Forestry Commission
England

WEST ENGLAND FOREST DISTRICT
Forest of Dean

Forest Plan

Nagshead and Russells

Plan period **2014 – 2024**

File Ref **OP10/41 & 42**

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December 2013

Forest Plan
Plan Period 2013 – 2023

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GENERAL DESCRIPTION

Topic	Description	Implications for Management	Proposals
Location	Nagshead and Russells consists of 1070Ha of mixed woodland in the heart of the Forest of Dean, with extensive areas of woodland lying to the north, south and east. The Town of Coleford and satellite villages lie to the west, with the village of Parkend lying on the southern boundary with other small settlements close by.	The boundaries of this plan area are clearly defined by public roads. Views of the woodland edge are common but long range external views are few. The woodland is often accessed informally by local people and formally by visitors using the cycle trail and range of way-marked trails that are provided. The RSPB nature reserve also draws in many visitors from further afield.	
Tenure & Management Agreements	The area is Freehold and part of the Statutory Forest of Dean. An area of 305 Ha in the south of the woodland that straddles Nagshead and Russells is let to the RSPB on lease as a Nature reserve. 145Ha of this reserve is a SSSI. Several working quarries and numerous mines with their associated surface	Much of the plan area forms part of an area that has been Inclosed for the past 20 years, with areas outside the Inclosure being subject to grazing by sheep. Nature Conservation is the primary objective within this area. Whilst occupying considerable areas of land the working area is	Under planting, group planting and Natural regeneration will be used alongside clearfelling. Additional fencing maybe needed for establishment purposes. The SSSI plan can be found in appendix 1 and relevant extracts from the RSPB management plan found in appendix 2, whose objectives will be consistent with those of the Forest Plan within the affected area. Existing quarrying activity fits comfortably with management

Tenure & Management Agreements (cont)	leases exist within the area and include the extensive Bixhead Quarry in the west of the woodland along with Cannop Stone Firm who operate in the centre of the area just south of Cannop Ponds.	relatively small and many areas now have geological and ecological value.	objectives.
	Spion Kop and Cannop Bridge Marsh are two reserves managed by GWT covered by the 2012-2022 concordat with GWT.	Spion Kop is noted for its geological exposures, plant and bird life whilst Cannop is valued for its marshy wet woodland habitat, plant, bird, Lepidoptera and Odonata interest.	Forest operations must recognise the value of these habitats and refer to the respective GWT management plans when preparing work in these areas.
	There are several privately owned properties within the woodland.	These are relatively few and scattered across the whole area.	Take into account when drawing up plans for forest operations.

Physical Environment	The northern end and western side of Nagshead sit on a plateau at an altitude of 200m tailing off to 100m in the south and is punctuated by 2 steep sided valleys. One valley runs from Hopewell colliery in the north to Bostonbury Hill in the south the other starts at Cannop Stone Firms and runs northeast to the Bixhead quarries. Russells is situated to the east of Nagshead and sits comparatively lower at an average altitude of 100m. The eastern boundary sits at 165m with the ground gently sloping westward into the Cannop Valley at an altitude of 65m.	Some parts of Nagshead are more exposed than others, especially the higher ground in the north and northwest. These areas have a DAMS* score of 16, although the DAM score for the lower and more sheltered eastern side of Nagshead drops to 7. Russells is generally more sheltered than Nagshead, with a DAMS score of 13 along the eastern edge, dropping to 9 in the Cannop Valley, exposure should be less of an issue.	Ensure that coupe boundaries are wind-firm in most sensitive areas. Natural regeneration and establishment of any under/group planting will be aided by the shelter afforded by the overstorey. *DAMS is a method for measuring levels of exposure and the likelihood of wind damage.
	Running from Parkend in the south to Cannop cross-roads in the north, Cannop Valley divides the two	Potential for contamination of ground water by insensitive forestry operations.	Forest operations should adhere to Landscape, Forest and Water Guidelines to

Physical Environment (cont.)	areas of woodland and contains a complex of ponds at its northern end fed by Cannop Brook, whose catchment area covers the whole of Nagshead and Russells.		avoid contamination.
	Soils in Nagshead are predominantly brown earths with some surface water gleys toward the Cannop Valley that continue easterly into Russells with fresh to very moist Soil Moisture Regimes, with drainage improving slightly on the higher ground on the east side of Russells, giving way to some areas of brown earths.	Nagshead enjoys good fertile soils on the slopes and plateau with heavier soils in the Cannop Valley, that also cover most of Russells; where these heavy wet soils become a major limiting factor to the tree and woodland types that can be established here. Crop stability can also be local problem.	There are opportunities to grow high quality conifers and broadleaves on the better soils although on the wetter heavier soils that predominantly occur in Russells, drainage will be critical for effective establishment and should increase the range of species available both in terms of restocking and the suitability of ground for natural regeneration.
	Mining and quarrying activities across a large area of Nagshead has produced some areas of skeletal soils poor in nutrients.	Poor soils are localised, but are unlikely to be suitable for productive woodland.	These areas are best left to encroachment by natural successional vegetation.

Landscape Setting	The landscape is physically diverse consisting of a high plateau to the west in Nagshead falling easterly down into the Cannop Valley – that runs north to south – before gently rising again in a easterly direction through Russells joining the Speech House to New Fancy road. A number of minor valley systems run easterly into the Cannop Valley that drain into the Severn basin and produce a very	Due to the topographical nature the only views over Russells are from the higher ground in Nagshead, but reveal little of the character of the woodland, due to the views being generally semi-oblique in nature. Whilst the viewpoint above Beechenhurst Lodge is still a significant vantage point over the Nagshead landscape, it is now somewhat filtered due	Internal and External landscaping will need consideration. For Nagshead external landscaping will be more important with lowland landscape design principals to apply on the plateau. In Russells internal landscaping will play a much more significant part.

Landscape Setting (cont.)	diverse, highly conspicuous topography. **Landscape Character Assessment & National Character Area Assessment** Geology consisting of Old Red Sandstones from the Devonian is responsible for the areas characteristic red soils. The underlying geology also contains other Carboniferous rocks of sandstones, mudstones and limestones and has majorly influenced the landscape and landforms in the area, giving rise to the varied soils associated with them. This has lead to a development of wide ranging habitat along with their characteristic flora and fauna. The varied nature of the woodland and management regimes along with small clearings adjacent to residential areas to the west such as those at Jugshole Pool or Purples Tump add to the visual diversity of the forest, with the other three sides of the area surrounded by contiguous woodland separated only by public roads. The woodlands cloak former industrial sites, quarries and mines that may sometimes be identified by birch copses that have colonised former workings and spoil tips.	to the crop of young p87 DF just in front of the viewpoint. Other views over Nagshead are few. The variety of topography, aspects, associated geology and soils should favour a wider species choice in future plantings. Some of these areas such as Spion Kop Quarry and the disused quarries west of Bixhead now provide valuable habitat for a range of flora, Lepidoptera, bats and birds.	Diversity of the plan area will be broadened by introducing new species and utilising a range of management techniques other than clearfelling that should enrich existing habitats. Manage these areas in line with any specific management plans relating to these areas ensuring other guidance or best practice is accounted for in the planning of forestry operations through the site planning process.

Woodland Structure	Woodland structure is diverse with a roughly even split between conifer and broadleaf, but with a 10% bias towards broadleaf.	A diverse woodland structure with many mixed species crops. Broadleaves are predominantly concentrated in the Cannop Valley and the south of the area.	To some degree broadleaves will continue to regenerate naturally, and together with planting, the broadleaf cover is likely to increase by around 20% over the next 40 years.

Management Objectives	❖ **Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.** ❖ **Continued production of sustainable marketable woodland products that also allows delivery of a range of other public benefits whilst providing future opportunities for the substitution of wood products for fossil fuels and other energy intensive materials.** ❖ **Undertake management in line with Biodiversity 2020 and other nature conservation policies that protect and enhance both woodland and open habitats and their associated species fostering and facilitating their resilience and adaptation to projected climate change and disease threats.** ❖ **To retain Nagshead SSSI in favourable condition, whilst maintaining and enhancing biodiversity values in and around the RSPB reserve (with particular reference to management of birds), GWT Reserves and the wider plan area.** ❖ **The enhancement of internal landscape through diversification of age class structure, integrated with nature conservation projects that will provide further conservation benefits.** ❖ **Conservation and protection of heritage features through identification, and recording.** ❖ **To maintain recreational usage of the woodland in keeping with FC policies.**

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AN EXPLANATION BEHIND PLAN PROPOSALS 2013-2023		
PAST	**Background**	Older FPs in the District dating from the late 1990s through to 2000 tended to concentrate on restructuring the age class distribution of the forest, using clearfelling and restocking as the primary method of management. This helped to ensure a more sustainable and even flow of timber available into the future.
PRESENT	**Challenges**	With the restructuring process pretty well under way within Nagshead and the wider forest, woodlands now face a different set of challenges; that of climate change and the constant threat of pests and diseases. In recent years we have had to deal with several new diseases:
	Diseases Dothistroma Needle Blight (DBN)	Often referred to as Red Band Needle Blight (RBN). This disease attacks **pine** species and first appeared in the Dean in the 1990s with the effect of reducing the growth rates of the pine trees by upto anywhere between 60 and 80% and is managed through thinning the wood more heavily than you would normally to introduce higher levels of air flow through the crop.
	Phytopththora ramorum (PR)	Found originally in Cornwall in 2009, attacking Oak, it is a notifiable disease and is dealt with by statutory plant health notices (SPHN) issued by DEFRA. At present there is no PR in Oak in the Forest of Dean, however, in 2012 Phytopththora was found to of infected **Larch** crops and again use of SPHN was used eradicate the disease, which is proving difficult; so regular aerial flyovers are helping keep track of the latest hot spots and are dealt with swiftly by informing the land owner and issuing of SPHN for felling of infected areas. Felling of infected larch crops within the Dean was completed in March 2012 and luckily recent flyovers in 2013 have shown no reinfection, although unfortunately other parts of the country have not been so lucky with further felling pending. This is not to say there will not be a need for further fellings of infected larch required in the future.
	Chalara fraxinea	The most recent disease showed up in 2012, and affects **Ash**. To date no infection has been found within the forest and let us hope it stays that way!
	Other	There are other diseases that may pose a threat in the future but the Forestry Commission Research Department is working hard both in this country and on the continent to ensure future risk to our woods is minimised.
	Climate Change	Climate change research tends to suggest the climate is going to get warmer. It is likely that some tree species may become less well suited to future changes in climate. Therefore it is

