

# Science and Innovation Strategy for British Forestry Annual Report 2014

## INTRODUCTION

When we refreshed the Science and Innovation Strategy for British Forestry in 2010, we made a commitment to produce an annual report.

*"Implementation of this Strategy will demand continuous analysis and review. The results will be reported annually to the Research Strategy Management Board. **An annual report of outputs will be published on the internet as a supporting document to the Strategy.** This will contain the analysis of measures detailed [on the following page], and a comprehensive summary of research work undertaken and delivered during the year. This annual report, combined with the published Catalogue of research, and the published forward research programme for the coming year will support this process, and aid the transparency of our research procurement programme."*

This is the final annual report, providing outputs against some of the measures specified in the strategy. As a result of SR10 and programme mergers, a number of indicators are no longer meaningful, so this report concentrates on the leverage obtained from FC research resources, and the outputs from the research programmes.

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## ANNUAL RESEARCH REPORT BY INDICATOR

<b>Indicator</b>	<b>Measure</b>
<b>1. Leverage and gearing from partnership work, including in-kind contributions</b>	Annual outturn for partnership work, by theme and programme, showing FC science budget spend and total value, to show total leverage. Partnership projects include FC-led projects with EU co-funding, Research Council funding, funding from other parts of FC, as well as funding from other organisations. It also includes all projects led by others for which the science budget contributes any funding, however minor.
<b>2. Statistics on publications are the crucial measures of the scientific quality. We will record and publish these annually by research theme.</b>	<p>The number of scientific publications in peer-reviewed journals or delivered at conferences as a result of research sponsored by the Commission</p> <p>The number of other complete publications, and other published articles</p> <p>Annual total number of publications as a result of research sponsored by the Commission, by theme, split between publications in peer-reviewed journals, published papers delivered at conferences</p>

**Indicator 1:** Annual outturn for partnership work, by theme and programme, showing FC science budget spend and total value, to show total leverage. Partnership projects include FC-led projects with EU co-funding, Research Council funding, funding from other parts of FC, as well as funding from other organisations. It also includes all projects led by others for which the science budget contributes any funding, however minor.

**2010/11:**

Programme	Income £000s	FC Funding £000s	%age Leverage
Hydrology	£100,000	£337,000	30%
Genetic conservation	£128,800	£240,000	54%
Ecological indicators	£40,250	£91,000	44%
Priority habitats	£0	£224,000	0%
Alien and invasive species	£70,000	£166,000	42%
Soil Sustainability	£103,000	£192,000	54%
Landscape ecology and spatial planning	£0	£182,000	0%
Management and restoration of Priority open habitats	£0	£116,000	0%
Priority species and their conservation	£0	£176,000	0%
Impact of large herbivores on woodlands	£0	£135,000	0%
Decision support for forest ecology	£0	£80,000	0%
Integrated Forest monitoring (inc Tree Health Monitoring)	£100,000	£237,000	42%
Red Band Needle Blight	£0	£274,000	0%
Integrated Forest Management (Hylobius)	£0	£50,000	0%
Advice and scientific support for tree health	£37,000	£347,000	11%
Risk assessment of invasive pathogens Phytophthora ramorum and	£130,000	£50,000	260%
Remote sensing	£30,000	£79,000	38%
Characterisation of Bacterial Disease of Oak - Acute oak decline	£0	£80,000	0%
Horse Chestnut Bacterial canker	£0	£50,000	0%
Pine Wood nematode	£0	£25,000	0%
ForeCast	£171,000	£510,000	34%
Pests and pathogens in a changing climate (semi-natural woodland)	£0	£180,000	0%
Managing Forest Carbon and GHG Balances	£0	£757,000	0%
Climate Change and Trees in the Built Environment	£0	£100,000	0%
Continuous cover silviculture	£0	£340,000	0%
Restoration and Management of Upland Native Woodlands	£0	£95,000	0%
Modelling for mixed age and mixed species stands	£0	£95,000	0%
Impact of Changing Management on Insect Diversity and Abundance	£0	£195,000	0%
Scientific support for FRM regulation	£0	£74,000	0%
Management of long term experiments	£0	£40,000	0%
Operational efficiency in a sustainable forest-industry wood chain	£0	£195,000	0%
Regeneration and sustainable silviculture	£0	£461,000	0%
Economic research for sustainable forest management	£0	£164,000	0%
Historic environment & cultural heritage	£0	£96,000	0%
Wildfires in Wales: Social drivers and mitigation measures	£0	£54,000	0%
Land Regen & Urban greenspace	£210,000	£244,000	86%
Social	£85,000	£602,000	14%
Wood and timber	£335,000	£324,000	103%
Tree breeding	£345,000	£697,000	49%
Woodfuel and biomass research	£198,000	£325,000	61%
	<b>£2,083,050</b>	<b>£8,679,000</b>	<b>24%</b>

