ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Moneen Mountain SAC 000054

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Citation:

NPWS (2021) Conservation Objectives: Moneen Mountain SAC 000054. Version 1. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage.

Series Editors: Rebecca Jeffrey and Christina Campbell
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

000054	Moneen Mountain SAC
1065	Marsh Fritillary *Euphydryas aurinia*
1303	Lesser Horseshoe Bat *Rhinolophus hipposideros*
3180	Turloughs*
4060	Alpine and Boreal heaths
5130	*Juniperus communis* formations on heaths or calcareous grasslands
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
7220	Petrifying springs with tufa formation (Cratoneurion)*
8240	Limestone pavements*

Please note that this SAC is adjacent to Galway Bay Complex SAC (000268) and East Burren Complex SAC (001926). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent sites as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1997
Title :	Coastal lagoons in the Republic of Ireland. Volume III: site reports
Author :	Healy, B.; Oliver, G.; Hatch, P.; Good, J.
Series :	Unpublished report
Year :	1997
Title :	Coastal lagoons in the Republic of Ireland. Volume II: inventory of lagoons and saline lakes
Author :	Healy, B.; Oliver, G.; Hatch, P.; Good, J.
Series :	Unpublished report
Year :	1997
Title :	Coastal lagoons in the Republic of Ireland. Volume I: background, outline and summary of the survey
Author :	Healy, B.; Oliver, G.; Hatch, P.; Good, J.
Series :	Unpublished report
Year :	2006
Title :	Bat mitigation guidelines for Ireland
Author :	Kelleher, C.; Marnell, F.
Series :	Irish Wildlife Manuals, No. 25
Year :	2007
Title :	Inventory of Irish coastal lagoons (version 2)
Author :	Oliver, G.
Series :	Unpublished report to NPWS
Year :	2007
Title :	Grasslands monitoring project 2006
Author :	Dwyer, R.; Crowley, W.; Wilson, F.
Series :	Unpublished report to NPWS
Year :	2009
Title :	Ireland Red List No. 2: Non-marine molluscs
Author :	Byrne, A.; Moorkens, E.A.; Anderson, R.; Killeen, I.J.; Regan, E.C.
Series :	Ireland Red List series, NPWS
Year :	2010
Title :	Ireland Red List No. 4: Butterflies
Author :	Regan, E.C.; Nelson, B.; Aldwell, B.; Bertrand, C.; Bond, K.; Harding, J.; Nash, D.; Nixon, D.; Wilson, C.J.
Series :	Ireland Red List series, NPWS
Year :	2012
Title :	The conservation status of juniper formations in Ireland
Author :	Cooper, F.; Stone, R.E.; McEvoy, P.; Wilkins, T.; Reid, N.
Series :	Irish Wildlife Manuals, No. 63
Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, NPWS

Year :	2013
Title :	Conservation status assessment for petrifying springs
Author :	Lyons, M.D.; Kelly, D.L.
Series :	Unpublished report to NPWS
Year :	2013
Title :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manuals, No. 78
Year :	2013
Title :	National survey of limestone pavement and associated habitats in Ireland
Author :	Wilson, S.; Fernandez, F.
Series :	Irish Wildlife Manuals, No. 73
Year :	2013
Title :	Baseline web surveys and habitat assessments for the Marsh Fritillary *Euphydryas aurinia* in Moneen Mountain SAC and East Burren Complex SAC
Author :	Ravenscroft, N.; Bourn, N.; O'Hanrahan, B.
Series :	Unpublished report to NPWS
Year :	2016
Title :	Monitoring guidelines for the assessment of petrifying springs in Ireland
Author :	Lyons, M.D.; Kelly, D.L.
Series :	Irish Wildlife Manuals, No. 94
Year :	2016
Title :	Ireland Red List No. 10: Vascular Plants
Author :	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series :	Ireland Red Lists series, NPWS
Year :	2017
Title :	Conservation objectives supporting document: Turloughs* and Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation
Author :	O Connor, Á.
Series :	Conservation objectives supporting document
Year :	2018
Title :	Conservation objectives supporting document – lesser horseshoe bat (*Rhinolophus hipposideros*)
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2018
Title :	The Irish Juniper Monitoring Survey 2017
Author :	O'Neill, F.H.; Martin, J.R.
Series :	Irish Wildlife Manuals, No. 101
Year :	2018
Title :	The Irish Juniper Monitoring Survey 2017 - Appendices
Author :	O'Neill, F.H.; Martin, J.R.
Series :	Irish Wildlife Manuals, No. 101
Year :	2018
Title :	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
Author :	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 102

Year :	2019
Title :	Checklists Protected and Threatened Species in Ireland 2019
Author :	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
Series :	Irish Wildlife Manuals, No. 116
Year :	2021
Title :	Checklists Protected and Threatened Species in Ireland. Version 2.1. 3 December 2021
Author :	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
Series :	Irish Wildlife Manuals, No. 116

Other References

Year :	2007
Title :	Protecting and managing underground sites for bats
Author :	Mitchell-Jones, A.J.; Bihari, Z.; Masing, M.; Rodrigues, L.
Series :	EUROBATS Publication Series No. 2
Year :	2008
Title :	The lesser horseshoe bat conservation handbook
Author :	Schofield, H.W.
Series :	The Vincent Wildlife Trust
Year :	2009
Title :	Importance of night roosts for bat conservation: roosting behaviour of the lesser horseshoe bat *Rhinolophus hipposideros*
Author :	Knight, T.; Jones, G.
Series :	Endangered Species Research, 8: 79-86
Year :	2009
Title :	Vegetation analysis of upland Burren grasslands of conservation interest
Author :	Parr, S.; O'Donovan, G.; Ward, S.; Finn, J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 109B(1): 11-33
Year :	2011
Title :	The Fen Management Handbook
Author :	McBride, A.; Diack, I.; Droy, N.; Hamill, B.; Jones, P.; Schutten, J.; Skinner, A.; Street, M. (eds.)
Series :	Scottish Natural Heritage, Perth
Year :	2015
Title :	The flora and conservation status of petrifying springs in Ireland
Author :	Lyons, M.D.
Series :	Unpublished Ph.D. thesis, Trinity College Dublin

