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A programme for wetland archaeology in Scotland in the 21st century

Anne Crone* & Ciara Clarke*

ABSTRACT

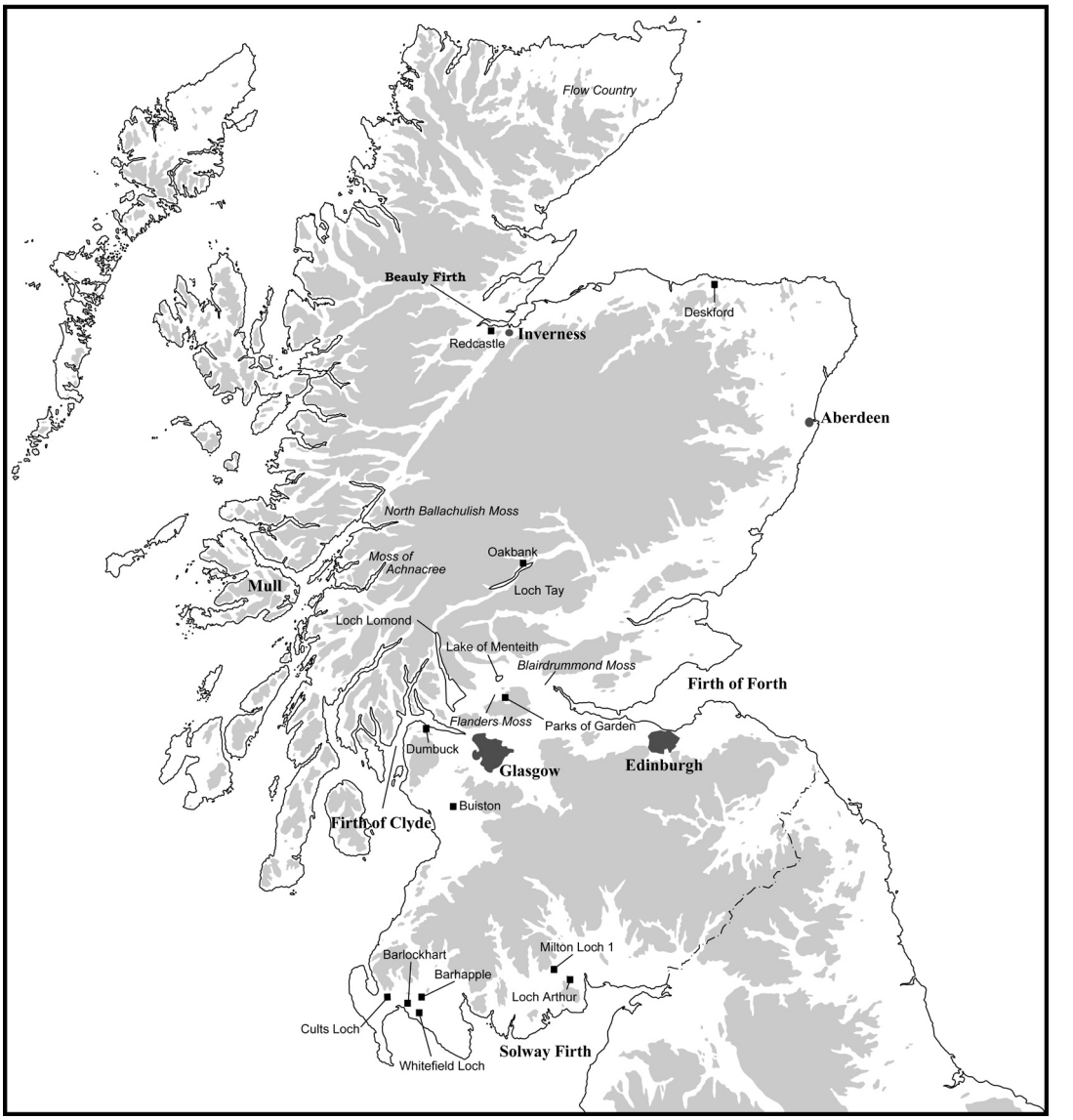
At the WARP (Wetland Archaeology Research Project) conference in Dublin in 1998, John Coles took the Scottish delegates to task for the absence of any strategic programme of wetland archaeology in Scotland. Spurred into action, the delegates established the Scottish Wetland Archaeology Programme (SWAP), an informal group of interested people whose overall aim was to initiate such a programme. Seven years on, SWAP was able to present what has been achieved in Scotland since then at the 11th WARP conference held in Edinburgh. This paper briefly summarizes progress in Scotland to date and outlines the SWAP proposal for a strategic programme of works which we hope would see the potential of the archaeological resource of the Scottish wetlands more fully addressed. We should establish at the outset that SWAP is focusing primarily on freshwater wetlands, because a Scottish forum to develop and promote initiatives in coastal archaeology already exists (Dawson 2005). However, it is recognized that there will be a great deal of overlap between respective interest areas.

