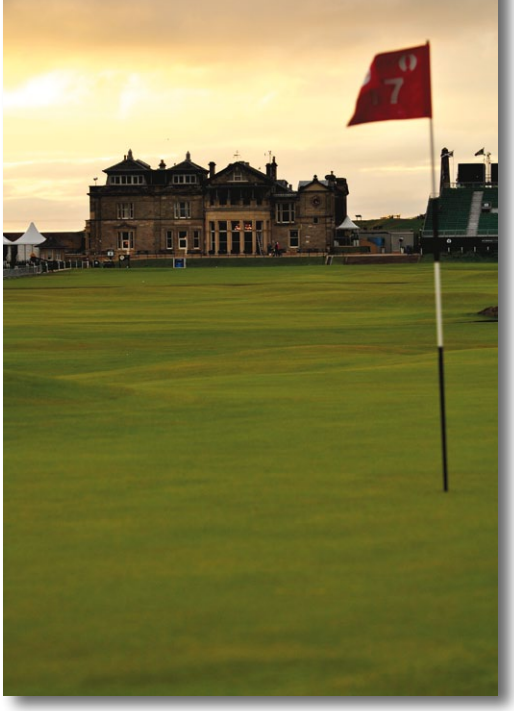
The course itself is an amazing reminder of how the game originated. The contours and undulations demand that imagination plays as much part as pure ball striking and that at least some part of your game will need to be played along the ground, even before you get to the green.

The course meanders out towards the Firth of Forth, where the breeze stiffens and the cross over holes of 7 and 11 proudly defy modern safe golf course architecture, until it turns back for home from the 10th tee. Blind tee shots, ruthless bunkering, extreme greens, from the 2nd to the 17th they test every aspect of your game and your mind. The 1st and 18th seem so innocuous, almost a calming start and finish to the round, yet disaster has been witnessed at both.

We were extremely fortunate to be given the chance to walk the course with the maintenance team from 4am on the Friday and Saturday of Open week as they set up for the day's play. The amount of activity was great to watch and yet the atmosphere was calm and collected....at least to the observer!

The Australian contingent on the iconic Swilcan Bridge at St Andrews

The Old Course itself is an amazing reminder of how the game originated



The hive of Open operations – the St Andrews maintenance facility

While walking the course, you couldn't help but imagine the great rounds that have been played there by some of the greats. But even more incredible was to imagine how little had probably changed since the days of Old Tom Morris.

Highlights? I could fill this journal. Sitting in the stand watching groups tackle the Road Hole; standing on Swilcan Bridge, in the Valley of Sin, on the first tee, the 18th tee, stepping onto the 17th green, into the Road Hole bunker; watching the sun rise over the most famous course in the world; seeing a new champion (Louis Oosthuizen) live out his dream from the most amazing vantage point; and sharing all this with colleagues and friends.

But that wasn't all. After the Open we then set out on a golfing odyssey, having the chance to play Lundin Links (a century-old links course, largely unchanged today), Gleneagles PGA course (site of the 2014 Ryder Cup), Blairgowrie Golf Club (a stunning heathland course) and the newest course of the St Andrews Links Trust stable, the Castle Course. But the highlight of that week for me was playing the Ailsa course at Turnberry – a magnificent piece of land with a course that did it justice and Euan Grant as a wonderful host.

All fairways, tees and green surrounds were cut at 7.5mm with Toro 3250 greens mowers

MARK COUCHMAN

CROMER GC, NSW

There are many memories from the recent tour to Scotland…not all of them turf/golf related (driving in cars can become a little sleepy). The first, and probably one of the highlights of the trip, was on the very first day when, having arrived in London, Peter Schumacher and I decided to make a house call to the new Emirates Stadium, home of the Arsenal Football Club, to see if we could say hi to head groundsman Paul Ashcroft.

Three-and-a-half hours later we left with a great appreciation not only for the sheer magnificence of the facility but also for the fact that as turf practitioners we could stand out in the middle of arguably one of the best football playing surfaces and talk to someone that has a great passion and phenomenal knowledge of the sports turf management business. And believe me it is a business!

St Andrews, and everything about the home of golf, is obviously somewhere that every golfer aspires to make a pilgrimage. To be able to go there while the Open Championship is on takes it to another level. I have been fortunate to visit St Andrews before, however, the town takes on a whole new life when the Open rolls in. Funnily, St Andrews is more than golf, it is history and the day when a group of us walked up to Old Tom Morris's grave in the ruins of the cathedral was very humbling.

From a course management perspective the opportunity to spend time out on the Old Course while the staff were preparing for play was one of those 'you had to be there moments'. Hearing St Andrews director of greenkeeping Gordon Moir telling the staff on Saturday morning that "we need to get the greens slowed up a bit" was certainly not the sort of thing that would roll off the tongue of many course supers (or members).

Then to see the golf course prepared for a shotgun start to complete day two and get ready for the onslaught of day three without cutting or even rolling greens was the sort of thing that puts our jobs into the perspective that we sometimes need. Certainly the 'minimalist' approach that is adopted by St Andrews is, for me, what course management is all about and the conditions and grass types definitely lend themselves to that type of regime.

The other fantastic thing about the experience was the opportunity to mix with other course management people from all parts of the world, getting to experience a little bit of their culture and the management issues and styles that they adopt in their workplaces.

From the Open we travelled from one side of Scotland to the other and back stopping to play golf, do a little bit of sledging and see the absolute degrees of separation in course management styles and landscape. The links styles of Lundin Links, Turnberry and the Castle Course at St Andrews compared to the heathlands of Blairgowrie and Gleneagles was invigorating.

To play a links course in the morning, drive for a few hours and then play on heavily treed and thick heather rough courses in the evening was fantastic. The polar opposite styles of turf management, presentation and maintenance of St Andrews to Gleneagles was very much an eye opener.

ADAM LAMB

BARWON HEADS GC, VIC

What I observed at the Old Course was very different from what I had ever imagined. I had created an image in my mind of what I expected. Watching past Opens on TV, looking at pictures in books and reading architect's descriptions only gave me a very blurred vision of how I was actually going to see it.

Approaching the town of St. Andrews the first thing that struck me were the peaks of the castles in the distance and instantly I got a sense of a special place ahead, rich in history and tradition. The first area of the course we entered on the Thursday morning, day one of the Open, was alongside the 18th green. I was sucking in as much as I could walking down the road beside the 18th, iconic features all within view – The Royal and Ancient clubhouse behind the 1st tee, Valley of Sin at the 18th green, the dual 1st and 18th fairways, the burn across the 18th and to the front of the 1st green, Swilcan Bridge. I was in awe.

By far the highlight of the trip was on the Friday and Saturday mornings when St Andrews superintendent Gordon Moir generously allowed us to walk the fairways while they were preparing the course prior to the day's play.

Everything about The Old Course seemed different and unusual. It was consistent throughout the entirety of the course and it almost made sense to me. Blind tee shots over the gorse to wide open fairways; huge knobs and deep hollows around the green made the positioning and angles for the approach shots critical; severely deep bunkers; huge putting surfaces with general flattish areas for pin locations; lean, tight and firm fescue/bent surfaces from tee to green; and beautiful seedhead throughout the rough areas that would make a majority of club golfers cry with unfairness.

St Andrews is a course that many regular visitors say "grows on you the more you play it" and until I play it I will not be able to fully appreciate the course as it should be. But certainly first impressions exceeded expectations and the experience has given me a taste of what it's all about and I'm even keener now to return, even try playing it backwards – another unique aspect of the Old Course.

Other courses we played following The Open included Lundin, Blairgowrie, Gleneagles and Turnberry. All were very different from each other and a good selection of courses for a trip with limited time. All courses have their own unique character, it's just that rare special something on a large scale throughout St Andrews that makes it great. We too have some great courses – Royal Melbourne and Kingston Heath are two that I find, like the Old Course, leave me wanting to learn more about their mystique.

The contours and undulations demand that imagination plays as much part as pure ball striking

ROBIN DOODSON

SANCTUARY COVE, QLD

Travelling 'home' for the 2010 Open Championship was truly a surreal experience for me. I had spent a fair bit of time in St. Andrews over the years but had never attended an Open Championship there.

My trip began in London where I was lucky enough to play a few of the UK's best heathland courses. The Blue and Red courses at the Berkshire are highly regarded and the club plays host to the prestigious Berkshire Trophy each year.

Bunkers were foot consolidated every day before they were raked to ensure perfect firmness and consistency

Both courses were in fantastic condition as usual in spite of the long, dry summer. They played more like links courses with the ball running for miles. Course manager Chris Lomas has recently moved on and has been replaced by Ian Morrison, who coincidentally used to be my head greenkeeper during my days at the Wentworth Club.

My next stop was Sunningdale where I spent time with course manager Murray Long looking at the operation there. Murray has carried out significant bunker renovations using Sportcrete bunker liner and has also used a new product called Blinder which uses pelletised rubber instead of aggregate, but produces similar results to Sportcrete. This was very interesting to see as we are currently installing Sportcrete at Sanctuary Cove.

Meeting up with the rest of the Australian contingent we headed for the main event – The Open. On Friday and Saturday morning we were privileged to join the greenstaff as they set up the golf course for the day's play. The most impressive thing was how calm Old Course manager Gordon Mckie was each morning and that each of his 50 plus staff new exactly what they were doing. Even after the suspension of play on the Friday afternoon, Gordon made the decision not to mow the greens at all on the Saturday. This was a pretty bold decision during a Major but was clearly the correct one.

Walking the fairways before play was a real treat and we got to talk to a lot of the staff, R&A officials, even Tiger's caddy. The attention to detail was very impressive and it was clear that all the staff were extremely passionate about their jobs.

The Sunday afternoon was spent in the offices of Elmwood College which overlooks the 18th green of the Old Course. We all had to pinch ourselves that we had such an incredible vantage point to watch the final round on a glorious Scottish summer's day.

After the Open I returned home to Glasgow and visited my home course Williamwood which brought back some great memories. The trip really was a once in a lifetime experience which was enhanced by the great bunch of Aussie supers that I had the pleasure of travelling with.

The unique heathland style plantings of the Rosemount course at Blairgowrie Golf Club

SHANE GREENHILL

SORRENTO GC, VIC

On the flight over, I wondered what St Andrews and the UK would be like. Of course I had seen the Old Course on TV many times, but what would surround it? What would surround the many courses of the UK? I had visions of built up metropolises with golf courses holding out the grey cement walls of an encroaching urban population.

I also wondered about the turf conditioning and quality. I had heard various reports about the turf standard being less than what is expected in Australia, with little focus on monostands of grass and uniformity. At times too the dryness of some fairways became quite startling during some Open tournaments, with other courses in the UK being quite lush green at the same time.

My first impression of the UK was the vast areas of open farming land once you had left the built up area of London. All the courses we visited (including St Andrews) were surrounded by vast tracts of farm land and each course had a real open country feel, with little evidence of urban growth. This made for some spectacular vistas especially at courses such as Gleneagles and Turnberry.

I found St Andrews to be a truly magical place. To visit the home of golf in Open condition in summer was just brilliant. From the sounds of the large gulls in the township to the roar of the air force jets taking off nearby just made it surreal. The Old Course was everything I hoped it to be and more. The oldest golf course in the world with all the unique features from the Road Hole to the Swilcan Bridge really made me realise I was walking on golf's holy ground.

I found the turf quality to be surprisingly good from reports I had heard. I even thought it looked better in person than on television which was surprising. All surfaces were a mixture of cool-season grasses, notably bentgrasses, fescues and *Poa*. The greens were cut at 4mm with walk behind mowers.

All fairways, tees and green surrounds were cut at 7.5mm with Toro 3250 greens mowers (with catchers). They had 11 of these mowers for the tournament which was a sight to see.

The greens had some noticeable *Poa annua* invasion, however, they ran smooth and fast. The speeds were kept to around the 10 to 10.5 feet mark for the first two days, then 9 to 9.5 for the Saturday after the wind caused suspension of play on Friday. Bunkers were intricately raked with a perfect wall to wall raking pattern and they were foot consolidated every day before being raked to ensure firmness and consistency. Despite being labour intensive, the results were exceptional.

Fertilising of the Old Course is virtually non-existent. The fairways have been fertilised only once in three years while the greens had only a 'touch' of nitrogen to green them up for the tournament. Divot recovery was slow in the fairways and these have to be filled with a seeded divot mix to aid recovery. The greens have three topdressings a year using 300 tonnes of sand applied in 100 tonne applications. This is carried out over the winter months and the greens are quite firm. No coring is carried out and the use of seaweed extracts is the only form of regular fertiliser used.

The tournament itself was not surprisingly the biggest I have ever attended. The crowds were enormous and to view the golf was a lot more difficult than I thought it would be. The ropes basically follow the outward and inward nines and do not really allow close viewing of play in some cases. Bunkers that are in the middle of the course, such as Hell Bunker, can be out of view from the ropes and to get the best view you have to sit in a grandstand and wait for each group to go through. On the last day we stationed ourselves next to the Road Hole with a view up the 18th fairway. To get these prime seats we had to sit in the stand by 7:45am.

Of the golf courses we played (Lundin Links, Blairgowrie, Gleneagles and Turnberry) they all had quite slow greens. Cutting heights for greens for all courses was 4mm. *Poa* invasion varied and fairways were quite lush in appearance without being fertilised. Striping was a common practice on all cut areas.

The polar opposite styles of turf management, presentation and maintenance of St Andrews to Gleneagles (pictured) was very much an eye opener

Final stop of the tour was Turnberry, home to course superintendent Euan Grant who spoke at this year's Gold Coast conference

What I will take back to my own course I think is a sense of wanting to develop its own character more. All of the UK courses had a special 'feel' that made them a memorable experience to play.

IDRIS EVANS

WESTERN AUSTRALIAN GC, WA

Prior to heading to the Open, Geoff Stephens and I spent a couple of days in London visiting Lords and Wimbledon. On the Monday we played the East Course at Wentworth with course superintendent Chris Kennedy taking us on a tour of the exceptional golfing estate and greenkeeping facilities.

Walking around St Andrews is one thing, but being there for the Open was a buzz. The first thing that struck me was the undulations in the greens and the size of them. On the Thursday I stood by the 18th green watching play. Unfortunately the TV cameras had a close up of me which resulted in about 100 of my members sending text messages. You cannot get far enough away from them it seems.

Being able to walk inside the ropes while the groundstaff were preparing the course gave me an appreciation for the renowned pot bunkers on the course and also the firmness of the turf. You can see why the pros putt from so far off the greens. It seems that the true nature of links golf is also that maintenance is very minimalist, or for a want of a better word, sustainable.

On the Monday morning after the Open we played Lundin Links. At first the course didn't offer much but as the round went on the layout and over all condition of the course grew on me. The use of shared fairways was apparent, minimising maintenance and allowing the golf course to be built on a relatively small footprint of land.

That afternoon we drove to Perth where we arranged a game on the Rosemount course at Blairgowrie. This course had some of the best tree-lined fairways that I have seen. The roughs were all natural ryes and fescues that looked like they had never been touched. What made this a bit of fun was the fact that we teed off at 6.30pm and completed the round in the light despite the rain and cloud cover at 9.50pm. Trying to find somewhere to eat at 10.30pm was one drawback to playing so late so a two-star Indian restaurant was it but we all survived.

LEIGH YANNER

THE NATIONAL GC, VIC

I have always wanted to attend the Open Championship and I, like many other supers no doubt, have sat up late watching past tournaments on TV. However, television never gives a true indication of what the Old Course is really like, in particular the severity and size of the double greens.

St Andrews has a lot of idiosyncrasies which would not be accepted in golf course design today. Take the Road Hole for instance; how many great holes are there in the world where you drive the ball over a hotel and then the second shot is played to a green that is protected by one of the most famous small bunkers in the world which is extraordinarily hard to play out of. Then if you miss the green to the right you're forced to play off a gravel track, a bitumen road or against a rock wall.

The management practices employed on the Old Course are old fashioned and one could say behind the times, but it works and the quality of the surfaces are a real eye opener. Certainly the surfaces are not pure in grass species, but one thing noticeable is the lack of *Poa annua*. I admire the links courses and their traditions, particularly with low nitrogen inputs. One of the best ways to prevent *Poa annua* dominating is the minimalist approach towards fertiliser use and the links land lends itself to this preferred management style.

It was interesting that this approach cannot be used everywhere. The inland courses, where the soil is heavier and the temperatures vastly colder, have to rely on fertiliser and subsequently *Poa* is more prevalent. The inland courses were like playing golf in large cottage gardens, with fairways pattern cut, flowering roughs and silver birch tree-lined fairways.

Catching up with Euan Grant and playing the Ailsa course at Turnberry was definitely memorable. Ailsa is completely different to other links courses that I have seen in Scotland. It wasn't just sand dunes; it had some rocky outcrops and the surfaces were slightly different with more bentgrass evident in the greens and fairways.

This trip also gave me the opportunity to meet the designer of The National's Old course, Robert Trent Jones Jr. Speaking with him at The Open was memorable and invigorating, gaining an understanding of his philosophies and his insight. We spoke about when he first set his eyes on the location of the Old Course and how they mapped out the layout through thick, undulating scrub and then the construction process.

ACKNOWLEDGEMENTS

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Class acts

Two of Melbourne's leading colleges have taken significant measures in recent years to ensure their future irrigation requirements. Scotch College's grounds manager Michael Smith and Wesley College grounds supervisor Rob Savedra look at their respective projects and the considerable improvements in efficiencies that have resulted.

In 2005 Melbourne-based Scotch College conducted a water audit with assistance from sustainability consultants. Since undertaking that detailed assessment, the college has actively taken a strategic approach to reducing its demand for potable water and consequently given water conservation and reuse a very high priority to point where now in 2010 a saving of more than 50 per cent has been realised across the whole facility.

As well as setting a number of objectives, such as reducing mains water usage, developing water saving initiatives for the long-term, reducing environmental impact and maintaining the high standard of the college's turf facilities, the audit also highlighted where water was being used.

Irrigation of the college's sports fields accounted for 55 per cent (30.8 megalitres) of the total amount of water used (56ML), with the remaining 45 per cent made up of irrigating garden beds and water used in school buildings. A number of water saving initiatives have been implemented since the audit that have helped reduce mains water consumption including:

- Introduction of Australian natives and drought tolerant plants to garden beds;
- Sub surface drip irrigation to garden beds, eliminating drift and evaporation;
- Ozone technology to onsite laundry operation with potential reuse on lawns and gardens;
- Water efficient shower heads, tapware and toilet fittings;
- Junior School oval synthetic grass conversion (water savings up to 6ML p/a);
- Automatic irrigation upgrade to sports fields; and
- Drought tolerant, warm-season grass conversion to sports fields (about 50 per cent less water requirements than cool-season grasses).

The consultants also investigated and reported on any potential alternative water sources that the college could use. These included:

Rain water collection: A number of rain water collection tanks have been strategically placed around the school with a storage capacity of approximately 100,000 litres. This water is used for watering garden beds, trees and washing down plant and machinery.

