An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

National Raised Bog SAC

Management Plan

Draft For Consultation

17 January 2014

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Foreword by Minister

The issue of managing and conserving Ireland's raised bog SACs, and addressing the needs of land-owners and turf-cutters, is proving to be a difficult journey.

Raised bogs present us with starkly competing demands - between existing land-use, turf-cutting, and the conservation of a habitat that is in danger of becoming extinct in Ireland. Government is given the difficult task of balancing these competing demands, in particular the rights of private individuals with the common good.

In this case, the common good of preserving an iconic part of the Irish environment and landscape, and fulfilling our EU obligations, is set against the rights and wants of individuals and families who have been sourcing their fuel from these sites for years and in some cases, generations.

The decision to protect some of our raised bogs from the inevitable destruction that continued turf-cutting and drainage would deliver was not taken recently. Even before the 1992 Habitats Directive was agreed, international and domestic concerns were mounting over the future of our raised bogs. The Directive set the standards that were to be reached and from then it was clear that the issue of turf-cutting on those bogs selected for preservation would need to be addressed.

However, addressing this issue was delayed and postponed until Ireland faced legal action in the European courts. This has not served the interests of the country, the turf-cutters, the raised bogs or the wider community. This draft National Raised Bog SAC Management Plan sets out a roadmap for the effective preservation of these important habitats.

In January 2011 the EU Commission commenced infringement proceedings against the State for its failure to protect these SACs. A continued failure to address this issue and provide the protections required will inevitably lead to fines against the Irish State, which would fall to be met by the tax-payer. Being fined would not remove our obligation to protect these sites through bringing turf-cutting to an end - it would simply add further to the burden being carried by the Irish taxpayer at this time.

Since taking office, this Government has been decisive in addressing this long-running issue. Through the establishment of the Peatlands Council, we have brought stakeholders together to work through the complexities of a resolution and to address the needs of existing land-users. We have, for the first time, introduced a comprehensive compensation and relocation scheme for turf-cutters which has been heavily subscribed. We convened a Peatlands Forum under Mr Justice Quirke involving all parties. And, we are working though relocation options in a systematic way, in consultation with turf-cutters and with the assistance of Bord na Móna.

On 7 March 2012, Dáil Éireann unanimously agreed to a motion which called on the Government to "engage actively with the European Commission to seek a resolution within the terms of the Habitats Directive, and to prepare and submit a National Raised Bog Restoration Plan to the Commission as a matter of urgency." Drafting such a plan was also the central recommendation of the Peatlands Forum, which was convened in February of that year. The objectives behind drawing up a national plan was that there would be an agreed approach to managing our raised bog SACs, that some flexibility for continued turf-cutting might be obtainable in a small number of cases where the plan determined that there were no alternatives, and that the concerns outlined in the terms of the motion agreed unanimously by Dáil Éireann could be addressed.

The Government immediately sought and secured the agreement of the European Environment Commissioner to the preparation a National Raised Bog SAC Management Plan. Since then the Government has put in place significant resources to deliver such a plan.

My Department has engaged RPS Consultants to lead a team of hydrologists, hydro-geologists and ecologists to advise on the preparation and implementation of this plan. They have been asked to address those scientific issues raised by stakeholders and reflected in the Dáil motion.

The team is undertaking the most comprehensive review to date of our scientific understanding of our raised bogs, both within and outside the SACs, and is applying new information and survey techniques to assess the current condition and future prospects for over 250 SACs, NHAs and other bogs. The provisions of this National Plan, along with the National Heritage Area (NHA) review and National Peatlands Strategy, will for the first time provide a coherent approach to the conservation of raised bogs in Ireland, while addressing the needs of those most directly affected by the requirement to curtail turf-cutting.

The work is being undertaken in an open and transparent way to provide the detail that everyone needs, especially local communities, when deciding on the future good management of our SAC raised bogs. Stakeholders, through the Peatlands Council, have been given an opportunity to oversee the preparation of this Plan.

It was the express wish of Dáil Éireann - which all members of the Dáil supported - that a National Raised Bog SAC Plan would be delivered, one which could seek to address the concerns of local communities within the terms of the Habitats Directive.

I would like to thank those parties that have worked with my Department, and with the Peatlands Council, to put this draft plan in place. Members of the Peatlands Council representing turf-cutters, land-owners and environmental interests have advocated strongly for those that they represent and have helped guide me towards the proposed approaches. Semi State bodies such as Bord na Móna and Coillte are also demonstrating great responsibility and leadership in contributing to the State’s

conservation effort through management of the lands that they hold in trust for the Irish people. The Scientific and Policy Advisory Group to the Peatlands Council has provided invaluable advice and guidance during this process. Commissioner Potocnik and his officials have also proven themselves to be constructive partners in tackling this difficult issue.

Not all parties have engaged. This is regrettable as it has undoubtedly delayed progress at local and national level and risks the achievement of the flexibility that is allowed under the Directive for the most difficult of bogs, where relocation options are limited. I would again encourage turf-cutters and their representatives to work with me towards a long term resolution to this issue. A continuation of unauthorised turf-extraction by a minority of people from our SACs, and a refusal to engage by some of their representatives, limits our options and does not serve the interests of ordinary turf-cutters, the wider community, or the country.

I hope that the publication of this draft plan provides the basis for us all to move forward together.

Jimmy Deenihan, T.D.,

Minister for Arts, Heritage and the Gaeltacht

Executive Summary

What are the Aims of this Draft National Raised Bog SAC Management Plan?

This draft plan has two broad aims:

Conservation and Management of Raised Bog SACs - Ireland has nominated 53 sites as Raised Bog SACs under the EU Habitats Directive and therefore is required under the directive to put in place measures to protect these sites from deterioration. The aim of the National Raised Bog SAC Management Plan is to provide clarity to all parties regarding how these sites will be managed and restored into the future in co-operation with land-owners and local communities and in keeping with legal obligations under the directive.

Addressing the needs of Turf-Cutters & Land-Owners - The Plan also aims to set out how the needs of those who depend on these bogs will be addressed where it has been necessary to curtail activities for conservation purposes. The needs of affected turf-cutters' are being, and will be, largely addressed through compensation or relocation. The concerns and interests of land-owners within and around these sites will also be addressed, through the putting in place of site-specific management and restoration plans for each raised bog SAC in consultation with them and in keeping with the requirements of the Plan. The site-specific plans can also be used to explore how the restoration and management of these sites can benefit local communities through their use as amenity areas, for education, and as a focus for conservation.

What are the main threats to the Raised Bogs?

Raised bogs are wetland ecosystems and so the main threats to their welfare arise from any actions that drain water from them and dry them out. The main threats include:

- Drainage of raised bog habitat or surrounding wetland habitats;
- Peat harvesting and turf cutting;
- Planting of commercial forestry;
- Spread of fires; and
- Other human activities such as water abstraction from groundwater and quarrying which can have a significant impact on the raised bogs by lowering the regional groundwater level.

All of these damaging operations can compromise the hydrological integrity of a raised bog leading to the lowering of the water table which can cause the bog to shrink, crack, deform, collapse or burst. Such actions can result in peat being exposed to air as the water levels drop and the dead plants in the peat start to decompose, releasing carbon dioxide and other gases into the atmosphere. These changes to the structure of the raised bog result in the loss of the unique raised bog ecology.

What is the current condition of the Raised Bogs?

The current condition of Ireland's Raised Bog Network was determined from scientific ecological and eco-hydrological assessments of Ireland's entire network of Raised Bog SACs, NHAs and other non-designated raised bogs of potential conservation value (Figure 1).

The most important raised bog habitat is *Active Raised Bog* which is defined as the living, actively growing upper layer of a raised bog, the surface of which is composed mainly of living bog mosses (Sphagnum spp.) which form peat, due to their incomplete decomposition under waterlogged conditions (Plate 1). *Degraded Raised Bog* is raised bog habitat which has dried but is still capable of natural regeneration following restoration.The ecological assessment used data mainly from previous NPWS ecological surveys and associated reports supplemented by selected site surveys to address data gaps in non-designated raised bogs.

The ecological condition of Raised Bogs is fundamentally dependent on the hydrology (namely the availability of water close to the surface of the bog). An eco-hydrological assessment was therefore undertaken to assist with understanding the Raised Bogs' current condition and, equally importantly, determining their restoration potential.

The methodology developed to undertake the eco-hydrological assessments makes use of detailed topographic data for each raised bog obtained from LiDAR surveys to assess the potential for the bog surface to support active raised bog. LiDAR is a remote sensing technology that measures vertical surface elevation by illuminating a target with a laser and analyzing the reflected light. The data is collected in the field using a low flying aeroplane. This gives much more detailed and accurate raised bog topographical maps than can be collected by traditional surveying techniques.

The use of the LiDAR data has supported a programme of scientific research which has greatly improved the knowledge of the eco-hydrological behaviour of raised bogs in Ireland. By using the detailed topographic survey data, it is now possible to model eco-hydrological conditions (based on the raised bog's slope, drainage patterns and rainfall) and relate these conditions to recent ecological surveys. In this way it is possible to determine the area of each bog that has suitable conditions for the development of active raised bog habitat, but are currently being impacted by a pressure that is preventing active raised bog growth in these areas. In short, the eco-hydrological modelling process can quantify each raised bog's restoration potential.

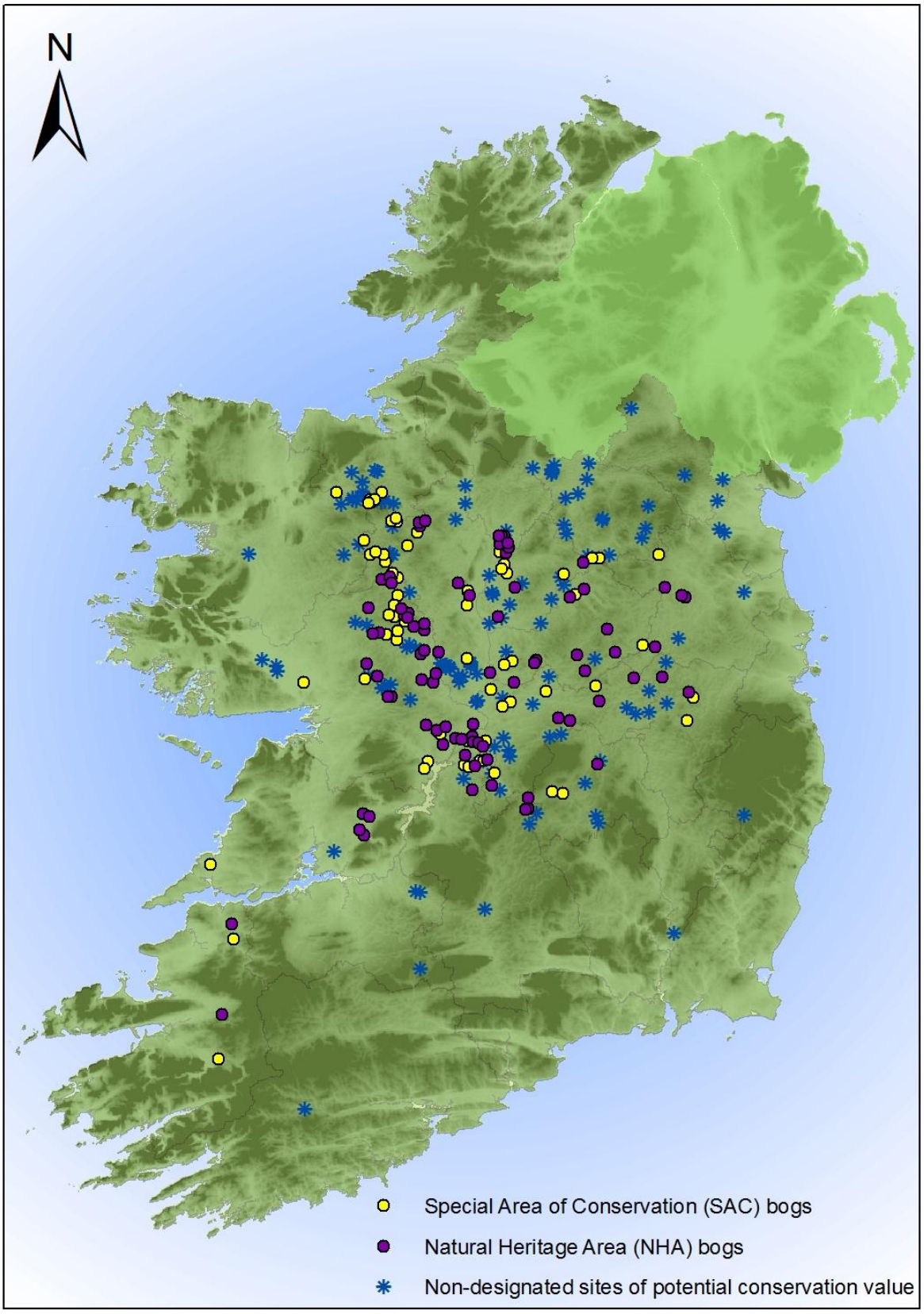

Figure 1 National raised bog network assessed within this draft plan

The investigations have identified an overall decline in Active Raised Bog and High Bog areas within the national Raised Bog network in Ireland (see Table 1). A significantly greater loss in the area of active raised bog has occurred relative to losses in High Bog. This is because the activities associated with the loss of High Bog, such as turf cutting and associated drainage, has caused significant changes to the hydrological regime resulting in a lowering of the water table and causing large areas of the High Bog to dry out for long periods of time. Consequently, there has been a loss of the water dependent ecosystems present on the High Bog, the most important habitat being active raised bog.

Plate 1 Example of Active Raised Bog in Ireland

What conservation objectives or Targets are being set by this draft Plan?

One of the main aims of the Habitats Directive is to ensure that the habitats and species listed in it achieve “favourable conservation status”. In essence, this means that these habitats and species are being maintained in satisfactory condition and that this situation is likely to continue for the foreseeable future.

The conservation status of bog habitats listed in the Habitats Directive has deteriorated in Ireland and continues to do so. As a first step in planning the restoration of active raised bog, conservation objectives at different scales need to be set. A conservation objective aims to define how much, where and what conditions are necessary to bring the habitat back to favourable status.

Ireland's commitment under the Habitats Directive is to have a robust raised bog network that is sustainable into the future. This includes the Raised Bog SACs, which are the best remaining examples of the habitat. This commitment includes replacing the area of active raised bog within the SAC network that has been lost since 1994. Table 1 sets out the Condition, Trends and Conservation Objectives (Targets) for Ireland's National Raised Bog Network.

Table S.1 Condition, Trends and Conservation Objectives (Targets) for Ireland's National Raised Bog Network

Bog Habitat	Resource	1994	2012	Change	Conservation Objective (Target)
		(ha)	(ha)	(ha)	(ha)
Active Raised Bog (ARB)	**SAC network**	**1,940[A]**	**1,210**	**-730**	**2,590[(A+C)]**
	NHA network	490[B]	284	-206	
	Non Designated Sites	200	145	-55	
	National Resource	**2,630**	**1,639**	**-991**	**3,600[(A+B+C+D)]**
Degraded Raised Bog (DRB)	SAC network	650[C]	1,200	+550	
	NHA network	520[D]	410	-110	
	Non Designated Sites	625	520	-105	
	National Resource	**1,795**	**2,130**	**+335**	
High Bog	SAC network	10,740	10,515	-225	
	NHA network	7,790	7,480	-310	

Raised Bog SAC network targets

The target of achieving 2,590 ha of active raised bog in the SAC network is derived by summing the areas of active and degraded raised bog in the SAC network at the time of designation in 1994. There is currently 1,210 ha of active raised bog in the SAC network, plus 1,200 of degraded raised bog which can be restored to active using the measures outlined in this plan. However, this still leaves a

shortfall of 180 ha and this must be provided by the designation of compensatory habitat into the SAC network. A target of replacing 225 ha of permanently lost high bog within the SAC network has also been set.

National network target

The target of achieving 3,600 ha of active raised bog in the national network is derived by summing the areas of active and degraded raised bog in the current SAC and NHA networks at the time of designation in 1994. There is currently a total of 1,500 ha of active raised bog in the SAC and **new** NHA networks (see Table 4.3 for new NHA network statistics), plus 1,675 of degraded raised bog which can be restored to active using the measures outlined in this plan. In addition 195ha of active and degraded raised bog will be provided by the designation of a small number of additional SACs as compensatory habitat into the SAC network. However, this still leaves a shortfall of 230 ha. Achieving this target will require restoration of a portion of the cut-over bog as well as restoration of degraded bog.

What Options are available to achieve the conservation objectives or Targets?

Protection and Restoration Options

Detrimental impacts of human activity on Irish raised bogs range from those which have been demonstrated to be largely reversible through natural processes, for example, re-colonisation / regeneration following localised burning on the high bog, to others where active (engineered) intervention may be necessary to halt degradation and potentially restore Active Raised Bog. In order to meet the Conservation Objectives for the Raised Bog SACs, any restoration measures put in place need to have a long term objective of restoring self-regulating eco-hydrological processes to conditions resembling those encountered in undisturbed raised bog ecosystems.

Areas identified as Degraded Raised Bog are, by definition, capable of being restored or restoring themselves to Active Raised Bog. In order to meet restoration targets, it is desirable to restore as much of the current area of degraded raised bog to active raised bog as possible. Although this may occur spontaneously over long periods of time, in some places, engineered intervention will usually be necessary to arrest continuing losses of active bog and to speed up natural regeneration. Engineered options consist of a wide range of potential measures, requiring contrasting commitments of financial and human resources. In the framework of the current National Raised Bog SAC Management Plan, those measures which seek to maximise the area that can be restored to active raised bog with minimum initial and maintenance costs are considered most appropriate for achieving the Conservation Objectives set for the SACs.

Restoration is most effective where drain blocking and forest clearance is accompanied by the cessation of damaging activities such as turf-cutting, drainage, fires etc.

Replacement Options (including the NHA network review)

A scientific assessment of the NHA Raised Bog network and the non-designated raised bog sites of potential conservation value was undertaken to:

- fundamentally review the current raised bog NHA network in terms of its contribution to the national conservation objective for raised bog habitats; and

- scientifically determine the most suitable sites to replace the losses of active raised bog habitat and high bog areas within the SAC network and to enhance the national network.

In order that the selection process adopts a sustainable approach the selection criteria consider the primary environmental and technical factors essential for a raised bog's existence now and into the future plus supporting economic and social criteria. Such integration of environmental, technical and socio-economic knowledge, attempting to balance the competing objectives of economic efficiency, social equity and environmental sustainability is employed by the internationally accepted Integrated Water Resources Management (IWRM) approach. However when using the analysis to determine the most suitable sites to replace the losses of active raised bog habitat and high bog areas within the SAC network, only the environmental and technical criteria were applied as SAC site selection excludes socio-economic considerations.

The scientific assessment, which was supported by an expert panel review, identified three categories of sites under the review:

- Category 1 – contains the best 63 sites from an ecological and restoration potential perspective with relatively low levels of active turf-cutting. These include 36 of the current NHA sites and 27 currently undesignated raised bogs of national conservation interest. 25 of these will be designated as NHAs and 2 as SACs to compensate for habitats losses within the SAC network. These new sites are either state owned (primarily Bord na Móna), or have relatively reduced turf-cutting pressure. The designation process for these new sites will commence in 2014. Until that time, the names and locations of these sites will not be published. It is expected that most turf cutting on these sites will cease by 2017.

- Category 2 – contains 46 current NHAs (or parts of NHAs) which have been assessed as having some ecological value but their contribution to the attainment of the national conservation objective is expected to be marginal and/or restoration would be prohibitively expensive for the conservation benefits achieved. The conservation of these sites is not

considered to be necessary to reach the National Conservation Objective and it is proposed to move towards the de-designation of these sites.

- Category 3 – contains 83 sites which have been assessed as being of little value in their contribution to the conservation of raised bog habitat in Ireland (i.e. sites with little or no active raised bog or restoration potential).

Sites will be chosen from category one to provide compensatory habitat for the SAC network. The designation process for these new sites will commence in 2014. Until that time, the names and locations of these sites will not be published.

What Conservation Measures are proposed by this draft Plan?

Protection and Restoration of current SAC Network

A key element of the plan is to protect currently active raised bog in the SAC network and restore any degraded raised bog habitat that can be effectively restored to active raised bog habitat. The assessment of the eco-hydrological potential of each site in combination with consideration of the efficacy of drain blocking and accompanying restoration measures established that 1,200 ha of active raised bog habitat can be achieved by restoration of the existing SAC network

Additional Raised Bog designation and Restoration to Fulfil SAC Area Objectives

The second element of the strategy is to select sites to provide additional habitat to replace permanently lost areas in the existing SAC network since they were selected for designation. This can be achieved by including currently non-designated areas of active raised bog or degraded raised bog within the SAC network.

From the list of suitable sites identified under the review of non SAC raised bogs of conservation value, it has been decided to achieve this through the designation of two raised bog complexes which are predominantly owned by Bord na Móna.

This includes four of the top five most suitable sites, as determined by the NHA review. As these complexes are owned predominantly by Bord na Móna the sites can be brought into the SAC network relatively quickly and restoration work advanced with the minimum of complications. Some restoration works have already commenced in these areas by Bord na Móna. These designations will provide an additional active raised bog area over 180 ha following restoration with an additional high bog area of over 1100 ha. The current area of active raised bog on these sites is over 30 ha. This also introduces

the opportunity to bring clusters/groups of sites into the network, which has added ecological benefits for more mobile species (Grouse and Curlew for example).

Cutover Restoration

A demonstration project at Clara Bog West will be undertaken to restore the high bog and to evaluate the rewetting of a proportion of the cutover bog. This will support achieving the national objective of 3,600 ha of active raised bog in the SAC and **new** NHA networks combined. Achieving this target will require additional restoration of an area of the cutover bog to replace the current deficit of 230 ha during the second planning cycle.

Summary of Proposed Programme of Conservation Measures

In addition to the detailed protection, restoration and replacement measures, Ireland's National Raised Bog SAC Management Plan's proposed programme of conservation measures requires a framework of activities drawn from existing legislation and conservation initiatives as summarised in Table S.2.

Table S.2 Summary of Proposed Programme of Conservation Measures

Measure	Where	When	Who (& Cost)
1. Protection and Restoration of current SAC network entailing • Preventative measures (cessation of damaging activities including drainage, peat harvesting and turf cutting, planting of commercial forestry, fires etc.) and • restoration measures (drain blockage in both open and overgrown drains, coupled with forestry plantation clearance) • Note: Detailed restoration and management plans for each SAC will be developed during	Current SAC bogs	2014-2020	DAHG (NPWS) Preventative measures costed separately in Chapter 6 of this draft plan Cost €1.7 m

Measure	Where	When	Who (& Cost)
2014			
2. Additional Raised Bog Selection and Restoration to Fulfil SAC Area Objectives	Compensatory sites	2014-2020	DAHG (NPWS) Cost €2.4 m
3. Demonstration Project – Rewetting of Cutover Bog to restore the high bog and to evaluate the rewetting of a proportion of the cutover bog	Clara Bog	2014-2017	DAHG (NPWS) Cost €1.5 m
4. EU LIFE Proposal and Project implementation	Selected SACs	2014-2020	DAHG (NPWS) Sum of the plan measures cost
5. Support for other conservation works – making funding available to individuals and organisations to carry out approved restoration works	Selected Sites	2014-2020	DAHG (NPWS) Not costed in this draft plan
6. Mid-cycle Review of the National Raised Bogs SAC Plan	National	2017	DAHG (NPWS) Cost €0.2 m
7. Preparation of Second National Raised Bogs SAC Plan	National	2020	DAHG (NPWS) Cost €1.0 m
8. Review of the NHA Network Designation Status (additional NHAs and de-designation of sites of low conservation value)	Current and **new** NHA Networks	2014	DAHG (NPWS) Not costed in this draft plan
9. Preparation of a national Raised Bog NHA Management Plan and site specific NHA Restoration and Implementation Plans affording protection and restoration measures akin to those in the SAC Network with supporting Code of Practice and Guidance Documents	New NHA Network	2014-2016	DAHG (NPWS), DECLG Cost €1.0 m

Measure	Where	When	Who (& Cost)
10. Raised Bogs Education and Awareness Programme and engagement and consultation with local communities	National	2014-2020	DAHG (NPWS) Cost €1.0 m
11. Raised Bogs Monitoring Programme	National	2014-2020	DAHG (NPWS) Cost €2.0 m
12. Habitats Regulations implementation to prevent damaging activities	National	Ongoing	DAHG (NPWS) Not costed in this draft plan
13. Environmental Impact Assessment Regulations and Environmental Liabilities Regulations implementation to prevent damaging activities	National	Ongoing	DAHG (NPWS) Not costed in this draft plan
14. Ensure legislative and policy linkage to other plans and programmes including River Basin Management Plans and Catchment Flood Risk Management Plans	National	Ongoing	DAHG (NPWS) Not costed in this draft plan

The estimated cost of the programme of measures is in the order of €10.8 million over the six year planning cycle. It should be noted that this value excludes the associated public sector costs of DAHG and other government departments and organisations that will play an important role in the plan's implementation. It also excludes costs associated with the compensation and relocation scheme for turf-cutters.

It is important to note that the National and SAC conservation objectives for active raised bog habitat cannot be achieved within the timeframe of the first planning cycle (2014-2020). Restoration measures (drain blockage in both open and overgrown drains, coupled with forestry plantation clearance) will be implemented but it is expected to take at least 10 years after drain blocking is completed before the effects of restoration works start to be realised. A more rapid response is however expected in reversing the current downward trend of active raised bog area before notable increases in area of active raised bog start to develop.

How are the needs of those affected by the draft Plan being addressed?

This draft plan has implications for a large number of people. At a broader level every citizen has an interest in the protection of Ireland's endangered natural habitats and the benefits that they provide. At a local level, communities will continue to benefit from having exceptional ecological sites on their doorstep which will be carefully managed in partnership with local communities into the future. Those most directly and immediately affected are those who use these bogs for activities such as turf-extraction as well as landowners within and adjacent to the SACs.

In general, turf-cutting and its associated drainage is damaging to the ecology and functioning of raised bogs and is incompatible with their conservation. For raised bog SACs, it will in most cases not be possible for the State to consent to further turf-cutting, as the State is legally obliged to prevent such damage to these sites. There are, however, two sets of circumstances, in which turf-cutting could be consented to. These can be referred to as Article 6(3) consents (where it can be shown that cutting will not have an adverse effect on the SAC) and Article 6(4) consents (if there are no relocation possibilities or for imperitive reasons of overriding public interest), under the Habitats Directive.

Continued cutting under Article 6(3)

All specific proposals put forward for cutting within specified parts of particular SACs made by the Turf Cutters & Contracters Association (TCCA) and by other turf-cutting groups were examined and assessed as part of the preparation of this draft Plan. The assessments have resulted in three categories of sites/outcomes.

Proposals were put forward for continued turf-cutting at specific location on four sites (Camderry SAC, Coolrain SAC, Callow SAC and Redwood SAC).

For each of the sites, the proposals have been considered using information on the presence of active raised bog habitat or degraded raised bog habitat within or adjacent to the proposed area for turf-cutting. The physical and hydrological connection between the proposed extraction area and the protected habitats within the site was analysed. The following are some of the criteria which are used in reaching a conclusion.

1. Would the cutting lead to the direct loss of protected habitat?

2. Would the cutting lead to the indirect loss of protected habitat?

3. Would the cutting, necessary drainage and saving of the turf prevent or impede restoration works that will be necessary on the site?

If the answer to any of these questions is yes, or if such an impact cannot be ruled out, then giving consent to turf-cutting would not be possible under Article 6(3). It should be noted that the nature of raised bogs and the impacts of turf-cutting will in most cases lead to a decision that turf-cutting will not be possible. It has been concluded that the four proposals above fall into this category.

A further five proposals were also considered (River Moy (Cloongoonagh), River Moy (Derrynabrock), Lough Ree, Ballinagare, and Lough Lurgeen).

In these cases, following preliminary assessment, it has not been ruled out that limited turf cutting in certain identified areas could be undertaken without having a negative effect. If the potential for continued cutting in these defined areas is to be pursued, it will be necessary to undertake further work to fully assess the possibility. Continued cutting on small areas within these SACs may be possible under strict controls and perhaps for a defined period of time and this will be explored further.

In one case, Tullaher Lough and Bog SAC, it has been possible to identify a significant area within the SAC where turf-cutting could continue without having an adverse impact on the protected habitat. This is because the protected habitat is hydrologically separated from the proposed extraction area. It will be possible, in this case to allow a continuation of turf-cutting within a defined area.

Continued cutting under Article 6(4)

The Habitats Directive makes provision for damaging activity to be undertaken on SACs in exceptional circumstances where certain tests provided for in Article 6(4) of the Directive can be met. In short these include the following:

1. That no alternative exists than to undertake the proposed action;

2. That Imperative Reasons of Overriding Public Interest (IROPI) exist that would justify the damage to the SAC;

3. That compensatory measures can be taken to ensure the integrity of the SAC network;

4. In considering plans and projects involving activities such as turf-extraction, where priority habitats (such as active raised bog) are affected, an opinion of the European Commission is required before consent can be give to a damaging activity.

For this draft Plan, not all of the information required to make this assessment was available. Such information includes the number of turf-cutters who would be prepared to relocate to a nearby undesignated site, the number who qualify for compensation or relocation, the number who might prefer financial compensation and whether the NHA review has opened up new relocation possibilities for certain SACs. It is not possible to definitively establish an absence of relocation possibilities (alternatives) without this information.

Public consultation on this draft plan, and the finalisation of the plan, will provide an opportunity to clarify whether the provisions of Article 6(4) could be applied to any particular SAC within the broader context of the Plan. It could also establish whether sufficient consensus can be achieved at a national level in regard to this issue to make a successful case for flexibility on this basis.

Cessation of Turf Cutting Compensation Scheme

The mechanisms described in this draft plan to address the needs and rights of turf-cutters and land owners include The Cessation of Turf Cutting Compensation Scheme and relocation of turf cutting activity to non-designated bogs.

- A total of 2,837 applications for compensation under the Cessation of Turf Cutting Compensation Scheme have been received and acknowledged by the Department. 796 applicants have expressed an interest in relocation to non-designated bogs. 1,820 payments have been made in respect of Year 1 of 15, 1,629 payments have been made in respect of Year 2 of 15 and 559 payments have been made in respect of Year 3 of 15. 405 deliveries of turf have also been made.

Relocation can be a complex process involving the investigation of suitable sites for turf quality and quantity, establishing the infrastructure/drainage works required, establishing the number that can be accommodated on the relocation site, assessing the cost and feasibility of land purchase or lease, and securing necessary planning consents. Establishing the preferences of individual turf-cutters and their entitlements to participate in the scheme can also take time.

- Arrangements for the relocation of turf cutters to non-designated bogs have been made for a group from Clara Bog SAC in County Offaly and a group from Carrownagappul Bog and Curraghlehanagh Bog SACs in County Galway. The group from Clara Bog has now commenced turf cutting at the relocation site. The Department envisages that qualifying turf cutters from the group from Carrownagappul Bog and Curraghlehanagh Bog will be able to commence turf cutting in one of the relocation sites from the 2014 turf cutting season.

- Progress has been made in the relocation of qualifying turf cutters from Ballynafagh Bog SAC in County Kildare to Timahoe North which is in the ownership of Bord na Móna. The Department envisages that qualifying turf cutters from Ballynafagh Bog will be able to commence cutting in the

relocation site during the 2014 turf cutting season, provided that final agreement is reached with them.

- Progress has also been made with a view to the relocation of a small group of qualifying turf cutters from Ballynamona Bog and Corkip Lough SAC in County Roscommon to Togher, County Roscommon, which is also owned by Bord na Móna. The Department envisages that this group of turf cutters will be able to commence cutting in the relocation site during the 2014 turf cutting season, provided that final agreement is reached with them.