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		important that the range of species planted in our forests is increased making them more resilient and by doing this now will hopefully make them more adaptable to future threats posed by pests and disease too.
FUTURE	**Proposals**	The primary restructuring process of clearfelling from the previous plan has served its purpose. With these new challenges, the proposals put forward will continue the process of diversifying the wood and you will notice more of an emphasis placed on "Alternatives To Clearfelling" (ATC) as opposed to the more conventional clearfell and restocking methods used previously. This will make the woodland more resilient to future demands. ATC methods minimise the need to clearfell; instead, in some areas micro-climates will be created by felling smaller groups of around 0.5Ha. This enables the planting of a much wider selection of species, increasing diversity within the wood. ATC methods achieve a slower rate of change in how the wood is structured, so that the future age class structure will be more diverse too. At the same time ATC can help protect both habitats and flora as they are less harsh by comparison. Over all the plan proposes an increase in broadleaf cover by upto around 20% and conversely a reduction in conifer cover by around the same amount. The Site Analysis map and Design Concept map will enable you to get a quick over view of what is proposed.

SILVICULTURE

Topic	Description	Implications for Management	Proposals
Silviculture: Species Choice (Figs. 1 - 1.2)	**Broadleaves** Oak (OK) Pedunculate oak (POK) Sessile oak (SOK)	A strong cultural and ecological association with oak exists in this part of the Dean. Occurs mainly in the south of the plan area, within the RSPB Nature Reserve and to the north along the lower slopes of the Cannop Valley. Many mature stands of oak also remain around the peripheral edges to the east and west. The entire area has an NVC type of W10 & W16. It grows well on the heavier soils here.	Oak will be one of the main planted species used on suitable sites, supplemented by minor species and incorporate the inevitable birch regeneration. Both POK and SOK oak are suitable for the site. POK should be used on heavier wetter areas with SOK better suited for the drier sites, having a higher tolerance of drier soils /drought, renders it

Silviculture: Species Choice (cont.)			better suited to a warming climate.
	Beech (BE)	BE occurs along the peripheral edges of the plan area, with a number of stands along the western side of the RSPB reserve exhibiting signs of strong natural regeneration.	Timber potential for younger crops is limited due to the potential for squirrel damage. This should not preclude BE in helping to diversify future crops by acceptance of natural regeneration or planting (in mix with other minor species) as there is a healthy market for firewood.
	Sweet Chestnut (SC)	SC is mainly found along the eastern edge and southeast corner of Russells, with some smaller areas of newly planted SC in the northwest corner of Nagshead. SC does best on slightly acidic soils with ample but not excessive soil moisture and is likely to benefit from a warming climate. Although vulnerable to bark stripping by grey squirrels, the ability to manage it as a coppice crop with the attendant wildlife benefits merits the continued use of this species.	SC is unfortunately susceptible to "*P.ramorum*" Existing areas of larch with an understorey component of SC and existing coppice areas may therefore need some level of enrichment planting with other broadleaves to affect full stocking for healthy establishment of subsequent crops.
	Ash (AH)	Ash is a minor component of woodland within Nagshead and Russells. It requires a good supply of soil moisture for best growth. The timber is suitable for various products and firewood.	Where ash occurs, natural regeneration will be recruited into future crops and where needed enrichment planting of other species will help diversify the crop and help minimise risk of infection from a new fungal disease "*Chalara Fraxinae*". Ash components will be

Silviculture: Species Choice (cont.)			monitored for *C.fraxinae*. Planting of ash might continue, albeit in smaller quantities and only with trees grown from seed sources where a possible genetic resistance has been found.
	Birch (BI)	Birch naturally regenerates pretty well throughout Nagshead and Russells. Timber is typically used as firewood/wood fuel.	Birch is likely to form a component of most sites managed on either extended rotation or clearfell areas restocked with broadleaves, and on some sites (e.g. declining NS) Birch will act as a soil improver.
	Cherry (P.avium) (WCH)	There is consistent demand for good quality cherry. Very little exists within the plan area. Cherry prefers fertile soils that are fresh, well drained and reasonably sheltered.	Cherry may be planted in mixture with other broadleaves when restocking or carrying out enrichment planting where shelter can be afforded.
	Hazel/Hornbeam (HAZ/HBM)	Both minor species of little commercial value occurring very rarely within the plan area. Use of these species should be encouraged to increase habitat diversity and can be included as a mixture along with other minor species.	These species will contribute to the 'minor species' percentage component of future crops across Nagshead and Russells. If specimens are present within crops they should be retained and their regeneration promoted to add diversity.
	Conifers Douglas Fir (DF)	A commercially valuable timber appropriate for the free draining brown earths and suited to extended	To aid establishment of new crops areas of DF will be retained on an extended rotation.

Silviculture: Species Choice (cont.)		rotation and continuous cover. Found extensively throughout Nagshead and Russells.	Thinning is likely to encourage natural regeneration.
	Norway Spruce (NS)	Found more in Russells than Nagshead and although commercially valuable and appropriate for wetter sites, in Russells previous crops have been subject to extensive squirrel damage.	The presence of Axiophyte species - species characteristic of semi-natural habitat – under some NS crops indicate some areas currently stocked with NS of declining performance maybe better suited to broadleaves.
	Corsican Pine (CP)	Mostly found in Nagshead although Dothistroma Needle Blight (DNB) is present in all CP crops at varying levels of severity. Management will be through thinning to the Districts DNB thinning regime.	Although well suited to some of the drier sites in Nagshead, presence of DNB means no CP will be planted for the moment. The heavier thinning of crops should be used to promote development understorey / natural regeneration and can be used as a focus to begin under-planting or group-planting of more suitable species that may also be better suited to a warming climate.
	Larch (Japanese – JL European – EL Hybrid – HL)	The proportion of larch in Nagshead and Russells is roughly equal. Larch is well suited to the browner earths, with JL preferring the moister sites over EL that enjoys a drier site. Although due to disease may well disappear fro this woodland over the next 10-15 years. Research tends to suggest that EL may well be more suitable than HL or JL with a warming climate	Clearfelling of larch will not be accelerated perse just because of the presence of *PR*, although some smaller components maybe removed during thinning; in other areas thinning should encourage natural regeneration and along with enrichment planting, e.g. in

Silviculture: Species Choice (cont.)		in mind. Presence of *PR* has meant the felling of around 8 Ha and a further thinning out of 8-9Ha of larch within Nagshead, (some of which were younger crops that had been subject to squirrel damage too.) replacement species are likely to come from those conifer listed below, whilst page 11 mentions some suggestions for broadleaf alternatives.	existing coppice areas, will help to diversify woodland structure.
Future alternative species for considerat-ion	**Conifer:** Douglas Fir (DF)	A commercially valuable timber appropriate for the free draining brown earths and suited to extended rotation and continuous cover. Found extensively throughout Nagshead and Russells.	To aid establishment of new crops areas of DF will be retained on an extended rotation. Thinning is likely to encourage natural regeneration.
	Western Red Cedar (RC)	There is a modestly small amount of RC in the plan area with principal coverage of RC occurring in the south of Nagshead, some in mix with NS. Along with DF, RC too is a species suited to extended rotation and continuous cover. Research tools suggest RC would be well suited for consideration in increasing future resilience to a predicted warmer climate.	Extended rotation enables the thinning of RC crops to develop an understorey of natural regeneration. Any OK or BI regeneration would be accepted.
	European Silver Fir (ESF) and Coastal Redwood (RSQ)	Two Species that currently do not feature in the species composition of Nagshead or Russells, except in small quantities on 2 recent restock sites. Considered currently as minor species, both ESF and RSQ share the same soil requirements needing moderately fertile soil with a fresh to moist soil conditions. Both are also shade tolerant,	ESF and RSQ would lend themselves well to being considered as a component for under-planting where the overstory affords the shelter required for successful establishment.