Treatment and reuse of laundry water: The Boarders' laundry discharges approximately 1ML of grey water annually into the sewage system. An ozone laundry system has been installed to treat the water by minimising energy, water and chemical inputs to the washing process. Further investigation is being explored to reuse, store and treat the discharged water for irrigation purposes to the lawns and garden beds within the Boarding and Junior school precincts.

Bore water: Investigation has been undertaken to explore the likely availability of bore water from an underground aquifer. Conclusions from the study were this water source would not provide sufficient flow to justify investment and potential

Left: Through the implementation of various water efficiency strategies in recent years, Melbourne's Scotch College has realised savings of around 50 per cent, with future forecasting predicting even greater savings now that the school is totally independent of mains water for sports field irrigation

future regulation of ground water retrieval also made this an uncertain and therefore unattractive option.

Gardiner's Creek: The school has an extraction right of 6ML from Gardiner's Creek which has been in use since 2005. The creek is located behind the school's southern boundary and runs into the Yarra River. The school has invested in an ultraviolet (UV) sterilisation system to improve water quality and to ensure safe water.

Storm water harvesting: It was identified that storm water collection and reuse for irrigation was the best solution as an alternative water source given the school's large internal catchment area and extensive underground storm water drainage network. Consideration was given to the type and size of the tanks required due to the large volume of water required to maintain the seven hectares of sports fields.

IRRIGATION SELF SUFFICIENCY

After four years of planning and construction, the school now has a water storage capacity of 5.4 million litres. The storm water harvesting and irrigation reticulation master plan now allows Scotch to irrigate, maintain and present its sports fields at a high standard with safe conditions all year round.

The project involved capturing storm water runoff from the school's large internal catchment (about 8ha) and diverting this storm water through new and existing drainage networks to fill a 2.4ML water tank that was positioned underneath the school's McKendrick soccer pitch and a further 3ML litre water tank positioned underneath the school's Melville oval.

The storm water is treated through gross pollutant traps preventing coarse sediments, grease, oil and organic material from entering the tanks. The water is then transferred from the tanks through an irrigation pump that pressurises the water through irrigation transfer lines that interconnect with new and existing irrigation systems within the sports fields.

The tank structure was made from rectangular shaped recycled polypropylene modules, an Australian made product. The modules are 600mm long x 400mm wide x 1.35mm high and are tightly stacked next to each other and encased by a water proof heavy duty reinforced liner that is sandwiched between two layers of geotextile fabric. All joins within the liner are heat welded and pressure tested on site to ensure there are no leaks. The tank then sits neatly on a compacted 200mm crushed rock base (see photos above and on page 24).

The perimeter of the tank excavation is filled with stabilised sand to lock the structure together and to ensure there is no movement. A 300mm layer of crushed rock is spread and compacted over the

After four years of planning and construction, Scotch College now has a water storage capacity of 5.4ML, comprised of two tanks situated underneath two of the college's sports fields.

Storm water runoff captured from the school's large internal catchment (about 8ha) is diverted through new and existing drainage networks to fill the tanks

top of the tank, approximately 500mm of clay and 300mm of existing topsoil was spread back over the tank to match finished surface levels. New automatic irrigation systems were installed and Santa ana couchgrass was laid to complete the project.

When both are full the tanks will supply about one month's summer irrigation requirements to the school's sports fields (7ha). Early calculations have shown that about 10mm of rain over the site will harvest around 600,000l of water therefore 90mm of rain will fill the tanks – a total of 5.4ML.

Recent climate data over the past five years has shown that Melbourne receives approximately 285 mm of rain from October through to April with an average monthly rainfall of 47.5mm. This information indicates that the tanks could fill up about three times over the 24-week irrigation window.

As previously mentioned, in addition to storm water collection Scotch College has annual extraction rights from Gardiner's Creek which is located along the southern boundary of the school. Water can be pumped from the creek, filtered through an ultraviolet sterilisation system to improve water quality and then transferred into both tanks if required. However, in order to protect the waterway environment, flow trigger points have been set. Bans or restrictions on the taking of water come into effect when flow levels are, low therefore this water source is not guaranteed.

Another key project was the conversion of Scotch's ovals from traditional cool-season grasses (ryegrass/*Poa annua*) to Santa ana

OVAL CONVERSION

Another key project was the conversion of the school's sports ovals to drought tolerant turf species. The aim was to convert the school's sports fields from the traditional cool-season grasses (ryegrass/*Poa annua*) to the more durable, drought resistant couchgrass thus reducing irrigation demands by up to 50 per cent.

Problems synonymous with sports fields built 20 years ago included poor summer moisture retention, poor drainage and *Poa annua* infestation. These characteristics were all evident within the school's sports fields.

The soil on site was very fine textured, had a low drainage rate and was susceptible to compaction. As a result the grounds became hard and unsafe with little if any grass cover for protection during summer and the potential to become waterlogged during a wet winter. Despite this the grounds presented a reasonable playing surface under below average rain fall.

Surface fall of the ground was adequate, however, there were localised high and low areas that required significant regrading. Four sports fields required new irrigation systems and one sports field's existing irrigation system needed upgrading to improve water uniformity and efficiency due to unevenly spaced sprinkler heads.

The programme of works required included:

- Total spray out of existing cool-season grasses and removal of 20mm of surface with top field maker machine;
- Double power harrow oval base;
- Soil amendments added and then double rotary hoe;
- Shape and laser level rough out;
- Irrigation installation;
- Final laser level;
- Fertilise with turf starter;
- Reset sprinkler heads to finished surface level;
- Lay Santa ana couchgrass sod;
- Topdress turf after establishment period.

The oval conversions were staged over two years and began immediately after the last scheduled Associated Public Schools cricket match in November 2008 and 2009 giving about an eight week window during the school holiday period to complete the works and be ready for play at the beginning of the school year in February 2009 and 2010. The turf of choice was Santa ana.

Given the timing of the project (during summer) the soil temperature was consistently over 20°C allowing the turf root system to establish at a rapid rate. It was noticed that the turf root depth was

50mm after only seven days and a further 200mm after 28 days allowing mowing of the turf to take place after three weeks. Appropriate signage was also displayed to promote the project as a drought recovery initiative.

Approaching the cooler months the couch is oversown with ryegrass to give it protection from leaf burn due to wear, as well as enhance winter colour. These cool-season grasses are then transitioned out with Monument herbicide at the beginning of spring to remove competition and give the couchgrass additional sunlight and air to encourage new growth and the break of dormancy.

FINE FUTURE

All the above projects have been covered comprehensively in the school's 'Environs' newsletter which aims to keep the Scotch College community informed about how the school is responding to the considerable environmental challenges that it confronts each day.

Through the implementation of the school's water strategy considerable savings have been achieved. In 2004 records indicated the school's total water use was around 70ML per annum and 60 per cent (42ML) of this was used for irrigation purposes. In 2009 total water use was just 36ML, a saving of about 50 per cent and future forecasting predicts even more savings now that the school is totally independent of mains water for sports field irrigation.

Conversion to more durable, drought resistant couchgrass has reduced irrigation demands by up to 50 per cent

Approaching the cooler months the couch is oversown with ryegrass to give it protection from leaf burn due to wear, as well as enhance winter colour

WESLEY COLLEGE RIDES A NEW WAVE

Wesley's desalination unit produces 48,000 litres a day at 250ppm

Since 1999 Wesley College's Glen Waverley campus has undertaken a range of complementary strategies, including water efficiency measures, investigating and developing alternative water supplies and using these actions within its educational programmes. That same year a bore was sunk to sure up a water supply for the future but proved to be too salty (7000ppm) and was not acceptable.

The head of the campus convened a special committee to oversee and coordinate all environmental action. This committee initiated and supported many small scale water saving initiatives:

- Environment Improvement Plan implemented to improve stormwater quality. Internal water meter allows us to separate irrigation and domestic water use;
- Installed water tanks;
- Grounds compound area is self sufficient. Water from a 10,000L rainwater tank provides water for the wash down machinery facility, toilet and water for boom spraying wetting agents on grounds and 600 litre water cart for garden watering;
- Design and construct fully automated, irrigation system for five hectares of grounds;
- Conversion from spray irrigation to drip irrigation in garden beds;
- Installation of Greymate subterranean system in Junior School lawn;
- WaterMap, Water Management Plan and trade waste agreement with Yarra Valley Water;
- Warm-season grass conversion; and
- Desalination project.

BROUGHT BACK TO LIFE

With water restrictions tightening, the grounds deteriorated in turf quality and surface hardness. With technological advances over the years and desalination units becoming compact and better value for money, it was time to reinvestigate making the bore viable again. Having contact with a hydraulic engineer who managed the project, a decision to purchase a desalination unit together with water storage facilities for 1ML was approved.

The college embarked on its biggest capital investment for the grounds to ensure their future viability. Some 1100m^3 of clay was excavated from the banks and laser graded with crushed rock for the foundations of four 250,000L tanks.

The desalination unit was constructed off site and delivered on its skid as the tanks were being built. The tanks took four days to erect and once finished the unit was hooked up to the bore and filtration tanks filled with sand.

Having worked through the teething problems and every case scenario of the desalination process, it took eight weeks from switching the unit on to filling the tanks. Currently, desalinated water is costing us 70c/1000L to produce compared to $1.05/1000L to purchase from Yarra Valley water. A total of 48,000L is produced per day with water quality measuring 250ppm.

The desalination project has allowed Wesley to process water from an alternative source, with a direct savings of 6ML of potable water that would have been used around the campus. We would anticipate in the project's second and future years output would be ramped up to about 10ML/year. The tanks are filled by this project and are not reliant on rainfall as our sole alternative source to town water.

Now that the tanks are full with desalinated bore water, planning for the next stage is well under way. Stage 3 will consist of harvesting rain water from the extensive roof system and storm water drainage network to recharge the tanks. This will mean the bore will be used on an as needed basis and will truly be an alternative water source. A warm-season grass transition programme was also implemented now the water supply is assured, so quality of grounds will be more consistent.

The students have a state-of-the-art, working model chemistry laboratory on site that produces drinking water from 7000ppm salty, rust coloured bore water. The benefits of having the unit have exceeded initial expectation. The college is excited with the project and it fits in perfectly with its Environment Improvement Plan strategies.

It has been 10 years in the making but finally the bore is viable and a quality alternative water source is flowing onto the grounds, gardens, toilets and pool. It has been a team effort and now we can look forward to the future with another great tool at our disposal to show our turf trade skills.

The Wesley and wider community are now enjoying five hectares of pure couch sporting surfaces that would not have been initiated during water restrictions unless we had this alternative supply of water. - **Rob Savedra**

After some 10 years in the making Wesley College Glen Waverley Campus grounds supervisor Rob Savedra has a viable and a quality alternative water source and students and the wider community are now enjoying five hectares of premier couch surfaces

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Helping hands?

Volunteers are the lifeblood of many sporting clubs, particularly those in regional and country areas, and golf course superintendents will often rely on a dedicated core of volunteers to assist with general course duties. Despite the best of intentions, however, volunteers can create just as many problems as they solve. The Pulse asked superintendents whether it is becoming increasingly difficult to effectively manage volunteers as part of their course operations?

"Although they all want to help out in what is effectively their golf course, they definitely start running their own agendas. At one stage I ceased all voluntary help due to members taking issues into their own hands. We now have a volunteer coordinator who members liaise with on certain projects or task that they think they can undertake. Once they have discussed the proposal with the coordinator, I meet with him and set a date to implement this, see if the proposal is realistic and fits in with what we are trying to achieve. This is so we can allocate tools, vehicles, staff etc… as required. This is where we ran into trouble in the past with volunteers interrupting staff for assistance.

Volunteers definitely have a place in our operation, but we need to be very selective in what, when and how they are used on the golf course. We are currently receiving free concrete from a major Bypass project, with loads being delivered with as little as 20 minutes' notice. We have put together a specific volunteer team of 20 for this project to be on call. As we are using it for cart paths, without this added help obviously other areas of the golf course would suffer on those days. We also have a team of four that install the formwork to keep us well prepared in advance of any pours.

A philosophy I have adapted is 'keep it simple'. (e.g.: tournament preparations, divots, debris collection, weeding, mulching, sponsor signage etc…). It helps you out and they feel like they are putting something back into the club. On the OH&S front we have just taken out an insurance policy to cover all voluntary labour on the golf course, which works in conjunction with our in-house policy of no equipment to be used except for utility vehicles if they have a driver license. In closing, have a team leader on site, be well prepared, allocate a time slot and resources and then still expect some arising agendas!" **Shaun Cross, Byron Bay Golf Club, NSW**

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"As with the majority of clubs our size, volunteers form an integral part of our maintenance team. With only myself and an apprentice employed full-time, the presentation and development of the course relies heavily on volunteers. At Marysville we are fortunate to have three dedicated members who spend countless hours doing whatever they can to reduce our workload by doing whatever tasks are required.

I can understand that in some instances, volunteers have been known to go off and do their own thing and as such become the potential for disaster, but in our case the volunteers always ask for direction as to what is required of them and they are never sent off without the knowledge that they are fully aware and capable to carry out the designated task. More often than not they are more than happy just to sit on a roughcutter.

Our volunteers are treated the same as staff. We all have our breaks together, they are supplied with all the necessary safety gear and they are encouraged to give their input in discussions re improvements to course aesthetics etc. Having said all this, I must admit that we are very fortunate having such a dependable group of volunteers who I feel entirely comfortable with and that there are also a lot of members out there that have good intentions, but sadly not the capabilities." **Rob Christie, Marysville Community Golf and Bowls Club, VIC**

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"At Whittlesea we do have Dad's Army which comes in once a month to help out with certain tasks. I find that with only three on staff their contribution and value is quite good overall. In saying that, however, it does come with its share of headaches as far as knowing what to get them to do without making my workload more stressful.

OH&S is a big issue with these volunteers as they are all of retiring age and for the most part don't having any formal training in machinery safety and operations. For me the management of these people

is becoming more difficult as time goes on as I don't seem to have enough time in the day to carry out my normal duties and then have them ring every half hour wanting to know what to do next or to put more line on the whipper snipper or get them more fuel. The other problem that does arise is when they have had enough they just head home and leave things unfinished. That puts more pressure back on the ground staff to get it finished.

The best way I find to limit the stress is to send out an email a week before they turn up and outline the jobs I need done. We have one man who is quite active and switched on so he has become the leader of the group and sets them tasks for that day. After talking to and watching the group of volunteers it soon becomes apparent who can do what in regards to operating certain equipment. They do create a lot of problems and I do get frustrated at times, but in general I think the volunteers are well worth the effort if they are set tasks that don't become too complex and involved." **Brad Tucker, Whittlesea Golf Club, VIC**

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"We are a country course and volunteers started this and many other courses. We have a register at the pro shop that volunteers have to sign time in and time out before any work is carried out. Their jobs are only to paint tee signs, tend to the gardens and help clean up after floods. The group we have do not use machinery at all and use tools that are on site only. They follow certain instructions from the staff and are not allowed to go outside of the square. This is the only way we can effectively manage to ensure their safety and address OH&S issues." **John Duncan, Jamberoo Golf Club, NSW**

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"We have volunteers every Monday morning. They generally have their own agenda and I find myself in discussions most Mondays trying to justify our work programmes.

I believe long ago there was a need for this sort of kindly help, but now with the skills required and the finish demanded by our members it is a professional's job to maintain a golf course at an acceptable level. Machines are specialised, OH&S is certainly not high on the volunteer's priority list and jobs left half done mean more work for my staff to finish.

I have found our particular volunteers tend to lower morale within our staff with snide comments and a demand for equipment. We seem to be keeping a group of older members together for their camaraderie rather than for the good of the club. When the volunteers are offered to club directors to volunteer at their workplace they are quickly declined. When I am asked by members if they can help I tell them to volunteer at the Salvos, or somewhere it would be of benefit to the community. I'm not a big fan." **Glenn Cross, Mt Lawley Golf Club, WA**

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"At Box Hill Club we have a dedicated team of up to 24 volunteers who come in fortnightly on a Friday morning for four hours. Their tasks range from general course clean-up of tree-lines and garden beds to bridge refurbishments and shed construction.

The volunteers have saved the club a fortune in labour costs over the 15 years I have been here. Apart from their physical efforts, the volunteers also assist in being public relations officers. I can inform them directly on various projects the club is undertaking, problems that have surfaced and

superintendents and golf clubs course maintenance practices
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can ask them to 'police' other members in regards to basic etiquette and current local rules. They are always willing to give input but ultimately they know that I must have the final say.

To assist with any 'rogue volunteer' going off on a tangent, I have appointed a leader who liaises with me and then delegates tasks as age and experience suit. Volunteers with personal conflicts are segregated from each other, however, we make sure there is no loss of face by either party. Volunteers are covered by our insurance policy but we still minimise the risk by only allowing capable and qualified members to use power tools. Before setting out on their tasks, I address the volunteers on their duties and take questions. They are given instruction on use of carts and their routes. A Friday morning can be quite busy, but the work they do is well worth it." **Mark Jennings, Box Hill Golf Club, VIC**

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"Here at Bermagui Country Club we rely heavily on working bees to maintain gardens, trees and clearing debris around the course. What I have worked out is that if you give them garden bed maintenance every time you have a working bee the numbers drop off. Garden bed maintenance is better accomplished by getting your members to adopt a garden bed. Pride and competition gives a higher result. But make sure you control what's being planted.

Our members definitely respond better to the bigger tasks. At the moment the members are finishing the last pour on a 220m cart path and have done a wonderful job. They have also just completed a Boral block retaining wall on our 1st tee complex.

Each year we appoint a working bee organiser/foreman who meets me the day before for allocated tasks. Quality control and criticism over quality must be approached with extreme diplomacy. To combat this, I usually appoint one of our staff members to work with them. It's only for three hours and is a good investment I think. This also helps with equipment operation and any idiosyncrasies that older machines may have.

Our small machinery fleet is the biggest challenge as far as getting volunteers around the course, so to get around this the members with small box trailers bring them along to the working bees. At the moment OH&S is monitored very well and along with our staff member we are also fortunate to have a retired Sydney Water Board OH&S manager on our working bee team." **Dave Thomson, Bermagui Country Club, NSW**

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Here at Portland Golf Club volunteers have become an essential part of our day-to-day workforce. With a staff of two we realise that if the course is to improve and not be just maintained we need input from members. Tree maintenance is a big issue here with tree-lined fairways and an abundance of wind, so if we can train volunteers to use chainsaws or to just pick up debris it takes this work off our hands so we can concentrate on the turf surfaces.

I think the longer you get to know the individual volunteers the easier it is to match them to the right job, keeping them happy and reducing supervision. With volunteers come extra costs in safety equipment, hand tools, fuel etc… but committees don't have to go far to see the bonus of a little extra cost for a lot less cost of paid staff and a better looking golf course." **Eddie Ruis, Portland Golf Club, VIC**

"At Kogarah Golf Club we have working bees once a month, coordinated by the club captain and the greens chairman. All works are formulated and approved by the superintendent and required materials organised prior to the working bee, including safety PPE. They start at 8am on a Monday, not good at a busy time to set them up with tools and transport, not to mention the late attendees you have to shuttle out to the various working bee location.

