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Review of the Exmoor Mires Restoration Project

Final Report

by

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Executive Summary

1. Introduction

The Exmoor Mire Restoration Project (EMRP) 2006-2010 aimed to restore the natural hydrology of degraded blanket bogs on Exmoor by blocking up the network of old drainage ditches. This project will shortly finish and funding has been secured from South West Water for a new and larger 'Mires on the Moors' project which could potentially rewet up to 2,500 hectares of peatland on Exmoor. The EMRP Steering Group commissioned the Countryside and Community Research Institute (CCRI) to undertake an external and independent review of peatland restoration work on Exmoor to help guide future activity.

The two main aims of the review were:

- i) to conduct a review of peatland restoration on Exmoor to date; and
- ii) to give guidance to the Steering Group on how best to proceed with peatland restoration, while furthering National Park purposes, and having regard to the economic and social well being of the local community.

2. Methodology

The research used both desk based methods and the collection of primary data, involving:

- *Review of existing data* held by the EMRP, including monitoring reports, site plans, project progress reports, a future hydrological plan and future project plans.
- *Review of 22 UK peatland restoration projects* highlighting examples of best practice with respect to community and stakeholder engagement which might be transferable to Exmoor.

In total, the review team interviewed and consulted with 60 experts, land managers and stakeholders

- *Expert interviews* - in-depth, semi-structured interviews with 11 Steering Group representatives and other experts within the partner organisations.
- *Land manager interviews* - in-depth, semi-structured, mostly face-to-face interviews with 19 land managers, including current participants and those managing land with potential for rewetting, to identify: the impacts of project activity on existing farm management and the farm business; farmers' experience of and attitudes to the project; and to elicit views on future project work involving the farming community.
- *Stakeholder workshop and interviews* - facilitation of a stakeholder workshop and interviews with 18 stakeholders to explore the achievements of the mire restoration on Exmoor to date, and discuss ideas for future activity.

3. Key Findings

Ditch blocking – The EMRP has developed a good understanding of ditch blocking techniques most appropriate to Exmoor. The EMRP almost doubled its original target for ditch blocking, blocking, 49,967 m of ditches on 12 sites, resulting in the restoration of 313 ha, exceeding the original target of 250 ha.

Biodiversity – Extensive vegetation monitoring by the EMRP has revealed that ditch blocking has successfully encouraged an increase in abundance and richness of plant species associated with wetter conditions. Aquatic invertebrates have also benefitted from increased pools of water.

Hydrology – Limited resources and difficulties encountered with the hydrological monitoring equipment impacted on the quality of hydrological data obtained. Analysis of the dipwell data by the Project Officer and visual observations revealed a rise in the water table at Exe Head since 1998, with a less evident rise in the water table at Blackpitts. To date, changing flow patterns have not been analysed so the impact of ditch blocking on downstream flows is unclear. Lessons learnt from EMRP hydrological monitoring have been incorporated into a new and comprehensive hydrological monitoring plan for the Mires on the Moors project which has been reviewed and endorsed by UK academics.

Historic Environment - The actual extent of the impacts on the historic environment resulting from mire restoration activity is difficult to ascertain: to a great extent concern has been and continues to be about the potential for damage. Recommendations focused on the need to continue integrating the historic environment into all aspects of project activity.

Landscape - No major concerns about the long-term, landscape-scale impact of the project on the Exmoor moorland landscape were identified. A number of minor visual impacts, such as loose bales in the water, were observed and should be avoided in the future.

Access – Project procedures are in place to consider recreational access issues on each proposed site. Some limited access restrictions for the hunt due to mire restoration were identified, but overall the impact on access for recreationalists was low. Landowners were concerned about public liability issues on mire restoration sites and required some legal clarification.

Agriculture - The impact of mire restoration on farm management varied: for some it improved grassland quality; for others it ran in conjunction with their agri-environment scheme and had little impact, whilst others saw it as reducing the long-term agricultural quality of their land with inadequate compensation. Some specific concerns related to possible hindrance to general farming access and stock checking and increases in ticks and liver fluke.

Communication - The EMRP achieved widespread promotional press coverage, but was less effective at communicating and engaging with the local community, resulting in some local concerns and misunderstandings about the project. Ideas for future potential communication mechanisms were proposed by stakeholders. Land managers appreciated the one-to-one approach adopted by the Project Officer.

Education - Educational outreach was not one of the original objectives of the EMRP, nevertheless the Project Officer has spent some time on educational visits in order to further the understanding of the project. At a national level the EMRP has contributed to the understanding of peatland restoration through presentations and national reports. More locally the educational impact has been limited and the review presents ideas as to how the educational benefits of the project can be enhanced.

Local community involvement – The EMRP has used volunteers to help with project activities and has focused on using local contractors to construct ditch blocks and cut bales, although there are relatively few contractors available locally to undertake this specialist work.

Governance and decision-making - some stakeholders felt excluded from the decision-making process and thought their views should be incorporated into the project. The proposed governance structure for the Mires on Moors project offers opportunities for more inclusive decision-making incorporating an Advisory Board of local representatives who will give strategic direction to the project and a Project Delivery Group with a responsibility for project management.

4. Conclusions and Recommendations

The review concluded that the EMRP has achieved a substantial amount of ditch blocking on Exmoor within a short period. It suggested that lessons learnt from the EMRP will provide a firm basis on which to develop and implement the larger and more ambitious Mires on the Moors project. To provide guidance in the development of the new project, 49 recommendations were presented covering all aspects of project activity.

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1. Introduction

1.1 Background to Study

1. In the late 1990s the Exmoor National Park Authority (ENPA) began work with the Environment Agency (EA) and English Nature to look at ways of improving the ecology of moorland by blocking ditches which drained areas of blanket bog. This original phase was initiated by a concern amongst stakeholders in the wider catchment that changes to the hydraulic regime in the river was in part linked to changes in land management in the uplands. It had a project objective 'To modify water management in upland areas of Exmoor in order to influence stream and river hydrology. To achieve this by improving the quality of existing moorland and restoring agriculturally improved land to a more natural state. The aim of such work is to restore the hydrologically and ecologically intact blanket mire systems that pollen and peat analysis suggest were once more widespread on Exmoor'. This ambitious objective was set before advances in the level of understanding amongst both practitioners and researchers led to a more pragmatic approach to what benefits moorland restoration may have on a catchment, and at what scale. At the time the relative scale of impacts was not understood – and this is still one of the routes of enquiry in the 2010-15 phase.

2. In 2006, South West Water (SWW) joined as a major funder and with three other bodies, ENPA, Natural England (NE) and the Environment Agency (EA) formed a partnership and launched the Exmoor Mire Restoration Project (EMRP). A Steering Group was set up and a Project Officer was appointed. English Heritage subsequently joined the Steering Group. To date over 300 hectares of moorland have been “rewetted” using a variety of techniques.

3. The Exmoor Mire Restoration Project is due to end in October 2010 and will be replaced by a new project as part of the the Mires on the Moors project. In 2009, South West Water (SWW) was granted consent by OFWAT under the Periodic Review 2009 to spend up to £3.8m on catchment management in Dartmoor and Exmoor. It is expected that potentially up to 2,500 hectares of peatland soils could be rewetted on Exmoor. It is thought that this will help to ensure the long term conservation of the peatland soils, stabilise carbon emissions and encourage sequestration of carbon, improve wildlife habitats, ensure favourable Site of Special Scientific Interest (SSSI) conditions, increase water storage in the uplands and help to ensure that the water draining the moors is of high quality and continuous supply.

4. OFWAT stipulated as a condition of expenditure that future mire restoration work should have a strong focus on monitoring and research. The project partners also felt that there should be a greater capacity for engagement and communication with farmers and land managers in implementing the proposals, together with greater engagement with the local community to address any concerns arising from peatland restoration work.

5. The Exmoor Mire Restoration Project (EMRP) 2006-2010 has had a high national profile and very strong support from the national Agencies. However, concerns about the effectiveness of rewetting have been raised, particularly in relation to the impact on stock

management, access, landscape and the historic environment and doubts expressed about the effectiveness of the techniques in relation to the benefits anticipated. The Steering Group, therefore, felt it was timely to commission an external and independent review of the mire restoration on Exmoor to guide future activity.

1.2 Objectives of Review

6. The Countryside and Community Research Institute (CCRI) was commissioned by the Exmoor Mire Restoration Project Steering Group in May 2010 to undertake a review of the EMRP. There were two main aims to this review:

- i) to conduct a review of peatland restoration to date; and
- ii) to give guidance to the Steering Group on how best to proceed with peatland restoration, while furthering National Park purposes, and having regard to the economic and social well being of the local community.

1.3 Report Structure

7. The remainder of this report is divided into three sections. Section 2 provides details of the methodological approach adopted for the review. The main review findings with recommendations are presented in Section 3. Section 4 provides a summary of the recommendations and discusses the use of an adaptive management approach to encourage and organise peatland restoration work on Exmoor.

2. Methodology

8. This section outlines the methods employed in reviewing the Exmoor Mire Restoration Project. The methodology was divided into two phases: desk-based research and field-based research. The methods employed in each phase are described in detail below.

2.1 Desk-based research

Review of existing data

9. The first phase involved a review of existing data held by the Exmoor Mire Restoration Project, by the project partners and others on peatland restoration on Exmoor between 1997 and 2009 and on future plans. This included monitoring reports, site plans, project progress reports, a future hydrological plan and future project plans.

Review of existing peatland restoration and management projects

10. A review of existing peatland restoration and management projects in the UK was also undertaken. A starting point for the review was the website www.peatlands.org.uk which contains a compendium of peatland restoration and management projects. The aim of the review was to identify best practice that might inform future peatland restoration activity on Exmoor. A proforma was designed against which each project was described, including factors such as objectives of project, the peatland restoration activities, stakeholders engagement mechanisms, stakeholder participation, duration, scale, funding. The review particularly looked for examples of best practice with respect to community and stakeholder engagement which might be transferable to Exmoor. In total, 22 projects with similar objectives to the Exmoor Mire Restoration project were reviewed. A summary of the projects reviewed can be found in Appendix 1.

2.2 Field-based research

Site visits

11. Members of the review team, including the team archaeologist, undertook visits to the project sites over 2 days accompanied by the EMRP Project Officer. This helped the team to develop a better understanding of the nature of the project work and the issues specific to Exmoor and provide context for the review. The site visits were also important in helping to develop appropriate questions for the interviews and the stakeholder workshop.

Expert interviews

12. The review team undertook in-depth, semi-structured interviews with 11 Steering Group representatives and other experts within the partner organisations (see Table 2.1). These interviews were designed to develop an understanding of the impacts and effectiveness of the work to date, to signpost particular local concerns and to obtain views based on the interviewees' experience of how best to encourage, support and organise future peatland restoration activity. Eight of these interviews were conducted on the telephone, whilst 2 interviews were undertaken face-to-face.

Table 2.1 Experts interviewed

Expert	Organisations
Flemming Ulf Hansen	Steering Group member, Natural England
David Smith	Steering Group member, Mire Restoration Project Officer
Mary Rose Lane	Steering Group member, Environment Agency
Vanessa Straker	Steering Group member, English Heritage
Martin Ross	Steering Group member, South West Water
Sarah Bryan	Steering Group member, ENPA
Graham Wills	ENPA, Head of Conservation and Land Management
Rob Wilson North	ENPA, Historic Environment Manager
Ali Hawkins	ENPA, Wildlife Conservation Officer
Nigel Stone	ENPA, Chief Executive
Dr. Richard Brazier	Exeter University

Landowner and grazier interviews

13. The review team conducted a series of in-depth, semi-structured interviews with a total of 19 landowners and graziers between 17th May and 16th June 2010. Eight of the interviews were conducted with land managers currently involved in the project and 11 with land managers whose land had potential for rewetting. A copy of the questionnaire used for both groups can be found in Appendix 2. Of the 19 interviews, 17 were conducted face-to-face on the farm, and 2 were conducted on the telephone. In total, 7 land managers declined to be interviewed, either because they felt they had insufficient knowledge of the project to contribute to the review or because they were too busy at the time of the interviews. The questions were designed to identify the impacts of project activity on existing livestock management and the farm business; identify farmers' experience of and attitudes to the project; and to elicit views on how future work involving the farming community should be encouraged, supported and organised.

Stakeholder workshop and interviews

14. The diversity of functions and attributes of Exmoor is reflected in the range of stakeholders who have an interest in the peatland restoration on Exmoor. It was important, therefore, that the views of as many of these stakeholders as possible were incorporated into the review. In total the views of 30 stakeholders were obtained.

15. The review team facilitated a stakeholder workshop which was attended by 12 stakeholders. The format of the workshops was consultative, and facilitated by three members of the review team. The workshop used two participatory exercises to explore the achievements of the mire restoration on Exmoor to date, and discuss ideas for future activity. A summary note of the workshop is presented in Appendix 3.

16. Follow-up telephone interviews were conducted with those stakeholders who were unable to attend the workshop or whom we wished to interview in more depth about specific issues. Discussions were held with Exmoor Society members, a local ecologist, a park ranger, a project volunteer, and a hunting representative.

17. In total, the review team interviewed and consulted with 60 experts, land manager and stakeholders as shown in Table 2.2.

Table 2.2 Summary of interviews conducted

	Face-to-face	Telephone	Non-responses	Total
Experts	2	9	0	11
Land managers - current	8		1	8
Land managers - potential	9	2	6	11
Stakeholders workshop	12			12
Stakeholder interviews	13	5	0	18
Total	44	16		60

2.3 Analysis

18. All the interviews were written up and analysed in a systematic way to identify common themes and key issues. The farmer interviews were analysed using the software package Nvivo. The use of this specialist software allowed the team to bring the data produced into a common 'workspace'. This facilitated the development of a consistent and rigorous analytical framework.

19. The analysis focused on the specific areas identified by the Steering Group in the project brief, namely:

- Biodiversity
- Water and peat
- Landscape
- Historic Environment
- Access
- Agriculture
- Communication
- Education
- Involvement with local people
- Governance and decision-making

3. Biodiversity and Peat Restoration

3.1 The current state of knowledge

20. Blanket bog occurs only on the wettest, level plateau tops where rainfall is highest on peat that is usually more than 0.5 m deep. Exmoor retains 310 ha of blanket bog out of a national total of 15,000 ha. This small area is important for the maintenance of the geographic range of this internationally scarce habitat with a unique association of plants and animals. It is internationally important because it lies near the southern edge of its British range. Blanket bog is composed of a mixture of *Sphagnum* moss, cotton grasses, purple moor grass, deer sedge, heather and crossleaved heath with the scarcer bog asphodel and round-leaved sundew also present. Species which are at or near their southern British limits include crowberry and cranberry, all of which are widespread on moorland in northern Britain and have a major southern English outpost on Exmoor (Land Use Consultants, 2004).

21. The peatland areas on Exmoor are in a deteriorating state, in part as a result of drier conditions brought about by centuries of moorland reclamation, agricultural drainage and domestic peat-cutting. On Exmoor a large area of ditches were hand dug in 19th century to improve agricultural production, for example in the former Royal Forest of Exmoor, when land was owned by the Knight family. More recently, larger machine dug ditches were created between the 1960s and 1980s.

22. Features, such as drainage ditches and peat cuttings, can damage the stratigraphic integrity of mire systems, and may also impair the natural hydrology of mires and moorland. The structure of peat is separated into an upper acrotelm layer and a lower catotelm layer. The upper acrotelm layer contains mosses, higher plants and roots, and aerobic bacteria form peat from the decomposing organic matter. This layer has variable water content and is no more than 30 cm deep. It forms a protective layer for the lower catotelm layer which is in constant water and therefore anaerobic. The full decomposition of peat is inhibited in this layer because decomposer bacteria are unable to survive the acidic and waterlogged conditions (Lindsay, 1995). The anaerobic conditions found where the water table is very close to the surface prevent the decomposition of the organic matter, so the peat layer can develop over millennia to depths of up to 10 m (Holden and Burt, 2003). The depth of the peat on Exmoor ranges from between 0.1 m to 2.5 m, with an average depth of 0.33 m (Bowes, 2006).

23. The integrity of the peat depends on maintaining the barrier between the acrotelm and catotelm; any disturbance of this barrier, such as the construction of drainage ditches, threatens the saturated and anaerobic nature of the catotelmic layer and leads to degradation of the peat. Also a drop in water table brought about by drainage ditches removes waterlogged conditions required by *Sphagnum* mosses which are highly dependent on water logging. These species then start to decrease in abundance leaving the acrotelm exposed, which further dries the peat through the increased exposure to the atmosphere (Wheeler & Shaw, 1995).

24. As peat degrades CO₂ is released into the atmosphere. Research has shown that restoration of peatlands halts oxidation and reverses the processes of damaged peatlands as net CO₂ producers into net CO₂ accumulators through active peat growth and CO₂ absorption from the atmosphere. Targets for restoration of damaged areas and deposition of peat in healthy growing mires will result in carbon storage and contribute to combating global warming. The EMRP Project Report (2009) states that the total amount of carbon stored on Exmoor's moorlands could be in the region of 1 million tons. If all this material dried out and released its carbon it would equate to 3.7 million extra tons of carbon dioxide in the atmosphere. In addition each hectare of wet healthy mire can sequester approximately 1 ton of carbon/hectare/year in peat growth and storage.

25. Exmoor's central moorlands are currently dominated by purple moor grass (*Molinia*) which has replaced areas of former heather, sedge and moss communities. Whilst *Molinia* is an integral part of Exmoor's moorland vegetation and particularly wet heaths, blanket mires and valley bogs, it supports little wildlife when it becomes dominant to the exclusion of virtually all other plants. At Larkbarrow, Chambers *et al.* (1999) showed using palaeoecological methods that the rise to dominance of *Molinia* was indeed very recent, within the last century, and so attempts to control its spread could be justified in terms of there being no historical precedent for its present dominance.

26. Improvement to the peatland areas will enhance biodiversity, conservation status and wildlife value, thereby ensuring the achievement of favourable condition for this internationally important habitat. It is thought that the re-wetted blanket bog will also improve conditions for breeding water birds that are currently threatened with localised extinction or are at extremely low population densities in the south-west region (SWW, 2009).

3.2 Biodiversity aims of the project

27. The Mire Restoration Project Proposal 2006-2009 states that the aims and objectives of the Exmoor Mires Restoration Project during the period 2006-2009 was "To undertake an agreed programme of habitat restoration that results in physical improvements to the structure, function and distribution of upland wetlands (blanket, hillside and valley mires) on Exmoor. Work will continue on existing ENPA land and be extended to privately owned land in order to improve hydrological conditions and achieve ecological (BAP) targets in the Exe catchment initially" (EMRP Proposal, 2006, p. 4).

28. Thus the specific biodiversity aim of the Mire Restoration Project was to restore damaged peatlands in the uplands of Exmoor and was focused on achieving Biodiversity Action Plan (BAP) targets. These included:

- UK Habitat Action Plan for Blanket Bog;
- UK Habitat Action Plan for Fens;
- England Biodiversity Strategy;
- South West's Regional Biodiversity Action Plan (& Implementation Plan); and
- 2001 Exmoor Biodiversity Action Plan.

29. The Mires on the Moors project has the broader biodiversity goals of preserving and enhancing the existing peatland areas on Exmoor. The project proposal states that:

“The moors of Exmoor and Dartmoor support remnant areas of ecologically important upland wetlands, blanket bogs and valley mires. *Mires-on-the-Moors* will target these fragile, valuable and hydrologically-sensitive ecosystems in order to (i) save the existing blanket bogs and mires from slow degeneration and decay by re-creating the hydrological conditions needed for active growth of *Sphagnum* moss and peat, and also (ii) improve degraded peatlands and develop a continuum of diverse habitats. The expansion of this wetland network across the upland moors will provide landscape scale enhancements of internationally important habitats in the North Exmoor Site of Special Scientific Interest (SSSI) and the North Dartmoor SSSIs, which comprise parts of the Exmoor Heaths Special Area of Conservation (SAC) and the Dartmoor SAC” (South West Water, p. 3).

30. The EMRP Project Report 2006-2009 states that “The overall aim is to promote the regeneration of moorland bog vegetation. Repaired ditches will become overgrown by mire plants and eventually no longer visible” (EMRP Project report, p. 2). Of particular interest is the increase in peat-forming mosses, *Sphagnum* spp. As part of restoring better ecological condition of the mires the project hopes that raising the water table will result in an increase in *Sphagnum* spp. and a reduction in purple moor grass (*Molinia*) dominance.

31. Hand (2009, p. 2; cf p. 50) suggested that “a sub-group of the bryophyte species found at the study sites which included *Sphagnum* species was found to have potential in monitoring the rewetting process, without resorting to full surveys of the whole flora of the sites”. Whilst this conclusion has some validity, in that *Sphagnum* species are totemic for mire growth and regarded as ‘keystone’ species (Rocheftort, 2000) in peatland restoration (Gorham and Rocheftort, 2003), it is nevertheless not surprising that Hand (2009, p. 49) also cautioned that bog restoration is long-term and that “the system of indicator species described...is not yet sufficiently proven to be used to assess other potential restoration sites”. Further detailed analysis of *Sphagnum* could be undertaken in the new project in order to produce more sophisticated research evidence of changes as a result of the rewetting process.

32. For assessment of the ‘success’ of mire restoration in combating the decline in extent of wetland, vegetation survey monitoring has been carried out. The surveys classify the vegetation using the National Vegetation Classification (NVC) system (see Appendix 4). Most of the project sites are classified as M25 *Molinia caerulea-Potentilla erecta* mire. The aim of the project is to re-establish the processes and functioning of the moorlands that then leads to a complex mire community, such as M17 *Scirpus (Trichophorum) cespitosus – Eriophorum vaginatum* blanket mire or M18 *Erica tetralix-Sphagnum papillosum* blanket mire (Langton, 2009; Hand, 2009).

33. To summarise, in relation to vegetation changes the project is seeking an increase in indicator species of saturated conditions, such as peat-forming mosses, *Sphagnum* spp., and a decline in species associated with drier habitats, particularly *Molinia*.

34. In the list of project benefits the Mires on the Moors project plan identifies other biodiversity goals in addition to the vegetation changes. This includes improving conditions for threatened breeding waders and increasing invertebrates. Also in the lower catchment the project intends to improve riverine conditions for Atlantic salmon, otter and river jelly lichen which will act as indicator species.

3.3 Review Findings

35. In reviewing the impact of the EMRP on the biodiversity of the moorland a number of sources of information were used. This included: a review of existing monitoring documents listed in Table 3.1 below; interviews with experts, farmers and other stakeholders; and observations made during site visits.

Table 3.1 Project Monitoring Reports

Vegetation
Somerset Environmental Record Centre (1998) Base line vegetation survey prior to drainage reversal on blanket mire, Exe Plain
Bowes, A (2006) Exmoor Blanket bog inventory and restoration plan for English, MSc, Calgary, Alberta
Hand, A (2009) Upland Mire Restoration in Exmoor National park: using bryophyte species as indicators of mire hydrology - Advanced diploma, Oxford
Langton, S (2009) Response of vegetation to raising water tables as part of the Exmoor mire Restoration project. Undergraduate dissertation, University of Exeter
Scott, K (2008) Has blocking ditches at Blackpitts altered the mire vegetation communities? Research skills project for Cannington College
Rutty, T (2007) , Analysis of the effects of Drainage ditch blocking on Blanket bog vegetation patterns, Exmoor National Park - MSc, Bristol University
Invertebrates
Boyce, D (2009) Invertebrate Survey of Mire blanket bog sites on the Exmoor Forest.
Reptiles
Richards, D (2008) Habitat selection in the common lizard (with reference to mire restoration implications). Undergraduate dissertation, University of Exeter

Ditch blocking:

36. To achieve the aims of restoring peatland areas on Exmoor, the project has adopted a range of ditch blocking techniques. Due to the limited experience of peatland restoration in the UK, the earlier work of the project was, by necessity, experimental in nature, although based on best practice advice in publications at the time. Various techniques were trialled over the period from 1998 to 2008. The EMRP Project Officer has expressed the opinion that the EMRP has now developed the most appropriate suite of techniques for the different situations on Exmoor, the choice of which will be dependent upon the restoration aims, the available materials on site, site sensitivities (e.g. water supply requirements downstream, archaeology in the peat) and the nature of the problem (eroding ditch, dry

peat etc.) (EMRP Report, 2009). There is a need to clearly document the decision variables used in selecting which techniques are used on a given site and which ditches to block, such as peat depth, ditch width and slope. One land manager expressed confusion as to why some large gullies on his land were not blocked as part of the project.

37. The EMRP has been recognised for its achievements in peatland restoration and received a prestigious award for the best “Sustainable Urban Drainage & Flood Management Initiative of the Year-2009” by the Water Industry. The EMRP has also reported to the Royal Commission for Environmental Pollution in 2009 and it has been used in several case studies for peatland restoration best practice (EMRP Report, 2009).

38. The EMRP has been extremely successful in the extent of ditch blocking achieved over a short time period. The projected target for ditch blocking was 27,199 m on 10 sites. The project has in fact blocked within a 2 year period a total of 49,967 m of ditches on 12 sites, almost double the original target. These ditches were blocked with 12,320 bales and 4,324 dams, resulting in the restoration of 313 hectares, exceeding the original target of 250 hectares set when the initial three year project was developed (EMRP Briefing Note, 2010). This was achieved as a result of increased funding via agri-environment schemes and the effectiveness of the Project Officer.

Vegetation monitoring:

39. A vegetation baseline survey is undertaken for all EMRP sites and a subsequent survey is conducted after 2 to 3 years. To date, baseline surveys have been undertaken on 21 transect lines covering all 12 restoration sites in the project. These surveys have recorded the number of species and NVC communities present. The project has achieved a good coverage of vegetation monitoring given the limited resources available within the budget for monitoring. A summary of the base line and monitoring transect data by NVC classes is given in Appendix 2. This shows that to date, where follow-up surveys have been conducted, 8 of the 10 monitoring sites have shown an increase in species, with 2 showing a small decline (-4 and -3), both at Blackpitts. Also it reveals that 3 of the monitoring sites, at Exe Head, Squallacombe and Hangley Cleave West have recorded a positive change in NVC community shifting from M25 to M3 or M17.

40. To date, only the sites at Blackpitts and Exe Head have been subjected to analysis of the monitoring data. Baseline vegetation surveys were undertaken at Blackpitts and Exe Head by Somerset Environmental Records Centre in August 1998 (SERC, 1998). Six transects were laid for each site and random quadrats surveyed for presence/absence of vascular plants and bryophytes (*Sphagnum* mosses in particular). Repeat vegetation surveys using the same methodology were undertaken in 2006 (Rutty, 2007), 2008 (Scott, 2008) and 2009 (Langton, 2009). Thus far, these surveys of the effects on vegetation of ditch blocking and damming on Exmoor show mixed results. Rutty (2007) found that there had been a decrease in plants indicative of saturated conditions, acidity and infertility, and inferred that the dams had failed to prevent drying of the peat both sides of the ditch at Blackpitts and to the north of the ditch at Exe Head. However, dams had been successful south of the ditch at Exe Head, with drying of peat reversed and an increase in saturated soil plant indicators. Scott (2008) found contrary indications at Blackpitts, noting an increase in species favoured by minerotrophic conditions, and inferred that this was a transitional phase toward

ombrotrophy. This inference is based on a model of plant succession in which it is anticipated that an initial mineral flush would reduce over time. There is, however, no certainty of this happening. Langton (2009) also found at Blackpitts, that while the community has remained dominated by *Molina caerulea* the richness and abundance of mosses had increased between 2006 and 2009. Also graminoids had decreased in abundance, but the number of species remained constant. It should be noted that ombrotrophic mires are species poor communities containing predominantly rare specialist species and few common generalist species within internationally rare and highly complex environmental systems. Thus increasing or decreasing species number changes are not necessarily indicative of positive change.

