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The conservation of acid grassland and heathland on golf courses - A Greater London perspective

By

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DECLARATION OF OWN WORK

I declare that this thesis

The conservation of acid grassland and heathland on golf courses - A Greater London perspective

is entirely my own work and that where any material could be construed as the work of others, it is fully cited and referenced, and/or with appropriate acknowledgement given.

Signature……

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Abstract

Heathland and acid grassland are classified as UK priority habitats and have individual habitat action plans (HAPs) prepared to aid their conservation. In London a notable proportion of what remains of these habitats is found on golf courses. Features of the London HAPs applicable to golf courses are targets to secure appropriate management on all sites and to restore areas of degraded heathland. In February 2004 a seminar was hosted to engage London's golf courses as a means of contributing to theses targets.

This report evaluates to what extent London's golf courses can contribute to these HAP targets, and evaluates the seminar as a tool to help this happen. The evaluation is comprised of three elements; a condition and management assessment of the current habitat on golf courses, analysis of key stakeholder opinions and evaluation of the effectiveness of the seminar as a tool to promote appropriate management.

This research found that despite a keen interest in conservation amongst course managers the condition of heathland and acid grassland at most sites is poor. This is closely associated to inappropriate and undesirable habitat management. Drivers of this include the size and landscape style of the course and a lack of appreciation of the habitats. At sites where the habitat is in a favourable condition, or efforts are being made to improve it, specific drivers are also identifiable including the habitat as an integral feature of the site and a strong specific interest by the club.

The analysis of stakeholder opinions revealed that many members value the natural features of their course; 27% were willing to pay an increased course fee to see increases in wildlife and 68% would like more information regarding wildlife on their own course. This should encourage sympathetic management. However this was not extended to all wildlife. Reptiles, particularly snakes, are viewed very negatively.

The conclusions from this evaluation are that only a small number of sites will be able to contribute to these targets, as they are not entirely compatible with many clubs objectives for their course. The seminar failed to engage a large audience due to its narrow content. However it was highly successful in transferring information to delegates and in identifying the courses that have the highest potential to contribute to the HAP targets so should be considered a success.

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1. Introduction

1.1 An overview

The 1992 United Nations Conference on Environment and Development represented the largest meeting of world leaders to date. The agenda of this meeting was pioneering. It recognised that stopgap measures, such as the preservation of key ecosystems, would not ensure the long-term viability of many species and that the sustainable use of natural recourses must be integrated into conservation measures. The Convention on Biological Diversity was a product of the summit, and aimed to address this issue by committing signatories to the development and implementation of national strategies promoting the conservation, enhancement and sustainable use of biodiversity.

As one of over 175 signatories the UK response to this obligation has been the production of a biodiversity action plan (DoE. 1994). This strategy builds on original conservation initiatives such as the English Nature species recovery programme and introduces a new framework in the form of species and habitat action plans, which identify the most threatened 'priority' species and habitats, and outlines specific actions for their conservation.

The overall goal of the biodiversity action plan (BAP) is 'to conserve and enhance biological diversity…through all appropriate mechanisms' (DoE. 1994. p: 15) and at present a considerable amount of our land area is put aside to nature conservation of some form. There are over 330 protected areas designated as National Nature Reserves and approximately 520,000 hectares are held under trust by bodies such as The National Trust, the Royal Society for the Protection of Birds and the Wildlife Trust, whom actively manage this land with environmental conservation amongst their main objectives for doing so (Dwyer & Hodge. 1996). The use of such protected areas can primarily be regarded as a response to the significant habitat losses and modifications that have occurred throughout the British landscape in recent history.

There is little doubt that nature reserves do make an important contribution to the conservation of biodiversity, however such areas are too few in number, too far apart and often too small to guard against the loss of some species (Miller & Hobbs. 2002). As net losses of semi-natural habitat continue to occur, and the quality of this remaining

habitat continues to decline (Haines-Young et al. 2003), it becomes apparent that the preservation of nature in a reserves system will not be adequate to meet the targets of the BAP. Indeed the action plan states that the use of biological resources (including habitats and ecosystems) should be sustainable. Therefore alternative land uses such as agriculture, military training grounds, parks and golf courses, which are primarily used for purposes other than nature conservation, should also be included in any strategy to conserve biodiversity. Although areas such as golf courses may be small in scale the cumulative effects of such actions could make a significant contribution to generic wildlife conservation.

The concept of landscape scale conservation becomes extremely relevant in the urban environment. In such conditions the scope for increasing conservation areas is extremely limited, and those in place are often bordered within a matrix of developed land. Often these 'non-conservation' sites are often the only other form of remaining open space within a city and can harbour relict habitats that have been lost to development elsewhere. Indeed this is the case in London where all of the remaining heathland and the majority of the remaining acid grassland is located on either public open spaces or golf courses (LBP 2004[a]; 2004[b]). Both of these habitats are listed as priority habitats in the national BAP and subsequently there are national and local habitat action plans (HAPs) in place to ensure their conservation.

In London the BAP is implemented by a partnership of relevant organisations. The partnership is called the London Biodiversity Partnership (LBP) and is broken down into 'working groups' which concentrate on the implementation of a specific HAP or species action plans (SAP). As no habitat or species exists in isolation there is often close links between the objectives of related plans. The targets of the London HAP for heathland and acid grassland include actions to secure appropriate management on all sites accommodating them, and to provide adequate guidance to all heathland and acid grassland managers. Activities to meet these targets have already begun. A strategy for heathland recovery in London has been produced (Waite. 2004) and a leaflet is under construction that will provide a source of appropriate advice to land managers of acid grassland (LBP. 2004[c]). Actions that are more specifically target have also been introduced. In February the members of the LBP heathland and acid grassland working groups held a seminar at the Wimbledon Common and Royal Wimbledon Golf Clubs. The aims of this day were to inform managers about the status of both habitats within

London and also to provide advice regarding appropriate management techniques, funding and sources of advice.

1.2 Project rationale

Previous research has been carried out to assess the ecological value of courses and the contribution they can make to local biodiversity (Tanner & Gange 2004; Gange et al 2003; Terman 1997). The Sports Turf Research Institute (Wood et al 2004) have produced a report assessing the heathland resource on selected UK courses in addition to survey work to establish how course managers perceive heathland on their courses. There is a recognised need for conservation bodies to actively engage with golf courses to promote sympathetic management and to offer reliable sources of advice (Morris. 2002; EGA Ecology Unit. 1995). Little is known about the condition of heathland and acid grassland habitats on golf courses in London at the moment, and even less about the opinions of course managers and golfers regarding nature conservation on the golf course. Therefore it is unclear what contribution golf courses could make to the London HAP for these habitats.

The overall objective of this research is to provide understanding to satisfy these knowledge gaps. This project will assemble information to generate ideas and hypothesis rather than testing preconceived theory. In addition the managing the roughs for golf and wildlife seminar provides a useful opportunity to evaluate the effectiveness of a seminar as a tool to promote sympathetic management. The following report can therefore be considered as a scoping exercise to provide initial insights into the role that London's courses could play in acid grassland and heathland conservation in the context of the London HAP's for these habitats. Specifically applicable to golf courses are targets to secure appropriate management on all sites by 2011 and a target to undertake a programme of heathland restoration and creation. In addition the information will be available to inform decisions regarding future HAP targets and initiatives regarding golf courses as a peer group.

1.3 Project aims and objectives

The aims of the research are:

- To make an ecological assessment of the condition of the heath and acid grassland currently present on London's golf courses
- Assess the level and type of current on course management of these habitats
- To identify any particular measures carried out to aid wildlife/conservation on the courses visited
- Establish any obstacles to sympathetic management
- Assess members attitudes towards natural features and wildlife on the course
- Assess delegates opinions of the seminar and the influence it has had on course management to date

With the overall objective of:

Evaluating to what extent golf courses can aid specific targets of the London Habitat Action Plans for heathland and acid grassland

1.4Methodology overview

There are four main research sections included in this report:

1. Ecological condition assessment

The ecological condition of the heathland and/or acid grassland present on the study courses will be assessed. The course will then be given an overall classification in terms of the condition of the habitat present. This will allow a greater understanding of the ecological value of the resource at the present time and also will provide an indication of the management advice needed in the future.

2. Semi-structured interviews with golf course management

Interviews will be held with either the secretary or course manager depending upon the management structure of the club. Questions will be asked to establish knowledge of the current management in place and to what extent management of priority habitats on courses occurs. Obstacles to sympathetic management will be identified and the openness of management to new ideas and advice will be evaluated. This information will highlight the main issues surrounding habitat management by clubs and will be important in ensuring that future advice to encourage sympathetic management is relevant to stakeholder requirements.

3. Member's structured questionnaires

Structured questionnaires will be distributed at clubs to evaluate the perception of golf players regarding biodiversity issues on course. The questionnaire will assess how players regard habitats on the course, how they feel about management practices on the course and if wildlife on course is an important feature for them. The questionnaire will include general attitude questions along with an assessment of the member's willingness to pay to see biodiversity increases on their course. The results from this survey will provide insight into stakeholder requirements, which do inevitably influence the available management options. This research will also show areas where further information could be provided to members.

4. Structured and semi-structured interviews with seminar attendees

Along with the general management semi-structured interviews those clubs that attended the seminar will also be interviewed regarding the event. Again semi-structured interviews will be used. Structured questionnaires will also be used to assess the key messages attendees took from the conference. A comparison can then be made between these and the key points the London Biodiversity Partnership were hoping to convey. In addition it will be established if any new management practises have been introduced since the seminar or are planned to be introduced in the future as a direct result of it. This process will be used to evaluate the seminar as a tool to meet HAP targets and promote sympathetic golf course management.

2. Acid grassland and Heathland as Priority Habitats

2.1 Habitat characteristics

Lowland acid grassland and lowland heathland are closely associated habitats, typically found on nutrient poor, free draining acidic soils at altitudes below c.300 metres. Acid grassland communities are characteristically formed of fine leaved grasses and herbs with associated mosses, lichens and fungi contributing to the diversity of the sward. The main distinction between acid grassland and heathland is the presence of ericaceous shrubs such as *Calluna vulgari*s, *Erica sp.* and *Vaccinium myrtillus as* a major feature of the latter. However it is not always simple to make the distinction between the two habitats; heathlands often contain open patches of acid grass as a mosaic of habitats, and some heath communities are in essence acid grassland communities with a high proportion of *Calluna vulgaris* cover (Sanderson. 1998).

Both habitats are frequently described as species poor. It is important to note however that the plants and animals that are encompassed in this definition of low diversity are often strongly associated with these habitats, and therefore are scarce elsewhere. There is also evidence that challenges this definition. Lowland heaths in different parts of the country can be very diverse in terms of vegetation composition (Alonso et al. 2003) and recent botanical surveys have demonstrated that specific acid grassland communities can be equally species rich as their calcareous or neutral counterparts (Sanderson & Stanbury. 1996). Both the acid grassland and heathland habitat are especially important for fauna such as birds, reptiles and invertebrates. The sandy soils these habitats thrive on provide a specialist habitat for a number of ground dwelling and burrowing insects and provide suitable basking locations for reptiles. Subsequently conservation strategies for these groups are closely associated with the acid grassland and heathland HAP's.

2.1.1 The life cycle of heather[1]

The life cycle of Heather (*Calluna vulgaris*) is clearly categorised into four main phases. The first phase (pioneer) represents the growth phase and can last for three to six years. The plant then develops into a building phase characterised by a closed, bushy

[1] Sources for this section: English Nature (2002) & Gimmingham (1972).

canopy. At around fifteen years the rate of growth begins to slow and the plant itself becomes increasingly woody. This process can occur for ten to fifteen years and is termed the mature phase. At approximately thirty years the plant starts to die back from the centre outwards leading to a collapse of the canopy. This is classified as the degenerate phase. It is followed by the death of the plant. This distinct life cycle has specific implications for the management of *Calluna vulgaris* that must be incorporated into any conservation strategy.

2.1.2 Management options

Due to the distinct life cycle of heather this habitat must be actively managed to ensure regeneration. Management is also necessary to maintain acid grassland in a desired state; neglect can quickly lead to the deterioration of habitat quality. Low intensity grazing is the preferred management method to maintain both habitats whilst preventing natural scrub regeneration. Within a heathland grazing will create a variety of height and ages of dwarf shrubs and helps to maintain areas of bare ground (Gimmingham. 1992). Grazing of grassland promotes sward diversity, although the resulting plant community is heavily dependant upon the type of animal used (LBP. 2004[c]).

In many situations grazing is an unsuitable option, normally due to issues surrounding public access or simply due to the resources required to manage livestock. Heathland can also be managed by controlled burning. The aim of this process is to remove all above ground vegetation whilst leaving the shoots unharmed to regenerate (Webb. 1986). Clearly then a burn must be carried out in highly controlled conditions.

Both habitats can also be managed by mechanical cutting. Although not an ideal form of management if carried out in a suitable way it can achieve acceptable results. An essential feature of cutting management is the removal of arisings and brash after the cut. Leaving these in situ can suppress regeneration and also returns nutrients to the soil. The timing of the cut is also of up most importance for both habitats. Measures must be taken to ensure the least disturbance to breeding animals and birds.

Evidently the options for management of either habitat on a golf course are limited. Only in a few exception al circumstances would grazing be an option (see section 4.2) and burning is generally not be suitable for such an environment. Cutting is therefore

the only realistic option for the majority of golf courses, with the same management considerations as outlined above still applying.

2.2 Cultural history

The landscape of Britain is essentially man-made. Human use of the land has worked alongside natural influences such as climate and geology to shape the environment into that which we are familiar with today. Our most important natural habitats, including ancient woodlands, heathland and unimproved grasslands, are termed semi-natural in recognition of the prolonged anthropogenic influences that have helped to create and maintain them. Rackham (1986) documents evidence confirming grassland and heathland was rare prior to human civilisation and other authors such as Gimmingham (1972) and Webb (1986) also support this view regarding the origins of heathland.

The formation of the earliest heathlands is thought to date back to the bronze-age clearance of forested land. This process caused, or at the very least accelerated, the creation of podzolic soils in these felled areas (Webb. 1986), which unable to support woodland contributed to the suppression of natural regeneration. These heathland areas would have provided a valuable resource to graze livestock on, so whilst Rackham (1986) feels there is no evidence that Bronze Age man cleared trees specifically to encourage heather, it is accepted that they would have made use of the heathland and thus helped to keep it open. The first record of widespread grassland dates back to Neolithic times, and again the habitat appeared as a result of de-forestation.

Subsequently throughout history heathlands and grasslands as meadows or pastures have been strongly linked to agricultural practices. Heaths were often areas of common land and provided a valuable source of animal fodder and fuel to local communities whilst meadows were often the most valuable areas of land in a parish (Surrey Wildlife Trust. 2003).

Mans extensive use of these habitats maintained them. Grazing animals were typically taken off of the heaths at night and their excrement used to fertilize agricultural land. Gorse (*Ulex sp.*) and broom were harvested to provide bedding and fodder for animals and turf was cut to provide fuel. All of these practises resulted in an export of nutrients from heathlands and thus maintained the low nutrient status of the ecosystem.

Grasslands were maintained via a similar removal of nutrients that occurred with the cutting of meadows for hay or the sustainable grazing of pastureland. Dung from pasture fed animals was also used to fertilise arable fields in a similar fashion to the system in place on heathlands (Rackham. 1986). Additionally harvesting and grazing of both habitats helped to control scrub invasion and maintained the habitats in an open state.

2.3 Habitats in decline: Past, present and future threats

In line with most semi-natural habitats there have been marked declines in the extent of both acid grassland and heathland in both the UK and Europe. Destruction and loss of has been well documented throughout the oceanic and sub-oceanic European range of heathland. Marked reductions have occurred in Denmark, Germany, Holland and Belgium and on a massive scale in Sweden where the remaining heathland area is thought to be a meagre 5% of its former cover (Webb.1989; Gimmingham. 1972). This magnitude of loss has been closely mirrored in the UK. Since the early 1800's an area reduction of 78% has been recorded throughout six of the most important lowland heathland areas in the country (Farrell. 1993). Nationally, an estimated 56% of an already diminished heathland resource has been lost since 1940 (Michael. 1996).

The decline of acid grassland is less well documented. It is acknowledged that grassland habitats in general have also suffered reductions in extent on a significant scale (Jefferson & Robertson. 1996). Localised losses have been recently investigated and show dramatic reductions occurring over short time scales (Haines-Young et al. 2003).

2.3.1 Changing land use as a driver of decline

The human use of both habitats helped to create and preserve them. However, once no longer part of the lowland agricultural system they begun to deteriorate (Michael. 1996, Gimmingham. 1972). By the 18th century people were in a position to control the land and could modify heathlands into areas of higher, more profitable production. Improved transport opportunities meant that heathland communities were no longer solely reliant on local resources (Webb. 1986). The agricultural revolution of the late 17th and early 18th century produced movement away from multiple land uses and soon heathland became a redundant landscape.

The decline of grassland habitats followed a similar path of modification and changing land use. Agricultural advances made grass seed widely available. Traditional land uses such as grazing decreased and soils were actively improved for agriculture (Rackham. 1986). Many of these changes had significantly decreased the resource of both habitats prior to the First World War. However, heathland continued to suffer substantial losses after this time under forestry commission timber production policies and agricultural reclamation of land during the Second World War (Michael 1996).

2.3.2 Modern pressures upon depleted resources

In recent times impacts such as development and inappropriate management have led to further losses and fragmentation of these habitats. Appropriate management, which often mimics traditional land uses, is essential to maintain both habitats in a favourable condition. Management neglect soon allows natural succession to occur, which results in an immediate reduction in habitat quality. This process has been identified as the major threat to three red data book bird species strongly associated with heathland (Woodrow et al. 1996) and as a significant factor in the reduction of the national acid grassland resource (Haines-Young et al. 2003).

The effects of development are often two-fold. As well as the immediate losses that occur the integrity of the remaining habitat is reduced through fragmentation and subsequent isolation. The Dorset Heaths are an area which have been the focus of much investigation regarding these pressures. Due to a combination of development and management neglect the heath has been reduced to approximately 20% of the area it covered two centuries ago, and has been fragmented into over 800 habitat islands that lie within a matrix of forest and modified land (Webb & Haskins. 1980). Despite protection under SSSI designation three quarters of the remaining area is adjacent to urban development. Numerous studies have identified a reduction in ecosystem function due this fragmentation (Webb & Thomas. 1984; Webb 1989 and Webb & Thomas. 1994) and species losses recorded as a direct result. The pattern of loss and destruction has been repeated throughout the country for many semi-natural habitats.

In addition to these pressures acid grassland also suffers from a lack of clear identity. The ambiguity of the habitat can often lead to inappropriate management and a lack of

appreciation from developers. As Sanderson (1998) points out relatively little research has been afforded to this habitat and consequently little is known in terms of its current distribution, condition and ecology.

2.3.3 Looking to the future

The nature conservation value of both habitats has been acknowledged by their inclusion as priority habitats in the national BAP with the subsequent production of HAP's outlining the need for their active conservation. Much of the heathland in the UK is now statutorily protected under SSSI designation and more than three hundred SSSI sites have been designated principally due to their acid grassland interest (UK BAP. 2004). Both habitats are also widely protected in National Nature Reserves. These measures ensure appropriate management of habitats and offer protection from the pressures of development.

It would appear then that the above measures would help to stop future declines in habitat quality and extent. However the threats to semi-natural habitats are not static and evolve throughout time, as demonstrated in sections 2.4.1 and 2.4.2 respectively.

A significant hurdle to the future conservation of semi-natural habitats is atmospheric pollution. Pollutants such as sulphur dioxide, ozone and nitrogen compounds have been shown to have a detrimental effect upon many forms of natural vegetation (NEGTAP. 2001). For biological systems that are characteristically nutrient poor the eutrophication caused by atmospheric nitrogen deposition is of most concern. This type of pollution has also been shown to cause other effects. For example changes in plant physiology and a reduction in the capabilities of a plant to cope with environmental stresses such as frost and pests (Power et.al. 1998). These factors do not exist independently but interlink to cause changes in species composition, which often involves a net loss of species.

Manipulation experiments involving the artificial addition of nitrogen to a system have caused changes in species composition and cover for both acid grassland and heathland habitats (Carroll et.al. 2003; Johnson et.al 1998; Lee & Caporn. 1998) Such changes have now been identified under natural conditions throughout the UK (DETR. 2000), with alterations in heathland and acid grassland communities towards those more

typical of neutral communities reported. This appears to have been most acute for acid grassland, with increases in species diversity in this habitat recorded alongside measurements of increased fertility (Haines-Young et.al. 2003).

2.4 The significance of the remaining London resource

As the first stage of preparing the London HAP's the LBP attempted to audit the remaining acid grassland and heathland areas remaining within Greater London. The soils that support these habitats are extensive throughout London, suggesting that at one time both were widespread across the city. This presumption is partially verified by the fact that acid grassland is present in all but six of the thirty-three London boroughs. The large number of streets across Greater London that contain the term heath, common, or furze[2] in their name also suggests that at one time the habitats were widespread and important in daily life (Waite. 2004).

Results from the audits indicate that London now holds 4% (1300Ha) of the UK's acid grassland resource, with the Heathland area considerably smaller at less than 1% (80Ha). All of this heathland and the majority of the surviving acid grassland is found on public open spaces such as Putney Heath and Richmond Park or on golf courses.

Both of the audits are estimations and their limitations are acknowledged. However despite some ambiguity surrounding the extent of London's acid grassland and heathland it is worth placing the results of the audits into a national and international context. As discussed above in section 2.4 both habitats are important in a European context. Representing 4% of the national area London's acid grassland is a significant proportion of this important resource. At only 80ha the London heath is still important as the UK has around 20% of the global resource, much of which is held in the south of England (Michael. 1996). The significance of such small areas underlines the need for appropriate management of all sites in London to ensure that no more is destroyed.

[2] Furze is a generic word for prickly shrubs such as gorse and broom, which are common features of a heathland landscape.

3. The relationship between golf and nature

3.1 A game originally shaped by nature

The game of golf finds its origins in Scotland during the late 1400's where the first courses were laid out within the natural landscape. Often courses were within areas of common land used by the whole community. Animal husbandry and grazing created and maintained fairways, tees and greens. These original sites embraced the natural characteristics of the land and with features such as coastal sand dunes and moorland vegetation dictating the layout of the course whilst providing natural golfing hazards. Reference to golf is recorded in England as early as 1608, although the first club was not founded until 1787 with widespread popularity evident by the mid 1800's (Fordham & Isles. 1987).

In many respects the game has moved away from its origins, mainly due to it's ever increasing popularity (see 3.2). Technological advances mean it is now possible to develop courses upon most sites, thus weakening the ties between golf and nature. Changing desires from the golfing population have also helped to push courses away from their natural roots to a manicured state with lush dark green courses representing ideals of nature (Hansen. 1998). Indeed during the 1960s and 1970s some heathland courses were limed in attempts to rid the site of heather altogether and create a parkland style course (Dutton. 2003). As Taylor (1995: p21) states 'In conclusion many of our courses are simply well manicured parks…' However a recent survey of clubs by the Sports Turf Research Institute (STRI) has shown that the relationship between golf and nature is still valued by the some parts of the industry (Wood et.al. 2002). The majority of their survey respondents stated that heather is still important to both the character of their course and the enjoyment members get from playing it.

3.2 The current status of golf

Estimations predict that worldwide there are 30 000 golf courses played by 60 million golfers. European courses total approximately 5000 and cover a land area of 250 000 hectares (Stubbs. 1998). England holds the largest share of the European golfing industry. The UK and Republic of Ireland courses represent over half of Europe's and the members that play them 43% of all European registered golfers (Ennomosser. Date

Unknown). The percentage of the population that play golf is likely to be much higher than this due to a large body of British golfers whom are unregistered as club members and therefore not included in this statistic.

Between the periods of 1998-2000 fifty-seven new golf courses were developed within the UK and Ireland. Greater accessibility to golf as a result of reduced costs and a trend towards individuals increasing the time they devote to personal leisure pursuits suggests that this trend will continue and that England can expect to accommodate 3500 golf courses by 2010 (EGU. 1995; Ennomosser. Date Unknown).

3.3 The public perception of golf

The perception of golf amongst the general public is often not positive. There have been numerous explanations of the main motivations of public apathy towards golf, including social and political conflict (Stubbs. 1998). A major grievance that the public tend to harbour regarding golf is the land space it occupies. However it is the perceived environmental impacts of the game that are most often used against the sport. A survey exploring non-golfers perceptions of golf's environmental impacts showed that the great majority viewed golf as bad for the environment. This main reason for this view was a perceived destruction of natural habitats (Gange. et.al. 2003). Chemical pollution is often sited as a major impact of the game. Evidence of surface and groundwater contamination by fertiliser and pesticides has been well documented in America (Davis & Lydy. 2002). Increasingly stringent EU regulation is being introduced regarding golf course pesticide usage in light of the damage it can cause (Taylor. 2003). Environmental disturbance by a club such as light and noise pollution can often cause conflicts with both immediate neighbours and the wider community.

3.4 An industry recognising its environmental responsibility?

Golf's governing bodies are acting to change these perceptions by promoting environmental stewardship throughout the industry. The early beginning of this movement can be traced back to the 1980's (see Wallwork. 1992), when a substantial body of literature was produced highlighting the need for environmental golf management. In 1994 collaboration between The Royal and Ancient[3], The Professional Golf Association Tour (PGA) and the European Golf Association resulted in the

[3] The worlds golf governance and development body.

formation of a European ecology unit to distribute and provide ecological advice to golf courses. The Royal and Ancient have recently produced 'best practice guidelines' for golf course management, which includes a chapter on environmental management (R&A. 2004). The guidelines were produced in collaboration with the Wildlife Trust and are available free of charge to all courses. The Scottish Golf Union have gone one step further by providing free environmental advice to all member courses via the Scottish Golf Course Wildlife Group. The funding for this scheme is taken directly from membership to the union regardless of whether a course uses the service thus promoting the importance of environmental best practise. The system in England is not so highly developed although there is collaboration between the English Golf Union, the British and International Green keeping Association (BIGGA), the STRI and English Nature to provide an environmental advisory service.

The necessity to be 'green' is also being identified at the golf course development level. There is growing recognition that a basic appreciation of nature during the design stage of a course can significantly increase its biodiversity value and reduce negative environmental externalities created by the site (Terman. 1997; Hurzdan. 1998). However it was only in 1999 through modification to the Town and County Planning Regulations for England and Wales that environmental impact assessment (EIA) became mandatory for all golf course development in excess of 1ha (ODPM. 1999). Prior to this EIA was only necessary if a course was part of a larger urban or leisure development. Additionally it is not mandatory within European law to carry out an EIA for such development. It is therefore at the discretion of the individual member state to require this within their own planning policies.

Environmental consideration is also included in green keeping training. The most widely recognised qualification for green keeping staff in the UK is the National Vocational Qualification (NVQ), which does cover environmental issues. However, this training only became part of the syllabus in 1994 (Taylor. 1995) and is only included at the higher levels of the scheme, which are not typically required to gain employment. It appears then that despite environmental recognition at a policy level within the governing bodies there is little practical training to ensure that the new generation of green keepers can translate this on the ground.

Awards for environmental excellence are now part of the golf industry as a means of raising and awarding participation in environmentally sensitive management. The details for the two main programmes applicable to the UK are found in sections 3.3.4 and 3.3.5 below.

3.4.1 Committed to green award

'Committed to green' is an award given to clubs in recognition of them undertaking a full environmental management programme. The award programme was developed by the European Golf Ecology Unit (see 2.4) as a means of promoting the benefits of environmental management on the golf course. It also recognises a need to begin the process of actively implementing the theory of how to best manage golf courses for wildlife in light of predicted trend for new course development.