- Of the remaining 48 raised bog Special Areas of Conservation, potential relocation sites have been identified for a further 32 bogs and work is ongoing on identifying and investigating sites. Relocation is unlikely to be required, or is likely to be small-scale, for another 16 raised bog Special Areas of Conservation due to, for example, the small number that had been cutting turf on these sites during the relevant five year period.

It is thanks in large part to the efforts of turf-cutter representatives, the Peatlands Council, Department officials and Bord na Móna, that such considerable progress has been made to seek solutions to meet Ireland's obligations under the Habitats Directive and to allow turf-cutters to continue to cut turf on alternative non-designated bogs or to provide them with monetary compensation.

The final version of this plan, and a suite of site-specific restoration and management plans which will be developed during 2014-15, will go further towards addressing turf-cutter and land owner needs in a practical way.

Financing

The current compensation and relocation schemes established by Government will pay out up to €69 million to turf-cutters over a 15 year period. Further costs will arise from the implementation of restoration and management plans of each of the sites amounting to circa €10.8 million. As the conservation measures and compensation payments are costly, consideration will be given as to whether some of these costs could be met through EU funds. More information on funding is provided in Chapter 6.

What are the benefits of this draft Plan?

Full implementation of the Programme of Conservation Measures set out in this draft Plan will result in a more sustainable network of SAC bogs which bring a wide range of beneficial ecosystem service opportunities. Ecosystem services are the benefits people derive from natural systems.

Ecosystem structures and processes (what the bog is made of and how it works) can be represented as a number of ecological functions which can be measured by well-accepted scientific methods (providing information on how an ecosystem is performing). These functions create services which are then translated into benefits that can be measured by how people value or place importance on those systems and associated products at different spatial levels. This is typically done using valuation methods for ecosystem services. Figure 2 gives an overview of these functions and associated benefits for a typical Irish raised bog. Natural bogs (those with little human impact) are considered one of the most important ecosystems of the world, because of their key value for biodiversity, regulation of climate, water filtration and supply, and important support for human welfare (e.g. source of well-being and knowledge).

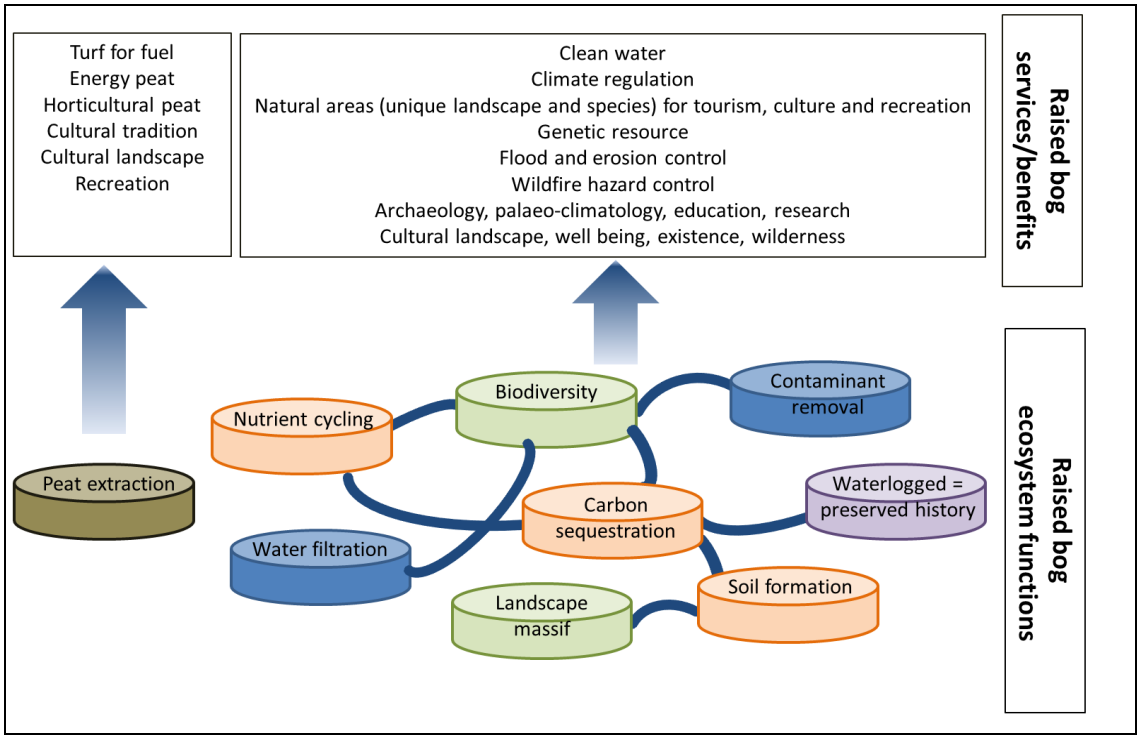

Figure 2 Raised Bog Ecosystem Functions and Services/Benefits

This draft Plan will ensure that while turf cutting needs are met for individuals, and the associated cultural heritage is preserved in non-designated sites (90% of the national raised bog resource), all the other benefits that raised bogs bring to society can be almost all recovered and enjoyed by everyone on the remaining 10% of the resource that is located in the protected sites. Therefore the

Plan can bring an overall positive impact on ecosystem services provided by raised bogs, without compromising on cultural and traditional benefits.

Without such a plan, i.e. in a 'business as usual' scenario with continued drainage and turf cutting on conservation sites, Ireland would experience the continued loss of all aforementioned benefits and the cost of losing such benefits will be borne by the whole of society.

What are the Next Steps?

This Draft National Raised Bog SAC Management Plan has been prepared to encourage public participation in the planning process and to enable all interested parties to have their say.

A formal period of Public Consultation will be undertaken between December 2013 and March 2014.

Every submission received during the Public Consultation process will be carefully considered and used to inform the making of the Final National Raised Bog SAC Management Plan. The process of how the submissions have been considered in the making of the Final Plan will be formally documented within the Strategic Environmental Assessment (SEA) Statement which will be published at the same time as the Final Plan.

The Final National Raised Bog SAC Management Plan will be published following consultation.

Please send your comments and views by 18 April 2014 to:

Email: info@raisedbogconservation.com

Web: www.raisedbogconservation.com

Address: Raised Bog SAC Consultation, Unit 33, Innovation Works, National Technology Park, Limerick

Finding your way through this Draft Plan

Chapter	Title	Contents	
1	Aims and Background to the Plan	• Aims of the plan • Background to the development of the plan • Guiding principles	**PROCESS** ↓
2	Current Condition of Ireland's Raised Bog Network	• Scientific analysis of the raised bogs • Current condition/status and trends	**STATUS** ↓
3	Conservation Objectives of the Plan	• National and SAC conservation objectives	**OBJECTIVES** ↓
4	Options to Achieve Conservation Objectives	• Potential protection, retoration and compensatory measures to achieve conservation objectives	**MEASURES**
5	Proposed Programme of Conservation Measures	• Proposed strategies and summary programme of measures to achieve conservation objectives	
6	Addressing the Needs of Those Affected by the Plan	• Measures to address the needs of those affected by the plan	
7	Benefits of the Plan	• Beneficial impact of Plan through recovery of ecosystem services	
8	Next Steps	• Next steps involved in finalisation and implementation of the plan	

Chapter 1 Aims and Background to the Plan

Aims

This document is a *Draft for Consultation* of the National Raised Bog Special Area of Conservation (SAC) Management Plan. It provides an overview of the planning process, outlines the conservation objectives that have been set for raised bog sites and the proposed programme of measures to achieve those objectives, and outlines the options available to address the rights and needs of those affected by the plan (specifically turf-cutters and land owners).

The plan has two broad aims:

Conservation and Management of Raised Bog SACs - Ireland has nominated 53 sites as Raised Bog SACs under the EU Habitats Directive (Appendix 1) and therefore is required under the directive to put in place measures to protect these sites from deterioration. The aim of the National Raised Bog SAC Management Plan is to provide clarity to all parties regarding how these sites will be managed and restored into the future in co-operation with land-owners and local communities and in keeping with legal obligations under the directive.

Addressing the needs of Turf-Cutters & Land-Owners - The Plan also aims to set out how the needs of those who depend on these bogs will be addressed where it has been necessary to curtail activities for conservation purposes. The needs of affected turf-cutters' are being, and will be, largely addressed through compensation or relocation. The concerns and interests of land-owners within and around these sites will also be addressed, through the putting in place of site-specific management and restoration plans for each raised bog SAC in consultation with them and in keeping with the requirements of the Plan. The site-specific plans can also be used to explore how the restoration and management of these sites can benefit local communities through their use as amenity areas, for education, and as a focus for conservation.

Invitation to comment

It is important that you consider this draft plan and how it will affect you. We are seeking the views of all interested parties and all submissions received will be taken into consideration during the finalisation of the plan. The final plan will also build on the progress made over the past two years and to explore options and proposals made by communities directly to the Department of Arts, Heritage and the Gaeltacht (DAHG), at the 2012 Peatlands Forum, and through the Peatlands Council. The final National Raised Bog SAC Management Plan will be published in 2014 and will contain the approach to be taken for all sites.

Please send your comments and views by 18 April 2014 to:

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Address: Raised Bog SAC Consultation, Unit 33, Innovation Works, National Technology Park, Limerick

Guiding Principles of Plan Preparation

The guiding principles of the process of devising Ireland's National Raised Bog SAC Management Plan derive from the discussions that took place at the 2012 Peatlands Forum, the concerns expressed by turf-cutting communities, and a motion passed by Dáil Éireann on 7 March 2012. They also derive from the principles laid down in the draft National Peatlands Strategy and the requirements to protect the Raised Bog SACs for future generations and in keeping with legal obligations. The following principles must apply if we are to succeed in producing a final plan that can deliver the flexibility under the Habitats Directive that may be required to address those small number of Raised Bog SACs where relocation solutions for turf-cutters are limited.

- The best available scientific understanding of the ecological and hydrological functioning of raised bogs will be applied to the control of turf-cutting and future management of these sites.

- Approaches for the future management of all of the affected bogs, and measures to address the needs of land-owners and turf-cutters that have been sourcing their domestic fuel from these sites, will move forward together.

- All parties will engage with each other in identifying relocation solutions for Raised Bog SACs and will work together to secure the information required. Relocation sites identified will be developed into fully functional solutions as soon as possible but in some cases this may take a number of years, with turf cutters receiving interim arrangements (turf or financial payments) to meet their fuel needs. Identification of the small number of sites, if any, that genuinely do not have viable relocation options will also be finalised. Alternative options, such as exploring the possibilities for future cutting on these sites will be developed with the communities and the European Commission. It is likely that the Commission will require several months to consider the plan, once submitted, before it can provide an opinion under Article 6(4).

- The process can only be undertaken in a context where turf-cutters refrain from cutting on Raised Bog SACs, pending the finalisation of the plan. Cutting outside the parameters of EU

law will detract from the relationship of trust and confidence building that is required and will make constructive engagement on progressing the plan more difficult.

- In instances where unauthorised cutting takes place, the Department and An Garda Síochána will undertake the necessary enforcement and legal action.

- Interim measures are in place to ensure that turf-cutters are provided with a financial payment or the delivery of a supply of turf as the plan is being finalised.

- Parties will work within the framework of the Habitats Directive and in close consultation with each other and with the European Commission as the Plan is finalised.

Background

Ireland's Raised Bog SACs

Special Areas of Conservation (SACs) are selected to protect habitats and species that are rare and threatened at a European scale. The EU Habitats Directive lists certain habitats (listed in Annex I) and species (listed in Annex II) that must be conserved by designating and appropriately managing SACs. Habitats and species on these lists that are considered to be particularly endangered are called "priority" habitats and species. There are 59 habitats listed in Annex I in Ireland, including raised bogs, blanket bogs, turloughs, sand dunes, limestone pavement, heaths, orchid-rich grassland, estuaries and reefs. Annex II species found in Ireland include salmon, otter, freshwater pearl mussel, Killarney fern and bottlenose dolphin. Each SAC is designated for one or more Annex I habitats and/or Annex II species. 429 SACs have been nominated for designation throughout the State.

The Natura 2000 network was introduced by the Habitats Directive. It comprises the network of SACs and SPAs (Special Protection Areas for birds) throughout the EU.

Between 1997 and 2002, Ireland nominated a total of 53 raised bog sites for designation as Special Areas of Conservation (SACs). These areas were selected primarily for the presence of a habitat listed for priority protection under the Habitats Directive. This *active raised bog habitat* is in danger of disappearance within the EU, and within Ireland.

Raised bogs are extremely rare in global and European terms. Ireland's SAC's contain the last functioning remnants of the great bogs that once covered much of Ireland's midlands. The SACs are different from the vast majority of Ireland's raised bogs, because they still have areas of active raised bog, where the conditions are right for peat to continue to form, and where species of plants and animals typical to bogs can thrive. Damaging activities such as land reclamation, drainage and peat

extraction over time have left Ireland with less than 1% of the area of active raised bog we once had. These bogs also contain large tracts of degraded raised bog, which is the area of high, uncut bog which has been damaged by human activities but which could be transformed into active raised bog again through restoration measures.

Ireland, through successive Governments, has decided that for the benefit of all its citizens, and in the light of global concerns about loss of bio-diversity, a proportion of our remaining raised bogs should be protected. Ireland signed up to do this through the 1992 EU Habitats Directive which commits Ireland to the achievement of favourable conservation status for this and other endangered habitats. The key mechanisms to achieve this are the designation, protection, management and restoration of the Raised Bog SACs.

Ireland's Raised Bog SACs are faced with a number of pressures which need to be addressed rapidly if they are to be effectively protected and restored, in line with the requirements of the Habitats Directive. Drainage, peat harvesting and turf-cutting, planting of commercial forestry, fires and other damaging activities (such as water abstraction and quarrying) are the principal causes of the general deterioration of these sites that has been observed over recent years. This has included a significant decrease (circa 37%) in the area of active raised bog at these sites and the permanent loss of smaller areas of degraded raised bog that is capable of restoration. The provision of the necessary protective measures is now urgent and is required under EU law.

Infringement Proceedings

In 2011, The European Commission commenced infringement action against Ireland for alleged failures to adhere to the Habitats Directive (relating to the regulation of turf-extraction from its SACs) and the Environmental Impact Assessment (EIA) Directive (relating to turf-cutting on Natural Heritage Areas (NHAs) designated under domestic legislation). The National Raised Bog SAC Management Plan is part of the Government's approach to addressing these infringement proceedings and focuses on the future management of Raised Bog SACs. However, it is just one part of a broader strategic approach to the future management of Ireland's peatlands which includes the establishment of the Peatlands Council and the development of the Peatlands Strategy. The Government's response has been comprehensive and includes the following elements:

Peatlands Council - The Government established an independently chaired Peatlands Council in April 2011 to ensure that stakeholders had an opportunity to engage with each other and with the relevant State authorities, so that all parties could reach a shared understanding of the challenges involved and work together to address this complex issue. While the Turf Cutters and Contractors Association (TCCA) decided to withdraw from engagement with the Peatlands Council in September 2011, the Council has been central in finding acceptable and workable approaches to challenging issues, and members have been effective in representing their own members' interests. The interests

of turf-cutters and land-owners have been represented by the Irish Farmers Association and Irish Rural Link and environmental concerns have been represented by the Irish Environmental Network. Expertise on bog management and restoration has been provided by Bord na Móna, Coillte and the Irish Peatlands Conservation Council. Officials from the Department of Arts, Heritage and the Gaeltacht represent the Minister, and the Peatlands Council is assisted by an independent Scientific and Policy Advisory Group.

Peatlands Strategy - In establishing the Peatlands Council, the Government asked that it would assist in drafting a National Peatlands Strategy. A draft of the Strategy has now been published for public consultation and is available at www.npws.ie. This draft National Raised Bog SAC Management Plan is being produced as one element of the implementation of the Peatlands Strategy which aims to agree principles on how decisions are reached concerning the future use and management of Ireland's peatlands. While there is an undoubted conservation and legal need to limit damaging activities, including turf-cutting, on the Raised Bog SACs, and this has proven to be a contentious issue to resolve, the extent of Ireland's peatlands allows for multiple uses into the future, including traditional uses such as turf-extraction for domestic purposes. The Strategy puts into context the efforts to conserve a proportion of Ireland's peatlands from destruction through turf-extraction and other uses.

2012 Peatlands Forum - In February 2012, at the instigation of Conor Skehan, then Chair of the Peatlands Council, a Peatlands Forum was convened. This was chaired by a High Court Judge, Mr. Justice John Quirke. The Forum heard proposals from turf-cutting communities on each of the Raised Bog SACs to find solutions for their particular circumstances. Most proposed relocation to alternative bogs. Some proposed co-existence, where limited cutting would continue within the sites and a small number proposed complete habitat replacement, where cutting would continue and compensatory habitat would be provided. The level of detail and information regarding the proposals for each SAC differed and further work was, and is, required to assess the feasibility of the proposals and their compatibility with the Habitats Directive.

In his report following the 2012 Peatlands Forum, Justice Quirke recommended that a national plan for Raised Bog SAC habitats be drawn up to ensure a holistic approach to the management of Ireland's Raised Bog SAC network. The Government accepted this recommendation at its meeting on 6 March 2012, and this draft National Raised Bog SAC Management Plan has been prepared on foot of Justice Quirke's recommendation and the resolution from Dáil Éireann.

The Plan

The plan is both a policy document and a legal document which must follow the stepped approach set out in the Directive. In summary, Articles 6(1) and (2) of the Directive requires Ireland to establish and

put in place the necessary conservation measures to protect SAC's from deterioration. Article 6(3) requires projects or activities which may impact on those habitats to be assessed fully in light of the sites' conservation objectives, and Article 6(4) sets out the processes to be followed where such an assessment shows a negative impact on the integrity of the SAC.

The purpose of the National Raised Bog SAC Management Plan is to set out Ireland's strategic approach to the conservation and restoration of its Raised Bog SACs and to give clarity and confidence to all parties in regard to how Ireland will protect these sites in keeping with its legal obligations. It forms a "plan" within the meaning of Article 6(3) of the Habitats Directive and establishes the necessary conservation measures which the Directive requires to be achieved.

The Plan, by definition, seeks to avoid damage, through activities such as turf cutting, which would result in an adverse impact on the integrity of any of the 53 Raised Bog SACs. But the plan also aims to achieve a successful accommodation of the needs and requirements of turf-cutters and land owners associated with the raised bogs. Efforts to accomodate these sometimes conflicting aims have included a scientific analysis of the raised bog resource as well as significant and ongoing consultation and engagement with turf-cutters and land owners to find workable solutions.

Scientific Analysis and Conservation Measures

Following a competitive tender, the Department of Arts, Heritage and the Gaeltacht engaged a team of scientific consultants, led by RPS, to undertake the scientific analysis required to underpin the National Raised Bog SAC Management Plan. The team includes experts in the scientific disciplines required to inform policy on conservation, restoration and hydrological management of these sites.

The analysis undertaken includes a review of 75 raised bogs that have been designated as Natural Heritage Areas (NHAs) under domestic legislation, but are also subject to the EU Environmental Impact Assessment (EIA) Directive. The purpose of the NHA review is to identify the contribution of each of the 75 sites to the protection of raised bog habitat in Ireland, as well as the scope that exists for allowing continued turf-cutting at some sites (see Review of Raised Bog Natural Heritage Area Network).

The scientific research that has been undertaken to produce this Plan, and the NHA review, is unprecedented. For the first time, a comprehensive review of the wider resource of Ireland's remaining raised bogs of potential conservation value has been undertaken, applying new scientific methods and survey techniques. Over 270 sites have been examined in detail and their current and potential value as conservation sites has been assessed. This has included the 53 Raised Bog SACs, the 75 Natural Heritage Areas and over 140 additional undesignated sites that are deemed to be of potential conservation value. Armed with this information, a more coherent network of conservation sites has now been proposed, including the 53 existing SACs and proposed designation of two raised

bog sites as SACs to compensate for the loss of habitat from the SAC network. The loss has occurred over the years since they were first nominated for designation. It has been possible to use this information to put a coherent, ambitious and achievable national conservation and restoration approach in place that will steer Ireland's efforts and available resources to the best, most important sites, with the greatest potential for long-term conservation.

Finding Solutions for turf-cutters and land owners

As well as containing proposed programme of measures to address the conservation objectives of the sites, the draft plan also contains measures to address the needs and rights of turf-cutters and land owners. The final plan, and the site-specific restoration and management plans that the plan provides for, will go further towards addressing turf-cutter and land owner needs in a practical way.

Thanks in large part to the efforts of turf-cutter representatives, the Peatlands Council, Department officials and Bord na Móna, considerable progress has been made in finding solutions to meet Ireland's obligations under the Habitats Directive and to allow turf-cutters to continue to cut turf on alternative non-designated bogs or provide them with monetary compensation if that is their choice.

Environmental Assessment

To ensure that the plan does not have adverse consequences for the wider environment Strategic Environmental Assessment (SEA) has been undertaken. SEA is a multi-staged process for evaluating the potential effects of plans or programmes on other aspects of the environment before they are adopted. It also provides all interested parties, including the public, with opportunities to comment on and influence the plan. The European SEA Directive establishes the requirement for SEA and this requirement has been transposed into Irish law.

An SEA Scoping Report, outlining the proposed contents of the plan and the environmental issues to be taken into consideration in its development, was made available on the study and NPWS websites and in hard copy at NPWS offices between 1 September and 1 October 2013. Submissions and observations were invited from all interested parties in relation to the SEA Scoping Report. The comments made and issues raised were taken into consideration during the development of this draft National Raised Bog SAC Management Plan.

An SEA Environmental Report has been made available with this draft plan. It includes an assessment of the potential effects on the environment of the management measures outlined in this draft plan. It also includes recommendations for how potential negative effects can be mitigated and potential positive effects can be enhanced. Submissions and observation on the SEA Environmental Report are invited until 18 April 2014. All submissions received will be taken into account during the

development of the final plan and an SEA Statement will be issued with the final plan which will describe how the SEA process influenced the plan-making process.

An Appropriate Assessment (AA) process is also being undertaken in relation to this plan. This is a multi-staged process for ascertaining whether a plan or project, alone or in combination with other plans or projects, will adversely affect the integrity of a specific set of nature conservation sites, namely SACs and Special Protection Areas (SPAs) which together form the Natura 2000 network of internationally important sites. A Natura Impact Statement, including an assessment of the potential effects on the Natura 2000 network of the management measures outlined in this draft plan, has been made available with this draft plan for information. It includes mitigation measures necessary to avoid, reduce or offset negative effects.

Consultation and Engagement

Consultation and engagement with the public and all interested parties is an important element of the development of the National Raised Bog SAC Management Plan.

To facilitate a two-way flow of information between the public and the plan-making team, a website has been developed www.raisedbogconservation.com. Comments are welcome at all times during the plan-making process and can be made directly through the 'contact us' section of the website, or via the dedicated email address info@raisedbogconservation.com.

Comments have already been received in relation to the SEA Scoping Report. Currently comments are invited in relation to this draft plan and associated SEA Environmental Report.

Chapter 2 Current Condition of Ireland's Raised Bog Network

What is peat?

Peat is an accumulation of partially decayed vegetation which forms in wetland conditions, where water logging obstructs contact with oxygen from the atmosphere, slowing rates of plant decomposition. Peat soils are mainly formed of water, organic matter (plants) and small amounts of mineral material. On undamaged Irish peat bogs, springy bog mosses (*Sphagnum* species) dominate the vegetation and are the most important contributors to peat formation. According to Schouten (2002) the volume of water in undisturbed peat varies in the range of 88 to 97%.

What is a Raised Bog?

Raised bogs are wetland ecosystems formed by accumulations of deep peat that originated in shallow lake basins or topographic depressions at the end of the last glaciation, 10,000 years ago. The water-logging that occurs in these areas provides anaerobic conditions that slow down the decomposition of plant material that in turn lead to an accumulation of peat. During development of raised bogs, the vegetation initially grows upward until it eventually looses contact with the groundwater beneath so that the bog wetland receives water only from rain.

The name raised bog is derived from the elevated surface that develops as raised bogs grow upwards creating a slight dome-shaped surface above that of its surrounding, illustrated in Plate 2.1. This *high bog* is primarily rainwater fed and isolated from the local groundwater table. The surface of a relatively intact raised bog is typically wet, acid and deficient in plant nutrients (as bogs receive most of nutrients through rainfall), and supports specialised plant communities that are not generally found in other ecosystems. One of the most abundant plant components is Sphagnum moss, although many other species can contribute. Grasses and sedges are abundant in damp places while small shrubs in the heather family grow in drier areas.

Plate 2.1 Sheheree Raised Bog SAC, Co Kerry

Active Raised Bog, as illustrated in Plates 2.2 and 2.3, is characterised by the presence of a top (10-30cm) vegetation layer or acrotelm, which is defined as the living, actively growing (growth rate of approximately 1 – 3 cm per year) upper layer of a raised bog, the surface of which is composed mainly of living bog mosses (Sphagnum spp.). The presence of the acrotelm is vital to a raised bog as this is the peat forming layer and it strongly influences the rate of water runoff from the bog. Below the living acrotelm lies the catotelm which comprises layer after layer of dead vegetation in waterlogged conditions which over a very long period of time forms brown peat. The catotelm can grow at a rate of 1mm per year and can be up to 10m deep in Irish bogs. As successive increments of dead vegetation build up, the peat layers at the bottom turn black.

Intact bogs are surrounded by other wetland habitats such as swamps, fens and wet woodlands. Drainage, agricultural improvement and peat cutting disrupt the structure and function of the peat bog and leave the remaining uncut remnants of peat in isolation from the wetland habitats that developed with them. The water environment is affected with lower water tables and increased rates of surface water run-off. All raised bog sites in Ireland have been damaged or degraded to some extent. This has largely occurred due to drainage, peat harvesting and turf cutting, planting of commercial forestry, burning and other damaging human activities such as water abstraction from groundwater and of quarrying which can have a significant impact on the raised bogs by lowering the regional groundwater level. Degraded and damaged raised bog sites look very different to their intact counterparts. They typically have a network of drains and ditches on and surrounding the site and the natural characteristics of the peripheral habitat (lagg) are generally severely affected. Water tables are lowered, consequently causing drying out and shrinkage of the whole bog and significant reductions in the area of the active peat-forming layer or acrotelm. The acrotelm may be absent altogether where it has been totally removed by peat harvesting or degraded by drainage.

Plates 2.2 and 2.3 Examples of Irish Active Raised Bog - central ecotope habitat

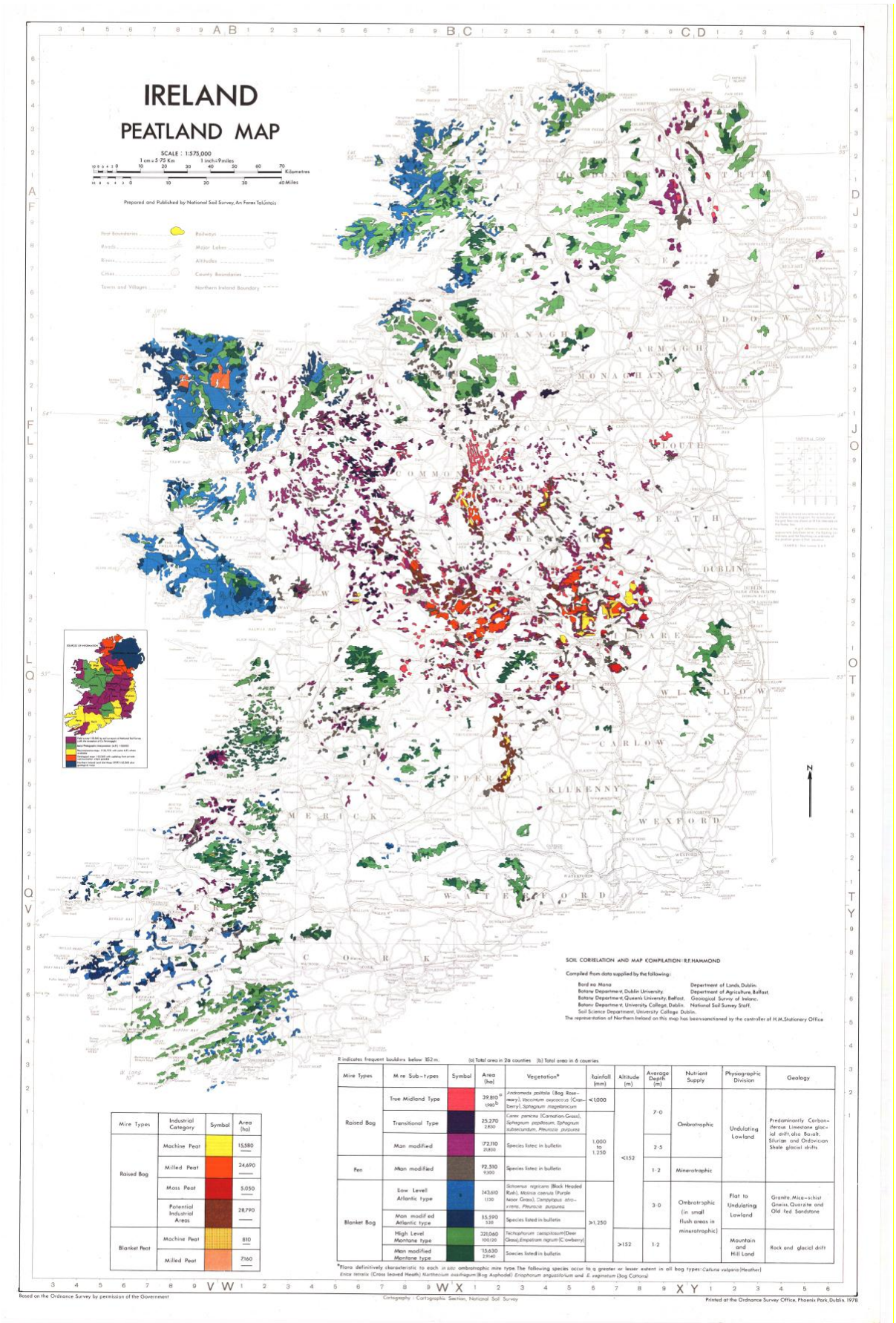
Where are Irish Raised Bogs Found?

Raised bogs once formed extensive wetlands over much of the central lowlands of Ireland (Figure 2.1) but are becoming increasingly rare in Ireland due to human activity. Today Active Raised Bog is a rare habitat with those remaining mainly found in the lowlands of central and mid-west Ireland (Figure 2.2). It is most notably found within the Shannon River Basin; particularly where the limestone plain is covered by a variable thickness of undulating glacial drift which originally provided suitable basins for the development of lakes and/or fens (precursors to the bogs).

In Ireland, raised bogs are confined to areas with an annual rainfall below 1,250 mm (Hammond, 1984). They occur principally on land below an altitude of 130m. Irish raised bogs are classified into two sub-types: Western or Intermediate raised bogs and True Midland raised bogs (Schouten, 1984), with the boundary between the two being taken as the 1,000mm isohyet. Above the 1250mm limit, raised bogs are replaced by blanket bogs, which are more common in Ireland.

Raised bogs in Ireland are found in two main locations (Figure 2.1): the largest one expanding from the central counties and with a high density of bogs along east Galway and west Roscommon, and the second one separated from the main largest location along the southwest in county Kerry and west Clare. The eastern and southern boundary is not very clearly defined as many smaller bogs have been cut away entirely. Currently scattered, isolated and frequently severely damaged bogs remain in counties Monaghan, Meath and Kildare, with extreme outliers in Wicklow, Carlow and Cork. The northern (counties Cavan and Sligo) and part of the southern (counties Laois and Clare) boundaries of the main raised bog cluster is demarcated by higher ground, which would have resulted in very small pockets of raised bog that have been cut away. In the west the boundary of the raised bogs is generally associated with the band of much thinner drift in Galway and Mayo, where limestone is close to the surface. Extensive cutting in the past has largely destroyed the transition zone between raised and blanket bog, but some good examples of transition raised bogs can be found in Clare, Galway, Mayo and Sligo. The south-western cluster (counties Clare and Kerry) mostly consists of spread out and severely damaged bogs.

