REVIEW OF ARCHAEOLOGICAL SURVEY AND MITIGATION POLICY RELATING TO BORD NA MÓNA PEATLANDS SINCE 1990

Prepared for National Monuments Service

Department of the Arts, Heritage and the Gaeltacht

FINAL REPORT

June 2013

NMS Peatland Review

Table of Contents

ABBREVIATIONS

ADS	Archaeological Development Services Ltd
ALO	Archaeological Liaison Officer
AMLC	Archaeology Management Liaison Committee
ASI	Archaeological Survey of Ireland
BNM	Bord na Móna
COP	Code of practice
DAHG	Department of Arts, Heritage and Gaeltacht
DBS	Depth Below Surface
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
GIS	Geographical Information Systems
IAI	Institute of Archaeologists of Ireland
IAWU	Irish Archaeological Wetland Unit
INSTAR	Irish National Strategic Archaeological Research
LOR	Level of Resolution
NMS	National Monuments Service
NMI	National Museum of Ireland
NRA	National Roads Authority
OD	Ordnance Datum
PA	Project Archaeologist
QUB	Queens University Belfast
RMP	Record of Monuments and Places
SEA	Strategic Environmental Assessment
SMR	Sites and Monuments Record

UCD	University College Dublin
XYZ	Co-ordinate System (Easting, Northing) and Elevated Height (Ordnance Datum)

CHAPTER 1

INTRODUCTION

1.1 Circumstances of and background to the review

Since 1991 an annual programme of archaeological survey has been conducted in Bord na Móna bogs, the results of which have been incorporated into the Sites and Monuments Record. The surveys have been accompanied by an annual programme of selective archaeological excavation and palaeoenvironmental analysis, determined by the production needs of Bord na Móna and in agreement with the DAHGI. *An Evaluation of Current Peatland Survey and Excavation Strategy* was commissioned by the National Monuments Service and carried out in 2001 by Professor John Coles which informed the development of current management strategies. Subsequently, a report entitled *Collation and Evaluation of Archaeological Data from Bord na Móna Bogs* was carried out in 2002 to evaluate the archaeological data gathered since 1991. In 2011, the National Monuments Service of the Department of the Environment, Heritage and Local Government commissioned this second review.

1.2 Review aims and specification

The aims of the Review were defined by the National Monuments Service (NMS) as:

1. "To assess the contribution which archaeological survey and excavation in Bord na Móna peatlands since 1991 has made to our understanding of the archaeology of Ireland of all periods, both in regard to wetland environments and Irish archaeology in general (i.e. including dryland environments);
2. Consider whether and to what extent different archaeological survey and excavation strategies and methods would increase or enhance the contribution which future archaeological survey and excavation in Bord na Móna peatlands is likely to make to such understanding (i.e. the understanding referred to as 1) above). Such

consideration will need to have regard to the relevant national and international comparisons for archaeological survey and excavation strategies and methods;

3. Having regard to the results of 1) and 2) above, propose priorities, strategies and methods for future archaeological survey and excavation in Bord na Móna peatlands."

1.3 Review approach

In order to address these three aims it was necessary to carry out a quantitative and secondary review of all archaeological data generated through archaeological survey and excavation in Bord na Móna (BNM) peatlands. This was approached through the following broad process:

- Collation of all available archives including digital data and paper records;
- Quantitative analysis of available raw data;
- Secondary review of all output;
- Integration of these analyses;
- Formulation of conclusions and recommendations for future strategies.

1.4 Review Team

The Review was administered by the Institute of Archaeology and Antiquity, University of Birmingham. The team consisted of: Dr Benjamin Gearey (University College Cork), Dr Nóra Bermingham (University of Birmingham), Caitríona Moore (Independent) and Professor Robert Van de Noort (University of Exeter).

CHAPTER 2

2.1 Policy and organisational framework and process

This chapter outlines the key stakeholders involved in the process of planning and delivery of the archaeological survey and excavation within BNM peatlands. A brief summary of the relevant policy and legislative framework concerning this work, the financial aspects of its delivery and a timeline summarising key events and dates are also presented**.**

2.1.1 Key stakeholders

Department of Arts, Heritage and the Gaeltacht

National Monuments Service

The National Monuments Service (NMS) forms part of the Department of Arts, Heritage and the Gaeltacht (DAHG) and plays a key role in the protection of the archaeological heritage. The NMS advises the Minister for Arts, Heritage and the Gaeltacht on the exercise of functions under the National Monuments Acts, 1930 to 2004 and on protection of the archaeological heritage generally.

Archaeological Survey of Ireland

The Archaeological Survey of Ireland (ASI) forms part of the NMS. The ASI is responsible for recording all known monuments in the country and for the upkeep and updating of the Record of Monuments and Places (RMP).

National Museum of Ireland

The NMI is the national repository for all archaeological objects found in Ireland. The role of the NMI is to pursue policy in relation to portable archaeological objects from BNM bogs, including objects identified and recovered during survey and excavation and through to the conservation of artefacts. The NMI is a statutory, regulatory body in Irish archaeology. It has a licensing role in relation to licenses to alter and export and a consultative role with the NMS in relation to archaeological excavation and licensing.

Department of Communications, Energy and Natural Resources

Bord na Móna

Bord na Móna is a semi-state company established in 1946 with a statutory mandate for the development and management of Irish peatlands. Development mainly, although not exclusively, takes the form of mechanised peat extraction. The peatlands in BNM are under the ownership of Bord na Móna Energy Ltd. The state stakeholder is the Peat Division, Dept. of Communications, Energy and Natural Resources. BNM own 86,878 Ha of peatland; the majority of which (74,193 Ha) is classified as Industrial Cutaway (EPA Strive report 2011). Of those peatlands under production, c. 64,000 Ha has been subject to archaeological survey.

Contractors

Irish Archaeological Wetland Unit (IAWU)

The IAWU was established in 1990 in University College Dublin. A Steering Committee comprising representatives of the NMS, NMI and UCD oversaw management of the IAWU. From 1990-2000, NMS funding for annual peatland surveys conducted by the IAWU was administered via UCD. Peatland surveys went to public tender in 2001 and from 2001 to 2003 tenders were awarded to the IAWU. The IAWU closed in 2005.

The IAWU was charged with conducting archaeological survey of BNM industrial peatlands with a view to identifying and recording sites for inclusion within the RMP. In addition to surveys the IAWU undertook other projects within wetlands on behalf of the NMS. This included site record visits, small-scale excavations of threatened wetland sites and the provision of specialist advice to other archaeological practitioners. The IAWU also conducted surveys in advance of the Minorco Lisheen Development in the BNM bog at Derryville, Co. Tipperary.

Archaeological Development Services Ltd (ADS)

ADS are a commercial archaeological consultancy established in 1989 which operates in the Republic and Northern Ireland. ADS provide a wide range of archaeological services of which

peatland services is a significant component. ADS was appointed as BNM's archaeological consultants in 1998. From 1998 to 2006 ADS conducted archaeological mitigation, namely excavations, in industrial peatlands on behalf of BNM. Since 2007, mitigation has been awarded via tendering. An integrated peatland survey and excavation tender (2007-2009) was awarded to ADS in 2007. The current programme of mitigation (2010-2013) was also awarded to ADS in 2010. Separately, ADS were awarded Peatland Survey Tenders funded by the NMS in 2003, 2004, 2005 and 2006. In addition, in 2002, ADS were commissioned by NMS (via tender) to undertake the "Collation and Evaluation of Archaeological Data from BNM Bogs". ADS also provide on-site training within BNM peatlands for students, both fee and non-fee paying students. Fee-paying students are trained under the auspices of the ADS Peatland Archaeological Field School. Occasionally, between 2005 and 2011 there has been student participation in survey and mitigation projects.

Palaeoenvironmental study associated with ADS excavations have been carried out by Archaeoscape (Royal Holloway College, University of London) and more recently by QUEST (University of Reading). Both organisations are directed by Dr Nick Branch and represent commercial archaeological concerns based within University departments. The BNM palaeoenvironmental programme has been carried out by a combination of full time academic staff, research assistants and postgraduate students. A collaboration between ADS and QUEST was awarded INSTAR funding in 2008 and 2009 for the project "Examining the relationship between climate change and human activities in the wetlands of Ireland" (refs: 16659, 16718).

2.1.2 Legislative and Policy Framework

National Monuments Act

The National Monuments Acts 1930-2004 provide for the protection of monuments and archaeological sites, the protection of the portable archaeological heritage and the regulation of archaeological works. All known monuments are entered in the statutory Record of Monuments and Places (RMP). Following a major review of archaeological policy and practice in Ireland in 2007, a single piece of consolidated and modernised legislation was proposed to replace the existing National Monuments Acts 1930-2004.

The Record of Monuments and Places

The Record of Monuments and Places (RMP) is the statutory list of recorded monuments established under Section 12 of the National Monuments (Amendment) Act 1994. The RMP was issued for each county between 1995 and 1998. Monuments appear on the paper RMP maps issued in the 1990s and have a form of statutory protection. The ASI is in the process of revising and updating the RMP for publication in the near future (2012/2013). Monuments listed in the RMP are afforded legal protection and typically, any work taking place at or in relation to a Recorded Monument must be notified to the Minister.

The Sites and Monuments Record

The Sites and Monuments Record (SMR) formed the basis of the RMP and comprises an extensive body of records relevant to the archaeological heritage of the State. This includes a list of sites accompanied by Ordnance Survey maps onto which the sites have been plotted. All sites recorded in the SMR appear on the ASI Map Viewer (www.archaeology.ie) but not all of these are included in the RMP and hence have no statutory protection.

Turf Development Acts 1946-1998

BNM's mandate to develop the national peatlands is stated in the Turf Development Acts 1946-1998. BNM operations related to peat extraction lie outside the scope of the Planning and Development Acts. The Turf Development Act 1998 (Section 56) introduced provisions to ensure that: "The Company and each subsidiary shall ensure that its activities are so conducted as to afford appropriate protection for the environment and the archaeological heritage." The introduction of the 1998 Act was concurrent with the development of an Agreed Set of Principles between the Minister, the NMI and BNM. The same year saw the beginning of BNM archaeological mitigation. Prior to this BNM had facilitated state-funded survey of BNM peatlands and had a long-term history of co-operation with the NMI in relation to objects and structures discovered in BNM bogs. Other legislation applicable to BNM activities apart from peat extraction that may have an archaeological impact include the Environmental Impact Assessment (EIA) Directive (85/337/EEC, amended 2003) and the Strategic Environmental Assessment (SEA) Directive (2001/42/EC).

Agreed Principles for the Protection of Wetlands Archaeology in Bord na Móna Bogs (1998)

Ten principles which provided the framework within which the archaeology of BNM peatlands is currently managed were agreed between the Minister and BNM in 1998. The principles recognized the separate legislative responsibilities of the Minister, the NMI and BNM and established a basis for communication and co-operation between the Minister, the NMI and BNM with regard to archaeological issues arising as a result of peat extraction.

Code of Practice (Pending)

The Code of Practice (COP) formalises the partnership between the DAHG, the NMI and BNM and outlines the principles to be applied for the protection of the peatland archaeological resource. The COP will supersede the earlier Agreed Principles (1998) and provide an updated and revised framework within which peat extraction and archaeological mitigation can progress. The COP is applicable to peat extraction operations that lie outside current Planning and Development Acts. The COP is guided by 16 agreed principles some of which are drawn from the Agreed Principles (1998) and some of which represent significant additions to the former. Legislative frameworks are reiterated and include reference to the Valletta Convention (The Convention on the Protection of the Archaeological Heritage (Revised), 1992).

2.1.3 Operating structure

Archaeological Management Liaison Committee

The AMLC was established in 1998 in accordance with the Agreed Principles 1998. Since 1998, the AMLC has met at regular intervals on an annual basis, with up to four AMLC meetings a year. The AMLC comprises representatives of NMS, NMI and BNM as well as the BNM Project Archaeologist and ADS Ltd.

Archaeological Liaison Officers

Archaeological Liaison Officers (ALOs) have been in place since 1998. There are five ALOs distributed across BNM Bog Groups that serve as a point of contact for BNM operatives, particularly those engaged in milling. ALOs receive basic training on how to deal with

archaeological objects upon discovery. They appear mainly to respond to discoveries of artefacts (i.e. stray finds) as opposed to structures. Where finds are made by BNM personnel these are generally reported to and inspected by an ALO before being reported to the NMI. The role of the ALO has been laid down in ten points in the COP (pending).

BNM Project Archaeologist

The position of Project Archaeologist has effectively replaced in practice the archaeological consultant as chief archaeological advisor to BNM. Currently, the role is informal with a part-time PA in place since 2010. Following publication of the COP the role of the PA will be formalised. The PA has an advisory, liaison, and supervisory role in relation to BNM mitigation and works in partnership with NMS and the NMI to progress BNM's archaeological requirements. The PA is also responsible for quality control of the output arising from BNM archaeological mitigation.

2.1.4 Timeline of events

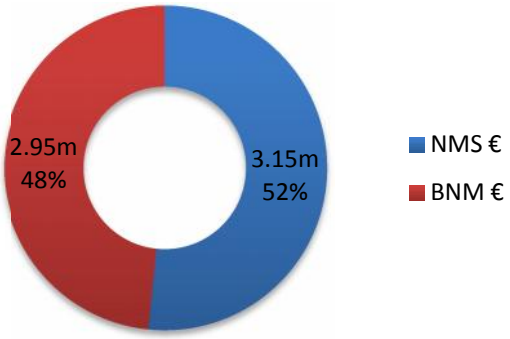
Year	Event
1985	"Toghers or Causeways: some Evidence from Archaeological, Literary, Historical and Placename sources" A.T. Lucas PRIA 85, 2
1985-1991	ESF funded excavations by Raftery
1990	IAWU established. Excavations at Clonfinlough 1990 and 1991
1996	Heritage Policy Division produce internal discussion document on wetland archaeology
1996/7	NMI extend their existing role to stray finds recovered from field survey
1998	Turf Development Act; Section 56
1998	Agreed Principles adopted
1998	Archaeological Management Liaison Committee established
1998	BNM Archaeological Liaison Officers in place
1999	BNM funded excavations and re-assessment survey begins
2001	John Coles Review commissioned and produced
2001	Surveys become tendered

2002	Collation and Evaluation Report commissioned and produced
2002	Draft strategy published
2005	IAWU cease operating
2007	Integrated approach to survey and excavation established
2007–9	Integrated tender awarded to ADS
2007/8	Scientific panel established
2009/10	BNM assume financial responsibility for stray finds from field survey
2008	First stage survey of all BNM peatlands completed
2008	Transfer in NMS from A. Lynch to M. Keane and S. Kirwan
2009	Code of Practice discussions
2010	BNM appoint Project Archaeologist
2010-13	BNM excavation tender
2011	NMS Peatland Review commissioned
2011	Code of Practice finalised (Publication pending)

2.2 Resourcing

A full breakdown of available expenditure from BNM and NMS is provided in Table 2.1 below. Related expenditure was not requested from the NMI. Note: The table also includes INSTAR funding and grant funding obtained from the Heritage Council in relation to projects which originated in BNM peatlands. Based on the available data, the total investment in the archaeological survey and mitigation of BNM peatlands amounts to €6.1 mill. NMS input accounts for c. 52% of the total expenditure while BNM has input c. 48 % (Figure 2.1). The duration of the funding periods for BNM and NMS differs. NMS investment covers twenty years (1990-2009) while BNM's funding extends over 13 years (1998-2011).

Figure 2.1—Total investment survey and mitigation



The total expenditure by the NMS is c. €3.15 million, which pertains to the costs of survey only and includes additional expenditure by the ASI (c. €46k) in relation to the production and submission of digital data. From 1994-2009 inclusive the NMS expenditure in relation to peatland survey was c. €157k per annum. From 1998 to 2011 BNM's total expenditure was c. €2.95 million, equating to an annual outlay of c. €210k and including all archaeological excavation, re-assessment survey and post-excavation projects. Other sources of funding amount to c. €100k with INSTAR funding accounting for c. €87k.

Table 2.1—Peatland related expenditure (third party payments). Note: Totals have been rounded up. NMS expenditure from 1990-1993 is presented as an average over four years. This table does not include BNM peatland related expenditure by NMI

Year	BNM €	NMS €	INSTAR €	HERITAGE COUNCIL
1990	—	c. 87,500	—	—
1991	—	c. 87,500	—	—
1992	—	c. 87,500	—	—
1993	—	c. 87,500	—	—
1994	—	107,950	—	—
1995	—	120,650	—	—
1996	—	127,000	—	—
1997	—	177,800	—	—
1998	40,000	190,500	—	—
1999		190,500	—	12,000
2000	1.712 mill	240,030	—	—
2001		242,847	—	—

2002		312,029	—	—
2003		317,254	—	—
2004		193,626	—	3000
2005		226,575	—	—
2006		42,354	—	—
2007		134,008	—	—
2008		167,872	50,000	—
2009	1.2mill	8,505	37,000	—
2010		—		—
2011		—		—
TOTAL	**€2.952 mill**	**€2.8 mill**	**c. €87,000**	**c. €15,000**

CHAPTER 3

REVIEW METHODOLOGIES

3.1 Desk-based assessment

3.1.1 Archive compilation

The desk based assessment involved the compilation and subsequent interrogation of all relevant and available archival material produced over the last 20 years (referred to as the review archive). In total the review archive comprises 306 documents and reports obtained from the following sources:

Bord na Móna	Internet
National Monuments Service	IAWU
National Museum of Ireland	Publication

The majority of documents were only available in hard copy. Digital copies, i.e. pdfs, were obtained for 36% of the documents compiled including excavation and survey reports. Around two thirds of these were obtained via web searches with the remainder supplied by stakeholders on request.

3.1.2 Archive management

Each document within the review archive (Appendix 7) was assigned a unique record number in the following format PR001 (Peatland Review 001). All documents were logged in a fully searchable database (or inventory) and primarily categorised as follows with individual document categories quantified in brackets:

Annual report (BNM) (15)	Miscellaneous (1)	Progress report (8)
Excavation (95)	Mitigation strategy (10)	Re-assessment survey (5)
Method statement (101)	Monitoring (2)	Survey and Site visit (37)

Minutes and Agenda (AMLC) (12)	Policy (12)	Request for tender (8)

3.1.3 Secondary review

Documents were assessed using a dedicated review sheet which included basic information and a brief overview of the document contents. Where applicable reports and documents were reviewed under the following broad headings:

Project context	Illustration and mapping
Report type and purpose	Scientific dating
Aims and Objectives	Recommendations
Methodologies	Specialist analyses
Results – description, discussion and integration	Quality and standards in relation to existing guidance

Where possible, reports were combined and reviewed in project groups such as geographical areas or individual bogs for which multiple reports on survey, mitigation strategy and excavation exist. Reports on surveys without corresponding mitigation were dealt with separately. In total, 82% of documents catalogued in the inventory were reviewed.

3.1.4 External reviewers

External consultation and review of a selection of reports (Appendix 6) was additionally sought from industry specialists within Ireland and the UK. Such consultations were sought with reference to specific aspects of specialist work, including coleoptera, wood studies and phosphate analyses. The individuals consulted and their organisations, where relevant, are listed below.

Dr Eileen Reilly Independent Palaeoentomologist	Dr Ingelise Stuijts, Palaeoenvironmentalist. The Discovery Programme
Dr David Smith, Lecturer and Palaeoentomologist, University of Birmingham	Dr Rebecca Bartlett, Lecturer, Geochemist. University of Birmingham

3.2 Data Compilation, Management and Analysis

3.2.1. Primary datasets

Primary datasets consulted were in two forms:

1. Survey Data (IAWU and ADS) inclusive of any available radiocarbon and dendrochronological results.
2. Peatland Site Data held by the ASI.

3.2.2. Additional data from stakeholders

In addition to the primary datasets, additional data was acquired from NMS, IAWU, BNM and ADS. Data generated by the IAWU was supplied by Conor McDermott, UCD. The preferred format for such data was spreadsheets generated within Microsoft EXCEL or WORD but other formats were accepted. Other spatial datasets were received as ArcGIS files. All datasets received are listed in Table 3.1 and explained in detail in Appendix 1.

Table 3.1—Digital data files supplied by stakeholders

Agent	Format	Contents
Archaeological Survey of Ireland		
NMS Peatland Records excluding RMP Status	Excel	List of peatland sites pre-2006
NMS Peatland Records including RMP Status	Excel	List of peatland sites up to and including 2008
ADS Sites for inclusion in RMP	Excel	List of peatland sites for inclusion in RMP
GIS Mapping: Ireland Map	ArcGIS	Map Data
NMS		
ADS Peatland Survey data FINAL for REVIEW TEAM	Excel	ADS Ltd field survey results from 9 counties
Peatland Monument Nos. New monuments 2006-2010_MK (Draft)	Excel	Preliminary data analysis. Superseded by the review.
List of Excavations (BNM Peatland) 2010 and 2011	Word	Peatland excavations by JW and NR, ADS Ltd
BNM Archaeology Status-updated by Jane Sep08	Excel	Copy of file provided by BNM (see below)
BNM		
BNM Archaeology Status-updated by Enda Jul 2011	Excel	BNM bog's status re: production, survey, excavation, reporting and outstanding work
BNM Archaeology Status-updated by Jane	Excel	as above

Sep 2010		
BNM Archaeology Status-updated by Jane Sep 2008	Excel	as above
GIS Mapping: BNM Bog boundaries	ArcGIS	Mapping Data
ADS Ltd		
Mountdillon NGRs	Excel	XY Data pertaining to 198 sites
Blackwater and Mountdillon Summary Tables	Word	Descriptive data pertaining to 106 sites listed in XY data above
Reports	Excel	
IAWU		
IAWU Master Data	Excel	Field Survey Data inc. data from NMI, SMR and Raftery
Ireland Master Dates	Excel	Dating record, all counties but Offaly
Offaly Master Dates	Excel	Dating record, Co. Offaly
IAWU Artefacts 92E148	Excel	Data for all artefacts recovered under 92E148
IAWU Artefacts 2001-2	Excel	Data for all artefacts recovered in 2001–2

3.2.3 Data handling

The review dataset represents a range of independent, complimentary and overlapping information. Consequently, one of the first tasks was to extract information required for the review purposes and where necessary to standardise the data. The review dataset can be broken down into two major parts: data pertaining to survey and data pertaining to mitigation (i.e. excavation).

The review focused on original field survey data as opposed to digital data held by the ASI as the former could be directly linked to available reports and publications. In addition, field survey data includes all sites identified during the course of a given survey. The ASI data has been filtered to exclude certain categories of site (i.e. Archaeological wood) and hence does not provide the fullest record of the archaeological resource from BNM peatlands. In addition, ASI data do not distinguish between archaeological sites located in BNM and non-BNM peatlands. Finally, the ASI dataset could not be directly linked to project reports as to date, a digital concordance between field survey site codes and SMR numbers is not available. However, this information is included within the SMR (paper) file for a given site.

To facilitate data compilation, standardisation and analyses eleven fields were defined for each archaeological site included in the review dataset including: Townland name; County; Site code; Bog name; Site type (also referred to as class code); Threat status; Date surveyed; Depth below surface (DBS) and overall site dimensions, namely length, width and depth. In general, the above fields were readily completed for each archaeological site although problems were encountered with certain fields in relation to survey data produced since 2004. These were typically in relation to site classification, in particular ambiguity in the application of classcodes and threat status. Other difficulties were encountered in attempting to update site classifications for 110 sites (listed as *classification uncertain* in subsequent analyses). The Review applied updated classcodes to 385 sites (Appendix 2) Note: This process may have introduced discrepancies between the review dataset and data held by the ASI. If necessary, this could be addressed in the future once a site concordance is made available.

Efforts at standardising data necessitated the use of classcodes in addition to the eight currently listed by the ASI for peatland archaeological sites (Table 3.2). In particular, the site classifications *Archaeological Wood* and *Complex* were maintained although these are no longer applied by the ASI. In total, 13 different categories of classcode were used in the course of this review.

Table 3.2—Range of classcodes employed in the Review.

ASI Peatland Classes	
Archaeological wood–peatland	Road–Class 1 Togher
Platform–peatland	Road–Class 2 Togher
Post row–peatland	Road–Class 3 Togher
Structure–peatland	Road–gravel/stone trackway–peatland
Additional Classifications	
Complex	Classification uncertain
Find	Miscellaneous
Habitation site	

The second major component of the review dataset was the compilation of an Excavated Sites spreadsheet. The spreadsheet was compiled using data derived from available excavation reports and included all sites subject to mitigation by BNM and excavation by the NMS. The fields entered included Licence no.; Licensee; Field survey code; Townland; County; Site type; Dated (Yes or No); Known length and Excavated length. Initially, a field was included for the DBS (Depth Below Surface) of each site but this data could not readily be extracted within the timeframe of the review. Analyses of the Excavated Sites Data are presented in Chapter 5.

3.3 Stakeholder Consultation

Stakeholder consultation comprised three components:

- Interviews between the review team and stakeholders. The latter included individuals and representatives of organisations (see Chapter 8 for details);
- An on-line survey consisting of five questions with provision for additional comments. Two formats of this survey were produced; one for Ireland and a slightly modified version of this for selected organisations and individuals from England, Scotland and Northern Ireland (see Chapter 8);
- Customised short questionnaire issued to industry organisations highlighted by the NMS (see Appendix 3).

CHAPTER 4

RESULTS: PEATLAND SURVEY

4.1 BNM peatland structure and survey

BNM peatlands are divided into 10 production groups (Table 4.1) in which there are 162 bogs (raised bogs). Blanket bogs in Oweninny, Co. Mayo incorporating 15 individual bogs, are not listed here. Two bogs in this group were subject to peatland survey in 2003 (Bangor and Bellacorrick) but have since been withdrawn from production. The status of the remaining bogs was not established during this review.

Table 4.1—BNM Production Groups

Allen	Derryfadda
Ballivor	Derrygreenagh
Blackwater	Kilberry
Boora	Littleton
Coolnamóna	Mountdillon

The bogs can be distinguished further on the basis of their production, cutaway and preserved status (Table 4.2). As of 2011, the majority of bogs (75%) are in production although the level and extent of production can vary between bogs. A further 13.5% are classified as *Cutaway* and are presumed to be currently out of production. The majority of bogs in production have been subject to archaeological survey. Based on data supplied by BNM, nine bogs have not yet been surveyed. At least three are not in production and this may be the case for the remaining six bogs, but this requires further verification.

Table 4.2—BNM Production and Peatland Survey Status

Status	*Bog Nos*	Survey (Yes)	Survey (No)	Survey Unknown
Cutaway	*22*	20	1	1
Preserved	*17*	1	16	–
Production	*122*	113	9	–
Unknown	*1*	1	–	–

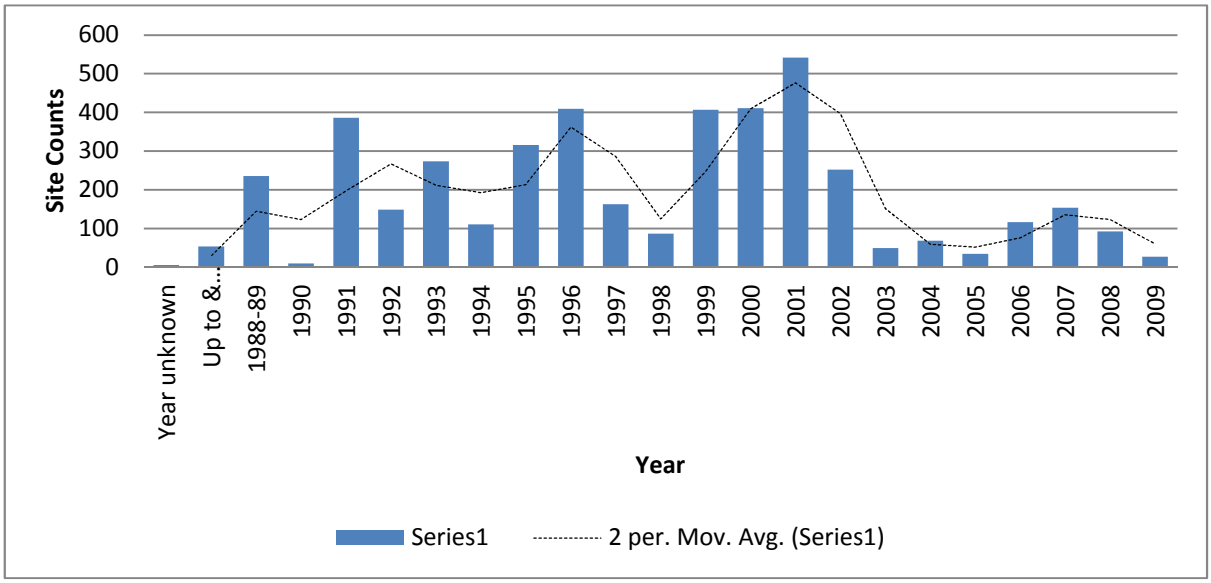
Total	*162*	135	26	1

4.2 Quantification of peatland survey results

4.2.1 Number of sites

To date, 4,358 archaeological sites have been identified in BNM peatlands. This figure includes both new and known sites identified in re-assessment surveys. The majority of sites (92%) were identified as result of NMS-funded surveys since 1991. Sites identified prior to and including 1990 amount to 8% of the total. Figure 4.1 charts the number of known sites by the year of discovery. A trendline has been inserted (2 point moving average).

Fig. 4.1—Sites identified per annum



4.2.2 Hectares surveyed per annum

The area covered by survey has varied annually with the area selected for survey based on requirements of the DAHG and BNM and on what was considered reasonable to achieve within a given field season. Figure 4.2 charts hectares surveyed per annum. Values are based on data derived from BNM and from tender documents issued since 2001. The total area subject to survey has been c. 64,000 Ha with the greatest proportion of which has been surveyed since 2001. Conversely, the majority of archaeological sites were identified prior to and including 2001 (Table 4.3). Overall, there are c. 0.07 archaeological sites per hectare.

Figure 4.2—Hectares surveyed per annum

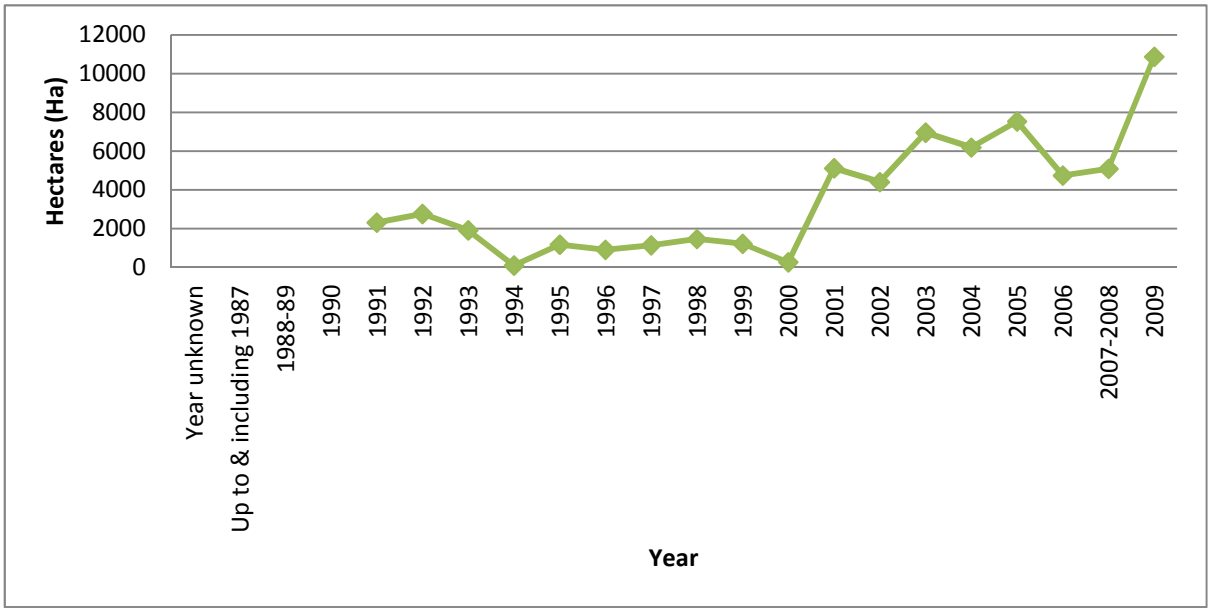


Table 4.3—Hecatres surveyed and sites identified per annum

Year	Ha	Sites (n.)		Year	Ha	Sites (n.)
≤1990	—	306		2000	267	411
1991	2310	386		2001	5114	542
1992	2761	149		2002	4402	252
1993	1909	274		2003	6951	50
1994	95	111		2004	6187	69
1995	1176	316		2005	7529	35
1996	910	409		2006	4743	117
1997	1142	163		2007-8	5086	247
1998	1458	87		2009	10369	27
1999	1214	407		–	–	–
	Total		**Ha**	**Sites**		
			64,126	**4,358**		

4.2.3 Peatland survey records held by the ASI

The total number of known sites (4,358) exceeds the number of sites held by the SMR and listed in the RMP. As of May 2011 the ASI hold records on 2,267 peatland sites with 1,421 records intended for inclusion in the next revision of the RMP. More records may have been added over the last year. These records are likely to relate mainly to BNM peatlands but may include peatlands in other ownership. In addition, the ASI has started to account for sites and monuments destroyed as a result of peat extraction and/or sites subject to investigation with sites marked for deletion currently indicated in the ASI Map Viewer as

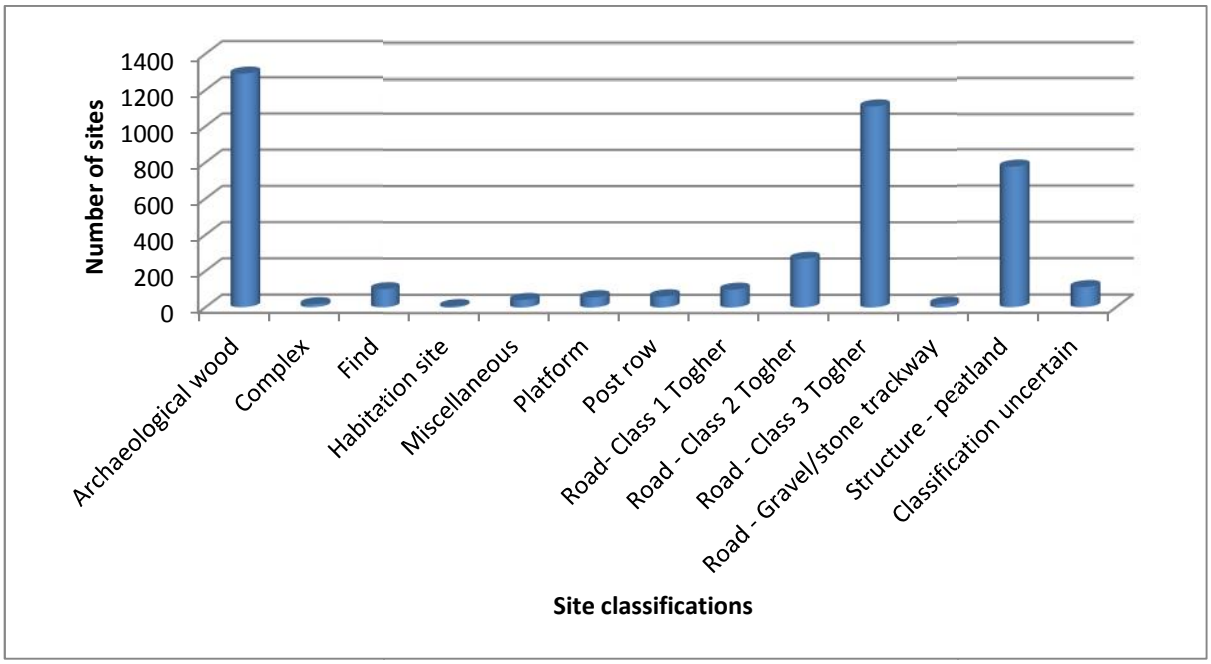
'Redundant Records' (www.archaeology.ie). Currently, there are 510 monuments in BNM peatlands included in the statutory Record of Monuments.