This scheme is a Europe wide initiative, which focuses on environmental best practise throughout the whole club infrastructure from on course management to energy efficiency in the clubhouse. To qualify for recognition a club must demonstrate 'specific achievements' across eight specific environmental categories such as water resource management, pest management and nature conservation.

3.4.2 BIGGA award scheme

In conjunction with the STRI, BIGGA hold an annual Golf environment competition that is based upon the eight Committed to Green criteria. Courses do not have to demonstrate participation in all eight criteria. The scheme aims to promote any level of environmentally sensitive management, with award categories such as best newcomer and best overall environmental initiative. The scheme has been well accepted within the UK and has attracted corporate sponsorship, which provides financial prizes for category winners. The scheme and winning clubs are well publicised in the trade publications such as Green Keeper International, which is a publication by BIGGA.

4. The role of golf courses in heathland and acid grassland conservation

4.1 The rationale for involving golf in conservation initiatives

Golf is a sizeable land use with approximately 0.7% of the UK developed as a golf course (Tanner & Gange. 2004). No other sport occupies such a substantial area (Stubbs 1998). The area they cover is larger than protected sites such as RSPB and Wildlife Trust reserves. The average course occupies 58ha, with approximately one third of this area designated as rough in the form of habitats such as grasslands, heathlands, woodland and shrub communities (Dair & Schofield. 1990).

In line with the rest of Britain's semi-natural habitats, the conservation value of a golf course is dependant upon the form of management that is carried out. Well-established courses can help to safeguard important sites and over 100 courses are designated as SSSI in England alone (Gange. et al. 2003), with many more recognised under planning policy guidelines as sites of importance for nature conservation (SINC). A recent review of SSSI condition by English Nature revealed that golf course sites were generally in a better condition than non golf course sites with 66% in a favourable condition compared to 57% of other sites (R&A. 2004).

Even new courses developed on otherwise sterile land can have ecological value if designed in the right way. Tanner and Gange (2004) have demonstrated that golf courses of any age can enhance the biodiversity of an area when developed in a matrix of intensively managed agricultural land. The close links between nature and golf and the sizable land resource occupied by this industry make golf courses an important peer group to engage in conservation efforts and initiatives to use land in a sustainable manner.

4.1.1 Generic positive attributes of golf courses

There are a number of features generic to all golf courses that make them attractive as a land resource to aid conservation. Whilst some areas of golf courses represent an intensive land use the whole site is usually not managed to the exhaustive standards of the greens, tees and fairways. There are often extensive areas of 'rough' that are either left unmanaged or are managed at a low level of intervention. These areas can provide

refuges for wildlife and can also provide a means of connectivity in the surrounding landscape. Furthermore golf courses often represent a stable land use; that is they are typically free from the threat of development. This makes them a somewhat unique peer group, especially in urban environments, and consequently increases the value such sites have as an open space for wildlife.

Golf clubs are also an attractive opportunity in terms of resource management, as they exist as a functioning economic and social unit. The effects of this are two fold. Firstly clubs will have the infrastructure in place, such as a well-equipped ground staff, to manage wildlife habitats with little or no extra pressure added to the limit resource budgets of conservation bodies. Secondly management for wildlife on their own golf course could act as a tool to educate members about conservation issues, and on a large scale this could represent reaching thousands of individuals that would not normally be interested in such matters (Terman, 1997).

4.2 Examples of good conservation management practices

As outlined in chapter 3, there are many initiatives promoting environmental best practise within golf. Nationally there are many golf clubs that are excellent examples of the integration of golf and conservation. Taylor (1995) and Gange et. al (2003) list a number of courses, many of which are designated as a SSSI, which through appropriate management support an array of rare and endangered flora and fauna. Trade publications such as Greenkeeper International often report on clubs that are making significant contributions to biodiversity conservation on their course. Recent examples include grand projects such as the introduction of Hebridean sheep on the course to graze invading scrub, as well as smaller scale but equally notable schemes (Wood. 2004).

Closer to London are the Surrey golf courses of which 20% accommodate lowland heathland (Lindsay & Gange. 2002). Many of these clubs demonstrate good management of their heathland, as it is such an integral part of the courses in this area.
Hankley Common Golf Course is an excellent example of this commitment where recent work has seen the area of open area of heathland increase from 20ha to 65ha with a subsequent increase in the diversity of invertebrates with 12 ‘new’ species recorded on the site post creation (Morris. 2002). It is worth noting that the club holds an area of

heathland comparable to the remaining London resource of 80ha and is appropriately designated as a SSSI and special protection area (SPA) under European legislation. Walton Heath Golf Club is another example of good management where over a number of years the green keepers have tried and tested techniques to restore and increase the heather on the site. The club is now so successful in doing so it is in a position to sell heather turf strips to other clubs.

These specific examples demonstrate how wide reaching good practise is within golf. They also help to demonstrate that conservation and golf can co-exist without any detrimental effect to the game. Indeed it is well recognised by golf clubs that habitat maintenance can enhance a golfers enjoyment by contributing to the visual character of the course and the strategic difficulty of the game (Wood. et al. 2002).

4.3 Golf and the London acid grassland and heathland HAP targets

Recognition of the contribution London's courses currently make to nature conservation is expressed via a number of site designations. The Wimbledon Common golf club and approximately one third of the Royal Wimbledon golf course are designated as SSSI due to their heathland ecological interest; Woodford and Chingford golf courses are situated within the Epping Forest SSSI (although excluded from the designation) and numerous courses are designated as SINCs.

All of the remaining heathland and the majority of the surviving acid grassland in London is found on public open spaces or golf courses, with an estimated 15 courses supporting relict heathland and a further 19 including areas of acid grassland (Waite 2004). Many courses are providing a refuge for areas of relict acid grassland and heathland that would otherwise have been long lost to development. Indeed the heathland found on Coomb Hill, Mitcham and Addington golf clubs contributes to London's remaining 80ha. The significance of London's golf courses as a stable land use has increased in recent years as initiatives begin to develop and regenerate areas within the city, resulting in the loss of open spaces. It is therefore evident that golf clubs as a peer group have to be recognised in any initiative to aid acid grassland or heathland conservation in London.

The LBP have prepared action plans for both habitats, which out line specific targets to underpin three overall objectives for acid grassland and heathland conservation in London (LBP. 2004[a] and 2004[b]). Objectives common to both habitats are to raise awareness and appreciation of them and to secure appropriate management on all sites supporting these habitats by 2011. The third objective for London's heathland is to restore and where appropriate create new areas of habitat. To help meet this objective a recovery strategy for London's heathlands has been prepared (Waite. 2004) which identifies potential sites for restoration and creation and outlines a programme for undertaking this work. Twenty-one sites have been included in this plan and work has begun already at some of them.

The programme for acid grassland conservation in London is more focused toward increasing knowledge about this habitat and using this information to provide advice for site management. As discussed previously (section 2.3) much less research has been carried out to understand the ecology of acid grassland than heathland. Therefore the third objective of the acid grassland HAP is to increase ecological understanding about this habitat to facilitate the production of a strategic conservation programme for invertebrates found on acid grassland in London by 2006.

Evidently there is a significant initiative in place to drive the conservation of both habitats within London. Golf courses could be expected to play an important role in the achievement of the management based HAP objectives due to their role as refuges for much of the capitals remaining resource. Not only are golf courses an important group to engage to secure appropriate management on all sites there is also a possibility that heathland restoration and creation work could take place upon selected courses.

4.3.1 Managing the roughs for golf and wildlife seminar –an initiative to engage the peer group

The process of engaging and educating people has already begun. Activities to date have included inviting ward councillors to visit local sites of interest and a leaflet is in production which will provide a reference point of information and guidance for acid grassland managers (LBP. 2004[c]). In February this process was extended to specifically target golf clubs when the LBP hosted a seminar for club managers at the Wimbledon and Royal Wimbledon golf clubs. The event aimed to provide information about the

status of both habitats within London and also to provide advice regarding appropriate management techniques, funding and sources of advice. The day also provided an opportunity to look at heathland and grassland management in practice on the Royal Wimbledon golf course.

4.4 Limitations to the role golf can play

In spite of the positive features discussed previously the contribution that a golf course can make in real terms is limited by two main factors; the primary land use requirements of a golf course and the ecological limitations of the ecosystems found on courses.

The desires of golf course managers and bodies such as the LBP are not entirely exclusive. Finer grasses such *Festuca sp.* that are typical of acid grasslands are typically preferred by course managers. The traditional heathland courses may wish to retain this habitat as it provides an important golfing hazard on the course. However ultimately golf courses are a business run to meet the requirements of the members, meaning that management to promote biodiversity on a course can only occur if compatible with golfing requirements.

Even when management is compatible resources must be free to implement it. The production of quality playing surfaces is a highly important management priority in golf, and is an activity that consumes a great deal of resources. Morris (2000) identified a number of transferable management practices that could be used to benefit the nature conservation value of a course and concluded that most were of medium to high financial or manpower cost to implement, thus suggesting that a club with stretched resources would struggle to include biodiversity conservation as a management objective.

Due to the nature of the game, blocks of semi natural habitat can be small and fragmented between fairways, greens and tees on a golf course. This causes the isolation of areas and reduces the connectivity of the course. The detrimental effects of fragmentation upon ecosystem functions have long been documented (see 2.3). Recently the ecological effects of heathland fragmentation upon golf courses have been investigated (Lindsay & Gange. 2002; Gange. 1998) and have unsurprisingly

demonstrated that fragmentation does have a detrimental effect upon ecological function. Additionally intensively managed areas were shown to be a substantial barrier to movement around the course by some invertebrates. This may not be so much of an issue for mammals and birds but for the rich insect fauna associated with both habitats it is a serious consideration. This research has also identified another problem endemic to golf courses; many of the larger heather areas are adjacent to fairways and tend to be less 'natural' than the smaller more isolated patches further away from areas of high play. Therefore golf courses can accrue highly populated, small and highly isolated patches of habitat that are at a high risk from an extinction event.

Evidently the issue of fragmentation must be seriously considered when evaluating the contribution golf courses can make to biodiversity. This may be especially true for habitats such as heathland and acid grassland that support a high number of specialists, as these species are especially vulnerable to decreases in patch size or increases in patch isolation (Steffan-Dewenter. 2003).

5. Introduction to the study sites

5.1 Selection of target golf courses

There are approximately 130 golf courses within Greater London area (Penrose. 2004). Not all of these courses are able to support acid grassland or heathland habitats due to the geology of the soils that they sit upon. Evidently these courses would not be relevant to the objectives of this report, making it necessary to specifically identify relevant courses for inclusion in this study.

The first stage to identify relevant courses (from now on referred to only as sites) was undertaken by the LBP in preparation for the Managing the Roughs for Golf and Wildlife Seminar. A list was compiled of sites that were situated on strata compatible with acid grassland and heathland plant communities, and therefore could theoretically hold these habitats. Strata suitable for acid grasslands and heathlands are typically gravels and sands, characteristic of the free draining, nutrient poor soils typically associated with such habitats. Due to deposits from the movement of the River Thames, London has an interesting and extensive variety of such strata. These included localised examples such as the Blackheath/Woolwich Beds and Plateau Gravels along with the widespread River Terrace Gravels.

The above-mentioned list was used as the starting point for site selection for this project. The relevance of sites listed was confirmed using site descriptions in the London Ecology Handbooks[4] and phase 1 habitat surveys[5] that had been carried out throughout London during the 1980[s]. This process identified sites that had not been included on the original list and those that had been identified but were not actually relevant to the study. It also generated information regarding the condition and extent of habitat that could be expected at each site, and any designation the site held regarding its importance for nature conservation.

[4] These are a series of reports for each of the Greater London Boroughs that identify and describe sites of importance for nature conservation within the borough.
[5] This is a method of mapping land areas by broad habitat definition such as acid grassland, heathland, improved grassland, native woodland etc.

All sites that had attended the seminar and had indicated that they had either habitat type on their course were automatically included in the target group. This criteria result in the exclusion of two clubs from the target group as both stated that they had neither acid grassland nor heathland habitats on their course. Shirley Park golf course was not originally identified as a target site and was approached to participate at a later date. In total thirty-eight clubs were invited to participate in this study. Twenty-three of these sites were identified as supporting relict acid grassland and fourteen as holding both relict heathland and acid grassland. A full list of all sites approached can be found in Appendix 1.

5.2 Engaging target sites

The first point of contact with the target sites was by letter. The letter invited the recipients to indicate if they could participate in the research by returning a form that was included with the letter. In total fourteen of the clubs approached returned this form, nine confirming that they could participate and five indicating that they could not at this time. Clubs that did not respond were telephoned approximately two weeks from the date of the letter. Another ten clubs agreed to participate via this process, brining the total number of clubs involved in the study to nineteen: seven seminar attendees and twelve non- attendees. In addition it was possible to include Chingford Golf Club in the habitat assessment although an interview could not be arranged. The course is on common land as part of Epping Forest and is therefore accessible to all. Information regarding the management of the club was available from the Corporation of London who own and run the site. Details of the participating sites can be found in Table 1 below.

5.3 Classification of course type

In total nine of the sites were expected to hold heathland and acid grassland, eleven acid grassland only. These sites can be categorised as heathland and acid grassland sites respectively. Their location within Greater London can be observed in Figure 1 overleaf. It is also possible to categorise a golf courses according to the landscape and design of the course. The courses included in this study can be grouped into three distinct landscape types: parkland, grassland and heathland. Examples of each course type can be seen in Plate1.

London Borough	Golf Course	Importance for nature conservation
Bromley	Chistlehurst	Unknown
	Langley Park	GII Borough Importance
	Shortlands	GII Borough Importance
Croydon	**Addington Palace**	GI Borough Importance
	The Addington*	GI Borough Importance
	Shirley Park ⊙	GII Borough Importance
Ealing	Horseden Hill	Site of Metropolitan Importance
Greenwich	Eltham Warren	GI Borough Importance
	Shooters Hill	GI Borough Importance
Havering	Maylands	GI Borough Importance
Kingston	**Coombe Hill***	Site of Metropolitan Importance
	Coombe Wood*	GII Borough Importance
Merton	**London Scottish/Wimbledon Common***	SSSI
	Mitcham	Site of Metropolitan Importance
	Royal Wimbledon*	Partial SSSI
Richmond	**Fulwell***	GII Borough Importance
	Royal-mid Surrey*	GI Borough Importance
	Strawberry Hill	GII Borough Importance
Waltham forest	Chingford	Unknown
	Woodford	Unknown

Table 1: Courses included in the study.
Courses in **bold type** expected to contain both relict heathland and acid grassland, those in plain type acid grassland only.
***** Courses that attended the seminar.

Parkland: 10 Courses

These courses are typically bordered by woodland and contain copses and screens of trees throughout the site. These features provide definition between adjacent holes and fairways and are integral to the 'natural' feel of the course. The grasslands are often heavily maintained to promote a well kept park appearance, hence the name parkland.

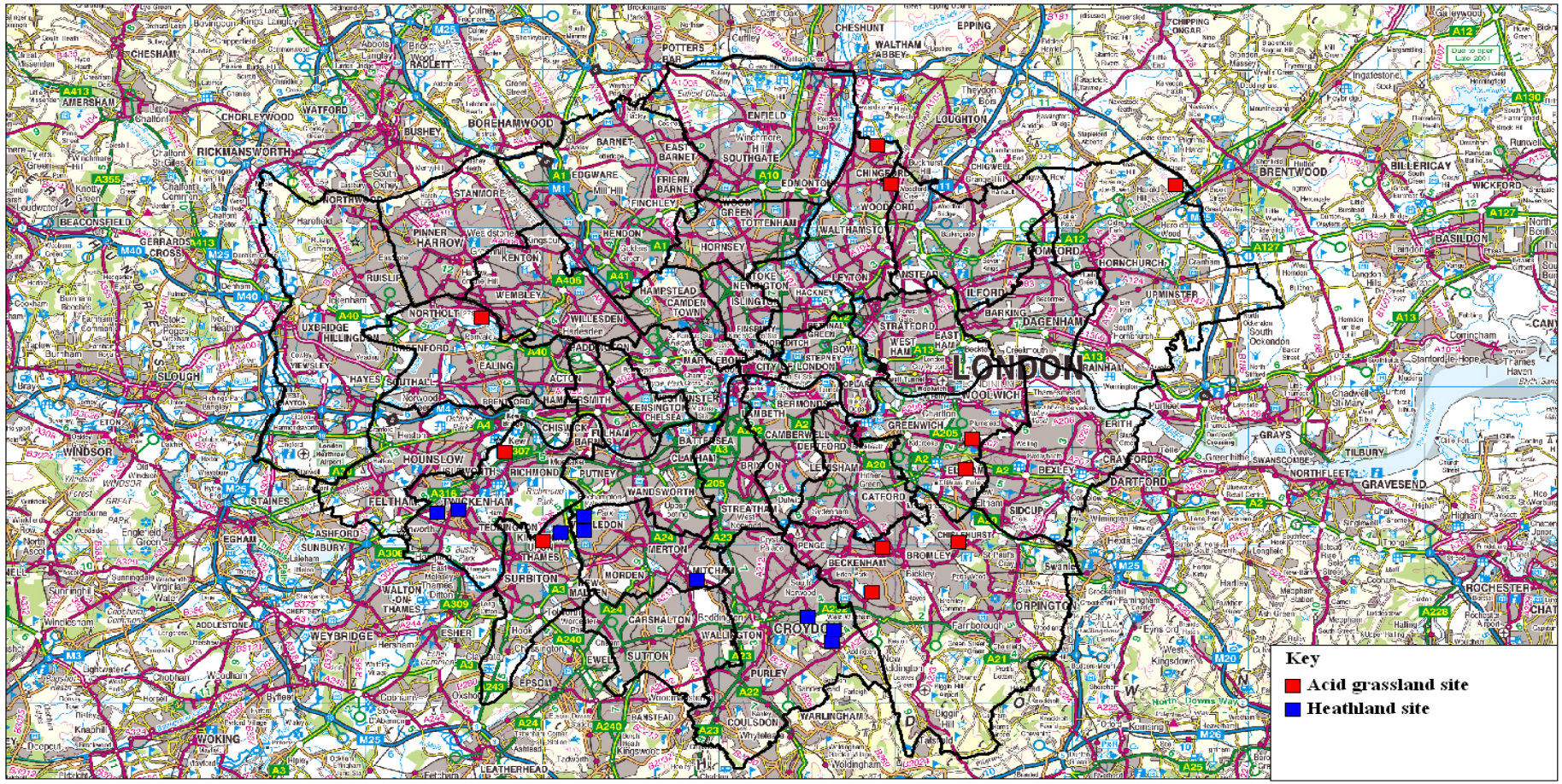
Heathland: 7 Courses

Heathland courses are designed around the natural heathland features of the landscape. Stands of heather and associated grasses are often important characteristics of the site, providing definition, visual benefits and golfing hazards. These sites obtain their natural feel from the wildness of the heathland habitat and areas of grassland and appear less maintained than parkland sites. Consequently areas of bare ground and rough grass are accepted as intrinsic features of the course.

ENGLISH NATURE

Figure 1

Location map of sites



Scale 1:200000

0 4 8 12km

0 10000yd.

Map 1 of 1
Drawn By: Samantha Lyne
Date: 17/6/2004
Ref: sx0000000051

Grid North

English Nature
London Office
Devon House
12-15 Dartmouth Street
Queen Anne's Gate
London
SW1H 9BL

Plate 1: Landscape styles of courses

A heathland style course

A parkland style course

A grassland style course. Note the bare ground in the foreground

The edge of a fairway on a heathland style si

Grassland: 3 courses

During site visits it became clear that some of the parkland sites were fundamentally different from the majority. Like heathland courses these sites derived their natural feel from the grassland roughs. Woodland, although still present in areas, was not as significant a feature as for the parkland sites. To make a clear distinction between parkland sites and these types of courses the classification of grassland will be used for such sites.

Another way to classify the study sites is by the ownership and organisation of the club. Within the study group three types of ownership were represented.

Municipal: 2 courses

Municipal clubs are owned by an independent body, normally a local council, and are maintained for public use. The site owner contracts management of the site and makes decisions regarding this management.

Private: 1 course

Private clubs are owned by one individual, whom controls the management of the course. The members of these clubs have no authority over the management of the club.

Private Members: 17 courses

Private members clubs are managed by a committee, or sets of committees, who are accountable to the membership. Members can vote for committee members and thus have a theoretical control over the management of a site. Within the study sites huge variations were observed between the organisational structures of private members clubs.

A third way that courses can be classified is by size. For the purpose of this study courses are ranked as one of three sizes. In the context of the average UK course size of approximately 160 ha the majority of the study sites can be regarded as small outside of this group.

Small: under 120 ha	**11courses**
Medium: 120-150ha	**6 courses**
Large: Over 150ha	**3 course**

6. An evaluation of the current habitat resource

6.1 Methodology

The original aim of this research was to quantify the amount and condition of acid grassland and heathland currently present on Greater London's golf courses. However the first site visits acted as pilot studies and revealed that this would be a task well beyond the scope of the project. Habitats on the courses were typically sporadically located around the course, often as small patches. It was decided that within the time frame of this research the most important aspect was the analysis of stakeholder opinions. Consequently the habitat evaluation was modified to become a qualitative exercise, with the new aim of being an initial scope of the quality of the habitats present.

6.1.1 Methodology rationale

To allow comparisons between the sites it is necessary to use a standardised monitoring system. English Nature and other conservation bodies in the UK have developed rapid assessment methods to classify the condition of SSSI sites as one of seven standards ranging from favourable maintained to destroyed. The assessments are standardised and thus repeatable between sites at a given point in time and within sites throughout time.

The SSSI assessment defines broad habitat attributes, such as vegetation structure, which should be considered in any conservation objectives for a site. Each of these attributes have indicators of condition, for example the amount of bare ground that compromises the vegetation structure. An indicator can have one or more targets attached which act as a measurement of habitat condition. If an attribute indicators fall outside of these targets it provides a signal that the habitat is in an undesirable condition. This system of monitoring also provides a baseline against which to measure change in habitat condition between each assessment. Each semi-natural habitat has its own unique set of attributes and is therefore assessed independently.

6.1.2 Modified assessment methodology

The SSSI assessment system has been adopted for this study due to its rapid nature and high level of repeatability between sites. In order to be more representative of the extent and condition of habitats that would be found on a London golf course

the SSSI acid grassland assessment (Robertson & Jefferson. 2000) and SSSI heathland assessment (English Nature. 2002) have been modified accordingly. This process has involved the exclusion of attributes that are not relevant to this research such as a measurement of habitat extent, and also the inclusion and modification of indicators to make them representative of golf course habitats. Additions and modifications include evidence of golf related disturbance, damage and disturbance from frequent mowing and the presence of common golf course grasses such as *Lolium dioica* as a negative indicator. The targets set for indicators in the SSSI assessment criteria are used in this modified procedure. These targets have been decided upon after rigorous examination and provide a sound ecological measurement of habitat condition (Robertson & Jefferson. 2000). A full list of attributes and targets used to carry out the assessments at the study sires can be found in Appendix 2. A summary of these attributes and indicators without stipulated targets can be seen below in Tables 2 and 3.

Attribute	Indicator
Vegetation structure	Amount of bare ground Cover of dwarf shrubs Cover of *Ulex* sp. Growth phase composition of ericaceous cover Height of ericaceous shrubs
Vegetation composition	Presence of desirable graminoid species Presence of desirable forbs
Indicators of negative trends	*Pteridium aguilinium* cover Presence of undesirable herbaceous/grass species Tree and scrub cover Habitat disturbance or damage

Table 2: Habitat attributes and condition targets used to assess the condition of heathland on golf courses.

Attribute	Indicator
Vegetation structure	Amount of bare ground Organic litter cover
Vegetation composition	Cover of *Ulex* sp. Presence of positive indicator grasses Presence of positive indicator herbs
Indicators of negative trends	*Pteridium aguilinium* cover Cover of undesirable herbaceous species Cover of undesirable course/invasive grasses Tree and scrub cover Habitat disturbance or damage

Table 3: Habitat attributes and condition targets used to assess the condition of acid grassland on golf courses.

6.1.3 Field methodology

The habitat assessment was carried out at all twenty sites included in this study. All of the heathland sites also contained separate areas of acid grassland; therefore twenty acid grassland assessments and nine heathland assessments were conducted. Acid grassland associated with heathland on a site was assessed as part of the heathland vegetation composition attribute (see Table 3 above). As Table 1 (section 5.3) shows, two of the golf courses included in this study are designated wholly or partially as a SSSI. The modified assessment was carried out at these sites to make the evaluation comparable to other courses.

Fairways, greens and tees were not included in the habitat assessment. It is reasonable to assume that these areas could not contribute to the London BAP targets due to the intensive management they receive. All areas of acid grassland or heathland classified as roughs were surveyed. A map of the course was used to plan a structured walk around the site, ensuring that all areas were viewed. When an area of acid grassland/heathland was found a 'W' shaped path was walked through the sward to gain an idea of the overall characteristics of the patch. All the areas found on the courses were small enough that they could be viewed by eye as a complete unit, therefore it was possible to make a reasonable estimation of the cover variables, e.g. cover of invasive trees and shrub, by looking at the area as a whole. Other attribute qualities such as presence of desirable species were noted whilst carrying out the structured walk.

The habitat condition of the whole course was classified after consideration of all areas of habitat assessed. In keeping with the rationale behind SSSI assessment, this classification is not intended to be an average of all patches of habitat but a general indication of the condition of the site. Areas in favourable condition on a site classified as unfavourable are outlined in the individual site summaries (Appendix 3).

Three of the heathland sites have mapped the area of heath on their course as part of the LBP heathland audit. As part of the assessments at these sites the mapping will be ground-truthed to assess if the contribution they are thought to make to London's heathland resource is accurate.

6.2 Classification of habitat quality

Sites have been classified as one of four standards depending on the results of the habitat assessment:

1. Favourable

Each vegetation attribute is currently in a satisfactory condition. All targets for attribute indicators have been met.

2. Unfavourable

One or more of the vegetation attributes are in an unsatisfactory condition. The condition of one or more of the attribute indicators is below target.

3. Unfavourable improving

The habitat is classified as currently in an unfavourable condition, however measures are in place to remedy this. Measures may be evidence of plans to restore the habitat or activities currently being carried out to do so. Classification as unfavourable-improving does not indicate that the site will definitely reach favourable condition, only that measures are in place that will move the site towards a more favourable condition.

4. Feature absent

There is no acid grassland or heathland habitat present on the course.

6.3 Results of the assessment

The following sections summarise the results of the habitat assessment. Full details relating to the resources at each club can be found in the individual site summaries of Appendix 3 and the results of the individual assessments in Appendix 4.

6.3.1 Initial analysis

Figure 2 shows that a higher proportion of the acid grassland sites are currently in a favourable condition. Additionally all sites expected to contain acid grassland do still

hold the habitat in some condition. In comparison two of the heathland sites are classified as feature absent. However the cumulative total of sites in a favourable and favourable-improving condition was highest for heathland. There was also a lower proportion of unfavourable habitat amongst the heathland sites. Table 4 provides the numerical distribution of the site conditions.

