



European Site Conservation Objectives: Supplementary advice on conserving and restoring site features

Bracket's Coppice Special Area of Conservation (SAC)

Site Code: UK0030095



Meadow Thistle *Cirsium dissectum*
© Christian Fischer

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Bracket's Coppice SAC.

This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Bracket's Coppice Special Area of Conservation (SAC)
Location	Dorset
Site Map	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	01 April 2005
Qualifying Features	See section below
Designation Area	53.66 hectares
Designation Changes	Not applicable
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Bracket's Coppice and Ryewater Farm SSSI
Relationship with other European or International Site designations	None

Site background and geography

Brackets Coppice SAC is located 2 km north of Corscombe in west Dorset within the Yeovil Scarplands National Character Area ([NCA 140](#)).

Jurassic clays and limestones underlie the site and nodular limestone is exposed where fast flowing streams have cut deep gulleys through the drift and clay. A Geological Conservation Review Site is present where fossil rich exposures of Jurassic clays and sandy limestones are present in the stream banks. In addition a tufa deposit is present in Redland Coppice and Bracket's Coppice contains traces of Tertiary silcrete deposits as Sarsen Stones. The soils range from seasonally waterlogged clay loams to well drained brashy calcareous soils over limestone and the site covers an altitudinal range of 75 -115 m.

The varied and significant underlying geology and soils support a mosaic of ancient oak and ash woodland dissected by deep narrow streams beds and neutral and acidic grassland pastures and meadows. Purple moor grass *Molinia careulea* fen meadows are present on intermittently peaty mineral soils across the SAC. The pastures are enclosed by tall diverse hedgerows which are thought to provide an important resource and landmarks for foraging bats. The woodland supports several bat species including a maternity roost of Bechstein's bat, the first maternity colony to be discovered using bat-boxes in the UK. The SAC contains two Nature Reserves, Ryewater Farm owned by Plantlife and Brackett's Coppice owned by the Dorset Wildlife Trust.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H6410. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*). (Purple moor-grass meadows)**

Molinia meadows are found mainly on moist, moderately base-rich, peats and peaty gley soils, often with fluctuating water tables. They usually occur as components of wet pastures or fens, and often form mosaics with dry grassland, heath, mire and scrub communities. This habitat type includes the most species-rich *Molinia* grasslands in the UK, in which purple moor-grass *Molinia caerulea* is accompanied by a wide range of associated species, including rushes, sedges and tall-growing herbs. The more impoverished forms of *Molinia* pasture on acidic substrates are excluded from the Annex I definition.

In the UK these grasslands are represented by two NVC types:

- M24 *Molinia caerulea* – *Cirsium dissectum* fen-meadow
- M26 *Molinia caerulea* – *Crepis paludosa* mire

M24 *Molinia* - *Cirsium* fen-meadow is the more widespread and diverse community and is present at Bracket's Coppice in small discrete stands at Ryewater Farm and more extensively at Bracket's Coppice Nature Reserve.

Molinia meadows are important habitats for a number of S41 Priority species such as the Annex II butterfly marsh fritillary (*Eurodryas aurinia*), narrow-bordered bee hawk-moth (*Hemaris tityus*) and lesser butterfly orchid (*Platanthera bifolia*).

Qualifying Species:

- **S1323. Bechstein's bat *Myotis bechsteinii***

Bechstein's bat is a medium-sized species, with very long ears and a long, pointed, bare, pink face. It has shaggy light-to reddish-brown fur on its back and contrasting greyish white-tipped fur on its underside. The species is closely associated with mature deciduous woodland and appears to select old woodpecker holes or rot holes in trees for breeding. It also occurs in coniferous woodland in some areas. Maternity colonies may move between suitable crevices within a small area, such as a piece of woodland. It is believed to hibernate in hollow trees and sometimes in underground localities. It is one of the UK's rarest mammals, recorded from only a small number of sites in southern England and Wales. Very few maternity roosts are currently known, Bracket's Coppice being one where the maternity roost uses bat boxes. The great majority of other records come from caves or abandoned mines, which are important hibernation sites for a range of bat species.

Bechstein's bat is also one of the rarest bats in Western Europe, and is regarded as endangered in several countries. A population decrease has been reported over most of its European range. The species occurs from the Iberian Peninsula east to the Ukraine and Moldova. Local populations in southern England, Wales, southern Sweden and Bornholm mark the northern border of the range.

