

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Mount Brandon SAC 000375



*An Roinn*  
*Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of*  
*Arts, Heritage and the Gaeltacht*



**National Parks and Wildlife Service,  
Department of Arts, Heritage and the Gaeltacht,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

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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

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000375	Mount Brandon SAC
1029	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i>
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1421	Killarney Fern <i>Trichomanes speciosum</i>
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea
4010	Northern Atlantic wet heaths with <del><i>Calluna vulgaris</i></del> <i>Calluna vulgaris</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
6230	Species-rich <del><i>Poa</i></del> • grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)E
7130	Blanket bogs (* if active bog)
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)
8210	Calcareous rocky slopes with chasmophytic vegetation
8220	Siliceous rocky slopes with chasmophytic vegetation

**Please note that this SAC overlaps with Dingle Peninsula SPA (004153) and is adjacent to Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1999
<b>Title :</b>	A survey of four rivers in the south-west of Ireland for the freshwater pearl mussel, <i>Margaritifera margaritifera</i> (L.)
<b>Author :</b>	Ross, E.
<b>Series :</b>	Unpublished report to Duchas, the Heritage Service
<b>Year :</b>	2009
<b>Title :</b>	NS II freshwater pearl mussel sub-basin management plans: report on biological monitoring of surface water quality in Owenmore catchment 2008/2009
<b>Author :</b>	Williams, L.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2011
<b>Title :</b>	National survey and assessment of the conservation status of Irish sea cliffs
<b>Author :</b>	Barron, S.J.; Delaney, A.; Perrin, P.M.; Martin, J.; O'Neill, F.
<b>Series :</b>	Irish Wildlife Manual No. 53
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List no. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel
<b>Author :</b>	Roden, C.; Murphy, P.
<b>Series :</b>	Irish Wildlife Manual No. 70
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2014
<b>Title :</b>	National survey of upland habitats (phase 2, 2011-2012), site report no. 7: Mount Brandon cSAC (000375), Co. Kerry (revision)
<b>Author :</b>	Perrin, P.M.; Roche, J.R.; Barron, S.J.; Daly, O.H.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2014
<b>Title :</b>	National survey of upland habitats (phase 4, 2013-2014), summary report
<b>Author :</b>	Barron, S.J.; Perrin, P.M.
<b>Series :</b>	Unpublished report to NPWS

**Year :** 2015  
**Title :** Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting  
**Author :** O Connor, Á.  
**Series :** Unpublished document by NPWS

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**Year :** 2015  
**Title :** Monitoring methods for the Killarney fern (*Trichomanes speciosum* Willd.) in Ireland  
**Author :** Ní Dhúill, E.; Smyth, N.; Waldren, S.; Lynn, D.  
**Series :** Irish Wildlife Manual No. 82

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**Year :** 2015  
**Title :** Mount Brandon SAC (site code: 375) Conservation objectives supporting document- coastal habitats V1  
**Author :** NPWS  
**Series :** Conservation objectives supporting document

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**Year :** 2016  
**Title :** Mount Brandon SAC (site code: 375) Conservation objectives supporting document- upland habitats V1  
**Author :** NPWS  
**Series :** Conservation objectives supporting document

## Other References

**Year :** 1982  
**Title :** Eutrophication of waters. Monitoring assessment and control  
**Author :** OECD  
**Series :** OECD, Paris

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**Year :** 1984  
**Title :** Studies on the biology of freshwater mussels (Lamellibranchia: Unionacea) in Ireland  
**Author :** Ross, E.D.  
**Series :** Unpublished MSc Thesis. National University of Ireland, Galway

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**Year :** 1988  
**Title :** The Irish red data book 1. Vascular plants  
**Author :** Curtis, T.G.F; McGough, H.N.  
**Series :** Wildlife Service, Dublin

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**Year :** 1988  
**Title :** The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography  
**Author :** Ross, E.D.  
**Series :** Unpublished PhD Thesis, National University of Ireland, Galway

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**Year :** 2000  
**Title :** Colour in Irish lakes  
**Author :** Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.  
**Series :** Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623

