Ecological implications of oak decline

Table 6s Planting options for all 30 case study sites.

Region	Case study site	Vulnerability level		Species to include in the planting mixture that are beneficial for oak-associated species		ESC AT	ESC Expos.	ESC MD	ESC SMR	ESC SNR	Soil type
		Site	Region	Trees	Shrubs						
N Scotland	Ledmore	Low	Low	Scots pine, rowan, sliver birch	Hazel	1 071	14	90	Slightly dry	Very poor	Podzolic upland brown earth
	Coille Dhubh	Low	Low	Beech, rowan, sycamore, Scots pine	None	1 208	13	99	Slightly dry	poor	Upland gleyed brown earths, mineral gleys
NE Scotland	Alvie	Low	Low	Scots pine, rowan, downy birch	Hazel, elder, hawthorn, blackthorn	973	11	64	Slightly dry	Very poor	Brown podzolic and brown soils
	Dinnet	Low	Low	Alder, Scots pine, beech, sycamore	Hazel, goat willow, blackthorn, hawthorn	1 112	11	107	Fresh	Medium	Deep to shallow brown and brown-podzolic soils, rankers
E Scotland	Drummond Loch	Low	Low	Alder, sycamore, Scots pine, rowan	Hazel, hawthorn, elder, privet	1 356	9	130	Fresh	Medium	Typical brown earth
W Scotland	Mugdock	Low	Low	Sycamore, beech	Elder, hawthorn,	1 321	13	112	Moist	Medium	Brown earths
	Glen Nant	Low	Low	Alder, sycamore, Scots pine	Hazel, blackthorn	1 252	13	93	Fresh	Medium	Brown earth
	Ariundle	Low	Low	Rowan, alder, downy birch, sycamore	Hazel, blackthorn	1 294	13	102	Very moist	Medium	Surface water gleys
S Scotland	Wood of Cree	Low	Low	Sweet chestnut, sycamore, alder	Hazel, elder	1 434	15	117	Fresh	Medium	Gleyed brown earths, upland brown earths, mineral gleys
	Dalkieth	Low	Low	Scots pine, sycamore	Hazel, hawthorn	1 393	13	142	Slightly dry	Medium	Stony brown earth
	Tower Wood	Low	Low	Turkey oak, sweet chestnut, beech, alder	Hawthorn, hazel, blackthorn, elder, goat willow	1 438	11	130	Fresh	Medium	Brown earth
NW England	Borrowdale	Medium	Medium	Beech, sycamore, alder	Hazel, hawthorn, blackthorn	1 346	12	117	Fresh	Poor	Upland gleyed brown earths, mineral gleys
	Miterdale	Low	Medium	Sycamore, alder, beech, sweet chestnut	Hazel, hawthorn, blackthorn, elder, goat willow	1 570	10	149	Fresh	Medium	Brown earth
	Scale Green	Medium	Medium	Beech, downy birch, sycamore, alder	Hazel, hawthorn, blackthorn, elder	1 467	9	136	Fresh	Poor	Upland brown earth
NE England	Raindale	Medium	Medium	Beech, small-leaved lime, downy birch, Scots pine, aspen	Hawthorn, hazel, blackthorn, elder	1 442	10	164	Slightly dry	Poor	Podzolic brown earth
Wales	Rhayader	Low	Medium	Beech, Scots pine, sweet chestnut, rowan, small-leaved lime, sycamore	Hazel, hawthorn, blackthorn, elder	1 283	15	88	Slightly dry	Poor	Podzolic brown earth
	Coed y Rhaiadir	Medium	High	Alder, beech, sycamore	Hazel, hawthorn, blackthorn, elder	1 388	17	99	Very moist	Medium	Surface water gley

