

An Taisce
The National Trust for Ireland

An Taisce Submission

Re: Public Consultation on the Draft Environmental Requirements for Afforestation (2016)

Forest Service

Department of Agriculture, Food and the Marine

Johnstown Castle Estate

Co Wexford

afforreqs@agriculture.gov.ie

23th May 2015

Re: Public Consultation on the Draft Environmental Requirements for Afforestation

Dear Sir/Madam,

An Taisce would like to make the following comments in relation to the public consultation on the Draft Environmental Requirements for Afforestation which we request the Department take into consideration.

Yours sincerely,

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An Taisce submission Re: Public Consultation on the Draft Environmental Requirements for Afforestation

1.0 Introduction

An Taisce recognise the important role that the forestry sector has to play in supporting the development of the rural economy. An Taisce welcomes the opportunity to contribute to this public consultation on the Environmental Requirements for Afforestation. Our comments will be based on a review of:

(1) Document: 'Environmental Requirements for Afforestation' and

(2) Policy change: To remove the application level limit of 20% on GPC1 type land

(3) Land Availability for Afforestation - Exploring opportunities for expanding Ireland's forest resource.

As Ireland's oldest environmental NGO and a statutory consultee in the forestry consent system under the European Communities (Forest Consent and Assessment) Regulations 2010 (S.I. 558 of 2010) An Taisce is well placed to comment on the proposed changes to the forestry sectors environmental regulatiuons.

It makes sense to consolidate the forestry services afforestation guidelines for water, archaeology, biodiversity and landscape into one coherent document. However it is clear that this process is not being driven by the need to consolidate the current guidelines but rather to introduce new measures thawithout will facilitate the expansion of the national forest estate. For example none of the recommendations of the COFORD (2016) Land Availability for Afforestation - Exploring opportunities for expanding Ireland's forest resource report raise the benefits of consolidating the current environmental guidelines. For the most part the proposed changes to the guidelines do not address the established pressures and threats being exerted on the Irish environment by forestry but rather seek to expand the current model of forestry. There is an urgent need for a review of the Irish forestry model. In An Taisces opinion the forestry sector is not aligned with our national biodiversity strategy and is currently at odds with the Habitats and Birds Directives and the Water Framework Directive.

2.0 Biodiversity

Earlier this year Minister of State for Forestry Tom Hayes launched the COFORD Land Availability for Afforestation, Exploring opportunities for expanding Ireland's forest resource report (Coford, 2016). The report assessed future opportunities for afforestation and is set in the context of achieving a forest cover of 18% by mid-century, compared with the current national figure of 10.7%. The report was authored by the COFORD Land Availability Working Group which consists of a variety of relevant stakeholders such as the Forest Service, the NPWS, the EPA, Teagasc and the COFORD members and other stakeholders. A number of recommendations were agreed upon by the stakeholders including the Forestry Service and the NPWS. Recommendation 5 of the report states that:

> ***"The Forest Service and forest sector to continue to engage directly with the NPWS on the development of the Hen Harrier Threat Response Plan, with a view to (inter alia) creating opportunities for afforestation in Hen Harrier SPAs as soon as possible."***

Based on the scientific evidence available on the interaction between forestry and hen harriers it is clear that further afforestation within the Hen Harrier SPAs would be at odds with the objectives of the referenced Hen Harrier Threat Response Plan (TRP) as set out to An Taisce and the forestry service and forestry sector representatives and the stakeholders within the Consultative Committee, namely to:

> ***"Cease, Avoid, Reverse, Reduce, Eliminate or Prevent threats on the Hen Harrier; and specify a timeline for achievement of its objectives."***

An Taisce and the other environmental NGO stakeholders have engaged with the Hen Harrier TRP process in good faith on the understanding that the purpose of the TRP was to address threats to the species and achieve good conservation status for the Hen Harrier (*Circus cyaneus*) within the Republic of Ireland and meet Irelands legal obligations as an EU Member State in relation to this species and its habitat. It is clear from the recommendation 5 of the COFORD Land Availability Working Group report that our faith was misplaced. We further note and recognise that a healthy hen harrier population is closely linked to the health and prosperity of Ireland's hill farmers and their traditions, as well as the environmental sustainability of Ireland's forestry, agricultural and energy sectors.

As an apex predator associated with our uplands and "marginal" lands the hen harrier is a key indicator of the health of the ecosystems it inhabits. It's decline and the negative role forestry is playing in driving its population collapse both within and outside of designated sites is indicative of the role of forestry as a pressure and threat on Irish biodiversity. Based on the available evidence presented in the 2015 National Survey of Breeding Hen Harriers in Ireland and other studies the hen harrier populations in both within and outside of the SPA network continues to decline (Ruddock et al., 2015). According to the 2012 national hen harrier survey all of the SPA populations, with the exception of the Slieve Blooms SPA, are unable to support themselves without immigrants from other areas (Ruddock et al., 2012). The scientific evidence has clearly demonstrated the vital role that hen harriers outside of designated sites are playing in supporting the national population. In order to secure the long-term future of the species in Ireland the ongoing drivers of habitat loss within the SPA network and in the broader countryside must be addressed. The future outlook for the species is overshadowed by the ongoing loss of habitat driven in part by commercial forestry (Coford, 2016, Wilson et al., 2006). The fact that further afforestation is not only being contemplated in the six hen harrier SPAs but is openly being lobbied for despite the clear scientific evidence indicating that the forest cover within the designated sites actually needs to be decreased is the clearest possible indication that the facade the forestry sector is portraying of being environmentally sustainable and compliant with environmental regulations is a smoke screen for the ongoing expansion of one of the most environmentally destructive sectors in the history of the Irish state. The unsustainable expansion of the forestry in tandem with the intensification of Irish agriculture under Food Harvest 2020 and Food Wise 2025 and the ongoing impact of industrial and domestic peat extraction is the perfect recipe for mass biodiversity loss on a scale that cannot be undone.

2.1 Habitat Loss

It is clear from a number of recent reports that the Irish forestry sector has earmarked areas of unenclosed land, and in particular rough grasslands dominated by purple moor grass (*Molinia caerulea*) for afforestation (Coford, 2015; Farrelly and Gallagher, 2013; Forest Service, 2016). Unenclosed land with characteristics favourable for forestry development is adjudged to be in the region of ~178,000 ha (Farrelly & Gallagher 2015). The removal of the application level limit of 20% on GPC1 type land is part of the broader objective of the forestry sector to increase the country's forest cover from its current level of 10.7% to 18% by mid-century. The forestry sector have targeted achieving afforestation at a level in the region of 15,000 hectares per annum for the next two decades. This will alter the landscape radically in many parts of the country (Buscardo et al., 2008). The cumulative environmental impact of the expansion of forest cover nationally and the loss of unenclosed land and rough grassland on the scale proposed will have far reaching implications for biodiversity (Buscardo et al., 2008; O'Halloran et al., 2002). The impact of such a change in policy on Irish biodiversity has not been adequately addressed to date or even raised in any of the documentation we have seen.

Under Article 17 of the Habitats Directive (92/43/EEC) Member States are required to report every six years about the progress made with the implementation of the Habitats Directive. These reports give an overview of the status and trends in the conservation of some of Irelands most threatened habitats and species. These reports give an indication of the role the forestry sector is playing in driving biodiversity loss. The most recent report was published in 2013 and amalgamated pressures and threats on habitats and species and ranked them hierarchically to provide an overview of the greatest drivers of biodiversity loss. Of the national high level pressures/threats on designated habitats and species in Ireland the NPWS ranked forestry as the second greatest conservation issue after agriculture. Forestry is also closely linked directly to the eighth, ninth and tenth ranked national high level pressures/threats of pollution, invasive and problematic species and natural system modifications (NPWS, 2013). Almost 40% of designated habitats under the Habitats Directive have forestry as a pressure or threat of high, medium and low intensity. The associated pressures of pollution, invasive and problematic species and natural system modifications are each negatively impacting upon over 70% of designated habitats under the Habitats Directive as a pressure or threat of high, medium and low intensity (NPWS, 2013).

Designated habitats whose conservation status is being most negatively impacted upon by forestry are typically peatlands, grasslands, wetlands and coastal habitats. According to the NPWS (2013) areas of Annex I habitats which lie outside of designated sites are particularly vulnerable to afforestation. According to the NPWS (2013) the adaptation of forestry regulations is required to enhance protection of Annex I peatlands such as Wet Heath [4010], Dry Heath [4030], Alpine and Sub Alpine Heath [4060], Blanket Bog Active* [7130] and Rhyncosporion depressions [7150]. Annex I grasslands such as Molinia Meadows [6410] and Species-rich Nardus upland grassland* [6230] and other grasslands associated with marginal farm land on nutrient poor soils are particularly vulnerable to afforestation. In the case of Molinia Meadows [6410] surveys have revealed that 12% of sites have some type of forestry impact recorded within the Annex I habitat or immediately adjacent. One-off impacts such as planting forestry on open ground are rarely observed during one field visit and it would be expected that the importance of forestry pressures on the 6410 habitat have been underestimated based on the ISGS data (NPWS, 2013). Grasslands such as Species-rich Nardus upland grassland* [6230] which are found in a mosaic with heath in the

transitionary zone between intensively farmed fields and moorland have been completely obliterated by forestry in many areas of the country such as the Comeragh Mountains, the Devils Bit Range and the Slieve Blooms.

There is no mechanism in place to prevent the afforestation of Annex I and priority habitats outside of designated sites. Foresters in most cases lack the necessary ecological expertise to identify these habitats. It is also worth noting that they also lack the motivation to highlight issues which would result in permission for afforestation being refused. The forestry consent regulations must be adapted to ensure the protection of Annex I habitats. Any site which is likely to host an Annex I habitat due to its location, altitude, soil type etc should be assessed by a trained ecologist.

2.2 Species Loss

It is proposed that the application level limit of 20% is proposed for GPC1 type land will be removed. According to the Forestry Service GPC 1 type land is characterised by vegetation indicative of moderate fertility, and includes the following:

1. Sites purely comprising purple moor-grass and with less than 50 cm depth of peat.

2. Sites comprising purple moor-grass combined with bog-myrtle, and with less than 50 cm of peat.

3. Sites comprising purple moor-grass with a proportion of higher scoring plants such as soft rush, sharp-flowered rush, sweet vernal-grass, bent grass, bramble, gorse or bracken.

The removal of the cap on unenclosed land and the expansion of commercial forestry in general will lead to the loss of extensive areas of rough grassland habitats. The loss of undesignated grasslands due to forestry has been highlighted by the NPWS as a driver of biodiversity loss nationally (NPWS, 2013). Over 20% of species designated under the Habitats Directive have forestry as a pressure or threat of high, medium and low intensity. The associated pressures of pollution, invasive and problematic species and natural system modifications are each negatively impacting upon over 60%, 30% and 20% of designated habitats and species respectively as a pressure or threat of high, medium and low intensity. Rough grassland habitats have traditionally been associated with extensive upland grazing and provide important foraging (Aroyo et al., 2009, Ruddock et al., 2012) and nesting habitat (Sim et al., 2007, Wilson et al., 2009) for Annex I species such as Hen Harriers in Ireland and the UK. For example rough grassland constitutes 11.02% of the area of the six Hen Harrier SPAs and is the largest open habitat type within the network (Moran & Wilson-Parr, 2014). Aside from Hen Harriers rough grassland in Ireland and the UK is an important habitat for a range of species, such as the Irish hare (*Lepus timidus hibernicus*) (Tagney et al., 1995), waders such as Lapwing (*Vanellus vanellus*), Curlew (*Numenius arquata*), Snipe (*Gallinago gallinago*) and Redshank (*Tringa tetanus*) (Baines, 1988; Hendson et al., 1999), passerines such as Meadow Pipit (*Anthus pratensis*) and Skylark (*Alauda arvensis*) (Henderson et al., 2004), and Short-eared Owls (*Asio flammeus*)(Glue, 1977). Hen Harrier and Short-eared Owl are both Annex I species under the Birds Directive (Directive 2009/147/EC) while Lapwing, Red Shank and Curlew are Red listed birds of high conservation concern having undergone declines of 88%, 88% and >80% respectively in their breeding populations between 1988/91 and 2008 (Crowe et al., 2010). Declines in Irish waders have been attributed to habitat loss linked to land drainage, intensification of agriculture, afforestation and increased predation (Henderson et al., 2010).

Trends in bird populations are useful as they are well studied and are good indicators of ecosystem health. The implications of forestry expansion on bird diversity in an Irish context have been investigated in a number of studies, all arriving at similar conclusions i.e. the net effects of afforestation will depend on the biodiversity of the habitat it replaces and is related to the previous land management intensity at the site (Buscardo et al., 2008; Graham et al., 2015). Common bird species many of them associated with woodland will benefit from afforestation (Walsh et al., 2000). While forestry might initially favour some species associated with open-habitats, through increases in shrub and herb cover associated with the relaxation of grazing pressure on recently planted land, they are lost from plantations at canopy closure (Walsh et al. 2000). The recently published report by Scotland's Moorland Forum on the issue of upland predation summarised the negative impacts of forestry on ground-nesting birds. The findings are directly applicable to Ireland:

> "*Extensive commercial afforestation in the Southern Uplands has destroyed large areas of suitable habitat for a whole range of wild birds, bringing predators onto open hills and fragmenting moorland into small pockets. This has been disastrous, particularly for Black Grouse. In many areas suitable habitat remains, but it is not present in sufficient quantity to support birds on a landscape scale, and a general reluctance to manage heather and upland vegetation near forestry by traditional methods (or often any methods) has meant that these remaining islands are becoming increasingly degraded* (Ainsworth et al., 2016)."

Afforestation causes direct habitat loss and fragmentation of remaining open ground; moreover, such fragmented wooded landscapes host high abundances of mesopredators including red foxes Vulpes vulpes and corvids Corvus spp. relative to continuous open landscapes. Afforestation is associated with edge effects on adjacent open ground across a range of systems, by altering habitat configuration and through the association of predators with woodland. Increased predation pressure on open ground adjacent to woodland, coupled with potential behavioural avoidance of edge habitats, are established negative impacts of forestry on ground nesting upland bird species and waders and acts cumulatively with the direct losses of habitat due to afforestation (Douglas et al., 2014). These negative impacts have been established for species such as curlew, dunlin and european golden plover and hen harrier (Douglas et al., 2014; NPWS, 2015; Wilson et al., 2014). Because of its short- and long-term effects, afforestation will have a detrimental effect on semi-natural habitats, breeding waders and other birds of upland and moorland habitats (particularly red/amber-listed species) (Buscardo et al., 2008, O' Connell et al., 2015; O'Halloran et al., 2002; Walsh et al., 2000; Wilson et al., 2006). Numerous studies in Ireland have all concluded that in order to prevent the loss of open habitat bird species of conservation concern afforestation should be focused in areas of improved grassland.