41. Evidence from monitoring reports of vegetation at Blackpitts suggests that between the initial baseline surveys on Blackpitts 1998 to 2006 there was little evidence of an increase in plants indicative of saturated conditions. Discussions with the Steering Group revealed that many of the initial dams on this site had failed during this period. The ditch blocking construction prior to 2006 were following best practice set out in key references from that time. There was a design fault with the recommended ditch blocking construction which resulted in many of the dams leaking. However, following the recruitment of a dedicated Project Officer, new dams were installed on the site and existing ones repaired and the survey evidence suggests that this remedial works has started to improve the success of the blocks that are now functioning more effectively with an increase in the abundance and richness of species associated with wet habitats.

Figure 3.1 Spread of *Sphagnum* from ditch



42. Visual observations made during the site visits also identified an increase in *Sphagnum* mosses and other bog indicators in areas adjacent to some of the ditches, particularly on the downslope side where a head of water had been built up by a ditch block higher up the slope, as Figure 3.1 illustrates.

Invertebrate monitoring:

43. David Boyce (2009) undertook a baseline survey at Blackpitts and Squallacombe, with Ricksy Ball (Aclands) site as a control. The method used was a standardised ISIS sweeping, ground search and pond netting. He found that Blackpitts retains a reasonably diverse acid mire invertebrate fauna, with 25 key species. There was a good range of aquatic species relating to the presence of a large number of pools. Currently, most of the aquatic species are highly mobile pioneers, such as the black darter, dragonfly and the back swimmer *Notonecta obliqua*. He speculated that the diversity of the invertebrate fauna will further increase, with colonisation by further species that require more mature pool habitats. He also concluded that Blackpitts will become one of the most important sites for acid mire invertebrates associated with bog pools on Exmoor, as such bog pools are very scarce on Exmoor's blanket bogs.

44. At Squallacombe, Boyce noted 29 key species of which 9 were upland species. The site has aquatic fauna characteristic of more mature 'patterned' mire habitat with wet hollows containing saturated bog-moss, cotton grasses and other vegetation. Boyce concluded that a continuation of the current moderate grazing regime and no further burning, in tandem with the improvement to hydrological integrity of the bog will increase invertebrate fauna. As a 'control' Boyce surveyed Ricksy Ball, a site degraded with most of the area dominated by species-poor purple moor grass, with some patches of more diverse blanket bog vegetation with bog-mosses, deergrass and cotton grasses and patches of ling and whortleberry. In this site only 13 invertebrate species were noted. In this site bog pool habitat were virtually absent and important plants for blanket bog invertebrate fauna, especially bog mosses and ericaceous dwarf shrubs were much lower in incidence. Boyce recommended ditch blocking to create pool habitats that are virtually absent from the site.

45. The main finding from Boyce's work is that the creation of pool habitats through ditch blocking has been particularly beneficial to aquatic invertebrates.

Bird monitoring

46. In 2008 the RSPB undertook a bird survey of the whole of Exmoor's open moorland. As part of this survey, extra effort was put into monitoring breeding snipe, in particular in the areas likely to be re-wetted. It is thought that mire restoration could provide further suitable breeding habitat for this species which is currently present in only very low numbers on Exmoor. The bird survey across Exmoor recorded a total of 15 drumming and chipping Snipe. Amongst the 15 territories, three were found within mire zones that had received restoration work: Roosthitchen, Broad Mead and the north side of the Exe Plain. However, it is still too early to identify whether the restoration work is having a positive impact on these bird species.

Other species

47. Information gathered during interviews with land managers and stakeholders revealed observations of other biodiversity gains as a result of project work. One land manager had noticed an increase in amphibians on his site within a year of the ditches being blocked and another had seen an increase in deer.

3.4 Recommendations

Recommendation 1: Clearly state aims of ditch blocking and decision variables used in selecting ditches to block.

48. There is a need to clearly document and communicate the aims of ditch blocking. There was uncertainty amongst some stakeholders as to what the ditch blocks were trying to achieve in terms of storing water or slowing flows. There is also a need to clearly document the decision variables used in selecting ditches to block, such as peat depth, ditch width and slope.

Recommendation 2: Clearly state biodiversity goals and targets against which success can be measured

49. The Mires on the Moors project requires a comprehensive evaluative framework, detailing the specific biodiversity goals and quantifying the biodiversity targets against which the success of the project can be measured.

Recommendation 3: Consider using palaeoecological work as a guide to the potential range of plant assemblages that might be set as targets for the subsequent restoration work.

50. The ultimate goal for restoration is informed mainly by the prevailing vegetation in areas thought to be *least* 'damaged' or 'degraded', and by visualisations of what so-called 'pristine conditions' might be. Alternatively, palaeoecological work could be used as a guide to the potential *range* of plant assemblages that might be set as targets for the subsequent restoration work. This would ensure a long-term ecological approach that would allow the full cultural heritage of the locality to be assessed and assimilated before the physical restoration work commenced, and so would inform and illuminate the target-setting.

51. This approach would integrate contemporary ecology with long-term records (i.e. on palaeoecological timescales, over centuries and millennia, not 10–30 years). Just such an approach was exemplified at the recent 'Long-term Ecology in Habitat Management' Conference held in Stirling in January 2010, and it is also the theme of a forthcoming conference in Southampton in September 2010, sponsored by IGBP-PAGES (International Geo-Biosphere Project–Past Global Environmental Change), on 'Regional integration of past records for management of modern resources and landscapes', which seems directly relevant to the future of the Mires Restoration Project.

Recommendation 4: Continue and enhance the vegetation monitoring programme

52. The EMRP has achieved extensive vegetation monitoring on a limited budget which has proved valuable in identifying changes in vegetation species in response to wetter conditions. In the Mires on Moors project a strategic vegetation monitoring programme should be drawn up incorporating as many sites as resources permit, as vegetation changes provide a good indication of changes in mire hydrology. Vegetation surveys should also consider recording NVC Domin values for percentage cover within quadrats, as well as the presence and absence of species.

Recommendation 5: Consider further research into bryophyte species as indicators of change

53. Hand (2009) identified a suite of bryophyte species, mostly *Sphagnum* mosses, on Exe Head and Blackpitts that had potential as indicators of improvement in environmental moisture. However, limitations in the dataset size meant that no clear conclusions could be drawn as to their usefulness as indicators. Further research with a larger dataset, may result in more conclusive evidence for using these species to monitor the rewetting process.

Recommendation 6: Consider further invertebrate surveys

54. Invertebrates are a good indicator of changes in habitat. On a few selected sites, especially where pools of water may be created, baseline invertebrate monitoring should be conducted using the approach adopted by Boyce (2008).

4. Hydrology

55. Information in this section of the report has been drawn from published and unpublished reports, correspondence and discussion with those involved in past monitoring activity (e.g. Paul Smith, Environment Agency) and planning future monitoring (e.g. Richard Brazier, University of Exeter) and land manager and stakeholder views.

4.1 Current state of knowledge

56. It is known that drainage ditches in peatland areas may impair the natural hydrology of mires and moorland. The main impact of drainage is that the water table becomes lower (Wallage et al, 2006) which exposes the peat to atmospheric oxygen. Oxygen diffuses into the peat and decomposition occurs (Holden, et al, 2007). In the long term (50 years) this drying leads to alteration of the peat structure resulting in lower overland flow and higher throughflow than in intact peats (Holden et al, 2006). The increase in throughflow is due to an increase in 'peat piping' – small fissures in the soil caused by drying. This causes a greater sensitivity to rainfall and produces flashier stream hydrographs.

57. Erosion is also a particular problem in blanket bogs. As the peat dries and decomposes, the sediments are removed by the flow of water leaving the bog and entering drainage ditches (Holden et al, 2007). The eroded sediments cause the infilling of reservoirs downstream (Yeloff et al, 2005). Of particular concern is that erosion removes particulate carbon (Holden, 2005). The carbon rich soils of peatlands are a principle source of dissolved oxygen (DOC) to the fluvial environment. Drainage causes elevated DOC to be released from peatlands into fluvial systems (Worrall et al, 2003) through an increase in throughflow. DOC mobilises metal and pollutants and contains a large proportion of coloured humic substances, which affect the colour, taste, safety and aesthetic value of the water.

58. Whilst ditch blocking on peatland areas in UK is a relatively new activity, monitoring results identifying the positive impact of peatland restoration activities on catchment hydrology are starting to emerge. Two examples of recent monitoring results are set out below:

1) Monitoring and modelling of the Oughtershaw Beck sub-catchment in the Yorkshire Dales by the University of Leeds showed that the hydrological effects of "grips make it easier and quicker for water to leave the catchment....the Oughtershaw Beck....and this increases flooding. Our tests show that this latter effect is important and may be why grips seem to have made the Wharfe 'flashier'...." [Reference: Lane, N.S. Sediment delivery, flood risk and river processes in Upper Wharfedale: headline results.]. Also initial monitoring of the hydrological effects of grip (drainage channels) blocking demonstrated a 24% reduction in run-off volume following blocking (Information Series No 3: Moorland Drainage the Gripping Question).

2) Monitoring of the SCaMP project, a peatland restoration project in the north west of England, has shown over a 4 year period that there is a decrease in the levels of carbon in a dissolved form being flushed from the Upper Goyt catchment year on year. There was a 43% drop in the DOC loss between the first and second year. The SCaMP data for the Goyt catchment showed carbon losses falling from 9.2g C/m²/year in the first year to 5.2g

C/m²/year in the year up to September 2009. The reduction in carbon lost from the Goyt catchment is explained in two ways. Firstly, streamflow discharge in the Goyt and the hydrograph response have decreased slightly as an increased volume of runoff water is held back on the treated parts of the catchment for longer following the grip blocking process. Therefore, the apparent reduction in discharge will flush out less DOC. Secondly, and possibly as a result of this reduction in storm discharge and of the elevated water table in the peat, the levels of colour within the runoff have fallen (Penny Anderson Associates, 2010).

59. Hydrological monitoring of peat and its drainage is well recognised by the research community as a challenging area.

‘Relatively little is known about the hydrological processes in peat catchments, with traditional principles of hillslope hydrology and flow processes being difficult to apply in such complex environments. Posing the wider question of impacts on annual runoff or baselevels is likely to provide a wide range of conflicting theories or results’ (McGrath and Smith, 2006, p95).

60. Historically, research monitoring of the impact of drainage on the hydrology of peat bogs has mainly focused on comparing runoff hydrographs before and after the implementation of drainage in small catchments (see Nicholson *et. al.*, 1989). This paper is referred to in publicity for the Exmoor Mire Restoration Project.

4.2 Hydrological aims of project

61. It is important to note the evolution of projects involving hydrological monitoring at Exmoor. It is also important to note that the hydrological monitoring programmes were (as with the ditch blocking techniques used) experimental and investigatory in their conception, design and progression. Both the MIRE pilot (1998 to 2006) and the EMRP (2006-2010) have been targeted at developing restoration and monitoring techniques appropriate for South West peatlands. The project stages are identified for the purposes of this report.

62. *Stage 1:* Key questions in the original hydrological baseline survey in the pilot project (commencing 1998) looked specifically at water quantity impacts. This work aimed to:

‘address in part concerns regarding changes to the hydrological regime in the rivers in the south-west and particularly those with their sources on Exmoor. At the time, the perception was that baseflows were becoming lower and the spate flows were higher with a more rapid response to rainfall events’ (Mire Restoration Project 2006-9, p2).

63. It was considered that land drainage techniques (e.g. under-draining and gripping) were likely to have reduced the retention capabilities of upland wetlands. The research drew on evidence from a NERC funded project on grip blocking hydrology run by the University of Leeds, which demonstrated that the ditching associated with grips makes runoff response quicker.

64. Work in the pilot stage at Exmoor focused on the question: 'Is there hydrological evidence to support the theory that man-made drainage on Exmoor has caused change in the river flows? In particular, attention was given to whether:

- (a) summer low flows have become lower; and
- (b) spate flows have become flashier.

65. *Stage 2*: The hydrological aims of the pilot project (2006 -2010) are stated as follows:

'Re-establishment of natural stream-flows in Exmoor headwaters. The retention of precipitation in uplands helps maintain stream-flow during dry periods. Reduction of upland stream response times and flows following high levels of precipitation is also a project aim, potentially reducing downstream erosion and flooding risks.' (Project Report, July 2006 - June 2009)

66. The sampling design involved monitoring water table levels and the flow coming out of the small scale systems at selective study sites. Again the focus of hydrological monitoring was on water quantity and there has been no water quality monitoring on the restoration site to date (Brazier, pers. comm.).

4.3 Hydrological Monitoring Techniques

67. The Project Report (July 2006 - June 2009) gives information about the methods used for: (a) dip well monitoring; and (b) hydrological flow monitoring. The original MIRE project's baseline hydrological monitoring (*stage 1*), commencing in 1998, was small scale and set up to last 3-4 years. The monitoring equipment was then in place for 5-10 years. The EMRP project (*stage 2*) was originally conceived as a three year project, extended for a further year (ends October 2010). The Exmoor Mire Restoration Project report (2006-2009, p5) states:

Dip well monitoring

At the vegetation monitoring transect locations at the Blackpitts and Exe Head pilot sites, dip-well measurements of the water table height have been taken regularly by EA since 1998. The dip wells were refurbished in summer 2008 by volunteers to ensure their continued recording accuracy. The water table data is being used to monitor the effect that restoration is having on watertable height.

Hydrological flow monitoring

Monitoring change in the hydrological output from the ditch systems (as a result of the restoration work) is an important part of the project. The data gathered will be used in the justification of the project and is, therefore, key to future project planning. Weirs were installed at 3 locations, and Environment Agency is carrying out the flow monitoring at these sites. The relationship of this data to the vegetation and water table data will be analysed by students from University of Exeter during the latter half of 2009 (Exmoor Mire Restoration Project Report, July 2006-June 2009). The river level and estimates of discharge (from a rating curve) were monitored at Blackpitts gauging station, ca. 0.5 km downstream of

the Blackpitts monitoring site (NGR SS7642141539). This station did not produce good quality data during rainfall events as the flow was augmented by local runoff from the adjacent road after the Highway Authority carried out drainage works. The station has now been closed.

Water quality monitoring

There was no water quality monitoring during the first or second phases of the project.

4.4 Hydrological Monitoring Findings

68. Project resources for hydrological monitoring were limited and this is reflected in the quality of data obtained. While there seems to have been a large amount of data collection, the results are of variable quality and reliability, particularly from the dipwells. For example, early in the project concern was raised about the accuracy and reliability of the Blackpitts and Exe Head experimental dipwell monitoring by the Environment Agency (see Barber and Lane, undated).

‘Continuation of the monitoring programme is only viable if data are accurate and reliable (quality assured); data are analysed appropriately; results of the analysis are used to inform the project.’ (Barber and Lane, undated).

69. In addition:

- there are issues of scale and extrapolation of results (e.g. changes to flow regime) to larger catchments.
- there is a stated need to monitor hydrological impacts in a more structured way before, through and after the ditch blocking.
- the data will not always show what is evident on the ground. This can be due to small changes in water levels being hidden in a data set that has large variation in it due to heavy or prolonged rainfall events.’ (unpublished Environment Agency document referring to research, University of Durham)
- the data analysis has been carried out by a range of people/universities (including undergraduate students) and has not been drawn together or disseminated in a systematic way. This is in part due to budget constraints, with only one project officer’s time available for monitoring and analysis. Also EMRP project funding was not available for hydrological monitoring, but had to rely on partner contributions, volunteers and students.

How has the project affected water tables, water storage and peat wetness?

Dipwell monitoring

70. The Exmoor Mire Restoration Report (2006-2009) has the following statement on results:

‘The ongoing long-term monitoring work (detailed above in section B.3) is now starting to deliver quantitative details of the changes taking place in vegetation and hydrology. These changes show an increased site water table height and wetness and a change to a wetter vegetation type.’

71. In 2004, Kate Bowers (Environment Agency) analysed the dipwell and ditchwater level data before and after blocking. Her results showed less variability in levels after blocking, suggesting that the blocking had a dampening effect on levels (P. Smith, Environment Agency, pers. comm.).

72. P. Smith (Environment Agency, pers. comm., 2010) reports that there has been no analysis of the dipwell data by the Environment Agency over the last three years, but notes that visually the rise in water table can be seen at a local scale at Exe Head where some dipwells are now constantly underwater. Further analysis is, however, on-going. The dipwell and weir dataset at Blackpitts and Exe Head is scheduled to be analysed by an MSc student at King’s College, London. The focus of this thesis is on the streamflow and groundwater response to rainfall for the period from March 2008 to present.

73. The Project Officer has produced summary graphs of the water table changes at Exe Head and Blackpitts for the period between 1998-2009 which are presented in Appendix 5. Years with extreme events or measurement errors have been removed from the graphs to enable clearer trends to emerge. Whilst there is no indication on the graphs of rainfall patterns between dipwell monitoring activity, there does appear to be clear evidence of an overall trend in the rise in water table between 1998-2009, particularly at Exe Head. A rise in water table is less evident at Blackpitts.

74. Hand (2009; see above) also makes the general conclusion that water tables have risen on Exe Head from 1999-2009, but not on Blackpitts.

4.5 General observations on the research results

75. At the majority of sites: Broadmead, Roostichen x2, Squallacombe, Hangley Cleave West, Exe plain, North Twitchen, Long Holcombe, Exe Plain, Verneys Allotment, water is held behind some of the ditch blocks on a semi-permanent basis, saturating the peat in the area of the ditch block. No formal measurements have been taken, but this has been observed and documented by many individuals. At sites restored before July 2008, the 2008 near infrared aerial photos held by ENPA show open water in the pools at these sites. Boyce (2009) also makes reference to these pools in his invertebrate survey.

76. A number of land managers interviewed have also noticed visual changes to their land as a result of the ditch blocking as the following quotes illustrate:

“Yes, I think it has made a significant difference in a short time – in 4-5 months it’s wetted up quickly and it will slowly wet up more I’m sure”.

“Definitely noticed some changes.... because they have stopped the erosion. Had some quite big gullies which if had left would have got worse”.

“when you go up there now, you used to see the water gush down there normally, it would just wash out. It’s definitely stopped it coming down in the same amount as before”

77. Others, however, are less convinced of the differences made by the ditch blocking and some are doubtful that the scale at which the EMRP is operating will affect downstream rivers.

“I have not noticed any changes, but any views I might have are unscientific, it’s difficult to see over a period of time we are having less or more flooding....so we need to look and see if it is really affecting or getting the benefits we are looking for. I don’t think so as the ditches weren’t very effective, I doubt very much it’s made a fraction of 1 % of difference”.

Flow monitoring

78. Flow monitoring has taken place at 3 locations (Blackpitts, Exe Head and Exe Plain). V notch plates with 15 minute loggers were established and monitored by the EA. The weirs were established post monitoring so there was no pre- monitoring data to make direct comparisons. To date, there has been no study of changing flow patterns, although this will shortly be analysed by a Kings College MSc student (Smith, pers. comm.). Consequently, the impact of the blocking of drainage ditches on downstream flows is unclear.

79. So far, the research results have not been systematically published in the research or practitioner literature, or promoted around stakeholders so that methodologies and results gain external input and scrutiny. The research results from other peat blocking experiments (e.g. by Leeds University) does not seem to have been shared with stakeholders, alongside the monitoring data for Exmoor (e.g. the hydrological differences between ‘damaged’ and undamaged’ peat bogs), to aid understanding of potential patterns and the issues/challenges involved in monitoring.

4.6 Future hydrological plans

80. Discussions with Steering Group members revealed a recognition of some of the limitations of the EMRP hydrological monitoring and lessons learnt from this project have been incorporated into the proposed hydrological plan for the Mires on the Moors project (Arnott, 2010). This plan has been reviewed by UK academics and their recommendations have been built into the new plan, resulting in a comprehensive and ambitious hydrological monitoring plan.

81. The new monitoring programme for water quantity and quality is set within the broader multiple objectives of the next phase of the Exmoor Mire Restoration Project. The hydrological aim of the monitoring is: ‘to assess the hydrological and hydroecological impacts of an extensive ditch blocking exercise that will be conducted across both Dartmoor

and Exmoor National Parks' (see Arnott, 2010). Strategies for future monitoring are proposed in the monitoring plan for water quantity and water quality. The proposals for water quality are currently under submission for funding and hence the research methodology is only briefly mentioned.

Water quantity

82. The proposed monitoring programme for water quantity provides a step change to what has been implemented previously, and is high resolution and ambitious. It uses a water balance approach and focuses on the monitoring/ equipment requirements across the different elements including rainfall, evapotranspiration, groundwater surface interactions, water velocity, overland flow, through flow and discharge outputs. It also plans to monitor gully erosion and its impacts, monitoring the surface runoff on sites where there is gully erosion and to establish whether holding the water on a wider area rather than in the ditches can reduce gully erosion.

83. Feedback from the scientific research community on the proposed plan has been positive:

'It will be the first time that truly appropriate monitoring has gone alongside a major restoration scheme.' Martin Evans (Manchester University)

84. A number of specific comments were made by the research community on the proposed hydrological monitoring plan. These were:

- The monitoring could investigate the ability of peatland restoration to increase baseflows and whether baseflows will reduce water velocities as this can depend on the design of the network, slopes and plant cover.
- The scale of monitoring and the ability to extrapolate from smaller monitoring sites, and the impacts immediately downstream to the larger catchment. This applies, for example, in evaluating the impact of ditching on flood response and for monitoring suspended sediment concentrations from gully erosion. In fact the project does not intend to extrapolate to the larger catchment, but to investigate and gather evidence on the scale of impact that the restoration works might have downstream.
- Advice from the Senior Flood Risk Scientist, Environment Agency was that an electronic project record was needed for data management (with the large volume of data generated). The data will be held on WISKI at the Environment Agency.
- The recommendation is to retain a 15 minute logging interval (or even shorter, where possible) to pick up any changes in timing of delivery as well as just changes in magnitude.
- It is positive for the project to have experts from different Universities involved (Exeter, Manchester, Durham). Research degree students and others in the local area might provide a suitable, cost-effective model for data collection.

- The monitoring proposal would benefit from a section on how the proposed monitoring strategy has been informed by what has been learnt from previous hydrological monitoring on Exmoor during the pilot phases of the project.
- It is unclear whether existing flow gauges operated by the EA are being monitored to establish whether there are any impacts on flood character on larger water courses.
- There is no reference to other peat monitoring projects (e.g. SCaMP) to help inform the monitoring methodology proposed.

Water quality monitoring

85. Brazier (University of Exeter) is proposing a four package research strategy for monitoring water quality, which is dependent on external funding. Package 1 will characterise the hydrology, soils and vegetation across the whole Exmoor National Park to support the monitoring and modelling strategies involved in packages 3 and 4. Package 2 will characterise baseline conditions at the two study sites. Package 3 involves monitoring the hydrology, ecology, sediment and carbon fluxes while package 4 will model the hydrology, sediment and carbon fluxes to improve the predictive evidence base of the effects of peatland restoration strategies on hydrology, sediment and carbon fluxes. The research design ensures that there will be direct links between the water quantity and water quality monitoring and is clearly structured. The proposed methodology involves a PhD student and/or a TSB KTP associate to carry out the water quality monitoring and data analysis.

4.7 Recommendations

Recommendation 7: Implement the proposed hydrological monitoring plan

86. The proposed hydrological monitoring plan by Arnott and Brazier is both comprehensive and ambitious and should be implemented within the project budget that is available. It has the potential to significantly contribute to the evidence base for UK peatland management.

Recommendation 8: Document lessons learnt from monitoring in the earlier project

87. The Steering Group have learnt lessons from the EMRP hydrological monitoring, but these lessons need to be documented to ensure that this information is used to good effect in the new phase of monitoring.

Recommendation 9: Continuously check monitoring data for problems

88. The data gathered should be continuously quality assured so that any errors/monitoring problems are picked up early.

Recommendation 10: Check water quantity monitoring equipment reliability against costs

89. Proposed water quantity monitoring equipment should be checked in terms of reliability against costs. For example, one expert suggests that capacitance probes may be cheaper and potentially more reliable kit to monitor water depths.

Recommendation 11: Consider some local volunteer hydrological monitoring

90. The expert hydrological monitoring of water quantity could be supported by local volunteer monitoring (e.g. of dipwells) to increase stakeholder participation and ownership. There may also be the potential to integrate some local knowledge and observation alongside the expert science. Past evidence, however, suggests that there can be a tension between getting volunteers involved in a wide network of monitoring sites and the reliability of low cost dipwells. This reliability should be tested drawing on the experience of the previous project so that reliable data is collected.

Recommendation 12: Monitor for a minimum of 5 years

91. Ensure that monitoring takes place over at least 5 years to accommodate hydrological patterns in wet and dry years, in a climate change context. Research (EA quoting Durham University) also suggests that the full remediation process can take at least 10 years to complete.

5. Historic Environment

92. In reviewing the impact of the mire restoration project on the historic environment of moorland a number of sources of information were used. These included interviews with the ENPA archaeologist and English Heritage archaeologist, observations made during two day-long site visits with the EMRP Officer and the views of farmers and other stakeholders interviewed

5.1 The current state of knowledge

93. The past two decades have brought substantial advances in understanding Exmoor's upland historic environment, revealing numerous important individual sites but also large and well-preserved historic landscapes. The historic environment potential of the area is now perceived to be much greater than was previously acknowledged.

94. A key element in these advances was a programme of field survey carried out by the Royal Commission for Historic Monuments for England during the 1980s and 1990s and subsequently by English Heritage. An overview volume was published in 2001: H Riley and R Wilson-North, *The field archaeology of Exmoor*. Additionally, a two-year English Heritage National Mapping Programme project to map archaeological features on Exmoor from air photographs was completed in July 2009. More than 12,000 photographs were examined: over 2,200 previously unknown sites were recorded across Exmoor and additional information was gained on some 600 known sites.

95. Recent field investigation has also emphasised the potential of Exmoor's uplands. A later prehistoric settlement excavated at Holworthy Farm provided evidence of wheat and barley, unprocessed and therefore presumed to have been grown nearby, at an elevation of 340m (Exmoor National Park *Historic Environment Review*, 2008). Work at Codsand and Hoar Moors and elsewhere in the uplands has identified prehistoric field systems (Riley and Wilson-North, 2001). Far from only accommodating a small number of easily visible prehistoric ceremonial monuments it is clear that there is also a 'busy' landscape of farming and settlement to be explored, much of which is still poorly perceived. Investigations using techniques such as geophysics are still yielding important new insights (see below). Survey has also demonstrated the extent and significance of features relating to the nineteenth-century efforts by the Knight family and others to reclaim, improve, settle and farm these landscapes (*ibid.*).

96. It is important to understand and remember, however, that this explosion in the available data has not yet been accompanied by opportunities for synthesis which would allow us to 'know what we know' and exploit the information fully, not least by developing predictive models to provide a better indication of historic environment potential in different contexts within the uplands.

97. The palaeoecology of Exmoor has been much less well studied than Dartmoor. It is also less well studied than some other moorland areas in England and Wales (Simmons, 2003), including the North York Moors (e.g., Innes and Simmons, 2000; Blackford *et al.*,

2006), the Peak District (e.g., Anderson and Shimwell, 1981; Long *et al.*, 1998), and South Wales (Chambers *et al.*, 2007a, b, and references therein).