Spatial data sources

Year :	2016
Title :	Point file associated with Lyons (2015)
GIS Operations :	Dataset created from spatial references; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	7220 (map 3)
Year :	2013
Title :	National Survey of Limestone Pavement and Associated Habitats in Ireland distribution data
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	8240 (map 4)
Year :	2021
Title :	NPWS rare and threatened species database
GIS Operations :	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
Used For :	1065 (map 5)
Year :	2021
Title :	NPWS lesser horseshoe bat database
GIS Operations :	Roosts identified, clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1303 (map 6)
Year :	2012
Title :	Forest Inventory and Planning System, (FIPS)
GIS Operations :	Dataset clipped to 2.5km buffer centred on roost location
Used For :	1303 (map 6)

3180 Turloughs*

To maintain the favourable conservation condition of Turloughs* in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The area and distribution of Turloughs* in Moneen Mountain SAC is not currently known. The SAC was designated for Turloughs* owing to the presence of Muckinish Lough, considered at one time to be transitional between a turlough and a coastal lagoon. It is, however, now considered to be a karst rock coastal lagoon (Healy et al., 1997; Oliver, 2007) and is not covered by this conservation objective. Turloughs are likely to occur elsewhere in the SAC, particularly to the west of the Belcare to Carran road, notably at Gortboyheen South. Part or all of these turloughs may, like Turloughnagullaun, lie outside of the SAC boundary. Further survey is required. See O Connor (2017) for information on all attributes and targets
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the distribution of turloughs in Moneen Mountain SAC is currently unknown. Muckinish Lough is no longer considered to be a turlough, rather it is a coastal lagoon
Hydrological regime	Various	Maintain appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat	Hydrological regime is sub-divided into more detailed attributes (groundwater contribution, flood duration, frequency, area and depth, and permanently flooded/wet areas) and targets in O Connor (2017). Further study will be required of the hydrological regime of any turloughs in the SAC
Soil type	Hectares	Maintain variety, area and extent of soil types necessary to support turlough vegetation and other biota	Further study will be required of the soil types in any turloughs in the SAC
Soil nutrient status: nitrogen and phosphorus	N and P concentration in soil	Maintain nutrient status appropriate to soil types and vegetation communities	Any turloughs occurring in Moneen Mountain SAC are likely to be naturally at the oligotrophic end of the scale; however, they may have been enriched through agricultural activities
Physical structure: bare ground	Presence	Maintain sufficient wet bare ground, as appropriate	See O Connor (2017) for further details on this and all attributes
Chemical processes: calcium carbonate deposition and concentration	Calcium carbonate deposition rate/soil concentration	Maintain appropriate calcium carbonate deposition rate and concentration in soil	Any turloughs occurring in the SAC are likely to have high rates of calcium carbonate deposition
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	Water quality is sub-divided into more detailed attributes (nutrients, colour, phytoplankton and epiphyton biomass) and targets in O Connor (2017). Any turloughs occurring in the SAC are likely to be naturally highly oligotrophic and require a target of ≤10µg/l total phosphorus (TP) to reach favourable condition
Active peat formation	Flood duration	Maintain active peat formation, where appropriate	See O Connor (2017) for further details on this and all attributes
Vegetation composition: area of vegetation communities	Hectares	Maintain area of sensitive and high conservation value vegetation communities/units	Study will be required of the vegetation of any turloughs in the SAC
Vegetation composition: vegetation zonation	Distribution	Maintain vegetation zonation/mosaic characteristic of the turlough	Study will be required of the vegetation of any turloughs in the SAC

Vegetation structure: sward height	Centimetres	Maintain sward heights appropriate to the vegetation unit, and a variety of sward heights across the turlough	Study will be required of the vegetation of any turloughs in the SAC
Typical species	Presence	Maintain typical species within the turlough	Typical species is sub-divided into more detailed attributes (terrestrial, wetland and aquatic plants, invertebrates and birds) and targets in O Connor (2017)
Fringing habitats: area	Hectares	Maintain marginal fringing habitats that support turlough vegetation, invertebrate, mammal and/or bird populations	See O Connor (2017) for further details on this and all attributes
Vegetation structure: turlough woodland	Species diversity and woodland structure	Maintain appropriate turlough woodland diversity and structure	See O Connor (2017) for further details on this and all attributes

4060 Alpine and Boreal heaths

To maintain the favourable conservation condition of Alpine and Boreal heaths in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alpine and Boreal heaths occur in mosaic with other Annex I habitats throughout Moneen Mountain SAC: Limestone pavements* (8240), Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) (6210) and *Juniperus communis* formations on heaths or calcareous grasslands (habitat code 5130). These Annex I habitats cannot easily be mapped or considered separately. Conservation objectives for all these habitats should be used in conjunction with each other as appropriate. Alpine and Boreal heath is particularly well-developed on higher ground of the uplands (above 200m) to the north and north-east of the SAC (NPWS internal files). As part of the National Survey of Limestone Pavements and Associated Habitats, Wilson and Fernandez (2013) recorded the habitat within two sub-sites, Aillwee (site code NSLP07) and Rannagh West (NSLP08), in the SAC. This survey should be consulted for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for habitat area above
Vegetation composition: positive indicator species	Number at a representative number of monitoring stops	At least seven positive indicator species present	Attribute and target based on Wilson and Fernandez (2013), where the list of positive indicator species, as identified by Wilson and Fernandez (2013), is presented. This document should be consulted for further details. Positive indicator species recorded in the habitat in the SAC include bearberry (*Arctostaphylos uva-ursi*), ling (*Calluna vulgaris*), crowberry (*Empetrum nigrum*), juniper (*Juniperus communis*), blue moor-grass (*Sesleria caerulea*), mountain avens (*Dryas octopetala*), tormentil (*Potentilla erecta*) and wild thyme (*Thymus polytrichus*) (Wilson and Fernandez, 2013; NPWS internal files)
Vegetation composition: negative indicator species	Percentage cover at a representative number of monitoring stops	Negative indicator species collectively not more than 1% cover	Attribute and target based on Wilson and Fernandez (2013), where the list of negative indicator species for the habitat, as identified by Wilson and Fernandez (2013), is presented
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Non-native species not more than 1% cover	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: native trees and shrubs	Percentage cover at a representative number of monitoring stops	Cover of native trees and shrubs (except juniper (*Juniperus communis*) not more than 25% cover	Attribute and target based on Wilson and Fernandez (2013)
Physical structure: disturbance	Percentage cover at a representative number of monitoring stops	Less than 10% disturbed bare ground (excluding rocks/stones)	Attribute and target based on Wilson and Fernandez (2013)
Indicators of local distinctiveness	Occurrence	Indicators of local distinctiveness are maintained	This includes species on the Flora (Protection) Order, 2015, species of flora and fauna on Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson, 2019, 2021) and other rare or localised species, as well as archaeological and geological features, which often support distinctive species. The Near Threatened intermediate wintergreen (*Pyrola media*) (Wyse Jackson et al., 2016) occurs in Alpine and Boreal heath vegetation on higher ground in the SAC (NPWS internal files)