Silviculture: Species Choice (cont.)		but frost sensitive. Research suggests their suitability for a warming climate within this plan area.	
	Weymouth Pine (WEP)	Not currently present within Nagshead and Russells. Although species does suffer from white blister rust, can be used in mixtures with SP and broadleaves and is moderately resistant to DNB.	Use in small quantities and in mixture with SP and is a good alternative for CP in terms of resistance to DNB.
	Scots Pine (SP)	Use of SP should continue. Little effect of DNB showing at present. Frost hardy and wind-firm and will do well on the drier more fertile sites. Good in later years for visual aesthetics, structural diversity and conservation value.	Where maturer stands exist, retain some SP for visual aesthetics, structural diversity and conservation value.
	Pacific Silver Fir (ESF)	A shade tolerant species that can be vulnerable to late frosts. Avoid exposed sites with drier soils. Prefers more fertile sites with ample but not excessive soil moisture.	Research tools show ESF as being suitable for the southern areas of Nagshead and the drier parts of Russells. These areas are generally less exposed, and ESF will be used for under-planting which will provide the required shelter needed for establishment.
	Broadleaves: • Oaks (POK / SOK & ROK) • Beech (BE) • Hornbeam (HBM) • Birch (BI) • Hazel (HAZ) • Cherry (WCH)	See page 9 to page 11	See page 9 to page 11

Figure 1: Current Landuse within Nagshead and Russells

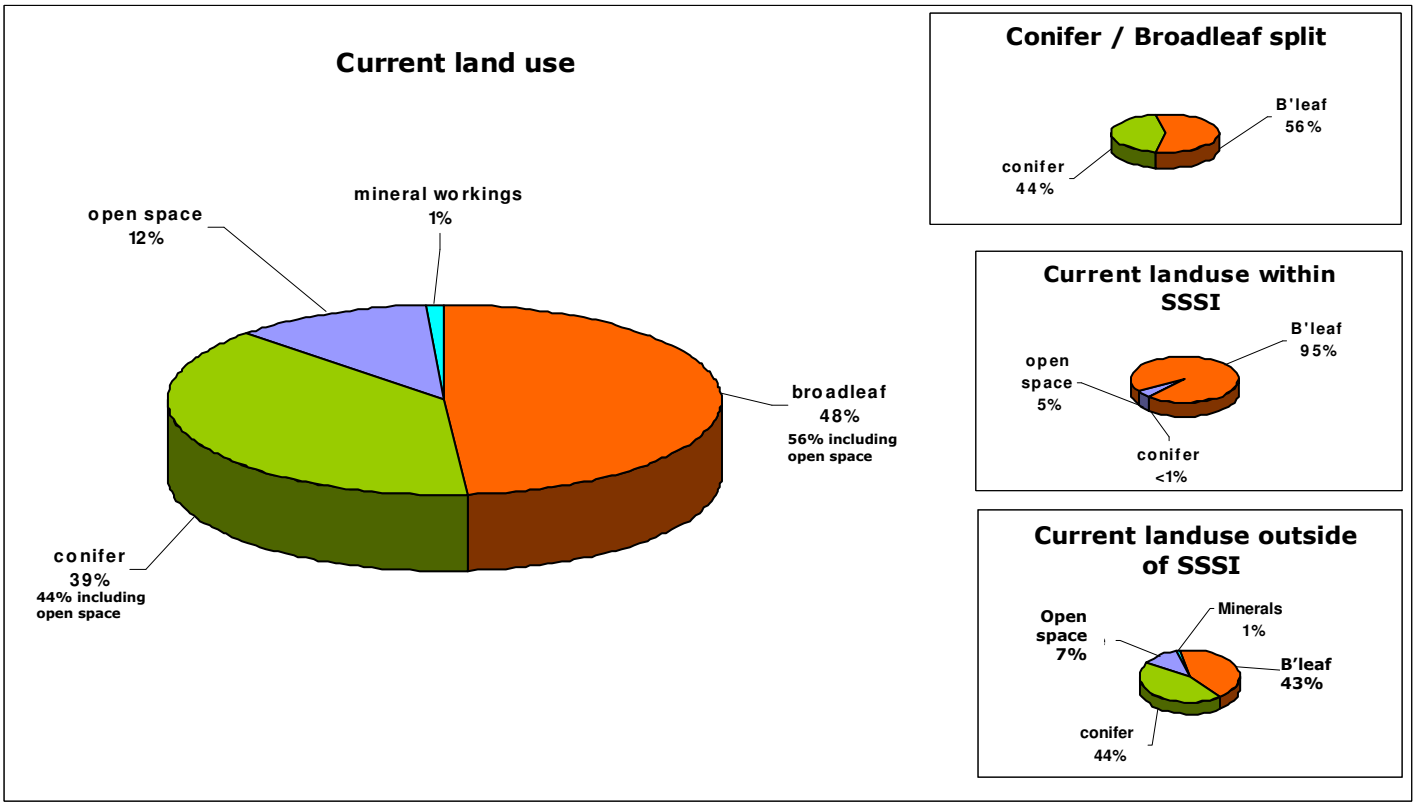

Figure 1.1: Nagshead & Russells Current Species

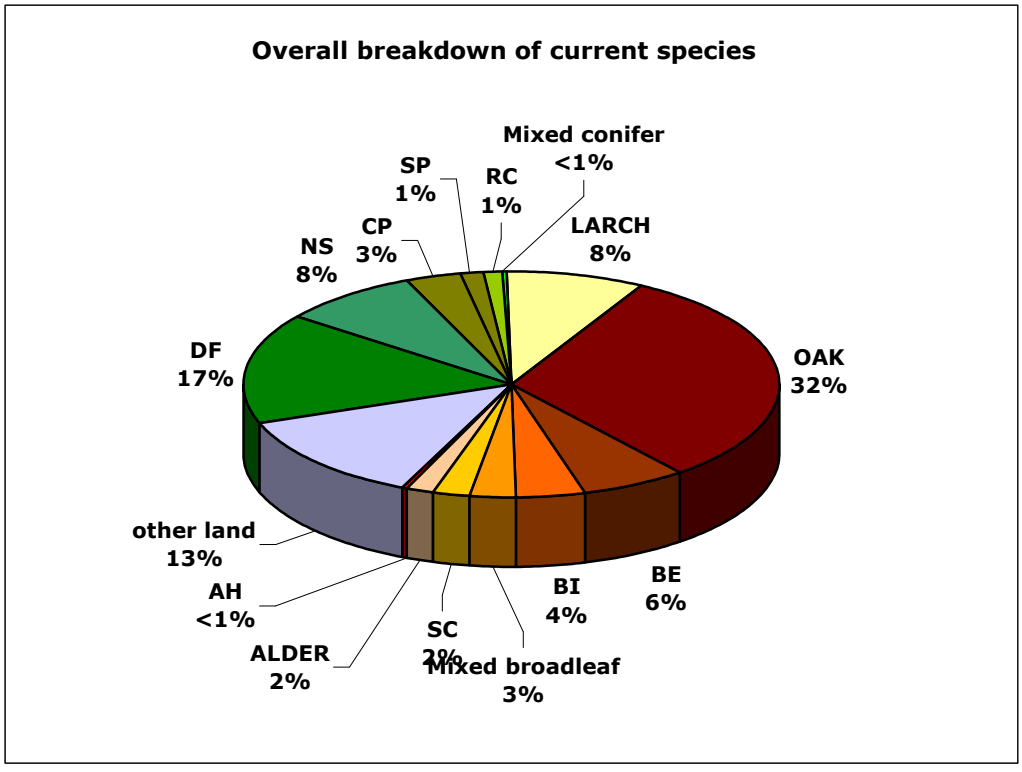

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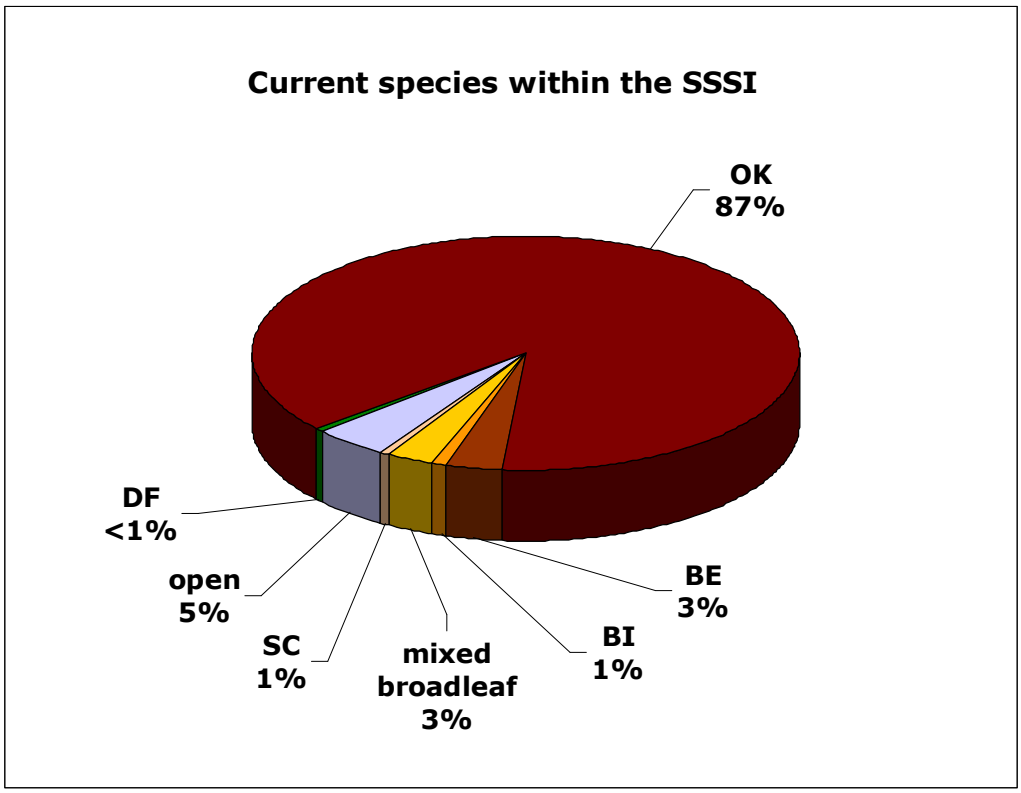
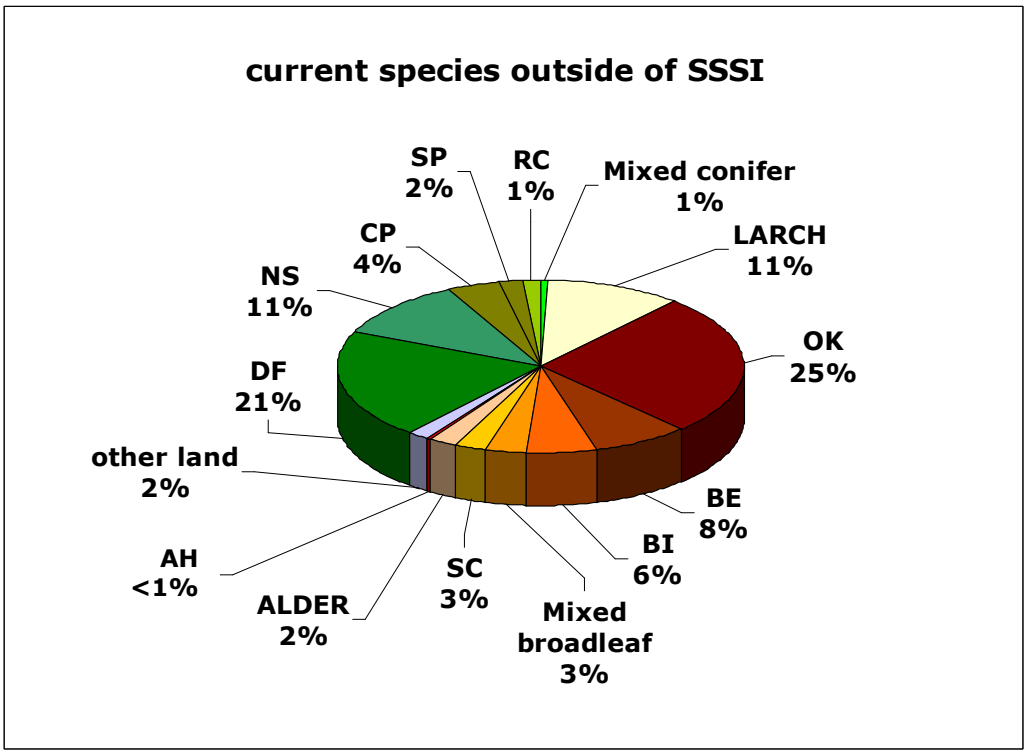
Figure 1.2: Comparison of current species composition inside and outside of Nagshead SSSI