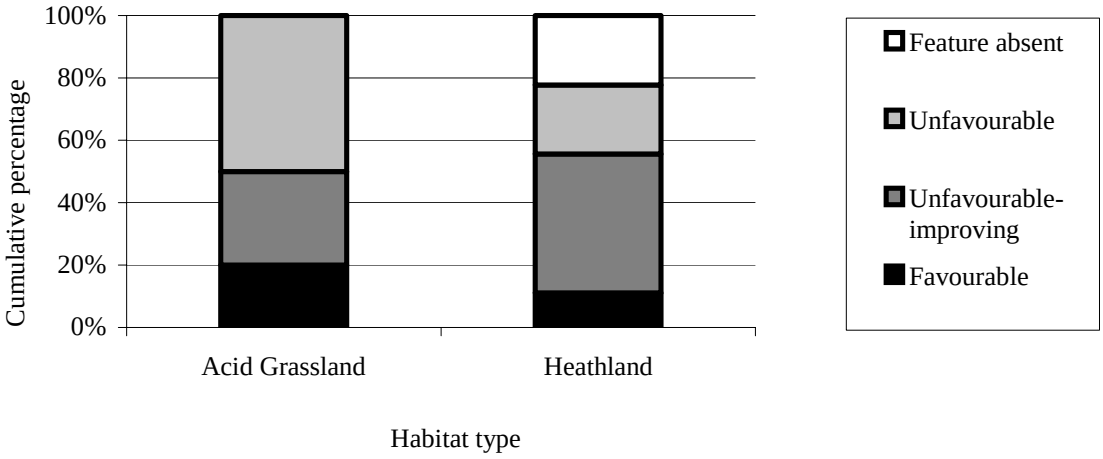


Figure 2: Proportional habitat condition of sites

Assessment Condition	Habitat Type		
	Acid Grassland	**Heathland**	**TOTAL**
Favourable	4	1	**5**
Unfavourable-improving	6	4	**10**
Unfavourable	10	2	**12**
Feature absent	0	2	**2**
TOTAL	**20**	**9**	**29**

Table 4: Number of each site classified as one of four conditions.

6.3.2 Trends of condition

Segregating golf courses by specific characteristics allows identification of possible associations between the characteristic as an independent variable and the result of the habitat condition assessment as a dependant variable.

Ownership of course

All but three of the study sites are public members clubs. There is variation between the size and landscape type of these sites. It is therefore difficult to make any assessment of the influence of ownership upon habitat condition.

Size of the course

Tables 5 and 6 show the distribution of habitat condition dependant upon the size of the course. Heathland sites were generally larger than the acid grassland only sites, and represent the majority of the larger sites in the acid grassland assessment. It is clear from these tables that there is little association between course size and the condition of acid grassland found on a course. This also appears to be the case for heathland sites. Although both of the sites classified as feature absent are also classified as small the other small heathland site is the only favourable site. Additionally at one of the sites classified as feature absent for heathland the acid grassland is in an unfavourable-improving condition.

Acid grassland Condition	**Course Size**			
	Large >150 ha	**Medium 120-150ha**	**Small <120 ha**	**TOTAL**
Favourable	2	1	1	**4**
Unfavourable-improving	0	2	4	**6**
Unfavourable	1	3	6	**10**
Feature absent	0	0	0	**0**
TOTAL	**3**	**6**	**11**	**20**

Table 5: Contingency table of acid grassland condition against course size.

Heathland Condition	Course Size			
	Large >150 ha	**Medium 120-150ha**	**Small <120 ha**	**TOTAL**
Favourable	0	0	1	**1**
Unfavourable-improving	2	2	0	**4**
Unfavourable	0	2	0	**2**
Feature absent	0	0	2	**2**
TOTAL	**2**	**4**	**3**	**9**

Table 6: Contingency table of heathland condition against course size.

Landscape type of the course

Initial analysis of this relationship within a contingency table suggested that there may be some association between the landscape type of the course and the condition of the acid grassland and heathland habitats found upon it. This is displayed in graphically in figures 3 and 4. It is clear that acid grassland is in a more favourable state on heathland style courses. Grassland style courses represent most cases where the habitat condition is improving. Similarly heathland style courses account for all instances where the heathland is in a favourable or improving condition.

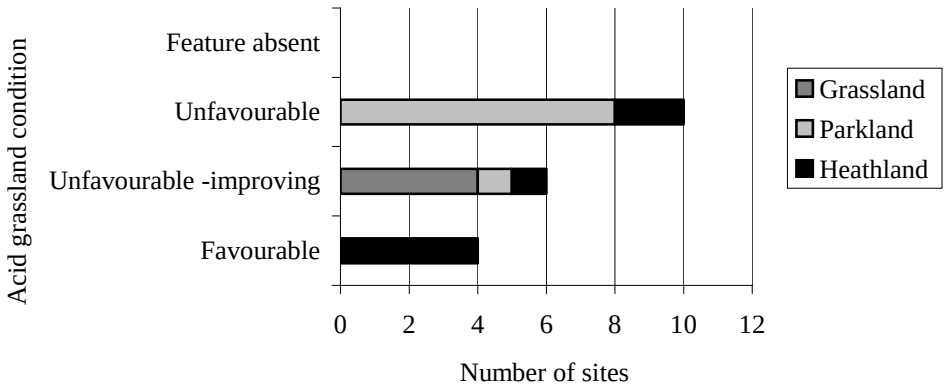


Figure 3: Condition of acid grassland on different landscape types of courses.

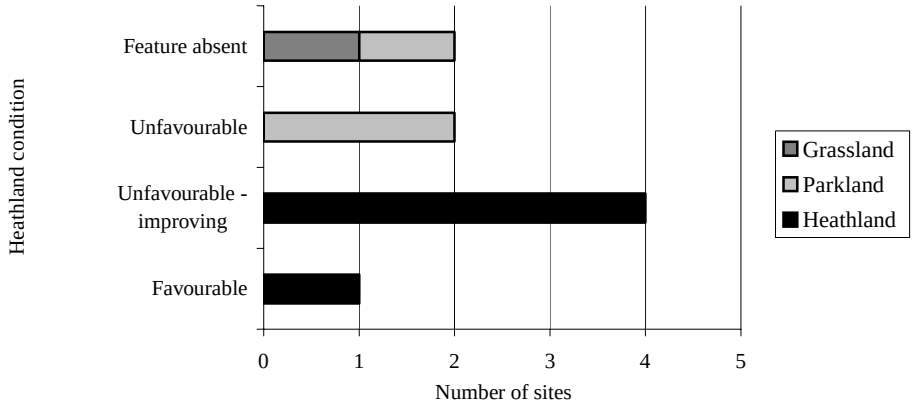


Figure 4: Condition of heathland on different landscape types of courses.

6.4 Implications for the London BAP targets

This assessment shows that currently only 20% of the acid grassland and 10% of the heathland surveyed is in a favourable condition. These figures are very low and initially suggest that golf courses can contribute little to the conservation of these habitats. However there are a significant amount of sites where the condition of the habitat is improving.

The ownership of the course or its size seem to have little association with the condition of the habitats upon it, or the likelihood the club will be undertaking measures to improve the quality of these habitats. There does however appear to be an association between the landscape type of the course and the habitat condition. All of the acid grassland in a favourable condition was situated on the heathland style courses, as was all of the heathland in a favourable condition. Similarly the acid grassland on the grassland style courses was generally under repair. There was a high tendency for the parkland sites to contain habitat of a poorer condition and not to be working to rectify this. This suggests that heathland style courses have the potential to contribute substantially to both HAP targets, and that grassland style courses are contributing more to the acid grassland HAP than the parkland sites.

7. Current management

7.1 Methodology

A semi-structured interview can be considered as a non-standardised purposeful discussion between individuals (Saunders et.al. 2000), to obtain information regarding a set of pre-selected topics. By adding structure to an interview in this way it is possible to make comparisons across a number of interviews (Bryman & Bell. 2000). A major benefit of this method is its flexibility as it allows the interviewer to alter the topics to be discussed, and respondents are encouraged to introduce their own topics.

Semi structured interviews were carried out at nineteen of the twenty sites where the habitat condition assessment was undertaken. Chingford Golf Course was not included due to the reasons outlined in section 5.2. Questions were asked to gain an understanding of the current management of priority habitats, obstacles to this management, the current knowledge of the course management and also how open the club are to new ideas regarding wildlife management. In all cases the interview was carried out with either the club secretary or head green keeper/course manager, and in some cases both depending on the organisational set up of the club. From now on the interviewee is referred to as the course manager. A list of those interviewed and their position at the club can be found in Appendix 5.

Interviews were carried out on the same day as the habitat assessment for the site. The majority of interviews took place inside and were audio recorded. At three of the sites the interview took place entirely on the course and therefore could not be recorded. Interview lengths ranged from thirty minutes to one hour and twenty minutes, with the majority lasting approximately forty-five minutes. At many of the sites course managers also walked areas of the course to point out areas of interest and to answer specific questions about the site management. Information regarding the current management was also obtained from personal observations whilst walking the course as part of the habitat condition assessment. This information was then analysed to provide information about current management practices.

7.2 Best practice management

There are 'best practice' management techniques that can maintain acid grassland and heathland habitats in an optimum condition from a conservation perspective. In order for a golf course to make a realistic contribution to the London HAP targets it would be necessary for the majority of these practices to be in place at a site. Table 7 summarises these best practice activities and outlines why they are important for acid grassland or heathland conservation. Many of these management activities are generic to all sites; however some such as the minimisation of golf damage are specific to golf courses. The removal of leaf litter and of thatch from grassland is highly relevant to golf courses compared to other sites due to the high representation of woodland and amenity grassland habitats on golf courses (Wallwork, 1992).

Practice	Benefits
Generic management	
Scalloped edges to roughs	Provides a variety of microhabitats within a larger habitat patch.
Scrub clearance	Prevents a gradual decline in habitat quality via the natural colonisation of trees and scrub.
Removal of leaf litter	Leaf litter prevents regeneration and over time can change the properties of the soil.
Minimisation of golf related damage	Informative meetings with members, designated paths and instruction from signs can help to reduce trampling and damage from trolleys and clubs.
Habitat restoration	Expansion of the area of good quality habitat on the site would directly contribute to HAP targets and would increase the biodiversity value of a course.
Acid grassland management	
Annual to tri-annual cutting of roughs	Neglect as a form of management can reduce the sward diversity of grasslands.
Rotational cutting of grassland	Creates structural diversity in the sward and provides refuges from mown areas.
Removal of arisings	Keeps the nutrient load low. Leaving cuttings in situ returns nutrients into the system.
Heathland management	
Removal of grass thatch	A thatch layer can prevent natural regeneration of heather.
Promotion of heather at different growth phases	The distinct age classes of heather provide structural diversity. Some heathland species are dependent on one age class, whilst others may rely on a mosaic of ages.

Table 7: Best practice management activities and the positive implications of undertaking them

Sources: Gimmingham (1992); Taylor (1995); LBP (2004[c])

7.3 Current utilisation of best practice techniques

Table 8 shows how many courses currently manage their heather or acid grasslands to achieve the benefits outlined above in Table 7, and summarises the main reasons why they are doing so. The reasons why clubs do not or cannot undertake this type of management are also identified.

Table 8 shows there is currently a low level of use of best practice management methods at the study sites, and Figure 5 below illustrates that the majority of the best practice management is currently undertaken by eight of the nineteen courses. When this information is broken down into management undertaken by course type it becomes clear that currently all positive management, with the exception of the acid grassland scrub clearance work undertaken by a parkland site, is currently undertaken by courses where these habitats are an intrinsic feature of the site; the heathland and grassland courses.

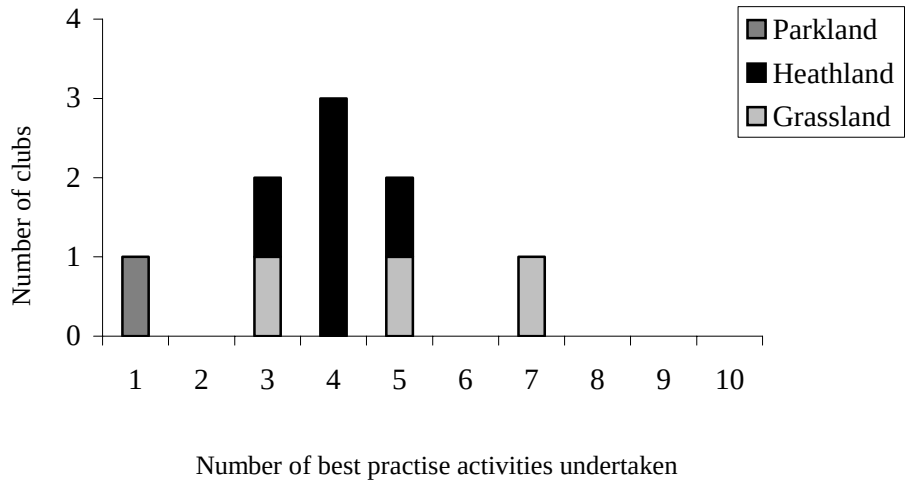


Figure 5: Number of each landscape type of course currently undertaking best practice management

Table 8: The involvement in specific best practice management and the reasons why more clubs do not use employ this management.

Generic Management			
Scalloped edges to roughs	**3** 3 grassland	To increase invertebrate diversity. For aesthetic reasons	Straight edges provide definition between the rough and fairway. Straight edges are more aesthetically in keeping with the course design.
Scrub clearance	**8** 2 grassland 1 parkland 5 heathland	Routine maintenance. To improve habitat quality. To improve the appearance of the course.	Not a priority.
Removal of leaf litter	**1** 1 heathland	To encourage heather regeneration. To assist heather turfs.	Only have enough time to do this on playing surfaces. Not aware that it could damage 'natural' rough areas. Not necessary on this site.
Minimisation of golf related damage	**4** 2 grassland 2 heathland	To aid habitat restoration/creation. To maintain good quality habitat patches.	Members do not like signs on the course. There is no need for such measures.
Habitat restoration and creation	**7** 2 grassland 5 heathland	To restore the course to a former state. To improve the biodiversity value of the site. To improve the aesthetics of the course.	Not a priority on the course. Have not got room to increase the area of the course out of play.

Table 8: Continued

Acid grassland management			
Annual to tri-annual cutting of majority of roughs	**8** 3 grassland 5 heathland	To maintain the rough in a favourable condition**.**	Have not got room on the course to allow grass to grow by undertaking such low level mowing. Members loosing balls in the grass. Long grasses are not a feature of the course.
Rotational cutting of grassland roughs	**2** 1 grassland 1 heathland	To increase invertebrate diversity.	Would not be in keeping with the appearance of the course. Not aware that it is important to do this.
Removal of arisings	**3** 2 grassland 1 heathland	Actively trying to reduce the nutrient load of the soil. Maintenance of good quality acid grassland.	Too labour intensive. Are aware that this is best practice but their machinery cannot pick up the cuttings. Feel it is unnecessary to do so. Are aware of problems this can cause but do not feel it is a significant issue for their course. Not aware of a need to do so. Think that it is beneficial to leave clippings in situ.
Heathland management			
Removal of grass thatch	**0**		Not aware that this is necessary.
Promotion of heather at different growth phases	**1**	For conservation purposes. Fear of destroying all of the sites heather in one cut.	Not aware of importance to do so. Ease of mowing as one large unit. No structured regime for mowing.

7.3.1 Links between habitat condition and best practice management

As explained previously (section 7.2) there is a strong link between the type of management carried out and the ecological condition of a habitat. It is therefore possible to predict that sites carrying out some forms of favourable management would be classified as in more favourable ecological condition than those that are not. The results from this research support this assumption. Figure 8 shows that eight sites are currently undertaking most identified cases of best practice management within the study sites group. These eight include all the sites that currently support heathland or acid grassland in a favourable condition and all of the heathland sites and four of the five (excluding Chingford) acid grassland sites where the habitat is in an improving condition.

7.4 Level of participation in habitat restoration

It is clear from Table 8 that a high proportion of the positive management currently undertaken is work to restore unfavourable habitats or to re-establish habitat recently lost from a site. Five of the nine heathland sites are currently or will imminently be undertaking some form of restoration work, including examples of scrub clearance, scarification and the importation of heather turfs from both local and non-local heathlands. All of these five sites are heathland style courses. At two of the sites this includes ambitious plans to substantially increase the area of heathland on the site and to link up areas separated by secondary woodland and scrub.

Four of the acid grassland sites are involved in the restoration of this habitat on their course and one is planning to undertake work in the near future. Two sites have undertaken extensive restoration work in the last two years and have transformed the landscape style of the site from parkland into grassland. Both sites have done this by relaxing the rowing regime of their roughs in most areas of the course and by removing dense scrub from areas to increase the openness of the habitat. At the other two sites this is occurring at a smaller scale including localised scrub removal and attempts to control invasive herb and grass species spreading throughout the sward. Plate 2 shows some of the restoration work currently being undertaken at both types of course and plate 3 highlights some of the more positive management observed during the site visits.

Plate 2: Habitat restoration

The importation of heather turfs was a popular management option

Scrub clearance and relaxation of the mowing regime has transformed this parkland site in a short time.

The use of fencing to prevent rabbit grazing. Heather inside the pen is regenerating well.

Plate 3: Positive management

Scrub clearance and soil stripping has promoted heather and acid grassland regeneration at this site

Selective use of ground under repair status to protect new heather turf

Simple measures such as leaving the edges of bunkers un-mown can contribute to the overall quality of the site

The use of appropriate signs can help to reduce golfing damage

7.5 Benefits derived from positive management

Clubs that were undertaking best practice management were able to identify benefits they have gained as a result of doing so. These benefits can be categorised as either economic benefits or social benefits.

Economic benefits

Three clubs identified substantial financial savings as a result of increasing the area of acid grassland roughs or relaxing the mowing regime of their rough. Savings were predominantly made by reduced fuel use and a reduced necessity for machinery repairs. Additionally man-hours had been saved which were often put to use improving the playing surfaces of the course. Sites undertaking heathland restoration work identified high costs involved with the initial stages of this process but acknowledged that the restoration work could help to retain and attract new members as an indirect economic benefit.

Social benefits

It was widely acknowledged that habitat restoration on a site could increase both staff and member satisfaction of the course. At most sites a personal sense of satisfaction from being involved in conservation was also evident.

7.6 Inappropriate and undesirable management

Evidently there are cases where courses are implementing one or more of the best practice management techniques, however many more are not and at some sites inappropriate or undesirable management is currently employed which detracts from the conservation value of the golf course.

For the purpose of this study inappropriate management can be categorised a**s** that which fails to maintain the habitat in a favourable condition. Therefore it is unsurprising to note that most cases of inappropriate management observed on the sites visited were either a direct contrast to the recommended best practice techniques such as leaving arisings in situ and mowing of heather stands to a uniform height, as outlined in Table 8, or were a partial but unsuccessful attempt to implement appropriate management. One example of this is the unsuccessful attempt to control bracken at Addington Golf Club, which has killed off some *Calluna vulgaris* in the process.

In contrast undesirable management can be defined as an act that is undertaken to alter the nature of the habitat. Examples of this type of management were most regularly linked to conflicting objectives between the nature of the golf course and heathland/grassland conservation. Table 9 displays the undesirable management observed at sites and outlines the reasons why it occurs.

In stark contrast to Figure 8 analysis of Table 9 illustrates that the majority of undesirable management is currently taking place on parkland courses. The two cases of tree planting at the grassland sites occurred prior to the current course manager taking position at the club and is not an activity that will be continued. It was not as always simple to identify undesirable management at a site, for example if the course manager did not discuss it during the interview or if it was not easily visible during the assessment, therefore this may be an under estimate of the extent of current level. Some examples of the more negative management observed can be seen in plate 4.

Undesirable management activity	**Number and course type of clubs**	**Reasons for doing so**
Tree planting within acid grassland swards.	**5** 2 grassland 3 parkland	Native tree planting seen as a positive activity for nature conservation. To add definition to fairways. To provide a barrier between holes.
Over seeding of acid grasslands.	**4** 4 parkland	To prevent bare/sparse patches of ground. Originally to create a more durable playing surface outside of the roughs, although spread into roughs not prevented.
Liming of acidic soils.	**1** 1 parkland	To improve the quality of the playing surfaces.
Frequent mowing of the majority of grassland roughs.	**10** 10 parkland	Have not got room on the course to allow grass to grow by undertaking such low level mowing. Members loosing balls in the grass. Long grasses are not a feature of the course.
Application of herbicides.	**3** 3 parkland	Plants such as *Pilosella officinarium, Hypochaeris radicata, Rumex acetosella* and *Veronica sp*. seen as a turf weeds not as a positive feature.
Use of secluded acid grassland roughs for organic waste disposal.	**3** 1 grassland 2 parkland	Do not realise damage this can do. Intentional creation of wildlife ‘set aside’.

Table 9: Current levels of inappropriate and undesirable management

Plate 4: Negative management

Inappropriate tree planting in acid grassland swards reduces habitat quality

Tree seedlings can quickly reduce the quality of heather stands

Leaving grass arisings in situ can degrade habitat quality

Bracken and scrub invasion from tree lines needs to be managed

7.7 Comparing current acid grassland and heathland management.

For both habitats a low level of best practice management was recorded and there was much evidence of inappropriate management. However, as Table 9 shows, most identified cases of undesirable management were recorded for acid grassland. Where clubs did not value their heathland as an important part of the course it was neglected not actively removed or altered. Alternatively where the acid grassland was not an integral feature of the course this habitat was modified or managed with little appreciation of its significance. In certain cases, such as tree planting, it was felt that the management was increasing the wildlife value of an otherwise inconspicuous habitat. Much of the generic best practice was undertaken by heathland sites, thus these courses are contributing a greater amount to acid grassland conservation than the parkland courses that also contain this habitat.

7.8 Implications for the London HAP targets.

The low level of best practice management observed at the study sites initially suggests that the contribution these golf courses currently make heathland or acid grassland conservation is low. However as Table 8 shows the highest levels of participation are already for the more intensive aspects of management such as scrub clearance and habitat restoration. Small modifications of the current management regime at these sites to include practices such as scalloping edges, rotational cutting and encouraging a variety of age classes of heather, could significantly increase the conservation value of their site. A lack of knowledge regarding the need to undertake some aspects of management Eight clubs are already undertaking three or more of the identified positive management practices and if all were to increase their level of best practice management this could represent an important contribution to BAP targets. As a peer group the heathland and grassland style courses are undertaking the highest levels of best practice management.

Less encouraging are the high levels of inappropriate and undesirable management observed. This is taking place primarily at parkland sites, which suggests that this group need to be specifically targeted to fulfil any potential they may have to contribute to acid grassland conservation.

8. Drivers of current habitat management

8.1 Methodology

Data to analyse drivers of management was collected as part of the semi-structured interviews detailed in section 7.1. Relationships between themes identified from the interviews were explored using a qualitative data analysis technique called grounded theory, which involves identifying key trends and themes within a data set, and exploring the relationships between them. This technique is highly iterative and facilitates the construction of theory out of qualitative data. The technique has been identified as highly suited to organisational research and for generating ideas in areas that have not been well researched previously (Bryman & Bell. 2003).

8.2 Factors that drive management

The condition of the habitats on golf courses is a function of the techniques used to manage them. In spite of the organisational differences observed between the study courses there are a series of factors common to many sites that are significant determinants of the way the course habitats are managed. These factors can be split into those which promote best practice on the course, those which limit the positive work of clubs undertaking best practice management techniques and those that drive the implementation of inappropriate or undesirable management.

8.3 Promotion of best practice

The following conditions were in place at all the courses where the acid grassland or heathland was in a favourable condition due to the use of best practice techniques and were also identifiable at many of the courses that were improving the habitat from an unfavourable state by changing the way they manage their resource. The following discussions are relevant to those sites only, except where identified as otherwise.

Heathland/acid grassland is a significant feature of the course

Clubs where heathland or long grassland roughs are still an important feature of the course have a strong incentive to manage these habitats in a way that maintains them in a good condition. The natural features on such a course can provide definition to holes,

create hazards that reduce the need for artificial bunkers and give the course its own characteristic 'wild' feel. Additionally, neglected areas of these habitats are unattractive and detract from the visual quality of the site. Therefore this factor is a driver of general habitat maintenance and also of restoration management.

Sites originally designed as a grassland/heathland course

Many of the courses in this study reported a historical increase in the wooded cover of the course. For most this was not regarded as a problem as it was felt to contribute to the parkland nature of the site or was accepted as how the course had always been in the memory of the current membership. In contrast the heathland sites and open grassland courses do not find these successional changes acceptable. Five of the courses classified as unfavourable-improving are currently or planning to undertake measures to increase the open nature of the course or to increase the heath/grassland component of the site closer to that which historic records document was once there. Therefore this is a strong driver of habitat restoration management.

Strong personal interests in grassland/heathland conservation amongst management

A specific appreciation of heathland and grassland habitats is a strong driver of best practice management on a course. All of the course managers at clubs designated as in a favourable condition or as improving had an interest in the conservation of these particular habitats and felt sense of responsibility for their conservation. Representatives from six of the eight clubs undertaking best practice management attended the seminar hosted by the LBP, and the course manger at the other two intended to go but could not on the day.

At three sites the recent arrival of a new course manager has significantly increased the level of sympathetic on course management, and in all cases has resulted in an increase of the best practice management outlined in Table 7 (Chapter 7). At a further two sites a recent change in management is driving forward investigation and planning regarding habitat restoration and creation. Therefore personal interest and awareness is a very strong driver of the type of management that occurs at a course and a specific interest in heathland/grassland conservation can significantly influence the condition of these habitats on a site. This is discussed further in section 8.5 below.

Course management supervised/controlled by a conservation agency

Ownership or supervised management of the course by a conservation body was in place at all but one of the four sites where acid grassland was in a favourable condition and at the only favourable heathland site. It was also a feature of many sites where the habitat condition was being improved.

Two of these sites are designated as SSSI and therefore English Nature supervises their heathland management. At both sites the acid grassland is in a favourable condition and the heathland in an improving condition due to imminent restoration work. Additionally one site is located within Wimbledon Common and is supervised by a n elected common land conservators group. Supervision by a conservator body is also the case at the only site where both the acid grassland and heathland is in a favourable condition. This site is also situated within common land on Mitcham Common.

A further two sites where the grasslands are improving are owned by the Corporation of London. These courses are situated within Epping Forest, which again is common land. The corporation supervises the management of the courses and provides general advice. They are in the process of preparing ecological management plans for both sites. One of these sites is a parkland style course. It is not in an unfavourable condition due to frequent mowing, which is unusual for this type of course.

Although these associations regulate the type of management that occurs all of these courses stated that they would still be managing in a sympathetic way without such an association. The controlled management was typically regarded as a positive thing; a way of gaining advice whilst also acting as an incentive to maintain a high standard of management. This direct access to advice coupled with supervision to correct inappropriate management may explain why these sites are typically in more favourable conditions.

8.4 Limitations to the level of best practice undertaken

At courses that are committed to improving the habitat quality on the site there are limits to the extent that these objectives can be implemented. These limitations are primarily a result of the land use of the site as a recreational facility.

Aesthetic considerations

Aesthetic considerations are greatest for courses that contain heather. They can restrict the options for restoration and also impose upon general management of the habitat. A positive feature of heathland style courses is an increased tolerance and acceptance of bare ground on the course and a lower pressure to maintain the site in a manicured fashion. However these clubs still have to ensure that the course is aesthetically pleasing to its members; a consideration course managers feel limits the options available to them. This can produce results that are not entirely compatible with conservation objectives.

Five clubs are currently undertaking or embarking upon a programme of heathland restoration and creation to improve and expand the areas of heath on the course. In the initial stages of this work two sites feel they can only consider using heather turf's from other sites as a means of increasing the net amount of heather they hold. Both clubs state expected member dissatisfaction with highly visual measures such as soil scraping or scarification as the main reason for doing so. If this initial work is successful they will consider such methods to continue their restoration programmes. It is felt that members will be more likely to accept unsightly areas of the course having seen the effects of the original turf laying.

Prevention of slow play

At eight of the twenty sites areas of long rough or heathland were not confined to marginal strips. These areas formed an important feature of the whole course from both a visual and sporting perspective. At a further two sites longer rough areas were an important golfing hazard on at least one hole of the course. All ten course managers reported having to reduce the size of these rough areas to increase their distance form a fairway edge as players were continuously loosing balls in the rough and taking a long time to find them, hence slowing the play of the course for those behind them. This was identified as a serious limitation to the area of long rough that could be accommodated on a course, even where the course had been designed with such areas in mind.