5130 Juniperus communis formations on heaths or calcareous grasslands

To maintain the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	*Juniperus communis* formations on heaths or calcareous grasslands may occur in intimate association with other Annex I habitats in Moneen Mountain SAC: Alpine and Boreal heaths (4060), Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (6210), Limestone pavements* (8240) and Petrifying springs with tufa formation (Cratoneurion)* (7220). Therefore, these habitats cannot easily be mapped or considered separately. Conservation objectives for all these habitats should be used in conjunction with each other as appropriate. Cooper et al. (2012) identified areas of juniper (*Juniperus communis*) vegetation at four sub-sites (CE04 Moneen Mountain, CE05 Tonarussa, CE12 Aillwee Mountain and CE14 Deelin More) within the SAC, although none were classed as a juniper formation (see below). It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above. It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Juniper formation size	Number and proximity of juniper plants	At least 50 juniper plants present with each plant separated by no more than 20m	Attribute and target based on O'Neill and Martin (2018). A juniper formation is defined by O'Neill and Martin (2018) as any cluster of ≥50 juniper plants where no plant is more than 20m from another. In practice, this means that juniper plants should achieve a minimum density of 25 plants per hectare to qualify as a formation
Vegetation structure: female fruiting plants	Percentage in a representative number of 5m x 5m monitoring stops or in an *ad hoc* count of 50 plants	Fruiting females comprise at least 10% of juniper plants rooted in plot in at least 50% of stops or in an *ad hoc* count of 50 plants	Attribute and target based on Cooper et al. (2012) and O'Neill and Martin (2018)
Vegetation structure: seedling recruitment	Presence in a representative number of 5m x 5m monitoring stops	At least one seedling recorded in at least one monitoring stop	Attribute and target based on O'Neill and Martin (2018). Juniper seedlings are defined as plants less than 15cm high that are still flexible and single-stemmed, or with only two branches at most
Vegetation structure: live juniper	Percentage in a representative number of 5m x 5m monitoring stops or across the site as a whole	At least 90% of juniper plants rooted in plot alive in at least 75% of stops or across the site as a whole	Attribute and target based on Cooper et al. (2012) and O'Neill and Martin (2018)
Vegetation composition: negative indicator species	Percentage in a representative number of 5m x 5m monitoring stops	Total cover of negative indicator species to be less than 10% in at least 50% of stops	Attribute and target based on O'Neill and Martin (2018) where the list of negative indicator species is also presented
Physical structure: germination niches	Percentage in a representative number of 5m x 5m monitoring stops	At least 5% bare soil and/or at least 5% bare rock in at least 25% of stops	Attribute and target based on O'Neill and Martin (2018). Bare soil is important as a germination micro-site and bare rock can also contribute, particularly at the soil-rock interface and in limestone pavement grikes
Formation structure: browning/die-back of plants	Percentage of juniper cover in a representative number of 5m x 5m monitoring stops	Browning or dead juniper branches (excluding fully dead plants) comprise no more than 20% of total juniper cover in plot in at least 75% of stops	Attribute and target based on O'Neill and Martin (2018)

Formation structure: evidence of browsing and bark stripping	Occurrence across a representative number of 5m x 5m monitoring stops	No browsing of Juniper shoot tips, and trunk bark stripping evident in no more than 10% of Juniper shrubs in at least 75% of stops	Attribute and target based on O'Neill and Martin (2018). This attribute concerns bark stripping by animals, due to herbivory or trampling. Bark stripping or damage from abrasion by rock is not included here. It should be noted, however, that distinguishing between the two may be difficult
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021)

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The habitat occurs in intimate association with other Annex I habitats in this SAC: Limestone pavements* (habitat code 8240), Alpine and Boreal heaths (4060), Petrifying springs with tufa formation (Cratoneurion)* (7220), and *Juniperus communis* formations (5130). Therefore, these habitats cannot easily be mapped or considered separately. Conservation objectives for all these habitats should be used in conjunction with each other as appropriate. Pockets of 6210 calcareous grassland have been mapped in this SAC by the following four surveys: Grasslands Monitoring Project 2006 (Dwyer et al., 2007); Irish Semi-natural Grasslands Survey (O'Neill et al., 2013); National Survey of Limestone Pavement (Wilson and Fernandez, 2013); and Grasslands Monitoring Survey (Martin et al., 2018). However, the total current area of the habitat in the SAC is unknown
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes for habitat area above
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. A small number of additional positive indicators for upland examples of this habitat are also provided (Martin et al., 2018). These documents should be consulted for further details. A wide range of the typical indicator species for this habitat have been recorded from within this SAC, and the various surveys listed above should be consulted for further information
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented. Past surveys have recorded such negative species as white clover (*Trifolium repens*), cock's-foot (*Dactylis glomerata*) and perennial ryegrass (*Lolium perenne*)
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5%	Woody species that can occur above 5% cover are juniper (*Juniperus communis*), burnet rose (*Rosa spinosissima*), mountain avens (*Dryas octopetala*) and hoary rock-rose (*Helianthemum oelandicum*). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or *Juniperus communis* formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). The encroachment of hazel (*Corylus avellana*) scrub and bracken have been noted as threats to species-rich calcareous grassland in this SAC in numerous studies (but note that established scrub is a valuable habitat, and low bracken levels are a normal component)

Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018). High herb cover and diversity is a feature of many species-rich calcareous grassland areas in this SAC
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

