Forest Enterprise
England

Natural Capital Account

2017/18

Forestry Commission
England

Westonbirt Arboretum in autumn © Sreelal Sreenivasan

Welcome

In the last year, 20,000 people all over England loved our woods and forests so much that they volunteered to help look after them.

It's not surprising that so many people want to spend their time enjoying the forests – come rain or shine – while working hard to preserve their beauty: those of us lucky enough to work in and for woodlands feel every day how life-affirming those towers of cellulose, lignin and life are. But the 180,000 hours given by these volunteers humbles us, and we are incredibly thankful for their dedication and their respect for the natural environment they spend their time caring for.

The value that these volunteers contribute, and the benefits that our national woodlands give back to everyone, are all part of the complex interaction between people and nature that is now commonly referred to as 'natural capital'. Forest Enterprise England (FEE) is proud to care for the natural capital of England's woods and forests, and to be the custodian of the benefits our society gets from those forests. Those benefits aren't just the intangible well-being volunteers and visitors get from spending their time with trees, but also the nuts and bolts of daily life – our forests provide cleaner air for us to breathe, hold back the flood waters from our homes, clean the water we drink, provide the timber for our homes and mitigate the speed of climate change to keep our planet cool.

This document, our third annual Natural Capital Account, is our attempt to capture how well we are doing our job as carers and custodians of the forests; of enabling the delivery of natural capital benefits to each and every one of you, every year. The following pages update you on how much more natural capital accounting is than simply the increasing commercial value of our woods, and detail how we are improving our reporting of this very complex picture of benefits.

Simon Hodgson, Chief Executive
Miranda Winram, Head of Strategy and Insight

Cover photo: Grizedale Forest

Pine Marten © Nick Martin

The 'valuing nature' debate

Natural capital, and its accounting, has had significantly greater prominence in the last year because of the publication of the Government's 25 Year Environment Plan in early 2018, and the emphasis it gives to the importance of securing an overall improvement in the nation's natural capital. There has been considerable press coverage of the concept, including the view - espoused by some environmental commentators - that it is fundamentally wrong to put a price on nature.

We agree with them that the natural environment is priceless but, until now, society – and particularly its economic development - has placed a default value on nature which has all too often been negligible or nothing. Not valuing nature has given us a UK where more than 1 in 10 of our native species are threatened with extinction, the numbers of our more endangered species have plummeted by two thirds since 1970, and where 1 in 6 birds, animals, fish and plants have been lost.[1]

Forest Enterprise is finding natural capital accounting a very useful additional tool to help us understand what benefits our forests are delivering for society. We firmly believe that by understanding these more, we can in turn make better management choices about how to maximise those benefits.

We know that the monetary value we assign to the benefits our forests deliver is not representing all the benefits, but where it is possible to assign a financial value it helps us understand and communicate to others how very worthwhile the comparatively modest cost of running the forests is.

We also find the process of identifying assets and physical flows of benefits in natural capital accounting very beneficial in highlighting what we do and don't understand about the services we're delivering, and how we might do that better.

And, for the avoidance of doubt, we never believe that we are putting a price on the nation's forests – we know that the sum of what they deliver for society is far greater than we can ever calculate, and that no purchase price could ever compensate for their irretrievable loss.

1. 2016 State of Nature Report

Thetford Forest

Fly agaric mushroom, Amanita muscaria

New Forest Pony

2017/18 NCA commentary

Silver-washed fritillary © Andrew Cooper

FEE's Natural Capital Account 2017/18 maintains the continuity of recording from the last two years, and the balance sheet's monetary asset value is derived from the same ecosystem services. The account continues to be developmental; we're still working out the best way to calculate our physical flows and attribute monetary value to them, and there are (as there will be every year for some time ahead) amendments to some of the values as a result.

The natural capital asset value this year is £22.99bn, and compares to our updated 2013/14 baseline year value of £17.82bn. The baseline has been updated where methodologies have changed, so that the current year value is comparable.

Balance sheet

Our balance sheet (p18) has increased against the baseline because several renewable areas have strengthened, and there has only been a modest fall in one area (food). There is a substantial increase in the net asset value attributed to timber, this reflects both a strengthened current timber price (assumed to be constant for the future based on long term trends) and increased volume predictions for the next few years. Visit numbers remain the largest single contributor to the balance sheet, and have recorded a one quarter increase against baseline year. The increased value attributed to carbon reflects increased non-traded carbon values (UK Government published values) as well as an increase in projected sequestration.

Asset register

The asset register continues to be a very useful mechanism to shed light on more specific areas of our custodianship of the nation's forests.

The 12% fall in leasehold land since 2013/14 (p20) is flagged as a 'planned' negative movement. This largely reflects where we have reached the end of long leases, although it is also affected by some smaller transactions where we have exchanged leasehold for freehold land. There is a small allied increase in freehold land to 200,000 ha. The net impact of these changes is a 1.5% drop in total land holding over the last 5 years, and is not planned - all other things being equal, strategically we would like to increase, not reduce, the size of our land. We are however reassured that the drop is small.

The work we do to improve the diversity of our habitats is reflected in the positive direction of travel for plantations on ancient woodland sites (PAWS) and ancient semi-natural woodland sites (p21).

We continue to try to bring woodlands closer to people by strategic land acquisitions, and this is reflected in the increase in woodland geographically located adjacent to urban conurbations (p23).

The maintenance of the status quo in most areas of the asset register is positive, and reflects the achievement of appropriate balance in operational management decisions between commercial income, visitor enjoyment and environmental protection.

New data

Whilst the main ecosystem services we are attributing a value to haven't changed, this account starts to report on several areas where we anticipate new or improved data or values will be assignable in future years. This includes:

- **Volunteers**. We have always included the value of the time our volunteers contribute as a cost of delivering our natural capital benefits, and we've introduced better internal systems for recording volunteer time over the last couple of years, so we now have a higher level of confidence about this data.

  We include the time as a cost, because effectively this is the 'avoided cost'[2] of using volunteers to deliver services. We include it so that our natural capital benefits are not overvalued, i.e. if contractors were paid to deliver this work, then this would be netted off the value of the benefits in the monetary account, or included in the maintenance account. Volunteer time is not allocated to specific physical flows in our recording system, so the 'cost' can't be netted off in the monetary account, and has to be indicated in the maintenance account.

  The values we attribute to the hours given are a combination of Defra guidance (where it is available) and third sector common standards. Our internal assessment of these values suggests that the 'avoided cost' of the work volunteers do is likely to be an underestimate. Although volunteers may in some circumstances 'leak' time (e.g. some volunteer groups may be slower to do physical tasks than a contractor), in many cases volunteers do jobs that are highly time-consuming, like guided tours for visitors,

or where the terrain means that machinery can't be employed. Our estimate of how much it would cost to get contractors to do that work shows higher values than the volunteer time calculations add up to. We're happy with this as we seek to be conservative in allocating values through our methodologies.

This year for the first time we are also identifying the social benefits from volunteering by including the time contributed as a physical flow. These social benefits are the increased health and well-being of volunteers, and their consequent reduction in interaction with healthcare and social welfare services. We aren't able to carry this physical flow forward into the monetary account yet, because there is not an agreed monetary social value of volunteering. It's an active area of discussion in the sector, and we are asking Forest Research (FR) to advise us on a value we can attribute for next year's Natural Capital Account. It is very likely to be higher than the 'cost' value of hours given, and so this change will likely contribute a significant increase in the value of benefits we are recording.

- **Freshwater assets**. This year we have made progress on including information about freshwater assets for the first time (p24 in the Asset Register). The data shows some positive and some negative trends, and we want to understand much more about this than we do at present. There are complexities in disentangling the impact FEE land holdings have on freshwater condition where other land also impacts on the water body, and we may find that there are different metrics that better represent FEE impact. We look forward to being able to include a more detailed picture in future years.