OH&S is always an issue and inductions are made and sometimes to members who will never be seen again. Sometimes politics and small debates develop on who does what job and in what order the jobs get completed. Sometimes, follow up work may be necessary by course staff to lift worked areas up to the required standard.

All in all, these are blokes who care about their club enough to want to give something back and working close to the greenstaff they tend to learn about what the greenstaff do on a daily basis. Just after noon, a few beers and a pie completes a day where some jobs got done, friendships are made and the golf course is the real winner." **Rob Barnes, Kogarah Golf Club, NSW**

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At Katoomba Golf Club we've kept our volunteer work to a minimum. Along with inherent OH&S issues we've found that the time required to maximise their efficiency with certain tasks greatly reduces our own efficiency. Often we find volunteers tend to wander off on their own tangents attempting to remediate what they perceive to be problems, not what we are asking them to help us with. We've found keeping the tasks very simple, like weeding a garden bed instead of helping us trim the plants, keeps them in check and doesn't take too much of our time to monitor. Trimming plants can get out of hand very quickly!

Volunteers are always going to be a part of helping to maintain a golf course. They always mean well and have good intentions. As long as you can minimise the supervision they sometimes require they are always going to aid in your cause." **Steve Smith, Katoomba Golf Club, NSW**

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"The volunteer support we receive at Traralgon Golf Club plays an important role in the ongoing presentation and upgrade of the course and without them the course would not be in the condition it is. With a groundstaff of five, comprising two full time and three permanent part-time, at times we need to rely on volunteers to have jobs completed. We are very lucky to have a dedicated group of around 10-15 members, known as 'Dad's Army' that volunteer their time every Thursday morning for four to five hours. At other times such as leading up to our Pro-Am and Ivo Whitton events, rarely a day goes by that a volunteer is not up at the sheds asking if there is anything they can do which helps us out tremendously." **William Cheatley, Traralgon Golf Club, VIC**

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"I have recently moved from Hawks Nest on the mid-north coast of NSW to sunny Queensland and the argument for and against volunteer work on the golf course is completely different. At Hawks Nest we had plenty of help from volunteers whether we wanted it or not! There is a growing concern these days whether all that 'extra help' is worth it. Well, things have changed recently since I moved to the superintendent's job at Proserpine Golf Club in the Whitsundays. I have a staff of two and rely heavily upon the help of volunteers. OH&S aside, I cannot expect to produce a quality course on my own without the extra hands.

I have the situation where I turn up each day, go on with my daily routine and sometimes have guys coming up to me throughout the day offering a helping hand. Although I am unprepared for their unexpected arrival, I am keen to make the most of what I can get out of them. Mowing rough proves to be a very popular job! I have implemented a volunteer programme that involves training and signing off on jobs to cover the legal side of things.

Every greenkeeper wherever they are in the world has been involved with volunteers and will have plenty to say for and against them, but if you ask me, bring them on, because when it comes down to it the more hands the better here at Prossy!" **Ben Matheson, Proserpine Golf Club, QLD**

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"I think volunteers are valuable if you need them but on the proviso that they work for you and not for themselves. I am used to running smaller courses with smaller staff numbers and budgets. At these courses I won't say I rely on them because that is when it can become a problem, but I will say at times they are most helpful.

I never give them any task that is vital to be done on the day and failure to turn up will leave me short. Having said that, up here I have a dedicated bunch of volunteers that currently exceeds 20 and growing. They do simple tasks such as using weed wands on Crow's Foot (once trained), trimming trees (person on the chainsaw must have their ticket), operating a front deck (three regulars on this all signed off on SOPs) and other simple tasks.

This all works very successfully mainly due to good communication. We have a notice board stating when someone is due to turn up, where they intend to work, what they intend to do and any requirements they need. They don't randomly turn up; they have their usual crews and days. If you need them, having a good friendly relationship is a must and a free BBQ and beer periodically goes along way. They aren't staff and can't be treated as such but that's not to say practices can't be corrected or stopped when needed.

OH&S probably needs to be more strict here than with trained staff. This area will always be a work in progress and for now the basics are covered – site inductions, SOPs, sign in/out register. Providing all the above efforts are largely outweighed by their results, most of the time it is worth it and in my case will see jobs get done that we would normally not find time for." **Linc Urquhart, Bargara Golf Club, QLD**

This photo was taken by Dubbo Golf Club superintendent Allan Horrocks in 2004 after a plague of locusts descended on the township. A triplex mower was just one novel way of removing part of the problem

Plague proportions

With spring on our doorstep most superintendents will be thinking of renovations and the approaching summer, but as John Neylan reports state authorities are warning all sectors of the agriculture industry, including turf, about the impending threat of locust plagues.

In this job you often receive some intriguing requests. In this instance it was from the horse racing industry regarding the effects of plague locusts (*Chortoicetes terminifera*) on race tracks and race meetings and how to control them.

Earlier in the year in northwest Victoria a race meeting was cancelled due to swarms of locusts upsetting horses and jockeys. In late August the AGCSA received advice from the Victorian Department of Primary Industries specifically for turf and parklands of the impact that plague locusts can have and the responsibility of land holders in relation to this pest. It seemed to be something that we needed to take seriously.

The media has recently carried numerous stories regarding the impending plague of this largely agricultural pest and the economic impact that it would have on the agricultural industries. The serious aspects to be considered from a turf perspective are that they can cause significant turf damage and if they occur on your property they must be reported and subsequently treated. The following information has been taken from the Department of Agriculture, Forestry and Fisheries website (www.daff.gov.au) regarding the national perspective on the plague locust.

AUSTRALIAN PLAGUE LOCUST THREAT

Widespread swarm formation occurred in NSW, northern South Australia, northern Victoria and southwest Queensland during early April after the fledging of the major nymph infestation during March. There were three generations of population increase over 2009-2010 as a result of widespread heavy rainfall and favourable habitat conditions in inland areas. Despite intensive control of nymphs of the third generation in NSW, eggs laid in autumn will produce a further generation of high density nymphs in the spring.

Inter-agency meetings are continuing to plan and coordinate the response to the anticipated spring populations in NSW, Queensland, South Australia and Victoria. State agencies and industry groups are conducting landholder information meetings in areas likely to be affected. Information to assist landholders prepare for and implement locust control continues to be developed and is being provided through the Australian Plague Locust Commission and state agency websites, industry newsletters and discussions at landholder meetings.

Migration to the south during April brought many swarms into the Murray Valley and northeast regions of South Australia, northwest and north central Victoria and the southern Riverina in NSW. High density autumn egg laying followed immigration into these regions, and also occurred in other regions of NSW and Victoria.

The outlook is for a serious widespread nymph infestation in NSW, northern Victoria and eastern South Australia during spring, with some localised high density hatchings in southwest Queensland also possible. The plague situation, where numerous regions across several member states are affected by high densities of locusts, could continue during spring and summer if there is a high level of nymphal survival in spring.

In NSW, swarms affected the Western, Darling, Central West, Lachlan, Riverina, Hume and Central North Livestock Health and Pest Authority (LHPA) areas during April and May. Hatching of eggs will start in late August in northern areas, during September in the central west, Lachlan and western LHPA areas and from the end of September in the Riverina.

In South Australia, southward migration from the far north region of that state and from western NSW during the first week of April resulted in increased swarm activity in the southern Flinders Ranges area and throughout the Murray Valley region. Swarm activity and sporadic egg laying continued during May and June in some locations. Spring hatchings will commence in mid-September in the Hawker area and from the end of September in the Murray Valley.

Adult locust population levels continued to increase in northern Victoria during April. Migrations

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from NSW and within Victoria resulted in egg laying by swarms in the Mallee and Wimmera districts of the northwest and in areas along the Murray River from Swan Hill to Echuca. Swarms were reported in the Bendigo and Shepparton districts of north central Victoria and as far south as Horsham and Maryborough in western Victoria. Spring hatchings will start at the end of September in northwest Victoria, through to mid-October in areas south of Echuca and late October in the Horsham area.

The Department of Agriculture, Forestry and Fisheries website provides a map of the key risk zones for anticipated locust control activity during spring 2010 and a table of forecast development dates as a guide to the expected emergence of nymphs in spring (http://www.daff.gov.au/animal-plant-health/locusts/current#risk-map).

The following information has been adapted from the Victorian Department of Primary Industries fact sheet for Turf and Parklands (http://new.dpi.vic.gov.au) and provides useful general information on the occurrence and control of plague locusts.

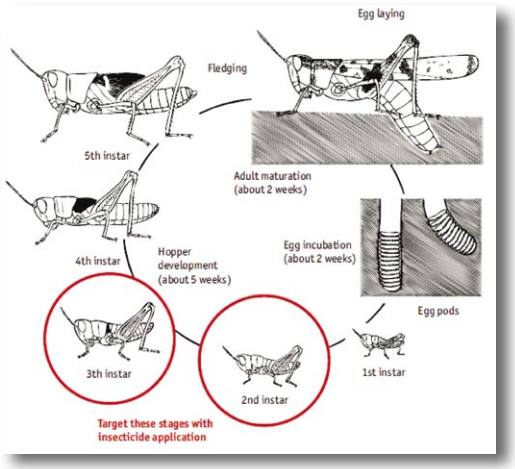
LOCUST EGGS HATCHING IN SPRING

Warm, moist weather conditions are the most favourable for locust egg hatchings. Locusts are hard to spot when they first emerge as young immature locusts (called hoppers). They are only about 3mm long and pale in colour. Newly hatched locusts can cause considerable damage and can consume half their body weight in food per day.

Hoppers, which are wingless and unable to fly, move as a 'band' or group, with up to thousands of hoppers for every square metre of the band. Spraying with insecticides at this stage is very effective and can greatly reduce numbers. Treatment of the hoppers is needed in spring to prevent another egg laying period in December and January 2011. Based on spring weather forecasts, it is expected the vast majority of hatching locusts will survive and grow into adults unless chemical treatment is undertaken.

WHAT FACILITIES ARE AT RISK?

Cultivated turf (e.g.: turf farms), sports grounds, golf courses and parklands are potentially at high risk from locust attack. Green pastures are very susceptible and recently sown grasses are particularly vulnerable to these insects.



Locusts are ravenous feeders of fresh, green vegetation. Turf is particularly susceptible to hopper (immature locust) attack because they prefer to graze on short, green feed. This can potentially lead to widespread damage of turf farms, playing fields, parklands and golf courses.

WHEN IS THE BEST TIME TO ACT?

The best time to treat locusts is when they are in the 'hopper' stage and before the adults can fly. Programmes to treat adult flying locusts are generally ineffective.

When locusts first hatch and emerge from the ground, they are often scattered. Treating locusts at this stage may be inefficient as some locusts may not have yet hatched. Newly hatched locusts are vulnerable and without food and shelter they are susceptible to premature death. As these locusts develop, they form high density bands and this is the best time for treatment activities.

Treating locust eggs through cultivation of egg beds is generally ineffective. It is recommended that horticulturalists/land managers concentrate their efforts on more regular monitoring and applying chemicals while hoppers are in a concentrated band.

WHAT ARE THE TREATMENT OPTIONS?

The use of insecticides is the most effective method of treating locusts. There are a number of products eligible for rebate under the Victorian Government's Locust Insecticide Rebate Scheme. Horticultural business owners and land managers (including mangers of council-owned playing fields, golf courses and parklands) should seek expert advice from their chemical reseller or agronomist as to which chemical best suits their situation.

The factsheet Locust Chemicals for Turf, Ornamental Plants, Flowers and Forestry Plantations (available through the http://new.dpi.vic.gov.au) lists

With favourable conditions earlier in the year, state authorities are warning all sectors of the agriculture industry, including those involved in turf, that the spring and summer could bring massive swarms to regional areas of NSW, QLD, SA and VIC

Figure 1. The most effective time to spray locusts is when they are in the second and third instar 'hopper' stage, before their wings have grown

PHOTO COURTESY CASEY GROVES, SUNRAYSIA DAILY

This photo appeared in the 6 April 2010 edition of the Sunraysia Daily newspaper and shows Peter Gill, track manager at Sandilong Park in Mildura, surrounded by locusts as he prepares the track for a race meet

the chemical products eligible for the Victorian Government's Locust Insecticide Rebate. Chemicals should only be used according to the label directions and all withholding periods observed.

The biological insecticide Metarhizium anisopilae is the safest of the products to use, but can take up to 20 days to kill hoppers under cool conditions, which may be too long to prevent crop damage. All of the other chemicals in the table work much quicker than the biological insecticides, causing locusts to stop feeding within a few hours, and to die within two or three days. Products containing the active ingredient fipronil can provide a degree of residual treatment in situations where use of these products is appropriate.

WHEN SHOULD GROWERS SPRAY?

The most effective time to spray locusts is when they are in the second and third instar hopper stage and form concentrated bands, before their wings have grown. The locust life cycle diagram (Figure 1, previous page) shows where this stage occurs within the complete locust life cycle. Third instar hoppers form large slow moving bands providing a clear target for efficient chemical use.

The hopper stage will last for around six weeks, depending on temperature, but the third instar stage only lasts for a week or so, making it important to carry out regular monitoring. The most effective treatment is achieved when hopper densities get up to around 80 hoppers per square metre. The best time of the day to spray hoppers is late morning through to late afternoon when they are most active and most visible.

OBLIGATIONS FOR TURF MANAGERS

Horticultural businesses such as turf farms, parklands and managers of community-owned recreational facilities (e.g. golf courses and ovals) need to be vigilant in monitoring their farms and facilities where known locust egg beds exist for evidence of activity and damage.

Throughout Australia, primary control of locusts is the responsibility of the landholder. Officers from the relevant state authorities are available to provide technical assistance, do inspections and advise on control techniques. These officers should be your first point of contact when reporting locust infestations or making inquiries about locust control.

It is important that any locust activity is reported as soon as possible to your local biosecurity authority or department of primary industries or agriculture. All chemical use must be in accordance with state laws and regulations including record keeping requirements.

While the Australian plague locust is an unusual pest of turf it can never-the-less damage turf areas. The photos on the previous pages show dramatic images from Dubbo Golf Club (superintendent Allan Horrocks) in 2004 when a locust swarm descended and a triplex mower was used as a novel form of control. The Dubbo Bowling Club was similarly affected.

Once the locusts are on the wing there is not a lot that can be done other than to physically discourage them from staying in one place long enough to damage the turf. It is at the fledgling stage before they take wing that is the critical time for spraying and controlling the infestation, both present and future.

Editor's note: The above information is only a small amount of that which is available. If you have any queries please contact the relevant authority in your state (see table below).

TABLE 1. STATE AUTHORITY CONTACTS

State	Department
NSW	Livestock Health and Pest Authorities (LHPA). **www.lhpa.org.au** LHPA rangers organise landholder control of bands and distribute insecticide. Primary Industries, Industry & Investment NSW **www.dpi.nsw.gov.au/agriculture**
SA	Primary Industries and Resources South Australia **www.pir.sa.gov.au/home**
VIC	Department of Primary Industries **http://new.dpi.vic.gov.au**
QLD	Biosecurity Queensland **www.dpi.qld.gov.au/4790.htm** Department of Employment, Economic Development and Innovation **www.deedi.qld.gov.au**
WA	Department of Agriculture and Food WA **www.agric.wa.gov.au**

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In the dark?

In this instalment of Tech Talk, AGCSA senior agronomist Andrew Peart casts a little light on shade management.

Winters can be a stressful time for turfgrass and particularly for stands trying to survive in shaded environments with excessive traffic wear. Shade can be caused by buildings, grandstands, roof structures and, of course, by the presence of trees and shrubs.

Shade not only alters the light intensity that the turfgrass receives, but also changes many other environmental factors. These include:

- Light quality;
- Reduced air movement;
- Increased relative humidity;
- Increased carbon dioxide levels;
- Moderation of temperature extremes;
- Competition for nutrients and water from tree roots; and
- Interception of rainfall by the tree canopy.

LIGHT QUANTITY

Only a small portion of solar radiation reaching the earth is used in the process of photosynthesis. Cool-season and warm-season grasses have different irradiance requirements for photosynthesis to begin. Productivity in terms of synthesised organic matter increases with increased photosynthetic irradiance up to 116 to 233 Watts/m^2 for cool-season grasses and 390 to 465 Watts/m^2 for warm season grasses (Dudeck and Peacock, 1997).

The difference in light requirements can be attributed to the different photosynthetic pathways of the two grasses. Cool-season grasses (C_3 grasses) utilise the Calvin cycle and require a lower light intensity to function than the C_4 pathway used by warm-season grasses. Warm-season grasses not only require high levels of photosynthetic irradiance but also high temperatures to achieve optimum carbon fixation, which is the conversion of carbon dioxide into organic compounds.

Shade is often referred to as a percentage reduction of sunlight. However, this is not the only factor affecting turfgrass growth as the quality of light can also have a direct influence on the quality of turf as well as the quantity of light.

LIGHT QUALITY

The solar spectrum can be divided into three main categories – ultraviolet (100-380 nanometres), visible (380-750nm) and infrared (750-3000nm). Solar radiance available for plant growth occurs in a spectral band from 400-700nm wavelengths and is called photosynthetically active radiation (PAR). About 45 per cent of direct solar radiation is PAR, but when both diffuse and direct components of solar radiation are considered, PAR is about 50 per cent of total solar radiation (Dudeck & Peacock, 1997).

The radiant energy available for plant growth is a combination of direct, diffuse and reflected solar radiance. Diffuse irradiance results from the scattering of solar spectra by atmospheric aerosols and other molecules. Diffusion causes the blue colour of the sky and enables blue light to strike the earth at any angle. Reflectance occurs when solar radiance is deflected by a nearby surface and the intensity and spectral quality is controlled by the proximity and origin of the reflecting material.

PAR from 400-500nm is referred to as blue light and is active for photosynthesis, photomorphogenesis and chlorophyll synthesis. PAR from 500-600nm is referred to as green light and is basically inactive for plant growth and development.

PAR from 600-700nm is referred to as red light and is similar to blue light. Far red irradiance occurs in a spectral band from 700-800nm and is not active for photosynthesis but strongly influences photomorphogenesis (Bell et al. 2000). Photomorphogenesis is the process by which plant development is controlled by light.

Shade, regardless of whether it is buildings or trees, reduces PAR and alters the spectral quality, affecting plant photosynthesis and photomorphogenesis. The light quality under a dense stand of trees can be altered since the canopy acts as a spectrally selective filter. As sunlight reaches a tree's canopy it is either:

- Absorbed by the leaves and used for photosynthesis;
- Reflected back into the atmosphere; or
- Transmitted to the plants (turf) below (Tankersley & Samples).

Under tree canopies, preferential absorption of PAR, especially in the blue and red spectra, reduces the proportion of PAR transmitted. However, as far red light is not active for photosynthesis most of this is transmitted through the tree canopy causing the increase in the proportion of far red light. Goss et al. (2002) states that the higher proportion of far red light increases the amount of inactive phytochrome (Pr), thereby increasing gibberellic acid biosynthesis in grasses, resulting in a taller and more spindly growth habit with longer and narrower leaves.