7220 Petrifying springs with tufa formation (Cratoneurion)*

To restore the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)* in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	A total of 3,045m² (c.0.305ha) of Petrifying springs with tufa formation (Cratoneurion)* was recorded at eight locations by Lyons (2015) within Moneen Mountain SAC: three were recorded at Glennamanagh, Moneen Mt South (PS092a=1,545m²; PS092b=760m²; PS092c=500m²); three at Moneen Mt West, Acres Village (PS100a=150m²; PS100b=5m²; PS100d=10m²); and one location each at Eanty More, Burren (PS052=25m²) and Ballycahill Rises, Aillwee (PS094=50m²) (see map 3). This is a dynamic habitat and one which is likely to be significantly impacted by any reduction in water supply. Tufa sites may also decrease naturally due to natural blockages of upwelling springs. See Lyons (2015) and Lyons and Kelly (2016) for further details. It is important to note that further unsurveyed areas of the habitat are likely to be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3 for point locations of surveyed sub-sites	See map 3 for the habitat distribution (point locations) in Moneen Mountain SAC based on Lyons (2015). Please note that further unsurveyed areas of the habitat are likely to be present within the SAC
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources (Lyons and Kelly, 2013). In karst areas, water tends to flow away rapidly over bare rock surfaces, even on fairly flat ground (Lyons and Kelly, 2013). Water flow should not be altered anthropogenically. See Lyons and Kelly (2016) for further details. Lyons (2015) reported loss of habitat due to modifications to water flow at PS100b. At PS100a and PS092b, Lyons (2015) noted minor water extraction for animals, but noted that this had an insignificant impact on the flora at these two sub-sites. Lyons (2015) noted minor alteration at PS052 due to a pipe diverting some springwater, but noted that cattle still congregated at the springhead which was causing damage by trampling
Physical structure: tufa formations	Seepage rate to the spring and groundwater quality (saturated calcium carbonate, pH, temperature and alkalinity conditions)	Maintain appropriate levels of tufa formation	Petrifying springs are springs that typically form small calcareous or 'tufa' deposits. On contact with the atmosphere at the spring head, carbon dioxide is lost from calcium saturated water to the atmosphere or is depleted by the photosynthetic activities of plants. This results in the precipitation of a calcium carbonate marl or tufa. Seepage flow rates are crucial for the development of tufa. The main tufa type recorded by Lyons (2015) at Eanty More, Burren (PS052) was classified as tufa cascades. The tufa type classification at all other locations (PS092a, PS092b, PS092c, PS094, PS100a, PS100b and PS100c) was paludal tufa/stream crust (Lyons, 2015). See Lyons (2015) and Lyons and Kelly (2016) for further details
Ecosystem function: water quality - nitrate level	mg/l	Maintain nitrate level at less than 10mg/l	Attribute and target based on Lyons and Kelly (2016). Nitrate levels were recorded at PS092a and PS092b by Lyons (2015), where the baseline levels were 1.5mg/l and 0.28mg/l, respectively
Ecosystem function: water quality - phosphate level	µg/l	Maintain phosphate level to less than 15µg/l	Attribute and target based on Lyons and Kelly (2016). Phosphate levels were recorded at PS092a and PS092b by Lyons (2015), where the baseline levels were 1.5µg/l and 4µg/l, respectively

Vegetation composition: community diversity	Variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Lyons and Kelly (2016) describe eight plant communities of Irish petrifying springs based on relevé data. The main vegetation community found at PS092a, PS092b and PS100a was *Palustriella falcata-Carex panicea* springs (Lyons, 2015). Further information on the vegetation communities associated with this habitat is presented in Lyons and Kelly (2016)
Vegetation composition: positive indicator species	Number per spring	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number	Attribute and target based on Lyons and Kelly (2016), where the lists of positive and high quality indicator species are presented. Lyons (2015) recorded 5 positive indicator species at PS052, 16 at PS092a, 12 at PS092b, 8 at PS092c, 9 at PS094, 14 at PS100a, 8 at PS100b and 14 at PS100d. Positive indicators recorded by Lyons (2015) include long-stalked yellow-sedge (*Carex lepidocarpa*), carnation sedge (*C. panicea*), red fescue (*Festuca rubra*), golden saxifrage (*Chrysoplenium oppositifolium*), common butterwort (*Pinguicula vulgaris*), lesser clubmoss (*Selaginella selaginoides*), the stonewort *Chara vulgaris* and the bryophytes *Aneura pinguis, Bryum pseudotriquetrum, Campylium stellatum, Eucladium verticillatum, Fissidens adianthoides, Jungermannia atrovirens, Palustriella commutata, P. falcata, Pellia endidiviifolia* and *Philonotis calcarea*. See Lyons (2015) for the full list of species recorded at each sub-site
Vegetation composition: negative indicator species	Cover (DAFOR scale)	Potentially negative indicator species should not be Dominant or Abundant; potentially negative woody species should be absent in unwooded springs; invasive species should be absent	Based on Lyons and Kelly (2016), where the lists of potentially negative herbaceous, bryophyte, algal and woody species are presented. See Lyons and Kelly (2016) also for details on potentially invasive species. If two or more potentially negative bryophyte/alga species are present, and if at least two are Frequent, or at least one is Abundant, then the habitat fails for this attribute. See Lyons and Kelly (2016) for further details on this attribute. The potentially negative bryophyte species *Cratoneuron filicinum* was recorded by Lyons (2015) at PS052, PS092b, PS092c and PS094, *Brachythecium rivulare* at PS052 and PS094, and *Platyhypnidium riparioides* at PS094. The potentially negative herbaceous species hemp-agrimony (*Eupatorium cannabinum*) was recorded at PS052. However, no species was recorded as Dominant or Abundant by Lyons (2015). No woody species were recorded at the unwooded springs, but scrub was noted at the margins of PS100d (Lyons, 2015)
Vegetation composition: algal cover	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of algae less than 2%	Algal cover is indicative of nutrient enrichment from multiple sources (McBride et al., 2011)
Vegetation structure: sward height	Centimetres	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm)	Attribute and target based on Lyons and Kelly (2016)
Physical structure: trampling/dung	Cover (DAFOR scale)	Cover should not be Dominant or Abundant	Attribute and target based on Lyons and Kelly (2016). Lyons (2015) recorded trampling/dung as Abundant at Eanty More, Burren (PS052) and stated that cattle congregated in the flush area causing damage due to trampling and dung
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and species of flora and fauna on Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021)