Note: The ASI does not include sites classified as *Archaeological wood* as a monument and therefore all records of archaeological wood are excluded from the SMR. This is discussed further in Chapter 9.

4.2.4 Range of site types

The total number of sites identified to date in BNM peatlands is 4,358. However, 407 sites identified in the 1999 Re-assessment of Mountdillon and Blackwater bogs, have been excluded as these data were insufficiently detailed. The final working total number of sites is 3,951 which can be further broken down by classification by total number (Figure 4.3) and percentage (Figure 4.4).

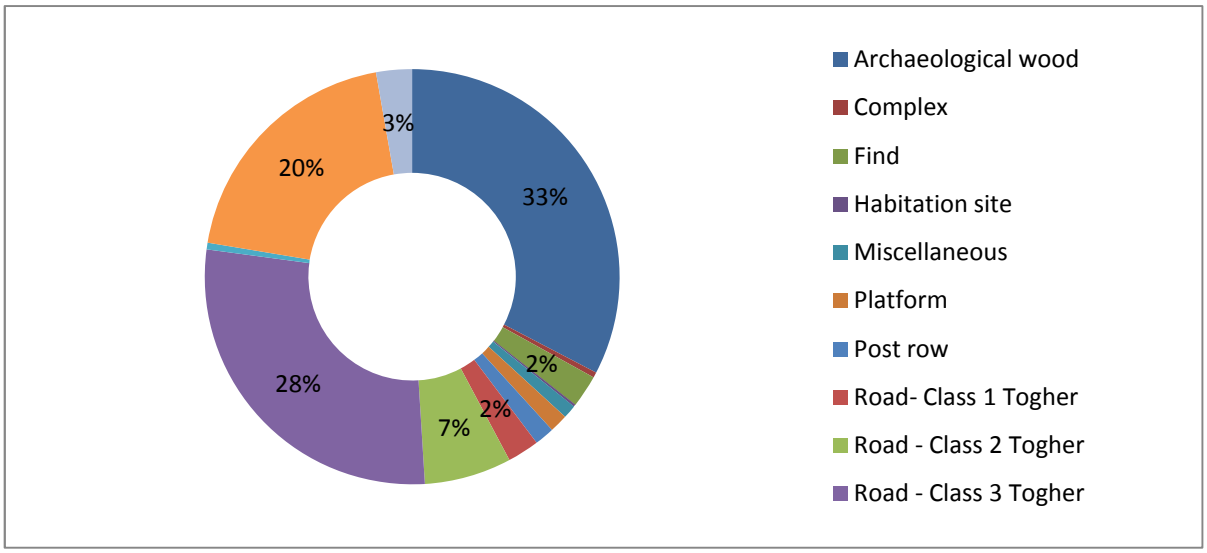
Figure 4.3—Range and number of known site types



Of the 13 classes of site *Archaeological wood* (n=1290) represents the largest category at 33%. This is followed by *Road-Class 3 Togher* at 28% (n=1109) and *Structure-peatland* at 20% (n=774). Larger trackways, namely *Road-Class 1 Togher*, *Road-Class 2 Togher* and *Road-gravel/stone trackway* account for 10% (n=387) of the known site total. All other site types

including finds, account for c. 7% of the site total (n=281) with the classification of 3% of sites (n=110) uncertain.

Figure 4.4—Site Classifications %



4.2.5 Finds

One hundred finds have been included in the review survey dataset, equating to stray objects found during field survey. This figure excludes those finds reported by BNM Archaeological Liaison Officers to the NMI. The majority of finds (n=88) were identified in surveys conducted between 1991 and 2003 with a further five finds made since 2004. The remaining 7 artefacts represent stray finds made in BNM bogs prior to the programme of State-funded survey. All finds recovered on state-funded survey between 1991 and 2003 have been catalogued and transferred to the NMI. No information was available regarding the status of finds recovered through later survey.

Note: The actual number of stray finds retrieved from BNM peatlands exceeds 300 (NMI Finds Database). This includes finds identified and reported by BNM personnel since 1990. Interrogation of this data did not form part of this review.

4.2.6 Sampling

Dating; Palaeoenvironmental; Wood studies and Wood technology

With the exception of scientific dating, only limited quantification of the number and types of samples obtained during survey was carried out. This was mainly because the available survey datasets and related reports do not include information on the level of sampling undertaken during survey; although some include the results of samples subject to analyses. Samples were obtained for a range of analyses including:

- Coleoptera (sub-fossil beetles);
- Scientific dating: using dendrochronology or radiocarbon;
- Plant macrofossils;
- Wood studies (species identification and ring counts);
- Wood technology: including the analysis of woodworking techniques, e.g. cut-marks.

Samples for dating and wood studies were common to surveys conducted from 1991-2009 whilst samples for wood technology, insect and plant macrofossil analyses relate solely to the earlier period of survey from 1991-2003. The number and range of samples subject to analysis is detailed in Table 4.4. This excludes information on scientific dating (see Chapter 6) and on wood technology, as the number of samples analysed could not be reliably determined. The quantity of analysed samples may equate with the actual numbers of samples taken but this is unclear on the basis of the available data.

Table 4.4—Number of survey-obtained samples subject to analyses

	Insects	**Plant macrofossil**	**Wood studies**
1991-2003	3	17	2797
2003-2009	—	—	503
TOTAL	3	17	3300

Wood studies

2797 samples were analysed between 1991-2003 for wood species identification and ring counts. Sampling for wood studies was revised downwards from 2000 so that between 2000 and 2003 analysis was limited to c. 330 samples. Around 500 samples were analysed for

wood species purposes from 2003-2009. The number of sites represented by these samples could not be established.

Wood technology

In terms of wood technology initial surveys (1991-1999) included relatively comprehensive sampling of site exposures; although the number of sites represented by the samples obtained was not established. Data from 2002 suggest 562 samples had been taken for wood technology studies during this period of survey (Whitaker 2002a, 36). From 2000, sampling for wood technology analysis was reduced to c. 10 samples per season equating to an additional 40 samples. The combined total of wood technology samples taken during the 1991-2003 survey is therefore c. 600, of which (as of 2002) about 250 had been discarded (ibid.). The status of the remaining samples was not established during the course of this review. Later surveys, from 2003-2009 did not include sampling for wood technology studies.

Coleoptera and plant macrofossil samples

Analysis of bulk peat samples (coleoptera and plant macrofossils) was limited and treated as additional or supplementary information. Limited qualitative analysis of macrofossils was undertaken on samples from the 2001 survey to infer the probable habitats represented within the bogs surveyed (IAWU 2002a).

4.3 Threat status analysis

The review used survey data to quantify the number of sites assigned to the five categories of threat originally developed in the 1990s (see Figure 4.5):

- Destroyed: No visible remains (re: known sites which lack visible remains)
- Being destroyed: Sites exposed on or within 10 cm of the field surface
- Imminent danger: Sites within 10cm to 40 cm of the field surface
- Threatened: Sites 40 cm or more below the field surface
- Resolved: Recovered artefacts and sites noted as destroyed by the time a survey has been completed *or* Sites and/or finds subject to preservation by record within

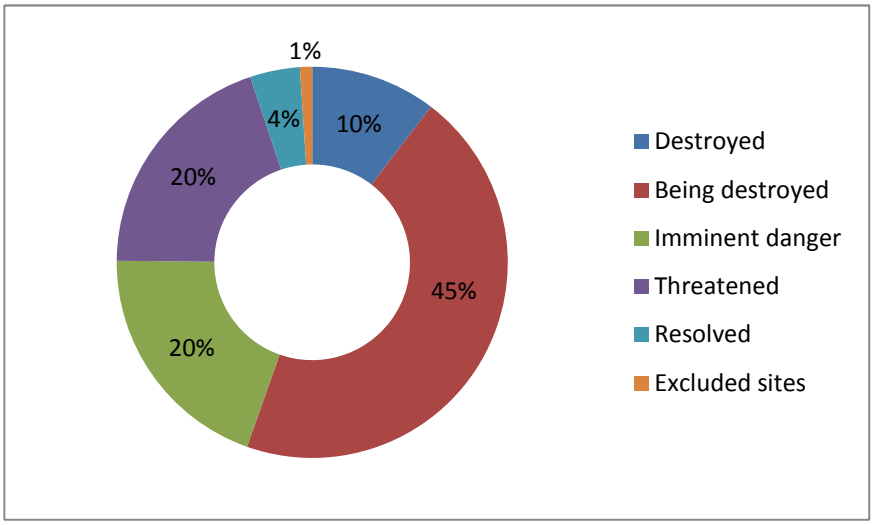
a given survey period. The definition of Resolved is in two parts as it reflects different usage by survey agents.

These categories were typically assigned during survey and as such reflect a site's status at given point in time. For the purposes of this review, threat status was assigned retrospectively to survey records pertaining to 2003 and 2009. Categories of threat assigned in earlier surveys were maintained. The total number of sites reviewed was 3,951.

Around 1% of sites were excluded from threat status analysis as there was insufficient information available to allow a category of threat to be reliably assigned (Figure 4.6). The greatest percentage of sites is within the category *Being destroyed* indicating the majority of known sites are exposed on or within 10 cm of the field surface. Sites in *Imminent danger* or *Threatened* are equally represented at 20% each.

Note: Each category of threat represents a 'snap shot' in time that in principal is subject to change as milling progresses. In practice, however both desk based and re-assessment surveys have shown that this may not be a reliable indicator of a site's preservation potential (see below).

Figure 4.5—Category of threat



4.4 Re-assessment survey

Purpose

Three survey projects have been carried out since 1998 when BNM commenced mitigation in their peatlands. These are referred to as either *Assessment Surveys* or *Re-assessment Surveys* and typically entailed the re-identification of known sites and the identification of new sites, with a view to subsequently recording all archaeological sites identified during the course of the assessment. The earliest survey (1998) also targeted areas known to contain archaeological deposits with a view to assessing the preservation status of any sites and/or groups of sites, previously recorded. The results of each survey would then inform subsequent mitigation strategies developed for the archaeological resource within the relevant area.

1998 Assessment survey

The earliest assessment, undertaken in 1998 focused on parts of bogs within the Lemanaghan Works, Boora Group, Co. Offaly first surveyed between 1993 and 1997 (IAWU 1998). The subsequent assessment concentrated on parts of five bogs; specifically areas where significant archaeological content had been demonstrated. Overall, fewer sites were identified during the assessment project than the original surveys with the reduction in the region of 30 % (162:299).

1999 Re-assessment survey

A 1999 re-assessment of parts of the Mountdillon and Blackwater Groups identified 407 sites with the majority (361) occurring in Mountdillon and the remainder (46) in Blackwater. The 1991 survey of Mountdillon identified 386 sites, while Blackwater surveys in 1992 added around 40 new sites. Overall site numbers thus decreased in the ten years between surveys, the survey director noted that in general the overall pattern of site distribution was maintained; with most sites occurring in areas where archaeology had been previously recognised (Dunne 1999). There were also instances where previously recorded sites appeared to have been destroyed. Limited distinction was made between previously known and new sites with the exception of a small number of larger structures, presumably Road-Class 1 and 2 Toghers.

The results contrasted significantly with a desk-based assessment (known as the Longford Paper Survey 1998) in which it had been suggested that c. 250 sites in Mountdillon were likely to have survived since 1991. The DBA also suggested that little fundamental change in the overall distribution of sites might be anticipated, a fact which was borne out by the 1999 survey.

2009 Re-assessment survey

The third re-assessment survey (c. 10,369 Ha) pertains to the Blackwater and Boora Groups. The re-assessment was completed in 2009 and included areas first surveyed between 1992 and 1997 in which 306 individual archaeological sites were identified. The 2009 survey identified 30 sites, twenty-seven of which were new and three had been known previously. Changes in overall site distribution were not assessed. The results of this survey contrast significantly with those of the earlier assessment surveys. Possible reasons for this are explored in Chapter 9.

Re-assessment surveys and planning conditions

A further class of re-assessment survey has been noted within BNM peatlands in the form of walkover surveys of parts of BNM bogs in which developments subject to planning permission were undertaken (i.e., works related to the power stations at Shannonbridge and Lanesborough) (Whitaker 2002b and c). In each case, the part of the bog subject to development was recognised as an area of archaeological potential due to the presence and/or proximity of known archaeological sites within each bog. Initial field surveys did not identify any new archaeological sites that may have been impacted on by the proposed developments, although it was acknowledged that potential, future phases of development at Lanesborough might require archaeological mitigation. These surveys were followed by monitoring the removal of peat under the archaeological supervision and in one case, the excavation of test trenches in order to assess the presence of archaeological sites within the development area.

CHAPTER 5

RESULTS: MITIGATION

5.1 BNM peatlands and mitigation

Archaeological mitigation has taken place in 38 of the 162 bogs owned by BNM (23.5 %) most of which are bogs currently in production (Table 5.1). Note: 90 of the 162 bogs are known to contain archaeology.

Table 5.1—BNM peatland production status and mitigation status. Mit. = mitigation.

Status	*Bog Nos*	Mit. Y	Mit. N	Mit. n/a	Mit. Unknown
Cutaway	*22*	5	7	4	6
Preserved	*17*	—	16	1	—
Production	*122*	33	44	16	29
Unknown	*1*	—	1	—	—
Total	162	38	68	21	35

5.2 BNM set-aside

The concept of *set-aside* proposes that following identification of significant archaeological deposits, a bog or area thereof may be removed from production. *Set-aside* may be classed as temporary (short-term) or permanent (long-term). *Temporary set-aside* is most commonly applied to areas where sites are exposed on the bog surface (BNM pers comm.) and therefore under immediate threat of destruction. There are currently no bogs or areas of bogs listed as *temporary set-aside* for archaeological reasons.

In contrast, nine bogs are listed as *permanent set-aside* for archaeological reasons (Table 5.2). This is based on the results of archaeological survey and in all cases with the possible exception of Curraghalassa, portions of the bog, rather than the entire bog is set aside. The actual area in hectares currently with this designation was not established. The number of archaeological sites located within these areas remains to be established.

In principle, within areas of *permanent set-aside* no further work, either peat extraction or archaeological mitigation is undertaken. In practice, the value of this approach as part of the process of mitigation is problematic. Of the nine bogs currently designated as *permanent set-aside*, archaeological sites within five bogs have been previously subject to targeted mitigation in advance of the designation being applied.

Table 5.2—BNM bogs designated as Permanent Set-aside for archaeological reasons.

Group	Bog	Status	Survey	Mitigation
Allen	Clonad	Production	Y	Y
Blackwater	Blackwater	Production	Y	N
Boora	West Drinagh	Production	Y	N
Boora	Leamonaghan	Production	Y	Y
Boora	Curraghalassa (Ballydaly)	Cutaway	Y	N
Derrygreenagh	Ballybeg	Production	Y	Y
Littleton	Killeens 1	Production	Y	Y
Mountdillon	Corlea	Production	Y	Y
Mountdillon	Derrarogue	Production	Y	Y

5.3 Preservation *in-situ*

Within BNM peatlands only one archaeological site, Ballybeg, Co. Offaly has been considered for active preservation *in situ*. The site extends over at least three production fields. The project methodology outlined in 2009 proposed to block the drains flanking and bisecting the site; erect a perimeter fence around the site and cover the archaeological deposits with terim. Low root vegetation would then be planted across the area. Monitoring of the water table and, by implication the site's preservation status would be reviewed annually (Whitaker and Rohan 2009). Sites in areas of *permanent set-aside*, such as Clonfinlough, may be considered 'passively' preserved *in situ* as they are no longer subject to peat extraction. However, potential deleterious impacts on the burial environment and archaeology arising from drainage, associated dewatering and the physical effects of vegetation growth on shallow archaeological remains should be considered.

5.4 Quantification of mitigation results

5.4.1 Excavations 1990–2009

Since 1990 a total of 351 excavations have taken place in BNM owned peatlands (Table 5.3). From 1990–1998 excavations were carried out by the IAWU. With one exception in 2000, all excavations since 1999 have been carried out by ADS.

Table 5.3—Excavations 1990–2011

Year	Excavations (n.)	Agent
1990–1998	15	IAWU
1999–2011	336	IAWU (1), ADS (335)

5.4.2 NMS-funded excavation 1990–1997

Table 5.4 lists per year the number of NMS-funded excavations undertaken in BNM bogs. These projects represent both rescue and/or test excavations.

Table 5.4—NMS-funded excavations 1990–1997

Year	Excavations (n.)
1990	1
1991	5
1992	4
1996	2
1997	1
TOTAL	**13**

5.4.3 BNM mitigation 1998–2011

A total of 260 archaeological licences covering 338 individual sites have been issued for mitigation in BNM peatlands since 1998: of the 3,951 sites included in the review dataset, 338 (9%) have been targeted for excavation. Table 5.5 lists the number of archaeological licences issued per year and the number of site types excavated. Differences between the two columns reflect instances whereby multiple sites were excavated under a single licence.

Two licences granted for archaeological monitoring work in BNM bogs have been excluded from the figures below.

Table 5.5—Number of archaeological licences and sites targeted per annum since 1998. Unless otherwise indicated ADS is the agent for these mitigation projects.

Year	Licences issued (n.)	Sites targeted (n.)
1998	2 (IAWU)	2
1999	18	20
2000	43 (inc. 1 IAWU)	50
2001	21	31
2002	24	38
2003	16	44
2004	14	15
2005	12	12
2006	19	23
2007	9	15
2008	18	24
2009	5	5
2010	40	40
2011	19	19
Total	**260**	**338**

5.4.4 Mitigation and site class

Table 5.6 details the range of site classes subject to mitigation. *Roads (Class 1, 2 and 3 Toghers)* and *platforms* represent the greatest proportion of sites targeted for excavation with these groups amounting to 70% of the total number (n=338). *Archaeological wood* and *Peatland-structure* account for 15% of sites targeted. The remaining 15% comprises finds, habitation sites, post rows, miscellaneous sites and those recorded as *classification ambiguous*.

Table 5.6 Number and % of site types subject to mitigation

Site type	Total identified (n.)	Targeted for mitigation (n.)	% of total no. Mitigated	% of total no. known
Archaeological Wood	1290	34	10%	3%
Complex	16	0	0%	0%
Find (inc. human remains)	100	6	2%	6%
Habitation site	7	2	1%	29%
Miscellaneous	41	5	1%	12%

Platform–peatland	56	82[1]	24%	146%
Post row–peatland	61	4	1%	7%
Road–Class 1 Togher	98	43	13%	44%
Road–Class 2 Togher	268	35	10%	13%
Road–Class 3 Togher	1109	79	23%	7%
Road–Gravel/stone trackway	21	4	1%	19%
Structure–peatland	774	18	5%	2%
Classification uncertain	110	26	8%	24%
Total	**3951**	**338**	**100%**	**9%**

5.5 Overall level of resolution

The level of resolution (LOR) undertaken during mitigation was calculated based on the length of a given site as a proportion of overall site length. This proved problematic for those in which the original classification appeared to conflict with the dimensions of a given site, e.g. sites designated as platforms and archaeological wood. In addition, a small percentage of sites were not excavated as they could not be re-located and were hence presumed destroyed.

[1] Due to reclassification of sites following excavation and during the course of this review, the figures expressed for platform sites are distorted. Following revised classification, 56 platforms were identified in survey but 82 have been subject to mitigation.

Figure 5.2—Level of resolution and the number of sites excavated

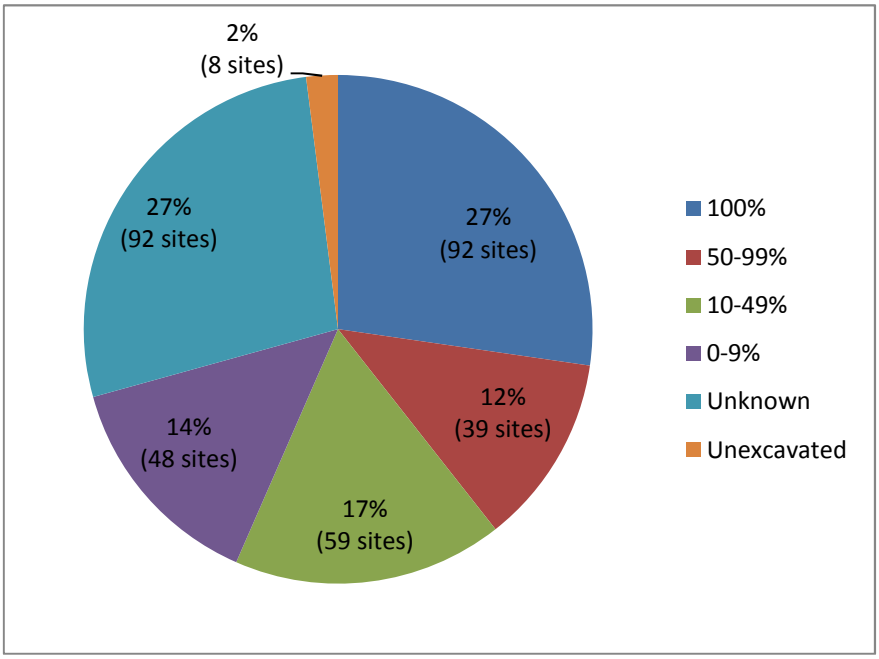


Figure 5.2 presents the percentage LOR of sites excavated. Sites subject to 100% resolution (i.e. full excavation) accounted for 27% the total. All other sites were subject to partial excavation with 12% of sites achieving resolution between 50% and 99%. Sites subject to less than 50% resolution account for c. 31% of the excavated sample. As stated above, the LOR of 27% of sites could not be established with an acceptable degree of certainty. A more detailed breakdown of the spread of the LOR across the mitigation population is presented in Table 5.7.

Table 5.7—Level of resolution and mitigated sites

Level of Resolution	Sites (n.)	Level of Resolution	Sites (n.)
9%	**5**	100%	**92**
8%	**5**	90-50%	**3**
7%	**6**	80-89%	**8**
6%	**6**	70-79%	**6**
5%	**5**	60-69%	**13**
4%	**6**	50-59%	**10**
3%	**3**	40-49%	**6**
2%	**6**	30-39%	**5**
1%	**5**	20-29%	**20**
0-0.9%	**1**	10-19%	**28**
Not established	*92*		
Unexcavated	*8*		

5.5.1 Level of resolution per site class

Table 5.8 shows the LOR of each excavated site class. Sites which have been omitted from the table include: those for which the LOR could not be established; sites that were not re-located in advance of excavation; and complexes of which no examples have been excavated. Smaller sites such as *Archaeological wood*, *Platforms*, *Road–Class 3 Toghers* and *Structure - peatland* typically achieve 50% LOR and/or above. Other site classes with a high or full LOR include finds and a number of small scale miscellaneous sites. To date, mitigation of *Road-Class 1 Toghers,* the longest class of linear structure, falls below 50% LOR with most attaining less than 10% resolution.

Table 5.8—Level of Resolution and site class. Note: abbreviated site class names.

Level of Resolution	Arch. Wood	Find	Habitation	Misc.	Platform	Post row
100%	12	4	—	5	31	1
50-99%	3	—	—	—	18	—
10-49%	—	—	—	—	3	—
1–9%	—	—	—	—	1	1
<1%	—	—	—	—	—	—

Level of Resolution	Road–Class 1	Road–Class 2	Road–Class 3	Road–gravel/stone	Structure–peatland	—
100%	—	—	25	—	14	—
50-99%	—	2	14	—	2	—
10-49%	11	19	23	—	2	—
<10%	28	12	1	4	—	—
<1%	1	—	—	—	—	—

5.6 Finds recovered during mitigation

A total of 91 finds have been produced from archaeological excavations carried out on behalf of both the NMS and BNM (Table 5.3). A total of 27 of these were found on excavations conducted between 1990 and 1998. Since the commencement of mitigation, 64 individual artefacts have been recovered during excavation, the majority of which (56) represent a lithic assemblage from Ballybeg, Co. Offaly. The remaining eight finds were recovered from multiple sites. All artefacts recovered at Clonfinlough have been recorded, conserved and transferred to the NMI. Artefacts recovered during mitigation 1999-2000 have also been conserved but available reports did not include information on the conservation status of finds retrieved after this date.

Table 5.9—Mitigation and finds

Source	No. of finds
Excavations 1990-1998	27
Mitigation 1998-2009	64
TOTAL	**91**

5.7 Sampling: Excavation and Mitigation

Detailed sample information relating to excavations carried out from 1990–1998 has not been assessed although sampling programmes were limited and small-scale, and reflected the scale of the excavations which were exploratory or rescue in nature. Available excavation reports indicate that samples were taken for scientific dating (radiocarbon and dendrochronology), wood studies and coleopteran analysis. Limited sampling of worked wood was also undertaken with the exception of excavations related to Corlea 1, Co. Longford (Raftery 1996) and Clonfinlough, Co. Offaly (Moloney *et al*. 1993, 55–60).

The quantification of samples derived from excavations from 1999–2011 is also limited. Method statements from the period state that sampling of sites was undertaken 'where appropriate'. Excavation reports demonstrate sample categories in mitigation and survey are similar but with some significant additions, namely tephrochronology and pollen analysis. Sampling in relation to dating and palaeoenvironmental analyses on mitigation projects is discussed further in Chapter 6.

Wood studies

Quantification of sample analysis relating to early NMS-funded excavations (1990–1998) has not been undertaken, although the majority of wood studies from this period relate to survey rather than excavation (see Chapter 4). Available data for wood studies arising from later mitigation is detailed in Table 5.10. Samples taken for wood studies may contain multiple pieces of wood; hence the distinction made between the number of samples and the number of pieces. The figures may under-represent the actual amount of samples and pieces of wood taken and analysed.

Table 5.10 Estimate of wood samples retrieved and analysed

Year	Samples (n.)	Pieces (n.)	Analysed (n.)
1999-2000	Unknown	Unknown	637
2001-2002	Unknown	Unknown	300
2003-2007	Unknown	Unknown	Unknown
2007	28	c. 248	292
2008	44	c. 758	638
TOTAL	**72**	**1006**	**1867**

Wood technology

With the exception of Clonfinlough (1990) and Corlea 1 (1991) no significant wood technological studies were carried out on material recovered from excavations conducted between from 1990–1998. Available data for studies from 1998–2008 are summarised below (Table 5.11) in which the total number of samples taken and analysed has been estimated.

Table 5.11 Wood technology samples and analysis from excavations

Year	Sample (n.)	Analysed (n.)
1999-2000	Unknown	330
2001-2002	Unknown	200
2003-6	Unknown	Unknown
2007	80	0
2008	72	104
TOTAL	**152**	**634**

Palaeoenvironmental studies: coleoptera, plant macrofossil, palynological and other analyses

Limited coleopteran analysis was carried out on material from excavations undertaken between 1996 and 1998 with further studies completed on excavations conducted in 1999-2000, 2007 and 2008. Additional work undertaken in association with excavations in 2007 and 2008 has examined plant macrofossil remains, pollen and peat stratigraphy, peat humification and loss of ignition determinations. This work has been delivered by a variety of personnel including academic archaeologists, independent specialists and postgraduate students studying for higher degrees (including Master's and Doctoral dissertations) at Royal Holloway, University of London and the University of Reading. Work carried out under the provision of INSTAR funding has focussed on six bogs: Kinnegad, Gilltown and Lullymore

East, Ballykean, Littleton and Ballybeg Bogs. This has expanded on earlier studies to include tephrochronology and formal (Bayesian) modelling of archaeological chronologies. The results of this work have not yet been reported on in full with available reports effectively in the form of overview summaries, which somewhat restricts the ability of the review to comment on any detail on the broader contribution of this work. The review sought additional external advice on technical aspects of the palaeoenvironmental work and submitted reports for specialist review.

CHAPTER 6

SCIENTIFIC DATING and PALAEOENVIRONMENTAL ANALYSES

6.1 Chronology and Quantification

6.1.1 Overall dating results

Based on the available data there are 424 scientific dating determinations resulting from archaeological work in BNM peatlands. Seventy-five of these derive from excavation and mitigation, and 305 were obtained following survey. A total of 44 dates, inclusive of four failed determinations, have been omitted from analyses other than the overall sample count presented in Table 6.1. The concerns with these 44 dates are discussed in Chapter 9. All dendrochronological dates were analysed by the Chrono Centre, Queens University Belfast. Radiocarbon determinations were obtained from various commercial laboratories including Beta Analytic, Miami, Florida; Centre for Isotope Research (University of Groningen), Chrono Centre, QUB; University College Dublin Radiocarbon Laboratory and University of Waikato Radiocarbon Dating Laboratory.

Note: Twenty-three sites targeted for excavation were not subject to dating; this includes those that could not be located and were presumed destroyed as well as sites for which scientific dating was not considered appropriate. The dating status of 131 sites subject to mitigation from 1999–2007 could not be ascertained. It is unknown if these sites were subject to scientific dating as the information was not present in the available project records.

Table 6.1—Overview of dating samples submitted following survey and excavation

Source	Dates (n.)
Excavation	75
Survey	305
Ambiguous data	44
Total	**424**

Scientific Dating: Survey

Peatland surveys conducted by the IAWU (1990–2003) and by ADS (2003–2009) have generated an almost equivalent number of dates (Table 6.2). Survey-derived dates can be distinguished further by type: 29% (n=89) are dendrochronological with 71% (n=216) representing radiocarbon determinations.

Table 6.2—Breakdown of dates by type and project period

	Survey 1990-2003	**Survey 2003-2009**	**Totals (n.)**	**% of Total (n. 313)**
Dendrochronology	78	11	89	**29 %**
Radiocarbon	76	140	216	**71 %**
	154	151	**305**	**100 %**

Dating: Excavation and mitigation

Excavations conducted between 1990 and 1997 produced 29% (n=14) of dates. Mitigation has resulted in the production of 71% (n=61) new dating determinations. Radiocarbon assays outnumber dendrochronological dates by more than 2:1.

Table 6.3—Overview of dating samples submitted following excavation

	Excavation 1990-1997 (n.)	**Mitigation 1998-2009 (n.)**	**Totals (n.)**	**% of Total (n. 75)**
Dendrochronology	11	11	22	**29%**
Radiocarbon	1	52	53	**71%**
	12	63	**75**	**100%**

Correlating dating determinations to sites

The 380 dates represented in the review analysis equate to 349 archaeological sites (Table 6.4), indicating that c. 9% of the total sites identified within BNM peatlands have been subject to scientific dating over the past two decades. Of the 349 dated sites, 20 have had multiple dates, ranging from 2 to 5 determinations. Two of these sites have five, one site has four, a further six sites have three and the majority (n=11) have two determinations. Hence

the majority of sites have single scientific dates, including most linear sites i.e. Roads (Classes 1-3 Togher and Stone/gravel trackways) subject to mitigation.