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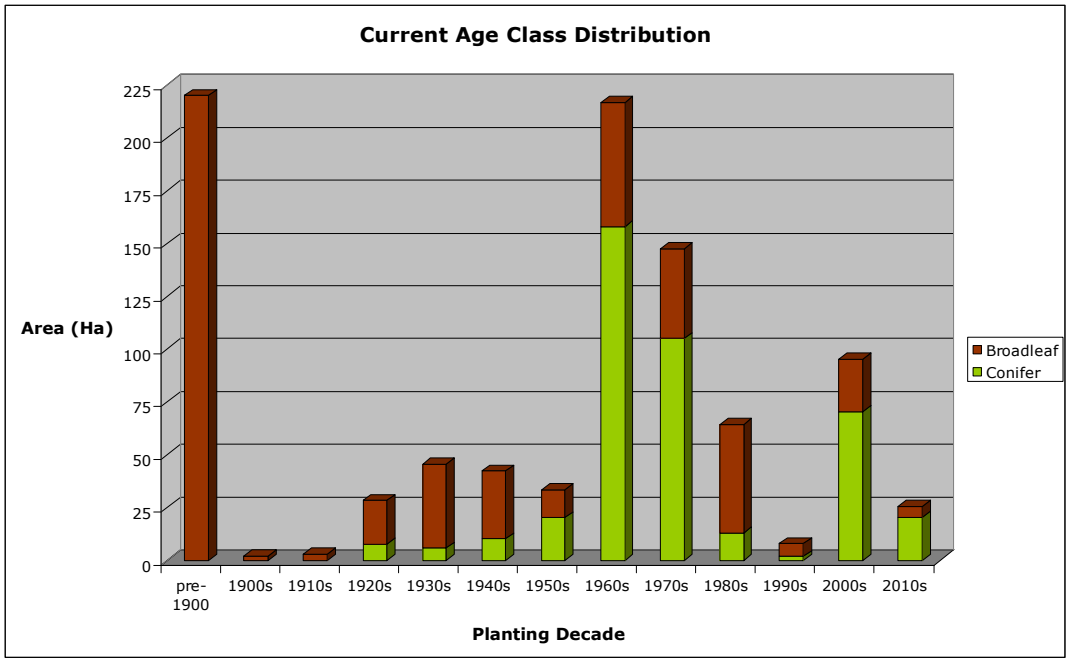
Topic	Description	Implications for Management	Proposals
Silviculture: Age Class Structure (Fig. 2)	Figure 2 shows that although the restructuring process has begun, there is still a peak present from the 1960s and '70s and the age class structure is still skewed.	Conifer is prevalent in the west and north of the plan area. Recent onset of new diseases and predictions on climate change has put more of an emphasis on the use of Alternative To Clearfell (ATC) systems. This does not preclude the use of clearfelling that will be used, for example, where wind throw could be an issue on some of the wetter more gleyed sites.	Use of ATC will afford shelter that enables selection from a wider choice of species when under / group-planting, or enrichment planting. This approach will help foster species diversification and woodland resilience to a warming climate as well as enriching structural diversity.
	Older stands of oak are concentrated around the RSPB reserve, Nagshead SSSI, the Cannop Valley and the area of Minimum Intervention along Fetter Hill to Palmers Flat.	These tend to date from the early 19^{tth} Century.	Some previous work on the regeneration of oak in Russells has had partial success. This work should continue as silvicultural conditions allow, based on survey of existing stands and in consultation with RSPB for those areas on the reserve. Although enrichment planting using minor species would benefit habitat diversity and may reduce the risk of squirrel damage. A proportion of the older age classes will be maintained as described in the Broadleaf Management Plan.

Figure 2: Current age class distribution



Silviculture: Thinning & Felling (Fig.3)	Conifer clearfelling	The process of age class restructuring has begun breaking up the more extensive areas of even aged conifer and removal of conifer from areas subject to windblow along with areas badly affected by squirrel damage. More recently Statutory Plant Health Notices issued by Forest Services (FS) in response to new diseases such as *P.ramorum* has meant an increase in felling programmes. This has led to re-prioritising felling coupes so as to remain compliant with UKWAS in terms of contributing to a sustainable supply of marketable woodland products.	Some areas of DF and RC that were down for felling have now been moved to an extended rotation. Both DF and RC are prime components of continuous cover forestry and due to the shelter from frost and exposure that the overstorey affords and enables a broader choice of species when under / group planting – helping to ensure future woodland resilience from the threat of a warming climate.

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Silviculture: Thinning & Felling (cont.)	Broadleaf clearfelling	With the exception of any coppicing, no clearfelling is planned. Broadleaved stands will be maintained as shelterwood. However, SC is vulnerable to *P.ramorum* and areas of SC may need clearing should future infections occur.	Some areas of SC may be diversified with other broadleaves by enrichment planting, strengthening future resilience against disease issues and a warming climate.
	Mixed plantations of conifers with broadleaves.	These crops will generally be managed on extended rotations.	Broadleaf components will be halo thinned to aid crown development. With conifer components thinned to favour DF, SP and RC. Both conifer and broadleaf natural regeneration will be accepted. Some crops may have group fellings taking place, giving the opportunity to increase species diversity and adaptability to climate change, as well as contributing to a sustainable supply of marketable woodland products.
	Conifer thinning	Conifer stands will be assessed for thinning every 5 years.	Thinning will be to promote good form and vigour. Some areas of conifer will managed using group felling and be felled over the next 20-30 years or so to facilitate diversification of species for the next rotation through under / group planting. In other areas where ATC systems are specified, (see silvicultural systems map) frame trees will be retained following final overstorey removal, adding structural diversity. These are likely to be DF, RC or SP. The remaining crops will be thinned conventionally.

Silviculture: Thinning & Felling (cont.)		Conifer thinning within the RSPB reserve. – The RSPB has an ideal of 10% (30Ha) as being non-native species.	Within the RSPB reserve, non-native (conifer) species are acceptable and currently stands at 14%. There is an assumption for thinning of conifer rather than removal of conifer. This helps maintain favourable habitat for bird species such as Firecrests, Goldcrests, Cross-bills, Siskins and Coal tits, all highlighted by RSPB as important species meaning reduction of non-native species is not a priority for RSPB; although Larch being a deciduous conifer means the non-native percentage would drop to 11% if the larch component of the reserve were to be excluded.
	Broadleaves See Map 18b "Native wood Management Intentions"	**Oaks predominantly in the SSSI and RSPB reserve** 19th Century stands. Some regeneration work under the Uniform shelterwood system has taken place over the last 20 years with some success. Assessment for thinning intervention does NOT automatically qualify an area for thinning as thinning will be carried out based on silvicultural need	To be managed on a long rotation of around 400 years and with continued use of the uniform shelterwood system, diversification of structure through this method will occur; acting on existing advance regeneration of oak where apparent. Older stands of broadleaves will be thinned in order to establish a crop density likely to promote better chances for regeneration as prescribed in the FOD Broadleaved Management Plan. In the reserve, enrichment planting may be used to diversify species composition - but only outside of the SSSI area and in consultation / agreement from RSPB. .
	See Map 18b	**Existing areas under natural regeneration.** Significant areas throughout the southern	Natural regeneration should be surveyed to assess the structure and species composition of the stand.