8240 Limestone pavements*

To maintain the favourable conservation condition of Limestone pavements* in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Limestone pavements* occur in intimate association with other Annex I habitats in Moneen Mountain SAC: Alpine and Boreal heaths (4060), *Juniperus* communis formations (5130), Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) (6210) and Petrifying springs with tufa formation (Cratoneurion)* (7220). Therefore, these habitats cannot easily be mapped or considered separately. Conservation objectives for all these habitats should be used in conjunction with each other as appropriate. As part of the National Survey of Limestone Pavement and Associated Habitats, Wilson and Fernandez (2013) mapped the indicative area of limestone pavement, including mosaics with associated habitats as c.5,436ha (see map 4). Three sub-sites (Aillwee, site code NSLP07; Rannagh West, NSLP08; Sheshymore, NSLP21) were surveyed in detail (Wilson and Fernandez, 2013). This survey should be consulted for further details
Distribution	Occurrence	No decline. Map 4 shows indicative distribution, including mosaics with other habitats	See the notes for Habitat area above. Distribution based on data from Wilson and Fernandez (2013). This habitat can be split into exposed pavement and wooded pavement. In Moneen Mountain SAC, limestone pavement includes smooth, blocky and shattered types. Pavement with ash (*Fraxinus excelsior*) and hazel (*Corylus avellana*) woodland occurs in a few scattered, inaccessible locations associated with ledges/cliffs in the SAC (NPWS internal files)
Vegetation composition: positive indicator species	Number at a representative number of monitoring stops	At least seven positive indicator species present	Positive indicator species for exposed and wooded pavement are listed in Wilson and Fernandez (2013). Positive indicator species recorded by Wilson and Fernandez (2013) in exposed pavement in the SAC include bloody crane's-bill (*Geranium sanguineum*), herb-robert (*G. robertianum*), ivy (*Hedera helix*), wall lettuce (*Mycelis muralis*), burnet rose (*Rosa spinosissima*), blue moor-grass (*Sesleria caerulea*), wood sage (*Teucrium scorodonia*), wild thyme (*Thymus polytrichus*), violet (*Viola*) species, maidenhair spleenwort (*Asplenium trichomanes*), wall-rue (*A. ruta-muraria*), rustyback fern (*A. ceterach*), hart's-tongue fern (*A. scolopendrium*), soft shield-fern (*Polystichum setiferum*) and the mosses *Breutelia chrysocoma, Ctenidium molluscum, Fissidens dubius, Neckera crispa* and *Tortella tortuosa*
Vegetation composition: bryophyte layer	Percentage at a representative number of monitoring stops	Bryophyte cover at least 50% on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	Negative indicator species are listed in Wilson and Fernandez (2013). Negative indicator species for wooded pavement overlap with non-native species (below)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: scrub	Percentage at a representative number of monitoring stops	Scrub cover no more than 25% of exposed pavement	Attribute and target based on Wilson and Fernandez (2013)

Vegetation composition: bracken cover	Percentage at a representative number of monitoring stops	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation structure: woodland canopy	Percentage at a representative number of monitoring stops	Canopy cover on wooded pavement at least 30%	Attribute and target based on Wilson and Fernandez (2013)
Vegetation structure: dead wood	Occurrence in a representative number of monitoring stops	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Physical structure: disturbance	Occurrence in a representative number of monitoring stops	No evidence of grazing pressure on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)
Indicators of local distinctiveness	Occurrence	Indicators of local distinctiveness are maintained	This includes species on the Flora (Protection) Order, 2015, species of flora and fauna on Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021) and other rare or localised species, as well as archaeological and geological features, which often support distinctive species. Records exist of a range of notable invertebrates found in association with the habitat in the SAC. During the NSLP, shrubby cinquefoil (*Potentilla fruticosa*), listed as Vulnerable in Wyse Jackson et al. (2016), was recorded in the habitat in the Rannagh West sub-site (NSLP08) by Wilson and Fernandez (2013)

1065 Marsh Fritillary *Euphydryas aurinia*

To maintain the favourable conservation condition of Marsh Fritillary (*Euphydryas aurinia*) in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied 1km grid squares	Number in a 10-year period	No decline, subject to natural processes	There have been confirmed records of marsh fritillary (*Euphydryas aurinia*) between 2010 and 2020 from five 1km grid squares (M2406, M2703, R2398, R2596 and R2697; see map 5) in Moneen Mountain SAC but it is considered likely, given the extent of habitat, that there are other occupied sites within the SAC. This figure is, however, taken as a baseline
Proof of breeding: larval webs	Number at a representative number of sub-sites	Proof of breeding, confirmed by detection of webs	The presence of the larval webs of marsh fritillary (*Euphydryas aurinia*) provides best proof that the habitat is suitable for the species. Proof of breeding should be established at least one year in six
Potential habitat: area	Hectares	Area of potential habitat stable or increasing, subject to natural processes	Suitable potential habitat for marsh fritillary (*Euphydryas aurinia*) is defined as areas of vegetation where devil's-bit scabious (*Succisa pratensis*) is present in a sward with mean height less than 50cm and with less than 10% cover of scrub more than 1m high. In Moneen Mountain SAC, a 2012 survey estimated that there could be 2,500ha of suitable habitat (Ravenscroft et al., 2013). Suitable marsh fritillary habitat in the Burren was considered to correspond most to the weak winterage vegetation class of Parr et al. (2009), but it was not exclusive to these areas
Habitat quality	Distribution	No decline, subject to natural processes	Ravenscroft et al. (2013) devised a habitat quality index for the Burren. Larval webs were associated with higher quality habitat (scoring more than 5). Habitat of this quality is widespread in Moneen Mountain SAC (Ravenscroft et al., 2013) and there should be patches of high quality habitat present in all areas of occupied habitat