Wilson et al (2006) concluded that *"new afforestation should not take place in areas with diverse communities of open-habitat birds"*

Walsh et al (2000) asserted that *"Areas of open habitat which support diverse assemblages of open-habitat specialists (particularly when these are red/amber-listed species) should therefore be safeguarded from afforestation, and managed in such a way as to ensure their continued suitability for these species."*

O'Halloran et al., (2002) recommend that *"afforestation should target habitats with relatively impoverished bird assemblages. By far the most abundant of these is improved*

grassland"…"other open habitats generally cannot be afforested without negatively impacting on birds, particularly where elements of the bird community are of national or international conservation interest."

Graham et al., 2015 recommended that "*forest management should encourage any proposed future exotic plantations to be located in areas of high management intensity such as improved agricultural land rather than in low management intensity peatlands that typically support bird communities of high conservation value*."

Based on these warnings the strong overlap observed in recent research between newly planted forests and the distribution of "Birds of Conservation Concern in Ireland" (BoCCI) associated with farmland habitats is deeply concerning (Corkery et al., 2015). Recent forest planting was found to overlap with 78% of the 10 x 10 km squares occupied by birds of conservation concern, with 11% of these squares being planted with 100ha or more. Overlaps of recent forest planting with individual species range from an 8% overlap (Twite) up to 93% overlap (Barn owl) (Table.1). Species associated with rough grassland had a 78% overlap with new forestry (Snipe (81%), Curlew (84%), Lapwing (76%), Redshank (72%), Meadow Pipit (78%), Skylark (11%)) with an average of 12.5% of the squares which hosted these species being planted with 100 ha or more. This study again concluded that "*afforestation may represent a threat at a regional and national scales to some of these bird species in the near future. At least for the already threatened species, which depend on grassland areas for foraging, plantation forests may already be having a negative impact*."

Table 1. Number of 10 x 10km atlas squares occupied by BoCCI species with the percentage overlap between those squares and recent afforestation (2008-2012) (Corkery et al., 2015).

Species	No. occupied cells	% overlap with forestry	% overlap >10ha
Barn Owl	249	93	15
Stock Dove	252	91	12
Grey Wagtail	649	88	13
Snipe	306	81	13
Yellowhammer	309	88	9
Mistle Thrush	752	87	13
Curlew	64	84	16
Greenfinch	790	83	12
Red Kite	12	83	0
Kestrel	768	81	12
Tree Sparrow	141	81	5
Robin	841	80	12
Starling	842	80	12
Linnet	804	80	12
Swallow	855	79	11
Whinchat	34	79	6
Meadow Pipit	831	78	12
Skylark	737	76	11
Stonechat	655	76	11
Lapwing	206	76	11
Redshank	68	72	12

Corncrake	43	51	2
Chough	167	46	4
Golden Plover	167	46	4
Twite	18	6	0

The ongoing loss of biodiversity associated with semi-natural ecosystems both within and outside of the Natura 2000 network is an issue right across the EU. More than 50% of Europe's most highly valued biotopes occur on low-intensity farmland (Bignal & McCracken, 1996). Among Europe's threatened habitats and species, 57 types of habitat and 257 species depend on or are associated with farming. More than 75% of these habitats and at least 70% of the species are in unfavourable conservation status (Keenleyside et al., 2012). Most of this farmland has in the past had no environmental policy directly affecting it (Bignal & McCracken, 1996). The need to protect farming systems in Europe of greatest biodiversity value or 'High Nature Value (HNV) farming' has been embraced at an EU level and it is recognised that the conservation of HNV farming is essential if the EU is to meet its 2020 biodiversity targets (Cooper et al., 2007; Keenleyside et al., 2014). According to DG Agri the working definition of HNV farming is "*High Nature Value farmland comprises those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports or is associated with either a high species and habitat diversity, or the presence of species of European, and/or national, and/or regional conservation concern, or both* (Cooper et al., 2007)." Indeed "*the highest grade of HNV farmland is that which supports the presence of species of European conservation concern* (Cooper et al., 2007)." Traditional hen harrier foraging and nesting habitats comprising broken moorland, rushy fields and rough pasture are accepted as meeting the definition of HNV farmland due to the presence of many red/amber and Annex I species under the Birds Directives (Bignal & McCracken, 1996). While the development of locally led agri-environment schemes in Ireland will help to support HNV farming it is clear that greater protection of these areas is essential. In EU regulation No 807/2014 of 11 March 2014 (supplementing Regulation (EU) No 1305/2013) of the European Parliament and of the Council on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) have provided some provisions relating to the protection of HNV farmland from afforestation: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0807&from=en

Article 6 of the regulation reads (emphasis added):

> *"Minimum environmental requirements with which the afforestation of agricultural land must comply should be laid down ensuring that* ***no inappropriate afforestation of sensitive habitats including areas under high natural value farming takes place*** *and that the need for resilience to climate change is taken into account.* ***On sites designated as Natura 2000, afforestation should be consistent with the management objectives of the sites concerned. Special attention should be paid to specific environmental needs for particular sites such as the prevention of soil erosion. More stringent rules should be provided for afforestation operations leading to the creation of larger forests in order to take into account the impact of scale of those operations on the ecosystems and to ensure that they comply with*** **the objectives of the Green Infrastructure Strategy (1) and new EU Forest Strategy (2)."**

These obligations have been accepted in principle by the Forestry Service in the Forestry Programme 2014-2020 (Forestry Service, 2014). The need to protect HNV farming is highlighted in Priority 4 (a) of the programme: in order to preserve restore and enhance "*biodiversity, including in Natura 2000 areas and high nature value farming, and the state of European landscapes*." However there are no corresponding objectives under priority 4 which specifically mention HNV farming or the biodiversity of open habitats. All of the objectives relate to further afforestation although objective 4 (2) commits to "*increase the number of forestry schemes which contribute positively to the environment by contributing towards the protection of soil and water quality as well as habitats of endangered species such as the Hen Harrier and Freshwater Pearl Mussel."*

The obligation to protect HNV farmland is referenced later if the Forestry Programme (2014) where it states "*the inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of high ecological value including areas under high natural value farming*." This statement obliges the Forest Service to carry out no further afforestation in areas of HNV farmland which supports Annex I species such as the Hen Harrier and other Annex I and Red/Amber list species. A limitation to fulfilling this obligation is put forward in the Forestry Programme where it is states that "*the concept of High Nature Value land is not yet fully established in Ireland and HNV land has not been specifically designated or mapped.*" It is not correct to say that the concept of High Nature Value farmland is not fully established in Ireland given that Ireland is at the forefront when it comes to identifying HNV farming systems and protecting them through the development of the Locally Led Approach (Ó hUallacháin & Finn, 2015). There are clear issues however with the mapping of HNV farming areas although progress is being made through GIS and biodiversity surveys (Martin et al., 2015; Sullivan et al., 2015). The forestry service must utilise the maps that are currently available on HNV farmland distribution in Ireland (Martin et al., 2015; Sullivan et al., 2015) and species surveys (Ruddock et al., 2012; Ruddock et al., 2015). A mapping system of HNV sites and other areas unsuitable for afforestation due to the presence of threatened habitats and species and High Status Sites under the Water Framework Directive should be developed and used to avoid inappropriate afforestation. On sites which are likely to support semi natural habitats of high nature value an ecological assessment should be carried out by a properly qualified individual. The assessments should be supplied to the NPWS and An Taisce to facilitate full transparency in the forestry consent process.

There has been a lot of recent research carried out in relation to the availability of land in Ireland for forestry expansion. This research has been ongoing at a time when mapping projects are also identifying the distribution of HNV farmland in Ireland. Based on the most recent produced maps it is clear that there is a direct overlap with land which is being earmarked for afforestation and HNV farmland (Teagasc Research, 2016). This is a clear indication of the threat posed by forestry to Irish biodiversity.

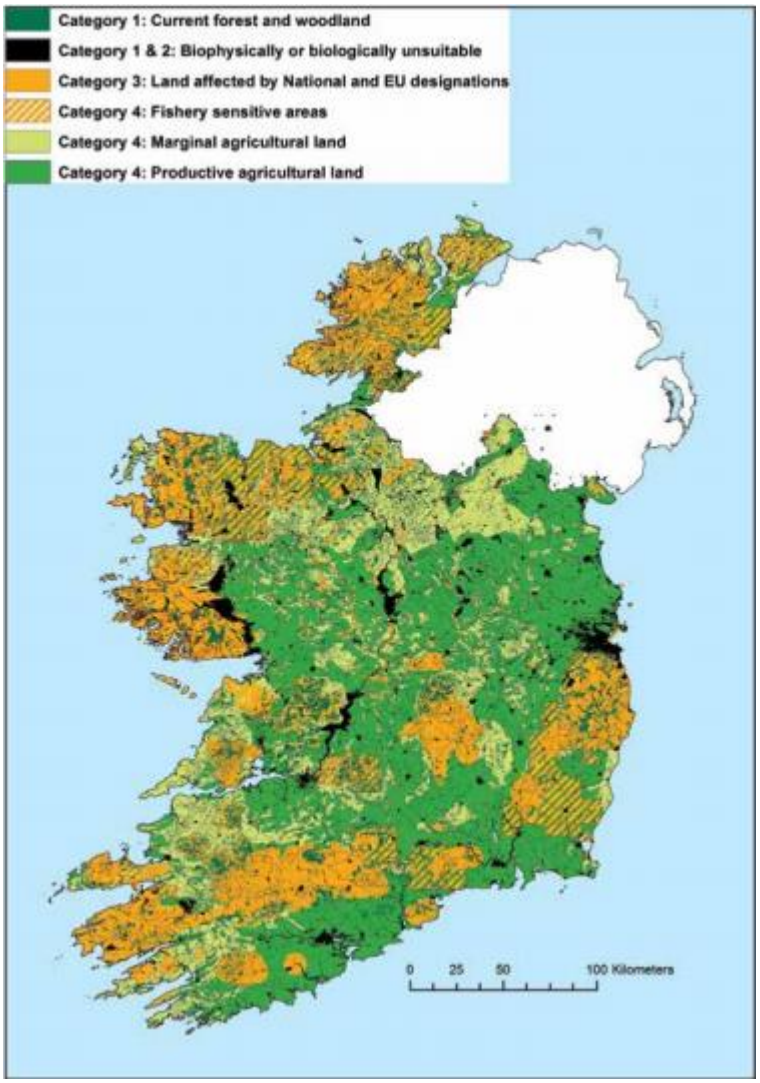


Figure 1. Classification of Ireland's land area in relation to availability for forestry expansion and the area of productive and marginal agricultural land with most potential for forestry expansion (Teagasc Research, 2016).

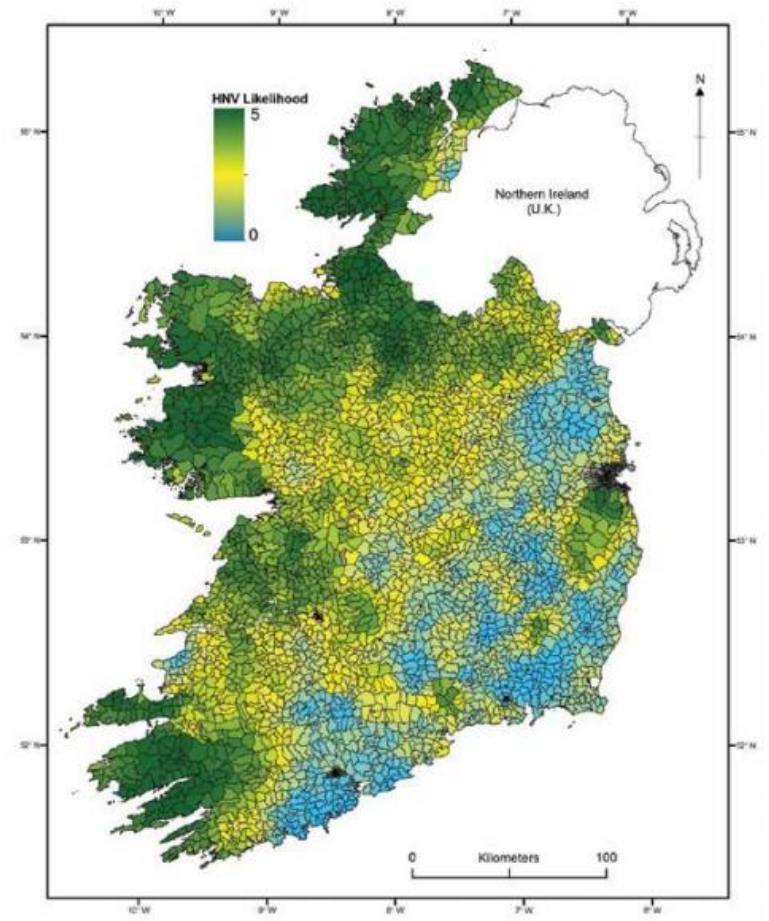


Figure 2. Likely occurrence and distribution of HNV farmland in each Electoral Division, based on a scale ranging from low (blue) to intermediate (yellow) to high (green). Note that non-HNV farmland may still occur in areas with high likelihood of HNV farmland, and vice versa (Teagasc Research, 2016).

Outside of designated sites, the Birds and Habitats Directives impose certain additional requirements to protect biodiversity. Article 4(4) of the Birds Directive requires Member States to "*avoid pollution or deterioration of habitats,*" while Article 10 of the Habitats Directive requires Member States to "*encourage the management of features of the landscape which are of major importance for wild fauna and flora. Such features are those which, by virtue of their linear and continuous structure…or their function as stepping stones… are essential for the migration, dispersal and genetic exchange of wild species*." That being said Ireland has a poor record in protecting biodiversity in the wider countryside as evidenced by the CJEU Ruling C418-04 in which the Court held that despite a requirement for Member States to "make a serious attempt at protecting those habitats which lie outside the SPAs," Ireland has not "*transposed that provision fully and correctly by taking suitable steps to avoid pollution or deterioration of the habitats lying outside the SPAs. It is thus clear, in the present case that Ireland must endeavour to take suitable steps to avoid pollution or disturbances of the habitats*." This case remains open and has obvious implications for the proposed expansion of the Irish forestry sector.

3.0 Forestry and Appropriate Assessment

3.1 An eNGO perspective of forestry AAs in Ireland

As a prescribed consultee An Taisce have valuable insight into the forestry consent process in Ireland. Full compliance with environmental law is not only a legal obligation but one of the most effective ways of ensuring that the forestry sector can contribute to the conservation of species like the hen harrier, and also serves to avoid the sector falling into disrepute and costly legal actions. It is in this constructive and supportive context that we wish to make our observations on the Forestry Services current shortcomings in the implementation of Article 6(3) of the Habitats Directive, on the legislative requirements and relevant directives and case law. This part of the submission will use the hen harrier as a case study of these shortcomings.