98. There have been a few published palaeoecological studies on Exmoor, notably by Merryfield and Moore (1974) in *Nature*, and by Fyfe *et al.* (2003), but these are not well known and not widely cited, even by palaeoecologists. Other studies have been published in even lesser-known outlets (e.g. by Francis and Slater, 1990, 1992). The *potential* for palaeoecological work on Exmoor, earlier identified by Straker and Crabtree (1995), was reassessed by Fyfe (2005), implying that it is still under-investigated. A consequence of the relative paucity of palaeoecological studies on Exmoor is that the moorland restoration work that has been carried out there, and indeed proposed future work, has not benefitted from a detailed, area-based, long-term palaeoecological perspective. Resources were not available within the EMRP budget to undertake such studies, although external funds were provided by NE to carry out outline work at Comerslade and Long Holcombe (Fyfe *et al.*, 2008). The new project will address this in a more strategic way as some funding is built into the project, though resources will have to be carefully targeted.

5.2 The benefits of re-wetting for the historic environment

99. Maintaining high water levels in peat mires and re-wetting those which are potentially drying out has several benefits for the historic environment. In essence these derive from the potential of such action for preserving *in situ* peat deposits in good condition. Such deposits are important in four key ways:

100. a) Peat deposits often preserve a range of palaeoenvironmental data; that is, a record of past environments in the form of preserved pollen, insect and plant macrofossils and other evidence, incorporated into the peat as it developed. Sample columns taken from intact, undisturbed peat can provide a sequence of information on past environments; the peat can itself be radiocarbon dated at various levels within such columns, making it possible to reconstruct the chronology of past environmental change. Such chronologies can be linked with what is known of past patterns of human activity and land use (for example, Gearey and Charman 1996; Gearey *et al.*, 2001a; 2001b; Jones 2004-5) and offer a rich resource in improving understanding of our past and the impact of human activity on the environment. More work is required on Exmoor linking the emerging palaeoenvironmental record to what is known of the archaeology (Vanessa Straker, pers comm).

101. The potential for palaeoenvironmental research on Exmoor has been demonstrated – past work and the potential for future investigation have been reviewed by Fyfe (2005) – and more work is in progress through the Exmoor Valley Mires Project being undertaken at University of Plymouth as a PhD by Heather Adams. Further sampling and analysis has recently been carried out at Long Holcombe and Comerslade in association with the Mire Restoration Project, but the authors make it clear that the work was outline only (Fyfe *et al.*, 2008).

102. b) Peat can also preserve organic materials - structures such as the wooden trackways found in the Somerset Levels (Coles and Coles 1986), for example, the remains of prehistoric trees at Halscombe Allotment and artefacts in materials such as leather, basketry and

textiles – which rarely survive well in dry-ground archaeological contexts. Recovery of such objects from peat deposits is well known in Ireland and Denmark, for instance, where exploitation of peat resources has historically taken place on a large scale using techniques¹ which aid the exposure of artefactual material. No such artefactual finds are known to have been recovered from Exmoor, but preservation of wood within the peat has been demonstrated during mire restoration works and the potential is therefore there.

103. c) Peat deposits may themselves conceal, partly or completely, but also preserve complex historic landscapes. One of the better known examples of this is Céide Fields in Co Mayo, Ireland. There past peat cutting in blanket bog and subsequent non-destructive archaeological investigation has revealed stone field walls laid out and farmed in the Neolithic period (the complex has been radiocarbon dated to c 3700-3200 BC), together with contemporary houses and stone-built tombs; the known archaeology extends over an area of several square kilometres. Preservation of this landscape is generally very good because it has been protected to a substantial extent from later modification by the overlying peat. The evidence from Céide has been crucial in recent re-interpretations of human subsistence and settlement activity in the Irish Neolithic (for example, Cooney 2001, 168).

104. Recent work on Exmoor has demonstrated that there is also clear potential here for prehistoric landscapes to survive within and below peat deposits. Some can be located very close to the surface, making them vulnerable to damage. For example, a stone row has recently been identified at Furzehill Common, 2-3 km from Blackpitts and Exe Plain. Initially only four stones were visible over a distance of about 10m in a shallow historic peat cutting. Subsequent investigation by careful surface examination identified 10 or more additional stones in the alignment, none higher than 5 cm, continuing over about 70m and ending on a previously unknown cairn (Rob Wilson-North, pers comm).

105. A further example is at Lanacombe, approximately 2 km north east of the mire restoration work site at Blackpitts and Exe Head, known as the site of several of the very small ‘minilith’ prehistoric stone settings found on Exmoor. Recent geophysical investigations in the area around these monuments located a ‘dense, and wholly unexpected, series of features in the immediate vicinity of the known stone settings - a ‘hidden’ landscape of related cairns, structures and boundaries’ (Gillings *et al*, 2009). The sites located so far appear to be on areas where the underlying bedrock is shallow. What is not yet clear is whether this represents a preference for these locations in the original development of the landscape in the prehistoric period; it is possible that the pattern is to some extent a consequence of targeting survey around known sites which are themselves only visible because they are located in areas where peat is shallow. The survey did, however, indicate that traces of a coaxial field system, likely to date to the Middle Bronze Age, some 3500 years ago, extended into the area between belts of shallower bedrock (*ibid.*). This particular case highlights the potential – and the sensitivity – of the occasional shallow and drier areas within moorland, but also allows that extensive archaeological remains may be present below deeper peat deposits. The fact that only one site on Exmoor

¹ removal of peat from vertical faces which are extended progressively across the bog surface

has to date been investigated in this way emphasises how much more there may be to discover about the archaeological potential of its moorland areas.

106. A further important perspective on the potential for recovering information on past human activity from peatlands has recently come from Dartmoor, where a stone row has been identified with individual stones lying *within* the peat layer: the monument was apparently constructed after the commencement of peat development (Fyfe and Greeves, 2010). This allowed radiocarbon dating of peat deposits both below and above sample stones, giving dates – firmly in the Neolithic – for both construction and abandonment of the monument.

107. d) The upland mires on Exmoor also preserve evidence of past exploitation of the peat itself, in the form of earthwork traces of former peat cuttings, and of historic drainage schemes cut into the peat surface. These features are widely distributed but are not necessarily well understood, in terms of their chronology or the techniques represented, and merit further study. Re-wetting may prevent such remains from drying out and being eroded by desiccation, shrinkage or oxidation of the peat. At the same time, it is probable that wetter conditions arising from ditch blocking will spur further peat growth which will in time infill, and therefore blur or erase, the existing earthwork features.

5.3 Perceived impacts of mire restoration activities on the historic environment

108. No concerns were raised about the possible impact of the initial mire restoration work (1998-2006) on the historic environment as the methods used, involving heather bales rather than peat, and the small-scale nature of the work, were considered to have little impact on the historic environment. It was in the second phase of the project, when small diggers were used to move peat, that concerns were raised about safeguarding the archaeological resource. The problem was compounded by the limited extent of knowledge and understanding of that resource in the target areas. Progress in subsequent incorporation of appropriate pre-works and mitigation measures into the methodology was also felt to be slow; even when a mitigation strategy was agreed there was a perception that the consideration of historic environment factors was being 'bolted on' to the project, rather than integrated into it. Lessons have now been learnt and the new Mires on the Moors project will build in the historic environment from the outset.

109. Additionally, there has been concern that mire restoration is directed at features that are themselves historically significant, in the form of nineteenth-century drainage systems created as part of efforts to reclaim and improve areas of the former Royal Forest.

110. The use of previously undisturbed peat for ditch blocking was also a major concern: disturbance and damage to the palaeoenvironmental resource was seen as highly probable, both directly through material taken to create blocks and through localised damage to otherwise undisturbed deposits through drying of peat deposits around borrow pits on steeper slopes. The potential consequence is the truncation of peat sequences over fairly substantial areas. However, following the agreed mitigation strategy borrow pits are now only taken from previously disturbed peat.

111. There has also been unease at the use of large machinery and intrusive methods in sensitive historic landscapes, and, on occasion, apparently loose adherence which contractors gave to project specifications (for example, one incident of baling outside agreed areas).

Direct impacts

112. The *actual* extent of impacts on the historic environment which have resulted from the EMRP is difficult to ascertain: to a great extent concern has been and continues to be about the *potential* for damage. Concern increases as understanding develops of the historic environment resource in the areas in which the project is working (see above).

113. There are only a few known impacts. An upright stone was lifted out of the way by a contractor at Madacombe / Porlock Allotment, well outside the area designated and agreed for baling; the same area also saw a 'near miss' on a small prehistoric cairn. At Blackpitts there has been extensive disturbance to earthworks representing the remains of an unusually large and complex area of historic peat cutting, the significance of which is not well understood. The earlier EMRP method which used undisturbed peat deposits as ditch blocking material will also have limited the potential for obtaining palaeoenvironmental data from some areas of these sites in future, because of the truncation to the peat sequences.

114. Archaeological watching briefs carried out on more recent project works have not made significant discoveries, although it should be understood that monitoring machine interventions in landscapes such as these does not provide ideal conditions in which to recover archaeological information. Project works have occasionally revealed – for example, at Blackpitts / Exe Head – individual stones and spreads of stones of a size and form directly comparable with others which elsewhere on Exmoor form part of, for example, prehistoric stone settings, cairns, field boundaries and clearance heaps. However, without potentially substantial further archaeological investigation (with attendant costs, logistical problems, etc), and the consequent destruction of the features themselves, these cannot be firmly demonstrated to be significant; equally, without such investigation they cannot be dismissed as unimportant.

115. Such instances underline the fundamental and problematic distinction between, on the one hand, the necessarily intervention-oriented approach of the EMRP and, on the other, the 'safety first' presumption against actions which may cause harm to potentially significant remains, which guides the curatorial element of historic environment practice.

116. Another clear consequence of EMRP works is the impact they have on the 'legibility' and visual integrity of historic landscapes. In places they have created a variety of new earthwork features unrelated to historic processes on the moors, but which, once re-vegetated, will blur or obscure the historic patterns: the larger flooded borrow pits, for example, will resemble peat cuttings. In time re-wetting is also likely to result in surviving historic earthwork features being obscured and lost through renewed peat growth.

Indirect impacts

117. Potential indirect impacts of EMRP work include the following.

- Changes to stock grazing patterns may result from the re-wetting of areas of grazing; animals are likely to increase their known preference for drier areas such as earthworks (barrows, industrial spoil), with consequent damage through poaching and erosion.
- New access points across drainage patterns have been and are being created to aid individual farmers. This may result in new patterns of vehicle movements over the moorland and predictably in greater levels of traffic in areas which have not been open to it previously through use of such access points by riders, hunt followers, etc.

What is the potential for damage in the next project?

118. The increased scale of the next project could mean that there is a parallel increase in the potential for negative impacts. On the other hand, the experience gained to date, adoption of amended working practices and the proposed inclusion of an historic environment professional in the project team should have a significant effect in reducing risk. A number of specific proposals aimed at this are listed as recommendations below.

5.4 Recommendations

119. The current historic environment mitigation strategy is undoubtedly a very significant advance on the situation at the beginning of the EMRP, when there was insufficient awareness of or concern for archaeology and the historic environment in the project's approach and methodology. There is still scope for enhancements, however, and a number of proposals are made below which it is strongly recommended are integrated into the policy and practice of the new project.

120. The key principle to carry forward is that consideration of (and for) the historic environment should be integrated into all aspects of project activity: the process of planning mire restoration and catchment management works, in principle and for individual sites, should incorporate historic environment expertise from the beginning.

121. The following substantive recommendations are proposed:

Recommendation 13: Undertake a comprehensive appraisal for each piece of work based on the model of an EIA

122. Each proposed piece of work to be carried out by the project should be the subject of a comprehensive appraisal based on the model of an environmental impact assessment (EIA). This would take into account the potential benefits of works in terms of mire restoration or catchment management but also assess possible direct risks to the historic environment and the potential impact of factors such as changes in access and potential future alterations in grazing patterns. Such an approach must acknowledge that some sites or areas may be of such archaeological significance and sensitivity that work should not be carried out there.

Recommendation 14: Enable a strategic approach to rewetting works, rather than site by site approach

123. Rather than taking a site by site approach to planning rewetting works, a strategic approach should be adopted incorporating larger landscape areas. This will enable prioritisation of the budget, ensuring the funding for historical environment survey works is directed at those areas with most archaeological potential. It will also enable consideration of the landscape scale implications on the historic environment.

Recommendation 15: Continue and enhance current historic environment mitigation strategy

124. Current mitigation practice should be continued and enhanced. This will include both watching briefs on works and walk-over survey in advance of areas on which works are proposed. Experience indicates that the latter will be most effective (also cost effective) when the target area is carefully defined and time is available for close inspection: rapid walkover may not identify very low stones within extensive areas of dense purple moor grass, for example.

Recommendation 16: Ensure good communication by historic environment professionals as to the potential of sites

125. Historic environment constraints on proposed works may not be self evident and it is important that the significance or potential significance of particular sites or features is fully communicated by historic environment professionals. Similarly, it is important to make clear the impossibility in the current context of predicting with a degree of certainty the historic environment potential of any particular site, and that this means that there is always the possibility of surprises.

Recommendation 17: Ensure work undertaken by contractors is precisely specified and appropriately supervised and monitored.

126. Works to be carried out by contractors should be very precisely specified and appropriately supervised and monitored. Contractual agreements and other liaison with contractors should emphasise the sensitivity of the landscape in which works are being carried out and the need to follow prescribed methods and areas of working. There should be no departure from agreed extents of works or methods used without prior agreement by an appropriate historic environment professional. Where there is a deviation from specifications – that is, when something goes wrong – there should be a halt to works and a review before work continues.

Recommendation 18: Ensure practical considerations are observed

127. Practical considerations such as giving appropriate notice in advance of watching briefs and advising of amendments to working timetables should be observed.

Recommendation 19: Favour use of ditch spoil for ditch blocking over undisturbed peat

128. If peat or soil are to be used to block ditches, ensure use of previously excavated ditch material rather than undisturbed peat.

Recommendation 20: Take strategic palaeoecological samples where resources permit

129. On some strategic sites and within the resources available, restoration work should be *preceded* by detailed palaeoecological studies so that the climate, vegetation and cultural archive can be recorded before any potential effects of restoration works are felt. At present the Mitigation Strategy Agreement requires an archaeological watching brief and in some cases a peat Monolith sample to be taken, but there are now new, internationally recommended protocols for this, and these should be followed (De Vleeschouwer *et al.*, 2010).

Recommendation 21: Consider post-work monitoring of historic environment

130. Monitoring of the historic environment in the aftermath of works should be carried out, so that unpredicted consequences can be identified and future methods altered, accordingly. Monitoring of changes in grazing patterns and the impact on earthwork features in rewetted areas should be regarded as important.

Recommendation 22: Consider incorporating further historic environment investigations and research into the project

131. Finally, there is potential to achieve substantially greater total benefits from the Mire Restoration Project by incorporating within it, an explicit historic environment research and data enhancement element. The 2007 strategy agreement proposed the taking of peat core samples from each site and their subsequent analysis. This provides a good starting point, but there are likely to be other potential areas of investigation which can be integrated into the project. Surveys of historic ditch systems, for example, could be carried out in ways which allow them to be interpreted and incorporated into the Historic Environment Record. There may be potential for geophysics, LIDAR or trial pitting to be commissioned to enhance understanding of specific site areas which are being considered for project works.

6. Landscape

132. The review team were asked to consider the impact of the EMRP on the Exmoor moorland landscape. Landscape here, refers to the physical landform and cover and associated scenic and visual qualities. It was not possible within the scope of the project to undertake a landscape assessment of the impact; instead, the review was based on visual observations made during site visits and incorporated the views of land managers and other stakeholders expressed during interviews and the stakeholder workshop.

133. Exmoor is a nationally valued and protected landscape and was designated as a national park in 1954. The Exmoor Park Landscape Character Assessment (Preece, 2007) recognises that the open moorland area on Exmoor is the landscape most recognised as quintessential to Exmoor's characters. Surveys of local residents and visitors (Land Use Consultants, 2004; ENPA, 1994) found that moorlands were considered the most important landscape element on Exmoor. When asked to identify the qualities of the moorlands that make them special to their appreciation of Exmoor, the three qualities of "*views and openness*", "*peacefulness*" and "*wildness and remoteness*" were the most popular. The Grass Moors of the centre scored highly in relation to the qualities of wildness and remoteness (The Chains and Exe Plain, and Lanacombe, Warren and Larkbarrow being the two moorland units on Exmoor most identified with this quality). The ENPA recognise the special qualities of the moors and the National Park Management Plan Objective for the moorlands is to "ensure that Exmoor's moorlands are open, remote and relatively wild in character..." (ENPA, 2007 p. 20) and the Plan has a specific target "to remove or ameliorate man made features that detract from the apparent naturalness of moorland." (ENPA, 2007 p. 20).

6.1 Review findings

134. It is clearly evident from discussions with stakeholders that the local community are passionate about the moors and feel a degree of ownership for these areas. They are regarded as an integral part of the Exmoor landscape and therefore any changes have to be well considered and justified. It is also apparent from discussions with the Steering Group that some stakeholders have expressed anxiety that the moors which they perceive as being wild and remote are being turned into 'experimental sites'. There is concern that the work and structures associated with mire restoration and monitoring might represent intrusions into this valued landscape.

135. However, the review found no major long-term, landscape-scale impact of the project on the Exmoor moorland landscape. There was no significant impact on the openness or remoteness and wildness of the moors, or on views and edges or landmarks or landscape features. Most of the stakeholders interviewed, including the Exmoor Society, felt that the project activities had had little detrimental impact on the landscape as the scale of the work meant that the impact was minimal. Furthermore, some stakeholders and land managers saw the project as having a positive impact on the landscape through the blocking of gullies, thereby preventing further erosion.

136. Although some of the land managers initially had concerns about the visual impact of the project work on vegetation colour and texture *'last summer you could see the bigger ditch blocks, that stood out when everything was green...it has left localised scarring'*, most acknowledged that the impact was toned down after a year or two. As one land manager put it:

"Mostly work areas have toned down as they are filled in and the Molinia grows over them"

137. Some land managers even stated that they could not see where the dams had been constructed after a few years. This view was supported by a local contractor involved in the project work, who felt that there was minimal impact on the landscape with many farmers saying to him a few weeks after he had completed the work *'I can't see where you've been'*.

138. Any concerns expressed about the landscape impact related to the Blackpitts sites, where areas of open water were created by the project which were thought to impact on the wildness qualities of the moor. This site is atypical of most of the EMRP sites due to large areas of ditch cutting which have filled up with water. As one land manager stated *"The big thing is the standing water, it is visible on aerial maps and it draws the eye to it, it looks man-made"*. There was also some concern about peat scars left after excavation work, as they take time to revegetate. The Project Officer recognises this and has suggested covering exposed areas of peat with bale brush to speed up the process of regeneration.

139. The site visits revealed a number of minor visual impacts which should be avoided in the future. In particular, loose floating bales which have dislodged from the ditch blocks, as shown in Figure 6.1, look unsightly and should be removed from the Blackpitts sites. These bales were produced using ENPA equipment and plastic netting. The EMRP now has a policy of using larger bales and sisal wrap which blends into the landscape and is less visible. Other policies introduced to reduce visual impacts during the mire restoration work include ensuring that appropriate machinery is used in favourable weather conditions to minimise track marks. Also that the visual impact of excavation is minimised, such as shallow borrow pits, placing carefully restored surface vegetation on new dams and in borrow pits and avoiding digger bucket marks in the borrow pits.

Figure 6.1 Loose bales in pool at Blackpitts



140. The key principle in carrying out mire restoration is to consider the impact of the work on the wildness and remoteness of the moorland landscape. The following recommendations are proposed which incorporate this principle:

6.2 Recommendations

Recommendation 23: Continue to minimise local visual impacts on sites.

141. The existing approach of removing loose bales in existing ponds should, where possible, be continued. Also any exposed areas of peat should be covered with bale brush as according to the Project Officer this encourages regeneration of vegetation, otherwise re-vegetation is slow.

Recommendation 24: Avoid creation of large pools

142. Some stakeholders and land managers viewed the larger pools, such as those created at Blackpitts, as out of character with the moorland landscape; looking man-made, and felt that they should be avoided.

Recommendation 25: Continue to limit use of signage on the moor itself

143. In line with current practice, the EMRP should continue to limit signage on restoration sites which can detract from the remoteness of moorland areas. As highlighted by Preece (2007) in the Exmoor Landscape Character Assessment, signs placed in areas of remote moorland can heighten the awareness of proximity to modern infrastructure and dilute the moorland's attributes of wilderness and solitude.

Recommendation 26: Continue to keep photographic records of project sites

144. The new project should keep a photographic record of sites before and after ditch blocking work to enable an assessment of the visual impact of the work. Photographs should be taken from viewpoints where any significant visual effects are most likely to occur. Reasons should be given for the choice of viewpoint, and a map should highlight the location from where the photograph was taken.

7. Public Access and Recreation

145. Exmoor is an important area for recreation used by many people living in or near the National Park and by tourists on day trips or holiday. There is a range of recreational activities undertaken on the moorlands of Exmoor, including horse riding, walking and cycling, with many visitors to National Parks citing walking as their main reason for being there. Many leisure walkers start their walks in Simonsbath to access the surrounding moorland areas such as Brendon Common, Exe Plain and Woolcombe. Also the Two Moors Way is a popular rambling route which crosses the moorland core from Lynmouth to West Anstey (Land Use Consultants, 2007). The Countryside and Rights of Way Act 2000 (CRoW) which came into force on 31 October 2005 has provided a public right of access on foot to open moorland across Exmoor. This means that the public have a right to move freely on foot across the area without constraint.

7.1 Review Findings

146. The review of access issues was based on stakeholder views expressed during the stakeholder workshop and interviews with land managers, and from observations made during site visits. In reviewing access issues related to EMRP activities the review team focused on issues relating to access for recreationalists and public health and safety concerns.

Access for recreationalists

147. Most of the current EMRP sites are located in open country where the public has the right to walk freely without having to stick to paths under the Countryside and Rights of Way (CRoW) Act 2000. Additionally, three of the 12 sites are crossed with public bridleways and the ENPA Rights of Way Improvement Plan is proposing a new bridleway which may affect another site. On most sites the demand for access is low but at a few sites, such as Squallacombe, access demand from walkers and equine tourism is high.

148. There was a feeling amongst some stakeholders that initially there was limited consultation on access issues, and in particular that the Exmoor Local Access Forum had not been consulted, although this has now been addressed.

149. A number of stakeholders and land managers raised concerns about access loss and safety issues due to rewetting the mire, which was considered a particular issue for horse riders and hunters. However, a representative for the British Horse Society felt the impact of the EMRP was minimal for horse riders provided bridleways were kept dry, as there is no right of access for horse riders on CRoW land. Also, a representative for the hunt on Exmoor felt that there would be minimal impact on the hunt as the restoration work would mainly impact areas which were already wet and avoided by the hunt.

150. The review team concluded that whilst there may be some limited impact for the hunt due to mire restoration; overall the impact on access for recreationalists was low. There has been no disruption to linear routes as a result of mire restoration work. The EMRP Steering Group recognise that any increased wetness on established linear access routes could be

detrimental to access and there are project procedures in place to consider recreational access issues on each proposed new site.

151. Some stakeholders suggested that mire restoration could be actually used to improve current linear routes. Some ditch blocks could be widened to provide access across ditches, and some new ditch blocks could be located above established linear routes in order to make them drier.

Health and Safety concerns

152. The ENPA was aware of potential health and safety issues in relation to the peatland restoration work at the site it owns at Blackpitts and commissioned an independent review by the Somerset Country Health and Safety Unit (CHSU). This review concluded that whilst there was a small residual risk of injury at Blackpitts, it is no more likely to occur there, and unlikely to be more serious there, than anywhere else on the moor. A number of remedial actions were suggested to reduce public risk at Blackpitts which have subsequently been implemented at Blackpitts and other sites. This included:

- reducing the gradient of any steep pool edges to prevent people or animals stepping directly into the pools;
- permanent signage at the access points warning of deep pools (Blackpitts only);
- filling in with bales in deep steep sided gullies and above or below the steepest-sided dams in order to reduce the risk associated with these features;
- producing a leaflet including a warning notice and distributing it widely, including to visitor centres, local rambling and walking groups, those taking groups to the moor, and those who exercise hunting rights across the area;
- carrying out site tours with youth groups and members of the public in order to raise awareness of the mire restoration.

153. During the interviews some of the land managers who had land with potential for re-wetting expressed concerned about public liability in the event of an injury due the structures used in mire restoration. This was also an issue of concern raised by a number of stakeholders. There was particular concern that the wooden planks used for the dams could become a tripping hazard for cattle and horses once surrounding bales started to disintegrate. As one land owner put it:

“They block them [the ditches] and drop sedge bales in and put planks of wood in the moor which is clearly a tripping hazard to horses and stock.”

154. Clarity was required of the public liability for land owners in the event of an injury from EMRP activity, given that it had introduced a new hazard on their land as is illustrated by the following quote.

“I’m worried about people, it gets very misty. If my fields were involved whose responsibility is it if someone falls into this man-made hole?”

155. The Steering Group took advice on this issue and the legal interpretation of the CROW Act by the EMRP is that the landowner is not liable to the public for any natural or man-made water feature. The key wording in the Act is:

"(6A) At any time when the right conferred by section 2(1) of the Countryside and Rights of Way Act 2000 is exercisable in relation to land which is access land for the purposes of Part I of that Act, an occupier of the land owes (subject to subsection (6C) below) no duty by virtue of this section to any person in respect of-

(a) a risk resulting from the existence of any natural feature of the landscape, or ***any river, stream, ditch or pond whether or not a natural feature***"

156. Where the access is not on CROW registered land or it is either permissive access or tolerated by the landowner it is important for the landowner to seek clarification on the issue of public liability either through legal channels or through representative organisations such as the NFU or CLA.

7.2 Recommendations

Recommendation 27: Continue to avoid making access routes on proposed sites wetter

157. The EMRP has a policy of avoiding making definitive, permissive and *de facto* linear routes wetter. The project should continue to identify linear access routes on proposed sites and to consult with the ENPA ranger team on access issues for any proposed sites. The project should also identify opportunities for making existing access routes drier, by diverting water from them.

Recommendation 28: Consider wider crossings as part of new ditch blocks

158. The project should consider widening ditch blocks, to help access on foot and horseback and for livestock and quad bikes, subject to such improvements in access not having potentially damaging impacts on archaeological features.

Recommendation 29: Produce an advisory map identifying sensitive areas on the mires

159. Produce an advisory map identifying deep peat areas or very sensitive areas on the mires – this would need continuously updating as the project area expands. The map could be combined with commercial guided walks or horse riding tours leading visitors through the mires.

Recommendation 30: Monitor tripping hazard risks from wooden boards used in dams

160. The use of wooden dams to create dams was considered a tripping hazard by several of the stakeholders and land managers consulted. This potential impact should be closely monitored. If it is found that there is an increased safety risk, particularly as the bales around the boards start to disintegrate, then the use of wooden boards in ditch block construction should be minimised.

Recommendation 31: Clarify public liability issues

161. Landowners are concerned about public liability issues on their land resulting from mire restoration activities. The project would, therefore, benefit from spending some time

and possibly resources so that it can reach a position on landowner public liability that can be shared with landowners as part of the early discussions. It is clearly in the best interests of the project to clarify this position as much as possible in order to allay the fears of landowners. However, it is ultimately the landowner's responsibility to seek this clarification and they should be encouraged to check with their own legal advisors or seek the views of representative bodies, such as the NFU and CLA.

8. Agriculture

162. The moorland areas of Exmoor are managed by traditional hill farmers. The relatively harsh climate favours livestock farming of mainly sheep and some cattle. These farms are more likely to have been in the hands of the current operator for a long period of time compared to lowland farms. This means that present moorland farmers hold a significant store of land management knowledge and skills and that they and their family's attachment to the land is an important facet of Exmoor's upland farming cultural history (ENPA, 2007).

