Quantock Hills National Landscape

Quantock Hills National Landscape Climate Risk Assessment



Cover photo: Ash dieback impacting mixed deciduous woodland. Mick Biddle, Forestry Commission

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This version of the Climate Risk Assessment for the Quantock Hills builds on the version completed as part of the Management Plan review process. It includes further habitats, species and features that the Partnership consider to be part of the Special Qualities of the National Landscape.

The risk assessment identified the vulnerability of features and assets to the impacts of climate change, based on likelihood and impact. It has been based on an approach used by Protected Landscapes and other land-based organisations and is designed to be regularly reviewed and adapted as evidence develops.

Table 2 identifies the special features assessed and considers the headline changing climate types, the impact of these and the likelihood and severity. It should be noted that impact can be both positive (opportunity) and negative (risk). Consideration of the likelihood and impact indicates the potential effect on a scale between 'severe risk' through to 'significant opportunity'. The table assesses the impacts over time that allows consideration of priority when assessing potential adaptation.

Table 1: Risk / Opportunity Matrix: The combination of likelihood and impact leads to a scoring of risks and opportunities.

				Likelihood					Risk rating
				Rare	Unlikely	Possible	Likely	Almost certain	
				1	2	3	4	5	
Impact	**Risk**	-5	Catastrophic	-5	-10	-15	-20	-25	Severe Risk
		-4	Major	-4	-8	-12	-16	-20	
		-3	Moderate	-3	-6	-9	-12	-15	Moderate risk
		-2	Minor	-2	-4	-6	-8	-10	
		-1	Slight	-1	-2	-3	-4	-5	Slight risk
	No Change	0	No Change	0	0	0	0	0	No impact
	Opportunity	1	Slight	1	2	3	4	5	Slight opportunity
		2	Minor	2	4	6	8	10	Moderate opportunity
		3	Moderate	3	6	9	12	15	
		4	Major	4	8	12	16	20	Significant opportunity
		5	Fantastic	5	10	15	20	25	

Table 2: Quantock Hills Climate Risk Assessment.

Geology & Soils												
Special Quality	**Headline Projection**	**Projected Impact**	**Risks and Opportunities**	**2030 (Short Term)**			**2050 (Medium Term)**			**2080 (Long Term)**		
				Likelihood 1 to 5	**Impact -5 to 5**	**Risk**	**Likelihood 1 to 5**	**Impact -5 to 5**	**Risk**	**Likelihood 1 to 5**	**Impact -5 to 5**	**Risk**
Geology	Sea level rise 0.27 - 1.13m by 2100	Increase in erosion of coastal area	Risk of loss of geological interest, coastal agricultural fringe	2	-3	-6	4	-4	-16	5	-4	-20
		Increased sustained coastal flooding (low lying land)	Increased salination of coastal agricultural fringing land	2	-2	-4	3	-3	-9	4	-4	-16
	Wetter winters	Increased coastal flooding	risk of flooding	2	-2	-4	3	-3	-9	4	-4	-16
		Altered flow regimes / greater fluctuation of water tables	Changes in plant communities favouring wetland plant communities	1	0	0	2	-2	-4	3	-3	-9

Special Quality	Headline Projection	Projected Impact	Risks and Opportunities	2030 (Short Term)			2050 (Medium Term)			2080 (Long Term)		
				Likelihood 1 to 5	Impact -5 to 5	Risk	Likelihood 1 to 5	Impact -5 to 5	Risk	Likelihood 1 to 5	Impact -5 to 5	Risk
Soils	Summer droughts more extreme and intense	Accelerated decomposition of soil organic matter (D)	Increased likelihood that water & nutrients supply is limited	1	0	0	2	-1	-2	3	-3	-9
			Increased soil erosion	1	-1	-1	2	-2	-4	3	-3	-9
		Increased input of litter (foliage, woody material & roots if increased tree / plant growth (ID)	Increased vegetation growth increase litter and root input	1	0	0	2	1	2	3	2	6
	Sea level rise	Increased salinity of soils	Increased soil salinity will negatively impact traditional crops such as wheat meaning a move to more salt tolerant cultivars or crops	1	0	0	1	-1	-1	2	-1	-2