The European Commissions 'Study on alleviating and improving the article 6(3) permit procedure for Natura 2000 sites' provides a valuable overview of the historical and current issues with AA implementation in the EU from the point of view of various stakeholders (Sundseth & Roth, 2013).

On-going problems highlighted by the report include the following:

- Poor quality of the Appropriate Assessment undertaken
- Lack of skills/ knowledge /capacity in the Article 6.3 procedure
- An inadequate knowledge base on which to assess impacts
- Inconsistent screening of plans and projects
- Lack of understanding of key concepts and legal terms
- Persistent lack of assessment of cumulative effects
- Confusion with the EIA/SEA Procedure
- Lack of early dialogue
- Lack of effectiveness of AAs on plans
- Problems during public consultation

Many of these issues of course are also relevant to Irish AAs. Within the report the report the Forestry Services Appropriate Assessment Procedure is highlighted as best practice in the case study "Adopting a Systematic Approach to the Screening and Appropriate Assessment of Plans and Projects Related to Forestry Activities (Ireland)."

The key strengths of the Forestry Services approach were identified as:

- The establishment of a robust and consistent framework ensuring the AA permit procedure is implemented in a more systematic way across the country.
- reduced administrative burden on all concerned since it leads to better recording of the Article 6.3 process in the forestry sector and helps increase the overall level of understanding and awareness of how to carry out an AA screening or full scale assessment correctly for activities in this sector.

• The wide ranging consultations with other statutory authorities (especially NPWS) and NGOs.

However issues which were raised include:

• There is however a need to ensure that the guidelines and new procedures are now fully and correctly implemented, and do not merely lead to a kind of **'tick-box' exercise in practice**.

• There is as yet no mechanism in place for an independent review of the process and its application. Nor are the AA procedures and associated tools (such as the iFORES system), or the screening and AA permit results readily available to the public. This would allow for better scrutiny of the procedures and greater public confidence that guidelines and AA procedures for forest activities are being correctly implemented in practice.

• Hen Harrier and Fresh Water Pearl Mussel, two key species found in areas where forestry-related decision-making is important, continue to be seriously at risk, with the former in decline in SPAs and the latter no longer reproducing. *It has yet to be demonstrated that forestry is being managed in a way that ensures the favourable conservation status of these species. Furthermore, the context in which the AA system operates remains incomplete as site management plans that would bring together the full range of actions needed to conserve these species are still in preparation.*

We would fully agree that on paper the procedure set out by the Forestry Services AAP is excellent and seems to address the main issues however in our experience there are still serious weaknesses in the implementation of appropriate assessment (AA) within Irish forestry sector.

3.1.1 The failure to carry out a proper screening for appropriate assessment

Screening is a crucial step of the Article 6 (3) permit procedure however in our experience this stage of the process has the capacity to act as a "loophole" through which plans/projects likely to have an impact may escape the assessment if the screening process is too simple or incomplete. Too often the process is something of a 'tick box' exercise. In our experience the need to carry out a full AA is frequently and inappropriately screened out at the screening stage. An Taisce regularly call on the forestry service to carry out an AA and we clearly indicate our reasoning for doing so with specific references to the site in question, its features of interest and the potential direct, indirect and cumulative impacts of afforestation. The failure of the forestry service to carry out a proper screening assessment is often compounded by the NPWSs failure to call for an AA in their submissions.

The failure of the forestry, farming and fisheries sectors to carry out AAs is not unique to Ireland and has been highlighted at an EU level (Sundseth & Roth, 2013). One of the reasons may be a lack of understanding of key legal terms and the implications of the relevant EU case law. There seems to be confusion around key legal terms such as the definition of a 'plan or project'. There certainly seems to be confusion about the 'trigger' for AA at the screening stage. Given the low threshold set by the Waddenzee judgment (C-127/02) regarding the trigger for appropriate assessment, it is likely that a land use like forestry which is so prevalent in many Natura 2000 sites and which has so many negative

impacts on biodiversity should result in many more appropriate assessments being carried out than is currently the case.

3.1.2 The need to carry out a full Appropriate Assessment

Given the known and potential direct, indirect and cumulative impacts of forestry on species such as hen harriers (*Circus cyaneus*) (NPWS, 2015), it is essential that all forestry applications which have the potential to negatively impact upon the six Special Protection Areas (SPA) designated for the species are subjected to an Article 6(3) assessment. The habitat types and species for which a Natura 2000 site is designated are influenced by a wide range of intrinsic and extrinsic factors which means that the assessment of impacts has to be studied on a case by case basis and must be supported by good baseline knowledge. Poor baseline data and information on local pressures is a complicating factor as is the lack of site specific conservation objectives. Often the information provided within the forestry applications is inaccurate or incomplete.

3.1.3 The lack of assessment of cumulative impacts

Another key issue which is relevant for all AAs in Ireland is the lack of assessment of cumulative impacts. This is one of the biggest issues in Irish AA implementation and it is still recognised as a major gap in most AA reports at an EU level with 41.4% of surveyed respondents stating that assessment of cumulative impacts is 'rarely' or 'never' done. The analysis of the significance of the effects and of effective mitigation measures is also 'sometimes' a problem (33.3% and 40.4% of the cases respectively) (Sundseth &Roth, 2013). The Forest Service operates an electronic iFORIS system for use by its inspectors (showing proposed afforestation, existing afforestation, details of that afforestation, Natura 2000 boundaries, etc.). The Forest Service also provides a version of this system – iNET – to professional foresters on a username and password basis. However, the public is not permitted access to the iNET system, despite recent requests; moreover, An Taisce is not permitted to access the iNET system, notwithstanding our prescribed status. Providing An Taisce access to this system would improve the transparency of the Forestry Services AAP and it would allow the eNGO sector greater input into the assessment of cumulative impacts.

3.1.4 The lack of protection afforded to Hen Harriers outside of the Six SPAs

Another issue is the lack of protection for designated habitats and species outside of the Natura 2000 network. Ireland has a poor record in implementing our broader obligations outside of the Natura 2000 network as demonstrated by the Fourth complaint in the judgment of the Court of Justice of the European Union (CJEU) in Case C 418/04 Commission v Ireland "The Birds Case," in which the Court found that Ireland had failed to transpose and apply obligations to protect birds in the wider countryside as required by Article 4(4) of the Birds Directive. There is also the issue that even within Irelands designated sites species such as hen harriers are not being afforded a high enough level of protection.

In the EPAs 'Management Strategies for the Protection of High Status Water Bodies' report Ní Chatháin et al (2012) analysed many of the pressures on High Status sites including forestry and windfarms. The report concluded that "*Current AA levels need to be radically improved with regard to their acceptance under Article 6 of the Habitat's Directive, including the assessment of the level of rehabilitation needed to allow a catchment to function sustainably. It would be beneficial if this were extended to potential impacts to high status sites that lie outside the cSAC network, e.g. via independent EIA routes*." The report also highlighted the lack of consideration of cumulative impacts in AAs. These observations are directed more generally at the planning system but are relevant for forestry consent.

A review of AA in relation to forestry and other plans and projects within Hen Harrier SPAs should be carried out. An appropriate assessment procedure should be put in place for forestry in other sites outside of the six SPAs which are of national importance for species like the Hen Harrier and the Freshwater Peal Mussel.

As part of the BIOFOREST project a review of forestry Environmental Impact Statements in Ireland was carried out (Iremonger et al., 2006). One of the finding of the review was that the personnel involved in biodiversity assessment for afforestation do not currently receive adequate training or other guidance (e.g. in the Forest Service publication the Forest Biodiversity Guidelines) for the identification of habitats and fauna and flora of biodiversity importance. The report noted that the employment of an ecologist by the Forest Service was a welcome development, however more were needed.

The review found that none of the EISs contained adequate assessments of overall biodiversity. The main deficiencies were insufficient scoping, non-standardised habitat/vegetation classifications, reliance on incomplete lists of species with little or no information on abundance or distribution within the site, and little or no evaluation of the conservation importance of the site. Despite these deficiencies six of the nine afforestation projects for which an EIS was submitted were approved. This indicates that assessment by the appropriate authorities was deficient. The report concluded that ***"lack of adequate strategic assessment, failure of regulations to require biodiversity assessment for the vast majority of afforestation proposals, and serious deficiencies in those biodiversity assessments that are carried out mean that sites of high biodiversity importance are currently at risk of being damaged by afforestation."***

The lack of adequate biodiversity assessment and the approval of afforestation in inappropriate locations as highlighted by this report is still an ongoing issue.

3.1.5 The Birds Directive

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

Member States unanimously adopted the Birds Directive (Directive 79/409/EEC) in April 1979. It is the oldest piece of EU legislation on the environment and one of its cornerstones. Amended in 2009, it became Directive 2009/147/EC.

Article 4 of the Birds Directive addresses the designation of SPAs and the protection afforded to Annex I species and their habitats within the SPA network and provides as follows:

> "Article 4
>
> 1. The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.
>
> In this connection, account shall be taken of:
>
> (a) species in danger of extinction;
>
> (b) species vulnerable to specific changes in their habitat;

(c) species considered rare because of small populations or restricted local distribution;

(d) other species requiring particular attention for reasons of the specific nature of their habitat.

Trends and variations in population levels shall be taken into account as a background for evaluations.

Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species in the geographical sea and land area where this Directive applies.

2. Member States shall take similar measures for regularly occurring migratory species not listed in Annex I, bearing in mind their need for protection in the geographical sea and land area where this Directive applies, as regards their breeding, moulting and wintering areas and staging posts along their migration routes. To this end, Member States shall pay particular attention to the protection of wetlands and particularly to wetlands of international importance.

3. Member States shall send the Commission all relevant information so that it may take appropriate initiatives with a view to the coordination necessary to ensure that the areas provided for in paragraphs 1 and 2 form a coherent whole which meets the protection requirements of these species in the geographical sea and land area where this Directive applies.

4. In respect of the protection areas referred to in paragraphs 1 and 2, Member States shall take appropriate steps to avoid pollution or deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article. Outside these protection areas, Member States shall also strive to avoid pollution or deterioration of habitats."

3.1.6 The Habitats Directive

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

EU governments adopted the Habitats Directive in 1992 (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) in order to ensure the protection of a broader range of European habitats and species and habitats for species than provided for by the Birds Directive. Together with the Birds Directive, it sets the standard for nature conservation across the EU and enables all 28 Member States to work together within a consistent and strong legislative framework in order to protect the most vulnerable species and habitat types across their entire natural range within the EU.

Article 3 (1) of the Habitats Directive provides for a coherent ecological network of special areas of conservation under the title of Natura 2000, and this shall include the special protection areas classified by the Member States pursuant to Directive 79/409/EEC . It also provides that this Network: (emphasis added)

> "**SHALL** enable the natural habitat types and the species' habitats concerned **to be maintained or**, where appropriate, **restored at a favourable conservation status in their natural range**."

Importantly this identifies an obligation to address a Natura 2000 provision which addresses **the natural range of the species**.

According to article 7 of the Habitats Directive (92/43/EEC):

> "*Obligations arising under Article 6 (2), (3) and (4) of this Directive shall replace any obligations arising under the first sentence of Article 4 (4) of Directive 79/409/EEC in respect of areas classified pursuant to Article 4 (1) or similarly recognized under Article 4 (2) thereof, as from the date of implementation of this Directive or the date of classification or recognition by a Member State under Directive 79/409/EEC, where the latter date is later*."

In other words the obligation on Member States to take appropriate steps within the SPA network *"to avoid pollution or deterioration of habitats or any disturbances affecting the birds, in so far as these would be significant having regard to the objectives of this Article,"* has been replaced by the legal obligations set out in Article 6 (2), (3) and (4) of the Habitats Directive.

The remaining element then of Birds Directive Article 4(4) is unchanged and provides for obligations on Member States in respect of avoidance of pollution or deterioration of habitats of Annex I species outside of the SPA network. Indeed the obligation for protection outside the network is further strengthened by Article 10 of the Habitats Directive, and the broader provisions of the Birds Directive.

Article 6(3) of the Habitats Directive

Article 6(3) places specific obligations on the relevant competent authority to assess the impact of **ANY** plan or project on European sites. It requires that any plan or project which, is not directly concerned with or necessary to the management of the site and is likely to have a significant effect on a site, individually or in combination with other plans or projects must be subject to 'appropriate assessment' of the implications of the proposed plan or development in view of the site's conservation objectives.

Article 6 (2-4) of the Habitats Directive

> 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."

Council Directive 92/43/EEC

3.1.7 The need to screen forestry applications for AA

While large infrastructural projects usually do not raise any doubts as to the need for AA, small-scale projects, especially those not subject to EIA and linked to land management issues, might pass unnoticed, especially if there is no consistent framework in place to screen these projects for their potential impact and need for a full AA. This confusion around the definition of a 'plan or project' is recognised at an EU level and it is an ongoing issue in relation to the proper implementation of Art 6(3) (Sundseth and Roth, 2013). The potential confusion around the definition of a plan or project may be one of the reasons that forestry activities are not being screened for AA. The Waddenzee case ('the Waddenzee case' – Case C-127/02, Landelijke Verening tot Behoud van de Waddenzee and Netherlandse Vereninging tot Bescherming van Vogels v Staatssecretaris van Landouw, Natuurbeheer en Visserij [2004] I-07405) made a number of important clarifications on how the obligations in respect of appropriate assessment should be construed and approached. The Waddenzee case held that:

> 30…"*for unintentional damage to Natura 2000 sites to be avoided effectively,* ***all potentially harmful measures*** *must, where possible, be subject to the procedure laid down in Article 6(3) of the habitats directive. Therefore, the terms 'plan' and 'project' should be interpreted broadly, not restrictively. This is also consistent with the wording, which expressly refers to any plan or project in almost all language versions.*"
>
> "39*…The words 'plan and project'…also cover an activity which has already been carried on for many years but for which an authorisation is in principle granted each year for a limited period."*

3.1.8 Stage One Screening for the need for Appropriate Assessment

The obligations of the EU Birds and Habitats Directives are purportedly transposed into Irish legislation through a variety of instruments. For our present purposes most notable amongst these are the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) (referred to below as the Birds & Habitats Regulations 2011) and the Planning and Development (Amendment) Act 2010, as amended by the Environment (Miscellaneous Provisions) Act 2011 (see Irish Statute Book, http://www.irishstatutebook.ie/) and the Forestry legislation.

The Forest Service of the Department of Agriculture, Food and the Marine is the relevant authority responsible for assessing applications for consent, grant approval and licences relating to various forestry activities, they are the authority who apply the appropriate assessment procedure. The obligation to conduct a lawful evaluation and decision-making procedure, lies with the Forestry Service and to do so in consultation with the National Parks and Wildlife Service and a number of other prescribed bodies. The Forestry services Forest Service Appropriate Assessment Procedure Information Note March 2012 indicates that it "sets out the Forest Service Appropriate Assessment Procedure (AAP)"

This 'Appropriate Assessment' of the implications of the proposed plan or development in view of the site's conservation objectives is set out as a two-stage process and initially requiring a preliminary screening for appropriate assessment. It states in Section 4 of the Forest Service AAP that:

> "Screening is required in relation to all applications within, partially within, or outside of a Natura site."