163. For many farms on Exmoor the Environmentally Sensitive Area (ESA) scheme has provided important income linked to environmental management by farmers. This scheme is being phased out and is moving towards a new Environmental Stewardship scheme. While this new scheme is likely to benefit many Exmoor farms, it is no longer constrained, as ESA funding was, to specific geographical areas but Higher Level funds have to be bid for on a competitive basis.

8.1 Review Findings

164. This section looks at the findings of the land manager interviews, firstly reviewing the farming background of those interviewed followed by assessing the impact of the project on farm management. The later sections explore the economic impacts and the views of the farming community more widely.

Breakdown of farming background

165. Most of those interviewed would be classed as traditional family farms, with the person interviewed the second, third or more generation to farm there. Of those who are first generation farmers, one had brought the farm relatively recently, another was a tenant and the other had only farmed on Exmoor with their family farming on other parts of the area. In addition three farm managers were interviewed and a further interview was conducted with a land owner.

166. In terms of size, most of the holdings that provided the information would be considered quite large in comparison to the national average. Three were over 2,000 hectares with a further three of about 1,600 hectares. A group of nine farms were between 300 and 800 hectares with only a single farm of less than 100 hectares in size. Many of the owner-occupied farm businesses rented some land, either through grazing licences or longer term arrangements, including the Full Agricultural Tenancy and Farm Business Tenancy. A minority of those we spoke to had blocks of land away from Exmoor that were integral to the farm business and enabled them to finish livestock more easily.

167. The farming systems are predominantly a combination of beef and sheep. Numbers of both stock types have declined in recent years, largely in conjunction with the requirements of agri-environment scheme agreements and the 2005 cessation of headage payments such as the Suckler Cow Premium and Ewe Premium, as well as an overall decrease in the profitability of both sectors. It would seem that personal preference and the farm environment are the key to determining the balance of cattle to sheep found on each farm,

with some farmers cutting out or reducing numbers of either sheep or cattle, in favour of the other. Ponies, particularly Exmoor ponies, are now used by a number of those interviewed as an effective tool for grazing the moorland areas.

168. All those land managers who are involved in the current project were approached individually by the project about 4 years ago and for most, their first recollection is of a face-to-face meeting. Only one recalls receiving a large package 'through the post'. The other six to whom we spoke fall into two equal-sized groups. For one group, the project was closely linked with their application for Higher Level Stewardship (HLS) or coincident with an adjustment to an existing ESA agreement, and they saw the mires restoration aspects as a logical addition to these processes. As one land manager put it '*we were in ESA before the mires project came along, so that fitted in with the ESA*'. The other group of three phrased their comments not around the substance of the first meeting but the approach, which is summed up by the following quote.

"They had decided that this was going to happen before we were on board, there was no chance to opt out – [I'm] not saying we would have but just that there was no chance".

169. In the latter group, the link to their agri-environment scheme was not so clear-cut and they seemed to perceive the initial contact as representing a one-way transmission of information by the EMRP, rather than a discussion or consultation.

170. Among the potential land managers contacted to seek interviews, some were aware of the project because they had seen the work in areas like Blackpitts or had received a letter outlining the project as well as some leaflets. A few had been involved in discussions with the Project Officer about recent surveys and possible areas for future intervention. Most of the potential land managers we spoke to who did not want to be interviewed had not been formally contacted by EMRP, and seemed to know little about the project.

171. Motivations for land owners joining the project varied. Some joined in order to be "good" tenants, others joined as they thought it would help them to get into HLS and for one the motivation for joining was to improve his grazing pasture.

172. Of the eleven interviewed with potential for rewetting on their land, 3 said they would not join the project. Reasons for this varied. One land manager felt that their farm size was too small to give up any grazing land, another was not convinced of the benefits of the ditch blocking and was concerned about the resulting damage to the moor and the hazards created. The third did not believe their land was suitable as it contained very little peat. Most of the remaining potential land managers would consider joining if there were sufficient financial incentives to do so. Three of the current land managers stated that if they had known what was involved in the project they would not have joined or at least rushed in so quickly. One was not convinced of the benefits of the project and viewed the blocking of 19th century ditches as "vandalism" and another was concerned about an increase in fluke and loss of the long term agricultural viability of the land.

Understanding of project aims

173. Most of the land managers in the project seemed to have a good understanding of the project aims in relation to holding the water on the moor and thought that the aims were explained well. As one land manager states *“David has explained it thoroughly, to help wet up the moor so that water can be retained and the moor plant species return”* and another land manager *“The aim is to slow up water and keep it on the hills and thus restore the bogs”*. However, their knowledge of the biodiversity goals of the project was less clear. Also, a significant minority of land managers and particularly those not yet involved in the project thought that the main aim of the project was to reduce flood risk: as one land manager put it *“To stop flash flooding down in the river. They are trying to convert the moor to prevent another Cocker mouth”*

174. Knowledge of the project among the farming community is clearly mixed as is shown by the range of views and knowledge expressed among the land managers who could potentially be involved in the new project. As one of these interviewees put it *‘about 50% of what I know about the project I have heard is from the project direct and the other half is from other sources – which may not be so reliable’*. The knowledge among current land managers is variable with one noting that they *‘have seen glossy leaflets and pictures but no hard figures to tell me what is happening’*. As other sections have noted communication of findings from the project is not systematic and from the land managers we spoke too they would be interested to hear some of the results of the current project.

Livestock Management

175. The types of reported impact of the project on the land manager’s management of livestock can be broadly divided into three groups. First, there are those that feel the project has had a positive impact on livestock management. Several farmers referred to an improvement in grazing pasture, as illustrated by the following quote

“the vegetation is definitely better, water has been spread out, there is no waterlogging”

176. Secondly, there are those who see the project running in conjunction with the ESA or HLS agreement; and from this standpoint, the project has little impact because, in the words of one land manager who might be involved in the future project, *“I can’t see that it’s a problem ... because in ESA you can’t graze in winter anyway so if it’s too wet it doesn’t matter”*. For these land managers they see no problem with the scheme and note that *“with the lack of numbers on the common, light ewes know where to go anyway”*. Even those with cattle in this group feel that there is not a significant problem, *“we summer graze it and ... no problems, the old ditches were just as dangerous”*.

177. A third group look at the impact of the project beyond the association with their agri-environment scheme. They note that the project has changed the nature of the land and that this change will last beyond the duration of the scheme and has, in their view, reduced the agricultural value of the land in the longer term. The main thrust of the change, as these land managers see it, is moving from a managed *Molinia* grazing pasture to an excessively wet, overgrown pasture that is still dominated by *Molinia*. Land managers in

this group who are currently involved in the project note that the sheep tend to avoid the wettest areas around the blocks put in under the project almost confirming what they had expected would happen. The sole mainly cattle land manager within this group also noted that *“the general feeling is it's better to have cattle on the moor to get through the tough sedge grass – so having a boggy moor is not good for getting cattle up there”*. More broadly, this group also feels that the link between the project and HLS undermines the voluntary nature of the agri-environment scheme as these two quotes show.

“Slightly worried ... it may be less voluntary if it is linked to AES with NE trying to achieve their objectives through the project – even though they can't demand to do so it makes it less voluntary”.

“Can they deny access to HLS if farmer does not want to join the mires project? – seems like a misuse of money”.

178. There are also three general concerns that were expressed by land managers in all these groups. The first area of concern is that of disease, with land managers noting that the longer vegetation as a result of reduced grazing is associated with an increase in tick abundance and that wetter areas may increase the risk of liver fluke (*fasciolosis*). Liver fluke appears to be on the increase in the UK, and land managers are concerned that the wetter grassland areas and availability of summer drinking pools may increase the incidences of the disease. The second concern is a little wider than the project specifically, but is that the presence of the project and the associated reductions in grazing levels increase the 'hassle factor' of tasks such as shepherding and collecting stock that are likely to range further when grazing is more extensive. Tasks such as collecting on and off the moor remain fairly time-consuming regardless of the number of animals involved, so with fewer stock grazing the time taken on these tasks is viewed as more significant. As one land manager put it *‘they [the project and AES schemes] are not helping with things like stock and shepherding which are really important to farmers’*. Thirdly, there was also general concern about responsibility for the future maintenance of the ditch blocks when/if the project ended. If the ditch blocks fail in the future whose responsibility is it to repair them?

179. Mixed views were expressed by land managers on the effect of EMRP activities on access for the management of the land and livestock. The EMRP Project Officer has a policy of discussing access issues with the farm manager to identify ways of preserving and even improving access routes for quad bikes and livestock.

180. Some of those not yet involved in the project were concerned that the uneven terrain left around ditches from borrow pits might cause them to be thrown off their quad bikes. Also the presence of the blocks and the open water was seen as a possible hindrance to general farming access and stock checking. By contrast, another land manager involved in the project found that the project had improved quad bike access as the following quote illustrates.

“Quad bikes are light anyway and as long as it is not really boggy you can go across it. You are not having to go into the dip and out of the other side when you are chasing cattle, but can go straight over it [the ditch]”.

181. Some land managers involved in the project also felt that the ditch blocks themselves had improved livestock access, although one felt that the ditch blocks were too narrow and therefore hindered quad bike and livestock access. Another, not yet involved in the project, was also concerned for livestock safety; fearful of the livestock falling into holes left on an unfamiliar terrain.

182. It became apparent from discussions with the Steering Group that much had been made of 'missing stock' in areas where the project was active. All of those interviewed were asked about this and the overall view of both current and potential land managers was that you "*don't always collect those animals that you put on [the moor]*". Amongst the farming community it is considered a natural hazard of moors generally that some stock will be lost.

183. Another land manager pointed out that land managers put stock "*out on top and one less came back but then this often happened before the project and you blamed 'the mire' but never knew*". In this sense the project is another opportunity to explain losses in stock but as another land manager suggests, "*it remains a possibility*".

Farming Economy

184. Most of those interviewed felt that the wider economic impact of the project would be fairly neutral. As noted elsewhere the project has had a positive impact on the local contractors and other works associated with the management work. None of the land managers interviewed were involved in this work, although two interviewees stated they would have liked to have undertaken some of the tasks and others provided access to their land for the baling of heather or *Molinia*. The project is also associated with a more widespread view that the lack of grazing management on the moors of Exmoor has not improved the quality of these areas either from an agricultural point of view or from an environmentally one.

185. All of the land managers we spoke to recognised that since the introduction of the ESA on Exmoor, the environment was now part of the farming economy. Some of them do not like this as noted earlier; they see it as a 'backward step'. Most of the land managers we spoke to felt that the re-wetting payments under HLS of £10/ha were too low compared to other options. For those where re-wetting had reduced grassland quality, it was felt the payments did not fully compensate for the loss of the agricultural value to their land. Unlike other management options in agri-environment schemes, it is difficult to reverse the impact of re-wetting the mires should funding cease. As one land manager put it if environmental schemes are to include other aspects such as clean water and carbon storage then this needs to be fully explored and not rely on voluntary schemes requiring some altruistic intent on the part of the landowner.

"Environment-wise I can see that it is good but not recognised for that so the landowner is sort of doing it for free as no return on the main capital asset (land). This does not compare well with Wind Turbines, which are worth £20,000 each in terms of the renewable energy generated. Why can't clean water and carbon storage be done in the same way".

186. In fact, Dartmoor and Exmoor are pilot areas for a Defra pilot study into paying for eco-system services and the evidence from the Mires on the Moors project will in time help inform this pilot (Natural England, 2009). The pilots will demonstrate that investment and improvement in the natural environment can result in multiple benefits for people and society in a cost effective way. Also SWW are exploring the idea of an additional annual payment to land managers for the delivery of water services. This idea was broached with the land managers and most looked on it favourably. However, for some, even this added incentive would not be enough to persuade them to join the project.

8.2 Recommendations

Recommendation 32: Embed the systematic and routine encouragement of land manager's direct involvement in carrying out restoration related activities and subsequent monitoring.

187. On most occasions participant land managers have been offered the opportunity for involvement in project work on their land, which might include cutting bales or simple ditch block construction. However, on two occasions this opportunity was not offered resulting in the view that the project was 'something done to them' rather than involving them. The next phase of the project should embed the participation of land managers further so that the offer of involvement, on a wide range of levels, becomes both systematic and routine. The precise aspect of involvement would be open and may vary depending on the land managers' interest. Also land managers should be offered the opportunity of contributing to the monitoring on their land if there is interest and funding available. This could take the form of simple dipwell monitoring or vegetation surveys or, as specifically mentioned in two of the farmer interviews, to cut and possibly bale the rushes/heather used in the project.

Recommendation 33: Continue to discuss access issues with land managers

188. A number of land managers referred to improved access conditions as a result of the EMRP. The new project should continue to consult with land managers on access issues and identify ways to improve access for livestock and quad bikes.

Recommendation 34: Consider forming a Mire Farmers Group/Forum of project farmers

189. The project would benefit from the formation of a Mire Farmers Group or Forum. Such groups have been successfully formed in other peatland restoration projects, such as Caithness and Sutherland Peatland management scheme. This would be an informal grouping comprised of current participants and would give them a means to voice their concerns and influence project activities and help them to feel some ownership of the project. A group like this is also likely to increase the perceived efficacy of their actions if there is realisation that all are working towards peatland restoration. This group could be provided with regular updates detailing the latest monitoring results and information about visitors to the various sites, enabling them to gauge the level of outside interest in the project. The group could have one informal social gathering a year where they could meet and have an opportunity to ask questions.

Recommendation 35: Improve farmer representation on the project Delivery Group

190. The involvement of a representative body on the Delivery Group would be beneficial, but it is important to ensure that they are truly representative and communicating with the

project farmers. Alternatively, there could be a representative from a farmer group, such as the South West Upland Federation, who would also be able to cover Dartmoor. Whichever approach is taken, the representation should be agreed by the farmer participants and a channel of communication agreed.

Recommendation 36: Monitor for any increases in livestock parasites.

191. One of the concerns expressed by several land managers was the possibility that re-wetting work might lead to an increase in liver fluke and ticks. The project should monitor for any increases in incidences of fluke and ticks. Tick monitoring is undertaken in the Wales Life-Nature Project during April and August each year and collecting this information has proved valuable in demonstrating to the land managers the level of importance that those running the project attach to farming interests (RSPB, 2009).

9. Communication

192. The review team was asked to consider the extent to which the project has been communicated successfully at national and local levels. Evidence was collected from project documents and discussions with stakeholders and land managers.

9.1 Review Findings

193. The EMRP has been extremely effective in promoting itself and has achieved considerable press and TV coverage, both nationally and locally. To date there have been:

- Local publications – e.g. Exmoor Magazine Spring 2007
- Newspaper articles – e.g. Western Morning News
- At least 10 local radio and television interviews

194. A recurring theme expressed during the review is that the EMRP was less effective in locally communicating the aims and objectives of the project. There appeared to be confusion as to what the project is trying to achieve and some unease about the impact of the project on issues such as access, stock management and flooding. As one stakeholder expressed it *“There is a lot of ‘white noise’ surrounding the project, which is being filled in with misinformation”*. Also many of the stakeholders consulted were not convinced of the benefits and cost effectiveness of the project, and were seeking monitoring results and reassurance. More transparency was needed about the costs of the project as well as its benefits, to enable interested stakeholders to check whether the project was delivering good value for money. It became apparent during the stakeholder interviews that there is not an appropriate outlet or opportunity for stakeholders to seek answers to these questions. Two open days were organised, but attendance at these events was poor.

195. It was suggested by the Exmoor Society that project communication mechanisms should be more than a newsletter or presentations to a group of stakeholders, but involve open discussions with real opportunities for questions and answers.

196. Land managers were mostly happy with the one-to-one approach adopted by the Project Officer. This was preferable to meetings and open days which they found difficult to attend due to time constraints. However, some land managers felt that they would like more feedback about the project and information on monitoring results on their sites or other sites in the project.

9.2 Recommendations

Recommendation 37: Ensure communication of project aims and monitoring results is understandable and widespread

197. Effective science communication to different stakeholders should form part of the project monitoring plans. The dissemination strategy needs to sit alongside the monitoring strategy. It is not always easy to communicate complex hydrological processes to non-experts and expert advice should be taken on this process to ensure that this is done effectively. This will help dispel some of the local myths about the impacts of blocking peat

ditches². Also results from the water quantity and quality monitoring should be shared more widely to help inform peat restoration nationally.

198. In explaining the goals of the project an illustrative, annotated upper catchment profile should be produced including the moorland plateau and slopes, detailing what the project is trying to achieve. This will help in explaining technical concepts to non-experts. It is also important that this explanation should clarify the assumptions made, acknowledge any uncertainties and identify knowledge gaps, particularly in relation to flood risk mitigation. Also the issues in relation to temporal and spatial scales should be clearly explained.

Recommendation 38: Communicate ‘lessons learnt’ before proceeding with new project

199. The Steering Group need to communicate widely to stakeholders the lessons learnt from the current project before proceeding with the new project. Doing this will demonstrate to the local stakeholders that they are being listened to. One way to achieve this is to communicate to stakeholders the Group’s response to the recommendations proposed in this review.

Recommendation 39: Consider communication mechanisms raised in workshop.

200. The participants at the stakeholder workshop put forward many ideas for effective communication methods that could be employed by the project (see Appendix 3). These included:

- An interactive website with image led and interactive resources including audio and video recorded views of land managers and others;
- parish magazine articles; and
- interpretation and information boards, including one at Cutcombe market for farmers.

201. The review of peatland restoration projects identified other innovative approaches to communications which could be considered by the Mire on the Moors project. This included the following:

- A project blog. Flanders Moss achieved active public participation through the creation of a ‘Flanders Moss bog blog’. The blog is updated several times a week and provides an up-to date and informal account of the progress of the restoration, including many pictures which are uploaded to show the wildlife as well as anything new installed in the site as the restoration continues. This is an innovative way to open up direct communication between the project officer who writes the blog and the stakeholders and local community who follow and visit the blog regularly.
- Project podcasts. The Great Fen project has 5 podcasts available to download from the main project website each of which has a theme. The themes include; an overview of the project area, summer wildlife on the Great Fen, fenland history and mini-beasts safari and wildlife education.

² *An Exmoor conservation project has been condemned as a "ghastly experiment" by moor dwellers who warn it could prompt a flood disaster on the scale that Lynmouth saw in 1952. (North Devon Journal, 30 April, 2009)*

- Downloadable walking guides. These are a popular engagement mechanism used by many of the projects as they actively encourage website users to visit the project site and explore the restoration for themselves.
- Project community days. In the Restoring Fenn’s Whixall and Bettisfield Mosses project, a ‘bogs are brilliant day’ was held where the public were invited to gain an insight into the management carried out on the reserve to enhance wildlife, as well as raise awareness to how bogs can help mitigate the effects of climate change. A similar “Mires are marvellous day” could be held on Exmoor.

Recommendation 40: Forge better links with other moorland organisations and projects.

202. The new project should focus on forging better links with other moorland projects, such as the Exmoor Hill Farming Project and the Exmoor Moorland Landscape Partnership Scheme. This scheme is proposing setting up an Exmoor Moorland Manager Association which could provide another opportunity.

Recommendation 41: Continue good communication between Mire Restoration projects on Exmoor and Dartmoor and other peat restoration projects

203. As peat restoration work nationally is still at an early stage of development, it is essential to have good communication between different peatland restoration projects. It is particularly important to continue effective communication between the Dartmoor and Exmoor projects, as they are operating in similar geographical conditions.

204. To facilitate this communication to other projects, the project should document lessons learnt, show what problems have been encountered in the past project and how these problems were addressed. By documenting these lessons it will enable other restoration projects to determine whether the lessons learned apply to their situations, and to help avoid repeating mistakes.

10. Education

205. The review team was asked to assess the extent to which the EMRP had furthered the understanding of peatland at both the national and local level. The evidence for the review of educational impact was derived from project documents and discussions with the Project Officer and stakeholders.

10.1 Review Findings

206. Educational outreach was not one of the original objectives of the EMRP, nevertheless the Project Officer has spent several days a year on educational visits in order to further the understanding of the project. This has included:

- school group visits and work experience days, organised in co-operation with the Exmoor Outdoor centres at Pinkery and Yenworthy Lodge.
- 2 open days: at Exe Head and Squallacombe
- 7 guided walks between 2007 and 2009
- assistance with development of a Teachers pack for the Aclands site as part of HLS agreement.
- local illustrated talks – e.g. Parish meetings, Local access forum
- numerous student projects.

207. At a national level the EMRP has contributed to the understanding of peatland restoration through presentations and national reports, including:

- a case study in Review of Blanket Bog Management and Restoration. Technical report to Defra (O'Brien et al April 2007)
- presentation at the launch of the EA climate change mitigation strategy
- national radio and television coverage.
- presentation and attendance at national peatland restoration conferences and seminars including : Moors for the Future annual conferences, World Wetland Day, British Hydrological Society meetings, etc (approx 2/year)
- reporting to IUCN commission of enquiry into peatland restoration: attendance at x3 workshops into biodiversity, historic environment, restoration and monitoring.

208. The Steering Group recognise that significantly more can be achieved in promoting the understanding of peat restoration on Exmoor. The Mires on the Moors project may benefit from a greater commitment of resources for educational outreach so that a dedicated part-time education outreach officer can be in post. There are many areas where the educational benefits of the project can be enhanced. A number of suggestions were put forward during the stakeholder workshop which are outlined below. One of the stakeholders suggested that as much emphasis should be placed on adult education as on the education of children.

209. Suggestions included:

- starting a monitoring programme that can be conducted by the local schools on Exmoor, this can be carried on for generations as the responsibility for monitoring is passed down the year groups.
- developing an interactive website, with resources specifically for schools and linked to the school curriculum, including a short film about the project.

210. There is also great potential to develop wider understanding and appreciation of the moors amongst local communities and visitors. Increasing an understanding of the historical and cultural links with moorlands will result in a greater appreciation of the peatland restoration work on Exmoor.

211. All of the partners in the EMRP (with the exception of South West Water) are also partners in the Exmoor Moorland Landscape Partnership Scheme which has been developing a suite of Projects to conserve and enhance Exmoor's moorland and help more people to enjoy, learn about, look after and celebrate the moorland landscape. In developing this Scheme they carried out a range of studies including commissioning Land Use Consultants to prepare an "Audience Development Plan" for Exmoor's moorlands. This document has provided the Steering Group with information that has helped in developing the education aspects of future mire restoration work.

212. The Exmoor National Park Management Plan (2007 – 2012) has a target (F4.2) to provide a "major National Park Centre ...at a central location in the National Park by the end of 2012 to interpret Exmoor's moorlands and the importance of farming and historic environment and to provide a base for educational activities and an exciting destination for the visiting public." Resources have not been secured to enable this project to go ahead but if it does there would be great potential for the Centre to act as a focus for explaining mire restoration and developing a cultural and historical appreciation of the moors. In the meantime opportunities to further the understanding of peatland should continue to be sought.

10.2 Recommendations

Recommendation 42: Develop a programme of education outreach with schools

213. Develop links with local primary schools and produce curriculum-specific resources to encourage greater understanding of the moorland restoration work and the threat to the moors. This could be linked to topics related to climate change, history, geography and biology. This is planned through the Moor to Sea project, if funding is secured for ENPA's Landscape Partnership Scheme.

11. Involving local community

214. The project review team was asked to consider how the project has engaged with local groups and individuals in the project activities, particularly in relation to use of local volunteers and contractors. Evidence for this section of the review was derived from project documents and stakeholder interviews.

11.1 Review Findings

215. The review team found that there has been some use of volunteers to help with project activities. The EMRP Project Report (2006-2009) states that volunteers have been used in vegetation monitoring work by helping with identification and recording of species and also in entering data in spreadsheets and analysing the results. Also there has been some limited use of volunteers in building wooden dams at Blackpitts and Exe Head, although they have been used mostly for site after-care and conservation work. This has included refurbishment of the dipwells at pilot sites, peat ditch block maintenance at two other sites and post-contractor worksite tidying at Blackpitts.

216. At the stakeholder workshop the feeling was that there was greater potential for use of volunteers for monitoring and project work, such as the Exmoor Natural History Society. The review of other peatland restoration projects identified activities in which the local community could be involved, including working with groups to grow cottongrass from seed which is planted out to stabilise peat and prevent erosion.

217. A number of stakeholders emphasised the importance of using local contractors to undertake the project activities, such as construction of ditch blocks and cutting of bales. This was seen as positively contributing to the local economy and will provide local contractors with work as ESA agreements on Exmoor come to an end. On two of the earlier sites the EMRP used a specialist contractor from outside the area (due to the difficult nature of the site ground conditions and in a bid to demonstrate best practices to the local contractors) which caused some resentment amongst local stakeholders. Since then, there has been a greater focus on using local contractors, although there are relatively few contractors available locally to undertake this specialist work.

11.2 Recommendations

Recommendation 43: Increase the use of volunteers for monitoring and restoration work to encourage stakeholder participation and ownership.

218. Efforts should focus on recruiting more volunteers to undertaken monitoring and to assist in ditch block building on archaeologically sensitive sites. The new project should continue to work with the Exmoor Volunteers partnership, a partnership between Exmoor National park Authority, the National Trust, Dunster Crown Estate and the South West Lakes Trust which encourages members of the public to help with various tasks and projects within the National Park. It should also seek to encourage more local community groups to volunteer and more young people.

Recommendation 44: Train and use more local contractors in project work.

219. Avoid use of external contractors and continue to employ local contractors to undertake project work. Due to the limited number of contractors available on Exmoor with the necessary machinery and skills to do the work, offer appropriate training and provide assistance in completing applications for grant funding for machinery.

12. Governance and decision-making

220. The review team were also asked to consider the extent to which the current governance structure of the project could be improved. In forming recommendations on improving the governance structure the review took evidence from the Expert interviews and discussions with stakeholders and land managers.

12.1 Review Findings

221. A key finding from the review is that some stakeholders felt excluded from the decision-making process. There was a strong feeling that their views should be incorporated into the project. A number of practical suggestions for ways in which community involvement in decision-making could be increased were put forward at the stakeholder workshop. This included:

- an on-line feedback site, with a facility to view comments from others;
- community representatives/parish councillors on the project steering/stakeholder group;
- a land manager representative on the decision making board – but it will be important to ensure that they are communicating with the wider land managing community;
- using telephone and postal questionnaires to gather feedback on attitudes to the project;
- strengthening personal contacts – project staff and SG members developing long term relationships with land managers;
- a travelling road show – open to all, interactive, and with park-wide coverage;
- including the research community that might inform the project in its future decision-making.

222. The EMRP Steering Group recognises the need to involve the local community and stakeholders more in the decision-making of the new project. They have produced a draft Governance Structure for the Mires on the Moors project (see Appendix 6) which incorporates an Exmoor Mire Restoration Project Advisory Board whose role will be to give strategic direction to the project. This would include representatives of the Exmoor Moorland Initiative Board, and of related Exmoor projects e.g. catchment sensitive farming, EU WATER project, River Exe Project etc, Exmoor moorland landowners group representatives, Local access forum representatives, delivery group, other relevant /interested bodies and individuals. The current view is that this group will meet biannually.

223. The structure also proposes an Exmoor Mire Restoration Project Delivery Group whose role will be to take direction from the Advisory Group and to manage the Project Delivery. This will include representatives of the project partners who constitute the current EMRP Steering Group, namely, SWW, EH NE, EA and ENPA.

12.2 Recommendations

Recommendation 45: Implement the proposed governance structure, but expand Project Delivery Group with representations from farming and voluntary sectors and academia

224. The proposed governance structure for the new Mires on the Moors project is an improvement on the previous EMRP structure and provides a good basis into which the following recommendations can be built.