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**Year :** 2002  
**Title :** Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and algalisation  
**Author :** Arts, G.H.P.  
**Series :** Aquatic Botany, 73: 373-393

<b>Year :</b>	2004
<b>Title :</b>	The ecology of <i>Najas flexilis</i>
<b>Author :</b>	Wingfield, R.A.; Murphy, K.J.; Hollingsworth, P.; Gaywood, M.J.
<b>Series :</b>	Scottish Natural Heritage Commissioned Report No. 017 (ROAME No. F98PA02)
<b>Year :</b>	2006
<b>Title :</b>	The status of host fish populations and fish species richness in European freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) streams
<b>Author :</b>	Geist, J.; Porkka, M.; Kuehn, R.
<b>Series :</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
<b>Year :</b>	2006
<b>Title :</b>	A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
<b>Author :</b>	Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2008
<b>Title :</b>	Water Quality in Ireland 2004-2006
<b>Author :</b>	Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2009
<b>Title :</b>	The identification, characterization and conservation value of isoetid lakes in Ireland
<b>Author :</b>	Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.
<b>Series :</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 19 (3): 264–273
<b>Year :</b>	2010
<b>Title :</b>	Addressing the conservation and rehabilitation of <i>Margaritifera margaritifera</i> populations in the Republic of Ireland within the framework of the habitats and species directive
<b>Author :</b>	Moorkens, E.
<b>Series :</b>	Journal of Conchology, 40: 339
<b>Year :</b>	2010
<b>Title :</b>	Water quality in Ireland 2007-2009
<b>Author :</b>	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2010
<b>Title :</b>	Second draft Owenmore freshwater pearl mussel sub-basin management plan (2009-2015). March 2010
<b>Author :</b>	Department of the Environment, Heritage and Local Government
<b>Series :</b>	Unpublished report
<b>Year :</b>	in prep.
<b>Title :</b>	Monitoring of hard-water lakes in Ireland using charophytes and other macrophytes
<b>Author :</b>	Roden, C.; Murphy, P.
<b>Series :</b>	Unpublished report to NPWS

## Spatial data sources

<b>Year :</b>	2011
<b>Title :</b>	National survey and assessment of the conservation status of Irish sea cliffs
<b>GIS Operations :</b>	Clipped to SAC boundary
<b>Used For :</b>	1230 (map 3)
<b>Year :</b>	2008
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising
<b>Used For :</b>	3110, 3130 (map 4)
<b>Year :</b>	2012
<b>Title :</b>	National Survey of Upland Habitats - Phase 3
<b>GIS Operations :</b>	Habitat dataset for site clipped to SAC boundary. Relevant QI selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	4010, 4030, 4060, 6230, 7130, 8110, 8210, 8220 (maps 5, 6, 7, 8, 9, 10, 11, 12)
<b>Year :</b>	2012
<b>Title :</b>	Margaritifera Sensitive Areas data Revision
<b>GIS Operations :</b>	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1029 (map 13)
<b>Year :</b>	2015
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1029 (map 13)