According to the 2009 National Parks and Wildlife Service (NPWS) Guidance on Appropriate Assessment of Plans and Projects in Ireland:

> *"…the first test is to establish whether, in relation to a particular plan or project, appropriate assessment is required. This is termed AA screening. Its purpose is to determine, on the basis of a preliminary assessment and objective criteria, whether a plan or project,* ***alone and in combination*** *with other plans or projects, could have significant effects on a Natura 2000 site in view of the site's conservation objectives.* ***The need to apply the precautionary principle in making any key decisions in relation to the tests of AA has been confirmed by European Court of Justice case law. Therefore, where significant effects are likely, uncertain or unknown at screening stage, AA will be required.****"*

The case law of the CJEU provided important clarification on the very low threshold for the trigger for an appropriate assessment. In the Case C-127/02 *('the Waddenzee case'* – Case C-127/02, *Landelijke Verening tot Behoud van de Waddenzee and Netherlandse Vereninging tot Bescherming van Vogels v Staatssecretaris van Landouw, Natuurbeheer en Visserij* [2004] I-07405*)* it was held that the trigger for an appropriate assessment is a very light one, and the mere probability or a risk that a plan or project might have a significant effect is sufficient to make an 'appropriate assessment' mandatory. Therefore, an appropriate assessment is always necessary where reasonable doubt exists as to the absence of significant adverse effects:

> *"43…It follows that the first sentence of Art 6(3) of the Habitats Directive subordinates the requirement for an appropriate assessment of the implications of a plan or project to the condition that there be a probability or a risk that the latter will have significant effects on the site concerned.*
>
> *44…In the light, in particular, of the precautionary principle, which is one of the foundations of the high level of protection pursued by Community policy on the environment, in accordance with the first subparagraph of Article 174(2) EC, and by reference to which the Habitats Directive must be interpreted, such a risk exists if it cannot be excluded on the basis of objective information that the plan or project will have significant effects on the site concerned (see, by analogy, inter alia Case C-*

180/96 United Kingdom v Commission [1998] ECR I-2265, paragraphs 50, 105 and 107). Such an interpretation of the condition to which the assessment of the implications of a plan or project for a specific site is subject, which implies that in case of doubt as to the absence of significant effects such an assessment must be carried out, makes it possible to ensure effectively that plans or projects which adversely affect the integrity of the site concerned are not authorised, and thereby contributes to achieving, in accordance with the third recital in the preamble to the Habitats Directive and Article 2(1) thereof, its main aim, namely, ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora."

In Case C-258/11, Sweetman & Ors. V An Bord Pleanála & Ors., Advocate General Sharpston opined:

> "46…*that the test is set at a lower level and that the question is simply whether the plan or project concerned is capable of having an effect. It is in that sense that the English 'likely to' should be understood."*

Thus allowing for a more expansive linguistic interpretation, the test would appear to involve a lower threshold than that of likelihood which connotes 'probability' as distinct from 'possibility'. Where doubt exists as to the absence of significant effects an appropriate assessment must be carried out. The approach to appropriate assessment is further reinforced by the precautionary principle which is set out in the Treaty of the Functioning of the EU (TFEU) and underpins EU Environmental legislation such as the Habitats Directive.

Article 191 of the TFEU provides *inter alia* for the Precautionary Approach which is required to inform action and decisions in environmental matters. Consequently where there is uncertainty – the obligation is to take the cautious route – unless scientific evidence can provide certainty there are no impacts.

Clearly C-127/02 is most helpful on the Precautionary principle of Article 191 of the treaty of the Functioning of the EU, TFEU some clarifications from the CJEU and Irish High Court are included below:

Artegodan a.o. v Commission[2002] ECR II-4945, clarified that:

> "184*. . . the precautionary principle can be defined as a general principle of Community law requiring the competent authorities to take appropriate measures to prevent specific potential risks to public health, safety and the environment, by giving precedence to the requirements related to the protection of those interests over economic interests."*

The absence of certainty as regards the possibility of a significant negative effect as the result of forestry activities is clearly enough to trigger a Stage I and Stage II appropriate assessment, and to trigger the screening threshold identified as being '*capable of having an effect*' by AG Sharpston in c-258/11.

Without expanding on the established direct and indirect negative impacts of forestry on Hen Harriers and other habitats and species at this point it is sufficient to note that this absence of certainty in relation to effects has been acknowledged time and again within the Irish forestry sector. The recently published COFORD report titled Land Availability for

Afforestation - Exploring opportunities for expanding Ireland's forest resource acknowledges that:

> *"The impact of afforestation on specific bird populations is not yet fully understood e.g. hen harrier, merlin."*

Given this uncertainty forestry activities which have the potential to impact upon a hen harrier SPA will trigger a stage I screening assessment.

3.1.9 Stage Two Appropriate Assessment

In the absence of certainty as to the likelihood of a negative impact of a plan or project on a Natura 2000 site at the screening stage a full Stage II AA is required. The obligations imposed under Article 6(3) of the Habitats Directive has been affirmed and expanded upon in subsequent decisions of the CJEU.

In Case C-258/11, Sweetman & Ors. V An Bord Pleanála & Ors . it was held that the provisions of Art 6 (2) –(4) of the Habitats Directive must be interpreted together

> "32…*as a coherent whole in the light of the conservation objectives pursued by the directive*"

and that they impose a series of specific obligations necessary to achieve and maintain favourable conservation status. A plan or project will negatively impact upon a site if it prevented the

> "39…*lasting preservation of the constitutive characteristics*"

of the site for which it was designated, with reference to the sites conservation objectives. Significantly it was determined that

> "40…*authorisation for a plan or project ….may therefore be given only on condition that the competent authorities ….are certain that the plan or project will not have lasting adverse effects on the integrity of the site. That is so where no reasonable scientific doubt remains as to the absence of such effects*."

In Kelly v An Bord Pleanála & Ors.,[2013 No 802 J.R.] with reference to Commission v Spain c-404/09 the High Court held in para 36 that that the competent authority must carry out an AA for a plan or project in light of the **best scientific knowledge in the field and that the final determination of the competent authority must include complete, precise and definitive findings**.

> "36…*This formulation as to the nature of the obligations imposed under Article 6(3) of the Habitats Directive has been affirmed and expanded upon in subsequent decisions of the CJEU. In Commission v. Spain (Case C-404/09) [2011] E.C.R. I-11853, the CJEU referred again to the obligation to identify the affects of the proposed development on the European sites conservation objectives "in the light of the best scientific knowledge in the field" and referred again to the test that "no reasonable scientific doubt remains as to the absence of such effects". At paras. 99 and 100, the CJEU stated:*
>
> "99*. Under Article 6(3) of the Habitats Directive, an appropriate assessment of the implications for the site concerned of the plan or project implies that, prior to its*

approval, all aspects of the plan or project which can, by themselves or in combination with other plans or projects, affect the site's conservation objectives must be identified in the light of the best scientific knowledge in the field. The competent national authorities are to authorise an activity on the protected site only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects (see, in particular, Commission v Ireland, at paragraph 243).

100. An assessment made under Article 6(3) of the Habitats Directive cannot be regarded as appropriate if it contains gaps and lacks complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the SPA concerned (see, to that effect, Case C-304/05 Commission v Italy [2007] ECR1-7495, paragraph 69."

The case repeated the conclusion of CJEU at in Case C-258/11, namely that an AA

> "44… *cannot have lacunae and must contain complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt*."

And in Waddenzee Case c-127/02:

> *"61…under Article 6(3) of the Habitats Directive, an appropriate assessment of the implications for the site concerned of the plan or project implies that, prior to its approval, all the aspects of the plan or project which can, by themselves or in combination with other plans or projects, affect the site's conservation objectives must be identified in the light of the best scientific knowledge in the field. The competent national authorities…concerned in the light of the site's conservation objectives, are to authorise such an activity only if they have made certain that it will not adversely affect the integrity of that site. That is the case where no reasonable scientific doubt remains as to the absence of such effects."*

The Kelly Judgement has provided a very helpful clarification of the requirements of an AA and in particular in a summary of what must be delivered by the process in order for it to be lawfully conducted

> "40*…(i) Must identify, in the light of the best scientific knowledge in the field, all aspects of the development project which can, by itself or in combination with other plans or projects, affect the European site in the light of its conservation objectives. This clearly requires both examination and analysis.*
>
> *(ii) Must contain complete, precise and definitive findings and conclusions and may not have lacunae or gaps. The requirement for precise and definitive findings and conclusions appears to require analysis, evaluation and decisions. Further, the reference to findings and conclusions in a scientific context requires both findings following analysis and conclusions following an evaluation each in the light of the best scientific knowledge in the field.*
>
> *(iii) May only include a determination that the proposed development will not adversely affect the integrity of any relevant European site where upon the basis of complete, precise and definitive findings and conclusions made the Board decides that no reasonable scientific doubt remains as to the absence of the identified potential effects."*

3.2 Appropriate Assessment and Forestry

A complete appropriate assessment for forestry must clearly identify, in the light of the best scientific knowledge in the field, all aspects of planting, management and harvesting which can, by itself or in combination with other plans or projects, affect a European site.

The site synopsis provided by the NPWS for each of the six SPAs provide important information about the conservation status of the Hen Harrier populations within each site and also about the major threats and pressures within each site. This information should inform how a particular plan or project will impact on the Hen Harrier population within each site. The impact on the Hen Harrier population will then feed into the conservation objectives for the species on a national level. Despite the fact that the population within the six SPAs has declined by 28% since the 2005 survey it is still clear that the SPAs are essential for the species supporting about 43% of the national population in and around their boundaries (Barton et al., 2006; Ruddock et al., 2015).

The main threat identified by the NPWS for each of the six SPAs is further afforestation while windfarm development is also highlighted as a potential threat within several of the SPA: Mullaghanish to Musheramore Mountains (004162), Slieve Aughty Mountains (004168), Slieve Beagh (004167), Slieve Bloom Mountains (004160), Slievefelim to Silvermines Mountains (004165), Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle (004161)

> "*The main threat to the long-term survival of Hen Harriers within the site is further afforestation, which would reduce and fragment the area of foraging habitat, resulting in possible reductions in breeding density and productivity*."

Much of the scientific literature underpinning this conclusion is presented in the 'Hen Harrier Conservation and the Forestry Sector in Ireland' document, which was written by the Golden Eagle Trust in consultation with the Forestry Services and the National Parks and Wildlife Service (NPWS, 2015).

The threats and potential threats identified in the 'Forestry Report' will have to be addressed in any AA. Some of these threats include direct impact of forestry on hen harriers due to habitat alteration and loss relevant to the breeding season both within and outside the SPA network. Another impact of forestry identified within the report and the scientific literature include the loss of foraging habitat. According to the scientific literature post-thicket or mature forest is generally avoided by Hen Harriers for hunting (Barton et al. 2006; Madders, 2000; Madders, 2003; O'Donoghue, 2004). Using remote tracking technology Irwin et al. (2012) found that Hen Harriers within forested habitats appear to avoid forest stands less than 3 years and greater than 15 years of age. These finding are supported by the findings of the WIND HARRIER report (unpublished) presented to the HH TRP consultative committee which demonstrated that foraging Hen Harriers strongly favoured peatlands habitats relative to availability and strongly avoided closed canopy forestry relative to availability. The avoidance of closed canopy forestry would mean that forestry plantations are only useful as foraging habitat for about 12 years (Irwin et al. (2012). Data provided by COFORD indicates that the silvicultural rotation length of sitka spruce in Ireland ranges from 45-70 years with an average age of 57.5 years (Horgan et al., 2003). This is in agreement with the average rotation time for sitka spruce in the UK of 59 years (Dewar & Cannell, 1992). Therefore the conversion of a suitable foraging habitat would lead to a loss of

foraging habitat for an average of 45.5 years. An AA would have to demonstrate that the foraging opportunities provided by pre-thicket and in particular second rotation forestry outweigh the loss of open habitat due to afforestation. Such an assessment should pay particular attention to the impact of afforestation on Meadow Pipit (Anthus pratensis) Skylark (Alauda arvensis), Willow Warbler (Phylloscopus trochilus) and Stonechat (Saxicola torquata) given their importance as prey species during the breeding season (O'Donoghue, 2010) and their intolerance of these species to afforestation (O'Connell et al., 2015). There is currently a knowledge gap regarding the relative value of different habitats for hen harriers. This lack of knowledge was highlighted by the BIOFOREST project as being particularly critical in relation to the quality of second-rotation forests (Iremonger et al., 2006).

The importance of hedgerows and other linear features as foraging habitat for hen harriers is well established (Irwin et al., 2012, O'Donoghue, 2012). The envelopment of hedgerows and other linear features by blocks of forestry may therefore result in the loss of foraging habitat. An AA will have to address this potential negative impact.

The foraging distances of Irish hen harriers as recorded by Irwin et al (2012) is greater than that recorded for in Scotland (Arroyo et al., 2009; Arroyo et al., 2014). This may be due to Irish Hen Harriers breeding in forested landscapes having to forage over larger areas in order to provision their broods. It has been suggested that the loss of foraging habitat and the fragmentation of foraging habitat due to forest maturation is likely to be the driving force behind the greater foraging distances observed in Ireland than in the UK (Arroyo et al., 2009; Irwin et al., 2012; Arroyo et al., 2014). Irish Hen Harriers breeding in forested landscapes will have to forage over larger areas in order to provision their broods. If this is the case it has serious implications for the condition of breeding Hen Harriers and the productivity of Irish broods. Any AA would have to disprove such an impact.

Other impacts of forestry on hen harrier ecology identified within the report include habitat fragmentation on a site and landscape level and as a result reduced habitat quality/extent. The forestry document also highlighted direct disturbance issues associated with forestry (NPWS, 2015). These are recognised by the forestry service appropriate assessment procedure (2012) as including: timber felling (thinning, clearfell); timber extraction to roadside; timber loading at roadside; mechanical cultivation for both afforestation and reforestation; forest road construction (and associated developments); the driving of fencing posts; and any other operation(s) the Forest Service may deem as creating disturbance. A number of pressures related to forestry were identified in the most recent national hen harrier survey (Ruddock et al., 2015).

One of the key interactions between hen harrier and forestry highlighted within the forestry report was the ecological trap caused by the mismatch between breeding success and hen harrier preference for second rotation pre-thicket forestry (Irwin et al., 2012; Wilson et al., 2009).