---

2. 'Avoided cost' is the cost that FEE would incur if we employed contractors or staff to undertake these tasks. In fact, the tasks our volunteers do would not happen without their time as we do not have the resources to pay for these activities to be undertaken commercially.

New Forest

Improved data

We've made incremental improvements to several of the indicators in the asset register and the flows in the physical and monetary accounts.

- **Woodland Ecological Calculator Index**. This index information is included for the first time, and shows that 18% of our native woodlands, and 0.5% of our non-native woodlands 'require no work'. Although these headline figures look low, 82% and 98% of the respective remaining woodlands falls within 'intermediate', with minimal amounts falling under 'unfavourable'. This is very new data that is being reviewed to inform management decisions.

- **Soil information**. We've given greater detail about woodland planting on peat this year, (p24) splitting the data into yield classes to reflect the UK Forestry Standard requirement (UKFS is the reference standard for sustainable forest management in the UK) to 'consider the benefits for carbon and other ecosystem services before making the decision to restock on soils with peat exceeding 50cm depth'. This is an active area of policy development through the England Peat Strategy.

- **Recreation assets**. A broader variety of recreation assets have been included in the asset register this year, (p24), to more accurately reflect the range of social benefits our recreation facilities deliver. The confidence level for this data is modest, however there is focus on improving our recording of recreation assets, and our confidence in it will improve in future years.

- **Carbon accounting**. We've reviewed and amended the calculations behind the carbon sequestered in timber leaving the estate in the physical flow account (p26) in order to exclude the value of wastage at the point of felling (brash and below ground carbon in roots), and have amended the data feed to reflect the timber that actually left the estate, rather than the timber committed to market.

We are now also including the emissions from woodland planted on peat as a deduction from the overall sequestration figure, although this amount is so small that it does not have a significant impact.

We will continue to work on the accuracy of our management of carbon data, and have work underway that should allow us to include the negative impact of carbon emissions from soils and deadwood left on the estate after felling.

We also have the 'boundary' that we use for carbon under review. At present we calculate benefits from the carbon locked up in the timber that is felled, irrespective of its eventual end use. That end use could immediately release the carbon (wood fuel), or could lock it up for a century (house building). We've done this because we don't yet track the end use of timber, so we simply don't know. However a recent University of Cambridge PhD project identified the end use of East Anglia timber, suggesting it may be possible to develop broad categories of end use for commercial timber. This would potentially better reflect the actual carbon benefits of timber sourced on the Public Forest Estate (PFE).

- **Visitor numbers**. The visitor and visit numbers in the physical flow account have been updated in both the base-line and current year to reflect an updated methodology. The volume of visits has been reduced since last year's account; using the new methodology, this year's visit number is 207 million visits, compared to a baseline year in 2016/17 of 165 million. The increase from year to year is substantial, and makes a significant difference to the values reported in this Natural Capital Account.

  Visit data is based on statistically valid quarterly surveys of at least 1,000 individuals, against which very conservative assumptions as to reliability of recall and accuracy of knowledge have been applied. We now have a continuous data set for two and a half years. Reviewing this data set showed considerable variability associated with the large number of visits our most frequent visitors make (e.g. those who walk their dogs almost daily), and we have now reduced the impact this small category of visitors have on the overall visit numbers.[3]

  The significant 25% increase in visitor numbers from the first full year of surveying to the second cannot be fully explained; some of our visitor hubs (where we physically count visitors) have experienced visit volume increases of a similar amount, but not all. We have very limited information about visitors to our wider woodlands, but we are aware they are often very differently motivated, and have a different sort of interaction, to those who come to our visitor hubs. Our quarterly surveys are still a relatively new area of data collection for FEE, and we are actively monitoring the data trends as each additional year passes. Further adjustments to methodology may be required, or, as longer term trends become available to us, it may become apparent that this year to year variability is business-as-usual: that the numbers may go down as well as up; and it is the longer term trends that we need to pay more attention to.

---

3. TNS analysis undertaken June 2018: Poisson distribution analysis is the methodology now employed to model the survey data against which conservative assumptions have already been applied. Poisson was selected after comparison with bionomial and pareto methodologies.

Forest Live, Thetford Forest © David Barrow

Valuing biodiversity in our Natural Capital Account

Our forests – the trees and the spaces in between them, whether that's rivers, lakes, meadow or farmland – provide a wide spectrum of habitats, and a broad variety of species live within them. Our management of the forests places protecting, and where possible enhancing, biodiversity centre stage – whether it's a commercial forest, a protected environmental area, or both. This might mean using low impact felling methods like heavy horses to avoid crushing the mycorrhizal fungi in the soil, restricting access at certain points of the year or controlling invasive species to allow more delicate vegetation to establish.

FEE proactively restores habitats and protects and promotes appropriate species reintroductions. FEE has played a significant role in the reintroduction and increasingly healthy populations of ospreys in England, and we are currently working with species specialists to pilot a reintroduction of beavers in the Forest of Dean, and working towards the reintroduction of pine martens. We work with partners supporting the protection and improvement of populations of declining species; significant butterfly habitat work has been undertaken across the estate, we're supporting work with turtle doves in North Yorkshire and water voles in Kielder forest in Northumberland.

There is an active debate about whether biodiversity has value intrinsically, or whether its value is simply as an underpinning service to deliver the other natural capital benefits of provisioning, regulating and cultural services. If it is simply a supporting service, then the value biodiversity contributes to society is captured in the values given to those other services. If, however, there is intrinsic value in biodiversity, then a Natural Capital Account would need to capture this separately. And given the complexity of biodiversity, that is terribly tricky to do.

Biodiversity is not given a monetary value in the Office for National Statistics' national Natural Capital Account at present, but Defra's recent Tree Health Strategy [4] does include an estimate of society's existence value for biodiversity from trees. The approach used to generate this figure has several caveats, excludes some areas of woodland and employs caution in taking the lower of values available.[5]

Turtle doves © Richard Bennet

At present – because of the challenges identified above - FEE's account doesn't capture a physical flow or monetary flow for biodiversity. However, using the approach adopted in the Tree Health Strategy can give an idea of the order of magnitude that a value for biodiversity may one day contribute to Forest Enterprise's natural capital balance sheet.

Using the same methodology, we estimate that a conservative annual value of biodiversity may be in the region of £70 million to £80 million. Should more robust valuation methods become available, biodiversity could therefore potentially make a significant contribution to our account.

In the meantime, we're trying to understand whether our custodianship of our biodiversity is good through improving the information we are tracking in our asset register. This year for the first time we include metrics from the Woodland Ecological Calculator Index (p22). Our work to include more biodiversity information about species in future years, and improved priority habitat condition in our asset register is detailed on p12.

---

4. May 2018 Defra Tree Health Resilience Strategy

5. Forestry Commission working document 'Aggregating Biodiversity Values in 2016', data updated to 2017 values. Data sourced from a 1995 study, extended as a further study in 2002 and used focus groups to derive estimates. The studies are based on historic forest structures (e.g. mono species blocks) and will underestimate biodiversity values as new conifer planting and restocked broadleaves are not included. This working document is intended to provide an order of magnitude value and is not suitable for inclusion in a corporate account balance sheet.

Improving our understanding

2017/18 has been a year of investigating many areas where we hope to make improvements in the data we hold about our natural capital, and about the flow of benefits it provides. Some of the areas where we have initiated work programmes are:

- **Species biodiversity**. Although we are, for the first time, citing a potential scale of value for biodiversity for our land this year (see page 11), we're aware that this is only a very tentative monetary lens through which to view biodiversity. We spend lots of time when planning our operational work trying to improve habitats for the diverse species in our woods, and we want to be able to measure whether this is delivering the outcome we want of greater abundance and/or diversity of species across all the nation's forests.

  - We've investigated whether any species data sets exist that are comprehensive enough to cover all the public forests in a statistically robust way, and that would be appropriate indicator species to suggest wider biodiversity health.

  - We have a project with Butterfly Conservation currently underway to identify whether primary data that already exists for Lepidoptera (butterflies and moths) could be used in this way.