BACKGROUND

Within Scotland, there is a wide range and high concentration of wetland types that combine to give the Scottish landscape its unique character. These include bogs, fens, lochs (lakes), rivers, floodplains, estuaries, coastal marshes and mudflats. However, two particular wetland environments dominate in the Scottish landscape – bogs and lochs. Scottish bogs account for 72% of the British peat resource (Lindsay 1995), and generally comprise widespread but discrete areas of blanket peat with a few isolated areas of raised bog. The Flow country of Caithness and Sutherland (illus 1), in the extreme north of Scotland, is the largest and most intact area of blanket bog in the world, and is considered to be of global importance due to its unique composition and state of preservation. The largest surviving areas of natural primary raised bog are also to be found in Scotland, predominantly along the Forth valley and on the north Solway shore (illus 1). With over 30,000 lochs, which comprise approximately 160,000ha of Scotland's total land area, together with associated river systems, the potential of inland freshwater wetland deposits is also substantial.

The character of the Scottish landscape will have influenced the type of settlement and exploitation patterns of its inhabitants and the resulting material remains. As a consequence of the predominant landforms, wetland studies tend to divide naturally into two research areas – lake settlement, almost exclusively in the form of crannogs (man-made island structures) (illus 2), and peatland archaeology, which has been characterized by serendipitous finds and the occasional structure (illus 3). In Britain, lacustrine archaeology is almost exclusive to Scotland; in England, peatlands and alluviated lowlands are synonymous with 'wetlands', and consequently the English Heritage-funded wetland surveys focused on these environmental zones (eg Coles 1995).

* AOC Archaeology Group Ltd, Edgefield Industrial Estate, Edgefield Road, Loanhead, Midlothian EH20 9SY



ILLUS 1 Map of Scotland showing location of sites, find spots and wetland areas mentioned in the text

Crannogs are a peculiarly Scottish and Irish phenomenon. Only one crannog is known from the rest of the British Isles, at Llangorse in Wales, and this example is thought to have been built by an Irish prince (Campbell & Lane 1989). Evidence for lake settlement is more extensive elsewhere in Europe, but here this usually takes the form of lakeside settlement rather than deliberately created islands. Ireland has both crannogs and lakeside settlements, but in Scotland, despite the probability of its existence, lakeside settlement has yet to be found.

The assumption has always been that the archaeological potential of Scotland's bogs was high, if unrealized. However, 96% of the Scottish peatlands comprise blanket bog, which is found

mainly in often inhospitable and inaccessible upland areas, and may therefore never have been intensively exploited in the past. While these upland peats are archaeologically important in that they often seal earlier prehistoric landscapes, they are unlikely to produce organic archaeological remains other than occasional artefacts in pockets of deeper peat. In other European countries, rich organic archaeological remains tend to be found in areas of fen peat and raised bog, which as well as being located in low-lying, more accessible areas were also resource-rich and hence attractive to early populations. It therefore seems most likely that the potential for Scotland's peatlands to yield organic archaeological remains is highest in the surviving areas of lowland raised bog and fen.

