Dothistroma Action Plan for Scotland (2018)

Audience

1. The primary audience for this Action Plan is the Scottish Tree Health Advisory Group (STHAG). A copy will also be maintained on Forestry Commission Scotland's Tree Health pages[1].

Background and context

2. Actions for the health of Scotland's trees, woods and forests are set within the overarching, sustainable forest management principles set out in the UK Forestry Standard[2] and the Scottish Forestry Strategy[3]. Such actions must also have regard to the aims of the Scottish Biodiversity Strategy[4]. Legislation relating to plant health matters does not override other legislative requirements – and vice versa.

3. Dothistroma needle blight (DNB) – formerly known as red band needle blight - can be caused by two fungal pathogens: *Dothistroma septosporum* and *Dothistroma pini*. Currently, only *D. septosporum* has been found in the UK and is known to have two mating types and multiple genotypes. The potential for genetic exchange is therefore likely to be a significant risk and, accordingly, future virulence is unpredictable. The potential for the introduction of *D. pini* from mainland Europe is an additional concern.

4 Moisture is required for natural dispersal of *D. septosporum*, with long-distance dispersal thought to occur in moist winds and mists. Movement of infected plants and plant material, including infected needles on footwear, clothing, machinery and timber, can also potentially spread spores.

5 DNB can cause year-on-year defoliation, gradually weakening trees and very significantly reducing timber yields. It can also eventually cause mortality, such trees becoming unmarketable over time.

6. Worldwide, DNB has been found on a range of conifers, but pine species are by far the most common hosts with two thirds of the 129 pine species known to be susceptible to some degree. Five spruces (including Sitka and Norway), European larch, Douglas fir

1 scotland.forestry.gov.uk/supporting/forest-industries/tree-health
2 www.forestry.gov.uk/ukfs
3 scotland.forestry.gov.uk/supporting/strategy-policy-guidance/forestry-strategy
4 www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy

and Atlantic cedar have also been known to host the disease but are currently thought to be of low susceptibility.

7. DNB has been present in GB since the 1950s but was first recorded in Scotland in 1985. As pine woodland comprises about one quarter of the total forest area in Scotland, DNB represents a significant threat to the forest resource.

8. Management of DNB is currently focused on silvicultural measures to reduce inoculum loads, nursery controls, and the use of alternative, less susceptible species in future rotations. Trials of potential fungicide treatments and aerial application technology are underway.

9. *D. septosporum* is currently listed in the EU Plant Health Directive as a "quarantine pest" (under the now out of date name *Scirrhia pini*) with regulation restricted to pine plants for planting, the only EU pathway currently recognised for regulation. This is implemented through the Plant Health (Forestry) Order 2005 and only applies to nurseries growing pine plants. It is applied through the plant passport process[5]. The regulatory status of *D. pini* remains under review, as is that of *D. septosporum*. Protected Zone status for either pathogen is unlikely to be accepted, although other mechanisms such as Regulated Non Quarantine Pest status, would provide a good level of protection from long distance spread through movement of infected nursery stock.

Current situation in Scotland

10. As at 2014 there were approximately 245,000 ha of pine in Scotland (63% Scots pine; 36% lodgepole pine; 1% Corsican pine).

11. The distribution of DNB on the national forest estate (since 2006) is shown in Annex 1. The disease is widespread and eradication is not practicable.

12. Extensive surveys on the national forest estate since 2006 have indicated the presence of DNB in 11,000 ha of pine woodland on the national forest estate representing 76% of surveyed Corsican pine sub-compartments, and 27% and 26% respectively in lodgepole pine and Scots pine sub-compartments. The distribution of these sites confirms that the disease is now endemic.

13. Impacts on timber yields have been most severe on Corsican pine and lodgepole pine, and extensive mortality has occurred with inland provenances of the latter species

[5] Before a passport can be issued to permit movement of pines from a place of production, there must have been no symptoms of DNB observed either at the place of production or within the immediate vicinity since the beginning of the last complete growing cycle.

in the north and east of Scotland. A major programme of felling the most heavily infected stands on the national forest estate is nearing completion and can be expected to have reduced overall inoculum levels significantly. Prior to this, increasing rates and levels of infection were seen on Scots pine, and the disease has been detected in over one quarter of the 84 Caledonian Pinewood Inventory (CPI) sites. Although the impact of the disease in CPI sites currently appears to be modest, monitoring of disease progression remains essential.