Top: Shade not only alters the light intensity that hits the turf but also changes many other environmental factors including air movement and carbon dioxide levels

MICROCLIMATE IMPLICATIONS

Tree canopies screen out a significant portion of the incident radiation, resulting in reduced temperatures and restricting the nocturnal cooling process by inhibiting the loss of heat as outgoing, long wave radiation. Overall, this causes a moderation of air and soil temperatures (Beard, 1973).

The frequency and intensity of dews are less under a tree canopy due to the reduction of cooling. However, when dew does occur, the duration is longer due to the reduced wind movement and reduced light intensity. This can also favour disease development in shaded environments.

Soil moisture stress can often be reduced in a shaded environment compared with full sunlight in periods of drought, due to lower temperatures, reduced rates of evapotranspiration and increased levels of relative humidity. However, in a treed environment, the reduced replenishing of soil moisture from canopy interception, as well as competition for that soil moisture with existing tree roots, can nullify the higher soil moisture levels that are sometimes experienced in shade.

TURF RESPONSE TO SHADE

The reduced light intensities under shaded conditions limit the carbohydrate reserves and the growth of roots, shoots, rhizomes, and stolons (Beard, 1973). Plants therefore are normally less dense, have reduced tillers, a more upright growth habit, a greater succulence and reduced stem diameter. This tends to lead to a reduced tolerance to heat, cold, drought and water stress as well as increased disease and insect susceptibility.

Shaded turfgrass in most cases has to be carefully managed as the ability to remove the source of the shade is often impracticable. The options therefore are to investigate more shade-tolerant species or varieties (Table 1), the use of growth regulators and cultural practices including judicious pruning.

GROWTH REGULATORS

Trinexapac-ethyl (TE) is a plant growth regulator that reduces leaf elongation by directly inhibiting the production of gibberellic acid. It has been utilised in turfgrass management primarily for clipping reduction and seedhead suppression.

Goss et al. (2002) conducted studies on creeping bentgrass under 60 per cent and 80 per cent shade cloth. In 60 per cent shade the applications of TE at 0.050kg a.i/ha significantly improved the quality ratings when applied at a two-weekly interval for the duration of the trial. Applications of TE made at four-weekly intervals and at half the rate at two- and four-week intervals generally produced turf that was significantly greater quality than the untreated control, however, the results were not consistent. Although the 80 per cent shade had severe implications on turf quality the TE applications significantly increased turf cover, tiller counts and fructose concentrations when compared to the non-TE treated plants.

Winters can be a stressful time for turfgrass, particularly for stands trying to survive in shaded environments with excessive traffic

CULTURAL PRACTICES

In shaded areas, if possible, select species or varieties that are better suited to these environments. In temperate areas, use fine fescue for dry shaded sites. In moist conditions either rough bluegrass (*Poa trivialis*) or supina bluegrass (*Poa supina*) are alternatives. Most warm-season grasses have poor traffic tolerance when grown in the shade. Diamond zoysia or some cultivars of buffalo grass (*Stenotaphrum sp*.) are probably the best options.

Increasing mowing heights by 20-25 per cent will increase the total leaf area index, thus providing a greater capability to absorb light and synthesize carbohydrates. Turf should be fertilised as regularly as that grown in the sun but only at half the rate. Excessive nitrogen can limit the number of carbon-containing molecules available for protein synthesis and reduce root growth and carbohydrate reserves (Goss et. al 2002).

Irrigation should be less frequent than turf in full sun, unless there is extreme competition from tree roots, and should be carried out during the day so the leaves do not stay wet for extended periods, increasing the likelihood of disease.

Pruning trees and shrubs will increase air movement and sunlight. Tree limbs should be pruned ideally to a height of 3 metres above the ground and the canopy thinned to allow flecks of sunlight to reach the turf. Future planting into lawn areas should involve the use of open canopied trees, such as eucalypts.

TABLE 1. RELATIVE ADAPTATION TO SEVERE SHADE (Source: Beard, 1973)

	Excellent	Good	Medium	Poor
Cool-season	Red fescue	Rough bluegrass	Colonial bent	Kentucky bluegrass
	Velvet bent	Creeping bent	Perennial ryegrass	
		Tall fescue		
Warm-season	Buffalo grass (Stenotaphrum sp.)	Zoysia	Centipede grass	Couch grass

Getting to the core of carbs

A two year field study by US researchers Jinmin Fu and Peter Dernoeden was initiated to examine the effects of coring on rates of photosynthesis and whole plant respiration and to quantify carbohydrates in creeping bentgrass leaves and roots during the summer.

Core cultivation or coring is routinely performed on putting greens for a multitude of beneficial purposes. Coring, however, is disruptive to the putting surface and causes mechanical injury to turf. Mechanical injury to plants would be expected to result in an increase in respiration and possibly a reduction in photosynthesis. A concomitant decrease in photosynthesis and increase in respiration could cause a harmful depletion of carbohydrates.

The rate of turf recovery from mechanical injury can depend on the availability of carbohydrates (Donaghy and Fulkerson, 1998). Carbohydrates in turfgrasses consist of the monosaccharides glucose and fructose (reducing sugars), disaccharide sucrose and various starches and fructans (Smith, 1972). Fructan can be hydrolyzed into fructose, which can be converted to glucose or used to form sucrose. Both mono- and disaccharides are depleted during respiration, when new leaves and roots of perennial ryegrass (*Lolium perenne L.*) are produced (Amiard et al., 2003).

Root growth in some grasses is more sensitive to a decrease in the availability of carbohydrates than leaf growth (Donaghy and Fulkerson, 1998). Therefore, root regrowth following coring may require a considerable amount of carbon investment.

Understanding how leaf and root carbohydrate levels change following coring may be important for maintaining high-quality creeping bentgrass greens. This is especially true in summer when high temperature stress reduces photosynthesis, root growth and quality in creeping bentgrass (Xu and Huang, 2000).

Understanding how leaf and root carbohydrate levels change following coring may be important for maintaining high-quality creeping bentgrass greens

The effects of coring on carbohydrate metabolism during summer months in creeping bentgrass have not been documented. Therefore, the objectives of this field study were to quantify photosynthesis (P_n) and respiration (R_w) rates as well as carbohydrate levels – water soluble carbohydrates (WSC; i.e.: glucose, fructose and sucrose), soluble carbohydrates (SC i.e.: fructan and starch) and total non-structural carbohydrates (TNC = WSC plus SC) in creeping bentgrass leaves and roots in response to spring-only coring versus spring plus summer coring.

MATERIALS AND METHODS

This field study was conducted on a research green built using USGA (2004) recommendations at the University of Maryland Turfgrass Research Facility in College Park during 2006 and 2007. Soil was a modified sand mix (97 per cent sand, 1 per cent silt and 2 per cent clay) with a pH of 6.5 and 10mg of organic matter per gram of soil.

In September 2005, the study site was treated with a non-selective herbicide and the sod was removed to expose bare ground. The area was seeded (50kg/ha) with 'Providence' creeping bentgrass later that month. A total of 250kg/ha N was applied between 20 September and 11 November 2005. (NB: Northern Hemisphere spring is March-May, summer is June-August and autumn September to November).

The bentgrass was fertilised bi-weekly with 4.9kg/ha N from urea between 1 May and 7 June and then weekly through 24 August for a total of 78.4kg/ha N during the experimental period in 2006. In autumn 2006, 71kg/ha N was applied between September and November. In 2007, the bentgrass was fertilised weekly with 4.9kg/ha N from urea between 30 April and 27 August to provide a total of 88.2kg/ha N during the experimental period.

The green was mown to a height of 4mm five times weekly and clippings were removed. Turf was irrigated to prevent wilt and was syringed frequently during dry, windy periods. Each plot measured 1.8m x 2.4m and was separated by a 60cm creeping bentgrass perimeter border. Three coring treatments were assessed as follows:

- Non-cored (NC);
- Spring-only coring (SP); and
- Spring plus summer coring (SP+SU).

Typically, large diameter tines are used to core greens in the spring and small diameter tines are used in the summer (O'Brien and Hartwiger, 2003). In the spring coring programme, plots were cored

once annually in late April using a Miltona Handi Aerifer. This hand-held, manual device had seven, 0.5inch hollow tines, which penetrated to a depth of 9cm (3.5").

Spring plus summer treatment involved coring in April as previously described combined with three summer corings using hollow tines. Summer coring was performed using one leg taken from a CoreMaster 12 Aerator equipped with a quadra-tine holder on 6 June, 28 June and 25 July 2006 and 6 June, 3 July and 31 July 2007. The four, 0.25" hollow tines penetrated to a depth of 5.5cm (2.1").

Topdressing, using the previously described mix, followed spring coring to fill holes to the surface. Following summer coring, plots were brushed to incorporate sand from cores, but no additional topdressing sand was applied.

Canopy net photosynthesis (P_n) and whole plant respiration (R_w – including plant and soil microbe respiration), were measured on a two- to three-week interval between 6 June and 7 September 2006 and on a three- to four-week interval between 31 May and 6 September 2007 using a portable gas exchange system.

P_n and R_w were determined by enclosing the turf canopy in a transparent plexiglass chamber attached to a LI-6400 CO_2 analyser as described by Fu et al. (2007). Measurements of P_n and R_w were obtained in one location of each plot on each date and data were expressed as CO_2 uptake and evolution per unit area.

Clippings were the source of mostly leaf plus some sheath (hereafter leaf or leaves) tissue used to measure WSC and SC levels. Clippings were collected on 25 May, 21 June, 21 July, 4 August and 7 September 2006 and 1 and 28 June, 17 July, 15 August and 6 September 2007.

Roots were sampled by removing four soil cores from each plot on the aforementioned dates. The four soil cores from each plot were mixed and roots were washed free of soil. Leaves and roots were placed in separate plastic bags and placed immediately in liquid nitrogen and stored in a freezer until analysed.

RESULTS – PHOTOSYNTHESIS AND RESPIRATION

Between 6 June and 24 July 2006, P_n rate was similar among coring regimes (Table 1). A higher P_n level was observed on 16 August 2006 in spring plus summer versus non-cored bentgrass, but was similar compared to spring-only cored bentgrass. On the final measurement date in 2006, bentgrass subjected to spring plus summer coring had a higher P_n level compared to spring-only and non-cored bentgrass.

In 2007, P_n levels were higher on 31 May and 24 July in spring plus summer versus non-cored bentgrass, but were similar to spring-only cored bentgrass (Table 1). No differences in Pn were observed on 2 July and 14 August 2007 among

TAKE-HOME POINTS

- Coring with large diameter times in the spring resulted in an increase in respiration on the initial rating date in each year. In general, however, photosynthesis and respiration were not negatively impacted by coring.
- Photosynthesis was unchanged when measured about 21 days following coring. On the final rating in September of each year photosynthesis was higher in spring and summer cored bentgrass.
- Leaf and root water soluble carbohydrate (WSC), storage carbohydrate (SC) and total non-structural carbohydrate (TNC) levels were similar among coring treatments throughout the summer of each year. Root TNC levels were lower in July of each year in spring and summer cored bentgrass versus other coring treatments.
- Coring in spring and summer resulted in enhanced carbohydrate levels in leaves and roots by September (start of autumn), which would benefit plants in their recovery from drought and other summer stresses.
- Seasonal carbohydrate status of creeping bentgrass support the use of large and small diameter times in spring versus summer corings respectively.

Coring is performed periodically on creeping bentgrass putting greens for numerous reasons, however, its impact on carbohydrate metabolism is unknown

coring regimes. On 6 September 2007, the P_n level was higher in spring plus summer cored compared to spring-only cored bentgrass. The P_n level, however, was similar between spring-only and non-cored bentgrass at the time of the final measurement in 2007.

Respiration rates generally were similar among coring regimes in 2006 (Table 2). Spring plus summer cored bentgrass, however, exhibited a higher R_w level on 6 June 2006 compared to non-cored bentgrass. Except on 31 May, no differences in R_w were observed in 2007 among coring regimes (Table 2). On 31 May 2007, spring plus summer cored bentgrass had a higher R_w level compared to non-cored bentgrass.

LEAF CARBOHYDRATES

In 2006, creeping bentgrass leaf tissue from plots subjected to spring plus summer coring had a greater level of WSC on 21 June compared to spring-only and non-cored bentgrass (Table 3). On 21 July, WSC were greater in spring plus summer versus spring-only cored bentgrass. No significant differences in shoot WSC levels were observed on 25 May and 4 August among coring treatments. Leaf WSC level was lower on 7 September in spring plus summer and non-cored bentgrass compared to spring-only cored bentgrass.

SC levels were greater on 25 May and 7 September, but similar on 4 August for spring plus summer versus non-cored bentgrass (Table 3). Spring plus summer cored bentgrass leaf tissues had lower SC levels on 21 June compared to spring-only and non-cored bentgrass. Storage carbohydrate levels were higher on 7 September 2006 in spring-only and spring plus summer regimes compared to non-cored bentgrass. Except on 21 July and 7 September, no differences in leaf TNC were observed among coring treatments. On 21 July, TNC levels were lower in spring only cored bentgrass leaves versus non-cored bentgrass. By 7 September lowest TNC levels were found in bentgrass leaves from non-cored plots.

In 2007, spring plus summer cored bentgrass tissue had a lower leaf WSC level on 17 July, but similar levels on 1 and 28 June, 15 August, and 6 September, when compared to non-cored bentgrass (Table 3). Except on 6 September, leaves subjected to spring plus summer coring generally had similar WSC levels compared to spring only cored bentgrass. On 6 September, leaf WSC levels were lower in spring plus summer versus spring only cored bentgrass.

Leaf SC levels were lower on 1 June, similar on 28 June and 17 July, and higher on 15 August and 6 September for spring plus summer versus non-cored bentgrass. Spring plus summer cored bentgrass had lower leaf SC levels on 1 June and 17 July, similar SC levels on 28 June, and higher leaf SC levels on 15 August and 6 September, when compared to spring only cored bentgrass tissues. TNC levels in leaves were similar on 1 June and 17 July, but greater on 28 June, 15 August, and 6 September 2007 in spring plus summer cored compared to spring-only and non-cored bentgrass.

ROOT CARBOHYDRATES

In 2006, spring plus summer cored bentgrass had higher root WSC levels on 25 May and 7 September compared to non-cored bentgrass (Table 4). No differences in root WSC levels were observed on the

In the spring coring programme, plots were cored once annually using a hand aerifier containing seven 0.5-inch hollow tines which penetrated 3.5 inches

TABLE 1. PHOTOSYNTHESIS IN CREEPING BENTGRASS IN RESPONSE TO DIFFERENT CORING REGIMES.

Photosynthesis (mmol/s/m²)

			– 2006 –			
Treatments	**6 June**	**21 June**	**7 July**	**24 July**	**16 Aug.**	**7 Sept.**
SP	6.7 a	8.4 a	4.6 a	4.1 a	4.8 ab	7.2 b
SP + SU	7.2 a	7.7 a	5.4 a	4.1 a	6.7 a	8.3 a
NC 6.9 a	8.2 a	4.9 a	3.7 a	4.6 b	7.3 b	
			– 2007 –			
		31 May	**2 July**	**24 July**	**14 Aug.**	**6 Sept.**
SP		5.8 ab	6.0 a	7.0 ab	6.6 a	4.1 b
SP + SU		7.0 a	6.4 a	8.5 a	6.9 a	5.4 a
NC		4.6 b	5.3 a	6.4 b	7.1 a	4.7 ab

NB: SP=spring only, SP + SU = spring plus summer, NC= non-cored. Means in a column in a given year followed by the same letter are not significantly different.

TABLE 2. RESPIRATION IN CREEPING BENTGRASS IN RESPONSE TO DIFFERENT CORING REGIMES

Respiration (mmol/s/m²)

			– 2006 –			
Treatments	**6 June**	**21 June**	**7 July**	**26 July**	**16 Aug.**	**7 Sept.**
SP	8.7 ab	9.4 a	7.0 a	9.8 a	8.4 a	7.8 a
SP + SU	9.3 a	7.9 a	6.0 a	7.8 a	7.8 ab	8.5 a
N-C x	8.0 b	9.1 a	6.3 a	9.4 a	7.5 b	8.0 a
			– 2007 –			
		31 May	**2 July**	**24 July**	**14 Aug.**	**6 Sept.**
SP		10.4 ab	10.8 a	10.1 a	8.6 a	10.6 a
SP + SU		11.0 a	9.8 a	10.2 a	7.2 a	9.6 a
NC		9.8 b	10.0 a	10.2 a	8.8 a	10.3 a

NB: SP=spring only, SP + SU = spring plus summer, NC= non-cored. Means in a column for each year followed by the same letter are not significantly different

other three measurement dates between spring plus summer and non-cored bentgrass. Root WSC levels were similar between 25 May and 4 August, but greater in spring plus summer versus spring-only cored bentgrass on 7 September.

Similar root SC levels were observed on 25 May and 21 June among the three coring treatments. A lower root SC level was observed on 21 July in spring plus summer compared to spring-only and non-cored bentgrass. Root SC levels were higher on 4 August and 7 September 2006 in spring plus summer versus spring only and non-cored bentgrass. Root TNC levels were similar on 25 May and 21 June, lower on 21 July, and higher on 4 August and 7 September in spring plus summer versus spring only and non-cored bentgrass.

In 2007, root WSC levels generally were similar among coring treatments on most measurement dates (Table 4). Root SC levels were lower on 1 and 28 June, similar on 17 July and 15 August, and higher on 6 September for spring plus summer cored versus non-cored bentgrass. No differences in root SC were observed on all five measurement dates between spring plus summer cored and spring only cored bentgrass.

Root TNC levels were lower on 1 June and 17 July, similar on 28 June and 15 August, and higher on 6 September in spring plus summer compared

Photosynthesis and whole plant respiration were determined by enclosing the turf canopy in a transparent plexiglass chamber attached to a CO_2 analyser

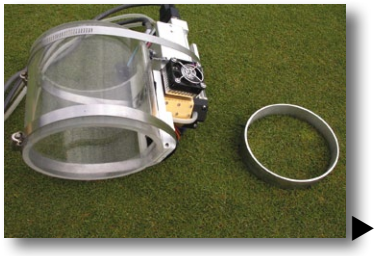

TABLE 3. LEAF TISSUE CARBOHYDRATE LEVELS.

