Summary: Intervention & Options

Department /Agency:	Title:	
Forestry Commission	**Impact Assessment of "Restoration and expansion of open habitats from woods and forests: Government policy**	
Stage: Consultation	**Version:** 6	**Date:** 4 December 2008

Related Publications: Restoration of open habitats from woods and forests: process for developing policy. Restoration of open habitats from woods and forrests: evidence.

Available to view or download at:

http://www.forestry.gov.uk/england-openhabitats

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What is the problem under consideration? Why is government intervention necessary?

Restoration and expansion of open habitats is an element of delivering the England Biodiversity Strategy. Woods and forests provide a potential resource for such restoration and expansion. However, the woods and forests already deliver a range of public goods. In addition, removal of woods and forests can be perceived negatively by many people. We need a policy to enable effective decision making about removal or retention of woods and forests on potential open habitat. This is to ensure that we end up with a landscape that delivers the greatest possible public benefit.

What are the policy objectives and the intended effects?

To develop a clear rationale to guide decisions about the removal or retention of plantations and woodland where Biodiversity Action Plan (BAP) open habitats can be restored.

Desired outcomes: Ecological communities able to cope with threats (key driver) , financially viable land management, no net deforestation in England, positive engagement by local and other users, biodiversity benefits and climate mitigation costs balanced, timber sector confidence not reduced, woodland biodiversity retained or enhanced.

What policy options have been considered? Please justify any preferred option.

At this consultation stage there are still several dependencies. Therefore, this analysis focusses on the reasonable range of scales of intervention over 10 - 15 years. Three scenarios are analysed:

High: based on Habitat Action Plan (HAP) targets: 30,000ha, 3,000 ha per year.

Middle: based on avoiding net deforestation: 16,500ha, 1,100ha per year

Low: based on remedies to bring SSSI into target condition: 5,600 ha, 370 ha per year.

A "do nothing" option is not analysed because this would not meet the policy objective.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

2012 - in line with Delivery Plan for England's Trees Woods and Forests (ETWF).

Ministerial Sign-off For consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

.....Date:

Summary: Analysis & Evidence

Policy Option: Low intervention	Description: 5,600 ha over 10 - 15 years, 370 ha per year

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£ -0.17M	3
Average Annual Cost (excluding one-off)	
£ -0.75	

Description and scale of **key monetised costs** by 'main affected groups' Net cost of conversion woods to open habitat: £0.43M yr-1. Net additional cost of management of open habitat: £0.046M yr-1 cumulative, £0.28M yr-1 average. Admin. 20% conversion costs: £0.086M yr-1. Carbon emissions (drop in long-term average carbon store and potential for abatement by subsitution) :£0.045M

Total Cost (PV) **£ -10.5M**

Other **key non-monetised costs** by 'main affected groups' 1% reduction in timber availability, possible negative impact on timber sector business acvtivity.

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£	
Average Annual Benefit (excluding one-off)	
£	

Description and scale of **key monetised benefits** by 'main affected groups'

Total Benefit (PV) **£**

Other **key non-monetised benefits** by 'main affected groups' Key benefits are to biodiversity. Robust evidence on value of net benefits is not available but value likely to be signiicant. Policy can contribute to 9 of 45 Habitat Action Plans (HAPs). Average 1.2% increase in area of habitat for these 9 HAPS. 6% increase for the most biodiverse - lowland heathland.

Key Assumptions/Sensitivities/Risks Assumed a linear rate of conversion of open habitat. Assumed the amount of each habitat converted is proportional to total potential habitat under woodland.

Price Base Year 2008	Time Period Years 15	**Net Benefit Range** (NPV) **£ n/a**	**NET BENEFIT** (NPV Best estimate) **£ n/a**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			June 2009	
Which organisation(s) will enforce the policy?			FC and NE	
What is the total annual cost of enforcement for these organisations?			£ 0.086	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ N/A	
What is the value of changes in greenhouse gas emissions?			£ 0.65M	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase £ 0 Decrease £ 0 **Net** **£** 0

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Middle	Description: 16,500 ha, 1,100 per year

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£ -0.17M	3
Average Annual Cost (excluding one-off)	
£ -2.2	

Description and scale of **key monetised costs** by 'main affected groups' Net cost of conversion woods to open habitat: £1.3Myr-1. Net additional cost management of open habitat: £0.14Myr-1 cumulative, average £0.82M. Admin. costs 20% conversion costs: £0.26M. Carbon emissions (reduction in long-term average carbon store and potential for abatement through subsitution) :£0.13M

Total Cost (PV) **£ -31M**

Other **key non-monetised costs** by 'main affected groups' 3% reduction in timber availability possible negative mpact on timber sector economic activity.

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£	
Average Annual Benefit (excluding one-off)	
£	

Description and scale of **key monetised benefits** by 'main affected groups'

Total Benefit (PV) **£**

Other **key non-monetised benefits** by 'main affected groups' Key benefits are to biodiversity. Robust evidence on the value of the net benefits is not available but value is likely to be significant. Policy can contribute to 9 of 45 Habitat Action Plans (HAPs). Average 4% increase in area of habitat for these 9. 17% increase for lowland heathland, the most biodiverse.

Key Assumptions/Sensitivities/Risks Assumed a linear rate of conversion of open habitat. Assumed the amount of each habitat converted is proportional to total potential habitat under woodland.