Habitats

Special Quality	Headline Projection	Projected Impact	Risks and Opportunities	2030 (Short Term)			2050 (Medium Term)			2080 (Long Term)		
				Likelihood 1 to 5	Impact -5 to 5	Risk	Likelihood 1 to 5	Impact -5 to 5	Risk	Likelihood 1 to 5	Impact -5 to 5	Risk
Sessile oakwoods	Increased mean temperatures, leading to longer growing season and altered phenology	Decline in bryophyte / moss species	Loss of bryophyte / moss species and associated invertebrate assemblages	1	-1	-1	2	-3	-6	3	-3	-9
		Breakdown in synchrony between species due to changes in time of flushing	Decline in key species and breakdown in food web.	3	-1	-3	3	-3	-9	4	-3	-12
		Increased shading due to increased and earlier canopy	Changed in ground flora composition and regeneration	1	0	0	2	-2	-4	3	-3	-9
		Increased threat from pests / diseases	Risk of loss of habitat	2	-2	-4	3	-3	-9	4	-4	-16
	Warmer wetter winters	Expansion of existing pests / diseases e.g. P. ramorum responsible for oak dieback	Risk of loss of habitat / species	4	-3	-12	4	-3	-12	4	-3	-12
		Improved winter survival of mammal pests such as deer and squirrel	Reduced regeneration and loss of ground flora	2	-2	-4	3	-3	-9	4	-3	-12

	Summer droughts more common and intense	Reduced soil moisture and drought	Decline and potential loss of sensitive ground flora	2	-1	-2	3	-3	-9	4	-3	-12
		Increased risk of wildfire	Fire could result in localised changes to ground flora and understorey composition	1	-1	-1	3	-2	-6	3	-2	-6
	Increased extreme weather events - high winds	Increased wind throw	Risk of rowan / birch dominance	2	-1	-2	3	-3	-9	3	-3	-9
Mixed ash dominated woods	Warmer wetter winters	Expansion of existing pests / diseases e.g. P. ramorum responsible for oak dieback	Risk of loss of habitat / species	4	-3	-12	5	-4	-20	5	-4	-20
		Improved winter survival of mammal pests such as deer and squirrel	Reduced regeneration and loss of ground flora	2	-2	-4	3	-3	-9	4	-3	-12
	Summer droughts more common and intense	Reduced soil moisture and drought	Decline and potential loss of sensitive ground flora	2	-2	-4	3	-3	-9	4	-3	-12
		Increased risk of wildfire	Fire could result in localised changes to ground flora and understorey composition	1	-1	-1	3	-2	-6	3	-2	-6

	Increased extreme weather events - high winds	Increased wind throw	Risk of rowan / birch dominance	2	-1	-2	3	-3	-9	3	-3	-9
Heathland	Warmer wetter winters	Reduced management options through burning or cutting (earlier bird breeding)	Risk of scrub encroachment	3	-2	-6	4	-3	-12	5	-3	-15
			Opportunity for Bilberry	1	1	1	2	1	2	3	2	6
			Opportunity for Dartford Warbler	3	2	6	4	3	12	4	4	16
		Increased surface runoff	Loss of habitat, or water logging	2	-2	-4	3	-3	-9	4	-3	-12
		Increased nitrogen deposits	Loss of nutrient poor species	1	-1	-1	2	-3	-6	3	-3	-9
			Increase sensitivity of heather to drought, frost & heather beetle	1	-3	-3	3	-3	-9	5	-4	-20
	Increased mean temperatures	longer growing seasons	Dwarf shrubs become less dominant	1	-3	-3	3	-3	-9	4	-4	-16
			Increased nutrients cycling causing grasses to become dominant	1	-1	-1	3	-3	-9	4	-4	-16
	Hotter drier summers	Increased evaporation / drought	Drying out and oxidation of peat soils change species composition and reduce carbon	1	-1	-1	3	-2	-6	4	-2	-8

			store / sequestration									
			Surface soils / peat drying out and increase wind blow (erosion)	1	-1	-1	3	-3	-9	4	-3	-12
			Loss of habitat structural diversity, potential local scale species extinction, especially for wet heath species	1	-1	-1	3	-3	-9	5	-3	-15
		Increased risk of wildfire	Increased frequency and intensity of fire could lead to species change favouring grass species	1	-1	-1	3	-3	-9	5	-4	-20

