Independent Review of the Requirements for National Forest Inventory Outputs

Report of the Independent Panel

December 2020

Forest Research is the Research Agency of the Forestry Commission and is the leading UK organisation engaged in forestry and tree related research.

The Agency aims to support and enhance forestry and its role in sustainable development by providing innovative, high quality scientific research, technical support and consultancy services.

This report has been produced by an independent panel. Except where otherwise stated, any views, opinions, or recommendations expressed in the report are solely those of the panel.

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Foreword

The new Science and Innovation Strategy highlights that: *forestry in the UK is a vital sector, with forestry and primary wood processing generating £2.5 billion GVA a year, from a total woodland area of 3.2 million hectares. In addition, trees and forests provide a vast bank of natural capital, delivering a wide range of valuable ecosystem services, helping to mitigate the effects of climate change and to address the biodiversity crisis.* Thus, the National Forest Inventory's (NFI) formally recognised role in delivering evidence and information on the current extent, location and nature of Britain's woodlands and of how they might change in the future under defined scenarios is incredibly important.

The information and data collected by the NFI on our growing stock in woodlands and forestry is seen as being essential in both supporting and evidencing policy and investment decisions and the NFI demonstrably has a high impact in its ability to do so. One of the respondents, a key funder, stated: *we see NFI as a 'central source of truth' which ensures that we are all talking about the same information when making decisions about the future of forestry and carbon management in Scotland.*

My own experience from many years in the forestry sector and particularly in productive forestry has emphasised the importance of having good data on growing stock and woodland condition easily accessible. My direct involvement with the NFI team in chairing the Private Sector Production Forecast Working Group has enhanced my appreciation and understanding of the value of the expertise, data and reports produced by the team.

The input from questionnaire respondents, the NFI team, panel members and the assistance from the FR staff allocated assist in designing the questionnaire and providing the critical secretarial and backroom support is greatly valued and this report would not have been possible without them.

It is hoped that this report and its recommendations help the NFI to continue to deliver the extremely important work it carries out and to keep it dynamic and relevant to all of its current and potential users.

Peter Whitfield BSc (For), FICFor, MRICS
Chair of the review panel

Summary

Background and methodology

1)   The National Forest Inventory (NFI) is a long-term, national level monitoring programme on the extent and condition of woodlands in Great Britain. It is composed of annual earth observations to identify the location and extent of woodlands over 0.5 ha in size and a five-year cycle of fieldwork to assess the composition and condition of the mapped woodland areas. The current reporting schedule was devised 10 years ago, and Forest Research wish to understand if that offering is still current and if not, how the current offering could be improved upon. In addition, as technology progresses and interest in woodland evidence increases, how is this best presented and communicated to existing and new customers.

2)   The aim of the review is to look at the existing and emerging service and product catalogue of the NFI with the aim to grow and expand both the catalogue and the markets that the NFI operates in. There were three main stages to the review; an online public survey to gather feedback from existing and potential users of the NFI, a meeting with FR's NFI team to seek their thoughts on the current operation of the NFI and the potential for its future development and a subsequent meeting with FR senior staff in order to discuss the emerging findings and recommendations from the consultation process. The review was conducted from March to December 2020.

Main Findings

3)   Feedback from users indicate that whilst there is clear support for the NFI there is a need for it to evolve and adapt if it is to continue to meet the diverse requirements of the current and future customer base. It is important for the NFI to establish a more structured dialogue with a broader range of key stakeholders, rather than just the current funders of the service, and the report sets out a number of recommendations for doing this. At a basic level, the engagement must be about keeping stakeholders better informed about progress and the development of the NFI, but also about FR looking outward to pick up on changing requirements, new technologies, innovative applications and other opportunities so that it can then consider which of these it might be able to integrate into the NFI offering.

4)   Two concepts which permeate the findings and recommendations of this report are the desire for the NFI to be more responsive to the requirements of users and the opportunities to leverage greater value from the data and the public investment which goes into it. These concepts arise in part from a degree of frustration with the

current lead time for the production of some reports but, more positively, are driven by a desire for new NFI 'products' related to changes in woodland composition and condition and topical areas of public policy as well as the potential for remote sensing techniques to augment the existing field survey programme. Three examples which might contribute towards delivering these concepts are:

a) Allowing some users to have more direct access to NFI 'data' and models in order to produce simple reports and analysis on a self-service basis. These types of tools could allow users to interrogate the data, potentially in combination with other data sets, in order to provide bespoke and on-demand reporting. This could be provided as a service that could be free at point of use, chargeable on demand or as a subscription service, or as a combination for different tools, packages or customers.

b) The development of a set of analytical partners who could either undertake some of the non-core analysis for other users or undertake their own novel analysis. Analytical partners might, for example, be better placed to operate at a regional or local scale and combine the NFI data with other information and datasets, in order to understand how woodland and non-woodland factors might impact on woodland condition and management.

c) Using remote sensing alongside the current field survey programme to produce additional shorter reports on an annual cycle. The publication of results and reports on an annual cycle could provide a better level of engagement with customers, better support monitoring changes in woodland pattern and condition and particularly topical aspects of public policy (for example woodland creation) and fit more readily with their usual annual cycle of business planning and funding.

5) A communication and data exploitation strategy is required to deliver on these concepts, as well as developing and implementing a structured dialogue with a broader range of key stakeholders. This could be led by a dedicated team within FR and should include a strong element of structured collaboration with external partners, especially academia and other bodies that focus on land use research. Finally, the user survey indicates that there is a pressing requirement to improve the NFI (FR) website.

Main Recommendations

6) A full list of recommendations is provided at annex F.

Background

Overview of the NFI

7)   The National Forest Inventory (NFI) is a long-term, national level monitoring programme which reports on the extent and condition of woodlands in Great Britain. It is composed of two elements;

a) annual earth observations to identify the location and extent of woodlands over 0.5 ha in size and;

b) a five-year cycle of fieldwork to assess the composition and condition of the mapped woodland areas.

8)   Together, these provide information on the current state of woodlands and a record of change over time.

9)   Figure 1 gives a timeline of monitoring of woodlands in Great Britain, from its conception in 1924 to the present configuration represented by the NFI. The current programme was established in 2009 (see figure 2) and over the past decade has collected an archive of annual GB woodland area and two detailed assessments of woodland composition arising from two completed field survey cycles and a third scheduled to begin.

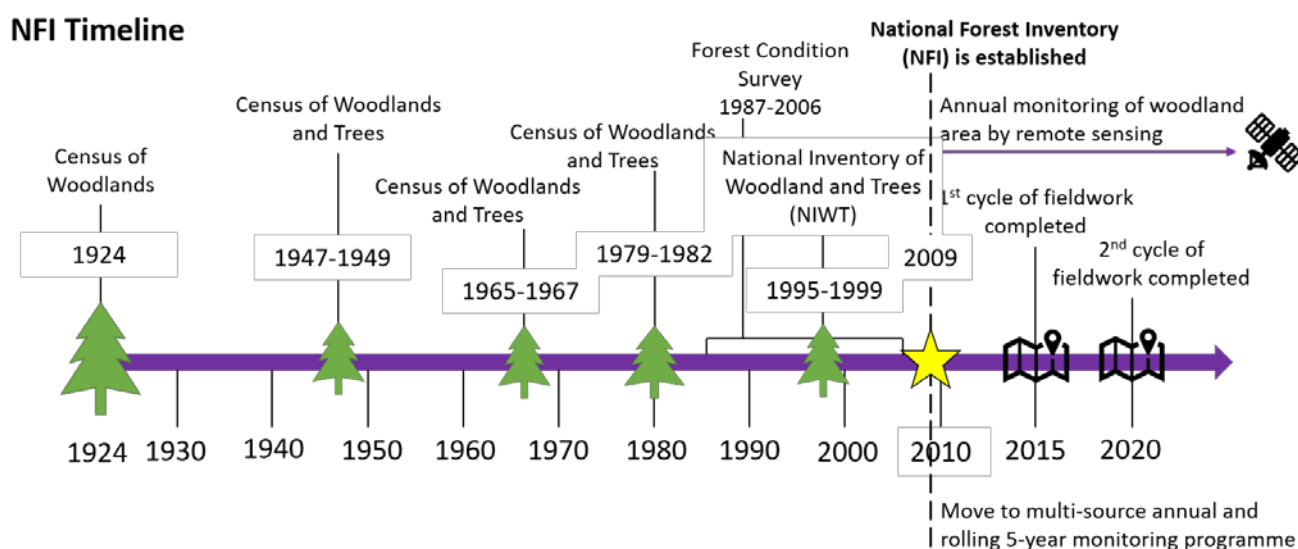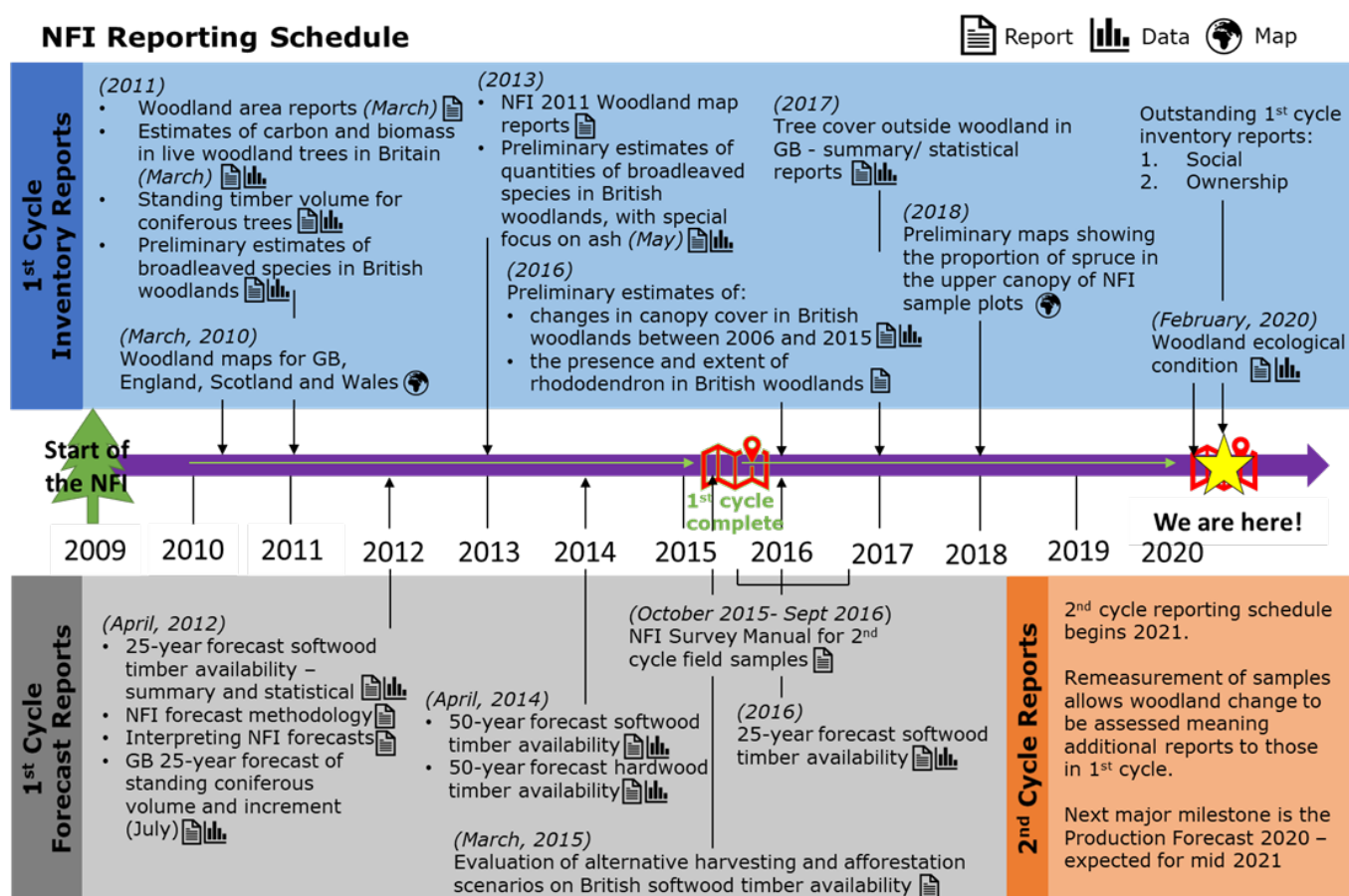*Figure 1: A timeline of woodland monitoring in Great Britain*

Figure 2: A timescale showing the outputs of the NFI reporting from 2009 to mid- 2020.