Price Base Year 2008	Time Period Years 15	**Net Benefit Range** (NPV) **£ ?**	**NET BENEFIT** (NPV Best estimate) **£ ?**

What is the geographic coverage of the policy/option?				England	
On what date will the policy be implemented?				June 2009	
Which organisation(s) will enforce the policy?				FC and NE	
What is the total annual cost of enforcement for these organisations?				£ 0.26M	
Does enforcement comply with Hampton principles?				Yes	
Will implementation go beyond minimum EU requirements?				No	
What is the value of the proposed offsetting measure per year?				£ N/A	
What is the value of changes in greenhouse gas emissions?				£ 1.9M	
Will the proposal have a significant impact on competition?				No	
Annual cost (£-£) per organisation (excluding one-off)		Micro	Small	Medium	Large
Are any of these organisations exempt?		Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase £ 0 Decrease £ 0 **Net** **£** 0

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Higher	Description: 30,000ha, 3,000ha per year

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Net cost of conversion woods to open habitat: £3.5Myr-1. Net additional cost of management of open habitat: £0.37Myr-1 cumulative, average £2.2Myr-1. Admin costs 20% conversion costs: £0.70M. Carbon emissions (reduction in long-term average carbon store and potential for abatement through subsitution) :£0.36M
£ -0.17M	
Average Annual Cost (excluding one-off)	**Total Cost** (PV) **£ -66M**
£ -6.1M	

Other **key non-monetised costs** by 'main affected groups' 6% reduction in timber availability possible negatve impact on timber sector economic activity.

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups'
£	
Average Annual Benefit (excluding one-off)	**Total Benefit** (PV) **£**
£	

Other **key non-monetised benefits** by 'main affected groups' Key benefits are to biodiversity. Robust evidence on the value of the net benefits is not available but value is likely to be significant. Policy can contribute to 9 of 45 Habitat Action Plans (HAPs). Average 7% increase in area of habitat for these 9. 32% increase for lowland heathland, the most biodiverse.

Key Assumptions/Sensitivities/Risks Assumed a linear rate of conversion of open habitat. Assumed the amount of each habitat converted is proportional to total potential habitat under woodland.

Price Base Year 2008	Time Period Years 15	**Net Benefit Range** (NPV) **£ ?**	**NET BENEFIT** (NPV Best estimate) **£ ?**

What is the geographic coverage of the policy/option?				England	
On what date will the policy be implemented?				June 2009	
Which organisation(s) will enforce the policy?				FC and NE	
What is the total annual cost of enforcement for these organisations?				£ 0.70M	
Does enforcement comply with Hampton principles?				Yes	
Will implementation go beyond minimum EU requirements?				No	
What is the value of the proposed offsetting measure per year?				£ N/A	
What is the value of changes in greenhouse gas emissions?				£ 5.3M	
Will the proposal have a significant impact on competition?				No	
Annual cost (£-£) per organisation (excluding one-off)		Micro	Small	Medium	Large
Are any of these organisations exempt?		Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase £ 0 Decrease £ 0 **Net** **£** 0

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

[Use this space (with a recommended maximum of 30 pages) to set out the evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Ensure that the information is organised in such a way as to explain clearly the summary information on the preceding pages of this form.]

Contents.

1. Introduction.

The England Biodiversity Strategy includes restoration and expansion of open habitats to combat their decline over the last few hundred years and contribute to targets to halt loss of biodiversity. During the 20th Century large areas of heathland, moorland, wetland and unimproved grassland – what are now considered to be priority open habitats - were planted with conifers for timber production. On other sites these open habitats were colonised by birch and pine due to lack of grazing or other management. Our current understanding of the area and types of potential open habitat under woods and forests is shown at Table 1.

These woods and forests now have many public values, but there is increasing interest in removing the trees and restoring them to open habitats. The England Biodiversity Strategy includes targets for restoration and expansion of open habitats as part of delivering biodiversity objectives. Woods and forests provide a potential resource for this. However, woods and forests already provide a range of public goods. England's Trees Woods and Forests (ETWF) includes a task to "produce a clear rationale to guide removal of inappropriate plantations and woodland where other key open habitats can be restored and where the benefits of doing so outweigh the environmental and social costs".

We in Forestry Commission England (FC) are developing a policy to provide this rationale. At this stage there are dependencies and undetermined balances between potentially competing priorities. This means that there are numerous policy options available. For simplicity, we focus in this assessment on a range of scales and rates of interventions. Following the consultation we will be presenting coherent policy options, the impact of which will be assessed.

The policy is assumed to operate over 15 years, to fit in with the timescale of ETWF.