1303 Lesser Horseshoe Bat *Rhinolophus hipposideros*

To maintain the favourable conservation condition of Lesser Horseshoe Bat (*Rhinolophus hipposideros*) in Moneen Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population per roost	Number	Minimum number of 100 bats for the summer roost (roost id. 133 in NPWS database); minimum number of 79 bats for the winter roost (roost id. 142). See map 6	A figure of 100 bats for summer roosts and 50 bats for winter roosts was set as a minimum qualifying standard (MQS) when SACs were being selected for lesser horseshoe bat (*Rhinolophus hipposideros*). NPWS conduct annual counts at each qualifying roost. Qualified means from the 2016-2020 summer data and the 2017-2021 winter data have been calculated whereby the year with the highest maximum count and the year with the lowest maximum count were removed and the mean of the remaining years was calculated. This mean for each season is set as the target figure for the summer roost (roost id. 133 in NPWS database) and the winter roost (roost id. 142) in Moneen Mountain SAC. See the conservation objectives supporting document for lesser horseshoe bat (NPWS, 2018) for further information on this and all attributes and targets
Winter roosts	Condition	No decline	Moneen Mountain SAC has been selected for lesser horseshoe bat because of the presence of one internationally important winter roost (roost id. 142 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Mitchell-Jones et al., 2007)
Summer roosts	Condition	No decline	Moneen Mountain SAC has been selected for lesser horseshoe bats because of the presence of one internationally important summer roost (roost id. 133 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Kelleher and Marnell, 2006)
Auxiliary roosts	Number and condition	No decline	Lesser horseshoe bat populations will use a variety of roosts during the year besides the main summer maternity and winter hibernation roosts. Such additional roosts within the SAC may be important as night roosts, satellite roosts, etc. Night roosts are also considered an integral part of core foraging areas and require protection (Knight and Jones, 2009). In addition, in response to weather conditions for example, bats may use different seasonal roosts from year to year; this is particularly noticeable in winter. Several other winter and summer roosts that support lesser horseshoe bats, but at numbers below the MQS figures, are known from Moneen Mountain SAC. A database of all known lesser horseshoe bat roosts is available on the National Biodiversity Data Centre website. NB further unrecorded roosts may also be present within this SAC
Extent of potential foraging habitat	Hectares	No significant decline within 2.5km of qualifying roosts	Lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). See map 6 which shows a 2.5km zone around the above roosts and identifies potential foraging grounds
Linear features	Kilometres	No significant loss within 2.5km of qualifying roosts. See map 6	This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5km around each roost (Schofield, 2008)

Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roosts or along commuting routes within 2.5km of those roosts. See map 6	Lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Inappropriate lighting around roosts may cause abandonment; lighting along commuting routes may cause preferred foraging areas to be abandoned, thus increasing energetic costs for bats (Schofield, 2008)

Blackhead Or Ballyvaghan Bay
Bá Bhaile Uí Bheacháin

Ballyvaghan
Baile Uí Bheacháin

Moneen Mountain

Burren Way

CO. GALWAY

CO. CLARE

Galway

Kinvara

Ballyvaghan

Gort

Moneen Mountain SAC

Lisdoonvarna

Kilfenora

Lehinch

Ennis

Legend

Moneen Mountain SAC 000054

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MAP 1:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.25 0.5 1 Kilometre

N

Date: December 2021

Galway Bay Complex SAC

Moneen Mountain SAC

East Burren Complex SAC

Legend

- Moneen Mountain SAC 000054
- Galway Bay Complex SAC 000268
- East Burren Complex SAC 001926

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MAP 2:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
ADJACENT SITES

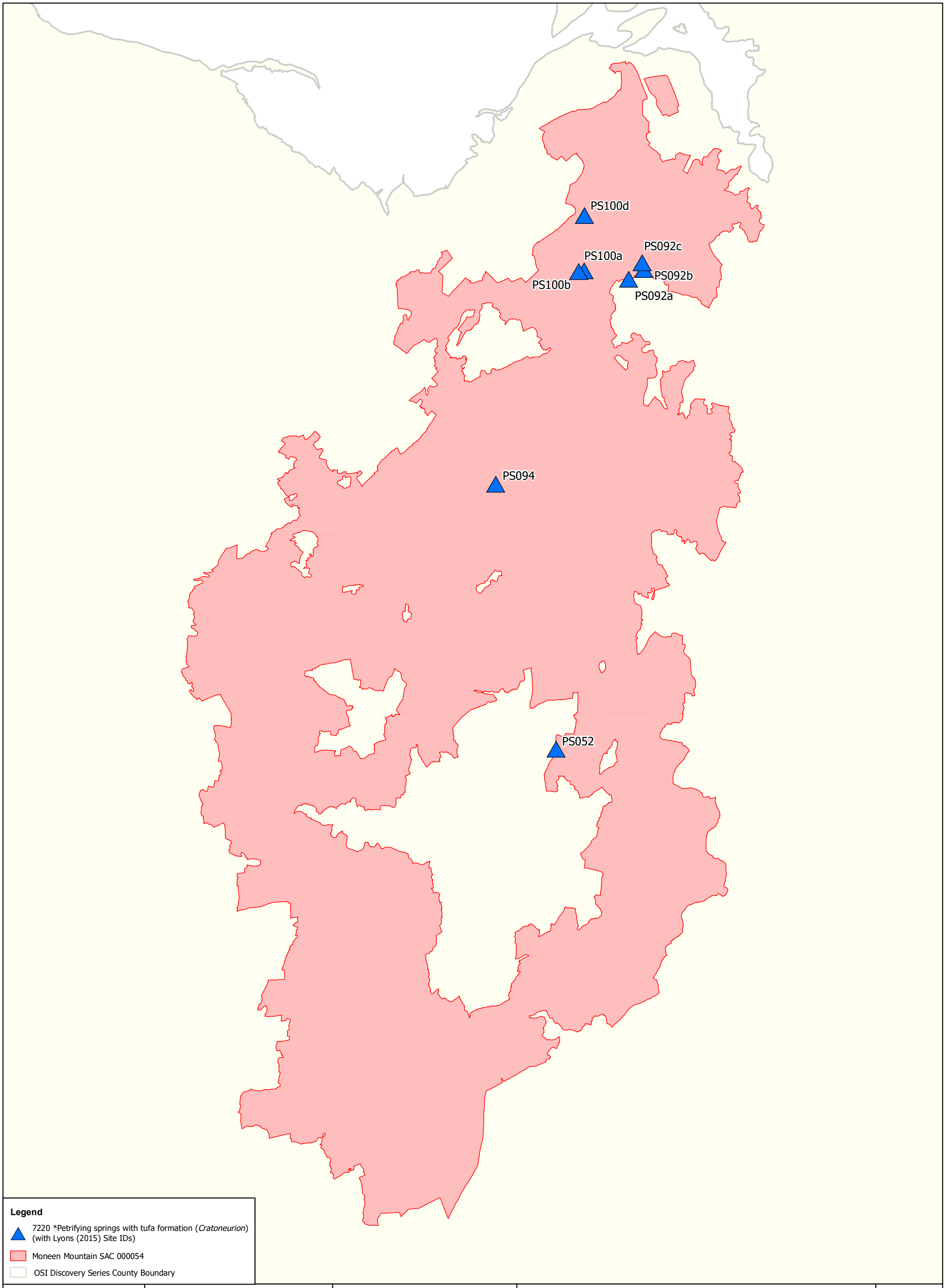
Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.5 1 2 Kilometres

N

Date: December 2021



Legend

- 7220 *Petrifying springs with tufa formation (*Cratoneurion*) (with Lyons (2015) Site IDs)
- Moneen Mountain SAC 000054
- OSI Discovery Series County Boundary