**2011/12:**

<b>Research programme</b>	<b>Income £000s</b>	<b>FC Funding £000s</b>	<b>%age leverage</b>
Advice and Scientific Support for Tree Health	537	1370	39%
Alternative Management Approaches	10	550	2%
Bioenergy Development Programme	16	200	8%
Forest Climate Change Adaptation Strategies	430	510	84%
Managing Forest Carbon and GHG Balances	162	757	21%
Protected Species, Biodiversity, Genetic Conservation and Forest Reproductive Materials	168	805	21%
Land Use and Ecosystem Services (LUES)	163	413	39%
Integrated forest monitoring	0	356	0%
Protecting Soil and Water Resources	70	529	13%
Societal benefits and governance of trees, woods and forests	62	714	9%
Genetic Improvement (Tree breeding)	82	650	13%
Urban Trees and Greenspace in a Changing Climate	130	344	38%
Vertebrate management	8	250	3%
Wood and timber properties	88	324	27%
Operational efficiency in a sustainable forest industry wood chain	34	190	18%
Regeneration and sustainable silviculture	54	455	12%
<b>Totals</b>	<b>2012</b>	<b>8417</b>	<b>24%</b>

**2013/14:**

Research programme	Income £000s	FC funding £000s	%age leverage
<b>Ecosystem resilience and climate change</b>			
Knowledge management for Ecosystem services and Biodiversity	385	654	59%
Forest hydrology and soils	232	516	45%
Economic research for sustainable forest management	42	178	24%
Managing Forest Carbon and GHG Balances	291	880	33%
Forest Climate Change adaptation strategies	285	550	52%
Urban Trees and Greenspace in a changing climate	86	344	25%
Integrated Forest monitoring	360	384	94%
Advice and scientific support for tree health	1,125	2,143	53%
Species and gene conservation	-	410	0%
<b>Sustainable forest management</b>			
Alternative Management Approaches	33	400	8%
Vertebrate management	71	45	157%
Regeneration and sustainable silviculture	4	275	1%
Wood and timber properties	65	332	20%
Tree Selection and Breeding	168	446	38%
Woodfuel and biomass research	-	50	0%
Social Research for Forestry in Sustainable Society	396	390	102%
<b>National Forest Inventory</b>			
Forest Mensuration, Modelling and Forecasting	-	641	0%
<b>Totals</b>	<b>3,543</b>	<b>8,637</b>	<b>41%</b>

**Notes:**

1. Some research programmes have changed between 2011/12 and 2013/14.
2. No data available for 2012/13.

**Indicator 2:** The number of scientific publications in peer-reviewed journals or delivered at conferences as a result of research sponsored by the Commission. The number of other complete publications, and other published articles. Annual total number of publications as a result of research sponsored by the Commission, by theme, split between publications in peer-reviewed journals, published papers delivered at conferences.

	2010/11	2011/12	2013/14
<b>Publications by theme</b>			
Monitoring and biosecurity	30	15	18
Climate change	19	7	7
Ecosystems and biodiversity	38	27	7
Species and gene conservation	0	0	2
Social and economic	36	34	23
Wood and Timber Properties	12	10	9
Sustainable Forest Management	22	20	22
National Forest Inventory	5	0	0
<b>All publications</b>	<b>162</b>	<b>113</b>	<b>88</b>
<b>Publications by type</b>			
Book	1	1	4
Books, proceedings and other technical publications	40	22	6
Bulletin	1	1	0
General publications	18	13	9
Papers published in peer-reviewed journals	77	48	41
Practice Notes	2	2	2
Research Notes	3	4	3
Research Reports	1	16	23
Web publication	19	6	0
<b>All publications</b>	<b>162</b>	<b>113</b>	<b>88</b>