NFI Reporting Schedule   📄 Report 📊 Data 🌐 Map

1st Cycle Inventory Reports

(2011)
- Woodland area reports *(March)* 📄
- Estimates of carbon and biomass in live woodland trees in Britain *(March)* 📄📊
- Standing timber volume for coniferous trees 📄📊
- Preliminary estimates of broadleaved species in British woodlands 📄📊

(March, 2010)
Woodland maps for GB, England, Scotland and Wales 🌐

(2013)
- NFI 2011 Woodland map reports 📄
- Preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash *(May)* 📄📊

(2016)
Preliminary estimates of:
- changes in canopy cover in British woodlands between 2006 and 2015 📄📊
- the presence and extent of rhododendron in British woodlands 📄

(2017)
Tree cover outside woodland in GB - summary/ statistical reports 📄📊

(2018)
Preliminary maps showing the proportion of spruce in the upper canopy of NFI sample plots 🌐

Outstanding 1st cycle inventory reports:
1. Social
2. Ownership

(February, 2020)
Woodland ecological condition 📄📊

Start of the NFI

1st cycle complete

We are here!

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020

1st Cycle Forecast Reports

(April, 2012)
- 25-year forecast softwood timber availability – summary and statistical 📄📊
- NFI forecast methodology 📄
- Interpreting NFI forecasts 📄
- GB 25-year forecast of standing coniferous volume and increment *(July)* 📄📊

(April, 2014)
- 50-year forecast softwood timber availability 📄📊
- 50-year forecast hardwood timber availability 📄📊

(March, 2015)
Evaluation of alternative harvesting and afforestation scenarios on British softwood timber availability 📄

(October 2015- Sept 2016)
NFI Survey Manual for 2nd cycle field samples 📄

(2016)
25-year forecast softwood timber availability 📄📊

2nd Cycle Reports

2nd cycle reporting schedule begins 2021.

Remeasurement of samples allows woodland change to be assessed meaning additional reports to those in 1st cycle.

Next major milestone is the Production Forecast 2020 – expected for mid 2021

10)   The data produced by the NFI is used by a wide range of public bodies for developing and monitoring the policies and guidance that support the sustainable management of woodland, as well as academia and commercial companies for research and other operational planning.

11)   A core output of the NFI is an annually updated and freely available digital woodland map[1] which is used as the basis of statistics published by the NFI programme and in Forestry Statistics. The woodland data collected in the field surveys is used to produce a series of analytical reports[2] which fall into three main categories:

  a) Inventory reports – which outline the current state of Britain's woodland;

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[1] data-forestry.opendata.arcgis.com/
[2] www.forestresearch.gov.uk/tools-and-resources/national-forest-inventory/

b) Forecast reports – estimating how the woodlands may change over time and;

c) Customised reports – created according to specific requirements as requested from external enquiries.

12)   Most NFI outputs are released as official statistics and comply with the Code of Practice for Statistics[3].

The Review Process

Aim of the Review

13)   The aim of the review is to look at the existing and emerging service and product catalogue of the NFI with the aim to grow and expand both the catalogue and the markets that the NFI operates in. The full terms of reference are given at annex A.

The Independent Panel

14)   Details of the membership of the independent panel are given at annex B.

Review Methodology

15)   The bulk of the period in which the review was undertaken coincided with the outbreak of the COVID-19 virus and the consequent restrictions on business and social activity. As a result, it was necessary for the review to be conducted on a 'virtual' basis with all of the meetings of the review panel and the information gathering exercises being undertaken remotely and online.

16)   There were three main stages to the review:

a) An online public survey to gather feedback from existing and potential users of the NFI. The survey was a mixture of ranked options supplemented with free-text commentary.

b) A meeting with FR's NFI team to seek their thoughts on the current operation of the NFI and the potential for its future development.

c) A subsequent meeting with FR senior staff (CEO, Chief Scientist, Head of Inventory and Forecasting Services) in order to discuss the emerging findings and recommendations from the consultation process.

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[3] https://code.statisticsauthority.gov.uk/the-code/

17)   The findings and feedback from all three of these stages, coupled with the expertise and experience of the panel, has formed the basis of the recommendations in this report. A more detailed methodology and timeline is at annex C.

Findings

The User Survey

18)   Full details of the user survey including the questions, responses and all of the free-text comments are available in annex D. The user survey consisted of 23 substantive questions designed to cover the breadth of the 7 key criteria as set out in the review's terms of reference (see annex A).

19)   There was a total of 62 responses to the survey, of which 17 were formally submitted on behalf of an organisation and 33 on behalf of individuals; 12 respondents skipped this question. The responses covered a wide range of organisations including central government, local authorities, other public bodies, professional and industry representative bodies, commercial (e.g. sawmilling) companies and academia; albeit that the response from academia and the forest industries sector was quite limited. Respondents variously declared themselves, inter-alia, to be; foresters and forestry consultants, agents and managers, silviculturalists, ecologists and conservationists, researchers, owners, directors, coppice worker, woodland planner and heads of business development, planning and environment.

20)   Given the relatively small number of responses and the wide range of views expressed (reflecting the different roles of the respondents and the differing use made of the NFI data and reports), the analysis of the survey has largely been qualitative in nature; albeit that the format of some of the questions allowed for some basic ranking of usage and importance. It should also be noted that the frequency of response to a particular question and its allocated rating or importance by respondents may be skewed by the particular use made of the NFI data and reports by that user. For example, production forecasting is only important to a relatively narrow range of users but the importance of the forecast within this group is very high.

Criterion 1: Confirm the requirement for long term monitoring

Confirm the requirement and importance for long term monitoring that is stable and provides a long-term view on the condition of forest and woodlands in Great Britain.

Evidence from users

21)   Feedback on the primary use of NFI indicates that there is an ongoing need for datasets which provide a degree of long-term monitoring. This is particularly the case for public sector policy teams whose work necessitates a long-term planning perspective, but a similar approach is also reported by some woodland owners and the timber processing industry.

> We see NFI as a 'central source of truth' which ensures that we are all talking about the same information when making decisions about the future of forestry and carbon management in Scotland.

> Heavily reliant on NFI data to inform strategic decisions that inform operational management of the public forest estate in Wales, e.g. forecast availability, as well as forestry policy decisions, strategy delivery, and woodland assessment.

> Long term strategic planning for the development of our business, specifically our harvesting and sawmilling business which is the core of the £200m ... Group.

> As a woodland owner with a young plantation, I look at the hardwood data to understand the current market potential.

> I and my colleagues in Confor, and across the private sector, use all the woodland/tree/forest evidence available via the NFI for various reasons. It is an essential source of data/info for us to promote forestry, estimate wood-fibre availability for investment decisions, species composition to understand species diversity and productivity, habitat condition, forest cover and impact of tree health and impacts of windblown, etc.

22)   In a similar vein, there is a significant interest in datasets which report changes in woodland condition (see figure 3) and, whilst this of itself need not necessarily be 'long-term', it would at the least require a consistent methodology repeated over a reasonable period of time.

23)   The NFI woodland map GI layer influences many land use decision-making activities at a range of scales, both by users with an interest in forestry and those with interests in biodiversity or the ecosystems services that forested land may provide.

24)   Users are developing or using other sources of information, but these are largely to provide accurate information for users with a specific interest in a particular area of land e.g. assessing tree health, identifying the composition of individual stands to species level, rather than a landscape or large-scale assessment.

Figure 3: Table of importance of woodland change assessments

How important to you are each type of woodland change assessments?					
Answer Choice	Very important	Quite important	Not at all important	Don't know/ no opinion	Response Total
1 Type of woodland felled	29	23	6	3	61
2 Type of woodland lost	45	10	3	3	61
3 Trees species change	38	19	1	2	60
4 Actual increment and removals for: Timber, Biomass,	33	23	2	4	62
5 Improvement or deterioration of woodland ecologica	39	17	3	3	62
6 Habitat condition & area change	41	15	2	4	62
7 Tree species diversity and connectivity	42	17	0	3	62
8 Impacts of specific tree diseases over time	45	13	3	1	62
9 Identification of decline in woodlands & linkage	35	21	2	4	62
10 Functions of young tree recruitment to canopy and m	20	28	8	6	62
11 Ownership	27	23	5	5	60
12 Recreational/social use of woodlands	24	22	11	5	62
				answered	62
				skipped	0

25)   Several users comment that provision of a strategic picture, given the fragmented nature of the forest resource and its ownership, is suited to a public solution. Only one provides a counter view, which places the forest owners/manager as the source of field data with the public function one of auditing/verification. However, this is also linked to proving a more continuous and more 'intensive' picture, presumably much more at the land holding level.

Evidence from NFI team

26)   The NFI team highlighted that the basis of sampling on a broad range of forest metrics of interest to industry and to policymakers has established a resource that is robust to short term changes in policy/industry priority (for example around specific plant health threats, or events affecting the viability of downstream industry) whilst providing core data for strategic planning and long term assessment, for example for national carbon accounting.

27)   Whilst the balance of how the information is obtained — field collection versus remote sensing — may change, new techniques are integrated once proven to be robust, respondents consider that the ability to provide a statistically robust picture for many metrics will remain through field data collection for the foreseeable future. However the understanding of the nature of the NFI, particularly what it can and cannot report and the fundamental business case driving its scale and accuracy, has probably declined, as stakeholder engagement scoping high level objectives has been

replaced by a focus with an engagement on developing specific analytical products, and there has been considerable turnover and diversification in the user-base.

28)   The team also highlighted that alongside the planned cycle of long-term data collection and reporting, they are also called upon to respond to more immediate demands, particularly with regard to tree health pests and pathogens, such as the 2012 analysis of Ash Dieback. Given the unpredictable nature of this work and the limited resources available, these immediate pressures can impact on the delivery of longer-term reporting.