Table 1: Woodland on potential UK Habitat Action Plan open habitats in England.[1]

Habitat Action Plan	Potential habitat under plantation.		Potential habitat under native woodland		Distribution within England. Northern – North of Humber & Mersey. Central – East and West Midlands. Southern – rest.
	Area (ha)	Typically managed for timber.	Area (ha)	Typically natural regeneration, little management, general yield class (GYC) 4.[2]	
Lowland meadows	0	n/a	0		n/a
Upland hay meadows	0	n/a	0		n/a
Lowland calcareous grassland	0	n/a	c.20,000	Scrub.	Mainly southern or central.[3]
Lowland dry acid grassland	c.300	Scots pine GYC 8	c.3,000	Mixed regeneration mainly birch with some Scots pine.	Mainly southern or central.
Purple moor grass and rush pasture	c. 300	Douglas fir, Sitka spruce, GYC 18.	c. 200	Scrub / secondary native woodland	Plantation mainly south west, native woodland in all parts.
Upland heathland (moor)	c.20,000	Sitka spruce GYC 10	0	n/a	Mainly northern.
Lowland raised bogs	c.500	Sitka / Norway spruce, Lodgepole pine GYC 8	0	n/a	Mainly northern.
Blanket bog	c.5,000	Sitka / Norway spruce, Lodgepole pine GYC 8	0	n/a	Mainly northern.
Fens	c 600	Scots pine GYC 6 and poplar, GYC 14.	1,000	Wet woodland	Wet woodland in East England, plantation in northern England.
Reedbed	0	n/a	1,000	Wet woodland	East.
Lowland heathland	c.60,000	Scots pine GYC 12.[4].	c.20,000	Mixed regeneration mainly birch with some Scots pine.	Mainly southern or central.[5]
TOTAL	86,700		45,200		

We analysed the impact of removing this woodland and forest to restore open habitat for 16 factors derived from ETWF. The results of this analysis are summarised in Table 2. A detailed discussion can be found at www.forestry.gov.uk/england-openhabitats. This analysis shows that the key impacts that need to be monetised are on:

Biodiversity.

Carbon emissions

Timber sector economic activity.

Conversion, long-term management, and administrative costs.

[1] Figures from national and regional staff in Natural England and Forestry Commission and various studies such as the RSPB's HEAP project, see http://www.rspb.org.uk/ourwork/conservation/advice/heap.asp.

[2] General Yield Class (GYC) is a measure of timber productivity. It is the number of m3 of timber by which a stand grows per ha per year. Some conifers can reach YC22, many hardwoods can achieve just YC4 or 6.

[3] We estimate that 66% of the grassland resource is in southern England.

[4] Much is currently Corsican pine at yield class 14 but guidelines for responding to red band needle blight (see below) make an assumption of Scots pine at yield class 12 more realistic.

[5] We estimate that 75% of the lowland heathland resource is in southern England.

Table 2: Likely impact of removing woods and forests to restore and expand open habitats from woods and forests.

ETWF theme	Factor	Likely impact	Comments
A sustainable resource.	Financial viability of land management.	Negative.	Woods and forests on average cost less to manage than open habitats. The net cost of managing open habitats ranges from £60 to £800 per hectare with a typical cost of about £200ha per year. Preventing tree growth and managing access is the main cost. The average cost of woodland management is £61per ha per year, timber income ranges from £180 per ha per year to £40 per ha per year.
	Avoiding net deforestation in England.	Negative or little impact.	The area of woodland or forest in England has been expanding for about 100 years. If the rate of woodland or forest removal goes above a threshold the area could start to decrease. Our current calculation of this threshold is 1,100ha per year.
Climate change.	Ecological communities able to cope with threats, particularly climate change, so that biodiversity is maintained or enhanced.	Positive.	Likely to help the development of ecological communities that can cope with threats, climate change being the main threat. This should help reduce loss of biodiversity. Having a lot of variation in the landscape appears to be helpful as does developing large areas of semi-natural habitat. Therefore, mosaics of woodland and open habitat appear useful.
	Carbon balance.	Negative.	There is a reduction in long-term (100 years) average carbon store of 168 tonnes of carbon dioxide equivalent per hectare of woodland removed (tCO_2eha-1). There is a reduction in the long-term potential for reducing carbon emissions through substituting wood for higher carbon products of $289tCO_2eha-1$.[6] The total negative impact on carbon balance is therefore $457tCO_2ha-1$. Under the possible range of woodland removal the contribution of England's woods and forests to reducing carbon emissions could be reduced by between 1% and 3%. This is a maximum negative impact on England's total carbon emissions of 0.1%. The cost of the impact is £0.5 million to £5 million.
Natural environment.	Positive trends in populations of open habitat species.	Positive.	See 'Ecological communities" factor above.

[6] Based on an assumption that all the wood is mixed with coal for power generation ("co-firing"). The calculations are discussed in more detail below.

ETWF theme	Factor	Likely impact	Comments
	Quality of life and landscape.	Little impact.	There could be significant changes in the landscape. However, these changes are unlikely to take the landscape across thresholds whereby there are significant impacts on quality of life. However, if the process is handled badly or if the resulting landscapes are poorly designed there could be significant negative impacts. Conversely, there could be opportunities to make improvements in the landscape. Therefore, it is important that landscape guidelines are followed.
	Learning about landscape history.	Little impact.	A historic landscape will be restored. However, historic environment policy does not demand recreation of a particular type of landscape. Provided appropriate interpretation is used people will be able to learn how history has shaped the landscape whether or not woodland is removed.
	Preservation of historic environment.	Positive or negative.	Potential to improve the setting and access to the historic environment. Potential to damage heritage features through inappropriate operations or subsequent management. It is important that guidelines are followed.
	Commitments on native and, or, ancient woodland.	Little impact.	There is a clear policy framework protecting ancient and native woodland. Restoration of open habitats from well-established native woodland is difficult so they are unlikely to be targeted anyway.
	Desired trends in woodland biodiversity not compromised.	Little impact.	The woodlands most likely to be targeted tend to be the less biodiverse. However, policy will need to be flexible to respond to local conditions. There is a particular issue with wet woodlands being targeted for removal to restore fen or reedbed. We can resolve this through guidance. There will be a presumption against removal of ancient woodland or recent but mature native woodland.
	Water quality and yield maintained.	Little national impact or local impacts vary.	On a national or regional scale there is little impact. Local impacts vary, but should be low if good practice followed.
	Soil condition maintained.	Little impact.	If good practice is followed.
	Air, light and noise pollution abated.	Little impact.	Trees have significant local role as visual screens, but whole woodland blocks are not required. Such screens can be easily accommodated in open habitat projects.