PREVIOUS DISCOVERIES

The practice of cutting peat for fuel has a long history in Scotland and has often resulted in the accidental recovery of archaeological remains. Increasing antiquarian interest during the 19th century meant that these finds began to be recorded, as the acquisitions lists published in the early volumes of the Society of Antiquaries of Scotland testify. The majority of finds from Scottish bogs have been isolated artefacts, particularly wooden containers such as bog butter kegs and bowls (eg Earwood 1993). There have been more dramatic finds such as the Deskford carnyx – an Iron Age trumpet found in a moss at Leichestown, Banffshire in 1816 (Alexander Smith 1868; Anderson & Black 1888) – and the famous wooden effigy found when cutting foundations for a wall in North Ballachulish Moss in 1880 (Christison 1881). A trickle of discoveries has continued throughout the 20th century, despite a reduction in peat-cutting by hand and the mechanization of activities such as ditching.

The practice of improving the agricultural potential of the land by removing the surface peat, especially in the raised bog complexes of the Forth valley (Cadell 1913), also played a pivotal role in the discovery of archaeological remains. Items such as the tripartite disc wheel from Blairdrummond Moss (Piggott 1959) and the Flanders Moss cauldron (Anderson 1885), as well as numerous trackways (Tait 1794; Sheriff 1796; MacGibbson 1798), were recovered during these operations.

These finds indicate that the Scottish bogs were certainly a focus for human activity in the past, such as for the storage of foodstuffs (for security or perhaps to improve their flavour) and as places for ritual activity. However, there is very little evidence for settlement on, or transport across, the Scottish bogs, a situation which contrasts markedly with the evidence from England and Ireland (eg Coles & Coles 1986; Moloney 1993). It is possible that this evidence remains to be discovered, but it is equally likely that because blanket bog, the type of bog that predominates in Scotland, was 'resource-poor' in the past it has not been as extensively exploited as raised bog (although in the more recent past blanket peat in particular has been drawn on as a fuel source). It may be more than coincidence that the only records of wooden trackways in the National Monuments Record for Scotland (NMRS), five in all, come from Flanders Moss, the most extensive area of raised bog in the UK. The wheel from Blairdrummond Moss, mentioned above, provides further evidence for transport across this particular raised bog complex.

Evidence for settlement in wetland environments has come almost exclusively from crannog sites. Some 353 crannogs or possible crannogs are recorded in the NMRS, but to date only a handful of lochs have been investigated in any detail. Furthermore, underwater survey has consistently recovered more sites than were originally known (eg McArdle & Morrison 1973; Dixon 1982), so this figure is probably a gross underestimate. Again, the bulk of the evidence from these site types was gathered during the 19th century when they became the focus of antiquarian interest as a result of

the revelations of the Swiss lake villages in the middle of that century. In all, 46 crannogs have been excavated to varying degrees, but it is salutary to remember that only nine of these have been investigated since the 1930s to a standard where the excavation report is coherent and can be usefully interrogated. While these investigations serve to demonstrate the wealth of organic and other evidence often preserved on crannogs, they do not provide a dataset of sufficient size to make anything more than broad generalizations about important issues such as chronology, distribution, form and function, among others (Crone 2000).

The second half of the 20th century has seen little new archaeological evidence being recovered from the Scottish wetlands. This is partly due to the recognition that wetland excavation was time-consuming and costly (despite the obvious returns), while the overwhelming potential of the deposits and lack of knowledge about the location, condition or extent of archaeological remains made prioritization difficult, a continuing problem to which we will return later. However, recovery of archaeological evidence had also slowed down because the nature of the threats to these environments was changing. What is currently known about wetland archaeology in Scotland was primarily revealed during the hand-cutting of peat and the drainage of bogs and lochs in order to increase and/or improve agricultural land. Hand-cutting of peat for fuel has diminished steadily since the early 20th century; consequently, fewer artefacts have been recovered from this source. Large drainage schemes are no longer countenanced, meaning that fewer crannogs and other site types are exposed and visibly threatened.

THE THREAT?