29)   Finally, the team highlighted that whilst the lead-time between data collection and reporting might be longer than is ideal, this is often due to the novel and bespoke nature of the reports and the consequential need for consultation with stakeholders and delivery partners.

Criterion 2: Current Demands

What are the demands for the current NFI catalogue of products?

Evidence from users

30)   The user survey asked respondents about the level of importance that they place on NFI products and services as well as the preferred frequency of the delivery of these publications.

31)   Figure 4 shows the relative importance , based on responses to the user survey, of the existing NFI products grouped by; (A) annually updated products and the following quinquennial reports (B) the NFI field survey manual, (C) inventory reports, (D) forecast reports and (E) custom analysis reports.

32)   The highest scoring products are the annually produced, specifically the digital woodland map and the Forestry facts and figures (which contains information from NFI but also many other sources). The lower scoring products all appear to be oriented to the needs of the timber industry (standing timber volume, biomass, and the softwood timber forecasts), although all were considered quite important or very important by the majority of respondents. This scoring may reflect the survey's low return rate from industry representatives and from Welsh & Scottish govt, who might have particular interest in the commercial elements of the NFI products.

Figure 4: Importance of current products
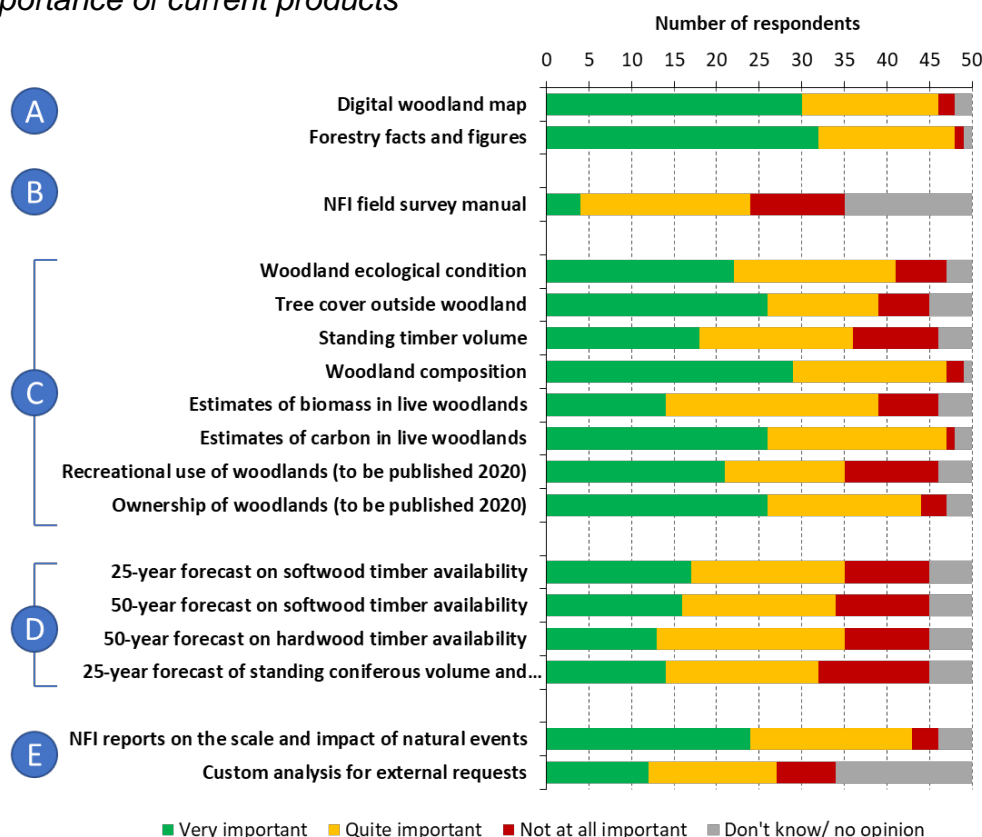
33) This pattern is similarly marked in users' responses on services (see figure 5), where evidence for policy, research and natural capital accounting and tree health is rated highly, with much lower returns of the 'very important' ratings for inventory, forecasting and statistics.

34) Overall, the current frequency of reporting (see figure 6) appears to meet the needs of the majority of respondents, but around 20% of respondents would like an increased frequency of reporting for many assessments. Perhaps unsurprisingly the areas where an increased frequency is most often requested is areas where woodlands are perhaps the most dynamic (see also paragraph 38), for example with trees outside woodlands and recreational use.

Figure 6: Importance of current services
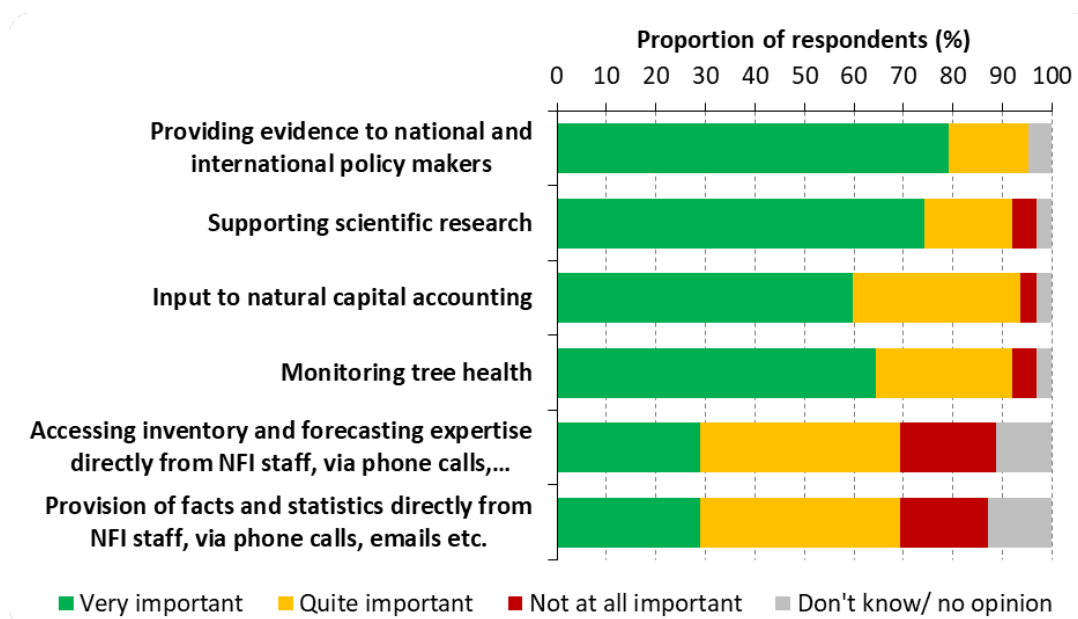
Figure 5: Frequency of Reporting
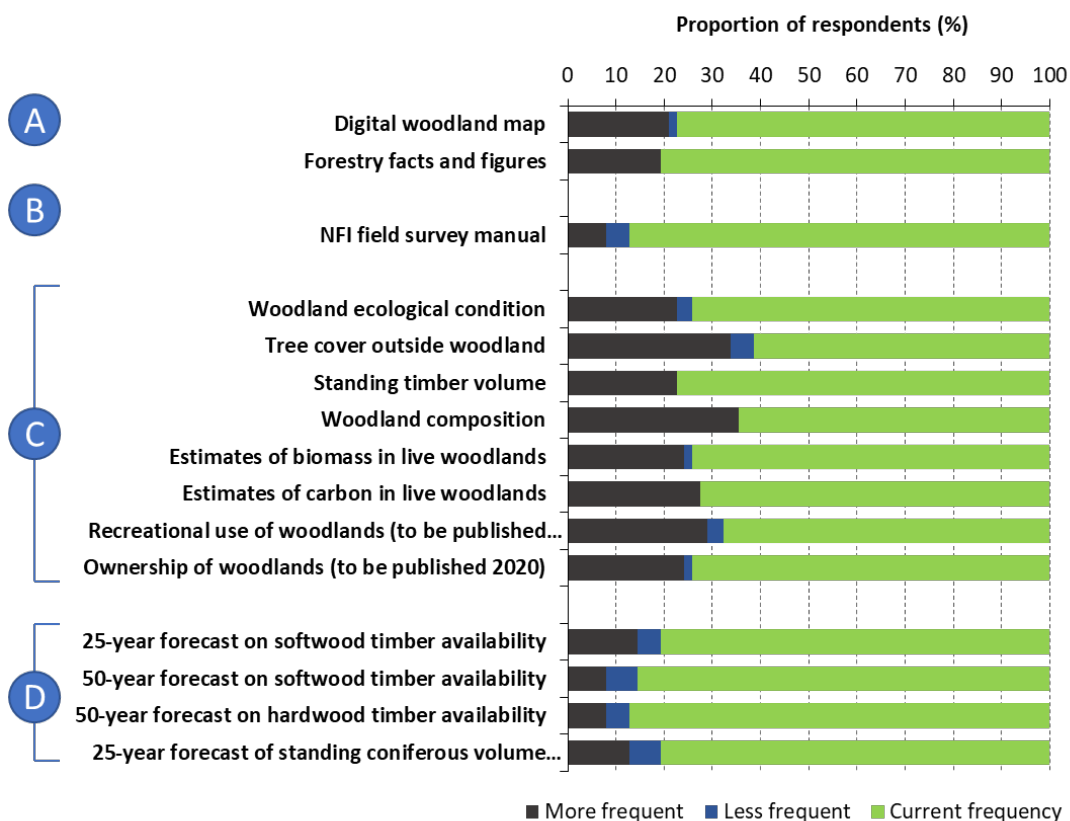
Evidence from NFI team

35)   Whilst new products and services for the NFI are always developed in conjunction with users (this not only ensures that stakeholders have provided input to defining the requirements, but also that products can be properly interpreted and understood), the NFI team expressed a view that many of their stakeholders may be unaware of, or unable to access, previous analyses and this may affect the scoring and value perception within the survey.

36)   The NFI team believes that the viability of the UK timber processing sector and its ability to properly target investment, is supported by the growing stock reports and forecasts from the NFI. Consequently, whilst the user survey might not score these types of products particularly highly, they are nonetheless critical for those users that rely on them.

Criterion 3: Future Requirements

What will be the future product requirements of NFI?

Evidence from users

37)   A significant number of the questions within the user survey provide some insight into the likely future requirements for the NFI. However, given the breadth of the NFI and the diversity of the current user base, the feedback does still allow for a wide interpretation of how the NFI might be developed.

38)   For example, question 12 asks 'if there are any missing products or services that you require that are not being met by the NFI?' Whilst it has been possible to draw out some key themes from the responses — such as, more dynamic data, reports/data on woodland composition, and woodland condition, the specific instances are quite varied and, in some case, quite niche.

More Dynamic data

> Aggregate data should be dynamic and constantly updating, rather than static and just released periodically.

> Moving to a reliable figure on annual felling areas would be really useful, especially if spatially linked to the woodland cover map

Woodland Composition

> Analysis of the tree species composition of UK woodlands would be extremely useful to inform a range [of] work programmes

Data on CCF canopy layers - perhaps something to include biodiversity, AFI Protocol a suggested model?