Table 6.4—The number of dated archaeological sites in BNM peatlands

Project Type	Dates	No. of sites
Survey	305	287
Excavation and Mitigation	75	62
Total	**380**	**349**

6.1.2 Chronological analysis

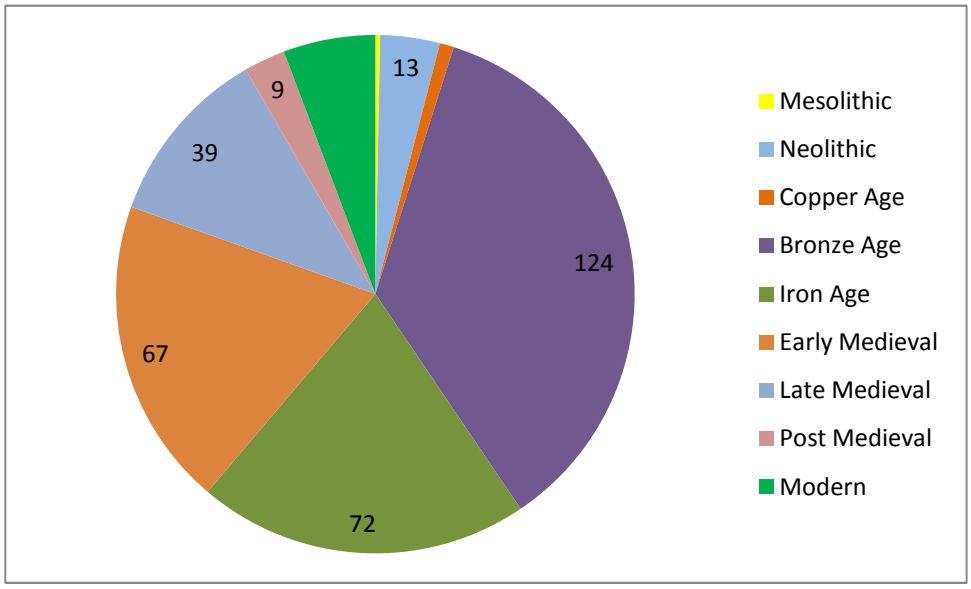
Analysis of the review dating dataset commenced by distinguishing each dated site by period based on the timeline presented in Table 6.5. Eight broad chronological periods can be distinguished. The majority of dated sites are prehistoric: only one site has been dated to the Mesolithic with c. 4% dating to the Neolithic and the greatest proportion of prehistoric sites assigned to the Bronze Age (35%). There is an almost equivalent number of Iron Age and early medieval sites represented with each at c. 20%. Later historic sites account for 15% of (late medieval c. 12%, post-medieval c. 3%) and just below 6% of determinations produced determinations demonstrating that the samples were modern in origin with most indicating wood living within the last 50 years.

Table 6.5 Chronological Timeline

Mesolithic	8000–4000 BC	Iron Age	700 BC–AD 400
Neolithic	4000–2400 BC	Early medieval	AD 400–1169
Copper Age	2400–2200 BC	Late medieval	AD 1169–1540
Bronze Age	2200–700 BC	Post medieval	AD 1540 –1700

Figure 6.1–Dated sites (n.) distinguished by period.

Periods with less than 10 sites have not been numbered in the chart.



6.1.3 Scientific dating results by site type

Although 349 sites were subject to scientific dating, issues concerning site classification (Section 9.3.1) means this number has been reduced due to omission of certain sites. Chronological analysis of individual site classes is therefore based on a total of 315 sites, with analyses concentrating on 8 site classes, i.e. the most commonly encountered site types within BNM peatlands.

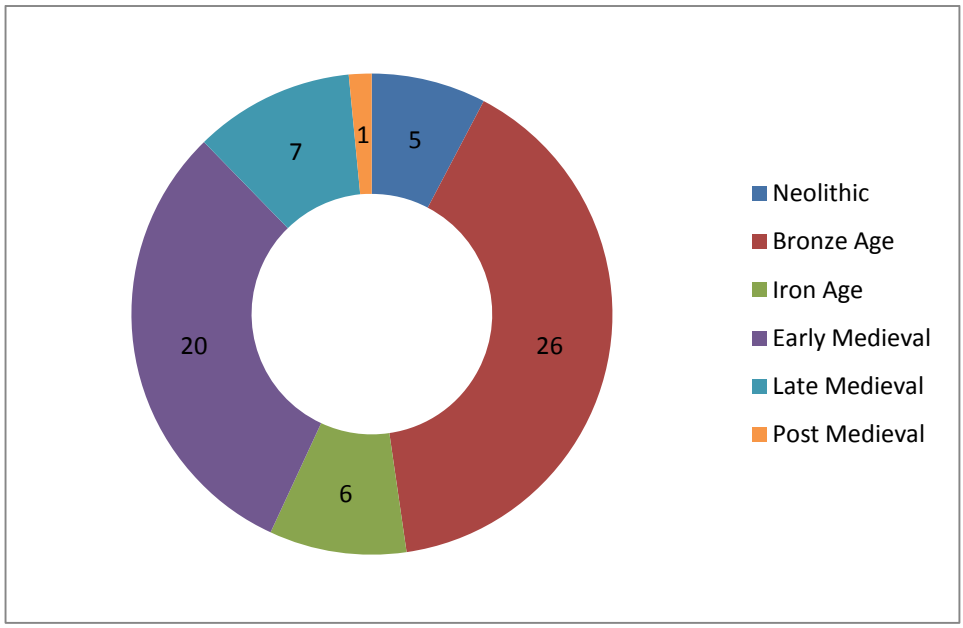
Table 6.6—Peatland site classes subject to chronological analysis

Archaeological wood	Road–Class 2 Togher
Platform	Road–Class 3 Togher
Post row	Structure–peatland
Road–Class 1 Togher (incl. Road-gravel/stone trackway)	

Road–Class 1 Toghers

Sixty-six Road–Class 1 Toghers and Road-gravel/stone trackways have been dated via 88 individual determinations; this includes 12 sites with between two and five dates per site. There is an equal amount of Bronze Age and medieval examples of these sites (Figure 6.2). Similarly, Neolithic and Iron Age dated sites are almost equally represented.

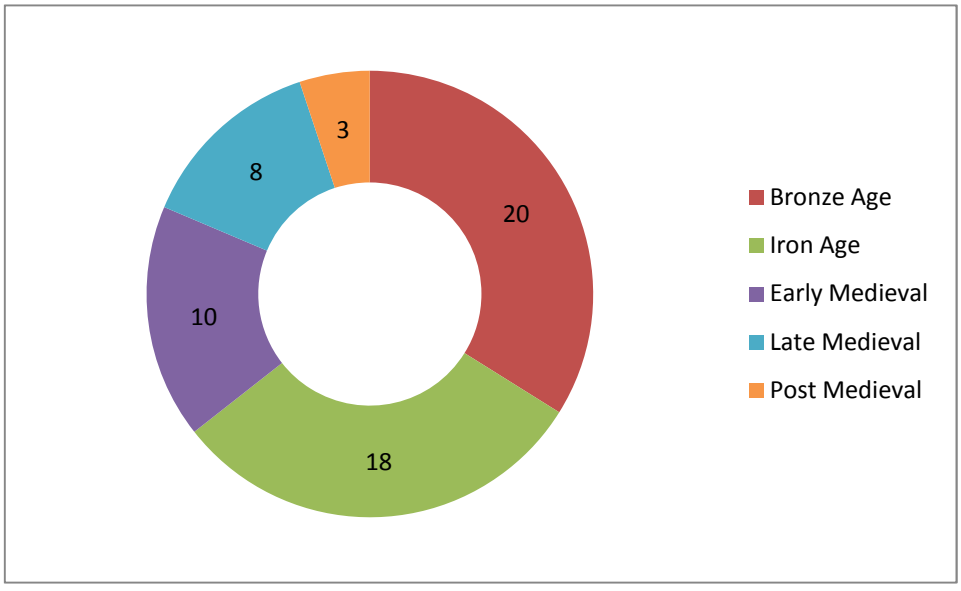
Figure 6.2–Chronological range of Road–Class 1 Toghers



Road–Class 2 Toghers

Fifty-nine Road–Class 2 Toghers have been dated (Figure 6.3); two sites were dated twice meaning that the number of returned dates for this site class is 61. In common with the larger Class 1 trackways, most Road–Class 2 Toghers are either Bronze Age or medieval.

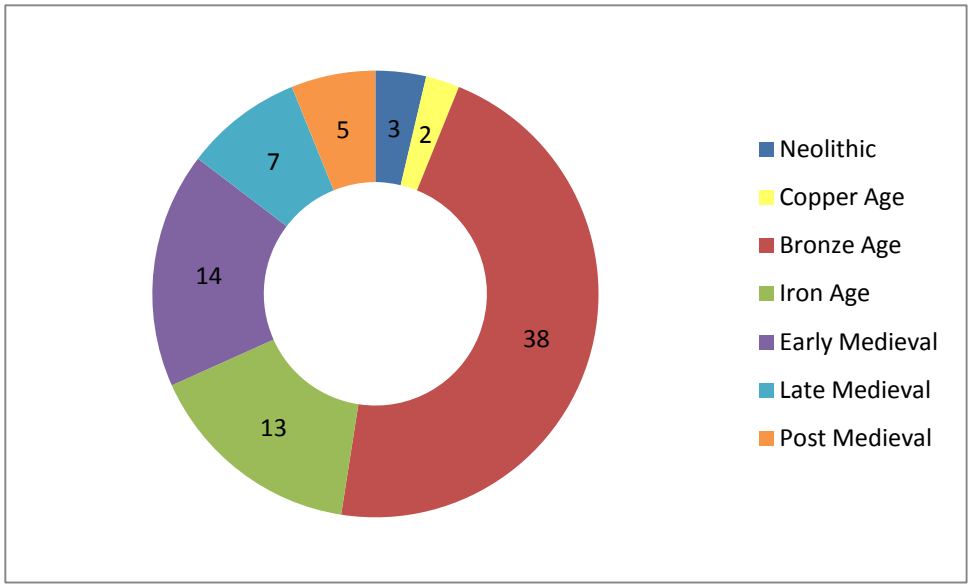
Figure 6.3–Chronological range of Road–Class 2 Toghers



Road–Class 3 Toghers

Eighty-two Road–Class 3 Toghers have been dated with one site having two determinations, meaning that there are a total of 83 dates for this site class. Bronze Age and Iron Age sites comprise more than half of the dated examples with the early medieval period next best represented (Figure 6.4).

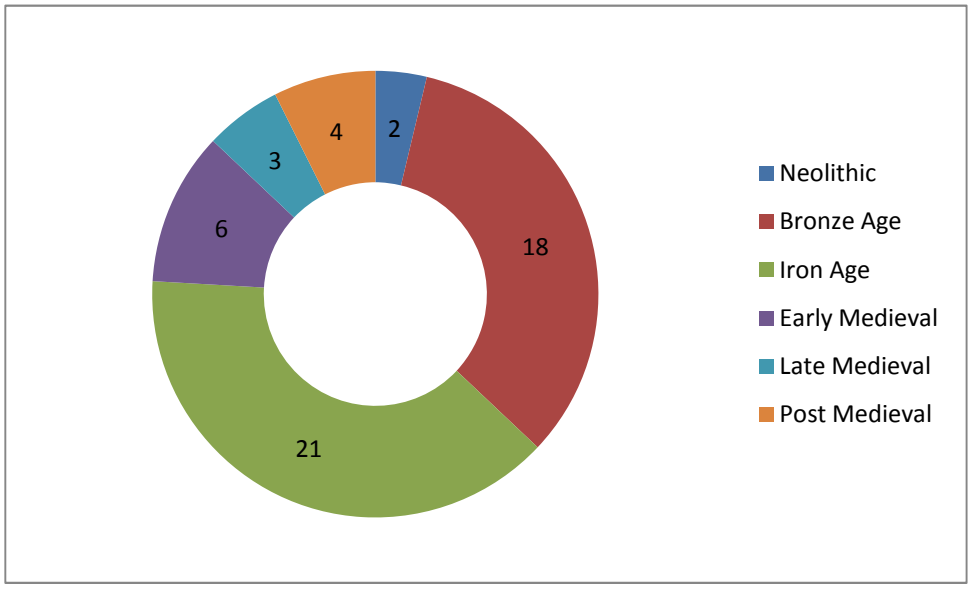
Figure 6.4–Chronological range of Road–Class 3 Toghers



Platforms

Fifty-six sites classified as platforms have been dated; one site has three determinations and thus there are a total of 56 dates for this site type. Most platforms are prehistoric in date with the sites distributed almost evenly between the Bronze Age and the Iron Age (Figure 6.5).

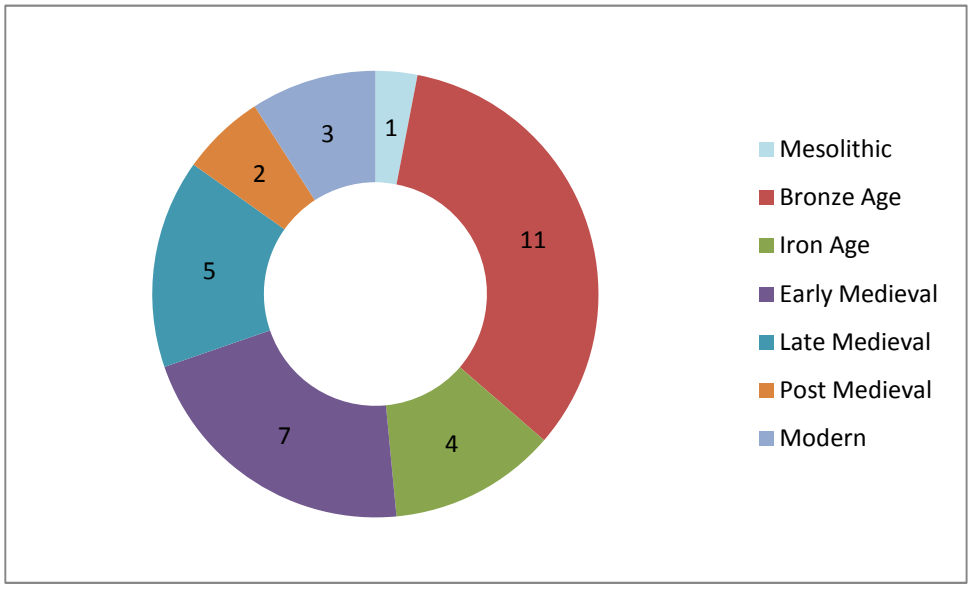
Figure 6.5–Chronological range of Platforms



Structure–peatland

Thirty-three sites classified as Structure-peatland have been dated, a figure that includes two sites excavated together and classified in mitigation as 'Structure peatland and platform'. Bronze Age and medieval dated examples comprise the majority of this category (Figure 6.6).

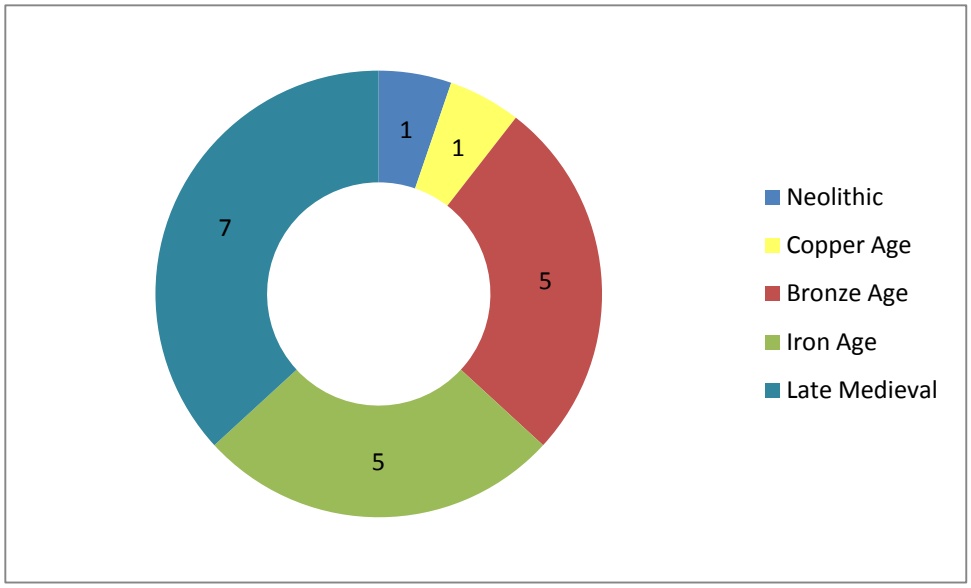
Figure 6.6–Chronological range of Structure–peatland



Archaeological Wood

Nineteen sites classified as archaeological wood have been subject to a single determination. Almost half of this class are late medieval with the other half mainly Bronze Age or Iron Age (Figure 6.7), with a single Neolithic and one Copper Age site also represented.

Figure 6.7–Chronological range of archaeological wood sites



Post Rows

Of the three post rows subject to dating, two returned Bronze Age dates and the third was medieval.

6.1.4 Dating methodology per site type

Road-Class 1 Toghers are the only site type for which dendrochronological dating is more common than radiocarbon dating. This presumbaly reflects the use of longer lived oak timbers suitable for dendrochronology within these structures. Radiocarbon dates account for 60% to 100% of all determinations for other site types.

Table 6.7 Dating method per site type

Site type	14C (n.)	DENDRO (n.)
Road–Class 1 toghers (incl. gravel/stone roads)	35	53
Road – Class 2 toghers	41	20
Road – Class 3 toghers	65	18
Platform	54	2
Structure - peatland	21	12
Archaeological wood	18	1
Post row	3	0

6.1.5 Comparison: dating of excavated sites vs. the number of known sites

The number of each site class subject to dating has been compared with the overall number of identified sites, enabling analysis of the overall % of each excavated site type and the % which has been subject to scientific dating (Table 6.7). In general 1% or less of the known number of each site class has been subject to scientific dating. The exceptions are Road-Class1 Togher including Road-gravel/stone trackway and Road-Class 3 Togher.

Table 6.7 Site types subject to dating

Site type	% of excavated sites (n. 338)	% of known sites (n. 3951)
Archaeological Wood	5%	<1%
Complex	<1%	<1%
Find (inc. human remains)	<1%	<1%
Habitation site	<1%	<1%
Miscellaneous	<1%	<1%
Platform - peatland	16%	1%
Post row - peatland	<1%	<1%
Road–Class 1 Togher (incl. gravel/stone road)	19%	2%
Road–Class 2 Togher	17%	1%
Road–Class 3 Togher	24%	2%
Structure - peatland	9.8%	<1%
Classification uncertain	7.7%	<1%
Totals	**100%**	**9%**

CHAPTER 7

REPORTING AND DISSEMINATION

7.1 Reporting

In line with the fulfilment of conditions of an archaeological excavation licence, reporting occurs in two stages, each of which represents a legal obligation on behalf of the license holder. In principal, preliminary reports should be submitted within one month of the end of the excavation or field season. Final reports should be submitted within 12 months of this date although it is possible to negotiate extensions with regard to submission with the NMS.

7.2 Quantification

7.2.1 Mitigation

The status of available excavation reports was reviewed in terms of the number of licenses and individual sites represented and the year of report submission. The analysis is based on information extracted from the reports made available to the review by NMS and BNM. In addition, ADS supplied a full list of reports submitted to NMS in relation to BNM peatland archaeological survey and mitigation. The report counts and categories tally well with the figures arrived at by the review but a margin of error of ±2 is advised.

Since 1998, when BNM's mitigation programme commenced, a total of 260 licences have been issued for the purposes of excavation within BNM peatlands. Two licensed excavations were conducted by the IAWU but the vast majority of excavations have been undertaken by ADS. The 260 archaeological excavation licences issued represent c. 338 individual sites targeted for mitigation from 1998 to 2011. **Note:** This section of the review concerns reporting related to mitigation carried out from 1998 to 2010 inclusive, those works conducted in 2011 are not included. From 1998 to 2010, 241 licences representing 319 sites have been issued and these figures (±2) form the basis for the analysis presented below (Table 7.1 and Figures 7.1-7.2).

Table 7.1—Report status

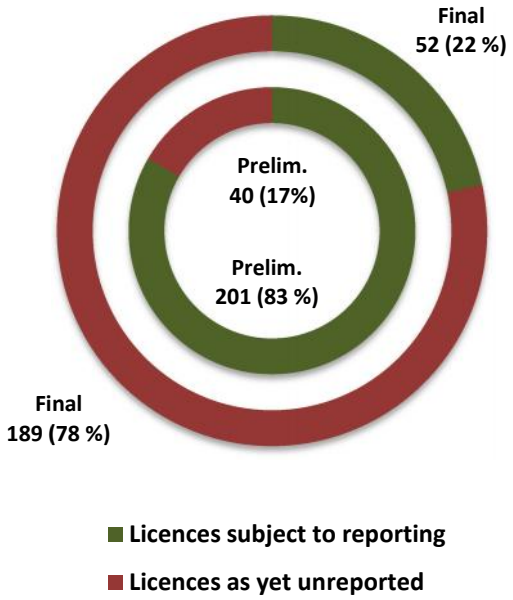
	Licences subject to reporting	Licences as yet unreported	Total
Prelim. reports	201 (83%)	40 (17%)	241 (100%)
Final reports	52 (22%)	189 (78%)	241 (100%)

	Sites subject to reporting	Sites as yet unreported	Total
Prelim. reports	279 (87%)	40 (13%)	319 (100%)
Final reports	65 (20%)	254 (80%)	319 (100%)

Report status by licence

To date, 82 preliminary excavation reports have been submitted which represent 83% (n= 201) of the total licences issued (Figure 7.1) and pertain to mitigation conducted from 1998 to 2009 inclusive. Preliminary reports have yet to be submitted for mitigation undertaken in 2010. A total of 6 final excavation reports have been submitted which represent 22% of all excavation licences issued (Figure 7.1) and pertain to mitigation conducted between 2001 and 2008 inclusive. The majority of excavation licenses (78%) have yet to be subject to final reporting.

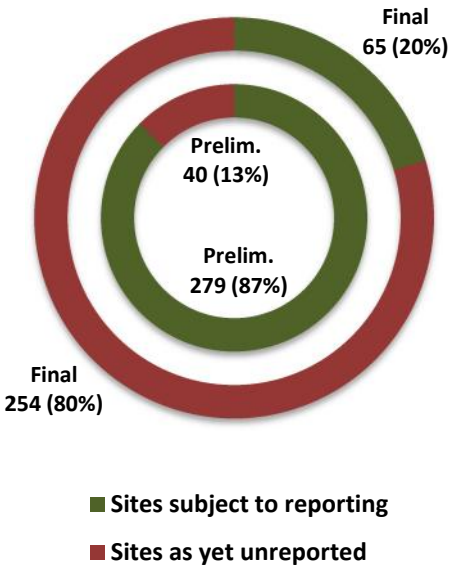
Figure 7.1—Preliminary and final report status by licence



Report status by site

The number of sites represented by the reports submitted to date has also been estimated (Figure 7.2). Preliminary reports have been submitted for all sites with the exception of excavations undertaken in 2010. Final reports are outstanding for 80% of sites subject to excavation between 1998 and 2010 inclusive.

Figure 7.2—Preliminary and final report status by site



Rate of report submission

Preliminary reports have typically been submitted within 4-6 months of fieldwork completion (Table 7.3). The exception is the 2010 fieldwork season for which preliminary reports are outstanding. The rate of submission of final reports by license is currently 22% with the timing of submission ranging between 0.5-3 years from the completion of fieldwork. For example, some excavations conducted in 2001 in the Mountdillon Group were subject to final reporting in 2004. In contrast, an investigation related to the discovery of human remains in 2003 (Licence no. 03E1221) was reported on in the same year. Lastly, excavations conducted in 2007 and 2008 were subject to final reporting in 2009 and 2010. **Note**: The review team was informed that all outstanding final reports pertaining to BNM mitigation would be submitted within 12-18 months of September 2011.

Table 7.3—Excavation reporting status by year

Fieldwork Year	Submission Year (Prelim.)	Submission Year (Final)
1999	1999	All reports outstanding
2000	2000 and 2001	All reports outstanding
2001	2001	2004
2002	2003	2004
2003	2003	2003
2004	2004	All reports outstanding
2005	2005 and 2006	All reports outstanding
2006	2007	All reports outstanding
2007	2008	2009
2008	2008	2010
2009	2009 and 2010	All reports outstanding
2010	All reports outstanding	All reports outstanding

7.2.2 Survey

Licensing and survey

Peatland surveys have been conducted under annual licence since 2001. Prior to this, surveys were not licensed as they were not envisaged as having any scope for archaeological excavation. There have been 19 annual surveys completed to date incorporating 85 licensed surveys with 11 surveys undertaken in the pre-licensing period. Individual bogs are typically assigned separate licence numbers, although there have been instances where a single licence incorporates two or more bogs.

Structure of survey reporting

Reporting of survey results has been subject to a variety of approaches. Typically, results are presented in catalogue form, although the format of the catalogue and the level of information included have varied overtime. Digital data files, namely spreadsheet data, are also submitted to the ASI. With the introduction of licensed surveys, reporting structure and format expanded to meet licensing requirements.

Survey results 1991 and 1992

- Digital data files submitted to the ASI/NMS.
- Formal catalogues published in Transactions of the IAWU 1 and 4.

- These data and catalogues equate to final reporting.

Survey 1993 and 1998

- Digital data files submitted to the ASI/NMS.
- Individual site catalogues submitted digitally in ENTITY/SMR number format submitted in two forms: *Long-form*—extended site descriptions, artefact/sampling notes etc. where relevant; *Short form*—standardised shorter descriptions prepared to ASI conventions.

Additional information was provided in the form of "Bog Threat Assessments". These included descriptions of the extent and character of the bogs, access, history of peat extraction, assessment of the archaeological potential and threats, summary of archaeological survey results and accompanying annotated mapping. These data and catalogues equate to final reporting.

Surveys 1999 to 2009

- Digital data files submitted to the ASI/NMS.
- Survey reports for this period typically cover a single annual field season with one exception; survey results for 2007 and 2008 were combined into a single report.

The structure of reporting between survey agents differs during this period. Typically, the IAWU produced both preliminary and final reports for each field season. The exception was the 2000 field season which was subject only to a preliminary report. Preliminary reports were produced as single reports for each licensed survey or as a combined report in which all surveys licensed in a given season were combined. These were comprehensive reports produced to allow survey results to be assessed in terms of mitigation and inclusion in the RMP as soon as possible.

Final reports, named "Supplementary Survey Reports" represent the combined and full survey results of all licensed surveys completed in a given field season. Additional information included full mapping (typically as inserts); the results of dating and specialist

analyses; site and artefact illustrations (plates and figures); and integrated discussions of survey results are provided.

In general, surveys conducted by ADS are subject to reporting by means of a final report in which the licensed surveys undertaken in a given year are combined into a single volume. There are some instances where preliminary reports have been produced (Table 7.5). Four short reports providing summary results of individually licensed surveys undertaken in 2005 were produced. The fifth submission refers to a draft report of the Blackwater Re-assessment Survey 2009. The remaining two preliminary submissions represent reports related to re-assessment surveys conducted in BNM bogs.

Survey reports quantified

To date, *all* surveys conducted in BNM peatlands have been subject to reporting in one form or another. This has resulted in the production of 39 reports with the definition of report including: digital data, site catalogues and integrated reports more typical of surveys from 2000.

Table 7.5—Survey reports quantified

	Prelim	**Final**
IAWU 1991-2003	11	15
ADS 1999-2009	7	6
TOTAL	18	21

Submission of survey reports

The timing of survey report submission varies across time and between agents. Up to 1998 the emphasis was on the submission of digital data to the ASI/NMS. Final reporting on surveys conducted after 1993 took place in 2000/2001. Similarly, data arising from the 1999 Re-assessment survey was submitted in 2009. The production of fully integrated survey reports recommenced in 2000 and most submissions appear to have occurred within 6-12 months of a given field season. The exceptions are surveys conducted in 2007 and 2008 that were reported on jointly in 2009.

Table 7.6—Survey report status per annum

Fieldwork Year	Submission Year (Prelim.)	Submission Year (Final)
1991	1993	1993 (Published)
1992	1993	1993 (Published)
1993-94	—	2000/1
1995	—	1995
1996-97	Draft catalogue on select bogs submitted in 2000	2000/1
1998	1998	1998
1999	2009	—
2000	2000	—
2001	2002	2002
2002	2002 and 2003	2003
2003	2003	2004
2004	—	2004
2005	2005	2006
2006	—	2007
2007	—	2009
2008	—	2009
2009	—	2009

7.3 Other outputs

7.3.1 Presentations

The review considered presentations as one measure of dissemination/outreach. Presentations were made by three agencies:

- IAWU 1990-2005 and 2006-2010: presentations by former staff members utilizing IAWU data;
- ADS;
- INSTAR in which ADS are project partners.

Presentations were grouped into three categories (Appendix 4):

- Conferences: national, international and seminars, typically heritage and/or academic sectors;

- Workshops: information events for BNM personnel;
- Outreach: e.g. archaeological and historical societies; heritage-related field excursions and University teaching (Note: individual courses provided by staff of the IAWU based on survey data are included as single items)

The data was analysed on a per annum basis (summarized in Tables 7.7 and 7.8). The numbers of presentations relates to individual contributions and includes multiple presentations made at the same event.

Table 7.7—Presentations by the IAWU (1990-2005) and former IAWU staff 2006-2010

YEAR	Conferences	Workshops	Outreach
1990-2005	20	3	19
2006-2010	6	0	3
TOTAL	**26**	**3**	**22**

Note: The overall figures for the IAWU are under-estimated as the figure pertaining to Outreach is incomplete for the period 1990-1994. ADS overall figures are similarly under-estimated as the number of workshops conducted by ADS with BNM personnel was not established.

During the period 1990-2010, IAWU presentations at conference exceeded one per yr (c. 1.3 p/a). A higher rate of conference presentation is indicated for ADS with c. 2 (1.8) per annum. This includes two one-day seminars hosted by ADS in 2005 and 2009 which account for 14 of 22 presentations. Outreach presentations were made at just over one per annum by the IAWU and c. 0.5 per annum by ADS. The acquisition of INSTAR funding has had a positive impact on dissemination: eleven conference presentations were made in the three years from 2008 to 2010 inclusive, i.e. 3.5 INSTAR presentations per annum.

Table 7.8—ADS and INSTAR presentations 1999-2010

	YEAR	Conferences	Workshops	Outreach
ADS	1999-2010	22	No data	6
INSTAR	2008-2010	10	No data	0
	TOTAL	**28**	**0**	**6**

7.3.2 Publication

The review considered publication as a key measure of dissemination. Publications are listed below by format and decade (see also Appendix 5).

Table 7.9—Publications: peatland archaeological projects in BNM bogs 1990-2010

	IAWU	ADS	INSTAR	OTHER
BOOKS	4	2	0	1
CHAPTERS IN BOOKS	9	0	0	1
CONFERENCE PROCEEDINGS	9	2	1	0
IN-HOUSE (Scéal na Mona)	3	6	0	0
JOURNAL (PEER-REVIEW)	8	0	0	0
PERIODICAL	8	5	0	0
OTHER (e.g. Booklet, guides, newsletters)	9	1	0	0
	50	**16**	**1**	**2**

Table 7.10—Publications per decade

	IAWU	ADS	INSTAR
1990-1999	26	4	--
2000-2005	18	4	--
2006-2010	6	8	1
	50	**16**	**1**

These figures represent a gross output. Of note is the production by the IAWU of Transactions Vols. 1–4 within a six year period, the desktop publishing for which was carried out in house. The significance and wider impact of all the publications quantified above will be discussed further in Chapter 9.

7.3.3 Web presence

The following websites have been identified by the review as providing a web presence for the various agencies involved in BNM peatland archaeology. The review does not have the relevant data regarding the frequency with which this material is accessed. In general, the web sites provide short, summary descriptions of the archaeological resource, individual project results and related research and the role various agencies play in identifying and developing this resource. There are some exceptions where greater individual site and project details is available, namely the website of the NMS (http://www.archaeology.ie/) in which details of many BNM peatland sites included in the SMR/RMP are currently available. In addition, summary results of licensed (and unlicensed) surveys and excavations undertaken within BNM bogs up to and including 2008 are available online (http://www.excavations.ie/). Currently, there is no website or detailed web pages dedicated to peatland archaeology within BNM bogs.

http://www.archaeology.ie/

http://www.excavations.ie/

http://www.museum.ie (Kingship and Sacrifice)

http://www.bordnamona.ie/

http://www.bordnamona.ie/community/history-heritage/

http://www.heartland.ie/

http://www.adsireland.ie/

http://www.charles-mount.com/info.asp?id=50

CHAPTER 8

STAKEHOLDER CONSULTATION

8.1 Consultation Results:

8.1.1 Stakeholder consultation:

Stakeholder consultation took multiple forms: interviews; email and telephone consults and via anonymous and confidential online survey. All stakeholders consulted are listed in Table 8.1. Notes were made of all meetings and interviews. Stakeholder comments have been incorporated into the body of this report with a selection of direct anonymous quotes taken from the online survey and interviews highlighted in text boxes.

Table 8.1 Stakeholders consulted during the course of the review

Organisation and Name	Date of Interviews
National Monuments Service, Dept. Arts, Heritage and the Gaelteacht.	
Ms Margaret Keane	17/01/2011, 26/07/2011, 27/10/2011
Mr Sean Kirwan	17/01/2011, 27/10/2011
Dr Ann Lynch	11/10/2011
Mr Paul Walsh, Archaeological Survey of Ireland	23/05/2011
National Museum of Ireland	
Mr Eamon Kelly, Keeper of Irish Antiquities	29/06/2011
Mr Padraig Clancy	
Bord na Móna	
Mr Charles Shire	19/07/2011
Mr Enda McDonagh	
Dr Charles Mount, Project Archaeologist	
ADS Ltd	
Mr Eoin Halpin, Company Director	02/09/2011
Ms Jane Whitaker, Operations Manager	
School of Archaeology, University College Dublin	
Dr Aidan O'Sullivan, Senior Lecturer	07/09/2011
Dr Steve Davis, Lecturer	
Mr Conor McDermott, Laboratory and Field Officer, (Former Director IAWU)	

National Road Authority Mr Michael Stanley, Archaeologist (Former IAWU Archaeologist)	07/09/2011
Dept. of Forestry Mr Emmet Byrnes, Archaeologist	via email Nov. 2011 and email response to questionnaire
The Heritage Council Mr Ian Doyle, Conservation Officer	via email Nov. 2011 and email response to questionnaire
Individuals	
Ms Ellen O'Carroll, PhD Candidate, TCD. (Former Project Director, ADS Ltd and Archaeologist, IAWU)	27/10/2011
Mr Noel Dunne, NRA Archaeologist. (Former Excavation and Survey Director, ADS Ltd)	16/09/2011
Mr Sinclair Turrell Independent Archaeologist (Former Peatland Excavation Director, ADS Ltd)	09/11/2011
IAI Mailing List, Membership of the IAI (Surveymonkey)	Nov. 2011
UK	
University of Reading	
Dr Nick Branch, Senior Lecturer, QUEST Director	13/10/2011
Dan Young, QUEST	13/10/2011
Queens University Belfast	
Dr Gillian Plunkett, Lecturer Queen's University Belfast (former IAWU Archaeologist)	via email Nov. 2011

Interview results are presented and summarised below in an essentially qualitative manner. The most significant points and issues arising have been grouped by theme. The number of stakeholders who explicitly referenced a particular issue is indicated. Seven broad/major themes can be identified from the analysis of these stakeholder contributions which are presented in no particular order below. All stakeholders expressed a welcome for the review and acknowledged the significant scope and volume of work that has been undertaken and produced over the last 20 years. However all identified problems with the processes currently in place and with outputs of the work.