Silviculture: Thinning & Felling (cont.)		part of Russells have been subject to management under the uniform shelterwood system. Seed fellings date from 1988 and regeneration has been prolific, if patchy in places.	(See prescription under "Age Class Structure"). All subsequent operations in these areas of the reserve will be carried out in consultation with RSPB.
	 See Map 18b For areas of SC and BE	**Stands of BE and SC** in the western part of Nagshead within the RSPB reserve are showing significant signs of group regeneration dating from the early 1990s. The older storey dates from the 1920s and '30s.	Manage as group shelterwood by relieving shade around patches of regeneration. Surrounding trees will be assessed every10 yrs with the aim of gradually removing them to encourage an expanding cone of regeneration. A proportion of overstorey trees should be retained to retain structural diversity. Although BE is the dominant species in these stands, later respacing and thinning should seek to recognise other species such as SC and OK.
	 See Map 18b For areas with a site naturalness score of 2	**Mixed conifer and broadleaf crops that contain 50-80% site native species (Site Naturalness (SN) class 2)** Natural Regeneration of native species will be acceptable in areas of SN class 2. Existing areas of conifer being restored to native woodland cover will aim to establish a minimum of 2500 stems per hectare. With natural regeneration being variable across this area, enrichment planting maybe required to achieve full stocking.	In the first ten years of the plan, conifer removal will be carried out through thinning. It is expected that broadleaf cover will rise by 2-5%. Over 40 years it is hoped through further thinning, under-planting or group planting that broadleaf cover will have risen by a further 15-18%, achieving a total increase of native broadleaf cover of around 20%. Conversely it will see a reduction in conifer by a similar amount. Where conversion is possible through thinning this will be the preferred method. Where clearfelling takes place any broadleaves of good form will be retained for inclusion with the future broadleaved crop.
	 See Map 18b For areas of conifer & mixed Broadleaf intended for restoration	The majority of crops fall	

Silviculture: Woodland Naturalness (Fig. 4 to 4.1)	Composition	into to the two extreme categories site nativeness of either >80% site native species or plantation with very few stands in between.	During the next 40 years woodland naturalness scores should reveal a more tangible shift in distribution of woodland structure in a direction towards sites containing 20-50% and 50-80% site native species. (classes 2 and 3) Although open to the vagaries of natural regeneration, there is scope for proactive intervention by means of group felling and replanting / enrichment planting following thinning operations. Some sites that show high levels of Axiophyte species e.g. those in the valley bottom of Cannop Valley but have little or no broadleaf components to act as parent trees are better suited to conversion by clearfelling and restocking.

Figure 3: Future composition of woodland cover

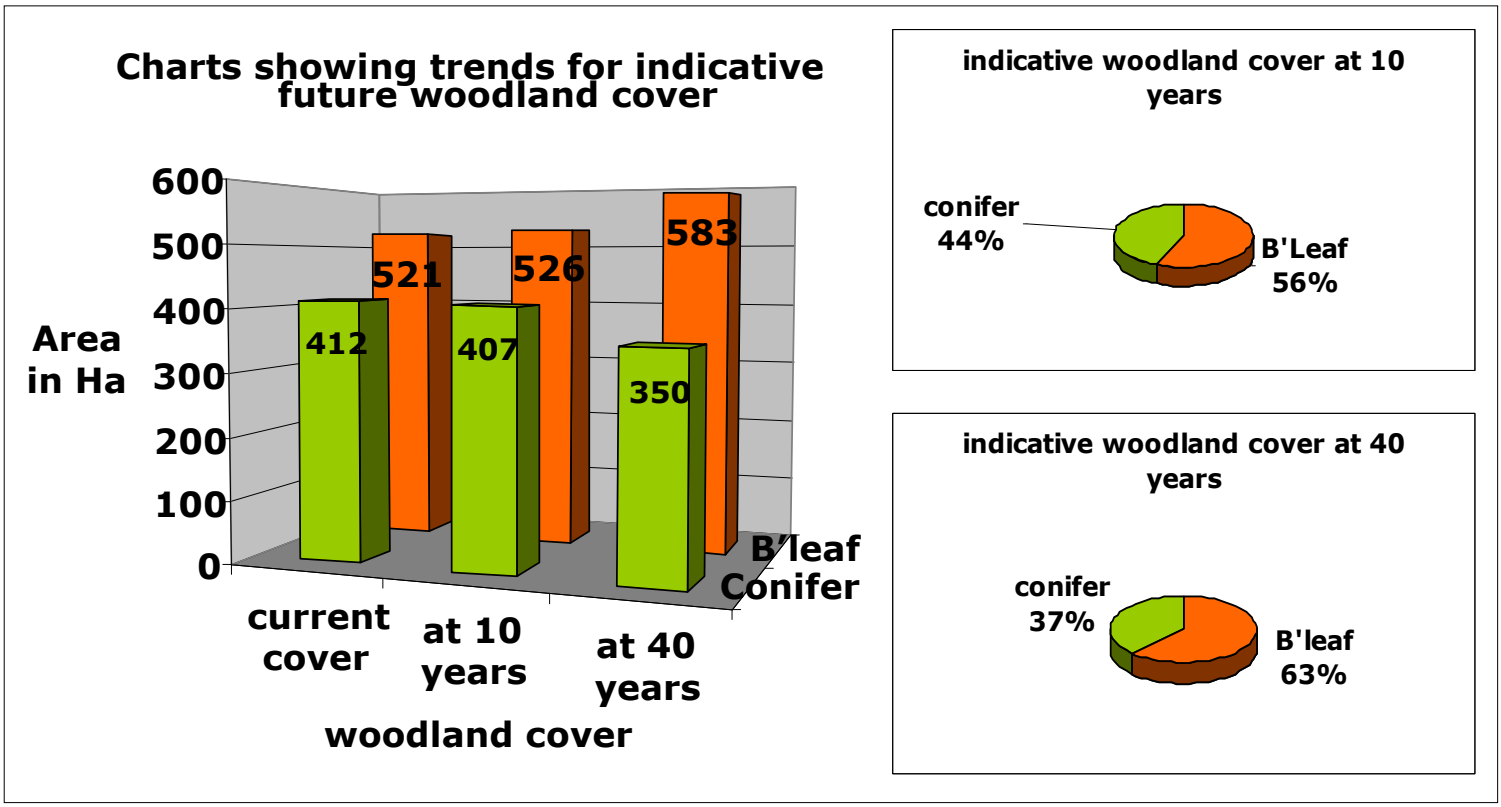

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Figure 4: Nagshead and Russells Woodland Naturalness