Acidic mires	Higher intensity rainfall events leading to peak flows increasing by 40% by 2080	Increased flood and erosion events	Loss of peat / soils associated with acidic mires due to erosion / landslip	2	-2	-4	3	-3	-9	3	-4	-12
	Summer droughts more common and intense	Reduced water table	Change in species composition. Reduced water quality due to increased release of particulate & Dissolved organic carbon	1	-3	-3	3	-3	-9	4	-4	-16
		Increased grazing pressure due to lack of alternative water sources	Increase in poaching and grazing, leading to change in species composition, erosion, compaction	3	-2	-6	4	-4	-16	4	-4	-16
			Drying out and oxidation of peat soils change species composition and reduce carbon store / sequestration	1	-1	-1	4	-3	-12	4	-3	-12
	Higher mean temperatures	Reduced water quality due to increased nutrient concentration from faster decomposition	Change in species composition favouring ruderal plant species	1	-1	-1	2	-2	-4	3	-3	-9

Acidic / neutral dry grasslands	Wetter and warmer winters	Soil erosion, compaction of soil (reduced incidents of frost heave)	Risk to soil health, risk of soil erosion	1	-1	-1	3	-5	-15	4	-5	-20
	Drier summers	Change in composition to favour annual over perennial species	Risk to soil health, risk to grazing and livestock	2	-1	-2	3	-5	-15	4	-5	-20
		Reduction in grass production	Risk to grazing livestock & species diversity	2	-2	-4	3	-3	-9	5	-4	-20
		Drier conditions favour deep rooted plant species	Risk to natural carbon stores & sequestration	1	-1	-1	2	-3	-6	3	-4	-12
		Increased risk of wildfire	Change in composition of grassland leading to increased bare ground & invasive species	1	-2	-2	3	-3	-9	3	-3	-9
	Hotter summers	Longer growing season \\	Change in composition of grassland due to earlier flowing and seeding	1	1	1	3	3	9	3	3	9
			Increased spread of invasive species such as bracken	3	-2	-6	3	-3	-9	5	-3	-15
	Economics	Reduced livestock grazing	Reduced grazing stock / intensified grazing systems / conversion to arable production	3	-4	-12	2	-4	-8	1	-4	-4

Beech hedgebanks	Summer droughts more common and intense	Suppression of growth, increased prevalence of drought stress	Reduced growth and spread of beech	1	-1	-1	3	-2	-6	4	-4	-16
	Warmer summers	Increase frequency and duration of high temperature incidents	Increased sun scorch leading to bark death in beech	1	-1	-1	3	-3	-9	3	-3	-9
	Increased frequency of extreme weather	High winds	Increase loss of trees and banks to wind throw	1	-4	-4	2	-4	-8	2	-4	-8
		Higher intensity rainfall events leading to peak flows increasing by 40% by 2080	Reduced nutrient uptake and reduce vigour of beech trees	1	-2	-2	3	-4	-12	3	-4	-12
	Warmer winters	Reduced late frost events	Increased survival of pest species (squirrel, deer etc) result in more damage to trees	2	-3	-6	3	-3	-9	3	-3	-9
			More generations of insect pests per year	1	-2	-2	2	-3	-6	3	-3	-9
			Reduced bud initiation	1	-2	-2	2	-2	-4	3	-2	-6

Native hedgerows	Increased frequency of extreme weather	Higher intensity rainfall events leading to peak flows increasing by 40% by 2080	Increased flooding and soil saturation - damage to soil structures, difficulty in winter management	1	-1	-1	3	-3	-9	3	-3	-9
		High winds	Increase loss of mature and veteran trees	1	-2	-2	3	-3	-9	3	-3	-9
	Increase in average temperature	Longer growing season	Increased growth and vigour of hedgerows	1	2	2	2	3	6	3	3	9
	Warmer winters	Fewer frost events	Reduced bud, flower and fruit production impacting wildlife	1	-1	-1	2	-3	-6	3	-3	-9
	Warmer drier summers	drought	increased die back of some species & increased stress increasing susceptibility to pests and diseases	1	-2	-2	3	-3	-9	3	-3	-9
	Economics	Changing agricultural systems	Intensification of adjacent land use leading to impacts such as pesticide drift & nutrient enrichment	1	-2	-2	3	-3	-9	3	-3	-9
			Intensification leading to reduction of buffer strips and margins	1	-3	-3	3	-3	-9	4	-3	-12