The Vincent Wildlife Trust carried out the first radio-telemetry studies on the species in Britain during the mid-1990s, to determine the habitat preferences of this species. The study colony at Bracket's Coppice was in a bat box scheme in a deciduous lowland woodland and the results of the research showed that this species feeds in closed canopy broadleaf woodland with a well-developed understorey often close to water bodies. During the summer females rarely travel more than a kilometre from their day roosts.

Site-specific seasonality of SAC features

The table below highlights in grey those months in which significant numbers of each mobile qualifying feature are most likely to be present at the SAC during a typical calendar year. This table is provided as a general guide only.

Unless otherwise indicated, the months shown below are primarily based on information relating to the general months of occurrence of the feature in the UK. Where site-based evidence is available and has been used to indicate below that significant numbers of the feature are typically present at this SAC outside of the general period, the site-specific references have been added to indicate this.

Applicants considering projects and plans scheduled in the periods highlighted in grey would benefit from early consultation with Natural England given the greater scope for there to be likely significant effects that require consideration of mitigation to minimise impacts to qualifying features during the principal periods of site usage by those features. The months which are *not* highlighted in grey are not ones in which the features are necessarily absent, rather that features may be present in less significant numbers in typical years. Furthermore, in any given year, features may occur in significant numbers in months in which typically they do not. Thus, applicants should not conclude that projects or plans scheduled in months not highlighted in grey cannot have a significant effect on the features. There may be a lower likelihood of significant effects in those months which nonetheless will also require prior consideration.

Any assessment of potential impacts on the features must be based on up-to-date count data and take account of population trends evident from these data and any other available information.

Feature	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bechstein's bat, <i>Myotis bechsteini</i>	Breeding												

Table 1: Supplementary Advice for Qualifying Features: H6410. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); Purple moor-grass meadows