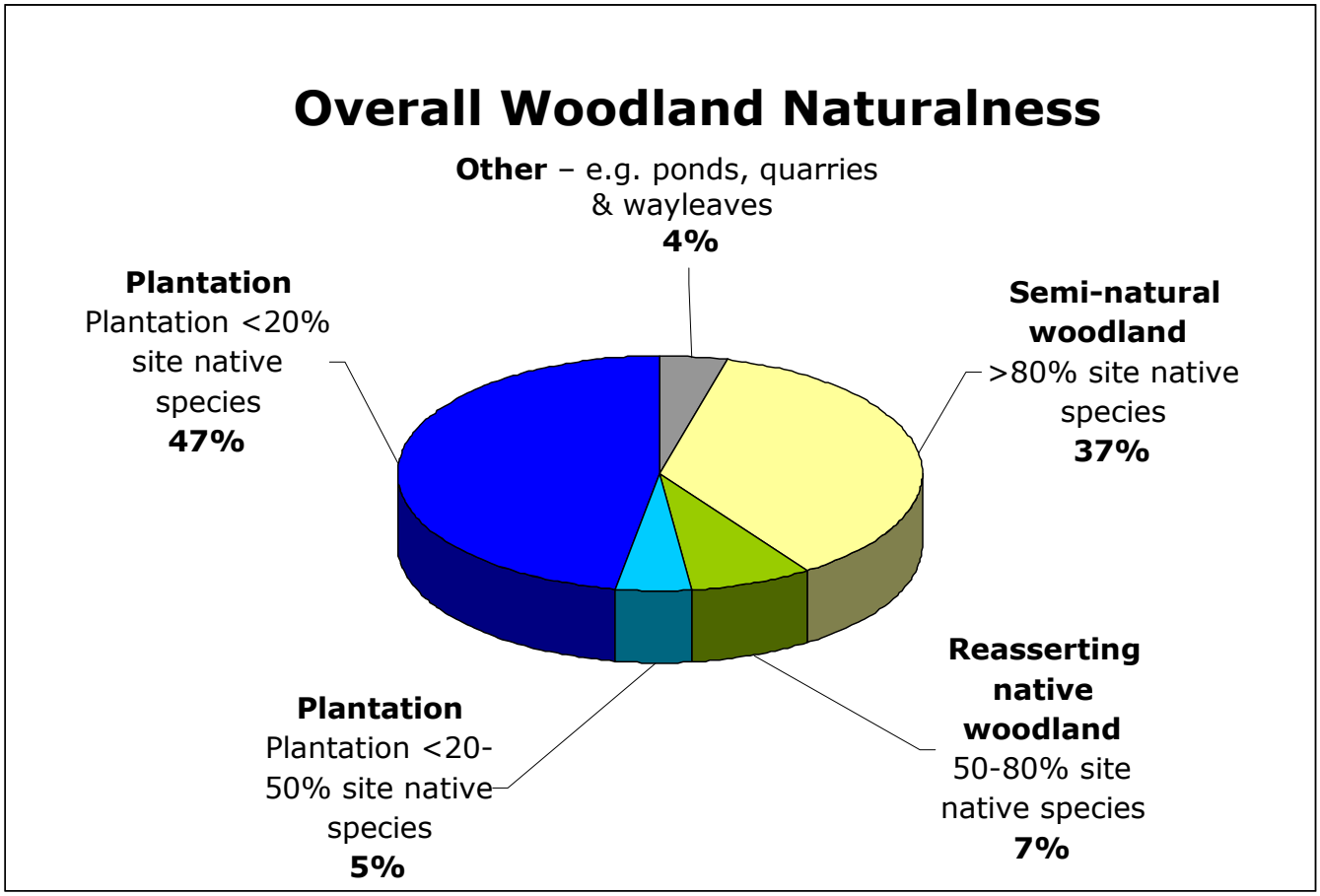
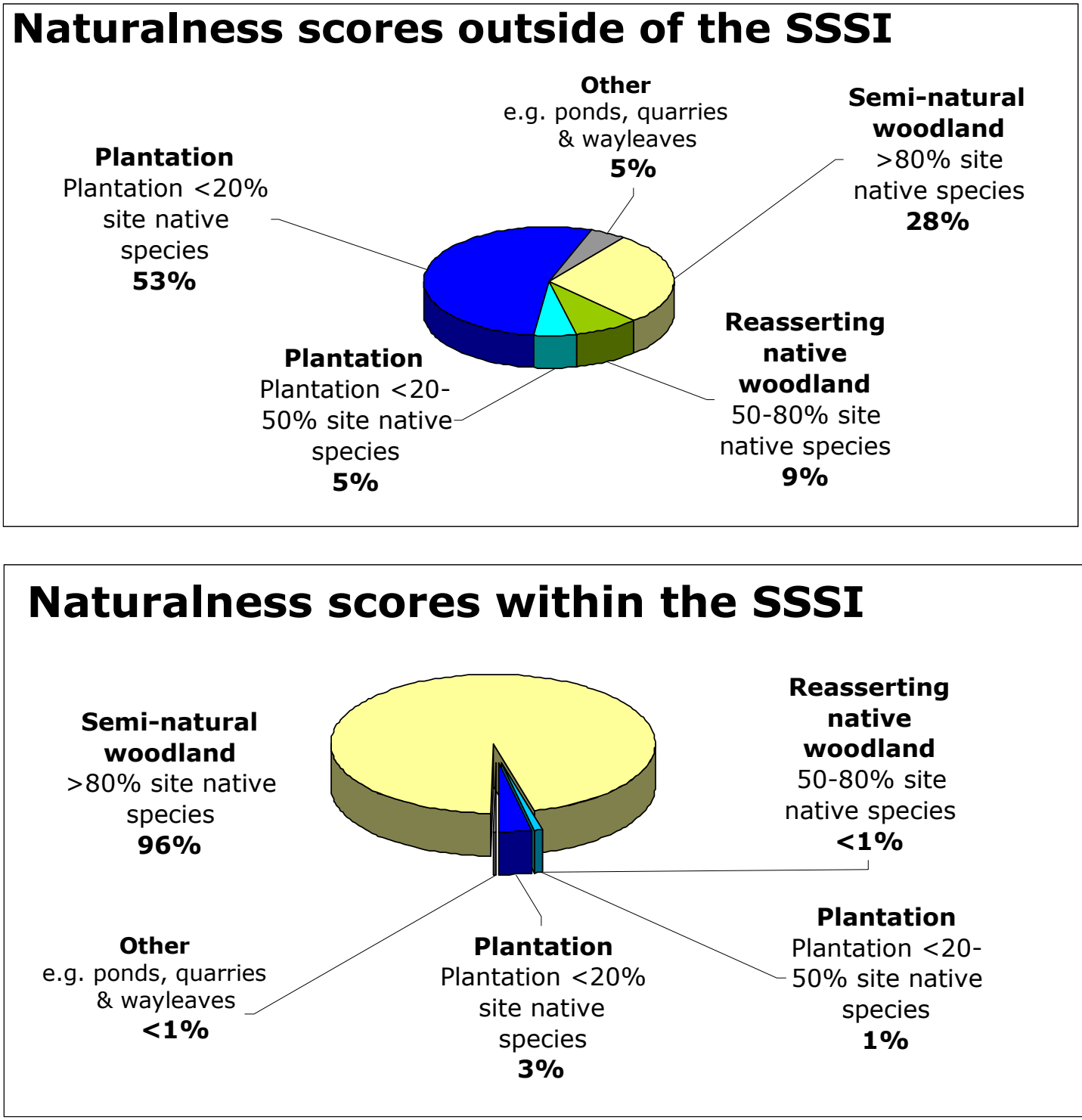


Figure 4.1: Comparison of Nagshead and Russells Woodland Naturalness inside and outside of Nagshead SSSI



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Silviculture: Woodland Structure (Fig 3)	Conifers currently account for 44% of the area. Douglas fir alone accounts for 17%. The proportion of broadleaves is currently 56%.	Where appropriate the proportion of conifer will reduce through progressive thinning and felling interventions on sites to be converted to site native broadleaves, whilst on other sites a mixed crop of conifer/ broadleaf will develop.	Proportions will not change significantly in the first 10 years of the plan, but over the following 30 years removal of conifers from mixed stands and the conversion of conifer stands to site native broadleaves will see a reduction in conifer by around 20% and conversely a 20% increase in broadleaves.
	The proportion of open space is currently 12%.	Open space will not change significantly during the plan period.	Open space will be built into some areas where characteristics are typical of heathland vegetation. The "Linking the Pearls" project will contribute to temporary open habitat on a cyclical basis of coppicing, shrub clearance that will help in promoting structural diversity within the woodland.
	Coupe restructuring	The programme of clearfelling and group fellings within ATC coupes will create areas of temporary open space from the date of felling to the time of establishment of restocked / naturally regenerated species.	Thinning will seek to diversify species and structure. In some areas where ATC systems have been indicated some over storey will be retained, scattered as frame trees or in groups adding structural diversity to future crops (Especially DF, SP or RC, OK, SC). Where needed woodland structure along ride sides will be diversified through heavy and variable thinning and subsequent mosaic coppicing.
Conservation	Nagshead SSSI and RSPB Reserve (see Appendix 1 for SSSI plan)	Nationally important site managed by the RSPB in conjunction with the Forestry Commission. The reserve covers 305Ha of	The SSSI will be managed under the FP acting as the SSSI plan (appendix 1), signed off by Natural England. No clearfell is due

Silviculture: Conservation (cont.)		which 145Ha lies within the SSSI. The SSSI only includes areas of old oak, where as the RSPB reserve extends both to the east and west to include some conifer.	in the SSSI within the plan period. Thinning operations will be carried for silvicultural benefit and in conjunction with the RSPB management plan for the reserve. Some non standard thinning detailed in the silviculture section will be used to encourage regeneration.
	Speech House Oaks SSSI	Area of old oak wood pasture of national importance for its lichen interest.	The FP has been formulated to take into account the objectives of the Speech House Oaks SSSI plan. (see appendix).
	<u>Nature Reserves And Key Wildlife sites (KWS)</u> • GWT Small Biological sites at Lower Whitelea Green.	Areas of botanical interest.	Lower Whitelea Green part of SSSI. Manage as broadleaved high forest.
	• Cannop Bridge Marsh GWT Reserve and a KWS	Important for its assemblage of wetland species.	Managed under agreement with GWT. Management plan to be drawn up by GWT.
	• Cannop Ponds car park	Part of SSSI and the ponds and adjacent woodland are also a KWS	Managed in partnership with GWT
	Spion Kop Quarry KWS	Small quarry just north of SSSI in Nagshead	Retain area as minimum intervention. The Martin & Taylor Quarry is small and will not significantly impact on the quality of the surrounding area. Some intervention will be required along the length of the cycle track for the purpose of public safety.
	Bixslade Quarry Natural Reserve (minimum Intervention area near Fetter Hill)	Just north of Spion Kop Area north of the Parkend to Coleford road has been extensively mined and replanted at various points in time. The area is diverse with some veteran trees and undulating ground with naturalised vegetation composition.	

Silviculture: Conservation (cont.)	Stands of old oak & Veteran Trees	The majority of veteran trees occur in the south of the plan area and along the Cannop Valley with smaller stands of Napoleonic oak close to communities of Broadwell and Coalway as well as around the peripheries of the area.	These will be retained. During the last 10years, some have already been expanded with native broadleaves when the adjacent conifer crops were felled. Some of these sites are in need of beating up a minimum stocking of 2500 stems per hectare is achieved. In other areas such as the SSSI and RSPB reserve thinning will try to promote the potential for natural regeneration of the oak.
	Jughole Pond & surrounding Forest Waste.	A small pond on the edge of Broadwell. Of local interest. Open area of Forest Waste.	Open areas will be maintained in its current state with the annual swiping of Forest Waste. Pond maintenance will be carried out when required.
	European Protected Species (EPS)	**Bats -** species such as Daubentons, Pipistrelle and Barbastelle have been recorded as recently as 2011 foraging around Cannop pond and around the Bixhead area (2007- possible Great Horseshoe). South west of the plan area Old Bow and Old Ham mines has been notified as a bat SSSI.	The area of wood along Fetter Hill is designated as a natural reserve and will provide diverse habitat and help link the Old Bow and Old Ham SSSI to the main forest block.
		WACCA schedule 1 bird species – numerous sites present from recent years.	These sites are monitored regularly and FC records updated to inform forest operations.
		Otter – Locally rare but moving back along the tributaries of the Severn and Wye, with numerous sightings over recent years along Cannop Valley and ponds area.	An area of wet woodland managed by GWT at the northern end of Cannop Ponds helps provide suitable habitat that will be checked for signs of otter habitation during the

Silviculture: Conservation (cont.)			planning of all forest operations. Low impact silvicultural systems will be adopted along the stream corridors. All operations and the management of woodlands where EPS may be present will comply with the guidance agreed with Natural England. Operational site plans will confirm compliance with EPS guidance.
	Dead wood habitats	In line with UKWAS, District policy, and existing practice guide "managing deadwood in forests and woodlands" deadwood habitats will be maintained subject to operational and safety requirements and will work towards achieving 20m^3 of deadwood per Ha.	As forestry operations are undertaken throughout the area, measures to increase the number and variety of deadwood habitats will be put in place. For example, this may include retaining felled material on site, creation of new standing dead wood where it is safe to do so or eco-piles created by volunteers such as the GWT volunteer group, DGT or RSPB volunteer groups.
	Other wildlife	The area could be enhanced by identification of possible habitat opportunities be it by enhancing existing or creation of new habitat that could be built in to work programmes.	As resources become available, opportunities for habitat enhancement will be identified and realised through use of volunteer groups such as the Dean Green Team (DGT) or by paying a contractor.
	Forest road Network	The forest road network should be capable of taking 44 tonne haulage vehicles.	Routine maintenance should be undertaken to ensure a road infrastructure that is capable of meeting management objectives is maintained.