Treatments	1 June	28 June	17 July	15 Aug.	6 Sept.
		– WSC [glucose (mg/g)] –			
SP	40.9 a	40.5 a	27.1 ab	30.4 a	30.1 a
SP + SU	38.9 a	40.9 a	25.7 b	29.9 a	27.6 b
NC	40.5 a	39.9 a	30.0 a	30.5 a	28.6 ab
		– SC [glucose (mg/g)] –			
SP	88.8 a	43.6 a	45.2 a	43.8 b	36.2 b
SP + SU	78.9 b	44.5 a	41.6 b	50.2 a	39.4 a
NC	87.5 a	43.1 a	40.9 b	45.3 b	36.8 b
		– TNC [glucose (mg/g)] –			
SP	129.7 a	84.1 b	71.3 a	74.2 b	66.3 b
SP + SU	117.8 a	85.4 a	67.3 a	80.1 a	67.0 a
NC	128.0 a	83.0 b	70.9 a	75.7 b	65.4 b

NB: WSC = water soluble carbohydrates, SC = storage carbohydrates, TNC = total non-structural carbohydrates. Means in a column for each carbohydrate parameter followed by the same letter are not significantly different.

to non-cored bentgrass. Creeping bentgrass roots subjected to spring plus summer coring had similar TNC levels on 1 and 28 June and 15 August, and lower TNC levels on 17 July versus spring only cored bentgrass. On 6 September, TNC levels were higher in spring plus summer cored than in spring only cored or non-cored bentgrass.

DISCUSSION

Data showed that P_n levels generally were similar among the three treatments throughout the experimental periods in both years. On the final measurement date in early September 2006 and 2007 (i.e., 37 to 42 days since last cored), however, P_n was higher in spring plus summer cored than spring-only cored bentgrass. Coring in the spring, however, did impact R_w on initial measurements.

On 6 June 2006 and 31 May 2007, R_w was higher in spring plus summer cored versus non-cored plots. Perhaps an increase in R_w occurred at this time because creeping bentgrass growth would be more rapid earlier in the year versus in summer. It also is possible that the larger diameter tines used in spring created more injury, resulting in an increase in R_w. Thereafter, R_w levels were similar among all coring regimes in both years. Hence, coring in general did not negatively impact P_n or R_w.

The rate of leaf and root regrowth following coring could depend on the availability of carbohydrates. Leaf carbohydrate levels were similar among rating dates and years. Highest levels of leaf carbohydrates were observed in spring at the time the first measurements were made in either May or June. Leaf WSC levels in both years generally were lowest in July. Leaf WSC levels were higher in September in spring plus summer versus the other coring treatments in 2006, but not in 2007.

Leaf TNC levels also were higher in September in spring plus summer cored compared non-cored bentgrass in both years. Similarly, Narra et al. (2004) found that TNC levels in bentgrass clippings decreased in mid-July and August, but increased during autumn. There are no other known coring studies with which to compare our results.

Mowing causes mechanical injury and does impact leaf carbohydrate levels. For example, a reduction in fructans and glucose in leaves was reported in response to mowing (Howieson and Christians, 2008; Volenec, 1986). Howieson and Christians (2008) found that the duration and amount

TABLE 4. ROOT TISSUE CARBOHYDRATE LEVELS.

Treatments	1 June	28 June	17 July	15 Aug.	6 Sept.
		– WSC [glucose (mg/g)] –			
SP	22.2 a	18.2 a	35.4 ab	36.5 a	34.4 a
SP + SU	20.3 a	19.1 a	32.5 b	38.0 a	36.9 a
NC	22.5 a	18.8 a	37.4 a	38.2 a	37.0 a
		– SC [glucose (mg/g)] –			
SP	61.9 b	38.1 ab	19.7 a	22.1 a	25.3 ab
SP + SU	67.2 b	36.9 b	18.2 a	20.0 a	27.0 a
NC	73.8 a	40.3 a	19.2 a	21.9 a	22.2 b
		– TNC [glucose (mg/g)] –			
SP	84.1 b	56.3 a	55.1 a	58.6 a	59.7 b
SP + SU	87.5 b	56.0 a	50.7 b	58.0 a	63.9 a
NC	96.3 a	59.0 a	56.6 a	60.1 a	59.2 b

NB: WSC = water soluble carbohydrates, SC = storage carbohydrates, TNC = total non-structural carbohydrates. Means in a column for each carbohydrate parameter followed by the same letter are not significantly different.

Spring plus summer treatment involved coring in April combined with three summer corings using hollow tines

of fructan and glucose reduced was greatest in double-cut bentgrass. The aforementioned effects, however, were transient and leaf sugar levels were equivalent to those found in uncut bentgrass by 60 hours following mowing.

Root TNC levels were highest in the spring and lowest in late summer. The summer decline of TNC levels in creeping bentgrass roots was previously reported by Xu and Huang (2003). Water-soluble carbohydrate levels in roots generally were similar on most rating dates. Storage carbohydrate and TNC root levels were highest in non-cored bentgrass in June 2007 and root TNC levels were lowest in spring plus summer cored bentgrass in July 2006 and 2007. Otherwise, root carbohydrate levels were similar among coring treatments until September. Like leaves, TNC levels in roots were highest in May and June. Thereafter, TNC levels declined in 2006, but remained static in 2007.

Root SC levels were on average 56 per cent (2006) and 22 per cent (2007) higher in September of each year in spring plus summer cored compared to non-cored bentgrass. Root TNC levels were 26 per cent (2006) and 8 per cent (2007) higher in spring plus summer cored versus non-cored bentgrass in September. Late-summer increases in TNC and SC levels associated with coring may have been due to improved nutrient (i.e., N) availability accorded by re-incorporation of soil and topdressing or improved oxygen availability.

Following summer coring, plots were brushed to incorporate sand from cores, but no additional topdressing sand was applied

The higher leaf and root TNC levels found in creeping bentgrass in spring would be useful in assisting the turf in recovering from injury caused by the more invasive, large diameter tines. Lower TNC levels in summer, however, indicated that using a larger tine at this time would have a greater negative effect on plant recovery. Higher TNC levels in tissues of spring plus summer cored creeping bentgrass in September likely would enable plants to recover more rapidly from summer stresses in the autumn.

ACKNOWLEDGEMENTS

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Trans-Tasman travels

New Zealand is quickly establishing itself as one of the world's hottest golfing destinations and for a group of Melbourne superintendents their first visit across the Ditch back in May left some lasting impressions. Here Rob Halsall recounts the trip which took in the likes of Jacks Point, Cape Kidnappers and Kinloch.

During May 2010 Martin Greenwood (Kingston Heath Golf Club), Glenn Stuart (Metropolitan Golf Club), Hayden Mead (Spring Valley Golf Club), Shane Stuart (Long Island Country Club), Rod Tatt (Woodlands Golf Club) and Rob Halsall (GB&S Australia) travelled to New Zealand as part of a GB&S Australia Study Tour.

Martin and Glenn were keynote speakers at the three-day South Island Fine Turf Seminar and joined the likes of Mark Perham (Eden Park, Auckland) and David Howard (NZSTI) as well as a host of local New Zealand superintendents and sports turf experts.

As well as attending the seminar, the study tour also provided an opportunity to visit New Zealand's finest golf courses including the world renowned Cape Kidnappers and Kauri Cliffs. The aim of the tour was to better acquaint ourselves with our Kiwi neighbours and to observe, discuss and compare some of the philosophies which have created such a unique golfing destination.

It was the first visit to New Zealand for all of us and we were greeted with breathtaking views of the snow-capped Remarkables mountain range as we flew into Queenstown for the South Island Fine Turf Seminar which ran from 2-5 May at Rydges Hotel.

The conference week began with golf at the picturesque Queenstown Golf Club, a par 72 course with a combination of challenging, scenic and unique holes laid out across the Kelvin Peninsula overlooking Lake Wakatipu. It was our first taste of fescue fairways and Egmont greens which Rod obviously enjoyed as he shot 73 to upset the locals.

Following a mayoral welcome, the seminar sessions began and included some excellent presentations. Martin and Glenn both discussed the various histories of their golf clubs and joined David Howard to present on integrated pest management. Martin looked back at Kingston Heath's hosting of the 2009 Australian Masters and together with Glenn spoke on playing surface management. Other informative topics included organic turf management (Ian Douglas, The Hills), wetting agents (John Illingworth) and managing rootzones (David Howard).

The conference also afforded a number of visits to Queenstown's many spectacular courses. One of the first courses visited was Millbrook, a Greg Turner-Scott Macpherson designed course set in a natural, alpine amphitheatre against the backdrop of the Remarkables. The course boasts magnificent fescue/browntop fairways and Egmont greens and is the central feature of an exclusive housing development.

Opened in 2007, The Hills has hosted the last three New Zealand Opens and is set on over 100 hectares of a former deer farm on the outskirts of Arrowtown in Central Otago. Trees, both native and exotic, are a feature of the course. The wetland areas include 10 lakes and various ponds and have been planted out with varieties of New Zealand flax, toetoe, cabbage tree and wetland grasses and reeds. More than 5000 red and silver tussock plants create a spectacular visual statement.

Arrowtown Golf Club proved to be one of the highlights of our trip. A classic, character-filled golf course built amongst historic stone cottage ruins, it's undulating greens, tight fairways and natural rocky outcrops make this unique course a must see for anyone heading to the South Island.

The afternoon of the last day of the seminar was spent at the stunning Jack's Point. Nestled at the base of spectacular mountain ranges and overlooking Lake Wakatipu, the course traverses wetland areas to the lake edge, encountering steep bluffs, indigenous vegetation and wildlife. The Egmont greens and tees were both cut at the same height and along with the fescue fairways provided golfers with fantastic playing surfaces. Extensive sheeps/hard fescue rough areas also complimented the golf course.

Jack Nicklaus's rugged Kinloch

Far left: Nestled at the base of spectacular mountain ranges and overlooking Lake Wakatipu, Jack's Point in Queensland traverses wetland areas to the lake edge, encountering steep bluffs, indigenous vegetation and wildlife

NORTHERN EXPOSURE

Following the seminar, we embarked on the second leg of the journey which saw a road trip throughout the North Island. A flight from Queenstown took us to Wellington where our first stop was the magnificent Alex Russell-designed Paraparaumu Golf Club.

Paraparaumu is a world renowned layout on the undulating dune land of the Kapiti Coast and has hosted an unprecedented 12 New Zealand Opens. Leo Barber has the inimitable role of superintendent/general manager and has challenged his club to improve and restore the course to its original model. With slick *Poa annua*/bentgrass greens, fescue fairways and a magnificent layout, Paraparaumu was certainly one of the country's hidden gems.

From there we headed east up the coast to the world famous Cape Kidnappers. Completed in 2004 by Tom Doak, the course is located among spectacular landscape overlooking Hawke's Bay. Doak probably best describes the golf course: "Our goal in designing golf courses is to create interesting holes you wouldn't find anywhere else. That wasn't hard to do at Cape Kidnappers."

Superintendent Steve Marsden presented the golf course in great condition and we all enjoyed the opportunity to play. We were interested to hear how Steve looked at *Poa annua* management and controlling potentially debilitating thatch collapse issues.

Travelling inland to Taupo we discovered what must rank as one of Jack Nicklaus's finest works – Kinloch. After four years of planning and construction, the Golden Bear fulfilled a lifelong ambition to create a golf course in New Zealand. The layout is wonderfully strategic with undulating fairways and greens and fescue encrusted bunkers providing a real test of golf.

Similar to Cape Kidnappers, cattle were used to control the luxuriant fescue rough areas – temporary electric fencing was used to keep cattle within the rough confines on a rotating schedule. With such a magnificent result, we all wondered how we could implement the initiative into our respective courses. Unfortunately, financial constraints including a recent change of ownership has stalled progressive development of the clubhouse and golf course.

After a long drive north the next stop was Kauri Cliffs which is situated on a spectacular site overlooking Matauri Bay in the Bay of Islands. The weather conditions were less than ideal with gale force winds and at times, driving rain but this didn't deter six Aussies as we really enjoyed the golf course, particularly the SR1119/1020 greens.

Following an extended drought in the area, superintendent Andy Wood welcomed the timely precipitation as he had oversown much of the golf course with ryegrass only a week earlier. We were interested in some of the techniques Andy and his staff used to control *Poa annua* in the cool-season environment.

Getting their first taste of New Zealand's finest golf courses were from left Martin Greenwood, Rob Halsall, Hayden Mead, Shane Stuart, Glenn Stuart and Rod Tatt

Back in Auckland we had the opportunity to visit Titirangi Golf Club before flying home. Alister Mackenzie visited Titirangi in the early 1930s for a brief period and drew up a basic course layout and green designs (these sketches are on display in the clubhouse). He described the land as being "exceptionally well adapted for golf, undulating without being hilly." The club is attempting to restore the course back to its former architectural glory with an ongoing reconstruction plan.

Superintendent Todd Fletcher had the golf course in great condition with fescue fairways, Manor browntop tees and Egmont/browntop/*Poa annua* greens. Todd has used a number of specific wetting agents to successfully prevent/reduce the incidence of black layer in new greens.

The New Zealand experience was one which we will all long remember. In just 10 days we had attended the very informative South Island Fine Turf Seminar, visited the best golf courses in the country and created some key relationships with our Kiwi neighbours. We returned much better informed on cool-season grass management and are now more aware of the potential role of fescues in the golf course environment. We all agreed that visiting New Zealand is like the kiwifruit – once you get through that rough exterior, the taste is irresistible.

Cape Kidnappers is a must visit on any trip to New Zealand

Curlewis Golf Club is set to embark on a sewer mining project to help end its reliance on potable water

Water reclamation project to revive Curlewis

In 2008 Pennant Hills Golf Club in Sydney became the first club in Australia to invest in sewer mining technology to help remedy ongoing issues with water availability. Two years later and as course superintendent Rob Bradley writes, Curlewis Golf Club near Geelong in Victoria is hoping to following in Pennant Hills' footsteps.

Water has always been an issue that has plagued Curlewis Golf Club ever since Vern Morcom first tabled his designs for the course back in 1947. It stopped construction of the course in the early stages after the primary bore was found to be too brackish before failing altogether, and it wasn't until the development of a town reticulation scheme that the course was completed and opened in the early 1970s.

Since starting here as course superintendent in June 1993, water has continued to dominate discussions and the years where some form of water restrictions were not in place have been very few and far between. The real low point came during the summer of 2006/2007 where no town water was available for outside use. As a result of that long, hard summer, course quality dropped dramatically and even now some areas of the course are still recovering.

With competition from newer clubs such as 13th Beach and The Sands, Torquay and other clubs that had resolved their water issues, Curlewis was in danger of losing members as well as green fee players. Financially that 2006/2007 period was very costly and provided the kick in the backside that the club needed after the 'no worries' attitude that had been prevalent before. Since then water has become the club's number one priority with a number of options being investigated.

TAPPING IN

Curlewis Golf Club is located in what might be called the 'middle of nowhere' as far as the Geelong region is concerned, which currently makes the harvesting of extraneous storm water not an option as yet. While there is a reasonable volume of water that we can harvest from rain events as course run-off, in the scheme of our total requirement it has proven to be inadequate. Inside the next 10-15 years with the urban sprawl that has already started nearby it will be another option to be explored, but as we all know it still needs to rain.

Bore water was also investigated, but with salt levels being very high (tests from a number of local bores were undertaken) together with predominantly low flows being the likely outcome, it would become a very costly and unjustifiable exercise to produce serviceable water from a desalination plant.

With local water authority Barwon Water's Drysdale-Leopold raising sewer running along the old Geelong-Queenscliff railway line parallel to our northern course boundary, it was considered worthy researching sewer mining as a potential water source option. The Internet, being the valuable tool that it is, readily showed that we potentially had all the water we needed running past our doorstep.

This mainline, as we discovered, takes 450 million litres (ML) of sewage per year to the Black Rock treatment plant near 13th Beach, with indications that it will increase to 750ML/y in the future. The Black Rock plant supplies Class C treated water to 13th Beach, Barwon Heads and The Sands, Torquay golf clubs as well to a number of nearby farms.

We approached Barwon Water to see if sewer mining was a permissible option and we were met with a very positive, albeit cautious response. Finally, we had a direction in which to go.

EXPERT HELP

With Pennant Hills Golf Club in Sydney having recently commissioned their plant, a seminar in Melbourne on recycled water seemed a good next step with the construction company of that project being among those who presented. New club manager Mat Loughnane and I attended and left full of enthusiasm and interest in the sewer mining process.

With Mat's contacts through the Golf Manager's Association he was able to find more about the ins and outs of such a project as Pennant Hills, which was a first for Sydney Water. This was also to be a first for our local water authority.

The most logical first step for our project was to enlist a consultant to help with the project and guide us through the many detailed processes. In my experience smaller clubs like us tend to go it alone and spend money in areas that they need not to and make limited progress.

We choose Kurt Dahl from Permeate Partners as his experience with the Pennant Hills project and sewer mining/storm water reclamation projects made him an ideal candidate.

We started the process by endeavouring to establish our potential water requirements. Using figures based on past usage was hard because our fairway irrigation system had only been used once without limited water access since 2000 because of the imposition of Level 3 and 4 water restrictions. So, basing my figures on local evaporation rates and those of other local veteran superintendents, I made sure that I was close to the mark. My first thought that anything more than 10ML would be great was obviously not the answer required.

A plant specification was formulated with a budget in mind and our decision was to take the minimalist approach with the ability to expand in the future. An output of 260,000 litres a day was what we were looking at. With adequate storage facilities the plant would give us the opportunity, if required, to water our greens five times per week, tees twice a week and fairways once or twice depending on the needs of the soil type.

The nutrient output of the plant was specified so that we could obtain as good a balance as we could get without there being a huge increase in cost of stripping nutrients back further. Our concern was more for potential impact on the greens than anywhere else on the course as we currently use limited nitrogen as part of our programme. With the help of Darren Cribbes looking at our nutrition programme and plant balance, it showed that getting two consultants on the same page earlier rather than later is very handy.

Once we had the water, nutrients and specifications worked out, Kurt started to earn his money. He met with local authorities in Geelong and ironically every time he did so it seemed to rain (we could have saved money by flying him down weekly during watering times).

We are now a year on after the holding of a special meeting at which the proposal for the project was approved by 98 per cent of the 189 members in attendance without a sod having been turned. A company has been selected for the plant, and approvals from local authorities have been finally received. Earthmovers are ready to cut an access/construction road, so hopefully by the time you are reading this edition we will have some action which will satisfy our impatient members.

As is normal in a project of this size and type you look early for help from members and other contacts with the hope of someone having a foot in a door somewhere. In the beginning we had very little, but now things are happening a few have come out of the woodwork. The club has also been fortunate in securing some grant money through the Victorian Government's Smart Water Fund and was one of 17 successful projects announced to receive funding in July 2010.

Hopefully, come next summer I will have something that has water coming out the end of it and onto the golf course. So far it has been a very interesting experience and not one I had foreseen back in 1988 when I left New Zealand and joined The Lakes, that's for sure.

Curlewis Golf Club superintendent Rob Bradley

Past summers have proven cruel for Curlewis with the club seeing a drop in revenue and membership as a result of the drought

Cooroy Golf Club QLD

She rides a Harley, plays rugby league for the Sunshine Coast Sirens and when she isn't pulling on a helmet or lacing up Kirsty Herring is course superintendent at Cooroy Golf Club. Here she takes ATM inside turf management operations at the south-east Queensland course.