While turf-cutting has been carried out for centuries, the loss of raised bogs in Ireland escalated during the 20th century, with the removal of peat on a commercial scale for the production of fuel and horticultural peat. As a result, only about 16% of Ireland's former area of raised bog habitat remains today. The impact on the area of active bog has been more severe, with less than 1% of the original. It is estimated that there has been a 99% loss of the original area of actively growing raised bog in Ireland.



Mire Types	Industrial Category	Symbol	Area (ha)
Raised Bog	Machine Peat		15,580
	Milled Peat		24,690
	Moss Peat		5,050
	Potential Industrial Areas		28,790
Blanket Peat	Machine Peat		810
	Milled Peat		7160

Mire Types	M re Sub-types	Symbol	Area (ha)	Vegetation*	Rainfall (mm)	Altitude (m)	Average Depth (m)	Nutrient Supply	Physiographic Division	Geology
Raised Bog	True Midland Type		39,810 (a) 1980 (b)	Andromeda polifolia (Bog Rosemary), Vaccinium oxycoccus (Cranberry), Sphagnum magellanicum	<1,000	<152	7·0	Ombrotrophic	Undulating Lowland	Predominantly Carboniferous Limestone glacial drift, also Basalt, Silurian and Ordovician Shale glacial drifts
	Transitional Type		25,270 2,830	Carex panicea (Carnation-Grass), Sphagnum papillosum, Sphagnum subsecundum, Pleurozia purpurea	1,000 to 1,250		2·5			
	Man modified		72,110 20,830	Species listed in bulletin						
Fen	Man modified		92,510 9,300	Species listed in bulletin			1·2	Mineratrophic		
Blanket Bog	Low Level Atlantic type		143,610 1130	Schoenus nigricans (Black Headed Rush), Molinia caerula (Purple Moor Grass), Campylopus atrovirens, Pleurozia purpurea	>1,250		3·0	Ombrotrophic (in small flush areas in mineratrophic)	Flat to Undulating Lowland	Granite, Mica-schist Gneiss, Quarzite and Old red Sandstone
	Man modified Atlantic type		55,590 530	Species listed in bulletin						
	High Level Montane type		221,060 100120	Trichophorum caespitosum (Deer Grass), Empetrum nigrum (Crowberry)		>152	1·2		Mountain and Hill Land	Rock and glacial drift
	Man modified Montane type		15,630 2,940	Species listed in bulletin						

*Flora definitively characteristic to each in situ ombrotrophic mire type. The following species occur to a greater or lesser extent in all bog types: Calluna vulgaris (Heather) Erica tetralix (Cross leaved Heath) Narthecium ossifragum (Bog Asphodel) Eriophorum angustifolium and E. vaginatum (Bog Cottons)

Figure 2.1 Peatland map of Ireland (Hammond, 1981)

Current conservation status of EU raised bog habitats in Ireland

According to the most recent EU Habitat Directive Article 17 Conservation Status Assessment Report (NPWS , 2013) the overall extent of the raised bog resource including "intact*"* high bog and secondary degraded raised bog (i.e. intensively drained high bog devoid of vegetation, cutaway bog, cutover and occasionally reclaimed agricultural land with peaty soils) remaining in the country is approximately 208,00ha. Only 50,000 ha of "*intact"* high bog remain in the country out of an original figure of 310,000 ha estimated by Hammond (1979). 18,000 ha of the "*intact"* high bog are within designated sites (SACs or NHAs) and only 1,639 ha of the "*intact"* high bog can be classified as Active Raised Bog (Figure 2.2).

The Active Raised Bog habitat national conservation status has been assessed as *Unfavourable Bad-Declining*. Its range has been assessed as *Unfavourable Bad-Stable*. Despite ongoing restoration efforts over the last two decades, approximately 13ha (1.61%) have been lost between the 2004/05-2011/13 period within 44 raised bogs assessed. Area has been given an *Unfavourable Bad-Decreasing* assessment.

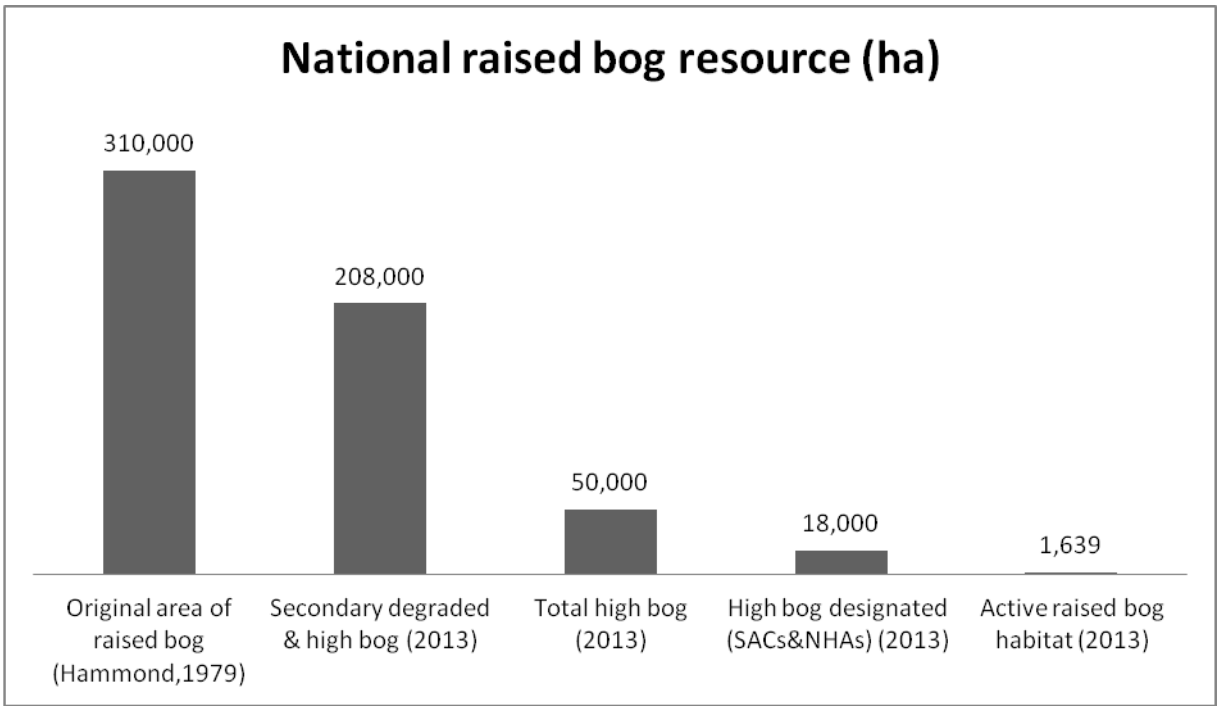


Figure 2.2 National raised bog resource

What are the main threats to the Raised Bogs?

Raised bogs are wetland ecosystems and so the main threats to their welfare arise from any actions that drain water from the bog and dry them out. The main threats include:

- Drainage of raised bog habitat or surrounding wetland habitats;
- Peat harvesting and turf cutting;
- Planting of commercial forestry;
- Burning; and
- Other damaging human activities such as water abstraction from groundwater and quarrying which can have a significant impact on the raised bogs by lowering the regional groundwater level.

All of these damaging operations can compromise the hydrological integrity of a raised bog leading to the lowering of the water table which can cause shrinkage cracking, deformation, collapse or bursts. Such actions can result in peat being exposed to air as the water levels drop and the dead plants in the peat start to decompose, releasing carbon dioxide and other gases into the atmosphere. These changes to the structure of the raised bog result in the loss of the unique raised bog ecology.

Tackling raised bog ecosystem degradation requires an understanding of the root causes leading to a change in a bog's hydrological regime. Introducing drains on the high bog not only results in water being rapidly transported off the bog surface, but also can result in increased topographic gradients on the bog surface as the peat compresses due to a lowering of the water table. In areas where topographic gradients are increased, water flows away much more rapidly resulting in unsuitable hydrological conditions for active raised bog.

Drains at the bog margins can also have significant impacts. Raised bogs develop by infilling waterlogged basins, leading to a hydrological equilibrium with surrounding inorganic deposits (Figure 2.3a). High water levels (heads) in the peat, and lower levels in the inorganic deposits underling the bog (substrate), result in natural downward seepage of bog water. Vertical seepage is proportional to the difference in water level between both units and is influenced by the permeability of the substrate. Small differences in water level and/or a low permeability substrate usually mean that this loss is small.

Cutting and draining peat around bog margins disturbs the natural hydrological equilibrium. The degree of disturbance depends both on the permeability of substrate materials and how deep marginal drains have been cut. Marginal drains that do not cut through the peat base have limited impact on water levels in the deposits underlying the bog (Figure 2.3b). This results in small declines in substrate water levels, leading to minor increases in vertical water loss. Impacts to the bog ecosystem occur mainly in the vicinity of marginal drains.

By contrast, where drains cut through the peat substrate water levels can decline substantially, resulting in significant increases in vertical water loss (Figure 2.3c). This can cause ecological impacts over a wide area, even at significant distances from drains. Substrate permeability determines the degree of water loss and the extent of ecological damage, with impacts being greater with more permeable materials.

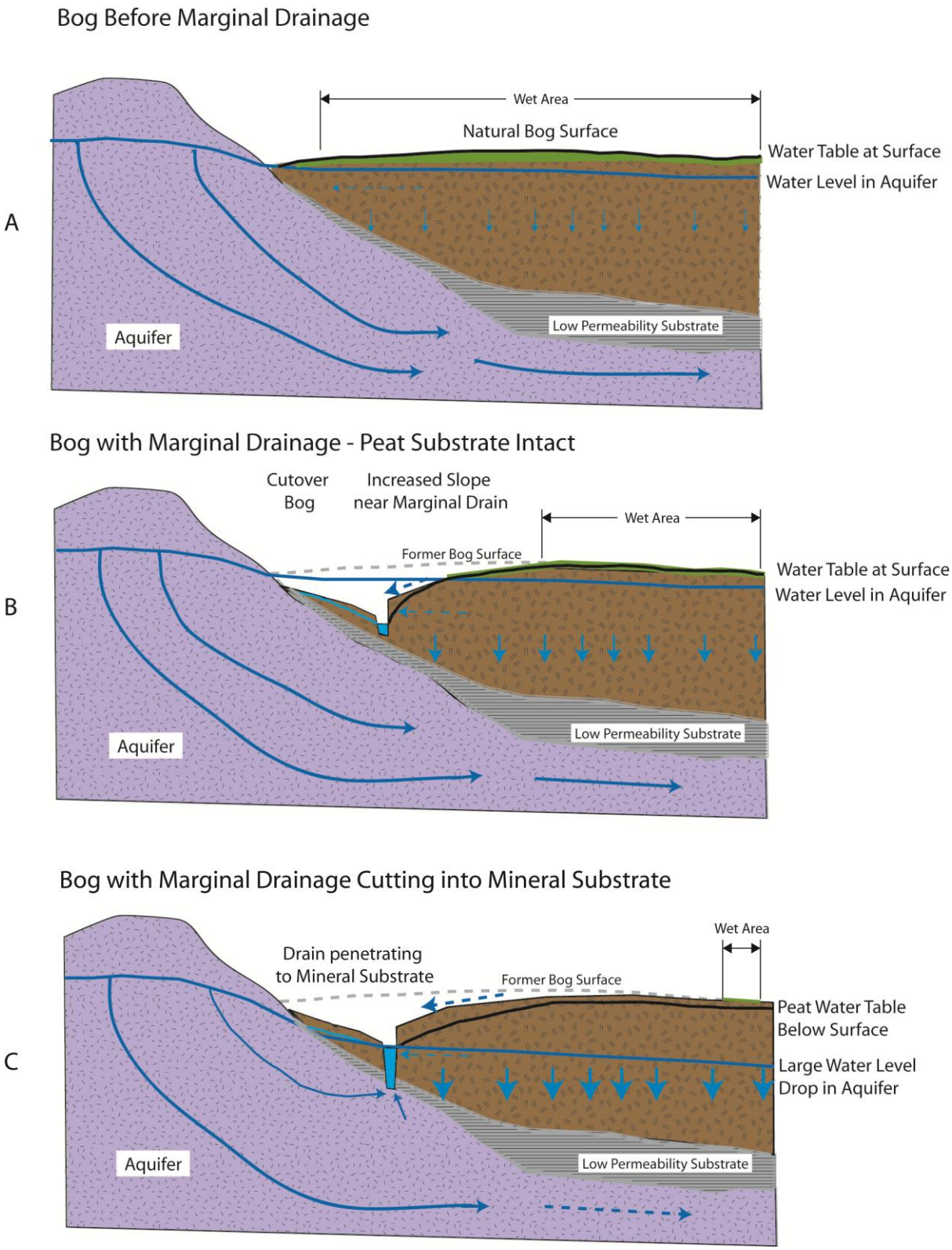


Figure 2.3 The impact of marginal drains on the eco-hydrology of Raised Bogs

Plate 2.4 Clara Raised Bog SAC

Plate 2.4 is an example of where a marginal drain has been cut into the underlying mineral soils adjacent to a face-bank at the southern edge of the Clara West High Bog. The drain has caused an up-welling of groundwater bringing nutrient enriched waters to the adjacent cutover bog which has provided the opportunity for non-bog species to become established such as bull-rushes. The drain has also caused a lowering of the water table under and within the High Bog resulting in a deformation (shrinkage) of the bog. The dark coloured ridge in the background is a till hummock which has become visible as the raised bog surrounding it has been lowered as a result of the loss of

water to the marginal drain. Significant drainage and shrinkage effects have occurred over 700 meters away from the drain.

Ecological Assessment of Ireland's Raised Bog Network

The current condition of Ireland's Raised Bog resource was determined from an ecological assessment of Ireland's network of Raised Bog SACs, NHAs and other non-designated raised bogs of potential conservation value. The non-designated bogs were selected as the remaining raised bogs of potential conservation value, based on recommendations from Bord na Móna, the Turf Cutters and Contractors Association (TCCA) and the Irish Peatland Conservation Council (IPCC), and other available wetland surveys from National Parks and Wildlife Service (NPWS) and Local Authorities. The national raised bog network assessed within this draft plan is shown in Figure 2.4.

Methodology

The data used originated from various NPWS ecological surveys and associated reports (Cross 1990; Kelly et al. 1995; Derwin and MacGowan 2000; Fernandez et. al. 2005, Fernandez et. al. 2006; NPWS, 2008; Fernandez et. al. 2012; NPWS, 2013 and Fernandez et. al. in press) supplemented by selected site surveys to address data gaps in non-designated raised bogs.

The assessment considered the following six attributes, which are based on SAC selection criteria in Annex III of the Habitats Directive, for each bog:

- Area (of Active Raised Bog ARB)
- Range (Geographic)
- Habitat quality
- Ecological diversity relating to each of the following three features:
    - Diversity of marginal habitats adjoining the high bog
    - Local distinctiveness (presence of features that represent the range of variation of the habitat)
    - Presence of other EU Habitats and Birds Directive species
- The occurrence of 'negative species'
- The occurrence of 'negative features', notably the frequency and severity of burning

There was ecological mapping available for all 53 Raised Bog SACs with very few data gaps. The mapping was based on the identification of ecotopes, which are areas of relatively uniform vegetation

associated with specific physical conditions. These are separated into central and sub-central ecotopes (active bog) and marginal and submarginal ecotopes which are dried out to varying extents.

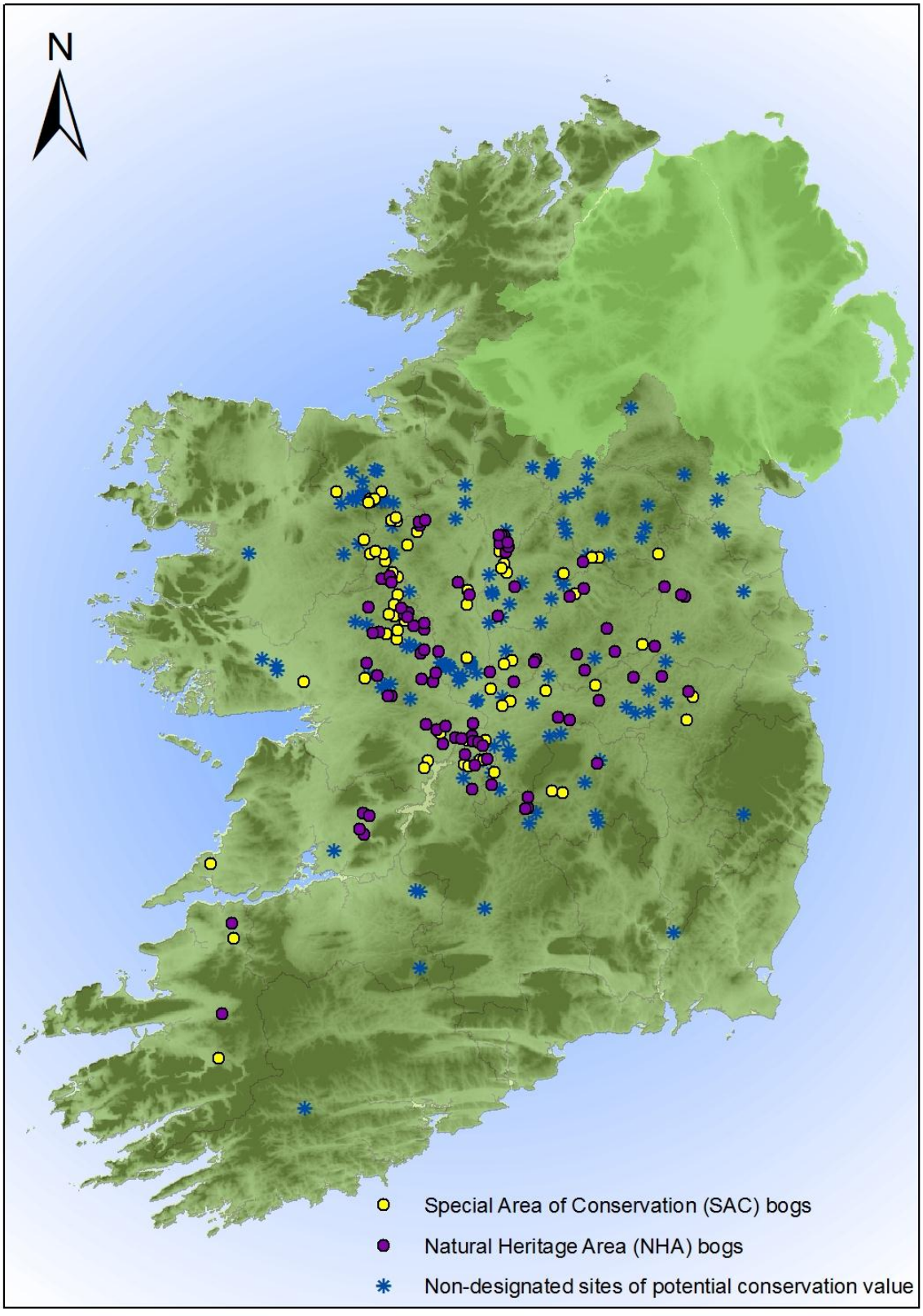


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Figure 2.4. National raised bog network assessed within this draft plan

Ecological mapping was available for 72 of the NHAs mostly surveyed in 2003. Recent surveys were available for only four Raised Bog NHAs. The ecological assessment must therefore be viewed with caution as it is likely that there has been a significant decline in Active Raised Bog since they were last surveyed as a result of continued damaging activities. In some cases where it is known that high bog drainage took place after the sites were last surveyed and where a lower vegetation quality is now expected than previously mapped, the extent of the originally reported active raised bog was reduced by expert judgement.

Ecological data for the non-designated sites was limited to sites owned by Bord na Móna and a further 48 sites where targeted field surveys were undertaken.

The Raised Bog Network was assessed for each of the six attributes and assigned various categories as described in Table 2.1.

Table 2.1 Criteria used in determining the ecological condition of Ireland's Raised Bog Network

Attribute	Means of scoring	Criteria used
Area of Active Raised Bog (ARB)	A (excellent) B (high) C (moderate-high) D (moderate) E (low)	>35 ha >10 ha >5ha 0 - 5 ha 0 ha
Range (geographic) (Based on position within 10km^2 distribution squares)	B (high) D (moderate) E (low)	Site located at edge of known range **and** site increases current range of ARB Site located at edge of known range **or** site increases current range of ARB Site does not make a significant contribution to current range of ARB
Habitat quality	B (high) C (moderate-high) D (moderate) E (low)	>20% of ARB conforms to best quality (which refers to central ecotope as described by Schouten and Kelly (2002)). Best quality ARB is present ARB is present No ARB present
Ecological diversity	**Highest of the following three criteria (see below)**	
Diversity of marginal habitats	B (high) D (moderate) E (low)	Good range of marginal habitats Low quality semi-natural marginal habitats No natural marginal habitats
Local distinctiveness	B (high) D (moderate) E (low)	Local distinctiveness is reported - specific features which contribute to the range of variation Possible occurrence of local distinctiveness No indication of local distinctiveness

Attribute	Means of scoring	Criteria used
Other Annex habitats or species	B (high) D (moderate) E (low)	Two bog related Annexed species or habitats present Single Annexed habitat or species present No Annexed habitats or species present
Negative species	B (high) D (moderate) E (low)	No negative species recorded Some negative species recorded; impact affecting <10% of site Low - Significant negative species recorded; affecting ≥ 10% of site
Negative features (burning)	B (high) D (moderate) E (low)	No fire reported in last 20 years (pre 1993) Post 1993 Fire reported; affecting up to 30% HB Post 1993 Fire reported; affecting greater than 30% HB

Results of the Ecological Assessment

The results of the ecological assessment of the Raised Bog SAC Network are presented in Table 2.2. The results of the ecological assessment of the Raised Bog NHA and Non Designated Sites are presented in Appendix 2.

Table 2.2 Results of Ecological Assessment of the Raised Bog SACs (excluding negative attributes)

Site Code	Bog Name	County	Area	Geographic Range	Habitat Quality	Ecological Diversity
000006	Killyconny Bog	Cavan/Meath	C (moderate-high)	B (high)	D (moderate)	B (high)
000231	Barroughter Bog	Galway	D (moderate)	D (low)	D (moderate)	D (moderate)
000248	Cloonmoylan Bog	Galway	A (excellent)	B (high)	C (moderate-high)	D (moderate)
000285	Kilsallagh Bog	Galway	B (high)	E (low)	C (moderate-high)	D (moderate)
000296	Lisnageeragh Bog and Ballinstack Turlough	Galway	B (high)	E (low)	C (moderate - high)	B (high)
000297	Lough Corrib (Addergoole)	Galway/Mayo	A (excellent)	B (high)	C (moderate - high)	B (high)
000301	Lough Lurgeen Bog East	Galway	B (high)	E (low)	B (high)	B (high)
	Lough Lurgeen Bog West	Galway	D (moderate)	E (low)	D (moderate)	B (high)
000326	Shankill West Bog	Galway	B (high)	E (low)	B (high)	B (high)
000382	Sheheree (Ardagh) Bog	Kerry	B (high)	B (high)	D (moderate)	B (high)
000391	Ballynafagh Bog	Kildare	C (moderate - high)	B (high)	B (high)	D (moderate)
000440	Lough Ree - Clooncraff and Cloonlarge Bogs	Roscommon	C (moderate - high)	E (low)	D (moderate)	B (high)
000497	Flughany Bog	Mayo/Sligo	B (high)	B (high)	C (moderate - high)	D (moderate)
000566	All Saints Bog and Esker	Offaly	A (excellent)	D (moderate)	D (moderate)	B (high)

Site Code	Bog Name	County	Area	Geographic Range	Habitat Quality	Ecological Diversity
000572	Clara Bog	Offaly	A (excellent)	E (low)	C (moderate - high)	B (high)
000575	Ferbane Bog	Offaly	B (high)	D (moderate)	C (moderate - high)	D (moderate)
000580	Mongan Bog	Offaly	A (excellent)	E (low)	B (high)	B (high)
000581	Moyclare Bog	Offaly	B (high)	E (low)	B (high)	B (high)
000582	Raheenmore Bog	Offaly	A (excellent)	E (low)	D (moderate)	D (moderate)
000585	Sharavogue Bog	Offaly	B (high)	D (moderate)	D (moderate)	B (high)
000592	Bellanagare Bog	Roscommon	A (excellent)	D (moderate)	D (moderate)	B (high)
000595	Callow Bog South	Roscommon	B (high)	D (moderate)	D (moderate)	D (moderate)
	Callow Bog North	Roscommon	D (moderate)	D (moderate)	D (moderate)	D (moderate)
000597	Carrowbehy/Caher Bog	Roscommon	A (excellent)	D (moderate)	B (high)	B (high)
000600	Cloonchambers Bog	Roscommon	C (moderate - high)	E (low)	D (moderate)	B (high)
000604	Derrinea Bog	Roscommon	B (high)	D (moderate)	B (high)	B (high)
000614	Cloonshanville Bog	Roscommon	B (high)	D (moderate)	C (moderate - high)	B (high)
000641	Clonfinane Bog	Tipperary	D (moderate)	E (low)	D (moderate)	D (moderate)
	Ballyduff Bog	Tipperary	B (high)	D (moderate)	C (moderate - high)	E (low)
000647	Kilcarren Bog	Tipperary	B (high)	E (low)	C (moderate - high)	B (high)
	Firville Bog	Tipperary	B (high)	E (low)	B (high)	D (moderate)
000679	Garriskil Bog	Westmeath	A (excellent)	E (low)	B (high)	D (moderate)
001242	Carrownagappul Bog	Galway	B (high)	D (moderate)	C (moderate - high)	B (high)
001818	Ballykenny Bog	Longford	C (moderate - high)	E (low)	D (moderate)	B (high)
	Fisherstown Bog	Longford	D (moderate)	E (low)	D (moderate)	D (moderate)
002110	Corliskea Bog	Galway Roscommon	A (excellent)	E (low)	D (moderate)	B (high)
002110	Cloonfelliv Bog	Galway Roscommon	D (moderate)	E (low)	D (moderate)	E (low)
002110	Trien Bog	Roscommon	B (high)	E (low)	D (moderate)	D (moderate)
002298	Kilgarriff Bog	Sligo	B (high)	D (moderate)	C (moderate - high)	D (moderate)
	Gowlaun Bog	Sligo	D (moderate)	D (moderate)	D (moderate)	D (moderate)
	Tawnaghbeg Bog	Sligo	B (high)	D (moderate)	B (high)	D (moderate)
	Derrynabrock Bog	Mayo/Sligo	C (moderate - high)	D (moderate)	B (high)	B (high)
	Cloongoonagh Bog	Sligo	B (high)	B (high)	C (moderate - high)	B (high)
002331	Mouds Bog	Kildare	A (excellent)	B (high)	D (moderate)	D (moderate)
002332	Coolrain Bog	Laois	B (high)	B (high)	D (moderate)	B (high)
002333	Knockacoller Bog	Laois	C (moderate - high)	B (high)	B (high)	E (low)
002336	Carn Park Bog	Westmeath	D (moderate)	E (low)	D (moderate)	D (moderate)
002337	Crosswood Bog	Westmeath	C (moderate - high)	E (low)	D (moderate)	B (high)
002338	Drumalough Bog East	Roscommon	NA	E (low)	NA	D (moderate)
	Drumalough Bog West	Roscommon	C (moderate - high)	D (moderate)	D (moderate)	E (low)
002339	Ballynamona Bog and Corkip Lough	Roscommon	B (high)	D (moderate)	D (moderate)	B (high)
002340	Moneybeg Bog	Meath/ Westmeath	B (high)	D (moderate)	B (high)	D (moderate)

Site Code	Bog Name	County	Area	Geographic Range	Habitat Quality	Ecological Diversity
	Clareisland Bog	Westmeath	B (high)	D (moderate)	C (moderate - high)	B (high)
002341	Ardagullion Bog	Longford	B (high)	D (moderate)	C (moderate - high)	E (low)
002342	Mount Hevey Bog	Meath/ Westmeath	B (high)	B (high)	C (moderate - high)	B (high)
002343	Tullaher Lough and Bog	Clare	B (high)	B (high)	D (moderate)	E (low)
002346	Brown Bog	Longford	B (high)	E (low)	B (high)	D (moderate)
002347	Camderry Bog	Galway	C (moderate - high)	E (low)	D (moderate)	B (high)
002348	Clooneen Bog	Longford	B (high)	E (low)	D (moderate)	D (moderate)
002349	Corbo Bog	Roscommon	B (high)	E (low)	C (moderate - high)	D (moderate)
002350	Curraghlehanagh Bog	Galway	B (high)	E (low)	C (moderate - high)	D (moderate)
002351	Moanveanlagh Bog	Kerry	C (moderate - high)	B (high)	D (moderate)	B (high)
002352	Monivea Bog	Galway	C (moderate - high)	D (moderate)	C (moderate - high)	B (high)
002353	Redwood Bog	Tipperary	B (high)	E (low)	D (moderate)	B (high)
002354	Tullaghanrock Bog	Roscommon	B (high)	E (low)	B (high)	B (high)
002356	Ardgraigue Bog	Galway	B (high)	E (low)	D (moderate)	E (low)

Restoration Potential Assessment of Ireland's Raised Bog Network

The ecological condition of Raised Bogs is fundamentally dependent on the hydrology (namely the availability of water close to the surface of the bog). It has been shown earlier in this Chapter how both the hydrology and dependent ecology of a raised bog can be significantly affected by the cutting of drains into the raised bog. An eco-hydrological assessment was therefore undertaken to assist with the understanding of the Raised Bogs' current condition and equally importantly, to determine their restoration potential.

Methodology

The methodology developed to undertake the eco-hydrological assessments makes use of detailed topographic data for each raised bog obtained from LiDAR surveys to assess the potential for the bog surface to support active raised bog. LiDAR is a remote sensing technology that measures vertical surface elevation by illuminating a target with a laser and analyzing the reflected light. The data is collected in the field using a low flying aeroplane. This gives much more detailed and accurate raised bog topographical maps than can be collected by traditional surveying techniques.

The use of the LiDAR data has supported a programme of scientific research which has greatly improved the knowledge of the eco-hydrological behaviour of raised bogs in Ireland. By using the detailed topographic survey data, it is now possible to model eco-hydrological conditions (based on

the raised bog's slope, drainage patterns and rainfall) and relate these conditions to recent ecological surveys. In this way it is possible to determine the area of each bog that has suitable conditions for the development of active raised bog habitat, whether or not active raised bog currently occurs on that area. Where active bog is absent from such areas, it is assumed that the area must have been impacted by a pressure that is preventing active raised bog growth. The eco-hydrological modelling process can therefore quantify each raised bog's restoration potential. A detailed description of the eco-hydrological modelling techniques use in the assessment is presented in Appendix 3.

Results of the Eco-Hydrological Assessment

The results of the eco-hydrological assessment related to the Raised Bog SACs are presented in Table 2.3. Further examples of the Restoration Potential are presented for part of Clara Bog SAC, Goat's Lough Bog South and Aghnamona Bog NHA (Figures 2.5 – 2.7). Those areas with values over 30km are generally considered to have potential the maintenance of restoration of Active Raised Bog habitat.The results of the eco-hydrological assessment related to the Raised Bog NHAs and Non-designated Sites are presented in Appendix 3.

The assessment is based on the assumption that drains on the High Bog and cutover bog are present but that the underlying peat substrate remains intact. Where deep drains have been cut through the underlying peat substrate into the mineral soils, a much greater loss of bog water may be occurring which cannot be addressed by the current eco-hydrological modelling process. The likelihood of this occurring can only be assessed through detailed survey work which is planned for 2014-15.