8.1.2 Frameworks and objectives

It was commented (n=4) that much of the work on BNM peatlands over the last 20 or so years has effectively been carried out without a clear, over-arching national research framework for Irish peatland archaeology. This lack of specific aims and objectives means

that it is difficult to assess the success of much of the work. One result of this is that subsequent work has progressed on an essentially re-active basis. Associated with this was an acknowledged need (n=5) for greater consideration of multi-disciplinary and multi-agency approaches, in particular through a firmly embedded palaeo-environmental programme.

8.1.3 Comparative standards

The scope of the work carried out on BNM peatlands is sometimes regarded as out of line with that carried out by other public bodies (e.g. the NRA) and also with that of the planning process more generally. In addition, the apparent absence of policy with regard to private peat extraction and/or private large scale turbary that may impact on the archaeological resource was also raised.

> **Stakeholder comment:**
> *I think the problem is that BnM peatlands are seen as being a completely separate resource in terms of the archaeology of Ireland, being that very little 'other' development ever takes place in or around non-BnM bogs*.

> **Stakeholder comment:**
> *I also feel it worth noting the special treatment afforded to Bord na Móna with regard to the archaeological heritage. I do not know of any other organisation that is allowed to knowingly destroy significant archaeological remains having only excavated a very small percentage.*

The apparent lack of consistent standards and procedures between certain aspects of BNM peatland archaeological work and those pertaining to other areas of professional archaeological practice in Ireland was identified by several stakeholders (n=5) as an area of concern. Specific examples included:

- Limited resourcing of excavations compared with mitigation projects conducted in other environments, particularly of major discoveries of international importance (e.g. Ballykean, Co. Offaly).
- Differences in the treatment of burial sites, i.e. Peatland locations where human remains have been discovered are not classed as burial sites. Instead they are treated as the locations of isolated artefacts rather than places which may have been the focus for repeated forms of ritual deposition, including burial, over time. In other archaeological contexts disturbance of known burial sites as a result of development is subject to the provisions of the National Monuments Acts.
- The submission of joint reports for multiple licences stands in contrast to the approach taken for comparable archaeological projects such as NRA schemes where separate reports are required for each individual licence.
- Lack of clarity around the status of bogs subject to survey once, particularly those in which archaeological sites were not identified and those bogs withdrawn from production but which may be subject to other forms of development. Concerns expressed that one-time survey is being interpreted by some parties as meaning that the archaeological record of a given bog has been fully and finally resolved.

8.1.4 Broader profile

It was commented (n=5) that there is a lack of professional awareness of the archaeology of BNM peatlands. Certain stakeholders suggested this was in part a failure by multiple agencies to actively promote the resource. Most recently this failure to widely communicate the archaeological value of BNM peatlands is demonstrated by the apparent absence and/or limited consideration of peatland archaeology within two major public consultation processes. Notably, the UCD Boglands STRIVE Report (Renou-Wilson *et al*. 2010) and the recently published *National Peatlands Strategy* (Department of Arts, Heritage and the Gaeltacht 2011).

The STRIVE report sought to reveal the global significance of Irish peatlands and the problems of their management, utilisation and conservation. The project failed however to identify a clear association with archaeology or the cultural heritage value of bogs as

repositories of archaeological structures and finds (ibid. 89–90; see also Collier and Scott 2008). Similarly, the *National Peatlands Strategy* does not include reference to the archaeological and heritage significance of peatlands.

Stakeholder comment:

Given the scale of industrial peat milling, there should be greater communication and transparency of the rate of site discovery. This is crucial in terms of maintaining public confidence in the arrangements for protection of wetland archaeological heritage. All reports produced should also be made available via a public website.

8.1.5 Dissemination and communication

Following on from point 8.1.4 above, issues were raised with regard to the reporting and publication of the results of the archaeological programmes completed in BNM peatlands, particularly since the late 1990s. The relative speed of dissemination was highlighted as problematic and in contrast to other major publicly funded mitigation projects (n=7). There is a perceived lack of drive to publish and consequently an apparent failure of the work to provide a genuine benefit and contribution to both the archaeological profession and a wider public audience. In addition, the lack of dissemination hampers promotion of the resource outside Ireland and arguably restricts opportunities for attracting funds from international sources and agencies.

Stakeholder comment:

There is generally a very low level of awareness regarding the surveys and excavations that take place every year on Bord na Móna bogs. This is in large part due to the lack of publication, particularly in more recent years, and the lack of any attempt to disseminate the results of this work.

8.1.6 Data and meta-data management

> **Stakeholder comment:**
> *Some of the most important archaeological sites in peatlands have been located during Bord na Móna works, more needs to be done to record, protect, excavate and enhance the heritage and make the data accessible.*

The lack of an up-to-date database/GIS containing the full results of the archaeological survey and excavations was highlighted by the several stakeholders (n=5). This inhibits the broader use or application of these data. The absence of an accessible concordance lists for sites identified in BNM peatlands and subsequently included in ASI mapping was highlighted as an issue (n=2) which prohibits the broader use or application of these data. The issuing of NGR centroids for linear structures is seen as problematic (n=2) resulting in a poor understanding of the nature of the archaeology amongst both the archaeological community and associated professions. The exclusion from the SMR/RMP of sites classified as Archaeological Wood, on the basis that they cannot be regarded as monuments, was identified as problematic if not erroneous (n=1).

The criteria used to list certain sites as 'redundant records' and not others are unclear. In addition, despite disclaimers on the NMS website, in practice, there is an apparent failure to understand that monuments listed as redundant records still retain legal protection and may still survive on the ground.

8.1.7 Grey literature

The availability of data and grey literature pertaining to archaeological sites in BNM peatlands was identified (n=4) as problematic. This appears largely to relate to information both archaeological and palaeoenvironmental, that is not included in reports accessible through NMS.

8.1.8 Post-excavation

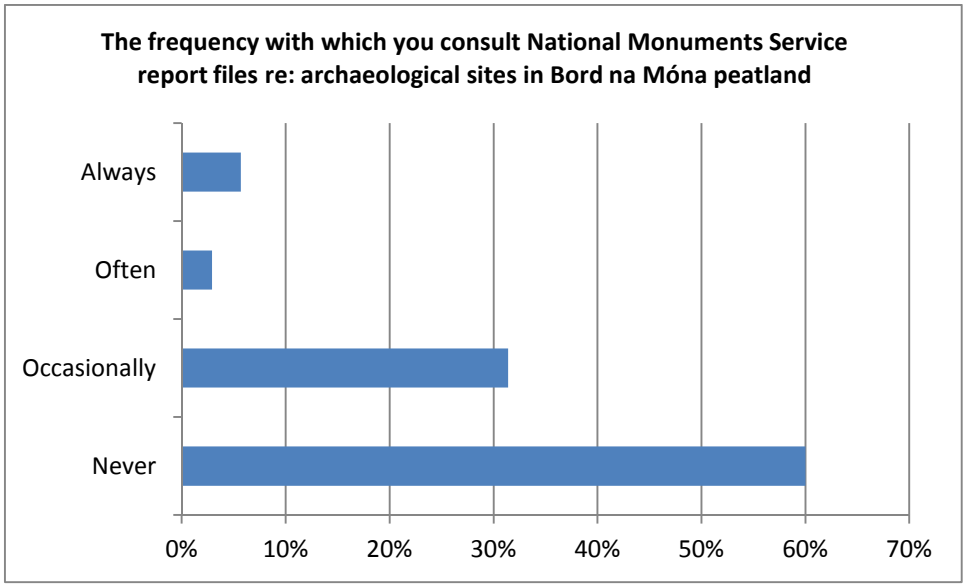
The relationship between excavation and post-excavation analyses is at times unclear (n=4). Various forms for e.g. palaeoenvironmental analysis have been undertaken but little additional substantive understanding seems to have resulted from this work.

8.2 Online survey results

The online survey was distributed to the email recipients (n=330) of the Institute of Archaeologists of Ireland. It was designed to measure the archaeological sectors utilisation of the available resources on BNM archaeology and the frequency with which BNM peatland archaeology is generally considered by the profession. The survey was conducted anonymously and had a total of 35 respondents (c. 11.5%). A slightly modified version of the survey was distributed amongst selected members of the profession in the UK and had three respondents. The results of the survey as provided by Irish recipients are presented below; each question was posed with specific reference to BNM archaeology. The results are presented as percentages although given the relatively low response rate; the raw counts may be regarded as more significant.

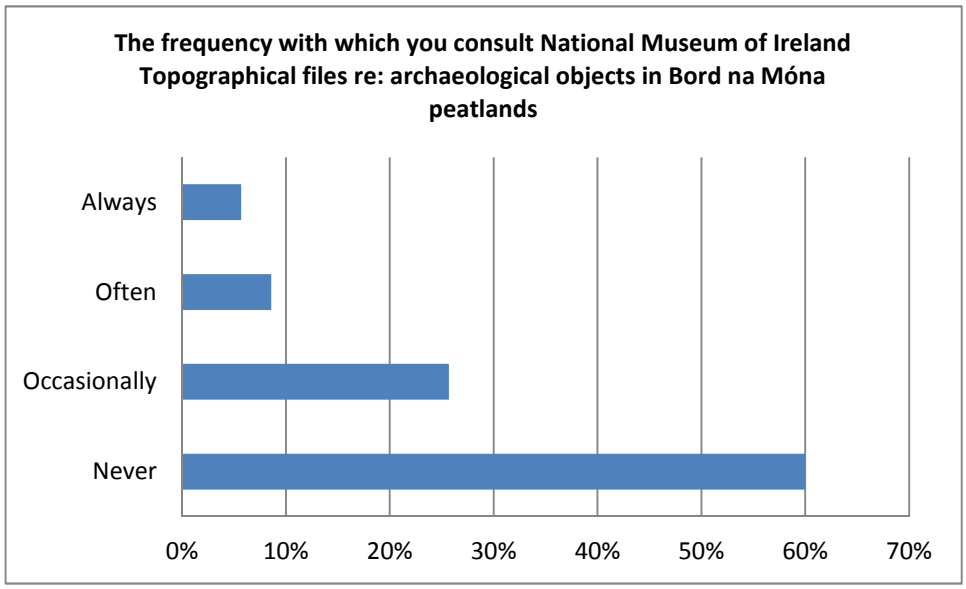
Question 1 addressed the frequency with which NMS files on archaeological sites in BNM peatlands are consulted. Only 6% (n=2) of respondents always consult the files while a majority of 6% (n=21) reported they never consult. However 31% (n=11) occasionally utilise the resource indicating that a third of those polled have a level of awareness and consideration of the resource (Figure 8.1).

Figure 8.1 Consultation of National Monuments Service report files



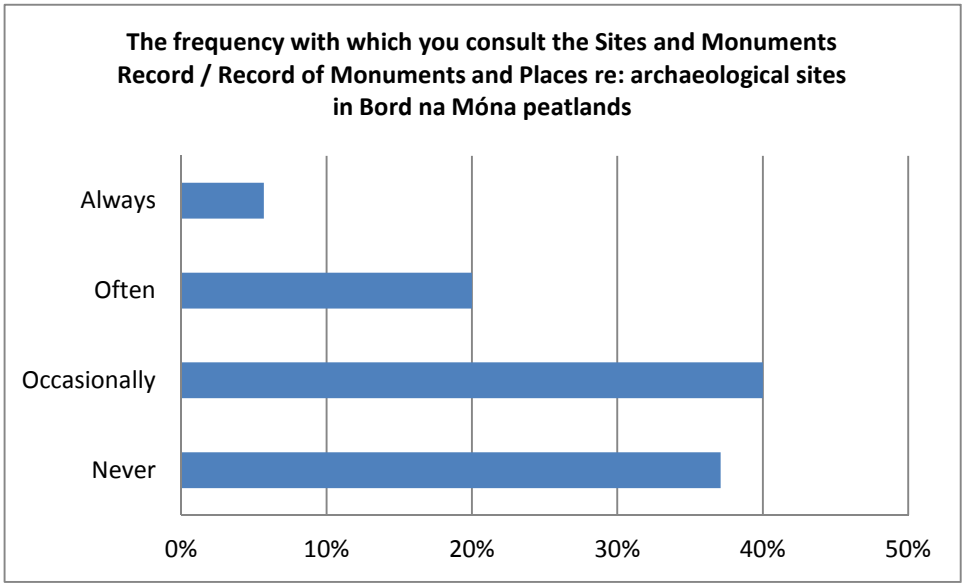
Question 2 assessed the frequency with which respondents consult the NMI Topographical files regarding archaeological objects in BNM peatlands. The results were similar to those for Question 1 with 60% (n=21) never accessing the files and 6% (n=2) always doing so. In contrast 26% (n=9) often consult the files (Figure 8.2)

Figure 8.2 Frequency of consultation of National Museum of Ireland topographical files



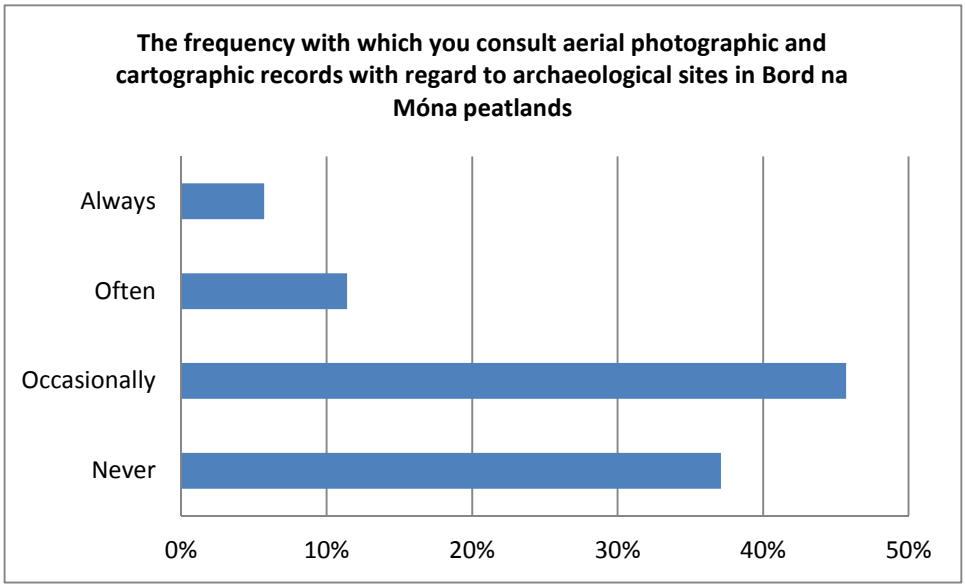
Question 3 concerned the frequency with which the SMR and RMP are consulted regarding archaeological sites in BNM peatlands (Figure 8.3). In this case the majority 40% (n=14) of repondents occasionally consult the files while a slightly lower 37% (n=13) never do. In keeping with the reponses to the previous questions, 6% (n=2) of respondents always consult the files.

Figure 8.3 Frequency of consultation of SMR/RMP



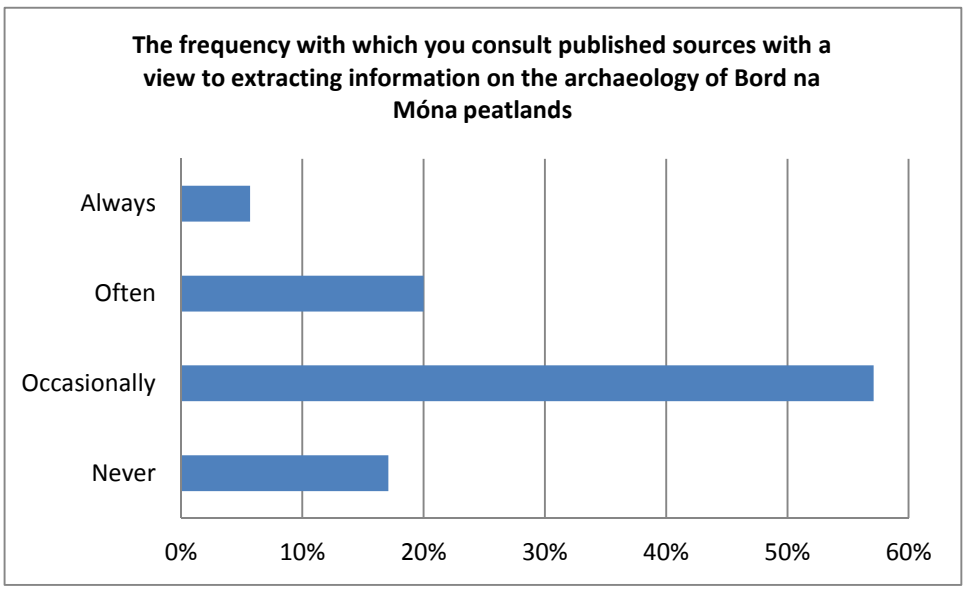
Question 4 addressed the frequency with which aerial photographic and cartographic resources are consulted regarding the archaeology of BNM peatlands. The response to this was similar to that for Question 3 with 45% (n=16) of respondents occasionally accessing the resources while 37% (n=13) never do (Figure 8.4).

Figure 8.4 Frequency of consultation of aerial photographic and cartographic resources



Question 5 considered the frequency with which published sources are consulted in order to extract information on the archaeology of BNM peatlands. The responses show that 57% (n. 20) of respondents occasionally consult publications while 20% (n=7) often do. Two (6%) of respondents always consult published sources (Figure 8.5).

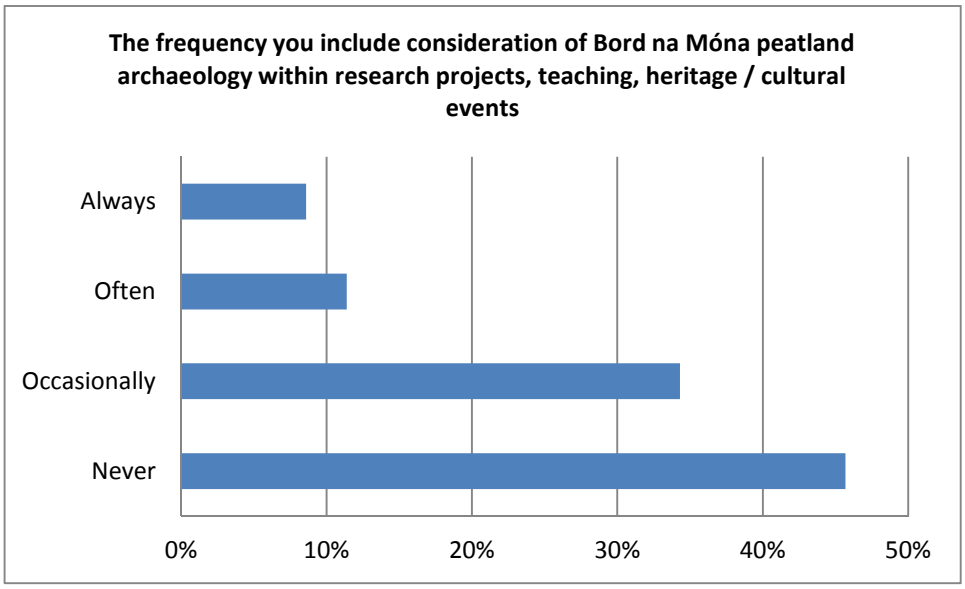
Figure 8.5 Frequency of consultation of published sources



Question 6 assessed the frequency that respondents consider the archaeology of BNM peatlands within various types of projects such as teaching or other heritage events. Response to this indictaed that 45% (n=16) never do, while 34% (n=12) occasionally do. Only

8% (n=3) of respondents always regard the archaeology of BNM peatlands in this context (Figure 8.6).

Figure 8.6 Frequency of consideration of BNM peatlad archaeology within various projects



CHAPTER 9

DISCUSSION

9.1 Survey

9.1.1 Role of the survey and quality of survey record

Initially, the primary role of survey was the provision of data to NMS and the SMR. Subsequently, with the establishment of the RMP (a result of the National Monument's (Amendment) Act 1994) survey results were provided for inclusion in the RMP. Initial peatland surveys were designed as rapid walkover surveys subject to a fast turn-around in the submission of results. The altered purpose of the survey appears to have directly influenced survey methodologies including the scale and range of information recorded pertaining to archaeological sites identified in BNM peatlands. The survey was also intended to provide data to the NMI in relation to finds of archaeological objects.

Following the 1991 peatland surveys, what has been referred to as the 'singular purpose' of the survey was viewed as problematic (Moloney 1995, 1). It was recognised that survey was out-paced by the rate and scale of peat extraction and, as a consequence the destruction of archaeological sites for which only a limited record had been made. It appears that there was recognition that the survey record was in effect a substitute for "preservation by record" which in other circumstances equates to full excavation. Therefore the survey record was developed beyond what was anecdotally referred to as "Dots on Maps" as this often represents the only archaeological record made before a site was totally destroyed (ibid.).

With the introduction of the Turf Development Act 1998, and BNM's consequent obligation towards archaeological sites within BNM peatlands, the role of the survey was expanded. Survey results were now required to directly inform future mitigation strategies. Survey records therefore had to be sufficiently detailed in order to facilitate site selection and excavation methodologies as well meet the requirements of the ASI. For the most part the essential elements recorded in survey for each archaeological site have remained in place.

Between 1990 and 2003 the direction, scale and detail of peatland survey records were subject to an ongoing process of revision. Typically, this entailed:

- Expansion of descriptive information based on increased interrogation of site exposures, i.e. cleaning of drain faces and field surfaces;
- Increased use of digital photography in recording in addition to field drawings;
- Increased precision with regard to establishing site location (XYZ) through the adoption of new technologies (specifically the utilisation of differential GPS);
- Improvements in mapping in recognition of the potential difficulties in re-identifying archaeological sites in an industrial peatland.

Sampling for scientific dating and other analyses also featured; later surveys of the period 2000-2003 saw significant reduction in terms of sampling for anything other than scientific dating. By 2003 the survey record had developed significantly from the "Dots on Maps" approach, to one in which increased emphasis was placed on producing a comprehensive descriptive, location and threat status record quickly and within the limitations of a survey charged with feeding data rapidly to the ASI, as well as providing information sufficiently detailed to allow design of mitigation programmes. Surveys conducted from 2003-2009 were subject to renewed methodological revision which (based on survey reports) entailed the following:

- Scale and extent of the survey record was reduced (based on survey reports). This is most evident with regard to the level of investigation (or cleaning) afforded to individual site exposures;
- Reduced level of descriptive record made including field drawings;
- Reduction in the precision with which site location is captured (use of hand-held GPS vs. Differential GPS);
- General omission of individual site ODs from the primary site record; and the quality of the resulting mapping.

In common with earlier peatland surveys, the 2003-2009 projects appear to have involved relatively small-scale levels of sampling for anything other than scientific dating. The result is a record that is more akin to survey records made in the early 1990s but with at least one omission: individual site ODs. The use of hand-held GPS in determining site location (XYs) raises issues regarding the relatively low precision of these instruments. Hand-held GPS clearly has a useful role to play within peatland survey but to ensure accurate geo-referencing of the archaeological record, differential GPS should used to locate all peatland sites where possible. The role of survey has thus appeared to have changed and arguably somewhat narrowed over time possibly due to altered funding structure (awarded via tendering) resulting in limitations on the level of record achievable for the available financial resource.

9.1.2 Re-assessment Surveys

The review identified some important implications of re-assessment surveys. In general, following the 1998 and 1999 re-assessment surveys, the overall distribution of archaeological sites within each region was maintained between surveys. In each case, there were instances where known concentrations had been either destroyed entirely or reduced in extent. In addition, new discoveries meant areas in which sites had not been previously identified were subsequently recognised as containing archaeological deposits. Site numbers identified on these surveys were generally maintained, however, destruction as a result of milling was cited as the primary reason for the reduction in site numbers in 1998. A secondary factor was the improved definition of sites including examples previously recorded as individual structures which on re-survey were found to represent parts of a larger site.

In contrast, re-assessment survey in 2009 saw a major reduction in overall site numbers from the Blackwater and Boora Groups. This appears to be due to a combination of reasons typically related to production status of a given area. Changes in survey methodology, namely the application of an increased survey interval in places, may also have contributed to the reduction in site numbers. The survey included areas of tapped-out bog, overgrown and afforested sections and portions of bog inaccessible due to re-development e.g. Lough Boora Parklands. The survey director acknowledged that archaeological sites may survive

within such areas but their particular conditions prevented site identification at the time of survey (Rohan 2009, 29). In support of this surveys in Mountlucas and Derryarkin Bogs have identified archaeological sites in comparable areas (IAWU 2003a; IAWU 2003b). The re-assessment surveys have shown that assumptions cannot be made about the archaeological potential of a bog based on its pre-existing archaeological record.

9.1.3 Peatland surveys and site counts

In Section 4.2 it was concluded that site numbers identified through survey generally increased throughout the 1990s and to c. 2002. After this time site counts have dropped significantly and were maintained at significantly lower levels than generated by surveys pre-2003. Possible reasons for this may include:

- Changes in survey methodology;
- Apparent change in the interpretation of survey 'remit' resulting in an altered recording structure;
- Peat loss through milling;
- Peat production history of individual bogs.

9.1.4 Site Classification

Site classifications have been subject to repeated revision and re-definition over the last two decades. Early site classifications were overly interpretative and out of step with the requirements of the SMR and there have been two significant stages of revision between 2000 and 2009.

With respect to field projects, the Review has identified a time lag between the revision of peatland classcodes and their application in the field and subsequent reporting. In addition there are instances where agreed classcodes appear to be inappropriately applied. One consequence of this is that the data is difficult to use and compare across all records. The streamlining of the RMP has consequences for peatland classcodes, most notably sites categorised as *Archaeological Wood* or *Complexes*. For example, some sites classified as *Archaeological Wood* have been reclassified as *Structure - peatland* and are therefore included in the SMR, whilst others not subject to reclassification are excluded from the SMR

on the basis that they represent 'objects' rather than sites. The criteria by which *Archaeological Wood* are reclassified may need reconsideration as field survey exposures can be limited and site classification may be subject to change on further investigation. *Complex* was applied to areas with a high density of archaeological deposits closely associated in space and/or time. This category is now obsolete and individual elements of complexes have been subject to re-classification. The level of re-classification has not been quantified in this review but examples in which individual deposits have been re-classified as either *Structure-peatland* or *Archaeological Wood* have been encountered (c.f. Ballydaly, Co. Offaly). The outcome of this is that complexes have been 'teased apart' by the ASI with some elements included in the SMR and some now listed as redundant records. The criteria for this are unclear and may need reconsideration.

9.2 Mitigation (excavation)

The primary aim of mitigation is to release production fields back to BNM and hence fulfil BNM's archaeological obligations, thereby reducing the impact of archaeological work on overall production schedules. The review has estimated that 9% of the current known archaeological sites have been subject to archaeological mitigation. There is no other comparable body of work against which this may be compared or assessed but this figure should be viewed in the context of the significant geographical scale of the problem. The distribution and scale of peatlands in the Irish midlands contrasts with that of other European countries and are amongst of the last such environments to undergo such large scale extraction works. Lastly the method of peat extraction results in an uneven but progressive exposure of new and existing archaeological sites.

9.2.1 Site Selection

Historically BNM had little input into site selection, however, since 2010 site selection and the criteria on which it is based has been recommended by the BNM Project Archaeologist. This process tends to group sites rather than target individual structures, with a focus on large trackways and any archaeological sites within 100m thereof. Depth from the field surface is also important in terms of site selection. Prior to 2010 the criteria for site selection were devised by NMS and the NMI, and are typically cited as follows:

- Sites under immediate threat with adequate preservation;
- Representative cross-section of sites;
- Sites requiring clarification of form, nature, date and extent;
- Potential for integrated study.

In principal, these appear to have equal weighting but the Review has found that in practice the level of threat takes appears to take precedence and of sites prioritised for excavation c. 65% lay within 20 cm of the field surface. This is particularly the case with mitigation undertaken since 2005/6. Consideration of the three remaining criteria is not always immediately apparent on the basis of review of mitigation strategy reports and the threat status of sites targeted for excavation. Furthermore, excavations have focused on chiefly on four particular site types, namely *Road–Class 1, 2* and *3 Toghers and platforms*, which account for 75% of the sites targeted for excavation. It is open to discussion as to whether the selection process has succeeded in targeting a representative range of site types.

9.2.2 Level of Resolution

The review has found that the level of resolution is low with half the targeted sites generally resolved to below 10 %. In many instances, with the exception of smaller sites, it is a matter for future debate and discussion as to whether such levels of resolution are regarded as sufficient for clarifying the form, nature, function and extent of any given site.

9.2.3 Excavation Methodology

Excavation objectives are typically outlined as to:

- examine the link between bog development and archaeological activity;
- determine nature, extent, function of sites;
- establish the date range;
- establish the local environmental conditions;
- place the site in its regional environmental context;
- establish the relationship to surrounding archaeological landscape.

With the introduction of tendering from 2007 the following aims and objectives were introduced into site method statements:

- the use of GIS mapping to investigate past perceptions of wetlands;
- investigation of archaeological deposition and boundaries;
- examination of wetland/dryland associations through cartographic, aerial photographic and documentary evidence;
- the use of GIS applications in predicting routeways in bogs;
- examination of trackway construction to extract information on social organisation, craft and technology;
- comparative analysis of sites, regionally, nationally and internationally;
- palaeoenvironmental sampling for land use and woodland management studies.

While the final aim has met with some success (see Section 9.6 below) these objectives do are not generally explicitly returned to in discussions presented in available final excavation reports (but see 9.4 below). This suggests that there are discrepancies between the aspirations of such method statements (2003-2009) and the results of archaeological data generated through fieldwork and the subsequent post-excavation programme. This may in part be related to interpretative problems associated with certain archaeological and palaeoenvironmental datasets.

9.3 Reporting: Survey and Mitigation

Almost 80% of final reports and 20% of preliminary reports have not been submitted. This represents a substantial body of information which is unavailable as of the date of this Review. This has impacted on the ability of the review to produce a balanced assessment of the entire excavated resource to date.

9.4 Dissemination and Impact

A key element of the overall success of any programme of archaeological work is the dissemination of the results; this is especially important for a body of work of the scale of

that which has been carried out in the BNM peatlands over the last two decades or so. Dissemination could and should take a variety of forms typically intended to target a range of audiences, ranging from the professional archaeological and academic communities through to the general public. This is broadly reflected in the published outputs. The review has identified a total of 69 publications of various forms arising from the BNM work. Despite this, the main impediment to enhancing the impact of much of the archaeological and palaeoenvironmental work on the wider archaeological community is the relative lack of regular publication, with a reduction in output of all forms other than *In-house* apparent over the last two decades. It can be noted that there is a lag in output, with five publications arising from the work of the IAWU appearing between 2006 and 2010. To an extent, such a lag is inevitable in all programmes of archaeological work.

The difficulty of assessing the wider value of much of the BNM peatland work is exacerbated by the fact that there has been a decline in publication in peer reviewed formats, especially journals and proceedings of conferences or learned societies. An independent estimation of the academic impact of the published material can be made via the number of citations of individual publications; although citation indices should be used with caution and arguably do not necessarily provide an entirely robust measure of the academic impact of a particular piece of work. A search using the online resource Google Scholar demonstrates that the only cited publications arising from BNM peatland work are Raftery's (1996; 25 citations) *Trackway Excavations in the Mountdillon Bogs, Co. Longford 1985-1991* and (1990; 17 citations) *Trackways through time: archaeological investigations on Irish bog Roads 1985-1989.*

It is problematic to provide further estimation or comparison of discipline impact, but the significance of the former work can be identified through its citation in a recent synthetic account of the prehistory of Britain and Ireland (Bradley 2007). Some measure of broader comparison might be possible through an examination of the level of citation of publications such as those arising from the English Heritage funded wetland archaeological surveys, also published during the mid-late 1990's. Google Scholar searches for *Flandrian Environmental Change in Fenland* (Waller and Alderton, 1993) and *The Wetland Heritage of the Humberhead Levels* (Van de Noort and Ellis, 1997) produce citation counts of 55 and 15

respectively. This suggests that the impact of Raftery's work is broadly on a par with other broadly similar assessments of wetland archaeological resource in England. Other academic publications arising from the work of the IAWU include Mc Dermott's (2007) paper in conference proceedings from the WARP conference Edinburgh in 2005. The latter represents one of the few, more widely available synthetic overviews of the BNM peatland work available and has recently been cited within a review of European peatland archaeology (Gearey *et al.* 2011). Whitakers (2006) paper published in the Proceedings of the 1st Seminar of the Irish National Committee of the International Peat Society further provided synthesis of the work of ADS since 1999.

Early work within the BNM peatlands can be regarded as groundbreaking with excavations at Corlea identifying and defining a new agenda for peatland archaeology both in Ireland and arguably within Europe. The production of five volumes of transactions within six years should be regarded as a significant achievement. The two recent monographs (Whitaker 2009; Whitaker and O'Carroll 2009) have not been published long enough to allow assessment of impact via citation indices. However, the online survey and stakeholder feedback has identified publication and dissemination as areas of concern. Both online survey and stakeholder meetings suggest there is a pressing need to consider ways to better develop the profile and outputs of the work within Ireland itself.