14. There remains concern that the impact of DNB could increase as there is considerable potential for genetic exchange due to the presence of two mating types and a number of genotypes of *D. septosporum*, and the potential for introduction of D. pini from mainland Europe. Two recent PhDs suggest there are at least three different 'populations' of DNB in Scotland, one of which could be a native strain (on Caledonian pine), one possibly associated with lodgepole pine imports last century, and one 'southern' strain.

15. Previous assumptions about 'distance of spread' were based on experiments conducted in the early 1960s in Kenya, these finding infections out to 300 yds (275 m) from source plants. Results from the recent PhD study in England now suggest the potential for spread out to 1.4km (although, as with most forms of spore dispersal, the highest spore densities are found close {0-10 m} from source material).

16. Since 2010, *D. septosporum* has been found at a number of pine producing forest tree nurseries in Scotland, leading in 2011 to the introduction of a two-year forest nursery transition scheme to support resilience building in that sector. Although no DNB was detected in Scottish forest tree nurseries in 2013, the disease was detected again at three locations in 2014, one of which required the destruction of very significant numbers of pine plants, and was also detected at one nursery in 2016. Although subsequent inspections have not detected any further DNB infections in Scottish forest tree nurseries, the disease remains a major cause of concern to the forest tree nursery sector, not only from a business risk perspective but also in relation to future plant supply requirements from the wider forestry sector.

Strategic objectives

17. The main objectives of this plan are to:

a. Minimise the economic impacts of DNB;

b. Protect the environmental, social and economic functions of Caledonian and other high nature conservation pinewoods[6];

[6] High nature conservation value in relation to the UK Biodiversity Action Plan habitat type. Also includes Scots pine where it is integral to other priority habitats.

c. Support the continuation of pine silviculture to help safeguard the long term sustainability and resilience of Scottish forestry; and

d. Reduce the collateral damage from other pests and diseases.

Key priorities

18. The main actions in the priority areas of research, surveillance & monitoring, prophylactic measures, reactive measures, and communications are listed below and shown in more detail in Annex 2.

19. Research

a. Continue to monitor the impact of DNB in Scotland and the management implications.

b. Identify low susceptibility pine provenances/species and potential treatments for DNB.

20. Surveillance&monitoring

a. Encourage monitoring for disease presence and impact, including CPI sites, and maintain a statutory inspection regime for forest tree nurseries.

b. Continue to engage citizen science to assist with monitoring DNB.

21. Prophylacticmeasures

a. Encourage DNB awareness and adaptive management across the forestry sectors.

b. Facilitate seed-banking of Scots pine across its genetic range in Scotland.

22. Reactivemeasures

a. Encourage removal of stands with highest inoculum loading (primarily inland origins of lodgepole pine).

b. Continue to take statutory action on infected and potentially asymptomatic plants in forest tree nurseries.

23. Communications

a. Ensure FCS/FC web-based information about DNB in Scotland remains current.

b. Maintain sectoral awareness of DNB and its management

Reporting on progress

24. The overall action plan will be reviewed annually by the Scottish Tree Health Advisory Group.

25. Progress against Annex 2 will be reviewed on an 'exception reporting' basis at each Scottish Tree Health Advisory Group (Steering Group) meeting.