Archaeology	Features	Mainly from mining and quarrying, some platforms earthworks and stones recorded. An old well and site of an old lime kiln is also recorded.	Any new findings need to be recorded in GIS and together with existing ones noted down in operational site plans so they can be protected when operations are carried out.
	Areas	Mainly a result of previous mining and quarrying activity. Quite a few require consultation with the County Archaeologist, whilst others need to be retained in there current form.	Where these areas occur, consult with County Archaeologist.
	Lineal features	Mainly old tramways associated with coal workings or post-medieval foundries. Also old earth embankments present.	Any new findings need to be recorded in GIS and together with existing ones noted down in operational site plans so they can be protected when operations are carried out.
Landscaping	In Russells topography is relatively flat falling gently to the Cannop Brook in the west.	Due to the topography here landscaping presents few external landscaping concerns. Issues are more related to internal landscaping as several recreational rights of way cross this area and thus internal landscape design is an important feature of the coupe layout and future age class structure.	Lowland landscape design techniques have been used in the design of the felling coupes.
	Travelling west into Nagshead topography rises comparatively steeply from the Cannop Valley up onto the plateau running back to Broadwell and Coalway.	To the north this area is dominated by conifers, with broadleaves increasing to the south (into the SSSI) whilst the plateau is still predominantly even aged conifer with small stands of broadleaves scattered around the edges, recently bolstered by the fellings and replanting of	Restructuring of age classes on the plateau will be a more gradual process than previously envisaged due to higher percentages of crops under extended rotation. Changes in structure will change as the crops respond to thinnings and under/group plantings.

Silviculture: Landscaping (cont.)		broadleaves around Broadwell and Coalway as prescribed in the previous plan.	
	Yet despite its bold and diverse landform of Nagshead forming part of the Cannop Valley views to this area are infrequent.	In spite of its relative lack of prominence, temporary views of the Nagshead area have appeared from other felled areas across the valley.	These views will gradually either disappear or become more filtered as the young restock areas within Russells become older. Design of felling coupes has not changed from the previous plan so remain complimentary to landform. Change in landscape views will be less dramatical and more gradual with the higher percentages of crops under extended rotation.
	The main viewpoint into Nagshead remains the view from 'Place' above Beechenhurst Lodge.	This is a prominent and sensitive view-shed, frequently seen by visitors to the Forest.	Views from 'Place' are becoming more filtered as the young DF crops below 'Place' grow. Views from here are likely to be managed but remain filtered for the time being. – This may change as 'Place' may be replaced within the plan period but with crops under extended rotation and coupe shapes remaining unchanged the quality of the view should not be compromised.

Meeting Objectives

Objective	Description	Proposals & Monitoring
❖ **Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.**	Management of the district's woodlands is undertaken to the standards required under UKWAS as endorsed and certified by the Forest Stewardship Council	Compliance to these standards is monitored through various national and district policies, guidance, field surveys, use of GIS and other IT software, internal support audits and external audits carried out by SGS (Société Générale de Surveillance) which is an independent auditing company.
❖ **Continued production of sustainable marketable woodland products that also allows delivery of a range of other public benefits whilst providing future opportunities for the substitution of wood products for fossil fuels and other energy intensive materials.**	Management of the district's woodlands is undertaken to the standards required under UKWAS as endorsed and certified by the Forest Stewardship Council as well as to maintain PEFC accreditation. As part of the forest district's business plan and the organisation's customers' charter, the forest district is committed to financial and sustainable timber marketing targets. Growing quality timber in so far as this is consistent with other objectives. Giving local companies the opportunity to purchase timber through open competitive sales. Providing future opportunities for the substitution of wood products for fossil fuels and other materials	Sustainable production will be monitored as part of the forest district's marketing plan, five year production forecast and at the Forest Plan (FP) five-year review. This process is audited as part of the FSC forest certification process. Annual pre-thinning survey. Production forecast comparison with actual output to assess accuracy of forecast. Annual Customer Liaison meetings. The Forestry Commission is already committed to making available supplies of timber for the wood-fuel market and this will be monitored as part of the district's marketing plan.

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❖ **Undertake management in line with Biodiversity 2020 and other nature conservation policies that protect and enhance both woodland and open habitats and their associated species fostering and facilitating their resilience and adaptation to projected climate change and disease threats.**	Forestry Commission England is committed to managing the public forest estate to deliver a range of woodland benefits including working towards meeting bio-diversity targets for a wide range of species and habitats. In addition a number of species found in woodland are afforded protection under either British or European legislation. Promoting resilience Develop structural mosaic of woodland types and open space. Retention of scattered individual trees or groups of trees beyond their usual felling age to become large mature trees. (DF, RC, SP) Landscape scale habitat management and improvement of edge habitats by track and ride edge enhancements. Monitoring	Protection of existing native woodland and the conversion from conifer woodland will be monitored through the sub-compartment database. To ensure the protection, enhancement and expansion of woodland habitats and associated species, individual coupes will also be monitored as part of the five-year and ten FP review processes. Species used for planting should be mixed in species and proportions and will be filtered against Forest Research climate change models. Such calculated diversity will assist in making the woodland more robust in light of projected changes in climate. The plan identifies suitable strategies for encouraging natural regeneration of both broadleaf and conifer, that will be achieved through a mixture of clearfell and thinning systems followed by a combination of natural regeneration recruitment, restocking and or under/group/enrichment plantings designed to be consistent with the scale and topography of the landform. All the above methods can be used to manipulate edge habitat and structure to protect, improve or expand them. Nature conservation projects can either be free

		standing or can be integrated along side routine forest operations. When operations are undertaken, their impact on the landscape can be assessed as the operation progresses. If required, small amendments can be incorporated at the time of the operation providing that the changes are not in excess of the thresholds detailed in the tolerance table in CSM 6. Ongoing formal and informal monitoring of habitats and species by FC staff, other stakeholder organisations and recording by individuals will help to maintain up to date data sets and will provide feedback on the impact of woodland management and how certain habitats have changed.
	Protect veteran trees and retain a proportion of standing and fallen dead wood. Note that **all** work in and around areas where veteran trees are present should adhere to the 2013 guidelines for Trees of Special Interest that are laid out in FC operational guidance OPS 31 "Ancient and Veteran Trees"	The plan identifies suitable strategies for increasing the number and variety of deadwood habitats. These can be monitored through the site planning process for forest operations or conservation, and recreation. The district also has a robust survey and inspection system in place for the monitoring of such older trees, where tree surgery is used in preference to felling that is used as a last resort.

❖ **To retain Nagshead SSSI in favourable condition, whilst maintaining and enhancing biodiversity values in and around the RSPB reserve (with particular reference to management of birds), GWT Reserves.**	Manage the SSSI in accordance with the SSSI plan (appendix 1) that forms a part of this Forest Plan. Both sit together and in conjunction with the RSPB management plan will be used to inform decisions on woodland management within the SSSI and reserve areas. Use of volunteer groups such as RSPB or GWT volunteer groups and The Dean Green Team. Monitoring	Work inside the reserve and SSSI will be done with reference to the SSSI plan in Appendix 1 and RSPB management plan and in consultation with the RSPB. Work inside GWT reserves will be done in consultation with the reserves manager. The operational site planning system will highlight opportunities where conservation benefits can be delivered. Whilst contract special conditions, ongoing contract management & supervision and the contract closure review system ensure that operations can be undertaken smoothly minimising risk of any adverse impact resulting from forest operations. Nature conservation projects can either be free standing and carried out by volunteers or can be integrated along side routine forest operations or carried out as separate specialist contracts. The SSSI and reserve is routinely surveyed by RSPB staff and its volunteers, giving a good handle on the dynamics of habitats and species. The information gathered can be used to inform any changes and improvements to management methods. GWT sites are often surveyed by GWT

		volunteers or individuals and results used to up date data sets to inform future planning.
❖ **The enhancement of internal landscape through diversification of age class structure, integrated with nature conservation projects that will provide further conservation benefits.**	Develop a variety of age/ habitat types and open spaces particularly along access routes. Nature conservation projects can either be free standing or can be integrated along side routine forest operations.	The sustainable programme of thinning and felling will continue to diversify stand and age structure, enhance the landscape and benefit a wide range of species. Whilst the site planning of harvesting operations should account for landscape enhancements where appropriate. The operational site planning system will minimise the risk of adverse impact resulting from forest operations and will also highlight opportunities where conservation benefits can be delivered. Appropriate reinstatement works will be carried out once operations have been concluded.
❖ **Conservation and protection of heritage features through identification, and recording.**	Work in the area will be undertaken to take into account the various heritage features of interest within the plan area. Areas of archaeological sensitivities Maintain a record of any unscheduled features and ensure their protection and possible enhancement, seeking advice if required, prior to work when appropriate.	Liaison with the County Archaeologist to help Maintain GIS records and provide on site advice on working in and around sensitive areas. The site planning system, use of contract special conditions, ongoing contract management & supervision and the contract closure review system ensure that operations can be undertaken without adverse impact.