It is perhaps because wetland resources in Scotland have been perceived as relatively

ILLUS 2 A crannog in Loch Leathan, Argyll, western Scotland (© *Crown copyright: RCAHMS*)

unthreatened that no concerted plan of action has ever been implemented. Scotland has not suffered the same degree of development pressure that has elsewhere in the British Isles resulted in the exposure and consequent investigation of archaeological deposits. Apart from the Central Lowlands (ie the Forth and Clyde valleys), Scotland is not heavily populated and therefore has not witnessed the processes of urbanization, such as road building and housing development, which exposed and threatened many of the prehistoric settlements on the shores of the Swiss lakes (eg Arnold 1999), and which have contributed to the erosion of the peatlands of north-west England (eg Hall et al 1995).

Although Scotland does have some commercial peat-harvesting, primarily in the peatlands of the south-west and the Central Lowlands, it is nowhere near the scale of that seen in the Somerset Levels of England or the midland bogs of Ireland. In these areas it was the scale of this visible and imminent threat that led to decisive action to halt the unrecorded destruction of their archaeological heritage. In some ways the situation in Scotland can be characterized as the absence of a sufficiently recognizable and immediate threat to the resource.

While the English fen peats have been subjected to extensive drainage operations in advance of ever-deeper cultivation, most of the blanket peatlands of Scotland are of limited agricultural value, lying over podzolized soils in inhospitable and inaccessible terrain. One of the few areas in Scotland that has seen improvement of peatland for agriculture is the Forth valley raised bog complex. During the 19th century, large areas of peat were removed by floating peat blocks into the Firth of Forth, in order to cultivate the underlying mineral soils. By the end of the century this process had ceased, due to its polluting effect on the waters and the consequent intervention of the salmon industries (Cadell 1913). Although many archaeological finds came to light during these operations (see above), it is likely that much important evidence

ILLUS 3 The Neolithic wooden platform at Parks of Garden, Flanders Moss. This is thought to have been used as a base for hunting forays into the Moss

was lost in the large blocks of peat that floated out to sea.

Scotland is also apparently less at risk from the natural processes that threaten wetland deposits elsewhere in the British Isles. In Britain, rising sea level is greatest along the south coast, with Scotland being least affected (see Coles 1995, 14). Rising sea and river levels have caused erosion in the Severn, Thames and Humber estuaries, which has seen the exposure of significant archaeological remains, prompting targeted archaeological programmes of survey and selected excavation in these areas.

Thus, during a period when other countries were beginning to address the issue of diminishing wetland resources (through the English Heritage wetland surveys and the establishment of the Irish Archaeological Wetland Unit, for instance), Scotland's attitude to the cultural heritage of its wetlands could perhaps be described as complacent. Although there are no clear and obvious threats, Scotland's wetlands are probably as much at risk from the more insidious processes that also threaten wetlands in other parts of the British Isles; acid rain, climate change and water pollution may all be taking their toll on the resource. However, apart from the physical damage to organic deposits recorded on some crannogs and imputed to the use of modern fertilizers and nitrate run-off (eg Barber & Crone 1993; Henderson 1998a), there are few quantitative data on the impact these factors have on buried archaeological remains, either at the regional or national scale.

In contrast, the impact of more visible processes such as afforestation, mineral extraction and groundwater abstraction can be more easily quantified and appreciated. Until recently, the primary threat to the Scottish upland bogs came from afforestation and associated invasive works, together with the consequent lowering of the water table (Brooks & Stoneman 1997). Following the increased recognition of the nature conservation value of peatlands (eg Ramsar 1971 and amendments), the last decade has seen a decrease in forestry activities in these environments. Threats from new forestry have now largely ceased, and moves towards bog rehabilitation are underway in some areas (Forestry Commission 2000). Once the ecosystems have returned to equilibrium, the buried cultural heritage will presumably benefit from the stable waterlogged conditions, but the damage caused to date may be irreversible.

Mineral extraction is identified as a threat, particularly to the raised bogs of central Scotland. These areas are potentially archaeologically rich (see above) but are often located over economically valuable mineral deposits and, as a consequence, decades of open-cast coal mining have altered the integrity of many bogs (Brooks & Stoneman 1997, 232). Evidence of subsidence is widespread, and open-cast mining has resulted in the complete removal of several areas of peat. The repercussions from these alterations may continue to impact in the future.