Contingency arrangements

26. An immediate review of the Action Plan will be triggered by:

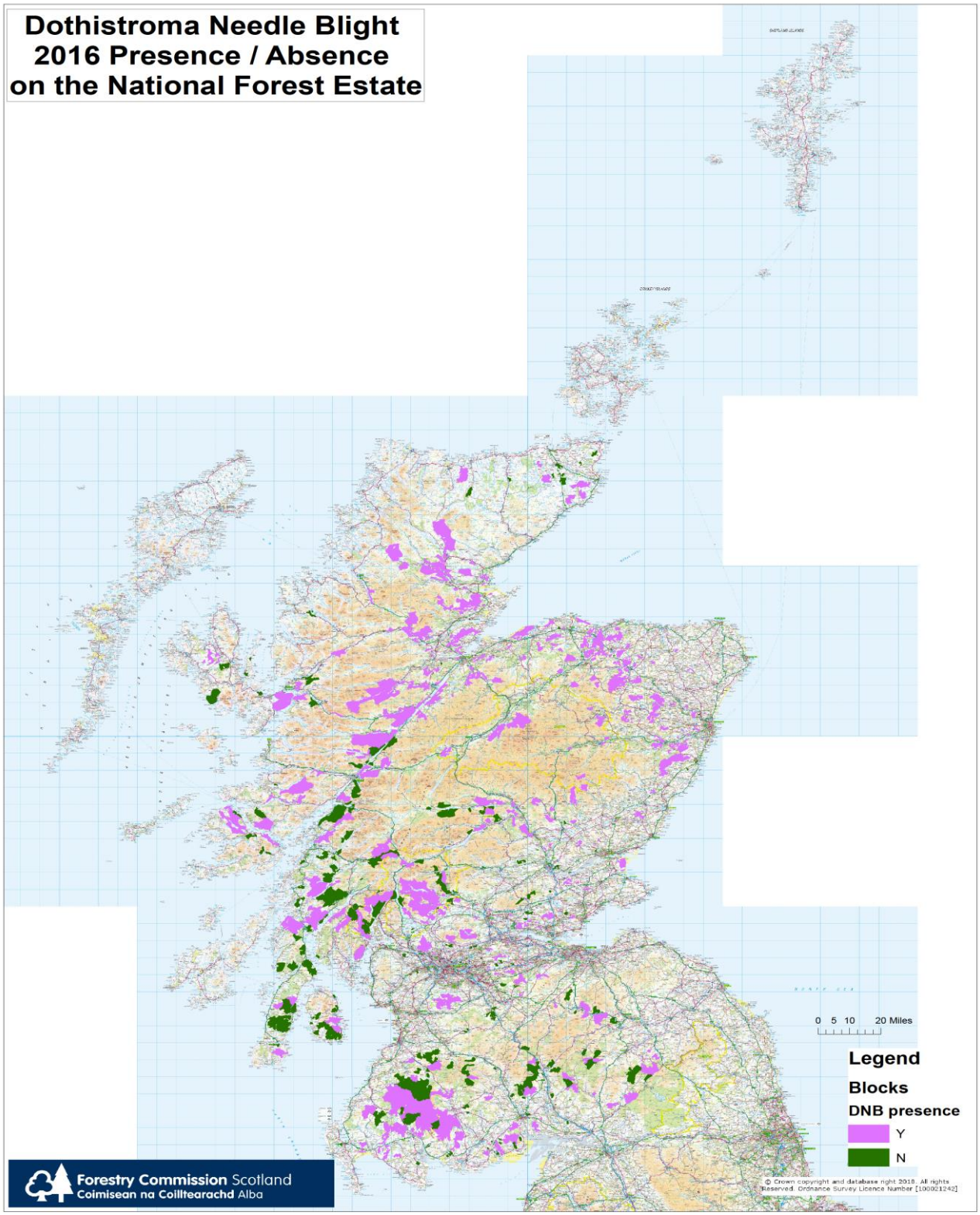
a. Any significant escalation of the impact of DNB on Scots pine in general and CPI sites in particular.

b. Significant changes to the regulatory status of DNB in the UK/GB.

Prepared by: Hugh Clayden (October 2018)
Approved by: STHAG Chair (November 2018)
Review by: November 2019

Annex 1

Distribution of DNB detections on the national forest estate (2016)



Annex2

Dothistroma Action Plan (2018) – Detailed Actions

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Research	Monitor pine for durable, lower susceptibility	Laboratory and field research studies	PhD provision	M	Budget Viability of methods Staff capacity	On-going	FR and Aberdeen university	○ Publish current results	Papers published
	Identify alternative species	Guidance based on ESC[7] and existing information	In house	M	Staff capacity	On-going	FCS	○ Considerable bank of information already exists	See FES DNB Strategy (2017)
	Alternative surveillance techniques	Watching brief on research and commercial developments	Networking	L	N/A	On-going	All STHAG members	○ Includes remote sensing and Remotely Piloted Aerial Vehicle (RPAV) technology	
	Identify/assess practicality of chemical and biological treatments	Watching brief on other research and commercial developments	Networking	H	N/A	On-going	All STHAG members	○ Commercialising products can take time (and money)	

[7] Ecological site classification: www.forestry.gov.uk/esc

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Research (cont)	Identify/assess practicality of chemical and biological treatments (cont)	Continue aerial application trials	FR	H	Staff capacity Aerial spraying capacity Budget	Ongoing	FCS	○ Subsequent monitoring extends 3-5 years post-spraying when chemicals used. ○ Trials of application technology started 2017	Aerial application (technology) trials to be resumed in 2019 (SUAs) and 2020 (helicopter and SUAs)
	Risk assessment of fungicides use across woodland types	Desk based assessment	FCS/FR/ SNH	L	Staff capacity	After completion of aerial application trials	FCS		
	Assess efficacy of silvicultural measures	Field trials	FES	H	Staff capacity	Ongoing		○ Current evidence relates primarily to England ○ Priority given to FES thinning trials	
	Rapid detection/field diagnostics	Watching brief on research and commercial developments	Networking	M	N/A	On-going	All STHAG members	○ Potential commercial opportunities extend beyond DNB	Initial work underway (e.g. LWEC[8] initiative)