ETWF theme	Factor	Likely impact	Comments
Quality of life.	Positive engagement by local and other users.	Negative or little impact.	Without high quality local engagement local users can feel that they have no say in changes to their local landscape. This can result in reduced benefits to those people. It can also result in opposition from the local community to projects to remove woodland. Therefore, high quality local engagement in decisions about the initial proposals is important. If you have this type of process there can be a positive impact if the proposals can meet local aspirations.
	Access and recreation.	Little impact.	While the landscape may change significantly it is unlikely to change across thresholds where access patterns are significantly changed. There could be an exception where heathland restoration results in more conflict between the needs of recreational users and the needs of ground nesting birds.
Business and markets.	Timber sector confidence.	Negative.	There will be little impact on hardwood timber production. Softwood timber production could be reduced on a regional scale by between 8 and 1%. We do not fully understand the relationship between the reduction in timber production and timber sector business activity. We are working to fill this gap.

2. Monetising the impact.

2.1 Biodiversity benefits.

There is evidence that removing woods and forests to restore or expand open habitat will have significant biodiversity benefits in certain circumstances. There is strong evidence that failing to achieve biodiversity benefits will be costly, e.g.: Braat, L and ten Brink, P (ed's) (**2008***) The Cost of Policy Inaction: The case of not meeting the 2010 biodiversity target.* However, there is also evidence that the woods or forests that might be removed under this policy have biodiversity value.

Any valuation must take account of the net impact of marginal change – the impact of losing some woodland must be assessed against the impact of gaining some open habitat. The biodiversity in woods and forests delivers a range of direct and indirect use values and non-use values such as quality of life and landscape, access and recreation, soil, air and water quality. However, our analysis of the evidence shows that in practice restoring and expanding open habitats from woods and forests will have little impact on these values provided practitioners follow good practice. Under current practice and, it is likely, any future policy projects rarely involve 100% removal of woodland with 30 – 50% woodland retention being typical. Therefore, there is sufficient flexibility to accommodate landscape design to ensure use values are maintained. Table 2 sets out a summary. Therefore, the most significant impact will be on non-use values of biodiversity.

There are several examples of potentially relevant studies cited in Economics and Funding SIG (**2007**) *Valuing the benefits of biodiversity*, Defra:

> Studies of residents in Cambridgeshire gave direct use and non-use value of action to halt biodiversity loss in the county at £16.6M per year.
>
> A study of the non-use value of Natura sites in Scotland gave a value of £211M per year across the UK.

Studies in Cambridgeshire and Northumberland gave direct use and non-use values for conserving rare unfamiliar species or rare and common familiar species of between £189 and £94 per year per household.

Studies of the direct use and non-use value of restoration of existing habitats in Cambridgeshire and Northumberland found values of £34 - £71 per year per household.

A study of the non-use value of biodiversity in woodlands in Britain found a value of £386M per year.

Other studies are relevant, for example:

A study of the non-use value attributed to increases in the area of different types of woodland gave figures ranging from £0.35 per household per year for a 12,000ha increase in the area of upland conifers to £1.13 per household per year for a 12,000 ha increase in lowland ancient woodland.

These studies indicate that the non-use value of the biodiversity benefits of both woodland and open habitat are high. However, the studies are not comparable nor can they be scaled up to a national picture. We know of no studies that provide direct evidence of the net change in value as a result of restoring or expanding open habitat from woodland.

Policy can make significant contributions to increasing the area of habitats of 9 out of 45 habitats with Habitat Action Plans (HAP) in the UKBAP. The potential % increase in habitat area under the scenarios ranges from 1.2% to 7% on average. The area of the most biodiverse of the habitats, lowland heathland, could be increased by between 5.9% and 32%. The figures are set out in Table 3. The relevant HAPs are directly linked with about 70 of 382 species with Species Action Plans. It is therefore likely that the value of the biodiversity benefits will be significant.

Table 3: Potential increase in area of relevant open habitats under different policy scenarios.

Open habitat.	Total area of habitat (ha).	Maximum contribution from woods or forests to restoration or expansion (ha)		Maximum % increase from woodland or forest.	Maximum % increase in area under the policy scenarios		
		From plantation	From native woodland	Total potential	High	Mid	Low
Lowland meadows	7,282	0	0	N/A	N/A	N/A	N/A
Upland hay meadows	870	0	0	N/A	N/A	N/A	N/A
Lowland calcareous grassland	38,687	0	20,000	51.7	11.9	6.5	2.2
Lowland dry acid grassland	20,142	300	3000	16.4	3.8	2.0	0.7
Purple moor grass and rush pasture	21,554	300	200	2.3	0.5	0.3	0.1
Upland heathland (moor)	220,000	20000	0	9.1	2.1	1.1	0.4
Lowland raised bogs	11,200	500	0	4.5	1.0	0.6	0.2
Blanket bog	240,000	5000	0	2.1	0.5	0.3	0.1
Fens	11,200	600	1000	14.3	3.3	1.8	0.6
Reedbed	5,200	0	1000	19.2	4.4	2.4	0.8
Lowland heathland	58,000	60000	20000	137.9	31.6	17.3	5.9
Average				28.6	6.6	3.6	1.2

2.2: Carbon costs.