The forestry document also highlighted issues relating to edge effects and susceptibility to predation. Increased afforestation may be causing indirect negative impacts on Hen Harriers as forest habitats may act as reservoirs for predators such as corvids, Fox, Mink and Pine Marten that prey on the ground-nesting birds in the surrounding area and close to forest edges (Ainsworth et al., 2016; Douglas et al., 2014; NPWS, 2015; Wilson et al., 2014). These predators which typically persist at higher abundances in fragmented landscapes and

may show behavioural associations with habitat edges (Ainsworth et al., 2016). Predation of Hen Harriers by Pine Martens has been observed in the Slieve Blooms SPA (Ruddock et al., 2015). The predation of Hen Harriers by Pine Martens is especially noteworthy as Pine Martens are arboreal predators and their presence on a regional and national level is linked to forest cover and the connectivity of forest cover (O'Mahony et al., 2006). In Ireland evidence of pine marten have found in a variety of habitat types from conifer plantations, to semi-natural woodland, scrub dominated habitats and mixed forest (O'Mahony et al., 2006). Pine Martens are however known to favour mature forest stands and avoid open habitats such as bogs and fields (Brainerd and Rolstad, 2002; Storch et al., 1990). Habitats traditionally associated with Hen Harriers (Ruddock et al., 2015). A number of studies also demonstrate that the probability of predator occurrence tends to decrease with increasing distance from forest edges and that predators prefer smaller forest fragments (Chalfoun et al., 2002; Cervinka et al., 2011). Any AA must consider the increased risk of predation as an indirect impact of increased forest cover. Increased levels of predation may also impact on hen harrier indirectly through increased competition with other predators for prey items such as passerines and mammals.

Wilson et al (2012) found that Hen Harrier breeding success can decrease noticeably when the percentage of second rotation pre-thicket forest in the surrounding landscape is greater than 10%. On this point Irwin et al (2012) sets out that 'In a forest landscape with a well-balanced age-structure, approximately one quarter of the forest estate will be in pre-thicket stage at any one time. A maximum threshold of 40% for total forest cover in the landscape would therefore ensure that the percentage of pre-thicket forest did not regularly exceed 10%.'

The question when carrying out an appropriate assessment is not at what point will forestry drive the collapse of a hen harrier population regionally but rather at what threshold will a negative impact occur?

3.3 Significance of effects in view of the SPA conservation objectives

According to Article 6(3) of the Habitats Directive 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.

There are six SPAs designated for the Hen Harrier within the Republic of Ireland: Mullaghanish to Musheramore Mountains (004162), Slieve Aughty Mountains (004168), Slieve Beagh (004167), Slieve Bloom Mountains (004160), Slievefelim to Silvermines Mountains (004165), Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle (004161).

The conservation objectives for all six SPAs are:

To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA: A082 - Hen Harrier - *Circus cyaneus*.

The favourable conservation status of a species is defined in the Habitats Directive and is achieved when:

• Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and

• The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and

• There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

3.3.1 Population Dynamics

There have been four national surveys of the Hen Harrier in Ireland to date (Norriss et al., 2002, Barton et al., 2006, Ruddock et al., 2012, Ruddock et al., 2015). Based on the analysis of the population dynamics data carried out in the most recent survey for the Hen Harrier it can be concluded that the species is not maintaining itself on a long-term basis. The subset analyses carried out as part of the most recent survey in order to standardise the comparison of numbers between years and reduce biases associated with increasing survey effort between surveys has revealed that the national population has undergone declines in the short, medium and long term (Ruddock ey al., 2015).

• The first subset comparison shows a decline of -16.4% over the last five years in the maximum population estimate;

• The second subset comparison shows a total decline of -16.7% from 2010 to 2015 and -9.7% between 2005 and 2015 in the maximum population estimates; and

• The third subset comparison shows an overall decline of -33.5% from 1998 – 2000 to 2015 (Ruddock et al., 2015).

3.3.2 Natural Range and Suitable Habitat Availability

There has been an increase in recorded distribution since the last survey in 2010 particularly with the number of possible pairs and whilst some of this may be due to increasing survey effort, some of this may be due to redistribution from the loss of pairs from within core breeding areas this may indicate a shifting range from formerly suitable areas to other areas which may be less suitable and hence the high number of additional possible pairs recorded (Ruddock et al., 2015). This redistribution theory however has yet to be substantiated. In any regard the ongoing decline in the national population will inevitably impact upon the species national range and this has been recorded historically with the loss of breeding hen harriers from former strongholds like the Wicklow Mountains (Ruddock et al., 2012).

The range of the species in the medium to long term will be linked to the quality and availability of suitable habitat. As Hen Harriers are traditionally associated with upland habitats, peatlands and rough grasslands the conservation status of these habitats is a valuable reference for the species long term prospects. According to the NPWS many activities including drainage, reclamation, agricultural improvement, peat extraction, erosion, burning, and afforestation and overstocking have resulted in large scale loss and degradation of upland habitats. The focus of wind energy developments on upland areas has also had serious impacts on sensitive habitats through fragmentation, disturbance, hydrological changes, soil erosion and landslides (Perrin et al., 2014). The ongoing loss of semi-natural grasslands to pressures such as agricultural improvement, afforestation and scrub encroachment is well established (O'Neill et al., 2013). Many of these pressures will continue to increase due to factors such as the ongoing intensification of the agricultural sector under Food Harvest 2020 and Food Wise 2025, the expansion of national forest

estate towards 2046 and the increase in windfarm development. The NPWS in 'The Status of EU Protected Habitats and Species in Ireland' report list the overall conservation status of Irelands peatlands (4010 Wet heath Bad, 4030 Dry heaths, 7110 Raised bog (active)*, 7120 Degraded raised bogs, 7130 Blanket bog (active)*) as bad. Each of the Annex I grassland habitats were also considered to have a bad conservation status (NPWS, 2013).

Based on the current trends the long term outlook for the species and its traditional habitats are unfavourable. Any AA for a plan or project is required to be considered in light of the precautionary principle and the conservation objectives for the sites designated for the species, and falls to be considered amongst extensive pressures on the Hen Harrier and its habitat impacting on its favourable conservation status.

3.4 Specific examples of improper procedure

An Taisce have made somewhere in the region of 80 submissions in relation to forestry applications in or adjacent to the Six Hen Harrier SPAs since 2013. This does not include submissions made in relation to other sites of conservation interest to Hen Harriers which lie outside of the SPA network. This figure is significant given that An Taisce only makes observations in instances where it is deemed that a potential significant negative impact may occur. The figure is also large given that there has been a moratorium on further afforestation in the Six Hen Harrier SPAs (Slieve Bloom Mountains SPA, Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Mullaghanish to Musheramore Mountains SPA, Slievefelim to Silvermine Mountains SPA, Slieve Beagh SPA and Slieve Aughty Mountains SPA).

In the case of application CN72850 afforestation was approved within the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle (004161). No screening for AA or a full AA were carried out. The NPWS acknowledged that the site lay within a Hen Harrier SPA but did not object to the application or call for an AA. The site also lay within a Hen Harrier Red Zone. This example highlights confusion around the definition of a plan or project as well as the conditions which trigger an AA. This application should have been subjected to an AA and approval should have been refused based on the direct, indirect and cumulative negative impacts associated with forestry.

Application CN67351 and CN67361 were both approved despite the fact they lie within the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) and also in the Lower River Shannon cSAC (002165).

In relation to CN72821 approval was given for afforestation within Flughany Bog SAC/NHA, Site Code: 000497. Conifer forestry was highlighted by the NPWS as one of the key conservation issues within the site. Afforesting the site would be in clear contradiction of the Conservation Objectives of the site and would not be in line with the main issues for the site which are clearly identified in the NPWS Conservation Plan for Fulghany Bog SAC (2005) - http://www.npws.ie/sites/default/files/publications/pdf/CP000497.pdf

In relation to application CN71582, approval was given for a large forestry plantation partly within and partly outside of Slieve Rushen Bog NHA (site code: 00009). This site is of national importance for hen harriers and other upland habitats and species. This approval highlights the lack of protection afforded to hen harriers outside of their six SPAs and the lack of protection afforded to NHAs in general. It also highlights a failure to accept the clear

negative impact of forestry on upland biodiversity and the damage that fragmentation and edge effects cause upland species. An Taisce successfully appealed the approval of this application and afforestation of plots within Slieve Rusheen Bog NHA. Our objection to another plot on that basis that it would create a barrier to movement for species within the landscape and fragment suitable habitat was also upheld. A field inspection by the Forest Service Ecologist deemed that plot 4 of the application was wet heath, an Annex I habitat. By virtue of the habitats size and quality and its connectivity to Slieve Rusheen Bog NHA the approval of afforestation in this plot was also overturned. The fact that approval was given by the Forest Service to afforest an Annex I habitat warrants review. As does the failure of the NPWS to object to this application. Field surveys of sites which are likely to harbour important habitats or species should be carried out mandatorily by a trained ecologist.

The afforestation of NHAs is a recurring issue. Even NHAs containing habitats as threatened and sensitive as raised bogs have been approved for afforestation (CN67700 - Black Castle Bog NHA, Site Code:000570, CN68771 - Lough Tee Bog NHA, Site Code: 000307).

3.5 Recommendations

- The forestry consent regulations must be adapted to ensure the protection of Annex I and priority habitats. The protection of any site which is likely to host an Annex I habitat due to its location, altitude, soil type etc should be assessed by a trained ecologist. The protection of Annex I peatlands such as Wet Heath [4010], Dry Heath [4030], Alpine and Sub Alpine Heath [4060], Blanket Bog Active* [7130] and Rhyncosporion depressions [7150]and Annex I grasslands such as Molinia Meadows [6410] and Species-rich Nardus upland grassland* [6230] should be an urgent priority.

- New afforestation should not take place on habitats that support diverse assemblages of open-habitat specialists particularly when these are red/amber-listed species or Annex I species under the Habitats Directive.

- The forest service must review their guidelines and procedures and ensure compliance with the provisions relating to the protection of HNV farmland from afforestation in EU regulation No 807/2014 of 11 March 2014 (supplementing Regulation (EU) No 1305/2013) i.e. "*Minimum environmental requirements with which the afforestation of agricultural land must comply should be laid down ensuring that* ***no inappropriate afforestation of sensitive habitats including areas under high natural value farming takes place*** *and that the need for resilience to climate change is taken into account. On sites designated as Natura 2000, afforestation should be consistent with the management objectives of the sites concerned. Special attention should be paid to specific environmental needs for particular sites such as the prevention of soil erosion. More stringent rules should be provided for afforestation operations leading to the creation of larger forests in order to take into account the impact of scale of those operations on the ecosystems and to ensure that they comply with the objectives of the Green Infrastructure Strategy (1) and new EU Forest Strategy (2).*"

- The forest service must ensure that there is no further afforestation of sites which are nationally important for breeding hen harriers. In the six Hen Harrier SPAs forestry should be removed to achieve a maximum threshold of 40% for total forest cover in the landscape as per Irwin et al (2012).

- The forestry service should carry out a review of their implementation of the legal requirements of Article 6(3) of the Habitats Directive and address the issues we have highlighted, including issues at screening, appropriate assessments stage and the failure to assess cumulative impacts.

4.0 Water

4.1 Forestry as a significant water management issue

Under the Water Framework Directive (WFD) (2000/60/EC), EU member states must implement the necessary measures to prevent deterioration in the status of all bodies of surface and groundwater and where necessary, restore all waters to good ecological and chemical status by 2015.

As part of the initial characterization process required under the WFD, a risk assessment of the anthropogenic pressures on water resources was undertaken to identify the pressures present in each river basin and the threat they pose to the chemical and ecological status of waterbodies. This "National Characterisation Report for Ireland" (Anon, 2005) identified forestry as one of the land-use activities posing a potential risk in terms of diffuse pollution. Forestry in Ireland, along with agriculture are accepted as a major source of diffuse pollution. Forestry both directly, indirectly and cumulatively may negatively impact on water quality and represents a risk to the ecological integrity of Ireland's aquatic environment (Hutton et al., 2008). Pressures associated with forestry are increased acidification from plantations in acid sensitive catchment, sedimentation from clear fell, harvesting, new plantations, road construction and erosion on steep catchments and eutrophication from fertilisation on steep catchments and forest harvesting on peat soils (Hutton et al., 2008).

Historically Irish forestry has been concentrated on agriculturally unproductive or 'marginal' land. Much of this marginal land is found in our uplands, where many Irish rivers are sourced and where many of our dwindling high status sites remain. These areas are usually characterised by highly mobile soils such as peat which are associated with a higher risk of acidification and sedimentation. The distribution of forestry nationally is not homogenous and as such it is a greater source of pollution in some catchments than others. Forestry is however a significant water quality issue in certain parts of the country due to the status of forestry as a significant land use and also due to other contributing factors such as local abiotic conditions and forestry management (Hutton et al., 2008). According to the integrated water quality assessment for the North Western and Neagh Bann River Basin District in 2013, a total of 168 river stations in the North West International River Basin District (NWIRBD) had a biological Q value that was less than 'good' status (i.e. <4). The suspected causes of pollution at 93 or 55.4% of these stations was agriculture while 32 or 19% of pollution incidences were due to forestry. The third biggest pressure was municipal waste water which was identified as a pressure at 22 or 13.1% of stations (EPA, 2014). Similarly in the Western River Basin District (WRBD) forestry is one of the most significant suspected causes of pollution. The main causes of river station in the WRBD river stations

being in unsatisfactory condition (i.e. biological classification less than Good) was 31% agriculture, 21% municipal waste water and 11% forestry (EPA, 2014).

According to the EPAs National Source Apportionment Assessment 2012 forestry is responsible for 3,014,509 N Load Kg yr^{-1} and 300,500 P Load Kg yr^{-1}. The percentage difference in N has increased a massive 44% on the 1995 assessment figures. There are no figures available for P in 1995 unfortunately to make a comparison but one can assume a similarly significant rise. Based on these figures forestry nationally is more N polluting than unsewerd houses and comparable to unsewered house in terms of P pollution (EPA, 2015).

According to the Ireland's Forestry Programme 2014-2020 the aims of Ireland's forest policy is to encourage planting by private landholders in order to achieve a forest cover of 18% by 2046. The ongoing expansion in the national forest estate will take place on private land holdings and will be driven by the provision of grants to cover the cost of afforestation, and an annual forest premium to compensate for income foregone as a result of converting farm land to forest (Forest-Service, 2015). It is likely that forestry will continue to grow in areas of the country where forestry has traditionally been a significant and growing land use such as the North Western, Western and South Western River Basin Districts as well upland areas in other parts of the country. The current water quality issues associated with forestry will be exacerbated as forestry expands nationally. This will be a challenge to Ireland meeting our targets under the WFD unless changes in practice are adopted.

4.1.1 Acidification

Forestry causes acidification in surface waters through its interception of atmospheric pollutants coupled with the inability, in sensitive areas, of the substrate soils and geology to buffer the acidity. Factors that influence the scale of acidification are (I) the pollutant load and (II) the percentage of catchment forest cover (Johnson et al., 2008).