Member's skills

Somewhat linked to the factor of slow play is the consideration of the handicap of the membership. Sites such as Fulwell, Royal Mid Surrey and Wimbledon Common have

recently increased the areas of long rough (cut only 1-2 times per year) and by doing so have increased the difficulty of the course. Prior to these changes members could easily play out of shorter roughs, now they have had to increase the distances they can hit a shot or have had to alter the way in which they approach a hole to avoid loosing their ball. This can prove to be unpopular with some members who prefer to play an easier round, which can put the course manager under pressure to decrease the size or length of these roughs.

Multiple land use of the course

As outlined in section 8.2 four of the sites are situated within common land. Whilst being located in such an area has positive benefits for the clubs, such a location also imposes limitations. Wimbledon common has extremely heavy user pressure from dog walkers, horse riders and the golfers, which can damage areas of vegetation. Trampling and animal excreta are particular problems for heathland and acid grassland. The public also have to be considered when implementing any management at such sites. Wimbledon common has a significant rabbit-grazing problem that is limiting the regeneration of heather and damaging some areas of grassland. However public use of the site limits the control options available to tackle this problem thus restricting immediate progress. Common land sites also have restrictions regarding fencing; old by-laws state that these areas must remain accessible to the public. Again this restricts options for management, for example at Wimbledon Common this means fencing on a large scale to restrict rabbit grazing is not an option despite pilot trial evidence of the success it can bring.

Sites with less user pressures also have to consider the public when making management decisions. Composting arisings is regarded as an unrealistic option due to arson fears. This in turn causes problems when disposing of grass arisings and can promote inappropriate disposal. Additionally habitat restoration and to a lesser extent maintenance can meet with opposition from members of the public who use these sites regularly. Clubs on common land therefore have additional stakeholder requirements to consider compared to those with no public access.

Knowledge

A lack of knowledge regarding the best way to manage heathland and acid grassland often limited the positive work these courses were undertaking. For example

unsuccessful scrub and bracken control or lack of knowledge about the best ways to cut grasslands was limiting habitat quality at some sites. Additionally a lack of knowledge regarding alternative methods of management was also found to be limiting the contribution some heathland sites were making to habitat conservation. The sites that were using heather turfs for 'quick' visual effect were sure that scarification would be far too visually disturbing as an alternative. However the turfs are also visually unattractive immediately after laying and take time to regenerate into growing heather stands (see Plate 2). From a conservation perspective it is much more satisfactory to encourage the regeneration of heather endemic to a site rather than importing it from elsewhere. If course managers had a better understanding of techniques such as scarifying they would be able to consider them as a viable option instead of discounting them immediately.

8.5 Promotion of inappropriate and undesirable practice

A number of conditions have been identified which tend to drive the inappropriate or undesirable management of heathland and acid grassland habitats on the golf course.

Landscape type of course

Despite a heavy bias towards heathland courses in club selection twelve of the sites visited are classed as a parkland site. Two of these sites have relict areas of heathland upon the course yet still classify themselves as parkland. Parkland courses have very different habitat management objectives than heathland courses and to a lesser extent to the grassland sites. Management of this habitat is seen as a misappropriation of scarce resources and subsequently can result in the neglect of heathland habitats, as they are not high on the list of priorities for the course.

The two parkland sites containing heathland patches carried out no maintenance of this habitat. One was in a very poor condition and the other in decline with the club currently not taking measures to rectify this, with all of their habitat restoration work taking place in the woodlands. Additionally heathland had been lost from at least one parkland site where it had been previously recorded simply as it was not an important feature of the course.

As shown in chapters 6 and 7 acid grassland is often poorly managed on parkland style courses. Longer roughs are often not considered to be in keeping with the design of

such sites and are mown short to maintain a parkland feel. There are some sites that have introduced small areas of longer rough in recent years as part of a more sympathetic management regime. However they are limited to the extent that they can do this because it is not consistent with the rest of the course. In most cases this limitation has resulted in the relaxed areas being situated in marginal areas, often adjacent to tree lines or under copses on the course. Often the situation of the relaxed area has reduced the quality of the habitat, as shading and leaf litter pushes conditions towards those favoured by rank species. This then makes these areas harder to manage, which in turn deters the site from considering the expansion of such areas on the course. Alternatively sites opt for a policy of non-intervention management, which also reduces the quality of the habitat.

Size of the course

Although this factor did not appear to be closely associated to habitat condition in the analysis of the assessment results (section 6.3.2), many course managers identified the size of their course as a major limitation to the management they could carry out. At eleven of the twelve courses where longer and natural roughs were not already an integral feature of the whole site it was felt that to expand the areas of rough or at the very least increase the length of the rough would not be possible due to restricted area. Course managers explained that to do this would necessitate changes in the layout of the course e.g. changes to the width and angle of fairways. At two sites there was not room to even make these changes as extra holes had been built into the course since it was originally designed. One of the twelve course managers is planning to introduce longer areas of rough as part of an overall plan to improve the biodiversity value of the site. It is acknowledge that changes will need to be made to the course to accommodate this. These changes are accepted at this site due to a strong interest in nature conservation and a desire to take the course back to a more open state that is consistent with its original design. Interestingly these are two factors identified as drivers of good management outlined in 8.2.2.

Size limitations are distinctly different to those of slow play. In this case the size of the course means that much of the turf area must be set aside to golf surfaces and there is not physically enough room on the course to allow longer roughs to develop. Management to avoid slow play means that on courses that wish to and can accommodate a longer rough they are limited to do due to a need to prevent slow play.

Little appreciation of grassland/heathland habitats

All sites demonstrated an interest in general conservation issues (further details in chapter 9). However if this was not inclusive of grasslands and heathlands or if the value of these habitats was not fully appreciated, inappropriate and often undesirable management was often observed. A lack of appreciation of heathland habitats was directly responsible for the decline in habitat quality at two sites, and probably responsible for the complete loss of this habitat at two more. The habitat was either not acknowledged as important or the significance of the seemingly small golf course resource was not appreciated. This was occurring in spite of keen interests in woodland conservation at the sites, with one having involved an ecologist in the production of a structured ecological management plan. At many sites the condition of the acid grassland is also suffering for the same reason. However along with neglect acid grassland is often modified. Tree planting with acid grassland stands was frequently observed and in one extreme case the course had been limed to reduce the acidity of the soil.

8.6 Overall limitations to management for wildlife

Each golf course is a unique and therefore perceptions about what is the overriding limitation to management for wildlife will vary between sites. Regardless of the condition of the habitats on a site the course manager was asked if there was any one thing acting as an overriding restriction to the amount of conservation work they could carry out on the site, acknowledging the limitations imposed upon them by the above conditions. All nineteen managers identified a factor that they felt to be the main limitation to what their club could do for wildlife. Eleven felt that there are secondary factors that would restrict them even if the major limitations were addressed. Figure 6 lists the limitations that were identified by managers.

It is clear that manpower is a huge constraint to the level of work sites carry out, with over half identifying it as the major limiting factor. The issue of manpower is complex. It does not just represent time constraints but also the amount of time staff can allocate to such activities. The larger the greenkeping staff at a course the higher the expectations become for the quality of the playing surfaces; the net time available to carry out such work does not rise proportionally to the number of staff at a site.

Interestingly the expectation of the membership was the factor most commonly felt to impose secondary limitations. I.e. a course could increase their knowledge or manpower available yet still be constrained in the type of work they carry out due to the membership. The issue of club management is similar; motivated course managers can overcome limitations only to face opposition from other areas of the club management when they try to put their plans into place.

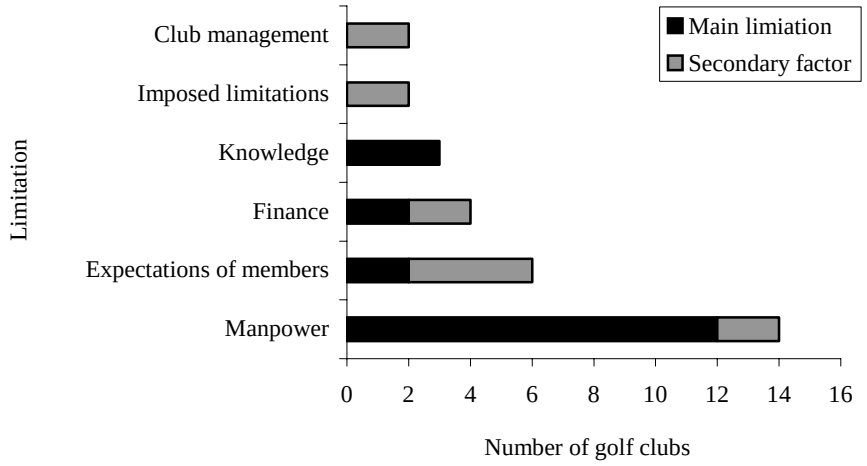


Figure 6: **Overall limitations to management for wildlife**

8.7 Implications for the London HAP targets

With the unique circumstances in place at each club the homogeneity of the limitations to management of heathland and acid grassland is surprising. There does appear to be specific criteria one would expect to see in place when a club was managing their acid grassland or heathland to a high standard or to undertake restoration work. Consistent with the findings of chapters 6 and 7 the clubs that demonstrate these criteria are a small group for whom heathland or acid grassland is an intrinsic feature of the course.

Unfortunately a number of limitations have been identified which limit the level of good management that a club can undertake or can drive a site to mismanage the habitats. To engage all sites in appropriate management these will have to be overcome. Through the provision of adequate advice the factors lack of knowledge and low appreciation of these habitats can be addressed. This still leaves factor such as size, expectations of the membership and aesthetic considerations to be addressed, which are somewhat intrinsic to golf courses and are not something an outside organisation can alter. However by providing adequate information courses would be in a better position to work within these limitations and contribute something to the HAP targets.

9. London's golf courses and wildlife

9.1 Current level of general on course conservation

The level of participation in conservation on the courses is high, with every club engaging in at least one activity to enhance the ecological value of the site. Figure 7 below summarises these activities as identified during site visits and interviews, and shows the level of involvement for each.

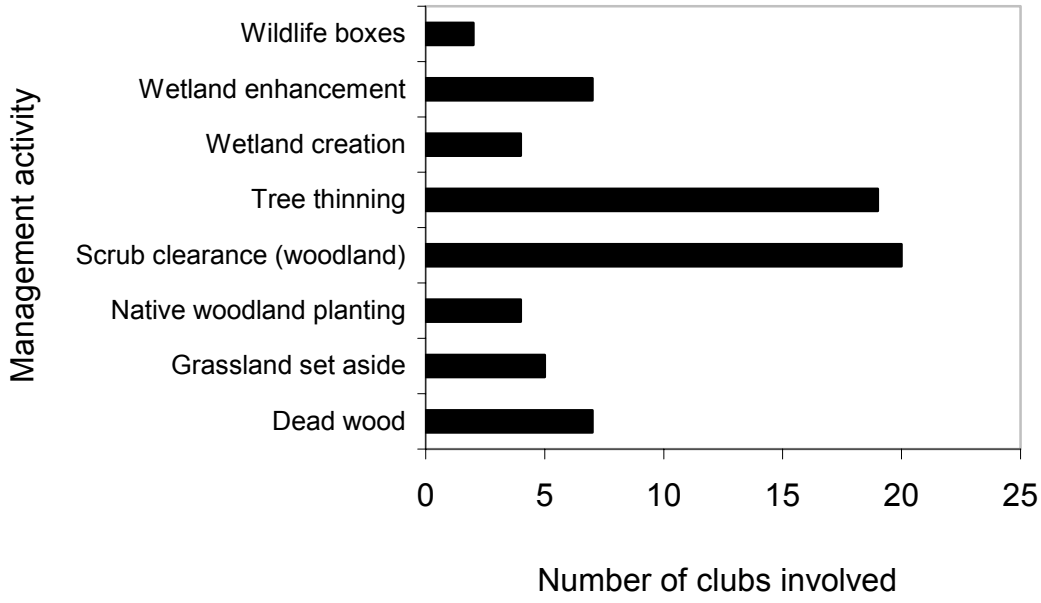


Figure 7: Current participation in conservation at the sites

The most widespread management activities centre on woodland maintenance, which could be expected, as twelve of the courses visited are classified as parkland sites. Additionally scrub clearance, and to a lesser extent tree thinning, were typically identified as activities green keeping staff feel competent to undertake without external advice, hence participation from clubs that generally feel limited by finances or the time available for them to actively seek expert guidance. In comparison the clubs that have left dead wood or erected animal boxes have all done so under the advice of an expert. Some sites have recently introduced areas that can be classed as ecological set-asides; again this has generally occurred due to advice from an external source. These are areas of rough that can be left out of the intensive mowing regime for the rest of the site.

9.2 Collaborations with conservation professionals

Within the courses that participated in this research there is a high level of collaboration with bodies or individuals that specialise in wildlife conservation or can provide relevant management advice. The collaborations are summarised in Table 10. Two main points can be identified:

1. There is variation between the sources of advice and thus the type of advice that courses are currently receiving.

The source of advice sought is dependent upon the course manager's own opinions and knowledge e.g. if they are aware of local biodiversity groups and which source of advice they feel will be most appropriate for their club. Additionally bodies may approach the club if they hold a feature of interest, in which case the source of advice is not pre-selected by the club.

2. Many partnerships have been initiated by the golf clubs.

This demonstrates that clubs do have an interest in maintaining their course to a high ecological standard, especially as the use of a private consultant represents an economic cost to the club. However this also means that a club needs to be a position to initially develop ideas regarding the type of work they want to carry out or at the very least to recognise the conservation potential of the site. Not all clubs have had a positive experience by way of such relationships, with two course managers left feeling negatively towards organisations they feel promote wildlife conservation.

9.3 Participation in environmental award schemes

Despite a demonstrated commitment to nature conservation on the study courses only Eltham Warren Golf Club has participated in an environmental award scheme to date. Many course managers were aware of the BIGGA award scheme. It was generally regarded as a positive programme, one that works to promote high environmental standards throughout the industry. The Committed to green scheme was less widely recognised. Only two course managers had a working understanding of the structure of the programme, and a further two some recognition of the programme. Eight of the course managers interviewed indicated that at some point in the future they would be interested in participating in the BIGGA scheme. They felt that the current condition of the course was not at the required standard to enter. None of the course managers aware

Club	English Nature	Local biodiversity group	Local council ecology unit	Ecological consultant	STRI ecology unit	Public land conservators group	Site managers (E.g Rangers, Corporation of London)	Agronomist
Addington								⑦
Addington palace				⑦				⑦
Chingford							⑦	
Chistlehurst		⑦	⑦					
Coombe Hill		⑦		⑦				
Coombe Wood		⑦						
Eltham Warren		⑦			⑦			
Fulwell		⑦		⑦				
Horseden Hill							⑦	
Langley Park					⑦			
LondonScottish	⑦					⑦		
Maylands		⑦						
Mitcham						⑦		
Royal mid Surrey					⑦			⑦
Royal Wimbledon	⑦			⑦				
Shirley Park		⑦		⑦				
Shooters Hill				⑦				
Shortlands		⑦	⑦		⑦			
Strawberry Hill				⑦				
Woodford		⑦					⑦	
Total	**2**	**9**	**2**	**7**	**4**	**2**	**3**	**3**

Table 10: Collaborations between golf courses and professional sources of conservation advice

Ticks in red represent partnerships initiated by the club.

of the Committed to Green programme foresaw their club partaking in the scheme. It was generally required as too broad and not rewarding enough of small initiatives.

9.4 Is there a relationship between golf and nature?

Regardless of the type or condition of the habitats present on the course the managers that participated in the interviews all felt that nature is an integral part of the golfing experience. Every site was partaking in at least one activity that they thought to be beneficial to nature conservation, and importantly which had been undertaken with wildlife as a main consideration. There was much evidence of clubs working within the restraints outlined in chapter 8 to improve the wildlife value of their course.

Interestingly despite this recognised relationship many course managers felt that the membership were generally uninterested in the wildlife on the course, or took such features for granted without recognising their importance. A common comparison was between the attitudes of the membership regarding nature to those of the general public: there are some that have a high interest in such matters, some that are aware of its presence and appreciate it and others that would not notice if all the wildlife was to disappear from the site. A course manager summarised these thoughts by stating “Most of them (members) would be hard pushed to notice if all the grass was burnt off the fairways, let alone if the wildlife was to go”. Interestingly this comment was made at one of the eight sites undertaking best practice management.

9.5 Relevance to London HAP targets

The relationship between golf and nature clearly exists. There is a keen interest in nature conservation issues amongst the courses that participated in this research, with many actively seeking advice regarding the wildlife on their course. This demonstrates that as a peer group they are open to forming and working within external partnerships. However as Figure 7 and the information in chapter 7 show that this interest is often not inclusive of the conservation of acid grassland or heathland. Obviously this will need to be addressed to increase the contribution golf courses can make to specific aspects of habitat conservation.

10. The analysis of stakeholder requirements: the views of the membership

10.1 Introduction

Considering the requirements of communities directly affected by environmental conservation programmes is widely accepted as the best way to increases the chance that a project will be a success (Miller & Hobbs. 2002; Argrawal & Gibson. 1999; Millner-Gulland & Mace. 1998). A community can exist at any scale; the members at a golf club being one such example. Wood et.al (2002) and Smith (1998) both highlight the importance of engaging and educating the membership for any environmental management programme a club wishes to undertake. In spite of this recognition there has been very little investigation into the opinions of golfers regarding the links between the environment and the game, and more specifically their views regarding environmental management on their own course. What is known is that the overwhelming majority of golfers regard the game, as it is now, as good for the environment (Gange et.al. 2003).

In order to comprehensively assess the contribution the study sites can make to the HAPs it is necessary to understand the opinions of their members. Most golf clubs are highly dependent upon the financial contribution of the membership. There is currently a large proportion of golf clubs that have membership vacancies (EGU. 2002), so therefore the views of current members are given serious consideration. Ultimately the majority of golf course managers have to work to the demands of their employers, i.e. golf club members, which inevitably influences the on course management options available to a club.

10.2 Methodology

In order to understand these opinions a structured questionnaire including a contingent valuation assessment was used. This was distributed to ten of the twenty sites. It was not possible to distribute questionnaires at all sites due to reservations by course managers. At all courses it was deemed inappropriate to actively engage members at the site so questionnaires were left with the course manager and distributed at their

discretion. At some sites the course manager actively distributed the questionnaires to a 'cross-section' of the membership whilst at others the questionnaire was simply left for the membership to fill in if they desired. This did not appear to influence the response rate; at the two clubs with the highest response rate alternate methods were used. In total 220 questionnaires were distributed between the sites. A total of 97 were returned although 7 of these had to be discounted as respondents had either provided more than one answer on a number of single choice questions or had opted to leave a large number of questions. The level of response was not the same across all sites. This is shown in Table 11.

	Site number										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*TOTAL*
Valid responses	0	5	9	6	10	24	9	20	7	0	**90**
Invalid responses	0	0	2	0	0	1	1	1	0	2	**7**
TOTAL	**0**	**5**	**11**	**6**	**10**	**25**	**10**	**21**	**7**	**2**	**97**

Table 11: Total level of response to the questionnaire at each site

10.2.1 Questionnaire design

There are many considerations when designing a questionnaire to ensure a maximum response rate and also that the questions do not bias the respondents answers. A full description of these considerations and recommendations to overcome potential bias in the questionnaire design can be found in texts such as Bryman & Bell (2003) and Saunders et.al (2003). These recommendations were followed for the design of this questionnaire.

Important stages in questionnaire design are the initial scoping of questionnaire topics via a focus group and the modification of the questionnaire design through pilot trials. As this investigation was supplementary to the main report there was not adequate time to conduct focus group investigations. However the Managing the Roughs for Golf and Wildlife seminar acted as an informal focus investigation by providing insight into the main topics relevant to golf and conservation. Two stages of pilot studies were conducted at three golf courses not included in this research. In total 27 pilot questionnaires were completed and modifications made upon recommendation from the

golfers that completed them. A final draft of the questionnaire can be viewed in Appendix 5.

10.2.2 Contingent valuation

In addition to their general opinions members were asked if they would be willing to pay more in their membership fee to see an increase in wildlife on their golf course. This type of assessment is encompassed in the discipline of environmental valuation, which aims to put a monetary value on public goods such as the environment for which no market currently exists. The underlying rationale of a contingent valuation assessment is the acquisition of property rights (Garrod & Willis. 1999). If an individual does not currently own a good this method investigates how much are they willing to pay to acquire it. The results from this analysis can be crossed referenced to respondent's general responses to validate both data sets and also to gain a wider understanding of their opinions.

The first stage in conducting a contingent valuation study is to present the respondent with a hypothetical market in which they can make a decision whether to pay to acquire the good in question. It is important that the hypothetical market and the method of payment (bid-vehicle) are relevant to the respondent (DETR. 2000). The hypothetical market used in this survey can be found in Box 1 below.

> It may be possible to increase the diversity and abundance of wildlife present on your golf course through changes in the way it is managed. These changes would occur primarily in the roughs and would be aimed at promoting and conserving important types of native vegetation that can support a diverse range of animals and plants. Some aspects of this management could require increases in labour and resources, which would need to be financed.
>
> **Would you be willing to pay an increased membership fee or playing fee to see these increases on this course?**

Box 1: Willingness to pay scenario and bid vehicle scenario

Respondents were asked to indicate if they would be wiling to pay for such an increase and if so what was their maximum willingness to pay in extra course fees form a choice of given alternatives. This is known as a single bid survey method (Dixon & Sherman.

1990). Respondents were also asked to explain their choice by selecting one of several statements which best represented the motivations for their choice at this time.

10.3 Results and analysis

The data from the questionnaires can be split into sections to answer specific questions regarding member's opinions. Cross tabulation analysis followed by Chi-squared (X^2) tests were used to test if there was any statistical association between the respondent's answers and a number of independent variables. If an association was detected its strength (correlation) was analysed by calculation of the Cramérs V coefficient where appropriate. All analysis was carried out using SPSS 11.5 for windows.

10.3.1 Demographics

Age

The most represented age class was 50-64 with 39% of respondents falling into this age group. 28% of respondents were over 65 and 26% between 35-49. Only 5% of respondents were 34 or under.

Sex

78% of respondents were male.

Education

15% of respondents did not complete the question regarding their level of education. These respondents were not excluded from the overall analysis however as education was only found to be associated with one of the responses of those that did provide this information (see results and analysis below). Of those that did provide this information 48% were educated to Bachelors degree level or higher. A further 23% had completed some form of upper secondary education.

Playing frequency

86% of respondents golf at least once per week and can be classed as frequent players.

Membership of a conservation organisation

20% of all respondents were currently or had been a member of a wildlife conservation organisation such as the Wildlife Trust or the RSPB.

10.3.2 General attitudes

Four questions were included to assess respondent's general attitudes to wildlife on the golf course and the contribution it makes to their personal enjoyment of the game.

Do you feel that these natural features enhance your playing enjoyment of the course?

Yes	89%	No	11%

'Golf courses are a place for recreation, not for wildlife conservation'.

Strongly agree (1):	00%	Rank 4:	18%
Rank 3:	18%	Rank 2:	40%
Strongly disagree (5):	36%		

'I think golf courses should always be managed with nature in mind'.

Strongly agree (5):	44%	Rank 4:	34%
Rank 3:	14%	Rank 2:	06%
Strongly disagree (1):	01%		

Evidently nature appears to play a significant role in the respondent's enjoyment of their respective courses. The respondent's answer to question 1 was associated to both the age of the respondent (X^2=17.01, p=0.005, d.f 15) and the frequency they played golf (X^2= 32.94, p=0.049. d.f.9). The landscape type of the course or any of the other demographic variables outlined in 10.3.1 was not associated to the response. For questions 2, 4D and 4E there was found to be no statistical association between the respondents answer and the landscape type of the course or any of the demographic factors outlined in section 10.3.1.

10.3.3 Specific attitudes

Conservation plans for insects and reptiles are often closely linked to the conservation targets for acid grassland and heathland habitats. Unfortunately reptiles, and in particular snakes, have been persecuted by golfers in the past. The dislike of such animals by golfers was expressed at the managing the rough for golf and wildlife seminar also. Two questions (4B and 7) were specifically included in the questionnaire to explore if this feeling is still prevalent amongst golfers. The pilot studies revealed that the inclusion of any more questions on this topic could concentrate the respondent on this aspect of wildlife only and negatively affect their opinions throughout the rest of the questionnaire. In order to reduce this problem the questions regarding reptiles are not specific to this group but are 'buffered' by reference to other types of wildlife.

'I would like to see a diversity of animals on my course including insects, birds and reptiles'.

As described in section 10.3.2, over 75% of respondents stated strongly that seeing certain types of wildlife enhanced their golfing experience, 45% of these strongly agreeing with this statement. However when asked if they would like to see a diversity of wildlife on the course inclusive reptiles just 25% responded with such a strong preference and only 28% with a weaker rank of 4. In addition these results may be slightly misleading. Eight respondents actually modified this question by crossing out the word reptile and then proceeded to answer it with high agreement. These responses had to be eliminated from the analysis. However if they had answered the question to include their opinions of reptiles the percentage of those in strong or moderate agreement (rank 4 and 5) would be smaller.

There was shown to be a positive association between high agreement responses and whether the respondent had been or was currently a member of a wildlife conservation organisation (X^2=13.370, p=0.004, d.f 3). Analysis of the strength of this relationship by calculation of the Cramérs V coefficient showed that this association is reasonably strong (Cramérs V = +0.395, p=0.04). No other association was detected.

If efforts were made to selectively encourage native British wildlife onto your course what types of animals do you think these efforts should concentrate on?

Respondents were given five animal groups to choose from and were free to choose more than one group. They were also given the option of stating no interest in encouraging any. As Figure 8 shows only one respondent had no interest in encouraging wildlife. All of the other respondents (96%) indicated they would like to actively encourage birds onto the course, and the second highest choice was insects such as bees and butterflies. In contrast only 22% and 7% of the respondents expressed a desire to encourage lizards and snakes respectively. No association was found between the demographic characteristics of the respondent and their choices. However the actual course a respondent was from was associated to their choice for lizards (X^2=16.23, p=0.023, d.f 7). Therefore the members of some courses are more tolerant of reptiles than others. However this association was not related to the landscape type of the course.

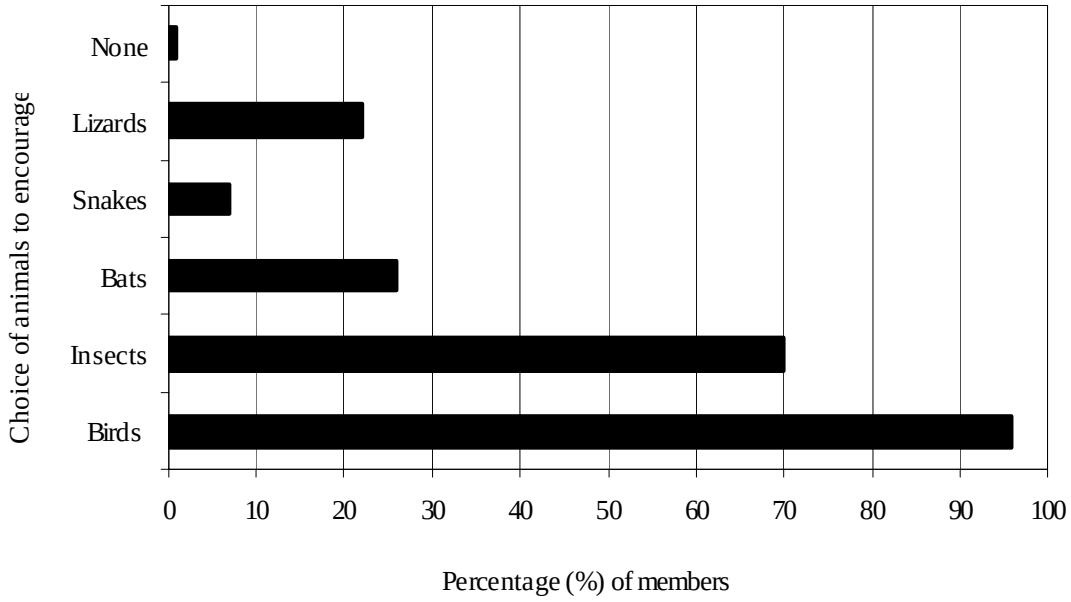


Figure 8: Animals members would like to directly encourage onto the course.