**Note:**

1. No data available for 2012/13.

Author(s)	Title	Publisher
Climate change		
Doick, KJ, Hutchings, TR (2013)	Air temperature regulation by urban trees and green infrastructure	Forestry Commission Research Note FCRN012
<a href="http://www.forestry.gov.uk/PDF/FCRN012.pdf/\$FILE/FCRN012.pdf">www.forestry.gov.uk/PDF/FCRN012.pdf/\$FILE/FCRN012.pdf</a>		
Edwards, D, Bathgate, S, Mason, B, Nicholl, B (2013)	The application of climate change models to support forestry decision-making: stakeholder perspectives from MOTIVE and ForeStClim	Forest Research Research Report
Lawrence, A, Marzano, M (2013)	Is the private forest sector adapting to climate change? A study of forest managers in north Wales	Annals of Forest Science 71 291-300
<a href="http://link.springer.com/article/10.1007%2Fs13595-013-0326-4#page-1">http://link.springer.com/article/10.1007%2Fs13595-013-0326-4#page-1</a>		
Moffat, AJ (2013)	Whither reclamation research?	Mineral Planning 150 11
<a href="http://www.mineralandwastepanning.co.uk/news/1222859">www.mineralandwastepanning.co.uk/news/1222859</a>		
Moffat, AJ, Lowe, R, Christie, M (2013)	Adaptation of native woodlands in Scotland. Issues Paper	Forest Research Research Report to ClimateXChange, Edinburgh
<a href="http://www.climatexchange.org.uk/files/7513/7517/4411/Native_woodlands_adaptation_-_issues_paper.pdf">www.climatexchange.org.uk/files/7513/7517/4411/Native_woodlands_adaptation_-_issues_paper.pdf</a>		
Moffat, AJ, Nicholl, B, Beckmann, K, Roaf, S (2013)	Demonstrating adaptation - lessons learned so far in the forestry sector	Forest Research Research Report to ClimateXChange, Edinburgh
<a href="http://www.climatexchange.org.uk/files/3913/7349/4611/Demonstrating_a_daptation_lessons_learned_so_far_in_the_forestry_sector.pdf">www.climatexchange.org.uk/files/3913/7349/4611/Demonstrating_a_daptation_lessons_learned_so_far_in_the_forestry_sector.pdf</a>		
Vanguelova, EI, Nisbet, TR, Moffat, AJ, Broadmeadow, S, Sers, TGM, Morison, JIL (2013)	A new evaluation of carbon stocks in British forest soils	Soil Use and Management Vol. 67 169-181
<a href="http://onlinelibrary.wiley.com/doi/10.1111/sum.12025/abstract">http://onlinelibrary.wiley.com/doi/10.1111/sum.12025/abstract</a>		



**Ecosystems and biodiversity**

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[www.sciencedirect.com/science/article/pii/S0378112713006051](http://www.sciencedirect.com/science/article/pii/S0378112713006051)
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- Devoto, M, Bailey, S, Memmott, J (2013) Ecological meta-networks integrate spatial and temporal dynamics of plant-bumble bee interactions OIKOS  
<http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0706.2013.01251.x/abstract>
- Mason, WL, Mencuccini, M (2014) Managing forests for ecosystem services – can spruce forests show the way? Forestry 87 189-191  
<http://forestry.oxfordjournals.org/content/87/2/189.extract>
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Broome, A, Mitchell, RJ, Bailey, S, Beaton, JK, Bellamy, PE, Brooker, RW, Chetcuti, J, Eaton, S, Ellis, CJ, Farren, J, Gimona, A, Goldberg, E, Hall, J, Harmer, R, Hester, AJ, Hewison, RL, Hodgetts, NG, Hooper, RJ, Howe, L, Iason, GR, Kerr, G, Littlewood, NA, Morgan, V, Newey, S, Potts, JM, Pozsgai, G, Ray, D, Sim, DA, Stockan, JA, Taylor, AFS, Taylor, P, Woodward, S (2013)

Ash dieback: impacts on other species and understanding the ecology of Ash

Forest Research  
Contract Report JNCC  
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Crous, PW, Denman, S, Taylor, JE, Swart, L, Bezuidenhout, CM, Hoffman, L, Palm, ME, Groenewald, JZ (2013)

Cultivation and disease of proteaceae: leucadendron, leucospermum and protea

2nd Edition, CBS  
KNAW Fungal  
Biodiversity Centre,  
Utrecht, The  
Netherlands: CBS  
Biodiversity Series  
No.13

Ferretti, M, Fischer, R, Moffat, AJ (2013)

Terrestrial methods in forest monitoring: towards the next generation?