In other words the current models may over-predict the potential for restoration of the active raised bog (unless these vertical losses can be reduced substantially), this issue is addressed by assessment of the efficacy of measures within this Plan's proposed programme of measures. For example, where there is an obvious reason for the absence of active bog in an area where the model predicts it should occur, such as the presence of functional drains in or adjacent to that area of the bog, it is assumed that restoration by drain blocking will be highly effective in restoring active bog (high efficacy). In contrast, where such obvious reasons for the absence of active bog are not apparent it is assumed that restoration will be relatively ineffective and the restoration potential predicted by the model is reduced (low efficacy).

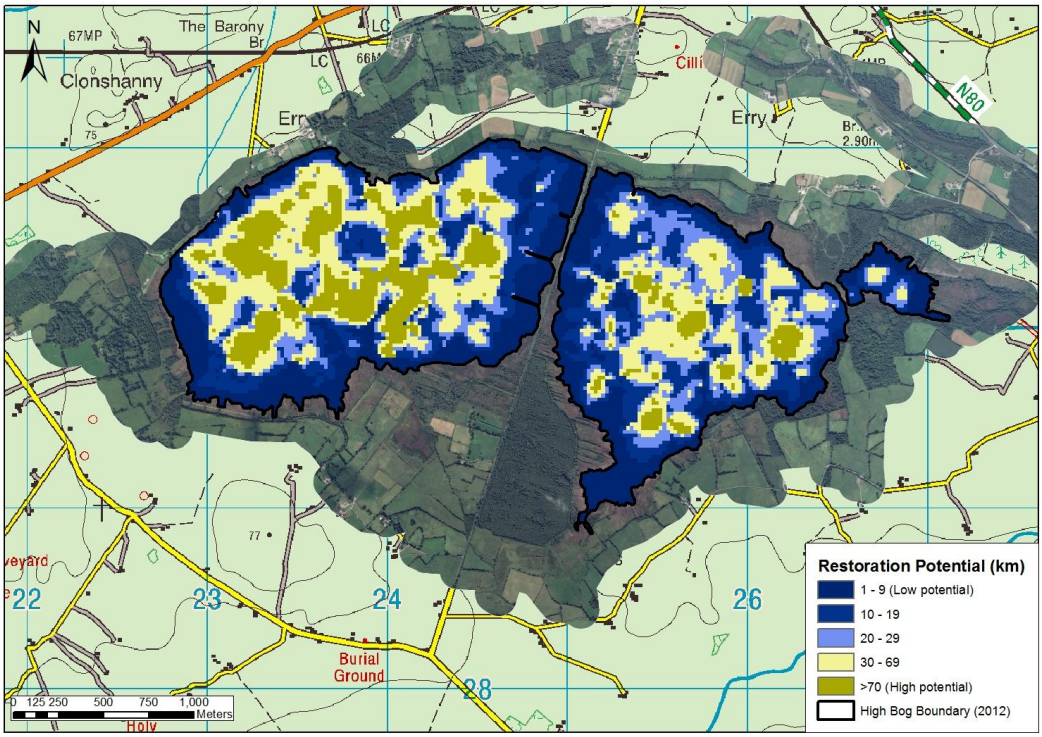


Figure 2.5 Clara Bog SAC. Restoration Potential derived from Eco-Hydrological Model

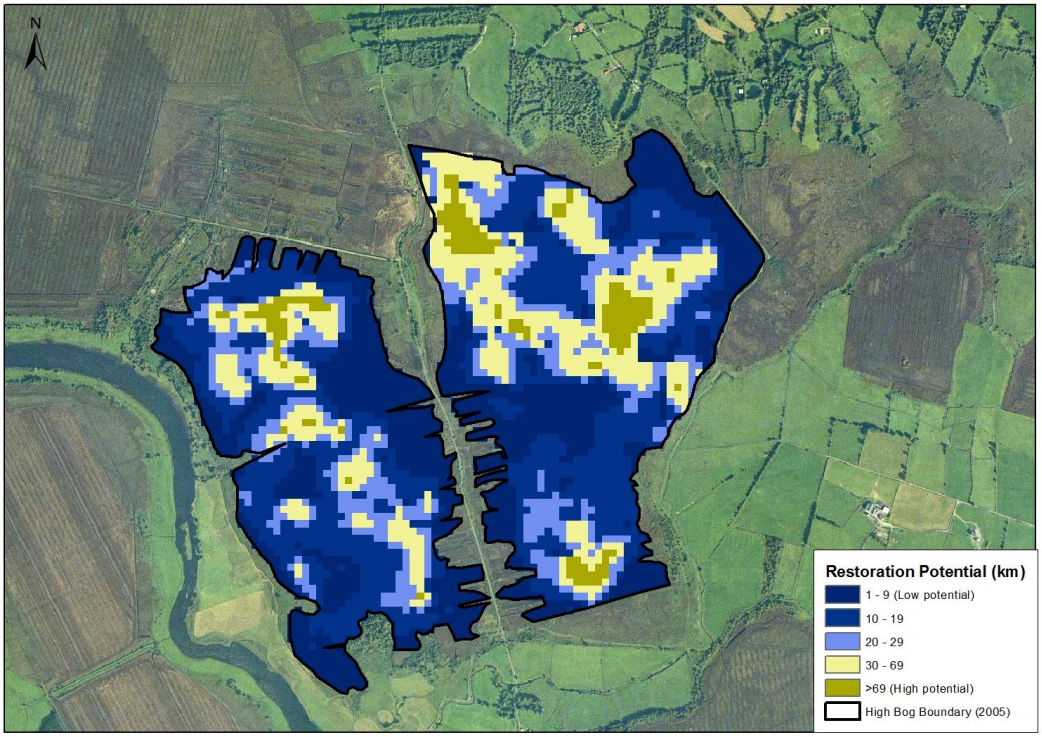


Figure 2.6 Goat's Lough Bog South - Restoration Potential derived from Eco-Hydrological Model

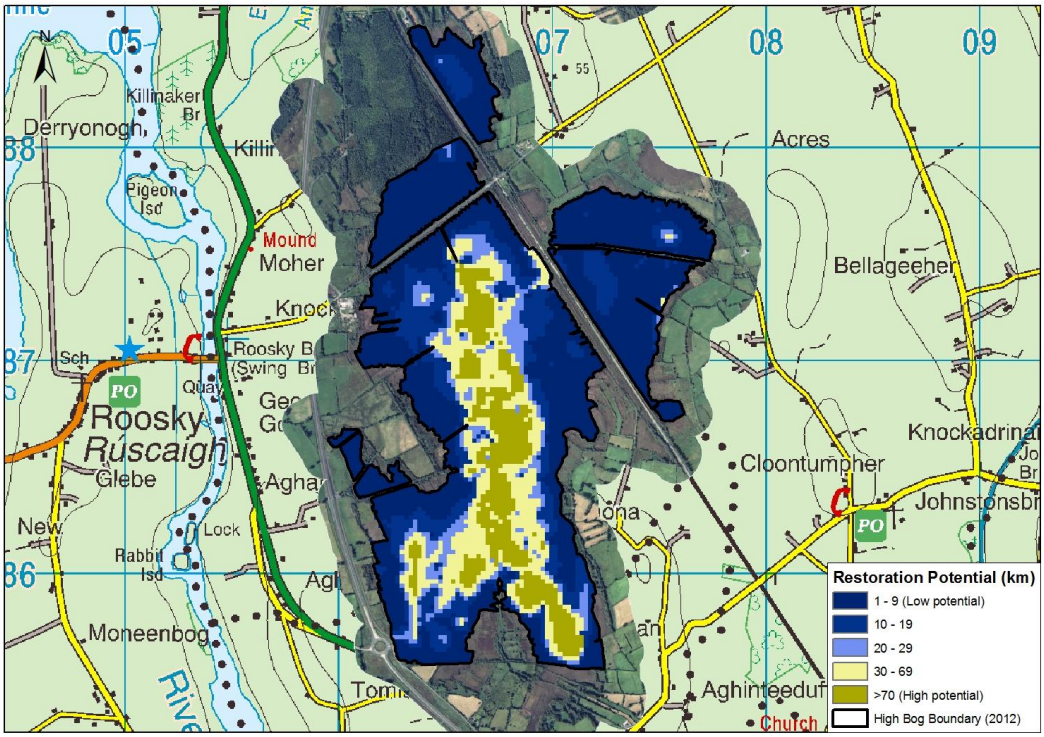


Figure 2.7 Aghnamona Bog NHA - Restoration Potential derived from Eco-Hydrological Model

Table 2.3 Results of Eco-hydrological Assessment of the Raised Bog SACs

Site Code	Bog Name	Last Ecological Survey	Total high bog (ha)	Active raised bog (ha)	Degraded raised bog (ha) (Area restorable)
000006	Killyconny Bog	2011	83.0	3.9	4.8
000231	Barroughter Bog	2005	73.5	2.4	1.6
000248	Cloonmoylan Bog	2005	412.0	52.3	93.3
000285	Kilsallagh Bog	2012	182.1	11.5	18.0
000296	Lisnageeragh Bog	2012	269.5	29.6	38.0
000297	Addergoole Bog	2012	157.4	39.2	16.0
000301	Lough Lurgeen Bog West	2004	113.9	0.5	6.3
	Lough Lurgeen Bog East	1995	499.5	15.8	32.8
000326	Shankill West Bog	2012	67.4	13.3	14.4
000382	Sheheree (Ardagh) Bog	2012	6.4	4.1	<1
000391	Ballynafagh Bog	2011	69.7	6.5	6.9
000440	Clooncraff and Cloonlarge Bogs	2003	474.5	5.9	22.4
000497	Flughany Bog	2012	143.6	11.4	13.1
000566	All Saints Bog	2011	226.8	39.8	21.2
000572	Clara Bog	2009	436.5	111.5	43.8

Site Code	Bog Name	Last Ecological Survey	Total high bog (ha)	Active raised bog (ha)	Degraded raised bog (ha) (Area restorable)
000575	Ferbane Bog	2012	120.0	32.6	10.9
000580	Mongan Bog	2011	124.4	48.3	14.8
000581	Moyclare Bog	2012	74.3	21.7	8.3
000582	Raheenmore Bog	2011	130.5	52.3	16.4
000585	Sharavogue Bog	2011	137.0	25.8	20.6
000592	Bellanagare Bog	2013	879.1	49.6	73.8
000595	Callow Bog North	2012	42.7	0.4	5.0
	Callow Bog South	2012	309.3	10.9	28.9
000597	Carrowbehy/Caher Bog	2012	204.6	69.9	35.6
000600	Cloonchambers Bog	2012	195.8	7.7	21.1
000604	Derrinea Bog	2012	53.8	17.1	9.8
000614	Cloonshanville Bog	2012	146.3	20.1	22.6
000641	Ballyduff Bog	2011	86.7	15.2	8.5
	Clonfinane Bog	2011	87.2	2.6	18.0
000647	Firville Bog	2011	183.7	16.8	50.1
	Kilcarren Bog	2011	178.6	11.9	36.0
000679	Garriskil Bog	2011	170.3	50.9	31.6
001242	Carrownagappul Bog	2012	323.5	28.1	36.5
001818	Fisherstown Bog	2012	102.4	1.4	8.3
	Ballykenny Bog	2011	180.8	7.6	24.9
002110	Trien Bog	2013	123.3	24.2	11.4
	Cloonfelliv Bog	2013	55.1	0.7	4.0
	Corliskea Bog	2013	274.0	44.3	22.9
002298	Cloongoonagh Bog*	2000	116.8	10.3	22.7
	Derrynabrock Bog	2012	80.5	6.6	16.2
	Tawnaghbeg Bog	2012	71.7	9.9	11.1
	Gowlaun Bog	2003	185.9	1.8	43.1
	Kilgarriff Bog	2000	43.5	13.3	4.5
002331	Mouds Bog*	2003	267.7	47.5	3.7
002332	Coolrain Bog*	2003	51.6	15.7	<1
002333	Knockacoller Bog	2012	53.3	4.8	7.5
002336	Carn Park Bog	2013	160.3	3.2	13.1
002337	Crosswood Bog	2012	96.3	4.6	19.4
002338	Drumalough Bog West	2003	63.4	5.1	10.7
	Drumalough Bog East	NA	90.3	NA	31.3
002339	Ballynamona Bog	2003	60.9	25.1	<1

Site Code	Bog Name	Last Ecological Survey	Total high bog (ha)	Active raised bog (ha)	Degraded raised bog (ha) (Area restorable)
002340	Clareisland Bog	2003	70.2	21.3	3.1
	Moneybeg Bog	2000	71.3	27.1	1.5
002341	Ardagullion Bog	2003	56.9	21.0	2.7
002342	Mount Hevey Bog*	2000	217.5	32.3	17.2
002343	Tullaher Bog	2000	19.6	6.8	5.6
002346	Brown Bog	2012	50.9	10.8	1.4
002347	Camderry Bog	2012	193.2	6.2	15.7
002348	Clooneen Bog	2003	93.5	11.2	5.4
002349	Corbo Bog	2012	96.5	15.5	10.7
002350	Curraghlehanagh Bog	2012	146.4	9.8	19.8
002351	Moanveanlagh Bog	2012	117.4	4.6	7.3
002352	Monivea Bog	2012	130.6	7.0	18.0
002353	Redwood Bog	2012	366.0	12.1	51.5
002354	Tullaghanrock Bog	2000	62.8	11.0	2.7
002356	Ardgraigue Bog	2003	80.4	10.3	3.7

Note:

Bog Name* - Original area of active raised bog amended due to reinterpretation of the survey results. Some surveys are more than 10 years old and the current area of active raised bog is likely to be less than outlined.

The results of the eco-hydrological assessment, summarized in Table 2.3, shows the area of high bog which can be restored to active raised bog habitat. This can however only be achieved if the surrounding area of high bog remains intact. This is because the high bog is one hydrological unit with the habitat at the periphery of the high bog acting as the ‘life support system’ by reducing water losses to the surrounding cutover or drained areas.

Continued turf-cutting at the periphery of the high bog will, in almost all cases, have a disproportionate impact on the remaining active raised bog habitat and degraded raised bog habitat (area restorable) as illustrated in Figure 2.8.

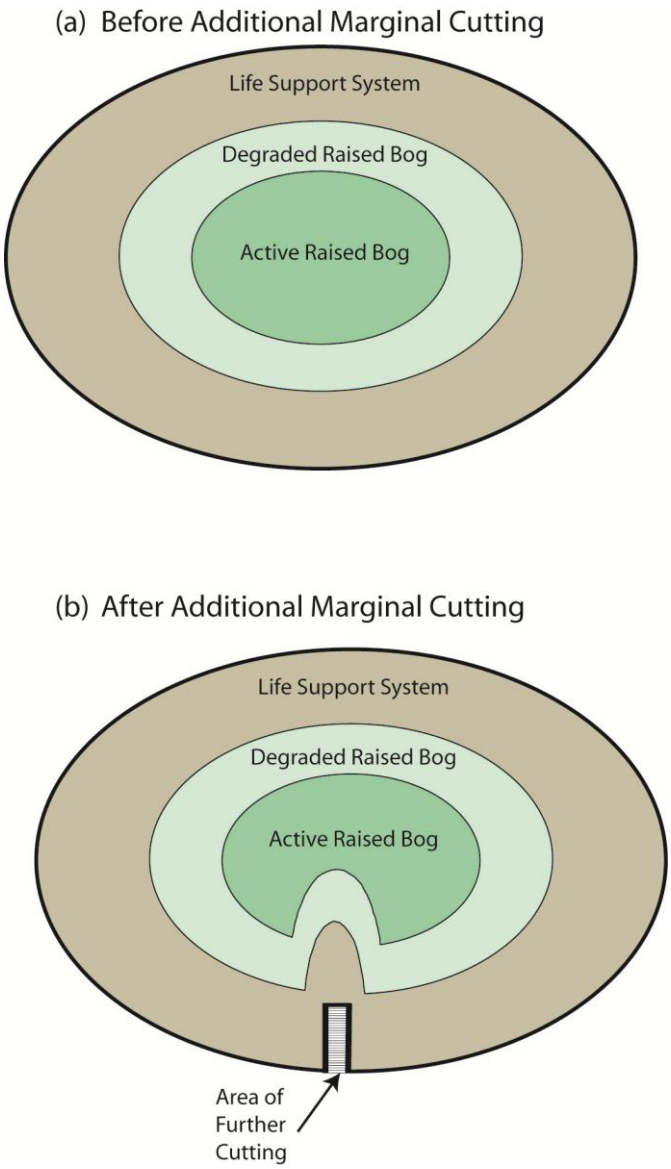


Figure 2.8 Schematic illustrating the disproportionate impact cutting of the “life support” system can have on active and degraded raised bog habitat

Raised Bog Status Trends

Area is a key metric of the status of Ireland's Raised Bog Network, the changes in area of active raised bog and degraded raised bogs (which are the two principal bog related habitats annexed under the Habitats Directive) and the total area of high bog within Ireland's network were assessed to determine the trends in the network's status.

Active Raised Bog

The area of active raised bog within Ireland's 53 SACs, estimated from ecological surveys was 1,940 ha in 1994, decreasing to 1,210 ha in 2012/13, which is a loss of 730 ha. This represents an approximate loss of 37% of the SAC Active Raised Bog habitat over the past 20 years.

In addition, the area of active raised bog within Ireland's 75 NHAs, estimated from available ecological surveys and extrapolated to establish the national picture, was 490 ha in 1994, decreasing to 284 ha in 2012/13, which is a loss of 206 ha. This represents an approximate loss of 42% of the NHA Active Raised Bog habitat over the past 20 years.

Furthermore, the area of active raised bog within the non-designated bogs of potential conservation value, again estimated from available ecological surveys and extrapolated to establish the national picture, was 200 ha in 1994 (the year in which the Habitats Directive came into effect), decreasing to 145 ha in 2012/13, which is a loss of 55 ha. This represents an approximate loss of 28% over the past 20 years.

Nationally this demonstrates a significant loss (circa 1,000 ha) of active raised bog habitat which was 2,630ha in 1994 and 1,639 ha in 2012.

Degraded Raised Bog

At the time Ireland's SAC Raised Bogs were nominated for designation, it was assumed that the entire High Bog (which is the central dome of the raised bog) was capable of natural regeneration. The estimation of Degraded Raised Bog was therefore assumed to be the entire area of High Bog less the area of active raised bog. However, through scientific research, it is now known that this is not the case and that the quantum of degraded raised bog was significantly over-estimated at that time. The figures quoted in this draft plan are based on the updated definition of degraded raised bog and therefore are not directly comparable with the degraded bog figures previously reported.

Scientific research has shown that the area of active raised bog and degraded raised bog on the High Bog is dependent on a number of topographical factors including slope, shape and natural drainage

patterns in addition to effective rainfall. Towards the margins of the High Bog, notably where drains have been constructed, the slope of the High Bog increases until it reaches a point where the bog is not capable of natural regeneration. An area around the periphery of the High Bog therefore exists which cannot be considered as degraded raised bog.

The distance from the edge of the uncut High Bog to the point where the habitat can be considered as degraded raised bog varies significantly from bog to bog. Notably, there is a regional variation where bogs in the West and South West of Ireland receive higher rainfall enabling degraded raised bog habitat to be present on steeper slopes closer to the edge of the High Bog compared to the Midlands.

In the absence of reliable survey information, the current area of degraded raised bog was determined by using the eco-hydrological model to identify the areas with potential for restoration of active raised bog (which is 1,200 ha within the SAC Raised Bogs and 2,130 ha within the national network of raised bogs). In order to hind-cast the area of degraded raised bog in 1994, historical photography was used to identify the boundary of the high bog and a marginal buffer applied to delineate the outer boundary of the degraded raised bog habitat, the known historical area of active raised bog was deducted to calculate the area of degraded raised bog.

Whilst the statistics demonstrate a gain in degraded raised bog area within the SACs (Table 2.4), it must be noted that this represents significant deterioration in status as it occurred at the expense of the active raised bog. The aim, at the time of selecting the SAC bogs for designation, was to improve the degraded area to active so the target for degraded raised bog area was a reduction as opposed to the net gain now observed.

Total Area of High Bog

The changes to the area of High Bog on the Raised Bog since the mid 1990s were calculated using ortho-rectified aerial photographs and Digital Terrain Modelling (DTM) data for a range of time periods. This data enabled the high bog boundaries to be accurately digitised and entered into a Geographical Information System (GIS) from which differences in area could be evaluated.

The area of high bog within Ireland's 53 SACs, was 10,740 ha in 1994, decreasing to 10,515 ha in 2012/13, which is a loss of 225 ha. This represents an approximate loss of 2% of the SAC High Bog area over the past 20 years.

In addition, the area of high bog within Ireland's 75 NHAs, was 7,790 ha in 1994, decreasing to 7,480 ha in 2012/13, which is a loss of 310 ha. This represents an approximate loss of 4% of the NHA High Bog habitat over the past 20 years. This is almost twice the rate of loss within the SAC bogs over the same time period.

Summary of Status Trends

The investigation has identified an overall decline in Active Raised Bog and High Bog areas within the national Raised Bog network in Ireland as summarised in Table 2.4. The site specific details for SACs are presented in Appendix 4.

A significantly greater loss in the area of active raised bog has occurred relative to losses in High Bog. This is because the activities associated with the loss of High Bog such as turf cutting and associated drainage, has caused significant changes to the hydrological regime resulting in a lowering of the water table and causing large areas of the High Bog to dry out for long periods of time. Consequently, there has been a loss of the most water dependent ecosystems present on the High Bog, the most sensitive and important habitat being active raised bog.

Table 2.4 Summary of Raised Bog Status Changes

Bog Habitat	Resource	1994	2012	Change
		(ha)	(ha)	(ha)
Active Raised Bog (ARB)	SAC network	1,940	1,210	-730
	NHA network	490	284	-206
	Non Designated Sites	200	145	-55
	National Network	**2,630**	**1,639**	**-991**
Degraded Raised Bog (DRB)	SAC network	650	1,200	+550
	NHA network	520	410	-110
	Non Designated Sites	625	520	-105
	National Network	**1,795**	**2,130**	**+335**
High Bog	SAC network	10,740	10,515	-225
	NHA network	7,790	7,480	-310

Is Climate Change influencing the loss of Active Raised Bog Habitat?

Changes in climatic conditions have a demonstrated impact on peat accumulation/disintegration on peat bogs (Bellamy, 1986). This raises the issue of whether changes in climatic conditions may have contributed to the loss of active raised bog habitat observed in Ireland. More specifically a reduction in either rainfall or rainfall frequency could be expected to give rise to less favourable conditions supporting active raised bog, and thus a potential loss of habitat. The following is a summary of the findings of an investigation into this issue.

A comparison of climatic (30 year average) rainfall and evapotranspiration data at the 12 Met Éireann synoptic weather stations permitted the following questions to be addressed:

- Has total rainfall declined during the period over which active raised bog degradation has occurred?
- Has effective rainfall declined over the same period?
- Has rainfall frequency declined over this period?
- Have there been significant shifts in regional rainfall patterns that have given rise to localised climate change and corresponding changes leading to active raised bog habitat loss?

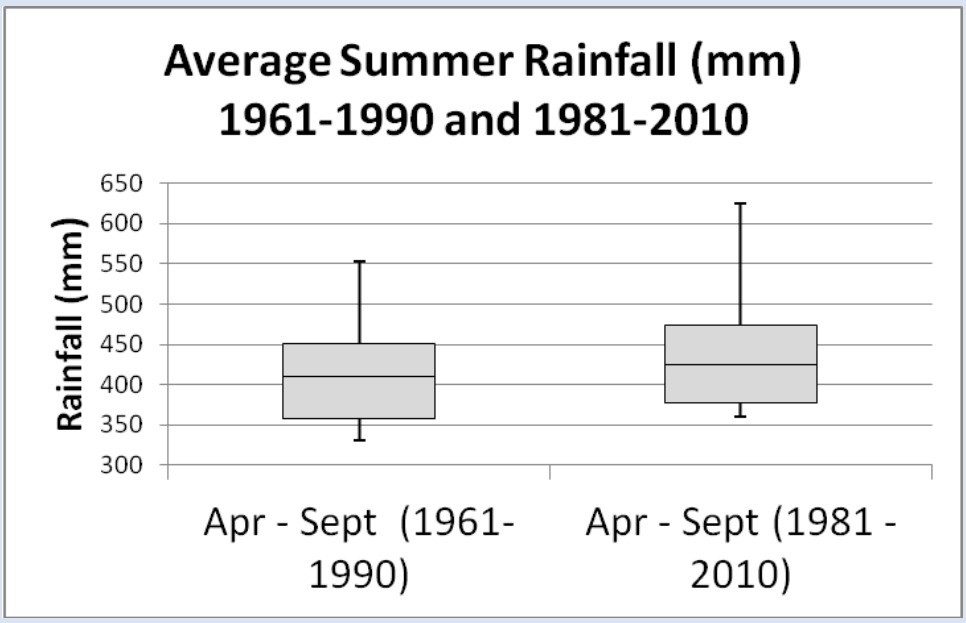


Figure 2.9 Contrast in Nationwide Summer Rainfall (Apr-Sep)

Answering these questions involved comparing climatic data (rainfall, evapotranspiration and rain days) for the period from 1961-1990, with data collected in the period from 1981-2010. In the case of the number of rain days, Met Éireann long term average rain days for 1961-1990 were were compared to long-term average rain days for 1981-2010 for 12 weather stations. The findings of the study show that total rainfall across Ireland over the period 1981-2010 was slightly higher than that for the period from 1961-1990 (Figure 2.9).

A similar result was observed for effective rainfall (Total rainfall – Potential Evapotranspiration which occurs at comparable (or higher) rates than potential rates for grassland). Moreover countrywide and regional analyses of rainfall data show that there was no significant change in rainfall intensity/number of rain days over the same period (Figure 2.10).

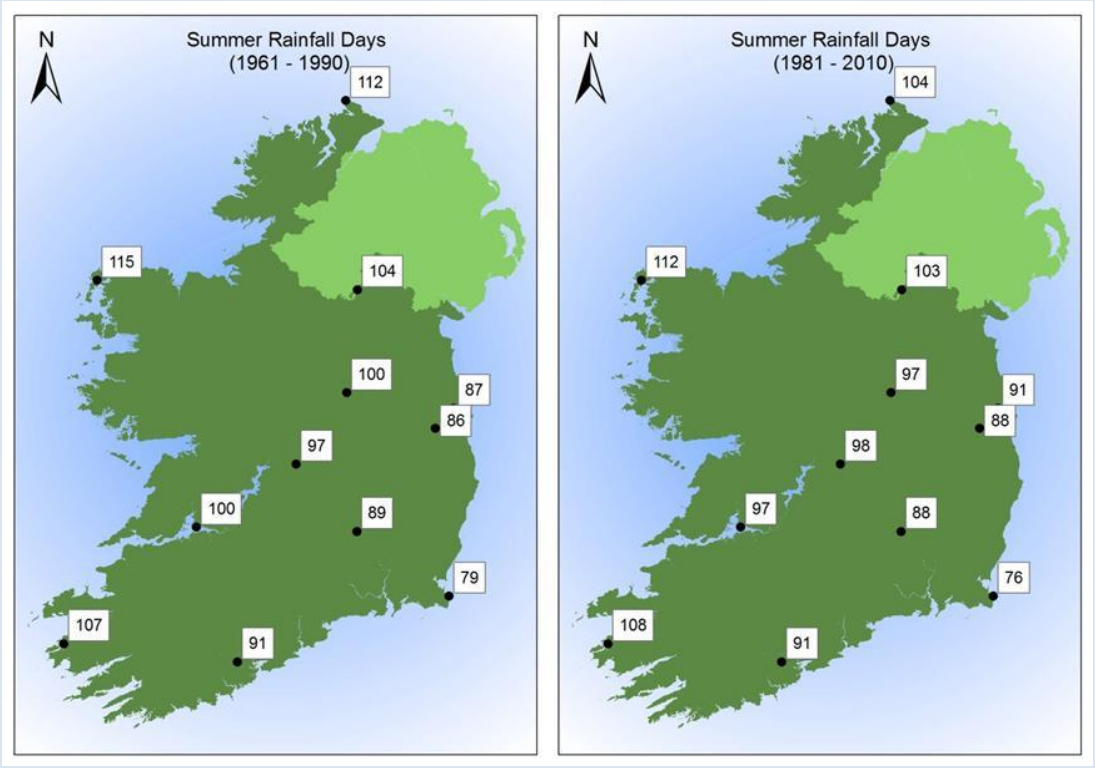


Figure 2.10 Nationwide Variations in Summer Rainfall Days

The results of the analyses of Met Éireann climatic data sets indicate that climatic conditions needed for supporting active raised bog have not deteriorated, and may have even slightly improved between 1990 and 2010. This in turn implies that the underlying causes giving rise to loss of active raised bog habitat are not related to climate but point to alternative drivers.

Studies, including Irish case studies, have demonstrated that intact bogs (with good high bog status) are less sensitive to climatic fluctuations.

Chapter 3 Conservation Objectives of the Plan

Introduction

One of the main aims of the Habitats Directive is to ensure that the habitats and species listed in it achieve “favourable conservation status”. In essence, this means that these habitats and species are being maintained in satisfactory condition and this situation is likely to continue for the foreseeable future.

As illustrated in chapter 2, the conservation status of bog habitats listed in the Habitats Directive has deteriorated in Ireland and continues to do so. As a first step in planning the restoration of active raised bog, this chapter sets out conservation objectives at different scales. A conservation objective aims to define how much, where and what conditions are necessary to bring the habitat back to favourable status.

Ireland’s commitment under the Habitats Directive is to have a robust raised bog network that is sustainable into the future. This includes the Raised Bog SACs, which are the best remaining examples of the habitat. This commitment includes replacing the area of active raised bog within the SAC network that has been lost since 1994.

Conservation objectives can be set at different scales, from site-specific (e.g. SAC) to national. This plan does not define detailed conservation objectives for each of the 53 SACs, as these will be developed on a site-by-site basis. However, it quantifies the overall area, distribution and the general conditions required to restore the SAC network. To put this in context, the National Conservation Objective for active raised bog is also defined. The restoration of raised bog habitats within SACs to favourable conservation condition will contribute to the overall restoration of favourable conservation status of those habitats at a national level.

Setting conservation objectives

The setting of a conservation objective is a scientific process that aims to define favourable conservation status for a particular habitat. This is achieved by identifying relevant attributes (characteristics, qualities or properties) and setting targets for each one that can be used to define its favourable reference value.

For habitats listed in the Habitats Directive, Article 1 of the Directive provides a definition of favourable conservation status as follows:

"The **conservation status** of a natural habitat will be taken as "**favourable**" when:

its natural **range** and **areas** it covers within that range, is **stable or increasing**, and

the specific **structure and functions** which are necessary for its long-term maintenance **exist** and are **likely to continue to exist** for the foreseeable future, and

the **conservation status** of its **typical species** is **favourable**.

Because the current conservation status of active raised bog is bad, the conservation objective is:

To restore the favourable conservation status of active raised bog in Ireland.

The following sections set out the targets for range, area and a series of attributes relating to "structure and functions". This last parameter comprises the physical components of the habitats ("structure") and the ecological processes that drive them ("functions"). Targets for range and area are set at two levels - one for SACs and one for the national raised bog resource.

Range of Active Raised Bog

At a national scale, this is the geographic range that encompasses all significant ecological variations of the active raised bog habitat and must also be large enough to allow for long-term survival. The range for SACs cannot decline from the current.

Target		Notes
National	Range increasing from current situation	Target based on the current national range of active and degraded raised bog.
SACs	Not less than current range subject to natural processes	Target based on the current range of 53 Raised Bog SACs.