225. The Mires on the Moors project should establish the proposed Advisory Board. This will bring more stakeholders into the decision-making process. Involvement of stakeholders at this level should ensure a certain amount of ownership of the project and will act as a sounding board for different ideas and ensure that different perspectives are incorporated into the project. It will also give the project a sound remit for its work and plans. We advise that the group should not number more than 15 people, in order to ensure that all those present feel their voices can be heard.

226. The Mires on the Moors project should establish the proposed Project Delivery Group which would include the current project partners. These organisations would continue to share the responsibility for the project success and achievement of defined outcomes. However, this group should also be broadened to ensure good stakeholder representation in the project decision-making and delivery process. We recommend incorporating:

- a farming representative - ideally, this person should be someone from the existing EMRP, if there is someone willing to take on this role.
- a representative from the voluntary or community sector with a good knowledge of broader stakeholder interests and concerns would be a valuable addition, possibly someone from the Exmoor Society.
- an academic from one of the Universities already involved in mire restoration work on Exmoor. This will help to maintain contact with the academic community and to ensure academic rigour within the monitoring work.

227. One of the roles of the Project Delivery Group would be to give direction and guidance to the Project Staff Team. It would meet more frequently than the Advisory Board, up to 8 times a year, and the total membership should be fewer than 8 people, reflecting the more hands-on nature of its work.

Recommendation 46: Ensure clear lines of communication and responsibility

228. To improve stakeholder participation the project should clearly indicate and publicise who should be approached to voice concerns and which organisation has responsibility for the project. With different partners involved in the project the stakeholders can find this confusing. By providing a single point of contact, issues can then be addressed efficiently and effectively.

Recommendation 47: Invest time before new project in achieving stakeholder buy-in

229. The current EMRP Steering Group should invest time now, before the start of the new project, to ensure that all stakeholders and land managers have bought into the project and they feel they have a voice within the project. Some stakeholders still need convincing of

the need for peatland restoration, which could be achieved through a clearer articulation of the threats to the mires on Exmoor and the positive results that have been achieved by other peatland restoration projects.

Recommendation 48: Encourage a process of iterative problem-solving

230. Adopt the principles of adaptive management which recognises the inevitable experimental nature of land management projects due to knowledge constraints, and promotes a process of iterative problem-solving with all relevant actors involved in understanding, debating and then agreeing on the best way forward.

Recommendation 49: Consider on-going external evaluation to ensure relationships are working

231. Finally, consider an on-going external evaluation of the governance and management process for the project, possibly gathering information on a yearly basis to ensure that relationships are working. This could take the form of an annual stakeholder workshop organised and recorded by someone independent from the project's governance structures, which would aim to reveal and analyse any underlying issues which had not been raised through the formal governance channels.

13. Recommendations and Conclusion

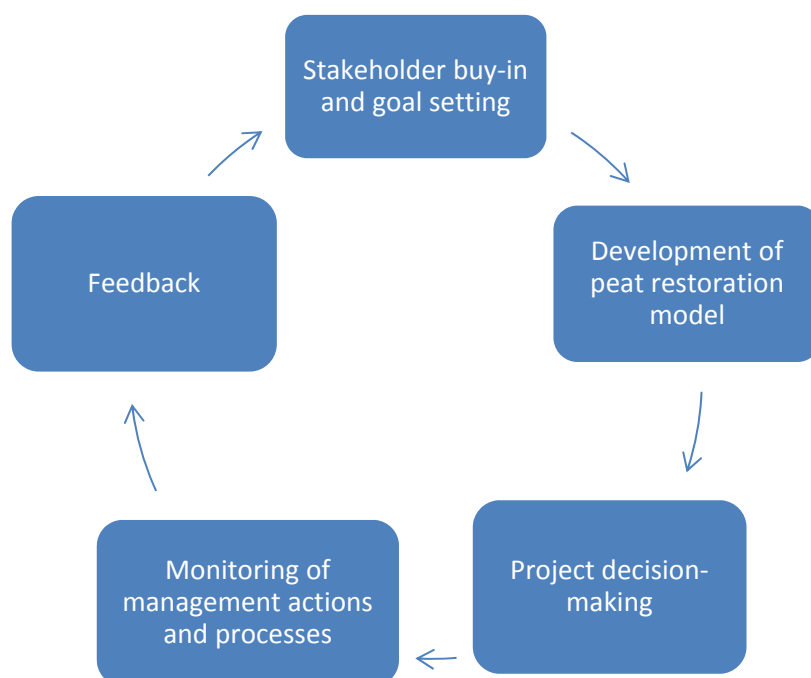
232. This section of the report summarises the recommendations presented in the earlier sections and considers the use of adaptive management as a framework for more collaborative and open decision-making.

233. The review has highlighted the importance of securing local stakeholder engagement within the EMRP. There is clearly a need for the new project to develop ways in which the project engages with and involves local people, informing people about project activities, seeking their views on proposals and involving them in the decision making process

13.1 Adaptive management

234. One of the recommendations for the Mire on the Moors project is to consider adopting the principles of adaptive management. Adaptive management recognises that projects, such as peatland restoration, must move forward with insufficient knowledge, due to uncertainties of the complex systems involved and the inevitable time constraints. Project management activities are therefore implemented as a set of experiments based on the best understanding of the system. The results are monitored in a systematic way so that managers can evaluate their hypotheses, learn what has or has not worked well and modify practices accordingly. Much of the EMRP represented a period of experimentation in which the most appropriate ditch blocking techniques were established. What was lacking from this phase, however, was stakeholder input to analysing, understanding and decision-making on the basis of the results of these experiments. If the EMRP took an experimental adaptive management approach, the second phase, the Mires in the Moors project, should look to take a collaborative adaptive management approach where there is greater communication within the project between all the stakeholders.

Figure 13.1 Adaptive management for peat restoration project



235. While there are different interpretations of adaptive management, there appears to be general agreement on the steps involved. These are clearly defined by Jacobsen et al (2009) as: buy-in and goal setting; model development; action; monitoring and feedback. Figure 13.1 presents these stages in relation to the Mires on the Moors project.

Buy-in and goal setting

236. The Steering Group need to expend energy now, before the start of the Mires on the Moors project, ensuring that stakeholders and land managers are signed up to the aims of the project and are convinced of the need for peat restoration on Exmoor. The project needs to provide clear evidence and explanations to facilitate this buy-in. The messages about the project should aim to convince the receiver: (a) the problem is serious, (b) it affects them, (c) the recommendations will solve the problem, and (d) they are capable of performing the recommendations. The message should target as wide a range of people as possible using a variety of approaches and a combination of different mechanisms. The key for the project is to try to ensure that its message is picked up and discussed positively within farming communities and networks. The best way to achieve this is to ensure that social processes are operating, for example, ensuring different interest groups are able to get involved, and creating a favourable social environment within which advice is given or learning takes place.

237. The project should also have clearly defined goals, with agreement from the stakeholders and land managers as to the goals that should be set. The project should also consider social benchmarks of success as well as ecological and hydrological ones. To facilitate these social processes, clear lines of communication are required. The proposed Advisory Board and an expanded Delivery Group will assist this process.

Model development

238. The EMRP, through a process of experimentation has been very successful in identifying the most appropriate ditch blocking techniques to be used in different situations on Exmoor. This knowledge can be transformed into a model of peatland restoration for the Mires on the Moors project. This model should clearly communicate the underlying assumptions used in developing the techniques and acknowledge the uncertainties and gaps in knowledge, particularly in relation to the impact on river base flows. The model should also clearly indicate the variables used for selecting which ditches or gullies are to be blocked. Furthermore, the model should clearly articulate the issues in relation to temporal scale, such as the length of time for ditches to disappear and the appropriate spatial scale.

Action

239. This step involves a decision-making process to choose between the different management options. In the Mires on the Moors project the focus will be on deciding which areas to restore and what techniques are to be used. It is important at this stage to consider the risks and trade-offs of proceeding with peatland restoration on a particular site or of using certain techniques (for example, weighing up local concerns about wooden boards as a tripping hazard or the use of ditch spoil rather than peat in archaeologically sensitive areas). The project should continue to have an underlying acceptance that some

areas may not be suitable for re-wetting due to other local priorities, particularly in relation to the historic environment.

Monitoring

240. Systematic and planned monitoring of management actions is an integral part of adaptive management because of its focus on social learning. This will be an important part of the Mires on the Moors project. Experience from EMRP has shown that monitoring is key to ensuring rigour in knowledge about the effectiveness of management actions. Whilst there has been systematic vegetation monitoring; it has not been possible within the scope of the project to carry out in depth hydrological monitoring which has left many questions unanswered about the effectiveness of peatland restoration. Given the resources available, there is great potential for systematic monitoring within the Mires on the Moors project, which will be of national as well as local interest.

241. The project should also collect some basic data so that the management processes and the extent of stakeholder participation can be evaluated.

Feedback

242. Feedback involves the analysis and assessment of project activities and the assumptions, uncertainties and knowledge gaps identified during the model stage. It also involves the analysis and assessment of the goals and success benchmarks identified. This analysis then feeds back into the goal-setting stages and evaluates the appropriateness of the goals set. This step also focuses on the transmission of learning to stakeholders, and ensuring that lessons learnt are documented and widely disseminated.

243.

244. Table 13.1 summarises the recommendations described at the end of each the previous sections.

Table 13.1 Summary of the review recommendations

Biodiversity and Peat Restoration
Recommendation 1: Clearly state the aims of ditch blocking and decision variables used in selecting ditches to block
Recommendation 2: Clearly state biodiversity goals and targets against which success can be measured
Recommendation 3: Consider using palaeoecological work as a guide to the potential <i>range</i> of plant assemblages that might be set as targets for the subsequent restoration work
Recommendation 4: Continue and enhance the vegetation monitoring programme
Recommendation 5: Consider further research into bryophyte species as indicators of change
Recommendation 6: Consider further invertebrate surveys
Hydrology
Recommendation 7: Implement the proposed hydrological monitoring plan
Recommendation 8: Document lessons learnt from monitoring in the earlier project
Recommendation 9: Continuously check monitoring data for problems

Recommendation 10: Check water quantity monitoring equipment reliability against costs

Recommendation 11: Consider some local volunteer hydrological monitoring

Recommendation 12: Monitor for a minimum of 5 years

Historic Environment

Recommendation 13: Undertake a comprehensive appraisal for each piece of work based on the model of an EIA.

Recommendation 14: Enable a strategic approach to rewetting works, rather than a site by site approach.

Recommendation 15: Continue and enhance the current historic environment mitigation strategy

Recommendation 16: Ensure good communication by historic environment professionals as to the potential of sites

Recommendation 17: Ensure work undertaken by contractors is precisely specified and appropriately supervised and monitored.

Recommendation 18: Ensure practical considerations are observed

Recommendation 19: Favour the use of ditch spoil for ditch blocking over undisturbed peat

Recommendation 20: Take strategic palaeoecological samples where resources permit

Recommendation 21: Consider post-work monitoring of the historic environment

Recommendation 22: Consider incorporating further historic environment investigations and research into the project

Landscape

Recommendation 23: Continue to minimise local visual impacts on sites

Recommendation 24: Avoid the creation of large pools

Recommendation 25: Continue to limit the use of signage on the moor itself

Recommendation 26: Continue to keep photographic records of project sites

Access

Recommendation 27: Continue to avoid making access routes on proposed sites wetter

Recommendation 28: Consider wider crossings as part of new ditch blocks

Recommendation 29: Produce an advisory map identifying sensitive areas on the mires

Recommendation 30: Monitor tripping hazard risks from wooden boards used in ditch blocks

Recommendation 31: Clarify public liability issues

Agriculture

Recommendation 32: Embed the systematic and routine encouragement of land manager's direct involvement in carrying out restoration related activities and subsequent monitoring

Recommendation 33: Continue to discuss access issues with land managers

Recommendation 34: Consider forming a Mire Farmers Group/Forum of project farmers

Recommendation 35: Improve farmer representation on the project Delivery Group

Recommendation 36: Monitor for any increases in livestock parasites.
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Communication

Recommendation 37: Ensure communication of project aims and monitoring results is understandable and widespread

Recommendation 38: Communicate 'lessons learnt' before proceeding with the new project
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Recommendation 39: Consider communication mechanisms raised in the workshop

Recommendation 40: Forge better links with other moorland organisations and projects
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Recommendation 41: Continue good communication between Mire Restoration projects on Exmoor and Dartmoor and other peat restoration projects.
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Education

Recommendation 42: Develop a programme of educational outreach with schools

Community Involvement

Recommendation 43: Increase the use of volunteers for monitoring and restoration work to encourage stakeholder participation and ownership
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Recommendation 44: Train and use more local contractors in project work.
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Governance and decision-making

Recommendation 45: Implement the proposed governance structure but expand Project Delivery Group with representations from farming and voluntary sectors and academia

Recommendation 46: Ensure clear lines of communication and responsibility

Recommendation 47: Invest time before the new project in achieving stakeholder buy-in

Recommendation 48: Encourage a process of iterative problem-solving

Recommendation 49: Consider an on-going external evaluation to ensure relationships are working

13.2 Concluding Remarks

245. The EMRP was established as a pilot project for mire restoration on Exmoor involving the blocking of drainage ditches. The review revealed that since the recruitment of a dedicated Project Officer in 2006, a significant amount of ditch blocking has been achieved to date on Exmoor, exceeding the original target of 250 hectares. Over this period the EMRP has also gained valuable experience as to the most appropriate ditch blocking techniques for the different situations on Exmoor.

246. Extensive vegetation monitoring has shown that already within 2 or 3 years there is evidence of vegetation change, with an increase in plants indicative of wetter conditions, such as *Sphagnum* spp. and Cotton grass on some sites. Insufficient project resources for hydrological monitoring combined with some early problems with the monitoring equipment has meant that hydrological monitoring data is limited in showing the impact of

ditch blocking on the peatland hydrology. Summary graphs of the dipwell data produced by the EMRP Project Officer show a clear rise of the water table at the Exe Head site. Visual observations have also identified wetter conditions at most of the other project sites. Lessons learnt from the EMRP project have been incorporated into the new and more detailed hydrological monitoring plan for the future Mires on the Moors project which has been reviewed and endorsed by leading academics in the UK and by the Environment Agency.

247. The primary role of the Project Officer was to organise the practical mire restoration work, using and modifying techniques successfully adopted elsewhere and the Project did not have the capacity to carry out a wider range of activities such as outreach and educational programmes. The review found that whilst promotion of the EMRP has been extensive, communication and consultation with local stakeholders has been limited. This had resulted in some local concerns and misunderstandings about the project. The review has shown that some of these concerns in relation to access and landscape impacts, for example, are unfounded.

248. Some valuable lessons have been learnt from the EMRP. In moving into the next phase of mire restoration on Exmoor, the new Mires on the Moors project is envisaged as a significantly larger project which will require a strong evaluative framework with clearly defined goals and targets against which the success of the project can be measured, including ecological, hydrological and social goals. Increased involvement of the local community is required to ensure greater acceptance and understanding of the project. The establishment of an informal group of Mire farmers will provide a forum for voicing issues and will facilitate greater engagement with the project. The proposed governance structure with a Project Advisory Board, incorporating local representatives and a Project Delivery Group, including the project partners and representatives from the farming and voluntary sector and academia, will ensure a certain amount of stakeholder ownership of the project and will enable different perspectives to be incorporated into the project. Adoption of an adaptive collaborative management model will ensure that there is local stakeholder buy-in into the project, will establish a clear model of peatland restoration that is well communicated to the local community and will ensure that project decision-making continues to incorporate local priorities.

249. Lesson learnt from EMRP will provide a firm basis on which to develop and implement the larger and more ambitious Mires on the Moors project. The nature and scale of this new project has great potential to achieve multiple benefits to the environment and society by conserving and enhancing the moorland habitat for upland wildlife, improving water quality and increasing the potential of Exmoor's blanket bog to store carbon and hence to mitigate the impacts of climate change.

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Appendix 1 Review of UK Peatland Restoration Projects

	Project Name & Website	Main Organisation(s)	Objectives – Project type	Activities	Engagement mechanisms e.g. ES scheme, own scheme	Stakeholder participatory activity/communication e.g. stakeholder group, meetings etc	Scale (area)	Funding
1	Ballynahone Bog , Northern Ireland	Ulster Wildlife Trust (UWT) and the Environment and Heritage service (EHS)	The Primary objective is to restore and manage the lowland bog, in order to preserve the large abundance of heath butterfly in Northern Ireland.	Birch Removal and removal of other invasive species, blocking of peat drains.	Initial purchase of 400 acres of bog in 1990 by Friends of Ballynahorne bog group. The project maintains direct involvement with landowners – who are mainly local councils. EHS offers grant aid to local councils who construct a BAP and the local appointment of local biodiversity officers. EHS also conducts an agri-environmental scheme called the Northern Ireland Countryside Management scheme, as used on Ballynahorne bog.	<ul style="list-style-type: none"> • Friends of Ballynahorne bog group established in 1990 as a community campaign for the restoration of the peat. They worked with environmental organisations and professionals to oppose the drainage and extraction of peat on the site. They also lobbied for the site to be legally protected, as a direct result of this in 1994 the site was recognised as a SSSI, NNR and a Ramsar site. Members of the group now sit on management board alongside representatives from UWT and EHS. • Volunteer days are held which involve the local community directly in the peat restoration- the last one took place in January 2010 and included Birch removal. • Wildlife ramble days are also held on the bog, they seek to actively educate the public of its importance – the last one 	224ha- the second largest area of intact raised bog in Northern Ireland.	NA

						took place June 2009.		
2	Border Mires Restoration , Northumberland	Forestry Commission	<ul style="list-style-type: none"> To re-establish the Mires within their original boundaries, the project aims to deliver blanket bog as part of a blanket bog habitat action plan. The project aims to reach the NE target of restoring 95% of land within SSSIs by 2010. To ensure that the quality of all blanket bog habitat is improved to a near natural and sustainable condition. To expand the area of high elevation blanket bog so that the area is free from the influence of the forest edge. To encourage other private owners within the SAC to take positive action towards achieving favourable conservation status in land under their control. 	Dam construction, raising of water levels to restore water table, blocking drainage ditches, tree felling – carried out by RAF bombing exercise removing 145,000 trees, the creation of 130 raider pools constructed as deliberate result of the bombing	No information available.	The site is situated in a remote area, so little community and stakeholder interaction was directly required. However, the NWT does offer volunteering opportunities in the mires. In terms of communicating with the general public it was deemed difficult to reach a general audience and even if they could, the habitats and conservation required were deemed to be specialist issues rather than of interest to the general public. Project material was therefore targeted at a professional audience. Nonetheless, the unusual method of tree felling did attract some media attention, with TV crews filming the bombing of the site.	1,317 ha Consists of 56 peat bogs stretching from Kielder to Butterburn	£700,000 from EU and Northumberland National Park
3	Burns Beck Moss , Cumbria	Cumbria Wildlife Trust (CWT)	The primary aim is to reverse the drainage carried out on the site that had taken place prior to the purchase of the site by the CWT in 1995, this included the filling of a number drains.	Rewetting of the land using a series of small dams and blocking of the drains which were built into the site in the previous drainage exercise.	CWT purchased Burns Beck Moss in 1995.	Burn Beck Moss is open to the public and advertised to walkers as an area for nature walks and bird watching; it is also featured on several websites as well as offering an education programme to the public on how it is managed. However, there is no evidence to suggest significant	15.1 ha	NA

4	Caithness and Sutherland Peatland Management Scheme , Scottish Highlands	Scottish Natural Heritage (SNH)	<p>The overall aim as defined in the management strategy; is to enhance and promote sustainable land management, the encouragement of a sustainable community and economic development through co-ordinated action.</p> <p>The scheme was launched in 1992, and reviewed in 2001 and 2002 in light of changes to the EU guidelines on payments for agri-environmental measures; the project was then re-launched at the end of 2002, and is currently half way through the 2005-2015 management strategy. The strategy outlines 4 key objectives:</p> <ul style="list-style-type: none"> • Objective 1 – To promote and carry out land management that benefits nationally and internationally important peatland and associated habitats. • Objective 2- To promote and undertake appropriate woodland management, with an appropriate balance between woodland and peatland. • Objective 3 – To encourage 	Grip blocking, hydrological management, grazing, burning; drain blocking, track restoration, Restoration of over cut peat, removal of redundant fences, payment scheme to discourage excessive drainage of the peatland.	<p>Mainly based on environmental stewardship schemes that have developed over time.</p> <p>The project began by using a combination of the Rural stewardship scheme (RSS) and The Peatland Management scheme (PMS) payments, which involved offering annual payments to crofters, farmers and land owners within the SSSI who have been notified for their peatland interest. Applicants agreed to manage their land in accordance with the guidelines of the scheme, designed to encourage best practice for improving natural heritage. The PMS payment scheme secured over 100 contracts.</p> <p>In 2001 the PMS payments were changed in line with European community guidelines on payment for agriculture. The PMS payments then became part of the wider SNH Natural Care programme, which aimed to make all voluntary management schemes and agreements more widely available to allow for land owners</p>	<p>stakeholder engagement.</p> <p>Aspects of all the objectives outlined in the management strategy are designed to directly communicate and engage with stakeholders. The project primarily endeavours to implement the local BAP for Caithness and Sutherland by working together with all stakeholder organisations, community and interest groups as well as land managers.</p> <p>It does this by aiming to:</p> <ul style="list-style-type: none"> • Conduct a survey of public and stakeholder attitudes at the beginning and the end of the project. • Support community involvement in the planning and management of peatland areas. • To conduct a review into the economic and community benefits of peatland management. • Establish a forum of those involved in the management of the peatlands. • To carry out active training schemes to educate land managers and owners in 	98,626 ha	<p>SNH spent £164,228 on agreement from 1995-2002.</p> <p>The EU is co-funding the project with payments of agri-environmental scheme part of EU LIFE.</p>
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			<p>community and economic development that is compatible with safeguarding those features that make the peatlands important.</p> <ul style="list-style-type: none"> Objective 4- To promote greater awareness, understanding and enjoyment of the wildlife, landscape, historical and cultural values of the peatlands. 		<p>to benefit from having land in a SSSI.</p> <p>Since 2008, the Scotland Rural Development Programme (SRDP) became the main source of funding and support for land management and Rural Development in Scotland, replacing existing systems such as Natural care.</p>	<p>effective sustainable management of the peatlands.</p> <ul style="list-style-type: none"> Actively support Deer Management groups as a forum for collective deer management. With a view of finding a middle ground between public and private objectives of deer management. Encourage co-operation between deer and forestry managers, therefore aiming to bring together stakeholders. To increase public understanding and awareness of natural heritage. 		
5	Campfield Marsh , Solway	RSPB	The projects aim of managing the wetland is for the benefit of waders and wildfowl. This is to be implemented through the object of restoring five fields of previously cattle-grazed and drained land, with a view of raising the water table.	Diverting the main drain, installing sluices along the drains length to manipulate water levels, protection of the land from any drainage.	RSPB purchased an additional 57ha of land in 1990 to add to the reserve; of this the restoration area of 23ha was selected.	This site is based on a relatively isolated reserve, so little direct stakeholder engagement is required. However, the project has been the subject of academic research, the findings of which are found in (Lyons 2005), published in Conservation Evidence.	23ha of the reserve outlines the project area.	NA
6	Cayton & Flixton Carrs Wetland project , Scarborough	Scarborough Borough Council, Natural England, RSPB	Cayton and Flixton Carrs is a partnership project with farmers on drained lowland fen peat using running from 2005 - 2011. Aims to: Restore wet grassland for	Reseeding and regeneration on arable fields and improved pasture; seasonal rewetting and	Uses Environmental Stewardship agreements– mainly HLS.	The project has actively engaged with stakeholders, mainly farmers after its initial implementation across a small piece of land nearby gaining much interest of	250ha	NA

			breeding waders and associated farmland birds, protect undesignated Mesolithic archaeology in the peat, improve flood storage, develop opportunities for wildlife based tourism, and improve financial security of the farming community.	hydrological management; grazing, hay cutting; scrape creation and ditch restoration by re-profiling and raising ditch levels using sluices.		local farmers, allowing for the to the project being expanded into surrounding farmland as a direct result of their interest. Cayton and Flixton Carrs wetland project prides itself on active communication with all stakeholders, namely farmers, the council, landowners and walkers. It does this through a variety of means including its own project website , quarterly newsletters , introductory articles and presentations, all of which are available through the website. Another key component of the project is to carry out consultations with members of the public, local communities and local interest groups.		
7	Cumbria Basin Mires , Cumbria	Natural England	Objectives include: <ul style="list-style-type: none"> To establish the distribution of all basin mires in Cumbria and to review objects for all sites whilst identifying areas that are in least favourable conditions. To ensure that the planning and legislative mechanisms protect existing basin mires. Initiate measures to achieve 	A) Survey and map distribution of potentially restorable basin mires in Cumbria. B) Review local environmental policy. C) Identify priority plant communities, compare current site condition with historical records, create catchment buffer zone, Implement water	Uses environmental stewardship, the effectiveness of which is to be assessed as part of the project aims.	Objective C is targeted directly at interacting with stakeholders. These include to: <ul style="list-style-type: none"> Carry out consultations and negotiations with owners and occupiers of land prior to planning management works. Carry out appropriate consultations with interested members of the public (particularly where there is 	112.09ha	NA

			<p>water quality appropriate for favourable conditions.</p> <ul style="list-style-type: none"> To develop a monitoring programme designed to monitor changes in the extent and quality of basin mires in Cumbria, so that an assessment can be made of the effectiveness of conservation action. Foster increased awareness and understanding of the importance of basin mires and their management needs. 	<p>level management plans, scrub clearance, reintroduce small scale peat cutting, and monitor water quality and the condition of peat which is to be reported every 5 yrs.</p>		<p>significant public access.)</p> <ul style="list-style-type: none"> Provide information and advice, via key organizations, to all appropriate landowners/managers with land on or adjacent to the basin mires. The information aims to highlight the importance of the roles landowners and farmers play in land management and peat restoration, linked to agreed habitat management needs. 		
8	Cumbrian N Pennines SSSIs (Geltsdale, Moorhouse, Appleby) , Cumbria	Natural England	<p>Aims to:</p> <ul style="list-style-type: none"> Create a database of all blanket peat sites in Cumbria and categorise relative importance, investigate effects and solutions relating to pollution and climate change. Promote appropriate management to support blanket bog in order to maintain the current extent and overall condition of bog. Allow for increased awareness and understanding of biodiversity of blanket bog and how it 	<p>Grip blocking, stock reduction/enclosure, grazing, burning</p>	<p>Environmental stewardship schemes.</p>	<p>The project aims to:</p> <ul style="list-style-type: none"> Seek opportunities to work with moorland owners to resolve issues associated with raptors. Provide information and advice to land managers through site management statements on SSSIs. Produce and distribute a North Pennines wildlife leaflet alongside offering advice to managers of wildlife sites. To disseminate information to the general public through press releases and articles in 	3429ha	NA

			<p>can be protected.</p> <ul style="list-style-type: none"> • Monitor changes in the extent and quality of blanket bog in Cumbria so that an assessment can be made of the effectiveness of conservation action. 			magazines and newspapers.		
9	Drumburgh Moss , Cumbria	Cumbria Wildlife Trust.	The project aims to reverse the drainage carried out previously on the site. Consequently, major work has been undertaken to slow the flow of surface water run off on the bog and sustain the unique habitat. Parts of the nature reserve have also been cut for peat and have now resulted in have wet and dry heath, scrub and grassland. These areas are managed by grazing and periodic scrub control.	Peat profiling; vegetation removal; rewetting; hydrological management; monitoring; grazing; scrub clearance; visitor facilities.	The site is owned by Cumbria Wildlife Trust.	No evidence of significant engagement with stakeholders or the public.	121ha	