  - We have a project with the British Trust for Ornithology currently underway to identify whether primary data that already exists for birds could be used in this way.

  - We have also identified the possibility of collecting new primary data for bats, and a project scoping exercise is underway in collaboration with the Bat Conservation Society.

- **Habitat condition**. We'd like to improve our understanding of the condition of our habitat, and are pleased this year to have been able to include the woodland ecological calculator index referred to in the commentary on p9.

- We have data about those sites which have SSSI status, sourced from the Natural England Site Information Database (ENSIS). These assessments have reduced in frequency, and their usefulness in guiding management decisions (for us and other land managers) is correspondingly reducing. We are discussing with Natural England what the prospects for improving frequency are.

- In 2016/17 we started work to assess the condition of our priority woodland habitats that are not-SSSI designated internally. Building this data into operational routines is required, and work on assessing how to do that has started. This may also expand the condition assessment to non-woodland priority habitats (grassland etc).

Alder cones, Alnus glutinosa

- **Carbon**. Carbon calculations are one of the more complex areas of natural capital accounting, and so we try to keep information about carbon and how we account for it reviewed and updated where possible.

  - A project is underway to apply Forest Research data on carbon in soils to our soil map.

  - The project will also identify the carbon in deadwood, and provide the basis for further refining of this estimate in collaboration with data that may be available from the National Forest Inventory work.

  - We will scope the future possibility of supply chain analysis to enable us to nett off the emissions of carbon from timber that leaves our forests when its usage means it starts to biodegrade.

- **Soils**. The characteristics and condition of our soils is a very important underpinning to the flows of benefits from our forests. We currently have little consistent, detailed knowledge about soils across all the nation's forests, and this could make substantial advances in our management decisions to expand both the private and public benefits delivered. The complexity of the subject area, the scale of the project and likely resources required mean that progress in this area is a long term aspiration. In the short term, Aberystwyth University are piloting a proof of concept project with DNA profiling of soil microbial content in our forests.

- **Dynamic ecosystem service modelling**. A four-year joint project with Oxford University Long Term Ecology Lab will identify trends and produce predictive analysis of future ecosystem service results within our nation's forests. This will improve our physical flow data, and may enable us to include and update ecosystem services that are currently missing from our Natural Capital Account.

Guisborough Forest Festival

Hicks Lodge

Flooding

There's no doubt that woodlands provide a significant benefit to society from mitigating the effects of flooding. They do this through taking water up into their own system; by the increased porosity of woodland soils allowing greater infiltration of rain water to be stored in or on the soil; by slowing the flow of water overground by providing obstacles and roughness; by protecting soil from erosion and therefore reducing the amount of sediment that ends up in, and clogging up, watercourses; and quite simply by intercepting the rain before it even hits the ground, allowing it to instead evaporate.

Calculating the scale of the contribution that woodlands make to the mitigation of flooding, and then valuing that contribution has however proved a thorny problem, not least because the impact varies depending on the location of the woodland, the geography of the land it is planted in, the location of any homes and valuable assets below them, and the timing of run-offs and river flows.

Forest Research are in the process of undertaking a study into the benefits from the water take up by trees and the amount stored above/below the ground. (Other aspects of the flood benefits are too complex to be included.) This work is ongoing, and so we cannot yet report the value attributed to FEE's forests, however early indications are that the contribution from just this partial assessment of flood benefit may be in the region of £30 million to £40 million per annum. Rolled forward into perpetuity this may make a contribution to our natural capital balance sheet of up to £1 billion to our net asset value. This once again highlights the comparison between the commercial value of our woodlands (for example, £12.8 million from timber production) and the natural capital value contributed to society by just one of its functions.

Kielder Water

Tall Trees Trail in the New Forest

Cannock Chase

Sherwood Pines © Jen & Sim Benson

Practical decision making

All the information included in this Natural Capital Account is fascinating (of course!), and at a strategic level it is very valuable for the organisation to have a regular check on whether the value of the natural capital assets we care for is improving, as well as an overview of the direction of travel of specific assets. But what difference can a natural capital approach make to any of the things we actually do to manage the land?

We've been exploring this question this year, and, with lots of input from our Forest District teams, developed a practical tool that draws together information about a specific local site. We tested it on two very different sites where there is the possibility of significant land use change through afforestation. The first, in Northumberland, looked at a large site of 145 ha surrounded by existing conifer planting, and the second considered a 20 ha site in Thames Chase, Essex, (close enough to London that you can see Canary Wharf!) that is currently being capped off after landfill.

Looking 'bottom up' at sites meant that we could measure a slightly different range of ecosystem service benefits than the 'top down' corporate accounts. The smaller scale also meant that we could include qualitative information, for example a biodiversity commentary and a landscape commentary - information that can't be summarised across all our landholdings.

Feedback from the two teams engaged in developing the tool was extremely positive: they told us that it had been relatively easy to gather the data required; the process of considering the benefits of different options for change in this way had helped their thinking; on one site a new planting approach was now being considered as a result of the values the tool highlighted for the different options; and it was considered an extremely useful communication tool for discussing choices with stakeholders and local communities.

This pilot project, alongside our national natural capital accounting experience, will form the basis of the development of our continued approach and use of natural capital to guide FEE's operational delivery.

Balance sheet

This is a breakdown of the balance sheet, reporting asset values into perpetuity for each natural capital benefit. It draws together the headline values reported under each of the monetary account schedules and the maintenance cost schedule.

The balance sheet only represents those parts of the natural capital value of the public forest estate that can currently be both measured in quantity, and where that quantity

of physical benefit flow can be given a monetary value. This excludes many of the benefits we know our land provides, for example flood mitigation or improvement of air quality. So the values in this balance sheet are highly conservative estimates of the net natural capital asset value.

Notes included below and opposite.

	Private Value [c]				
	Baseline (2013/14) [d]	Cumulative Gains/Losses [e]	Additions [f]/ Disposals [g]	Revaluations/ Adjustments [h]	Reporting Year (2017/18)
	Present value £m				
Non-renewables					
Minerals	4	-	-	-	4
Total Non-renewables	**4**	**-**	**-**	**-**	**4**
Renewables					
Timber [1]	255	(3)	-	72	324
Food [2]	7	(1)	-	-	6
Plant & Seeds [3]	-	-	-	-	-
Carbon Sequestered [4]	-	-	-	-	-
Recreation and Public Access [i]	(270)	55	-	-	(215)
Total Renewables	**(8)**	**51**	**-**	**72**	**115**
Government Payment for Ecosystem Services Funding [j]	578	-	-	-	578
Total Gross Asset Value [k]	**574**	**51**	**-**	**72**	**697**
Maintenance Costs [l]	(428)	(67)	-	-	(495)
Total Net Natural Capital Assets	**146**	**(16)**	**-**	**72**	**202**

Additional notes:

1. The private value of timber has increased due to a combination of volume and the market price of timber.

2. The private value of food has decreased since baseline as the additional costs of production are not being offset by an increase in income.

3. This is included as an external value because the plants and seeds that are provided by FEE to the public sector are not sold commercially, and are produced for the benefit they provide to society.

4. The increase in carbon sequestration is a combination of higher non-traded carbon values, and an increase in the the quantity of carbon sequestered.