To calculate the impact on greenhouse gas balance we have taken three elements into account:

The process of restoring or expanding open habitats can result in carbon emissions – policy is likely to require adoption of good practice to minimise emissions so the impact is considered to be minor.

Removal of woods and forests to restore open habitats results in a reduction in the long-term average carbon store on the site.

Removal of woods and forests reduces the opportunity for timber to be used as a substitute for higher carbon materials or fuel.

Long-term average carbon store: We calculate the reduction in long-term average carbon store as 168tons of carbon dioxide equivalent per hectare of woodland removed (tCO_2e per ha)[7] taking into account only above ground biomass. The calculations are shown at Table 4.

Substitution: Restoration results in a loss of potential for harvested wood products to substitute for higher carbon materials such as oil for fuel, or concrete and steel for construction. We believe that we should take account of changes in long-term average carbon storage and loss of potential to reduce emissions due to substitution. The evidence on the size of this impact is uncertain. Forest Research has a project to develop accurate figures, the Forest Carbon Review[8]. We will use the most accurate figures available at each stage of the policy process. In the meantime, for illustration, if we assume that all the wood is mixed with coal for power generation ("co-firing") the loss of potential to reduce carbon emissions is 289tCO_2e per ha over and above the reduction in long-term average carbon store.

[7] Average weighted for area of woodland or forest on potential open habitats, This includes an assumption of little impact for carbon in peatland soils, see evidence paper for detailed discussion..

[8] http://www.forestresearch.gov.uk/website/forestresearch.nsf/ByUnique/INFD-62XH5R

Table 4: Changes in carbon balance due to removal of woodland or forest for restoration and expansion of open habitats (tCO_2e per ha).

Land use change	Wood or forest pre-restoration		Restored open habitat		Change on restoration	
	Long-term carbon store	Theoretical abatement over 100 years due to product substitution.	Long-term carbon store	Theoretical abatement over 100 years due to product substitution.	Long-term carbon store	Theoretical abatement over 100 years due to product substitution.
Scots pine General Yield Class (GYC) 12 to lowland heathland	158	554	18	92	-139	-462
Sitka spruce GYC 8 (thinned) to upland heathland.	106	308	18	92	-88	-217
Sitka / Norway spruce (some Lodgepole pine) GYC 8 (unthinned) to lowland raised bog or blanket bog.	169	264	18	0	-150	-264
Scots pine GYC 8 to lowland dry acid grassland	136	374	18	0	-117	-374
Douglas fir and Sitka spruce GYC 18 to purple moor grass and rush pasture	213	899	18	0	-195	-899
Pine or poplar yield class 16 to fen	393	1,505	18	0	-374	-1,505
Native woodland GYC 4 to lowland calcareous grassland, lowland dry acid grassland or purple moor grass and rush pasture.	261	176	18	92	-242	-84
Native woodland GYC 4 to lowland heathland	261	176	18	92	-242	-84
Native woodland GYC 4 to fens or wet reedbeds.	261	176	37	330	-224	154

We can therefore conclude that the total negative impact on carbon balance is $457tCO_2e$ per ha on average over 100 years. Under the range of interventions the contribution of England's woods and forests to reducing carbon emissions could be reduced by between $0.026MtCO_2$ per year and $0.14MtCO_2$ per year. This is between 1% and 3% of the total rate of sequestration by woods and forests in England of $4MtCO_2e$ per year. The maximum reduction is therefore 0.1% of total carbon emissions for England.

We calculated the carbon impacts using the following assumptions:

For all woodland types, apart from native woodland GYC4, it is assumed that the option for open habitat restoration is made at the economic time of felling. The 100 year period over which the carbon benefits/disbenefits of retaining woodland cover is calculated starts follows felling,

assuming immediate re-planting. The carbon associated with the previous crop is not considered.

Standing volumes and production from Edwards and Christie (1981), assuming harvest of first rotation at maximum mean annual increment. Estimates of long-term carbon stocks in standing biomass include root and branch components, calculated according to the approach adopted in the UK GHG inventory (expansion factors of 1.18 and 1.2, respectively) and time-averaged across the two (or more) rotations.

Estimates of substitution savings include cumulative production from the first rotation (and second and third in the case of poplar) together with thinning (from Edwards and Christie, 1981) from the second/final rotation. Branch biomass is included, assuming an expansion factor of 1.2.

Native woodland (GYC4) is assumed to be mature (age 100 years, extrapolated SAB model from Edwards and Christie, 1981) and retained at the time that the decision over open habitat restoration is made. The woodland is then assumed to be managed on a continuous cover basis with 10 cubic metres per hectare harvested at 5 year intervals, typical for late rotation according to Edwards and Christie.

Specific densities taken from Hamilton and Christie (1974), apart from poplar, for which expert judgement was used from a range of sources. Carbon substitution benefits calculated assuming substitution for coal through co-firing of electricity generation, adopting a conversion factor of 0.71 tonnes carbon saved per tonne carbon in biomass (after El Sayed et al., 2003).

The figures are set out in Table 5.