10.3.4 Personal requirements

Questions were included to assess respondent's views towards specific management activities that may be required when managing or restoring both acid grassland and heathland. This section also focuses on respondent's general interest regarding the wildlife on their course.

‘Our course is beneficial for wildlife as it is now’.

Strongly agree (5):	34%	Rank 4:	43%
Rank 3:	17%	Rank 2:	06%
Strongly disagree (1):	00%		

Evidently the vast majority of respondents feel that their course is beneficial to wildlife in its current condition. This was found to have no statistical association with the current condition of the acid grassland or heathland on the site. However there was an association between the course that the respondent was from and their view (X^2=42.332, p=0.004, d.f 21) and also the landscape type of the course (X^2=14.274, p=0.027, d.f 6). Respondents from grassland and parkland sites tended to rank their course higher than those from heathland sites. However there was a stronger association between the response and the actual course the respondent was a member at than the landscape (Cramérs V = +0.396 and +0.282 respectively).

Would you be interested in information regarding any activities in place to encourage wildlife on your course?

Yes: 68% No: 32%

Respondents that indicated they would like to receive information were asked to indicate in which form. Four options were given plus the choice to suggest an alternative. Respondents could choose more than one option. No respondents provided an alternative preference. As Figure 9 below shows information in the clubhouse was the most popular choice with 70% of respondents opting for at least this type of information.

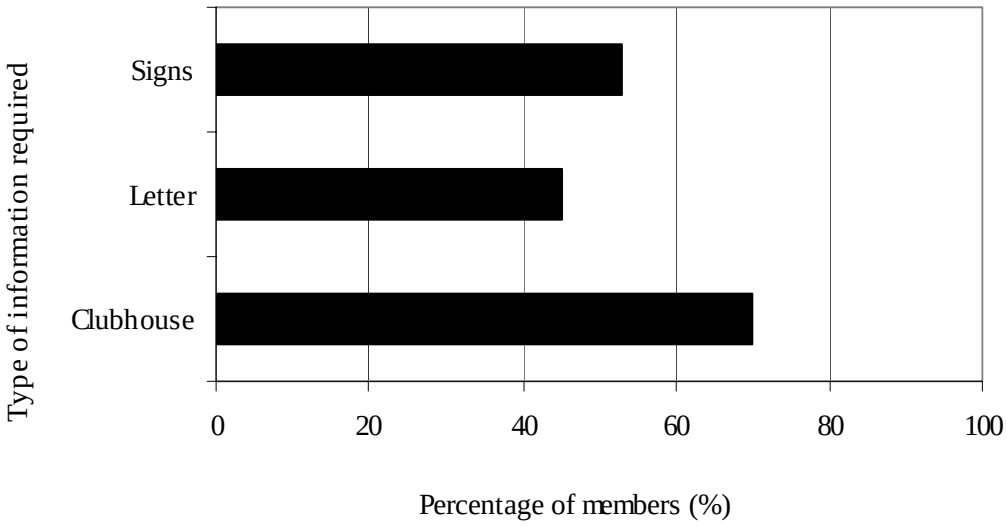


Figure 9: Preference for information type amongst respondents.

How do you feel about placing areas as ground under repair (GUR) to assist nature conservation on the course?

This would be acceptable: 67%
This would be unacceptable: 33%

The age and sex of the respondent were found to be highly associated with their opinion regarding GUR's on the course. Females were much more tolerant of this measure than males (X^2=9.296, p=0.010, d.f 2) and as the respondent got older their acceptance of GUR's decreased (X^2=31.637, p=<0.001, d.f 10). The association between age and response was moderately strong (Cramérs V = +0.419), that of sex and response less so (Cramérs V = +0.321).

Would you find it acceptable to reduce the number of trees in some areas of the course in order to conserve other types of natural vegetation?

Yes: 47%
No: 53%

The age of the respondent, their level of education and membership of a conservation body were all associated with the respondents answer to this question. As with the

response regarding GUR's older members were less tolerant of removing trees from the course (X^2=35.253, p=<0.001, d.f 10). Respondents who had completed their education at upper secondary level or above were more accepting of this management also (X^2=19.709, p=0.011, d.f 8) although the most tolerant group were those that had completed postgraduate education. Current or prior membership to a conservation organisation was also associated to a willingness to remove trees (X^2=9.461, p=0.009, d.f 2), with approximately 35% of all that said they would find tree removal acceptable falling within this category. Although not statistically associated to the respondents answer initial cross tabulation analysis revealed a trend regarding the response to this question and the landscape type of the course the respondent was a member at. This is shown in Table 12 below. It is clear that respondents from grassland and parkland style courses found tree removal less acceptable than those from heathland style sites

Landscape type	Acceptable to remove trees?		**TOTAL**
	NO	**YES**	
Heathland	14	21	**35**
Parkland	21	14	**35**
Grassland	14	6	**20**
TOTAL	**49**	**41**	**90**

Table 12: Association between landscape of course and acceptance to remove trees

10.3.5 Willingness to pay

Would you be willing to pay an increased membership fee or playing fee to see these increases on this course?

Yes: 27%

No: 73%

None of the demographic variables outlined in 10.3.1, the landscape type of the course or the actual course that the respondent was a member at was found to be statistically associated to a respondent's willingness to pay (WTP). However cross reference of respondents WTP with their answers in previous questions validated the WTP model by revealing that those that would pay had demonstrated an appreciation of and interest in nature on their course throughout the questionnaire.

Respondents who felt seeing nature contributed strongly to their golfing experience (X^2=17.215, p=0.001, d.f 3) and playing enjoyment (X^2=4.091, p=0.043, d.f 3) were more likely to pay. Additionally although no statistical association was found the data showed that only respondents that felt the roughs are important or very important to their visual enjoyment of the course demonstrated WTP.

WTP also appears to be associated to a general interest in or understanding of wildlife. Those that had expressed an interest in receiving information about wildlife were more WTP (X^2=8.552, p=0.003, d.f 1) as were those that wanted to see lizards encouraged onto their course (X^2=4.420, p=0.036, d.f 1). Finally those expressing a willingness to pay were more likely to accept the removal of trees to aid conservation (X^2=11.518, p=0.003, d.f 2). The strongest association was found between WTP and a feeling that nature contributed to the overall golfing experience (Cramérs V = +0.437).

If you indicated that you would be willing to pay please select an option from the list below that best represents the reason for your choice.

Respondents were offered four choices including an option to state the reason they chose to pay was because this was an imaginary scenario with no consequences. However as Figure 10 below shows none of the respondents chose this option; the overwhelming majority chose to pay as they felt seeing more wildlife would increase their enjoyment of the course. This correlates well with the associations between WTP and general opinions outlined above.

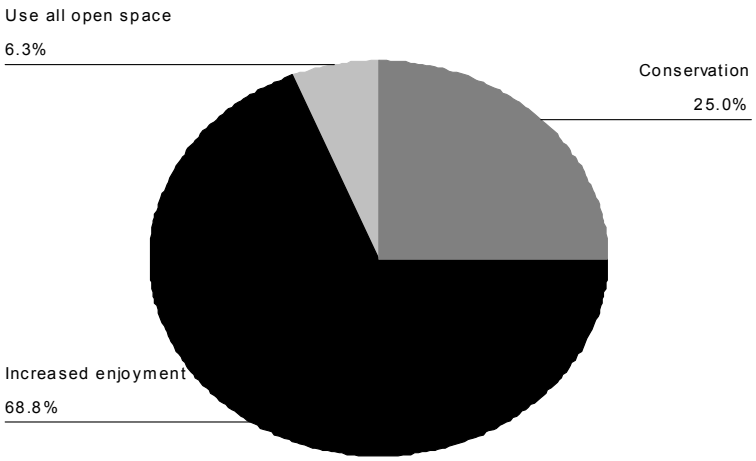


Figure 10: Reasons given for willingness to pay.

Please indicate the maximum amount you would be willing to pay by selecting a choice from the specified options.

Respondents who were willing to pay were offered five choices of amount that they would pay as a 'single bid'. Four of these options represented a percentage of the respondent's course fee and the filth a 'one-off' environment payment. As Figure 11overleaf shows none of the respondents chose the one-off payment option. The majority opted to pay 1% of their fee and only one respondent opted to pay greater than 10%. This person stated they would pay 'as much as it takes' so it is not possible to estimate the up most boundary of WTP.

There was found to be no association between the maximum willingness to pay and any of the demographic variables, the landscape type of the course or between the courses. However most of the higher WTP bids were made by respondents at two of the clubs. There was a statistical association between maximum WTP and the reason given for WTP (X^2=13.229, p=0.040, d.f 6, Craméns V = +0.525), with those stating that the importance of conservation was their motivation for paying WTP more.

To put these results into context the average annual membership fee for a golf club in 2002 was £596.04 (EGU. 2002). For a club that has membership of 500 the WTP demonstrated in this sample[6] would represent an annual income of £2587.97. Again placing these results into context it costs approximately £600-900 to scarify an area of 0.25ha to encourage heather regeneration (Waite. 2004). There are of course then additional costs where necessary of supplying heather seed or removing soil from the site but this money does represent a starting point. Additionally where such intensive management is not required such funds could be used for scrub clearance or to but machinery.

[6] Assuming that the one individual stating 'as much as it takes' chose 10% of their fee as their maximum WTP.

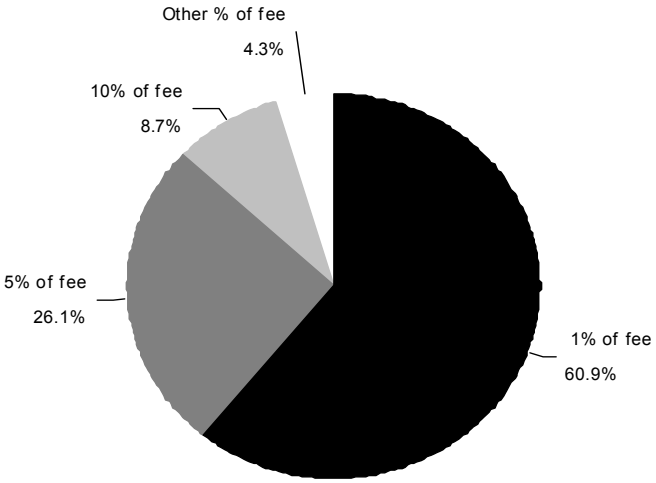


Figure 11: Increase in fees that respondents would be willing to pay

If you chose not to pay at this time please select an option that best represents the reason for your choice.

Respondents were given six options to choose from to express why they were not WTP at this time. As Figure 12 shows nearly half of those not WTP indicated that they felt conservation was important but should be taken from their current fees. Therefore in total approximately 75% of all respondents thought money should be put spent specifically on conservation. The range of choices for not being WTP is less homogenous than the choices for the WTP. However the choices were consistent with respondents answers throughout the questionnaire; those indicating that nature enhanced their experience (X^2=46.347, p=<0.001, d.f 13) and those that wanted more information (X^2=16.407, p=0.006, d.f 5) were more likely to state that they felt nature was important but the money should come from their fees. Age was the only demographic factor associated with the respondents choice (X^2=39.088, p=0.007, d.f 20). However this association is questionable as the small number of younger respondents was responsible for the least represented choices and a bigger sample of this age group would be needed to confirm this association.

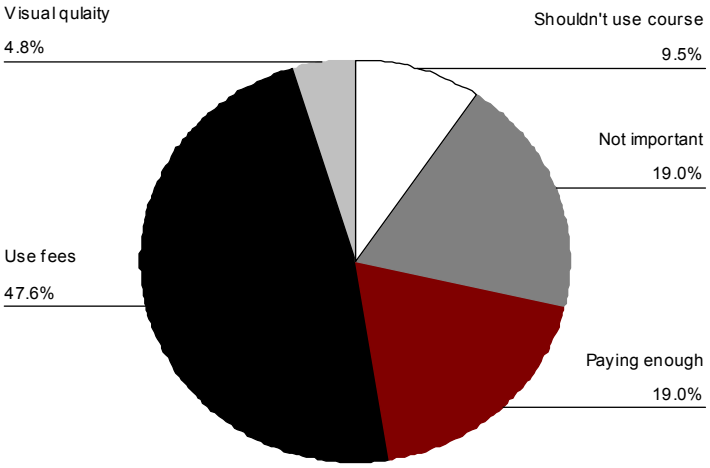


Figure 12: Reasons given for not being willing to pay

10.4 Implications for the London HAP targets

Evidently nature does appear to be important to a large percentage of the golfing body. The additional 'biodiversity' fees would be a highly controversial measure and it is unlikely that any club would introduce such a scheme. However the willingness of people to pay and the willingness of many more to donate money from their current fees is a signal that certain members think nature conservation on the golf course is an important issue which warrants expenditure that could have been used in other areas, for example the provision or maintenance of facilities.

As discussed in chapters 8 and 9 course managers often feel under pressure and limited by the expectations of their members. It was widely felt that members did not value the wildlife present on the course. This is a limitation that cannot be directly addressed by external bodies such as the LBP and must be challenged from within a club. The fact that golfers have explicitly stated wildlife enhances their golfing experience should provide additional motivation for course managers to do so and consequently feel in a position to manage their sites in a more sympathetic manner.

Unfortunately these questionnaires have revealed that there is still much hostility towards reptiles amongst golfers; they are generally not the type of wildlife members wish to see on their own course. However many are interested in receiving information so with the right approach there may be scope to develop their attitudes over time.

11. The use of a seminar to encourage sympathetic on course management – A case study approach

11.1 The rationale behind the seminar

The need to from partnerships between golf and conservation bodies has been widely acknowledged. Relevant organisations such as the STRI and the European Ecology Unit feel measures that can address current knowledge gaps and promote sensitive golf course management should be undertaken as a high priority (Woods et al. 2002; Stubbs. Date unknown). Case study assessments of individual courses have identified a desire by managers to form these partnerships, but a lack of awareness about how to do so amongst personal reservations of what would be expected of them in doing so (Morris 2000; Wallwork 1992). Evidently there is a need for conservation bodies to address this problem by providing informative information, and where desired accessible and relevant sources of advice. The necessity to do so is especially relevant in Greater London at this time. As outlined in chapter 4, and more specifically in section 4.3, London's golf courses have the potential to contribute greatly to the successful implementation of several HAP targets regarding heathland and acid grassland conservation.

11.2 Organisation and structure of the day

On 13th February 2004 the LBP held a seminar event at the Wimbledon Common and Royal Wimbledon Golf Clubs. The running title of the day was Managing the Roughs for Golf and Wildlife, with special emphasis placed on the management of acid grassland and heathland roughs 33 golf courses from around Greater London where invited to the event, with nine attending on the day. The overall aim of this day was to engage golf courses in the sympathetic management of acid grassland and heathland habitats to contribute to the achievement of the London HAPs for these habitats. Special consideration was also given to reptiles throughout the day due to the close nature of reptile species action plans and the acid grassland and heathland HAPs.

The seminar was structured around a series of talks in the morning to provide information regarding the species and habitats and an afternoon site visit on the Royal

Wimbledon golf course to discuss practical aspects of habitat management. All delegates were invited to take literature home with them that provided information relevant to that which had been delivered during the talks. Speakers represented a cross-section of interests with both traditional ecological talks and practical information from the STRI and the Rural Development Agency included in the agenda. A full schedule for the event is available in Appendix 6. The topic presented by each speaker related directly to one of eight overall objectives of the LBP for the day. All of the objectives related to a transfer of knowledge between the LBP and the golf course manager delegate. For example, objectives included making delegates aware of heathland and acid grassland habitats. A summary of the LBP aims and objectives for the day can be found in Appendix 7.

11.3 Evaluation methodology

The managing the rough for golf and wildlife seminar was evaluated as a tool to promote sympathetic habitat management. A delegate from seven of the nine clubs that attended the seminar was interviewed regarding the event to gain insight into their views. The pre-selected topics used to structure the interview included discussions regarding general opinions of the day, specific points of interest, any influence the seminar has had upon management and what they would like to see as a next step. The success of the day was evaluated in three ways. Firstly by the level of management change which had occurred as a result of the day, secondly by a structured evaluation of the transferral of knowledge between the LBP and the delegates and thirdly by exploring and analysing the views of the delegates.

Two clubs that attended the seminar were not included in the evaluation, as they held no acid grassland or heathland. Semi-structured interviews were used due to the benefits outlined in section 7.1. At all but one of the sites the course manger discussing general management had also attended the seminar, so both interviews were conducted with the one person. All interviews were audio recorded. Interviews specifically regarding the seminar lasted between twenty-forty minutes; however it was not uncommon for interviewees to also mention the seminar during discussion about general management. In order to gain a wide understanding of the opinions of golf course managers regarding such initiatives, discussion of a seminar scenario was also included in general management interviews.

11.4 Direct measures of success

In order to evaluate the usefulness of a seminar as a tool the success of the event needs to be measured. Success can be assessed in the context of the organisers' aims and objectives for the event.

11.4.1 Evaluation of the information transfer

As outlined in section 10.3 the LBP had specific objectives for the day relating to the transfer of knowledge between the LBP and the delegates. In order to assess the level of transfer that had been accomplished structured questionnaires were used during the semi-structured interview. Delegates were asked to state to what extent they agreed with a set of statements (A. opinion test) and then to indicate to what extent the seminar had shaped their opinion in the previous answer (B. seminar contribution test). Their agreement was demonstrated on a scale of 1-5 with 5 representing very much so and 1 not at all. Nine statements were tested, with eight derived from the eight original objectives of the LBP. The ninth statement addressed how informative the whole day had been regarding sources of advice available to further the delegates' knowledge. The statements shown below in Table 13 were tested:

Statement Number	Statement
1	How important do you feel it is to actively conserve areas of acid grassland in Greater London?
2	How important do you feel it is to actively conserve areas of heathland in Greater London?
3	Do you feel that golf courses have a role to play in achieving conservation targets for these habitats?
4	To what extent do you feel golf courses could contribute to achieving these targets?
5	Do you think that the members would benefit if initiatives were adopted?
6	Do you think that the club itself would benefit if initiatives were adopted?
7	Do you feel that the club has practical knowledge regarding techniques to
8	How aware do you feel you are about funding opportunities available when managing golf courses to benefit nature conservation?
9	**How informed do you feel you are about sources of advice regarding management for wildlife?**

Table 13: Statements tested in the seminar evaluation structured questionnaires.

The number of responses of each rank for each of the nine statements are summarised in Tables 14 and 15 below. As Table 14 shows the responses for the opinion rank are clearly higher for some statements than others. Statements 1-3 that represent opinions about the importance of conserving both habitats and the role of golf courses in this are ranked consistently high. This is true to a slightly lesser extent for statement 4, which explores how much of contribution the delegate feels golf courses can make to habitat conservation. Statements 7-9 which explore more specific aspects such as practical knowledge tend to score lower. As Table 15 shows the seminar's contribution to the delegates opinions regarding the nine statements tends to have been ranked as 3 or higher, with 3 being the most popular rank. This suggests that the seminar contributed at least moderately to delegate's knowledge in all areas. The mean opinion and seminar contribution rank of all nine statements can be seen in Figure 13.

Statement number	**A. Opinion rank**					
	1	**2**	**3**	**4**	**5**	**TOTAL**
1				2	5	**7**
2				1	6	**7**
3				1	6	**7**
4			2	1	4	**7**
5			4	1	2	**7**
6				3	4	**7**
7	1	2	2	1	1	**7**
8	1	2	4			**7**
9		1	2	4		**7**
TOTAL	**2**	**5**	**14**	**14**	**28**	**63**

Table 14: Distribution of responses for the opinion test.

Statement number	**B. Seminar contribution rank**					
	1	**2**	**3**	**4**	**5**	**TOTAL**
1			2	3	2	**7**
2			2	2	3	**7**
3		1	2	1	3	**7**
4			2	2	3	**7**
5		2	4	1		**7**
6			7			**7**
7			5	1	1	**7**
8		1	4	2		**7**
9			3	4		**7**
TOTAL	**0**	**4**	**31**	**16**	**12**	**63**

Table 15: Distribution of responses for the seminar contribution test.

Initial analysis of Figure 13 suggests that the seminar (band B) has contributed moderately or highly to most aspects of the delegate's knowledge/opinions. The only statements with a mean rank of 3 or lower are 5 and 6. These relate to the benefits of undertaking habitat conservation on the course. It is probable that delegates would have realised there are benefits to undertaking this type of work prior to the seminar; these realisations may have been a driver for why they attended. What is clear from analysis of Table 14 and Figure 13 is that delegates feel least knowledgeable about the more specific topics. However as Figure 16 shows the seminar appears to have provided the majority of this knowledge they do have.

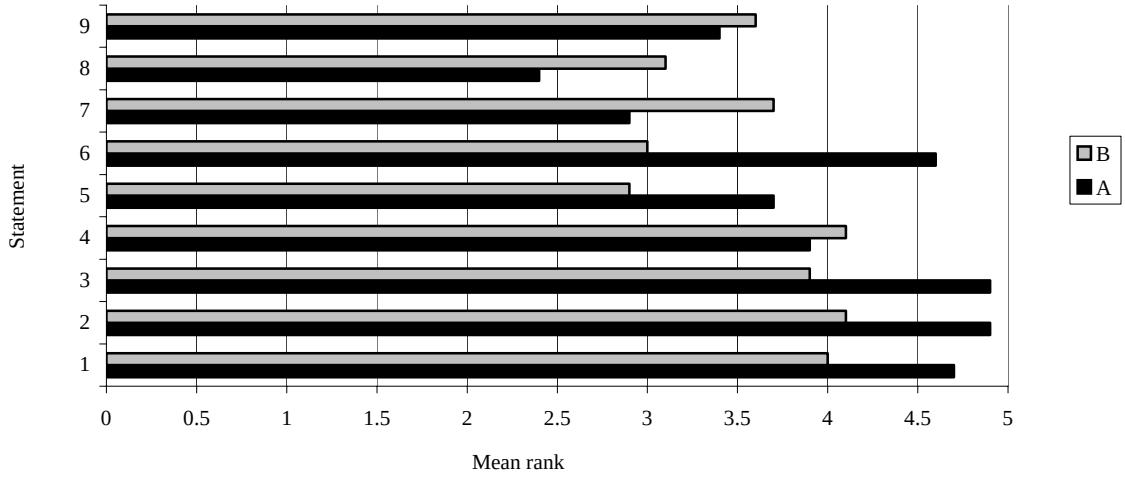


Figure 13: Mean opinion and contribution rank of each statement

11.4.2 Implementation of best management practices

The overall aim of the seminar was to engage golf courses in the sympathetic management to contribute to the achievement of the London HAPs. Therefore a second way to evaluate the success of the seminar is to see how many of the courses that attended have since entered into sympathetic management as a result of the day.

Only one of the seven sites that attended has changed their management as a direct result of the seminar. This site is a grassland style course that is currently undertaking an acid grassland restoration programme. As a direct result of information they received at the seminar the green keeping staff have made alterations to the mowing regime of the grassland rough and have started to remove arisings after mowing.

A further three sites have since implemented or are planning to implement changes to their management regimes as an indirect result of the seminar. In these cases the

information they received at the seminar re-enforced knowledge they already had regarding their site management and gave them the additional support they needed to undertake changes. Two of these sites are heathland courses and one a grassland course. All three are involved in habitat restoration work.

The remaining sites view the information they received at the seminar as a first step in organising changes to the way their course is managed. Two of the sites used the seminar as an introduction to the topics covered. Both course managers had ideas that they wanted to introduce changes at their site but had little idea of what and how they wanted to do. The final site is a unique case in that the management of the roughs are totally controlled by a common land conservators group. Therefore the delegate is not in a position to directly act as a result of the day although acknowledges that the seminar prompted discussion with the land managers.

11.5 Delegates opinions of the day

An alternative way to assess the success of the seminar is to obtain the opinions of those that attended. This process highlights factors that were important to the individual and can therefore detect areas of success that may not have been identified in the formal measures outlined in section 10.3.

Through a structured question the delegate was asked to indicate how they felt about the seminar on a scale of 1-4, with one representing very negative and four representing very positive. The overwhelming response was that delegates felt very positively about the day with six ranking their opinion as 4 (the highest option) and one as 3. The answer to this structured question then prompted discussion as to why they had chosen this option. The responses were surprisingly homogenous and could be split into five main themes, which are summarised below:

- Highly enjoyable, well organised day
- Always interested to learn new things
- Good quality and relevance of speakers
- Provided ideas that were applicable and relevant to their own course
- Reinforced and enhanced their own ideas regarding habitat management and conservation

11.5.1 Positive features of the day

All seven delegates noted that the seminar had introduced new ideas to them and helped them to think in terms of the ecological interactions between habitats and the species that depend upon them. Four of those interviewed specifically accredited the information they received about invertebrates as the main source of this information, stating that they had never been introduced to these ideas previously, nor thought of the habitats they managed in such a way. As a direct result of the seminar one site has employed an entomological consultant to assist in the preparation of a heathland restoration programme. The information regarding reptiles on the golf course was also of great interest to delegates. Delegates identified this information as a new perspective on how the small areas of rough they manage could make a contribution to conservation. Two clubs have expressed a direct interest in Adder conservation at their site as result of the day.

A second point that was well documented during interviews was the ability of the seminar environment to promote interaction between delegates, both between golf course managers and between this peer group and conservation professionals. Delegates found it useful to talk to their peers to gain an idea of what others were doing and to share information with them. They also valued the opportunity to meet 'experts' who could provide advice regarding on course management for wildlife. A key success of the day was the balanced approach in which information was delivered. All delegates indicated that they felt at ease within an attendance largely constituted of 'environmentalists.' This ease came from the theme of the day, which was received as environment and golf, not environment versus golf. It was however noted by three delegates that the bias in attendance might have been the reason why the information delivered was so broad. This criticism is discussed further in section 11.5.2.

The literature provided on the day was also well received. All seven delegates said their club had taken literature, either to provide a point of reference at the club and also for contact information. Not all delegates had made use of the literature, mainly due to limited time. However they were pleased that this resource had been available. Two sites have used this literature as the primary information source for talks they have given to their members regarding wildlife management on the course. A further one used the information to present a report to the clubs directors. Other delegates said the information had been an important resource to them for answering members' questions

in less formal circumstances, and had often lent support to measures they were taking on the course which provoked controversy within the membership.

11.5.2 Negative features of the day

Five of the seven delegates stated that although interesting, the information they received was broader than they expected to receive or than they wished to receive at this one time. Sites that contained heathland were typically most interested in this aspect whereas the acid grassland only sites felt that the day was sometimes biased towards the heathland management. This was particularly noted for the afternoon field visit where majority of the time was spent discussing heathland management.

It was also the field visit section that received the most criticism from heathland sites. Despite the focus on heathland management the delegates felt that issues important to them were not covered during this session. For example, the discussion and viewing of 'real life' management and restoration work. The morning talk on management techniques was widely well regarded and it was felt that the P.M session did not continue the theme of this talk adequately enough. Additionally delegates stated that they would prefer to look and at and hear about a course more representative of their own site when discussing management options.

Related to the broadness of the day was criticism of the tight schedule that the A.M talks were run to. As explained previously in section 11.5.1 the opportunity to develop contacts and share information was highly valued by delegates. Lack of time between talks to discuss the issues raised and to ask questions was acknowledged as a major failing of the event by four delegates and also identified as a disappointment by another one.