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	<p>Restore the total extent of the H6410 purple moor-grass meadow</p> <p>An area target has not been set because the baseline extent of purple moor-grass meadows is not known and the long term objective for the mix of scrub and grassland on site has not been fully developed.</p>	<p>There should be no measurable reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information.</p> <p>The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.</p> <p>H6410 purple moor-grass meadows is present in good condition across the SAC on peaty mineral soils with impeded drainage. There is scope to increase the extent of this habitat.</p> <p>Target set to Restore because some areas of purple moor-grass meadow have been encroached by e.g. birch, gorse and scrub. There is approximately 25.5 ha of neutral grassland (MG5, M23 and M24), including purple moor-grass meadow, within the SAC.</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>Natural England (2016)</p>
Extent and distribution of the feature	Spatial distribution of the feature within the site	<p>Restore the distribution and configuration of the H6410 purple moor-grass feature, including where applicable its component vegetation types, across the site</p>	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>Natural England (2016)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat.</p> <p>Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.</p> <p>Target set to Restore because some areas of purple moor-grass meadow have been encroached by e.g. birch, gorse and scrub. H6410 purple moor-grass meadows is present in good condition across the SAC on peaty mineral soils with impeded drainage. There is scope to increase the extent of this habitat.</p>	
Structure and function (including its typical species)	Adaptation and resilience	Restore the feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of natural habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning.</p> <p>Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p>	<p>Natural England (2015)</p> <p>Natural England (2016)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats and supporting habitats.</p> <p>This means that this site is considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>There may be the potential for habitat restoration on suitable soil types in the vicinity of Brackets Coppice SAC e.g. Sites Nature Conservation Importance.</p>	
Structure and function (including its typical species)	Functional connectivity with wider landscape	Restore the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	<p>This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives.</p> <p>These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site.</p> <p>These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.</p>	<p>Natural England (2015)</p> <p>Natural England (2016)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Target set to Restore because There is the potential for habitat restoration on suitable soil types in the vicinity of Brackets Coppice SAC e.g. Birch Common and other Sites Nature Conservation Importance	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Restore the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the habitat. For this feature, soil P index should typically be index 0 (< 9 mg l ⁻¹)	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	Natural England (2016)
Structure and function (including its typical species)	Supporting off-site habitat	Restore the extent, quality and spatial configuration of land or habitat surrounding or adjacent to the site which is known to support the feature	<p>The structure and function of the qualifying habitat, including its typical species, may rely upon the continued presence of areas which surround and are outside of the designated site boundary. Changes in surrounding land-use may adversely (directly/indirectly) affect the functioning of the feature and its component species.</p> <p>This supporting habitat may be critical to the typical species of the feature to support their feeding, breeding, roosting, population dynamics ('metapopulations'), pollination or to prevent/reduce/absorb damaging impacts from adjacent land uses e.g. pesticide drift, nutrient enrichment.</p> <p>Target set to Restore because There is the potential for habitat restoration on suitable soil types in the vicinity of Brackets Coppice SAC e.g. Birch Common and other Sites Nature Conservation Importance</p>	Natural England (2016)
Structure and function (including its typical species)	Key structural, influential and/or distinctive	Restore the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature:	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include;	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
	species	<p>M24 grasslands support a suite of scarce plants with an oceanic distribution in the UK. These plants are a distinctive component of the M24 <i>Molinia</i> pasture:</p> <p>Meadow thistle <i>Cirsium dissectum</i></p> <p>The purple moor-grass meadows are also an important habitat for marsh fritillary <i>Eurodryas aurinia</i></p>	<ul style="list-style-type: none"> • Structural species which form a key part of the Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for 'vegetation community composition'). • Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat) • Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular SAC. <p>There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.</p> <p>Target set to Restore because there is the potential for habitat restoration on suitable soil types in the vicinity of Brackets Coppice SAC e.g. Birch Common and other Sites Nature Conservation Importance.</p>	Natural England (2016)
Structure and function (including its typical species)	Vegetation community composition	<p>Ensure the component vegetation communities of the H6410 purple moor-grass feature are referable to and characterised by the following National Vegetation Classification type</p> <p>M24 <i>Molinia caerulea</i> - <i>Cirsium dissectum</i> fen-meadow</p>	<p>This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC).</p> <p>Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>Natural England (2016)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	