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MAP 3:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
PETRIFYING SPRINGS

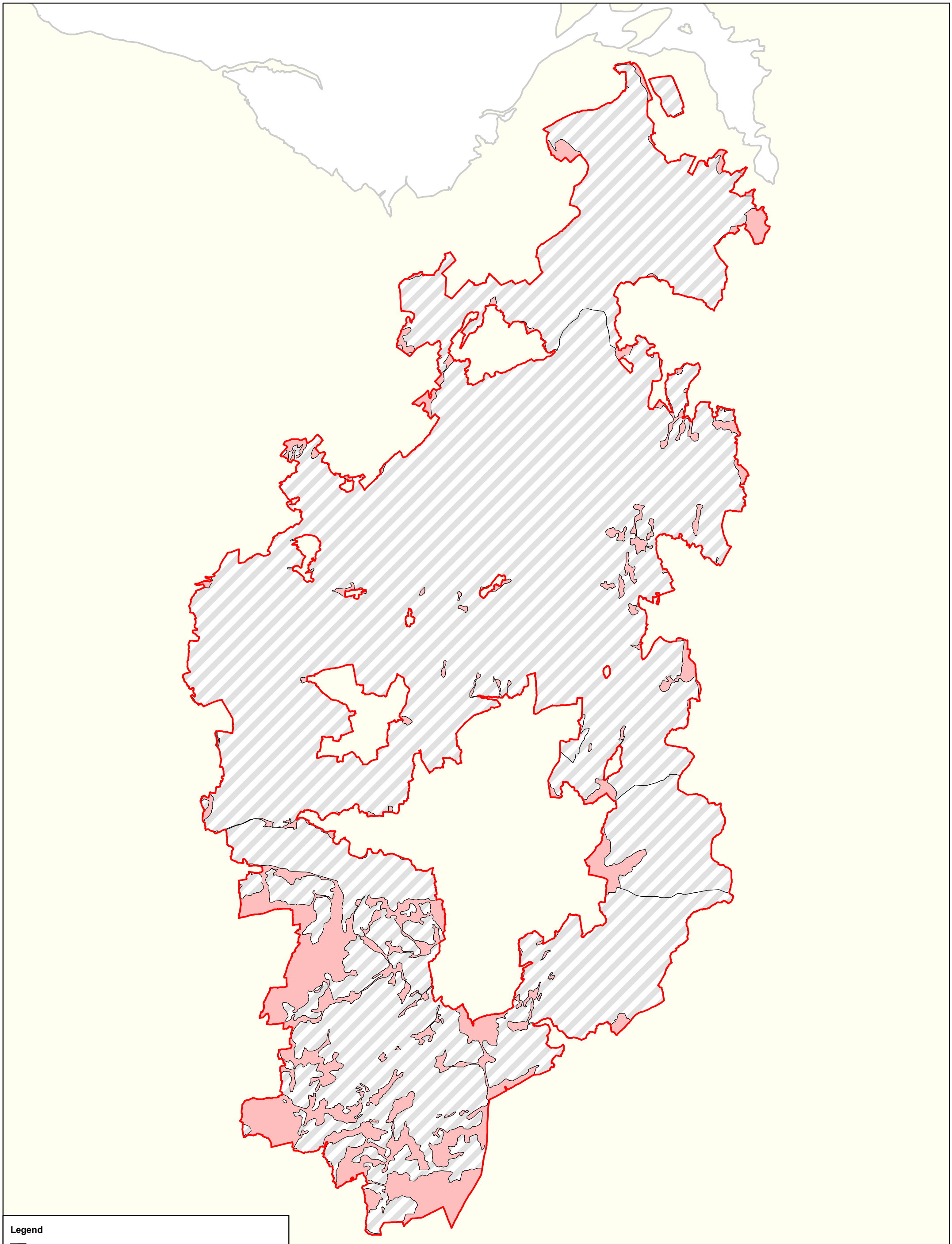
Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.25 0.5 1 Kilometre

N

Date: December 2021



Legend

- Potential 8240 *Limestone pavements including associated habitats
- Moneen Mountain SAC 000054
- OSI Discovery Series County Boundary

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MAP 4:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
LIMESTONE PAVEMENT

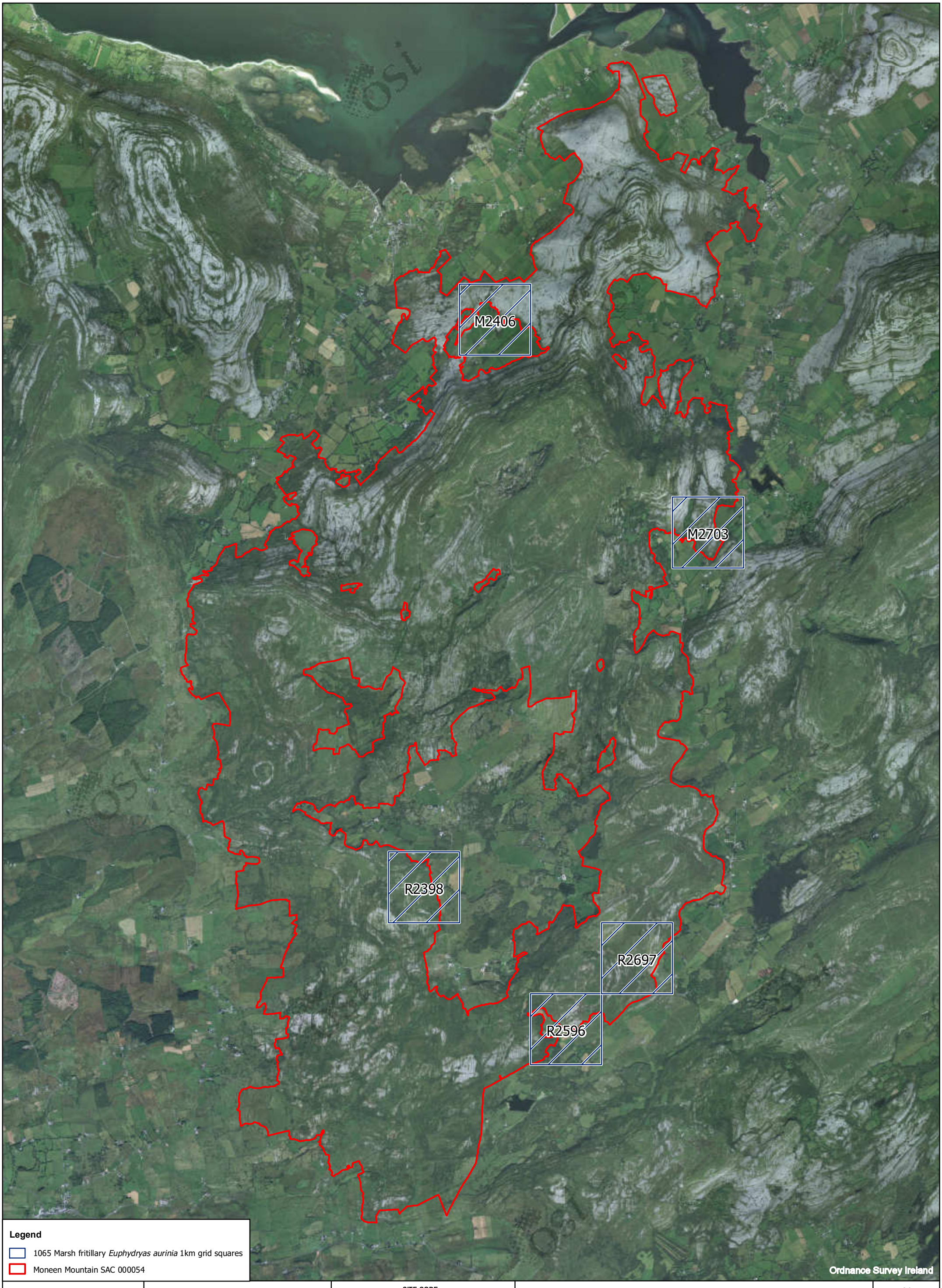
Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.225 0.45 0.9 Kilometre