Urban forestry assessments - canopy surveys

More focused condition assessments.

A small woodland digital map (tree cover outside woodland)

Wood pasture mapping.

More detailed regional analysis of all issues relating to the forecast

Woodland Condition

Quantify damage by grey squirrel.

Wildfire damage of NFI plots would be very important given climate change adaptation requirements

Impact of deer, boar, squirrels and introduction of species. Pine marten and beaver. Locations of veteran and ancient trees.

39)   Question 19 similarly asks 'what other new products, analysis, or services would you like to see provided' and again provides a wide range of suggestions covering woodland composition, woodland condition as well as some specific LIDAR-derived data:

LIDAR-derived DSM and DTM

Lidar generated digital terrain models are used in Scandinavia for planning roads and efficient harvesting operations

Using satellite imagery would seem to offer the greatest benefit to making real-time observations and comparisons for national forest inventory.

40)   However, some responses did provide a useful challenge that whilst additional data and reports will almost always be useful and welcomed by someone, this of itself does not necessarily provide a rationale for providing them: if they are required then they need not necessarily be provided by the NFI or as part of a standard or core reporting programme.

I am concerned at the focus of this survey on new products, analysis or services. All of these things would be 'nice to have' but I am not convinced that they are appropriate to be provided by the NFI!!!

41)   Question 17 draws out the potential for future products collected by remote sensing (see figure 7) and there is an overwhelming response that supports the usefulness of the 8 products and outputs suggested.

Forest Research

Figure 7: Usefulness of products based in remote sensing data
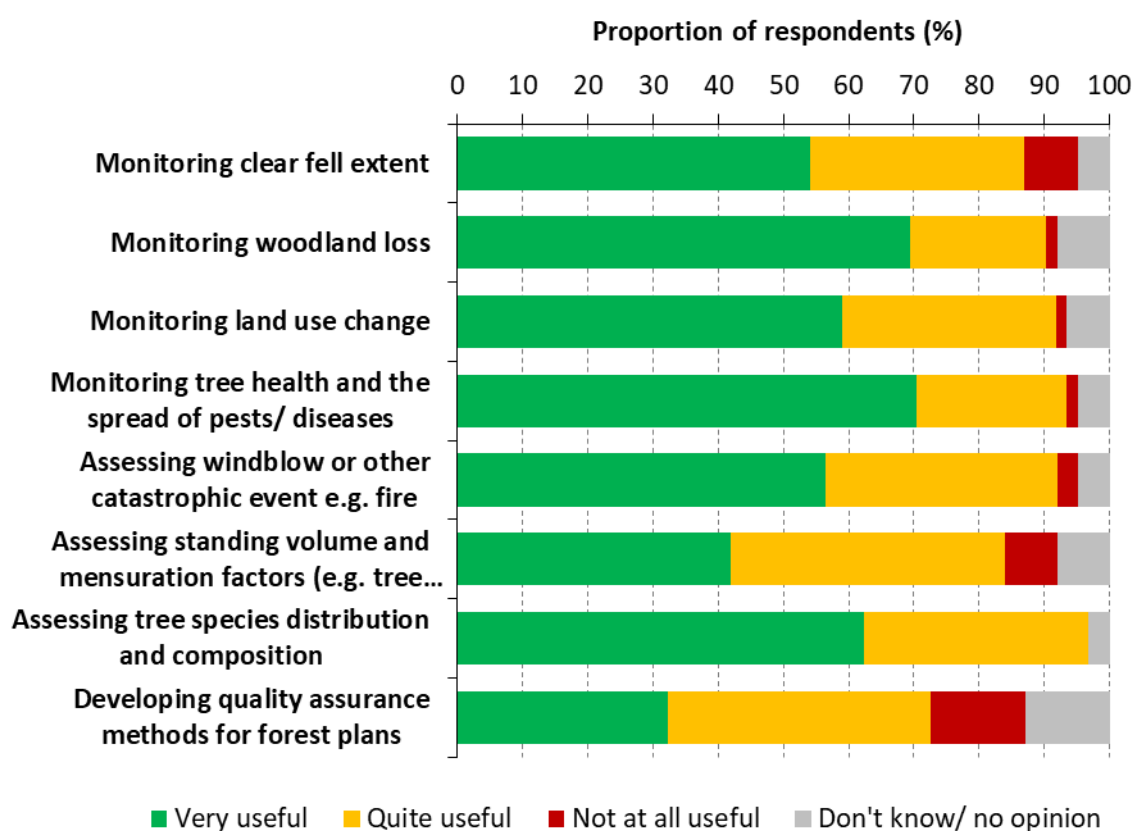
42)   Overall, although there isn't a broad consensus on specific products that might be useful to the majority, if not all of the NFI's current users, there is a reasonable picture that users would like;

a)   access to a GI spatial layer that includes tree species distribution (or more information on tree species),

b)   areas of small woodlands/trees outside of woodlands (maybe overlaps with Bluesky's National Tree Map™),

c)   more on plant health and

d)   modelling products based on ecosystem services.

43)   This lack of consensus could suggest a possible future model where the NFI focuses on a smaller range of core products and that additional reports could be provided to specific users on request – and potentially at an additional cost over and above the core-funded service. The results also draw out an option that FR could focus more on providing a range of tools and models that would enable users to

perform their own secondary analysis, producing custom reports on a 'self-service' basis. This is discussed in more detail later in this report.

Evidence from NFI team

44)   Feedback from the NFI team highlighted a similar range of products and services that could be developed. However, the team also highlighted that further development would necessitate finding an operating and funding model that better supports products (or bespoke requests) that might only be of value to a smaller group of customers. The team noted that, in their view, there seems to be a declining interest in production forecasts and greater interest in trees outside woodland and plant health issues.

> What's clear is that there needs to be space for reactive work built into the schedule.

> Think we have capacity to produce some provisional annual reports – e.g. standing stock

45)   The team also highlighted that there seems to be an overestimation of what can be achieved by remote sensing alone and this needs to be addressed through good communications with users and customers. Nonetheless there is an opportunity to develop products (clearfell maps and change data etc) based on earth observation products.

46)   Finally, reflecting both on the opportunities for developing new products along with concerns about the lead time for publishing results, the team highlighted:

> There might be an option [to] produce shorter national reports and then follow up with regional data. Dynamic modelling can also be utilised to reduce turn-around time.

> Maybe we just need to use existing models in a more innovative way.

Criterion 4: Timings for the next 5 years

In what order or timing would customers place the next 5 years of deliverables?

Evidence from users

47)   Given the feedback to previous questions, it is perhaps unsurprising that, whilst there were a few specific requests, there was little consensus around the future timing and sequencing of individual products. Again, this probably reflects the diverse nature of the NFI user base and the different uses and priorities for NFI products.

48)   However, there was a range of comments in support of increased access to the data and results; be this a range of self-service tools, additional annual reports or simply a reduction in the time between data collection and reporting. This would also support better data on trends of various types:

> Annual reporting of woodland loss to development

> Moving to a reliable figure on annual felling areas would be really useful, especially if spatially linked to the woodland cover map.

> I really need annual reporting of the change in woodland cover (generally loss but it would be good as we move into further implementation of biodiversity net gain to also consider gain) in relation to development.

> Annual surveillance for quarantine pests and diseases should allow long term comparisons to be made about the prevalence of pests and diseases, particularly those which have a negative impact on woodland condition.

> Possibly an additional service would be a biannual report and geospatial map of the volume and location of all the over-mature timber within the UK forests

49)   The feedback on potential missing products also elicited comments about the potential for dynamic data and, as has previously been commented and support for the production of custom reports on a 'self-service' basis:

> Aggregate data should be dynamic and constantly updating, rather than static and just released periodically

Criterion 5: Gaps and deficiencies

Identify any gaps or deficiencies in the existing or developing offering

Evidence from users

50)   The user survey identified a number of products and services which individual respondents consider to be missing; these including information on:

1. Dynamic data, for example, more regular reports, 'live' data, 'clicky' maps.

2. The ability to self-serve simple dynamic reports based on FR data and models.

3. Woodland composition: restocking, spp mix, CCF canopy layers.

4. Non-woodland trees: urban, wood pasture, parkland.

5. Woodland condition: management status and pests and diseases.

6. Carbon stocks and stores.

> "Aggregate data should be dynamic and constantly updating, rather than static and just released periodically" – timber industry

> A small woodland digital map (tree cover outside woodland)

51)   In some instances, these reported gaps are being bridged through the use of other data sources such as:

1. CEH land cover data,

2. Ancient woodland inventory and Native Woodland Survey of Scotland,

3. SAR Sentinel data for woodland structure change.

52)   With regard to LIDAR data, two respondents commented that:

> In the absence of a LIDAR-derived DSM, I generate this for my woodlands with drone photogrammetry, so I can derive up-to-date Canopy Height Models for planning and valuation purposes.

> Wales has LIDAR data - which perhaps could feed into / support NFI

Evidence from NFI team

53)   The completion of the second cycle of data capture provides an opportunity to explore the changes between the two cycles. The development of new models which can compare and contrast the two cycles could form the underpinning for tools which in turn allow users to have some element of self-service. The self-service of tried and tested model outputs for spatial subsets selected by the end users is a realistic goal and would free up time and focus role of published reports.

Criterion 6: Communication and marketing

Provide feedback on our current dissemination, communication and marketing of materials.

Evidence from users

54)   The latter sections of the user survey asked respondents to agree or disagree with various statements around the NFI (FR) website, publications and custom-analysis.

55)   With regard to the current NFI website (which is part of the wider FR website), whilst around 42% of correspondents reported being able to navigate to the NFI pages and find the information that they need, the remaining 58% either disagreed or neither agreed nor disagreed. Free text comments included:

> Providing keywords that would allow one to search the NFI for specific topics?

Forest Research

Much clearer website and links. Along with colleagues we have found a sharp decline in usability of the website in the last two years

Bespoke website with better access and organisation of information. More detail on silvicultural systems, woodland structure and silvicultural interventions / management

There is a lot that can be done to upgrade and provide more real-time data for end users. I would also recommend that you have a stand-alone platform where information can be more easily searched and retrieved. At the moment the menu is very confused and there is a piecemeal approach to the data presentation.

I would also like to be able to find a lot more of the archival information from earlier surveys and assessments. It would all be in one location. The same is true for aerial and remote sensing data/outputs. I agree this may be a challenging undertaking, but I hope this review is an opportunity to argue the case for an upgrade from the end-user perspective.