Table 5: Calculation of carbon impacts.

Woodland to be removed.	Rotation length	Specific density	Spacing	Sequestration		Substitution	
				Standing volume (>7cm) at end of rotation	Average long-term carbon stock	Harvested biomass (>7cm)	Theoretical abatement over 100 years
Scots pine Yield Class (GYC) 12	65 35	0.41	2.0	367 152	43	740 126	151
Sitka spruce GYC 8 (int. thinning)	65 35	0.35	2.0	299 133	29	505 56	84
Sitka spruce GYC 8 (unthinned)	65 35	0.35	2.0	479 169	46	479 0	72
Scots pine GYC 8 (int. thinning)	76 24	0.41	2.0	310 67	37	584 0	102
Douglas fir GYC 18 (line thinning)	54 36	0.43	1.7	486 300	58	964 372	245
Poplar GYC 14 (unthinned)	27 27 27 19	0.40	2.7	802 802 802 500	107	802 802 802 0	410
Native woodland GYC 4 (continuous cover)	NA	0.55	1.5	176	71	854	48
Native woodland GYC 4 (continuous cover)	NA	0.55	1.5	176	71	854	48
Native woodland GYC 4 (continuous cover)	NA	0.55	1.5	176	71	854	48

The cost of this impact over 15 years is between £0.65M and £5.3M (Net Present Value) (calculated using See shadow price of carbon according to Defra guidance, see http://www.defra.gov.uk/Environment/climatechange/research/carboncost/index.htm)

2.3: Reduction in timber sector economic activity due to reduction in timber availability.

Woodland removal for restoration or expansion of open habitat could eventually have an impact on the timber producing and primary processing sector, because the amount of timber and other harvested wood will be reduced.

Hardwood: There are about 45,200ha of native woodland on potential open habitat. However, the nature of this woodland means that little of it is likely to be delivering timber to the market, so the likely impact on the timber sector of its removal is insignificant.

Softwood: There are about 86,700ha of conifer plantations on potential open habitats in England. Due to high transport costs the timber market is regionalised. Forest Enterprise England divides its timber production into three marketing zones: Northern (North of the Humber/Mersey), Central (West and East Midlands) and Southern (the rest). We analysed the impact on softwood production according to these zones.

We estimate the reduction in softwood production under the scenarios could range from 1% to 7% in the Southern zone, 1% to 8% in the Central zone, and 1% to 4% in the Northern zone. This equates to a reduction England-wide of between 1% and 6%. The figures are summarised in Table 6.

Table 6: Potential loss (ha) of softwood timber availability due to removal of conifer plantations for restoration and expansion of open habitats.

Marketing zone	Conifer plantation on potential open habitat (ha)[9]	Total area of conifers (ha)[10]	Total potential loss of production under scenarios.		
			Higher	Intermediate	Lower
Southern	45,500	151,430	7%	4%	1%
Central	15,100	43,972	8%	4%	1%
Northern	26,100	142,929	4%	2%	1%
England	86,700	338,331	6%	3%	1%

Impact on businesses: The contribution to England's Gross Domestic Product (GDP) of production, primary and secondary processing of English grown timber is estimated at £2.1 billion or 0.1% of England's GDP employing 64,000 Full Time Equivalents (FTE) 11 Of this, 40% is contributed by businesses significantly exposed to changes in English timber production. These are defined as businesses where more than 50% of their wood material is grown in England. We can therefore calculate that the potential reduction in timber supply across England could reduce forestry's contribution to GDP of between £3.3M and £18M (Net Present Value). The figures are summarised in Table 7. These are hypothetical maximum figures only because the relationship between product supply, competition, business confidence, investment and ultimately on jobs is complex. We have asked for further evidence as part of the consultation. In the meantime, we do not consider these figures to be robust enough to be presented in the impact summaries.

Table 7: Theoretical maximum impact of reduction in timber supply on timber sector business activity.

	Higher	Intermediate	Lower
Impact on GDP (£ Net Present Value)	17,877,549	9,754,937	3,310,767

Assuming no impact for 20 years, discount factor 0.5026.

[9] Figures from Table 1.

[10] Figures from the NIWT 1998.

[11] Jaakko Pöyry Consulting (2006) Woodland and forest sector in England, England Forest Industries Partnership, www.efip.org.uk/

3. Cost of delivery.

3.1: Net cost of converting woodland to open habitat and additional net cost of managing open habitat converted from woodland.

The average cost of converting woodland into open habitat is £1,164 per ha. The figures we used to calculate this figure are shown in Table 8.

Table 8: Cost of converting woodland into open habitat.

Land use change	Area (ha)	Net cost of conversion (including net profit from timber)
Scots pine GYC 12 to lowland heathland	60,000	1,245
Sitka spruce GYC 8 (thinned) to upland heathland.	20,000	150
Sitka / Norway spruce (some Lodgepole pine) yield class 8 (unthinned) to lowland raised bog	500	4,975
Sitka / Norway spruce (some Lodgepole pine) yield class 8 (unthinned) to blanket bog.	5000	500
Scots pine GYC 8 to lowland dry acid grassland	300	517
Douglas fir and Sitka spruce GYC 18 to purple moor grass and rush pasture	300	575
Poplar GYC 14 to fen	600	517
Native woodland GYC 4 to lowland calcareous grassland	20,000	2,063
Native woodland GYC 4 to lowland dry acid grassland	3,000	830
Native woodland GYC 4 to purple moor grass and rush pasture	200	517
Native woodland GYC 4 to fens	1,000	575
Native woodland GYC 4 to reedbed	1,000	817
Native woodland GYC 4 to lowland heathland	20,000	1,245
Average		1,117
Average weighted by area		1,164

Costs from GHK Consulting Ltd (2006) UK Biodiversity Action Plan: Preparing Costings for Species and Habitat Action Plans: Costings Summary Report, https://statistics.defra.gov.uk/esg/reports/bioactionplan/default.asp. Lowland heathland costs from Forest Enterprise England and Tomorrow's Heathland Heritage.