Area of Active Raised Bog

Target		Notes
National	Area increasing and not less than 3,600 ha	Target based on the area of active raised bog (2,490 ha) and degraded raised bog (1,170 ha) present within the

		SAC and NHA network in 1994. The estimated area of active raised bog is 1,494 ha and degraded raised bog is 1,610 ha (totalling 3,104 ha) within the current SAC and NHA network.
SACs	Area increasing and not less than 2,590 ha	Target based on the area of active raised bog (1,940 ha) and degraded raised bog (650 ha) present within the SAC network in 1994. It is estimated that the area of active raised bog in the current SAC network is 1,210 ha.

Structure, Functions and Typical Species of Active Raised Bog

Ten attributes are listed which aim to encompass the conditions that are necessary for active raised bog to survive in the long term.

1. Hydrological regimes

Target	Notes
Maintain/restore appropriate water levels and flow directions on each bog	For active raised bog, mean water levels need to be near or above the surface of bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm, and should only be 10-15cm below the surface for very short periods of time. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of high quality active raised bog areas and soak systems .

2. Supporting high bog habitat

Target	Notes
Maintain/restore adequate high bog to support development and maintenance of active raised bog	Raised bog habitat that is classified as neither active nor degraded raised bog capable of restoration is still important in its own right, particularly as a supporting habitat for those listed in Annex I of the Habitats Directive. It is an essential part of the hydrological unit which supports the active and degraded bog habitats. The area of high bog in the SAC network in 1994 was 10,740 ha. The corresponding area in 2012 is 10,515 ha – meaning there is 225 ha less than at the time of designation.

3. Transitional areas between high bog and adjacent mineral soils

Target	Notes
Maintain/restore semi-natural habitats with high water levels around as much of the bog margins as necessary	Transitional zones between raised bogs and surrounding mineral soils are typically cutover bog and drained lagg zones. The maintenance/restoration of these areas will help to maintain hydrological integrity of bogs and support high diversity of other wetland habitats (e.g. wet woodland, bog woodland, swamp and fen) as well as species requiring such wetland complexes. It will also provide flood attenuation and water purification services to the downstream areas. The estimated extent of such transitional areas within the SAC network is circa 3,000 ha.

4. Vegetation quality

Target	Notes
Maintain/restore sufficient high quality vegetation (i.e. central ecotope and/or soaks). At least 50% of active raised bog habitat should be central ecotope and/or soaks	High quality indicators include hummock indicators: rusty bog-moss (*Sphagnum fuscum*) and Austin's bog-moss (*S. austinii* ssp. *austinii*); pool indicators: feathery bog moss (*S. cuspidatum*), lesser cow-horn bog-moss (*S.denticulatum*) and indicators of lack of burning events e.g. some lichen species (*Cladonia* spp.).

5. Micro-topographical features

Target	Notes
Maintain/restore adequate cover of high quality micro-topographical features	A diverse good quality micro-topography consists of bog moss-dominated pools, hollows, lawns and hummocks, which support the highest diversity of species.

6. Cover of bog-moss species

Target	Notes
Maintain/restore adequate cover of bog-moss (*Sphagnum*) species to ensure peat-forming capacity	*Sphagnum* cover varies naturally across Ireland, ranging from relatively high cover in bogs in the east of the country to lower cover in the west in transitional areas of raised bog to blanket bog. Hummock forming species such as *Sphagnum austinii* ssp. *austinii* are particularly good peat-formers.

7. Typical bog flora

Target	Notes
Maintain/restore typical raised bog flora	Typical species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range.

8. Elements of local distinctiveness

Target	Notes
Maintain/restore indicators of local distinctiveness	Such features include geological, topographical, archaeological, hydrological features (e.g. soaks, flushes) as well as notable species. This includes species that are listed in the Habitats and Birds Directives, red-listed species and other rare or localised species (such as Red Grouse (*Lagopus lagopus*).

9. Negative physical indicators

Target	Notes
Bare peat and other indicators of degradation including algae-dominated pools and hollows and tear patterns are absent or insignificant	Such indicators are signs of degradation of active raised bog habitat.

10. Negative indicator species

Target	Notes
Native negative indicators and non-native species are absent or under control	Indicators of disturbance include species indicative of drying out conditions such as abundant bog asphodel (*Narthecium ossifragum*) and deergrass (*Trichophorum germanicum*); harestail cotton-grass (*Eriophorum vaginatum*) forming tussocks; abundant magellanic bog-moss (*Sphagnum magellanicum*) in pools previously dominated by species typical of very wet conditions (e.g. feathery bog-moss (*S. cuspidatum*). Indicators of frequent burning events include abundant *Cladonia floerkeana* and high cover of carnation sedge (*Carex panicea*) (particularly in true “Midlands raised bogs”). Most common invasive species include lodgepole pine (*Pinus contorta*), rhododendron (*Rhododendron ponticum*) and pitcherplant (*Sarracenia purpurea*).

Site Specific Conservation Objectives

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at site level.

Following a similar process outlined above, conservation objectives will be set for each SAC Raised Bog habitat. The site-specific conservation objectives will give a target area for active raised bog in each of the raised bog SACs as well as giving site-specific targets for attributes relating to structure and functions.

Site-specific conservation objectives for each SAC will be used as a basis for restoration planning at each site. These objectives will be set during 2014 and 2015.

Chapter 4 Potential Measures to Achieve Conservation Objectives

Introduction

The review of Raised Bog status and setting of conservation objectives identified the primary need to restore existing SAC bogs, and the secondary requirement to add to the network both to replace losses in high bog and potentially replace losses in active raised bog areas (subject to what restoration of the current SAC network can achieve in terms of restoring active raised bog area). Potential measures to **protect and restore** existing and additional SAC bogs and to **replace** lost habitat by identifying additional sites are examined in the following sections.

Protection and Restoration Options

Background

Detrimental impacts of human activity on Irish raised bogs range from those which have been demonstrated to be largely reversible through natural processes, for example, re-colonisation/regeneration following localised burning on the high bog, to others where active (engineered) intervention may be necessary to halt degradation and potentially restore Active Raised Bog (ARB). In order to meet the Conservation Objectives for the Raised Bog SACs (Chapter 3), any restoration measures put in place need to have a long term objective of restoring self-regulating eco-hydrological processes to conditions resembling those encountered in undisturbed raised bog ecosystems.

Areas identified as Degraded Raised Bog are, by definition, capable of being restored or restoring themselves to Active Raised Bog. In order to meet restoration targets, it is desirable to restore as much of the current area of degraded raised bog to active raised bog as possible. Although this may occur spontaneously over long periods of time in some places, engineered intervention will usually be necessary as natural processes will take longer and more active area may be lost during that time. Engineered options consist of a wide range of potential measures, requiring contrasting commitments of financial and human resources. In the framework of the current National Raised Bog SAC Management Plan, those measures which seek to maximise the area that can be restored to active raised bog with minimum initial and maintenance costs are considered most appropriate for achieving the Conservation Objectives set for the SACs.

Eco-hydrological Setting

Restoring Degraded Raised Bog to Active Raised Bog requires an understanding of the underlying processes driving degradation. These often consist of complex hydrological and ecological processes

leading to a change in underlying eco-hydrological supporting conditions. Moreover, hydrological and ecological processes interact to give rise to feedback mechanisms that further perpetuate degradation processes. For example, lowering the water table through drainage can permit colonisation by vegetation not typically associated with bogs which, through increased transporation, can further lower the water table over the longer term to levels that result in acrotelm degradation or loss. As a consequence the success of any restoration programme must consider hydrological and ecological interactions.

Because of its high water content and its flexible matrix, peat shrinks when it loses water. The result of shrinkage is subsidence of the bog surface. Usually loss of water is caused by drainage. This drainage may result from a system of drains in the bog, peat cutting at the margins or both, and also from lowering of hydraulic heads in the mineral soil below the peat (Schouten 2002).

Human interference (e.g. peat cutting, drainage and burning) have changed the overall shape of the majority of the raised bogs in Ireland. As Schouten (2002) highlights, peat cutting along the margins causes a local lowering of the ground-water table and thus an increased drainage of the remaining peat along the newly formed margin (i.e. face-bank). As a result of the drainage, the peat shrinks and shrinkage of peat means surface subsidence. The subsidence thus caused is largest at the newly-formed margin. Initially, the slope of the bog surface begins to increase in a narrow zone along the margin. In a bog an increased surface slope means an increased hydraulic gradient. This results in a quicker discharge of water from the bog and consequently, an intensified drainage of more inward parts of the bog which in turn begin to subside, and so on. In this way the man-induced subsidence caused by the turf cutting gradually expands into the bog (Schouten 2002). This process highlights the dynamic nature of the surface of those raised bogs where damage has taken place. As the surface slope increases, the potential for retaining or restoring active bog decreases over time, leading to irreversible losses.

Studies outside Ireland

Peatland restoration, aimed at meeting diverse objectives, has been a topic of conservation interest for over 30 years. Recent years have witnessed a growth in peatland restoration activities in a number of countries, largely aimed at reversing the impacts of peat extraction for fuel/land reclamation on uncut (high) bog and/or cutover areas. The findings of many of these studies display potential to inform existing and proposed Irish restoration programmes. However, it must be noted that many of these programmes have been carried out in areas where physical or socio-economic circumstances differ from those encountered in Ireland. Consequently a note of caution is necessary as some published approaches may not be relevant or feasible for achieving the SAC Conservation Objectives. In a related vein, some of the approaches that have been adopted elsewhere may not have been tested in Irish settings, or tested in a limited number of settings. As a consequence their wider applicability remains to be determined, for example, excavation / re-profiling of the high bog boundary.

Studies in Eastern Canada have demonstrated the potential for inoculation with Sphagnum on peatlands that have been mechanically harvested (strip-mined) (Price, 1996). However, this technique has not been successfully demonstrated on uncut peatlands as it is more applicable to scenarios where there is a lack of suitable vegetation and spores to initiate the growth of *Spagnum spp*. In addition, this process may also require the use of fertilisers (Sottocornola et al. 2007), which is likely to be a significant threat to existing ecological conditions on bogs that have not been mechanically harvested. The key barrier to maintaining and restoring active raised bog in most raised bogs in Ireland is the lack of suitable hydrological conditions. Suitable hydrological conditions are a basic requirement regardless of whether natural regeneration or inoculation with *Sphagnum spp.* is the approach taken. Therefore this approach is unlikely to be required on many SACs in Ireland as suitable vegetation already exists on these raised bogs to initiate active raised bog development if favourable hydrological conditions are achieved. In the Irish context this approach offers the greatest potential for the restoration of cutover peatland or strip-mined peatlands where there may be a lack of suitable *Sphagnum spp.*

Overall, a review of published restoration studies/activities demonstrates the need for undertaking detailed site-specific characterisation, prior to implementing restoration programmes. Consequently the review of restoration options presented below is generic and subject to re-appraisal as further relevant site-specific data become available.

Protection and Restoration Activities in Ireland

A review of the ecological and eco-hydrological condition of the Raised Bog SACs (Chapter 2), has revealed that, in the absence of intervention measures aimed at limiting the detrimental impacts of human activities, the area under Active Raised Bog (ARB) has followed a declining trend from the mid 1990s to the present. In other words natural feedback processes arising from peat cutting and associated activities are incapable of maintaining the eco-hydrological conditions necessary to support ARB. Further intervention is therefore necessary if the current trend is to be halted and ultimately reversed. Interventions can be subdivided into two broad categories.

1. Preventative measures including cessation of the following activities:

    - Drainage of raised bog habitat or surrounding wetland habitats;
    - Peat harvesting and turf cutting;
    - Planting of commercial forestry;
    - Burning; and

- Other human activities such as water abstraction from groundwater and quarrying which can have a significant impact on the raised bogs by lowering the regional groundwater level.

2. Engineered (active intervention) measures including:

- Drain blockage on high bog;
- Drain blockage in marginal areas;
- Removal of forest plantations;
- Marginal dams;
- Bunding on high bogs; and
- High bog and cutover bog excavation/re-profiling.

It is noteworthy that the current consensus concerning peat bog restoration considers that the process is time dependant and the impact/benefit of restoration measures remains largely un-quantified in the Irish setting. Moreover, experience and success in the application of particular measures ranges widely. A review of wetland restoration activities on uncut peatlands (SAC, NHA and selected non-designated sites), revealed that of 264 sites reviewed, active restoration measures had been undertaken on 59 bogs. Of these, partial drain blockage had taken place on 54 sites, sometimes in combination with the removal of forest plantations. The success of these activities remains to be evaluated in detail. Nonetheless, the results from at least a subset of sites suggests that the restoration programmes implemented have been capable of at least partial restoration of Degraded Raised Bog to Active Raised Bog and may have prevented degradation that would otherwise have occurred if the works had not been put in place.

Table 4.1 provides a list of those sites where increases in active raised bog habitat extent were reported by the Raised Bog Monitoring Project (2013) and the estimated extent of habitat increase. High increases in habitats extent were noted at Lisnageeragh, Carrownagappul, Garriskil and Ballykenny. Improvements in degraded raised bog habitat quality were reported at the sites listed below and are also considered to have occurred at other sites (e.g. Killyconny).

Table 4.1 Examples of Restoration Using Drain Blocking on the High Bog

Site Name	Organisation/(Co-Funding)	Estimated increase in ARB due to restoration works in the 2004/5 to 2011-13 period (ha)
Lisnageeragh	NPWS/Coillte (EU Cohesion/LIFE)	13.2
Carrownagappul	NPWS (EU Cohesion)	9.9
Garriskil	NPWS	5.5
Ballykenny	NPWS (EU Cohesion)	5.1
Carn Park	Coillte (EU LIFE)	1.1
Raheenmore	NPWS (EU Cohesion)	0.8
Cloonshanville	Coillte (EU LIFE)	0.7
Ballyduff	NPWS (EU Cohesion)	0.6
Fisherstown	NPWS (EU Cohesion)	0.5
Kilsallagh	Coillte (EU LIFE)	0.5
Clonfinane	NPWS (EU Cohesion)	0.3
Mongan	NPWS (EU Cohesion)	0.1

An example of where drain blockage has been successfully undertaken is at Lisnageeragh Raised Bog SAC in County Galway, where drain blocking of a length of approximately 4 km commenced in 1998 resulted in an area of 13.2 ha of Degraded Raised Bog being restored to Active Raised Bog between the 2004 and 2012 survey periods, Figure 4.1.

Two further examples of restoration processes using drain blocking are depicted in Plates 4.1 – 4.4

Plates 4.1 and 4.2 depicts before and after drain blocks at Cuckoo Hill Raised Bog, County Roscommon constructed by Bord na Móna. A minimum of three drain blocks are constructed for every 100m of drain. Up to 10 drain blocks per 100m may be required depending on the slope of the drain in order to maintain the water level in the drain to within 10cm of the surface of the bog.

Plate 4.3 depicts the early stages of recovery. The drain blocks increase the level of water in the drain and this initially becomes colonised by algae species which take up nutrients released from the drained bog. Over time the algae is displaced by Sphagnum species which tend to colonise the blocked drains from the sides.

Plate 4.4 depicts Active Raised Bog re-established 10 years after drain blocking in 1996 at Clara (East) Bog SAC.

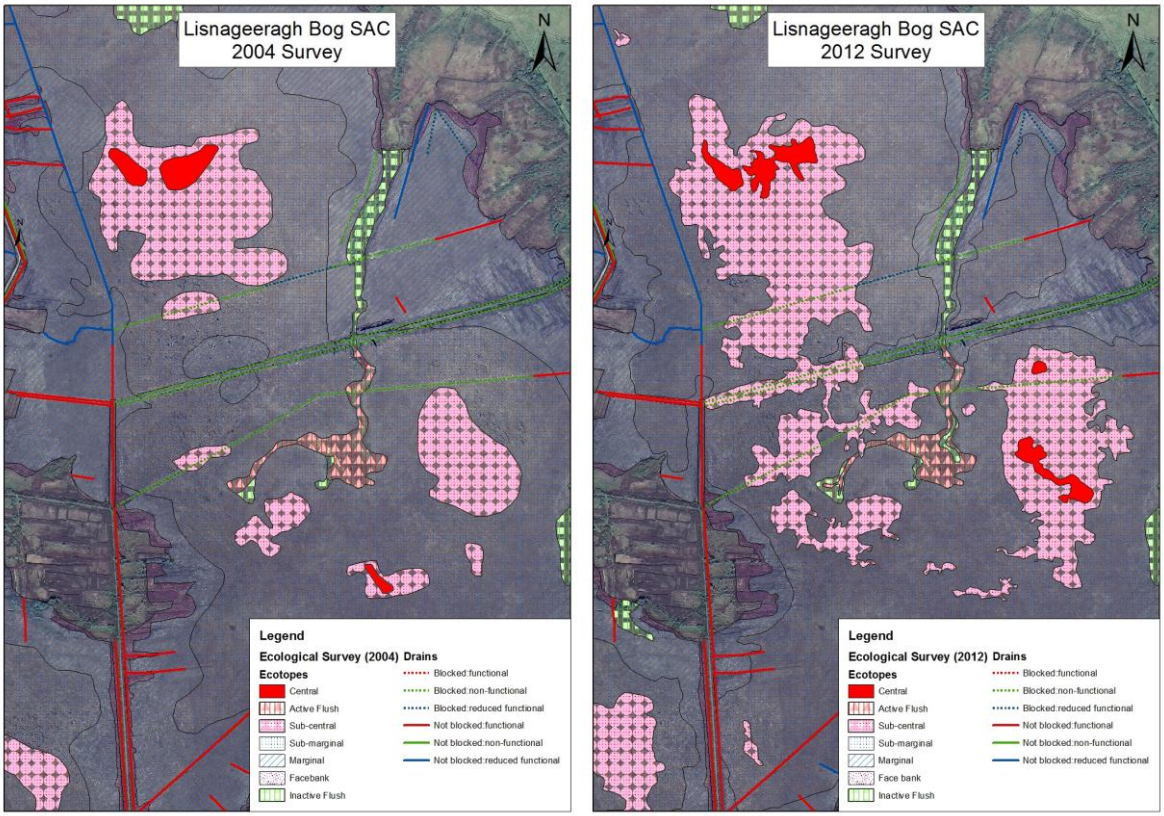


Figure 4.1 Lisnageeragh Raised Bog SAC. Example of successful restoration using high bog drain blocking. The increase of red (central ecotope) and pink (sub-central ecotope) shows the increase in active rasied bog due to restoration.

Plate 4.1 Before Drain Blocking at Cuckoo Hill Raised Bog by Bord na Móna, Co Roscommon

Plate 4.2 After Drain Blocking at Cuckoo Hill Raised Bog by Bord na Móna, Co Roscommon

Plate 4.3 Sphagnum species re-colonising a blocked drain at Cuckoo Hill Raised Bog

Plate 4.4 Clara Raised Bog SAC - Active Raised Bog re-established 10 years after drain blocks were introduced

Experience with other restoration techniques (apart from high bog drain blockage) in Ireland remains limited and has had variable degrees of success given the technical and financial inputs involved. These include the construction of three marginal dams (two of which subsequently collapsed) at Raheenmore Bog SAC, County Offaly. Ecological surveys undertaken in 2004 and 2011 (Figure 4.2) show that restoration at this site has been very limited with only slight increases in Active Raised Bog observed close to the margins of the High Bog in close proximity to the marginal dam. In this situation long term maintenance of the water level control system is required.

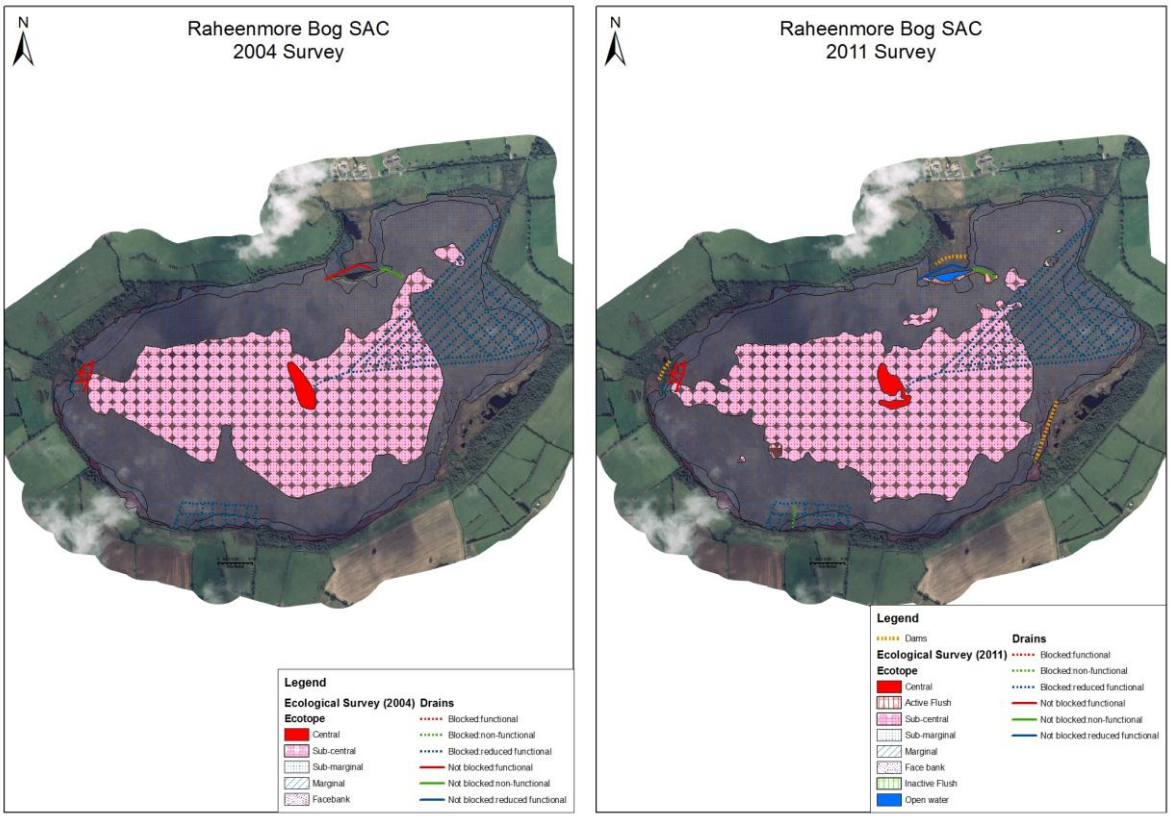


Figure 4.2 Raheenmore Raised Bog SAC. Example of limited restoration success using a Marginal Dam

Removal of forest plantations

Forestry plantations can have adverse impacts on raised bogs by causing a lowering of the water table, through both drainage and increased rates of evapotranspiration. In recent years experience has been gained in Ireland on the removal of forest plantation on raised bogs. Coillte are currently undertaking a project on “Demonstrating Best Practice in Raised Bog Restoration in Ireland” which is jointly funded by EU DG-Environment, the Department of Arts, Heritage and the Gaeltacht and Coillte under the EU LIFE-Nature Programme. This is Coillte’s second LIFE Project relating to the restoration of raised bogs and builds on experience gained during the first project where works were

undertaken on 571 ha of raised bog on 14 sites. The current programme involves the restoration of 636 ha of raised bog on 17 Coillte owned sites including both SACs and NHAs. Plate 4.5 and 4.6 illustrate the impact of restoration measures on afforested raised bog, carried out by Coillte on Woodown Raised Bog, Co. Westmeath. Plate 4.5 illustrates that prior to restoration measures hydrological conditions were unsuitable for supporting active raised bog. Following the implementation of restoration measures (tree felling and drain blockage) hydrological conditions now support sphagnum regrowth at the same location as shown by Plate 4.6. Plate 4.7 demonstrates the relatively rapid impacts on the water table as a result of tree clearance and drain blocking on Girley Raised Bog NHA, Co. Meath.

Plate 4.5 Wooddown Raised Bog NHA prior to restoration (Image: John Derwin, Coillte)

Plate 4.6 Wooddown Raised Bog NHA after restoration (Image: John Derwin, Coillte)

Plate 4.7 Aerial image showing the extent of rewetting following restoration measures, completed as part of the Coillte LIFE project. Girley Bog, Co. Meath. (Image: John Connolly, Coillte)

Efficacy of Potential Restoration Measures

Based on the restoration experiences gained in Ireland, drain blockage in both open and overgrown drains, coupled with forestry plantation clearance and cessation measures have the greatest potential as a restoration measure on Irish raised bogs. Therefore in order to achieve an increase in the area of active raised bog, there must be potential restoration measures available. This is particularly important in relation to bogs where the hydrological relationship between the peat and the regional groundwater has been affected, resulting in increased rates of vertical seepage. In such cases it may prove extremely difficult to successfully restore active raised bog, as despite hydrological conditions on the surface appearing suitable, water cannot remain at the surface for an adequate period of time. Therefore in order to adequately assess the future potential of each bog, it is necessary not only to consider the physical conditions of the bog surface, but to assess the efficacy of restoration measures for each bog.

Summary

A qualitative summary of the Engineered (active intervention) Options available as restoration measures is presented in Table 4.2. In all cases bog topography is assumed to be stable. Where recent peat cutting and/or drainage on either the high bog or surroundings has occurred this may result in subsidence leading to differential changes to topography. These processes may impact on

the success of restoration measures. As a consequence, more intense monitoring/maintenance may be needed.

Table 4.2 Qualitative summary of Engineered (active intervention) Potential Restoration Measures

Measure	Cost	Maintenance	Effectiveness	Potential problems
Drain Blockage (High Bog)	Inexpensive. Expertise gained in Ireland.	Robust technology. Periodic inspections of drain block integrity necessary in early years. Damage is easily repaired.	Demonstrated at selected sites, particularly where drain blocks hinder focused discharge.	Some damage to high bog by heavy equipment. Of limited/no use in areas of desiccated peat (cracking due to extreme drying as a result of marginal drainage. Typically this extends 10m-15m into uncut peat from facebanks and can hinder restoration efforts).
Drain Blockage (Marginal)	Potentially more expensive than high bog drain blocks, particularly if objective is to limit regional groundwater loss. (Alternative materials such as bentonite may be required at focused points).	Limited maintenance, depending on overall design.	Useful for assisting in cutover restoration. Benefit of raising marginal water levels for high bog restoration will need to be assessed on case by case basis.	Physical access of equipment less problematic than on high bog. Risk of water logging in adjacent areas not designated for conservation.
Forestry Clearance	Relatively inexpensive.	May need to be repeated periodically.	Effective, where combined with programmes to raise water levels leading to water-logging/anaerobic conditions in the root zone.	Needs to combined with measures to raise high bog water levels to be effective.

Measure	Cost	Maintenance	Effectiveness	Potential problems
Marginal Dams	Very Expensive.	Require routine maintenance and monitoring, particularly in early stages following completion, to check against malfunction/ failure. Long term monitoring is also required.	Demonstrated to be effective at smaller sites where high levels of maintenance feasible. Limited demonstrated restoration. Applicable in marginal areas with extensive desiccated/fissured peat or where internal subsidence recurs.	Significant technical and financial resources required. Limited benefit on sites where bogs have significant marginal topographic gradients.
High bog excavation /reprofiling	Expensive.	Measures must be taken, particularly in early stages, where risk of slope failure may arise.	No known high bog sites restored in Ireland. Potentially valuable approach in areas of excessive topographic gradient, and low permeability peat.	Excavation destroys existing plant cover. Some damage to high bog by heavy machinery. This technique can be effective in limited circumstances where initial stabilisation of the face bank is required.
Inoculation with *Sphagnum Spp*. (Canadian Method)	Relatively inexpensive but may require (expensive) reprofiling.	Routine monitoring of regrowth/ presence of invasive species.	Developed for mechanically harvested (strip-mined) peatland. Technique has not been successfully demonstrated on uncut peatlands in Ireland. Published studies from Canada suggest it has greatest potential for the restoration of cutover peatland.	May require fertilisers that may upset ecological balances in Irish bogs. Appropriate hydrological conditions required as prerequisite. Success reported in Eastern Canada where climatic conditions differ from those in Ireland.
Bunding on high bog	Expensive. Cost dictated by materials employed.	Level of maintenance required dictated by design and materials employed. Minimum level of maintenance needed to ensure water level conditions suitable for ARB vegetation re-growth.	Limited application in Ireland, often associated with other restoration measures. Bunding shown to be effective in permitting sphagnum species re- growth in sites in the Netherlands provided water depth does not exceed 50cm.	Potentially viable option for degrading high bog areas not impacted by high bog drains or for redirecting flows for areas of restoration potential.

Replacement Options (including the NHA network review)

A scientific assessment of the NHA Raised Bog network and the non-designated raised bog sites of potential conservation value was undertaken to:

- fundamentally review the current raised bog NHA network in terms of its contribution to the national conservation objective for raised bog habitats; and

- scientifically determine the most suitable sites to replace the losses of active raised bog habitat and high bog areas within the SAC network and to enhance the national network.

Network Review Methodology

This section of the draft plan sets out the decision support process used to select potential NHA and non-designated raised bogs to fulfil the plan's conservation objective of replacing lost habitat and to review the current NHA network.

In order that the selection process adopts a sustainable approach the selection criteria, while including the primary environmental and technical factors essential for a raised bog's existence now and into the future, also consider the supporting economic and social criteria. Such integration of environmental, technical and socio-economic knowledge, which attempts to balance the competing objectives of economic efficiency, social equity and environmental sustainability is employed by the internationally accepted Integrated Water Resources Management (IWRM) approach.

Multi Criteria Analysis (MCA) is an established decision support methodology (also often referred to as Multi Criteria Decision Analysis) enabling integration of these criteria to identify the bogs most suitable as replacement SAC habitats and those most suitable as part of a reviewed NHA network. A variety of MCA methods are available with a weighted score method being selected as a suitable technique for this application. Similar approaches have been applied in EU Member States to implement a variety of Plans and Programmes and a similar analysis is being applied in Ireland to support the Floods Directive implementation process.

This MCA approach demonstrates full consideration of environmental, technical and socio-economic factors in a logical and transparent manner so that these can be communicated to a range of stakeholders including bog users, regulators, the European Commission and the wider community.

The environmental, technical and socio-economic criteria used for the NHA review are given equal weighting and in all categories the highest scores are given to the most favourable of sites which are those with:

- the best existing environmental standing (described by area, range, habitat, structure and function);

- the best future potential (described by restorable habitat area and the likelihood of restoration measures being effective); and

- the most socially appropriate (described by factors which indicate how readily the site can be designated and restored and what wider social benefits might be brought) alongside the most economically advantageous investment (described by how much habitat is supported by a unit of investment in the site).

If there are two sites with equal standing on the primary considerations of environmental (existing condition) and technical (future potential) criteria then the socio-economic criteria identifies those where restoration measures would be most cost effective and socially appropriate and consequentially most likely to be implemented quickly.

However when using the analysis to determine the most suitable sites to replace the losses of active raised bog habitat and high bog areas within the SAC network, only the environmental and technical criteria were applied as SAC site selection excludes socio-economic considerations.

This decision support process focuses on the environmental objective of providing habitat (related to flora and fauna), whilst considering the social impacts (related to human beings) on those affected by the plan. The Strategic Environmental Assessment process ensures that the plan's wider implications on all aspects of the environment are considered.

The scientific assessment, supported an expert panel review, which identified three categories of sites under the review:

- Category 1 – contains the best 63 sites from an ecological and restoration potential perspective with relatively low levels of active turf-cutting. These include 36 of the current NHA sites and 27 currently undesignated raised bogs of national conservation interest. 25 of these will be designated as NHAs and 2 as SACs to compensate for habitats losses within the SAC network. These new sites are either state owned (primarily Bord na Móna), or have relatively reduced turf-cutting pressure. The designation process for these new sites will commence in 2014. Until that time, the names and locations of these sites will not be published. It is expected that most turf cutting on these sites will cease by 2017.

- Category 2 – contains 46 current NHAs (or parts of NHAs) which have been assessed as having some ecological value but their contribution to the attainment of the national

conservation objective is expected to be marginal and/or restoration would be prohibitively expensive for the conservation benefits achieved. The conservation of these sites is not considered to be necessary to reach the National Conservation Objective and it is proposed to move towards the de-designation of these sites.