9.5 Post-excavation

9.5.1 Palaeoenvironmental analyses

Palaeoenvironmental study has mainly (with the exception of coleopteran analyses undertaken by Reilly (2009, 131–49)) carried out by Archaeoscape (Department of Geography, Royal Holloway College, University of London) and later by Quaternary Scientific (School of Human and Environmental Sciences, University of Reading). The Principal Investigator has been Dr Nick Branch, with a range of other researchers including Research Assistants and postgraduate students involved in the delivery of this work. The programme has generally adopted a multi-proxy approach to the palaeoenvironmental record, utilising stratigraphic description (coring transects) and analysis of pollen, plant macrofossil, coleopteran, peat humification and loss on ignition determinations. Other analyses have

included determinations of phosphorous concentrations within certain peat sequences. A total of six bogs have been investigated (Kinnegad, Ballykean, Littleton, Ballybeg, Gilltown and Lullymore East) with a varying number of sequences/sites targeted from each of these locations. The stated aims of the palaeoenvironmental work are:

- To reconstruct the environmental context of past human activities;
- To assess the impact of past human groups on the natural environment;
- To elucidate the relationship, if any, between structure construction and abandonment and climate change;
- To further knowledge and understanding of the function of structures.

In general the sampling strategy consists of the analysis of 'proximal' (effectively 'on site' samples including monoliths and bulks from sections through archaeological sites) and 'distal' ('off site' sequences, usually in the form of cores recovered using a Russian corer, at distance (100-200m) from the archaeological focus). Sub-sampling intervals are generally between 0.08m-0.04m for pollen, macrofossil, humification and loss on ignition determinations. Contiguous bulk samples (0.8L; generally 0.05m thick) were taken from sections for coleopteran/plant macrofossil analyses. Following initial results and experiences, the sampling strategy has been adapted somewhat in recent years (N. Branch, pers. comm.). These studies have been supplemented by more focussed research on specific sequences in the form of the analysis of tephra and stable isotopes funded under the auspices of the INSTAR programme. This has included some further more detailed analyses and modelling of radiocarbon and tephra chronologies.

Whilst the palaeoenvironmental programme can be regarded as generally scientifically sound in terms of methods, certain issues may be identified in terms of the interpretation of specific datasets. This can be flagged as an issue for aspects of the coleopteran analyses and would appear to arise in part from the fact that some reported analyses seem to have formed part of postgraduate study carried out for higher degrees, which were un-awarded at the time of the publication of the specific volumes and had hence not been subject to examination. The use of postgraduate students to carry out analytical and other work is not

regarded as an issue in and of itself. However, it is essential that if the results of postgraduate studies are to be used within final reports, then the work must have been subject to examination in advance of its incorporation into final reports in any substantial sense. This process would serve both to ensure quality control of final reports but also protects and effectively indemnifies the student in the process. This may be less of an issue if a comprehensive process of peer review for all integrated publication is introduced (see Chapter 10), although it must be noted that this process may compromise subsequent procedures of submission and examination of higher degrees.

Integration of archaeological and palaeoenvironmental datasets

Another issue concerns the integration of archaeological and palaeoenvironmental datasets. The available published summaries are significantly restricted by the general paucity of the chronological control for the often relatively detailed multi-proxy palaeoenvironmental analyses. This restricts the ability of the work to effectively address certain of its stated aims. It would appear that the palaeoenvironmental analyses have produced an extensive body of information regarding patterns and processes of Holocene mire development, human impact and landscape change. However, in the absence of significant associated chronological control and closer, explicit integration with the archaeological data on site specific and inter-regional scales, then it is currently not possible to fully assess the success of this aspect of the programme of work nor to determine the contribution that this work can make to current debates regarding, for example, the relationship between peatland palaeohydrology, climate change and human activity. The reliance in places of the published work on the chronologies of patterns of regional change inferred from previous palaeoenvironmental work means that there is danger of circularity of argument.

A related issue for this part of the peatland programme is the methodological and analytical focus of certain aspects of the palaeoenvironmental analyses. For example, the use of beetle assemblages to produce Mutual Climatic Range estimations would appear to be somewhat unusual within the context of mid-Holocene mire records. Whilst the addition of these data do not detract from the output, the reported results seem to be of little substantive analytical use or application in terms of understanding the climatic context of human activity in Irish peatlands. This is not intended as overly proscriptive or critical; it

could be argued that without the trialling of such methodologies debates may never develop or move forwards. Again, it is difficult to fully assess the value of this work due to the fact that none of this work has as yet been subject to peer review; to this end future plans for publication (N. Branch, pers. comm.) should be encouraged.

9.5.2 Wood studies

Since 1990 wood studies have formed a major component of archaeological work in BNM peatlands. Early analysis (1990–1994) was often carried out in the field with identifications carried out by visual identification of macroscopic wood structure. As such certain results pertaining to this period should be treated with a degree of caution. The level of analysis has since improved substantially and several thousands of samples recovered on both survey and excavation have been analysed with the results presented in a variety of formats. This work is fundamental to understanding peatland sites and compliments other palaeoenvironmental analyses in establishing a detailed picture of past landscapes and their management. It is essential that wood studies continue to form an integral part of future study and are carried out with consideration of overarching research frameworks.

9.5.3 Scientific Dating

A total of 424 scientific dates have been obtained from archaeological work in BMN peatlands. This represents a significant financial investment and a correspondingly large body of chronological information although 1% or less of the known number of each site class has been subject to scientific dating. The exceptions are Road-Class1 Togher including Road-gravel/stone trackway and Road-Class 3 Togher.

However, data associated with 44 scientific dates (14C and dendrochronological) was problematic resulting in the subsequent omission of these determinations from chronological analysis. Concerns with these dates included: incomplete or incorrect site information whereby it was uncertain what site individual dates pertained to. For example five sites were excavated under licence number 00E0498. One radiocarbon date is cited for this licence number but it is not stated for which site it was achieved. Furthermore one of the sites excavated (98DNG0054a) is also listed under the licence number 00E0580 (Whitaker and OCarroll 2009, 96–8 and 105–9). These issues were compounded by the

failure in recent years to cite dates in line with standard practice (cf. Chapple 2010, 29–31) such as the provision of uncalibrated ranges and laboratory codes.

A total of 349 (9%) of the archaeological sites in BNM Peatlands have been scientifically dated. Whilst there are examples of multiple dates from individual sites the level of chronological resolution is effectively one date per structure, with a small number of sites subject to more. This arguably restricts the value of this data set beyond providing 'range finder' information for individual structures. This may be a particular issue for extensive linear monuments.

9.5.4 Wood technology

From 1990–1993 three significant studies of wood technology were undertaken on material derived from excavations at Clonfinlough (1990), excavations and surveys in the Mountdillon region, Co. Longford (1991) and surveys in Blackwater, Cos Galway, Offaly, Roscommon and Westmeath (1992–3). Published in the IAWU Transactions Vols 1, 2 and 4 these studies attempted to establish the type and size of tools used in the sites and the evidence for various methods of wood working. Each study provides an overview of results and discussion of wood technology including point shaping, timber splitting, joinery and potential issues of reuse of material. Photographs and illustrations of toolmarks and timbers are dispersed throughout the texts. These studies represent some of the earliest of their kind in this country and were produced when the discipline was in its infancy and are to be commended.

Since 1999 three significant studies have been undertaken on assemblages of worked wood derived from mitigatory excavations, the results of which contribute to the corpus of knowledge of ancient wood technology in Ireland. However, while these studies are methodologically sound there are some issues with regard to the approaches and level of analysis undertaken. The research framework applied to samples from 1999–2000 (Lemanaghan Bogs) and 2001–2002 (Mountdillon Bogs), was to compare them with the study of material from Mountdillon (O'Sullivan 1996 291–343). In contrast samples from 2008 (Littleton and Ballybeg Bogs, Co. Tipperary) were subject to an internal comparison between two assemblages with little reference to wider context. The methodology applied

to all the assemblages concentrated on recording roundwood and in particular measurements of diameter, cutting angle, facet size and point shape. This is based on the pioneering body of work by O'Sullivan (1991), but unfortunately has not considered later studies of wood technology in Ireland and Britain (c.f. Sands 1997; Ó Néill 2005, 137–85).

In general the discussion of results is limited and little attempt appears to have been made to establish the exact axe types which may have been used. Additional types of wood working tools are not discussed, and none of the reports make reference to known examples of axes or other tools from the relevant periods. The level of comparative analysis in all the reports is low, and there appears to be no exchange with other specialists or integration of results. In particular no reference is made to more recent wood working studies carried out in Ireland and beyond. This is especially pertinent in the case of material from Littleton and Ballybeg, Co. Tipperary, which lie in the same bog complex as Derryville on which an extensive wood working study was completed (Ó Néill 2005, 137–85). Likewise the examination of Early Christian material from Mountdillon is presented without discussion as the first study of its type from BNM peatlands. In this case comparison with contemporary assemblages from other contexts such as urban centres or mills could be considered. Several of the examined assemblages span the Bronze Age yet little distinction is made between these sites, and there is no discussion of the technological changes in axe production during the period. Timbers are briefly described and discussed where relevant; however, apparent issues such as potential reuse are not addressed. Finally none of the wood working reports are illustrated, which is unfortunate given the high quality of preservation and genuine rarity of this material.

9.5.5 Artefacts

A significant number of artefacts have been recovered during the course of survey and mitigation in BNM peatlands. Most are organic objects of wood or leather which are rarely if ever found in other archaeological contexts. Whilst methodologies for the physical recovery of artefacts are not in question, inconsistencies in post excavation processing can be identified.

From 1991–2000 finds recovered during DAHG funded survey (n=69) were recorded and processed under the Licence No. 92E148. In 2005 records of these objects were complied into a single catalogue. Each object is listed under an individual header with the following information: accession number, classification, townland, catalogue number, bog name and where applicable associated site classification. Also included is status, date of recovery, NGRs and OD. The catalogue entries vary from descriptions of individual objects to survey records of sites from which an object was recovered. In the case of the latter, reference is made to the relevant finds but this is often brief with little detail on the object itself. All wooden finds have been identified to species and where available, scientific dates are incorporated. No photographs are included although details of photography (IAWU photographic register) are provided for a number of objects. Seventeen finds recovered under this licence number were illustrated and 21 were photographed following excavation. The catalogue includes little comparative analysis or discussion although comments from external specialists are occasionally incorporated. All artefacts, catalogue and associated data files recovered under Licence No. 92E148 have been transferred to the NMI (1998/2000/2005).

Finds uncovered on later DAHG funded survey 2001–2003 were processed under the licence numbers assigned to the relevant bogs. Survey reports for these years include a list and brief description of recovered and occasionally unrecovered finds. Supplementary reports provide full artefact catalogues in which each find is listed under a header (see above) followed by a full description. These catalogues include wood species identification and dates where applicable, and selected artefact illustrations and post excavation photographs. Discussion of the finds is presented with the overall discussion of results, and includes comparative analysis and specialist comment where appropriate. A small number of specialist reports pertaining to artefacts are included as appendices.

Artefacts recovered on BNM funded survey between 1999 and 2008 are included in final survey reports either in separate catalogues or within overall results. The level of description varies and while some are fully described, relatively brief accounts are provided for others. In situ photographs of finds are included for a selection of objects. Reports do not include post excavation photographs or illustrations, and the species of wooden finds

are not provided. The level of comparative analysis and discussion varies and it is unknown whether objects have been conserved and/or transferred to the NMI.

All finds recovered during the DAHG funded excavation (Clonfinlough) in 1990 have been recorded, illustrated and/or photographed, published, conserved and transferred to the NMI. The level of processing carried out on artefacts recovered during later mitigation appears to have varied. Preliminary excavation reports for excavations 2002–2003 and 2005 all include reference to recovered objects, with limited discussion and description. Some of the finds are photographed but as no final reports are available for this work, the level of processing or status of these objects is unknown. Final excavation reports and publications for mitigation excavations between 1999 and 2002 include artefact catalogues which describe and discuss all recovered finds. Selected objects are illustrated but it is uncertain if all have been drawn and/or photographed in post excavation. Amongst the reports available for layer excavations, only one includes an object which was lifted in block. As such the description and discussion are limited, and no post excavation illustrations or photographs are included. No objects recovered during mitigation appear to have been given NMI accession numbers and in many cases the level of processing and research carried out is uncertain, as is the current status of the artefacts.

CHAPTER 10

OVERVIEW AND RECOMMENDATIONS

10.1 Overview: The Archaeological and Environmental Value of BNM Peatlands

The preservation of organic material which is entirely lost from dryland sites means that peatlands the world over have exceptional archaeological value (e.g. Coles and Coles 1986). The specific archaeological significance of Irish peatlands is well established. The Mesolithic settlement at Lough Boora, Co. Offaly, dating from the seventh millennium BC and discovered through peat cutting (Ryan 1984) represents the earliest evidence of human habitation in Ireland. Investigation of this site helped move the focus of early prehistoric studies from the northeast (Woodman 1978) to the midlands and has continued to inform the search for vestiges of the Mesolithic in other parts of the country (Zvelebil 1992; Stanley 2000). Trackways have been a feature of the archaeological record in Ireland since at least the middle of the twentieth century (Tohall and van Zeist 1955; Rynne 1965), with accounts and superficial examination of a small number of sites dating from the nineteenth century (Lucas 1985; Raftery 1999). Limited investigations were also conducted by personnel from the NMI during 1950s and 1960s (Rynne 1961-3, 1964-5).

By the late 1980's the potential of Irish raised bogs as rich archaeological repositories was being increasingly demonstrated through the ESF funded survey and excavation of 58 trackways in Corlea Bog, Co. Longford (Raftery 1990). This was the first systematic archaeological survey of a bog in Ireland and acted to promote the archaeological value of the Irish midland peat complexes within both national and international arenas, prompting Coles and Coles (1989, 159) to suggest that: "… there is some argument for saying that the Irish bogs still hold more information about the past than any other wetland in Europe …". It is clear that the last two decades of work within the BNM peatlands have continued to demonstrate this value.

The survey and excavation of BNM peatlands has led to the identification of new site types. There is evidence that some bogs have perhaps what might be referred to as different

archaeological 'personalities': some are characterised by the presence of trackways, e.g., Corlea Bog, Co. Longford (Raftery 1996), Annaghcorrib and Kilmacshane Bogs, Co. Galway (Moloney et al. 1995). Others seem to be distinguished by fewer of these structures and the occurrence of other site types, possibly suggesting different approaches or attitudes to these landscapes in the past. In contrast to many bogs in the Lemanaghan Group, Curraghalassa Bog offers an archaeological record dominated by small-scale structures, which may be platforms, many of which form successive horizons of archaeological stratigraphy (IAWU 1997a; McDermott 2001). Linear plank or brushwood trackways typical of other bogs in the complex are not known. The dating evidence indicates repeated activity from the late Iron Age into the medieval period. Elsewhere in Co. Offaly the survey of Ballybeg Bog produced almost 100 sites which included a number of brushwood and roundwood toghers; wooden platforms; a stone enclosure with multiple associated stone lined hearths; and an extensive complex of wooden structures (IAWU 2002b; O Carroll 2003). Finds from the bog included a bow stave and a yoke (McDermott *et al*. 2002). Dates so far returned from Ballybeg indicate that much of the activity now revealed through peat cutting had its origins in the Early Bronze Age. It is possible that an entire Bronze Age wetland landscape survives at Ballybeg and that, unlike other bogs, it lacks the multiplicity of sites belonging to different chronological periods, although the degree to which peat has been removed will have influenced site representation.

The discovery at Ballykean, Co. Offaly of an early medieval habitation site consisting of a post and wattle figure of eight house, surrounded by a palisade (Stanley and Moore 2004, 12–14; Turrell and Whitaker 2007, 4), further demonstrates the potential of peatlands to preserve important and truly rare site types. Finds of bog bodies continue to be made and since the discovery in 1998 of the Tumbeagh bog body (Bermingham and Delaney 2006), a further six have been recovered from BNM peatlands, a rate of discovery unparalleled elsewhere in Europe.

Trackways have been identified in peatlands in other parts of Europe (e.g. The Netherlands, Casparie 1982, 1984, 1987; Lower Saxony, Hayen 1987) and sites of a similar nature, but generally lacking associated detailed analyses, are also known from raised bogs in Denmark and in southern Germany (Jørgensen 1993). Perhaps one of the most comparable areas to

the Irish peatlands, at least in terms of the range and character of known sites, is the Somerset Levels in southwest England. This is the most important area in terms of the recorded peatland archaeological record in this country: one quarter of the surviving wet-preserved sites in England are located here with more scheduled examples of such sites than in the rest of the country combined. However, despite over a century and a half of archaeological fieldwork and associated analyses: "…only a tiny proportion of the wetlands of Somerset have been subject to detailed fieldwork…there is still a vast resource of un-investigated wetland archaeology including new types of sites" (Brunning 2001: 71).

The BNM funded survey and excavation programme provides a significant contrast in terms of the synthetic knowledge of the broad distribution and character of the resource in comparison to other countries. In this sense, the last two decades of work represents an unparalleled source of data regarding the distribution and general character of the wetland archaeological resource on a near national scale.

An integral component of the work within BNM peatlands has been the palaeoenvironmental programme, initial phases of which can be regarded as both innovative and agenda setting. Peat stratigraphic study of Corlea 1 focused on reconstructing the bog surface conditions below this site (Casparie and Moloney 1996). Detailed investigation of peat immediately below the roadway's timbers addressed the carrying-capacity of the bog surface and the implications for site construction and use. Pollen analysis of samples associated with peat sequences incorporating three prehistoric trackways, focussed on identifying vegetation change on the surrounding dryland, providing an explicit link between patterns and processes of human activity on wetland and dryland areas (Caseldine *et al*. 1996).

The coleoptera (Reilly 1996) and the wood species analyses from Corlea (Moloney 1996) represent the first such studies undertaken in an Irish context. This work developed from occasional limited sampling to 100% sampling of 58 excavated sites for identification purposes and issues of species selection, woodland management and landscape reconstruction. The final element of the palaeoecological research from Corlea was dendrochronology: many of the trackways were constructed of oak timbers suitable for

dating which also helped to refine the Irish oak chronology (Baillie and Brown 1996). The dendrochronological record from Corlea was also used to reconstruct local mire surface conditions in which trackway construction took place.

This programme of work demonstrated the value of an integrated, multi-proxy approach to the wetland archaeological record which formed the template for subsequent detailed study associated with the programme of archaeological mitigation at Derryville, Co. Tipperary (Gowen *et al*. 2005). The palaeoecological approaches employed at Corlea were followed by somewhat limited integration into the field surveys of the IAWU (Moloney *et al.* 1995; Bermingham 2001; O Carroll 2001b) although the utility of this record is limited by the lack of scientific dating and excavation. More recent study has extended to include consideration of the value of techniques such as tephrochronology and this is to be commended

It is difficult to over state the importance of the Irish peatlands in terms of the number (n= 4,358) and range of archaeological sites now known from BNM raised bogs. These landscapes represent an internationally unique, highly significant, finite resource. Study over the years has demonstrated the specific value of peatland archaeology to the understanding of Irish history and culture. The concept of 'ecosystem services' is the focus of a current international conservation initiative (http://www.iucn-uk-peatlandprogramme.org/) and this includes formal recognition of the scientific services (including archaeology and palaeoenvironmental potential) provided by peatlands. Nevertheless, the archaeological work on BNM peatlands is not without its challenges and shortcomings. Future work will need to seek to refocus attention and resources that will optimize the positive benefits for the archaeological resource, the dissemination of results and public understanding of the work in BNM peatlands.

10.2 RECOMMENDATIONS

The review offers seven recommendations which concern both the results of past archaeological work within BNM peatlands and also proposals for the organisation and delivery of future programmes of survey and mitigation.

RECOMMENDATION 1: DEVELOP AN OVERARCHING RESEARCH FRAMEWORK FOR FUTURE ARCHAEOLOGICAL WORK IN BNM PEATLANDS

The archaeological work that has been carried out on the BNM peatlands over the past two decades represents the most comprehensive study of such wetlands the world over. However, revision and reformulation of aims and objectives of the programme within the context of the specific peatland agenda, but also taking note of broader archaeological practice and theory, is essential to take this archaeological programme forward into the 21st century. It is recommended that this should be achieved through the definition of a Research Framework (RF) for the BNM peatlands. The realisation of an RF is a formal process that consists of two phases: an assessment phase where the 'resource' is characterized and a phase in which research priorities are defined through an inclusive stakeholder process.

RF's operate over a defined period for each topic, after which the achievements are reviewed and the RF is updated to consider newly emerging research priorities. The strength of the formal process of RF development lies in the inclusive nature of the process. This Review has provided the most comprehensive assessment of the results of BNM peatland work to date and can be considered as the assessment stage of the RF. The forthcoming seminar could mark the starting point for the setting of the research priorities which would include a discussion of the methods that will be most effective for resolving the most important research questions. It is probable that a range of research priorities will be identified, and the NMS and other key stakeholders should take a key role in prioritising these for funding (See also: http://www.eng-h.gov.uk/frameworks/bericht4.pdf)

Matters arising from the Review that can be flagged as requiring consideration in the development of the RF include:

- value and focus of future surveys, both in terms of identifying and recording the peatland archaeological resource, and in terms of informing future mitigation;
- value and focus of palaeoenvironmental research, and the contribution of this research to archaeological and ecological work;
- quality and consistency of scientific dating as applied in the archaeological work on BNM peatlands;
- archaeological implications of future planned and possible changes in BNM land-use, in particular, how this will impact on preservation *in situ* of any peatland archaeological sites and monuments;
- the efficacy of strategies of *in situ* preservation in the light of recent research;
- this Review considers that new technologies and approaches such as geophysics or predictive modelling are insufficiently developed to offer significant alternatives to the general strategy of survey and mitigation by excavation, future developments should be monitored for their potential application in BNM peatlands;
- Other technologies which may offer some scope for specific elements of the peatland archaeological record include the potential application of three dimensional laser scanning technologies for analysing and recording archaeological wood and also for possibly creating a 'virtual archive' of worked wood and artefacts (see Lobb *et al*. 2010).

RECOMMENDATION 2: REVIEW THE CURRENT TENDERING PROCESS

In general terms, given the inevitable financial pressures and the scale of the work required to do justice to the archaeological and palaeoenvironmental resource, it is proposed that there is a clear need for a paradigm shift in the way that BNM peatland archaeology is delivered in the future. One such possible model sees future funding for archaeological mitigation and research split in three ways:

- To sustain a focussed programme of survey and excavation;
- To support the publication of unpublished work;
- To attract and support external organisations who wish to undertake research on specific complexes or sites in BNM peatlands

Specifically:

- consideration should be given to the division of survey and excavation into separate tendering processes;
- 'additionality', or the ability to attract financial support and resources from outside sources (e.g. research councils, museums, universities) to optimize the research value of the work, should be explicitly included in the valuation of tender processes;
- the scientific dating programme should be explicitly removed from the tender process, with a clear specific allocation of scientific dating resource determined in advance of the tender process on the basis of the likely scale and aims of the archaeological and palaeoenvironmental programmes, which in part will arise from the RF (Recommendation 1).

RECOMMENDATION 3: ESTABLISH AN EXECUTIVE STEERING COMMITTEE

The compilation or oversight of, the production of a coherent synthesis of all BNM peatland archaeological and palaeoenvironmental work should be considered an initial priority of any such group. Presently, there is no comprehensive, combined overview of the results of the last twenty years of the peatland programme. The formulation of the RF will require some form of critical overview of the past two decades of work, considered within the context of broader archaeological thought and debates. This Review represents a formative step in this direction.

RECOMMENTATION 4: REVISE SPECIFIC METHODOLOGIES, INTERFACES, APPROACHES AND STANDARDS

The Review has concluded that there are a number of procedural and methodological areas require review/consideration, including:

- Site classification;
- Degree of exposure of sites during survey;
- Accuracy of geo-referencing for archaeological survey;
- Level of resolution of archaeological excavation;
- The programme of scientific dating;
- Sampling strategies for wood species analysis;
- Development of survey and excavation protocols

RECOMMENDATION 5: STANDARDIZE AND SYNTHESIZE ALL ARCHIVES AND DEVELOP A COMPREHENISVE DATABASE OF ALL ARCHAEOLOGICAL WORK IN BNM PEATLANDS

A bespoke database designed for the results of archaeological work in BNM peatlands is needed. This requires careful consideration in order to allow for the complex nature of the archaeological resource and its management i.e. changes to site classifications, numbers etc following mitigation. The database should provide information to the ASI, but also allow for the storage and submission of data over and above the needs of the ASI. Existing archives need to be fully collated and standardised and input to a centralised database incorporating the results of all archaeological work in BNM peatlands. As a condition of future work contractors should incorporate results as part of an on-going and reflexive process of archive quality control. The use of GIS systems and other digital technologies to manipulate and analyse diverse datasets are increasingly common place and offer a means of integrating large bodies of topographical, archaeological and palaeoenvironmental data. These packages may also provide a means of presenting the results of the BNM peatlands programme to a range of stakeholder groups.

RECOMMENTATION 6: REPLACE THE 'SINGLE UNIT' APPROACH WITH ONE BASED ON BNM GROUPS

The division of the BNM peatlands into a series of defined geographical entities based around BNM groups would permit a more focussed, defined and arguably manageable approach compared to the current tendering process. In addition, the delivery of the work by more than one contractor should present the opportunity to promote best practice, mutually beneficial knowledge transfer and to ease the significant burden of delivery on any single organisation.

RECOMMENDATION 7: DEVELOP A PUBLICATION SCHEDULE OF PAST RESEARCH IN BNM PEATLANDS

The programme of archaeological work over the last two decades has resulted in the discovery of some unique, internationally important archaeological sites. The formal transmission of the results of the BNM peatland programme is a task which places a significant burden on the consultant archaeologists. The Review recommends that the publication schedule and framework requires re-focus. In order to maximise academic output and input into the wider archaeological community, it is essential that defined phases and aspects of work are published rapidly and in appropriate formats (books, journals) for different stakeholder audiences, both to the broader archaeological community in Ireland and abroad, and to the general public. Recommendation 2 provides a potential mechanism for this.

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Whitaker, J. and O Carroll, E. 2009. *Peatland Excavations 1999-2000. Lemanaghan Group of Bogs, Co. Offaly. Archaeological Development Services Monograph 2.* Archaeological Development Services Ltd, Dublin.

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APPENDICES

APPENDIX 1 DATA FILES

ASI DATA FILES

Peatland Classes (MSWord)

This is the official terminology for archaeological structures identified within peatlands. There are 8 individual site classifications: Platform – peatland; Post row – peatland; Road–class 1 togher; Road–class 2 togher; Road–class 3 togher; Road–gravel/stone trackway – peatland; Road–unclassified togher; Structure – peatland. Each classification is defined further in Appendix X.

NMS Peatland Records *excluding* RMP Status (Excel)

This file contains 2142 peatland sites including those in non-BNM peatlands up to and including 2005. The data is arranged as follows: ASI Record No.; Class; Townland; ITM Reference (E,N); Irish Grid Reference (E,N).

NMS Peatland Records *including* RMP Status (Excel)

This file contains 2268 peatland sites including those in non-BNM peatlands up to and including 2008. The data is arranged as follows: County; Record number; Class code; Class; Townland; NAT_GRID_E; NAT_GRID_N; ITMEAST; ITMNORTH; RMP

ADS Sites for inclusion in RMP (Excel)

The ASI supplied data submitted by ADS Ltd to the ASI for inclusion in the RMP. This consisted of four Excel files named: ADS Eder Bog records; Co Galway Bogs Co Roscommon Bogs and Co Tipperary Bogs. Each file comprised a spreadsheet with the following headings: County; Bog; Site code; SMR; Site Type; Depth BS; Depth of archaeology; Width; Known Length; Easting 1; Northing 1; Easting 2; Northing 2; Date.

GIS Mapping: Ireland Map (ArcGIS Shape Files) (DAHG under OSI licence).

The ASI facilitated the acquisition of mapping data in order to allow the production of a base map of Ireland and its counties.

NMS DATA FILES

ADS Peatland Survey data FINAL for REVIEW TEAM (Excel)

ADS Ltd field survey results from nine counties: Galway, Kildare, Kilkenny, Laois, Longford, Meath, Offaly, Roscommon, and Tipperary. Each county is represented by an individual worksheet into which details of each archaeological *sighting* have been

entered. Note: Individual sites can have multiple entries as depending on the number of sightings a given site may comprise.

The data is presented as follows: Bog; Site No.; County; Townland; Site Type; Depth BS; width; depth; Known Length; East.; North.; Date; Status; ASI?; year surveyed.

List of Excavations (BNM Peatland) 2010 and 2011 (MSWord)

Two files containing a list of excavation licences awarded to Jane Whitaker and Nicola Rohan of ADS Ltd in 2010 and 2011. Each file lists Licence No.; Name; Site Type and County.

BNM Archaeology Status-updated by Jane Sep08

Duplicate of file provided by BNM (see below).

Peatland Monument Nos. New monuments 2006-2010_MK (Draft) (Excel)

Preliminary analysis regarding numbers and types of surveyed and excavated sites from 2006-2009. This information did not form part of the Review as it was superseded by the review data.

BNM DATA FILES

BNM supplied three versions of a working file detailing each BNM bog's archaeological status vis-a-vis production, survey, excavation and reporting. The more recent versions include reference to inclusion of survey data in the SMR.

BNM Archaeology Status-updated by Enda Jul 2011 (Excel)

Works; Bog Area; Area Name; Production; Surveyed? (Yes/No, Date, No of Sites, Report Y/N?); SMR?; Arch Temp Setaside (Yes/No); Arch Perm Setaside (Yes/No); Excavated? (Yes/No, Date, No of Sites, Report Y/N?;Outstanding Work (Yes/No?)

BNM Archaeology Status-updated by Jane Sep 2010 (Excel)

Works; Bog Area; Area Name; Production 2010; Area (Ha); Surveyed? ((Yes/No), Date, No of Sites, Report Y/N?); SMR? (Yes/No); Setaside? (Yes/No); Excavated? (Yes/No, Date, No of Sites, Report Y/N?);Outstanding Work (Yes/No?)

BNM Archaeology Status-updated by Jane Sep 2008 (Excel)

Works; Bog Area; Area Name; Production Status; Area (Hectares); Surveyed? ((Yes/No), Date, No of Sites, Report Y/N?); Setaside? (Yes/No); Excavated? (Yes/No, Date, No of Sites, Report Y/N?);Outstanding Work (Yes/No?)

Mapping

ArcGIS Shape Files of BNM bog boundaries.

ADS DATA FILES

Mountdillon NGRs (Excel)

XY or NGR references for 261 archaeological sightings (= 198 individual sites) identified in 1999 during re-assessment of part of the Mountdillon Group, Co. Longford. The data is presented as follows: Bog; County; Details; Easting; Northing. The data was originally prepared for submission to the ASI for inclusion in the RMP.

Blackwater and Mountdillon Summary Tables (MSWord)

Descriptive catalogue of 106 archaeological sites from the Mountdillon and Blackwater Groups; the latter contained a single entry. The catalogue is in tabular form and lists data under the following headings: Site No.; Bogland; Site Type; Dimensions; Depth; Description; Excavation.

Entries listed here can be included in the XY data file for Mountdillon. However, not all entries in the XY data for Mountdillon have an equivalent descriptive record.

Peatland Classes (MSWord)

Copy of Official State Classifications for peatland archaeology sites dated September 2010.

IAWU DATA FILES

IAWU Master Data

Excel spreadsheet with information on all archaeological sites identified by the IAWU and information pertaining to historical, SMR and NMI records. The data is presented as follows; Entity No.; SMR No.; Survey Code; Townland; Townland Id No.; 2nd Townland Id No.; County; Catalogue No.; Bog; Classcode; 2nd Classcode; Registration Status; Threat Status; Date Surveyed; Level of Work; 6"; 2nd 6"; N.G.R.E; N.G.R.N; OD; 2nd N.G.R.E; 2nd N.G.R.N; 2nd OD; Orientation; Depth below Surface; Depth of Drain; Depth to Subsoil; Sighting Code; No. of Sightings; Width; Length; Depth; Diameter. Also provided are fields for dimensions and composition (% of brushwood/roundwood/timber etc) of up to 5 individual layers.

Ireland Master Dates

Excel spreadsheet with information pertaining to all scientific dates (excluding Co. Offaly) for archaeological sites dated by the IAWU. Also contains information on some historical, SMR and NMI records. The data is presented as follows; Date Type; Lab. No.; Bog; Catalogue No.; Label; Survey Code; Site Type; Weight; Age BP; ±; -2 sigma; -1 sigma; +1 sigma; +2 sigma; Start; End; Felling; ±; Or Later; Easting; Northing; OD; Source; Project.

Offaly Master Dates

Excel spreadsheet with information pertaining to all scientific dates for archaeological sites in Co. Offaly dated by the IAWU. Also contains information on some historical, SMR and NMI records. Data is presented as follows; Date Type; Lab. No.; Bog; Catalogue No.; Label; Survey Code; Site Type; Weight; Age BP; ±; -2 sigma; -1 sigma; +1 sigma; +2 sigma; Start; End; Felling; ±; Or Later; Easting; Northing; OD; Source; Project.

IAWU Artefacts 92E148

Excel spreadsheet with information on all IAWU artefacts processed under 92E148. Data is presented as follows; Accession No.; Catalogue No.; Site Code; Townland; BNM Bog; BNM Works; NGR; OD; Material; Species; Description; Date; Number; Date of Recovery; Associated Structure; SMR No.; Drawn; Photo in-situ; Recorded/Published; File/Sheet; Conserved; Date of conservation; Method of conservation; Date Returned; Location; Storage; Submitted to NMI; Comments/Requirements.