10	Flanders Moss , Scotland	Scottish Wildlife Trust	The project aims as defined in the 2009-2015 reserve plan, endeavors to restore heavily degraded bog from agricultural land clearing, primarily by raising the water table.	Peat cutting, restoration of the broad walk to allow public access to the bog, damming of the ditches, removal of vegetation, grazing of moss.	Flanders moss is a SNH nature reserve; the peat cutting rights were also purchased by SNH in 1995. SNH owns 13.4% - 110ha of Flanders moss, the rest belonging to four different landowners with the grazing and Sporting rights held by, or leased out to three separate third parties. The management works on a broad partnership with all of its neighbours, £18,000 a year is spent on land owner agreements.	<p>A key priority of the project is to engage with the public directly and involve them and provide an education of the peat restoration. In the reserve plan, the project aims to double visitor numbers to 5,000 visitors a year. The main method of achieving this and to raise the bogs profile is through the installation of a walkway across the bog in 2006. Since then, active public participation has significantly increased and been encouraged, this has been done through the Flanders Moss bog blog –a useful tool to inform any interested party directly of the restoration being carried out, as well actively involving stakeholders in the restoration without them having to visit regularly. The Blog is written by the project manager, who updates the blog on a weekly basis with information such as new fences that have been installed, new signs, the wildlife he has spotted on the bog as well as details of the restoration itself.</p> <p>Another way that the project involves the public is by producing leaflets on a variety of topics; from the Battering the bog leaflet which</p>	1073ha	£40,000 annually to run the whole reserve including restoration .
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						<p>details the restoration work, to a Landscape tour of Flanders Moss – designed to attract more visitors, There is also a general guide to Flanders moss in the Land of Water leaflet. The story of Flanders Moss is also outlined in a publication made freely available to the public and available to download on the SNH website. The project also produces a series of seasonal Newsletters aimed at the local community and the general public.</p> <p>Objective 9 in the management plan is to build better links between local people and the reserve. This is to be done through public consultation and the creation of the 'Friends of Flanders moss' group – giving a better opportunity to coordinate local interests. Another key policy of the reserve is to give everyone in the surrounding a chance to voice their opinions about the restoration work. This is implemented by carrying out local talks and by creating more opportunities for local people to get involved.</p>		
11	Forsinard Flows	RSPB	The projects primary goal is to restore the peatland that has	Drain blocking (over 9,000 dams installed);	Farmers are receiving direct help from the RSPB in most	The project is developing facilities and educational programmes, as	19000ha -	NA

	Reserve, Scottish Highlands		been lost in recent decades due to commercial land uses such as forestry. It also aims to influence future peatland management schemes nationwide. In the reserve the RSPB are looking after existing bog, while restoring up to 2,200 ha of drained bog through blocking the hills, and converting 900ha of forestry back to blanket bog.	1,900ha restoration forestry removal; red deer (19,000ha) and stock grazing management; habitat and bird monitoring (18,000ha); ongoing and new research (bird/bog/forest interactions, carbon flux effects of drain blocking, water quality, grazing & vegetation recovery) ;public access & awareness (visitor centre, trails, cctv).	appropriate management methods of the land targeted to directly benefit breeding waders and other key farmland birds.	well as aiming to attract 6,000 visitors per year. They are also trying to build working relations with neighbours and stakeholders. The reserve is also used to demonstrate peatland restoration to key audiences, aiming to influence the management of other UK peatlands and raise national awareness of this habitat.	2,200 ha of drained bog restoration	
12	Great Fen project, Cambridgeshire	The Wildlife Trusts	Great Fen is one of the largest wetland restoration projects in lowland England. It aims to become a beautiful fenland landscape of more than 3,700 hectares stretching between Huntingdon and Peterborough, creating a haven for wildlife as well as a large green space with opportunities for recreation, education and business.	stabilization; revegetation-reseeding; grip blocking; gully blocking; rewetting	Acquiring land from landowners is seen as an essential method for the project. However, working alongside landowners is also used where land acquisition is not possible.	The project is extremely high profile due to the large amount of publicity it has received, including much TV and media coverage . Therefore, the projects communication with stakeholders; project associates, landowners and the local community is a high priority. The project produces Newsletters , Great fen taster days , Project brochure , as well as informative Podcasts and its own project website. There is also a Great Fen Twitter account which provides regular and up to date information about the project and events held on the fens to its 39followers.	3700ha	In August 2007 the project was awarded a grant of £7.3 million from the Heritage Lottery Fund, the largest ever given for an environmental project in

								England. Funds to acquire land and for other aspects of the project have also come from: Landfill tax Resources from within partner budgets European funding such as Interreg and LIFE, alongside private donors.
13	The Humberhead Peatlands (Thorne and Hatfield moors) ,	Natural England	Launched in the 1980s to restore the lowland raised mires that have undergone over 30 years of industrial peat extraction, the project was launched as the reserve finally came under the	Block peat drains, increase water table levels, pumping of water into some more recently drained cuttings, removal of invasive	A large area of the abandoned peat workings is managed as a National Reserve by Natural England and includes parts of Crowle Moor, owned and managed by The Lincolnshire	The Thorn and Hatfield Moors Conservation Forum (THMCF) was launched in the 1980s in order to provide a scientific forum for the discussion and dissemination of conservation	3170ha	NA

	Yorkshire		control of Natural England. The primary goal is to revert back the abandoned peat cuttings to a bog, and for the site to retain suitable conditions for the development of raised bog and its vegetation. Another objective is to maintain a high water table which is implemented through rainage channels from the old peat cuttings being blocked with peat dams. Water is also pumped into some recently worked out cuttings.	species, peat grazing.	Trust for nature conservation.	<p>issues in the Humberhead levels, and to provide a campaigning focus for individuals and groups on Peat restoration issues in the East of England. It holds regular workshops with a variety of stakeholder groups, to encourage active communication between each, as well providing opportunities for the local community to become involved in the peat restoration and the issues surrounding it.</p> <p>The THMCF makes information freely available for the general public, and holds events for stakeholders and the wider community to attend, such as the 2002 Conference; 'Peat – the way forward, a future for peatlands?' (published Oct 2007), which included 15 guest speakers who discussed a variety of topics which included: 'English Natures Hopes and aspirations for peatlands', 'Towards a peat free future' discussed by a representative from B&Q, ' the history of peatlands', 'did campaigning help?', as well as a talk on 'Peat and the law.' Throughout the day, case studies were also used from the local</p>		
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						<p>area and other peatlands in Northern Ireland and Scotland. The conference was mainly attended by conservationists as well as producers, and local members of the forum although the invitation was extended to all concerned with the THMCF's work.</p> <p>Other events held by the THMCF include a series of wildlife training workshops designed for both the local community and professional conservationists through different events leveled at novices or professionals, all of which involve afternoon fieldwork on the Hatfield moors itself. These are held every few years with the next series to be held from May 2010.</p>		
14	Ince Moss (Wigan Flashes Local Nature Reserve), Lancashire	Lancashire Wildlife Trust	The project has been running for over 71 years, and aims primarily to reverse the severe damage caused by industrial activity in the area. The Peat restoration on Ince Moss is part of a wider	Removal of post-industrial spoil, lowering and rewetting of reedbeds, blocking of drains, securing a series of bunds to stop	Wigan flashes is managed by Wigan Council and the Wildlife Trust for Lancashire, Manchester and North Merseyside.	Wigan Flashes Community Group was formed in 1992 to help the council formulate a plan for the management of the flashes, it consists of; local residents, amateur naturalists, fishermen,	240ha	Funded by European Life and Landfill tax

			<p>initiative on Wigan Flashes Local Nature Reserve, where a variety of different habitats are restored and preserved.</p>	<p>water movement and to prevent tree colonisation.</p>		<p>bird-watchers, Wigan sailing club, Wigan Youth Service Outdoor activities club and is open to anyone with an interest in the Wigan flashes development. The Wigan Flashes Conservation and Community Group assist in fund raising and developing the Local Nature Reserve, by being a source of fresh community based ideas and by reporting, suggesting and developing solutions to problems around the site. They also produce a local newsletter available in the community library.</p> <p>As part of the projects policy to encourage the public into the site, footpaths have been improved, along with community based walks and events held by the community group. Over 97,000 visitors a year visit Wigan Flashes.</p> <p>Events based around the wetlands theme held in the summer, including a coracle making workshop, a willow weaving even to make a 2m high wicker bittern, and a serried of art and discovery days where the public were invited for a guided walk, followed by a art session.</p>		
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						Another recent project called 'Young Roots' with local youths in partnership with Wigan Youth service, has seen the development of a canoe trail around Scotman's Flash, looking at aspects of the History, wildlife and culture associated with the Wigan Flashes.		
15	LIFE: Active Blanket Bog in Wales project,	RSPB/LIFE active blanket	The objectives of the project are to bring about a significant and sustained improvement in the condition of blanket bog in key parts of two SACs in Wales, and to catalyse complementary work elsewhere in SACs. All of the blanket bog targeted by the project is currently active or will be returned to activity through the project actions.	Blocking c. 90 km of drains on the Berwyn SAC, tree removal on 300 ha of the Migneint SAC, removal of Rhododendron & Sitka Spruce from 900 ha of Berwyn SAC, re-seed 50 ha of Berwyn SAC with heather (<i>Calluna vulgaris</i>), creation of fire control areas in both SACs, purchasing a piece of land on the Migneint with good blanket bog habitat to conserve it's fauna and flora and to demonstrate the value of blanket bog to local people, extensive demonstration and	The project developed a land management plan concentrating on the reserves already managed by the RSPB. In 2006 an additional 140 ha of land within the Migneint SAC was purchased by the project.	A key aim is to advocate best practice for blanket bog management through the project areas. To achieve this, the project is talking to local landowners and inviting them to come and see the peat restoration first hand. Newsletters have been produced for 2007, 2008 and 2009 and were distributed to all landowners within the Project area. Landowners within the Berwyn and South Clwyd Mountains and Migneint-Arenig-Dduallt have been directly invited to visit the project. These visits are currently on-going. A demonstration day was also held at Lake Vyrnwy in June 2009 in conjunction with the Farming and Wildlife Advisory Group. Talks were given to 94	6602ha	75% funded by the EU LIFE initiative

				<p>advocacy work with local farmers and land managers, extensive outreach work with local communities and schools, information sharing, pond creation, mowing and grazing.</p>		<p>farmers and landowners who were then shown some of the ditch blocking work that has been carried out and the machinery that was used.</p> <p>A crucial part of the project is to provide information and events about the restoration to the general public. As outlined in the interim report from 2006-2009 they have far engaged with the local community through a variety of mechanisms including: installation of 2 information boards, 46 guided walks, 35 illustrated talks, 22 school visits, community group visits, as well as the production of a project Video, leaflet and newsletter.</p> <p>The project has also recruited a project photographer who regularly updates the project website with photos, recording and updating the public on the progress of the project.</p>		
16	<p>Norfolk Broads – Bitten II site, Norwich</p>	Broads Authority	<p>Peat restoration is part of the overall national park initiatives and work. Bitten II is a former agricultural site that prioritises the restoration of wetlands across the National Park, the project is run</p>	<p>A variety of methods have been used to enable peat restoration this includes: Reed-bed creation, re-profiling dykes to make them</p>	<p>Bitten II is owned by the Broads authority.</p>	<p>Local communities are to be engaged in the responsibility of securing the long-term future for the Broads by embracing sustainable ways of living. Part of this will be to develop an adaptive</p>	<p>42ha (on the Bitten II site)</p>	<p>Receives EU LIFE funding, The broads budget is</p>

			<p>under the EU LIFE scheme, and prioritises the restoration of breeding grounds for Bittens.</p> <p>A 20-year aim of the park is that the Broads will become a more naturally functioning flood plain of extensive and connected habitats, accommodating the longer-term impacts of climate change and social and economic influences over the next 100 years. Bitten II plays a crucial role in this. The impacts will be monitored and projected with reasonable certainty, and then managed according to their associated risks.</p>	<p>more wildlife friendly, the creation of at least six shallow lagoons which will be stocked with fish from the dykes, low ground pressure excavators, cutting machines and portable incinerators have all been developed and are enabling large areas of scrub to be restored to fen, turf pond creation has also been used to restore fen habitat.</p>		<p>strategy to help enforce adaptive management across the site.</p> <p>The park produces a variety of materials that are designed to encourage visitors and to promote the restoration projects. They also produce a regular newsletter called the Broads sheets, designed to inform the public on events and management activities. Alongside this, the site has its own website, produces a regular podcast to interact with the public as well as holding several educational talks and schemes across the park. There is also a 5 minute Broads film which is available on the internet.</p>		available online.
17	North Pennines NNR – Peatscape, County Durham	Natural England	<p>The main motives of the work are to: encourage biodiversity, increase water quality, allow for carbon storage, to preserve a historic environmental record as well as to encourage the local economy.</p> <p>The key objectives of Peatscape are to:</p> <ul style="list-style-type: none"> • Support restoration and management work 	<p>Installation of 44,000 peat dams (grip blocking) which restored over 473km of peat – next year Peatscape aims to preserve a further 206km with active support from local landowners, farmers, Natural England, and the projects staff. The project will also begin to</p>	<p>Peatscape promotes environmental stewardship and wildlife enhancement grants to engage landowners in the targeted area. It also sources additional funds to carryout general work and to aid landowners.</p>	<p>Peatscape endeavours to encourage people to understand value and enjoy the peatlands in a number of ways. They work with their partners (see Tees Water Colour project) to produce a series of events accessible to the public and stakeholders. Events include an open day, as well as a peat depth measurement event. Information of which are available to the public in the annual pocket guide. Schools are also</p>	4000ha	NA

			<ul style="list-style-type: none"> • Raise the level of understanding and appreciation of the peatlands • Promote best practice by supporting the provision of management advice on upland peatlands to form the basis of practical management works • To conduct research by supporting and disseminating new and existing research into peatland processes, ecology and management. 	encourage the re-colonisation of bare peat from early this year.		encouraged to use peatlands in their work. Several publications are made available including: General Leaflets , Bird Guides , Walking Guides and Cycling Guides . Another aim is to produce over 50 stories about the peatlands in the local media, including the North Pennine news .		
18	Peatlands Park , Northern Ireland	DoE Northern Ireland in partnership with NI Environment and Heritage Service	Peatland Park was established in 1990 specifically to promote awareness and facilitate understanding of peatland issues and was the first of its type in the British Isles. The Park spans an area of 266ha, the vast majority of which is designated as an Area of Special Scientific Interest (ASSI) and candidate Special Area of Conservation (SAC). Within the Park are two National Nature Reserves; Mullenakill bog and Annagarrieff wood. Peatlands Park is a patchwork of cut-over bog, active raised bog, lakes, and	Peat reprofiling; revegetation-reseeding; grip blocking; hydrological management; mowing; scrub clearance; visitor facilities	Landowners are entitled to enter environmental stewardship agreements run by the Department of Agriculture and Rural Development. The two schemes available are: the Countryside Management Scheme and the Environmentally Sensitive Areas scheme which are both available across Northern Ireland.	The primary aim of Peatlands park is to engage with the public about general peatlands issues. Therefore, there is an extensive education programme. This includes 3 schemes specifically developed for adult education groups, activity and clubs groups, school children, summer schools and youth groups. These programmes focus on the importance of peatlands as a resource and as a habitat for some unusual species, as well as encouraging participants to take environmental responsibility. An	266ha	NA

			has the largest area of bog woodland in Northern Ireland.			<p>outreach scheme is also run by the park which includes numerous talks and visits to the local community.</p> <p>There are seasonal events which take place throughout the year, including International Bog day, guided walks, and specific peatland walkers route are also designed and encourage visitor participation.</p> <p>Through the development of Local Agenda 21 and Local Biodiversity Action Plans, councils across Northern Ireland can also encourage community groups and local residents to participate in peatland conservation and education initiatives.</p>		
19	Restoring Fenn's, Whixall & Bettisfield Mosses NNR , Shropshire	Natural England	<p>Aims of the project include:</p> <ul style="list-style-type: none"> • The reversal of the damage caused by commercial peat cutting that took place. • Protection of the land from becoming commercialised by its use as farmland or for forestry. • To recognise the importance of peat restoration in 	vegetation removal; stock reduction/enclosure; rewetting; draining; hydrological management; mowing; grazing; scrub clearance; visitor facilities	No information available on engagement mechanisms.	The project actively encourages local land owners as well as the community to visit the site by creating nature walks and by improving visitor facilities. There are walk guides available to download on the website that provides an education on peatlands and information on peat restoration. Numerous Free events are held on the site	948ha	NA

			<p>become a valuable carbon store.</p> <ul style="list-style-type: none"> To put in place measures to prevent peat cutting that will considerably add to carbon emissions. 			<p>throughout the year, including a 'Bogs are brilliant day' where the public are invited to gain an insight into the management carried out to preserve the wildlife as well as a talk on how bogs help with climate change.</p>		
20	<p>Sustainable Catchment and Management Programme (SCaMP), Peak District</p>	<p>United Utilities (UU), alongside the RSPB who are contracted to implement the monitoring of the project.</p>	<p>As outlined in the Sustainable Catchment Management Programme: From Hilltop to Tap report, United Utilities is a major land owner in the North West, with 56,000ha of catchment land under their control supplying 6.7 million people's water needs – therefore the responsibility for ensuring a high water quality from this area, as well as protecting the conservation importance of the land lies with UU.</p> <p>Consequently, the SCaMP project endeavours to fulfil both responsibilities by restoring habitats and improving biodiversity, which will then allow for a considerable improvement in water quality as an important by-product. It also endeavours to enable a sustainable future for the company's agricultural</p>	<p>peat reprofiling; grip blocking; stock reduction/exclosure; reverting Molinia and Nardus to Calluna; mowing; grazing</p>	<p>The SCaMP project is conducted within land owned by UU and managed by tenant farmers. Long-term agreements with tenant farmers are seen as a crucial mechanism to implement the project, in devising farm plans which co-inside with the project aims. Whole-farm plans are devised jointly between UU and the farmers, which identify specific land management techniques to be applied on all catchment and SSSI land within the funded areas. Around £2 million of UU's private sector money is set aside for capital grants to implement the project. Alongside this, once farm management plans are developed with UU, farmers are also encouraged to apply for HLS and other public sector agri-environmental schemes. This mixture of both public and private</p>	<p>The project has received a unprecedented amount of interest on both a regional and national level, in order to recognise this, a national advisory group has been established consisting of representatives from : OFWAT, EA, DWI, NE, DEFRA and CCW. Alongside this, both of the SCaMP areas have a local SCaMP stakeholder Group, the membership of which reflects interests within each area In order to allow for those affected by the actions of SCaMP to become actively involved.</p> <p>There is little material to suggest that this project has engaged the general public or interacted with the local community beyond the direct stakeholders.</p>	<p>1300ha – 90% of UU's SSSI land, based in two areas of the Peak district. This covers a total of 45 farm land holdings and 21 farms.</p>	<p>Funded by UUs financial regulator OFWAT as part of a 5 year investment plan (2005-2010)</p>

			<p>tenants.</p> <p>The Programmes main objectives are complex by aiming to: develop an integrated approach to catchment management, incorporating sustainable upland farming. This involves delivering government targets for SSSIs, biodiversity plans for priority habitats and species, as well as a considerable improvement in raw water quality.</p> <p>Benefits in the water quality are foreseen to be:</p> <ul style="list-style-type: none"> • Improvements in water colour, which has considerably deteriorated in the last 15 years as a result of the flushing out of humeric materials from damaged moorland areas as result of gripping, overgrazing, atmospheric pollution and fires – all of which is currently costly to treat. • Reduction in soil erosion which is currently increasing treatment costs as well as reducing reservoir capacity due to sedimentation. 		<p>sector funding is novel, and appears to be affective in actively engaging farmers and other stakeholders.</p> <p>Another key part of the project also outlined in the SCaMP report is the monitoring and evaluation of land management changes as agreed by UU and implemented by tenant farmers. The farmers are therefore actively involved in the monitoring of vegetation, hydrology and water quality.</p>			
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			<ul style="list-style-type: none"> Reducing the risk of contamination of raw water by faecal material, this will be targeted by focusing on winter grazing regimes. <p>Improvements in the habitat are predicted to be:</p> <ul style="list-style-type: none"> An increase in the area covered by blanket bog Improvement in population numbers of targeted species in the BAP. 					
21	Tees Water Colour Project , Darlington	Northumbrian Water Limited (NWL)	<p>The Tees Water Colour Project (TWCP) aims to link water treatment with upland catchment management by developing, demonstrating and promoting a more holistic approach. In order to try to address deteriorating water quality at the source in the upstream catchment, and to promote the potential additional benefits of such an approach to the wider environment and to other stakeholders.</p> <p>The Project, which ran from 2005-2010, has the following</p>	Peat Restoration through rewetting and grip blocking.	A key aim of the project is to establish and maintain working partnerships with local landowners as the land covered by the project is not owned by NWL. Much of the upper Tees catchment area used by NWL is occupied by blanket bog including 29,000ha of SSSI land. The development of a framework for stakeholder engagement and catchment delivery is also conducted under the project.	The Tees Colour Project, and local awareness of it, is seen by NWL as a vehicle which has allowed NWL to get involved with additional related activities. In 2006, the project successfully developed the 'your land and water colour' leaflet which was designed to raise awareness about water colour as a land management issue to the general public, alongside the Peatscape project.	100ha	AMP4 'Quality' funded pilot project (privately funded)

			<p>objectives:</p> <ul style="list-style-type: none"> • To demonstrate the value of using proactive catchment land management techniques to deliver water colour improvements in the upper Tees. • To demonstrate the potential multiple benefits of taking a holistic approach to sustainable catchment management. • To identify the costs and benefits of this approach to individual stakeholders. • To develop a wider model for stakeholder participation and application to other water quality issues to inform the PR09, Water Safety Plan and Water Framework Directive processes. 			<p>managers in the North Pennines area. It was designed to take into consideration land managers' perceptions of costs, benefits, drivers and constraints relating to changing land management practice. The summary report produced a result of the survey and was then sent out to all participants.</p> <p>The project has also actively engaged with stakeholder organisations such as: the Environment Agency, Natural England, DEFRA, RSPB, and North Pennines AONB Partnership. It has also liaised with the project team from Peatscape, who are conducting similar activities in the area.</p> <p>Other engagement mechanisms used by NWL with stakeholders includes:</p> <ul style="list-style-type: none"> • The financial support of the AONB Peatlands Matters conference in September 2007 • Supporting a moorland tracks workshop for practitioners in April 2009 • Producing a display stand 		
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						<p>'NWL and catchments' for use to raise awareness at events such as the peatlands matters events and the biodiversity partnership event.</p> <ul style="list-style-type: none"> • Continued involvement in the Uplands Hydrology Group • The financial support of Natural England's grip-blocking project in the area. • Numerous presentations at regional and national conferences about the work the project has undertaken. • Holding a visit inviting stakeholders to look at the grip blocking sites carried out by the project. 		
22	Wicken Fen , Cambridgeshire	National Trust	<p>The main aims of the Wicken Fen project, as outlined in the Wicken Fen Strategy are divided amongst the categories of: wildlife, habitat people, learning and resources.</p> <p>Wildlife aims are: To create space for both wildlife and for people. This is to be achieved through increasing the area of accessible nature reserve around the Fen to a sustainable and adaptable landscape. The project aims to significantly increase the</p>	Rewetting, grip blocking, intensive and extensive peat management.	<p>The project primarily runs on a policy of land acquisition, with most of the land for the project, already under the control of the National Trusts. However, as the project endeavors to expand towards Cambridge, the sensitive negotiation of the purchase of land from local landowners is a key target of the project.</p> <p>Where landowners are not willing to sell, or it is not possible for the</p>	<p>The Wicken Fen project actively seeks to engage with all local stakeholders including those living within the project area and within the surrounding villages. This is done through:</p> <ul style="list-style-type: none"> • Public consultation including a survey in 2008 which delivered 20,000 questionnaires to household in and around the area. This was then supported by a series of public meetings and drop in sessions. 	700ha	NA – finance for land acquisition is raised by campaigns ran by the National Trust.

		<p>area of the reserve by extending it towards Cambridge over 53Km².</p> <p>Habitat aims are: To create a mosaic of habitats, securing the water resources needed to protect peat and the soils. This includes methods of retention and re-wetting of the land. The investigation of using the land as a potential area for flood alleviation is also an objective.</p> <p>People aims are: To provide opportunities for visitors, allowing for tourists and local residents to benefit from access to the project area. Another aim is for the project team to actively engage with local communities to allow for locals to develop a sense of ownership for the project. As well as this, a priority is to also ensure that the project has a sustainable financial future that will economically benefit local communities, alongside increased employment opportunities within the trust itself by creating more visitor services.</p> <p>Learning aims are: To</p>		<p>project to purchase land, a key target is to develop and maintain strong relationships with individual landowners and farmers across the project area, to enable and agreement with farmers that encourage sympathetic management for wildlife. Agri-environment schemes are heavily promoted to these farmers.</p>	<ul style="list-style-type: none"> • A User Forum representing a wide range of user groups including walkers, cyclists, horse riders, anglers, bird watchers and naturalists has also been established. The forum looks at plans from the user's perspective to help make sure that new facilities and infrastructure meets the needs of as many different users as possible. • A policy of promoting and encouraging a wide range of community activities and engagement. • The provision of appropriate educational opportunities to help engage the public with nature conservation, climate change issues and the developing landscape. • The project also enables and encourages the creation of wildlife groups such as the Wicken Fen bird ringing group, with 49 members and 19 'friends of Wicken fen' , the group take responsibility for the monitoring and encouragement of bird species across the fen. This group works on a volunteer 		
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			<p>continually learn from experiences throughout the project and be able to influence wider policy development on a landscape scale at a national and international level. This is to be done through the monitoring and research projects conducted throughout the project. It is hoped that academic publications could be a result from the project.</p> <p>Resource aims are: To primarily secure a sustainable financial future for the reserve.</p>			<p>basis, and allows for any interested person from the local community to become actively involved.</p>		
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Review of UK Peatland Restoration and Management Projects

The objective of this review is to research peatland restoration and management projects across the UK, with the view to enable the identification of best practice measures that may inform future peat restoration activity on Exmoor. The peatlands compendium website (www.peatlands.org.uk) has been used as a primary database to seek out similar projects across the UK. This A to Z directory of 128 different peatland restoration projects has facilitated the research and allowed for 22 projects to be identified as being valuable with regards to best practice and innovative measures, and so each of which are detailed under the project proforma. In the Proforma, there is a highly diverse range of different projects which vary in scale, location, priorities, objectives, funding, engagement mechanisms and stakeholder participatory activities. There is also a wide range of different project areas; spanning from the smallest project area of 15.1 hectares to the largest project with an area of 98,626 hectares.

Lead organisations

A variety of different organisations are involved in peat restoration projects as detailed in the proforma, subsequently resulting in different objectives and aims of peat restoration. However, the majority of the lead organisations involved in peat restoration projects can be generalised as being not for profit, wildlife and natural resource focused. The most common of which include: the Wildlife Trusts, Forestry Commission, RSPB, Natural England and Scottish Natural Heritage; which has resulted in similar aims and project management across the various sites. Out of the 22 projects compared, 2 are initiated and funded by the private sector. Both the Tees Water Colour project and the Sustainable Catchment and Management Programme (SCaMP) are financed and managed through the commercial water sector. Consequently this shapes the project's priorities very differently, resulting in a contrasting nature of objectives, engagement mechanisms and stakeholder participatory activities, to the other projects considered in the proforma.

Objectives and Aims of the projects

From comparing different project objectives across the proforma, it is evident that a widely held aim of peat restoration is to enable an enhancement of biodiversity. It is also apparent that most projects have been initiated to restore habitats that had previously been damaged through past drainage of peat and commercial land uses such as for forestry and farming. Additional objectives that are apparent across several of the projects include the restoration of peat in order to enable carbon storage, as well as the use of peatland for flood mitigation. However, in most cases these appear to be secondary objectives to the priority of biodiversity enhancement.