Whilst Scotland is a region with abundant water resources, the absence of any comprehensive control on water abstraction has occasionally resulted in shortages in certain areas, ie the Spey valley, Dumfriesshire and Fife. In Dumfriesshire, abstraction has lowered the water table to such an extent that some rivers are drying out (SEPA 1999) With climate change, the demand for abstraction for agricultural irrigation is likely to rise, with a consequent reduction in groundwater levels.

We must also remember that the burial environment, be it water or sediment, is not passive – even without the perceived threats it is constantly changing and evolving (Barber & Reynolds 1984). Neglect has been documented as contributing to the deterioration of wetlands, and many sites continue to degrade due to interventions that may have taken place many years ago and of which there is no obvious visual sign, although the ecological changes continue (Brooks & Stoneman 1997). We simply do not know how much of our wetland heritage will survive without a significant loss of

environmental and cultural evidence for future generations to investigate.

RECENT WORK

The last decade of the 20th century saw some momentum gathering, partly in recognition of these threats and partly out of a growing realization that wetland studies in Scotland were stagnating. A condition survey of the crannogs of south-west Scotland, undertaken to investigate the degree to which the resource had diminished since the 19th century, revealed substantial losses (Barber & Crone 1993). The location and extent of crannog sites in the Lake of Menteith, Stirlingshire (Henderson 1998a), on the island of Mull, Argyll (Holley 2000), in the Beauly Firth (Hale 2004) and in Loch Lomond (Baker & Dixon 1998) have been surveyed.

Following on from the south-west Scottish crannog survey, Buiston crannog, Ayrshire, was singled out for extensive excavation which revealed the quality of information existing at these sites (Crone 2000) (illus 4). More limited excavation has taken place on the estuarine crannogs at Dumbuck in the Clyde (Sands & Hale 2001) and at Redcastle in the Beauly Firth (Hale 2004). The underwater excavation of Oakbank crannog in Loch Tay continues (Dixon 2004), fostering some valuable technical studies (Sands 1997) and engendering the construction of the Loch Tay Crannog Centre, which has been instrumental in raising the profile of this aspect of our wetland heritage. The growing number of radiocarbon dates from these surveys and excavations (Barber & Crone 1993; Holley & Ralston 1995; Crone 2000; Hale 2004) has led to some attempts at synthesis (Crone 1993; Henderson 1998b).

ILLUS 4 A range of wooden artefacts dated to the seventh century AD from Buiston Crannog, Ayrshire (© *Crown copyright, reproduced courtesy of Historic Scotland*)

The archaeology of the peatlands has also been addressed. The National Museums of Scotland has implemented a programme of radiocarbon dating of those organic artefacts in their collections whose isolated find spots in peat deposits means that there is no associated dating evidence (Sheridan 2002). The find spots of some of these artefacts have also been re-examined to elucidate the circumstances of their deposition. For instance, survey and excavation in the area around the find spot of the Deskford carnyx (see above) has located Iron Age activity (Hunter 2001), while at Ballachulish Moss, the find spot of the eponymous wooden effigy, structures and deposits of Late Bronze Age date have been investigated (Clarke et al 1999; Clarke & Stoneman 2001). An evaluation of the archaeological potential of Flanders Moss has been undertaken (Ellis 2001) and this led to the location and excavation of a Neolithic wooden platform at Parks of Garden, on the very edge of the Moss (Ellis et al 2002) (illus 3).