Structure and function (including its typical species)	Vegetation community transitions	Restore the pattern of natural vegetation zonation/transitions	<p>Transitions/zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' retain characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna.</p> <p>Target set to Restore because some areas of purple moor-grass meadow have been encroached by birch, gorse and scrub, disrupting the transitions between communities</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>Natural England (2016)</p>
Structure and function (including its typical species)	Vegetation: undesirable species	<p>Restore the frequency/cover of the following undesirable species to within acceptable levels and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread:</p> <p>All invasive non-native species, including <i>Impatiens glandulifera</i> Indian balsam</p> <p>Mixed scrub e.g. Blackthorn, gorse, willow</p> <p>Tree regeneration e.g. oak, birch, willow</p> <p>Undesirable species (see explanatory notes for more information)</p>	<p>Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants.</p> <p>Most of the species listed are natural components of a range of vegetation types within the SAC and may benefit a number of invertebrates. However, in certain circumstances (such as when they encroach on stands of rare plants or become extremely abundant) they can be undesirable and/or indicate negative pressures on the site.</p> <p>Undesirable species may include <i>Cirsium arvense</i> Creeping thistle, <i>Cirsium palustre</i> Marsh thistle, <i>Cirsium vulgare</i> Spear thistle, <i>Deschampsia cespitosa</i> Tufted hair-grass, <i>Juncus acutiflorus</i> Sharp-flowered rush, <i>Juncus articulatus</i> Jointed rush, <i>Juncus subnodulosus</i> Blunt-flowered rush, <i>Juncus conglomeratus</i> Compact rush, <i>Juncus effusus</i> Soft rush, <i>Juncus inflexus</i> Hard rush, <i>Molinia caerulea</i> Purple moor-grass,</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>Natural England (2014)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p><i>Myrica gale</i> Bog-myrtle, <i>Phragmites australis</i> Common reed, <i>Rumex crispus</i> Curled dock, <i>Rumex obtusifolius</i> Broad-leaved dock, <i>Senecio aquaticus</i> Marsh ragwort, <i>Urtica dioica</i> Common nettle</p> <p>Target set to Restore as there are areas with suitable soils, hydrology etc. where there is encroachment of e.g. blackthorn, birch, gorse and mixed scrub across the <i>Molinia</i> pasture.</p>	
Structure and function (including its typical species)	Water quality	Where the feature is dependent on surface water and/or groundwater, Restore water quality and quantity to a standard which provides the necessary conditions to support the feature	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year.</p> <p>Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type. Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>Target set to Restore because water table and river flows are thought to be compromised contributing to apparent drying out the purple moor-grass meadows.</p>	Natural England. (2016)
Structure and function (including its typical species)	Hydrology: Water table	Restore a hydrological regime that provides a sub-surface water table during the summer (range - 2 to -48 cm below ground level) and a winter water table \pm at the surface. Inundation should be absent or only occasional to a minor degree in winter	<p>Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and as precise tolerances are not known, further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts.</p> <p>Target set to Restore because water table and river flows are thought to be compromised contributing to apparent drying out</p>	Natural England (2016)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			the purple moor-grass meadows.	
Structure and function (including its typical species)	Maintaining integrity of hydrological catchment	Restore the full range of hydrological/hydrogeological aspects of a site's catchment that contribute to its functioning and the maintenance of the feature	<p>The movement, quality and distribution of water within a site's wider catchment and outside of the site's boundary will affect its ability to support this wetland habitat feature. Catchment size will vary. A site's water table and other hydrological aspects may be affected by changes in the use of the land surface, water abstraction, flood alleviation, development and mineral extraction in the wider catchment.</p> <p>Target set to Restore because water table and river flows are thought to be compromised contributing to apparent drying out the purple moor-grass meadows.</p>	Natural England (2016)
Supporting processes (on which the feature relies)	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).	<p>This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts.</p> <p>These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).</p> <p>Natural England (2016)</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Target set to Restore because the current levels of nitrogen deposition (APIS accessed 11 January 2019) exceed the critical load for purple moor-grass meadows.	
Supporting processes (on which the feature relies)	Conservation measures	Restore the management measures (either within and/or outside the site boundary as appropriate) which are necessary to Restore the structure, functions and supporting processes associated with the feature	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>Conservation measures for this feature typically include grazing, cutting, scrub management, weed control, recreation/visitor management. Also covered is maintenance of surface drainage features such as drains, grips, gutters and foot drains. Retention of suitable land use infrastructure/patterns to enable site management e.g. pastoral livestock farming.</p> <p>The Molinia meadows are managed with extensively grazed cattle. Target set to Restore as there is opportunity to extend the grazing area. This is recognised in the CS Ref. 467853</p>	<p>This attribute will be periodically monitored as part of Natural England's site condition assessments</p> <p>English Nature (2005)</p> <p>Natural England (2014)</p> <p>Natural England (2016)</p>
Version Control Advice last updated: N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 2: Supplementary Advice for Qualifying Features: S1323. *Myotis bechsteinii*; Bechstein's bat