11.6 How effective was the seminar?

Both the structured assessments and delegate interviews have shown that the seminar was an excellent medium by which to promote acid grassland and heathland conservation. As Figure 13 shows delegates are very aware of the need to conserve these habitats, especially in London, and feel that the seminar contributed greatly to

their opinion. The semi-structured interviews revealed that delegates now have an understanding of the complexities of ecosystems, which they will take into account when managing their golf courses.

Despite these positive points the seminar does not appear to have met all the objectives for the day. Delegates typically feel under informed about sources of funding and practical measures to manage acid grassland and heathland. However as Figure 13 demonstrates a substantial proportion of their knowledge regarding these matters comes from information received at the seminar. The day has therefore acted as an introduction to these topics. This should still be viewed as a success as these are complex issues and a short talk within a mass of other new information could never be expected to

However caution is needed when trying to draw general conclusions from the evaluation of this day. The delegates are from different clubs, all at differing points in their habitat management programmes. Therefore each individual has come to the event with their own requirements of what will be helpful and relevant to them. A statement ranked highly by one delegate may have been ranked lowly by another simply due to differing prior knowledge, not the failure of the day to convey the relevant information. What the seminar has done, that can be measured as a direct success regardless of individual circumstances, is identified and engaged an interested peer group.

The clubs at the seminar were the overwhelming perpetrators of the best practice management identified during site visits. Many aspects of this management were being carried out prior to the seminar taking place. The day has provided a focus and point of contact for these interested clubs, and in many cases has helped to push forward their original habitat management plans for their course. Importantly two of the courses that attended are those that directly contribute to the audited London heathland resource and the third site expressed regret that they could not attend this time. By making contact with all of these sites in such a way the LBP have helped to ensure that the habitat management and restoration which would have occurred regardless can now occur in more informed circumstances. This should increase the contribution these sites make to the HAP targets and habitat conservation in general.

11.7 Recommendations for the future

The following recommendations are a result of the interviews with both seminar attendee course managers and those managers that were interviewed regarding general management but did not attend the event.

11.7.1 General

There are some general organisational aspects that were identified. Firstly the location of the seminar appears have been influential over which clubs attended. There was a strong location bias for attendees to be from the south west of London, close to the location of the event. Six of the seven delegates stated that they would have been less likely to attended or would not have attended if the seminar had been hosted further a field, for example in the North or East of London. Location was also identified as a key issue amongst non-attendees. Of the seven that expressed interest in a seminar style event six stated that they would like to see it organised at a regional/local level.

The timing of a seminar must also be given consideration. The summer months up until late September/early October are very busy for course managers due to green keeping demands and golf club competitions. Both of these aspects must therefore be considered in planning further events. However location may be more of an issue when trying to widen the target audience as the original delegates have now been engaged and are keen to stay involved.

11.7.2 The next step

Delegates were asked about their expectations for after the event. I.e. did they expect any follow up to the day and if so what would they like this to be? All seven stated that they would like to be involved in another event that built on the introduction they had received. A popular request was further introduction to more aspects of practical management and also to hear from other courses that had implemented changes on their courses. However the timing, frequency and specific target audience suggested differed between all delegates. Again this is a direct result of each club being at a different stage in their habitat management programme.

A number of the courses also wanted a site visit to identify the key issues at their own course. Most have now received such a visit from a member of the heathland or acid grassland working groups so these expectations have been met

11.7.3 Ways to widen the audience

There was a high level of interest amongst general golf course managers regarding a seminar event. However the specific nature of the original seminar was unattractive to all; it was far too specific to be applicable to their course due to the limitations outlined in chapter eight. This may be one reason why the original attendance was so low. A more general 'golf and wildlife' event discussing a variety of habitats would therefore be more appealing to this group. As explained in chapter 9 all clubs undertake woodland maintenance and many have implemented other types of management with wildlife considerations as the main motivation so the interest is there. However this may not be a realistic option. To organise such an event would require a huge amount of co-ordination amongst the different habitat working groups within the LBP. As the need to ensure appropriate conservation on golf courses comes second to the necessity to do this for more important sites the resources may not be available to undertake such an initiative.

An alternative and possibly more realistic way to reach more courses would be to feed into existing groups and provide information and advice this way. For example some course mangers attended regional BIGGA meetings that cover a wide variety of management issues and many are members of the Golf Club Secretary Association, which also meets regularly.

Additionally many course mangers highlighted that they do not have the time to attend such events. Two had planned to come to the original seminar but due to a busy workload could not on the day and others stated that they would never be able to free staff for a whole day to attend. The production of a leaflet similar to the planned acid grassland manager's leaflet would be of interest to such sites as all course mangers stated they are always interested in things that increase their personal knowledge.

12. Discussion and evaluation

12.1 Evaluation considerations

The overall objective of this research was to make a comprehensive evaluation of the extent that golf courses can contribute to acid grassland and heathland HAP targets within Greater London. Two specific HAP targets are most applicable to the role that golf courses could play:

Target 1: To secure appropriate management on all heathland and acid grassland sites by 2011

Target 2: To create new areas of heathland habitat were appropriate and restore areas of degraded heath

To make this evaluation a number of aspects have been researched including the current condition of these habitats, key stakeholder opinions and any limitations that exist to the sympathetic management of either habitat. In order to make a balanced evaluation the results of the research must be considered independently and in the context of any limitations. Consideration of the following factors is essential to the overall evaluation process.

12.1.1 Willingness of the industry to be involved

A total of 38 'target' clubs were invited to participate in this research due to the assumption that they would contain either heathland or acid grassland. Five of these directly declined to do so upon initial contact and a further 14 declined at a later date. This may have been for a number of reasons such as a busy schedule however it does give some indication of the willingness of these golf clubs to be involved with external partners and also to have their management evaluated by the conservation lobby.

A high level of wildlife conservation and association with external organisations/individuals was observed at the study sites. Consistent with the findings of Wood et.al (2002) course managers were keen to explain the relationship between

golf and nature and stressed how important it was to the game, even if the members did not appear to notice this. This suggests a high level of appreciation of conservation issues amongst London's golf courses on the whole. It is possible this may have been observed because only clubs involved in such activities were willing to participate in the study due to its strong conservation theme. Ultimately regardless of if this sample is representative it does identify that this group at least are incorporating environmental considerations into their general management regimes and are willing to involve external sources of advice in planning this management.

Unfortunately in terms of the HAP targets this strong interest is not always inclusive of acid grassland or heathland due to a number of generic factors that were found to promote the mismanagement of both habitats. The large proportion of the target group involved in this research coupled with the widespread occurrence of factors shown to effect priority habitat management mean It is likely that this is representative of the whole peer group. An additional factor to consider is that sites co-managed by conservation organisations were well represented in the study group. This is a factor which promotes best practice management so may mean that the study group is over representative of this type of activity.

There are cases outside of the study group where interest in acid grassland or heathland conservation is evident. Bexleyheath Golf Club has undertaken heathland restoration at the site (GLA. 2004) and West Middlesex Golf club supports some of the most important acid grassland in the borough of Ealing (Ealing Council. 2004) However most of London's courses, including the majority of those in the target group, are parkland courses which have very little scope for contributing to the HAP targets. Within the study group the managing the roughs for golf and wildlife seminar had managed to identify most courses that have potential to contribute to the targets. It may be that this group are the main sites for doing so.

In conclusion it is not that London's golf courses are unwilling to become involved in general conservation initiatives it is that the objectives of these two HAP targets are not always compatible with their own objectives for the site. This will pose a major barrier to any initiative to engage the whole target group in appropriate management activities.

12.1.2 Current habitat condition and management

Within the study group only 10% of the heathland and 20% of the acid grassland site assessments were classified as favourable. Two of the sites expected to hold heathland no longer did. This implies that the current type of management employed at the majority of sites is far from ideal. Indeed analysis of this revealed that only a small group of courses were responsible for all cases of best practice management, who logically also accounted for the majority of the better quality habitat. This is consistent with the findings of Green & Marshall (1987) and more recently Wallwork (1992) who also concluded that unimproved semi-natural habitats are underrepresented on the majority of golf courses due to the management in place, with only the richness of a few sites suggesting otherwise.

A more encouraging discovery is the commitment demonstrated by some courses to improve the quality of these habitats. This was most prominent amongst heathland style courses where both habitats were intrinsic features of the site, and was also evident at courses wishing to promote a grassland style landscape. This is consistent with the research of the STRI that indexed the playing value and ecological value of heather at a number of clubs throughout the UK and Ireland (Wood et al. 2002). Where the playing index was high the ecological index tended to also be high.

There were cases were parkland courses had significantly relaxed mowing regimes in order to change the landscape of the site. This was mainly driven by strong personal interest within the club, in both cases due to the arrival of a new course manager. Although classification as ‘improving’ by no means guarantees the habitats will reach a favourable condition this is an important step towards appropriate management and can help to guard against future habitat loss. However within the study group the proportion of courses involved in this type of work was small; only half of the twenty acid grassland assessments and just over half of the heathland assessments were classified as favourable or unfavourable-improving.

Where courses were trying to appropriately manage these habitats there were often limitations to the extent that they could do so. Aesthetic considerations, the desires of the members and in some cases alternative uses of the course all had to be considered and balanced. In some cases a lack of knowledge regarding the best ways to manage heathland or acid grassland also limited the potential of the site.

The overwhelming majority of unfavourable habitat was recorded on parkland style courses. This strong trend is unsurprising. It is not that the managers of such clubs do not have an interest in conservation on their course it is simply that these sites have drastically different management objectives to heathland or grassland sites. There is often pressure to meet these objectives within size constraints. This was particularly relevant to the study group as most of the courses were smaller than the national average. The result is that conservation management in addition to woodland maintenance or that which directly contributes to the visual character of the course cannot easily be incorporated into the site.

Although size did not appear to be associated to habitat condition across all sites it was strongly perceived to be a severe limitation at most. Where there was a strong desire to make changes on the course and enough flexibility within a club to allow this to happen positive action was achieved. However all of those that had made such changes to their course had done so under pressure from both members and other areas of the site management to deliver results that were acceptable to the club. Evidently this is not an easy policy to adopt and the drive to do so can only come from within a club.

In conclusion there is no likelihood that all of the target sites will be in a position to undertake appropriate management of the heathland or acid grassland they are holding. The sites that are in a position to do so are also those that will be relevant to targets to restore and create heathland. Parkland sites are in general playing an important role in safeguarding relict examples of both habitats however the chance that these areas could be enhanced and maintained at a high standard is low.

It is important to realise that this assessment does have limitations that need to be taken considered when interpreting these results. The habitat condition assessment is only a test of condition; it does not identify the quality of the habitat. The process has simply identified that the habitat present is currently in one of four conditions and does not give any indication of local, regional or national distinctiveness. Additionally this assessment makes no measure of the important issue of the fragmentation and isolation of the habitats observed on the courses. Personal observation suggests that on all of the heathland sites the areas are small and isolated however this provides little useful information.

The assessment only represents the condition of the roughs and hence will overlook intensive management of acid grassland on fairways, tees and greens. If this were to be taken into and the whole site evaluated all courses would be classed as unfavourable. However to do this would be to miss the whole point of conservation on golf courses; the land area is only there as a result of its use as a recreational facility and therefore it is only feasible to expect best practice from a conservation perspective in areas out of play. Although the assessment has not made measure of the ecological integrity of the habitats found it has provided important information in terms of presence or absence and condition as a function of management. Ultimately it is this information that is most relevant to initial programmes aiming to conserve and enhance the remaining resource on golf courses.

12.1.3 Stakeholder opinions: Club members

A golf course membership can have substantial influence over the management that takes place on their course. The golfing profession is becoming increasingly aware of the environmental aspects of course maintenance, but often this is not readily communicated to the golfing public (Stubbs. Date unknown). However this is not strictly due to a lack of interest by members with 68% of respondents in this study indicating that they would like to receive more information about the wildlife on their own course. Additionally at the two sites involving members through newsletters and meetings the level of participation is good.

A total of six course managers identified the expectations of their members as a limitation to the conservation work they could undertake. Their attitudes and requirements can either directly influence on course management decisions or can indirectly effect management by influencing the options considered suitable by the course manager. Expected protests from members can make course managers wary of undertaking habitat maintenance or restoration and at sites where they are doing so it acts as a limit to the scale of the projects they will undertake. The semi-structured interviews revealed site managers are pessimistic about the relationship the members have with nature on the course. They feel it does enhance their game but many are not aware of this. However the results from the members' questionnaire revealed that the vast majority do appreciate the wildlife on their course, and for many it greatly enhances their overall experience.

A somewhat surprising result was that nearly half of respondents felt it would be acceptable to remove trees to aid the conservation of other types of natural vegetation. This is a controversial measure in the eyes of the general public and has been identified as an issue for the whole London heathland restoration programme (Waite. 2004). All course managers who had attempted to undertake habitat maintenance involving tree thinning and removal had faced protests from members and this was identified as a sticking point for heathland restoration in particular. Encouragingly members from heathland sites were more tolerant of selected tree removal than those at parkland or grassland courses. Younger respondents with a high level of education were most likely to find this acceptable, suggesting that clubs need to explain more comprehensively to their members why they need to remove trees in some cases. Like the golfers interviewed by Gange et.al (2003) most members felt that their course was beneficial to wildlife in its present state so they are probably unaware of the necessity to undertake such management.

On a less pleasing note the questionnaire revealed that there is still much hostility held by golfers towards reptiles, in particular snakes, despite being so positive about other aspects of wildlife. These types of views also were registered strongly during the pilot study. This is a national problem with many adders clubbed to death on courses (English Nature. 1999), so these results could unfortunately be expected.

The results from the questionnaire established that there is no such thing as 'typical' golfer who values nature. Often factors such as age, sex and education were not associated to the view of the respondent. Indeed for most questions even the actual course that a respondent was from did not appear linked to their views. What the questionnaire did reveal was that there are members of the golfing community who have a genuine interest in nature conservation on their course, with a substantial proportion even willing to pay to assist such measures. Even more encouraging was the high percentage of those that felt money should be made available from their current fee to finance on course conservation efforts.

As the sample of questionnaire responses was small at only 90 respondents there are limits as to how widely these results can be interpreted and applied. This sample cannot be regarded as a representative sample of all the members at the 20 sites visited either as only half of clubs were involved in the questionnaires with nearly half of all responses

coming from two sites. The method of distribution must also be considered. At all but two sites questionnaires were left for interested parties to fill in at their own discretion. This may have seriously skewed the responses to be more representative of those with extreme views, i.e. a very positive or very negative opinion of wildlife on the golf course. This may be why a high proportion of respondents had or is currently a member of a wildlife conservation organisation. This group represent 35% of all those willing to pay to increase wildlife on their course. Those with more moderate views may have been less motivated to spend time completing the survey and thus their views underrepresented.

In spite of these limitations the data does still identify some key points. Wildlife does significantly enhance the golfing experience for some members, with approximately 75% of this sample willing to pay directly or through use of their current fees to enhance biodiversity on their course. Hence whether this is representative of every golfer is irrelevant; these people do exist. Observations during site visits suggest that clubs should make better use of such individuals by involving them in wildlife issues to promote support amongst other members.

12.2 Evaluation conclusion

Target 1: To secure appropriate management on all sites by 2011

At present London's golf courses appear to be offering very little to the conservation of these priority habitats apart from protection from development. Undoubtedly this is a positive feature of a golf course. Their capability to act as a habitat refuge is one reason why they are of such relevance to the London HAP targets now. However through management neglect over time these habitats will disappear from golf courses as they have done elsewhere.

The habitat assessment provides evidence that this process is underway already. Two sites expected to hold heathland now contain no trace of this habitat and some acid grassland sites contain little more than relict patches of the hardiest species such as *Airia praecox* and *Rumex acetosella* scattered on the edge of over seeded fairways. There are a further two courses where the quality of their last reaming heathland is obviously deteriorating but no measures are in place to rectify this. This naturally raises the fear that if this assessment were to be repeated in years to come these two courses

would represent cases of ‘feature-absent’. Only one site currently manages its heathland to a favourable condition and this site along with three others are the only ones that support acid grassland in a favourable condition. This is in spite of a clear interest in nature conservation demonstrated across all clubs.

All of this evidence confirms the need to secure appropriate management on these sites; however there are a number of limitations that mean it is unlikely that this will occur on a large scale. Only courses that are willing to co-operate with enough space or motivation will feel in a position to undertake suitable management. For many even considering a change to the current regime to benefit either habitat is seen as an unrealistic.

However a number of clubs are taking measures to improve the condition of the habitat they hold. The motivations for doing so are unique to each case but generally involve a desire to maintain these habitats as an intrinsic feature of the course and a strong personal interest in their conservation. At these sites there is little conflict between the objectives of the course manager and those of the LBP. Areas of heathland and long grassland roughs contribute to the technical and visual characteristics of the course. Under no circumstances does the conservation of these habitats detract from the nature of the game.

Such sites are typically heathland or grassland style courses. The heathland style sites should be of particular interest to the LBP as they were found to support acid grassland in a better condition than their parkland style counterparts. Additionally the grassland style courses are tolerant of large areas of rough that is not managed intensively. This too represents a valuable resource. This group represent a clear target of land managers that could be actively involved in the promotion of appropriate management. The managing the roughs for golf and wildlife seminar successfully managed to engage most of this group so the process of educating and securing appropriate management is well under way.

Another encouraging finding is that members appear to significantly value wildlife on their courses, which should in theory promote more active management. Importantly natural habitat features such as heath and grassland roughs were typically ranked as very important to a golfers visual and strategic enjoyment of a golf course. This

knowledge coupled with high appreciation of such habitats by the relevant course managers should only work to promote maintenance of such areas to a high standard.

Target 2: To create new areas of heathland habitat were appropriate and restore areas of degraded heath

Of the fourteen 'potential' heathland golf course sites identified nine participated in this study. Two of them no longer contain any heathland at all and at a further two the small remaining area of this habitat is declining in quality due to scrub and rank grass invasion. Three of these sites are parkland style courses and the fourth was until very recently. It is unlikely that the two sites with remaining patches of heathland will enter into restoration management, as the areas do not contribute greatly to the nature of the site. Hence both clubs have other management priorities. Changing desires throughout the golfing industry has pushed clubs to create landscaped courses where habitats such as heathland have no intrinsic value. This is a nationwide trend. 16% of clubs throughout England and Wales that claim to support heathland now define themselves as parkland courses (Wood et al. 2002).

The remaining five sites are heathland style courses and thus have a vested interest in maintaining the habitat in a favourable condition. All but one of these courses had a representative in attendance at the seminar. At three of these sites heathland restoration, including expansion of the net area is planned by the course managers and at the other two restoration is being undertaken by a conservators group who manage the site. Significantly the three courses that contribute to the current resource identified in the heathland audit are part of this group.

Restoration work is already being undertaken at some courses such as scrub removal, soil scarification and heather turf importation. However due to the primary use of these sites restoration work will progress at a different scale and speed to that of other areas. Despite evidence that members of heathland courses are more tolerant of procedures such as tree removal golf course managers still wish to undertake projects on a small scale that will achieve the planned results.

This is a good policy; courses tend to start with the least controversial areas of the club progressing as time and resources allow and once club members have seen the results of the efforts and are more tolerant. This means that projects are sustainable and can be

developed to be more efficient as knowledge develops. However in the initial stages this can conflict with conservation objectives. The importation of heather turfs is a popular choice for course managers as it produces immediate results and often in the desire to begin implementing plans management can be undertaken that is far from ideal due to a lack of knowledge.

There are some features of golf courses that are positive when compared to other sites designated for heathland restoration. This is summarised well by comparison of the courses included in the SSSI on Wimbledon Common. The course that does not have public access can control rabbits with fencing and is in a position to undertake a scrub/secondary woodland clearance programme to create and link up two existing areas of heather. In contrast the course on common land is limited by user pressure and will not be in a position to undertake similar levels of restoration in the near future.

In summary heathland restoration is most likely to be a possibility on heathland style courses that wish to enhance and utilise the natural features that the course was originally designed around. It appears that the seminar has engaged an interested group that will contribute to the restoration of London's heathland resource. It is not possible to estimate how involved the other five potential heathland courses not included in the study are or would wish to be in heathland restoration. Each golf club is unique so it is not possible to generalise on a large scale. However their unwillingness to participate in this evaluation is an indication that they are unwilling to collaborate with external partnerships and it may therefore be difficult to engage them to contribute to the HAP target.

12.3 The next steps

This report has identified that it is highly unlikely that all golf courses will be able to contribute to the acid grassland or heathland HAP targets, especially the target to secure appropriate management on all sites by 2011. This does not mean however that there is no scope for vastly improving habitat management at a number of sites. Standards may not be improved to a level that could be classed as appropriate management but they could definitely be moved in a positive direction.

Unsurprisingly there was evidence that acid grassland habitat was suffering due to a lack of appreciation. Tree planting and waste disposal was occurring within this habitat not as a result of a desire to destroy it simply because people did not realise the harm

hey were causing. Heathland was suffering neglect and mismanagement due to limited knowledge about the techniques required to manage it appropriately or even the need to manage and conserve this important habitat. This all points to a clear need to inform course managers of the importance of these habitats which they are stewards of. The managing the roughs for golf and wildlife seminar was an excellent way of engaging and developing an already interested and moderately informed peer group; a similar programme will need to be undertaken to ensure appropriate management on a wider scale.

Ideally efforts should be made to remedy this situation by challenging some of the limitations preventing positive management. Little can be done to alter the size and manpower constraints many course managers feel but information can be provided to highlight alternative management methods and to show people how they can still contribute within these constraints. In real life however this is an optimistic aspiration. Acid grassland and heathland all over London is in need of appropriate management and understandably the limited resources of partnerships such as the LBP should and will concentrate on sites that can contribute the greatest net resource in terms of quantity and quality. However if something is not done to rectify the mismanagement and neglect observed at many courses these areas of habitat will continue to decline.

12.4 Wider significance

The role golf can play in wildlife conservation is well documented. Like Morris (2002) this study identified a high level of management to aid conservation on the courses involved. Consistent with the general trend within the industry (Stubbs. Date unknown; Stubbs 1998) the managers of these courses demonstrated a good appreciation of environmental issues and widely accepted their role as stewards of the land that they managed. However what this study has specifically demonstrated is when this role is evaluated in terms of explicit conservation objectives many sites are not able to contribute due to a number of limitations.

With adequate recognition of the inherent limitations the results from this evaluation can be applied to a wider scale. Within London the most relevant application is to the conservation of chalk grassland, which is known to exist on some golf courses. This habitat is also identified as a priority habitat under the UK BAP and has its own HAP

prepared for the Greater London region (LBP. 2004[d]). Chalk grassland does not suffer from the same lack of appreciation as its acidic counterpart, however it is likely that where space is limited and landscape priorities take precedence it could be suffering from the same mismanagement. Indeed in a study of habitats on Greater Manchester golf courses Wallwork (1992) concluded both habitats were under represented due to over intensive mowing regimes.

The results form the management evaluation and the members questionnaires are highly applicable to the reptile SAPs, both within London and on a national level. Golf courses can provide excellent habitats for reptiles (Atkins. Date unknown), hence they have a great potential to aid species recovery programmes. Many of the study courses were unknowingly undertaking activities that would support reptiles on the course. However the study has also shown there is still much hostility towards the group. Although the number of respondents questioned was small, their opinions identified that even amongst members who valued other aspects of nature their desire to see reptiles on their course is still low. Course mangers do not appear to be so hostile; two have expressed direct interest in adder conservation as a result of the seminar. However without the co-operation of members undertaking such a programme would be futile as reptiles, especially snakes, could still face persecution on the course.

This report concentrated on the issues surrounding specific aspects of habitat conservation within Greater London, however there are aspects that can be applied on a national scale. Within London heathland style courses and those that make use of the natural grassland are in the minority. This is true of the UK as a whole with only 10% of our golf courses classified as downland and 11% as heathland (Dair & Schofield. 1990). This is in spite of 16% of golf courses being originally designed upon heath areas (Lindsay & Gange. 2002). Many golf courses that still support heather are more representative of parkland, links and woodland sites (Wood et al. 2002) so the imitations to heathland and acid grassland management identified by examining the London courses could be equally applicable to these sites. This assumption is given weight as nationally sites containing heather have identified lack of or inappropriate past management, scrub invasion and grass invasion as the main drivers of heathland decline (Wood et al. 2002), which is highly consistent with observations on the London sites.

13. Conclusions and recommendations

There is growing recognition by both the conservation lobby and the golf industry of the positive role that golf courses can play in nature conservation. Golf courses at the very least represent a secure land use although some sites represent some of our most important landscape areas as sites of SSSI and SAC. This report has shown that there is undoubtedly a relationship between golf and nature in Greater London at the present time. Unfortunately when this is investigated to explore the relationship between golf and specific BAP priority habitats this relationship does not appear to be so strong.

Unless a course has specific objectives to enhance and maintain heathland or acid grassland in a favourable condition other management priorities tend to take precedence. In most cases the grass is for golf and the woods are for nature. However there are a core group of sites that have demonstrated a keen interest in maintaining these habitats to a high standard through attendance of the seminar and in some cases through already undertaking some aspects of best practice management. Although this group represent only a quarter of all sites expected to contain these habitats the contribution they can make to the HAPs is considerable. All sites wish to restore and enhance these habitats and are open to collaborations with professional sources of advice about how best to do this. This should also secure favourable management in the future.

The original logic for this report was to scope the role that courses could play in fulfilling two specific HAP targets in London. It has met this objective and has provided initial insight into the main issues surrounding acid grassland and heathland conservation on golf courses. There are areas that could be expanded through future research to provide a more robust assessment.

To make a truly comprehensive assessment of the contribution courses could make it is necessary to explore the resource and opinions at the sites that were not involved in this study. However this may not be possible to implement if these sites do not wish to co-operate with outside organisations.

The next step in the habitat condition assessment would be to quantify the area of each habitat represented on individual courses to inform the audits of both habitats and to

further highlight sites with the most potential. This would not be a simple task due to the number of sites and the sporadic location of ‘patches’ of habitat. A solution for the interim could be to ask the ‘core’ group of interested course managers to map the most relevant patches of habitat on their course. This appears to have been done with considerable accuracy at the three sites that mapped their heathland for the original heathland audit.

Although the members questionnaires provided some interesting information the data is too limited to draw strong conclusions from. It would be informative to carry out the questionnaire on a larger scale ensuring that the method of obtaining responses is more appropriate to truly measure member’s attitudes. Investigating additional areas would also be of value; for example members preferences for landscape type. This study suggests that the questionnaire format used was appropriate for golf course members as of the questionnaires that were completed few were void for analysis.

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Appendix 1: Target courses

London Borough	Golf Course
Bexley	**Bexleyheath**
Bromley	Chistlehurst Langley Park Shortlands **Sundridge Park**
Croydon	**Addington Palace** **The Addington*** **Shirley Park**
Ealing	Ealing Horseden Hill Perivale Park West Middlesex
Enfield	Enfield
Greenwich	Eltham Warren Royal Blackheath Shooters Hill
Harrow	Grims Dyke
Havering	Maylands Romford
Hillingdon	**Haste Hill** **Northwood**
Kingston	**Coombe Hill*** Coombe Wood*
Lewisham	Beckenham Palace
Merton	**London Scottish/Wimbledon Common*** **Mitcham** **Royal Wimbledon***
Redbridge	Hainault Forest
Richmond	**Fulwell*** Home Park Richmond Richmond Park Royal-mid Surrey* **Strawberry Hill** **Twickenham Park**
Waltham Forest	Chingford Wanstead Woodford

Table A: Courses approached to participate in this study.

Courses in **bold type** expected to contain both relict heathland and acid grassland, those in plain type acid grassland only.