Region	Case study site	Vulnerability level		Species to include in the planting mixture that are beneficial for oak-associated species		ESC AT	ESC Expos.	ESC MD	ESC SMR	ESC SNR	Soil type
		Site	Region	Trees	Shrubs						
Wales	Bryn Engan	Low	Medium	Beech, sycamore, Scots pine, hornbeam, downy birch, aspen, rowan	Hazel	1 499	12	117	Slightly dry	Poor	Podzolic brown earth
	Chepstow Park	Low	Medium	Sweet chestnut, small-leaved lime, yew, beech, sycamore	Hawthorn, hazel, blackthorn, elder	1 566	12	134	Fresh	Medium	Brown earth
	Hendre	Low	Medium	Small-leaved lime, hornbeam, beech, Turkey oak, aspen, sycamore, alder, crab apple	Hawthorn, hazel, blackthorn, goat willow, elder	1 736	9	157	Fresh	Rich	Brown earth
South West England	Britty common	Medium	High	Alder, sycamore, Scots pine, beech	Hazel, hawthorn, blackthorn, elder goat willow, privet	2 512	11	177	Very moist	Medium	Surface water gley
South East England	Island Thorns	High	High	Beech, Scots pine, small leaved lime, Turkey oak, alder, sycamore	Hazel, hawthorn, blackthorn, goat willow	2 732	10	226	Very moist	Poor	Sandy ground water gley
	Stratfield Brake	High	High	Turkey oak, beech, alder, sycamore, downy birch, hornbeam	Hazel, hawthorn, blackthorn, elder goat willow	2 664	13	226	Very moist	Medium	Surface water gley
	Foxhunting	Medium	High	Beech, Scots pine, small leaved lime, Turkey oak, alder, sycamore	Hazel, hawthorn, blackthorn, elder goat willow, privet	2 859	10	243	Very moist	Medium	Surface water gley
East England	Epping	High	High	Beech, sycamore, small leaved lime, Turkey oak, Scots pine, alder	Hazel, hawthorn, blackthorn, elder goat willow	2 646	13	252	Very moist	Medium	Surface water gley
	Monks wood	High	High	Small leaved lime, beech, sycamore, alder, Scots pine	Hazel, hawthorn, blackthorn	2 704	11	250	Very moist	Medium	Surface water gley
	Writtle	High	High	Turkey oak, beech, downy birch, alder, hornbeam	Hazel, hawthorn, blackthorn, elder	2 726	12	265	Very moist	Medium	Surface water gley
East Midlands	Abbeydale	Medium	High	Turkey oak, small leaved lime, beech, alder, sycamore, downy birch, hornbeam	Hazel, hawthorn, blackthorn, elder, goat willow	2 368	9	190	Very moist	Medium	Surface water gley
West Midlands	Sutton Park	Medium	High	Turkey oak, small leaved lime, beech, sweet chestnut	Hazel, hawthorn, blackthorn, elder	2 417	13	189	Slightly dry	Poor	Brown earth/ podzolic brown earth
	Newlands Wood	High	High	Turkey oak, small leaved lime, beech, downy birch, aspen.	Hazel, hawthorn, blackthorn, elder	2 451	12	188	Very moist	Medium	Surface water gley

Note: Most beneficial species listed first. Beneficial tree species may not be appropriate in meeting other management objectives.
Vulnerability level =
Site Low – Region Low: No changes in oak suitability are expected on this site, but extreme events are likely to become more frequent, resulting in increased stress in the coming decades.
Site Low – Region Medium: No changes in oak suitability are expected on this site. But in this region extreme climatic shifts to wetter winters and drier summers events will be more frequent, resulting in increased future stress to oak woodlands, particularly on surface-water gley soils (crown density reduction, die-back, bleeding lesions).
Site Medium – Region Medium: Parts of the woodland on gleyed soils will become less suitable for oak in the coming decades and productivity may be lower. This will be caused by increased winter waterlogging followed by drier warmer and droughtier summers. The changes in climate will result in increased stress (loss of canopy density, die-back, bleeding lesions).
Site Medium – Region High: Some changes in oak suitability are expected on this site, caused by more extreme events of higher winter rainfall and increasing summer evaporation. Oak trees may become increasingly stressed in the coming decades (e.g. loss of crown density, shoot die-back, bleeding lesions).
Site High – Region High: Changes in oak suitability are now occurring on this site, and extreme events are likely to become more frequent. Surface water gley soils may exacerbate the effects of drought causing increased fluctuations in seasonal water availability. Oak trees may become increasingly stressed in the coming decades. Oak woodlands on poorly draining soils in this area are predicted to show increasing site stress between 2010 and 2050 (e.g. canopy loss, bleeding lesions, dieback)(PuRpOsE, 2019).
Region = National Forest Inventory region (Figure 6). Soil type = interpreted from soilscape type, soil association and series for each location (www.landis.org.uk).
Abbreviations: AT, annual accumulated temperature >5°C; ESC, Ecological Site Classification (Pyatt, Ray and Fletcher, 2001; www.forestdss.org.uk/geoforestdss); Expos., score of exposure or windiness of site; MD, moisture deficit; SMR, soil moisture regime; SNR, soil nutrient regime.