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Population (of the feature)	Population abundance - maternity colony	Maintain the abundance of the breeding population at a level which is above 10 new Juvenile Bechstein's bats produced each year, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	<p>This will ensure there is a viable population of the feature which is being maintained at or increased to a level that contributes as appropriate to its Favourable Conservation Status across its natural range in the UK. Due to the dynamic nature of population change, the target-value given for the population size or presence of this feature is considered to be the minimum standard for conservation/restoration measures to achieve.</p> <p>This minimum-value may be revised where there is evidence to show that a population's size or presence has significantly changed as a result of natural factors or management measures and has been stable at or above a new level over a considerable period (generally at least 10 years). The values given here may also be updated in future to reflect any strategic objectives which may be set at a national level for this feature.</p> <p>Given the likely fluctuations in numbers over time, any impact-assessments should focus on the current size of the site's population, as derived from the latest known or estimated level established using the best available data. This advice accords with the obligation to avoid deterioration of the site or significant disturbance of the species for which the site is designated, and seeks to avoid plans or projects that may affect the site giving rise to the risk of deterioration.</p> <p>Similarly, where there is evidence to show that a feature has historically been more abundant than the stated minimum target and its current level, the ongoing capacity of the site to accommodate the feature at such higher levels in future should also be taken into account in any assessment.</p> <p>Unless otherwise stated, the population size or presence will be that measured using standard methods, such as peak mean counts or breeding surveys. This value is also provided</p>	Morris (2017)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>recognising there will be inherent variability as a result of natural fluctuations and margins of error during data collection. Whilst we will endeavour to keep these values as up to date as possible, local Natural England staff can advise that the figures stated are the best available.</p> <p>In 1999, 10 Juvenile Bechstein's bats were ringed at Bracket's Coppice (Morris, 2017). The number of ringed juveniles has been greater than this in all of the subsequent years with a maximum of 50 in 2010, but there are significant fluctuations in these counts – for example a total of 49 juveniles were ringed in 2005, followed by 13 in 2006, and then 47 in 2007 (Morris, 2017). In 2017, 38 juvenile Bechstein's bats were ringed in Bracket's Coppice (Morris, 2017).</p>	
Supporting habitat: extent and distribution	Extent of supporting habitat	Maintain the total extent of the habitat which support the feature at approximately 34 hectares of broadleaved woodland	<p>In order to contribute towards the objective of achieving an overall favourable conservation status of the feature at a UK level, it is important to maintain or if appropriate restore the extent of supporting habitats and their range within this SAC. The information available on the extent and distribution of supporting habitat used by the feature may be approximate depending on the nature, age and accuracy of data collection, and may be subject to periodic review in light of improvements in data.</p> <p>The woodland management plan for Bracket's Coppice identifies around 34 hectares of woodland including oak-ash woodland, former hazel coppice, riverine woodland, wood pasture, and regenerating woodland on former PAWS (Planted Ancient Woodland Sites).</p> <p>To date all records of breeding Bechstein's bat have been from bat boxes but it is possible that this species uses natural tree roosts too both within the SAC and in adjacent woodland. Management of all suitable woodland needs to account for the bat's roosting requirements and ensure that suitable trees are retained during management operations and are integral to any woodland management plans.</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting habitat: extent and distribution	Distribution of supporting habitat	Maintain the distribution and continuity of the feature and its supporting habitat, including where applicable its component vegetation types and associated transitional vegetation types, across the site	<p>A contraction in the range, or geographic spread, of the feature (and its component vegetation) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. Contraction may also reduce and break up the continuity of a habitat within a site and how well the species feature is able to occupy and use habitat within the site. Such fragmentation may have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for this feature and this may affect its viability.</p> <p>There are not any known threats to the distribution of the broadleaved woodland habitat which supports the Bechstein's bats in Bracket's Coppice.</p>	
Supporting habitat: structure / function	External condition of bat boxes - maternity colony	Maintain the structural integrity and weatherproofing of bat boxes, with no significant shading of the main roost area by trees/vegetation or man-made structures.	<p>Damp, draught and increases in light levels are likely to have a negative effect on the temperature and humidity of the roost.</p> <p>Maternity roosts at Bracket's Coppice are within bat boxes high up in the canopy. The boxes are checked monthly between April and September by the Vincent Wildlife Trust. Any maintenance needed would be flagged up during these checks.</p> <p>There is an unconfirmed report of a maternity roost at Birch Common using a hole in an oak tree deep in a narrow stream valley.</p>	<p>Miller (2011)</p> <p>Morris (2017)</p>
Supporting habitat: structure / function	Supporting off-site habitat (flightlines)	Maintain the presence, structure and quality of any linear landscape features which function as flightlines. Flightlines should remain unlit, functioning as dark corridors.	<p>Bechstein's bats don't tend to range far from their roosts, generally up to a maximum distance of 1-2.5km, usually closer to 1km. Though, a few breeding females may choose to roost in hedgerow trees, which have connections to the main woodland habitat. Generally forages within deciduous woodland which contain water bodies, occasionally feeding along woodland edge, treelines and hedgerows.</p> <p>Bechstein's bat generally commutes along linear landscape features such as woodland edge, hedgerows, however, they</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>will cross open fields to reach roost sites and foraging areas. Flightlines will extend beyond the designated site boundary into the wider local landscape. Bechstein's bat forage on crane flies, beetles and moths.</p> <p>The area within a 2.5km radius of Bracket's Coppice contains a number of linear landscape features including deciduous woodland and hedgerows. Within this radius, there are multiple agri-environment schemes which will encourage sensitive management of flightlines, and much of the radius is within the Dorset Area of Outstanding Natural Beauty, which provides additional protection against landscape-scale changes.</p> <p>Radio-tracking at another site (Ebernoe Common SAC), shows that adult females and young bats spend the majority of their time within the site. However, enhancing connections to isolated woodland patches (e.g. through hedgerow planting or less intensive hedgerow management) would increase the extent of foraging habitat and number of roost sites available to the colony. This is also likely to benefit male bats which tend to range more widely and spend more time outside of the site.</p>	