			increasing damage and impact on hedges									
Traditional orchards	Warmer drier summers	drought	Increase root stress, reduction in fruit production	1	-2	-2	2	-3	-6	3	-3	-9
		Warmer temperatures with longer growing season	Increased and new pest damage	1	-2	-2	2	-3	-6	3	-3	-9
			Increase of disease such as powdery mildew & fire blight	2	-2	-4	3	-3	-9	4	-3	-12
			Traditional orchard fruit species replaced by fruit currently grown in more southerly locations. Impact on insect species dependant on current fruit species	1	-2	-2	3	-3	-9	4	-4	-16
	Warmer wetter winters	Fewer frost events	Greater survival of insect pests with higher populations and impact on trees	1	-1	-1	3	-3	-9	4	-3	-12
			Inadequate periods of complete dormancy risking trees flowering early, at different times from pollinators or	1	-2	-2	3	-4	-12	4	-4	-16

			development of blind buds									
		Higher intensity rainfall events leading to peak flows increasing by 40% by 2080	Increase in diseases such as scab (warmer, wetter winter) and phytophthora spp (water logged soils)	2	-2	-4	3	-3	-9	4	-3	-12
			prolonged wet soil conditions increase risk of tree death from water logging	2	-2	-4	3	-3	-9	4	-3	-12
	Increased frequency of extreme weather	High winds	Increased wind throw especially of mature trees	1	-2	-2	3	-3	-9	3	-3	-9

Streams / ponds	Warmer summers and milder winter	Increased water temperature	Decline of cool water species, or possible migration further upstream	1	-1	-1	2	-1	-2	4	-2	-8
			Impact on food webs.	1	-2	-2	2	-2	-4	4	-3	-12
			Increase in non-native species	1	-1	-1	2	-2	-4	2	-3	-6
	Drier summers	Low flow / poor water quality	Temporary reduction in habitat extent leading to increased competition and predation.	2	-1	-2	3	-3	-9	4	-4	-16
			Headwater habitats (acidic flushes) increased stress and reduced diversity	1	-1	-1	3	-3	-9	4	-3	-12
	Wetter winters	Higher peak flows	Greater energy could allow greater natural recovery of river habitats	1	1	1	2	1	2	3	2	6
			Increase in flood defence actions may impact river habitats	1	0	0	2	-1	-2	2	-1	-2
			Species may be washed out during flood events or species that are less well	1	-1	-1	3	-2	-6	4	-3	-12

			adapted to high flows may be shifted downstream									
			Increased spread of invasive non-native species due to connectivity during flooding events	1	-1	-1	1	-1	-1	1	-2	-2
	Reduced annual rainfall	Reduced annual river flow	Decline in population of species that favour faster currents	2	-2	=4	3	-2	-6	4	-3	-12
			Increased demand for abstraction increases stress	0	0	0	1	-1	-1	2	-3	-6
	Increased frequency of storms	Increased rainfall intensity and run-off	Increased erosion especially in upper reaches of stream / river systems. Increased loads of fine sediments and nutrients causing siltation and eutrophication	2	-2	-4	3	-3	-9	4	-4	-16

Species – Species list derived from Quantock Hills Nature Recovery Plan and Natural England's S41 species list.													
Special Quality	**Headline Projection**	**Projected Impact**	**Risks and Opportunities**	**2030 (Short Term)**			**2050 (Medium Term)**			**2080 (Long Term)**			
				Likelihood	**Impact**	**Risk**	**Likelihood**	**Impact**	**Risk**	**Likelihood**	**Impact**	**Risk**	
				1 to 5	**-5 to 5**		**1 to 5**	**-5 to 5**		**1 to 5**	**-5 to 5**		
Adder	Hotter summers and milder winters	Increased soil temperatures & longer summers	Improved growth rates, longer activity periods, increased fecundity success	1	1	1	2	2	4	3	4	12	
	Drier summers & wetter winters	Changes to suitable habitat	Impact on adders and prey	1	1	1	2	2	4	3	3	9	
		Increase frequency and impact of wildfires	Loss of habitat	1	-1	-1	3	-3	-9	5	-4	-20	
	Increased frequency & intensity of storm events	Increased flooding events including water logging of soils	Drowning of individuals, disturbance to hibernaculum	1	-2	-2	1	-2	-2	1	-2	-2	