IAWU Artefacts 2001–2

Excel spreadsheet with information on all IAWU artefacts recovered on survey 2001–2. Data is presented as follows; Accession No.; Catalogue No.; County; Townland; BNM Bog; NGR; OD; Material; Species; Description; Drawn; Photo; Recovered/Full report.

APPENDIX 2 SITE CLASSIFICATION

Appendix 2.1 NMS peatland classes

The Archaeological Survey of Ireland operates a flat or simplified hierarchical 'class' list to support the management and curation of its records and assist in indexing and maximizing the retrieval of information. The list is arranged alphabetically and is accompanied by a 'scope note' for each term which may also include guidance on its use. As the terms have evolved over time they cannot be considered exhaustive or comprehensive. They are indicative of its record holdings and reflect the incremental and organic manner in which material has been added to the archive over many years, especially for monuments dating from the post-1700 AD period. While every effort has been made to ensure consistency of use, the terms should be considered as a fairly authoritative guideline only. The list is subject to review and amendments and enhancements are made on an on-going basis.

Peatland classes: 10 May 2011

Class	Scope Note
Platform - peatland	A non-linear artificially raised area, usually of wood, with or without a clear shape found in a peatland context. Although platforms can vary in size, the length rarely exceeds the width. These may date to any period from prehistory to the early medieval period (5th-12th centuries AD).
Post row - peatland	A line of related posts, including stakes, in a peatland context. In certain instances, these may be the vestigial underpinnings of single-plank toghers. These may date from prehistory (c. 7000 BC - AD 400) to the early medieval period (5th-12th centuries AD).
Road–class 1 togher	A peatland trackway/causeway constructed of wood and intended to traverse a bog: these have a known orientation. In most instances they comprise substantial timber planks and have good structural definition. They may have several phases of construction indicative of long-term use and reuse. These may date from the Neolithic (c. 4000-2400 BC) to the medieval period (5th-16th centuries AD).

Class	Scope Note
Road–class 2 togher	A length of peatland trackway, constructed of wood, believed to be over 15m in length. These have a clear orientation and good structural definition. These may date from the Neolithic (c. 4000-2400 BC) to the medieval period (5th-16th centuries AD).
Road–class 3 togher	A short stretch of peatland trackway, constructed of wood, up to 15m in length with a discernible orientation. It may not be possible to trace them beyond a single sighting. These have evidence of deliberate structure and are interpreted as laid down to cross a small area of bog. These may date from the Neolithic (c. 4000-2400 BC) to the medieval period (5th-16th centuries AD).
Road–gravel/stone trackway - peatland	A roadway in a peatland context constructed wholly or substantially of gravel (including sand and clay), cobbles or stone slabs, or a combination of these. These predominately date to the medieval (5th-16th centuries AD) and later periods.
Road–unclassified togher	A peatland trackway/causeway constructed of wood that cannot be classified as a class 1, class 2 or class 3 togher due to its form or lack of surviving evidence. These may date from the Neolithic (c. 4000-2400 BC) to the medieval period (5th-16th centuries AD).
Structure - peatland	Wood found in peat, which has been deliberately deposited or processed. These vary from single pieces to deposits without a clear form or orientation but which are indicative of an archaeological structure or activity. These may be of any date from the Neolithic (c. 4000-2400 BC) to the medieval period (5th-16th centuries AD).

Appendix 2.2. Site classcodes utilised by ADS up to and including 2009

Archaeological Wood	Togher (primary)
Gravel Road	Togher (tertiary)
Plank Trackway	Togher (secondary)
Platform	Togher (unclassified)
Poss-Archaeological Wood	Wood Remains
Possible Platform	
Possible Togher	
Togher	

Appendix 2.3 Numbers and types of sites subject to classification review

Original Classification	**Number**
Archaeological Wood, Possible Archaeological Wood	44
Platform, Possible Platform	13
Plank Trackways	13
Togher, Possible Togher and Togher (unclassified)	39
Togher (tertiary)	3
Wood remains	56
Total Revised	*169*
Classifications ambiguous	110
Classifications maintained but updated	216
Site Total	**495**

APPENDIX 3 Questions submitted to the Dept of Forestry and Heritage Council

3.1 Questions submitted to the Dept of Forestry, Archaeologist.

1. How is archaeology generally addressed within forestry projects? We are aware of the guidelines but are interested in the general application and issues that may have arisen in the last 10 years that could inform future strategies within peatlands.

2. What, if any, practical and/or procedural issues have arisen from the implementation of the Dept. of Forestry's guidelines on archaeology over the last 10 years that might be of relevance?

3. Are there any significant differences in the approach to the archaeological record on blanket bog as opposed to raised bog?

4. What specific problems have you encountered in terms of the archaeological resource at sites designated for afforestation? How were these overcome or remedied? Please give examples if possible.

5. Is future enhanced inter-departmental and/or inter-agency co-operation on the issue of archaeological mitigation within industrial peatlands a desirable thing? If possible, please provide brief case studies or examples of how this might benefit both individual agencies and the protection/management of the archaeological record.

3.2 Questions submitted to the Heritage Council, Conservation Officer.

1. What is the current position of the Heritage Council with regards to the practicalities of resource allocation to INSTAR research projects which also interface with commercially funded archaeological work?

2. Are you able at this time to provide any brief examples of the way in which INSTAR projects have enhanced understanding of and/or approaches to the peatland archaeological record?

3. How might the future dissemination of archaeological work within Bord na Móna peatlands be best promoted within the overall Heritage Council mission of the promotion of increased awareness of national heritage?

4. We are exploring models for collaborative and inter-disciplinary approaches to archaeological mitigation strategies for Bord na Móna peatlands. Do you have any specific thoughts or comments, particularly as regards the practical aspect or implementation of such models?

APPENDIX 4 PRESENTATIONS INCLUDED IN REVIEW

ADS Conference presentations

O Carroll, E (1999) Excavations in Lemanaghan, Co. Offaly. Spring conference, Irish Association of Professional Archaeologists.

S. Turrell (2008) A Peatland Habitation Site from Ballykean Bog. World Archaeological Congress (WAC), UCD.

S. Turrell (2010) A Peatland Habitation Site from Ballykean Bog, County Offaly. Wetland Archaeology in Ireland and Beyond, UCD.

S.Turrell (2008) Ballykean Bog Habitation Site. Institute of Archaeologists of Ireland, Spring Conference, Belfast.

N. Rohan and J. Whitaker (2010) A unique insight into a pre-historic landscape at Ballybeg Bog, Co. Offaly. Wetland Archaeology in Ireland and Beyond, UCD.

J. Whitaker (2005) Six Peaty Years, Bord na Móna Archaeology since 1999. WARP, Edinburgh.

J. Whitaker (2006) Peatland Archaeology Since 1999: Results and Areas for Future Research. Irish Peat Society Conference and AGM.

J. Whitaker (2008) Archaeological excavations in Bord na Móna peatlands. After Wise Use – The Future of Peatlands. International Peat Society Conference, Tullamore, Co Offaly.

J. Whitaker (2009) Overcoming the terrain of Ireland. Evolution of the Roads of Ireland Conference. Lismullin Conference Centre.

J. Whitaker (2010) Peatland excavations and surveys in BnM Peatlands 1999-present. Wetland Archaeology in Ireland and Beyond, UCD.

ADS Peatland Seminar 2009

N.P.Branch. 2007-2009 Mitigation project palaeoenvironmental strategy overview.

N. Rohan. Excavation Results Kinnegad, Gilltown, Lullymore, Littleton and Ballybeg Bogs.

D.S. Young. Palaeoenvironmental results from excavations.

S. Turrell. Excavations at Ballykean habitation site, Co. Offaly.

N.P. Branch and D.S. Young. Palaeoenvironmental results from Ballykean habitation site.

J. Whitaker and N.P. Branch. Additional research projects.

I. Mathews. Micro-tephrochronology studies in Bord na Móna Peatlands.

E. Halpin. An archaeological over view of Bord na Móna Peatlands.

ADS Peatland Seminar 2005

N.P. Branch. Developing an integrated model of human-environment interactions: Investigations at Daingean Bogs, Co Offaly.

I Mathews Developing a precise chronostratigraphic framework for human-environment interactions using volcanic ash layers: recent investigations at Clonad and Daingean Bogs.

G. Swindle Recent environmental archaeological investigations at Clonad, Co Offaly.

S. Turrell Daingean Bog, Co. Offaly - Preliminary archaeological findings.

J.Whitaker Excavations at Clonad Bog, Co. Offaly - the archaeological results.

Outreach

J. Whitaker (2003) Wetland excavations in Bord na Móna Bogs. Old Drogheda Society.

J.Whitaker (2004) Excavations in Bord na Móna bogs in Co's Offaly and Longford. Offaly Historical Society.

N. Rohan (2007) Recent Archaeological discoveries in Bord na Móna bogs, Co Offaly.

S. Turrell (2007) Excavation of a unique habitation site at Ballykean Bog, Co Offaly. Offaly Historical Society.

J. Whitaker (2009) Peatland Excavations in Ireland. Heritage week open day presentations to general public at ADS Kells office.

J. Whitaker (2011) Archaeological investigations in Bord na Móna bogs since 1999. Roscommon Archaeological Society.

J. Whitaker (2011) Archaeological investigations in Bord na Móna bogs since 1999. Old Athlone Society.

INSTAR and PHD Conference presentations

N.P. Branch and J. Whitaker (2008) Examining the relationship between environmental change and Bronze Age trackway construction: two new case studies from the Irish Midlands. World Archaeological Congress (WAC).

N.P. Branch and J Whitaker (2010) Environmental Change and Societal Response: Evidence from Wetlands in Ireland. IAI Spring Conference.

N.P. Branch, D. Young, S. Elias, L.J. Mansell, I. Denton, G.E. Swindle, I. Matthews and J. Whitaker (2008) Examining the relationships between environmental change, raised bog development and Bronze Age human activities: recent multi-proxy investigations at Clonad Bog and Kinnegad Bog, Ireland. After Wise Use – The Future of Peatlands. International Peat Society Conference, Tullamore, Co Offaly.

N.P. Branch, D.S. Young, S. Black, G. Dormer, I.P. Matthews, J. McCarroll, O. Pritchard and J. Whitaker (2010) Examining the relationships between Holocene climate change, vegetation history and human activities in the wetlands of Ireland: case studies from Littleton Bog (Co. Tipperary) and Kinnegad Bog (Co. Meath). Wetland Archaeology in Ireland and Beyond, UCD.

C. Bunting (2011) Quantifying the Heritage Resource Potential of Lowland Wetlands in NW Europe. IAI Spring conference, Dublin.

D. Howell, T. Astin, N.P. Branch and D.S. Young (2010) Using ground-penetrating radar to image features within peatlands: a feasibility study from four Irish bogs. Wetland Archaeology in Ireland and Beyond, UCD

I.P. Matthews, N.P. Branch, D.S. Young, K. Denton and J. Whitaker (2010) Sequencing and correlation of wetland archaeological and environmental records in the Irish Midlands: the need for robust chronological approaches. Wetland Archaeology in Ireland and Beyond.

P. Stastney (2011) Examining the relationships between Holocene climate change, hydrology and human society in Ireland. IAI Spring conference, Dublin.

J. Whitaker and N.P. Branch (2008) Developing Tephrachronoloy and Stable Isotope analysis to examine the relationship between climate change and human activities in the wetlands of Ireland. Institute of Archaeologists of Ireland, Autumn Conference.

D. Young and P. Stastney (2011) Holocene Hydrological and Vegetation Changes in Ombrotrophic Bogs in Central Ireland: Implications for our Understanding of Climate History and Human Activities. UK Archaeological Science Conference 2011, Reading.

Posters

I. Matthews (2011) The potential of tephrostratigraphy in the investigation of wetland archaeological records: Examples from Ireland (Poster). INQUA 2011, Bern, Switzerland.

IAWU Conference Presentations

McDermott, C. 1996. *Irish Wetland Archaeology: A Dry Future*. Irish Association of Professional Archaeologists Conference, Sligo.

Bermingham, N. and O Carroll, E. 1996 .*The 1996 survey of the IAWU*. Autumn meeting, Irish Association of Professional Archaeologists, Mullingar, Co. Westmeath. Joint presentation with EOC.

McDermott, C. 1997. *A Raised Bog Perspective*. Irish Association of Professional Archaeologists Conference, Ballinasloe.

O Carroll, E. 1998. *Woodland Management studies in the Irish Archaeological Wetland Unit*. WARP in Ireland Conference, University College Dublin.

McDermott, C. 1998. *Treckers Through Time.* WARP in Ireland Conference, University College Dublin.

Bermingham, N. 1998. *The trouble with peat*. WARP in Ireland Conference, University College Dublin.

Stanley, M. 2001 *Archaeological Survey of Irish Bogs: information without understanding?* Theoretical Archaeology Group International Conference, UCD.

Stanley, M. 2002. *Irish Archaeological Wetland Unit Surveys 2000/1*. Institute of Archaeologists of Ireland spring conference, Mullingar.

Murray, C. 2002. *The Irish Archaeological Wetland Unit: approaches to environmental analysis*. Association for Environmental Archaeology conference, UCD, April 2002.

McDermott, C. 2004. *Prehistoric Farming in the Midlands: Evidence from the Offaly Peatlands*. Agricultural History Society of Ireland Conference, Tullamore.

Stanley, M. 2005. *Anthropomorphic wooden figures: recent Irish discoveries*. 11th WARP International Conference on Wetland Archaeology, Edinburgh.

McDermott, C. 2005. *Peatland archaeology in Ireland: Plain and bog, bog and wood; Wood and bog, bog and plain!* Plenary Lecture, 11th WARP International Wetland Conference, Edinburgh.

McDermott, C. 2005. *Emerging Bronze Age Landscapes in the Irish Midlands*. European Association of Archaeologists 11th Annual Meeting, Cork.

McDermott, C. 2006. *The testing and mitigation of Wetland Archaeological Heritage*. National Roads Authority - building a better road environment, Croke Park, Dublin.

Plunkett, G., McDermott, C., Swindles, G.T. and Brown, D. 2007. *Wetland Archaeology in Ireland and the "Bigger Picture: a Critical Assessment of the Role of Environment in Determining Past Wetland Activity*. Association for Environmental Archaeology Spring

Meeting 'Environmental Archaeology in Ireland: new perspectives and recent research'. Cork.

Brown, D., Plunkett, G., Swindles, G. and McDermott, C. 2007. *Assessing the contribution of dendrochronology to the reconstruction of palaeoenvironmental and cultural change in Ireland.* [Invited Lecture], XVII INQUA Congress 2007, Cairns, Australia.

Stanley, M. and McDermott, C. 2008. *Joining the dots: a case study in assessing the potential of Irish peatland survey results*. Sixth World Archaeological Congress, UCD.

Plunkett, G., Swindles, G., McDermott, C. and Brown, D. 2008*. Patterns' of peatland activity and climate change: a critical evaluation. Sixth World Archaeological Congress,* Dublin.

Plunkett, G., Swindles, G.T., McDermott, C. and Kerr, T. 2009. *A need for criticality in the interpretation of human responses to past climate change: examples from the Irish archaeological record.* [Invited Lecture], Pre-Modern Climate Change: Causes and Human Responses. Stine Rossel Memorial Conference, University of Copenhagen.

Plunkett, G., McDermott , C., Swindles, G. and Brown, D. 2011. *Building bridges or breaking new ground? A critical examination of peatland activity and past climate change in Ireland.* [Invited Lecture], Archaeology and Science: Institute of Archaeologists of Ireland Spring Conference 2011, Dublin.

IAWU Outreach Presentations

McDermott, C. 1990. *The Increasing Importance of Wetlands in the Study of Irish Prehistory*. Westmeath Archaeological and Historical Society*,* Mullingar.

Bermingham, N. 1995. *The archaeology of Irish wetlands*. Edenderry Archaeological and Historical Society, Co. Offaly.

McDermott, C. 1996. *Towards Sustainability.* Seminar in Conservation and Development*,* Dept. of Botany, Trinity College Dublin.

McDermott, C. and Keane, M. 1997. *Irish Peatlands and Peatland Archaeology*. LSB Joint Seminar*,* Dublin Business School.

McDermott, C. and O Carroll, E. 1997. *Archaeological Sites in Lemanaghan Works, Co. Offaly and Corlea Trackway Visitor Centre*. Irish Association for Quaternary Studies Field Excursion, Longford and Offaly.

Bermingham, N. 1998. *The archaeology of Irish wetlands.* Joint Bord na Móna and DEHLG seminar series. Newbridge, Co. Kildare.

McDermott, C. 1998. *Recent Developments in Raised Bog Archaeology: A case study from County Offaly*. UCC Archaeological Society, University College Cork.

McDermott, C. 1998. *Irish Wetland Archaeology and Archaeological Practice*. Department of Archaeology, University College Dublin Seminar, University College Dublin.

Bermingham, N. 1999. *The Tumbeagh Bog Body*. Internal Bord na Móna seminar. Bord na Móna, Newbridge, Co. Kildare.

Murray, C. 1999. *The Lemanaghan Bogs, Co. Offaly*. National Heritage Week walking tour, Lemanaghan Co. Offaly.

Stanley, M. 2000. *The Archaeology of Peatlands*. Diploma in Rural Conservation Management Course, Department of Environmental Resource Management, UCD, May 2000.

McDermott, C. 2000. *The Work of the Irish Archaeological Wetland Unit*. Bord na Móna Workshop in Peatland Archaeology, Newbridge.

McDermott, C. 2001. *The Archaeology of Irish Peatlands*. International Peat Symposium Study Tour, Offaly.

Moore, C. 2001. *Wood Technology*. Archaeology of Materials Course, Parts 2–3, Department of Archaeology, UCD.

Moore. C. and Murray, C. 2001. *Irish Archaeological Wetland Unit: Recent Work.* Post–Graduate Seminar, Department of Archaeology, UCD.

Moore, C. 2002. *Irish Bogs the Hidden Treasures*. Public lecture delivered in Tipperary County Museum.

McDermott, C. 2002. *Wood technology.* Archaeology of Materials Course, Parts 1–3, Department of Archaeology, UCD.

Murray, C. 2002. *From Excavation to Report*. Parts 8 and 9 in From the Tree to the Artefact, 3rd Year Option Course, Dept. of Archaeology, UCD, November 2002.

Moore, C. 2005. *Recent discoveries in the peatlands of North Offaly*. Public lecture delivered to Croghan Development Association, Old Croghan., Co. Offaly.

McDermott, C. 2006. *Peatland Archaeology in Ireland*. Westmeath Archaeological and Historical Society, Mullingar.

McDermott, C. 2007. *People and peatlands in the past*. International Peatlands Dissemination Event, Tullamore.

Murray, C. 2007. *A Wooden Vessel from Toar Bog, Co. Westmeath*. Life and Death in Iron Age Ireland RSAI.

APPENDIX 5 PUBLICATIONS INCLUDED IN REVIEW

ADS Books

Whitaker J. and O Carroll, E. (2009) *Peatland Excavations 1999-2000: Lemanaghan Excavations.* ADS Monograph **2**. Dublin: Archaeological Development Services.

Whitaker, J. (2009) *Peatland Excavations 2001–2002: Mountdillon Group of bogs, Co. Longford*. ADS Monograph **3**. Dublin: Archaeological Development Services.

ADS Archaeology Ireland

Corcoran, E. (2003) 'Bog enigmas'. *Archaeology Ireland*, 17 (3):12–3.

O Carroll, E. (2000) 'Ireland's earliest crozier?' *Archaeology Ireland*, 14 (2):24–5.

Turrell, S. and Whitaker, J. (2007) 'Unique early medieval 'bog crannog''. *Archaeology Ireland* 21(3): 4.

Whitaker, J and O Carroll, E. (1999). 'A trek through the bogs in Co. Offaly'. *Archaeology Ireland* 13(3), 32–3.

Whitaker, J, Turrell, J and Rohan, N. (2008) 'Trecking the Bogs – The 2007 peatland survey'. *Archaeology Ireland*, 22(1):32–4.

ADS Conference Proceedings

Branch, NP, Young, D, Elias, S, Mansell, LJ, Denton, K, Swindle, GE, Matthews, I and Whitaker, J. (2008) 'Examining the relationships between environmental change, raised bog development and Bronze Age human activities: recent multi-proxy investigations at Clonad and Kinnegad bogs, Ireland'. *After Wise Use–Proceedings of the 13th International Peat Congress,* 524-527.

Whitaker, J. (2006) 'Peatland archaeology since 1999: Results and areas for future research'. In: Farrell, C.A. ed. *Peatland Utilisation and Research in Ireland 2006: Proceedings of the 1st Seminar of the Irish National Committee of the International Peat Society*. Gorey: Irish Peat Society.

Whitaker, J. (2008) Archaeological Excavations in BnM Peatlands in *After Wise Use – Proceedings of the 13th International Peat Congress,* 559-563.

ADS *Scéal na Móna*

Dunne, N 1999 'Archaeological Survey in Mountdillon and Blackwater'. *Scéal na Móna*, 13(28).

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APPENDIX 6 EXTERNAL REVIEW

Specialist Reports on Insect, Wood and Geochemical (Phosphorous) Analyses

Technical Review: Insect Analyses from BNM Peatlands,

Dr Eileen Reilly MIAI

Review Sheet: Ballybeg Bog, Co. Tipperary

Presence/absence of research framework

A detailed research framework is set out for the overall aim of all the palaeoecological studies. The stated aim for analysing insects from Ballybeg Bog was to test the theory that the togher (08E0394) was used for transport of animals across the bog. This is a common research question about the use of toghers/trackways to which palaeoentomological analysis is applied. However, it does somewhat limit the range of potential questions that could be addressed using insect analysis. It also requires a fairly targeted sampling strategy.

Methods

Methodology for processing is standard for palaeoentomological analysis. However, it is not clear how many flotations/paraffinings were carried out per sample. In general, at least 3 are recommended to ensure that all insects are recovered. No further details on methodology were outlined. It is not clear what comparative collections were used, in any. No table outlining the Minimum Numbers of Individuals and Minimum Number of Species per sample, species diversity or other standard habitat statistics is presented. Critically, no species list is presented. Given that this is a technical report, not a publication (where a species list may be consigned to an online archive or CD-rom), this is a rather glaring omission. Nowhere in the insect section of the report is the exact number of individuals per sample or the level of representation of select species given. No column graph outlining the location of samples and the relationship of the samples to the togher is presented. The graph that is presented towards the end of the section (Figure 4.9) is not easy to read and again does not clearly identify the position of the togher in the sequence.

Sampling

Bulk sampling, at intervals, of a section or column through a known archaeological feature to understand the 'before, during, and after' environmental context of a site is a fairly standard methodology for sampling for insects from wetland contexts. It was first employed by Maureen Girling in the Somerset Levels (1977-1981), applied in Thorne and Hatfield Moors by Buckland (1979) and Whitehouse (1997, 2004) and by Reilly in Lisheen, Tumbeagh Bog and elsewhere. However, given the stated aim of the analysis of insect remains from this particular bog, perhaps more concentration on samples from the superstructure and sub-structure of the togher itself would have been helpful. Equally, similarly targeted sampling of the other toghers/platforms might have been useful.

I modified the column sampling method in Derryville Bog and in Tumbeagh to take account of peat stratigraphic changes and not to cross stratigraphic boundaries, so that samples best represented actual peat formation 'events' in time (Reilly 2005, 2006). Here, samples have been taken at strict 5cm interval and not from contiguous samples. It is not clear if peat stratigraphic boundaries were ignored or respected. They may have been but this is not clearly stated.

Dating

Dating seems to be entirely reliant on dating of single archaeological feature through which a series of non-contiguous bulk samples are taken. No additional dates from sequence of samples were retrieved. This is not unusual in wetland contexts (see Reilly 2005) although it is not ideal. Only one dendro date was recovered from possible togher 08E0394. There is no consistency in presentation of dates throughout the report, with BC used in archaeological section and BP used in palaeoecological section. However, this is not uncommon in joint archaeological/palaeoecological reporting. Ideally, one style should be common to the entire report i.e. original calibrated BP date and BC/AD date in brackets or the reverse.

Quality and standard of the analysis

The sentence '80% of fossils picked being whole' could lead to some confusion. On first reading, it appeared they meant that 80% of beetles were whole. The term 'fossil sclerites' or 'disarticulated body parts' would be clearer to the reader.

In general, the analysis of the samples is perfunctory and to the point. Wetland insect assemblages can be quite repetitive, particularly were multiple samples are taken from the same kind of peat, which would appear to be largely the case here. There is a lot of repetition in the sample descriptions, but this probably does reflect the repetition in assemblages recovered. However, in the absence of a species list, it is not possible to examine this is any detail. During description of samples 10 and 8 no reference is made to the fact that these samples go through the level of the togher.

The finding of the ant species, *Leptothorax nylanderi*, would seem to me to be worthy of more discussion as this is a relatively rare species in Britain and its current status in Ireland is not clear. I would have expected the writer to do some checking with Irish entomologists (via Invertebrate Ireland Online or similar) as to its current status. This may have been done but is not alluded to in the report. Similarly, *Cymindis vaporariorum* in sample 6 is noteworthy, as this is one of very few records of this species in Ireland from palaeoenvironmental contexts. It was also found in Tumbeagh Bog and is discussed in Reilly (2005) but this is not referred to here.

The application of the Mutual Climatic Range method to column samples from an Irish raised bog, through which a trackway has been constructed at one point, seems to me to be highly dubious. Other writers, including the main architect of the MCR, Russel Coope, would argue that outside of very early Holocene deposits or Holocene deposits devoid of human interference, which are extremely rare in Europe, the MCR cannot be successfully applied. The results from its application here would appear to bear this out. Also, it is not clear why these results are being presented here. The stated aim of looking at insects here was to examine the use of the trackway itself. The application of the MCR method would appear to have no bearing on this aim.

Accuracy

In the absence of photographs of the sclerites, it must be assumed that the species identifications are correct. Reference to comparative collection used would normally be included in reports of this sort and is not included here. Habitat data applied to species is somewhat basic and does not take account of occurrences in palaeoecological contexts, which can differ slightly from modern habitat occurrences. A familiarity with palaeoentomological weltand literature though would be required to tease out these differences and time may not have been available for such analysis.

Reasons for why a particular type of analysis has been carried out – do the research questions stand up?

The question set out at the beginning of the section on palaeoecological studies for analyzing insect remains are perfectly legitimate, if perhaps limiting.

Has the work undertaken been able to address these questions and if not, why not?

It would seem to be me if the main purpose of analyzing insects is to establish potential uses for the trackway than sampling should concentrate on the superstructure and sub-structure of the features themselves, rather than sampling through the peat well below and well above the trackway itself. It would also have been a better use of resources to take ten bulk samples from more than one site in a number of locations, rather than samples in column format. So, on balance, the insects have not particularly contributed to the understanding of site function in this case. They have provided some corroborative information on the transition from fen to raised bog, which is alluded to in the overall conclusions of the palaeoecological studies section.

Comparative analysis

Unfortunately, and rather surprisingly, no comparative analysis of any kind is undertaken here. While the archaeological section of the report refers to the work in Derryville Bog (Gowen et al. 2005), and the Wetland Unit / ADS commissioned insect analysis between the years 1996 and 2001, which would have been available to the writers in original report or summarized form (Reilly 2009), none of these data are referred to here. Surprisingly, not even the iconic work of Girling in the Somerset Levels or Buckland in Thorne Moors, all of which would have been readily available to the writers, are alluded to. This is surprising and would suggest that very limited time was given to the analysts and/or there was a lack of familiarity with Irish and British wetland insect studies. The lack of access to such studies in online peer-reviewed journals is, in my view, not an excuse to ignore or overlook other available published data.

Interpretation

The interpretation of the data is perfunctory but accurate in essentials.

Identify limitations or problems with the work undertaken

There are a number of problems with the insect work as presented. The lack of habitat statistics, species list and easily readable habitat graph are unfortunate as it is difficult to compare the results of this work with other insect work in Ireland or elsewhere. The lack of any comparative analysis is also a problem, as the data is not placed in any local, regional or national context.

Innovation and creativity

While use of the MCR on these deposits might be viewed as innovative, its unsuitability for the deposits in question renders it unhelpful to the furthering of any stated aims in the research framework. Time might have been better spent comparing the findings to other Irish and British data sets.

Look at the work in relation to the development of insect studies in Ireland over the last 10 years and asses the contribution the work may have made

Any new palaeoentomological study is to be welcomed and, in that context, this study is a useful addition to the corpus already in existence. The finding of relatively rare ant and ground beetle species is also important and worthy of publication, even as a short note in a larger publication. However, it is vital that the species list and MNI per sample are presented with the analysis, along with a better graphical representation of the data. Publication of the work in some form is also critical. This will ensure that it is cross-referenced in other studies and that any local, regional or national trends can be evaluated.

Review Sheet: Littleton Bog, Co. Tipperary

Presence/absence of research framework

The same research framework (as Ballybeg) is presented. Again, the insect analysis is to be used as a means of identifying the movement of animals across the bog. As above, this is a somewhat limited use of insect analysis and requires targeted sampling.

Methods

Problems with methodology are as for Ballybeg.

Sampling

Problems with sampling methodology is as for Ballybeg, given that, once again, the stated aims of the research framework is to understand the use of the trackway/platform itself.

Dating

While a tephra date was added to the chronology of one of the cores taken for pollen and plant macrofossil analysis, the dating of the sequences once again relied on the dating of individual toghers/trackways and platform. As already discussed, this is not particularly unusual in wetland context although is perhaps not best practice. However, strangely, the site chosen as the focus for insect analysis was a platform rather than a trackway and was left undated (08E0411: TI-LTN025). This would appear to be a strange choice, given the stated research aim, as whatever about the use of trackways/toghers for animal movement, it is unlikely that platforms were so used. The lack of dates is also a strange omission, as unless it can be closely related stratigraphically to other dated sequences, the insect column of samples is effectively undated.

Quality and standard of the analysis

The quality of the analysis here is somewhat more problematic than Ballybeg. Firstly, and rather worryingly, the site is continuously referred to as a trackway, not a platform. It may be that there has been some mix up with numbers in the report and that the samples were actually taken from another trackway. However, the stated site code and licence number is for a platform.

While the same simplified or summary analysis is given per sample, the habitat information for some of the species discussed is too specific and the wetland context of the finding of some species is not considered (see *Accuracy* section below). For example, *Megasternum obscurum* is a generalist decomposer species, found in everything from decaying leaf litter in woodland contexts to cesspits in urban contexts. Its presence in wetland deposits is not necessarily definitive evidence of animal dung and this qualification should be outlined in the text. In the absence of actual dung beetle species or very large numbers of *M. obscurum*, alongside other secondary indicators of dung, a conclusion that dung is present at these levels should not be drawn so definitively.

Interestingly, given the stated aim of attempting to detect the use of the site as a routeway for animals, the lack of any evidence for dung at 'trackway' level (samples 9, 11 and 13) is not alluded to in the discussion or conclusions. However, later in the overall conclusions, a statement is made that there is unequivocal evidence for the use of 'the trackway' for movement of animals because of the presence of dung (page 74). This is despite the fact that the last mention of any potential indicator of dung (*M. obscurum*) occurs 40cm below the platform level. It may be that other indicators are present but because of the absence of a species list, I cannot confirm this.

Simplocaria semistriata, a pill beetle, is stated to be indicative of light woodland and cultivated soils (Sample 19). However, this beetle is also frequently found in moss, which should also have been mentioned.

The assertion that 'arable land growing beet crops' at the platform levels is indicated by *Chaetocnema concinna* is an over interpretation of the habitat preferences of this beetle. *C. concinna* is found on a huge range of ground vegetation, particularly bindweeds, knotweeds and various domesticated and wild beet species. It is difficult in the absence of the species list to see if there are any other reasons why such a conclusion was drawn. On the basis of *C. concinna* alone, this conclusion is at best a simplification, at worst erroneous.

A general comment too on the analysis is the lack of reference as to how some of these species, especially those indicating 'dryland' or 'cultivated land' might have ended up in peat deposits. No reference is made to flooding or erosion from the dryland margins into the basin, for example.

Rather, the analysis leaves one with the impression that the bog itself took on the characteristics of arable land etc at various points in time.

Comments above re the MCR apply here too.

Accuracy

Apart from the perhaps overly simplistic interpretation of some of beetles present and the use of term 'trackway' instead of 'platform', as outlined above, a couple of identification may be problematic.

Uloma culinaris (found in samples 19 and 17): This is a Tenebrid beetle found in wood mould in many species of coniferous and deciduous trees. It has also been found in flour and sawdust, as stated in the report (Koch 1989). There are no Irish records in either modern times or from previous palaeoenvironmental studies. Indeed, its status in Britain is uncertain, as only a single specimen exists in a British collection in the Booth Museum, Brighton. Keith Alexander, who compiled a comprehensive list of the saproxylic insect fauna of Britain in 2002, classifies it as either extinct or vagrant (Alexander 2002). Therefore, it is not impossible that this species is present in palaeoenvironmental contexts in Ireland but the extreme significance of such a find is not hinted at in the report. A simple check of the Irish Coleoptera list online, plus a check of Alexander's published list from 2002 (above), would have confirmed the sensational nature of such a find for the analysts. The BUGS database, which lists the fossil find locations of all British Coleoptera notes only one fossil find for this beetle in Europe, from the wreck of a Swedish East Indian cargo vessel, sunk in 1745 (Andersson 1986). It is not clear if any attempt was made to confirm the identity of this beetle using a comparative collection, as this is not stated in the report. In the absence of such checks, this identification is dubious.