***** Courses that attended the seminar.

Appendix 2: Habitat assessment indicators and specific targets

Heathland attribute	Indicator	Target
Vegetation structure	**Bare ground**	1-10% as a patchwork with the vegetation. No more than 1% heavily disturbed.
	Cover of dwarf shrubs E.g. *Calluna vulgaris, Erica cineria,*	25-90%
	Cover of Ulex sp.	Ulex sp./Genista sp. cover <50% *Ulex Europeans* cover <25%
	Growth phase composition of ericaceous cover	Pioneer 10-40%, Building/mature 20-80% Degenerate <30%, Dead <10%
	Height of ericaceous shrubs	Height of dwarf shrubs representative of age classes present.
Vegetation composition	**Presence of desirable graminoid species** E.g. *Deschampsia flexuosa, Nardus stricta,Danthonia decumbens Agrostis* sp., *Festuca* sp.,	At least three present throughout the sward. BUT <25% cover *Deschampsia flexuosa, Nardus stricta*
	Presence of desirable forbs E.g. *Galium saxatile, Lotus corniculatus, Genista anglica, Ornithopus pinnatus, Rumex acetosella.*	At least two present throughout the sward.
Indicators of negative trends	***Pteridium aguilinium* cover**	<10% dense canopy cover
	Presence of undesirable species E.g. *Scenico jacobea, Urtica dioica, Chamerion angustifolium, Epilobium* sp., *Juncus* sp., *Cirsium* sp. E.g *Holcus lantus, Dactylis glomerata*	<1% of sward
	Tree and scrub cover	<15% tree and scrub cover <1% *Rhododendron ponticum, Fallopia japonica*.
	Disturbance	<1% of habitat heavily damaged by erosion or trampling.

Table B: Heathland assessment attributes and targets

Acid grassland attribute	Indicator	Target
Vegetation structure	**Bare ground**	1-10% as a patchwork with the vegetation. No more than 1% heavily disturbed.
	Organic litter cover	No more than 25% of litter cover as a continuous layer
Vegetation composition	**Cover of *Ulex* sp.**	< 30% cover.
	Positive indicator grasses	At least three present throughout the sward.
	Positive indicator herbs *Campanula roundifolia, Galium saxatile,Genista anglica, Ornithopus pinnatus, Rumex acetosella.*	At least two present throughout the sward.
Indicators of negative trends	***Pteridium aguilinium* cover**	< 20% cover.
	Herbaceous species E.g. *Scenico jacobea, Urtica dioica, Chamerion angustifolium, Epilobium* sp., *Cirsium* sp.	<5% cover singly or combined.
	Coarse/invasive grasses E.g. *Holcus lantus, Dactylis glomerata, Lolium perenne, Poa anua*	<10% cover.
	Tree and scrub cover	<5% cover

Table C: Acid grassland assessment attributes and targets

Appendix 3: Individual site descriptions

The Addington

Borough: Croydon **Course type: Heathland**

Size: c.140 acres **Membership type: Private**

Course description

The Addington is an 18-hole course that was originally designed and laid out in 1914 by the famous golf course architect J.F. Abrcromby. The design of the course makes use of the natural contours of the land and the numerous areas of heathland rough are integral to the course as an important playing hazard. The course is enclosed by predominately oak and birch woodlands and lies adjacent to the neighbouring Addington Palace golf course with both courses forming an extensive area of open land.

Acid grassland/heathland resource

The course was involved in the London Biodiversity Partnerships heathland audit and reported holding an estimated 3.7 ha of heathland. Ground truthing a map of the estimated areas confirmed this to be an accurate approximation although one large mapped area was a fine *Descahampsia flexuosa* grassland stand with a small amount of *Calluna vulgaris* and *Erica cineria* regenerating in the sward.

Acid grassland is extensive throughout the playing surfaces of the course, although as expected it is cut short to millimetres on greens, tees and fairways. The grassland in the rough is allowed to grow naturally, cut only as necessary, which is usually annually. Most stands of grassland are in good condition containing species such as *Festuca rubra, Danthonia decumbens, Holcus mollis, Potentilla erecta,* and *Hyochaeris radicata.*

Both *Calluna Vulgaris* and *Erica ciner*ia are present in the heathland areas of this site. The *Calluna* is typically in poorer condition than the *Erica cineria* and appears to have deteriorated due to a combination of the hot summer of 2003 and treatments to control

bracken where the dead material has not been removed. There are areas of the course containing just *Erica Cineria* and these are in good condition and contain notable plants such as *Campanula roundifolia, Carex piluilifera*, *Carex flacca* and *Ornithopus pinnatus*. However many larger areas of heathland on the course are suffering from scrub encroachment from adjacent woodland areas. The majority of heather is at an early – mature life phase and although there are plants at other stages the uniform cutting of the sward means it is all at a similar height. Overall the condition of the heathland on this course is unfavourable.

General nature conservation practice

Apart from the intensive areas such as greens, tees and fairways the rest of the Addington golf course is left to develop with little intervention. There has been some work carried out in the wooded areas of the course, mainly tree thinning and the control of invasive species, and this is a area of management that the club is planning to expand upon in the near future.

Contribution to HAP potential

The Addington already contributes a substantial area of heather to London's resource and holds some good quality areas of acid grassland. The club are very keen to improve the quality of the heather on this site and appreciate the nature conservation value of their course. The Addington wishes to restore and even expand its heathland so with appropriate advice from the LBP this course could contribute significantly to HAP targets.

Addington Palace Golf Club

Borough: Croydon **Course Type: Parkland**

Size: Approximately 150 acres **Membership type: Private Members**

Course description

Addington Palace Golf Course is situated on the Addington Hills adjacent to the Addington Golf club and Addington Park. It is a large course, with natur**al undulations**

and hills that dictate the layout of the site. The main feature of the course is wooded glades that link holes throughout the site.

Acid grassland/heathland resource

Relict acid grassland species and *Airia praecox* are frequent throughout the site however in most areas the grass is mown too intensively to be of value to wildlife cut twice weekly to a maximum of 3cm in most places. Where longer roughs can develop they are typically dominated by *Trifolium repens* and *Taraxacum officinale* agg. There is one area on a slope adjacent to the 4th fairway, which is left to grow naturally and is very species rich containing typical heath and acid grassland species such as *Calluna vulgaris, Erica cineria, Hypocaeris radicata, Cerastium fontanum, Galium saxatile, Deschampsia flexuosa, Festuca. Sp.* and *Juncus squarrosus.* To one side of this patch invasion from rank grasses is beginning and the heather is mainly of mature phase although is short due to mowing to 4-5cm. There is also heather in small beds as a feature at one tee. This is poor condition, much of the stand dead and suffering from invasion by *Elymus repens.* This heather is not local and the beds contained at least two cultivars.

General nature conservation practice

As a parkland course most nature conservation value of this site is in its wooded boundaries and copses throughout the course. Woodland maintenance at the site is frequently undertaken included scrub clearance and tree thinning. Much of the woodland that borders the site is left un-touched.

Contribution to HAP potential

Due to the parkland style of this course there is little scope for expanding the areas of un mown rough. Even where this is already occurring the grassland is generally in an unfavourable condition. The noted patch of grass/heath is very diverse however this are is declining in quality. This is possibly due to rainwater running down onto the area from the higher woodlands and also as a result of grass invasion from the fairways. This patch is of low management priority to the club; especially the heather and thus the site will contribute little to the HAP targets.

Chingford Golf Course

Borough: Waltham Forest **Course Type: Parkland**

Size: 110 acres **Membership type: Municipal**

Course description

Chingford is set within Epping Forest SSSI and is owned and run by the Corporation of London. The course is predominately a parkland course although areas of the rough are allowed to develop, especially under tree lines and against the borders of the course.

Acid grassland resource

The acid grassland communities at this site are diverse and contain some notable species such as *Nardus stricta, Danthonia decumbens, Genista anglica, Pilosella officcinarum, Achillea ptarmica* and *Potentilla erecta*. Much of the rough is un mown in the roughs and there are many anthills. However this is a parkland style site in areas and in these places the rough is mown very short. The parkland feel of the course is also degrading the acid grasslands in places. In areas the leaf litter is a prominent feature of the grasslands and there is evidence of encroachment from tree lines. There is also evidence of undesirable management including tree planting and leaving grass cuttings in the swards.

General nature conservation practice

It was not possible to interview the manager at this site.

Contribution to HAP potential

Although there are some problems at this site the grasslands are still very diverse for London and therefore this course is an important site. The Corporation of London is in the process of preparing a structured management plan for the course, which should help to improve the quality of the grasslands.

Chistlehurst Golf Club

Borough: Bromley **Course Type: Parkland**

Size: 27.09 Ha **Membership type: Members**

Course description

Chistlehurst is a compact 18-hole golf course that has been expanded from its original 12-holes. It is situated in an urban area but open spaces such as Chistlehurst Common and numerous small woodlands are close by. The course can be spilt into two halves, the first the upper part of the site, which sits on free-draining soils and the second the lower section of the course, which sits on clay. As a result the vegetation of these two areas is quire distinct, with the upper area supporting the majority of the relict acid grassland and species more associated with calcareous soils recorded on the lower half.

Acid grassland resource

This site does not contain any heathland and but does contain relict acid grassland species such as *Festuca sp, Agrostis, Airia praecox*. Most of this grassland is mown too intensively to be of value to wildlife; the roughs and semi-roughs are cut weekly to 17 and 50mm respectively. However there are a few areas, particularly around copses and on natural undulations in the land where the grass is left to grow naturally. In one or two places this creates valuable invertebrate habitats where longer grasses and herbs such as Hawkweeds and *Galium saxatile* are allowed to grow freely on sunny banks. However this is unrepresentative of the majority of this site, and the acid grassland is generally of poor condition due to over frequent mowing and invasion from broadleaved grassed, predominately *Holcus lanatus* and *Dactylis glomerata*.

General nature conservation practice

As a parkland course most nature conservation value of this site is in its wooded boundaries and copses throughout the course. There is also a great crested newt population in one of the ponds on the site which Bromley Council and local voluntary groups are involved in maintaining. The Club takes measures to protect this area from the daily management of the course and covers the pond area when spraying chemicals.

General nature conservation practiceContribution to HAP potential

There is a limited potential to the value the acid grassland at this course could represent. The course manager would like to expand the extent of long rough but as a small parkland course the space to do this is restricted. The club are highly aware of environmental issues and would be willing to introduce management changes to benefit the grasslands as long as they are compatible with the nature of the course.

Coombe Hill Golf Course

Borough: Kingston **Course Type: Heathland**

Size: Approximately 155 Ha **Membership type: Private Members**

Course description

Coombe Hill course lies in the Coombe Estate close to the smaller Coombe Wood course. The course is bordered within residential development but is close to local woodlands and playing fields. It is a large, square course that is mainly heathland style although some areas are more characteristic of a parkland site. The soil in the parkland areas is heavier than that in the heathland section so the vegetation is different.

Acid grassland/heathland resource

Within the heathland section of the course regenerating patches of *Calluna vulgaris* are common alongside fairways. The acid grassland roughs are allowed to grow naturally and are cut only when necessary which is typically less than twice per year. The course has been undertaking work to increase the area of heather and acid grassland on the site. This has included leaf litter removal, scrub clearance and scarification, which were over seeded with grassland clippings from the roughs. *Calluna vulgaris* is regenerating well in these areas along with *Deschampsia flexuosa, Festuca ovina* and *Festuca rubra.* Heather turfs have also been used to provide immediate effects alongside fairways. In some areas there is scrub invasion, mainly *Quercus sp*. and *Rubus fruictosus* agg, which is reducing the quality of the heathland.

The main conservation work on this site is currently centred on heathland restoration. The site has also had surveys for other types of wildlife carried out including Badgers. They are interested in insect and reptile conservation.

Contribution to HAP potential

This site currently holds approximately 0.9ha of the London heathland resource. There is great potential for it to contribute more in the future due to the extensive restoration programme, including plans to restore a bomb crater that is covered in *Calluna vulgaris*. Acid grassland is well maintained on the site and new areas are being created as a by-product of the heathland restoration process. Due to the scrub and grass invasion still remaining in some areas the sites heathland is in an unfavourable condition however there are plans to restore these areas also.

Coombe Wood Golf Club

Borough: Kingston **Course Type: Parkland**

Size: c.32 ha **Membership type: Private Members**

Course description

This small course is located in the Coombe Estate at the bottom of the hill to Coombe Hill golf course. The course itself is situated on a hill. The upper part of the site sits on free draining Thames River gravels, the lower half on clay. The course is bordered by residential housing that is visible from most of the site. There are lines of trees throughout the course, some of which have TPOs attached by Kingston Council.

Acid grassland/heathland resource

The acid grassland at this site is confined to the upper half of the course. It is currently mown very short to a maximum of approximately 4cm. The semi-rough is hardly distinguishable from the fairways. However in areas some growth is allowed. These areas have plants such as *Rumex acetosella, Lotus corniculatus* and *Lenontodon sp.* There is little evidence of invasion from grasses or scrub; the grassland is unfavourable due to the intensive management it receives.

General nature conservation practice

The arrival of a new course manager has promoted a new interest in environmental issues at the site. The club are planning to plant extensive lengths of native hedgerows and to undertake woodland restoration. They also want to restore degenerate *Ulex Europeans*, which is common on the upper part of the course.

Contribution to HAP potential

Currently the acid grassland at this site is far too frequently mown to be of any significance to nature conservation. However the new manager is planning to expand the length and width of the rough in places throughout the site. The club are hoping to create an ecotone from the wooded borders of the course to the fairway in contrast to the sharp lines currently in place. The course is keen to form partnerships and to receive information.

Eltham Warren Golf Club

Borough: Greenwich **Course Type: Parkland**

Size: 35 acres **Membership type: Private members**

Course description

Eltham warren is a compact course situated in a residential area. The course itself is bordered by other open spaces including a wildlife reserve along its Northwest boundary. This is a parkland course although there are areas on longer grassland rough.

Acid grassland/heathland resource

In the 2002 open space survey of London it was noted that this site was very heavily mown and therefore was of low conservation value. During this visit substantial areas of un mown rough were observed which are cut once or twice per year. These changes have occurred as a result of the club working with STRI to use a management plan and subsequently entering the BIGGA award scheme. One of these areas was particularly diverse including *Ornithopus pinnatus, Festuca ovina* and *Hyochaeris radicata.* However rank species, particularly *Lolium perenne, Dactylis glomerata* and *Achillea millefolium,* are invading these areas.

General nature conservation practice

The course manager is very keen to improve the wildlife value of the site which is why the club became involved with the STRI management plan scheme. Work to date has included wetland creation and maintenance, tree and scrub management and the creation of large grassland 'set asides' as well as the relaxation of the mowing in the roughs.

Contribution to HAP potential

This site has potential to contribute to the acid grassland HAP with much of the rough allowed to develop with little disturbance. However the invasive grasses and herbs are starting to dominate the sward in some areas and there is little scope for this being rectified at the present time.

Fulwell Golf Club

Borough: Richmond **Course Type: Grassland**

Size: 90-100 Ha **Membership type: Private members**

Course description

Fulwell Golf Club lies in a heavily developed residential area although the open areas of Twickenham golf club and an allotment garden border the course. The River Longford runs near to the west boundary of the course but is separated from the site by private housing. The course was part of Hounslow Heath until the 19th century when development in the area separated the two areas. Until World War Two the adjacent Twickenham Golf Club was also held by the club but now operates as a separate facility. The course itself is wide and flat and the areas of rough grassland are an important feature of the site.

Acid grassland/heathland resource

The 1993 Ecology Handbook for Richmond described the acid grassland at Fulwell as mown extremely close to boundary hedges and of little wildlife value. The site was also listed as holding patches of relict heather. A lot has changed since this assessment as

the natural grasslands the club term their ‘ecological areas’ and areas of played rough now compromise almost one fifth of the course at 17Ha. Unfortunately the changes in management have come about too late to save the relict heathland on this site as no sign of heather remains.

The grasslands here are predominately acid species dominated by *Agrostis capilliaris* with both *Festuca sp.* and *Nardus stricta* also frequent in the sward. Due to neglect the grasslands are currently a mix of finer acid grasslands and invasive species such as *Holcus lanatus, Dactylis glomerata, Pheleum pratensis* and *Cirsium sp*. However management is now in place to try to rectify this and improvements have been noted.

General nature conservation practice

The green keeping staff at Fulwell Golf Club are making notable efforts to improve the overall wildlife value of this site. They are currently in the process on integrating ecological management into the clubs ten-year management plan. Over the last three years the chemical application to the course has been reduced by 98% and they are keen to encourage species to aid a programme of Integrated Pest Management. The course have undertaken woodland maintenance work and have involved a local biodiversity action group as well as the Hawk and Owl trust to ensure best practise.

Contribution to HAP potential

This course has a huge potential to aid the HAP for acid grassland simply due to the sizable area of grassland that is not under intensive management. Despite the poor condition of some areas efforts are being made to rectify this and staff have noted an improvement in the sward since changes to their grassland management were implemented. Prior to the management change at this course a programme of tree planting was introduced which if not rectified may reduce the value of the grasslands in coming years. Unfortunately the relict heather on this site has now gone although there are areas of the site that are left ‘wild’ which may be suitable for heather creation programmes. This would not appear to be a priority at the club at the moment but may be something they would consider when their grassland restoration programme was completed.

Horsenden Hill Golf Club

Borough: Ealing **Course Type: Parkland**

Size: 35 acres **Membership type: Municipal**

Course description

Horsenden Hill golf course is situated within the larger Horsenden Hill reserve, which is a site of metropolitan importance. The course itself is small but not cramped with only 9-holes.

Acid grassland/heathland resource

There is only one small area of acid grassland on this site; the rest of the course contains neutral grasslands some of which are important for the local BAP. The small acidic area consists predominately of *Agrostis capilliaris* with no evidence of associated herb species. This area is only mown a few times each year but is short and sparse possibly due to trampling. There are some more extensive acid areas adjacent to the borders of the course located on a disused reservoir.

General nature conservation practice

The course manager and greenkeeper work closely with the Horsenden Hill Rangers Team to manage the site in the most sympathetic way. This has included tree maintenance, the erection of bird and bat boxes and the creation of grassland set-asides.

Contribution to HAP potential

Although sympathetic to conservation management there is little this site can offer to the acid grassland HAP as this habitat forms little of the site.

Langley Park Golf Course

Borough: Bromley **Course Type: Parkland**
Size: 120 acres **Membership type: Private Members**

Course description

Langley Park Golf Club is located within a significant matrix of urban development including residential housing and local facilities. This course is an old site, originally developed in 1910 upon meadowland. Today it is the woodlands that are the dominant feature of the site, including areas of Roman remains.

Acid grassland resource

The course work to an ecological management plan that was produced by the STRI ecology department. An objective of this plan was to improve the extent and structure of the rough grasses and as a result the club have relaxed the mowing regime in part of the site and scallop cut the edges to these areas. However this only occurred alongside two fairways hence most of the acid grassland is mown too frequently to be of any great significance. In the relaxed areas species such as *Festuca rubra*, Agrostis *capilliaris* and *Rumex acetosella* can be found. Unfortunately there is evidence of coarser grasses moving in from the tree line. There are man made mounds near to these areas which do provide areas of bare ground.

General nature conservation management

This club have undertaken an extensive programme of management to benefit wildlife on the site. This has included the creation of a large pond and maintenance of other wetland areas including a natural stream that passes through the clubs woodlands. The club are undertaking work to provide new wildlife habitats in the woodlands as part of their ecological management plan.

Contribution to HAP potential

Langley Park does contain some areas of acid grassland that are in an acceptable condition. However these areas are small and isolated on the course. It is possible that when the club review their ecological management plan they decide to expand these

areas. However this seems unlikely as they have significant interest in woodland and wetland habitat maintenance.

London Scottish/Wimbledon Common Golf Course

Borough: Merton **Course Type: Heathland**

Size: Unknown (Large) **Membership type: Private Members**

Course description

This course sites inside the Wimbledon Common boundary and is played by two clubs in opposite directions. It is hard to tell where the golf course ends and the common starts apart form the greens and tees. The site is covered by the SSSI designation that applies to the whole common. As the site is on common land and therefore the public may use the area freely, hence the habitats suffer from heavy user pressure. The Wimbledon Common Conservators who are responsible for managing the common are also responsible for the golf course roughs and the course manager must agree any management to these areas.

Acid grassland/heathland resource

The areas of the common that act as the golf course roughs are typically allowed to grow freely and are cut once or twice per year as necessary. The fairways on the course provided areas of localised bare ground. None of the fairways, greens or tees is over seeded hence all of these areas are acid grassland. There are areas of heather that borders some of the fairways. This is generally in poor condition due to a number of factors. Much of the heather is in the mature and degenerate phases and needs management to clear dead debris and to break through a developing thatch layer. There are also suffering due to scrub invasion. Heavy rabbit grazing is preventing regeneration of heather; small fenced off areas have shown positive signs of regeneration. The conservators are also experimenting with imported heather turfs from Putney Heath, which have been laid adjacent to some fairways.

General nature conservation practice

The current course manger is very interested in sustainable course management. This involves using only organic fertiliser and trying to avoid other chemical use. The club fully co-operate with the conservators and English Nature. They are keen to see heather regeneration occurring on a large scale throughout the course and would like to see a reduction in woodland cover.

Contribution to HAP potential

Areas of Wimbledon Common have been identified as suitable restoration locations in the heathland restoration strategy. Whilst the golf clubs are not in a position to undertake such work directly they would support this programme and could be able to help with the management of some areas. However the whole of the common suffers from high public use and obviously this is especially high on the golf course area.

Maylands Golf Club

Borough: Havering **Course Type: Parkland**

Size: 200 acres **Membership type: Private members**

Course description

This is a large course situated in a heavily developed area. The busy M25 motorway passes close to the site and is visible from much of the course. However this does not detract from the site, which is well kept and has an extensive woodland border as a main feature.

Acid grassland/heathland resource

The acid grassland on this course is mown short in most parts of the rough and therefore has little conservation value. The club have recently relaxed the mowing regime in some places, mainly around trees and in the centre of some rough areas. These areas have developed well and contain species such as *Festuca rubra, Rumex acetosella* and *Lotus corniculatus.* The club have noticed considerable cost savings on doing so.

General nature conservation practice

The greenkeping staff at this site are very aware of their environmental responsibilities. They avoid chemical use where possible and have a programme to reduce their water consumption. The course undertakes an annual programme of woodland maintenance and provides habitats by leaving dead wood in situ. They also maintain a large pond on the course and are particularly interested in encouraging dragonflies to the site.

Contribution to HAP potential

Despite the large size of this course the potential to expand the un mown areas is severely limited by the landscape requirements of the course.

Mitcham Golf Course

Borough: Merton **Course Type: Heathland**

Size: 80 acres **Membership type: Private members**

Course description

Mitcham golf course is situated within the common land of Mitcham Common, which is an important heathland area. The grasslands and to a lesser extent heathland are an important feature of the site. The management of these areas is supervised by the Mitcham Common Conservators.

Acid grassland/heathland resource

Both the acid grassland and heathland at this course are well managed and thus in favourable condition. The grasslands are mown once per year and all arisings removed. The heather stands include a variety of age classes. The grasslands and heathlands are rich including *Calluna vulgaris, Ulex minor, Nardus stricta* and *Campanula roundifolia.* The course has undertaken 'scrapes' in some areas of the course to encourage heather regeneration.

General nature conservation practice This site includes many interesting habitats including woodland, ponds and ditches a swell as the heathland and acid grassland interest. The greenkeping staff use sensitive management to maintain and enhance these habitats and they are also managed by the conservators group.

Contribution to HAP potential

This course represents an important resource for both heathland and acid grassland conservation in London. It is well managed to maintain these habitats in a favourable condition. To date the course has been the focus for mush of the heathland restoration on the common, which has had positive results.

Royal Mid Surrey Golf Club

Borough: Richmond **Course Type: Grassland**

Size: 90 ha **Membership type: Private Members**

Course description

Royal Mid Surrey is situated in the Old Deer Park on the bank of the River Thames in Richmond adjacent to Kew Gardens.

Acid grassland/heathland resource

In the last year the club have drastically altered the landscape of the course by relaxing the mowing regime for all of the grassland rough. This has worked to good effect in most of the course. A fine-leaved sward has developed inclusive of large patches of *Danthonia decumbens* and anthills are present in the more secluded roughs. However in one area of the course the attempt to reinstate the acid grasslands has not been so successful and the sward is completely dominated by *Achillea millefolium.* The club suspect this is a result of the historical use of this part of the course as farmland. This area is also in the river flood plain although flooding onto the course is now a rare event.

The course is specifically concentrating on the acid grasslands at present with the ultimate aim of creating a fine-leaved rough all over the site. They have enlisted the help of the STRI ecology unit and are planning to scarify the rank areas this autumn in an attempt to destroy the *Achillea millefolium* and also to expose poorer soil. In the past the club have undertaken woodland maintenance and wetland maintenance. There is a long association with local interest groups.

Contribution to HAP potential

This site has the potential to offer a great deal to London's acid grassland resource. The results of their firsts year's efforts have been encouraging and there are plans to expand the rough if this autumn's work is a success. The club are actively taking measures to ensure this is so by seeking external advice and also educating members about the work they are undertaking.

Royal Wimbledon Golf Club

Borough: Merton
Course Type: Heathland
Size: Approximately 165 ha
Membership type: Private Members

Course description

This course sits close to the main Wimbledon Common, with approximately one third of the site falling under the common's SSSI designation. As a result English Nature supervises this area. The course is also bordered by residential housing on its south boundary. Acid grassland and heathland roughs are a significant feature of the site. Most of the natural heathland can be found at the higher part of the site within the SSSI designation. Woodland copses are also an important feature of the course.

Acid grassland/heathland resource

Much of the acid grassland roughs are left uncut for most of the year, including those around bunker edges. There are areas of semi-rough that are cut more frequently to approximately 3.8cm. These provide a gradient between the fairway and the deeper roughs. The acid grassland on the site is generally in good condition although there is

an area where *Pteridium aguilinium* is beginning to encroach from the tree line and another where a similar problem is occurring with *Holcus lanatus* although the club are taking measures to combat this. The grasslands include *Festuca ovina, Festuca rubra, Deschampsia flexuosa, Potentilla anglica* and *Hypocharis radicata.* The heathland areas are in less favourable condition, mostly in the mature phase and forming a low percentage of the grassland/heathland sward. There is some regeneration occurring on disused paths and other disturbed areas. At the moment the heather is all mown to a uniform height. The club have recently imported some heather turfs from Hankly Common Golf Course.

General nature conservation practice

The club are very keen to enhance the conservation value of their site and have employed an ecological consultant to help them implement a programme of woodland restoration. The club also have a structured plan for heathland restoration and creation including proposals to link and expand existing areas and to establish heather on holes where it does not currently exist. This involves and extensive programme of tree removal which in some areas will be replaced by *Ulex sp.* to provide definition.

Contribution to HAP potential

The Royal Wimbledon has huge potential to contribute to the HAP targets for both habitats, especially the restoration programmes. As they are receiving advice from both English Nature and an ecological consultant the results of their work should be positive. However the club will have to introduce changes to the way the heather is managed to ensure the habitat is in a favourable condition.

Shirley Park Golf Course

Borough: Croydon
Size: 130 acres
Course Type: Parkland
Membership type: Private Members

Course description

Shirley Park golf course is situated close to central Croydon between Lloyd Park and Shirley Hills County Park. It sits adjacent to the school playing fields and residential gardens. The course is spread out, with woodland bordering the site and providing definition between fairways. There are some areas of longer rough that provide this definition to the first holes of the course.