Forest canopies can significantly increase the capture of sulphur and nitrogen pollutants from the atmosphere. The scavenging of natural and anthropogenic sulphur and nitrogen has been observed to be greater for conifer species due to the large surface area and aerodynamic roughness of their evergreen canopies (Forest Service UK, 2003). The extent of the pressure is likely to vary with tree species with some species, such as Sitka spruce (*P. sitchensis*), being more effective scavengers of pollutants than others (Johnson et al., 2008). This is an issue in an Irish context given that the national forestry inventory stocked forest area is made up of 68.6%, broadleaves 17.5% and mixed forests 13.9%. Of this the vast majority of the national tree species composition is made up of Sitka Spruce at 52.4% with the second most common species being Larch sp making up just 4.4% (Forest-Service, 2014).

Mature forest canopies are more efficient at intercepting aerosols and dust particles from the atmosphere due to their height and surface area. Acidification will therefore increase as trees grow and the height of the stand increases (Johnson et al., 2008). This is also worrying in an Irish context given that just under three quarters of the national forest estate consists of trees of 30 years old or less (Forest Service, 2014).

Table 2. Tree Species Composition (Forest-Service, 2014)

Species Area	**ha**	**%**
Sitka spruce	334,560	52.4

Norway spruce	26,340	4.1
Scots pine	8,010	1.3
Other pine spp.	61,950	9.7
Douglas fir	10,380	1.6
Larch species	27,740	4.4
Other conifers	3,850	0.6
Pedunculate and sessile oak	16,840	2.6
Beech	9,500	1.5
Sycamore	9,250	1.5
Birch spp.	37,370	5.9
Ash	20,610	3.2
Alder spp.	15,080	2.4
Other short living broadleaves	46,220	7.3
Other long living broadleaves	9,440	1.4
Total	637,140	100

The interception of pollution also increase as altitude increases (>300 m) because of the longer duration of cloud cover and higher wind speeds. The expansion of conifer forest over a significant proportion of acidified catchments (>30%), or the restocking of existing forests above 300 m altitude, will increase surface water acidification (Forest-Service UK, 2003). The pollutant load varies from site to site and is influenced by emission levels, climatic conditions (e.g. frequency and magnitude of rainfall events, the amount of annual rainfall, prevailing wind direction) as well as site characteristics such as elevation and aspect, tree species, stand age and structure. Clear-felling also has an acidification effect as tree removal results in nitrogen mineralisation and nitrification. This can result in nitrate leaching and enhance acidity and aluminium solubility in waters draining some soils (Forest-Service UK, 2003).

As with any pressure which is contingent on a number of contributing factors it is difficult to make simplistic generalisations about the relationship between forest cover and acidification pressure however coniferous forestry in Ireland has been shown to depress site pH and alkalinity of surface waters (Johnson et al., 2008; Kelly-Quinn et al., 2008). Research carried out in Ireland has demonstrated that forestry on peat and podzolic/lithosoilic soils on both igneous/metamorphic and sedimentary geology and to some extent on poorly drained gleys has resulted in increased acidification of surface water. The minimum pH for both peat

and podzolic/lithosolic sites on igneous/metamorphic geology began to fall below the lower limit of the control sites when forest cover exceeded values in the region of 25-30%. The same results were found on peat sites draining sedimentary geology (Kelly-Quinn et al., 2008). The impacts of acidification on the physical and chemical status of surface waters were observed to impact upon the aquatic biology within the studied sites. Biological data largely mirrored the trends for the acidity variables and several macroinvertebrate metrics (taxon richness, ephemeropteran richness, abundance of baetids, EPT richness, diversity indices), showed a strong relationship with pH, were also shown to vary significantly across the forest cover bands or to correlate with % forest cover. The fish analyses has highlighted significant differences in fish catch and density between the control and forested groups. This difference was mainly attributed to low numbers of fry (salmon and trout) in the forested streams (Kelly-Quinn et al., 2008). Acidification of surface water can result in a cascade effect down through the trophic levels in aquatic ecosystems. Observed biological impacts associated with acidification in Irish streams in Wicklow, Galway and South Mayo include 1) the reduction in or total elimination of fish populations, 2) reductions in taxon richness and elimination of some acid-sensitive macroinvertebrate groups (particularly the Ephemeroptera) and 3) changes in the quality of primary producers. The effect of acidification is so pronounced in some rivers that pH has been found to be the key variable structuring biological communities (Kelly-Quinn et al., 2008).

4.1.2 Eutrophication

Eutrophication is the process whereby a water body becomes is impacted by an increase in nutrients, usually nitrogen (N) and phosphorus (P). This fertilisation can result in increased growth of algae and other plant life which in turn can deplete the levels of oxygen in the water. Reduced oxygen will negatively impact on invertebrate and fish communities (Hutton et al., 2008).

While the eutrophication impact of forestry is not as pounced as that of agriculture the impact of forestry is magnified by a number of factors. Forestry is usually located in upland areas and the eutrophication impact on headwaters and tributaries can be felt far downstream. Eutrophication on relatively pristine upland streams is compounded downstream by a multitude of pressures. Impacts on feeder streams may impact on public and private water supply, damage important salmonid fisheries and degrade impotent high status sites (Hutton et al., 2008).

Phosphorus is a limiting nutrient in Irish freshwater ecosystems. While mineral soils are proficient at immobilising P sandy and organic/peaty soils have a reduced capacity to hold onto P and are therefore associated with P leaching. Catchments which contain soils with a poor capacity for P absorption are therefore more susceptible to P eutrophication (Hutton et al., 2008). Given that many forests have been established on peaty soils there is an increased likelihood that forestry in Ireland is contributing to the eutrophication of Ireland's aquatic environment (Hutton et al., 2008). To give an indication of the scale of peatland afforestation in Ireland the state-sponsored forestry company Coillte had 55% of its total estate on peatlands in 1999 (Table 3).

Table 3. Percent of soil types on Coillte's estate (Anon, 1999)

Soil type	**%**
Gley	20
Podsol	20
Brown Earth	11
Other Mineral	5
Virgin Blanket Bog	34
Cutover Raised Bog	4
Cutover Blanket Bog	3
Virgin Raised Bog	2
Fen	1
Total	100

Plantations which have been established on Irish blanket bogs have been observed to have surface water P concentrations which are well above Irish thresholds for the eutrophication of rivers. Elevated P concentrations were noted up to three years after felling and fertilisation took place (Renou & Cummins, 2002). This historical legacy of forestry on peat soils is further exacerbated by the fact that many of these plantations predate the Forestry and Water Quality Guidelines (2000).

Studies in Ireland have identified elevated N levels in surface waters post felling and/or fertiliser treatments (Cummins & Farrell, 2003). Increased N inputs in tandem with forest maturation may lead to the phenomenon of nitrogen saturation resulting in nitrification and nitrate leaching. Farrell et al. (2001) found that an area of first rotation sitka spruce plantation in Wicklow was suffering from N saturation.

Fertilisation is one of the main sources of eutrophication associated with forestry. Its impact will be influenced by a number of variables such as soil properties, application timing, weather, catchment size and the water bodies' characteristics (Hutton et al., 2008). In Ireland, phosphorus in the form of granulated rock phosphate is the main fertiliser used in forestry, with nitrogen and potassium occasionally used (Hutton et al., 2008). One of the main issues associated with P in an Irish context is the increased run off of P after fertilisation on peaty soils. Fertiliser-induced leaching of phosphorus from peatlands drained for forestry has been detected in Irish studies (Cummins & Farrell, 2003).

Nutrients associated with forestry may also originate from decaying organic matter, including brash, and harvest residue associated with crop thinning or felling. The release of excess nutrients in the form of decaying organic matter is further exacerbated post felling as this is the time when there is least primary production and nutrient uptake on site (Hutton et al., 2008). Nutrients are typically lost into receiving surface waters post felling following rain showers. Staggeringly brash alone may contain half the amount of phosphorus recommended in fertiliser prescriptions and double the normal nitrogen application rate (e.g. Hyvönen et al., 2000). Different elements of the brash will decay at different rates and release different nutrient loads. Foliage and fine roots and branches will decay resulting in an initial flush of nutrients while coarser less nutrient rich stumps and thick branches will decay slower releasing their nutrients over a longer period of time (Hutton et al., 2003).

Forestry is also associated with increased atmospheric deposition of N. The scavenging of atmospheric ammonium and nitrate by conifer species may lead to plantation soils reaching saturation point. Nitrogen leakage into surface water as the result of N saturation has been

observed and may be accompanied by elevated concentrations of inorganic aluminium (Farrell et al., 2001).

Schulte et al. (2006) found that the annual amount of 'net rainfall' impacts on nitrate concentrations, while the risk of phosphorus loss was highest in western and northern areas of Ireland, where poorly drained soils carry water surpluses for large parts of the year and supply a pathway for P loss. This is an obvious issues for forestry in our uplands and along our western seaboard. These higher areas with high annual precipitation are also associated with peaty soils. This combination of factors means that extensive drainage systems are often present. These drainage systems and peat soils result in increased surface water runoff and transportation of pollution. This acts in combination with the poor P retention of peaty soils to increase the risk of eutrophication in some catchments.

Eutrophication is known to impact upon the composition, diversity and functional organisation of aquatic invertebrate communities. Eutrophication particularly with P can lead to an increase in primary production of algae and other flora resulting in a subsequent decrease in dissolved oxygen and elevated pH. Impacting on the chemical composition and characteristics of a waterbody on such a fundamental level naturally impact every trophic level within the aquatic environment. Eutrophication is commonly one of the leading causes of fish kills (Hutton et al., 2008).

P and N compounds can be directly toxic to freshwater pearl mussels. Eutrophication can cause filamentous algae to dominate rivers. Algal growth can smother the river bed limiting the exchange of oxygen on which juvenile mussels depend for survival. Dense algal growth can reduce the levels of dissolved oxygen in the water column at night which can result in the deaths of adult mussels. Decomposing algae can also clog up the riverbeds as they decompose resulting in the death of juvenile and adult mussels trough asphyxiation (Anon et al., 2010; Moorkens, 1999).

4.1.3 Sedimentation

Sedimentation is the deposition of fine sediment onto the stream bed or in stream gravels. Sedimentation is one of the main impacts of forestry on water quality. Forestry operations which cause soil disturbance and sediment runoff into waterways include cultivation, road building and harvesting. Soil is disturbed and exposed at various stages of the forest life cycle, the most important being site preparation, drainage, road/bridge construction and harvesting (Hutton et al., 2008).

The risk of sedimentation is influenced by a number of local factors. Certain soils types such as peats are highly erodible while soils with a high clay content would sit on the other end of the spectrum. The extent to which soil will erode is influenced by the slope and run-off. Steep slopes are associated with rapid surface run-off and fast flow in drains, and therefore are associated with a high risk of sedimentation (Hutton et al., 2008).

The climate will influence the extent of erosion and is linked to altitude, exposure and annual rainfall. Forestry at higher altitudes and on the West coast will experience higher levels of rainfall annually and are more prone to wind throw. These areas of high rainfall are generally characterised by peat formation in Ireland and this will act in tandem with high levels of run-off and erodible soils to create a higher risk of erosion. The vegetation on site will effect run-off and sediment entrapment. Vegetative ground cover will increase surface roughness and reduce run-off velocity and erosion (Gao et al., 2015). This is why the

utilisation of appropriately spaced and vegetated aquatic buffers is such a valuable tool in preventing siltation (Hutton et al., 2008).

The release of silt and sediment can smother streambeds and decrease oxygen levels within the waterbody. A reduction in the availability of oxygen will impact on the macroinvertebrates and the fish life present in the effected habitat (Hutton et al., 2008). The scale of the damage done to the aquatic environment will also vary depending on the sensitivity of the receiving water body. High status (Q4-Q5) rivers will contain species which are dependent on pristine or near pristine water quality. The negative impact of siltation usually comes under scrutiny through its impact on freshwater ecology and in particular young salmonids and freshwater pearl mussels. Sedimentation associated with forestry can however impact on every trophic level. Siltation and a resultant increase in turbidity can cause a decrease in sunlight penetration into the water column which will impact on primary productivity. This has been observed in Ireland post felling (Gallagher et al., 2000). Primary producers are the foundation for higher trophic levels and any negative impacts on primary production due to siltation will negatively impact on invertebrate and fish communities.

The main ways in which fine sediment can impact on benthic invertebrates are by altering substrate composition and stability, by negatively impacting respiration due to the deposition of silt on respiration structures or by lowering oxygen concentrations. Siltation will also impact on filter feeders ability to forage. Reduced macroinvertebrate taxa richness (particularly of species associated with high water quality) was observed in Ireland in a study on forestry sediments (Johnson et al.,2000).

Fine sediment impacts on fish species in a number of different ways. Reducing the amount of light available for primary producers will ultimately impact on animals higher up in the food chain such as fish. It may impact on their ability to locate food due to turbidity as reduced growth rates have been observed. Fish populations have been observed to be more susceptible to disease due to siltation. In extreme cases sediment may block the fishes gill rakers resulting in mortality (Newcombe & Jensen, 1996). One of the most studied impacts of sedimentation is the smothering of salmonid spawning sites and a decrease in the amount of dissolved oxygen available for fish eggs, larvae and juveniles to develop. Large inputs of sediment will change the physical instream environment impacting on macroinvertebrates and fish. In extreme cases habitat may be lost due to infilling and migration patterns will be impacted (Hutton et al., 2008).

Sedimentation can impact on any life stage of the freshwater pearl mussel (Margaritifera margaritifera), but it is during the first five years of their lives when the juvenile mussels are buried in the sand and gravel, that they are most vulnerable. Sedimentation during this period in their lives can clogs the gaps in the riverbed, which impacts on the movement of water through the benthic environment and in doing so limits the amount of oxygen reaching the juvenile mussels. This can lead to asphyxiation. Large influxes of sediment can also agitate the adult mussels into clamping closed in order to prevent clogging of their gills. Prolonged closure has been known to lead to the death of the adults through oxygen deprivation or starvation (Anon et al., 2010; Moorkens, 2000).