Conversely, the Norfolk Broads Bitten II project is an exception to this observation through its primary motivation of peat restoration lying in its use as a flood storage mechanism as well as a means to effectively adapt to climate

change which in this instance, replaces the biodiversity agenda. A major part of these objectives in Bitten II is to raise public awareness to the issues surrounding climate change and to promote sustainable communities, which appears to be novel in comparison with the other projects assessed in the proforma. Indeed, this project is managed by the Broads authority potentially allowing for alternative priorities and differing objectives to that of national organisations.

Engagement mechanisms

Across the proforma it appears that there is a divide between projects that are implemented on land owned by the project itself, and peat that is owned privately by local landowners. In most of the cases where land is owned by the project's organisation, the project area tends to be considerably smaller which is likely to be linked to project funding. Having said this, where larger funds have been available such as in the Great Fen project, a primary policy of land acquisition has been enforced allowing for the 3,700 hectare project to become the second largest lowland restoration project in England.

Environmental Stewardship

Alternatively, a considerable number of peatland projects use environmental stewardship schemes as a means of landowner engagement. On the whole, most projects in England encourage landowners and farmers to enter into Higher Level Stewardship (HLS) agreements where direct land ownership is not plausible. This has proven to be ideal in allowing for the successful delivery of peat restoration across the country. In the Cayton and Flixton Carrs Wetlands, the initial project was focused on a small farm area and was able to expand considerably using HLS when other local farmers gained interest and wanted to restore peat on their land. This is likely to have not been possible if funding for engagement mechanisms was from a different means.

Agri-Environment schemes outside of England

Schemes in Scotland differ to HLS and have evolved over time. In Scotland the original agri-environment schemes available to farmers and land owners were; the Peatland Management Scheme (PMS) and Rural Stewardship Scheme payments which were available up until 2001. These were then developed in line with new European guidelines to create the Scottish Natural Heritage Natural care programme. Natural care was designed specifically to make all voluntary management schemes and agreements more widely available to allow land owners to benefit directly from having land within an SSSI. Numerous peatland projects began in Scotland with a view of using the Natural care programme including the Caithness and Sutherland Peatland Management Scheme, as well as numerous other projects listed on the peatlands compendium website. Since 2008, the current system in place consisting of the Scotland Rural Development Programme and Rural Development in Scotland, replaced Natural Care as the primary engagement mechanism in most of the Scottish projects detailed in this proforma. Similarly, it appears that Northern Ireland has its own agri-environment scheme in place called the Northern

Ireland Countryside Management Scheme which has been use in Ballynahorne Bog. Alongside this, the Environment and Heritage Service of Northern Ireland run the Environmentally Sensitive Areas scheme that is used in Peatlands Park.

Alternative Engagement Mechanisms

In contrast to the Agri-Environment schemes, other engagement mechanisms are evident throughout the proforma. The Scottish Wildlife Trusts project, Flanders Moss spends £18,000 a year on its own land owner agreements and prides itself on a very strong partnership with all of its neighbours and the four landowners in the project area. The commercial SCaMP project also uses its own agreements alongside encouraging farmers to apply for HLS. SCaMP is implemented across land owned by United Utilities and managed by tenant farmers; therefore long-term agreements with tenant farmers are implemented across the project area and allow for the farmer alongside a member of the project team to decide on the land management required on the farm, in order to implement the peat restoration. United Utilities finance these agreements and sets aside a considerable budget to allow for this to take place. Even so, it is an innovative programme in that it allows a mixture of both public and private sector money. Alternative to financial mechanisms, some reserves such as Forsinard Flows offers direct help from the RSPB in best practice measures, rather than cash incentives.

Funding

When conducting the proforma, difficulties were met in obtaining accurate information on project funding. Where information has been available it appears that the EU LIFE scheme has been a key financier across the UK in providing funds for five of the projects compared in the proforma. In most of these cases EU LIFE has co-financed the project, with the lead organisation financing or raising the rest of the funds. Land Fill Tax has also featured heavily as a funding source throughout the proforma, often providing the co-funding required for EU LIFE projects. In contrast, the Great Fens Project has a considerably large comparable budget of £7.3million, awarded as a grant from the Heritage Lottery Fund which is also supplemented by land fill tax. On the contrary, commercial restoration projects are seen as investments by the water companies implementing the projects, and are consequently privately financed allowing for a considerably larger and more flexible budget than the majority of other projects detailed in the proforma.

Stakeholder consultations and communication

The variety of stakeholder consultations and different mechanisms for communication appear to be far greater and more innovative than other aspects detailed in the proforma. Active stakeholder communication is recognised in most peatland restoration projects as being crucial to their success and therefore a variety of measures and different schemes have been put in place to implement this.

Public Consultations

A recurring stakeholder engagement measure is the notion of the project team to conduct consultations with stakeholders, the local community and local interest groups. Many projects propose to implement this through conducting stakeholder surveys. The Wicken Fen project carried out a survey consisting of 20,000 questionnaires to households in and around the project area in 2008. This was then supported by a series of public meetings and drop in sessions. Likewise, the Cumbrian Basin mires project conducted a consultation and negotiation with owners and occupiers of peat sites prior to planning management works. This has been proven to be very popular with stakeholders as it provides a direct platform to voice concerns, and shape the level and method of peat restoration conducted on their land. The Caithness and Sutherland Peatland Management scheme has extended this concept of stakeholder consultation further by conducting a survey of stakeholder attitudes at the beginning and end of the project, therefore creating a gauge to see if there are changes in stakeholder attitudes over time and whether or not stakeholder inclusion activities have been successful.

Stakeholder Forums

Another established concept throughout the proforma is to create a forum for stakeholders as a means to voice their concerns and influence project activities. In the Caithness and Sutherland Peatland management scheme, a forum of those involved in the direct management of the peatlands has been established to develop an instrument to voice concerns. A further use of a forum is demonstrated in the Thorn and Hatfield Moors Conservation forum which provides a campaigning focus for local communities and individuals on peat issues. Alternatively, in Wicken Fen a user Forum was created to represent a range of user groups. Representatives of walking, cycling, horse riding, anglers, bird watchers and naturalist groups and societies are invited to join the forum and are consulted by the project team to look at restoration plans from a user's perspective. This has proved invaluable in ensuring new facilities and infrastructures meet the needs of as many different frequent users of the fen as possible.

'Friends of' Groups

Comparable to the stakeholder forums, it is evident that many restoration projects have 'friends of' groups which often consist of key stakeholders and members of the local community who help to influence project management. Friends of Ballynahorne bog was established in 1990 with the initial function to campaign for peat restoration. In keeping with this, activities were originally focused on working with environmental organisations and professionals to oppose drainage and extraction of peat on the site. Since this campaign has been successful and the restoration project implemented by Ulster Wildlife Trust, members of the group sit on the management board, subsequently allowing for stakeholders to have a strong influence over key decisions. Other 'friends of' groups include those of Wicken Fen and Flanders Moss which unlike the friends of Ballynahorne bog group, have been purposefully initiated by the projects in order to coordinate local interests and build bridges between the

reserve and the local community. Corresponding to 'friends of' groups, an alternative approach is established in the Wigan Flashes Conservation and Community Group. This consists of local residents, amateur naturalists, fishermen, bird-watchers, Wigan sailing club, Wigan Youth Service Outdoor activities club and is open to anyone with an interest in the Wigan flashes development. The group goes beyond the involvement of the well-established 'friends of' groups, by assisting in fund raising and developing the local nature reserve by being a source of fresh community based ideas and through reporting, suggesting and developing solutions to problems around the site.

Stakeholder Training

A less frequent and innovative example of involving stakeholders with peat restoration found in the proforma, is to provide stakeholder training in wildlife monitoring as well as peat management techniques. For example, the Humberhead Peatlands project includes a series of wildlife training workshops which are designed to actively involve local land managers and owners in the restoration by supplying them with the skills required to implement it. The day workshops run for several months and cover a wide variety of different topics such as: wetland plant identification, bird identification, as well as an introduction to mosses and liverworts. Moreover, the Caithness and Sutherland Peatland Management scheme aims to carry out active training schemes to educate land managers and owners in effective sustainable management of the peatlands. Similarly, farmers and land owners are also encouraged to directly participate in some projects through having the responsibility for monitoring changes in vegetation, hydrology and water quality. As in the SCaMP project, the responsibility of monitoring can be used to directly involve stakeholders whilst fulfilling the projects objectives of recording accurate data to monitor progress. This concept is also evident in the Wicken Fen bird ringing group which consists of 49 members who take the sole responsibility of monitoring and encouraging bird species across the fen.

Stakeholder site visits

An alternative stakeholder participatory activity is to actively encourage landowners and farmers to participate in a nature walk across the project site at various stages throughout the restoration to allow for the stakeholders to witness the progress of the restoration first hand. This is demonstrated in the restoration of the Fenn's Whixall and Bettisfield mosses project, where walk guides are disseminated amongst stakeholders along with invitations to visit the sites.

Communication with the Local Community and the General Public

Alongside active stakeholder communication and participation, many projects have also prioritised the direct engagement and communication with local communities as well as the general public. In most cases it appears that active community participation and public awareness is seen as essential to the project success. In order to implement this, a variety of methods are evident including more traditional methods of communication such as newsletters and

notice boards, to the more innovative use of modern technology and electronic media.

Conventional Methods of communication

Conventional methods of communication with the local community have been demonstrated throughout the proforma and includes; newsletters, leaflets, information boards, word of mouth, peatlands guides, and the local press. Every project detailed in the proforma has used a combination of these methods in order to engage with the local community, the most popular of which appears to be newsletters. Nearly all of the projects distribute newsletters on an annual or biannual basis to houses in the surrounding community to the project site, as well as leaving copies on community information boards and in public buildings such as a local library. Leaflets are also used to fulfil education criteria's in project objectives. The Flanders Moss project have designed different leaflets for a variety of purposes, this includes; 'The Story of Flanders Moss' which is a landscape guide to the moss itself, 'The Land of Water' which is designed to inform the public of the issues surrounding the peatland, and the 'Battering of the Bog' leaflet which details the restoration work carried out on the bog itself. It should also be noted that the media has appeared to be used as a means of raising the profile of certain projects. It was not an aspect that was featured in many projects, but some highlighted the importance of using the media to allow for the affective dissemination of information to the general public. This idea is illustrated in the Cumbrian Pennines SSSIs project, where the aim of disseminating project information to the general public is fulfilled through press releases as well as articles in magazines and newspapers.

Websites

Out of the 22 projects considered in the proforma, about half have project websites solely dedicated to the peatland restoration. The websites are used for different purposes; this is evident as some are orientated more towards stakeholders and the local community, whilst others are designed to raise the profile of the project amongst the general public. The Cayton and Flixton Carrs project website is targeted at stakeholders; this can be said as it is predominantly focused on the specific restoration project. The website users are immediately informed of the projects aims and objectives on the homepage, as well as kept up to date with the restoration with a news and progress section. Users are also invited to subscribe to an e-newsletter, as well as given access to a series of publications and information about the project. The Life Active: Blanket Bog in Wales website is more focused towards the wider education of the general public of the issues around peatlands and the importance of peatland restoration. The project has recruited its own photographer who regularly updates the website with pictures documenting the changes in the bog and its wildlife as the restoration takes place. This is fitting with their policy to provide information about the project to the general public; the website is consequently used by the project team as the main vehicle to implement this objective. Alternatively, other websites, such as Wicken Fen and the Great Fens are targeted at a wider public audience. Wicken

Fen uses its website to actively promote tourism to the site, whilst the Great Fen takes this further by having a more interactive website, with many links, downloads, films and information for the user to click on to explore the fens in greater detail from the comfort of their own computer.

Blogs

Besides project websites, it is also evident that further use of technology has been implemented by some projects as a means to engage with the public and local community. Flanders moss has achieved active public participation through the creation of a 'Flanders Moss bog blog'. The blog is updated several times a week and provides an up-to date and informal account of the progress of the restoration, including many pictures which are uploaded to show the wildlife as well as anything new installed in the site as the restoration continues. This is an innovative way to open up direct communication between the project officer who writes the blog and the stakeholders and local community who follow and visit the blog regularly. Similar to an online blog, the Great Fen project has a Twitter account, in which regular 'tweets' are made to update and inform its 39 followers about the project progress and events held on the fens.

Podcasts

Within the websites themselves, there is new media being used to share information. This includes podcasts which has been used by the Great Fen project. Podcasts are increasingly being used in the media, as well as by popular websites and learning programmes as a means to give listeners additional information, directly to their own computer or MP3 player. The Great Fen podcasts are available to download from the main project website and so far five are available each of which has a theme. The themes include; an overview of the project area, summer wildlife on the Great Fen, fenland history and mini-beasts safari and wildlife education. The podcasts have also been a means to embrace the modern celebrity culture in raising public awareness to the project, and promoting the concept of the informative podcasts. This concept has been applied by having a special podcast hosted by Stephen Fry, the media face of the Great Fens.

Web streamed films and DVDs

In addition to podcasts, alternative electronic media is also evident in many projects creating footage of the peat restoration which is only available online. The Life: active blanket bog in Wales project has a short 15 minute educational film which is available to view solely on the project website. It is presented from the bog itself and shows in detail the restoration carried out on the bog as well as explains the issues surrounding peatlands. Numerous other projects have a short film, which is often found on project websites or in another format such as a DVD, and kept for educational visits such as to schools. Another feature on some of the websites is downloadable walking guides. These are a popular engagement mechanism used many of the projects as it actively encourages website users to visit the project site and explore the restoration for themselves.

Public Participation

As well as communication with local communities and the general public, many projects also hold different events and schemes in an attempt to actively involve members of the public in the peat restoration. Guided walks are often held on project sites to actively encourage visitors to see the peat restoration for themselves as well as focusing on the wildlife. Walking guides are also advertised as being available at visitor centres as well as the downloadable guides that were previously discussed, to allow for visitors to explore the site for themselves. As well as this, volunteer days are held to involve the local community directly in the restoration. At Ballynahorne bog volunteer days take place on a regular basis, the last of which was held in January 2010 and involved Birch removal. Another way to encourage visitors to the project site is through holding community days. In the Restoring Fenn's Whixall and Bettisfield Mosses project, a 'bogs are brilliant day' was held where the public were invited to gain an insight into the management carried out on the reserve to enhance wildlife, as well as raise awareness to how bogs can help mitigate the effects of climate change. Similarly, the Great fen project hosts a series of taster days which are targeted at 12-18 year olds to explore the site in their monthly Greenwatch club.

Peat Education

Furthermore, raising the profile of the issues surrounding peatlands and increasing public awareness does appear to be a key theme throughout proforma as a method of engaging stakeholders and the wider community. This usually comprises of providing educational material alongside school visits, attending public events and information fair, as well as producing newsletters that are widely distribute across the local community. Peatlands Park was the first reserve established in the UK with the sole purpose to actively engage with the public about general peatland issues. Consequently, the park runs an extensive education programme with courses designed for adult education groups, schools as well as youth groups and extra-curricular clubs. Moreover, the Forsinard Flows reserve is designed specifically to influence future peatland management schemes nationwide. It achieves this through the reserves designation as a demonstration site, exhibiting peatland restoration to key audiences such as stakeholders in the reserve as well as similar peatland projects seeking out best practice measures. The Thorn and Hatfield Moors Conservation forum also aims to influence future restoration projects by holding national conferences such as the 2002 conference named: Peat – the way forward, a future for peatlands?" This included a variety of speakers from English Nature to B&Q.

Best Practice Measures

After comparing 22 peatland restoration projects across the UK, it is possible to draw out some best practice measures. From looking at the engagement mechanisms used as well as stakeholder participatory activity and communication a wide variety of different methods are evident that are well-established as well some of a more innovative nature. With regards to

engagement mechanisms, the use of HLS appeared to be the most popular in England and has been proven successful in numerous peatland restoration projects, where it has not been possible purchase land.

Stakeholder participatory activity and communication differs from engagement mechanisms, as there is no clear standard or method of best practice. From looking at the diversity of measures implemented by nationwide projects it is clear that these activities and methods are heavily dependent on project aims, objectives, scale as well as funding. Effective stakeholder communication has been identified by several projects as being crucial to the project's success. The primary methods for achieving this are identified in the proforma as; stakeholder consultations which are crucial prior to the start of the restoration, alongside the use of stakeholder forums and 'friends of' groups which provide a platform for stakeholders to voice concerns throughout the restoration. An alternative stakeholder participatory activity that is less frequently featured throughout the proforma is the notion of providing stakeholder training prior and throughout the restoration. This has proven to be very successful in capturing farmers and landowner's interest. As well as this, stakeholder site visits should not be overlooked.

In terms of communication, conventional methods of stakeholder communication have proven to be essential to nearly all of the projects considered in the proforma, particularly the use of newsletters. Unsurprisingly, project websites dedicated solely to the peat restoration project, are increasing in popularity. It is evident that they are a crucial tool to raise the profile of the project as well as effectively inform the public, local community and stakeholders of the importance of the work. It is also a valuable medium to limit miscommunication of project aims, objectives and activities by making all information easily accessible to the general public. At present, it appears that new alternative electronic media such as podcasts, web based films, blogs, Twitter and downloads are emerging as a new means to communicate with the public. However, the effectiveness of these new electronic media in communicating with stakeholders and the public is still yet to be proven, and may take some time until they are relied upon by these groups as a vital source of information. Nonetheless, the use of alternative electronic media is a powerful communication means in modern society and may allow for a new audience and project supporters to be captured into the peatland restoration project, who may have normally been overlooked in the dissemination of information through conventional means. In the proforma there is not a singular method of effective stakeholder communication and so all projects have used a variety of methods in order to achieve this with all interested parties. By doing so, a strategic combination should allow for project information to be accessible to all with a vested interest, providing everyone concerned an opportunity to receive accurate and timely information as well as the chance to engage with the peatland restoration project itself.

Appendix 2 Farmer Questionnaires

<p style="text-align: center;">Review of Exmoor Mire Restoration Project Farmer Questionnaire – Current Participants</p>

Interview with and name of farm

Introduction

The existing Exmoor Mire Restoration project is due to end this year and new funding has been secured for the project to continue. It is, therefore, timely to consider what has or has not worked well with the current project and to learn lessons for the future project. All findings will be treated in **confidence** and only amalgamated results will be reported by CCRI to the Exmoor Mire Restoration Project Steering Group.

Section 1 – Their Farm

- 1.1 When did you become a farmer and what has been your history of farming on this holding/area?
- 1.2 Can you outline the farming system here in terms of livestock and grassland management? How has this changed in the past 10 years (size, enterprises, household, labour, owner/tenant – improvements? gather a general picture) ?
- 1.3 How has your use of the moorland changed over the past few years prior to joining the project? (Livestock, timing of grazing, management activities) Do you own the moorland land or is it common land? (If common ask if they exercise their common rights, who else does/does not etc)
- 1.4 Is the farm family's income very dependent upon the farm business, or are other income sources equally or more important, e.g. diversification enterprise, (detail other main sources, e.g. Agric contracting / Farm shop, retail / Accommodation & hospitality / Tourism & recreation / Business units / Shooting / Equine / Training) or other off-farm jobs? How has this changed over the last 10 years?

Section 2 – Project Engagement

- 2.1 When did you first hear about the Exmoor Mires restoration project? In what context did you hear about it?
- 2.2 When were you first approached about the Exmoor Mires project? Who approached you? How was the project explained to you? What was your first reaction?
- 2.3 What were your motivations for joining? Did you know other farmers in the project?
- 2.4 How long will you be involved and what is the nature of commitment (a contract?)?

2.5 Was it clear from the start what was expected of you?

2.6 What would you say are the aims of the current project (the one you are involved in now)?

Section 3 Impacts of project activity on project goals

Ask questions for each of the 5 areas of activity.

- **Biodiversity**

3.1 In terms of biodiversity are you aware of the specific goals that the project was trying to achieve? What activities has this involved?

3.2 In terms of biodiversity, what do you think the project has achieved? Have you noticed any difference in your land or the land that your stock graze?

3.3 Has the project shared with you any of the information and findings gathered regarding biodiversity? If yes what? If no, what would have interested you?

- **Water**

3.4 Clearly the project is about water, its movement and levels, are you aware of the specific goals that the project was trying to achieve? What activities has this involved?

3.5 In terms of water, what do you think the project has achieved? Have you noticed any difference in your land or the land that your stock graze?

3.6 Has the project shared with you any of the information and findings gathered regarding water levels? If yes what? If no, what would have interested you?

- **Landscape**

3.7 Do you feel that the project has altered the character of the moors? If so in what way, positive and negative?

3.8 Have the management works (e.g. the pools, ditch blocking etc) associated with the project had a significant visual impact?

3.9 In terms of the management activities (e.g. ditch blocking), do you think they could have done things differently?

3.10 How could the work minimise the impact on the landscape or particular features?

- **Historic Environment**

3.11 What would you consider to be the historic features of the areas where the project is working?

3.12 Do you think that the project has had a positive or negative impact on the historic environment in these areas?

- **Overall impact**

3.13 Overall, what do you feel has been the impact of the project on the moorland areas of Exmoor?

3.14 Overall, from your point of view, what has the Exmoor Mires Project achieved to date? Would you say that it has been a success? Has it met its stated aims? If so, in what way? If not, why do you think this is the case?

Section 4 Impacts of project activity on farm management

4.1 Has the project affected your stocking / grazing regimes in terms of numbers, timing, patterns and type of stock? Has it made it more difficult to manage stock or easier?

4.2 Are you in an agri-environment scheme for all or part of the farm? If so which scheme and what is involved? How important is the AES income to you?

4.3 How important was your involvement in the project in getting into an AES?

4.4 Have the AES payments compensated for any lost profits/management constraints? If no, by how much do you think you are losing out?

4.5 When your AES agreement comes to an end would you consider renewing it?

4.6 Has the project affected the safety of your stock (positive or negative)? What have you noticed when checking your stock on the moor?

4.7 Knowing what you know about the project now, would you have originally joined it? If not, why not?

4.8 What impact do you think the project has had on the farming economy as a whole?

4.9 What is the perception among farmers and landowners who are not involved in the project? Is there anything that they are particularly concerned about?

Section 5 - Monitoring and research

5.1 Do you think that monitoring and research should be an important part of the project?

5.2 Are you aware of any monitoring activities for the project? Have you been involved in any of them? In your opinion are these adequate/likely to provide the information required?

5.3 To what extent do you feel that the management process with the project is transparent and is it iterative (has it evolved as new things are learnt)?

5.4 From your point of view what has been the main success of the current project?

5.5 What have been the main lessons on management and stakeholder involvement do you think?

Section 6 - Participation - farmers

6.1 Do you feel part of the project, that you, together with other farmers, are making a contribution to an important project? If so, what do you feel that you

(and other farmers involved) have contributed to the project? Is there anything that you would have particularly liked the project to take on board?

6.2 Do you discuss with the Project Officer the best ways to achieve the project aims?

6.3 Is there anything that the project does that you would be able and interested in contributing to? Eg building dams, baling, monitoring

6.4 What has been the level of contact /communication since you joined the project? How often are you in touch with the Project Officer?

6.5 Have you had a chance to talk to other farmers involved in the project? Does the project arrange meetings with other farmers involved in the project or provide updates on project activity? If not, is this something that would interest you?

6.6 Are you involved in any farming groups in within Exmoor/South West? Do you have a representative role for any of these?

Section 7 Participation – wider stakeholders

7.1 Do you think that the project has had any impact on other users of the moors? E.g. horse riders, walkers, fishing, shooting, mountain bike riding etc.

7.2 Do you feel that the project has engaged with local groups and individuals?

7.3 Are you aware of any conflict or feelings of being left out by groups or individuals within Exmoor?

7.4 Has the project worked with groups/partnerships that were existing before the project started? Do you feel that they have built on these rather than replaced or sidelined them?

7.5 Are there projects within Exmoor that the Mires project should be working with and/or integrating with more effectively?

7.6 How has the work of the project impacted on the local economy?

Section 8 Communication

8.1 To what extent have the local communities been involved or heard about the project?

8.2 What types of communication about the project have occurred in the area? Is this adequate? Are there ways it could be improved?

8.3 Are you aware of any feedback from the project that has been given to the various bodies in Exmoor and the South West.

Section 9 – The new project from 2010 to 2015

9.1 What elements from the current project do you feel must be successfully transferred into the new project?

9.2 What elements do you feel should be dropped or adjusted or added?

9.3 What have you heard about the new project? What from your point of view will be different within the new project? How has it been presented to you?

9.4 In your view how can future work involving the farming community best be encouraged, supported and organised?

9.5 Do you have any other comments you would like to make which would help in the development of the new project?

Thank you for your time

**Review of Exmoor Mire Restoration Project
Farmer Questionnaire – Potential Participants**

Interview with and name of farm

Introduction

The existing Exmoor Mire Restoration project is due to end this year and new funding has been secured for the project to continue. It is, therefore, timely to consider what has or has not worked well with the current project and to learn lessons for the future project. As someone with moorland that would be eligible for project support we are interested in hearing your views on the project. All findings will be treated in **confidence** and only amalgamated results will be reported by CCRI to the Exmoor Mire Restoration Project Steering Group.

Section 1 – Their Farm

- 1.1 When did you become a farmer and what has been your history of farming on this holding/area?

- 1.2 Can you outline the farming system here in terms of livestock and grassland management? How has this changed in the past 10 years (size, enterprises, household, labour, owner/tenant – improvements? gather a general picture) ?

- 1.3 How has your use of the moorland changed over the past few years prior to joining the project? (Livestock, timing of grazing, management activities) Do you own the moorland land or is it common land? (If common ask if they exercise their common rights, who else does/does not etc)

- 1.4 Is the farm family's income very dependent upon the farm business, or are other income sources equally or more important, e.g. diversification enterprise, (detail other main sources, e.g. Agric contracting / Farm shop, retail / Accommodation & hospitality / Tourism & recreation / Business units / Shooting / Equine / Training) or other off-farm jobs? How has this changed over the last 10 years?

Section 2 – Project Engagement

- 2.1 When did you first hear about the Exmoor Mires restoration project? In what context did you hear about it?
- 2.2 Have you been directly approached about the Exmoor Mires project? If yes, when was this and who approached you? How was the project explained to you? What was your first reaction?
- 2.3 If you do not intend to join the project, what are the main reasons for this? What are you most concerned about?
- 2.4 If you are intending to join the project, what is your main motivation for joining?
- 2.5 Is it clear what is expected of you, if you join the project? What, if anything, are you most concerned about?
- 2.6 Do you know other farmers in the project? What have they said about it?
- 2.6 What would you say are the aims of the current project ?

Section 3 Impacts of project activity on project goals

Ask questions for each of the 5 areas of activity.

- **Biodiversity**

- 3.1 In terms of biodiversity are you aware of the specific goals that the project is trying to achieve? What activities would this involve? Do you think the project can achieve these goals on your land?
- 3.2 Would you be interested in the project sharing with you any of the information and findings gathered regarding biodiversity? If yes what would interest you?

- **Water**

- 3.3 Clearly the project is about water, its movement and levels, are you aware of the specific goals that the project is trying to achieve? What activities will

this involved? Do you think the project can achieve these goals on your land?

3.4 Would you be interested in the project shared with you any of the information and findings gathered regarding water levels? If yes what would interest you?

- **Landscape**

3.5 Do you feel that the project might alter the character of the moors? If so in what way?

3.6 Do you think the management works (e.g. the pools, ditch blocking etc) associated with the project will have a significant visual impact on your land?