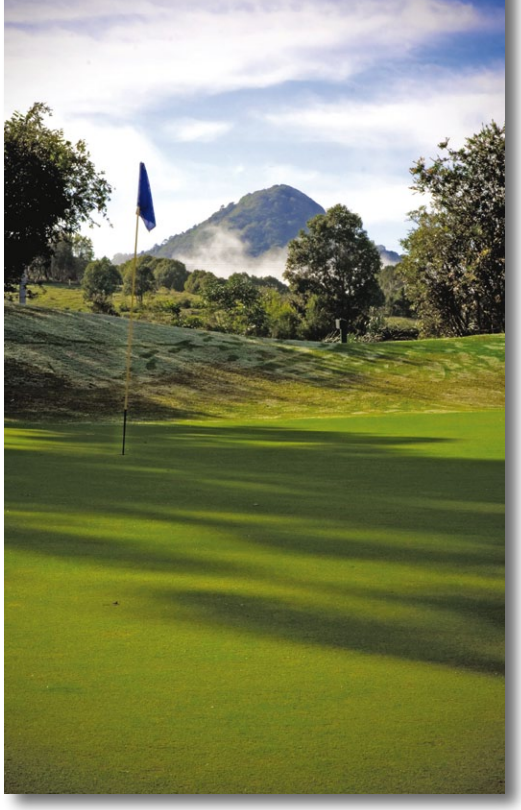
Superintendent: Kirsty Herring.
Age: 30.
Period as a superintendent: 14 months.
Association involvement: AGCSA, GCSAQ.
Previous clubs: Horton Park Golf Club (greenkeeper, one year); Berkeley Hall Golf Club, South Carolina, USA (spray technician, one year); Horton Park Golf Club (apprentice greenkeeper, three years); Beachmere Bowls Club (apprentice greenkeeper, two years).
Turf management qualifications: Cert. III Turf Management (Grovely TAFE). Currently studying Degree in Turf Science through University of Queensland.

Tell us a bit about your background in turf management. How did you start out in the industry? At the age of 20 I was unemployed and with my past experience being in data entry and office work I needed a change. I volunteered at Beachmere Bowls Club to help the local greenkeeper and keep myself busy and after three months I was offered an apprenticeship.

From there I spent the next two years pestering local golf courses until Pat Pauli at Horton Park Golf Club decided he liked the idea of having a woman on staff in the hope I would have attention to detail and take care of machinery (perhaps an unwarranted assumption). I finished my apprenticeship under Pat's wing and hooked up with the Ohio State Program which took me to Berkeley Hall, a private course in South Carolina, where I worked mainly as a spray tech.

During my time there I got the opportunity to work The Heritage PGA at Harbour Town and the US Ladies Open at Pinehurst. I came home and continued at Horton Park until the 2IC position at Cooroy came up. Within eight months of moving here I was appointed superintendent.

You are one of only a handful of women to rise to the position of superintendent in Australia. How do you find working in such a male-dominated industry and what qualities do you think you bring to the job? There's no denying this is a male-dominated industry and I was aware of that right from the get go. Getting a foot in the door was the hardest part. Once people understand that you're not afraid of hard work and you're just as capable as anyone else, they are excited to have a woman for a change. I still get a lot of reps show up asking to see my boss and they seem pretty surprised when I say "You're looking at her!" Having said that, local superintendents have been very supportive.



Far left: Cooroy Golf Club, situated about 15-20 minutes inland from Noosa Heads, opened as a nine-hole course in 1936 but it wasn't until 2005 that it became an 18-hole operation

Left: Cooroy Golf Club affords some spectacular views of Cooroy Mountain and the surrounding valleys

I'm not sure being a woman brings anything different to the job, it's really the individual. I work hard to integrate good turf nutrition, the environment, legislation and practicality into turf management, but I think most superintendents in 2010 think that way.

Give us an overview of Cooroy Golf Club and some of its unique characteristics? Cooroy Golf Club opened as a nine-hole course in 1936 and it wasn't until 2005 that it became an 18-hole operation, so half the course is relatively new. It's located on the edge of the hinterland just 15 minutes away from the heart of Noosa boasting a picturesque country setting including some amazing views of Cooroy Mountain and the surrounding valleys. The course itself has a good rustic feel to it and it's also challenging with some great doglegs and tricky holes that even get the professionals scratching their heads.

Take us through your turf management operations there and how have you fine-tuned them during your time as superintendent? My main focus is turf health for the future. The greens have suffered a lot with disease over the last few years – we nearly lost two greens to pythium last year and are battling brown patch this year – so it's all about really good nutritional and cultural practices to see healthier greens and spend less money down the track.

What are some of the unique features about Cooroy Golf Club from a turf management perspective? Is it an easy/hard facility to manage? The whole course is built on clay. Rainfall up here can be extreme at times, and in the first six months of 2009 for instance we received 1700mm and then not a single drop for the remainder of the year which made it very difficult to grow grass. The greens only make up 6000m^2 so they're easy to manage. Having said that, since coming here I have seen every disease, weed and insect known to man on these 328 greens!

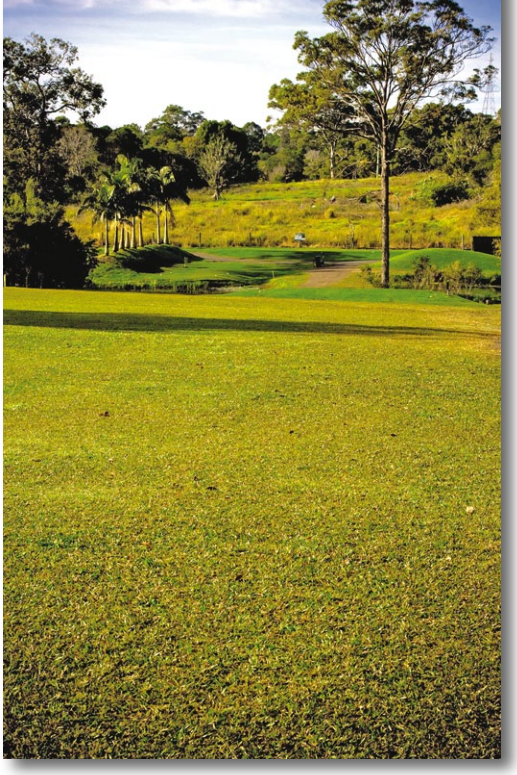
What are some of the major challenges facing Cooroy Golf Club both from a turf management and general club management perspective? Drainage is probably our biggest issue. With a solid clay base water lays around for long periods of time and underground springs pop up everywhere meaning buggies struggle to get out during the wet season which creates a financial strain, but I think a lot of small courses deal with similar stresses. It's just going to be a gradual process of working from hole to hole fixing the problem areas.

Outline any major course improvement works you have completed or that are in the pipeline? We're in the process of rebuilding our 7th tee and have two more to move to create a safer playing area for the golfers. We're also looking at major drainage issues in the next 12 months and adding some bunkers to increase the difficulty.

Water is obviously a critical issue around the country at present. How is Cooroy faring? It's difficult for sure. We get heavy rainfall in short periods and then can go long periods with nothing. Last year we had six months without a drop – our driest time in 20 years – and the dams were down to a puddle. I had to stop watering tees in September and push the greens as long as I could in between each watering. We didn't mow fairways or tees for five months and it was January before we really saw any decent rainfall. The biggest problem is storage and not being able to catch the massive amounts we get early in the year. In saying that we are lucky and I guess some places would love to get as much rain as we do.

What are some pros and cons of being a regional superintendent? People are very generous towards regional courses. Labourers and manufacturers are more likely to donate their time and products to help

Cooroy Golf Club superintendent Kirsty Herring



Cooroy's fairways are a mix of carpet grass and blue couch

you out of a jam. I don't think you'd see that so much in big city courses. Funds are always tight and you have to do most things the hard way. For instance, we topdress all our greens by hand which is time-consuming so it doesn't get done often enough and is hard to do accurately which can lead to localised dry patch issues. We also walk spray all our greens which has its ups and downs.

The one product I couldn't manage my course without is… Wetting agent. We use Mary River sand to topdress and doing it by hand means we have dry patch on a regular basis.

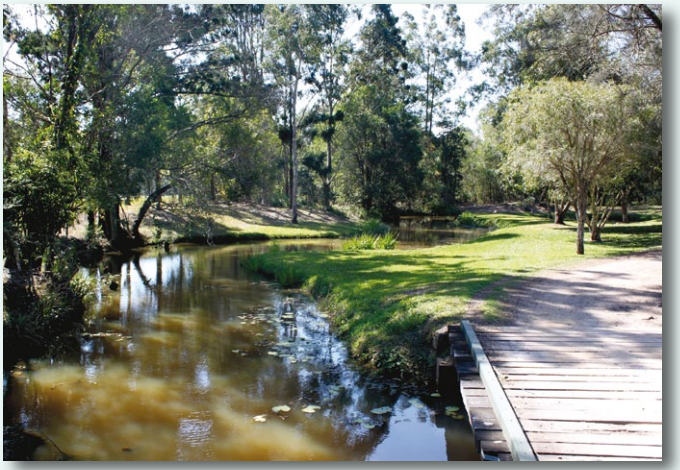
Are expectations of course presentation and conditioning any less than that placed on your metropolitan counterparts? It's the total opposite. Members and visitors see other courses with beautiful irrigated fairways and greens/bunkers manicured by 12 staff and expect your course to look the same. I think we have to work a lot harder with a lot less to produce something people want to come to.

Do you have to be more resourceful as a regional superintendent? You definitely have to be a jack of all trades. I'm currently an apprentice bush mechanic and I have certainly learnt a lot about machinery in the two years I have been here. You can't just go out and buy anything you need. You want a dew broom, you build one. The boys are very innovative and can create just about anything with a few planks of wood, an old mower blade and some bolts.

If you could change one thing about your job as a regional superintendent what would it be and

AT A GLANCE - COOROY GOLF CLUB

Where in the world is Cooroy? Cooroy is about 15-20 minutes inland from Noosa Heads on Queensland's Sunshine Coast.
Course specs: 18 holes, 5326m.
Greens: 328 cut at 3.8mm over summer and 5mm over winter.
Tees: Greenlees Park/carpet grass cut at 9mm.
Fairways: Carpet grass/blue couch cut at 17mm over summer and 20mm over winter.
Members: 450 full members and 100 social members.
Annual rounds: 12000 (includes competition and social).
Major tournaments/events: 2010 Queensland Police Games. We host many women's invitational days and were also very lucky to host a Chaplaincy Charity Day with Katherine Hull which will hopefully become an annual event.
Annual budget: Total course management budget including wages, daily running costs, chemicals/ferts, machinery maintenance, repairs and replacement is between $350,000-$400,000.
Staff structure: Wayne Patston (general manager), Paul Dawson (assistant superintendent), Scott Gordon (groundsman) and Daniel Manning (groundsman).
Water sources: We have a small creek system that runs through the course and into Lake Macdonald which we pull directly from and two back-up dams with a pipe system pumping into the creek during dry times. We are also in the process of installing a bore as an emergency backup.
Irrigation system: We have automated irrigation to greens and tees. We run two Grundfos multi-staging inline pumps with a variable speed controller and use a Hunter ICC. Sprinkler heads vary greatly from green to green.



A small creek system is Cooroy's primary water source

Renovations: We scarify early September then core with 5/8" tines in early October removing the cores, heavy topdress with Mary River sand after coring then light dustings throughout summer. We use solid needle tines every 6-8 weeks over summer to help water infiltration and get oxygen to the roots in the wetter months. We lightly groom them monthly over the growing period.
Major disease/pest pressures: Brown patch has been our biggest issue for the last two years; we just can't seem to get it down to an acceptable level. With brown patch came pythium last year which nearly cost us two greens but once identified and treated correctly hasn't been a problem since. Mole crickets are always an ongoing battle. Tired of using ineffective pesticides, I spent a whole day last summer pouring soapy water down their holes – time-consuming but effective!

why? Probably the limited funds; it'd be nice to just pick and choose any machines you want.

How important are the relationships you have with nearby regional course supers/trade reps? Hugely important, especially for myself just starting out as a superintendent. I've been very lucky. Guys like Pat Pauli (Horton Park GC) and Peter Smith (Tewantin Noosa GC) have more years' experience between them than I've had hot dinners and I'm very fortunate that they, and all the superintendents on the Sunshine Coast, have been so helpful and encouraging.

Ian Allison, my local Globe rep, has been great and a bloke that's a bit of a local legend as far as I'm concerned is Peter Knock from Peter's Turf Equipment Services. He'll bend over backwards to help get a machine up and running and he's even given me step-by-step instructions over the phone one time. He takes a lot of stress off me.

Given your distance from the major metro areas, how do you make sure you keep abreast of the latest turf management techniques and methods? Well, the Internet is a wonderful thing; there's really nothing you can't find out if you Google it! The AGCSA's website is always handy keeping you up to date with upcoming events, research and general turf news. And there are a few other good ones – Pest Genie for instance. Of course, having a chat with local supers is always insightful. I think it's very important to attend any education days/seminars that are nearby also.

Do you think regional/country superintendents have a better work-life balance than their metro counterparts? To a certain degree they'd have to but really it's up to the individual. It just depends how much you're willing to put in.

What are some of the more unusual requests/things you have had to do as a superintendent of a regional course (not necessarily turf management related)? Chasing dingoes off the course or removing their aftermath from greens is a fairly regular occurrence.

What have you got in your shed?

- Jacobsen 3800 fairway unit;
- Jacobsen GKIV greens mower;
- Jacobsen Turfcat 628 rough mower;
- Toro Reelmaster 3100D tees/surrounds mower;
- Old Toro Reelmaster 6500D; and
- A couple of old Toro greens mowers and a John Deere front deck roughcutter.

The John Deere rough mower is definitely the most beat up piece of machinery around here. If I came back in a second life as one of them I'd be very afraid! A topdresser would be my priority then maybe a flash spray rig and another Turfcat.

Favourite spot on your course? The creek in front of the 7th tee where the turtles like to sunbathe.

Most pleasing/rewarding moment during your time as Cooroy GC superintendent? Everyday – just listening to the members/visitors and the positive things they have to say. The boys and I have been working hard on lots of little projects over winter and the place is just looking fantastic at the moment.

Name three golf courses that you would like most to visit and why? Pebble Beach, Sawgrass (stood at the driveway once!) and of course Augusta (stood at the driveway there too...too scared to drive down it just in case security carried me away). They all just look amazing and I think they're America's best.

Cooroy Golf Club hosts numerous women's invitational golf days and also hosted the 2010 Queensland Police Games tournament

OFF THE COURSE - KIRSTY HERRING

Family: Myself, my partner of three years and my Harley Davidson Sportster 883cc (pictured)!

Any claims to fame outside of turf management? Played representative rugby union for South East Queensland in 2006.

Any unusual hobbies/past-times away from turf? I play rugby league for the Sunshine Coast Sirens and hopefully by the time this goes to print we will have won the grand final!

Favourite sporting team? Cronulla Sharks. Yes, I haven't had much to cheer about in the last few years!

What book are you reading now? 'Live to Ride' magazine.

Golf handicap? Myself!

Favourite golfer? John Daly and Katherine Hull.

The best thing about Cooroy (aside from the golf club and its turf surfaces) is... its location. It's a quiet little township nestled in the hills and close to some of the best beaches in the world.

What do you do to get away from it all? Jump on my sporty and cruise up the hills looking for a nice pub. Love camping and a fish as well.

UWA HOSTS PESTICIDE LEACHING WORKSHOP

A better understanding of pesticides and the risks associated with their routine application to vegetation in Western Australian urban, natural and agricultural environments will improve the management of potential public health and environmental risks.

Able to migrate through air, sediment, groundwater and surface runoff, for example, the extent and ways in which pesticides leach through soil to non-target zones, such as lakes and rivers, was the focus of a recent University of Western Australia (UWA) workshop at its Institute of Agriculture on the Crawley campus. Hosted by UWA's School of Earth and Environment and School of Plant Biology, it discussed recent developments in pesticide fate, risk assessment and regulations.

After recently meeting with concerned representatives of local government and discussing pesticide management, UWA Associate Professor Louise Barton and co-leader of the UWA Turf Research Program in the School of Plant Biology, approached UWA colleagues and specialists in the field, Professor Christoph Hinz and Dr Gavan McGrath, to present a workshop exploring current practices in pesticide management.

Dr McGrath said there was a need for a formalised, agreed risk assessment procedure, including an evidence-based evaluation system and effective data collection, in order to manage the risks.

"Potential impacts such as contamination of our drinking water supply, dermal contact by children in parks and playgrounds, inhalation of spray drift and environmental effects, such as those on frogs in our surface water bodies, lakes and rivers, can't be ignored," Dr McGrath commented. "We need to create a culture where by sharing information we help create a solution and the full room today proves the clear need for better understanding of pesticide risk assessment."

According to Associate Professor Barton, a very real need for more science and greater evidence based information had been identified for those managing turfgrass in urban environments and about 50 consultants, state and local government representatives and turfgrass managers were therefore invited to participate in the UWA workshop.

"Attendees had a common interest in better understanding all aspects of pesticide leaching and what that meant for those applying the pesticides and for members of the public," she said.

In discussing pesticide regulation in Australia and overseas, Dr McGrath said there was a need for funding to build a responsible pesticide management regime.

"Under Australia's existing regulatory regime, responsibility for minimising risk to health and the environment is the responsibility of the user, who is most often the least informed on the possible risks to people and the environment," he said. "We're not equipped in WA with a proper process in place to protect end users."

Dr McGrath said progress on pesticide risk management in New Zealand and some parts of Europe offered a good example of the future direction needed for WA.

"The latest European Union directive for 2011 includes safeguard zones for any surface and groundwater used for drinking water, prohibited use in specific areas used by the general public, residue limits for foods and training for pesticide users and salespeople," he said.

Participants agreed there was a need for an easy-to-use risk management tool, developed in consultation with regulators, scientists and end-users, to assist WA turfgrass managers to better choose the type and timing of pesticide applications.

To demonstrate the need for tighter regulation, Professor Hinz discussed field experiments, risk modelling, atmospheric and rainfall components and how soil and water contribute to the off-site flow of pesticides.

"A key challenge is managing the multitude of pathways through which pesticides can migrate, including through air, sediment, groundwater, surface runoff and biological factors," he said.

Town of Bassendean Director of Operational Services, Simon Stewert-Dawkins, said the UWA workshop provided a good opportunity to learn about recent developments in pesticide regulation in Australia.

"Our staff use chemicals in accordance with manufacturers' instructions and the Town's Occupational Health and Safety Chemical Spraying Guidelines," he said. "Based on information presented at the workshop, I am keen for the pesticide industry to develop an easy-to-use, computer-based risk assessment tool that could be applied to various WA soil types associated with turf and bush rehabilitation areas and for general horticultural crops."