4.1.4 Pesticides

Cypermethrin a Priority Substance pesticide which is highly toxic to aquatic invertebrates is widely used by Coillte. The FSC has classed cypermethrin as highly hazardous and Coillte have applied for a further derogation to continue to use it. The Environmental Pillar have

called for a ban on its use in its submission on the public consultation on the continuation of the derogation. Cypermethrin is very toxic even at low concentrations (Marigoudar et al., 2009). Under various lab experiments Cypermethrin has been demonstrated to be acutely toxic to an array of freshwater invertebrates and some species of fish (Cyprinus carpio. Scardinius erythrophthalmus, Salmo gairdneri, Salmo trutta and Tilapia nilotica) (Stephenson, 1982). Cypermethrin is acutely toxic to crustaceans and reduces the abundance of rotifers, protozoans and bacteria and the chlorophyll-a concentration of planktonic and periphytic algae (Friberg-Jensen et al., 2003). The reduction in predatory crustations is likely to lead to fundamnetal changes in the species composition of lower trophic levels (Friberg-Jensen et al., 2003). Any impacts on lower trophic levels will have obvious knock on effects on the entire ecosystem. At high doses cyperomethrin is lethal to finfish while fish exposed to sub lethal doses have exhibited erratic and darting movements with imbalanced swimming activity, which might be due to the malfunctioning of neurotransmitters, followed by hyper and hypo-opercular activity, loss of equilibrium, and mucus secretion all over the body were observed (Marigoudar et al., 2009). The use of all pesticides should be reduced.

4.2 High Status Sites

4.2.1 Context

The Water Framework Directive (WFD; 2000/60/EC) requires all EU Member States to categorise their water bodies according to their ecological status as high, good, moderate, poor and bad. The WFD also requires that Member States identify water bodies that have been minimally impaired by anthropogenic pressures (Irvine & Ní Chuanigh, 2010). In comparison to other EU Member States and certainly in comparison to other countries in Western Europe Ireland retains a large number of high status water bodies. This due to the low historical intensity of land use in many areas and low density human population (Irvine & Ní Chuanigh, 2010). There has however been a dramatic decline in the number of high status river sites since 1987. The percentage number of high quality sites had almost halved in the 22 years between 1987 and 2012 (EPA, 2015). In each survey period the decline continued, from 29.6% of the total sampled in the 1987-1990 period to 16.4% in 2007-2009 (Figure 1). Although there was a slight increase in the numbers of high status sites in the latest survey (18.3%) EPA 2010-2012 survey (EPA, 2015). Only 11.5% of rivers, 9% of lakes and 3.6% of transitional waters were considered to be of high status for the 2010-2012 period (EPA, 2015).

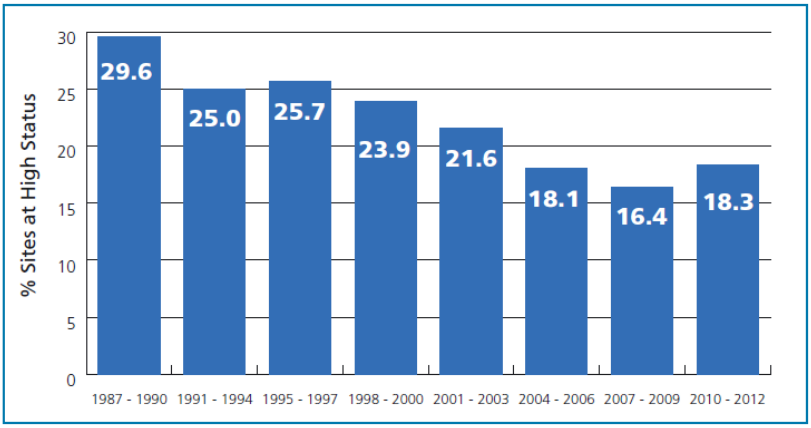


Figure 3. Long-term trends in the percentage number of high ecological quality (macroinvertebrate) river sites (1987 – 2012). EPA Water Quality Report 2010-2012 (EPA, 2015).

High Status Rivers equate to an EPA river monitoring score of Q4 or Q5 (EPA, 2015). The number of sites assigned Q5 high status reference condition continues to decline in the latest survey (38 sites (2007-2009) to 27 (2010-2012)).

Figure 2 shows the distribution of remaining 507 high status sites across the country (EPA, 2015). While Ireland still retains a large number of high status sites this ongoing numeric decline is very concerning. Such extensive and long-term monitoring is not available for other water bodies, although less than 30% of 35 putative reference lakes identified by the EPA were confirmed as such by palaeolimnology (Irvine & Ní Chuanigh, 2010).

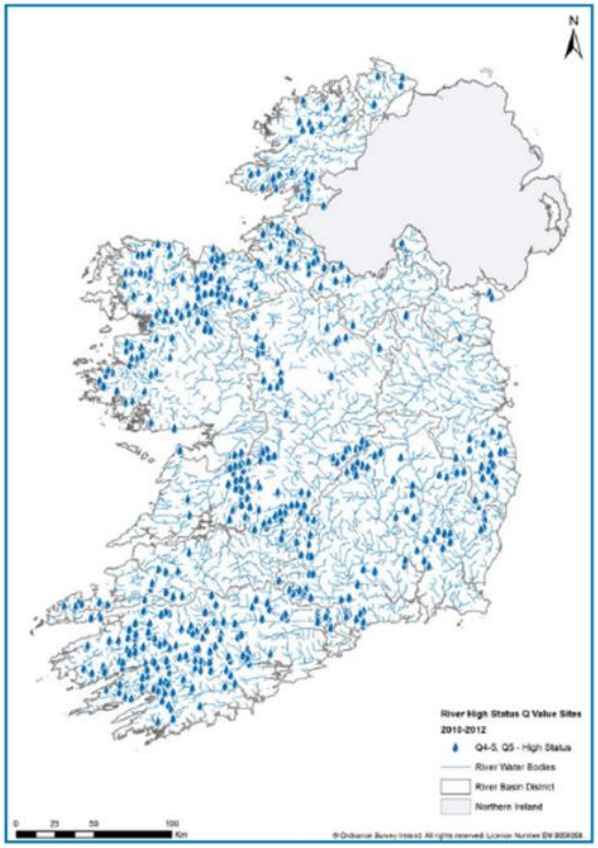


Figure 4. Map showing the location of the 507 high status Q value (Q4-5, Q5) sites across the country. EPA Water Quality Report 2010-2012 (EPA, 2015).

High status sites are indicators of largely undisturbed conditions and reflect natural background status or only minor distortion by anthropogenic influences (Ní Chatháin et., 2012). These are the reference sites from which all other sites are compared in order to estimate an Ecological Quality Ratio (EQR) based on observed state compared with reference. High status sites are important in this regard in that they provide a baseline against which monitored sites can be compared (Irvine & Ní Chuanigh, 2010). The majority of Ireland's habitats, including water and wetland habitats that are listed under the Habitats Directive are reported to be of poor or bad conservation status. Only 7% of listed habitats are considered to be in a favourable state. In Ireland 61% of species listed under the Habitats Directive are in an un-favourable state. Species particularly of wetland and freshwater environments are reported to be of poor or bad conservation status, including the Atlantic salmon, and the freshwater pearl mussel (NPWS, 2013a; NPWS, 2013b). High status sites are integral for the maintenance of biodiversity, ecological integrity and as refugia for sensitive and often endangered species. These refugia will hopefully play a pivotal role on the recolonization of restored sites in the future (Ní Chatháin et., 2012). The maintenance of these refugia is also important given that the multiplicity of pressures exerted by factors such as climate change will only intensify moving forward.

4.2.2 High Status Sites Legal Context

The maintenance of high status water bodies is a fundamental element of the legislation within the WFD (2000/60/EC). Article 4.7 of the WFD clearly states:

Member States will not be in breach of this Directive when failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities and all the following conditions are met:

(a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;

(b) the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;

(c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development;

(d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option; and exemption for activities that prevent the future achievement of good status through restoration activities have been defined.

There is also a direct overlap between our legal obligations to meet Ireland's conservation objectives for designated aquatic species under the Habitats Directive and our Water Framework Directive obligations. The WFDs programme of measures to achieve its environmental objectives are linked to measures specified under eleven directives, including the Habitats Directive. Likewise the conservation objectives for species such as the freshwater pearl mussel are linked to the maintenance of high status under the WFD (Ní Chatháin et., 2012). Sub-basin plans and environmental objectives established for freshwater pearl mussel populations designated under the Habitats Directive are also part of the Water Framework Directive's river basin programme of measures. They form part of the Basic Measures and the objectives for these protected areas must be achieved by 2015 and beyond (Anon et al., 2010).

The locations of high status sites overlap with the locations of protected areas on the Register of Protected Areas under the WFD (Ní Chatháin et., 2012).

These included:
- Candidate Special Areas of Conservation (cSACs) designated under the Habitats Directive;
- Freshwater pearl mussel cSAC catchments designated under the Habitats Directive;
- Special Protection Areas (SPAs) designated under the Birds Directive;
- National Heritage Areas (NHAs) and proposed NHAs under the Wildlife Act;
- Shellfish-designated waters designated under the Shellfish Directive;
- Recreational bathing waters designated under the Bathing Water Directive;
- Designated drinking waters under the Drinking Water Directive; and
- Nutrient-sensitive areas under the Urban Waste Water Treatment Directive.

Given the overlapping network of legislation, management plans and structures in place to protect high status sites and their ecological components you would assume that they would be well protected. This is not the case unfortunately as to date, the key focus in the implementation of the WFD has largely been on the objective that all water bodies meet at least good status by 2015. The WFD environmental objectives have received far less attention (Ní Chatháin et., 2012). Many high status sites also lie outside of designated sites under the Habitats and Birds Directives and are not covered by the aforementioned legislation (Ní Chatháin et., 2012).

4.2.3 Forestry as a Pressure and Threat to High Status Sites

If we are to address the ongoing decline in high status sites then we must tackle the principal threats and pressures causing the damage. Efforts to achieve good status have often focused on identifying point sources of pollution. However the situation with high status sites is more complicated in that even relatively low intensity activities such as an increase in diffuse pollution at catchment scale can cause the loss of Q4 and Q5 status (Ní Chatháin et., 2012). The smallest pressure can impact on high status. Small increases in the amount of P and N can damage the sensitive ecology associated with these sites (Ní Chatháin et., 2012). Likewise small changes in acidity, siltation, hydromorphological pressures or priority substances will have a disproportionate impact on a high status system relative to the impact of the same input to an already degraded system (Ní Chatháin et., 2012). Identified pressures include land-use changes such as field drainage and fertilisation, one-off housing, forestry activities, wind farms, animal access to waters, and sheep dip pesticides (Ní Chatháin et., 2012). Significantly the national network of high status water bodies are clustered and high status sites are negatively correlated with the intensification of land uses such as agriculture and forestry (Irvine & Ní Chuanigh, 2010).

Given that the freshwater pearl mussel (Margaritifera Margaritifera) and the nore freshwater pearl mussel (Margaritifera durrovensis) are associated with high status/near pristine water quality, the threats and pressures they are currently experiencing are indicative of the pressures being exerted on high status sites in general. According to the NPWS (2013) report on "The Status of EU Protected Habitats and Species in Ireland" both species have are of bad conservation status with an overall declining trend in conservation status. The pressures and threats identified by the NPWS are:

4.2.3.1 Pressures on freshwater pearl mussel

Modification of hydrographic functioning, general - high importance
Other human induced changes in hydraulic conditions - high importance
Restructuring agricultural land holding - high importance
Water abstractions from groundwater - high importance
Diffuse pollution to surface waters due to agricultural and forestry activities - high importance
Pollution to surface waters by industrial plants - medium importance
Diffuse pollution to surface waters due to other sources not listed - medium importance
Pollution to surface waters by storm overflows - medium importance
Other point source pollution to surface water - medium importance
Diffuse pollution to surface waters due to household sewage and waste waters - medium importance
Surface water abstractions for public water supply - medium importance
Collapse of terrain, landslide - low importance
Dredging/ removal of limnic sediments - low importance
Other outdoor sports and leisure activities - low importance

4.2.3.1 Threats on freshwater pearl mussel

Modification of hydrographic functioning, general - high importance
Other human induced changes in hydraulic conditions - high importance
Restructuring agricultural land holding - high importance
Water abstractions from groundwater - high importance
Diffuse pollution to surface waters due to agricultural and forestry activities - high importance
Pollution to surface waters by industrial plants - medium importance
Diffuse pollution to surface waters due to other sources not listed - medium importance
Pollution to surface waters by storm overflows - medium importance
Other point source pollution to surface water - medium importance
Diffuse pollution to surface waters due to household sewage and waste waters - medium importance
Surface water abstractions for public water supply - medium importance
Collapse of terrain, landslide - low importance
Dredging/ removal of limnic sediments - low importance
Other outdoor sports and leisure activities - low importance
Changes in abiotic conditions - low importance

4.2.4 Recommendations

Forestry is already identified as a significant pressure on water quality in certain RBDs and catchments. Given that the ongoing expansion of forestry in line with national targets of increasing forest cover from 10.7% to 18% by the mid-century it is extremely likely that the threat posed by forestry to water quality and aquatic ecology will only increase with time unless proactive action is taken by the Forest Service, EPA and NPWS (Forestry Service, 2015). There are a number of factors within the makeup and distribution of the national forest estate which mean that the current pressures being exerted on water quality by forestry are likely to increase.

The majority of the national forest estate predates the current Forestry and Water Quality Guidelines (2000) meaning that vast areas may not be compliant with the guidelines and therefore a threat/pressure on water quality. Replanted forestry must adhere to the relevant Water Quality guidelines.

The age structure of the national forest estate means that a large proportion of the forestry in Ireland will be felled over the coming decades. This will result in an increase in water pollution. Steps should be taken to ensure that such bottlenecks do not occur in the future. Replanting in catchments which host High Status Sites should be carried out so that a heterogeneous age profile is achieved.

During onsite assessment aquatic zones are identified as a permanent or seasonal river, stream or lake shown on an Ordnance Survey 6 inch map. This is in An Taisces opinion a deeply flawed method of identifying waterbodies and wetlands. The definition of a waterbody within the Forestry and Water Quality Guidelines (2000) is linked to whether a river featured in the old Ordinance Survey Ireland 6" map series. According to a personal communication with OSI the criteria for featuring a river in the 6" map was that the river had a name. This does not seem a reasonable basis for adjudging whether a river deserves an aquatic buffer under the Forestry and Water Quality Guidelines. Many seasonal rivers are not shown on the OS maps and as the maps are based on older maps they are prone to becoming outdated. It is also noted that the EPA water layer on iFORIS may not capture all aquatic zones onsite. The definition of a waterbody needs to be updated and a new guideline adopted which is linked to the potential of forestry to negatively impact on water quality and aquatic biodiversity on site and downstream. The definition of a wetland used by the Department of Environment is "natural or artificial areas where biogeochemical functions depend notably on constant or periodic shallow inundation, or saturation, by standing or flowing fresh, brackish or saline water".

Under the Forestry Service UK Guidelines a 10m setback may be required for a river under 2m wide. Currently in Ireland set backs are not even required for large drains which flow directly into designated SAC Rivers. A review of compliance with the Forestry and Water Quality Guidelines would also be very helpful in identifying sources of pollution and in encouraging greater compliance among foresters.