3.7 In terms of the management activities (e.g. ditch blocking), do you think they could do things differently?

3.8 How could the work minimise the impact on the landscape or particular features?

- **Historic Environment**

3.9 What would you consider to be the historic features of the areas where the project is working?

3.10 Do you think that the project has had a positive or negative impact on the historic environment in these areas?

Section 4 Impacts of project activity on farm management

4.1 If you join the project do you think it will affect your stocking / grazing regimes in terms of numbers, timing, patterns and type of stock? Will it make it more difficult to manage stock or easier?

4.2 Are you in an agri-environment scheme for all or part of the farm? If so which scheme and what is involved? How important is the AES income to you?

4.3 Will any involvement in the project help you get into an AES scheme?

4.4 Do you think the AES payments will compensate for any lost profits/management constraints? If no, by how much do you think you will lose out?

4.5 Do you think the project will affect the safety of your stock (positive or negative)?

4.6 What impact do you think the project will have on the farming economy as a whole?

Section 5 - Monitoring and research

5.1 Do you think that monitoring and research should be an important part of the project?

5.2 Are you aware of any monitoring activities for the project? If you joined the project would you like to be involved in any of the monitoring activities?

5.3 From your point of view what has been the main success of the current project?

Section 6 - Participation - farmers

6.1 Do you think you will be made to feel a part of the project, will your views be listened to? If not, how could you be made to feel a part of the project?

6.2 Have you discussed with the Project Officer the best ways to achieve the project aims on your land?

6.3 Would you be interested in carrying out the project activities, such as building the dams, yourself or would you prefer contractors to do it?

6.4 Have you had a chance to talk to other farmers involved in the project? Does the project arrange meetings with other farmers involved in the project? Is this something that would interest you?

6.5 Are you involved in any farming groups in within Exmoor/South West? Do you have a representative role for any of these?

Section 7 Participation – wider stakeholders (may have limited knowledge of this)

7.1 Do you think that the project on your land will have any impact on other users of the moors? E.g. horse riders, walkers, fishing, shooting, mountain bike riding etc.

7.2 Do you feel that the project has engaged with local groups and individuals?

7.3 Are you aware of any conflict or feelings of being left out by groups or individuals within Exmoor?

7.4 Has the project worked with groups/partnerships that were existing before the project started? Do you feel that they have built on these rather than replaced or sidelined them?

7.5 Are there projects within Exmoor that the Mires project should be working with and/or integrating with more effectively?

7.6 How has the work of the project impacted on the local economy?

Section 8 Communication

8.1 To what extent have the local communities been involved or heard about the project?

8.2 What types of communication about the project have occurred in the area?
Is this adequate? Are there ways it could be improved?

8.3 Are you aware of any feedback from the project that has been given to the
various bodies in Exmoor and the South West.

Section 9 – The new project from 2010 to 2015

9.1 What have you heard about the new project? What from your point of
view will be different within the new project? How has it been presented
to you?

9.2 In your view how can future work involving the farming community best be
encouraged, supported and organised?

9.3 Do you have any other comments you would like to make which would help
in the development of the new project?

Thank you for your time

Appendix 3 Notes from Stakeholder Workshop

Monday 24th May 2010, 10.30 am to 1.00 pm.

Rest and Be Thankful Inn, Minehead

Workshop notes

Attendees:

Jane Mills – Countryside and Community Research Institute

Lindsey McEwen- University of Gloucestershire

Bekki Griffiths – Countryside and Community Research Institute

Susan May – Moorland Initiative Board & Exmoor Trust

Ann Clitheroe – ENPA Member

Alison Kent – British Horse Society

Dan Barnett – Exmoor National Park Access & Recreation Manager

Nigel Hester- National Trust Countryside Manager

Paul St Pierre - RSPB

Simon Lazarus – Exmoor National Park

Richard McDonnell – Moorland Initiative Board & Freelance Archaeologist

Maria Floyd – Moorland Initiative Board, Moorland Owners Group/Brendon

Commoners

Richard Andrews - Natural England

John Hickey- Westcountry Rivers Trust

Alan Collins- Moorland Initiative board

Activity 1: Balloons and Stones

Stakeholders were divided up into 4 groups of 3 and provided with a sheet of paper with a line dividing the page with the top half of the page labelled as positive, and the bottom half labelled as negative. Each group was then given an envelope with 5 circles of paper called 'balloons', and asked to write a positive aspect of the current mire restoration on Exmoor programme, on each balloon. Also included in the envelopes were 5 oval shaped 'stones', where stakeholders were asked to write 5 negative points that their group agreed as being negative aspects of the present mire restoration. Each group then prioritised the stones and balloons in order of importance through the positioning of the balloons and stones on the page, and were asked to discuss these points and their thoughts behind them with everyone else at the end of the activity.

A write up of the group's activity sheets is below – note that each positive and negative point is put in order of importance as prioritised by the positioning of the topic on the original sheet.

Group 1

Positives

- 1) Money put into the local area- the large funds put into the project can directly feed into the local economy, which will have direct benefits to local such as in contractors, as well as in shops and services as more people are drawn to the area.
- 2) Water quality – the project should improve water quality in the local area.
- 3) Potential for flood mitigation – There is a lack of evidence preventing this from being higher up the agenda; nonetheless peat has a great capacity for water storage which can directly feed into flood mitigation.
- 4) Carbon storage- Peat is a great store of carbon, as climate change is pushed up the global agenda, so can the importance of the mires.
- 5) Biodiversity gain- this was debated in this group so compromised by having biodiversity as both a positive and a negative, some argued there will be a significant biodiversity gain which will be highly beneficial, whilst others considered the biodiversity loss of current species in the habitat to be more important. There is a need to monitor and see what is happening with ecology.

Negatives

- 1) Lack of local involvement and communication- “It just didn’t happen” land owners and farmers are currently being isolated from the project.
- 2) Access impact – Directly affects hunters as it is now too dangerous to ride.
- 3) Impacts on livestock- Animal welfare is a big issue. Loosing livestock is a large concern and their ability to graze freely. Sheep can’t last for long in bogs, maximum a day. Some people have lost livestock this year. Maybe fencing is needed around the peat to prevent loss of livestock. Farmers have to be part of a scheme in order to receive any compensation for the issues the restoration causes. The commons used to be used for summer grazing but now there is a loss of the ability for summer grazing therefore impacting on farmers’ incomes.
- 4) Biodiversity loss- this was debated in the group, some were concerned that the loss of the current species in the habitat are more important than the new species and biodiversity to be gained into the habitat.
- 5) Impact on Archaeology and historical records-“The consideration for historic landscapes was bolted on very late in the project.”

Group 2

Positives

- 1) Biodiversity- the gain of new species of plants, invertebrates and birds.
Needs monitoring?
- 2) Retention of water for summer flows – allows for affective abstraction. Needs monitoring?
- 3) River Ecology benefits – Needs monitoring?
- 4) Reducing erosion – in 40yrs there has been a 3ft ditch developed in Simonsbath Comerslade.
- 5) Carbon storage – is this measurable?

Negatives

- 1) Loss of summer grazing area
- 2) Compensation to farmers are only available through the Higher Level Stewardship scheme.
- 3) Loss of stock in bogs – fencing around the water is not possible.
- 4) Access loss- particularly an issue for horse riders and hunters.
- 5) Loss of historic working peat. People use to go and see the peat workings for themselves 10-15 years ago, now this historical record is being lost.

Group 3

Positives

- 1) Habitat / biodiversity increase
- 2) Carbon storage – it is very important, but it is not rated 1st due to a lack of evidence.
- 3) Water retention – to reduce flooding as well as for use for supply.
- 4) Water quality – we are unsure of the water quality and the supply to the local community, this stopped us from rating it higher in importance.
- 5) Moorland landscape – visual improvements of the landscape is subjective and there was less agreement amongst the groups as to whether this is a positive or a negative.

Negatives

- 1) Impact on agriculture – on productivity and on animal welfare e.g. losing livestock in bogs, as well as the economics such as the impact of the loss of grazing land available.
- 2) Lack of community engagement
- 3) Lack of Monitoring – monitoring of changes in hydrology as well as economics
- 4) Archaeology disturbance – we are not sure about the archaeological issues
- 5) Access –Any increased wetness on established linear access routes is detrimental to access and increased wetness generally could affect open access rights for walkers and horse riders where these exist. Access across new dammed ditches should be considered, for example using bridges and locating new dams just above established linear routes in order to make them drier. A reduction in the frequency and volume of spate conditions could be detrimental to Kayaking needs but this would need further study.

Group 4

Positives

- 1) Carbon sequestration- “we ranked this first but there is a significant absence of data, and an issue around the lack of a bench mark.”

- 2) Water quality
- 3) Flood and drought control
- 4) Long term economic savings on water treatment – directly feeds back to the customer which includes the local community who are served by South West Water, so the long term savings are no doubt beneficial.

Neutral

Biodiversity – decided as neither a positive nor a negative by the group as it will include both a loss and a gain. (Balloon was therefore placed on the positive/negative division line.) “Biodiversity ‘tested us’, therefore we put it in a neutral position.”

Negatives

- 1) Agricultural and the economic benefits are unclear- perhaps this should be communicated better to the community.
- 2) Poor communication – with farmers and the community.
- 3) Absence of strategic thinking and planning- the project seems to have been put in place first then thought out afterwards.
- 4) Effect on historic landscape – “archaeology and the historic landscape are not well considered or preserved.”
- 5) Costs –what are the costs? – is it value for money long term?

General comments

- A few people raised their concerns with the intention of the mires helping with flood mitigation. “I am not sure if it will make any difference to flash flooding. – It is not on a big enough scale. It must be on a landscape scale to work. However, for it to be on such a big scale there would have to be a considerable amount of damage done to the environment.”
- Many people raised the biodiversity question, highlighting that in order to increase biodiversity, other species will be affected. This was mainly questioned when considering loosing species of wildlife, in favour of allowing for insect populations to thrive. Members of the group were also concerned with foxes. “What you gain with one, you lose with another.”
- The issue that there has been a sudden change from years of land drainage in favour of food production was of concern to some. “It’s taken 60 years to realise that ditches weren’t a good idea.” Some questioned whether in 20 years time the priority may revert back to food production, or indeed focus on something else as society develops such as water availability or carbon sequestration. “We already import water.”

- It was generally agreed that maintaining and improving water supply is a benefit particularly to the local community.
- The lifespan of dams with timber structures was questioned, and whether 12-15 years is adequate enough.

Activity 2: Liquid Café

Liquid Café is a concept that is designed to get participants to consider and discuss key questions. In this activity, there were four sheets positioned across different tables in the room each with a question heading the top of the paper. The stakeholders were then given a block of post-it notes and invited to wander around the room and visit as many of the questions as they wanted to discuss. When visiting a table participants were asked to read the question on the sheet, and then write down their thoughts on a post-it which was then placed on the sheet under the question.

The four sheets have been typed up below with each bullet point representing a different post-it comment listed under the question.

Question 1: How might the views of the Exmoor community be incorporated into the peatland restoration decision making process?

- On line feedback site, with facility to view comments from others. The questions discussed by the decision making board should also be available with the feedback put on the site too.
- Series of local meetings having invited local land managers and farmers.
- Attend parish meetings for the relevant parishes.
- Views of other people are important to consider e.g. scientists.
- Link to existing work and structures.
- Community representatives on the project steering/stakeholder group.
- What is already in place to manage this project? A committee? If so how is it elected/chosen?
- Telephone and letter questionnaires.
- Best farm grumbler and parish councillors on the steering committee.
- Need to know the facts first before we can have a view on the decision making.
- Personal contacts – develop long term relationships with land managers.
- Travelling road show – open to all, interactive, and with park wide coverage.
- Note views but proceed with caution.
- Land manager representative on the decision making board – BUT they need to ensure they are truly representative by actively communicating with the community.
- Database of questions and answers

- What is the Exmoor community? Could this include the research community that might inform the project.
- Needs to be joined up with 'communication' page.
- Who is 'Exmoor Community?'
- Do visitors count as the 'Exmoor Community'?

Question 2: How might landowners and managers be encouraged to support peatland restoration on their land?

- Standardised cash payments.
 - Ongoing payments to compensate for loss of productivity.
 - Explain understanding of all the economic benefits to agriculture. 'ecosystem' services and payments set accordingly.
 - Better understanding of benefits from monitoring- so can believe it will work for carbon.
 - CASH – lots and often! Ongoing standardised cash payments and an understanding of land owners from the beginning is crucial.
 - Convince them that action now is cheaper and easier than dealing with problems in the future, for them and for others.
 - Farming representative on the steering group.
 - Understand problems facing landowners.
 - Farming representative included in the project development and management.
 - By being brought into the scheme early on and by being part of the discussion on their land.
 - By being brought into the discussions by compensating for disturbance and by receiving payment for water improvement and carbon storage.
- When discussing the question, a big issue was identified in getting landowners and farmers to turn up and engage with the issues, the use of markets for engaging with farmers or having a mediator to take responsibility and regularly visit farmers – rangers were suggested as being appropriate people to carry this out, getting accurate information out to the community is key. It was also agreed that the project needs to be embedded for future success in dealing with future needs.

Question 3: How can the wider understanding and support of the Exmoor community for peatland restoration be secured?

- Monitor and promote benefits.
- Wider stakeholder including various key community reps.
- Website resource – results of monitoring and research results from other places.
- Value water
- Schools project

- Why only the Exmoor communities? What about communities adjacent to ENPA and DNPA (SW region) OUR taxes pay for the National park.
- Out-reach education programmes, in reach of everyone.
- What about visitors to Exmoor? How are they represented?
- More publicity via press, TV etc. More open days and 'road shows'.
- Education in schools – summer camps for those outside the area. Available information.

Question 4: What might be the most effective ways of communicating the peatland restoration activities and outcomes to the Exmoor community?

- Local school long term projects.
- It might be more time consuming, but farmers have to be contacted on a one to one basis.
- Interactive website
- Image led and interactive resources, audio and video recorded views of land managers and others.
- Tweak or change the huge amount of education work already being done by the National Park Authority and others on Exmoor.
- Can we include visitors as the Exmoor park community?
- Local community workshops and drop in centre.
- Produce resources – hard copy or a website to send to anyone with an interest.
- Prove that they are listening to the grassroots people.
- Get various parts of the community to carry out bits of the project.
- More personal approach to farmers.
- Parish magazine articles- parish magazines are well read across the area.
- Simple way to explain what is to be achieved, like a cartoon character or a map put up on a board by the main areas showing all the restoration sites – what is happening, where and why.
- Use the commoners association.
- Publish before and after photos, as well as yearly updates.
- School workshops
- Start a monitoring programme that can be conducted by the schools on Exmoor, this will allow the school to carry this on for generations as the responsibility for monitoring is passed down the year groups.
- To convince people that this is a good use of public money – value for money.
- Use Cutcombe market for billboards and progress reports. This will ensure farmers will have access to the information as they often come here. The billboards must be eye-catching with little text, and only key information.
- Use existing community structures.
- South West water to keep sending out information to its customers about the benefits and savings for the customer.
- Face to face meetings with farmers.

- Create school projects on the Mires.
- Articles in the local press.
- TV and Radio – engage the media for regular coverage.
- Open days better planned and scheduled.

Closing Remarks

- The lack of information available has been filled with ‘white noise’ – they need to find out the facts and give this to the community. This would avoid any miscommunication.
- The project needs a Question and Answer section available on the website or elsewhere easily accessible to the community.
- If the project team receive questions or inquires they need to be recorded, answered and made available to the community.
- If baseline monitoring is not there than it makes it a lot more difficult to get the community on side.
- There is a need to communicate ‘lessons learnt’ from the old project to the new.
- It would be impractical to start the new project before questions have been answered and issues have been raised.
- Monitoring and research should be part of the communication from the beginning.
- There isn’t a farmer on the steering committee, this need to happen.
- There is not enough monitoring of the old project, so why are they starting with a new?
- They need to start with a baseline; there is a need to use best practice.
- There is a real need for hard data in order to get people on side. More use of university students would be beneficial, particularly the use of undergrads?
- Dartmoor could learn lessons from Exmoor- communication will help considerably.

Appendix 4 Vegetation monitoring – community tables analysis

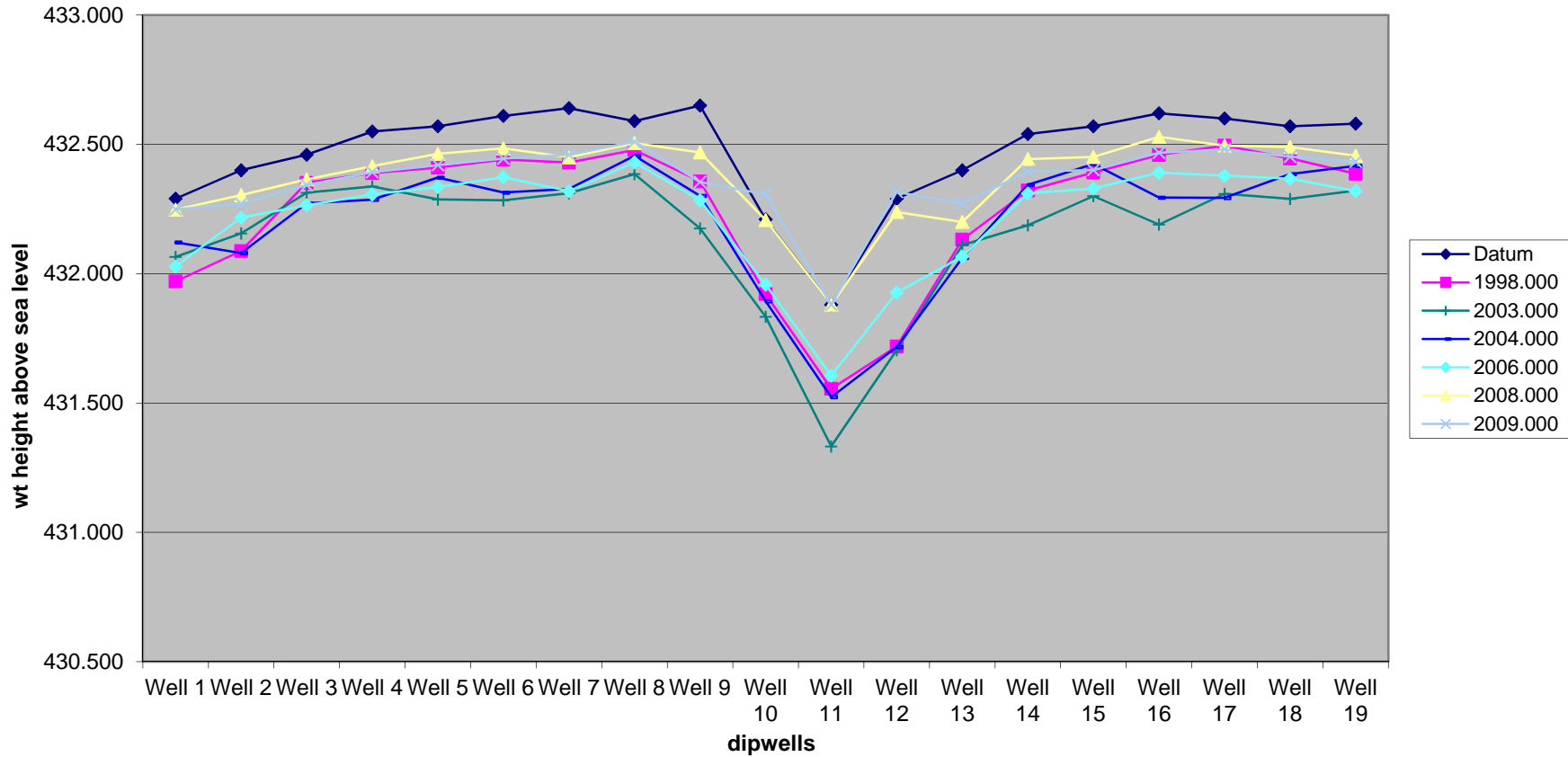
Summarised base line and monitoring transect data by NVC classes

Site	Base line (NVC) Surveyed 1998 (and species number)	Base line (NVC) Surveyed 2006/2007 (and species number)	Monitoring or base line survey 2008 (and species number)	Monitoring or base line survey 2009 (and species number)	Species Change 2006-present
1.Exehead Line E	M25: <i>Molinia caerulea</i> - <i>Potentilla erecta</i> bog (34)	M25 (33)	M25 (37)	M3 <i>Eriophorum angustifolium</i> bog pool, and M17 (37)	+4
2. Blackpitts Line G	M25: <i>Molinia caerulea</i> - <i>Potentilla erecta</i> bog (32)	M25 (30)	M25 (38)	M25 (39)	+9
3. Blackpitts 2		M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire or M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire (poor fit). (33)	M25 or M19 (45)	Elements of M25, M17, M3, M19, M20 (29)	-4
4.Blackpitts 50yr old cuttings (control site)		M17 <i>Trichophorum cespitosum</i> – <i>Eriophorum vaginatum</i> Blanket mire + M2 <i>Sphagnum cuspidatum/fallax</i> pool (30)	na	na	
6. Exe Plain		M25: <i>Molinia caerulea</i> - <i>Potentilla erecta</i> bog or M23 <i>Juncus effusus/acutiflorus</i> – <i>Gallium palustre</i> . Rush pasture (36)	M25 or M23 (55)	M25 or M23 (58)	+22
7. Upper Exe Valley (at lower Blackpitts)		M2 <i>Sphagnum cuspidatum/fallax</i> bog pool community (in ditch) and M6 <i>Carex echinata</i> – <i>Sphagnum fallax</i> mire (43)	Restoration Nov 08	M2 <i>Sphagnum cuspidatum/fallax</i> bog pool community (in ditch) and M6 <i>Carex echinata</i> – <i>Sphagnum fallax</i> mire (40)	-3
8. Roostitichen		M23 <i>Juncus effusus/acutiflorus</i> – <i>Gallium palustre</i> . Rush pasture (50)	M15 (62)		+12
9. Broadmead		M25: <i>Molinia caerulea</i> - <i>Potentilla erecta</i> bog <i>Erica tetralix</i> sub community (32)	M25 (46)		+14
10. Squallacombe Restoration site		M25: <i>Molinia caerulea</i> - <i>Potentilla erecta</i> bog <i>Erica tetralix</i> sub community or M15 <i>Trichophorum cespitosum</i> – <i>Erica tetralix</i> Wet heath (37)		M3/ M17 (38)	+1
11. Squallacombe Intact bog (control site)		M18 <i>Erica tetralix</i> – <i>Sphagnum papillosum</i> Blanket mire (29)			
12. Comerslade		M17 <i>Trichophorum cespitosum</i> – <i>Eriophorum vaginatum</i> Blanket mire (42)		Restoration work not started	

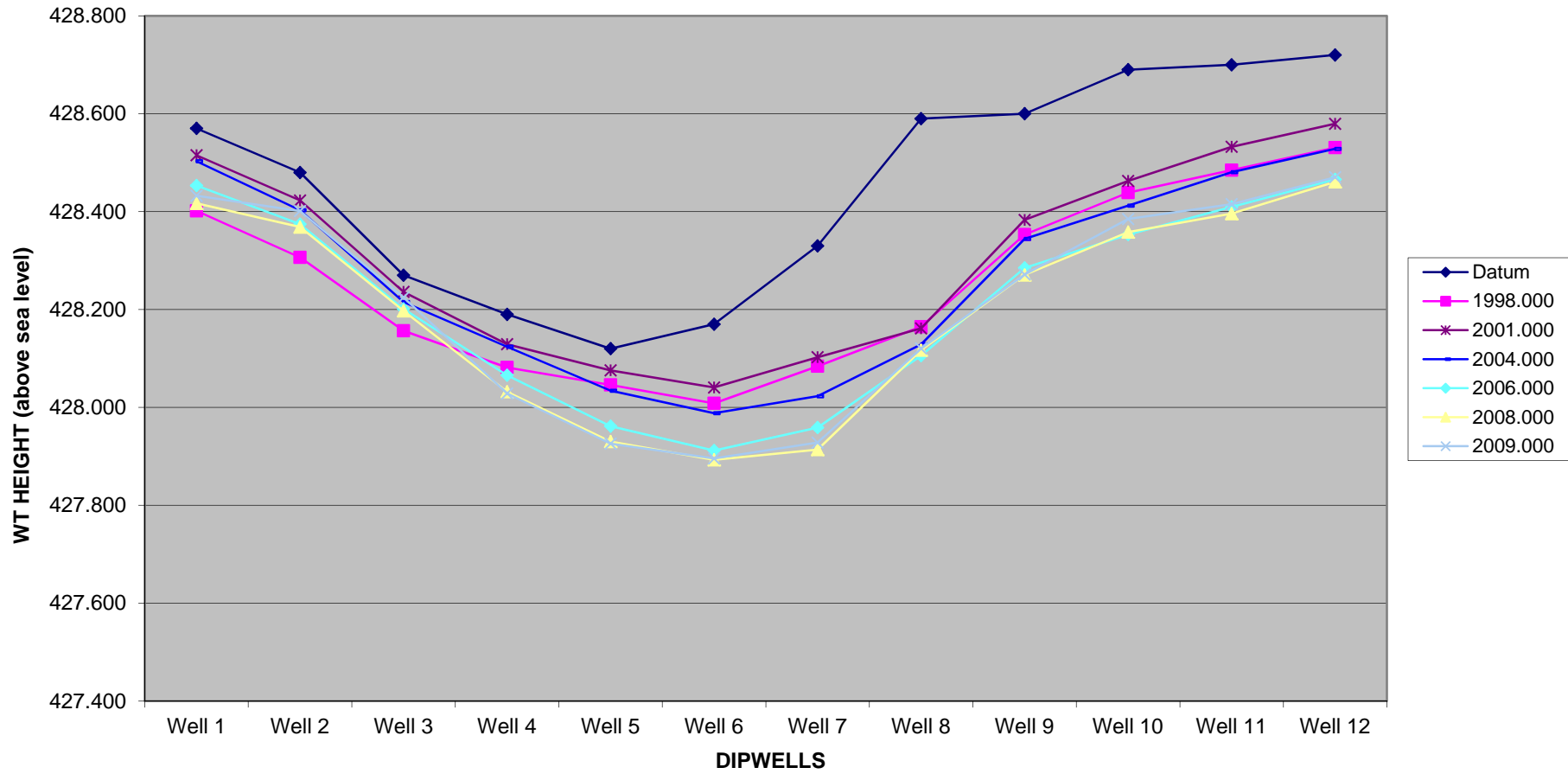
13. Hangley Cleave east		M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (22)		M25a (27)	+5
14. Hangley Cleave west		M25a <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire or M15 <i>Trichophorum cespitosum</i> – <i>Erica tetralix</i> Wet heath (40)		M17 (47)	+7
15. Long Holcombe west		M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (17)		Restoration March 09	
16. Long Holcombe east		M25b <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (12)		Restoration March 09	
17. Vernie's Allotment		Possible M17 <i>Trichophorum cespitosum</i> – <i>Eriophorum vaginatum</i> Blanket mire (38)	Restoration Nov 08		
18. North Twitchen		M15 <i>Trichophorum cespitosum</i> – <i>Erica tetralix</i> Wet heath (44)		Restoration March 09	
19. Aldermans Barrow allotment			M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (37) Restoration Nov 08		
20. Roostichen Phase 2			M15 <i>Trichophorum cespitosum</i> – <i>Erica tetralix</i> Wet heath or M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire (48) Restoration Nov 08		
21. Ricksy Ball (Aclands) damaged site				M25 (13)	

Appendix 5: Exe Head and Blackpitts Dipwell plots

Exe Head Annual Mean Watertable Height



BLACKPITTS ANNUAL MEAN WATERTABLE HEIGHT



Appendix 6: Exmoor Mires Project 2010-2015 Draft Delivery Structure