Supporting habitat: structure/function	Supporting off-site habitat (foraging areas)	Restore any core areas of feeding habitat outside of the SAC boundary that are critical to Bechstein's bats during their breeding period.	<p>Roost choice, and the presence of bats within the SAC, is likely to be influenced by the site's ability to provide bats with food and shelter. Key feeding areas around a roost, and the commuting routes (or flight-lines) between them, will be an important element of sustaining the SAC population.</p> <p>See also comments in 'Supporting and Explanatory Notes' in the 'Supporting off-site habitat (flightlines)' attribute, above. Improving structural diversity in neighbouring woodland areas would increase the extent of foraging habitat and number of roost sites available to the colony.</p>	
Supporting habitat: structure / function	Internal condition of bat boxes - maternity	Maintain appropriate light levels, humidity, temperature and ventilation.	The requirements of Bechstein's bats vary greatly throughout the maternity period and they will shift their roost sites accordingly. There is currently insufficient information available in the academic press to provide specific targets on humidity, temperature, light levels and ventilation preferred by the	Schwegler Vogel- und Naturschutzprodukte GmbH (2014a & 2014b)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>species during the hibernation and maternity period.</p> <p>2FN and 1FW Schwegler Bat Boxes are utilised as Bechstein's maternity roosts in Brackett's Coppice. 2FN Bat Boxes are designed with an intermediate floor to protect against draughts and light (Schwegler Vogel- und Naturschutzprodukte GmbH, 2014a). Bat Hibernation Boxes 1FW are suitable for both summer and winter roosts, and provide insulation in winter, alongside being manufactured from breathable materials, and with forced ventilation (Schwegler Vogel- und Naturschutzprodukte GmbH, 2014b).</p>	
Supporting habitat: structure / function	Roost access	Maintain the access points to the bat boxes at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways without obstructing accesses	Maternity roosts at Brackett's Coppice are within bat boxes high up in the canopy. The boxes are checked monthly between April and September by the Vincent Wildlife Trust. Any maintenance needed would be flagged up during these checks.	
Supporting habitat: structure / function	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, within typical values for the supporting habitat	<p>Soil supports basic ecosystem function and is a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with the supporting habitat of this Annex II feature.</p> <p>The majority of the soil within the SAC area is described as Evesham 1 (deep clay), with some of the eastern and southern fields belonging to Wickham 2 (seasonally wet silty to clayey over shale).</p> <p>The current HLS agreement on Brackett's Coppice prevents the use of fertilisers, organic manures, and waste materials on the RLR parcels with woodland management or creation. Species-rich grassland restoration and maintenance parcels are allowed up to 12.5 tonnes/ha of well-rotted farm yard manure either</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			every year (maintenance) or every three years (restoration). Cattle, sheep, and pony grazing is allowed on grassland parcels within the HLS agreement.	
Supporting habitat: structure / function	Woodland site - maternity colony	Maintain the extent and structural diversity of supporting woodland habitat used for feeding and foraging	<p>The structural diversity of supporting habitat will be important to maintain optimal feeding and foraging conditions in close proximity of maternity roosts; key aspects of woodland structure will include good canopy cover (typically 50-90%), an abundance of standing and fallen dead wood, areas of permanent and open space and the retention of open water and/or wetland features.</p> <p>The site's woodland management plan (CS Ref 467853) encourages structural diversity in the woodland by various management measures. The woodland has a good canopy cover, deadwood is to be retained (as specified in the agri-environment scheme, and the woodland management plan) and areas of open space are retained and managed.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Adaptation and resilience	Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site	<p>This recognises the increasing likelihood of supporting habitat features to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site. The vulnerability and response of features to such changes will vary. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.</p> <p>The overall vulnerability of this SAC to climate change has been assessed by Natural England (2015) as being moderate, taking into account the sensitivity, fragmentation, topography and management of its habitats and supporting habitats. This</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>means that this site is considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their habitat itself. In many cases, change will be inevitable so appropriate monitoring would be advisable.</p> <p>The woodland management plan encourages variety in the supporting woodland which increases the woodland's resilience to change. The plan also states that the woodland will be monitored for signs of disease such as Ash Dieback (<i>Chalara fraxinea</i>) and Sudden Oak Death (<i>Phytophthora ramorum</i>). If the diseases are encountered, then biosecurity best practice should be adopted.</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Air quality	<p>Restore as necessary, concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).</p>	<p>The supporting habitat of this feature is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its vegetation structure and composition (including food-plants) and reducing supporting habitat quality and population viability of this feature.</p> <p>Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH3), oxides of nitrogen (NOx) and sulphur dioxide (SO2), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis.</p> <p>Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. It is recognised</p>	<p>More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on the Air Pollution Information System (www.apis.ac.uk).</p> <p>APIS, 2018. <i>Bracket's Coppice – Critical Loads</i>. http://www.apis.ac.uk/srci/select-a-feature?site=UK0030095&SiteType=SAC&submit=Next Accessed 05/11/18</p>