Policy in relation to these sites is to allow cutting to continue within them with a view to de-designation where continued designation is not appropriate. The Department will follow a formal process in this regard. It is proposed that this would take the following format:

- A formal proposal will be drawn up to assess the implications of removing the designated status from the site;
- An Environmental Impact Statement will be prepared in relation to the proposal; and
- There will be full public consultation on the proposal and EIS in accordance with the EIA Directive.

Consideration is being given to the appropriate legislative/regulatory controls needed to put this system in place.

- Category 3 – contains sites which have been assessed as being of little value in their contribution to the conservation of raised bog habitat in Ireland (i.e. sites with little or no active raised bog or restoration potential).

As can be seen from table 4.3 below, the new network provides larger areas of current and potential active raised bog in fewer sites and with approx. 2,570 less turf cutters. The new NHA network will contribute 765ha of active raised bog to the achievement of the national conservation objective target area (see Review of Raised Bog Natural Heritage Area Network).

Table 4.3 Comparison of current and new raised bog NHA network

	Active Raised Bog (ha)	**Degraded Raised Bog (ha)**	**Total Active and Degraded (ha)**	**High Bog (ha)**	**N^{o} of Sites***	**N^{o} of Bog Units**	**Approx N^{o} of Turf Cutters**
Current NHA Network	284	410	694	7,477	75	82	3,091
New NHA Network	290	475	765	5,405	61	63	518

*Some sites contain more than one bog

This network review considered a number of raised bogs in Bord na Móna's ownership. Bord na Móna has a policy which "*fully recognises and accepts the need to preserve representative examples of different bog types, as well as areas of special natural beauty and significance*" To date a total of 6,500 ha of land have been transferred by Bord na Móna to the Minister for Arts, Heritage and the Gaeltacht for conservation purposes. This includes over 1,600 ha of Blanket Bog, 28 ha of Fen and over 3,000 ha of Raised Bog. Bord na Móna also has an ongoing programme to survey and identify potential biodiversity sites and has carried out extensive restoration works at sites such as Cuckoo Hill Bog, further underpinning its 1987 policy.

Chapter 5 Proposed Programme of Conservation Measures

Introduction

Chapter 2 of this draft plan determined the deterioration in status trends and area losses in Ireland's SAC and national stock of raised bogs.

Chapter 3 identified this draft plan's conservation objectives to support Ireland's commitment to Europe to provide a robust National Network of SAC Raised Bogs by conserving active raised bog and restoring degraded raised bog habitat and also maintaining the area of high bog within the SAC network.

This necessitates **reversing the current SAC network losses and trends** by:

- **achieving 2,590 ha of active raised bog in the SAC network**. The current area of active raised bog within the SAC network is 1,210 ha; the draft plan requires protection and restoration of any areas within the current network that can be returned to active, following protection and restoration. The next measure in the management hierarchy is to provide replacement habitat to achieve any remaining shortfall in area based targets by the addition of sites that have currently active raised bog habitat and/or potential active raised bog habitat under restoration measures into the SAC network.

- **achieving 10,740 ha of supporting high bog** (i.e. replacing the 225 ha of permanently lost high bog within the SAC network). These losses cannot be recovered within the current SAC network and again the addition of sites to the SAC network is required to regain the areas of high bog at the time of designation.

An integral part of this commitment is to **further review the SAC network** to ensure that the selected bogs represent and support a sustainable National Raised Bog Network.

This draft plan also contributes to achieving the national objective of 3,600 ha of active raised bog in the SAC and **new** NHA networks combined. Achieving this target will require the **additional restoration of an area of the cutover bog** to replace the current deficit of 230 ha.

Chapter 4 of this draft plan has demonstrated, through empirical Irish protection and restoration trials, that drain blocking, with associated tree plantation clearance and cessation of damaging activities, is the most suitable combination of measures with the best potential to restore degraded raised bog to active raised bog habitat.

Annex 3 also presents a list of NHA and other non-designated raised bog sites, showing each site's currently active and future potential restorable areas of raised bog habitat.

Selecting Proposed Conservation Strategies

This chapter of the draft plan develops strategies (or combinations of measures) to meet the plan's conservation objectives; including the designation of Bord na Móna bogs to compensate for losses since sites were nominated for designation.

1. Protection and Restoration of current SAC Network

   The first element of the strategy is to protect currently active raised bog in the existing SAC network and restore any degraded raised bog habitat within the existing SAC network that can be effectively restored to active raised bog habitat. This is based on assessment of the eco-hydrological potential of each site in combination with consideration of the efficacy of drain blocking and accompanying restoration measures which established that 1,200 ha of active raised bog habitat can be achieved by restoration of the existing SAC network.

   This element of the plan is already necessitated by the sites' SAC designation.

2. Additional Raised Bog designation and Restoration to Fulfil SAC Area Objectives

   The second element of the strategy is to select sites to provide additional habitat to replace permanently lost areas in the existing SAC network since they were selected for designation. 2,590 ha of active raised bog is ultimately required in the SAC network, 1,210 ha are currently active and 1,200 ha can be restored within the existing SAC network. Therefore an additional 180 ha of suitable habitat must be brought into the network to achieve the target of 2,590ha. This can be achieved by including currently non-designated areas of active raised bog or degraded raised bog within the SAC network. 225 ha of high bog has also been lost from the SACs since they were nominated for designation.

   From the list of suitable sites identified under the review of non SAC raised bogs of conservation value, it has been decided to achieve this through the designation of two raised bog complexes which are predominantly owned by Bord na Móna.

   Four of the top five most suitable sites, as determined by the NHA review, lie within these two bog complexes. As these complexes are owned predominantly by Bord na Móna the sites can be brought into the SAC network relatively quickly and restoration work advanced with the minimum of complications. Some restoration works have already commenced in these areas by Bord na

Móna. These designations will provide an additional active raised bog area of 195 ha following restoration with an additional high bog area of 1,150 ha. The current area of active raised bog on these sites is 34 ha. This also introduces the opportunity to bring clusters/groups of sites into the network, which has added ecological benefits for more mobile species (Grouse and Curlew for example) and would be in line with Bord na Móna's 1987 policy regarding bogs of significance as well as their Biodiversity Action Plan, in which bog restoration plays a significant role.

3. Cutover Restoration

A demonstration project at Clara Bog West will be undertaken to restore the high bog and to evaluate the rewetting of a proportion of the cutover bog. This will support achieving the national objective of 3,600 ha of active raised bog in the SAC and **new** NHA networks combined. Achieving this target will require additional restoration of an area of the cutover bog to replace the current deficit of 230 ha during the second planning cycle.

Summary of Proposed Programme of Conservation Measures

In addition to the detailed protection, restoration and replacement measures, Ireland's National Raised Bog SAC Management Plan's proposed programme of conservation measures requires a framework of activities drawn from existing legislation and conservation initiatives as summarised in Table 5.1.

Table 5.1 Summary of Proposed Programme of Conservation Measures

Measure	Where	When	Who (& Cost)
1. Protection and Restoration of current SAC network entailing • Preventative measures (cessation of damaging activities including drainage, peat harvesting and turf cutting, planting of commercial forestry, spread of fires, and other human activities) and • restoration measures (drain blockage in both open and overgrown drains, coupled with forestry plantation clearance)	Current SAC bogs	2014-2020	DAHG (NPWS) Preventative measures costed separately in Chapter 6 of this draft plan Cost €1.7 m

Measure	Where	When	Who (& Cost)
• Note: Detailed restoration and management plans for each SAC will be developed during 2014.			
2. Additional Raised Bog Selection and Restoration to Fulfil SAC Area Objectives.	Compensatory Sites	2014-2020	DAHG (NPWS) Cost €2.4 m
3. Demonstration Project – Rewetting of Cutover Bog to restore the high bog and to evaluate the rewetting of a proportion of the cutover bog.	Clara Bog	2014-2017	DAHG (NPWS) Cost €1.5 m
4. EU LIFE Proposal and Project implementation.	Selected SACs	2014-2020	DAHG (NPWS) Sum of the plan measures cost
5. Support for other conservation works – making funding available to individuals and organisations to carry out approved restoration works.	Selected Sites	2014-2020	DAHG (NPWS) Not costed in this draft plan
6. Mid-cycle Review of the National Raised Bogs SAC Plan.	National	2017	DAHG (NPWS) Cost €0.2 m
7. Preparation of Second National Raised Bogs SAC Plan.	National	2020	DAHG (NPWS) Cost €1.0 m
8. Review of the NHA Network Designation Status (additional NHAs and de-designation of sites of low conservation value).	Current and **new** NHA Networks	2014	DAHG (NPWS) Not costed in this draft plan
9. Preparation of a national Raised Bog NHA Management Plan and site specific NHA Restoration and Implementation Plans affording protection and restoration measures akin to	**New** NHA Network	2014-2016	DAHG (NPWS), DECLG Cost €1.0 m

Measure	Where	When	Who (& Cost)
those in the SAC Network with supporting Code of Practice and Guidance Documents.			
10. Raised Bogs Education and Awareness Programme and engagement and consultation with local communities.	National	2014-2020	DAHG (NPWS) Cost €1.0 m
11. Raised Bogs Monitoring Programme.	National	2014-2020	DAHG (NPWS) Cost €2.0 m
12. Habitats Regulations implementation to prevent damaging activities.	National	Ongoing	DAHG (NPWS) Not costed in this draft plan
13. Environmental Impact Assessment Regulations and Environmental Liabilities Regulations implementation to prevent damaging activities.	National	Ongoing	DAHG (NPWS) Not costed in this draft plan
14. Ensure legislative and policy linkage to other plans and programmes including River Basin Management Plans and Catchment Flood Risk Management Plans.	National	Ongoing	DAHG (NPWS) Not costed in this draft plan

The programme includes monitoring, review and further plan iteration measures to assess the progress and effectiveness of the long term strategies put in place under the first National Raised Bog SAC Management Plan and the supporting suite of NHA network reviews and plans. The programme also includes demonstration projects to support this plan's implementation which includes a demonstration of cutover bog rewetting for evaluation prior to possible incorporation into subsequent planning cycles. Educational and awareness programmes are also incorporated as are legislative measures.

The estimated cost of the programme of measures is in the order of €10.8 million over the six year planning cycle. It should be noted that this value excludes the associated public sector costs of DAHG and other government departments and organisations that will play an important role in the plan's

implementation. It also excludes costs associated with the compensation and relocation scheme for turf-cutters.

It is important to note that the National and SAC conservation objectives for active raised bog habitat cannot be achieved within the timeframe of the first six planning cycle (2014-2020). Restoration measures (drain blockage in both open and overgrown drains, coupled with forestry plantation clearance) will be implemented but it is expected to take at least 10 years after drain blocking is completed before the effects of restoration works start to be realised. A more rapid response is however expected in reversing the current downward trend of active raised bog area before notable increases in area of active raised bog start to develop.

Chapter 6 Addressing the needs of those affected by the Plan

Article 6 of the Habitats Directive

Managing and protecting Natura 2000 sites

Article 6

1. For special areas of conservation, Member States shall establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.

2. Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.

3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

Article 6 is one of the most important articles in the Habitats Directive as it defines how Natura 2000 sites (SACs and SPAs) are managed and protected.

Paragraphs 6(1) and 6(2) require that, within Natura 2000, Member States:

- Take appropriate conservation measures to maintain and restore the habitats and species for

which the site has been designated to a favourable conservation status; and

- Avoid damaging activities that could significantly disturb these species or deteriorate the habitats of the protected species or habitat types.

Paragraphs 6(3) and 6(4) lay down the procedure to be followed when planning new developments that might affect a Natura 2000 site. Thus:

- Any plan or project likely to have a significant effect on a Natura 2000, either individually or in combination with other plans or projects, shall undergo an **Appropriate Assessment** to determine its implications for the site. The competent authorities can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site concerned (Article 6.3); and

- In exceptional circumstances, a plan or project may still be allowed to go ahead, in spite of a negative assessment, provided there are no alternative solutions and the plan or project is considered to be of overriding public interest. In such cases the Member State must take appropriate compensatory measures to ensure that the overall coherence of the N2000 Network is protected. (Article 6.4).

This plan has implications for a large number of people. At a broader level every citizen has an interest in the protection of Ireland's endangered natural habitats and the benefits that they provide. The successful implementation of this plan will ensure that functioning raised bogs and their rich ecosystems survive in Ireland and, over time, are restored and improved. Successful implementation will also protect tax-payers from the risk of fines that are likely if Ireland fails to meet its EU obligations to safeguard a small proportion of its raised bogs.

At a local level, communities will continue to benefit from having exceptional ecological sites on their doorstep which will be carefully managed in partnership with local communities into the future. These sites provide services and benefits as set out in Chapter 7 of this draft Plan and have social and economic value for local communities beyond their current uses for turf-extraction. The putting in place and implementation of site level management/restoration plans may also provide opportunities to enhance the recreational and education value of these sites to local communities.

Those most directly and most immediately affected are those who use these bogs for activities such as turf-extraction and landowners within and adjacent to the SACs.

Conserving Raised Bog and Turf Cutting

In general, as outlined in Chapters 2-5, turf-cutting and its associated drainage is damaging to the ecology and functioning of raised bogs and is incompatible with their conservation. For raised bogs selected for designation as Special Areas of Conservation, it will in most cases not be possible for the State to consent to further turf-cutting, as the State is legally obliged to prevent such damage to these sites. There are, however, two sets of circumstances, in which turf-cutting could be consented to. These can be referred to as Article 6(3) consents and Article 6(4) consents, in that the criteria for giving such consent is set down in Article 6(3) and Article 6(4) of the Habitats Directive.

Continued cutting without damaging the SAC

Consent can be given to plans or projects (such as proposals to undertake turf-extraction) where it can be shown not to have a significant effect on the SAC – (where it can be screened out) - or where, following an Appropriate Assessment, within the meaning of Article 6(3) of the Habitats Directive, it can be shown not to have an adverse impact on the integrity of the SAC. The screening process and appropriate assessment of the impacts of a proposal are scientific exercises and focus squarely on implications of the activity on the protected features of the site. The impact of such proposals must be assessed both alone and in combination with other plans and projects. Given the clear scientific evidence of the negative impact of turf-extraction on raised bogs, for most such proposals it will not be possible for the State to consent under Article 6(3).

As part of the preparation of this draft Plan proposals to undertake turf-cutting on the SACs by turf-cutters and turf-cutting representatives have been examined. All specific proposals put forward for cutting within specified parts of particular SACs made by the TCCA and by other turf-cutting groups were examined and assessed as part of the preparation of this draft Plan. The assessments have resulted in three categories of sites/outcomes.

Proposals were put forward for continued turf-cutting at specific location on four sites (Camderry SAC, Coolrain SAC, Callow SAC and Redwood SAC).

For each of the sites, the proposals put forward have been considered using information on the presence of active raised bog habitat or degraded raised bog habitat within or adjacent to the proposed area for turf-cutting. The physical and hydrological connection between the proposed extraction area and the protected habitats within the site was analysed, including through the use of topographical information from the LiDAR surveys undertaken for each site. The following are some of the criteria which are used in reaching a conclusion.

1. Would the cutting lead to the direct loss of protected habitat?

2. Would the cutting lead to the indirect loss of protected habitat?

3. Would the cutting, necessary drainage and saving of the turf prevent or impede restoration works that will be necessary on the site?

If the answer to any of these questions is yes, or if such an impact cannot be ruled out, then giving consent to turf-cutting would not be possible under Article 6(3). It should be noted that the nature of raised bogs and the impacts of turf-cutting will in most cases lead to a decision that turf-cutting will not be possible. It has been concluded that the four proposals above fall into this category.

A further five proposals were also considered (River Moy (Cloongoonagh), River Moy (Derrynabrock), Lough Ree, Ballinagare, and Lough Lurgeen).

In these cases following preliminary assessment, it has not been ruled out that limited turf cutting in certain identified areas could be undertaken without having a negative effect. If the potential of continued cutting in these defined areas is to be pursued, it will be necessary to undertake some further work to fully assess the possibility. Continued cutting on small areas within these SACs may be possible under strict controls and perhaps for a defined period of time. In general, such outcomes will not cater for large numbers of turf-cutters. In addition it will be necessary to establish whether the land-owner or turbary right owner of the land in question is interested in or willing to allow continued turf-cutting or the commencement of turf-cutting on their land. These cases can be explored further with turf-cutters in the context of putting in place the management plan for the site in question. In the interim, no cutting can take place on these sites.

In one case, Tullaher Lough and Bog SAC, it has been possible to identify a significant area within the SAC where turf-cutting could continue without having an adverse impact on the protected habitat. This is because the protected habitat is hydrologically separated from the proposed extraction area. It will be possible, in this case to allow a continuation of turf-cutting within a defined area. Constructive engagement with the local community has also identified that turf-cutters from the more sensitive area of the site can be accommodated through relocation to the defined turf-cutting area (Appendix 6).

Turf Cutters who are compelled to discontinue turf-cutting from their raised bog SACs have been offered compensation or relocation. The Compensation and relocation schemes are outlined later in this Chapter.

Continued Turf-cutting under Article 6(4)

Continued Cutting due to lack of relocation possibilities

The Habitats Directive makes provision for damaging activity to be undertaken on SACs in exceptional circumstances where certain tests provided for in Article 6(4) of the Directive can be met. In short these include the following:

1. That no alternative exists than to undertake the proposed action

2. That Imperative Reasons of Overriding Public Interest (IROPI) exist that would justify the damage to the SAC

3. That Compensatory measures can be taken to ensure the integrity of the SAC network

4. In considering plans and projects involving activities such as turf-extraction, where priority habitats (such as active raised bog) are affected, an opinion of the European Commission is required before consent can be give to a damaging activity.

The European Commission has issued guidance on the application of Article 6(4). http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf

In the twenty years since the Habitats Directive has come into force there have been fewer than twenty cases throughout the EU involving priority habitats that have secured consent under Article 6(4). These cases were for specific projects. To date no IROPI case for a plan involving damage to priority habitat has been made.

In considering whether these tests could be met in the case of turf-extraction, there are a number of considerations. Firstly, where there is an opportunity for turf-cutters to be accommodated relocation to another undesignated bog within a reasonable distance, this clearly amounts to an alternative and the first criteria would not be met. Following extensive work by turf-cutters and the Department in identifying potential relocation sites, it is clear that this is the case for the vast majority, if not all, of the SACs. In fact, potential alternative sites have been identified for all of the SACs where relocation is required and alternatives are currently in the process of assessment, negotiation with land-owners or development. However, in a small number of cases based on the information available, there may be difficulties in accommodating all cutters requiring relocation in the available alternative sites. It is likely to be only in these sites where potential flexibility could be sought, based on this criteria.

What would the situation be if no alternative bog within a reasonable distance could be found for a particular SAC? Would this pass the alternative and Imperative Reasons of Overriding Public Interest tests? At an individual or a bog level, the cutting of turf is a private interest for the sole benefit of the individuals who own the land or turbary rights and perhaps also the contractor who is paid for the

services provided. When seen at that level, it is difficult to see an imperative reason of overriding *public* interest in a small number of individuals continuing to undertake turf-cutting for their private benefit, at the cost of the public good of preventing damage to the SAC. However, when looked at from the National perspective, could the conclusion be different?. If the availability of flexibility in a small number of sites, due to a genuine and demonstrable lack of alternatives for turf-cutters, would secure an agreed national network solution to the long-term conservation of Ireland's raised bog SACs, which is clearly in the public interest, then the overriding public interest becomes more apparent. In short, the long term conservation of the raised bog SAC network could be an Imperative Reason of Overriding Public Interest that might be invoked to allow flexibility in a small number of SACs, where alternatives do not exist.

The central recommendation of the Quirke Report that a National Plan be put in place reflected the legal parameters of the Habitats Directive. A plan, covering the future restoration and management of all 53 raised bog SACs could possibly unlock the flexibility of Article 6(4), if it is required, for a small number of SACs. The European Commissioner has agreed to work with the Irish Government in the preparation of this Plan and in exploring the possibilities of such an approach where it would deliver an agreed network solution and secure the long term conservation of Ireland's raised bog SACs. The Press release issued following the 2012 meeting between the Commissioner and Ministers Deenhan and Hogan is attached in Appendix 5.

If a case can be and is successfully made, the State will need to designate an additional site or sites as SACs and protect them, to make up for any damage to existing sites allowed under the plan.

It should be noted, however, that it has not yet been established that there is a need to make such a case or that there are raised bog SACs where relocation alternative do not exist.

If such a case were to be made it would require the plan to be finalised, to give clarity on the conservation approach to be taken to all raised bog SACs, a statement of case to be prepared that would set out the Imperative Reasons of Overriding Public Interest that apply, a clear demonstration that alternatives were fully explored and the reasons that they were ruled out, and how Ireland intended to make up – through designation of compensatory sites - for the damaging activities that are proposed.

Assessment of Alternative Solutions

A key objective of this Plan is to seek solutions that avoid damage to the SACs. This is the central requirement of Article 6 of the Directive. The Plan will only require to be considered under Article 6(4) if the needs of turf-cutters cannot be met through relocation to nearby bogs, or otherwise. It will be necessary, as part of the process of finalising the Plan, to agree on rational, comparable assessment

criteria that can be applied to objectively determine where no alternatives are available, recognising also that each site will have its own particular circumstances.

For the purposes of this exercise, the following criteria might be appropriate in determining whether alternatives are available:

1. A distance of up to 15k from the SAC is reasonable.

2. Sites should be suitable for turf-cutting

    a. There should be adequate quantity and quality of turf to allow for a domestic supply of turf for the individual to be relocated commensurate with the plot they are leaving or for a defined period of time.

    b. Adequate speadground should be available.

    c. Suitable access and drainage should be in place or achievable

3. Use of the bog for turf-extraction can be provided to the turf-cutter on a long-term basis

Further criteria could be informed by similar situations elsewhere where the relocation of turf-cutting has proven practical.

Information required to finalise plan

This is a *draft* Plan. A lack of engagement by certain turf-cutters and their representatives in certain SACs and more recent developments regarding the NHA Review have resulted in key information required to complete the plan not being available at this time. Such information includes the number of turf-cutters who would be prepared to relocate to a nearby undesignated site, the number who qualify for compensation or relocation, the number who might prefer financial compensation and whether the NHA review has opened up new relocation possibilities for certain SACs. It is not possible to definitely establish an absence of relocation possibilities without this information.

This period of public consultation and the finalising of this plan will provide an opportunity to clarify these issues and whether the provisions of Article 6(4) could be applicable for any particular SAC within the broader context of the Plan. It could also be used to establish whether sufficient consensus can be achieved at a national level in regard to this issue, to make a successful case for flexibility on this basis.

Cessation of Turf Cutting Compensation Scheme

In April 2011 the Minister for Arts, Heritage and the Gaeltacht (DAHG) established the Cessation of Turf Cutting Compensation Scheme to compensate land owners and turbary right holders affected by the restrictions on turf cutting on the 53 Raised Bog SACs. This scheme is administered by the DAHG on behalf of the Minister.

The Cessation of Turf Cutting Compensation Scheme has two main elements:

1. Annual Payment Scheme

A payment of €1,500 per annum (index linked) for 15 years together with a once-off incentive payment of €500 on the signing of a legal agreement with the Minister. (Total €23,000). These payments are exempt from income and capital gains tax.

2. Bog Relocation Scheme

As an alternative to financial payments and, where feasible, qualifying applicants will be facilitated in relocating to non-designated sites to continue turf cutting. While applicants are waiting for relocation projects to be fully developed, they may, on an interim basis, opt for the annual payment under the Annual Payment Scheme or opt to receive an annual supply of 15 tonnes of cut turf delivered to their homes. Under these interim arrangements, there is also flexibility for the provision of turf to other family members who had been sourcing turf from the bog plot. The terms and conditions relating to relocation will take account of any interim payments or deliveries of turf made.

Under the current relocation model, in the relocation site on a non-designated bog, the face-bank is shared and an area of spread ground is assigned to each relocating turf cutter for his/her sole use. The spread ground will be of a sufficient size to accommodate approximately 12 (10 sod) hoppers of turf.

Each relocating turf cutter may extract turf from the relocation site until his/her hopper allocation has been exhausted up to a maximum of 650 hoppers of turf or for 65 years (whichever comes first).

Each relocating turf cutter's allocation (number of hoppers of turf) in a relocation site will be calculated on the basis of the amount of uncut high bog which that Cessation of Turf Cutting Compensation Scheme applicant had remaining within the Raised Bog SAC. An additional 10% will be added (and if the applicant had more than 500 hoppers remaining within the SAC, he/she will receive an additional 20% per 100 hoppers over the 500 hopper limit). The overall allocation is subject to an upper threshold (650 hoppers). The minimum allocation is fifty hoppers.

The hopper allocation calculations are carried out by a contractor on behalf of the Department.

The Department is willing to consider other relocation models.

In May 2013, the Department launched the Pilot Energy Efficiency and Transition Programme as a new element of the Cessation of Turf Cutting Compensation Scheme. Four Raised Bog Special Areas of Conservation were selected to be part of the pilot programme, namely:

- Moneybeg and Clareisland Bogs, Co. Westmeath;
- Mouds Bog, Co. Kildare;
- River Moy Bog, Co. Mayo;
- Monivea Bog, Co. Galway.

The programme assesses the home of each participant and provides tailored advice on the energy efficiency of the home, options for upgrading heating systems and insulation within the home, and renewable energy solutions which may be considered. The programme is intended to facilitate the transition of participants in the scheme to a less carbon intensive energy future.

Cessation of Turf Cutting Compensation Scheme – Qualifying Criteria

The qualifying criteria for the Cessation of Turf Cutting Compensation Scheme are that:

- The applicant has a legal interest in one of the 53 Raised Bog SACs - ownership or a turbary right (right to cut turf);
- The applicant must have had the sole and exclusive right to cut and remove turf from the property on 25 May 2010;
- The applicant must have been cutting turf on the land in question during the five year period up to the 25 May 2010 in respect of the 29 Raised Bog SACs nominated for designation between 1997 and 1999 and up to 31 December 2011 in respect of the 24 Raised Bog SACs nominated for designation in 2002 (see Table 6.2);
- The turbary right/turf resource has not been exhausted; and

- No turf cutting or associated activity is ongoing on the property or has occurred from 2011 for the 29 Raised Bog SACs or from 2012 for the 24 Raised Bog SACs.

Lack of documentation to demonstrate ownership or a turbary right

Where a Cessation of Turf Cutting Compensation Scheme applicant does not have or cannot obtain the documentation required to demonstrate ownership or a turbary right, the Department requires the applicant to provide additional documentation including a sworn affidavit setting out the circumstances under which the applicant claims to have acquired the bog plot or turbary right over the bog plot.

Loss of turf as a source of domestic fuel for more than one household

Where an applicant, who is the owner of a bog plot(s) or has the turbary right to the bog plot(s), is at the loss of turf as a source of domestic fuel for more than one household because of the restrictions on turf cutting on the 53 raised bog Special Areas of Conservation, each separate family household may apply for compensation under the Cessation of Turf Cutting Compensation Scheme. Any applicant, who is not the owner of the bog plot(s) or does not have the turbary right i.e. is not the legal title holder, must provide in writing specific details of his/her situation to the Department. The Cessation of Turf Cutting Compensation Scheme application form and specific details will be assessed by the Department and a decision taken as to whether or not the applicant is considered eligible for compensation under the scheme. The Department requires such applicants to provide additional documentation including:

i. a sworn affidavit indicating that he or she had been cutting for his/her own separate household with the permission of the legal title holder; and

ii. a sworn affidavit from the legal title holder indicating that the Cessation of Turf Cutting Compensation Scheme applicant had cut turf on the bog plot(s) with his/her permission, for the applicant's own separate household.

The closing date for the receipt of applications under the Cessation of Turf Cutting Compensation Scheme

The closing date for applications generally has passed. However, the Department is continuing to accept late applications for compensation under the scheme for the time being.

Legal Agreements

Under the Cessation of Turf Cutting Compensation Scheme, in order to finalise compensation arrangements, applicants must sign a legal agreement with the Minister for Arts, Heritage and the

Gaeltacht. The signing of this document means that the Minister is bound to provide the applicant with the compensation as outlined in the legal agreement. The signing of this document also means that the applicant is undertaking to no longer cut turf on Special Areas of Conservation. Signing and returning both copies of the legal agreement allows the Department to make to the applicant a €500 once-off incentive payment.

Under the Cessation of Turf Cutting Compensation Scheme, three types of legal agreements have been and are being issued by the Department:

- The first is a legal agreement for qualifying turf cutters who are signing up to the annual payment of €1,500, index-linked, for 15 years.

- The second is a relocation interim legal agreement for qualifying turf cutters who have expressed an interest in relocation but no relocation site is currently available for them to relocate to. This relocation interim legal agreement provides for the payment of €1,500, index-linked, or a supply of 15 tonnes of cut turf per annum, while these applicants are awaiting relocation to non-designated bogs.

- The third is a final relocation legal agreement. This agreement has been issued to qualifying turf cutters where a site has been assessed as suitable for relocation and is ready, or can be made ready, for use for domestic turf cutting.

Existing land ownership or turbary rights will not transfer to the Minister by the signing of a legal agreement.

Cessation of Turf Cutting Compensation Scheme – Statistics

2,837 applications for compensation under the Cessation of Turf Cutting Compensation Scheme have been received and acknowledged by the Department. 796 applicants have expressed an interest in relocation to non-designated bogs. 1,820 payments have been made in respect of Year 1 of 15, 1,629 payments have been made in respect of Year 2 of 15 and 559 payments have been made in respect of Year 3 of 15. 405 deliveries of turf have also been made.

Updates of this information are regularly published on the website of the Department at http://www.npws.ie/peatlandsturf-cutting/turfcutting/compensationschemestatistics/

Relocation

As part of the Government's efforts to address the needs of turf-cutters, the Minister for Arts, Heritage and the Gaeltacht agreed to work with local turf-cutting communities to explore and implement relocation solutions, where turf-cutters could be moved from their raised bog within the SAC to a nearby non-designated bog where they could continue to source turf for their domestic needs. This was presented as an alternative to financial compensation and turf-cutters are offered a financial payment or the delivery of turf for each year until their relocation bog is ready for turf-cutting.