Notes:

a. **Whole sheet**: all values in 2017/18 prices £m in present value terms, rounded to the nearest £1 million.

b. **Whole sheet**: present values are calculated as discounted flow of annual value in perpetuity. A 3% discount rate is used. Annual values are forecast over 50 years and from year 51 to perpetuity it is assumed that the annual value is constant (i.e. a constant flow assumption).

c. Private value of assets is to FEE, external value of assets is to the rest of society.

d. The baseline value represents the value of assets at the baseline date (31 March 2014 where possible, if otherwise the baseline year is noted in the asset register).

e. Cumulative gains/losses show the net change in asset values (compared to the baseline date). The change is normally due to a change in the condition of the assets, either through natural improvement/deterioration or through management intervention.

f. Additions show the increase in asset values associated with the acquisition, realisation or discovery of new assets since the baseline date.

g. Disposals disclose the reduction in asset values associated with the disposal or extraction (for non-renewable resources) of natural assets.

h. Revaluations and adjustments calculate the asset value changes arising from changes in external factors and key assumptions (e.g. market prices).

i. Baseline data 2015/16 when FEE started regular surveying for visitor numbers. The methodology is still being refined and so there are some amends to the baseline and current year data in line with this. The increase in value is driven by an increase in visitor numbers, e.g. both our survey data of all visitors to the PFE, and the visitor counting we undertake at some of our more popular visitor destinations, has recorded an increase in visits year on year of about 20%.

j. Payment from central government for the provision of Ecosystem Services.

k. Total gross asset values are for the reporting year (2017/18) and are calculated after the deduction of production costs (i.e. value of benefits minus costs of production) as reported in the monetary account. This is shown as a flow of private benefit into FEE, but the same value is repeated as a cost to society in the external value flows.

l. Maintenance costs include the cost of all legal obligations and other activities necessary to preserve the long term output of the natural assets at the benefit levels assumed in the asset values section of the balance sheet.

External Value [c]					Total Value				
Baseline (2013/14)[d]	Cumulative Gains/Losses [e]	Additions [f]/ Disposals [g]	Revaluations/ Adjustments [h]	Reporting Year (2017/18)	Baseline (2013/14)[d]	Cumulative Gains/Losses [e]	Additions [f]/ Disposals [g]	Revaluations/ Adjustments [h]	Reporting Year (2017/18)
Present value £m					Present value £m				
-	-	-	-	-	4	-	-	-	4
-	**-**	**-**	**-**	**-**	**4**	**-**	**-**	**-**	**4**
-	-	-	-	-	255	(3)	-	72	324
-	-	-	-	-	7	(1)	-	-	6
14	5	-	-	19	14	5	-	-	19
7,237	1,066	-	1,024	9,327	7,237	1,064	-	1,024	9,327
11,030	2,808	-	243	14,081	10,760	2,863	-	243	13,866
18,281	**3,879**	**-**	**1,267**	**23,427**	**18,273**	**3,930**	**-**	**1,339**	**23,542**
(578)	-	-	-	(578)	-	-	-	-	-
17,703	**3,879**	**-**	**1,267**	**22,849**	**18,277**	**3,930**	**-**	**1,339**	**23,546**
(31)	(23)	-	(4)	(58)	(459)	(90)	-	(4)	(553)
17,672	**3,856**	**-**	**1,263**	**22,791**	**17,818**	**3,840**	**-**	**1,333**	**22,993**

Asset register

Indicator			Baseline Year (13/14)	Reporting Year (17/18)	Trend	Units	Prior Year (2016/17)
Ecological communities and species							
Broad and priority habitat area							
Extent	Broad habitat area [1]	Woodland	207,876	205,095	⟷	ha	205,336
		Grassland	12,748	14,138	↑		13,992
		Mountain, moors and heathlands	28,564	28,712	⟷		28,730
		Enclosed farmland	724	421	↓		723
		Freshwater	265	258	⟷		257
		Urban area	742	723	⟷		720
		Coastal margins area	17	17	⟷		17
		Total area	**250,936**	**249,364**	⟷		**249,776**
	Priority habitat within PFE [2]	Broadleaved, mixed and yew woodland	22,757	22,914	⟷	ha	22,915
		Lowland dry acid grassland and lowland heath	14,628	14,697	⟷		14,709
		Other priority grassland	522	586	↑		587
		Lowland raised bog	782	781	⟷		782
		Blanket bog	6,793	6,843	⟷		6,844
		Upland heathland	6,881	6,708	⟷		6,830
		Other	364	383	⟷		383
		Total area	**52,727**	**52,912**	⟷		**53,051**
	Woodland area [3]	Plantation	165,192	167,159	⟷	ha	166,825
		Native	37,897	34,726	↓		35,220
		Non-intervention	13,275 [16/17]	13,362	⟷		13,275
		Wood pasture	735 [16/17]	735	⟷		735
	Total land area holdings [4]	Freehold	197,527	200,805	⟷	ha	199,377
		Leasehold	58,319	51,258	↓		52,699
		Total area	**255,846**	**252,063**	↓		**252,076**

Notes:

1. The PAWS and open habitats policies continue to impact on woodland area with other broad habitat changes mostly being reclassification or landholding change related. Because the woodland area change is small in percentage terms it is not RAG rated as a decline. Decrease in enclosed farmland, and increase in grassland, mountain, moors and heathland categories due to land transactions in SW England.

2. Priority habitats continue to increase in area according to PAWS and open habitat policies being implemented via the Forest Plans.

3. Recording change, not actual change. Our recording system has in the past had areas assumed to be native woodland which on re-survey have been found to be less native than was assumed.

4. Land transactions during the year are reflected in the relative proportion of leasehold versus freehold land. Leasehold land often places significant restrictions on our management activities. We are proactive in buying out leaseholds with a strategic value; this contributes to the downward direction of leasehold land holdings, and is a positive and planned switch to freehold.

   The scheduled end of some leases also contributes to this fall, and on balance a reduction in the size of the PFE is seen as a negative. Though the percentage decrease is small it has been RAG rated red.

Indicator			Baseline Year (13/14)	Reporting Year (17/18)	Trend	Units	Prior Year (2016/17)
Ecological communities and species							
Broad and priority habitat area							
Extent	Total agricultural land use [5]		3,345	7,155	↑	ha	7,178
	Area land under statutory designations (SSSIs, AONB, SAM, NP)		147,823	147,806	↔	ha	147,795
	Area of priority open habitat		42,844	44,567	↔	ha	44,398
	PAWs--area by semi-naturalness score [6]	1 (over 80% native)	8,261	9,549	↑	ha	9,792
		2 (between 50 to 80% native)	3,332	3,516	↔		3,876
		3 (between 20 to 50% native)	5,765	5,639	↔		5,949
		4 (under 20% native)	27,252	23,138	↓		24,941
		0 (no trees)	993	918	↔		952
		Total area	**44,610**	**41,842**	↔		**44,558**
	ASNW - ancient semi-natural woodland by semi-naturalness score [7]	0 (no trees)	707	674	↔	ha	817
		1 (over 80% native)	11,513	10,399	↔		11,262
		2 (between 50 to 80% native)	940	2,656	↑		2,444
		3 (between 20 to 50% native)	694	763	↔		723
		4 (under 20% native)	1,362	1,303	↔		1,582
		Total area	**15,216**	**15,795**	↔		**16,828**
Condition	Condition of SSSIs [8]	% in favourable condition	35.6 [15/16]	37.4	-	%	37
		% in unfavourable recovering condition	63.9 [15/16]	61.2	-		62
		% in unfavourable no change or declining condition	0.5 [15/16]	1.4	-		1
		% part destroyed or destroyed condition	-	-	-		-
	Site condition of non-SSSI priority woodland habitat [9]	Ancient & semi-natural woodland — Favourable	1,422 [16/17]	-	-		1,422
		Recovering	2,667 [16/17]	-	-		2,667
		Declining	170 [16/17]	-	-		170
		Unfavourable	763 [16/17]	-	-		763
		Not known	92 [16/17]	-	-		92
		Priority ancient woodland — Favourable	2,061 [16/17]	-	-		2,061
		Recovering	10,850 [16/17]	-	-		10,850
		Declining	1,364 [16/17]	-	-		1,364
		Unfavourable	791 [16/17]	-	-		791
		Not known	14,793 [16/17]	-	-		14,793

[5] Reclassification of some upland heathland to agricultural land use due to their ongoing management results in this unusual increase this year. Although a substantial increase, this has no impact on FEE's achievement of its strategic priorities.