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.</p> <p>Target set to Restore because the Air Pollution Information System (APIS) reports that the nitrogen deposition critical load for the Bechstein's bat habitat (broadleaved deciduous woodland) at Bracket's Coppice is 10-20kg N/ha/yr, and that based on the data averaged between 2013-2015, this is exceeded at 32.5kg N/ha/yr (APIS, 2018). The same data found that acidity was below the minimum critical load for acid deposition nitrogen sulphur (keq/ha/yr) (APIS, 2018).</p>	
Supporting processes (on which the feature and/or its supporting habitat relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats.	<p>Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, site management strategies or plans, the Views about Management Statement for the underpinning SSSI and/or management agreements.</p> <p>The deciduous woodland of Bracket's Coppice has a woodland management plan as part of the Countryside Stewardship agreement. The management plan includes the creation and/or management of 0.09 ha of permanent open space, and of 1,184 metres of access rides. It is also prescribed that 736m of ride edges will be managed by annual cutting, deadwood will be retained <i>in situ</i>, 0.65 ha of woodland (mostly hazel) will be coppiced, and 7 trees will be marked as (existing or future) veteran trees, and will be protected accordingly.</p> <p>This is all aimed toward maintaining a diverse broadleaved woodland with variation in tree and shrub species, structure, and age.</p> <p>Wooded stream valleys and small scale fields bounded by</p>	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			hedgerows are a feature of the landscape around Corscombe and will provide roosting and foraging habitat for Bechstein's Bat	
Supporting processes (on which the feature and/or its supporting habitat relies)	Disturbance from human activity	Control and minimise human access to roost sites	<p>Site should be secured against unauthorised access, which can result in disturbance to bats at critical times of year and which can affect their population viability and use of the site.</p> <p>The maternity roosts are in bat boxes high in the trees. They are only physically accessed during the surveys by the Vincent Wildlife Trust.</p> <p>Brackett's Coppice is a Dorset Wildlife Trust reserve which is open to the public all year round (Dorset Wildlife Trust, 2018). Dogs must be under effective control, and there is limited parking at the main entrance (Dorset Wildlife Trust, 2018). Dorset Wildlife Trust, Vincent Wildlife Trust, and Natural England colleagues confirm that the site is not heavily frequented by visitors, and that the effect of dog walkers and other visitors is unlikely to cause significant disturbance to the bats.</p>	Dorset Wildlife Trust (2018)
Supporting processes (on which the feature and/or its supporting habitat relies)	Water quantity/ quality	Where the feature or its supporting habitat is dependent on surface water and/or groundwater, restore water quality and quantity to a standard which provides the necessary conditions to support the feature. This includes maintaining the invertebrate classification as 'High' or 'Good'.	<p>For many SAC features which are dependent on wetland habitats supported by surface and/or ground water, maintaining the quality and quantity of water supply will be critical, especially at certain times of year. Poor water quality and inadequate quantities of water can adversely affect the structure and function of this habitat type.</p> <p>Typically, meeting the surface water and groundwater environmental standards set out by the Water Framework Directive (WFD 2000/60/EC) will also be sufficient to support the achievement of SAC Conservation Objectives but in some cases more stringent standards may be needed to reflect the ecological needs of the species feature. Further site-specific investigations may be required to establish appropriate water quality standards for the SAC.</p> <p>Threats to the stream, which runs through the site, have</p>	Environment Agency (2016)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			<p>previously been identified, including potential point pollution from cattle drinking from the stream, and the presence of Himalayan balsam. The balsam is monitored and pulled within the Dorset Wildlife Trust's holding, and alternative water sources were investigated to overcome the possible point pollution issue. Wessex Water investigations have identified a detrimental impact from water abstraction on low flows in the stream running through the wood.</p> <p>The Sutton Bingham Stream – West Arm within the Parrett catchment is the area in which the Corscombe stream lies (in terms of catchment data). The overall classification for the water quality was 'moderate' in the most recent assessment (2016) – attributes that scored lower than 'good' were dissolved oxygen, and macrophytes and phytoplankton (Environment Agency, 2016). The cause of the issues is unknown and pending investigation. However, for the needs of the bats, the stream is not unacceptably polluted, and the invertebrate quality element was ranked as 'high' in 2016 (Environment Agency, 2016).</p>	
<p>Version Control Advice last updated: N/A</p>				
<p>Variations from national feature-framework of integrity-guidance: 'External condition of building – hibernation site', and 'Population abundance – hibernation site' attributes were removed as this site is used as a maternity site by Bechstein's Bats.</p>				