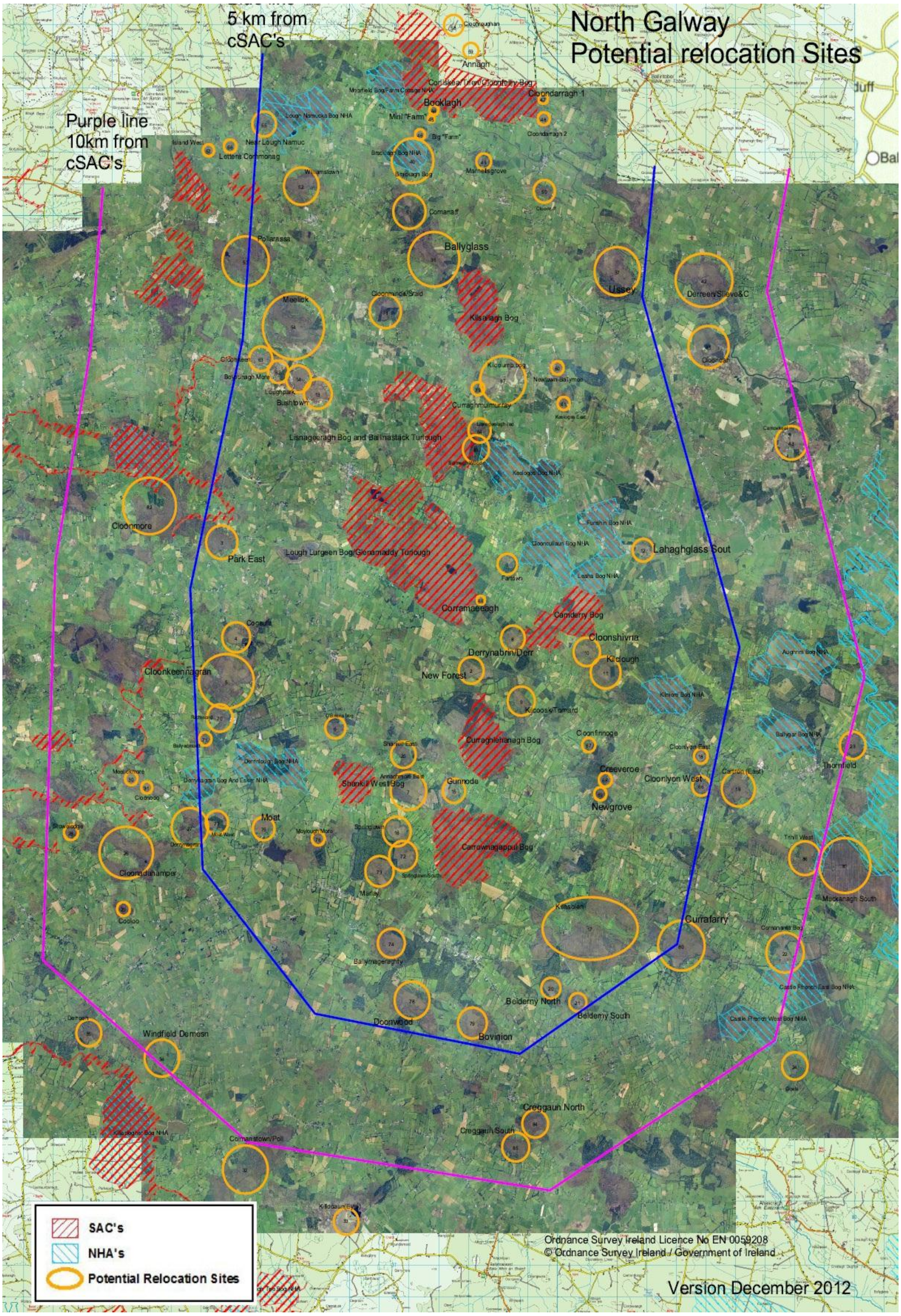
Relocation can be a complex process involving the investigation of suitable sites for turf quality and quantity, establishing the infrastructure/drainage works required, establishing the number that can be accommodated on the relocation site, assessing the cost and feasibility of land purchase or lease, and securing necessary planning consents. Establishing the preferences of individual turf-cutters and their entitlements to participate in the scheme can also take time. The Department is in the process of pursuing relocation options for each of the SACs where relocation may be required.

Process involved in the relocation of turf cutters to non-designated bogs

Stage 1 - Potential Site Identification

The first stage of the process is to identify potential alternative bogs near the SAC that would be suitable for turf-cutting. In certain cases, turf-cutting groups identified a bog which they would like to have investigated in terms of its suitability for turf-extraction. In some cases this has proved to be successful and in others the identified bog has been ruled out for various reasons, and the search moves on to other alternatives..

Stage 1 has also involved an assessment of potential relocation sites identified in the TCCA proposals on 57 Raised Bog Complexes to the EU Commission and Irish Government 4 March 2012, the Quirke Report (Peatlands Forum 28th February – 2nd March 2012), by local turf cutting communities, and by Departmental staff. Department officials have undertaken an initial identification exercise and investigated the presence of potential relocation sites suitable for further consideration within a radius of 15 kilometres from each of the SACs. This exercise included an examination of ownership details available from the Property Registration Authority of Ireland. Where this exercise had indicated that a site had potential, a field inspection of the site was undertaken by Department officials. If this inspection has indicated that a site appears suitable, details have been passed to a specialist contractor engaged by the Department for further assessment. To date, Department staff have identified and screened several hundred sites. For example, Figure 6.1 illustrates the potential alternative sites identified & screened within 10km of the North East Galway SACs.


North Galway
Potential relocation Sites
5 km from cSAC's
Purple line 10km from cSAC's
SAC's
NHA's
Potential Relocation Sites
Ordnance Survey Ireland Licence No EN 0059208
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Version December 2012

Figure 6.1

Stage 2 - Preliminary suitability assessment of a potential relocation site

This involves a site visit by the specialist with an examination of the high bog, spread ground, access roads, drainage and any other key issue.

Stage 3 - Stratigraphy suitability assessment of a potential relocation site

A stratigraphy assessment is undertaken to determine the depth and quality of peat deposits in the site. Peat samples are taken at various locations across the site, analysed and graded in accordance with the Von Post Scale of Decomposition of Peat.

Stage 4 - Full suitability assessment of a potential relocation site

A full assessment is undertaken in order to evaluate the suitability of the site for turf cutting for domestic purposes. The site is evaluated in terms of peat characteristics, peat depth and volume, site access, face bank and spread ground, drainage, potential number of turf cutters that could be accommodated on the site, and current site activity. The work involved includes topographic surveys, peat depth probing, and site design and layout.

(For Bord na Móna owned relocation sites - move to Stage 8)

Stage 5 - Secure agreement of land-owners for purchase or long terms lease of relocation site.

Stage 6 - Secure planning permission and any necessary consents.

Stage 7 – Conclude purchase or long term lease of site.

Stage 8 - Prepare relocation site and relocation of turf cutters.

This involves site clearance, drainage works, access road works, laying out spreadgrounds and preparing face bank for cutting. In facilitating a relocation site, the Department will undertake all the necessary access, drainage & infrastructure works, etc.

During the relocation process the Department endeavours to maintain contact with representatives of local turf cutting communities in order to keep them informed of developments. Letters have also been issued by the Department to Cessation of Turf Cutting Compensation Scheme applicants from some raised bog Special Areas of Conservation, who have expressed an interest in relocation, informing/up-dating them as to the state of play. It is clear, however, that relocation is an involved and time-consuming process for officials and for the turf-cutters involved. The experience to date is that most progress is made where turf-cutters are well organised and have individuals or groups who can

provide strong leadership in representing their interests and in working with officials to tackle the various challenges that arise during the process.

Some turf-cutters who wish to continue turf-cutting have opted for the monetary compensation and have made their own arrangements regarding fuel supply, including in some cases securing their own turf-bank in a non-designated site. In many cases, this might prove to be a quicker resolution for individuals. To date, larger scale relocation projects have been pursued, with the intention of addressing the needs of groups of turf-cutters together. It is also possible that individual relocation solutions for turf-cutters may be possible and the Department will positively examine any such proposals

Arrangements for the relocation of turf cutters to non-designated bogs have been made for a group from Clara Bog SAC in County Offaly and a group from Carrownagappul Bog and Curraghlehanagh Bog SACs in County Galway. The group from Clara Bog have now commenced turf cutting at the relocation site. The Department envisages that qualifying turf cutters from the group from Carrownagappul Bog and Curraghlehanagh Bog will be able to commence turf cutting in one of the relocation sites from the 2014 turf cutting season.

Progress has been made in the relocation of qualifying turf cutters from Ballynafagh Bog SAC in County Kildare to Timahoe North which is in the ownership of Bord na Móna. The Department envisages that qualifying turf cutters from Ballynafagh Bog will be able to commence cutting in the relocation site during the 2014 turf cutting season, provided that final agreement is reached with them.

Progress has also been made with a view to the relocation of a small group of qualifying turf cutters from Ballynamona Bog and Corkip Lough SAC in County Roscommon to Togher, County Roscommon, which is also owned by Bord na Móna. The Department envisages that this group of turf cutters will be able to commence cutting in the relocation site during the 2014 turf cutting season, provided that final agreement is reached with them.

Of the remaining 49 raised bog Special Areas of Conservation, potential relocation sites have been identified for a further 33 bogs and work is ongoing on identifying and investigating sites. Relocation is unlikely to be required, or is likely to be small-scale, for another 16 raised bog Special Areas of Conservation due, for example, to the small number that had been cutting turf on these sites during the relevant five year period.

Summary of current position in relation to relocation site suitability assessment

Well in excess of 400 potential relocation sites have identified, screened and subject to initial assessment by Department Officials. This has included sites put forward by the Turf Cutters and Contractors Association or suggested by local turf-cutters.

Expert preliminary assessments have been completed on 52 relocation sites for 35 raised bog Special Areas of Conservation by a specialist contractor on behalf of the Department.

Stratigraphy assessments have been completed on 43 relocation sites for 32 raised bog Special Areas of Conservation on behalf of the Department.

Full site assessments have been completed on 10 relocation sites for 13 raised bog Special Areas of Conservation on behalf of the Department and copies of the assessment reports have been provided to local turf cutting community representatives.

Figure 6.1 **NPWS Relocation Sites Summary Report**

#	Code	Site Name	County	Relocation site number(the same site may serve for relocation from more than 1 SAC)	Total Applications Received by DAHG	Number of Which for Relocation	Current Stage	Next Step
1	000006	Killyconny Bog (Cloghbally)	CN / MH	n/a	46	8	n/a	n/a
2	000231	Barroughter Bog	G	1	82	30	Stratigraphy Completed.	Agent to progress on land negotiation.
				2				D/AHG to provide further data to Agent.
3	000248	Cloonmoylan Bog	G	1	84	8	Stratigraphy Completed.	Agent to progress on land negotiation.
				2				D/AHG to provide further data to Agent.
4	000285	Kilsallagh Bog	G	3	38	9	Early suitability & scheme proposal report completed.	Agent to progress on land negotiation.
				4			Stratigraphy Completed.	Good depth of fuel peat under 3m of younger sphagnum peat. On hold pending progress of other relocation options for this site.
				5			Stratigraphy Completed.	Agent to progress on land negotiation.
5	000296	Lisnageeragh Bog & Ballystack Turlough	G	3	23	9	Early suitability & scheme proposal report completed.	Agent to progress on land negotiation.
				5			Stratigraphy Completed.	Agent to progress on land negotiation.
				6			Stratigraphy Completed.	Agent to progress on land negotiation.
6	000297	Lough Corrib	G / MO	Curraghmore - Montiagh	116	10	Not advisable to proceed.	On hold due to unfavourable rapid assessment.
7	000301	Lough Lurgeen Bog/Glenamaddy Turlough	G	6	33	9	Stratigraphy Completed.	Agent to progress on land negotiation.
				7			Stratigraphy Completed.	Agent to progress on land negotiation.
				8				

8	000326	Shankill West Bog	G	7	10	3	Stratigraphy Completed.	Agent to progress on land negotiation.
9	000382	Sheheree	KY		1	0	n/a	n/a
10	000391	Ballynafagh Bog	KE	8	58	28	Full Site Assessment Completed. Ready to Re-tender for Construction.	D/AHG to progress relocation with Turf-Cutters.
11	000440	Lough Ree	RN / LD / WM	34	330	99	Stratigraphy Field Work Completed.	Formal Stratigraphy report to be completed. Poor quality peat.
12	000497	Flughany Bog	MO / SO	9	17	3	Rapid Assessment Completed.	Drainage Assessment, Stratigraphy (and Full Site Assessment) and possible adjoining land.
				10			Rapid Assessment Completed.	Stratigraphy (and Full Site Assessment.)
				11			Rapid Assessment Completed.	Stratigraphy (and Full Site Assessment.)
				12			Stratigraphy Field Work Completed.	D/AHG to consider with regard to SAC / NHA status. Land Negotiation, followed by Full Site Assessment.
				13				
13	000566	All Saints Bog & Esker	OY	14	6	2		
14	000572	Clara Bog	OY	15	107	57	Completed.	Completed.
15	000575	Ferbane Bog	OY	16	4	3	Full Site Assessment Completed. Ready to tender for construction.	Advance Drainage Works. D/AHG to reach agreement with turf-cutters. Agent to tender for construction.
				17			On Hold.	Alternative relocation option to proceed.
16	000580	Mongan Bog	OY		5	1	n/a	n/a
17	000581	Moyclare Bog	OY	16	26	21	Full Site Assessment Completed. Ready to tender for construction.	Advance Drainage Works. D/AHG to reach agreement with turf-cutters. Tender for Construction.
				17			On Hold.	Alternative relocation option to proceed.
				18			Rapid Assessment Completed.	Alternative relocation option to proceed.

18	000582	Raheenmore Bog	OY		0	0	n/a	n/a
19	000585	Sharavogue Bog	OY		3	0	n/a	n/a
20	000592	Bellanagare Bog	RN	19	202	48	Rapid Assessment Completed.	Land acquisition investigation. Scoping exercise for land for spreadground.
				20			Rapid Assessment Completed.	Stratigraphy. Land acquisition investigation. Check if spread ground would be made available by Coillte.
				21			Rapid Assessment Completed.	Land acquisition investigation. Scoping exercise for land for spreadground. Check if spread ground would be made available by Coillte.
				22			Rapid Assessment Completed.	Land Acquisition investigation. Ownership and availability of adjacent lands to be investigated.
				23			Stratigraphy Completed.	Various sites to be individually assessed. D/AHG to assess feasibility of sites due to proximity to SAC / NHA.
21	000595	Callow Bog	RN	35	103	18	Stratigraphy Field Work Completed.	Not advisable as peat is poor quality.
				36			Rapid Assessment Completed.	Stratigraphy Testing.
				37			Rapid Assessment Completed.	Not recommended due to severity of site gradient and lack of spread grounds .
				38			Rapid Assessment Completed.	Stratigraphy Testing.
				39			Rapid Assessment Completed.	Agent to further investigation required into availability of adjoining lands.
				40			Rapid Assessment Completed.	Stratigraphy Testing.
				11			Rapid Assessment Completed.	Stratigraphy (and Full Site Assessment.)
22	000597	Carrowbehy / Caher	RN		3	0	n/a	n/a

23	000600	Cloonchambers Bog	RN	23	31	6	Stratigraphy Completed.	Various sites to be individually assessed. D/AHG to assess feasibility of sites due to proximity to SAC / NHA. D/AHG to clarify ownership in Annaghmaghera.
				24			Draft Full Site Assessment issued.	D/AHG to assess feasibility of sites due to proximity to SAC / NHA.
				25			Additional Stratigraphy Completed.	Not advisable to proceed due to peat quality and ESB overhead line.
				67			Stratigraphy Completed.	Progressing to full site assessment.
24	000604	Derrinea Bog	RN		1	0	n/a	n/a
25	000614	Cloonshanville Bog	RN		7	0	n/a	n/a
26	000641	Ballyduff / Clonfinane Bog	TN		2	0	n/a	n/a
27	000647	Kilcarren-Firville Bog	TN		26	3	n/a	n/a
28	000679	Garriskil Bog	WH		1	0	n/a	n/a
29	001242	Carrownagappul Bog	G	26	135	70	Site ready for relocation.	D/AHG to progress relocation with Turf-Cutters.
				27			Advance Drainage Works completed.	Agent to meet Coillte Area Foreman. Tender for relocation works.
				28			Draft Full Site Assessment issued.	Agent Land to negotiate settlement with adjoining / local landowners. Tender for relocation works.
				7			Stratigraphy Completed.	Agent to progress on land negotiation, followed by full site assessment.
				29			Site ready for relocation.	D/AHG to progress relocation with Turf-Cutters.
				30			Stratigraphy Completed.	On Hold.
30	001818	Lough Forbes Complex	LD / RN		13	4		

31	002110	Corliskea / Trien / Cloonfelliv Bog	G / RN	31	83	14	Stratigraphy Completed.	Stratigraphy Report. D/AHG affirmation of boundaries & ownership needed. Land negotiation with neighbouring land owner.
				32			Stratigraphy Completed.	Land negotiation to proceed.
				33			Rapid Assessment Completed.	D/AHG to research Turbaries.
32	002298	River Moy	MO / RN / SO	9	78	9	Rapid Assessment Completed.	Drainage Assessment, Stratigraphy (and Full Site Assessment) and possible adjoining land.
				41			Stratigraphy Field Work Completed.	Formal Stratigraphy report to be completed. Poor quality peat.
				10			Rapid Assessment Completed.	Stratigraphy (and Full Site Assessment.)
				11			Rapid Assessment Completed.	Stratigraphy (and Full Site Assessment.)
33	002331	Mouds Bog	KE	42	106	40	Full Site Assessment Completed.	Agent to investigate land ownership to the northern boundary of site.
34	002332	Coolrain Bog	LS	43	59	11	Stratigraphy Completed.	Landowner not intersted in selling.
35	002333	Knockacoller Bog	LS	44	30	5	Stratigraphy Completed.	On Hold, pending alternative site investigation.
				43			Stratigraphy Completed.	Landowner not intersted in selling.
36	002336	Carn Park Bog	WH	45	66	34	Early suitability & scheme proposal report completed.	Agent to progress land acquisition.
				46			Rapid Assessment Completed.	Stratigraphy Testing.
				47			Early suitability & scheme proposal report completed.	Part of Moydrum (See Above.)
37	002337	Crosswood Bog	WH	45	73	33	Early suitability & scheme proposal report completed.	Agent to progress land acquisition.
				46			Rapid Assessment Completed.	Stratigraphy Testing.

38	002338	Drumalough Bog	RN	23	23	1		6 Potential relocation areas identified. D/AHG to assess feasibility of sites due to proximity to SAC / NHA. Agent to progress land acquistion.
39	002339	Ballynamona Bog & Corkip Lough	RN	48	65	29	Stratigraphy & Drainage Report Completed.	D/AHG to progress relocation with Turf-Cutters.
				49			Site ready for construction.	D/AHG to progress relocation with Turf-Cutters.
40	002340	Moneybeg & Clareisland Bogs	MH / WH	68	94	13	Bord na Móna owned & currently unavailable.	Not available.
				69			Bord na Móna owned & currently unavailable.	Not available.
				70			Rapid Assessment Completed.	Not Advisable due to peat quality.
				71			Rapid Assessment Completed.	Not Advisable due to poor peat quality and too far from SAC.
				72			Rapid Assessment Completed.	Not Advisable but Department & Coillte exploring pilot stump removal after clear fell.
				73			Stratigraphy Fieldwork completed.	Test hoppers cut.
				74			Stratigraphy Completed.	Department & Coillte exploring pilot stump removal after clear fell.
41	002341	Ardagullion Bog	LD	75	43	11	Bord na Móna owned & not available.	
				68			Bord na Móna owned & currently unavailable.	
				76			Bord na Móna owned & currently unavailable.	
				77			Bord na Móna owned & currently unavailable.	
42	002342	Mount Hevey Bog	MH / WH	78	68	39	Bord na Móna owned & currently unavailable.	
43	002343	Tullaher Lough & Bog	CE	n/a	198	27	n/a	n/a
44	002346	Brown Bog	LD	n/a	6	0	n/a	n/a
45	002347	Camderry Bog	G	50	14	8	Stratigraphy Completed.	Agent to progress land acquisition.

				51				
				6			Stratigraphy Completed.	Agent to progress on land negotiation.
				52			Rapid Assessment Completed.	Not advisable at this stage. Limited high bog and multiple owners, quality of the bog to be tested.
46	002348	Clooneen Bog	LD	79	3	0	Not advisable to proceed. Ownership, limited access. drainage and peat quality issues.	Not advisable to proceed due to peat quality, drainage and multiple ownership.
				80			Stratigraphy good.	Agent to progress land acquistion and full site assessment.
47	002349	Corbo Bog	RN	53	77	32	Stratigraphy Field Work Completed.	Formal Stratigraphy report to be completed. Poor quality peat.
				54				
48	002350	Curraghlehanagh Bog	G	26	48	20	Site ready for relocation.	D/AHG to progress relocation with Turf-Cutters.
				27			Advance Drainage Works completed.	Agent to meet Coillte Area Foreman. Tender for relocation works.
				28			Draft Full Site Assessment issued.	Agent to negotiate settlement with adjoining / local landowners. Tender for relocation works.
				7			Stratigraphy Completed.	Agent to progress on land negotiation, followed by full site assessment.
				30			Stratigraphy Completed.	On Hold.
49	002351	Moanveanlagh Bog	KY	55	31	3	Stratigraphy Completed.	D/AHG to consider with regard to SAC / NHA status.
50	002352	Monivea Bog	G	56	54	9	Rapid Site Assessment Completed.	Land is not being made available for sale.
				57				
				58				

				59			Stratigraphy Completed.	Agent to draft access proposal followed by full site assessment.
				60			Stratigraphy Completed.	D/AHG to consider with regard to SAC / NHA status.
				61			Rapid Assessment Completed.	On hold due to access / infrastructural issues.
				62			Rapid Assessment Completed.	On hold due to access / infrastructural issues and concerns over quantity of high bog remaining.
51	002353	Redwood Bog	TN	63	83	6	Full Site Assessment(Draft) completed.	Planning Application being prepared.
52	002354	Tullaghanrock Bog	RN	n/a	2	0	n/a	n/a
53	002356	Ardgraigue Bog	G	64	23	2	Stratigraphy Field Work Completed.	Agent to progress land acquisition.
				65			Stratigraphy Field Work Completed.	Agent to progress land acquisition pending D/AHG approval.
				66			Stratpgraphy Completed.	Agent to progress land acquisition.

Table 6.2 Year Cessation of Turf Cutting was to take place

#	Cessation from Year	Code	Site Name	County
1	2010	000006	Killyconny Bog (Cloghbally)	Cavan/Meath
2	2010	000231	Barroughter Bog	Galway
3	2010	000248	Cloonmoylan Bog	Galway
4	2010	000285	Kilsallagh Bog	Galway
5	2010	000296	Lisnageeragh Bog and Ballinstack Turlough	Galway
6	2010	000301	Lough Lurgeen Bog/ Glenamaddy Turlough	Galway
7	2010	000326	Shankill West Bog	Galway
8	2010	000382	Sheheree (Ardagh) Bog	Kerry
9	2010	000391	Ballynafagh Bog	Kildare
10	2010	000497	Flughany Bog	Mayo/Sligo
11	2010	000566	All Saints Bog and Esker	Offaly
12	2010	000572	Clara Bog	Offaly
13	2010	000575	Ferbane Bog	Offaly
14	2010	000580	Mongan Bog	Offaly
15	2010	000581	Moyclare Bog	Offaly
16	2010	000582	Raheenmore Bog	Offaly
17	2010	000585	Sharavogue Bog	Offaly
18	2010	000592	Bellanagare Bog	Roscommon
19	2010	000597	Carrowbehy/Caher Bog	Roscommon
20	2010	000600	Cloonchambers Bog	Roscommon
21	2010	000604	Derrinea Bog	Roscommon
22	2010	000614	Cloonshanville Bog	Roscommon
23	2010	000641	Ballyduff/Clonfinane Bog	Tipperary
24	2010	000647	Kilcarren-Firville Bog	Tipperary
25	2010	000679	Garriskil Bog	Westmeath
26	2010	001242	Carrownagappul Bog	Galway
27	2010	001818	Lough Forbes Complex	Longford/Ros
28	2010	002110	Corliskea/Trien/Cloonfelliv Bog	Galway/Ros
29	2010	000297	Lough Corrib	Galway/Mayo
30	2012	000440	Lough Ree	Ros/LD/WM
31	2012	000595	Callow Bog	Roscommon
32	2012	002298	River Moy	Mayo/Ros/Sligo
33	2012	002331	Mouds Bog	Kildare
34	2012	002332	Coolrain Bog	Laois
35	2012	002333	Knockacoller Bog	Laois
36	2012	002336	Carn Park Bog	Westmeath
37	2012	002337	Crosswood Bog	Westmeath
38	2012	002338	Drumalough Bog	Roscommon
39	2012	002339	Ballynamona Bog and Corkip Lough	Roscommon
40	2012	002340	Moneybeg and Clareisland Bogs	Meath/Westmeath
41	2012	002341	Ardagullion Bog	Longford
42	2012	002342	Mount Hevey Bog	Meath/Westmeath
43	2012	002343	Tullaher Lough and Bog	Clare
44	2012	002346	Brown Bog	Longford
45	2012	002347	Camderry Bog	Galway
46	2012	002348	Clooneen Bog	Longford
47	2012	002349	Corbo Bog	Roscommon

#	Cessation from Year	Code	Site Name	County
48	2012	002350	Curraghlehanagh Bog	Galway
49	2012	002351	Moanveanlagh Bog	Kerry
50	2012	002352	Monivea Bog	Galway
51	2012	002353	Redwood Bog	Tipperary
52	2012	002354	Tullaghanrock Bog	Roscommon
53	2012	002356	Ardgraigue Bog	Galway

Financing

A key challenge facing Ireland is meeting the commitments it made under the Habitats Directive to designate and protect a proportion of its peatlands within Special Areas of Conservation. In raised bogs, this, by definition, requires the cessation of an existing land-use activity - turf-cutting - that is highly valued by those involved. It is to be expected that those who are asked to bear the burden of raised bog conservation, for the good of the wider community and of future generations, and who are asked to stop sourcing their fuel from these bogs, should be provided with adequate compensation. The current compensation and relocation schemes established by Government will pay out up to €69 million to turf-cutters over a 15 year period. Further costs will arise from the implementation of restoration and management plans of each of the sites amounting to circa €10.8 million.

The question arises as to how these costs should be met and consideration must be given to the possibility of using EU funding mechanisms to meet some of these costs, which otherwise will fall to be met by the exchequer.

The Prioritised Action Framework under the Habitats Directive

It should be noted that the Habitats Directive (92/43/EEC) is unusual in EU terms in that it has specific provisions in it in relation to EU co-financing. Article 8.4 of the Directive requires the European Commission to adopt a prioritised action framework of measures involving co-financing to be taken for Special Areas of Conservation chosen for designation under the Directive. This involves a process of agreeing financing priorities with Member States for the use of various EU funding instruments.

In accordance with these legal obligations, Ireland submitted a draft Prioritised Action Programme to the European Commission in January 2013[1]. The priorities set out in this document for investment in the protection of areas protected under the Birds and Habitats Directives were agreed by all relevant

[1] http://www.npws.ie/publications/archive/IE_PAF_draft_1.1_Jan2013.pdf

Government Departments. Peatlands and Ireland's raised bog SAC network are listed for priority attention.

While LIFE may offer some limited assistance and will be pursued, the operational programmes currently in preparation will determine how and for what purposes the bulk of available EU funding to support Ireland in pursuing agreed EU priorities is to be used. Structural and RDP funding provide possibilities to off-set some or all of these costs that will otherwise fall to be met entirely from the Exchequer. These issues will be considered in the context of Government decisions on Structural Funding in consultation with the European Commission.

Protecting Ireland's Natural Capital and its contribution to sustainable economic growth

The cost of managing the Natura 2000 network across the EU was calculated in 2008 to be €5.8 billion per annum. In 2008, it was estimated that the total cost of full implementation of the Nature Directives in Ireland would be €185.2 million per annum, with 79% of the cost associated with habitat management and monitoring.

While the management of biodiversity has an associated cost, it is also clear that there are significant economic benefits in managing this resource effectively. A 2013 DG Environment commissioned document ("The Economic Benefits of the Natura 2000 Network") attempts to quantify these benefits at the European scale. A first estimate of the economic value of the terrestrial Natura 2000 network (in "gross benefits") is in the order of €200-300 billion per year, with an even greater inherent value in terms of carbon sequestration, water provision, pollination etc. Many of these issues, as they relate to the management of peatlands are considered in the draft National Peatlands Strategy.

There is also an economic cost to not implementing the nature Directives, of circa €50 billion per annum. Therefore it is approximately 10 times more cost-effective to manage the Natura 2000 network well than to mismanage it or allow it to deteriorate.

Ireland is currently preparing its draft Partnership Agreements with the European Commission, which will inform the Operational Programmes through which Ireland will spend and disburse considerable EU and State funds. These funds are designed to support a wide range of agreed policy objectives within the EU, including those related to the restoration, preservation and enhancement of biodiversity (including in Natura 2000 and high nature value areas) and the shift towards a low carbon economy.

The implementation of this Plan will clearly contribute to the Promotion of Environment Friendly and Resource Efficient Economy, one of the funding priorities set down by the EU Commission.

There is also significant potential to seek support under the EU LIFE Programme. This programme offers significant benefits in that community involvement will be central to any bids for funding under LIFE and will be crucial to the success of any projects supported by the Programme. This is in line with the overall philosophy of building support for restoration and conservation with local communities.

Further funding opportunities will also be investigated including the EU CLIMATE, LEADER and INTERREG programmes.

The Department has engaged a specialist to commence the preparation of a LIFE application and to investigate other funding opportunities.

Chapter 7 Benefits of the Plan

Introduction

Full implementation of the Programme of Conservation Measures set out in Chapter 5 of this Plan will result in a more sustainable network of SAC bogs which bring a wide range of beneficial ecosystem service opportunities. Ecosystem services are the benefits people derive from natural systems.

Ecosystem structures and processes (what the bog is made of and how it works) can be represented as a number of ecological functions which can be measured by well-accepted scientific methods (providing information on how an ecosystem is performing). These functions create services which are then translated into benefits that can be measured by how people value or place importance on those systems and associated products at different spatial levels. This is typically done using valuation methods for ecosystem services. Figure 7.1 gives an overview of these functions and associated benefits for a typical Irish raised bog.

Natural bogs (those with little human impact) are considered one of the most important ecosystems of the world, because of their key value for biodiversity, regulation of climate, water filtration and supply, and important support for human welfare (e.g. source of well-being and knowledge). These benefits or services are further discussed below together with a description of their associated ecological functions and what happens when a bog is degraded, be it drained or cut for turf.

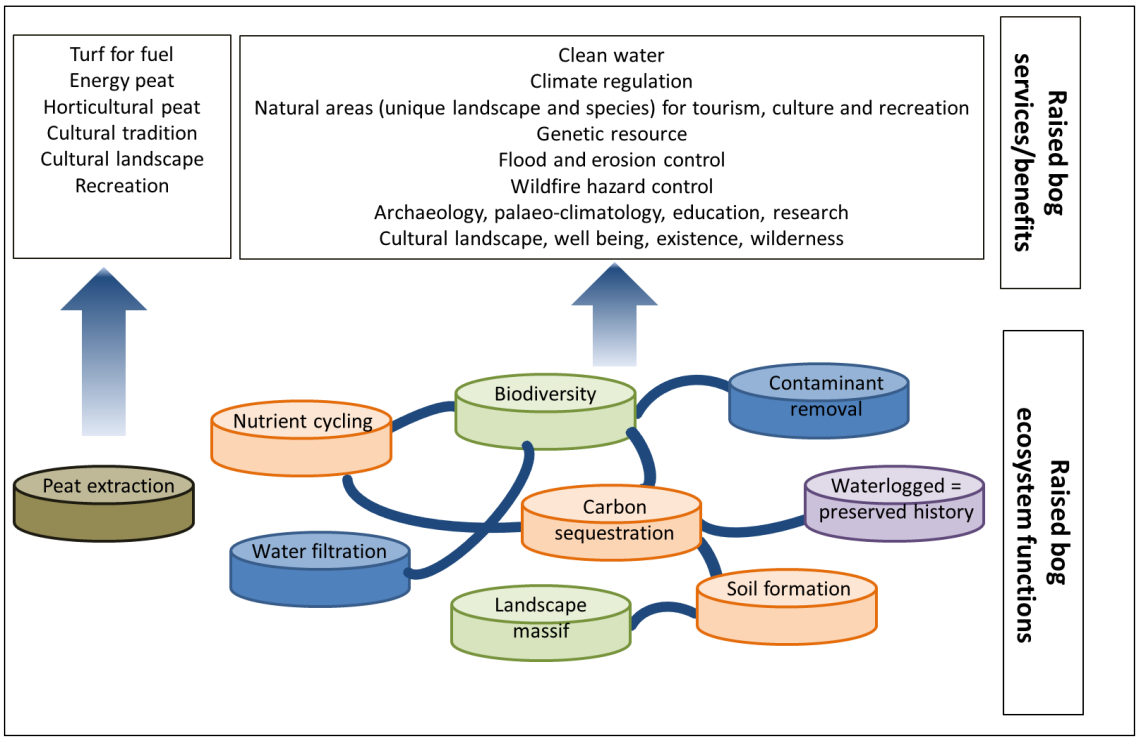

Figure 7.1 Raised Bog Ecosystem Functions and Services/Benefits

Function 1: Carbon storage and carbon sequestration;

Associated services/benefits: Climate regulation and mitigation against climate warming through removal of carbon dioxide (CO_2) from the atmosphere.