Barbastelle bat	Hotter drier summers	Increased abundance of insects	Higher reproduction rates	1	1	1	2	3	6	3	3	9
		Hotter summers	Increased body mass of newborn bats as calorific cost of regulating body temperature decreased	1	1	1	2	2	4	2	3	6
	Milder winters	Reduced number of consecutive colder days	Negative impact on bats ability to hibernate	1	-2	-2	3	-3	-9	4	-4	-16
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	3	-1	-3	3	-1	-3
Bilberry	Hotter summers & warmer winters	Increased frequency / intensity of drought	Seedlings negatively impacted, reducing germination	1	-1	-1	2	-2	-4	3	-2	-6
		Increase frequency / intensity of wildfires	Bilberry rootstock highly vulnerable to heat damage	1	-1	-1	3	-3	-9	5	-3	-15
	Warmer wetter winters	Wetter more humid winters	Increased prevalence of diseases such as *Phytophthora sp*	1	-2	-2	2	-3	-6	4	-4	-16

Brown hairstreak	Hotter drier summers	Increased growing period	Food source (blackthorn) able to flower for longer	1	2	2	2	2	4	2	3	6
		Drier calmer weather patterns	Increased flight time allowing increased activity	1	2	3	2	3	6	3	3	9
	Warmer wetter winters	Warmer temperatures impacting ability of eggs / caterpillars to	Negative impacts on ability of eggs / caterpillars to hibernate	1	-1	-2	2	-3	-6	3	-4	-12
Brown-long eared bat	Hotter drier summers	Increased abundance of insects	Higher reproduction rates	1	1	1	2	3	6	3	3	9
		Hotter summers	Increased body mass of newborn bats as calorific cost of regulating body temperature decreased	1	1	1	2	2	4	2	3	6
	Milder winters	Reduced number of consecutive colder days	Negative impact on bats ability to hibernate	1	-2	-2	3	-3	-9	4	-4	-16
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	3	-1	-3	3	-1	-3

Bullfinch	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	2	4	2	3	6
		Increased abundance of insects	Increased prey abundance for young	1	2	2	2	3	6	2	4	8
	Wetter warmer winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	2	4	2	2	4
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-1	-1	2	-1	-2	2	-2	-4
Camomile	Hotter drier summers	Hotter soil temperatures and drier soils	Ability to outcompete other plant species that are less drought resistant	1	1	1	2	2	4	2	2	4
Cuckoo	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	2	4	2	3	6
			Increased survival rates of chicks hosted by other species	1	1	1	2	2	4	2	3	6
	Climate change impacts across migratory routes	Significant warming and aridity in sub-Saharan Africa	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9
		Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16

Dartford Warbler	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	2	4	2	3	6
			Increased prey abundance leading to high survival of young	1	1	1	2	2	4	2	3	6
	Wetter warmer winters	Reduced extreme cold events	Greater winter survival rates	1	2	2	2	3	6	2	4	8
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	1	1	2	1	2	3	1	3
Dormouse	Warmer wetter winters	Reduced number of consecutive cold days	Reduced winter survival and ability to breed	1	-2	-2	2	-2	-4	4	-2	-8
	Hotter drier summers	Increased growing season	Increased period of food supply	1	2	2	2	2	4	4	2	8
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-1	-1	2	-1	-2	2	-2	-4
Dunnock	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	2	4	2	3	6
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	2	4	3	3	9
	Increased frequency &	Increased storm damage to trees / woodland	Reduced abundancy of	1	1	1	2	1	2	3	1	3

	intensity of storm events		suitable roost habitats									
Great Crested Newt	Hotter drier summers	Increased droughts	Loss of pond habitats as they dry out or linings are damaged by heat	1	-2	-2	3	-2	-6	4	-3	-12
	Warmer wetter winters	Warmer winters	Later pond arrival times of adults reducing period for juvenile feeding	1	-2	-2	2	-3	-6	3	-3	-9
		Increase in heavy rainfall events	Data shows reduced annual survival rate. Cause unknown	1	-1	-1	2	-2	-4	2	-2	-4
Lesser horseshoe bat	Hotter drier summers	Increased abundance of insects	Higher reproduction rates	1	1	1	2	3	6	3	3	9
		Hotter summers	Increased body mass of newborn bats as calorific cost of regulating body temperature decreased	1	1	1	2	2	4	2	3	6
	Warmer wetter winters	Reduced number of consecutive colder days	Negative impact on bats ability to hibernate	1	-2	-2	3	-3	-9	4	-4	-16