Acid grassland/heathland resource

Much of the rough at this site is frequently mown. In some areas there are considerable patches of longer rough containing *Agrostis capilliaris.* However these areas are dominated by *Scenico jacobea, Cirsium sp, Acheillea millefolium, Rumex acetosa* and grasses such as *Holcus lanatus and Poa pratensis.* Tree saplings have been planted in some of the swards. There is one small patch of heath remaining on this site, which holds species such as *Calluna vulgaris, Erica cineria, Festuca ovina, Festuca rubra, Galium saxatile* and *Carex sp.* This area is in a highly unfavourable condition with invasion by Quercus sp, Betula pendula and in some areas by degenerate *Ulex Europeans* which is collapsing.

General conservation practice

The course has recently employed an ecologist to undertake a botanical species survey of the site, which they are using to prepare a structured management plan for the course. The club are very aware of environmental issues including both for the course and the clubhouse. Woodland maintenance and tree planting has been carried out to enhance the natural woodlands.

Contribution to HAP potential

Despite containing both acid grassland and heathland this site is of little relevance to the aims of the HAPs. Heathland restoration as seen as a time consuming process that theclub cannot undertake. The grasslands in their current condition visually enhance the site so it is unlikely that measures will be taken to restore their acid grassland features.

Shooters Hill Golf Course

Borough: Greenwich **Course Type: Parkland**

Size: Approximately 120 acres **Membership type: Private Members**

Course description

Shooters hill is situated in a highly developed urban landscape. It sits adjacent to Shrewsbury Park on its North most point and residential gardens for much of the remaining boundary. As the name suggests this course is placed on a steep hill. Its main feature is a large wooded copse in the centre of the site.

Acid grassland/heathland resource

There are sparse patches of relict acid grassland species around this site, predominately on the top of the course where the soil is most free draining. The grassland diversity is low with large patches of *Airia praecox* containing small tuffs of *Festuca sp.* located on the edges of fairways. All of th erough is mown shoet except that which borders copses. *Rumex acetosella* and *Lotus corniculatus* are frequent in the mown rough although these are viewed as turf weeds. This course was limed approximately five years ago on the advice of an agronomist so this would help to explain why the relict acid grassland is so poor.

General nature conservation practice

The course manager is aware of the broader environmental issues surrounding management and is attempting to incorporate these into the daily maintenance of the site. For example reducing the amount of chemicals used. Woodland maintenance is carried out annually. A large restoration programme to thin and improve the species composition of the central copse has recently been completed. Dead woodpiles have been created from the material left.

Contribution to HAP potential

This course has little to offer the HAP at the moment partly due to its poor species composition and also due to the landscaping of the site. The new management team have other management priorities relating to playing surfaces and do not anticipate making changes to the layout of the roughs until this is completed, as they do not have enough manpower.

Shortlands Golf Club

Borough: Bromley **Course Type: Parkland**

Size: Unknown (Small) **Membership type: Private Members**

Course description

Shortlands is a relatively small 9-hole course situated in a highly developed residential area. The course is flat and open, lined by woodland of mainly oak and beech, residential gardens and the River Ravensbourne at its west boundary. Windbreaks of coniferous trees are frequent throughout the site, which add definition to fairways.

Acid grassland/heathland resource

This site does not hold any heathland and supports only a few relict acid grassland species. Evidence of acid grassland is present throughout the site with the hardy *Airia praecox* and *Rumex acetosella* the most abundant. Other typical acid grassland species present include *Lotus corniculatus, Galium saxatile, Lenontodon sp*. and *Eeuphrasia sp*. Recent surveys of the site documented *Campanula roundifolia* but this was not recorded during this visit. The acid grassland is managed very intensively, with the longest areas of rough cut frequently to a maximum of 3-4cm. Most other areas of the course are significantly shorter than this. Over seeding to maintain the 'green' appearance of the course occurs and invasion by *Lolium multiflorum* and *Poa sp* into the roughs is a problem, and also limits the area of bare ground on the course. Overall the acid grassland at this site is in a poor condition.

General nature conservation practice

Due to the parkland nature of this course the majority of its conservation interest is in its woodland, a small pond and the river. The local council have recognised the site due to its bird interest, which is especially significant due to the landscape it is situated in. The woodlands are managed mainly by a programme of non-intervention apart from preventing invasion onto playing surfaces. The club are currently trying to secure funding to enhance their wildlife pond and take measures to maintain the section of river that flows through their land.

Contribution to HAP potential

There is little potential to increase the value of the acid grassland at this course. As a small parkland course space is limited and therefore the areas of grassland rough are short and narrow with copses used as the more punishing rough areas. Additionally the club have had unfavourable experiences with organisations which they associate with nature conservation and are therefore very reluctant to receive advice.

Strawberry Hill Golf Club

Borough: Richmond **Course Type: Parkland**

Size: 27 ha **Membership type: Private members**

Course description

Strawberry Hill is a small 9-hole course, half a mile from the River Thames. The site was developed in 1902. The course is roughly triangular in shape, flanked by a railway line along the entire southern boundary, a school playing field on the northern boundary and residential houses and gardens along the rest of the perimeter. The main features of this course are its wooded areas, with a copse in the centre of the site, and a brook that runs the length of the course.

Acid grassland/heathland resource

Acid grassland is present throughout this site. Due to the intensity of cutting the acid grassland on the majority of the site is very short at a maximum of 4cm in the longest rough. There are set-aside areas around copses that are allowed to grow naturally with just an annual cut. These areas are a mixture of finer grasses and invasive species, particularly *Arrhenatherum elatius* and *Melica uniflora,* which are moving in from the tree line or are benefiting from the tree shading. However there are signs of burrowing insects and anthills, suggesting the grasslands do have some conservation value.

There is no heather on this course, despite a patch in the centre of the site recorded in Richmond's ecology handbook. Descriptions of the course dating back to the early 1900's state how there was no need for bunkers on the course as it was full of natural hazards, which it is reasonable to assume may have been heather. The trees on the

course are an integral feature of the club and management has historically concentrated on maintaining and improving them.

General nature conservation practice

The club have employed a tree surgeon to offer advice on their woodlands, which are suffering from Dutch elm disease. They have recently undertaken a programme of replanting to combat this. Under the advice of the tree specialist the club have recently started to leave standing and cut piles of dead wood for invertebrates. Additional environmental measures include they composting and re-use of leaf litter and the use of organic fertilizer.

Contribution to HAP potential

This course could offer a limited amount to acid grassland conservation. The size of the course would make it hard to relax the cutting regime in place, so it is unlikely that the longer areas of grassland could be increased. The areas of rough excluded from the mowing regime could be improved but finances and manpower significant limitations to what this club can do.

Woodford Golf Course

Borough: Waltham Forest/Redbridge **Course Type: Grassland**

Size: 34 acres **Membership type: Private members**

Course description

This course is situated within Epping Forest SSSI, although the course itself is not covered by this designation. This is only a small 9-hole course although the site does not appear cramped. The grassland roughs and natural topography of the land are the main features of the site. They define fairways and act as playing hazards as the course does not contain any bunkers. The site is owned and supervised by the Corporation of London.

Acid grassland/heathland resource

The acid grassland at this site is rich containing notable species such as *Nardus stricta, Holcus mollis, Danthonia decumbens, Potentilla erecta, Genista anglica* and large

patches of *Heiracium sp.* The grasslands are managed sympathetically, mown one per year or as appropriate. The edges to the roughs are scalloped and fertiliser is not used on any part of the course. Ant hills are frequent throughout the sward. Denser areas of the rough also contain *Ulex europeans*. However in areas the scrub invasion is becoming or will soon become a problem. There is a particular problem with woodland encroaching from the tree line in areas.

General nature conservation practice

The whole course is managed in the most environmentally sensitive way possible. As well as the grasslands there are also two ponds on the site, which are maintained. The greenkeping staffs try to contribute as much as they can to the ecological maintenance of the site although manpower is limited.

Contribution to HAP potential

The acid grassland at this site is classified as unfavourable due to the scrub and grass invasion occurring. However it is unlikely that this will be allowed to develop to cause a serious problem and overall the site is very rich. The corporation of London who manage the site are in the process of preparing a management plan for the course, which should rectify these problems

Appendix 4: Assessment Results

Club: Addington	**Date**23/07/04	**Condition:** Favourable Good quality patches separate from heathland areas.

Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex* . sp**	Yes	
	Positive indicator grasses	Yes	Diverse
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	

Club: Addington Palace	**Date:** 16/06/04	**Condition:** Unfavourable Acid grassland separate from the heathland areas are mown very short.

Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	No	30-40% leaf litter cover in areas.
Vegetation composition	**Cover of *Ulex* . sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	10-15% cover.
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Freaquent mowing, heavy golf traffic in places.
	Presence of course/invasive grasses	No	20-70% cover of broad-leaved grasses and *Trifolium repens* .

Club: Chingford	**Date:** 11/08/04	**Condition:** Unfavourable improving Assumed improving as C.o.L are in process of preparing management plan for site.

Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	No	Leaf litter.
Vegetation composition	**Cover of *Ulex* . sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	>5% cover especially *Scenico jacobea* and *Cirsium* sp
	Tree and scrub cover	No	Planting in places and natural colonisation.
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	No	

Club: Chistlehurst	**Date:** 14/06/04	**Condition:** Unfavourable Intensively managed but with nice patches of *Hypochaeris radicata* etc. on a large bank.

Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	No	Put as G.U.R to recover
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex* . sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Weekly mowing.
	Presence of course/invasive grasses	No	>30%*Holcus lantus* and *Lolium perenne* . 20% *Poa anua.*

Club: Coombe Hill	**Date:** 28/06/04	**Condition:** Unfavourable improving Good quality areas of grassland are being produced as part of restoration programme.

Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	Actively remove leaf litter.
Vegetation composition	**Cover of *Ulex* . sp**	No	Dominates sward in 2-3 places.
	Positive indicator grasses	Yes	Diverse
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	No	Mainly *Holcus lantus.* Up to 30% cover in areas.

Club: Coombe wood	**Date:** 29/06/04	**Condition:** Unfavourable improving Relict acid grassland in good condition but mown very short, plans to relax mowing regime in places.

Acid grassland attribute	Indicator	Acceptable	Comments
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Frequent weekly mowing, roughs to maximum 3-4cm.
	Presence of course/invasive grasses	Yes	

Club: Eltham Warren	**Date**:17/06/04	**Condition:** Unfavourable Acid grassland indecline.

Acid grassland attribute	Indicator	Acceptable	Comments
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	Diverse, including *Ornithopus pinnatus*.
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	*Plantago lanceolata, Trifolium repens* and *Achillia millefolium* frequent.
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	No	Mainly *Lolium perenne and Agrostis stolonifera.* Also *Dactylis glomerata and Holcus.*

Club: Fulwell	**Date:** 09/07/04	**Condition:** Unfavourable improving Acid grassland creation and retoration is part of an ongoing management plan.

Acid grassland attribute	Indicator	Acceptable	Comments
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	c.10% cover. *Cirsium sp., Scenico jacobea, Plantago sp.*
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	No	30% mainly *Phelum pratense, Poa annua, Elytrigia repens, Arrhenatherum elatius.*

Club: Horsenden Hill	Date:22/06/04	**Condition:** Unfavourable Only one very small patch of species poor, sparse grassland.

Acid grassland attribute	Indicator	Acceptable	Comments
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	No	Mainly *Agrostis*, some patches of *Festuca sp.*
	Positive indicator herbs	No	Species poor. Only *Rumex acetosella.*
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	

Club: Langley Park	**Date:** 23/06/04	**Condition: Unfavourable** Have taken maesures to increase areas of longer grasses in areas but some very poor quality.

Acid grassland attribute	Indicator	Acceptable	Comments
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	*>5%Rumex acetosa, Dipsacus sp., Achillia millefolium, some Trifolium repens*
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Freaquent mowing.
	Presence of course/invasive grasses	No	*Arrhenatherum elatius, Holcus lantus, Agrostis stolonifera.*

Club: London Scottish/Royal Wimbledon.	**Date:** 28/06/04	**Condition:** Favourable	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	

Club: Maylands	**Date:** 09/06/04	**Condition:** Unfavourable Some inner areas of rough acid grassland cut 1-2 yr but generally cut too frequently.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	No	No bare ground near or within roughs.
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Majority cut weekly.
	Presence of course/invasive grasses	Yes	

Club: Mitcham	**Date:** 15/07/04	**Condition:** Favourable Well managed roughs.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	Including *Campanula rotundifolia.*
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	

Club: Royal-Mid-Surrey	**Date:** 16/08/04	**Condition:** Unfavourable-improving Currently restoring and expanding grasslands.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	With ant hills.
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	No	Rather species poor.
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	>5% *Achillia millefolium.*
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	

Club: Royal Wimbledon	**Date:** 09/06/04	**Condition:** Favourable	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	Including *Potentilla anglica.*
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	Although some areas where *Holcus* is becoming a problem.

Club: Shirly Park	**Date:** 08/07/04	**Condition:** Unfavourable. Longer roughs rank, most cut too frequantly.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	No	High leaf litter in areas
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	No	
	Tree and scrub cover	No	Including some planting.
	Disturbance/damage	No	Most cut weekly.
	Presence of course/invasive grasses	No	*Poa annua, Holcus lantus, Phelum pratense* common.

Club: Shooters Hill	**Date:** 13/07/04	**Condition:** Unfavourable Acid grassland areas are mown very short.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	No	Species poor, mainly *Aira praecox*, some areas of *Festuca rubra*.
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	All cut to 3-4cm weekly
	Presence of course/invasive grasses	No	

Club: Shortlands	**Date:** 10/06/04	**Condition:** Unfavourable Would be favourable if not disturbed so regularly.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	Including a large patch of *Pilosella officinarum.*
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Roughs cut 1-2 times per week to 2-3cm.
	Presence of course/invasive grasses	No	

Club: Strawberry Hill	**Date:** 07/07/04	**Condition:** Unfavourable Areas left un-cut are not too unfavourable but most of the course is mown too frequently.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	With ant hills
	Organic litter cover	No	Leaf litter from copses onto adjacent grassland.
Vegetation composition	**Cover of *Ulex*. sp**	Yes	
	Positive indicator grasses	Yes	Including *Nardus stricta.*
	Positive indicator herbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	No	Some areas left but most cut weekly to 2-4cm.
	Presence of course/invasive grasses	No	30% near copses, mainly *Arrhenatherum elatius.*

Club: Woodford	**Date:** 02/07/04	**Condition:** Unfavourable improving C.o.L management plan and areas of restoration.	
Acid grassland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	With many ant hills
	Organic litter cover	Yes	
Vegetation composition	**Cover of *Ulex*. sp**	Yes	Although over 25% in some areas.
	Positive indicator grasses	Yes	
	Positive indicator herbs	Yes	Including *Genista anglica* and large populations of *Hieracium* sp.
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous species	Yes	
	Tree and scrub cover	Yes	
	Disturbance/damage	Yes	
	Presence of course/invasive grasses	Yes	Although over 10% in some areas. More a grassland/scrub community.

Club: Addington	**Date**23/07/04	**Condition:** Unfavourable improving Currently attempting to improve heathland and have plans for future management.

Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Cover of dwarf shrubs	Yes	*Calluna vulgaris* and *Erica cineria*
	Cover of Ulex sp.	Yes	
	Growth phase composition of ericaceous cover	No	20-30% dead heather, mainly *Calluna vulgaris.*
	Height of ericaceous shrubs	No	
Vegetation composition	**Presence of desirable graminoid species**	Yes	Diverse.
	Presence of desirable forbs	Yes	Diverse.
Indicators of negative trends	***Pteridium aguilinium* cover**	No	15-20% cover of dead and living *Pteridium aguilinium.*
	Presence of undesirable herbaceous/grass species	No	>1% broad leaved grasses and *Scenico jacobea.* Only where *Calluna.*
	Tree and scrub cover	No	>1% *Rhododendron ponticum.*
	Disturbance	Yes	

Club: Addington Palace	**Date:** 16/06/04	**Condition:** Unfavourable Only one area of heathland that is not maintained.

Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	No	Bare groung covered by thatch.
	Cover of dwarf shrubs	No	>25% cover. Mainly *Erica cineria.*
	Cover of Ulex sp.	Yes	
	Growth phase composition of ericaceous cover	No	<10% pioneer stage.
	Height of ericaceous shrubs	No	Heather mown with grass sward.
Vegetation composition	**Presence of desirable graminoid species**	Yes	Diverse.
	Presence of desirable forbs	Yes	Diverse.
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous/grass species	No	Approximately 25% of area dominated broad leaved grasses and herbaceous species as one patch due to run off from fairways.
	Tree and scrub cover	Yes	
	Disturbance	Yes	

Club: Coombe Hill	**Date:28**/06/04	**Condition:** Unfavourable improving Working to improve condition and area , with one area in favourable condition.

Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Cover of dwarf shrubs	Yes	
	Cover of Ulex sp.	Yes	
	Growth phase composition of ericaceous cover	Yes	
	Height of ericaceous shrubs	No	The heather is cut annually to a uniform height.
Vegetation composition	**Presence of desirable graminoid species**	Yes	
	Presence of desirable forbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	No	Only a problem in the largest area of heather, which is under repiar.
	Presence of undesirable herbaceous/grass species	No	As much as 10% cover in some natural areas, higher in transplanted turfs.
	Tree and scrub cover	No	>15% tree seedling and *Rubus sp.* cover.
	Disturbance	Yes	

Club: Fulwell	**Date:** 09/07/04	**Condition:** Feature absent Heather not present at this site.

Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	N/A	
	Cover of dwarf shrubs	No	Heather not present.
	Cover of Ulex sp.	N/A	
	Growth phase composition of ericaceous cover	N/A	
	Height of ericaceous shrubs	N/A	
Vegetation composition	**Presence of desirable graminoid species**	N/A	
	Presence of desirable forbs	N/A	
Indicators of negative trends	***Pteridium aguilinium* cover**	N/A	
	Presence of undesirable herbaceous/grass species	N/A	
	Tree and scrub cover	N/A	
	Disturbance	N/A	

Club: London Scottish/Royal Wimbledon	**Date:** 28/06/04	**Condition:** Unfavourable improving Conservators planning to restore heath.	
Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Cover of dwarf shrubs	Yes	
	Cover of Ulex sp.	No	>25% cover *Ulex europeans*.
	Growth phase composition of ericaceous cover	No	Mainly mature-degenerate.
	Height of ericaceous shrubs	No	
Vegetation composition	**Presence of desirable graminoid species**	Yes	
	Presence of desirable forbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous/grass species	No	Broad leaved grasses and *Cirsium* sp.
	Tree and scrub cover	Yes	
	Disturbance	No	Rabitt grazing preventing regeneration. Heavy user pressures.

Club: Mitcham	**Date:** 15/07/04	**Condition:** Favourable Heather in good condition and scrapes carried out to increase area.	
Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Cover of dwarf shrubs	Yes	
	Cover of Ulex sp.	Yes	
	Growth phase composition of ericaceous cover	Yes	
	Height of ericaceous shrubs	Yes	
Vegetation composition	**Presence of desirable graminoid species**	Yes	
	Presence of desirable forbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous/grass species	Yes	
	Tree and scrub cover	Yes	
	Disturbance	Yes	

Club: Royal Wimbledon	**Date:** 09/06/04	**Condition:** Unfavourable improving Have a management plan to restore and improve condition of heather.	
Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	Disused paths provide the majority of this habitat.
	Cover of dwarf shrubs	Yes	Although cover is at the lower end of the target.
	Cover of Ulex sp.	Yes	
	Growth phase composition of ericaceous cover	No	80% mature-degenerate heather.
	Height of ericaceous shrubs	No	The heather is cut annually to a uniform height, at a maximum of 30cm.
Vegetation composition	**Presence of desirable graminoid species**	No	>25% cover *Deschampsia flexuosa*.
	Presence of desirable forbs	Yes	
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous/grass species	Yes	
	Tree and scrub cover	Yes	
	Disturbance	Yes	

Club: Shirley Park	**Date:** 08/07/04	**Condition:** Unfavourable Heather in poor condition with no management.	
Heathland attribute	**Indicator**	**Acceptable**	**Comments**
Vegetation structure	**Bare ground**	Yes	
	Cover of dwarf shrubs	No	<25% cover. Half *Calluna vulgaris*, half *Erica cineria*.
	Cover of Ulex sp.	No	>25% cover *Ulex europeans.*
	Growth phase composition of ericaceous cover	No	95% mature, some regeneration near adjoining path.
	Height of ericaceous shrubs	Yes	Area is left unmanaged.
Vegetation composition	**Presence of desirable graminoid species**	Yes	
	Presence of desirable forbs	No	Sward swamped by scrub and leaf litter.
Indicators of negative trends	***Pteridium aguilinium* cover**	Yes	
	Presence of undesirable herbaceous/grass species	No	>1% Holcus lantus.
	Tree and scrub cover	No	40-50% cover.
	Disturbance	Yes	

Appendix 5: Members questionnaire

Golf and Nature
A Questionnaire Study

This independent questionnaire forms part of an MSc study at Imperial College London. The overall aim of the study is to assess the role London's golf courses could play in the conservation of wildlife habitats. The results from this questionnaire will be used to determine how golfers feel about wildlife on their golf course. It would be very helpful if you could spare some time to fill this in. The whole process should not take any longer than 10 minutes and all answers will remain confidential.

Thank you for your help.

1. **How frequently do you play golf at this course?** *Please indicate by ticking one choice below that best represents you.*

□ More than one per week □ Once per week

□ 2-3 times per month □ Once per month or less

2. **How important are natural features such as the longer grasses and plants (e.g. heather) that make up the 'roughs' in your visual enjoyment of this course?** *Please indicate by ticking one choice below.*

Very important □ Important

□ Not important □ Detracts from

3. **Do you feel that these natural features enhance your playing enjoyment of the course?**

□ Yes □ No

4. **To what extent you agree or disagree with the following statements?** *Please indicate by circling the appropriate place on the scale, with 5 being strongly agree and 1 being strongly disagree.*

A. "Seeing wildlife on the course such as birds, butterflies and wild flowers enhances my golfing experience"

1 2 3 4 5

B. "I would like to see a diversity of animals on my course such as insects, birds and reptiles"

1 2 3 4 5

C. " Our course is beneficial for wildlife as it is now"

1 2 3 4 5

D. "Golf courses are a place for recreation not for wildlife conservation"

1 2 3 4 5

E. "I think that golf courses should always be managed with wildlife in mind"

1 2 3 4 5

5. **Would you be interested in information regarding any activities in place to encourage wildlife on your course?**

□ Yes □ No

*If **yes** please proceed to question **6***
*if **no** please proceed to question **7***

6. **Please indicate the type(s) of information you would like to receive.**
Please tick as many choices as you wish.

□ Information displayed in the clubhouse

□ A newsletter

□ Signs on the course in areas that are being managed for wildlife

□ Other (*please specify below)*

_ _-

7. **If efforts were made to selectively encourage native British wildlife onto your course which types of animals do you think these efforts should concentrate on?** *Please tick as many choices as you wish*.

□ Lizards □ Bats

□ Snakes □ Birds

□ Insects such as Bees and butterflies

□ I would not be interested in encouraging any of the above

8. **How do you feel about placing areas as ground under repair to assist nature conservation on the course?**

□ This would be acceptable

□ This would be unacceptable

9. **Would you find it acceptable to reduce the number of trees in some areas of the course in order to conserve other types of natural vegetation?**

□ Yes

□ No

It may be possible to increase the diversity and abundance of wildlife present on your golf course through changes in the way it is managed. These changes would occur primarily in the roughs and would be aimed at promoting and conserving important types of native vegetation that can support a diverse range of plants and animals. Some aspects of this management could require increases in labour and resources which would need to be financed.

10**. Would you be willing to pay an increased membership fee or playing fee to see these increases on this course?**

□ Yes

□ No

*If **yes** please proceed to question **11***
*If **no** please proceed to question **13** (next page)*

11. **Please indicate the maximum amount you would be willing to pay by selecting an appropriate choice from the options below.** *Please try to be as realistic as possible when making your choice; it is important that your answers reflect your true opinion.*

□ 1% of my membership/playing fee (£1 for every £100 I already pay)

□ 5% of my membership/playing fee (£5 for every £100 I already pay)

□ 10% of my membership/playing fee (£10 for every £100 I already pay)

□ Other percentage of my fees *(please specify below)*

_____ %

□ I would prefer to make an annual payment *(please specify how much below)*

£_____

12. **If you indicated that you would be willing to pay please select an option from the list below that best represents the reason for your choice:**

□ I think that nature conservation is important

□ Seeing more wildlife would increase my enjoyment of the course

□ I think that we should make the maximum of our open spaces, including golf courses

□ This is just an imaginary scenario so I would not really have to pay

13. **If you chose not to pay at this time please select an option from the list below that best represents the reason for your choice:**

□ I do not think that golf courses should be used for nature conservation

□ I do not think it is an important issue

□ I already pay enough in fees

□ I think wildlife conservation is important but the money should come from the fees I already pay.

□ I would not trust that the money would be spent for this purpose

□ I think that these changes would reduce the visual quality of the course

Please could you now take a moment to complete a few optional questions about yourself. All answers will remain confidential.

14. **Are you male or female?**

□ Male □ Female

15. **Which age category do you fall into from the options listed below?**

□ 19 or under □ 20-34

□ 35-49 □ 50-64

□ 65 or over

16. **At which level did you/will you complete your education?**

□ Primary (age 12 and under) □ Lower secondary (12-16)

□ upper secondary (16-18) □ Undergraduate degree

□ Post graduate degree

17. **Are you or have you previously been a member of a wildlife conservation organisation?** *(E.g. RSPB, The Wildlife Trust, WWF)*

□ Yes □ No

18. **If you have any additional comments you would like to make please do so in the box below.**

Many thanks for your time

Appendix 6: Managing the Rough for Golf and Wildlife seminar agenda

09:30 -10.00	Registration and refreshments
10.00 – 10.10	**Chairman's opening remarks** Tom Tew English Nature General Manager
10:10 – 10:30	**Benefits of managing rough for wildlife** Stewart Zuill Secretary/Manager Sunningdale Golf Course
10:30 – 10:45	**The importance of acid grassland and heathland on golf courses** Nigel Reeve Royal Parks Community Ecologist.
10:45 – 11:00	Refreshment break
11:00 – 12:00	**Practical management of rough** Lee Penrose Sports Turf Research Institute (STRI)
12:00 – 12:15	**Reptiles and golf courses** Will Atkins London, Essex and Hertfordshire Amphibian and Reptile Trust
12:15 – 12:30	**Invertebrates and golf courses** Mike Edwards Invertebrate Ecologist.
12:30 – 1300	**Grant aid for Management** Vicky Robinson Rural Development Agency Lee Penrose (STRI) John Nicholson John Nicholson Associates Ltd
13:00 – 13:45	Lunch and networking
13:45 -14:00	**Introduction to Field Visit** Tom Tew
14:00 -15:30	**Field Visit: The ecology of the rough and management issues**
15:45 – 16:00	**Open forum and Chairman's closing remarks**

Appendix 7: Seminar aims and objectives

Overall aim:

To engage golf course managers in heathland and acid grassland management and restoration to contribute to the achievement of the London heathland and acid grassland HAPs and Reptile SAP targets.

Objectives:

By the end of the seminar the delegates will:

1. Have an appreciation of the biodiversity value and the nature conservation value of heathlands and acid grasslands in the Greater London and national context.
2. Be aware of the heathland and acid grassland resource within Greater London and on golf courses in particular.
3. Have an awareness of the reasons for the decline of these habitats and the need for active management.
4. Appreciate the contribution golf course managers could make to achieving London heathland and acid grassland HAPs.
5. Understand the benefits of managing rough for nature conservation to golfers including improvements in aesthetic and landscape value (economic benefits).
6. Be aware of alternative methods of managing rough on golf courses within Greater London.
7. Have an awareness of the habitat management training available to golf course managers.
8. Be aware of funding opportunities available for managing golf courses for nature conservation.