[6] The PAWS policy implemented predominately by thinning continues to impact negatively on SN4 conifer and positively on SN1, 2 and 3, as native species become dominant.

The decline in area for 'under 20% native' is a positive change as it is in accordance with the plan towards minimal non-native forest composition.

[7] Previous year showed ASNW and PAWs figure together. This has been altered to simply show ASNW by itself for current reporting year.

Increase in area with naturalness scores 2 and 3 are a direct consequence of management actions taken to improve semi-naturalness score and reduce the area with score 4.

[8] The increase in area of SSSI in unfavourable condition results from reassigning unfavourable recovering sites to declining or unfavourable is due to a change in interpretation of condition.

Although there has been a large percentage change in 'unfavourable' category, this represents only a very small area, and has therefore been RAG rated amber rather than red.

[9] No trend arrows are indicated because the baseline data was collated in 2016/17, and has not yet been updated. Management systems are being put in place to ensure the condition is reviewed and updated as a regular part of land management activity, and trend data will be recorded at this point.

Indicator			Baseline Year (13/14)	Reporting Year (17/18)	Trend	Units	Prior Year (16/17)
Ecological communities and species							
Broad and priority habitat area							
Condition	Site condition of non-SSSI priority woodland habitat [9]	Ancient & semi-natural woodland	Favourable	3,130 [16/17]	-	-	%	3,130
			Recovering	7,634 [16/17]	-	-		7,634
			Declining	1,077 [16/17]	-	-		1,077
			Unfavourable	1,898 [16/17]	-	-		1,898
			Not known	2,458 [16/17]	-	-		2,458
		Wood pasture	Favourable	283 [16/17]	-	-		283
			Recovering	192 [16/17]	-	-		192
			Declining	-	-	-		-
			Unfavourable	260 [16/17]	-	-		260
			Not known	-	-	-		-
		Non-intervention	Favourable	679 [16/17]	-	-		679
			Recovering	1,352 [16/17]	-	-		1,352
			Declining	330 [16/17]	-	-		330
			Unfavourable	573 [16/17]	-	-		573
			Not known	10,340 [16/17]	-	-		10,340
	Site condition of non-SSSI non-woodland habitat	Open	Favourable	1,679 [16/17]	-	-		1,679
			Recovering	3,582 [16/17]	-	-		3,582
			Declining	1,176 [16/17]	-	-		1,176
			Unfavourable	738 [16/17]	-	-		738
			Not known	175 [16/17]	-	-		175

Woodland Ecological Calculator Index [10]

Indicator	Baseline Year (13/14)	Reporting Year (17/18)	Trend	% ha favourable for all WEI indices	Prior Year (16/17)
Deadwood volume (native woodland)	6.0%	-	-	Over 80m3 of deadwood	-
Vertical structure (native woodland)	42.0%	-	-	Over 80m3 of deadwood	-
Ground flora (native woodland)	9.0%	-	-	Over 4 storeys of tree cover	-
Veteran trees (native woodland)	0.0%	-	-	Fully developed ground flora for habitat	-
Nativeness of occupancy (native woodland)	89.0%	-	-	More than 2 veteran trees per 100 hectares	-
Invasive species (native woodland)	95.0%	-	-	More than 90% native canopy cover	-
Tree pests and diseases (native woodland)	89.0%	-	-	No invasive species of concern	-
Herbivores/grazing pressure (native woodland)	49.0%	-	-	No mortality levels or pests/disease of concern	-
Regeneration at component group level (native woodland)	20.0%	-	-	No grazing damage	-
Number of native tree/shrub species (native woodland)	46.0%	-	-	All stages of regeneration present in stand	-
Age distribution of tree species (native woodland)	18.0%	-	-	More than 5 native species per stand	-
Proportion of Open Space (native woodland)	5.0%	-	-	Presence of young, intermediate and older trees	-
Proportion of woodland/open habitat (native woodland)	76.0%	-	-	Stands with over 10-25 % open space	-
Size of woodland parcel (native woodland)	97.0%	-	-	Over 20% semi natural habitat in vicinity	-
Regeneration at population level (native woodland)	41.0%	-	-	Over 20 ha in extent	-
Overall ecological condition score (native woodland)	18.0%	-	-	All stages of regeneration in immediate vicinity	-
Overall ecological condition score (non-native woodland) [11]	0.5%	-	-	Stands that are in favourable condition for a semi natural wood in good condition	-

Indicator			Baseline Year (13/14)	Reporting Year (17/18)	Trend	Units	Prior Year (2016/17)
Ecological communities and species							
Broad and priority habitat area							
Condition	Selected Taxa Indices [12]	All	-	-	-	Index	-
		Generalists	-	-	-		-
		Specialists	-	-	-		-
	Carbon stock in… [13]	…living biomass	12,397	13,160	↑	Thousand metric tonnes	13,143
		…deadwood and litter	-	-	-		-
		…soils	-	-	-		-
	CO_2e stock in… [14]	…living biomass	45,456	48,253	↑	Thousand metric tonnes	48,190
		…deadwood and litter	-	-	-		-
		…soils	-	-	-		-
	Biomass stock…	…total above and below ground	24,794	26,503	↑		26,285
		…above ground	19,295	20,618	↑		20,456
		…below ground	5,499	5,885	↑		5,829
		…in deadwood	-	-	-		330
	Standing timber volume (overbark standing) [15]	Coniferous	26,148	26,743	↔	Thousand m^3	26,457
		Broadleaved	8,147	9,920	↑		9,852
Spatial Configuration	Contiguity of SSSI and priority habitat areas [16]		-	-	-		-
	Contiguity of different habitats		-	-	-		-
	Location of PFE woodland by ONS land classification [17]	Rural town and fringe	27,601	27,867	↔	ha	27,869
		Rural village and dispersed	205,464	206,112	↔		205,963
		Urban city and town	16,294	16,306	↔		16,459
		Urban conurbation	1,840	1,990	↑		1,990

Notes:

[10] These are a new set of indices developed by the National Forest Inventory project. There are 16 indices showing the detailed condition of our native woodlands, as well as an overall ecological score for our non-native woodlands. These indicators will be reported on a five-year basis, and so only the baseline year is available here. Favourable here is defined as 'requires no work', and the remaining percentage as 'room for improvement', within which are the conditions 'intermediate' and 'unfavourable'.

[11] It is worth noting that 99% of our non native woodlands are in 'intermediate' condition, and less than 1% are in 'unfavourable'

[12] No indicator data yet. Work has started in 2018 to identify PFE indices for birds and Lepidoptera, and will be reported in future years.

[13] This represents the carbon stored in the PFE. This is distinct from the assessment of carbon dioxide (equivalent) flows from the PFE that are assessed in the physical and monetary accounts.

[14] This shows carbon dioxide equivalent (CO_2e) of the carbon stored in the PFE. The change in the stock as a result of sequestration or emissions of carbon (CO_2e) enter the physical account, monetary account and balance sheet.

[15] 'Overbark standing' is a standard timber production term meaning that the volume is measured including the bark, but excluding small branches, foliage and deadwood.

[16] The contiguity of habitats is very important, and this is a place marker that we would like to be able to report on this. Some progress has been made in identifying potential models to do this, and it may be possible in future years.

[17] The increase in PFE woodland by 'Urban conurbation' classification is largely due to a number of small purchases concentrated primarily in the south - particularly around London and the south coast.