Lesser Redpoll	Hotter drier summers	Changing pattern of bud / seed emergence / availability especially of birch (preferred tree)	Extended growing period increasing food supply	1	1	1	2	3	6	3	3	9
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	3	6	3	3	9
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-1	-1	2	-1	-2	2	-2	-4
Lesser spotted woodpecker	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher reproduction rates	1	1	1	2	3	6	3	3	9
		Drier soils impacting woodland tree species	Unknown impact	1	-1	-1	3	-2	-6	4	-2	-8
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	2	4	3	3	9
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-2	-2	2	-2	-4	4	-3	-12

Linnet	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	3	6	3	3	9
			Increased number of breeding attempts	1	1	1	2	3	6	3	3	9
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	2	4	3	3	9
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-1	-1	2	-1	-2	3	-1	-3
Marsh tit	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	3	6	3	3	9
		Drier soils	Drier soils reducing understory growth	1	-2	-2	2	-2	-4	3	-3	-9
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	2	2	2	2	4	3	3	9
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodland	Reduced abundancy of suitable roost habitats	1	-1	-1	2	-1	-2	2	-1	-2
			Increased light levels allowing understorey growth	1	1	1	2	2	4	2	3	6

Nightjar	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9
			Increased survival rates of chicks hosted by other species	1	1	1	2	3	6	3	3	9
		Increased risk of wildfire	Loss of nest & chicks	1	-2	-2	3	-3	-9	5	-3	-15
	Climate change impacts across migratory routes	Significant warming and aridity in sub-Saharan Africa	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9
		Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16
Noctule bat	Hotter drier summers	Increased abundance of insects	Higher reproduction rates	1	1	1	2	3	6	3	3	9
		Hotter summers	Increased body mass of newborn bats as calorific cost of regulating body temperature decreased	1	1	1	2	2	4	2	3	6
	Warmer wetter winters	Reduced number of consecutive colder days	Negative impact on bats ability to hibernate	1	-2	-2	3	-3	-9	4	-4	-16

	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	3	-1	-3	3	-1	-3
Otter	Hotter drier summers	Warmer average water temperatures	Reduced prey due to altered water flows and reduced water quality	1	-2	-2	2	-2	-4	3	-3	-9
		Reduced water levels / flows	Reduced forage and hunting habitats	1	-2	-2	2	-2	-4	3	-3	-9
	Sea level rise 0.27 - 1.13m by 2100 Increased frequency & intensity of storm events	Increased frequency & intensity of storm surges	Contamination of freshwater habitats with saltwater	1	-1	-1	2	-1	-2	2	-2	-4
Pied flycatcher	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9
			Increased survival rates of chicks	1	1	1	2	3	6	3	3	9
		Increase summer temperature	Increased breeding success (unclear as to why)	1	2	2	2	2	4	2	2	4
	Climate change impacts across	Significant warming and aridity in sub-Saharan Africa	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9

	migratory routes	Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16
Skylark	Warmer wetter winters	Reduced management options through burning or cutting (earlier bird breeding)	Increased scrub encroachment reducing suitable habitat for nesting	1	-2	-2	3	-2	-6	3	-3	-9
		Reduced extreme cold events	Greater winter survival rates	1	1	1	2	3	6	3	3	9
	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	3	6	3	3	9
			Increased number of breeding attempts	1	1	1	2	3	6	3	3	9
		Changing habitat with less heath species and more grassland species	Skylarks will nest in extensive grassland habitats as well as heathland habitats	1	0	0	2	1	1	4	1	4
		Increased risk of wildfire	Loss of nest & chicks	1	-2	-2	3	-3	-9	5	-3	-15
		Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9

			Increased survival rates of chicks	1	1	1	2	3	6	3	3	9
Soprano pipistrelle	Hotter drier summers	Increased abundance of insects	Higher reproduction rates	1	1	1	2	3	6	3	3	9
		Hotter summers	Increased body mass of newborn bats as calorific cost of regulating body temperature decreased	1	1	1	2	2	4	2	3	6
	Warmer wetter winters	Reduced number of consecutive colder days	Negative impact on bats ability to hibernate	1	-2	-2	3	-3	-9	4	-4	-16
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	3	-1	-3	3	-1	-3
Spotted flycatcher	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9
			Increased survival rates of chicks	1	1	1	2	3	6	3	3	9
		Increase summer temperature	Increased breeding success (unclear as to why)	1	2	2	2	2	4	2	2	4
	Climate change impacts across	Significant warming and aridity in sub-Saharan Africa	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9

	migratory routes	Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	2	-1	-2	3	-2	-6
Tree pipit	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9
			Increased survival rates of chicks	1	1	1	2	3	6	3	3	9
		Increase summer temperature	Increased breeding success (unclear as to why)	1	2	2	2	2	4	2	2	4
	Climate change impacts across migratory routes	Warming and drier climate in wintering locations such as southern Europe	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9
		Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16
	Increased frequency & intensity of storm events	Increased storm damage to trees / woodlands	Reduced abundance of suitable roost habitats	1	-1	-1	2	-1	-2	3	-2	-6