Option Testing

Objective	
Option 1 - (Current FDP)	**Option 2 - (Proposed FDP)**
❖ **Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.**	
Felling coupes are primarily aimed at restructuring the age class distribution at a landscape scale whilst being sensitive to landform, but with a limited number of restocking species.	The sensitivity of the landscape in option 2 is recognised by retaining the coupe design from option 1, whilst expanding the number of species suited for restocking by adopting ATC systems.
❖ **Continued production of sustainable marketable woodland products that also allows delivery of a range of other public benefits whilst providing future opportunities for the substitution of wood products for fossil fuels and other energy intensive materials.**	
The silvicultural system used as the primary means of achieving the establishment of future crops is clearfelling. It does not take into account the impact of new diseases and the implications for management of timber sales.	The issue of restructuring is still recognised with the retention of clearfell systems, but uses ATC systems to help keep sales plans within tolerance, whilst still providing an even flow of timber coming to market.
❖ **Undertake management in line with Biodiversity 2020 and other nature conservation policies that protect and enhance both woodland and open habitats and their associated species fostering and facilitating their resilience and adaptation to projected climate change and disease threats.**	
Heavy emphasis on clearfelling provides a mosaic of transient open habitat at various stages of successional development from open space to high forest; although the chosen restock species are limited and this perpetuates a practice of monoculture, making the forest more vulnerable to the threat of disease and changes in climate.	Raising the percentage of coupes managed by ATC does reduces the hectarage of woodland in transition from open space to high forest, but group fellings will still provide this habitat through nature conservation projects such as 'linking the pearls' and some of these groups will be broadleaf meaning a slower rate of transience to woodland so the open habitat value remains for longer. With this method there is also a temporary increase in edge habitat during establishment periods. Link group planting techniques with natural regeneration and the diversity of tree species, structure and therefore habitat type will increase whilst at the same time provide an increased resilience to the threat of disease and changes in climate.

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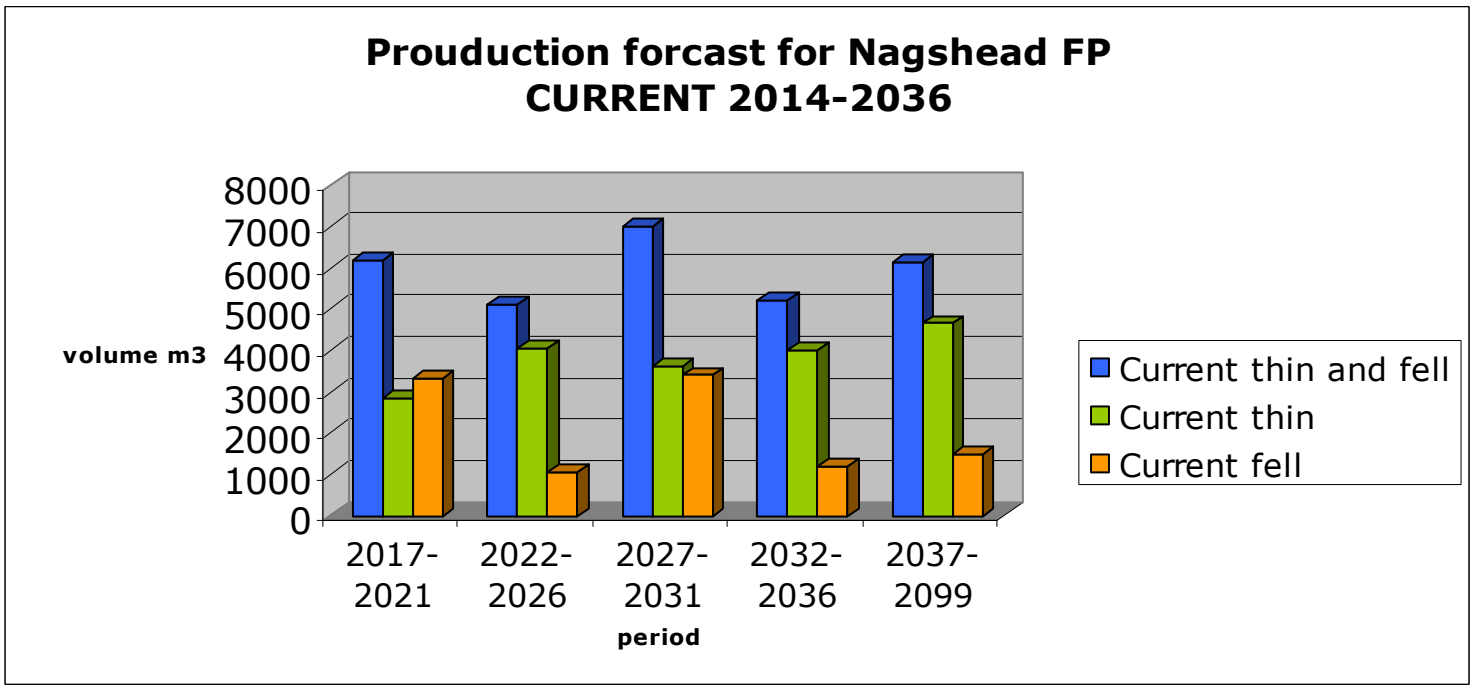
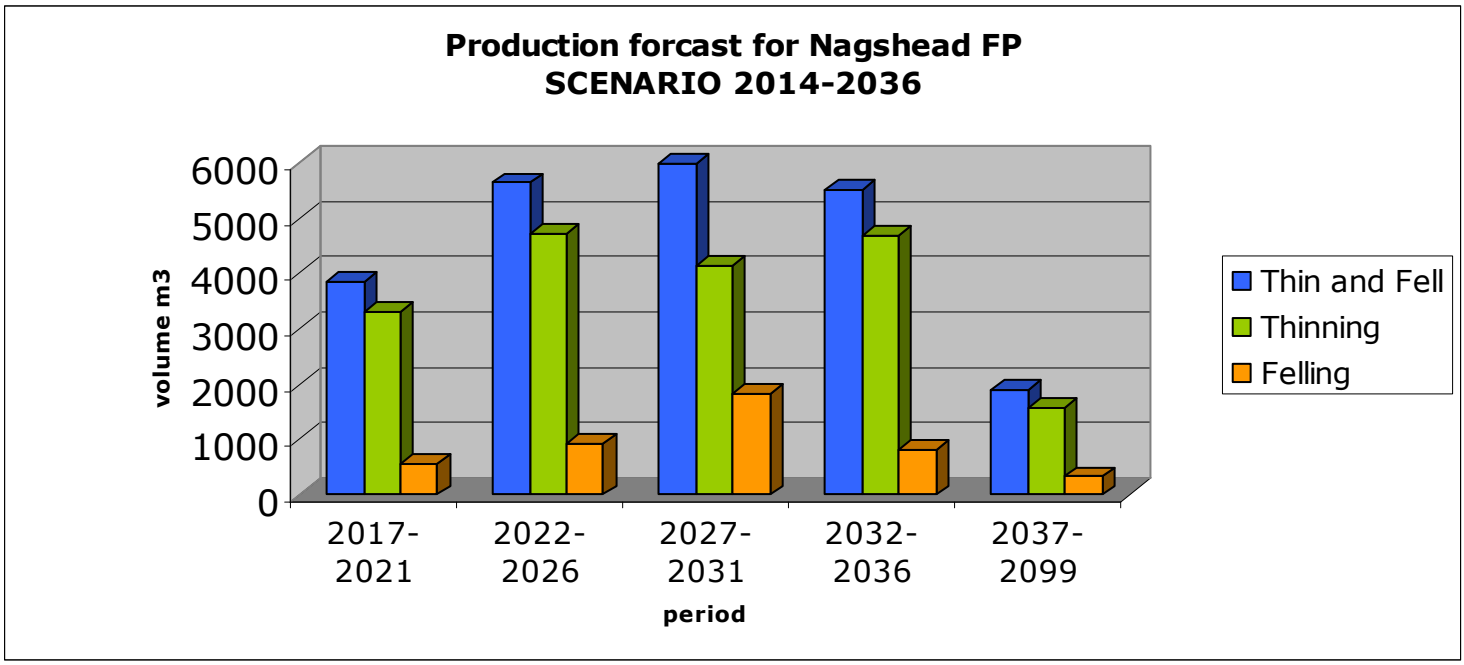
❖ **To retain Nagshead SSSI in favourable condition, whilst maintaining and enhancing biodiversity values in and around the RSPB reserve (with particular reference to management of birds), GWT Reserves and the wider plan area.**	
The plan initiated work in consultation with RSPB to ensure the SSSI remained in favourable condition. Work with GWT and volunteer groups ensured nature reserves also remained in favourable condition.	Work will continue to be carried out in partnership with RSPB to ensure favourable status is retained for Nagshead SSSI. Work with GWT and volunteer groups will continue to help nature reserves remain in favourable condition.
❖ **The enhancement of internal landscape through diversification of age class structure, integrated with nature conservation projects that will provide further conservation benefits.**	
Heavy emphasis on clearfelling provides a mosaic of transient open habitat at various stages of successional development, giving temporary views across the valley and a varied internal landscape.	The woodland structure is going to alter more gradually if option 2 is used. However, the diversity and quality of internal landscape should be improved over time with well thinned crops of DF, RC, SP and OK, a mosaic of developing understorey at different ages and retention of scattered overstorey trees will all add to the visual appeal and conservation value of the woodland.
❖ **Conservation and protection of heritage features through identification, and recording.**	
Sites identified and protected with consultation with County Archaeologists.	Sites identified and protected. Operational site planning and consultation with County Archaeologists will continue to improve the quality of recorded heritage datasets to safeguard heritage features.
Option 2 more fully addresses the current management priorities is the preferred option.	

Option testing - Comparison of current vs Scenario production forecast





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