56)   Whilst feedback on publications (see figure 8) was generally more positive, for example that inventory and forecast reports are fit for users' needs and methodologies are clear, there was still a significant proportion of users that were at

Figure 8: User feedback on publications

To what extent do you agree or not with the following statements about current NFI publication of data, communication and marketing of materials? Publications							
Answer Choice		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Don't know	Response Total
1	I know where to download the digital woodland map.	5	30	6	13	1	7	62
2	The woodland map is fit for my needs.	1	19	23	10	0	9	62
3	The inventory reports are fit for my needs.	0	26	17	8	3	8	62
4	The forecast reports are fit for my needs.	1	22	19	4	3	13	62
5	I am happy with the time taken between the end of data collection in a field cycle and the publication of	0	10	12	23	9	8	62
6	I am satisfied with the presentation of NFI reports.	2	23	21	10	1	5	62
7	The data in accompanying Excel spreadsheets are well-presented.	1	27	12	5	2	15	62
8	The data in accompanying Excel spreadsheets are fit for my needs.	1	24	15	7	3	12	62
9	The methods used by the NFI are presented in clear methodology reports.	3	29	14	2	2	12	62
10	I would like more easily accessible information e.g. infographics.	12	31	12	0	0	7	62
11	I would like to receive notification about new publications from the NFI.	21	28	8	0	1	4	62
							answered	62
							skipped	0

least ambivalent in not having an opinion or neither agreeing or disagreeing. Furthermore, 50% of users responded as being unhappy with the time taken between data collection and publication. There is also a request for more infographics within reports and this ties in with comments relating to reports being too wordy:

> Shorter more factual reports would be better, there has been the tendency to write reports which are very long and contain too much commentary/opinion. Hopefully by shortening the reports they can be produced more quickly and use fresher data.

> Much faster response time. I have made two inquiries about NFI data, one was first acknowledged EIGHT MONTHS later; the other took more than one month. This is incredible for a public funded information service.

57)   Better and more efficient notification of new reports to users is also identified as an improvement needed; 70% of respondents said they would like to receive notification of new publications. This view of respondents ties in with a need for better communication and the use of the most up to date media messaging.

58)   There is a low-level of awareness on how to inquire about custom analyses and reports, which may be a significant lost opportunity for FR, given that a higher proportion of respondents accept that they may need to pay for any additional work. Of the 32 users that responded to whether they were happy with the product / response that they received from an information request, only 15 responded affirmatively.

> Clearer process for commissioning custom reports. Agreed timelines and specifications to be provided.

59)   Finally, the free-text comments highlighted a general desire for increased publicity and awareness:

> Raised general awareness

> More publicity

> Level of awareness is low. There is a huge amount of useful data available from the NFI which could be more widely promoted both in the forest sector and beyond

> Don't keep yourselves so secretive!

> Timely publication of reports on all aspects of the NFI including the ownership and social use data.

60)   The key messages drawn from this section of the questionnaire are the need to;

a) reduce the time between data collection and publication, for example through the use of self-service tools or additional annual reports, and

b) renew or refresh the website to make it more accessible and easier to use. Users raised the point that it is not easy to search for data or reports.

Evidence from NFI team

61)   The NFI team acknowledged and highlighted that there is scope to improve the engagement with NFI users, the overall communication of progress and the marketing and dissemination of results and publications. The team felt that this is in part because there hasn't been a concerted effort to 'sell' the importance of the NFI for several years, and in the intervening period many of the users who were engaged with NFI (particularly in the public sector) have moved onto new roles.

62)   The team considered that an education exercise with customers outside of the funders and funding cycle would be worthwhile. A second factor (and constraint) is partly an organisational structure issue whereby the same people within the NFI Team are responsible within the team for reporting tool development, producing the forecasts and communications.

63)   Further, the NFI Team acknowledged that there is a need for a better marketing and communications strategy, for example making use of Twitter and other social media platforms, along with an improved website.

64)   In developing a new website there is also a good opportunity to develop new ways of working, such as a self-service automated reporting tool hosted online for pre-derived data. This could produce a basic set of queries for people and would not require a production of a report by the NFI team. It would however require some additional resources (money and staff) to implement.

65)   The team highlighted the demand on resources for report production and the shifting priorities and urgencies that can delay production of core reports. This is partially a resource issue in terms of numbers of people but also the changing nature of report requirements, e.g. carbon stock assessment having a much higher profile from other Government Depts now, compared with when the NFI reporting schedule was agreed/established.

66)   It is also possible that the NFI could share some provisional results (as for example, greenhouse gas inventory provisional statistics published by BEIS[4]), and shorter national reports followed up by regional data, albeit it would be important to ensure that any early results don't provide and inaccurate or misleading

[4] Department for Business, Energy & Industrial Strategy

interpretation of the data. Sometimes you can't explain the 'macro' without looking at the 'micro': you can give the quantum of change but not necessarily the understanding of why something has changed.

Discussion and Recommendations

Value and Purpose of the NFI

67) Although it is not within the Panel's remit to comment on the policy context within which the NFI operates, there are two strategies – the UK National Data Strategy and the Science and Innovation Strategy – and which are directly pertinent to this review and the NFI itself:

a) The UK National Data Strategy[5] (September 2020) highlights unlocking the value of data across the economy as the strategy's 'Mission 1' and comments that: *data is an incredibly valuable resource for businesses and other organisations. However, there is increasing evidence to suggest its full value is not being realised because vital information is not getting to where it needs to be. To ensure the UK is a world leader in data, our first mission will be to set the correct conditions to make data usable, accessible and available across the economy, while protecting people's data rights and private enterprises' intellectual property.*

b) The Science and Innovation Strategy for Great Britain[6] (SIS) (October 2020) directly references the NFI as part of the resource assessment and sector monitoring theme: … *Further development is required of underpinning data capture techniques and a range of models to provide updated estimates and timely identification of changes and trends … Develop the data acquisition capacity of the NFI and ensure effective utilisation of data for monitoring SFM of all woodlands.*

68) Both of these documents are helpful and timely in understanding Ministers' aspirations for the use and development of public data and, in the case of the SIS, Ministerial endorsement from all three nations of the NFI's ongoing role as a strategic GB resource with the potential for further development. It is pleasing to be able to report that, when taken in the broadest sweep, the feedback from users also supports these aspirations as well as providing some clear challenge and suggestions as to how the NFI needs to develop in order to fulfil its role.

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[5] UK National Data Strategy
[6] Science and Innovation Strategy for Great Britain

69)	Whilst the feedback from NFI customers and users highlights a number of concerns and challenges, it is clear that there is still a broad appreciation of the value of the NFI and, in a wider sense, the need for strategic datasets that present a long-term, temporally consistent and holistic view of trees and woodlands in the UK. The panel is therefore content that the NFI should continue as a core component of FR's offering to the sector.

70)	However, it is also clear that there are a number of different perspectives on exactly what the NFI should produce and how it should operate. There are many suggestions of new products that the NFI could offer as well as a desire for NFI to be more focused on a core set of outputs supplemented by bespoke tools and reports (see Reporting Cycles below). For example, the user feedback (see figure 7) showed very strong support for the eight suggested new products relating to changes in woodland composition and condition, but the challenge is to find a business model and appropriate funding stream to support their production. These differing perspectives are probably indicative of the diversification of the NFI user base. The 10 years that the NFI has operated in its current form has seen the devolution of state-owned forestry across GB into a variety of new organisations which, whilst ostensibly fulfilling similar roles, are nonetheless quite distinct in their policy and operational focus. This devolution has been accompanied by a significant change in key personal such that the rationale for the NFI and level of institutional knowledge of the contribution that the NFI makes to the businesses is somewhat less than it was when the NFI was established.

71)	Whilst the user feedback points to the strategic importance of the NFI, this is clearly contingent on the NFI being able to capture data and report on those aspects of woodland composition, condition and management that are of strategic importance to users. This is particularly the case with topical areas of public policy. For example, it can be expected that the expansion of woodland area will be important for all three governments for the foreseeable future. A second example might be the importance of biodiversity and ecosystem services derived from woodlands through, for example, capturing information on rides, open spaces and silvicultural practice. At a practical level therefore, it is important that the satellite and field sampling strategy is optimised to capture these relatively small-scale but nonetheless important aspects.

72)	It is the Panel's view that whilst there is clear support for the NFI, there is also a need for it to evolve and adapt if it is to continue to meet the diverse requirements of the current and future customer base. In addition, the FR / NFI team needs to re-engage with customers, firstly to better understand those requirements and secondly to reinforce the value of the NFI as a strategic resource to their businesses; ensuring

that the appropriate high-level messaging is in place is in many ways as important as the detail and the outputs.

Recommendation 1: That FR re-establishes and articulates the rationale and strategic importance for the public provision of a dataset that supports industry as well as the development of public policy.

Recommendation 2: That FR clarifies with stakeholders a set of core products and services that are required from the NFI and ensures that these are fully supported by the current funding model.

Recommendation 3: That FR ensures that the NFI has the structure and resources to sustain better engagement with the diverse user base in order to help develop the service and find opportunities to diversify the funding base.

Recommendation 4: That FR ensures that the data captured is appropriate to be able to report on and inform the development of key policy areas for all three governments.

Stakeholder Engagement

73)   Alongside the need to re-establish the basic dialogue with current and potential customers, it is clear from the feedback that users of NFI products have a low understanding of the progress of the NFI through its repeat cycle of inventory and the timetables for the production of individual reports. This leads to a perception that the time taken to produce reports is too long, or individual reports being delayed or late, and this in turn results in an evident frustration with the overall service. The NFI team also acknowledged this perception and frustration, which may in part point to a number of challenges in the operation of the NFI (cost recovery funding model, short-term funding cycles, the need to react to urgent requirements of funding partners, etc.).

74)   There is a need to better communicate with funders and other stakeholders through improved communication and engagement. This should focus on the NFI cycle and would undoubtedly help alleviate some of the confusion and frustration. It could help users to better understand the consequences of switching resources to meet short-term demands and perhaps foster a greater sense of partnership with funders and other key stakeholders. It may also allow for an element of peer input into the structure and content of individual reports.

75)   The panel therefore believes that it is important for the NFI to establish a more structured dialogue with a broader range of key stakeholders, rather than just the

current funders of the service. There are a number of approaches that this engagement could take:

a) A steering group of funders and key industry users to help direct the development and progress of the service. Although it is unlikely that the funders and industry representatives would want to have a formal role in directing the service, there may be an appetite for periodic engagement to help provide an agreed focus and priorities for the coming period. This might be linked to the business planning cycle. The main funders for the NFI (i.e. country representatives) currently play this role, at least in part, through the IFOS Service Forum, the Science and Innovation Strategy's (SIS) Research Strategy Group and SIS research programme steering/advisory groups.

b) An annual user forum of both stakeholders and key customers, so they are updated on the state of the current field cycle, reporting from completed field cycles, annual forestry statistics and a look ahead for what to expect from the NFI over the next 12 months. This could take the form of a presentation hosted by the NFI team (virtual or in-person) along with some feedback sessions to gauge future requirements and priorities.

c) Development groups to help with the development of specific products or themes; be they individual reports or new bespoke service areas. It may be that these are tied into the product production cycle or individual products (which might be annual or quinquennial) or operate on a task and finish basis for new product / service development. Woodland condition monitoring, carbon capture and remote sensing are examples of areas of increasing interest and have the potential to bring funding from the key stakeholders interested in these areas. Such groups are already used by the NFI team, for example the Production Forecast Board [or steering group] and task and finish groups established for each of the NFI topic reports.