Waxcap fungi	Increased average annual temperature	Higher average temperatures	Increased growth and fruiting	1	2	2	1	2	2	2	2	4
		Drier conditions association with higher annual temperatures	Damage to hyphal network and reduced fruiting	1	-2	-2	2	-2	-4	3	-3	-9
	Wetter winters & drier summers	Wetter soils during winter, drier soils during summer	Waxcaps later fruiting. Wetter late autumn conditions could benefit fungi as allow longer fruiting and sporing period	1	2	2	2	2	4	3	3	9
			Later summer droughts could negatively impact fruiting	1	-1	-1	2	-1	-2	3	-2	-6
			Flooding leading to damage to hyphal network	1	-1	-1	2	-2	-4	2	-2	-4
			Drought drying out soils damaging hyphal networks and reducing fruiting	1	-2	-2	2	-3	-6	3	-3	-9
	Wetter winters	Increased nitrogen deposition	Waxcaps sensitive to high soil nitrogen levels leading to a loss and reduction of abundance	1	-1	-1	2	-2	-4	3	-2	-6

Wood Warbler	Hotter drier summers	Increased abundance of insects	Increased prey abundance leading to higher survival rate of adults	1	1	1	2	3	6	3	3	9
			Increased survival rates of chicks	1	1	1	2	3	6	3	3	9
		Increase summer temperature	Increased breeding success (unclear as to why)	1	2	2	2	2	4	2	2	4
	Climate change impacts across migratory routes	Significant warming and aridity in sub-Saharan Africa	Reduced food sources, loss of habitat	1	-2	-2	2	-3	-6	3	-3	-9
		Disconnect between timing of migration of emergency of prey	Reduction in success of breeding due to reduced abundance of prey	2	-2	-4	3	-3	-9	4	-4	-16
Yellowhammer	Hotter drier summers	Changing pattern of bud / seed emergence / availability	Extended growing period increasing food supply	1	1	1	2	3	6	3	3	9
		Drier soils	Drier soils reducing understory growth	1	-1	-1	2	-2	-4	3	-2	-6
	Warmer wetter winters	Reduced extreme cold events	Greater winter survival rates	1	1	1	2	3	6	3	3	9

Built Environment												
Special Quality	**Headline Projection**	**Projected Impact**	**Risks and Opportunities**	**2030 (Short Term)**			**2050 (Medium Term)**			**2080 (Long Term)**		
				Likelihood	**Impact**	**Risk**	**Likelihood**	**Impact**	**Risk**	**Likelihood**	**Impact**	**Risk**
				1 to 5	**-5 to 5**		**1 to 5**	**-5 to 5**		**1 to 5**	**-5 to 5**	
Built environment - locally distinctive buildings in Quantock Hills villages	Increased frequency of extreme weather	Increase in frequency and severity of high rainfall events	Locally distinct heritage (properties) at increased risk of flooding	2	-3	-6	3	-4	-12	4	-4	-16
		Increase in frequency and severity of high wind events	Locally distinct heritage at increased risk of damage due to high intensity rain / wind events e.g. structural damage to roof	2	-3	-6	3	-4	-12	4	-4	-16
		Increase in frequency and severity of high heat events	Locally distinct heritage at increased risk of damage through soil / foundation shrinkage	1	-1	-1	2	-2	-4	2	-2	-4
			Potential increase of churches as 'cool spaces' during heatwaves	1	2	2	3	3	9	3	3	9

Heritage Assets – archaeological earthworks	Sea level rise 0.27 - 1.13m by 2100	Increase in erosion of coastal area	Loss or partial loss of features	1	-2	-2	2	-3	-6	3	-3	-9
	Hotter Drier summers	Drying out of soil	Shifting subsoil and substrate, increased wind erosion of surface layers	1	-1	-1	2	-1	-2	3	-2	-6
		Increased frequency and intensity of wildfires	Charring of remains with increased exposure of features	1	-1	-1	2	-1	-2	3	-1	-3
	Warmer wetter winters	Reduced intensity and frequency of frost events	Reduced frost damage to features	1	2	2	2	2	4	2	2	4
		Prolonged rainfall	Waterlogging and loss of surface cover protection	1	-1	-1	1	-1	-1	1	-1	-1
		Increased frequency and intensity of flooding events	Waterlogging and loss of surface cover protection,	1	-1	-1	1	-1	-1	1	-1	-1