Acupalpus meridianus: Only two *Acupalpus* species are currently listed for Ireland i.e. *A. dubius* and *A parvulus*. Again, it is not impossible by any means that *A. meridianus* was in Ireland in the past and is now locally extinct but its current status in Ireland should be clearly stated. It should be clear what attempts were made, if any, to confirm that this beetle was *A. meridianus*. It is also continuously stated throughout the analysis that *A. meridianus* is a clear indicator of cultivated soils and rotting vegetation. While this is true, it is also true that *A. meridianus* is found in damp, swampy locations and on peaty soils. This means that it could have found suitable habitat niches on the edge of fen or bog, without the explicit requirement of cultivated ground. Again, these alterative explanations are not given.

Reasons for why a particular type of analysis has been carried out – do the research questions stand up?

In general, the samples taken are not best suited to answering the research question as stated in the research framework. The samples can potentially answer other questions regarding the nature of bog development, but some of the analysis is too literal or simplistic to tease out the subtleties in the data. Also, if there is no mistake, and this site is indeed a platform, then sampling such a site to answer the research question outlined is almost a waste of time.

Has the work undertaken been able to address these questions and if not, why not?

The samples don't answer the specific question asked of the data and, indeed, the lack of dung beetles at platform level is not explicitly highlighted. Instead, the presence of possible indicators of dung many centimeters below platform level is wildly over interpreted as evidence of the use of the platform by animals. Given the nature of such sites, this is a somewhat unlikely scenario anyway unless it could be explained by means of other activities being carried out on the platform. None of this is discussed in the report though.

Comparative analysis

Again, this report lacks even the most basic comparative analysis.

Interpretation

There is an over-interpretation of some of the data, which leads to a rather problematic discussion and conclusions section. The essential wetland analysis is, however, accurate. It is the species chosen to represent other habitat and landscape types wherein lie the problems.

Identify limitations or problems with the work undertaken

Many of the sample limitations or problems that exist with Ballybeg apply here also. In addition, there are a couple of dubious identifications (in the absence of confirmed attempts to compare them with modern specimens) and an over-interpretation or simplification of the habitat data of

some beetles identified. In the absence of exact MNI for key species, it is difficult to assess if the interpretation is well grounded.

The fact that the platform is undated, and consequently the whole sequence of insect samples is also undated, makes comparing this dataset with others extremely difficult.

Innovation and creativity

The same criticism in terms of using MCR applies here. No other methods are used to compare the data, for example, ordination of the samples alongside other datasets to see if certain samples group together due to inherent similarities in their assemblages. This might help to elucidate similarities in peat formation processes at different points in time or the effects of trackway/platform construction on insect communities.

Look at the work in relation to the development of insect studies in Ireland over the last 10 years and asses the contribution the work may have made

Again, new studies are very welcome. This is essentially another worthy addition to the corpus of work already in existence. A check of the problematic species and a re-writing of the interpretation, coupled with some attempt at placing the work in its local, regional or national context, would make this a publishable study. It would be critical that *Uloma culinaris* is thoroughly checked before publication and, if confirmed, would be an extremely valuable addition to the growing list of extinct saproxylic fauna from Ireland (see Reilly 2011 for current list). A re-evaluation too of the research framework into which this analysis is being fitted is also needed. Clearly, this method of sampling to answer the key research question outlined for insect analysis is not suitable. Alternatively, other questions regarding peat basin development, increased acidification and effects of trackway/platform construction on the local bog environment could be addressed using these data.

Review Sheet: Kinnegad Bog, Co. Meath

Presence/absence of research framework

The same research framework (as Ballybeg and Littleton) is presented. Again, the analysis of Coleoptera is identified as the means to understand the function of sites, in particular the possible movement of animals across the bog.

Methods

Problems with methodology are the same as for Ballybeg and Littleton: lack of species list, MNI per sample or for key species, basic habitat statistics in tabular form or easily digestible graphic form, indications of comparative collection use etc.

Sampling

Problems with sampling methodology is as for Ballybeg and Littleton, given that, once again, the stated aims of the research framework is to understand the use of the trackways. The sampling method will not directly answer these questions, although they will answer other wider environmental context questions for each site.

Dating

For the two insect bulk sample sequences, reliance once again is placed on a single date from the two trackways examined (07E0497: ME-KND002, dated 1569 +/- 9BC and 07E0501: ME-KND0016 dated 1510-1260 BC). Again, there is precedent for this in other wetland insect studies, although for longer columns of samples, it would be preferable to independently date the sequence (Reilly 2006).

Quality and standard of the analysis

07E0501: ME-KND0016

Once again, the trackway position is not identified clearly in the analysis section – you have to wait until the discussion section before its made clear. No diagram or graph showing the habitat groups and the position of the trackway is presented (Fig. 4.21 is not helpful in this regard).

Habitat analysis is perfunctory and generally correct in the essentials. However, once again, the subtleties of analysing the habitat preferences of certain species in a wetland context are not clearly outlined. This leads in some cases to overly simplistic or selective presentation of habitat preferences of certain species.

Also, the clear separation of species that are living within the developing mire basin, at any point in time, and those that may be accidental casualties via flooding or erosion from the upland margin is not explicitly stated. While the presence of species such as *Agriotes obscurus* and *Phalacrus corruscus* may indicate the presence of grassland or cultivated land in the surrounding dryland, unless present in moderately high numbers they are no more than a hint at the presence of such landscapes. Indeed, *P. corruscus* is also known from sedges and could simply be representing the bog plant community rather than 'open grassland areas with cereals', as asserted in the report.

Again, without seeing a species list and MNIs, it is impossible to say if the interpretations presented are accurate or over-exuberant extrapolations based on very small numbers of individual species or groups of species.

07E0497: ME-KND002

The same general issues apply to the sequence of samples from this trackway. The definitive presence of particular kinds of habitats within the sequence of samples in stated. The presence of the trackway in samples 8 and 10 does not materially affect the assemblages, though this is not discussed, despite the overarching research aim. The presence of an important dung beetle in the deposit 5-15cm above the level of the trackway is given as evidence of the presence of animals '..(horses and cattle) after abandonment of the structure'. Later, in the overall conclusions, however, it is stated that 'the presence of insects associated with cattle dung suggests the trackway may have been used for movement of cattle'. It is not clear how they can be so definitive on the base of one dung beetle 5-15cm above the level of the trackway, but perhaps there is other data available upon which to base this assertion, which has not been presented in the report.

The presence of *Acupalpus meridianus* is again used as evidence of the presence of arable cultivation after abandonment of the structure, despite the other possible habitat niches it might occupy (see above). The analysis is, once again, somewhat perfunctory and simplistic.

Accuracy

07E00501: ME-KND0016

The presence in numerous samples of the beetle *Cercyon quisquillis* is curious. *C. quisquillis* is a possible indicator of dung, as stated in the report, while also occurring in rotting vegetation, fungi and compost. While its natural habitat origins are unclear, it generally has a strong association with human habitation from the early medieval period onwards, occurring in many urban archaeological contexts in places like York and Dublin. It is not impossible that it would occur in a wetland context in the past, in association with rotting vegetation and/or dung. To be the only indicator of dung, however, in an entire sequence of samples is surprising. As detecting the presence of animals at trackway level is stated as the most important research aim, the reader assumes that if their were multiple indicators of dung, especially actual dung beetles of the Scarabaeidae family, these would have been highlighted in the analysis alongside *Cercyon quisquillis*. They are not, however, which leaves the reader with a niggling doubt that this identification is in fact correct. It would have been useful if a picture of the species had been supplied in the report.

Reasons for why a particular type of analysis has been carried out – do the research questions stand up?

Again, there is a question as to whether the sampling methodology for both trackways actually matches the stated research aim, and, in the analysis as outlined, actually addresses that aim. The results are very much presented in a similar way to pollen analysis, trying to detect changes on the dryland margin and human activity, rather than the changes in the wetland environment, which insects are better suited to. The bulk of insect assemblages will always represent local site-specific changes with occasional casualties from further afield. The trackway may then supply additional species, some of which may provide answers as to site use. The column samples could be better used for detecting changes in the mire basin and specific targeted sampling could be used to assess the actual working surface of the trackway. The analysis as presented here doesn't make enough of the former and can't really address the latter adequately.

Has the work undertaken been able to address these questions and if not, why not?

No, for the reasons stated above.

Comparative analysis

Once again, no comparative analysis is carried out at either site.

Interpretation

Same problems as outlined above and for other sites.

Identify limitations or problems with the work undertaken

Same as above.

Innovation and creativity

None.

Look at the work in relation to the development of insect studies in Ireland over the last 10 years and asses the contribution the work may have made

Same as before.

Review Sheet: Giltown Bog, Co. Kildare

Presence/absence of research framework

Same framework as before.

Methods

Same methods as before, with same issues.

Sampling

Same sampling methodology as before, with same issues arising. The sampling method is best suited to picking up changes in the peat basin, and does so quite well. However, this is not well served by way the data is presented.

Dating

A single radiocarbon date from the trackway is used to date the sequence. In this case, the trackway lies at the base of the sequence.

Quality and standard of the analysis

The analysis follows the same pattern as all the previous reports and is accurate in all the essentials. The presence of large numbers of *Cercyon haemorrhoidalis* in the basal samples, at trackway level, is a very interesting and unusual finding. It could certainly point to the presence of dung at trackway and subsequent levels, although the fact that it is also found in rotting vegetation in wetter habitats needs to be highlighted a bit more. This is one of those situations where its current habitat preferences and, indeed, common occurrence in medieval cess-pits/animal byres etc may bias the interpretation of its presence in a wetland context. It could very well be indicative of dung, although the presence of other corroborative dung beetle species (i.e. the Scarabaeidae) would be helpful in this regard. The fact that there is no species list to examine is unfortunate.

Accuracy

Aclypea opaca (sample 13) is a pest of beet and turnip crops today but it is difficult to know if its presence in the peat deposits here is due to domesticated or wild beet and Brassica species in the surrounding dryland. It is generally less commonly associated with carrion, as is usual for members of the Silphidae.

Acidota cruentata (misspelled 'creutata') is not a specific indicator of cultivation and is more commonly associated with woodland and associated woodland habitats (Hyman 1994).

Reasons for why a particular type of analysis has been carried out – do the research questions stand up?

As before.

Has the work undertaken been able to address these questions and if not, why not?

As before.

Comparative analysis

None.

Interpretation

Somewhat too specific and literal. The subtleties of habitat preferences of some of the species selected for particular mention are lost. The assertion in the overall conclusions that the 'trackway was probably used for the transportation of animals, including sheep, cattle and horses' needs to be backed up with more data than is presented in the report.

Identify limitations or problems with the work undertaken

Same as before.

Innovation and creativity

None. MCR does not work well. No attempt to compare the datasets between the different bogs (i.e. Kinnegad and Giltown).

Look at the work in relation to the development of insect studies in Ireland over the last 10 years and assess the contribution the work may have made

Again, it is important to say that this work adds to the corpus of insect studies already undertaken in Ireland, and to that end is to be welcomed. Some additional analysis, comparative studies and better presentation of the data would help enormously towards making this a valuable piece of research.

Review Sheet: Lullymore Bog, Co. Kildare

Presence/absence of research framework

Same framework as before.

Methods

Same methods as before, with same issues.

Sampling

Same sampling methodology as before, with same issues arising. The sampling method is best suited to picking up changes in the peat basin, and does so quite well. However, this is not well served by way the data is presented.

Dating

A single radiocarbon date from the trackway is used to date the sequence, which is the standard method used for all of these reports.

Quality and standard of the analysis

Again, analysis follows a fairly typical pattern, with the usual issues outlined above applying here also.

Two species are worthy of note. *Gnormius nobilis*, a chafer, is identified in the sample underlying the trackway (sample 7). This beetle is not on the Irish list and is an extremely important finding, if correct. It is an 'old woodland' beetle and lives in hollows of old trees, not just willow (as stated in the report), but also oak and fruit tree species. The importance of this find is not brought out in the report, as the status of the beetle in Ireland is not alluded to. In addition, *Arpedium quadrum*, a rove beetle, found in sample 11 is also not on the current Irish list. While it may be overlooked, as the Staphylinidae family is not as well studied in Ireland as other beetle families, it may very well be a relict old woodland species also and no longer present here. However, a brief review of the BUGS database would suggest that *A. quadrum* is also found in woodland swamps, bogs and in moss so may not be a specific indicator of 'mould on hollow willows', as stated in the report. This is a very selective reading of the habitat data available for this species.

The status of these species in Ireland and the lack of Irish context for all of the findings is one of the biggest disappointments of these reports.

Accuracy

There is no particular reason to suspect that the identifications are not accurate, although the lack of reference to a comparative collection is unconventional. Familiarity with beetles from one period, deposit type or geographical location does not automatically mean that one is familiar with beetles from another period, deposit type or geographical location. Use of a comparative collection is vital to ensure accuracy.

Reasons for why a particular type of analysis has been carried out – do the research questions stand up?

As before.

Has the work undertaken been able to address these questions and if not, why not?

As before.

Comparative analysis

None.

Interpretation

Somewhat too specific and literal. The subtleties of habitat preferences of some of the species selected for particular mention are lost.

Identify limitations or problems with the work undertaken

Same as before.

Innovation and creativity

None. MCR does not work well. No attempt to compare the datasets between the different bogs (i.e. Kinnegad, Giltown and Lullymore).

Look at the work in relation to the development of insect studies in Ireland over the last 10 years and assess the contribution the work may have made

Again, it is important to say that this work adds to the corpus of insect studies already undertaken in Ireland, and to that end is to be welcomed. The finding of Gnormius nobilis, in particular if

confirmed, is an extremely important addition to the list of relict woodland species found in palaeoenvironmental contexts in Ireland. Some additional analysis, comparative studies and better presentation of the data would help enormously towards making this a valuable piece of research.

Review of Insect Analyses

Dr David Smith, Institute of Archaeology and Antiquity, University of Birmingham

1) Some of the ecological descriptions of species are essentially correct but rather problematic. For example *Pterostichus strennus* is discussed in detail and it is used to suggest, correctly that wet watersides and bog environments were probably present, however this description is followed by a list of potential but very specific environments such as woodland and carr in which this species could occur but for which it is not specific. Another example is that several species, for example *Phalacrus* spp. are used to suggest the presence of cereals and arable. They do occur on smuts on cereals but are also common on a wide range of waterside and bogland vegetation. Equally, other taxa are associated with very specific habitats but the descriptions given, in terms of landscape, are over broad. For example *Plateumaris discolour* is associated solely with cotton grass and therefore is a very strong indicator for acid bogland. However, in this text it is discussed in terms of a much broader set of habitats. The problem is that the ecology of the species has been mainly taken from 'bugs'. This is an excellent programme in itself but the ecology of the species and the landscapes in which they have been found are often over broad, sometimes too specific and contradictory leading to some confusion. In essence this problem needs tidying up rather than substantial rewriting.

2) I am concerned about the statistical calculations in terms of ecological groupings. There are several existing schemes as to which groups are commonly used and which species are assigned to each group (e.g. Robinson 1991; 1993; Kenward 1978 and Hall and Kenward 1990; Reilly 2004). Which scheme has been used and how it has been calculated is not made clear. I know from the work I saw in Katie's PhD that some mistakes were made with these calculations. For example all species were assigned an ecological code. Often this resulted in species with very board ecologies being pushed into groupings such as 'woodland' were they did not disserve to sit. I have not seen the full species lists but this may explain why woodland appears to be present in the figures but is not specifically mentioned in the text. I also know form the work presented in her PhD that the % have been calculated for very small faunas. The problem here is that the presence of a single individual from one particular grouping can therefore appear to dominate the faunas. I also know from having looked at Katie's PhD that the % calculations of aquatic and terrestrial faunas were not done separately as is the norm.

3) I am not sure of the reason for including the MCR data in the analysis. The MCR has great validity in terms of its use in Pleistocene faunas but its validity in terms of temperature reconstruction in post glacial landscapes is less clear. I also know, again from Katie's PhD that these temperature ranges are often derived from a very limited number of taxa meaning that the temperature calculations are not very reliable.

REVIEW OF WOOD REPORTS

Dr Ingelise Stuijts, The Discovery Programme Dublin

Wood reports discussed

Five section discussing wood identification and woodworking aspects of Bord na Móna excavations have been looked at for this review. They related to excavations from 1999-2000 (ADS monograph 2), 2001-2002 (ADS Monograph 3), Kinnegad bog report 2009 (relating to excavations in 2007), Ballybeg bog report 2009 (for excavations in 2008), and Littleton Bog report 2009 (also for excavations carried out in 2008).

Content of the wood reports

All reports list the wood species that have been identified in the archaeological wood samples, and summarize briefly the results per licensed excavation. The last three reports are very similar in structure and presentation.

The first report looked at 637 wood elements, the second at 300 elements, the other reports respectively 237, 347 and 291 elements.

The 2001-2002 report shows pie charts with wood species according to period, position (superstructure/substructure), and compares the results to the identifications from Raftery and colleagues in 1990s. The later reports have information on woodworking with bar diagrams showing the point characteristics.

The first report identifies 3 taxa that are not indigenous to Ireland, namely cf Castanea sativa, cf Aesculus hippocastanum and cf Ribes sp. It is suggested that these species are contaminants from later periods, but that also two of the taxa could have been confused with similar-looking taxa (Quercus and Populus respectively).

Although the last three reports mentions that work has been undertaken with regards to ring counts, ring measurements, bark presence and general condition, there is no table listing this information. Any observation outside species identification and diameter is not discussed in a systematic way.

Review and recommendations

Quality

The 2001-2002 report compares the data with older data from Raftery's excavations where identifications were being carried out in the field based on a visual inspection. It should be emphasized that no secure wood identifications can be done without microscopic examination of wood samples. The only exception may be oak, when well-developed rings and rays are present, and can be observed and checked using a hand-held magnifying lens.

The reviewed research was undertaken by experienced wood specialists and identified under proper laboratory circumstances. The emphasis was on wood species analysis.

It is recommended that when aberrant wood species are found this is checked against other work and with other specialists working in the area. Those samples should be kept for further checks in the future. The three species mentioned in the 2000-2001 report are extremely unlikely to have been present on site (it could for example be suggested that cf. Ribes in fact was Erica). It is recommended in such cases to use 'unidentified' as result and mention species suggestions and anatomical description in a remark section, as to not disturb the record of tree species identified from Irish sites.

There are relatively few wood species in Ireland compared to the Continent. In the bog excavations from the last 20 years, even less wood species appear. This is no surprise, as wood was often selected for a specific purpose. In a bog and fen situation this is rather limited, namely to access or cross a wet situation. Thus the number of wood species in these bog excavations by their very nature will always be limited. The value of wood research lies beyond species identification, in the detailed examination of wood elements to elucidate the archaeological site situation as well as the nature of the woodlands surrounding these wet areas.

Standard of the analysis

As mentioned above, the emphasis of all reports was on wood species identification, and this is the aspect that was most discussed. With regards to further observations, these hardly function in the discussions, except for woodworking (point type, angle of cutting, facet type). There are no charts or diagrams to visually present the results, except in the 2001-2002 report. But this latter report fails to give actual numbers per site.

Nothing is done with ring counts or age of the pieces. Where ring counts are given these are generally less than 20, but some larger timber fragments of Fraxinus and Quercus almost invariably have more than 100 rings.

One recommendation is to show all observations in table form as appendices, in a condensed form and to use charts or bar diagram to illustrate the results and make the report more accessible to a reader. One condensed table may suffice to show the total results per site or including periods.

Any information on the wood samples beyond wood species can be highly informative on the local site conditions and may help explain why a site was made in that specific location in the first place, how long it was in function and the function itself. Close collaboration with beetle specialist is necessary, especially when conclusions about a function are drawn by archaeologists.

Observations that should be noted include presence of roots, level and form of degradation, traces of beetle and other insect channels, presence and location of bark (upper/underside), presence of knots, discolouring of outer surface, general appearance, age and ring counts and growth patterns (fast, slow, variable). This would facilitate further comparative research but more importantly focus the reader on the text instead of the elaborate tables.

Accuracy

The wood specialists are very qualified and have analyzed the wood samples according to their brief. However, as mentioned above, one should be very careful with the identification of unusual species. A recommendation could be to set up a specific protocol for the handling of such cases. In Ireland the Irish Wood Anatomist Association (IWAA) has been in function for a number of years and has the practise to exchange material for checks and suggestions. It could be suggested to have a direct line to the IWAA for anyone working on Irish material outside Ireland, thus facilitating communication, exchange and collaboration.

As a side remark the reports also lists older finds from the bog areas, in some cases with wood. It is recommended to trace back those wood remains and check their identification. For example, a wooden yoke made of fir is mentioned for Timahoe East. Fir (Abies alba) is a species not indigenous for Ireland and thus this remark would indicate an import from Scandinavia!

Presence/absence of framework

There is no indication that wood specialists were present on site to suggest a sampling strategy and to become familiar with the site. This has become the norm over the last 10 years in Ireland. Even a site visit at the appropriate time would facilitate better results. Thus a clear recommendation is to have the relevant wood specialist on site for at least part of the excavation period. Preferably this should be done in collaboration with other specialists, so that discussions in the field can take place facilitating more integrated results.

Dating

The dating of wood samples is described in separate dendrochronological chapters and there is no indication of radiocarbon dates. There is no link between dated samples and wood report, so any reader will have difficulties tracing back a dated timber. Very interestingly for the Littleton and Ballybeg wood samples a clear link to the Derryville bog complex is indicated. It is a pity that this is not further explored. There are clear links with especially the Middle and Late Bronze Age sites.

Methods

The 2001-2002 report suggests that 22% of the assemblage excavated should be enough from a wood specialist point of view. This is a bit minimal, considering that this means that not more than 10-15 elements maximal from a cut will have been analysed (300 samples from 24 sites, no exact numbers given). The only conclusion with such small samples is the presence of certain species, but no conclusion can be taken about absence of other species.

There is a huge reduction in sample numbers compared with for example the Derryville Bog excavations, where ca. 8000 samples were identified, compared with 637 wood elements in 2000, 300 elements in 2001, and later even fewer elements (237, 347 and 291 elements). Of course a single-plank trackway gives fewer elements than lets say a hurdle, nevertheless these minimal numbers seem absolutely inadequate.

Sampling

There is no information about reasons for sampling, and only fragmentary links between sample location and wood sample. It is difficult to glean the exact sample reason. For example, the single-plank trackway should have been completely sampled and analyzed, with the underlying substructure.

Recommendations

It is recommended that the results of any research feeds back into the Irish research community. There is now an on-line database WODAN available where archaeological wood and charcoal data can be entered to facilitate further research and to establish an archive for Irish work. This database can be used by any researcher and includes European wood species and some tropical and North African species. It also has downloadable forms and instructions, all to make research more comparable in the future. An archive of printed and electronic files has been made as part of the WODAN project for any forthcoming and past wood and charcoal research, to be accessible for any researcher.

Comparative analysis

The wood report from 2001-2002 compares wood identifications with those from Raftery and colleagues in the 1990s. The later reports looks at the woodworking details from the Wetland Unit and concludes more work is needed to investigate the Iron Age toolmarks. There is no distinction between Early Bronze Age, Middle Bronze Age and Late Bronze Age toolmarks.

It is an omission that nothing from the Derryville bog excavation has been taken into account, especially because Littleton and Ballybeg are part of the same bog complex and basically lie not more than 5-15 km maximum rom this area. Also there is a lack of integration with other palaeo-environmental research thus leaving the wood research to an assessment stage.

For example, it is very interesting that the dendro dates for Littleton Bog in some cases are very similar to those of Derryfadda 23 and Killoran 18. This period is very interesting from an archaeological and a bog hydrological point of view. The large mortice holes present in site 399 and 400 could point to re-used timbers but this aspect is completely overlooked and should have been compared to the Derryville bog sites so close by.

Interpretation

The interpretation of the sites focuses on species identification. When wetland species are involved (Alnus, Betula, Salix) a local origin is indicated. When dry-land species are found (Fraxinus, Quercus, Ulmus) this points to a dry-land origin. This could be much more elaborate discussed, but is difficult for a reader to glean from the reports without comparative charts, maps and diagrams.

For example, the narrow rings noted for Fraxinus and Quercus in Littleton Bog deserve more attention and may not related to pure 'environmental stress' or 'climatic deterioration'. Generally 'climatic deterioration' or 'environmental stress' are very much noted in the reports, but not explored in detail. For this, close collaboration between the specialists should have occurred with proper dated pollen diagrams.

In Derryville bog, mature ash/oak woodland was noted in several areas around the bog in the Bronze Age on the margins. Here, the situation was very much determined by unstable local bog hydrological situation, an aspect completely overlooked in the Littleton/Ballybeg excavations.

Research questions

The research questions focus on wood identifications and – in the Littleton/Ballybeg reports- woodworking aspects of points, but do not compare with other current research. No obvious research questions are gleaned from the reports except 'presence' or 'absence' of wood species or specific characteristics. There seems to be little exchange with other specialists and there is no integration of results.

Limitations or problems with the work undertaken

It was mentioned that some wood elements could not be identified due to their condition. This may be a limit to identification though this is rather unusual. On another level this fact can give important information on the archaeological site itself, with regards to moisture, exposure and access. Thus it is important to verify that the quality of the samples was not determined by long-term exposure during excavation of even milling, but by the specific site conditions in the bog. If the wood specialist was not on site this could be a problem.

It is not clear whether the wood specialist received a full cross-section of an element or just a subsample intended for identification only.

The reports in general do not show an overview of a site with the identified elements and this might also have hampered a detailed interpretation including the archaeology.

Contribution to the wood studies development in Ireland over the last 10 years

Any work forthcoming from excavations with results regarding wood identification and woodworking complements the data available for wood research in Ireland and as such should be part of the database of wood and charcoal research. So far the emphasis is on wood species identification and as such informs us only on the wood species present in a bog situation.

The woodworking from Littleton and Ballybeg are another aspect that indicates that the there might be local differences during the Iron Age.

Recommendations summarized

- It is recommended that all research from Irish bogs feeds back into the research community in Ireland, using for example the WODAN database.
- Any unusual or controversial species identification should be kept 'unidentified' until securely established.
- The number of samples is too small for many conclusions. Sampling strategies should be put in place to avoid this, and numbers should return to at least one third or c. 33% of an opened area.
- The wood specialist should at least visit the site once to become familiar with the site and its surroundings, preferably joined with other palaeo-environmentalists.
- Detailed information on wood elements should be added as appendices, with a summary result, maybe per period, in one table form included.
- Pie charts or bar diagrams are needed to increase the reader's joy.
- Maps with location of samples taken are needed – if wished in the appendix – and pictures or drawings of the toolmarks are as of yet missing.

- A range of wood details (age/ring counts and measurements, diameter, quality aspects such as root presence, beetle channels, discolouring, quality of the wood etc.) should be systematically noted and used in the discussions.
- Archaeological site comparison to local data and recent research is necessary.
- The Littleton/Ballybeg reports should be closely evaluated with the Derryville bog results.
- A strategy should be put in place for specific toghers to try and reconstruct the trees/woodland required, including complete measurements of timbers.

General Comments on Phosphorous Analyses of Raised Bog Sequences

Dr Rebecca Bartlett, GEES,

University of Birmingham

It's not clear what the analyses were or how they were done. It refers to phosphate (PO43-(aq)), but I would have thought they'd have measured total phosphorous (total P in the solid?) – especially given the mg/Kg units.

2. Phosphorous is notoriously tricky and not well understood in soils/sediments/peats – there will be lots of biogeochemistry going on affecting solubility, mineral stability, biological activity etc and this can alter P form and fate on very tight temporal and spatial scales. It is not surprising that there are differences in the data and that the profiles are 'noisy'.

3. I guess they are looking for land use history – it would be interesting to see how this has been used in other studies in dry soils (p 79) but there is no ref. It is hard to know what it is they are looking for but I would agree with the assumption that there is no indication of anything unusual or unexplained in the P profiles.

4. From the data, it seems that P in this peat is fairly consistently between 60 and 160 mg/Kg, with lots of noise but no persistent trend with depth in a single site or comparable across the sites. (it would be interesting to know how this compares to other peats). There are 3 profiles with outliers above 160 mg/Kg (figs 4.11, 4.12, 4.14) but these are single data points. Would you expect them to correspond to data from particular horizons? I am guessing that if these outliers were coincident with other changes they might be considered more significant?

5. I general, I would have done away with the descriptions of P rising and falling at certain depths and the use of the word 'significant' – without the outliers, there are no trends.

6. This would be more powerful with some data from other sites to compare both the absolute concentrations and the level of noise.

7. Resolution might be an issue? Depending on the time interval over which you would expect to see (presumably sharp) changes in P, you might need better sampling resolution, or else be able to make a qualified judgement as to whether single outliers can be considered real. Otherwise, useful P peaks might look like outliers??

APPENDIX 7 REVIEW ARCHIVE

Report ID	Commissioning Body	Contractor	Author	Year of Work	Date of Submission	Category	Licence No.	Report Title
PR001	NMS	IAWU	IAWU	1990	1993	Excavation	E577	IAWU Interim report: Excavations at Clonfinlough, County Offaly
PR002	Minorco Lisheen	IAWU	IAWU	1995	01/03/96	Survey	n/a	Final report on the archaeological assessment of part of Derryville Bog 1995
PR003	NMS	IAWU	O Carroll	1996	1996	Excavation	96E0151	Preliminary report on the excavation of a multi-period trackway in Lemanaghan, Co. Offaly
PR004	NMS	IAWU	Bermingham	1996	Nov-96	Excavation	96E0150	Preliminary report on the results of a short rescue excavation of mid seventh century AD single plank walkway in Co. Offaly
PR005	NMS	n/a	NMS	1996	Nov-96	Policy	n/a	Discussion Document on Wetlands Archaeology (Confidential)
PR007	NMS	IAWU	Bermingham	1997	Dec-97	Excavation	97E0281	Preliminary report on the excavation of a pitfall trap with the remains of a red deer skeleton in situ and on the excavation of a horse skeleton in Garryduff Bog, Co. Galway
PR008	BNM and NMS	Bermingham	Bermingham	1998	2003	Excavation	98E0452	Final Report: the Excavation of Human Remains in Tumbeagh Bog, Lemanaghan, Co. Offaly.
PR010	BNM	IAWU	IAWU	1998	26/10/98	Mit Strat	n/a	Preliminary Report on the Assessment and Mitigation Project September to November 1998.
PR011	BNM	IAWU	IAWU	1998	1998	Mitigation Strategy	n/a	Final Report on the Assessment and Mitigation Project 1998 undertaken in Lemanaghan, Co. Offaly
PR014	NMS	IAWU	O Carroll and Whitaker	1998	Apr-98	Site visit	n/a	Site investigation report of three toghers in the Lullymore Bogs complex, Co. Kildare
PR016	NMS	N/A	NMS	1998	N/A	Policy	n/a	Agreed principles for the protection of wetlands archaeology in BNM bogs
PR017	BNM and NMS	IAWU	Bermingham	1999	Apr-99	Excavation	98E0452	Preliminary Report: the excavation of human remains in Tumbeagh Bog, Lemanaghan, Co. Offaly
PR018	NMS	ADS	ADS	2008	2008	Method Statement	08E0402	Excavation of a roundwood and brushwood trackway in Littleton Bog, Longford Pass South townland
PR019	NMS	ADS	ADS	2007	2007	Method Statement	07E0632	Excavation of a togher in Gilltown Bog, Gilltown townland, Co. Kildare

Report ID	Commissioning Body	Contractor	Author	Year of Work	Date of Submission	Category	Licence No.	Report Title
PR020	BNM	ADS	O Carroll	1999	Oct-99	Excavation	99E0287	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR021	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0288	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR022	BNM	ADS	O Carroll	1999	Oct-99	Excavation	99E0289	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR023	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0290	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR024	BNM	ADS	O Carroll	1999	Oct-99	Excavation	99E0291	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR025	BNM	ADS	O Carroll	1999	Oct-99	Excavation	99E0292	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR026	BNM	ADS	O Carroll	1999	Oct-99	Excavation	99E0325	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR027	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0326	Excavations in Castletown bog, in the townland of Castlearmstrong, Leabeg, Corrafurrish and Cortrabeg, Co. Offaly
PR028	BNM	ADS	O Carroll	1999	Nov-99	Excavation	99E0377	Report on archaeological excavation in Tumbeagh Bog
PR029	BNM	ADS	O Carroll	1999	Nov-99	Excavation	99E0378	Report on archaeological excavation in Tumbeagh Bog
PR030	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0444	Excavations in Killaghintober Bog, in the townland of Castlearmstrong, Co. Offaly
PR031	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0445	Excavations in Killaghintober Bog, in the townland of Castlearmstrong, Co. Offaly
PR032	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0446-7	Excavations in Killaghintober Bog, in the townland of Castlearmstrong, Co. Offaly
PR033	BNM	ADS	O Carroll	1999	Dec-99	Excavation	99E0448	Excavations in Killaghintober Bog, in the townland of Castlearmstrong, Co. Offaly