At the UWA Institute of Agriculture pesticide leaching workshop were (from left) Associate Professor Louise Barton, Professor Christoph Hinz and Dr Gavan McGrath all of the UWA School of Earth and Environment

BAROSSA CREW GETS TO THE ROOT OF DRAINAGE PROBLEM

Invasive roots have always been the bane of superintendents and turf managers when it comes to drainage issues. That said, however, the crew at Barossa Valley Golf Club (SA) still couldn't quite believe their eyes while rectifying some drainage issues recently. Course superintendent and AGCSA member Stephen Chapman, who sent in the accompanying photo, takes up the story:

"We were having some problems with drainage on a section of our 8th green. We thought that the subsurface drains were starting to silt up so we decided to install new drains on the edge of the green. After the turf was removed and the trenches dug we located the existing green drainage outlet pipe. We were planning to join the new drains into this pipe but after cutting a hole we discovered that the pipe was full of roots.

With further investigation we found that sometime in the past the pipe had been hit by a trenching machine. After cutting the pipe we began to pull out a mass of tree roots which had filled the 90mm wide pipe for a distance of 12 metres. No wonder the green wouldn't drain!"

NZ STUDENTS GET A TASTE OF MELBOURNE TURF

A group of turf management students from New Zealand's Otago Polytechnic fundraised for more than 18 months to fund a recent study tour across to Melbourne. Led by sports turf programme manager Gary Smith, the group of eight Year 2 students spent a week in late-July/early-August visiting some of Melbourne's leading sports turf facilities including the MCG and Royal Melbourne Golf Club.

To raise enough funds, students undertook a variety of work including course preparations at The Hills which hosts the New Zealand Open. No project was too big or small and the students assisted golf course contractors building greens and tees, installing irrigation and laying lawns for local residences. They even sold firewood.

"We have students who want to work on golf courses and at stadiums so we decided that Melbourne was the best place to visit world class venues to cover all aspects of sports turf management regarding cool- and warm-season grasses," says Smith.

The trip across got off to the right start with the group among the 51,000-strong crowd at Etihad Stadium that witnessed the All Blacks chalk up a victory over the Wallabies. A few days later the students were on the much-talked about surface itself with fellow countryman and Etihad Stadium arena manager Gavin Darby who discussed some of the many management challenges he faces.

The group also visited the MCG, Flemington and Melbourne's newest sporting facility AAMI Park before heading to the famed sandbelt where they were shown around Metropolitan, Kingston Heath and Woodlands. The final day saw the group head to the Mornington Peninsula where they inspected The National Golf Club and Moonah Links.

"It was great to listen to the different philosophy each turf manager had regarding managing their venues," says Smith. "There was also great interaction between the turf managers and students who were able to get a real insight into management practices.

"We really appreciated the time that all superintendents and turf managers set aside for us. The students were amazed by the hospitality we were shown and when Martin Greenwood said we were lunch quests at Kingston Heath, you couldn't get better than that. It was a trip of a lifetime for the students and Otago Polytechnic sports turf lecturers and we hope to bring the next intake of students over again in 2011."

Murray Bridge Golf Club became the staging ground for a twilight symphony spectacular back in March as part of the Ripples Regional Centre of Culture festival. More than 6000 flocked to the golf course for the event

MURRAY BRIDGE MALS HIT THE RIGHT NOTES

Regional superintendents and their crews are often called upon to undertake a raft of non-turf related projects, but not even Murray Bridge Golf Club's indomitable duo of Mal Grundy and assistant Mal McDonald could quite believe what came their way back in March.

The course, located about 45 minutes east of Adelaide, became the staging ground for a twilight musical spectacular as part of the year-long Ripples Regional Centre of Culture festival. On the evening of 20 March, more than 6000 people descended on the club's 8th fairway to listen to the Adelaide Symphony Orchestra play a full repertoire of classical hits, complete with Tchaikovsky's 1812 Overture as the grand finale and a $20,000 fireworks display.

"Minding my own business while slaving away one day in early 2009, I get a call from manager Stephen Cocks who wanted me at the clubhouse pronto," recounts Grundy, who has been superintendent at Murray Bridge for the past 28 years. "On arriving a small crew of well-dressed, high-heeled clad women greeted me explaining they represented Country Arts South Australia and that a year-long calendar of arts events was being planned for Murray Bridge in 2010. You can imagine what I was thinking. The only art I've seen is some of the handy work caused by vandals on our greens, usually before a major event.

"They wanted to see if we could host a twilight symphony and after showing them around the course in the work ute and looking at our golf calendar with Stephen, we decided on a date in February 2010 and chose the 8th fairway as the setting. Having then planned my course works around this event because there's only two of us on staff, several months later we get a call saying they wanted to move the date back to 20 March – the same week we were due to core and topdress the greens!"

Undeterred the event went ahead as planned and on the Monday prior three semi-trailers worth of rigging material turned up. Within three days a 15m high 50mx50m sound stage to seat 86 musicians had been erected at the start of the 8th fairway together with marquees, drinks tents, a sound booth, lighting towers, portaloos and pyrotechnic equipment.

"It was a pretty hectic week, especially seeing we were coring, sanding and adding amendments, but Dave Rogers from Turf Ace did a sterling job and got the job done with minimal fuss," says Grundy. "The club and committee really rallied and got behind the event and members and volunteers helped with parking, serving and the clean up.

"The day was a perfect 28°C and families arrived by the score and kids enjoyed playing on the adjacent fairways with soccer balls, footies, kites… and 'Dad, look at those sand pits!' Yes, the bunkers copped a hiding but we expected that. We left all the flags and markers out and only one flag was thrown to the side of a green where on any other weekend we can lose five or more. The budget for the whole programme was just short of $300,000. The crackers went for 2mins 37sec and they were very impressive. The whole course lit up."

Dear editor,

Further to the discussion about golf course rankings from the past two issues of ATM, Australian Golf Digest would like to add some brief input based on our long-standing biennial Top 100 Courses ranking. I don't need to go into great detail, as we generally agree with most of Brendan James' points from last issue:

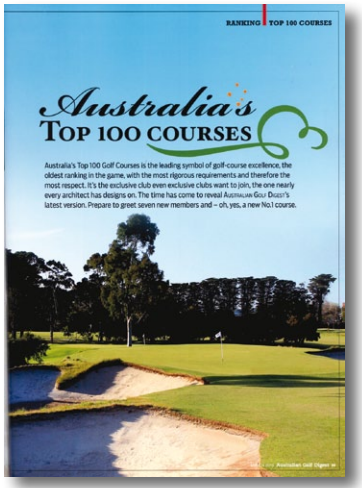
- We, too, seek to be fair, accurate and therefore credible;
- Our advertising staff are completely shut out of the entire ranking process. They don't know the make up of the final ranking list until the Top 100 Courses issue is printed;
- We, too, are more than happy for judges to visit courses anonymously. It's a practice we encourage, where possible;
- Numerical shifts in ranking are not necessarily an indication of a problem with the golf course. In our opinion, publishing a Top 100 is far, far more difficult than a Top 50 list. Most clubs know in their hearts whether or not their course is a legitimate top-50 golf course. Plenty of clubs, however, feel they have a place in that ultra-volatile second 50. The points average between course No.40 and the course that would rank 120th is far closer than most people realise. That's why a course can move from, say, 52nd to 85th for no apparent reason. The average scores are just that close.

However, Golf Australia magazine's assertion about our approach to conditioning is flat-out wrong. Conditioning makes up just 20 per cent of a course's overall mark in Australian Golf Digest, which is no more than any other single criteria. A ranking seeking credibility can't give conditioning greater weight than design. We take conditioning on merit. An astute judge can tell the difference between genuinely poor conditioning and what is merely the result of a harsh winter, for instance.

In fact, beginning with the 2010 ranking, we have altered our interpretation of the conditioning criteria to better reflect the challenges faced by golf course superintendents in Australia. It now reads: "How fast, firm and rolling were the fairways, and how firm yet receptive were the greens on the date you last played the course?" and is indicative of the move away from the "greener is better" mindset.

This role has taken me everywhere from Mossman Golf Club in tropical north Queensland to Kingston Beach in southern Hobart; from Augusta Golf Club in south-western WA to Byron Bay on our eastern tip; from the outback outposts of Broken Hill and Alice Springs to the Whitsunday tropics – and everywhere in between. We're extremely mindful of the challenges of maintaining golf courses in a country that is so climatically diverse.

STEVE KEIPERT
EDITOR, AUSTRALIAN GOLF DIGEST



Australian Golf Digest published its Top 100 Australian Courses rankings back in March

JOHN DEERE ZERO TURN MOWERS CUT A NEW TRAK

John Deere has recently unveiled its latest line of commercial mowers in the form of the Z-Trak PRO 900 Series to help improve productivity and efficiency.

Aimed at the professional landscape market and designed and developed in response to customer input, the seven models in the Z900 line-up feature the 7-Iron Pro deck with stamped, seven-gauge steel, full-wrap reinforcement and Mulch-on-Demand capabilities. The series comes with top mowing speeds of 16.8kph or 19.3kph.

The Z900s include a new, ground-drive transmission featuring a piston motor, internal wet disc brakes and a gear reduction final drive, providing more torque to the drive tyres. John Deere also offers a 'Comfort and Convenience' package on some of the models with ergonomic control levers including built-in PTO shutoff and electronic deck raise and lower.

Other key features include dual-captured anti-scalp wheels in 6 locations around the deck, fully folding ROPS for ease of storage, a 43.5-litre fuel tank and heavy duty cast I-beam caster arms and cast forks with flat-free tyres. The series also offers dial-in height of cut adjustment on the control panel, on-board self-diagnostics, run-flat tyres and John Deere's 'Brake and Go' system.

Seven models are available as part of John Deere's Z-Trak PRO 900 Series zero turn mowers

The Z-Trak PRO 900 Series line-up includes:

- **Z910:** 16.4kW (22hp), 48- or 54-inch deck, gas-powered, air-cooled Kawasaki engine;
- **Z920A:** 19.3kW (26hp) engine, 48-inch mulch-on-demand deck;
- **Z925A:** 20.1kW (27hp) engine and two deck options – 54-inch mulch-on-demand or 60-inch standard;
- **Z930A:** Air-cooled, 21.6kW (29hp) engine, 60-inch mulch-on-demand deck;
- **Z950A:** 23.1kW (31hp), 72-inch deck, gas-powered Kawasaki engine. 'Comfort and Convenience' package is standard on the 72-inch deck machine; and
- **Z970A:** 27.5kW (37hp) vertical crankshaft and Kawasaki air-cooled engine. A 72-inch mowing deck and the 'Comfort and Convenience' package are standard.

The new Z-Trak PRO 900s offer a commercial, two year bumper-to-bumper warranty with unlimited hours and John Deere's Rene Lubbers says the company is confident users will appreciate the new range.

"We're excited for customers to get the Z900s out in the field and put them through their paces," says Lubbers. "The 900 series covers more hectares faster, offers a higher quality of cut and will help landscape pros increase their uptime."

For more information on the Z-Trak PRO 900 Series visit www.johndeere.com.au or freecall 1800 800 981 (Australia) or 0800 303 100 (New Zealand) to contact your local John Deere dealer.

Right: Rain Bird has released a series of three fixed-depth insertion electromagnetic flow meters including the FM (top), FMND (middle) and FMDT (bottom) models

NEW METERS GO WITH THE FLOW

Rain Bird Australia can now supply a series of three fixed-depth insertion electromagnetic flow meters for use with conductive liquids in pipe sizes between 80 and 200 mm.

Models ranging in size from 80mm to 150mm have been independently tested by NATA to ensure they meet AS3665.1 Clause 3.9 by displaying a calibration error rating of less than 2.5 per cent. Test reports are available on request. Rain Bird offers three models – the FM, FMND and FMDT.

The FM model is a current-sinking pulse output flow meter designed for modularity and versatility. It has an output that can be combined with the appropriate transmitter or indicator, depending on the application. The FM meter can operate on a current loop voltage range of between 12 and 24 Vdc at temperatures between 0˚-55˚C and pressures up to 10 bar.

The FMND model is an analogue output flow meter with a 'blind' (non-indicating) transmitter that delivers a continuous analogue output signal. The digital design makes it possible to calibrate the unit in the field without the use of tools. The required 20mA frequency is fed into a microcontroller using a set of internal rotary switches and the microcontroller automatically scales all other values.

An additional benefit of the microcontroller is its ability to average inputs in order to smooth out the output signal. The FMND model will operate on a relatively wide range of current loop voltages between 12 and 36 Vdc. A built-in power regulator supplies the appropriate power to the flow sensor.

Third in the range is the FMDT model which is essentially a combination of the FM and the FMND with the addition of indicators displaying flow rate and flow total. The FMDT flow meter has a dual-relay output board with both pulse and 4-20mA analogue outputs. A password protected keypad allows settings to be changed without removing the cover. All the meters in the range feature empty pipe detection.

For further information about the new range of Rain Bird magnetic flow meters, freecall 1800 424 044, email info@rainbird.com.au or go to www.rainbird.com.au

FACELIFT FOR OASIS

Melbourne based turf products and services distributor Oasis Turf has had a bit of an image makeover. Started in 1997, the company now has a new logo as well as a new easy-to-navigate website (see photo left) which can be accessed athrough www.oasisturf.com.au

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Vol. 1, No. 3

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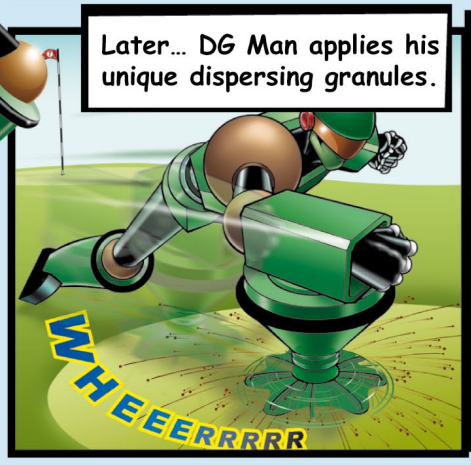

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AGCSA

ALSO CURRENTLY AVAILABLE THROUGH THE AGCSA BOOKSHOP….

26th Australian Turfgrass Conference Webcasts and Proceedings

It has only been a few months since the 2010 annual conference on the Gold Coast but the many and varied presentations that formed part of the programme continue to create plenty of debate and discussion within the industry.

If you missed the event, you can purchase through the AGCSA access to more than 12 hours of webcasts. Prices start from $110 (AGCSA members) for a day session through to $330 (AGCSA member) for access to all presentations.

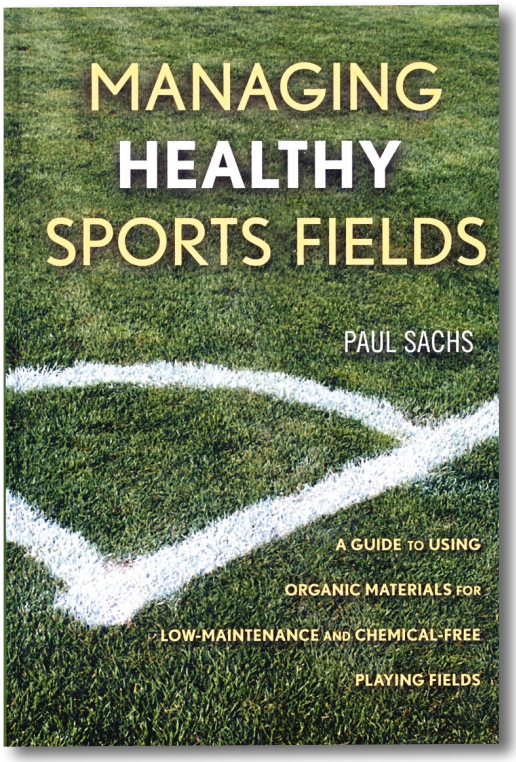
The AGCSA also has copies of 26th Australian Turfgrass Conference Proceedings for sale. Over 174 pages, the proceedings include summaries of the various presentations that were made on the Gold Coast, including keynote speakers Dr Thom Nikolai (green speed authority from Michigan State University), Euan Grant (head greenkeeper, Turnberry) and Kyle Waters (Home Depot Center complex , Los Angeles).

Given the wealth of material provided in the proceedings, it is a veritable steal at just $44 for AGCSA members or $55 for non members. The AGCSA has copies of the proceedings in stock and can ship immediately.

Managing Healthy Sports Fields

By Paul Sachs

Wiley, 2004



How green is the green industry? Well, never green enough for one of America's foremost authorities on organic land care Paul Sachs. Over the past two decades Sachs has built a reputation as a major proponent for the turf management profession to shift away from its reliance on chemical fertilisers and pesticides, and through numerous journal articles and conference presentations has asked turf managers to constantly question their practices and bring about change.

During his career Sachs has also produced a number of books and in 2004 the founder and owner of an organic manufacturing company in Vermont, USA published his fifth book – Managing Healthy Sports Fields: A Guide to Using Organic Materials for Low-Maintenance and Chemical-Free Playing Fields. This book followed up on the release two years earlier of Ecological Golf Course Management (see review in ATM Vol 5.5) which he co-authored with Richard Luff.

Many of the concepts in that earlier book are re-presented in this 2004 offering and Sachs continues to implore turf managers to question their current maintenance practices and encourage them to improve them.

Rather than just saying this is what you should do, Sachs is mindful of the practical implications and is quick to offer a variety of alternative methods to chemical treatments that effectively control a wide range of pests, weeds and diseases. Moreover, most of these alternative methods, he claims, can be relatively easily adapted to existing maintenance programmes.

As Sachs advocates in his introduction: "This book proposes to partially, or perhaps completely, liberate the modern turf manager from this chemical dependence by suggesting methods that don't adversely affect the game or the appearance of the playing field, but nevertheless dramatically reduce the need for pesticides and other chemicals". He goes on to say that the "information presented in this book does not constitute formula for every sports field" but rather the book "presents alternatives and information that will enable the turf manager to consider or even invent new ways of solving problems."

Managing Healthy Sports Fields is worth the buy for Sachs' introduction alone. Over three pages he describes what a futuristic turf management environment might well be like, one where all chemical use on turf is banned and where traditional aeration equipment has gone the way of the dinosaur and replaced instead by a machine emitting sonic pulses (now there's an idea – no surface disruption!)

The book is presented in seven broad chapters with each delving into a raft of detailed components. After examining the soil ecosystem in his opening chapter, Sachs then embarks on addressing topics such as fertility, composting, analysis, pests and cultural practices before finishing off with a chapter titled 'Simplicity versus stability'.

Sachs crams a lot of information into 244 pages and in doing so has done away with aesthetics. Unfortunately all photos and graphics are black and white, but as with many turf books it's the content which is of most importance for practitioners. The book is backed up by an extensive resource and bibliography section, while the conclusion of each chapter has a handy 'Points to remember' segment which summarises in bullet point form the main concepts and ideas presented in the chapter.

The AGCSA has copies of Managing Healthy Sports Fields in stock. AGCSA members can pick up a copy for $99 (non-member price $115).

AGCSA BOOKSHOP

The AGCSA has access to a huge variety of turf management books and can offer members substantial discounts off the retail price of many titles. A full list of books currently available through the AGCSA Bookshop can be viewed through the AGCSA website http://www.agcsa.com.au/products/books. The website also contains reviews which have appeared in Australian Turfgrass Management over the years.