These figures equate to a total cost of conversion over the period of the policy of £3.5M, £1.3M and £0.43M per year depending on the policy scenario. This gives the total cost of conversion over the lifetime of the policy as £30M, £15M or £5M (NPV).

The above are operational costs. Administrative costs (e.g.: cost of administering Environmental Impact Assessment) can be assumed to be 20% on top of the conversion costs (GHK Consulting (2006)).

The average net additional cost of managing open habitat once restoration is complete is £124 per ha per year, assuming the absolute cost is £100 per ha per year. The data we used to calculate this figure are shown in Table 9.

Table 9: Net cost of managing open habitat (£ per ha per year)

Land use change	Average annual timber income foregone	Cost of managing woodland	Cost of managing open habitat	Net cost of management
Scots pine GYC 12 to lowland heathland	120	61	100	159
Sitka spruce GYC 8 (thinned) to upland heathland.	80	61	100	119
Sitka / Norway spruce (some Lodgepole pine) yield class 8 (unthinned) to lowland raised bog	80	61	100	119
Sitka / Norway spruce (some Lodgepole pine) yield class 8 (unthinned) to blanket bog.	80	61	100	119
Scots pine GYC 8 to lowland dry acid grassland	80	61	100	119
Douglas fir and Sitka spruce GYC 18 to purple moor grass and rush pasture	180	61	100	219
Poplar GYC 14 to fen	140	61	100	179
Native woodland GYC 4 to lowland calcareous grassland	40	61	100	79
Native woodland GYC 4 to lowland dry acid grassland	40	61	100	79
Native woodland GYC 4 to purple moor grass and rush pasture	40	61	100	79
Native woodland GYC 4 to fens	40	61	100	79
Native woodland GYC 4 to reedbed	40	61	100	79
Native woodland GYC 4 to lowland heathland	40	61	100	79
Average				116
Average weighted by area				124

Management costs are cumulative. Assuming a linear rate in increase in area of open habitats provides additional costs of managing open habitats of between £3.5M and £25M NPV over the policy timescale.

Therefore, the total cost of delivering the policy scenarios is £9M, £27M, or £61M (NPV) over 15 years. These figures are summarised in Table 10.

Table 10: Costs of delivery of scenarios for policy on open habitats (£ million).

Scenario	Annual net cost of converting [12] wood or forest to open habitat.	Total cost of conversion (NPV)	Annual net additional cost of managing open habitat.	Total additional cost of management (NPV)	Total admin. costs (20% of operational costs of conversion) (NPV)	Total costs (NPV)
Higher	3.5	30	0.37	25	6.1	61
Middle	1.3	15	0.14	10	3.1	27
Lower	0.43	5.0	0.046	3.5	1.0	9

A study by the IUCN found that 60 – 70% of the domestic expenditure on delivering biodiversity objectives comes from Government with most of the rest coming from non-governmental organisations (Morling, P (2008) Funding for biodiversity, an analysis of the UK's spend towards the 2010 target, IUCN, http://www.iucn-uk.org/pdf/IUCNFundingUKBiodiversity_FullReport.pdf .

3.2 Administrative burden.

Calculating the administrative burden at this stage is difficult because of the number of dependencies and uncertainty over the number of organisations involved. However, some initial estimates can be provided as follows:

Number of organisations/landowners directly involved: 100 (stakeholders involved to date + local authorities with a significant interest + landowners with a significant interest).

Assimilating new guidance: 2 hours per organisation, one-off. However, much of the new guidance will be included in guidance and codes of practice already in development such as a refreshed UK Forestry Standard and new Forestry and People Guidelines. It is therefore unlikely that assimilating new guidance represents a significant additional burden caused by this policy.

There is likely to be a reduction in the administrative burden due to clarification of Environmental Impact Assessments (EIA) and Felling Licences. Each EIA costs about £25K to each of Government (FC) and the applicant. This should be viewed in the context of the FC's overall Simplification Plan. This policy is unlikely to provide additional savings or costs over and above this plan.

There is a commitment to applying an evaluation framework to individual projects. This will require practitioners to take baseline and post-intervention measurements of indicators of desired outcomes. The results will be submitted to a central point of collation. The administrative cost of the framework is likely to be about 1 hour per organisation per project per year. At this stage estimating the number of projects is difficult. However, assuming the average restoration project under the policy is about 20ha in size gives us 15, 55 or 150 projects per year at low, middle and higher rates of intervention. As above, adequate evaluation is not a novel approach and the additional administrative burden is not considered significant on a national policy scale. Indeed, the central collation of more comparable data should eventually enable more effective delivery of desired outcomes.

For the reasons set out above we have set the cost of changes in administrative burden as a result of this policy at £0.