Developments in  
Environmental  
Science 12 483–496

<http://dx.doi.org/10.1016/B978-0-08-098222-9.00025-X>

Forestry Commission (2014)

Phytophthora lateralis

Forestry Commission  
Pest Alert

[www.forestry.gov.uk/pdf/FCPH-PL-02-2014.PDF/\\$file/FCPH-PL-02-2014.PDF](http://www.forestry.gov.uk/pdf/FCPH-PL-02-2014.PDF/$file/FCPH-PL-02-2014.PDF)

Hunter, GC, Wylder, B, Jones, B, Webber, JF (2013)

First finding of Cryphonectria parasitica causing chestnut blight on Castanea sativa trees in England

New Disease Reports  
27(1)

<http://dx.doi.org/10.5197/j.2044-0588.2013.027.001>

Mitchell RJ, Beaton JK, Bellamy PE, Broome A, Chetcuti J, Eaton S, Ellis CJ, Gimona A, Harmer R, Hester AJ, Hewison RL, Hodgetts NG, Iason GR, Kerr G, Littlewood NA, Newey S, Potts JM, Pozsgai G, Ray D, Sim DA, Stockan JA, Taylor AFS, Woodward S (2014)

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| <a href="http://dx.doi.org/10.1016/B978-0-08-098222-9.00024-8">http://dx.doi.org/10.1016/B978-0-08-098222-9.00024-8</a>  |   |   |
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| <a href="http://onlinelibrary.wiley.com/doi/10.1111/efp.12040/full">http://onlinelibrary.wiley.com/doi/10.1111/efp.12040/full</a>  |   |   |
| Price, AJE, Macdonald, E (2013)  | Timber from larch trees infected by <i>Phytophthora ramorum</i> : options for harvesting and storage  | Forest Research Internal Report to Forestry Commission Scotland   |
| Sansford, CE (2013)  | Pest Risk Analysis for <i>Hymenoscyphus pseudoalbidus</i> (anamorph <i>Chalara fraxinea</i> ) for the UK and the Republic of Ireland                | Forestry Commission   |
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| <a href="http://onlinelibrary.wiley.com/doi/10.1111/efp.12064/abstract">http://onlinelibrary.wiley.com/doi/10.1111/efp.12064/abstract</a>  |   |   |
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| <a href="http://onlinelibrary.wiley.com/doi/10.1111/een.2013.38.issue-5/issuetoc">http://onlinelibrary.wiley.com/doi/10.1111/een.2013.38.issue-5/issuetoc</a>  |   |   |

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<a href="http://onlinelibrary.wiley.com/doi/10.1111/afe.2013.15.issue-3/issuetoc">http://onlinelibrary.wiley.com/doi/10.1111/afe.2013.15.issue-3/issuetoc</a>		
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<a href="http://www.forestry.gov.uk/PDF/FCRN015.pdf/\$FILE/FCRN015.pdf">www.forestry.gov.uk/PDF/FCRN015.pdf/\$FILE/FCRN015.pdf</a>		
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<a href="http://www.researchgate.net/publication/263172363_Mindfulness_practice_in_woods_and_forests_An_evidence_review">www.researchgate.net/publication/263172363_Mindfulness_practice_in_woods_and_forests_An_evidence_review</a>		
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Ambrose-Oji, B, O'Brien, E, Williams, R (2013)	FCRM volunteering baseline data and typology development	Forest Research Research Report to the Environment Agency
Ambrose-Oji, B, Roberts, G (2013)	Seeking sublime Snowdonia	Landscape Research Extra
Ambrose-Oji, B, Stewart, A (2013)	A survey of Forestry Commission staff on understanding and use of social media	Forest Research Research Report
<a href="http://www.forestry.gov.uk/pdf/Social_media_staff_survey.pdf/\$FILE/Social_media_staff_survey.pdf">www.forestry.gov.uk/pdf/Social_media_staff_survey.pdf/\$FILE/Social_media_staff_survey.pdf</a>		
Atkinson, GE, Doick, KJ, Burningham, K, France, C (2013)	Brownfield regeneration to greenspace: Delivery of project objectives for social and environmental gain	Urban Forestry and Urban Greening Vol 13 586-594
<a href="http://www.sciencedirect.com/science/article/pii/S1618866713000472">www.sciencedirect.com/science/article/pii/S1618866713000472</a>		
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