Please note that the prices contained within the list are subject to change due to exchange rates. If you want to order a book call the Lyndel Conway on (03) 9548 8600 or email info@agcsa.com.au to confirm exact price and shipping costs.

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GCSAWA

My last 12 months as president has been rewarding especially with the success of the first WA golf industry awards and the way our industry rallied to support injured Cottesloe Golf Club superintendent Simon Bourne. On behalf of Simon I would like to thank all of you for your fundraising efforts and support during recent times. It makes you feel pretty good that this sort of support is readily generated within our industry.

I must also take this opportunity to thank my committee for their efforts and support over the past year along with the way they have dealt with some challenging issues. Some of these include the winter sprinkler bans, the fertiliser action group and the logistics surrounding the inaugural awards night.

The GCSAWA AGM was held in August with 45 members attending at the new Driving Range Function Centre at Wembley Golf Complex. Committee elections saw one new face join the committee in the form of Paul Needham (Secret Harbour). Brad Sofield decided to step off committee after 10 years valuable service including four years as president from 2003 until 2006. We thank Brad for his dedication and commitment over these years and welcome Paul to the fold. The full GCSAWA committee is:

President: Darren Wilson (Wembley GC)
Vice-president/Secretary: Des Russell (Bunbury GC)
Treasurer: Craig New (Lakelands GC)
Committee: Brad Anderson (Sun City C C), Simon Bourne (Cottesloe GC), Glenn Cross (Mt Lawley GC), Paul Needham (Secret Harbour) and Geoff Kirk (Total Turf).

Simon Bourne made an emotional thank you to all WA, state and national members who have helped him recently. He also thanked Toro and Cottosloe Golf Club who have enabled him to get back to work and resume some normality back in his life. Simon started back there in early August which is a remarkable achievement.

As president I look forward to serving our members for another year and guiding our association into 2011. I would also like to thank Toro Australia and Geoff Stephens for their support and sponsorship of the AGM. Michael Dennis (Royal Perth Golf Club) won the Toro Cup with a 73 while Niel Graham from Pinjarra Golf Club won the stableford event.

The golf industry awards will be on again in February so please ensure you book your seats when tickets become available. A club or individual can nominate anyone as long as they meet the selection criterion which has been set along with the judging panel which will consist of both a GCSAWA committee member, PGA member and a representative from the managers' association. These criteria will be available upon request and in Divots.

As I have said before, the association at present is aiming to provide financial benefits back to its members and is not focused on building bank balances. I encourage members to make the most of our association's benefits, including events such as the Golf Masters Cup and the annual Christmas party, as well as Divots.

Support from our trade sponsors has again been exceptional and they remain key stakeholders in the development and success of this association. We are appreciative of their generosity and support, so please support your Western Australian trade.

The Margaret River Conference is on again next year. The response by superintendents and their assistants in supporting this event last time was exceptional and I look forward to the same support. I ask the trade to use this to invite interstate supers and comrades to come and possibly contribute through giving a talk. Many companies have some very knowledgeable people, so any suggestions or ideas can be forwarded to Glenn Cross.

Finally, a history of the GCSAWA is being accumulated as we speak and if anyone has anything to contribute please let the committee know as we would love to incorporate as much information as we can. I would like to acknowledge Nick Bell and ATI for their contributions over the past 20 years to the golf industry in WA, especially Nick who has always been passionate about the turf industry, sat on many industry panels and is always a true gentleman.

DARREN WILSON
PRESIDENT, GCSAWA

Cottesloe Golf Club superintendent Simon Bourne returned to work in August just six months after his accident in Bali. Toro have modified a Workman with hand controls for Simon to get around the course

NSWGCSA

With temperatures remaining into the high 20s throughout May, we seemed to have a very short winter period in NSW. However, records were broken in the Sydney metropolitan areas following some consistently low temperatures and great frosts and as the accompanying photo from Long Reef superintendent Peter Donkers shows a few hail storms as well. We now see ourselves getting ready for the spring with greens renovations beginning in early August at some clubs (I believe I was actually one of the first).

The NSWGCSA Annual General Meeting was held on 30 August at North Ryde Golf Club (host superintendent Ron Duffy) with all current directors remaining on the board and holding their current positions. The full committee is:

President: Craig Wright (Cabramatta GC)
Vice-president: Craig Molloy (Shortland Waters GC)
Secretary: Ryan Fury (Killara GC)
Membership: Stuart Hall (Asquith GC)
Committee: Mark O'Sullivan (Roseville GC), Matthew Goodbun (Newcastle GC), Martin O'Malley (Lynwood GC), Malcolm Harris (Northbridge GC) and Steve Jacobsen (Carnarvon GC).

We still have one vacancy on the board, so if there is anyone who would like to be part of this fantastic team and would like to be involved more with the NSGCSA please feel free to contact secretary Ryan Fury.

We are in final planning stages for a day at Tuggerah Lakes Golf Club where we are hoping to have a gathering of all our life members to get an insight of their involvement and the changes they have seen through the industry over the years. Our life members include such fine gentlemen as Albert Wallace, Harry Smith, Geoff Hatton, Reg McClaren, Peter McMaugh and Bill Hopkinson who I am sure will be able to spin some great yarns as they recall some of their more memorable moments.

The day will also include a tour of the course with host superintendent Andrew Banning. The course has seen a number of projects completed over the past couple of years, including the redesign and construction of two green surrounds and their bunkers on holes four and six.

October will see our education day based around water management issues. AGCSA environmental agronomist John Geary will be attending to impart some information on the AGCSA's Water Management Initiative and the day will also include a tour to some other facilities. This will be a good change from our usual education days which I am sure will be attractive and gain great support from our members.

Finally, it was great to catch up with everyone on the Gold Coast during the recent Australian Turfgrass Conference and Trade Exhibition. Congratulations to the AGCSA Board, events manager Simone Staples and the rest of the staff for a very well run event.

CRAIG WRIGHT
PRESIDENT, NSWGCSA

Long Reef Golf Club in northern Sydney was blanketed in hail on 15 August after a ferocious localised hail storm ripped through the area. Fortunately for course superintendent Peter Donkers the hail was small enough not to cause any major damage, but it certainly made for a picture-perfect scene

VGA

The past few months have been busy for members of the Victorian Greenkeepers Association. On 14 July, 40 members took to the Yarra River and Port Phillip Bay for the annual cruise and AGM. Many thanks to all who travelled from the country and interstate to make this annual event another great day. The new VGA committee for the coming year is:

President: Dyson Appleyard
Vice-president: Warren Maynard
Treasurer: Brian Hoey
Secretary: Alan Elliot
Committee: Adam Shawcross, Phil Grant, Nick Schofield, Mark Colless and Lee Govan.
Past President: Doug Agnew

The VGA thanks Dave Gudgeon, James Hood, Richard Lowman and Nick West for their services on the 2009 committee. The Greenkeeper of the Year was awarded to Warren Maynard of MCC.

The 4th Annual Gudgies Tifdwarf Tour was held in northern NSW this year with 17 greenkeepers from around Victoria heading for Coolangatta. Like previous years the aim of the tour was to visit clubs with Tifdwarf greens, talk to their greenkeepers and hopefully learn more about this relatively new type of grass down this part of the country.

After landing we boarded a bus driven by Shane Symes (K&B Adams) and headed straight for Tugun Bowling Club. Greenkeeper and former Queensland Greenkeepers Association president Graham Cooper was waiting to show us over his three greens that were in excellent condition. Graham explained that many greenkeepers in the area are using organics, carbon and beneficial microbes to combat disease.

We then headed south into NSW with Graham as our tour guide. Next stop was Cabarita Beach BC where we met Dave Perez who showed us over his three excellent greens. Dave uses minimal fungicide and relies mostly on foliar feeds which include calcium and beneficial microbes.

With the rain starting to come down hard we continued south through Broadwater (home of Australia's first Tifdwarf green) and on to Evans Head. The following morning we met Tony Morgan and his young assistant Josh at Evans Head BC to inspect their three greens. With Tony and Josh on board we headed inland through sugar cane territory where we called into Woodburn, Coraki, Lismore Workers Heights, Lismore City and then South Lismore bowls clubs.

The final day saw us at Tweed Heads BC, which holds a number of major tournaments throughout the year. Tweed has four Tif greens and an indoor carpet green. Before heading back home we also stopped by Coolangatta BC.

The trip was extremely beneficial and I am sure we all learnt something new about Tifdwarf. Many thanks go to David Gudgeon, Shane Symes, Nev Treadwell and Simplot Proline, and Graham Cooper and Tony Morgan for showing us around their regions.

In early August, the VGA held an information seminar at Buckley Park BC. Some 70 greenkeepers, greens directors and the like attended the day which boasted well respected turf lecturer Phil Ford. Phil spoke in depth about the positives and negatives of couch varieties, salt tolerance and spring root decline. As always Phil was very informative and answered many of the questions asked of him. Other speakers included Ted Boltong (Active Safety) who spoke on safety in the workplace and Patrick Madden (Syngenta) who discussed his company's various products and how they combat certain diseases.

To finish the seminar we held a forum with Phil Ford, Darren Martin, Gary Thurgood and Nick Schofield fielding questions in relation to their experiences with couchgrasses. This day was very well organised by Warren Maynard and Adam Shawcross and they deserve our accolades. Many thanks to Buckley Park BC for hosting the event and sponsors K&B Adams, Golf & Bowling Machinery, Active Safety, Simplot Proline, Colin Campbell Chemicals, Jim Lawford Engineering and Lee Govan.

DYSON APPLEYARD
PRESIDENT, VGA

TGAA ACT

The lead up to spring has been wet and windy in the ACT. Above average rainfall has seen dam levels increase slightly which is promising as we head into the higher use months. As at the beginning of September, the Canberra catchment sits about 20 per cent better off than the same period in 2009. There has been a slight rumbling around town suggesting it may be time to ease the current water restrictions, but personally I think it would be a better option to sit tight and continue to keep a very close eye on our water use.

The ACT TGAA held its annual seminar in July which was preceded by the workshop at the Canberra Institute of Technology. Thank you to all who helped out to ensure both events ran smoothly, in particular the hardworking committee members for giving their precious time once again. The delegates enjoyed the hospitality on offer by the TGAA and the Hellenic Club and we have had a lot of positive feedback which will help us to improve the seminar for next year.

When this goes to print our 2011 committee will have been elected at our AGM (held at the Queanbeyan Bowling Club). In a bid to entice more members to come along, the committee have organised a trivia night to run alongside the meeting. With loads of prizes on offer hopefully we can get a good crowd. At last check the bookies had installed the turf gurus from Parliament House as the red hot favourites to take out the trivia challenge with the boys from Royal Canberra rounding out the betting at around 101-1. Keep an eye on the next edition of ATM to see who the winners were.

BROCK WESTON
COMMITTEE, TGAA ACT

GCSAQ

The Globe Discovery Seminar series has wrapped up and there are a lot of people rapt with the way the seminars unfolded, particularly in Queensland. Unfortunately the tyranny of distance in Queensland means that most of the educational opportunities are limited to the south-east corner. Globe is to be congratulated on its foresight and investment in the series with large attendances at all Queensland venues. Congratulations are also due to the speakers who sacrificed a great deal of their own time to join in on the jaunt.

Our annual supers/managers day at Oxley Golf Club was an outstanding success with over 70 in attendance and 60 golfers venturing out on to host super Shane McDonald's layout which was in pretty tidy nick with the State Series just around the corner. Remnants of the installation of a sewer line through the heart of the course over the previous six weeks, that required a three metre wide trench to slice the course in half, could barely be seen.

We were fortunate to have a panel of three golf course architects comprising Richard Chamberlain, Graham Papworth and David Burrup present on the topic of golf course master planning. The three archies had got together prior to the meeting and each covered a different aspect of the process. They complimented each other very well and a lot of valuable information was disseminated to the group.

Unfortunately the planned discussion time seemed too short as there were a lot of issues the attendees would like to have covered. The take home quote for the day was certainly from David Burrup who said that there shouldn't be a tree within 30 metres of a green or tee…..I wish!! So successful was the day that plans are already in place for a repeat session next year.

This year's Turf Research Golf Day is to be held at Peregian Springs Golf Club on the Sunshine Coast. Host super Warren Green is keen to show off his golf course and the GCSAQ is hoping for a full field. Monday 15 November is the date and as usual the day's format presents the perfect opportunity to invite some management from your club to join in and to get some quality time away from your own golf course.

A large sum of money has been raised over the past few years and this year Matt Roach and Jon Penberthy at Redlands were able to purchase a 'muffle furnace' which has a number of uses including warming your pie for lunchtime! No, it is a great aid for the boys and Matt and Jon will be on hand at the day to give a full run down on its many uses.

PETER LONERGAN
PRESIDENT, GCSAQ

SAGCSA

The winter months have brought some colder than normal conditions for South Australia. A few big storm events and plenty of rain in August also had most superintendents and their crews in clean-up mode.

The recent Australian Turfgrass Conference on the Gold Coast saw between 15-20 representatives travelling to the Gold Coast from SA. The feeling from those who attended was that the conference was full of information and well worth the trip. The Globe Discovery Tour also rolled into Adelaide in early August and around 120 people from a range of turf industry sectors turned up. With an excellent range of guest speakers, the day was well acknowledged by many.

In late August we held the superintendents-general managers seminar at Tanunda Pines Golf Club in the picturesque Barossa Valley. The event included an information session on viticulture management techniques and gave everyone a chance to inspect the work done to the course in recent times.

The SAGCSA has been set down a meeting for mid-October at Riverside Golf Club with the theme for the day focussing on construction. Superintendent Stuart Gillespie and the crew at Riverside will be very busy through the spring and I like others are looking forward to seeing the work being carried out. More details on the day will be forthcoming.

I also encourage superintendents to put their hand up and host a meeting. It is something I did last year and thoroughly enjoyed. It is also a great opportunity to show off your club and the great work you and your staff are doing. Finally with upcoming spring renovations for most I wish everyone a successful, problem-free couple of months and hopefully some bright spring conditions ahead.

SAM SHERRIFF
PRESIDENT, SAGCSA

TGCSA

Aurora Stadium played host to the TGCSA AGM in early September

Since the national conference on the Gold Coast there hasn't been a great deal of news to report from the Apple Isle. With winter behind us, most parts of southern Tasmania have had one of the driest and warmest winters on record, with the Hobart area receiving only 66mm for the three months of winter and average maximum temperatures 1.6 degrees above average.

The first day of September saw Aurora Stadium host the 2010 TGCSA Annual General Meeting which was sponsored by Tas Turf Solutions and Globe Australia. Presenters included Adam Power from Golf Australia who gave members some information on the new course rating and handicap system, Deni Carter from David Golf and Paul Jackson from Barmac. To finish the day off Aurora Stadium grounds manager Bryan Dunn provided an insight into what is involved in setting the ground up for an AFL game. We then had a close inspection of the great surface he produces.

The TGCSA has been invited to the golf industry dinner at Launceston Country Club on 30 October. We have several presentations to make at this evening and it will be a chance to show the golfing fraternity a little bit about our association. We would like as many members as possible to support this evening and partners are welcome. Anyone wishing to attend this evening, please contact Dan Gilligan on 0428 337 356 or email tgcsa@bigpond.com.au. The final TGCSA meeting for the year is in the planning stage and will be held in the south of the state in early December.

As this is my last report for ATM I would like to thank Brett Robinson for his help in compiling these reports. Brett, you are welcome down this neck of the woods anytime mate. We will always have a warm coat and a Saint's beanie for you. Cheers.

STEVE LEWIS,
IMMEDIATE PAST PRESIDENT, TGCSA

VGCSA

In August the VGCSA held an education meeting at Eastwood Golf Club (host superintendent Michael Vozzo) with more than 70 members attending. The day kicked off with an informative presentation from David Greenhill (VGA) talking about the ins and outs of the new USGA course rating system.

Jyri Kaapro (Bayer Environmental Science) talked about Bayer's new Tribute herbicide before handing over to Michael Vozzo, Richard Forsyth (Royal Melbourne Golf Club) and Kurt Dahl (Permeate Partners) who all presented on different water harvesting and treatment projects that they have been involved in. The presenters then joined forces to form a panel that answered many questions from the floor.

The combined superintendents and general managers day at Thirteenth Beach Golf Club (superintendent Steven Hewitt) is back on the calendar in September and has been very well supported by all. The next meeting is the Annual Turf Research Golf Day on 18 October at Riversdale Golf Club (superintendent David Mason). This day is sponsored by Bayer and is the main fundraising event of the year for the VGCSA with money raised put back into projects that will benefit our members. In recent years the OH&S Induction DVD has been funded by this day and the committee is confident that the day will be well supported.

The last meeting for the year will be the Christmas function at Sunshine Golf Club (superintendent Mark Findlay) on 30 November. The committee is currently seeking nominations for two categories – superintendent and trade – for the annual VGCSA Recognition Awards that will be presented at this meeting. If you know of anyone that deserves recognition for their support of the VGCSA and the industry please fill out a nomination form or let a member of the committee know.

The VGCSA would like to take this opportunity to thank the SAGCSA for their kind donation to the golf clubs affected by the Black Saturday bushfires. I am sure that the funds will be much appreciated by the clubs and put to good use. The VGCSA has also passed on a donation to Simon Bourne (Cottesloe Golf Club) to help with his recovery and assist him with whatever he may require.

Most of Victoria has seen good winter rains, with some areas receiving their best rainfall totals since 1996. Let's hope that the trend continues over spring and summer.

JEREMY CUTAJAR
SECRETARY, VGCSA

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LOWARA

One of two LOWARA Dual SV92 Hydrovar controlled irrigation pump sets installed at the Virginia Golf Club in Brisbane by Australian Irrigation Services. Barry Lemke (pictured right) the Club Superintendent said " he is very pleased with the trouble free operation and considers the efficiency and simplicity of the Hydrovar system far superior to the manual pump system it replaced ". Australian Irrigation Services Dean Smith (pictured left) said " he had now installed several LOWARA Hydrovar systems at Golf Courses in Brisbane with very pleasing results". The second LOWARA Dual SV92 Hydrovar controlled irrigation pump set will be put into service later this year.

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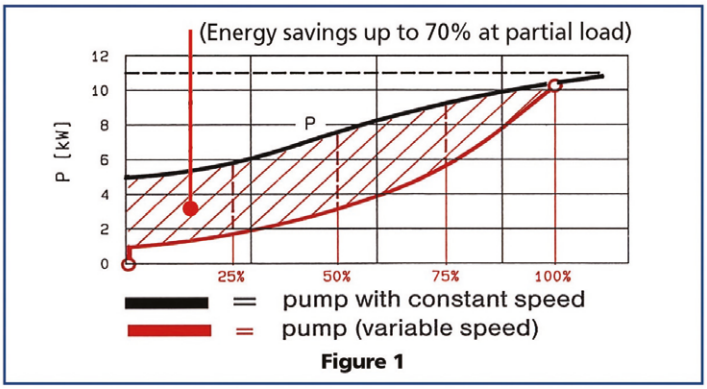

Figure 1

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