76) At a basic level, the engagement must be about keeping stakeholders better informed about progress and the development of the NFI; but perhaps more importantly it is about FR looking outward at changing requirements, new technologies, innovative applications, and other opportunities so that it can then consider which of these it might be able to efficiently integrate into the NFI offering. It is likely that this intelligence-gathering and environmental scanning will be best undertaken through high-level bilateral engagement with partners as a separate exercise to any collective updating process. Similarly, an annual forum of users might best be held at country level to ensure that NFI is involved in the country level dialogues without initially needing to be concerned about any cross-border sensitivities.

Forest Research

Recommendation 5: That FR establishes a structured ongoing dialogue with customers and other interested parties so they are aware of the status of the current field cycle, what to expect from the NFI over the next 12 months and can help to inform the ongoing development of the service.

Reporting Cycles

77)   Although much of the feedback from users related to developing new products and services, there is also a strong desire to improve on the delivery of current products or to present information in new and innovative ways.

78)   One of the components within the feedback was for a greater proportion of reporting and publishing to be done on an annual rather than quinquennial basis, in particular for monitoring changes in woodland pattern and condition and particularly topical aspects of public policy (for example woodland creation), particularly those that can be monitored through remote sensing. Whilst it would be important not to lose sight of the strategic nature of the NFI nor the importance of long-term funding, the production of annual reports or publications (such as the Forestry Facts and Figures) would provide a better level of engagement with customers and fit more readily with the usual annual cycle of business planning and funding.

79)   It should however be noted that this approach might not be appropriate for every report produced by the NFI and it may necessitate changes in the methodology for data collection, with either the introduction of a specific annual collection cycle or an adaption of the existing quinquennial process to ensure that statistically valid reports can be produced on an ongoing basis.

Recommendation 6: That FR looks to adopt new technologies and methodologies to allow for both an annual cycle of data collection, analysis and reporting (if necessary), alongside the current quinquennial cycle whilst still supporting robust and consistent long-term sampling. In doing so, FR should look for any quick wins for new products or services (e.g. simple adjustments to field protocol which don't significantly increase visit/survey time).

Data Exploitation

Data Exploitation Strategy

80)   One of the broader cross-cutting areas of feedback, both form NFI users and the NFI team is the potential for leveraging better value from the NFI data. This is in part related to allowing greater and easier access to the data but also to provide opportunities to combine the NFI data with other datasets or to collaborate with other research programmes and academia to develop new and innovative uses for the data.

Although some of this engagement is already evident, it is the Panel's view that there is scope to develop this much further through a smarter and clearer data exploitation strategy.

81)   The development and implementation of the strategy could be led by a dedicated team within FR but should include a strong element of structured collaboration with external partners, especially academia and other bodies that focus on land use research.   Creating a dedicated team might also provide a clearer distinction between 'operations' and 'development' which might be helpful in providing a clearer internal focus as well as a greater clarity for users and partners.

Recommendation 7: That FR develops and publishes a data exploitation strategy that sets out how FR will unlock and maximise the value and benefits that can be derived from the NFI data.

Self-Service Portal

82)   Whilst the time lag producing reports might in part be due to limited resources, modern technologies provide significant opportunities for users to produce simple reports and analysis on a self-service basis. Whilst there is clear feedback that some users would like more direct access to NFI 'data' it is the Panel's view that this would in reality not prove to be particularly helpful for most users. Improved access to data would, in the Panels' view, need to be supported by a set of models and tools that assist the interpretation of that data, for example through stratification, filtering and spatial analysis. These types of tools would allow users to interrogate the data, potentially in combination with other data sets, in order to provide bespoke and on-demand reporting. This could be provided as a service that could be either free at point of use, chargeable on demand or as a subscription service, or as a combination for different tools, packages or customers. These facilities could be provided through an online portal, through integration with other tools such as Forester or via one or more commercial business partners.

83)   This would of course require careful development in conjunction with existing and potential funders and users in order to provide a strong business model for the service and to ensure that the necessary skills and resources are in place. It is acknowledged that changing the character of the service will require significant capital and skills investment.

Recommendation 8: That FR develops a range of tools and business model(s) that allows users to perform simple queries and produce reports on demand and on a self-service basis.

Analytical Partners

84)   An additional approach to self-service portal could be the development of a set of analytical partners who could either undertake some of the non-core analysis for other users or undertake their own novel analysis. This approach might help to leverage additional overall value from the public investment in the NFI data set. The analytical partners might for example be better placed to operate at a regional or local scale and in doing so might also be better able to combine the NFI data with other national, regional or local datasets to again provide new or alternative insights into the state of woodlands (and potentially non-woodland trees). This approach would of course require careful consideration for the control and management of data, but such access could be controlled through licences covering ownership, usage, GDPR and any other data-related issues. (See also Communications and Marketing below.)

Recommendation 9: That FR explores the development of analytical partners who could, under licence, provide additional analysis and services that build on the NFI dataset.

Communications and Marketing

85)   The user survey indicates that there is significant opportunity to improve communications around the NFI and, in particular, there is broad outright criticism of the existing website. The concerns, and therefore opportunities, around communications relate directly to the previous discussion and recommendations on stakeholder engagement, data exploitation and self-service solutions. Fundamentally, it requires a clearer understanding of how the NFI adds value to policy development, operational planning and wider research and how FR can develop as the provider of choice for applied forest science and data services.

Recommendation 10: That FR develops a structured communications and marketing plan using social media and other means of suitable communications with users to keep them informed of what is happening in terms of work and upcoming publications.

86)   There is a requirement to improve the NFI (FR) website. Feedback indicates that the existing site is difficult to navigate, and an improved site that supports the wider narrative indicated above, as well as the type of self-service and interactive tools described elsewhere in this report, will not only encourage better engagement but also enable opportunities for the development and selling of existing and new products.

Recommendation 11: That FR develops a new website which improves user awareness, collaboration and knowledge transfer.

Official Statistics and Quality Assurance

87)   The designation of certain NFI outputs as official statistics is undoubtedly important and helpful in providing users with assurance that those outputs are produced to a consistently high standard and can be relied upon for any further analysis, policymaking or business planning processes. However, there is also a perception and frustration that the designation might in some instances contribute toward a delay in the publication of some results. It is difficult for the panel to determine whether there is an actual delay and, if so, whether that delay is in some way disproportionate to any benefit derived from the designation but, to the extent that some NFI users have expressed the perception and frustration, there is an issue which the panel believes needs to be addressed. This issue might simply require improved communications around the processes and timeframes for the production of reports, but there may also be merit in reviewing which publications are designated as official statistics, considering the quicker publication of shorter outputs ahead of the release of underlying data (perhaps for example through a quarterly of biannual summary of the NFI progress and findings) and reviewing the sequence of publication to minimise any dependencies between them.

88)   Whilst there may be benefits from improving the responsiveness of the NFI as set out above and elsewhere in this report, it will be important to ensure that this doesn't compromise the quality control and quality assurance (QA) associated with the preparation of the data and publications. Nonetheless, the panel believes that this should not prevent FR from exploring opportunities to publish reports and analysis at different stages of development. Further, whether or not FR decides to explore any of these options, the panel believes that it would be helpful for the NFI to publish clearer information on the quality assurance methodologies and standards that underpin NFI outputs (data, models and results), in order to provide users with confidence and clarity around their application.

Recommendation 12: That FR ensures that the designation of NFI outputs as official statistics does not have a disproportionate impact on either the lead time for the production of reports not the ability of FR and others to develop and exploit the value of the NFI data and models.

Recommendation 13: That FR publishes clearer information on the quality assurance methodologies and standards that underpin NFI outputs (data, models and results), in order to provide users with confidence and clarity around their use.

Possible Future Operating Model

89)   This report highlights a number of suggested structural and conceptual changes which FR may wish to consider as part of its future development of the function. It should be emphasised that the suite of suggestions and recommendations is as much, if not more, about doing existing things differently than it is about doing different things. The user feedback suggests a wide range of new aspects of data collection, analysis and reporting which the NFI could undertake, but before embarking in any particular direction, FR must understand how any new products or services will fit into its business model and add additional value for its funders and users. There is a perspective that the NFI should be doing less but enabling more. Figure 9 provides an example of how some of the recommendations might form a possible future operating model for the NFI.

90)   In addition to supporting the existing core users of the public policy teams, industry and operational managers, there is an opportunity to amplify the public benefit being derived from the NFI data through increased engagement with

Figure 9: NFI possible future operating model
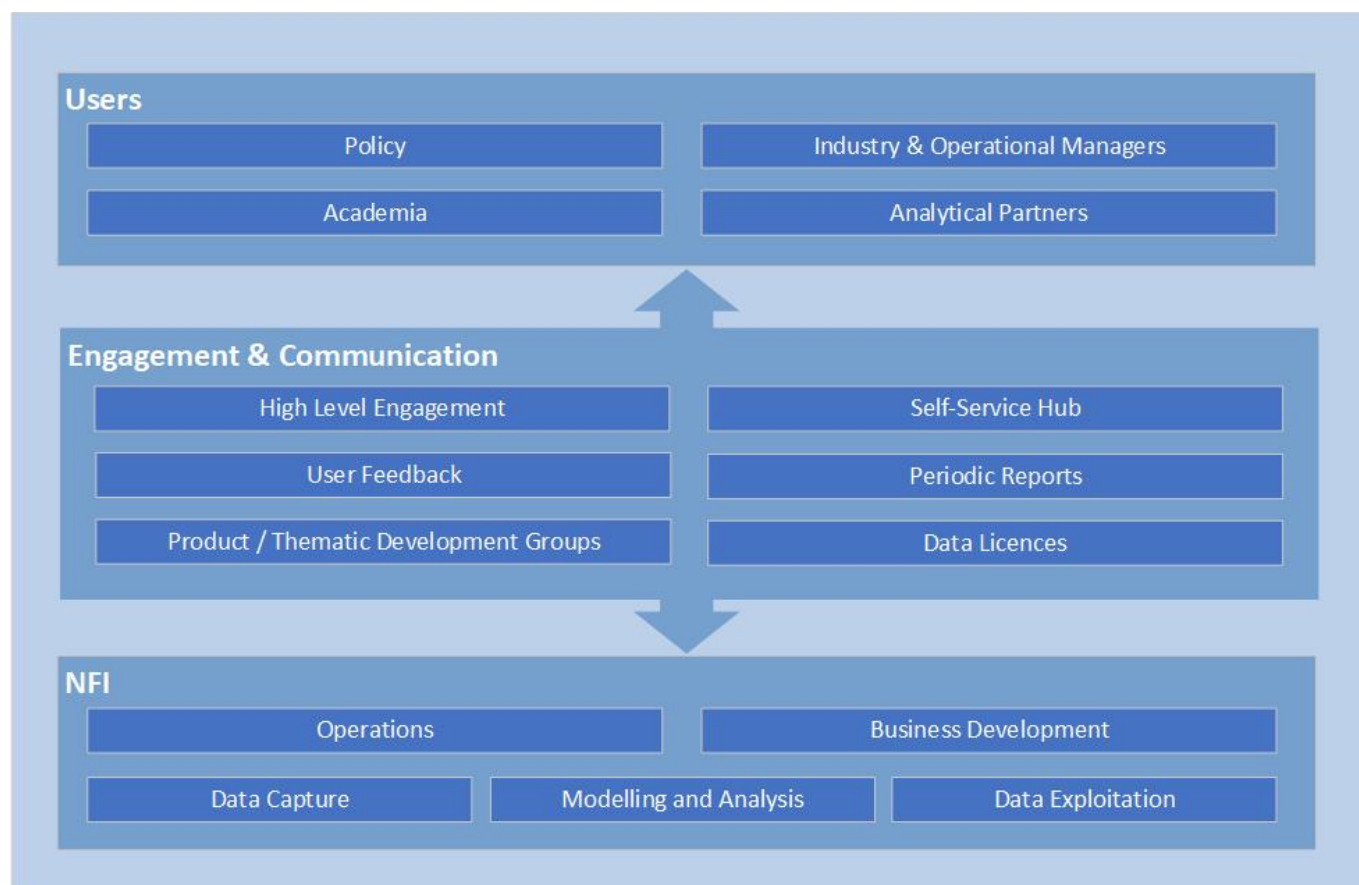
academia and the introduction of analytical partners. Academia, including the wider FR, offers the potential to incorporate and use the NFI data and models in wider research, analysis and the pursuit of evidence-based policy making. Analytical partners, which may include academia, have the potential to provide the capacity and granular capability to serve the needs of regional and local users as well as some of the more specialist modelling / reporting requirements.