While the work described above has certainly contributed to our knowledge base, it has not been implemented as part of a comprehensive strategy which aims to prioritize and target sites on the basis of informed decisions about aspects such as their age, condition, status or cultural value. Historic Scotland has recognized the need for a comprehensive policy for the management and preservation of the wetland archaeological resource (Hingley et al 1999), and to this end funded the establishment of two databases – the Scottish Wetland Archaeological Database (SWAD) and the Scottish Palaeoecological Archive Database (SPAD) – both of which are available on the Internet (http://www.geo.ed.ac.uk/SWAD/ and http://www.geo.ed.ac.uk/SPAD/). SWAD was compiled from desk-based sources and is essentially a site/findspot-focused summary of the known evidence for the cultural heritage of the wetlands. It was hoped that the database would help to identify those areas of wetland that were of national importance in terms of the condition, nature and extent of the cultural heritage they contained (Hingley et al 1999). SPAD is a collation of known palaeoenvironmental studies from Scottish sites with additional information on potential repositories, although the information is now somewhat out of date.

A second phase of work was commissioned to test the predictive power of the SWAD database by interrogation and subsequent field testing (Ellis 1999), and this concluded that there was insufficient data in the database to rank known sites in terms of potential. Limited fieldwork indicated that the use of desk-based sources which provide mainly general accounts of past and present landuse, and current and future threats, fails to account for very localized environmental and landuse factors which impact on the status and condition of a site (Ellis 1999). Most importantly perhaps, SWAD only deals with what is already known; it reflects the serendipitous nature of many wetland finds and thus focuses on those geographic areas where previous workers chose to work. It cannot be used in isolation to model the potential of other unexplored wetlands.

To summarize, until very recently there has been no systematic, sustained attempt to investigate the wetland archaeological resource. Most investigations have been site-specific, and consequently our knowledge of the resource is currently very patchy.

THE SWAP INITIATIVE

As a preliminary to the development of a well-focused archaeological programme, we consulted many natural heritage agencies whose activities impact in some way or another on the Scottish wetlands, in order to determine the degree to which the cultural heritage is recognized in their operations (Crone & Clarke 2001). We hoped that this would help us to prioritize more effectively those areas, both geographic and thematic, where research would facilitate the development of integrated management

policies towards the cultural heritage of the wetlands. Our consultations have highlighted a number of areas where slight adjustments in the activities and/or attitudes of at least some of the organizations could enhance the survival of the cultural heritage of the Scottish wetlands. Most importantly, it became clear that the 'invisibility' of the resource and the lack of available information on the subject are a hindrance in encouraging organizations to be more aware of the wetland cultural heritage and to be proactive in its conservation. It is also evident that, in the absence of baseline data, prioritization of geographic areas and/or thematic topics cannot be implemented as originally hoped. Therefore, it is now important to focus on establishing the nature, extent and condition of archaeological remains extant within the Scottish wetlands, and develop strategies on how to manage and monitor the resource. Thus, the development and implementation of methodologies aimed at locating and monitoring the resource is of paramount concern.

SWAP'S AIMS AND OBJECTIVES

It is against this background that SWAP established its aims and objectives. Our aim is: 'The enhancement of our cultural heritage through the exploration of the wetland resource and its full integration into the interpretative frameworks of "dryland" archaeology.' This integration will be achieved by focusing research within a series of hydrological catchments, rather than concentrating on discrete wetland sites. This will allow the relationships between diverse dryland and wetland archaeological sites and their landscape settings to be more fully investigated. As a result of the EU Water Framework Directive (2000/60/EC), many national environmental agencies will be required to work within catchment units, so by presenting the cultural heritage within the same framework we hope to encourage more active consideration of the archaeological resource.

The development of a coherent research agenda to fulfil the aim outlined above is clearly impeded by the lack of baseline data on the location and extent of the archaeological resource in Scotland's wetlands. A primary objective is, therefore, to establish the location and extent of archaeological deposits within the wetlands.

In keeping with national initiatives on sustainability and the presumption for preservation in situ implicit in national planning policy guidelines, conservation of the resource must also be an objective. It is likely that, with the limited resources currently available, it will only be possible to actively conserve the most important sites, and therefore the criteria necessary for ranking wetland sites must be clearly established. To do this, the condition and stability of selected sites must be determined and the nature of the processes impacting on them must be understood. Monitoring the resource is therefore an essential prerequisite of successful conservation.