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PR034	BNM	ADS	Whitaker	1999	Sep-99	Excavation	99E0404, 99E0405, 99E0406	Report on archaeological excavations in Tumbeagh Bog
PR035	BNM	ADS	Dunne	1999	?	Assessment	n/a	1999 Archaeological Reassesment. Blackwater Bog, Co. Offaly. Priority areas, draft catalogue
PR036	BNM	ADS	ADS	1999	?	Survey	n/a	Lough Bannow Survey 1999
PR037	BNM	ADS	ADS	1999	?	Assessment	n/a	Re-assessment Mountdillon Bogs - non priority sites
PR038	BNM	ADS	Dunne	1999	?	Assessment	n/a	Draft- Re-assessment Mountdillon Bogs - Priority sites
PR039	NMS	IAWU	IAWU	1999	16/09/99	Assessment	n/a	Longford Paper Survey. Desk-based assessment
PR041	BNM and NMS	ADS	ADS	1999	Jul-99	Progress report	n/a	Archaeological re-assessment and mitigation 1999. Progress report
PR042	BNM and NMS	ADS	ADS	1999	Oct-99	Progress report	n/a	Archaeological re-assessment and mitigation
PR043	IAWU	IAWU	Stanley	2000	May-00	Site visit	n/a	A late Mesolithic Site in Corrlanna townland, Co. Westmeath
PR044	BNM	ADS	O Carroll	2000	Sep-00	Site visit	n/a	Report on a site visit to Corralanna townland, Co. Westmeath
PR045	NMI	IAWU	Murray	2000	Sep-01	Excavation	00E0536	Stratigraphic Report on a wooden vessel from Pallasboy Townland, Toar Bog, Co. Westmeath
PR046	BNM	ADS	O Carroll and Dunne	2000	Feb-00	Mit Strat	n/a	Preliminary Mitigation Strategy Derrynagun, Corhill, Blackwater and Mountdillon
PR047	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0333	Stratigraphic report for an excavation in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR048	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0399	Stratigraphic report on the excavation of a small togher in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR049	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0468	Stratigraphic report on the excavation of a togher in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR050	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0441	Stratigraphic report on the excavation of a togher in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR051	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0440	Stratigraphic report on the excavation of a togher site in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR052	BNM	ADS	O Carroll	2000	Oct-00	Excavation	00E0439	Stratigraphic report on the excavation of a small brushwood site in Corhill Bog, in the townland of Lisdermot, Co. Offaly

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PR053	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0400	Stratigraphic report and metal detection survey for an excavation in Corhill bog, in the townland of Straduff and Lisdermot, Co. Offaly
PR054	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0432	Stratigraphic report for an excavation in Corhill Bog, in the townland of Straduff and Lisdermot, Co. Offaly
PR055	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0460	Stratigraphic report for an excavation in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR056	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0461	Stratigraphic report for an excavation in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR057	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0463	Stratigraphic report for an excavation in Corhill Bog, in the townland of Lisdermot, Co. Offaly
PR058	BNM	ADS	Whitaker	2000	Dec-00	Excavation	00E0620	Stratigraphic report on the excavation of a gravel and wood togher in Monettia Bog, in the townland of Ballinvalley, Co. Offaly
PR059	BNM	ADS	O Carroll	1999	Aug 99?	Excavation	00E0621	Report on excavations in Monettia Bog, Ballinavally, Co. Offaly
PR060	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0493	Stratigraphic report on the excavation of a togher in Derrynagun Bog, in the townland of Leabeg, Co. Offaly
PR061	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0494	Stratigraphic report on the excavation of a Bronze Age plank trackway in Derrynagun Bog, in the townland of Leabeg, Co. Offaly
PR062	BNM	ADS	Whitaker	2000	Dec-00	Excavation	00E0495	Stratigraphic report on the excavation of a togher in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR063	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0496	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR064	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0497	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR065	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0498	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR066	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0499	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR067	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0500	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly

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PR068	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0501	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR069	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0580	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR070	BNM	ADS	O Carroll	2000	Dec-00	Excavation	00E0581	Stratigraphic report for an excavation in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR071	BNM	ADS	Whitaker	2000	Oct-00	Excavation	00E0582	Stratigraphic reporton the excavation of a brushwood site in Derrynagun Bog, in the townland of Lemanaghan, Co. Offaly
PR072	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0516	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR073	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0517	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR074	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0518	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR075	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0519	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR076	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0520	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR077	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0521	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR078	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0522	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR079	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0457	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR080	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0458	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR081	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0459	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR082	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0456	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR083	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0455	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford

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PR084	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0452	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR085	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0454	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR086	BNM	ADS	Dunne	2000	Jan-01	Excavation	00E0453	Stratigraphic report for an excavation in Lough Bannow Bog, in the townland of Corlea, Co. Longford
PR087	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0702	Licence to survey an industrial peatland at BNM's Littleton Group
PR088	NMS	IAWU	IAWU	2000	31/10/00	Survey	n/a	Draft catalogue of archaeological sites Toar Bog, Co. Westmeath
PR089	NMS	IAWU	IAWU	1996/97	14/04/00	Survey	n/a	Draft catalogue of archaeological sites Corhill Bog, Co. Offaly
PR090	NMS	N/A	NMS	2000	N/A	Tender	n/a	The ASI Peatland Survey 2001
PR091	BNM	ADS	Whitaker	2001	?	Excavation	00E0372	Stratigraphic report for an excavation in Derryad Bog, in the townland of Cloonfore, Co. Longford
PR092	BNM	ADS	Whitaker	2001	Jan-01	Excavation	01E0765-6	Preliminary report on excavations carried out in Derrycolumb 4 Bog, Derrindiff and Derrylough, Co. Longford
PR093	BNM	ADS	Whitaker	2001	Nov-01	Excavation	01E0584-92	Preliminary report on excavations carried out in Derrycolumb 5 Bog, Derrindiff and Derrylough, Co. Longford
PR094	BNM	ADS	Whitaker	2001	Nov-01	Excavation	01E0761	Preliminary report on an excavation carried out in Begnagh Bog, Corragarrow, Co. Longford
PR095	BNM	ADS	O Carroll	2001	Oct-01	Excavation	01E0593-5, 618	Stratigraphic reports for excavations in Blackwater Bog, in the townlands of Cloniff and Curraghmore, Co. Offaly
PR096	BNM	ADS	O Carroll	2001	Oct-01	Excavation	01E0697	Stratigraphic report for excavations in Lough Bannow III Bog, in the townlands of Derryglogher and Derraghan More, Co. Longford
PR097	BNM	ADS	O Carroll	2001	Oct-01	Excavation	01E0767-9	Stratigraphic report for excavations in Begnagh Bog, in the townlands of Corragarrow and Cloonmore, Co. Longford
PR098	BNM	ADS	Whitaker	2001	Nov-01	Excavation	01E0841	Retrieval of a wooden vessel from Daingean Bog, Co. Offaly

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PR099	NMS	IAWU	IAWU	2001	08/01/02	Survey	01E0424	Peatland survey 2001. Archaeological survey report of Clonad Bog, Co. Offaly
PR100	NMS	IAWU	IAWU	2001	28/03/02	Survey	01E0476, 01E0475, 01E0664	Peatland Survey 2001: Archaeological survey report: Cavemount, Esker and Derryhinch Bogs, Cos Meath, Offaly and Westmeath
PR101	NMS	IAWU	IAWU	2001	18/01/02	Survey	01E0663	Peatland Survey 2001: Archaeological survey report: Ballybeg Bog, Co. Offaly
PR102	NMS	IAWU	IAWU	2001	12/06/02	Survey	01E0424, 01E0476, 01E0475, 01E0664, 01E0663	Peatland Survey 2001.Supplementary archaeological report
PR103	NMS	IAWU	IAWU	2001	13/03/02	Survey	01E0477	Peatland Survey 2001: Archaeological survey report: Daingean Bog, Co. Offaly
PR104	NMS	NMS	Coles	2001	Mar-01	Policy	n/a	An evaluation of current peatland survey and excavation strategy commissioned by Dúchas, The Heritage Service from John Coles
PR105	BNM	BNM	BNM	2002	Jan-02	Misc.	n/a	Rehabilitation of cutaway bog
PR106	BNM	ADS	O Carroll and Rohan	2002	Sep-02	Survey	unlicensed	Report on the archaeological re-assessment of Derrylahan Bog, Blackwater Works, Co. Offaly in advance of the construction of the ash disposal area for the new peat fuelled power station at Shannonbridge, Co. Offaly
PR107	Project Management	ADS	Whitaker	2002	30/10/02	Monitoring	02E0451	Archaeological monitoring report. Ground reduction works of the new power station at Shannonbridge, Co. Offaly (PL 01/187)
PR108	NMS	ADS	Whitaker	2002	Dec-02	Policy	n/a	Collation and evaluation of archaeological data from Bord na Móna bogs Vols I and II
PR109	BNM	ADS	ADS	2002	May-02	Mitigation Strategies	n/a	Mitigation/Excavation strategies (2002-2003) for Ballybeg and Clonad Bogs, Co. Offaly and non-priority areas, Mountdillon Bog, Co. Longford
PR110	BNM	ADS	O Carroll	2002	Mar-03	Excavation	02E0930-32, 09E1034-4, 02E1200-03, 02E1197-99	Stratigraphic reports for excavations in Ballybeg bog in the townlands of Togher, Barrysbrook, Toberdaly and Clonin, Co. Offaly

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PR111	BNM	ADS	Whitaker	2002	Sep-02	Survey	unlicensed	Report on the archaeological re-assessment of Derraghan Bog, Derraghan More, Mountdillon Works, Co. Longford
PR112	NMS	IAWU	IAWU	2002	16/05/03	Survey	02E0838, 02E0941, 02E0942, 02E0840, 01E0667ext, 02E0839	Peatland Survey 2002. Supplementary archaeological survey report
PR113	NMS	IAWU	IAWU	2002	06/03/03	Survey	02E0942, 01E0667 ext	Peatland Survey 2002. Archaeological survey report: Derryarkin and Drumman Bogs, Cos Offaly and Westmeath
PR114	NMS	IAWU	IAWU	2002	13/02/03	Survey	02E0838, 02E0840, 02E0839	Peatland Survey 2002: Archaeological survey report: Ballycon, Derrycricket and Mountlucas Bogs, Co. Offaly
PR115	NMS	IAWU	IAWU	2002	09/02/02	Survey	02E0941	Peatland survey 2002. Archaeological survey report: Cloncreen Bog, Co. Offaly
PR116	BNM	ADS	Whitaker	2003	Apr-03	Mitigation Strategy	n/a	Mitigation strategy for Bord na Móna Bogs 2003
PR117	BNM	ADS	Corcoran	2003	?	Excavation	03E1221	Investigation of the find spot of partial human remains in Ballivor Bog, County Meath
PR118	BNM and NMS	ADS	Whitaker and Corcoran	2003	Oct-03	Progress report	03E1117, 03E1119-21, 03E1223-4, 03E0983, 03E0926, 03E1001, 03E0906,03E0869, 03E0999, 03E0984, 03E1143	Report on wetlands projects carried out by ADS Ltd in 2003
PR119	NMS	ADS	Whitaker	2003	Autumn 2004	Survey	03E1319-20	Peatland Survey 2003. Oweninny Group. Bellacorrick and Bangor Bogs, Co. Mayo
PR120	NMS	ADS	Whitaker	2003	Dec-03	Survey	03E1319	Peatland Survey 2003. Oweninny 1, Bellacorrick Bogs, Co. Mayo
PR121	BNM	ADS	Whitaker	2003	Jan-03	Excavation	02E0967-8, 02E0970-4, 02E0976, 02E0978	Nine excavations in Derrycolumb 3 Bog, in the townlands of Derrynagran and Derrymany, Co. Longford

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PR122	BNM	ADS	Corcoran and Whitaker	2003	Dec-03	Excavation	03E1117, 19-23, 03E0983, 03E0926, 03E1001, 03E0906, 03E0999, 03E0869, 03E0984, 03E1143	Fourteen excavations in Cloncreen Bog, Ballynakill and Ballykilleen, Co. Offaly
PR123	NMS	ADS	Whitaker	2003	2003	Method Statement	03E1320	Licence to Survey an Industrial Peatland at BNM's Oweninny Group
PR124	BNM	ADS	Whitaker	2003	Mar-03	Progress report	n/a	BnM mitigation current status report March 2003
PR126	NMS	IAWU	Moore and Stanley	2003	17/12/03	Site visit	n/a	Report on site at Cooldorragh townland, Co. Offaly
PR127	NMS	IAWU	IAWU	2003	17/10/03	Survey	03E1127	Peatland Survey 2003. Archaeological survey report: Ballykean Bog, Co. Offaly
PR128	NMS	IAWU	IAWU	2003	19/01/04	Survey	03E1127	Peatland survey 2003. Supplementary archaeological survey report
PR129	NMS	IAWU	IAWU	2003	30/09/03	Survey	03E1241	Peatland survey 2003, Clonerl Bog
PR130	BNM	ADS	Whitaker	2004	Sep-04	Progress report	04E0722-7, 04E0729, 04E0797-802	BnM Mitigation 2004
PR131	BNM	ADS	Whitaker and O Carroll	2004	May-04	Excavation	Multiple	Draft excavation report 1999/2000 Lemanaghan plus separate graphics document
PR132	NMS	ADS	Whitaker	2003	Dec-03	Survey	03E1320	Peatland Survey 2003. Oweninny 2, Bangor Bogs, Co. Mayo
PR133	NMS	ADS	Whitaker	2004	22/12/04	Survey	04E0997-1010, 04E1033, 04E1123-6, 04E1163	Peatland Survey 2004: Derrygreenagh Bogs, Counties Offaly and Kildare
PR135	BNM	ADS	Corcoran	2004	Jul 04 and Oct 04	Excavation	04E0722-29	Archaeological excavations in Clonad Bog, Clonad and Rathfeston townlands, Co. Offaly
PR136	BNM	ADS	Whitaker and Turrell	2004	Jul-04	Excavation	04E0798-802	Archaeological excavations in Ballykean Bog, Kilbeg townland, Co. Offaly
PR137	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0729	Licence to excavate a site in Clonad Bog, Co. Offaly (OF-CLO-0027)
PR140	NMS	ADS	Turrell	2005	2006	Survey	05E0819	Peatland Survey 2005. Allen Bog, Co. Kildare
PR141	NMS	ADS	Turrell	2005	2006	Survey	05E0826	Peatland Survey 2005. Gilltown Bog, Co. Kildare

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PR142	NMS	ADS	Turrell	2005	2006	Survey	05E0827	Peatland Survey 2005. Ummeras Bog, Co. Kildare
PR143	NMS	ADS	Turrell	2005	2006	Survey	05E0825	Peatland Survey 2005. Kilberry Bog, Co. Kildare
PR144	NMS	ADS	Whitaker	2005	Mar-06	Survey	Multiple	Peatland Survey 2005: Allen, Kilberry and Coolnamona Bogs, Counties Kildare, Laois, Meath, Offaly and Westmeath
PR145	BNM	ADS	Whitaker	2005	Mar-05	Mitigation Strategy	n/a	Mitigation strategy for Daingean (South) Bog
PR146	BNM	ADS	Whitaker	2005	Apr-05	Mitigation Strategy	n/a	Mitigation strategy for Toar Bog, Co. Westmeath
PR147	BNM	ADS	ADS	2005	?	Mitigation Strategy	n/a	Mitigation strategy for Derrygreenagh
PR148	BNM	ADS	Turrell	2005	Dec-05	Excavation	05E0551-7	Preliminary report on archaeological excavations at Daingean (South) Bog 2005
PR149	BNM	ADS	Whitaker	2005	2006	Excavation	05E0727-31	Excavations in Rathgarret and Pallsaboy, Toar bog, Co. Westmeath
PR150	BNM	ADS	Turrell	2005	May-05	Monitoring	04E1660	Report on monitoring groundworks at Srahmore/Attavally, Bangor Erris, Co. Mayo
PR151	NMS	IAWU	McDermott and Rynne	2005	20/02/05	Site visit	n/a	Toghers in Timahoe West and Drehid Townlands
PR153	NMS	ADS	Whitaker	2006	Sep-07	Survey	06E0696, 06E0697, 06E0698, 06E0699, 06E0700, 06E0701-6	Peatland Survey 2006 Littleton Group of bogs, Counties Tipperary, Kilkenny and Laois
PR154	BNM	ADS	Whitaker	2006	2007	Excavation	06E0509-17, 06E0519-27, 06E0575	Excavations in Killavalley and Pallsaboy, Toar Bog, Co. Westmeath
PR155	BNM and NMS	N/A	BNM and NMS	2006	N/A	Tender	n/a	Peatland Archaeological Services 2007-09
PR156	NMI	N/A	Kelly	2006	N/A	Policy	n/a	The National Museum of Ireland and Peatlands Archaeology
PR157	BNM	ADS	Rohan	2007	Dec-08	Excavation	07E0496-501	Report on archaeological excavations Knockersally and Moydrum or Bogstown townlands. Kinnegad Bog, Co. Meath

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PR158	BNM	ADS	Corcoran	2007	Dec-08	Excavation	07E0630	Archaeological excavations Lullymore East Bog and Lullymore East townland, Co. Kildare
PR159	BNM	ADS	Corcoran	2007	10/12/08 and 01/12/08	Excavation	07E0631-2	Archaeological excavations Gilltown Bog, Derryarogue and Gilltown towlands, Co. Kildare
PR160	BNM	ADS	Rohan and Corcoran	2007	Dec-09	Excavation	07E0496, 97, 99-501, 07E0631-2	Final report archaeological excavations in Kinnegad Bog, Co. Meath, and Lullymore East and Gilltown Bogs, Co. Kildare
PR161	BNM	ADS	Rohan	2008	01/12/F1508 and 26/1/09	Excavation	08E0394-8	Report on archaeological excavations in Ballybeg townland,Co. Tipperary, Ballybeg Bog, Co. Tipperary
PR162	BNM	ADS	Turrell	2008	10/12/08 and 26/01/09	Excavation	08E0399-402, 08E0404-12	Excavations in Littleton Bog, Co. Tipperary
PR163	BNM	ADS	Rohan	2008	Sep-09	Excavation	08E0394-8	Final report on archaeological excavations in Ballybeg Bog, Co. Tipperary
PR164	BNM	ADS	Turrell and Rohan	2008	Sep-09	Excavation	08E0399-402, 08E0404-12	Final report on archaeological excavations in Littleton Bog, Co. Tipperary
PR165	BNM	ADS	Whitaker and Rohan	2008	Dec-08	Excavation	02E1202 ext	Report on archaeological testing at Ballybeg. Co. Offaly
PR166	BNM	ADS	Whitaker and Rohan	2009	10/03/09	Mitigation Strategy	n/a	BnM 2009 Proposed mitigation strategies
PR167	BNM	ADS	Rohan	2009	Feb-10	Excavation	09E0294-6	Report on archaeological excavations in Baunmore and Inchirourke townlands, Baunmore Bog, Cos Tipperary and Kilkenny
PR168	BNM	ADS	Rohan	2009	Dec-09	Excavation	09E0298-299	Preliminary report on archaeological excavations in Templetouhy townland, Templetouhy Bog, Co. Tipperary
PR169	BNM	ADS	Rohan	2009	Dec-09	Excavation	02E1202 ext	Preliminary report on archaeological investigations in Toberdaly and Clonin townlands, Ballybeg Bog, Co. Offaly
PR171	BNM	ADS	Rohan	2009	Apr-09	Assessment	09E0402-13, 09E0415	Blackwater and Boora Group of Bogs: Desk based re-asessment survey

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PR172	BNM	ADS	Rohan	2009	Dec-09	Survey	09E0402-13, 09E0415	Draft report on 2009 re-assessment field survey Blackwater and Boora Groups of Bogs, Counties Offaly, Galway, Westmeath and Roscommon
PR173	BNM	ADS	Whitaker	2010	Apr-10	Site visit	n/a	Report on site visit to Killinagh Bog, Co. Kildare
PR174	BNM	N/A	BNM	2010	N/A	Tender	n/a	Peatland Archaeological Services 2010-13. Request for Tenders
PR175	BNM	ADS	Halpin	2004	Jul-04	Site visit	n/a	Report on an archaeological site visit to Lisclogher Bog, Delvin, Co. Westmeath
PR176	BNM	ADS	Whitaker	—	—	Mit Strat	n/a	Archaeological mitigation strategy for Kilbeg townland, Ballykean Bog, Co. Offaly
PR177	NMI	N/A	NMI	—	—	Policy	n/a	Archaeology and Bogland - Code of Practice
PR178	BNM	ADS	ADS	2001-2	Apr-04	Excavation	Multiple	Wetland excavations 2001/2002. Mountdillon Group of bogs
PR179	NMS	N/A	NMS	2002	N/A	Policy	n/a	Draft Review of Strategy for peatland archaeology in BNM bogs
PR180	ADS	ADS	Halpin	2004	2004	Misc.	n/a	Letter from ADS to N Dunne re: archive and samples Mountdillon
PR181	BNM	N/A	BNM	—	—	Policy	n/a	Memo D Wynne re: NMS proposal for Archaeological Unit following Coles review
PR182	NMS	N/A	NMS	05/04/06	—	Tender	n/a	The archaeological survey of Ireland Peatland Survey 2006: request for tenders
PR186	DEHLG, BNM, NMI	n/a	DAHG, BNM, NMI	2011	—	Policy	n/a	Code of Practice between the Department of Arts, Heritage and the Gaeltacht, the National Museum of Ireland and Bord na Móna
PR187	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	27/04/06	—	Minutes	n/a	AMLC Meeting Minutes 27/4/06
PR188	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	18/10/08	—	Minutes	n/a	AMLC Meeting Minutes 18/10/08
PR189	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	07/12/07	—	Minutes	n/a	AMLC Meeting Minutes 7/12/07
PR190	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	04/03/08	—	Minutes	n/a	AMLC Meeting Minutes 4/3/08
PR191	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	16/10/08	—	Agenda	n/a	AMLC Meeting Minutes 16/10/08

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PR192	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	10/12/08	—	Minutes	n/a	AMLC Meeting+J100 Minutes 10/12/08
PR193	DEHLG	n/a	DEHLG	2003	—	Tender	n/a	The Archaeological survey of Ireland Peatland Survey 2003 (Ballykeane): request for tenders
PR194	DEHLG	n/a	DEHLG	2003	—	Tender	n/a	The Archaeological survey of Ireland Peatland Survey 2003: request for tenders
PR195	DEHLG	n/a	DEHLG	2004	—	Tender	n/a	The Archaeological survey of Ireland Peatland Survey 2004: request for tenders
PR196	DEHLG	n/a	DEHLG	2005	—	Tender	n/a	The Archaeological survey of Ireland Peatland Survey 2005: request for tenders
PR197	DEHLG and BNM	ADS	Rohan	2007/08	11/09/09	Survey	07E0740-45, 07E0906-8, 07E0643-5	Peatland Survey 2007 and 2008. Blackwater, Derryfadda, Coolnagun, Mountdillon Group of Bogs. Cos Offaly, Galway, Longford, Westmeath, Roscommon
PR198	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	02/06/10	N/A	Agenda	n/a	AMLC Mtg Agenda for mtg 02/6/10
PR199	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	17/03/11	N/A	Agenda	n/a	AMLC Mtg Agenda for mtg 16/3/11
PR200	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	11/03/09	N/A	Minutes	n/a	AMLC Mtg Minutes mtg 11/3/09
PR201	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	02/06/10	N/A	Minutes	n/a	AMLC Mtg Minutes mtg 02/06/10
PR202	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	16/12/10	N/A	Minutes	n/a	AMLC Mtg Minutes mtg 16/12/10
PR203	DEHLG, BNM, NMI	n/a	DEHLG, BNM, NMI	16/12/10	N/A	Agenda	n/a	AMLC Draft Agenda mtg 16/12/10
PR204	NMS	ADS	ADS	2009	2009	Method Statement	?	Application for Licence to Excavate inc. Method Statement: Templetouhy Bog TN TPY2a-c
PR205	NMS	ADS	ADS	2009	2009	Method Statement	?	Application for Licence to Excavate inc. Method Statement: Survey - Blackwater Bog
PR209	NMS	IAWU	IAWU	2003	2003	Method Statement	03E1127	Archaeological Survey of Ballykean Bog, Co. Offaly (inc. Parent Method Statement)
PR210	NMS	IAWU	IAWU	2001	2001	Method Statement	01E0424	Archaeological Survey of Clonad Bog, Co. Offaly (inc. Parent Method Statement)

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PR211	BNM	ADS	Turrell	2005	2005	Method Statement	05E0819	Peatland Survey Allen, Co. Kildare
PR212	BNM	ADS	Turrell	2005	2005	Method Statement	05E0825	Peatland Survey Kilberry, Co. Kildare
PR213	BNM	ADS	Turrell	2005	2005	Method Statement	05E0557	Excavation, Daingean, Co. Offaly
PR214	BNM	ADS	Turrell	2005	2005	Method Statement	05E0556	Excavation, Daingean, Co. Offaly
PR215	BNM	ADS	Turrell	2005	2005	Method Statement	05E0555	Excavation, Daingean, Co. Offaly
PR216	BNM	ADS	Turrell	2005	2005	Method Statement	05E0554	Excavation, Daingean, Co. Offaly
PR217	BNM	ADS	Turrell	2005	2005	Method Statement	05E0553	Excavation, Daingean, Co. Offaly
PR218	BNM	ADS	Turrell	2005	2005	Method Statement	05E0552	Excavation, Daingean, Co. Offaly
PR219	BNM	ADS	Turrell	2005	2005	Method Statement	05E0+I236551	Excavation, Daingean, Co. Offaly
PR220	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0792	Peatland Survey Lisclogher
PR221	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0793	Peatland Survey Bracklin
PR222	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0794	Peatland Survey Carranstown
PR223	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0795	Peatland Survey Kinnegad
PR224	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0796	Peatland Survey Ballivor
PR225	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0797	Peatland Survey Monettia
PR226	BNM	ADS	Whitaker	2005	2005	Method Statement	05E0798	Peatland Survey Derryclure
PR227	BNM	ADS	Rohan	2007	2007	Method Statement	07E0496	Excavation Knockersally

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PR228	BNM	ADS	Turrell	2008	2008	Method Statement	08E0412	Excavation Littleton
PR229	BNM	ADS	Turrell	2008	2008	Method Statement	08E0411	Excavation Littleton
PR230	BNM	ADS	Turrell	2008	2008	Method Statement	08E0410	Excavation Littleton
PR231	BNM	ADS	Turrell	2008	2008	Method Statement	08E0409	Excavation Littleton
PR232	BNM	ADS	Turrell	2008	2008	Method Statement	08E0408	Excavation Littleton
PR233	BNM	ADS	Turrell	2008	2008	Method Statement	08E0407	Excavation Littleton
PR234	BNM	ADS	Turrell	2008	2008	Method Statement	08E0406	Excavation Littleton
PR235	BNM	ADS	Turrell	2008	2008	Method Statement	08E0405	Excavation Littleton
PR236	BNM	ADS	Turrell	2008	2008	Method Statement	08E0404	Excavation Littleton
PR237	BNM	ADS	Turrell	2008	2008	Method Statement	08E0402	Excavation Littleton
PR238	BNM	ADS	Turrell	2008	2008	Method Statement	08E0401	Excavation Littleton
PR239	BNM	ADS	Turrell	2008	2008	Method Statement	08E0400	Excavation Littleton
PR240	BNM	ADS	Turrell	2008	2008	Method Statement	08E0399	Excavation Littleton
PR241	BNM	ADS	Rohan	2008	2008	Method Statement	08E0395	Excavation Littleton
PR242	BNM	ADS	Rohan	2008	2008	Method Statement	08E0396	Excavation Littleton
PR243	BNM	ADS	Rohan	2008	2008	Method Statement	08E0397	Excavation Littleton
PR244	NMS	IAWU	Murray	2001	2001	Method Statement	01E0424	Peatland Survey

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PR245	NMS	IAWU	Murray	2001	2001	Method Statement	01E0475	Peatland Survey
PR246	NMS	IAWU	McDermott	2001	2001	Method Statement	01E0476	Peatland Survey
PR247	NMS	IAWU	Murray	2001	2001	Method Statement	01E0664	Peatland Survey
PR248	NMS	IAWU	Murray	2001	2001	Method Statement	01E0663	Peatland Survey
PR249	NMS	IAWU	McDermott	2001	2001	Method Statement	01E0667	Peatland Survey
PR250	NMS	IAWU	Moore	2002	2002	Method Statement	02E0839	Peatland Survey
PR251	NMS	IAWU	Moore	2002	2002	Method Statement	02E0840	Peatland Survey
PR252	NMS	IAWU	Moore	2002	2002	Method Statement	02E0838	Peatland Survey
PR253	NMS	IAWU	McDermott	2002	2002	Method Statement	02E0941	Peatland Survey
PR254	NMS	IAWU	Murray	2002	2002	Method Statement	02E0942	Peatland Survey
PR255	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0696	Peatland Survey
PR256	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0697	Peatland Survey
PR257	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0698	Peatland Survey
PR258	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0699	Peatland Survey
PR259	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0700	Peatland Survey
PR260	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0701	Peatland Survey
PR261	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0702	Peatland Survey

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PR262	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0703	Peatland Survey
PR263	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0704	Peatland Survey
PR264	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0705	Peatland Survey
PR265	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0706	Peatland Survey
PR266	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0522	Excavation
PR267	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0523	Excavation
PR268	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0524	Excavation
PR269	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0525	Excavation
PR270	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0526	Excavation
PR271	NMS	ADS	Whitaker	2006	2006	Method Statement	06E0527	Excavation
PR272	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0722	Excavation
PR273	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0723	Excavation
PR274	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0724	Excavation
PR275	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0725	Excavation
PR276	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0726	Excavation
PR277	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0727	Excavation
PR278	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0728	Excavation

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PR279	NMS	ADS	Corcoran	2004	2004	Method Statement	04E0729	Excavation
PR280	NMS	ADS	Whitaker	2004	2004	Method Statement	04E0798	Excavation
PR281	NMS	ADS	Whitaker	2004	2004	Method Statement	04E0799	Excavation
PR282	NMS	ADS	Turrell	2004	2004	Method Statement	04E0800	Excavation
PR283	NMS	ADS	Turrell	2004	2004	Method Statement	04E0801	Excavation
PR284	NMS	ADS	Turrell	2004	2004	Method Statement	04E0802	Excavation
PR285	NMS	ADS	Rohan	2007	2007	Method Statement	07E0497	Excavation
PR286	NMS	ADS	Rohan	2007	2007	Method Statement	07E0498	Excavation
PR287	NMS	ADS	Rohan	2007	2007	Method Statement	07E0499	Excavation
PR288	NMS	ADS	Rohan	2007	2007	Method Statement	07E0500	Excavation
PR289	NMS	ADS	Rohan	2007	2007	Method Statement	07E0501	Excavation
PR290	NMS	ADS	Corcoran	2007	2007	Method Statement	07E0630	Excavation
PR291	NMS	ADS	Corcoran	2007	2007	Method Statement	07E0631	Excavation
PR292	NMS	ADS	Corcoran	2007	2007	Method Statement	07E0632	Excavation
PR293	NMS	ADS	Rohan	2009	2009	Method Statement	09E0402	Re-survey
PR294	NMS	ADS	Rohan	2009	2009	Method Statement	09E0403	Re-survey
PR295	NMS	ADS	Rohan	2009	2009	Method Statement	09E0404	Re-survey

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PR296	NMS	ADS	Rohan	2009	2009	Method Statement	09E0405	Re-survey
PR297	NMS	ADS	Rohan	2009	2009	Method Statement	09E0413	Re-survey
PR298	NMS	ADS	Rohan	2009	2009	Method Statement	09E0415	Re-survey
PR299	NMS	ADS	Rohan	2009	2009	Method Statement	09E0294	Excavation
PR300	NMS	ADS	Rohan	2009	2009	Method Statement	09E0296	Excavation
PR301	NMS	ADS	Rohan	2009	2009	Method Statement	09E0298	Excavation
PR302	NMS	ADS	Rohan	2009	2009	Method Statement	09E0299	Excavation
PR303	INSTAR	UOR/ADS	Branch et al.	2008	2008	Progress report	n/a	Climate Change and Human Activity in Wetlands of Ireland Progress Report 08
PR304	INSTAR	UOR/ADS	Branch et al.	2009	2009	Progress report	n/a	Climate Change and Human Activity in Wetlands of Ireland Progress Report 09
PR305	INSTAR	UOR/ADS	Branch et al.	2009	2009	Progress report	n/a	Climate Change and Human Activity in Wetlands of Ireland Summary 09
PR306	EPA	UCD	UCD	2011	2011	Policy	n/a	EPA Strive Report (Bogland)
PR307	BNM	BNM	BNM	n/a	2011	Sustainability Report	n/a	BNM_Sustainability_Report 2010_2011
PR308	BNM	BNM	BNM	n/a	2010	Sustainability Report	n/a	BNM_Sustainability_Report 2009_10
PR309	BNM	BNM	BNM	n/a	2009	Sustainability Report	n/a	BNM_Sustainability_Report 2008_09
PR310	BNM	BNM	BNM	n/a	2008	Annual Report	n/a	BNM Annual Report 07/08
PR311	BNM	BNM	BNM	n/a	2009	Annual Report	n/a	BNM Annual Report 08/09
PR312	BNM	BNM	BNM	n/a	2010	Annual Report	n/a	BNM Annual Report 09/10

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PR313	BNM	BNM	BNM	n/a	2007	Annual Report	n/a	BNM Annual Report 06/07
PR314	BNM	BNM	BNM	n/a	2006	Annual Report	n/a	BNM Annual Report 05/06
PR315	BNM	BNM	BNM	n/a	2005	Annual Report	n/a	BNM Annual-Report-04-05
PR316	BNM	BNM	BNM	n/a	2004	Annual Report	n/a	BNM Annual-Report-03-04
PR317	BNM	BNM	BNM	n/a	2004	Corporate Social Responsibility	n/a	BNM CSR 2003-04
PR318	BNM	BNM	BNM	n/a	2005	Corporate Social Responsibility	n/a	BNM_Corporate-Social-Resp-Rept-0405
PR319	BNM	BNM	BNM	n/a	2006	Corporate Social Responsibility	n/a	BNM_CSR-Rept-2005-2006
PR320	BNM	BNM	BNM	n/a	2007	Corporate Social Responsibility	n/a	BNM_CSR-Rept-2006-2007
PR321	BNM	BNM	BNM	n/a	2008	Corporate Social Responsibility	n/a	BNM_CSR-Rept-2007-2008
PR322	NMS	NMS	NMS	1998	n/a	Policy	n/a	Advice Notes on Excavation Licenses
PR323	NMS	NMS	NMS	2011	n/a	Policy	n/a	Peatland Classifications
PR324	NMS	NMS	NMS	2010	n/a	Policy	n/a	Peatland Classifications