Indicator		Baseline Year (13/14)	Reporting Year (17/18)	Trend	Units	Prior Year (2016/17)
Ecological communities and species						
Broad and priority habitat area						
Freshwater						
Extent	Freshwater broad and priority habitat area [16.]	-	-	-	ha	-
Condition	No of water bodies where PFE forestry is identified as contributing factor in reasons for not achieving 'good' status [17.]	84	75	↓	no.	-
	No of water bodies failing or at risk in PFE [18.]	142	277	↑	no.	-
	Area of PFE potentially contributing to water bodies at risk of acidification	32,245	68,072	↑	ha	-
	% water bodies achieving optimal shading (40-60% dappled shade) [19.]	19.8%	19.8%	↔	%	-
Minerals						
Extent	Volume of exploitable reserves by type	-	-	-	-	-
Woodland Accessibility						
	Percentage of people in 'Priority Places' close to accessible PFE woodland	9.0 [15/16]	9.0	↔	%	9
	Percentage of England population within 6 miles of any PFE land	49.1 [15/16]	48.4	↔		48.5
	Percent England population within 15min, 30min and 60min drive time to accessible PFE sites	15 minutes	40.3 [15/16]	39.1	↔		41
	30 minutes	85.8 [15/16]	84.9	↔		86.6
	60 minutes	99.9 [15/16]	99.9	↔		99.9
Soil [20.]						
	Area of woodland on deep peat soils - higher yield (above YC 6)	14,128	14,728	↑	ha	21,401
	Area of woodland on deep peat soils - low yield (below YC 6)	4,147	2,548	↓		-
	Area of woodland on shallow peat soils and peaty pockets - higher yield (above YC 6)	41,909	43,270	↑		44781
	Area of woodland on shallow peat soils and peaty pockets - low yield (below YC 6)	7,614	6,018	↓		-
Air						
	Area of woodland in areas of differing air quality	Urban	18,134	18,296	↔	ha	18,449
	Peri-urban	27,601	27,772	↔		27,869
	Rural	205,464	206,112	↔		205,963
Other forms of capital						
	No. of Car parks	568 [15/16]	579	↔	no.	569
	Area of land by accessibility status	Car Park Spaces [21.]	26,084 [17/18]	26,084	-	No. of	-
	CRoW access [22.]	149,940 [15/16]	149,768	↔	ha	149,937
	Other accessibility based on deeds [23.]	85,730 [15/16]	86,181	↔		85,980
	Km of published recreational routes across the estate [24.]	Walking	1,095 [17/18]	-	-	km	-
	Cycling	1,303 [17/18]	-	-		-
	Other (e.g. equestrian, rally)	497 [17/18]	-	-		-
	Total	**2,859** [15/16]	**2,895**	↔		**2,894**
	Other recreation infrastructure [25.]	Play Equipment	468 [17/18]	-	-	No. of	-
	Signage (primary and secondary)	2,082 [17/18]	-	-		-
	Interpretation and Information Boards	364 [17/18]	-	-		-
	Picnic Tables and Benches	2,265 [17/18]	-	-		-

Notes:

16. This is the first time that we are showing indicators for freshwater habitats, and we are yet to determine whether these are the best indicators for ascertaining the PFE's impact on freshwater habitats. However these are the best indicators available at the moment, and so have been published here.

17. WARNING: the Environment Agency investigate/report a variable number of waterbodies each year the fall in number of reported failures due to forestry may not be evidence of recovery.

18. WARNING: The map identifying catchments failing and at risk from acidification has not been updated by EA - these numbers reflect the worst case scenario based on FR assessment of failing waterbodies (2016) in published WFD water classification data the impact of forestry on these waterbodies is currently being discussed with EA.

19. WARNING: 342.5 ha (n = 1,305) of surface water within the PFE in England is captured in the data, of this 67.8 ha (n = 202) has between 40 - 60% indicative shade. There are many gaps in the data which only extends across the floodplain. Forest in headwater regions particularly in areas of steep slope are missed.

20. There has been no new planting of woodland on deep peat soils, and overall there is now 2% less woodland on peat than there was in our baseline year.

    Changes in these figures are borne out of a combination of mire restoration projects, and restocking sites where a higher yield trees class is achievable. Where conifer woodland on peat soils is above yield class 6, the current evidence shows that trees will sequester more carbon than the peat soils emit – restocking has therefore favoured sites capable of supporting higher yielding crop. The greenhouse gas balance for conifer woodland of yield class 6 and below on peat soils is less clear, therefore a decline in the two 'below YC 6' categories is assessed as a positive step.

21. This is an estimate based on an the average number of spaces per hectare of car park where known.

22. CRoW - 'Countryside and Rights of Way Act 2000'. This gives public right of access to land mapped as 'open country' (mountain, moor, heath and down) or registered common land across England.

23. 'Other' category includes anything that isn't CRoW designated, but is still accessible to the public. This includes 'de facto', and 'unrestricted' access designations.

24. This is the first year that we are reporting the breakdown of recreation routes on the PFE, and this will be updated and refined for future CNCA's. Current breakdown of routes will include some level of double counting but cannot at this point be avoided.

25. No trend arrows are indicated because the baseline data was collated in 2017/18.

Physical flow account

This schedule reports the flow of annual natural capital benefits that are produced on the PFE in the baseline year and the reporting year. This includes production by FEE itself, contractors and tenants. It is relevant to report all these aspects because total (annual) production relates to FEE management decisions.

This physical flow account is only a partial reflection of all the benefits produced by the PFE because we are not yet able to quantify many of them, for example improving air quality and mitigation of flooding are not yet measured here.

Spatial accounting unit by natural capital benefit	Indicator	Units	Baseline year 2013/14	Reporting year 2017/18
Timber provision				
Woodland	Total PFE timber production	m³/yr	1,522,967	1,420,209
Climate regulation [a]				
Woodland	Carbon sequestered / (emitted)	tCO_2/yr	1,645,657	1,592,829
Bogs			(8,717)	(8,781)
Grassland			-	-
Heathland			-	-
Woodland on Deep Peat Soils			(82,908)	(78,375)
Woodland	Carbon embodied in environmental goods (timber) [b]	tCO_2/yr	1,032,742	990,812
Recreation				
Whole estate	Visits to PFE [c]	visits/yr	165,000,000 [16/17]	207,000,000
	Visitors to PFE [c]	visitors/yr	21,000,000 [16/17]	24,600,000
	Volunteers	hours/yr	105,641	182,142
Plant and seed supply				
Whole estate	Plant production number	number/yr	14,961,000	14,246,116
	Seed production weight	kg/yr	-	-
Food provision				
Whole estate	Wild game carcass numbers	number/yr	11,586	13,067
	Livestock production from tenant farmers	number/yr	7,309	6,298
	Crop production from tenant farmers	kg/yr	381	597
Minerals				
Whole estate	Mineral production volume	tonnes/yr	1,295,850	1,313,408

Notes:

a. All GHG emissions are grossed out by expressing them all in terms of the same 'language': Carbon Dioxide Equivalents. Bogs on the PFE, for example, are net emitters of GHGs in the form of methane, nitrous oxide and carbon dioxide, depending on condition. PFE bogs are assumed to be 75% near natural and 25% modified.

b. Carbon embodied in environmental goods does not represent a release of carbon to the atmosphere. It represents carbon locked up in harvested timber, which leaves the estate for commercial uses in the reporting year. It does not include non timber biomass (such as brash and roots),

which is left on site after felling. This flow is of a slightly different nature to the other flows in the accounts, as it does not take into account what that subsequent use is, and in order to avoid double counting alongside the carbon sequestered figure, does not contribute to the monetary account or the balance sheet.

c. The total figure for visit numbers quoted for 2016/17 is reduced from that published in last year's CNCA. This is the result of refined methodology which has also been used to calculate the 2017/18 visits total, ensuring consistency of approach across these two reporting cycles.

Monetary flow account

This schedule collates the estimated total annual value (£) of natural capital benefits that are produced from the PFE in both the baseline year and the reporting year. These values are calculated after the deduction of production costs (but not maintenance costs, which cannot be attributed to individual benefits but are netted off the gross value of assets in the balance sheet).