91)   Underpinning this broader and more informed use of the NFI are some suggested new and improved pathways for engaging and communicating with users. Users require and desire better, more regular and more structured engagement with the NFI. The suggested combination of high-level engagement—probably bilaterally or at country level, coupled with regular, broader two-way user feedback and 'task and finish' product / thematic development groups should provide users with the information that will give them confidence in the running of the service and the NFI team with the intelligence to optimise and develop the service for new and emerging priorities. A virtual self-service hub would support this engagement whilst also empowering users to undertake their own simple analysis and reporting, thereby improving the actual and perceived responsiveness of the service and significantly increasing the derived value and benefit from the ongoing public investment. Data licences are intended as a vehicle to enable the development of analytical partners as set out in paragraph 90 above. The licence would allow for ongoing access to data and models and, if considered appropriate, might allow for the commercial exploitation of those within any prescribed limits. This, of course, should not lose sight of the importance of reporting, including the production and publication of official statistics, but the nature, frequency and format of these reports will evolve to compliment the other engagement and communication opportunities.

92)   The final component of the model is the form and function of the NFI itself. Whilst it might be difficult to increase the capacity within the team, it is the Panel's view that the team requires something of a shift in focus. Alongside the operating the current business there needs to be a clear focus on business development. This development should start with mapping the pathways and opportunities for greater data exploitation, particularly the self-service hub and data licences, and then work back through the modelling, analysis and data collection as required in order to support the new pathways. This will, of course, need to go hand-in-glove with the product / thematic development groups and the other engagement and communication opportunities. Again, for emphasis, the suggested focus is as much about doing existing things (outputs and user benefits) differently as it is about doing different things. It is about enabling others to self-serve their own requirements and

supporting third parties to fill and develop new and niche analysis and reporting opportunities.

Conclusion

93)   The panel believes that the feedback from NFI users, coupled with the newly endorsed areas of research interest within the SIS, provide clear evidence of the ongoing support for the NFI. If the opportunities to develop the service with a renewed focus on business development and empowering others to leverage better value from the data and investment can be grasped, then the panel believes that the NFI and have a mandate and model for at least another 10 years.

Annex A: Terms of Reference

The aim of the review is was to look at the existing and emerging service and product catalogue of the NFI with the aim to grow and expand both the catalogue and the markets that [the NFI] operates in. NFI was originally mandated and designed to produce an enduring evidence base of woodlands that could meet both current and future reporting requirements. The current NFI reporting schedule was devised 10 years ago.

Over the past decade technological advances and an increased interest from both the general public and government in woodland data has led to the need to review the information needs of the NFI. The aims of this review are, therefore to:

1. Confirm the requirement and importance for long-term monitoring that is stable and provides a long-term view on the condition of forest and woodlands in Great Britain.

2. What are the demands for the current NFI catalogue of products?

3. What will be the future product requirements of NFI?

4. In what order or timing would customers place the next 5 years of deliverables?

5. Identify any gaps or deficiencies in the existing or developing offering.

6. Provide feedback on our current dissemination, communication and marketing of materials.

7. Any other customer feedback that will help us develop and grow.

Annex B: The Independent Panel

Peter Whitfield (chair)

Peter is currently Business Development Director at Tilhill Forestry has more than 40 years' experience in Forestry both in the UK and overseas. Peter's experience is in harvesting and general management as well as forest management. Areas of particular interest are people development, strategy and business development. A Fellow of the ICF Peter has held a number of industry posts including being a member of the Expert Committee on Forest Science, Chairing Confor's Technical and Compliance Group, a member of the ICF

Professional and Educational Standards Committee and chairing the current Private Sector Production Forecast Working Group for Forest Research.

Lawrence Way

Lawrence is an analytical team lead at the Joint Nature Conservation Committee (JNCC) delivering evidence from strategic long-term surveillance, modelling and remote observing into environmental policy within the UK and internationally. He has worked at the science policy interface for 35 years drawing new technologies and analytical techniques into practical operations.

Mark Broadmeadow

Mark is Principal Adviser for Climate Change in the Forestry Commission and is currently their policy lead for woodland creation. He works closely with Defra on climate change adaptation and mitigation, including forestry's role in helping to meet future carbon budgets. He has sat on steering Boards for Inventory, Forecasting and Operational Support for more than a decade and prior to taking up his current role in 2007, was Head of the Environmental Research Group in Forest Research.

Kari Korhonen

The panel are grateful for early input from Kari Korhonen, head of the Finnish National Forest Inventory, although Kari was unfortunately unable to support the review through to the analysis of results and the drafting of this report.

Annex C: Timeline and methodology

1)   A timeline of the NFI Review is provided in figure 10. The beginning of the NFI review process coincided with the onset of COVID-19 and all interactions/activities had to be held remotely rather than in person. The inaugural meeting of the review board was held on the sixth March 2020 via Skype. This meeting was attended by the review board members as well as senior representatives from FR. It was agreed that the FR representatives were happy to not have an active role in the review process but to be available to assist with any matters arising requiring their input.

Figure 10: NFI Review Timeline
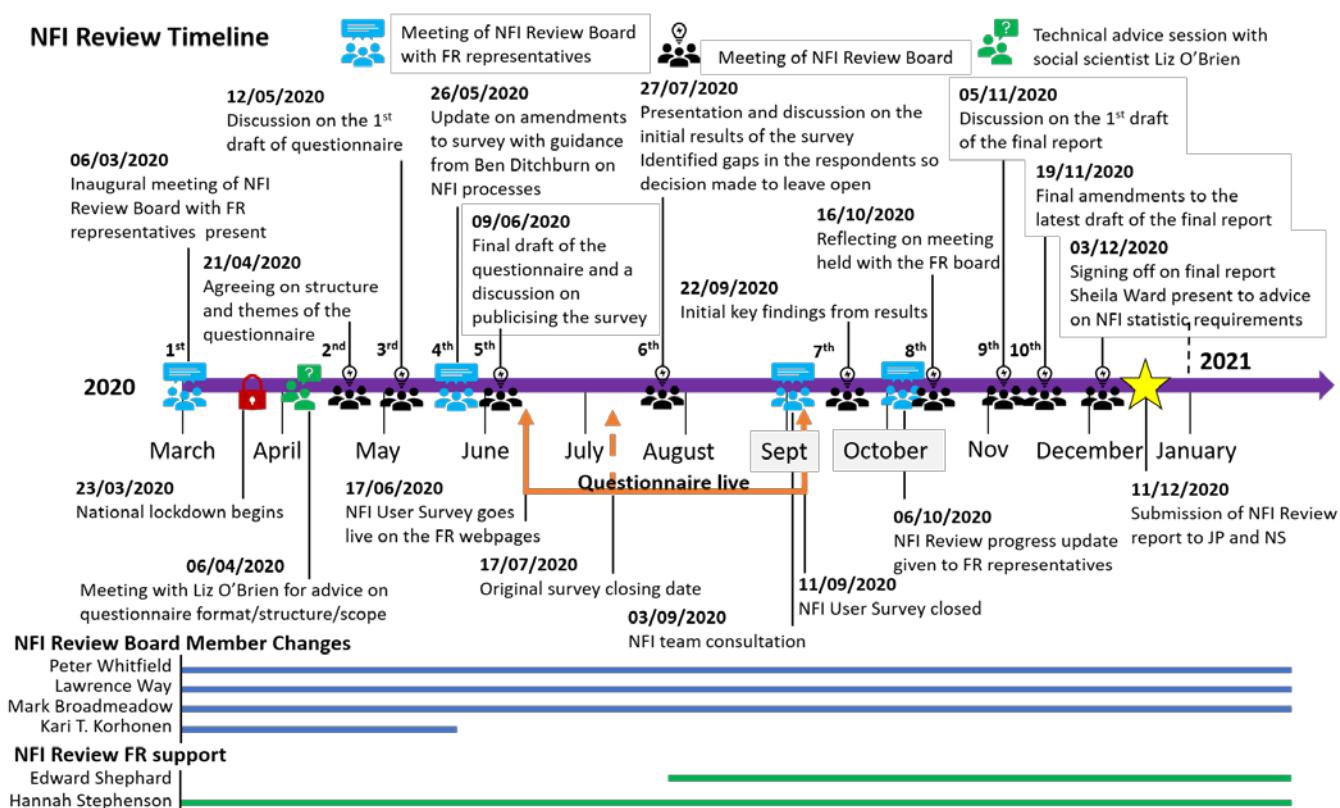
User Survey

2)   The approach the review took to collecting feedback from NFI users was decided at this initial meeting with an agreement reached that a 'user-survey' would be conducted (accessible via the FR website) followed-up, as required, with face-to-face interviews of key individuals. This decision was influenced by the experience of the board member Kari who had recently (in 2015) undertaken a review of the Finnish NFI using the same means to gather feedback. Kari also provided a copy of the 'NFI Finland Information Needs Assessment' questionnaire to the review board and a summary of the 'lessons learned' from this exercise.

3)   The survey design was undertaken with guidance from Liz O'Brien, Head of the Social and Economic Research Group in FR. Liz attended two meetings of the NFI review board to ensure that the survey had a robust structure with unambiguous questions that varied in style from open-ended, multiple choice and likert-scale. The survey structure was designed around a series of headings which broadly addressed the review boards terms of reference (see Appendix A). The final version of the survey consisted of twenty-seven questions and was divided into seven sections:

4)   Part 1: Respondent details (Q1 to Q6) – aimed at understanding who is answering the survey, whether the views expressed are personal or on behalf of an organisation and for what purpose do they use woodland data.

5)   Part 2: Use of existing NFI products and services (Q7 to Q13) – five likert-scale questions asked the respondents to rank how important the current catalogue of products and services are to them and whether they are delivered at an adequate frequency. The final two open-ended questions aimed to establish whether there are any products/services missing from the NFI offering and if the respondent was seeking alternative sources for this information.