		Increased frequency & intensity storm events	Erosion and scarring of surface leading to deeper erosion and exposure of features, washing aware of soil and feature material	1	-1	-1	2	-2	-4	3	-2	-6
Built environment – infrastructure (roads)	Hotter drier summers	Higher average summer temperatures	Increased surface rutting and deformation with associated verge damage and erosion	1	-2	-2	3	-3	-9	4	-3	-12
			Reduced lifespan of roads, increased engineered solutions impacting visual aspect of country lanes / roads	1	-1	-1	2	-1	-2	3	-1	-3
	Wetter warmer winters	Higher average rainfall	Saturation of road substrates weakening road structures	1	-1	-1	2	-1	-2	3	-1	-3
	Increased frequency and intensity of storm events	Increased frequency and intensity of storm events	Increased flooding of roads increasing damage to surfaces and verges impacting visual aspect of country lanes	1	-2	-2	3	-3	-9	4	-3	-12

Built environment – infrastructure (power)	Warmer average temperatures	Reduced OHL capacity	Increase in OHL resource required to increase capacity	2	0	0	3	-1	-3	3	-2	-6
		Greater heat dissipation from UGC	Increased soil temperatures impacting habitats and species	2	0	0	3	-1	-3	3	-1	-3
Built environment – infrastructure (water)	Warmer drier summers	Increased frequency and intensity of droughts	Increased need to abstract water impacting health of stream / river systems	2	-2	-4	3	-3	-9	4	-4	-16
			Increased requirement for water storage development e.g. reservoirs.	1	-1	-1	2	-1	-2	2	-1	-2
	Increased frequency and intensity of storm events	Increased peak flow of rivers and surface water	Overloaded systems increases sewage released into watercourses	2	-1	-2	3	-1	-3	3	-1	-3
		Deterioration of water supply / management infrastructure	Increased maintenance and replacement of current infrastructure leading to damage to landscape and habitats	1	-1	-1	1	-1	-1	2	-1	-2

Sources:

NAP3 Annex 1: Climate risks and opportunities (with correction slip)

Somerset's Climate Emergency Strategy

Habitats

Climate Change Adaptation Manual - NE751

NE Climate Change Adaptation Manual – Arable field margins (2020)

NE Climate Change Adaptation Manual – Beech and Yew woodland (2020)

NE Climate Change Adaptation Manual – Coastal floodplain and grazing marsh (2020)

NE Climate Change Adaptation Manual – Hedgerows (2020)

NE Climate Change Adaptation Manual – Lowland dry acid grassland (2020)

NE Climate Change Adaptation Manual – Lowland heathland (2020)

NE Climate Change Adaptation Manual – Lowland meadow (2020)

NE Climate Change Adaptation Manual – Lowland mixed deciduous woodland (2020)

NE Climate Change Adaptation Manual – Maritime cliffs and slopes (2020)

NE Climate Change Adaptation Manual – Purple moor grass and rush pasture (2020)

NE Climate Change Adaptation Manual – Rivers and streams (2020)

NE Climate Change Adaptation Manual – Traditional Orchard (2020)

NE Climate Change Adaptation Manual – Upland acid grassland (2020)

NE Climate Change Adaptation Manual – Upland flushes, fens and swamps (2020)

NE Climate Change Adaptation Manual – Upland heathland (2020)

NE Climate Change Adaptation Manual – Upland oak woodland (2020)

NE Climate Change Adaptation Manual – Wood pasture and parkland (2020)

REsource INFrastructure for monitoring and adapting European Atlantic FORests under Changing climatE (REINFFORCE) - Forest Research

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NE Climate Change Adaptation Manual – Beech (2020)

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Great crested newt | Climate Change Vulnerability Assessment

How are bats being affected by climate change? - The Climate

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Climate change is worsening hazel dormouse decline, new research confirms | Manchester Metropolitan University

Waxcap fungi | Climate Change Vulnerability Assessment

Pied flycatcher | Climate Change Vulnerability Assessment

Soils:

Climate Change Impacts on Soil Carbon - Forest Research

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Built Environment:

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