SWAP's objectives can be summarized thus: (a) to establish the location and extent of the resource, (b) to monitor the condition and stability of the resource and (c) to conserve the resource with effective management. These are comparable to the objectives of the large and successful wetland projects undertaken by English Heritage in recent years, and we hope that within the Scottish context they will help to focus what could seem like an overwhelming project into a series of discrete and achievable tasks.

ESTABLISHING THE LOCATION AND EXTENT OF THE RESOURCE

It would be a Herculean task to establish the location and extent of the wetland resource throughout the length and breadth of Scotland. Instead, specific catchments will be selected and predictive models that can be used to determine those locations with the greatest potential for surviving archaeological deposits

will be developed. Single artefact finds, which comprise 17.7% of the entries in SWAD, will by their very nature always be serendipitous and their location unpredictable. However, the location of structures relating to settlement, movement and economic activities will be predicated by variables such as underlying topography and geomorphology, while their survival will be determined by factors such as the local hydrology, depth of peat and alluvium and the nature of existing threats within the catchment. Geophysical advances such as the application of ground-penetrating radar (GPR) to wetland environments may provide information on anomalies within wetland deposits that could signify archaeological remains (Clarke et al 1999). By modelling these and other variables it may be possible to predict where in the wetland landscape we might expect to find archaeological deposits. Models may simply take the form of GIS databases collating these layers of information. A pilot study on the suitability of GPR to establish peat depths and the location and extent of the archaeological resource in Moine Mhor, Argyll, followed on from an earlier desk-based exercise to predict areas of archaeological potential (Campbell & Housley 2002) (illus 5). All of this information was stored on a GIS database which was used to establish areas of greatest archaeological potential within the moss. In particular, an area thought likely to be a former crossing point across the peat was targeted for investigation. While GPR was successful at defining peat depths within the study area, no archaeological evidence was located (Clarke 2003). A similar exercise is currently underway for the Moss of Achnacree.

ILLUS 5 Ground-penetrating radar and topographic survey at Moine Mhor, Argyll

MONITORING THE CONDITION AND STABILITY OF THE RESOURCE

Earlier survey work on crannogs in south-west Scotland highlighted their vulnerability to changing agricultural practices (Barber & Crone 1993) and, consequently, this region has been targeted as the locus for a pilot monitoring programme. Following on from underwater survey and fieldwork, six crannogs (Barhapple, Barlockhart, Cults Loch, Whitefield, Milton Loch 1 and Loch Arthur – illus 1) were selected as candidates for monitoring, the criteria used being accessibility and evidence of recent degradation and/or erosion (Henderson et al 2003). The submerged crannogs have been surveyed digitally so that the progress and degree of erosion can be measured (Henderson et al forthcoming) and a one-year pilot monitoring programme has been initiated (Lillie et al 2003). Piezometers and nests of probes have been inserted on five sites and water levels, redox and pH are being measured on a monthly basis. The water chemistry and ecological status of the lochs are also being measured every three months to determine whether changes in the environment of the crannogs are causing changes in their condition. The results of the monitoring programme will eventually feed into strategies for conservation.

CONCLUSION

The global issues that threaten wetlands worldwide apply equally to Scotland where, from an archaeological perspective, the wetlands can be considered as either lacustrine or peatland. In the same way that the peatlands of Scotland have achieved international significance for their ecological properties and condition, the crannogs, as a resource found only in Scotland and Ireland, should likewise be seen as being of international archaeological importance.

SWAP's work to date has demonstrated that the absence of much baseline data is a significant impediment in the formulation of strategies for the management and conservation of Scotland's wetland archaeological resource. Acquisition of those data must therefore be a major priority. It is also a major impediment to the formulation of research strategies, and we must never lose sight of the fact that the aim, in conserving the resource for future generations, is ultimately the understanding of our past.

In the last pages of *Enlarging the Past*, Coles & Coles (1996, 157–8) presented a 'shopping list' of actions that they considered necessary to galvanize wetland archaeology in Scotland. These include the implementation of research projects into particular environments or monuments, fostering relationships with other natural environmental bodies, establishing the condition of sites and raising the profile of Scottish wetland archaeology. With this latest initiative some of these actions have now been implemented.

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