Spatial accounting unit by natural capital benefit	Indicator	Units	Baseline year 2013/14	Reporting year 2017/18
Timber provision				
Woodland	Net asset value for timber produced	£/yr	£ 10,450,712	£ 12,763,488
Climate regulation				
Woodland	Carbon sequestration value	£/yr	£ 98,739,421	£ 103,707,655
Bogs			£ (523,001)	£ (571,754)
Grassland			-	-
Heathland			-	-
Woodland on Deep Peat Soils			£ (4,974,455)	£ (5,102,954)
Recreation				
Whole estate	Net asset value for recreation	£/yr	£ 346,308,992	£ 446,260,046
	Volunteers		-	-
Plant and seed supply [c]				
Whole estate [d]	Plant and seed revenues	£/yr	£ 3,091,288	£ 2,790,983
Food provision				
Whole estate	Wild game carcass value [e]		£ 12,677	£ (83,295)
	Livestock production value		£ 143,783	£ 185,172
	Crop production value		£ 57,030	£ 73,688
Minerals				
Whole estate	Mineral production volume	£/yr	£ 896,060	£ 426,925

d. Our plant and seed sales are counted as a benefit to society as the actual value of plants and seeds is much higher than their sale value when they are sold at cost of production.

e. Although the number of wild carcasses has increased against baseline, the huge decline in wild boar value from £2.50/kilo in October 2017 to £0.75/kilo in November 2017, as well changes in FEE venison contracts, has meant the revenues to FEE have fallen sharply alongside an increase in the cost of production. Wild game income is a by-product of culling for forest management purposes, rather than done primarily for profit.

Maintenance cost account

Where costs can be directly attributed to activities that deliver specific ecosystem services, (e.g. the costs of new tree planting that are necessary to continue to generate income from timber sales) this is taken from the value of the ecosystem service in the monetary flow account on the previous page. However, there are many costs that can't be precisely allocated, but are nonetheless incurred in managing the public forest estate and generating all the ecosystem services identified. This table is a 'bucket' for all those costs, to ensure they are taken into account in the balance sheet.

Liabilities					
Private			**External**		
Legal Maintenance Obligations [a]	£	(87,870,055)	Avoided cost of PFE volunteers [c]	£	(58,037,748)
Habitat Management	£	(120,945,939)			
Infrastructure, Roads and Buildings	£	(72,852,066)			
Forest Regeneration	£	(50,738,618)			
Timber Harvesting	£	(35,084,679)			
Other Maintenance Provisions [b]	£	(127,411,290)			
Total Net Maintenance Provisions	£	(494,902,646)			
Total Maintenance Provisions				**£**	**(552,940,395)**

Commentary:

a. Legal maintenance obligations cover those costs that would be incurred whatever activities Forest Enterprise (or any other landowner if the land changed hands) chose to deliver, for example the costs of maintaining rights of way in accordance with health and safety obligations, or the need to maintain condition standards on statutorily designated land.

b. Private 'Other maintenance' provisions are the costs of maintaining the public forest estate, such as those for community woodlands, and contribute to the natural capital physical flows that we are currently able to account for.

c. 'Avoided cost of PFE volunteers' identifies a conservative estimate of the value of work done by volunteers. This is included as a cost because the value of the benefits of the ecosystem services that are delivered is only possible because of the time these volunteers contribute. If they didn't give their time, then FEE would either have to pay contractors to deliver equivalent work, or not do the work (more likely, as volunteers often do work in places inaccessible by machine which would otherwise be cost prohibitive), in which case there would be a lower monetary account value. So including the 'cost' of volunteer time prevents over estimating the value of the benefits delivered, and therefore over estimating the net natural capital value of the PFE.

Appendix 1:

An introduction to natural capital accounting for Forest Enterprise England

What is natural capital?

Natural capital refers to the stock of natural assets upon which our economy and society is built. Natural capital produces value for people in the form of goods such as timber or minerals, and services such as climate regulation and air purification. Sometimes people need to intervene to best realise the benefits - such as recreation - but in other instances, production is simply the result of natural capital combining with natural processes - as with woodland carbon sequestration.

Natural capital

- Ecological communities
- Soils
- Freshwater
- Land
- Minerals
- Atmosphere
- Subsoil assets
- Oceans

Ecosystem service flows

Inputs from other capital

The benefits

- Food
- Fibre (e.g timber)
- Energy
- Fresh water
- Clean air
- Climate regulation
- Recreation
- Amenity
- Biodiversity / conservation
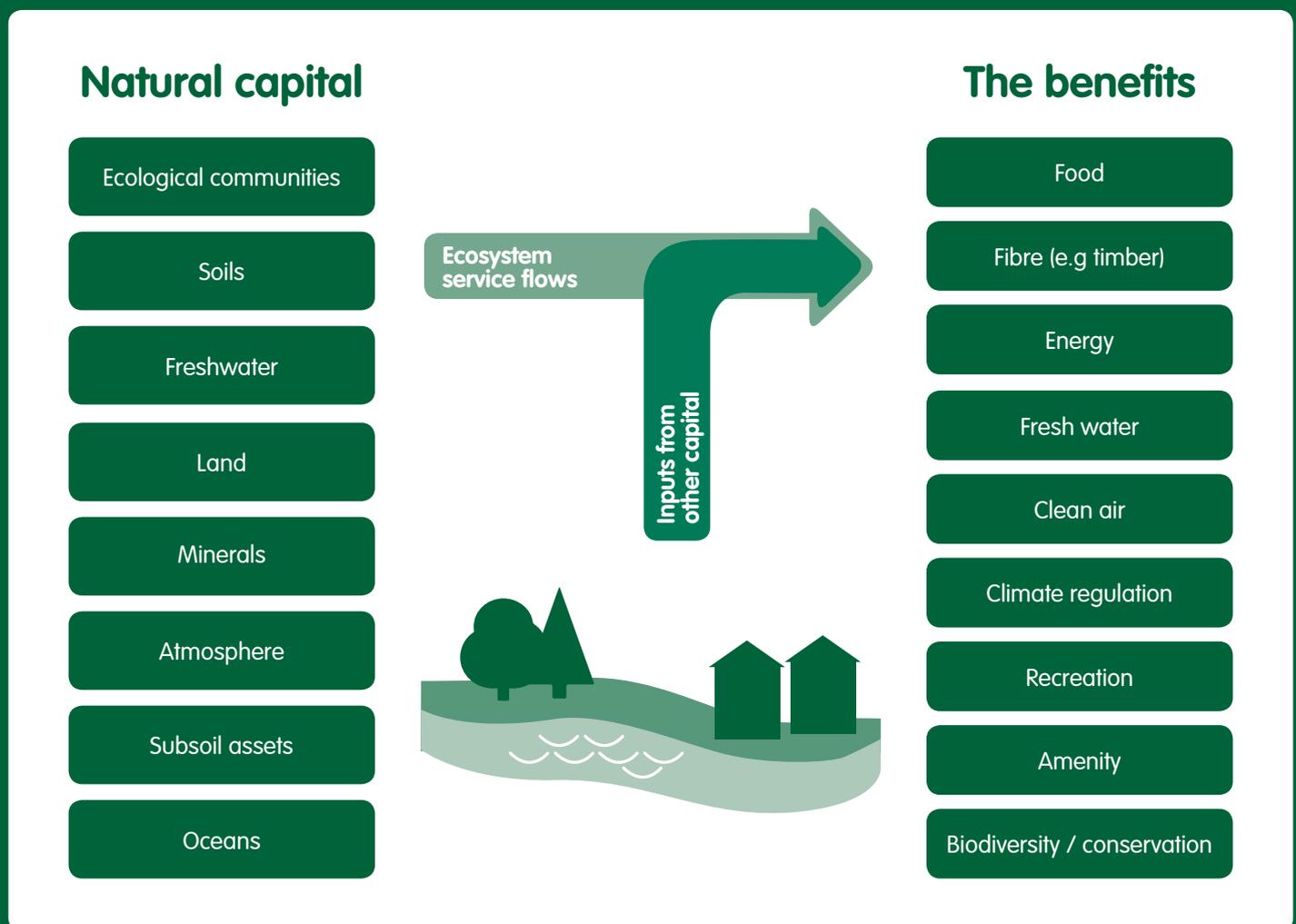
Fig. 1: Diagram showing the flow of natural capital benefits that come from natural capital.