References

- BAT CONSERVATION TRUST. 2013. *Bechstein's bat: An introduction for woodland owners*. 2nd edition. Bat Conservation Trust.
- DORSET WILDLIFE TRUST, 2018. *Brackett's Coppice Nature Reserve*.
https://www.dorsetwildlifetrust.org.uk/Bracketts_Coppice_Nature_Reserve.html. Accessed 05/11/18.
- ENGLISH NATURE. 2005. *A statement of English Nature's views about the management of Brackett's Coppice and Ryewater Farm Site of Special Scientific Interest (SSSI)*. Available at:
<https://designatedsites.naturalengland.org.uk/PDFsForWeb/VAM/1002524.pdf>
- ENVIRONMENT AGENCY, 2016. *Sutton Bingham Stream –West Arm Overview*. Catchment Data Explorer.
<https://environment.data.gov.uk/catchment-planning/WaterBody/GB108052015530> Accessed: 05/11/18
- FLANDERS, J. R. 2005. *Characteristics of maternity roosts of Bechstein's bats in the south of England*. MPhil Thesis, University of Sussex.
- GREENAWAY, F. 2006. *Results of bat monitoring at Ebernoe Common and in the wider landscape, 2005 and 2006*. Natural England Unpublished Report.
- GREENAWAY, F. 2007. *The status and breeding success of Barbastelle and Bechstein's bats on Ebernoe Common during summer 2007*. Natural England Unpublished Report
- GREENAWAY, F. & Hill, D. 2004. *Woodland management advice for Bechstein's bat and barbastelle bat*. English Nature Research Reports 658. Available from: <http://publications.naturalengland.org.uk/publication/93012>
- MILLER. 2011. *Bechstein's Bat Survey*. Bat Conservation Trust
- MORRIS, C., 2017. *Brackett's Coppice Bat Box Report 2017 for the Dorset Wildlife Trust*. The Vincent Wildlife Trust
- NATURAL ENGLAND. 2014. *Brackett's Coppice SAC Site Improvement Plan v1.0*. Natural England. Available from <http://publications.naturalengland.org.uk/publication/6253977968574464>
- NATURAL ENGLAND. 2015. *Climate Change Theme Plan and supporting National Biodiversity Climate Change Vulnerability assessments ('NBCCVAs') for SACs and SPAs in England*. Natural England. Available at: <http://publications.naturalengland.org.uk/publication/4954594591375360>
- NATURAL ENGLAND. 2016. *England Favourable Conservation Status and Strategy (FCS) for H6410 Purple Moor-Grass Meadow*. Natural England Internal Unpublished Draft Report.
- SCHWEGLER VOGEL- AND NATURSCHUTZPRODUKTE GMBH, 2014a. *Bat Box 2FN (custom-built)*.
http://www.schwegler-natur.de/portfolio_1395072079/fledermaushoehle-2fn/?lang=en. Accessed 05/11/18.
- SCHWEGLER VOGEL- AND NATURSCHUTZPRODUKTE GMBH, 2014b. *Bat Hibernation Box 1FW*.
- VOIGT, C.C., SCHNEEBERGER, K., VOIGT-HEUCKE, S. & LEWANZIK, D. 2011. *Rain Increases the Energy Cost of Bat Flight*. *Biology Letters* 7, p793-795.