[8] Living With Environmental Change

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Surveillance & monitoring	Monitor severity on national forest estate	Annual surveys	FES	H	Staff capacity Budget	On-going	FES	○ Annual reports available	
	Survey CPI sites	Rolling surveillance programme	FCS/SNH	H	Staff capacity Budget	Ongoing	FCS	○ Initial work focusing on presence/absence ○ Sample surveys of severity completed 2014/15	
		Aerial surveillance (develop programme of re-visits as part of wider aerial surveillance programme)	FCS helicopter surveys	M	Budget	On-going	FCS	○ Baseline, oblique photographs are being taken	
	Training private sector	Annual programme of training events	FR/FCS	M	Staff capacity	On-going	FCS and Confor	○ Field based ○ Includes Observatree volunteers	
	Forest tree nursery inspections	Annual inspections	SG HMU (with FR support)	H	Staff capacity	On-going	SG HMU	○ Annual update training by FR for SG HMU inspectors	
	Maintain diagnostic capacity	Laboratory analysis	FR laboratories	H	Staff capacity Budget	On-going	FCS	○ Explore other opportunities for diagnostic capacity	Capacity available

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Prophylactic measures	Measures to increase nursery resilience	Nursery Accreditation	HTA/Defra	H	Staff and sector capacity Availability of evidence	On-going	FCS	○ For discussion within the STHAG and Confor Nursery Producers Group	
	Measures to improve plant requirement forecasting	SRDP system	FCS and Confor	H	Staff and sector capacity	On-going	FCS		
	Review guidance on DNB management in CPI sites	Published guidance	FCS/SNH	H	Staff capacity	On-going	FCS	○ Continue to keep under review	Revised guidance published in 2017
	Establish a seed-bank for Scots pine	Ex situ collection of seed across genetic range in Scotland	Through the UK NTSP[9]	M	UK NTSP capacity	Ongoing	FCS/SNH	○ Store in Millennium Seed Bank	UK NTSP project in progress
	Production forecasting and marketing	Production forecasting and market feed-back	Through the STHAG	M	Demise of STHAG	On-going	STHAG	○ Assumptions fed into Production Forecast outturns	Pest and disease scenarios for the public forest estate and the private sector are to be reviewed.

[9] UK National Tree Seed Project

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Reactive measures	Remove heavily infected stands	Advice and support measures	SRDP and Forest Plans	H	Timber prices (biomass) Staff capacity Competition for SRDP resources	On-going	FCS	○ FES programme in place. ○ Extent of heavily infected stands in private sector requires co-ordinated assessment (Confor)	Well advanced on the NFE
	Continue mitigation actions	Advice via 'toolbox' (see below)	SRDP and Forest Plans	M	Timber prices (biomass) Staff capacity Lack of empirical evidence	On-going	FCS		
	Prevent new infections via infected plants	Continue to require destruction of infected plants at nurseries in line with agreed protocol	Statutory action	H	Staff capacity Lack of sectoral engagement	On-going	SG HMU	○ The agreed, proportionate approach will be kept under review in the light of new evidence and risk assessment	

Key priority	Actions	Mechanism	How	Priority (H, M, L)	Risks to delivery	By when	Lead	Other considerations	Progress
Communications	Ensure written information is current	FCS and FC website updates	Monthly review	H	Staff capacity	On-going	FCS	○ Forms part of wider review of tree health information on FC and FCS websites	FCS capacity issues
	Enhance forestry and arboricultural sector's awareness of DNB and its management	Use of trade press	Syndicated articles	M	Staff capacity	On-going	FCS	○ Initiate as and when situation changes significantly	No FH days held in 2018 due to FCS capacity issues
		Face-to-face updates	Forest Health (FH) Days and topic-specific seminars/ training		Staff capacity	Annual series	FCS/FR	○ 2-3 p.a.	
		Publish DNB toolbox	FCS/FR	H	Staff capacity	31/04/19	FCS	○ Requires finessing in light of recent research findings	Initial draft completed