Why develop a Natural Capital Account for FEE?

FEE's continuing development of Natural Capital Accounting remains at the forefront of the practical application of the concept, both in the UK and internationally. Back in 2015/16, it was the first organisation-wide account by anyone responsible for such a large base of natural capital, and we aim to stay at the cutting edge.

Beechenhurst

Developing our NCA will:

- Further complement our current reporting on the environmental, social and economic outcomes that are delivered by England's publicly accessible woods and forests.

- Demonstrate the societal value delivered by England's woods and forests and the management of them by FEE.

- Inform decision making at all levels by clearly linking management with the value of our natural capital assets.

- Assess our decision making's impact on natural capital values, in both the long term and short term.

The NCA has provided a replicable basis for comparison of trends from year to year. Over time, as this picture develops further, FEE's Strategy Board will be able to use the NCA to assess whether FEE's custodianship of England's Public Forest Estate is increasing or decreasing the natural capital value. The account will continue to provide a valuable evidence base and result in an annual prompt for the Strategy Board to engage in debate about policy and strategic goals and their long-term impact on the natural capital assets FEE looks after.

Time horizon

The NCA framework presents a forward-looking perspective for understanding the value of natural capital assets. This is because the purpose is to provide information in an accounting format that can inform strategic and business decisions concerning ongoing and future management of natural capital, with the aim of safeguarding the health and condition of natural assets into the future. This requires reporting the long-term value of natural capital assets and liabilities.

Consistent with the NCA framework, natural capital asset values in the account are calculated at a discounted rate of the expected future values into perpetuity. Discounting means we can compare the costs and benefits that occur in the future at today's prices. It is based on the principle that, generally, people prefer to receive goods and services now rather than later, while also ensuring that future generations are considered.

In FEE's account it is based on:

- **Profiling/forecasting values over 50 years.** This time period has been selected since it is consistent with the time horizon of the forest design plans that set the management objectives for each forest block. It aligns with data availability from the sub-compartment database, which is used to estimate timber and carbon flows over time.

- **A residual value assumed beyond 50 years.** This is an assumption that the level of provision from the last year of the forecast period into the future will remain steady with regards to costs and benefits.

The profile of costs and benefits over time are discounted at the social discount rate (3.5% declining to 3% after 30 years) as detailed in the HM Treasury Green Book. Use of the social discount rate to calculate present values, reflects the strategic objectives of balancing social, economic and environmental outcomes.

Structure of the account

The NCA framework is structured around four accounting schedules and reporting statements that draw on, and organise the financial and environmental management data which forms the basis of the natural capital account.
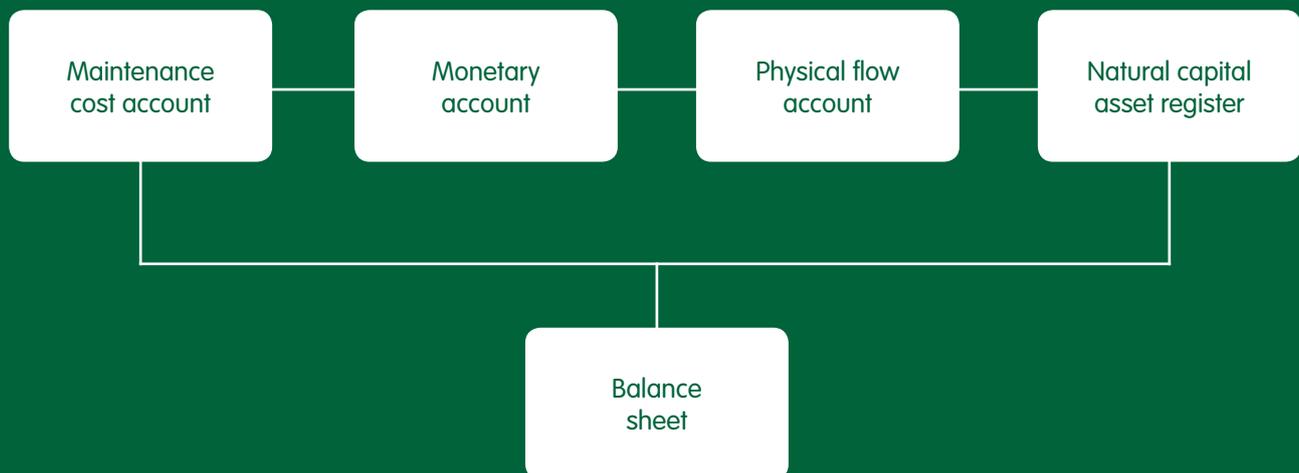
Fig. 2: Forest Enterprise England's natural capital account structure

The schedules each have a different focus which come together and make up the overall account. The purpose of each of the schedules is described in the next section.

FEE natural capital account structure

Natural capital asset register

The asset register is an inventory of the quantity and condition of our natural capital assets. Changes in these metrics over time help us understand the capacity of England's public woods and forests to produce benefits into the future. The asset register can be used as a tool in its own right to monitor the trends of natural capital assets; this is particularly useful while the account is being developed, before all of our assets can be fully represented as a monetary figure.

Physical flow account

The physical flow account records the volumes of ecosystem service flows from England's woods and forests. It covers both market (for example, the amount of timber in cubic metres) and non-market (like the amount of tonnes of carbon sequestered) goods and services. These figures are the basis for subsequently calculating the value of those flows (in the monetary account).

Monetary account

The monetary account is where the annual value of the goods and services flowing from England's woods and forests is reported. It records both the private value - in terms of FEE's revenue from marketed goods and services such as timber - and the external value to wider society from non-market goods and services such as recreation. Both values are netted off, with the cost of producing the benefit removed.

For example the cost of timber harvesting activity is deducted from the total revenue generated. This is so that only the value which comes from natural capital is reported, rather than value generated by other inputs. This is why some of the figures in the monetary account appear different to those reported in the financial annual report and accounts.

We are only able to include benefits in our monetary account where there is a robust evidence base for allocating a value. For example, for recreation we have based our valuation on the results of a study by Willis et al (2003) which gives a value for recreational visits to woods and forests. Because research work has not yet been undertaken for all natural capital benefits yet, we are unable to include everything in the monetary account, which is why FEE's (and anyone's) NCA at present is a partial account.

Maintenance cost account

The costs that are attributable to producing specific goods and services have been netted off against revenues from those goods and services in the monetary account, but there are substantial other costs involved in managing the public forest estate; for example, managing some of our woodland to an environmental standard that is above the standard required for timber production.

The maintenance cost account shows the money needed to manage the natural capital assets of the estate so that the value of the natural capital assets does not decline in the long-term.

Natural capital balance sheet

The natural capital balance sheet is essentially the 'front page' reporting statement of the account: the total net natural capital assets figure is the figure that shows overall value.

It provides an overall summary of the inputs from the four reporting schedules including:

- The total natural capital value derived from England's national woods and forests.

- Sources of change in asset values over the accounting period.

- The balance of private value to FEE to the external value delivered to society.

- The cost of maintaining natural assets and the productive capacity of England's national woods and forests.

The net asset value reflects the value of England's national woods and forests to both FEE as an organisation and the value to society. These values are referred to as 'private' and 'external' respectively, and are combined and balanced against the cost of maintaining and sustaining our natural assets over time.

The natural capital balance sheet highlights that what an organisation produces or delivers may be very under-valued if it is just assessed on the visible financial profit or loss it makes.

There are many factors that can influence the value of natural capital, some of these are within the control of FEE and others are not.

Westonbirt Arboretum

Leigh Woods

Acknowledgements

Find out more

Further information about Forest Enterprise England's Natural Capital Account can be obtained by contacting:

Forest Enterprise England
620 Bristol Business Park
Coldharbour Lane
Bristol
BS16 1EJ

0300 067 4000
fe.england@forestry.gsi.gov.uk