[12] In this table, we have used "converting" as shorthand for "restoring and expanding".

3.3 Compensatory planting.

One mechanism to reduce some of the potential negative impacts from woodland removal is woodland expansion to compensate for woodland loss ('compensatory planting'). At this stage it is difficult to calculate the costs and benefits of this element of the policy due to the number of dependencies.

Compensatory planting could cause a significant additional cost to Government. Funding for broadleaf woodland creation under the English Woodland Grant Scheme (EWGS) ranges from £1,800 to £4,000 per ha depending on location and type of planting. Funding for conifer planting is £1,200 per ha. Farm Woodland Payments of between £60 and £300 per ha per year may also be available to compensate for loss of income due to planting on agricultural land. Depending on policy, there could be an additional burden on practitioners. The basic grant rates are about 70% of the actual cost of woodland creation. Again, depending on policy some of the compensatory planting could be on the FC estate. This is likely to require additional land-purchase and increased costs to Government.

Compensatory planting could also help to deliver a range of other Government objectives, for example, the woodland HAP, green infrastructure, access and recreation. The kind of land most likely to be targeted is improved agricultural land or derelict, under-used and neglected land in urban and peri-urban areas. There is evidence that the value of the net benefit of such planting would be substantial.

It is likely under current forestry policy priorities that the new planting would be mainly native woodland. Timber production could be one of the management objectives. However, it is unlikely that planting would result in compensation for loss of softwood production in any direct like for like sense. Because they are likely to be mainly native with low yield class and many could be urban or per-urban there is likely to be a long-term net cost of management. This could be about £20 per ha per year.

For illustration, the additional cost of woodland creation under the three scenarios could be £11 million, £24 million and £64 million NPV over the policy timescale. This assumes the same area and rate of compensatory planting as woodland removal and that the basic grant rate of £1,800 per ha is applied. The additional cost of management of woodland created under compensatory planting could be £0.76million, £1.7 million or £4.6 million under the three policy scenarios. This assumes the same area and rate of compensatory planting as woodland removal and an average cost of woodland management of £20 per ha per year. Note that these figures are for illustration only and that there are a number of possible approaches to compensatory planting. For this reason, we have not included costs and benefits of compensatory planting in the summary impact assessments. The impact assessment accompanying the final policy options will include such costs and benefits as appropriate.

4. Next steps.

We will use the results of the consultation to develop a set of more mutually exclusive policy options. Once we have a clearer set of policy options we will be able to better define administrative burden and other costs of delivery. Through the consultation and other research we are working to develop the evidence on the value of the impacts, particularly for timber sector activity and biodiversity and to refine the carbon balance calculation. These refined analyses will be presented in the Impact Assessment attached to a submission to Ministers on policy options.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	No	No
Small Firms Impact Test	No	No
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	Yes	No
Other Environment	Yes	No
Health Impact Assessment	No	No
Race Equality	Yes	Yes
Disability Equality	Yes	Yes
Gender Equality	Yes	Yes
Human Rights	No	No
Rural Proofing	No	No

Annexes

Impact Assessment Summary

Name of policy, function or service Insert the name of the policy, process or service. Include information about whether this is a Partial Impact Assessment.
Restoration and expansion of open habitats from woods and forest in England: developing Government policy.

Purpose and aim(s) of the policy, function or service Insert a brief outline of the purpose of the policy, process or service and provide outline details of main aim(s).
Develop a clear rationale to guide removal of inappropriate plantations and woodland where other key Biodiversity Action Plans habitat can be restored or enhanced and where the environmental benefits outweigh the costs. Biodiversity benefits are the main objective.

Who will benefit mainly from this policy, function or service? Outline briefly who the policy, process or service is aimed at, for example, customers, and staff and identify any specific groups where appropriate.
People wishing to expand or restore open habitat from woodland or forest, woodland managers and owners, timber producers and processors, users of potential and restored open habitat sites, staff of Natural England and Forestry Commission using relevant delivery mechanisms. Users of potential open habitat and restored open habitat. Non-users who care about biodiversity.

Information and Data (evidence) used Include information of evidence collected to undertake the impact assessment. This can be a summary of information or a comprehensive list. Include information on any consultations undertaken and the associated findings.
Public Opinion of Forestry Survey. Study of preferences in woodland. Survey of Forestry Commission regional staff on differential responses from equality groups – none recorded.

Summary of Impact Provide a summary of the impact both negative and positive and outline of any remedial action or justifications for impact. Provide information about any modifications made to the policy, process or service as a result of the assessment and/or consultation, or alternative or additional measures.
Provided good practice is followed with high quality local engagement there appears to be little potential impact on factors such as landscape and quality of life and access and recreation. Therefore it is unlikely that there will be significant differential impact on equality groups.

Monitoring/Evaluation Provide a brief summary of how the policy, function or service will be monitored and evaluated in terms of equality.

We will re-visit this EqIA once the formal public consultation has completed.

We will apply an outcomes focussed framework for evaluation. One of the proposed indicators is based on the number and attitude of community groups involved in restoration projects or woodland on potential open habitat. When we review the policy in 2012 we will look for evidence of differential involvement by equality groups in these groups.

Policy proposes a requirement for good quality local engagement in decision making. When we review the policy in 2012 we will look for evidence of differential involvement by equality groups in these processes.

Further Information

Insert contact details of the individual who can supply additional information and a copy of the completed Equality Impact Assessment.

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