We welcome the proposed increase in the minimum water setback width (metres) for highly erodible soils, including peat has been increased from 15m to 20m for Moderate slopes and from 20m to 25m for steep slopes. This will reduce the negative impact that commercial forestry is currently having on water quality and biodiversity. However the setback for very steep slopes has remained at 25m. Given that the setback for both moderate slopes has

been increased by 5m one would logically expect that the setback for very steep slopes would go from 25m to 30m. An Taisce would like to know what the scientific basis is for the decision to maintain the setback on highly erodible soils at 25m. According to the proposed guidelines the potential for forestry to negatively impact on water quality is the same for steep and very steep slopes. This is obviously not the case and the setback distance should reflect this reality.

The minimum water setback width (metres) on each side of the aquatic zone has remained at 10m for moderate slopes while the setback for steep slopes has been increased from 15m to 20m and for has been increased from 20 to 25m for very steep slopes. The setback for highly erodible soils on very steep ground and non-highly erodible soils on very steep ground are both 25m. Again this would indicate that the potential impact for highly erodible soils such as peat is the same as other soil types on very steep ground. This is clearly not the case and the guidelines should reflect this. There is a serious argument to be made that clear-fell logging is not suitable for steep or very steep slopes on highly erodible soils. The impact of ground preparation, afforestation and clear-felling leads to soil erosion and degradation in areas with a steep gradient this impacts on water quality, carbon sequestration and flood attenuation. The forestry service should switch to a system of continuous cover forestry is these areas as well as in catchments with high status sites.

An Taisce suggest that the following setbacks be adopted:

Table 4. Suggested aquatic zone setbacks

Slope leading to aquatic zone (vary, as appropriate, where slope various over site)	**Minimum water setback width (metres) on each side of the aquatic zone**	**Minimum water setback width (metres) for highly erodible soils, including peat**
Moderate (even to 1-in-7 / 0-15%)	10 metres	20 metres
Steep (1-in-7 to 1-in-3 / 15-30%)	20 metres	25 metres
Very steep (1-in-3 / >30%)	25 metres – Continuous cover forestry	25 metres - Continuous cover forestry

The ground preparation works associated with forestry in many instances require drainage. The drainage of wetlands in the planning regulations requires an EIA, where it is proposed, for example, to drain or reclaim a wetlands area of less than 0.1 hectares, that development will be exempted from the requirement to obtain planning permission only where it would not be deemed to have a significant adverse effect on the environment. Where it is deemed that the drainage of less than 0.1 hectares of wetlands would be likely to have a significant adverse effect on the environment, a planning application with an environmental impact assessment will be required. Development consisting of drainage and/or reclamation of wetlands (including estuarine marshes or callows) is 2 ha.

All forestry must be in line with Ireland's legal requirements under the Water Framework Directive and the Habitats and Bird Directives. Any impacts should be highlighted and made public so that the direct, indirect and cumulative impacts of more forestry in these catchments can be assessed through the appropriate assessment procedure under the Article 6 (3) and (4) of the Habitats Directive (Council Directive: 92/43/EEC). An Taisce are aware that foresters regularly indicate that that the standard 10m setback will be

established when in fact the greater 15m setback should be used due to the presence of highly erodible soils or a steep slope on site. Buffers that are too narrow are likely to provide inadequate protection. Models need to be developed for nutrient and sediment losses under different soil, slope, climatic conditions etc. The physical and biological factors which characterise an effective buffer zone are still poorly understood. Over time buffer may become saturated by P and N rendering them less effective. More research is needed to ascertain whether the recommended buffer widths and riparian vegetation are effective at mitigating impacts of eutrophication and sedimentation in Irish forests.

As has been highlighted previously the predominance of coniferous species nationally and in particular of sitka spruce is an issue when it comes to acidification (Johnson et al., 2008). The age structure and the related height structure of Irish forestry nationally will also lead to greater acidification affect (Johnson et al., 2008). The location of so much forestry on soil types that are sensitive to acidification and the concentration of forestry at high altitudes is also an issue which is highlighted in the scientific literature (Johnson et al., 2008). Increasing the amount of broadleaf species nationally will reduce acidification and have obvious biodiversity benefits. Reducing the amount of forestry being planted in peaty soils and at altitude will also reduce acidification. In the UK the agreed approach is to undertake a catchment-based critical load assessment for waters failing or at risk of failing good status due to acidification (Forest Service UK, 2003). Given the ongoing loss of high status sites and the above highlighted issues it would be beneficial to carry out a catchment based assessments of pressures associated with forestry.

The opening-out of stream sides can promote biological recovery in streams showing acidification. Targeting such streams for earlier clearance of dense conifers, conversion to open, native broadleaved woodland and linking restored zones can aid the migration of fish and recolonization by invertebrates (Forest Service UK, 2003). Restructuring closed canopy conifer stands can help reduce pollutant capture and the risk of acidification by creating a more diverse forest with different aged stands, more open space, and a wider range of tree species including broadleaves. Restructuring should be prioritised in areas with - forest cover is over 50%, acid sensitive soils, areas with high-status sites or designated waterbodies (SAC/SPA/NHA/pNHA).

The impact of individual pressures on macroinvertebrate communities has been well researched but the cumulative impact of various forestry related pressures is less well understood. New bio-indicators may be needed to answer some of the questions around instream impacts moving forward.

Given the toxicity of Cypermethrin it should be completely banned in Ireland.

Sedimentation and eutrophication increase as the extent of soil disturbance increases. Limiting the area of land within a given catchment which is either being planted or harvested at any given time will limit the amount of sediment within the aquatic environment. This may be particularly beneficial in catchments with high erodible soils. Controlling the proportion of a catchment disturbed at any one time will also reduce N and P inputs (Hutton et al., 2008). The forestry service Code of Best Forest Practice – Ireland (Forest-Service, 2000b) advises that harvesting operations should take place between April and October. This is when ground conditions tend to be drier and water quality impacts associated with harvesting are therefore reduced. However the forestry service "Appropriate Assessment Procedure (AAP) requirements regarding Hen Harrier SPAs, felling and other

disturbance operations" state that no disturbance operation(s) associated with the felling licence are to take place within Hen Harrier 'Red Areas' during their breeding season (1st April to 15th August, inclusive) (Forest-Service, 2012). Restricting felling and other operations associated with ground disturbance to August 16th – October increases the likelihood of forestry associated water pollution. This is a major issue in areas where there is an overlap of Hen Harrier SPAs and Freshwater Pearl Mussel SACs. In such areas it is questionable whether current forestry practices can avoid having a significant negative impact on both protected species simultaneously. This conflict between forestry, the Habitats and Birds Directives and the Water Framework Directive must be resolved.

Despite the increased risk of P loading Ireland's uplands and western seaboard are generally associated with higher Q values and high-status sites. This is likely to be due to the lower incidences of other pressures such as intensive agriculture and municipal and urban waste water (Hutton et al., 2008). However the EPA Water Quality in Ireland 2010-2012 report (2015) highlights the ongoing decline in Irelands Q5 and high status (Q4-Q5) sites. Forestry is likely to be one of the main sources of pressures on the chemical, physical and ecological integrity of the water bodies in these sites. What is most concerning is the fact that the true impact of forestry is yet to be manifested. Given that just under three quarters of the national forest estate consists of trees of 30 years old or less a large proportion of the national forest estate will be felled within a relatively short timeframe (Forest- Service, 2014).

In relation to forestry and High Status sites An Taisce support the findings/recommendations and the key strategies proposed by the EPA in their "Management Strategies for the Protection of High Status Water Bodies" report (Ní Chatháin et., 2012).

Findings/Recommnedations:

(i) Planning and development in high status catchments is an environmental issue;

(ii) High status catchments provide valuable ecosystem services;

(iii) High status catchments have little to no capacity for further intensification;

(iv) High status catchments and protected areas require similar protection strategies; and

(v) County Development Plans and all plans and policies should reflect the sensitivity of high status water bodies.

The key strategies proposed are:

(i) High status catchment delineation and prioritisation for protection measures;

(ii) Establishment of a spatial network of high status waters;

(iii) Establishment of a 'blue dot' monitoring system by the EPA;

(iv) Potential additional measures under the WFD over and above European Directive requirements;

(v) Assessment of potential impacts, and consideration of the risk of failing to meet high status;

(vi) Planning/Licensing control and assessment of cumulative impacts;

(vii) Centralised GIS database, or activities database;

(viii) Integrated monitoring and protection;

(ix) Unregulated activities – where control mechanisms are required; and

(x) Public awareness campaigns.

As there is a direct overlap in areas containing high status sites and the distribution of marginal land targeted for the expansion of forestry it is likely that forestry will continue to drive further losses on high status sites with associated impacts on protected species such as the Atlantic salmon and freshwater peal mussel. As high status sites have no capacity to absorb further deterioration in water quality any increase in nutrient status, pH, or sediment loads associated with forestry will lead to the loss of high status. As many high status sites are found in upland areas with peaty highly erodible soils the disturbance associated with drainage and clear felling are highly likely to result in water pollution and may result in bog bursts in extreme circumstances.

There is a strong overlap with high status sites and many of our upland areas of high biodiversity value. Many of these areas are managed for conservation or are part of High Nature Value farming systems. Under the current RDP several schemes will be introduced under Pillar II in the form of Locally Led Agri-Environment Schemes. These schemes will include a freshwater pearl mussel scheme, a hen harrier scheme and an upland scheme. These schemes will also to complemented by the by the Green Low Carbon Agri-Environment Scheme (GLAS). Given the spatial overlap between the areas involved in these schemes and high status catchments there is a need for a landscape conservation approach to which focuses on the need to support traditional extensive HNV farming. Measures that protect high status sites should be part considered as part of other schemes which are targeted at upland areas.

There is a need to review forestry practices, forestry consent and the appropriate assessment procedure and the forestry and water quality guidelines has been covered in detail in the forestry section. Pressures exerted by forestry such as eutrophication, sedimentation and acidification will all negatively impact upon high status sites. These pressures will only increase as forest cover expands nationally.

There is an urgent need to explore the benefits of continuous cover forestry as an alternative to the current model in catchments which contain high status sites.

High status sites should be afforded the same level of protection as protected habitats, under the habitats and birds directives with the same approach to planning and appropriate assessment. High status sites should be connected and be part of a conservation strategy on a landscape scale. A national network of aquatic buffers and riparian habitat would protect aquatic biodiversity as well as providing habitat and corridors for terrestrial wildlife.

The protection of high status sites needs co-ordination at national level and RBD level by all local and public authorities. A detailed, of threats and pressures, within individual high

status catchments will inform remediation efforts and inform the screening for potential impacts by local and public authorities and to trigger impact assessments, which may be required of applicants. Policies and objectives within CDPs will provide a focus for protection and restoration of these sensitive catchments (Ní Chatháin et., 2012). The protection of high status waters requires an effective policy framework and protection mechanisms. It also requires locally focussed stakeholder engagement and a redirection of funding targeted to be fit for purpose. Relying on current policies and structures to protect high status water bodies is unlikely to be effective. (Irvine & Ní Chuanigh, 2010).

5.0 Landscape

The European Landscape Convention (ELC) was signed into force by thirty member states of the European Council in Florence, Italy on 20 October 2000. In the convention it was noted that the 'protection, management and planning' of landscape can aid in job creation, cultivating and maintaining local identity, achieving unity and cooperation between member states, human well-being, quality of life, and responsibility. Furthermore the concept of 'landscape' now represents natural, rural, urban, peri-urban, outstanding, every day and blighted landscapes. Under the Planning and Development Act 2010 landscape has the same meaning as it has in Article 1 of the ELC.

Under the convention, it is not enough to consider landscapes which are simply outstanding or beautiful as, unlike many past attempts to create a suitable landscape strategy, the ELC does not stick to the traditional methods of protectionism; rather, it sets a requirement to survey, record and understand the everyday landscape. It is considered that Ireland has failed to comply with the Convention. Most notably, Ireland has failed to put in place the implementation measures set out in Article 6E of the Convention:

> *To put landscape policies into effect, each Party undertakes to introduce instruments aimed at protecting, managing and/or planning the landscape.*

No national legislation, policy or guidelines have been produced by the State to respond to the ELC. Whereas local authorities have placed certain designations on landscapes as a result of Section 204 of the Planning & Development Act 2000, as amended, this is discretionary and largely fragmented across councils, often with the subjective influences of vested interests instead of the public interest, and in the interest of complying with the ELC.

The State has failed to set a clear methodology for how landscape should be assessed, protected and managed. With no more than vague policies, and lacking legislative tools, it is difficult to guide the process. To date only a small number of outstanding areas have been designated. Covering only limited pockets, this protection of isolation sites has not aided the protection of Ireland's landscape as a whole. With the failure to comply with the ELC, the Forest Service has been left with no basis to assess the impact of the proposal on the landscape. It crucial, therefore, that the Forest Service consider and make public their policy guidance on the 'protection, management and planning' of landscapes being impacted by forestry.

The majority of forestry in Ireland consists of blocks of non-native conifer species. These dark blocks are not part of the traditional Irish landscape and as such they have a negative impact on the landscape from an aesthetic perspective. Likewise the management of forestry means that drainage works and clear fell sites are a serious eyesore. In areas of high scenic native species should be used. Planting should achieve naturalised edges which sit unobtrusively in the landscape. The advantages of continuous cover forestry from a landscape perspective should also be considered.

6.0 Archaeology

Serious consideration must be given to all of the above when considering a programme for forestry. General guidelines are required for archaeological evaluation and mitigation under this programme. Archaeological evaluation needs to be a core consideration in evaluating site suitability at application stage, this goes beyond consideration of single Recorded Monuments and Places (RMP) and the creation of buffer areas.

The impact on the built environment needs to be fully considered, and forestry planned in a manner sensitive to those landscapes. In this regard An Taisce is conscious of:

- County Development Plan designations (incl. archaeological, architectural; landscape; views);
- National Monuments;
- Historic Houses, their demesnes and associated landscapes and views;
- Historic Gardens and their associated landscapes and views;
- All records / structures on the National Inventory of Architectural Heritage;
- Protected Structures; and
- Cultural heritage.

Consideration of archaeology needs to give attention to post 1700 as much as pre 1700 settlement and features. Potential post 1700 features would include country house demesnes, farming settlement, potato ridges, abandoned 'famine' settlements and historical mining activity. Furthermore, there is a requirement to but address both the physical and landscape impact of planting schemes. For particular categories of monuments or features landscape setting is an important consideration and standard buffer area guidelines would not be applicable. This would apply in particular to neothlitic tombs or later stone circles and alignments which are major features of West Cork and South Kerry. For these types of monuments landscape setting and the potential relationship and line of sight between two monuments is an intrinsic part of their significance. Accordingly, landscape evaluation on the setting of archaeological monuments, groups of monuments and landscapes is an essential requirement.

Archaeological monuments are often located in prominent positions. They were positioned so as to be viewed as part of the broader cultural landscape. Enveloping archaeology in a blanket of forestry has obvious negative impacts on cultural landscapes and should be avoided.

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