6)   Part 3: Potential value of future products and services (Q14 to Q19) – two sets of likert scale questions were used to ask the importance of a variety of woodland change assessments and the usefulness of potential future products, in addition to the desired frequency of delivery of each. Two open-ended questions accompanied each set of likert questions asking for examples of other change analysis and future products/services they would like to see offered by the NFI.

7)   Part 4: Scale of analysis and reporting (Q20) – one likert scale question asking the respondent to rate how relevant certain listed reporting areas are to their decision making.

8)   Part 5: Accessibility and ease of use (Q21 to Q25) – split into three likert scale questions asking the respondents to state how much they agree/disagree with statements about the website, publications and custom-analysis. Two open-ended questions were used to provide an opportunity to suggest any improvements could be made to the delivery of NFI products/services and to establish what they would like to do with any raw data if that was made available.

9)   Part 6: Role of the NFI in future (Q26) – a open-ended question designed to invite participants to outline what they expect to require from the NFI in the future.

10)   Part 7: Finale (Q27) – a multiple choice question to establish how the respondents found out about the NFI User Survey.

11)   The survey questions were circulated selected FR staff for comment and no serious concerns were raised. The final draft of the survey was transcribed onto the online survey software SmartSurvey.

12)   The survey was published through the FR website on the 17th July 2020. In addition to providing access to the survey via an embedded link, the review webpage also gave context and background information on the review process. The publicity of the NFI User Survey was a joint effort between the review board and FR. The survey publication strategy adopted by the review involved both an organisational

cascade and the targeting of individuals. Official FR communication channels were used to publicise the survey, this included a press release which was sent to the Defra contacts list, FLS, NRW and FC internal communications. The review board members also used their professional emails and social media accounts to target key individuals.

13)   The survey finally closed on the 11th September. At this 6th meeting with the preliminary results gathered from the user survey a meeting was scheduled with the NFI team to gain further insight on the results from them. Details of the discussion had in this meeting can be found below in Annex E.

14)   A progress update meeting was held on the 6th October between the NFI review board and FR representatives. This provided the opportunity for the review board to present the initial findings and outline the preliminary recommendations. The timeline for completion of the final report was discussed and agreed upon with the submission by the review board to FR by the end of the 2nd week in December.

Annex D: User survey results

See separate document.

Annex E: Feedback from NFI team

1)   As part of the evidence gathering exercise the panel held an open-discussion session with a select group of members of the NFI team. That discussion is covered here in detail. The discussions covered three broad topics:

Topic 1 – Key issues with the current NFI

2)   The discussion centred around the lack of resource, a flatlined budget and staff turnover. The spending review (SR10) caused a 25% reduction in staff and this hasn't been recouped. Core funding has been set for 5 years, although additional income has been created by the NFI this year via bidding for work which should enable an increase in resource availability in the short to medium term. It was suggested that moving forward a more robust funding strategy may need to be considered to account for the broader ask on NFI services from other forestry agencies and private sector.

3)   Staffing was raised for discussion as the current NFI team is composed of a lot of new personnel – staff turnover has been higher recently, potentially related to pay and reward. This raises the question on whether there are sufficient levels and job diversity within the NFI team structure for career progression in order to retain talent/knowledge/expertise. For example, the statisticians who worked on the 1st

cycle have all left which means that the knowledge gained has been lost for the 2nd cycle analyses – there is a feeling of playing catch-up.

4)   Finally, the issue was brought up by the review board about the delay to getting reports out after the end of the field cycle and the causes of bottlenecks in the reporting cycle – it's a concern for policy makers to know that the data is there it just hasn't been modelled and analysed. Two mitigating factors were provided by the NFI team, firstly, for the 1st cycle there was a delay between gathering data and producing the reports because of the novel nature of the analysis (first time this has been done). It took time to understand the data collected and build it into models to be exploited by bespoke analytical tools. The model testing and checking the meaning of the outputted results takes longer when there is no precedence. In addition, prior to the production of each report a review/steer group is established for consultation which also takes quite a long time especially on new datasets/analyses. There is the feeling that the NFI is in a good position to have a quicker turnaround on the 2nd cycle reports because the analytical tools have already been created – so don't need to be built from scratch just modified to account for changes in the 2nd cycle field manual. Secondly, the NFI handles unscheduled data enquiries from the general public, members of parliament and paid for projects outside of the programme plan. There is a default prioritisation within the team of handling these unscheduled tasks first because they generally have shorter timescales which in turn pushes back the scheduled core work. The opinion was expressed that scheduled work can wait in the short to medium term in order to deal with incoming requests.

5)   It was acknowledged by the review board that shrinking public bodies where core funding doesn't cover the resourcing that is needed to provide reactive capacity is commonplace. However, there should be a discussion on whether reactive analyses are really a core customer need. If this ability to do reactive analyses is a core requirement then time should be allocated to it in the programme plan. It was also suggested that dynamic modelling (as opposed to periodic) could be utilised to reduce turnaround time - use existing models in a more innovative way.

Topic 2 – Ideas and thoughts on future products/ services

6)   Topic 2 was opened with a question from the review board on whether there is "an opportunity to produce some quicker and 'dirtier' results that could provide the level of accuracy that some customers need?". The opinion was expressed that the key role of the NFI is to ensure that it maintains high statistical standards and doesn't produce inaccurate or misleading data – hence why the release of data/reports takes time. Shorter national reports could be produced on a faster turnaround time and followed up with regional data published later. Furthermore, the application of

technology e.g. reporting on woodland loss by remote sensing rather than woodland squares enables quicker turnaround of information on the macro-scale changes in woodlands. However, these larger changes in woodland can't always be understood without looking at the micro-scale changes – we could provide a quantitative result but no understanding of why. The analysis of micro-changes takes more time – the causes of this may need to be discussed with stakeholders.

7)   The NFI is now about to start the 2nd (repeat) cycle reporting, the following questions were asked about communications with customers "are the customers clear on the timeline and what reports they should expect to be produced? Are they kept informed about the tool development and testing cycle?" The point of these questions was to highlight that stakeholders are now turning over staff very quickly too and the number of customers that have a long memory of the NFI and its purpose is declining. The NFI needs an informed customer-base; if they only hear from the NFI every 5-years you lose relevance. It was acknowledged by the NFI team that an education exercise is probably overdue and was last undertaken about seven years ago.

8)   Finally, the question was asked of the NFI team "how do you engage with users on prioritising products?" The response was that initially it was decided after a long internal FC consultation and then went to private sector. More recently, for each product a steering group is pulled together, ~18 months before production, and asked "what do you want form this report?" There is also the IFOS Service Forum (meets 2 or 3 times a year with the main stakeholders) and SiS governance which results in a 5-year remit and subsequent internal management. There isn't an annual process with funders to go over what's on the NFI radar and immediate priorities which will be delivered in the next 12 months. The review suggested that it could be beneficial to include external stakeholders on annual governance this may take the form of a 'funders group'. This would give better focus on what is being produced and what the future requirements are – NFI needs to remain current. The NFI works to long timeframes but policy and decision makers may work differently so an annual process could be very useful.

Topic 3 – Opinion on current dissemination of results and opportunities for improving communication

9)   There was a consensus that the FR website is not very accessible, and that people struggle to find NFI data/reports. A more accessible and easily navigated website would free up staff time which is spent answering public enquiries when the information is already available on the website. For example, the publishing of the NFI woodland map on the FC open data site diverts a lot of traffic from the NFI team.

10)   The survey highlighted that people did not feel like they were made aware of NFI publications but would appreciate notification of new releases. This raises the question of what is the NFI promotion and marketing strategy? The current approach relies on the FR communications team who circulate press releases down official channels. In order for the NFI team to increase engagement with the public/stakeholders this would again come down to a resourcing issue because the same people covering all aspects of NFI reporting e.g. tool development, forecast production would need to be diverted to maintaining communications – the latter tends to lose out.

11)   A suggestion arising from the survey and raised by the review board at the meeting with the NFI team was the idea of a self-service automated reporting tool hosted online for pre-derived data. This would be able to run a basic set of queries and wouldn't require the production of a bespoke report. This suggestion was met with positive interest by the NFI team, but it was noted that the development of this platform would require budget approval. The review board highlighted that the NFI needs to think about future skill sets for the modern world where customers are changing and looking for high-level slicing of up-to-date data – this may involve investment to change the character of the service. There was an acknowledgement by the NFI team that the NFI is very good at producing comprehensive and statistically robust data but that access to data and reports needs re-thinking in a new communications strategy particularly for social media e.g. Twitter.

Closing Points

12)   At the end of the meeting the following concluding points were made by members of the NFI team:

    a) There is capacity in the NFI to produce more annual reports should there be demand for it e.g. standing stocks.

    b) There are big opportunities for earth observation products to be used to produce data on for example clearfell areas and land use change data.

    c) The NFI should look at new ways of presenting data more quickly and in dynamic/interesting formats to increase accessibility.

    d) The NFI team currently has a significant proportion (~30%) aged over 60, there needs to be succession planning implemented to ensure knowledge transfer and to remain operational after key staff departures.

Annex F: Full list of recommendations

1: That FR re-establishes and articulates the rationale and strategic importance for the public provision of a dataset that supports industry as well as the development of public policy.

2: That FR clarifies with stakeholders a set of core products and services that are required from the NFI and ensures that these are fully supported by the current funding model.

3: That FR ensure that the NFI has the structure and resources to sustain better engagement with the diverse user base in order to help develop the service and find opportunities to diversify the funding base.

4: That FR ensures that the data captured is appropriate to be able to report on and inform the development of key policy areas for all three governments.

5: That FR establishes a structured ongoing dialogue with customers and other interested parties so they are aware of the status of the current field cycle, what to expect from the NFI over the next 12 months and can help to inform the ongoing development of the service.

6: That FR looks to adopt new technologies and methodologies to allow for both an annual cycle of data collection, analysis and reporting (if necessary), alongside the current quinquennial cycle whilst still supporting robust and consistent long-term sampling. In doing so, FR should look for any quick wins for new products or services (e.g. simple adjustments to field protocol which don't significantly increase visit/survey time).

7: That FR develops and publishes a data exploitation strategy that sets out how FR will unlock and maximise the value and benefits that can be derived from the NFI data.

8: That FR develops a range of tools and business model(s) that allows users to perform simple queries and produce reports on demand and on a self-service basis.

9: That FR explores the development of analytical partners who could, under licence, provide additional analysis and services that build on the NFI dataset.

10: That FR develops a structure communications and marketing plan using social media and other means of suitable communications with users to keep them informed of what is happening in terms of work and upcoming publications.

11: That FR develops a new website which improves user awareness, collaboration and knowledge transfer.

12: That FR ensures that the designation of NFI outputs as official statistics does not have a disproportionate impact on either the lead time for the production of reports not the ability of FR and others to develop and exploit the value of the NFI data and models.

13: That FR publishes clearer information on the quality assurance standards that underpin NFI outputs (data, models and results), in order to provide users with confidence and clarity around their use.