Bogs contain 75% of all the soil organic carbon in Ireland and 1 hectare of raised bog contains the same amount of carbon as that being emitted annually by 1,040 cars (or 560 SUVs). In contrast to most other ecosystems, which rapidly recycle biomass releasing carbon dioxide, water and nutrients, bog biomass does not decay completely and builds up as peat due to the very wet and acid environment. A healthy, undrained bog can store carbon indefinitely as long as the bog is wet. Healthy bogs are not only the guardians of this carbon store but they continually take more carbon from the atmosphere by the vegetation which, upon dying will form new peat. Since the last ice age in Ireland, some 10,000 years ago, raised bogs have formed and grown, building up peat and a carbon store within. By taking the carbon dioxide from the atmosphere over long periods and by emitting other greenhouse gases such as methane, natural bogs affect and help to regulate the global climate. Over a long time scale and at the planetary scale, peatlands have been naturally 'cooling' the atmosphere, the opposite to human-induced 'warming' caused by the emission of carbon dioxide into the atmosphere. Like virgin tropical rainforest, natural peatlands act as natural climate regulators.

When a raised bog is either drained or cut at the edges causing the bog to become drier, decomposition of the peat increases, the bog no longer accumulates carbon and starts to release CO_2 to the atmosphere, thereby contributing to climate warming. The area that is usually used for turf cutting i.e. the outer edge of a raised bog, has been shown to emit 6 to 7 times more carbon dioxide than the centre of the bog (Wilson 2008, Renou-Wilson *et al*., 2011). As they become drier, domestically cut (cutover) bogs in Ireland cumulatively emit an estimated 2.46 Million tonnes of CO_2 to the atmosphere per year (Wilson *et al.* 2013). In addition, 1 Million tonnes of CO_2 per year is emitted to the atmosphere through the burning of turf in the residential sector. In total, this is equivalent to around a third of the emissions from the transport sector for 2013 (Duffy *et al.* 2013). Altogether, on-site emissions from bogs where peat is extracted for either industrial energy peat, domestic turf or horticulture together with off-site emissions from the associated energy related production (when the peat is burnt) and horticultural production (when the peat eventually decomposes), amounts to approximately 8.7 Million tonnes of CO_2 to the atmosphere every year (Wilson *et al*. 2013).

Function 2: Support habitats and species biodiversity.

Associated services/benefits: maintenance of unique and threatened flora and fauna, genetic resources and unique landscape.

Irish raised bogs support nationally and internationally important biodiversity. Raised bogs are on the list of 'priority' habitats under the Habitats Directive (Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC) because they are threatened with extinction in Europe. Raised bog landscapes are nowadays only present in remote areas of Europe and the remaining bogs, including those under conservation are known to be mostly damaged and undergoing further degradation. This has repercussions for the species that live in these habitats. Bogs species have become rare and endangered simply because of the massive decline of their naturally wet habitats. Healthy raised bogs have a variety of characteristic habitats, each of them harbouring specific biodiversity suited to the harsh environmental conditions. These species are not found anywhere else where 'normal' conditions prevail. This signifies that when the bog is degraded, drained or cut, the bog species are unable to compete with other 'common' species and disappear locally as there is not similar wet and acid landscape in the environment. In addition, the bog massif which is composed of various micro-habitats (drier hummocks, wetter *Sphagnum* lawns) is used by species that need different sites to complete their life cycle. The diversity of habitats within a site is important for hosting the full species diversity of raised bog landscapes. Some species are still being discovered in Irish bogs (Hannigan *et al.* 2009) and they are the ideal place for some bird species which are sensitive to disturbance (e.g. curlews breed preferentially in the wettest parts of a raised bog). Because a healthy raised bog is naturally wet, it also acts as a barrier for wildfires further reducing environmental damage (e.g. more CO_2 being emitted to the atmosphere) and deleterious visual effects.

Function 3: Water filtration, contaminant removal and nutrient cycling

Associated services/benefits: clean water, regulation of catchment water supply and hydrochemistry.

Raised bogs are linked with their neighbouring systems and continuously exchange substances through transformation of nutrients, buffering or storage resulting in a change in chemical composition of the water outflow. Raised bogs play an important part in regulating water within a catchment and in maintaining water quality. Mosses, which are the main vegetation component of a healthy raised bog can hold twenty times their own weight in water and together with the peat mass, they help to filter contaminants and release 'clean' water. Raised bogs may fulfil an essential role as source areas for rivers, especially in maintaining low flows during dry periods. Under certain geographical conditions, raised bogs can control the flow of water within a catchment, mitigating flooding downstream. The storage capacity of a natural bog is however limited and depends on the composition of the top layer

of the bog and the quality (presence or absence of drainage and cutting) of the bog margins. Damage to bogs, especially where channels have been created from cutting, drainage and loss of vegetation, can increase the amount and speed of water leaving the bog. In addition, this drained water contains higher amounts of dissolved organic carbon and particulate organic carbon (brown water) than natural bog water and leads to leaching of nutrients from the decomposing peat (Holden *et al.* 2004). In cases where this brown water is used as a source for drinking water, the treatment required to remove the colour becomes very expensive. Furthermore, the waterborne carbon which is lost via drainage leads to further off-site CO_2 emissions.

Function 4: soil formation, massif landscape and support for nature

Associated services/benefits: aesthetics, recreation and well-being.

Raised bogs are a unique landscape that cannot be replicated by other habitats. They are a living, organic landscape and because they provide a natural support or soil to unique flora and fauna, they provide recreational opportunities including wildlife watching. In the Midlands, healthy raised bogs are the main haunt of the cuckoo and the raised bog fringes were once a favourite place for the nightjar which has now gone, but may yet return when the raised bogs are restored. Nature as a source of well-being is now generating an economic value. Outdoor experiences in the open landscape (and bogs are ideal places) are increasingly used and have provided inspiration throughout history for poets, painters, artists.

At Clara, County Offaly, a multi-purpose building has been constructed to house a raised bog interpretative centre and town library which has become a focal point for nature education and tourism. The construction of a boardwalk over a portion of Clara Raised Bog SAC also provides a local recreational facility and offers further potential to attract tourists interested in the outdoors experience(see plate 7.1 and 7.2).

Studies in Ireland (Collier and Scott 2009, Bullock and Collier 2011) and Scotland (Market Research Partners 2008) have shown that people place a high value on the conservation of wild places. These cultural landscapes act as bridges linking people and nature and call for a balance between the use of the landscape as an economic resource and its preservation as a component of the natural and cultural heritage. Those valuing the cultural landscape almost inevitably include the landowners or turf rights owners who are instrumental in its management.

Plate 7.1 Interpretative display at Clara Raised Bog SAC

Plate 7.2 Boardwalk at Clara Raised Bog SAC

Function 5: Preservation of information in un-decomposed biota and artefacts

Associated services/benefits: Social-amenity, source of historical knowledge.

Bogs record their own history as the waterlogged soil in a bog can preserve archaeological artefacts (bog butter and bog bodies) as well as information in the un-decomposed plants, animals, seeds or pollen which represent the past biodiversity (what used to grow in Ireland) and that can tell us more about our past climates. Bogs hold the secrets of the past and hold a cognition function i.e. that is able to provide opportunities for the development of knowledge and understanding through palaeo-archaeology and palaeo-climatology as well as general research, education and training. Intact peat is a repository of information about the wider environment, not only about past climate but about regional vegetation, human settlement and even cosmic radiation. With new techniques constantly being developed, the depth and breadth of information we can obtain are unprecedented. The significance of bogs in this respect will increase in the future as changes may happen even faster. All this information is destroyed forever as peat is removed and burned and when decomposition is accelerated because the remainder of the bog is drying out.

Function 6: Production of peat/turf

Associated services/benefits: Source of domestic fuel, energy peat and horticultural peat; cultural tradition and recreation.

When a bog is drained and the turf is extracted, it fulfils a production function, in other words, it relates to the capacity to provide resources which can be economically valued and enjoyed by certain individuals. In this case, the peat can be used as domestic fuel, energy peat for electricity generation or for horticultural products. Peat extraction is a choice of utilisation of bogs which has clear economic values. Turf cutting can be valued at the household level in the saving that can be made on alternative fuel purchases or in terms of profit for the contractors, in other words a private benefit. Turf cutting can also be appreciated as a cultural tradition, a notable feature of the Irish landscape and as such, is a social public good. Such land-use and tradition is widely practiced around the country and turf cutting is and will continue on a significant number of raised bog sites of least conservation value following implementation of this Plan.

Favouring such production function has direct consequences in that the raised bog resource where turf cutting is allowed to continue, will continue to degrade and therefore will not provide the other benefits associated with healthy natural wet bogs as mentioned above (Functions 1 to 5). This is because when a bog is drained and peat is cut, critical functions are affected and associated services cease to exist.

Recovery of ecosystem services through the National Raised Bog SAC Management Plan and how people will benefit

The protection and restoration of Ireland's raised bog SACs within a robust national network of raised bogs as set out in this Plan means that all of the ecosystem services are valued for the benefit of the larger community. Therefore, it is expected that following implementation of the proposed programme of measures these protected areas can provide the full suite of associated benefits, such as clean water, climate regulation, water supply, biodiversity, important support for human welfare.

The restored bogs will be able to accumulate peat again and sequester carbon. The National Raised Bog SAC Management Plan, therefore, directly supports Ireland's aim to reduce its national greenhouse gas emissions by firstly conserving those bogs that are currently sequestering carbon and secondly, by providing mitigation measures to reduce the carbon emissions from currently drained/cut bogs. New accounting changes in the next Kyoto Protocol commitment period (2013-2017) permit the inclusion of rewetted peatlands and their associated greenhouse gas fluxes. Removal of carbon by rewetted bogs can be reported and used against our national emissions.

Rewetting the bogs will also lead to a decrease in waterborne carbon leaching to levels comparable with undrained/uncut bogs. Restoration also re-creates the natural heterogeneity of habitats which is critical for the diversity of flora and fauna. Once the pre-disturbance vegetation cover is re-established, the site can be deemed fully restored and therefore all the benefits including carbon sequestration can be enjoyed again. The restoration of the bog will also ensure that the knowledge it contains within is preserved for the future.

This draft national raised bog SAC management plan envisages that the cultural and production services of raised bogs in the form of turf cutting is not lost but is on-going. Re-location to other sites and the exclusion of turf cutting on natural protected raised bogs means that Ireland can harness all of the benefits (including cultural and traditional benefits) of a national resource for its people and not just choose one single individual benefit from all our raised bogs.

Research in Ireland has shown that where peat has been extensively extracted in the Midlands, local people value the rehabilitation of the cutaway through conversion to either a peatland or wetland landscape (Collier and Scott 2010). Unlike other ecosystems, attempts to create a new ecosystem from scratch are difficult for raised bogs, which took millennia to develop in the landscape. While this strategy is critical for future biodiversity and potential carbon sequestration, the outcome in terms of total benefits are still unknown. Therefore, it is the best option to protect and restore what is left for future generations. Restoration efforts that target improvements on the currently least degraded sites (the SAC network), as suggested in this Plan, offer the most hope for recovering a full range of ecosystem services in those designated sites only. Restoration efforts and the recovery of the full

suite of ecosystem services can only be achieved through a Plan integrating all the natural resource that remains, not on a site by site basis as was done in the past.

Similarly, a Plan such as this one, which includes the best remaining sites across Ireland, will have more chance to be successful as it can deploy adaptive management in order to target the ecosystem services of interest. Restoration based on structural features only, for example hydrological processes, is not sufficient to recover all the desired services.

This draft national raised bog SAC management plan will ensure that while turf cutting needs are met for individuals, and the associated cultural heritage is preserved in non-designated sites (90% of the national raised bog resource), all the other benefits that raised bogs bring to society can be almost all recovered and enjoyed by everyone on the remaining 10% of the resource that is located in the protected sites. Therefore the Plan can bring an overall positive impact on ecosystem services provided by raised bogs, without compromising on cultural and traditional benefits.

Without such a plan, i.e. in a business as usual scenario with continued drainage and turf cutting on conservation sites, Ireland would experience the continued loss of all aforementioned benefits and that the cost of losing such benefits will be borne by the whole of society.

Chapter 8 Next Steps

This Draft National Raised Bog SAC Management Plan has been prepared to encourage public participation in the planning process and to enable all interested parties to have their say.

A formal period of Public Consultation will be undertaken between December 2013 and March 2014.

Every submission received during the Public Consultation process will be carefully considered and used to inform the making of the Final National Raised Bog SAC Management Plan. The process of how the submissions have been considered in the making of the Final Plan will be formally documented within the SEA Statement which will be published at the same time as the Final Plan.

The Final National Raised Bog SAC Management Plan will be published in 2014.

The following Next Steps will be taken in the period leading up to the Final Plan and will continue during 2014-15.

Engagement with turf-cutters, land owners and residents

The elements of this draft plan that deal with relocation and compensation have emerged from consultation and discussions with turf-cutter and land-owner representatives of Raised Bog SACs. Liaison Committees representing turf-cutters and land-owners have formed for many sites and are now engaging with relevant State bodies. There are however groups, including the TCCA, which have not engaged. It is hoped that such groups will engage following the publication of this draft plan.

Further exhaustive engagement with turf-cutters and representative groups will continue to be undertaken to build awareness of the sensitivities of the sites in order to avoid further damage, as well as to gather information required to develop site-specific restoration and management plans. Such information includes: the number of turf-cutters who would be prepared to relocate to nearby undesignated sites; the number who qualify for compensation or relocation; and the number who might prefer financial compensation. This engagement process will also provide opportunities for continued turf-cutting proposals to be considered where relocation solutions prove elusive.

The Liaison Committees will be central to agreeing and implementing local solutions and also provide a vital service in terms of dispute avoidance and resolution between the state authorities and individuals. The local liaison committees will be centrally involved in the planning and execution of the site-specific restoration and management plans which will be developed for each of the Raised Bog SACs during 2014-15, and will be centrally involved in the on-going management of the sites and in developing amenity opportunities for the benefit of the local community. The undertaking of necessary

works will, to the maximum extent possible, use local expertise and capacities. In terms of the longer-term management of the Raised Bog SACs, the committees could also be expanded to include other local interests and local authorities.

Assessment of Alternatives

A basic requirement of this draft plan is to seek solutions that avoid damage to the Raised Bog SACs. If, after exhausting all reasonable possibilities, no alternative non-damaging solutions can be found for a small number of sites, the provisions of Article 6(4) of the Habitats Directive in relation to carrying out the activity for imperative reasons of overriding public interest may need to be explored as part of an overall national network solution, if such cases come forward during the preparation of the site specific plans. The preparation of any Statement of Case for the purposes of Article 6(4) will be undertaken with the Peatlands Council, for submission to the Minister and for forwarding to the European Commission for its opinion. Scientific oversight will be provided by a Scientific and Policy Advisory Group made up of members of the Peatlands Council, Peatland Experts and NPWS. As active raised bog is a priority habitat under the Directive, a formal opinion of the European Commission is required before any damaging activity could be consented to. Detailed site-specific analysis would be required for any proposal to permit a damaging activity within a Raised Bog SAC. The Commission is likely to require several months to examine any proposals before it can provide a definitive opinion. It would not be possible to implement such turf-cutting proposals until the opinion of the Commission is secured.

Preparation of Guidance Documents

Best practice procedures for planning and undertaking raised bog conservation management will be developed into concise and clear guidance documents so that the conservation, restoration and future management of sites can proceed in a structured and consistent way and that the concerns of local communities such as flooding of agricultural land and properties are fully addressed.

The restoration work proposed for the first six year planning cycle relates to the restoration of the high bog. A demonstration project will also be undertaken to rewet a small portion of the cutover bog at Clara Raised Bog SAC. The lessons learnt from this demonstration project will feed into the guidance documents to ensure that any long term plans to rewet suitable portions of the cutover (second six year planning cycle commencing 2020) will not cause flooding.

Site-specific Restoration and Management Plans

Site-specific restoration and management plans will be developed for each Raised Bog SAC during 2014-15. These site-specific plans will be technically feasible and sustainable. The plans will take into account the feasibility of achieving conservation objectives given the hydro-geological conditions at the site. They will seek to achieve the objectives in the simplest and most cost-effective manner while minimising inconvenience to landowners and land users. At the same time, the plans will seek to maximise the provision of ecosystem services, for example, carbon capture/storage and flood relief, in ways compatible with the conservation of the site. In draft form they will provide the basis for ongoing detailed discussions with stakeholders about the site-specific measures needed to achieve the conservation objectives for the sites. The plans will also consider existing and future uses of the site for recreation and amenity purposes, for educational purposes, as a tourism resource etc. The maintenance of paths and walkways, measures to prevent illegal dumping and action to be taken in the event of fires will be considered.

Appropriate Assessments will be undertaken for each of the site-specific restoration and management plans to ensure that any potential negative effects on the integrity of the Natura 2000 network are assessed and mitigation measures, and opportunities for enhancements, highlighted.

Consultation and Engagement

Comments are invited in relation to the SEA Environmental Report and this draft plan. All submissions received will be taken into consideration during the finalisation of the plan.

Please send your comments and views by 18 April 2014 to:

Email: info@raisedbogconservation.com

Web: www.raisedbogconservation.com

Address: Raised Bog SAC Consultation, Unit 33, Innovation Works, National Technology Park, Limerick

Further consultation will take place in relation to the final plan as well as the site-specific restoration and management plans.

Comments are welcome at all times during the plan-making process and can be made directly through the ‘contact us’ section of the dedicated website or email address associated with this plan (www.raisedbogconservation.com or info@raisedbogconservation.com).

Implementing the Plan

The first National Raised Bog SAC Management Plan will be in place for a six year period from 2014 to 2020. The task of implementing the plan will fall to a number of state and semi-state bodies including the Department of Arts, Heritage and the Gaeltacht (DAHG), Department of Environment, Community and Local Government (DECLG), Local Authorities and Bord na Móna but will require the co-operation of all stakeholders including the Peatlands Council, turf-cutters, residents, land owners and environmental groups.

The success of the plan in terms of achieving it's objectives in relation to both conservation and addressing the needs of those affected by the plan will be monitored. A mid-cycle review will be undertaken and the second cycle National Raised Bog SAC Management Plan will be developed for the period 2020 to 2026.

Glossary & Acronyms

ACROTELM	The living, actively growing upper layer of a raised bog, composed mainly of living bog mosses.
ACTIVE RAISED BOG	Where the conditions are right for peat to continue to form, and where species of plants and animals typical to bogs can thrive.
ANAEROBIC	The absense of oxygen.
ANNEX I	Annex I of the EU Habitats Directive lists natural habitats types of Community interest whose conservation requires the designation of SACs.
ANNEX II	Annex II of the EU Habitats Directive lists animal and plant species of Community interest whose conservation requires the designation of SAC.
ANNEX V	Annex V of the EU Habitats Directive lists animal and plant species of Community interest who's taking in the wild and exploitation may be subject to management measures.
APPROPRIATE ASSESSMENT	A multi-staged process for ascertaining whether a plan or project, alone or in combination with other plans or projects, will adversely affect the integrity of the Natura 2000 network of internationally important sites. Required under Article 6(3) the Habitats Directive.
ARTICLE 6(1)	Article 6(1) of the Habitats Directive states that for SACs, Member States shall establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.
ARTICLE 6(2)	Article 6(2) of the Habitats Directive states that Member States shall take appropriate steps to avoid, in the SACs, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of the Directive.
ARTICLE 6(3)	Article 6(3) of the Habitats Directive states that a plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.
ARTICLE 6(4)	Article 6(4) of the Habitats Directive states that If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

BIODIVERSITY	A general term used to describe all aspects of biological diversity including the number of species present in a given environment, the genetic diversity present within a species and the number of different ecosystems present within a given environment.
BIRDS DIRECTIVE	Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.
CALLOWS	Species rich grasslands in river floodplains that are flooded during the winter.
CARBON SEQUESTRATION	The capture and long-term storage of atmospheric carbon dioxide, for example, in peat bogs.
CATCHMENT	An area of land draining to a defined point. The term river catchment refers to the area of land that drains into a particular river system.
COLONISATION	The entry and spread of a species into an area, habitat or population from which it was formerly absent.
CUTAWAY BOG	Areas where all of the peat has been removed.
CUTOVER BOG	An NPWS habitat classification that describes areas of bog which have been previously cut (by hand or by mechanical means), although not down to the marl layer or bedrock. Remaining peat can still be an economic reserve. Cut-over areas are normally a mosaic of cut areas, face banks, pools, drainage ditches, uncut areas of peat, scrub, grassland etc.
DEGRADED RAISED BOG	The area of high, uncut bog which has been damaged by human activities but which could be transformed into active raised bog again through restoration measures
DESICCATION	The process of drying out.
ECO-HYDROLOGY	The sub-discipline of scientific study shared by ecology and hydrology. Investigates the effects of hydrological processes on the distribution, structure, and function of ecosystems, and on the effects of biotic processes on elements of the water cycle.
ECOLOGY	The study of the interactions between organisms, and their physical, chemical and biological environment.
ECOSYSTEM	A biological community of interacting organisms and their physical environment.
ECOSYSTEM SERVICES	Humankind benefits from a multitude of resources and processes that are supplied by ecosystems. Collectively, these benefits are known as ecosystem services and include products like clean drinking water and processes such as the decomposition of wastes.
ECOTOPE	The smallest ecologically distinct landscape features in a landscape
EFFECTIVE RAINFALL	The rainfall useful for meeting plant water requirements. This does not include water percolating down to aquifers, or surface runoff of water.
EIA DIRECTIVE	Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment.
ENDANGERED	Seriously at risk of extinction.

EROSION	The processes whereby the materials of the earth's crust are dissolved, or worn away and simultaneously moved from one place to another by natural processes which include weathering, solution, corrosion and transportation.
EVAPOTRANSPORATION	Water loss to the atmosphere from soil (evaporation) and vegetation (transpiration).
FAUNA	Animal life.
FAVOURABLE CONSERVATION STATUS	The conservation status of a natural habitat will be taken as "favourable" when: its natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.
FENS AND FLUSHES	An NPWS habitat classification. Fens are peatlands fed by calcium rich water, either from groundwater or from inflowing surface water. Flushes are wet areas maintained by the seepage of water down slopes of various gradient, and are usually local features. Both are characterised by an abundance of small sedge forming species-rich mosaics with other species.
FLORA	Plant life.
HABITAT	Refers to the environment defined by specific abiotic and biotic factors, in which a species lives at any stage of its biological cycle. In general terms it is a species' home.
HABITATS DIRECTIVE	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
HIGH BOG	The area of bog which has not previously been cut.
HUMMOCK	A small hillock or mound. Often used to describe the surface of active bogs where the ground forms a pattern of mounds, hollows and pools. Such hummocks commonly comprise bog mosses.
HYDROLOGICAL REGIME	Changes with time in the rates of flow of rivers and in the levels and volumes of water in rivers, lakes, reservoirs, and marshes.
HYDROLOGY	The movement of water through a catchment area including freshwater and seawater inputs, water level changes and drainage mechanisms which are all influenced by the underlying geology.
KYOTO PROTOCOL	The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that sets binding obligations on industrialised countries to reduce emissions of greenhouse gases.
LAGG	A term used to describe the area of transition from bog to mineral soil around a raised bog.
LIDAR	A remote sensing technology that measures vertical surface elevation by illuminating a target with a laser and analyzing the reflected light.
LIFE	The EU's financial instrument supporting environmental and nature conservation projects throughout the EU.
MICRO-TOPOGRAPHICAL	Uneven ground on a relatively small scale. Generally the high spots are about a meter higher than the low spots, and only a couple of meters across.

MULTI-CRITERIA ANALYSIS A decision-support methodology enabling the choice of preferred options taking into consideration, and quantifying, a range of factors.

NATURA 2000 A network of sites across the European Community selected for the purpose of conserving natural habitats and species of plants and animals which are rare, endangered or vulnerable. SACs and SPAs form the Natura 2000 network.

NATURAL HERITAGE AREA Area designated for wildlife conservation under the Wildlife Amendment Act 2000.

PALEO-ARCHAEOLOGY The study of the archaeology of deep time focusing on hominid fossils ranging from 15,000,000 to 10,000 years ago.

PALEO-CLIMATOLOGY The study of the climate of past ages.

PRIORITY HABITAT A subset of the habitats listed in Annex I of the EU Habitats Directive. These are habitats which are in danger of disappearance and whose natural range mainly falls within the territory of the European Union. These habitats are of the highest conservation status and require measures to ensure that their favourable conservation status is maintained.

RAISED BOG An NPWS habitat classification characterised by an elevated dome of peat, the surface of which is isolated.

SEA DIRECTIVE Council Directive 2001/42/EEC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment.

SPECIAL AREA OF CONSERVATION Area designated for the conservation of habitats and/or species under the Habitats Directive.

STRATIGRAPHY The branch of geology concerned with the order and relative position of strata and their relationship to the geological timescale.

TOPOGRAPHY The arrangement of the physical features of an area.

AA	Appropriate Assessment
ARB	Active Raised Bog
CO_2	Carbon Dioxide
DAHG	Department of Arts, Heritage and the Gaeltacht
DECLG	Department of Environment, Community and Local Government
DRB	Degraded Raised Bog
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
EU	European Union
GIS	Geographical Information Systems
IPCC	Irish Peatlands Conservation Council
IROPI	Imperative Reasons of Overriding Public Interest
IWRM	Integrated Water Resources Management
MCA	Multi Criteria Analysis
MFAC	Modified Flow Accumulation Capacity
NPWS	National Parks and Wildlife Service
NHA	Natural Heritage Area
PAC	Potential Acrotelm Capacity
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
TCCA	Turf Cutters and Contractors Association

References

Bellamy, D. 1986. *Bellamy's Ireland: the wild boglands*. Country House, Ireland.

Bullock C. & Collier M. 2011. *When the public good conflicts with an apparent preference for unsustainable behaviour*. Ecological Economics 70: 971-977.

Collier M. J. & Scott M. 2009. *Conflicting rationalities, knowledge and values in scarred landscapes*. Journal of Rural Studies 25(3): 267-277.

Collier M. J. & Scott M. 2010*. Focus group discourses in a mined landscape*. Land Use Policy 27(2): 304-312.

Cross, J. R. 1990. *The Raised Bogs of Ireland: their Ecology, Status and Conservation*. Report to the Minister of State at the Department of Finance.

Derwin, J. and MacGowan, F. 2000. *Raised Bog Restoration Project.* Unpublished report, Dúchas – The Heritage Service, Dublin.

Duffy, P., Hanley, E., Hyde, B., O'Brien, P., Ponzi J., Cotter E. & Black K. 2013. *National Inventory Report 2013. Greenhouse gas emissions 1990-2011 reported to the United Nations Framework Convention on Climate Change*.

Fernandez, F., Fanning, M., McCorry, M. and Crowley, W. 2005. *Raised Bog Monitoring Project 2004-05*. Unpublished report, National Parks & Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Fernandez, F., MacGowan F., Crowley, W., Farrell, M., Croal, Y., Fanning, M. & McKee, A. 2006. *Assessment of impacts of turf cutting on designated Raised Bogs 2003-06*. Unpublished report, National Parks & Wildlife Service, Department of Environment, Heritage Local Government, Dublin.

Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (in press) Raised Bog Monitoring and Assessment Survey 2013. *Irish Wildlife Manuals*, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Fernandez, F. Crowley, W. & Wilson S. 2012. *Raised Bog Monitoring Project 2011. Irish Wildlife Manuals, no 62*. National Parks & Wildlife Service, Department of Environment, Heritage and Local Government, Dublin

Hannigan, E., Kelly-Quinn, M. & O'Connor, J. P. 2009. Notable caddisflies (Trichoptera) *from Scragh bog, Co. Westmeath, including Erotesis baltica McLachlan new to Ireland*. Bulletin of the Irish Biogeographical Society 33: 76-80.

Holden, J., Chapman, P. J. & Labadz, J. C. 2004. *Artificial drainage of peatlands: hydrological and hydrochemical process and wetland restoration*. Progress in Physical Geography 28(1): 95-123.

Hammond, R.F. 1979. The Peatlands of Ireland. To accompany Peatland Map of Ireland, 1978. Soil Survey Bulletin 35. 1st Edition. An Foras Talúntais, Dublin.

Hammond, R.F. 1981. The Peatlands of Ireland. To accompany Peatland Map of Ireland, 1978. Soil Survey Bulletin 35. 2nd Edition. An Foras Talúntais, Dublin.

Hammond, R.F. 1984. The classification of Irish peats as surveyed by the National Soil Survey of Ireland. Proc. 7th Int. Peat Congress, Dublin, Vol. 1: 168-187. The International Peat Society, Helsinki.

Kelly, L., Doak, M. and Dromey, M. 1995. *Raised Bog Restoration Project: An Investigation into the Conservation and Restoration of Selected Raised Bog Sites in Ireland*. Unpublished report, National Parks & Wildlife, Department of Environment, Heritage and Local Government, Dublin.

Kelly, L. & Schouten, M.G.C.2002. Vegetation. In: Schouten, M.G.C. 2002. (Ed.) *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*. Department of Environment and Local Government, Dublin, Ireland/ Staatabosbeheer, The Netherlands.

Market Research Partners. 2008. *Public perceptions of wild places and landscapes in Scotland*. Comissioned Report No. 291, available at: http://www.snh.gov.uk/docs/B450684.pdf, Edinburgh.

Met Éireann. 2013. Climate – 30 year Averages. Available at: http://www.met.ie/climate-ireland/30year-averages.asp. [Accessed 1st June 2013]

NPWS. 2008. *The Status Of EU Protected Habitats And Species In Ireland. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin.

NPWS. 2013. *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0*. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Price, J. 1996. *Hydrology and microclimate of a partly restored cutover bog*. Quebec Hydrological Processes.10: 1263- 1272.

Renou-Wilson, F., Bolger, T., Bullock, C., Convery, F., Curry, J. P., Ward, S., Wilson, D. & Müller, C. 2011. *BOGLAND: A Protocol for the Sustainable Management of Irish Peatlands*. STRIVE Report No 76 prepared for the Environmental Protection Agency (EPA), Johnstown Castle, Co. Wexford.

Schouten, M.G.C. 2002. (Ed.) *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*. Department of Environment and Local Government, Dublin, Ireland/ Staatabosbeheer, The Netherlands.

Schouten, M.G.C. 1984. Some aspects of the ecogeographical gradient in the Irish ombrotrophic bogs. Proc 7th Int. Peat Congress, Dublin, Vol. 1: 414-432. The International Peat Society, Helsinki.

Sottocornola, M., Boudreau, S., &Rochefort, L. 2007. *Peat bog restoration: Effect of phosphorus on plant re-establishment*. Ecological Engineering 31(1); pp.29–40.

Van der Schaaf, S. 2002 *Using surface topography to assess potential and actual ecological conditions in Irish Midland raised bogs*. Annals of Warsaw Agricultural University. Land Reclamation 33: 49-56.

Van der Schaaf, S. and J. G. Streefkerk. 2002. *Relationships between biotic and abiotic*. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*, pp.186-209, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer.

Wilson, D., 2008. Carbon gas fluxes in Irish peatlands. Report on work package 3.5 of BOGLAND Project. Environmental Protection Agency

Wilson, D., Müller, C. & Renou-Wilson, F. 2013. *Carbon emissions and removals from Irish peatlands: current trends and future mitigation measures*. Irish Geography: In press.