N

Date: December 2021



Legend

- 1065 Marsh fritillary *Euphydryas aurinia* 1km grid squares
- Moneen Mountain SAC 000054

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MAP 5:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
MARSH FRITILLARY

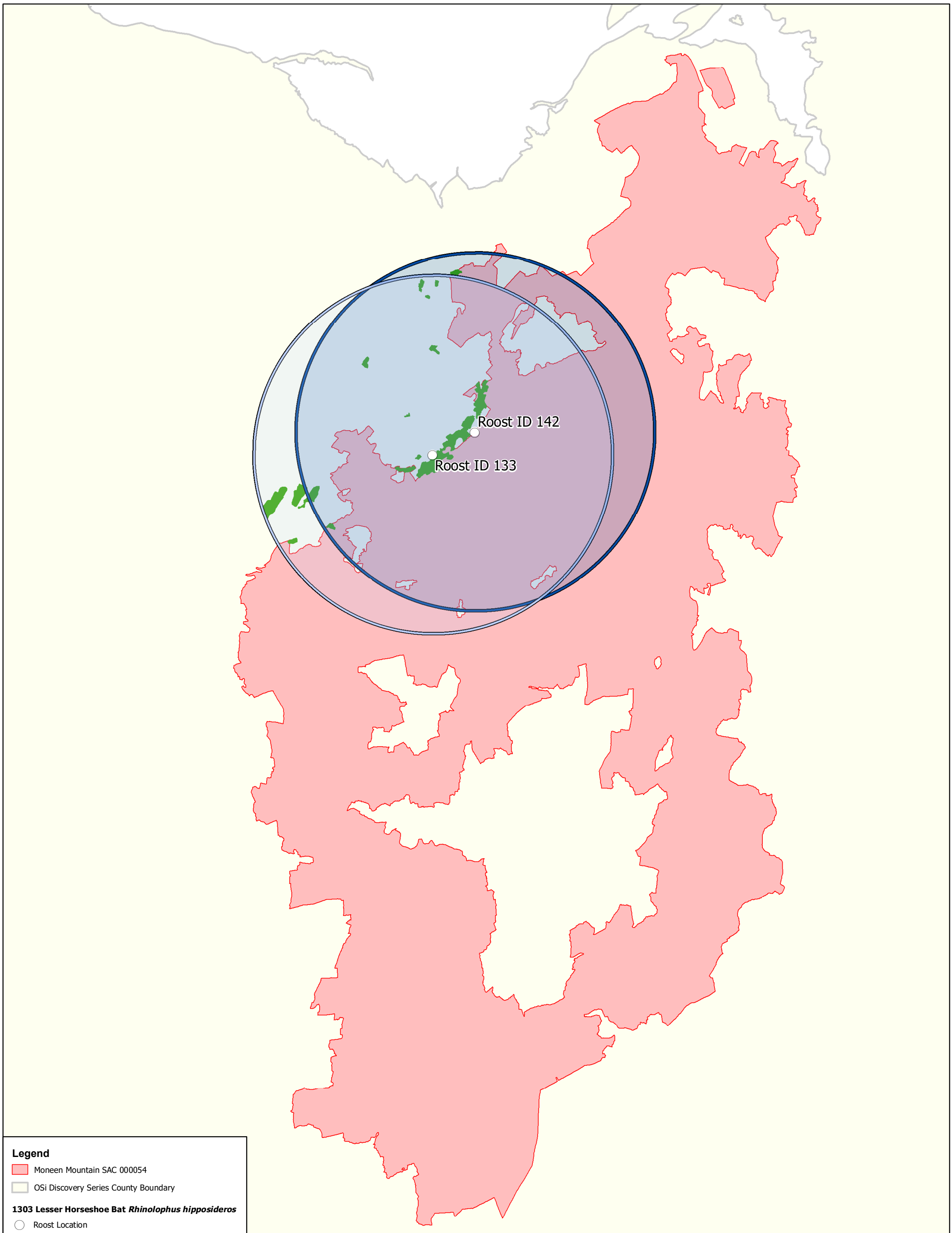
Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.25 0.5 1 Kilometre

N

Date: December 2021



Legend

- Moneen Mountain SAC 000054
- OSi Discovery Series County Boundary

1303 Lesser Horseshoe Bat *Rhinolophus hipposideros*

- Roost Location
- RoostID 133 Foraging Range
- RoostID 142 Foraging Range
- Potential Foraging Grounds

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MAP 6:
MONEEN MOUNTAIN SAC
CONSERVATION OBJECTIVES
LESSER HORSESHOE BAT

Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 000054; version 3.01
CO. CLARE

0 0.25 0.5 1 Kilometre

N

Date: December 2021