**1230 Vegetated sea cliffs of the Atlantic and Baltic coasts**

**To maintain the favourable conservation condition of Vegetated sea cliffs of the Atlantic and Baltic coasts in Mount Brandon SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat length	Kilometres	Area stable, subject to natural processes, including erosion. For sub-site mapped from desktop survey: Brandon to Ballydavid Head- 8.31km See map 3	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). Cliffs are linear features and are therefore measured in kilometres. One sub-site was identified using a combination of aerial photos and the DCENR helicopter viewer. The length of the cliff was measured (in some cases the cliff was measured in sections) to give a total estimated area of 8.31km within the SAC. The length of cliff is likely to be underestimated. See the coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3	Sea cliffs are distributed along the coastline in the north-western section of this SAC. Both hard and soft cliffs are present, with hard cliffs being by far the more dominant type (Barron et al., 2011). See the coastal habitats supporting document for further details
Physical structure: functionality and hydrological regime	Occurrence of artificial barriers	No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures	Based on data from Barron et al. (2011). Maintaining natural geomorphological processes including natural erosion is important for the health of a vegetated sea cliff. Hydrological processes maintain flushes and in some cases tufa formations that can be associated with sea cliffs. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession	Based on data from Barron et al. (2011). Adjacent habitats in this SAC include heath and maritime grassland. See the coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from Barron et al. (2011). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in the Irish Sea Cliff Survey (Barron et al., 2011)	See the coastal habitats supporting document for further details. Rare plant species such as roseroot ( <i>Rhodiola rosea</i> ), Irish saxifrage ( <i>Saxifraga rosacea</i> ) and mountain sorrel ( <i>Oxyria digyna</i> ) were noted on cliffs in this SAC
Vegetation composition: negative indicator species	Percentage	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Barron et al. (2011). <i>Hebe</i> sp. has been recorded as a negative indicator species at this site. See the coastal habitats supporting document for further details
Vegetation composition: bracken and woody species	Percentage	Cover of bracken ( <i>Pteridium aquilinum</i> ) on grassland and/or heath less than 10%. Cover of woody species on grassland and/or heath less than 20%	Based on data from Barron et al. (2011). See the coastal habitats supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Mount Brandon 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	This SAC contains c.52 lakes and ponds, based on 1:5,000 OSi data. Most are upland and/or surrounded by peatland or outcropping rock and are likely to contain lake habitats 3110 and/or 3160. The exact distribution of habitat 3110 in the SAC is unknown. In line with Article 17 reporting, all lakes larger than 1ha have been mapped as 'potential 3110' (See map 4) (NPWS, 2013). Some of these lakes are small however, and communities may not be properly developed. Some, notably those at higher altitude or in corries, may contain habitat 3160. Habitat 3160 also likely to be found in other small, high altitude lakes and in bog pools in the SAC. Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the exact distribution of habitat 3110 in the SAC is not known. In map 4, all lakes larger than 1ha (based on 1:5,000 data) have been mapped as potential 3110
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see Article 17 habitat assessment for 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015). Typical species including <i>Isoetes lacustris</i> , <i>Littorella uniflora</i> , <i>Lobelia dortmanna</i> and <i>Juncus bulbosus</i> have been recorded in the site, however little else is known about the vegetation of the lakes and ponds
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.), however, significant further work is necessary to describe the characteristic zonation and other spatial patterns in the remaining four Annex I lake habitats
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. An indicative target of more than 6m has been developed for hard water lakes (3140) (see Roden and Murphy, 2013; in prep.). Indicative targets will be developed for the other lake habitats with time. Maximum depth should be large in the site, as many of the lakes are deep corrie lakes and water clarity is expected to be high
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced

Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that the lake 3110 habitat is associated with a range of nutrient-poor substrates, from stones, cobble and gravel, through sands, silt, clay and peat. Substratum particle size is likely to vary with depth and along the shoreline within a single lake
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. A target has been set for hard water lakes (3140), however, specific targets have yet to be established for the remaining lake habitats. Habitat 3110 is associated with very clear water. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6\text{m}$ annual mean Secchi disk depth, and $\geq 3\text{m}$ annual minimum Secchi disk depth. Free et al. (2009) found high isoetid abundance in lakes with Secchi depths of more than 3m. High altitude deep lakes, such as those found in the SAC, are expected to have high transparency
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For the lake habitat 3110, annual average TP concentration should be $\leq 10\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to the lake habitat 3110. Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ . The annual average chlorophyll <i>a</i> concentration should be $< 2.5\mu\text{g/l}$ and the annual peak chlorophyll <i>a</i> concentration should be $\leq 8.0\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, habitat 3110 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/ absent attached algal biomass ( $< 5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipellic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/ absent ( $< 5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3110 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3110 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009

Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. In Europe, acidification of isoetid lakes can lead to loss of isoetids and dominance by submerged <i>Sphagnum</i> mosses and <i>Juncus bulbosus</i> (Arts, 2002). The specific requirements of lake habitat 3110, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. For lake habitat 3110, and adopting a precautionary approach based on Arts (2002), minimum pH should not be <5.5 pH units. Maximum pH should be <9.0 pH units, in line with the surface water standards established for soft waters (where water hardness is ≤100mg/l calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be <50mg/l PtCo. Water colour can be very low (<20mg/l PtCo or even <10mg/l PtCo) in lake habitat 3110, where the peatland in the lake's catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Fringing habitat: area	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet-woodland that intergrade with and support the structure and functions of the lake habitat. In this site, 3110 lakes are most likely to be fringed by poor-fen, flush, blanket bog and heath communities. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves

## Conservation Objectives for : Mount Brandon SAC [000375]

### 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*

**To maintain the favourable conservation condition of Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* in Mount Brandon 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	Lake habitat 3130 is unlikely to occur in this SAC, given the geology, small size, altitude and highly oligotrophic nature of most of lakes. Selection of the SAC for 3130 was based on an older interpretation of the habitat (see O Connor, 2015). Most of the c.52 lakes/ponds are likely to contain lake habitats 3110/3160. A tentative, indicative distribution of habitat 3130 is shown on map 4, and is based on lake size, altitude and the presence of <i>Margaritifera margaritifera</i> in the catchment. Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	The characteristics and distribution of habitat 3130 in Ireland are not yet fully understood. As noted above, it is considered unlikely that the habitat occurs in the site, but a tentative, indicative distribution is presented in map 4
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see Article 17 habitat assessment for lake habitat 3130 (NPWS, 2013) and O Connor (2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013, in prep.), however significant further work is necessary to describe the characteristic zonation and other spatial patterns in the remaining four Annex I lake habitats
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. An indicative target of more than 6m has been developed for hard water lakes (3140) (see Roden and Murphy, 2013; in prep.). Indicative targets will be developed for the other lake habitats with time. Maximum depth should be large in the SAC, as many of the lakes are deep corrie lakes and water clarity is expected to be high
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced

Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that lake habitat 3130 is associated with a range of substrate types that are more productive/base-rich relative to the substratum of 3110. Substratum particle size is likely to vary with depth and along the shoreline within a single lake
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. A target has been set for hard water lakes (3140), however, specific targets have yet to be established for the remaining lake habitats. Habitat 3130 is associated with clear water, as evidenced by the growth of the character species <i>Najas flexilis</i> at depths of up to 10m. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6$ m annual mean Secchi disk depth, and $\geq 3$ m annual minimum Secchi disk depth. There is likely to be some variation across lakes with habitat 3130 in Secchi depth and site-specific conditions should also be considered
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	3130 is associated with high water quality, with naturally low dissolved nutrients. It is naturally more productive than 3110, probably reflecting higher concentrations of nutrients such as calcium, rather than P alone. 3130 may reach favourable condition slightly above the oligotrophic boundary for nutrients, but in the absence of habitat-specific targets, the targets are Water Framework Directive (WFD) 'High Status' or oligotrophic (OECD, 1982). The "good-moderate" boundary is too enriched to support the habitat. Annual average TP concentration should be $\leq 10\mu\text{g/l TP}$ , average annual total ammonia should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . Where nutrient concentrations are lower, there should be no upward trend in nutrient concentrations. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	3130 is associated with high water quality, and naturally low algal growth. As for nutrients, the targets are WFD 'High Status' or oligotrophic (OECD, 1982). The "good-moderate" boundary is too enriched to support the habitat. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ . The annual average chlorophyll <i>a</i> should be $< 2.5\mu\text{g/l}$ and the annual peak chlorophyll <i>a</i> should be $< 8.0\mu\text{g/l}$ . Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, habitat 3130 is considered to require WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/ absent attached algal biomass ( $< 5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3130 should, therefore, be trace/ absent ( $< 5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3130 requires high phytobenthos status

Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the soft water lake habitat with base-rich influences (3130). The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for habitat 3130 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in habitat 3130. Acidification reduces the abundance and reproductive capacity of <i>Najas flexilis</i> (Wingfield et al., 2004). The specific requirements of habitat 3130, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. Median pH values should be greater than 7 pH units. Water and sediment alkalinity and concentrations of cations (notably calcium) should be appropriate to the habitat. The target for WFD Acidification/Alkalisiation status is high. Maximum pH should be $< 9.0$ pH units, in line with the surface water standards. See The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be $< 50$ mg/l PtCo. Water colour is generally $< 30$ mg/l PtCo or, more naturally, $< 20$ mg/l PtCo in lakes with habitat 3130, where the peatland in the lake's catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate unit	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes

Fringing habitat: Hectares  
area

Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3130

Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet woodland that intergrade with and support the structure and functions of the lake habitat. In this SAC, lakes are most likely to be fringed by poor-fen, flush, blanket bog and heath communities. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves

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## Conservation Objectives for : Mount Brandon SAC [000375]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Mount Brandon SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of wet heath in the SAC stated by Perrin et al. (2014) is 4056.3ha. It is the most extensive Annex I habitat, covering 28.26% of the SAC. Perrin et al. (2014) report obvious losses of habitat since 1995 of approximately 61.5ha. A summary of the mapping methodology and a brief discussion of restoration potential are presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 5	Wet heath was recorded by Perrin et al. (2014) throughout the SAC. Extensive patches occur in the east of the site at Cummeen, Stradbally Mountain, along the Owenmore River valley, on the slopes above Brandon village and on the western slopes of Brandon Mountain. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded seven different wet heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of 2m x 2m monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present near each monitoring stop	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found in the uplands supporting document
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2014) but did not form extensive carpets

Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage cover in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Douinia ovata</i> has been recorded from this habitat and is listed as Near Threatened in Lockhart et al. (2012). This and any new records from the habitat should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 4030 European dry heaths

To restore the favourable conservation condition of European dry heaths in Mount Brandon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of dry heath in the SAC stated by Perrin et al. (2014) is 1903.6ha. It is relatively extensive covering 13.26% of the SAC. Perrin et al. (2014) report obvious losses of habitat since 1995 of approximately 8.5ha. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 6	Dry heath was recorded by Perrin et al. (2014) throughout the SAC, but was most abundant along the coast and on the slopes of Beenoskee. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded four different dry heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2014) but did not form extensive carpets
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%.	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Leptodontium flexifolium</i> , <i>Mastigophora woodsii</i> , <i>Bazzania pearsonii</i> and <i>Scapania ornithopodioides</i> have been recorded from within this habitat. Lockhart et al. (2012) list the first two as Near Threatened and the last two as Vulnerable. These and any new species from the habitat should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris</i> - <i>Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 4060 Alpine and Boreal heaths

**To restore the favourable conservation condition of Alpine and Boreal heaths in Mount Brandon 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	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of Alpine and Boreal heath stated by Perrin et al. (2014) is 521.9ha, covering 3.64% of the SAC. Perrin et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 7	Alpine and Boreal heath was recorded by Perrin et al. (2014) on the high ground across the SAC, but was most abundant on the upper slopes at Masatiompan, Stradbally Mountain and Beenoskee. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded four different Alpine and Boreal heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 66%	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf-shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf-shrub species at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2014) but did not form extensive carpets
Vegetation structure: signs of grazing	Percentage of leaves browsed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	Based on Perrin et al. (2014). See the uplands supporting document for further details including the list of specific graminoids
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids and crowberry ( <i>Empetrum nigrum</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Based on Perrin et al. (2014). See the uplands supporting document for further details

Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Alchemilla alpina</i> and <i>Scapania nimbosa</i> were recorded in this habitat. Curtis and McGough (1988) list <i>Alchemilla alpina</i> as Rare; Lockhart et al. (2012) list <i>Scapania nimbosa</i> as Endangered. These and any new records from the habitat should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)

To restore the favourable conservation condition of Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\* in Mount Brandon 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	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of species-rich <i>Nardus</i> grassland in the SAC stated by Perrin et al. (2014) is 16.7ha. It is relatively infrequent covering only 0.12% of the SAC. Perrin et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 8	Species-rich <i>Nardus</i> grassland was recorded by Perrin et al. (2014) scattered throughout the SAC, with a concentration on the eastern valley side of the Glennahoo River valley. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded two different species-rich <i>Nardus</i> grassland communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: high quality indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least two high quality species for base-rich examples of the habitat and at least one for base-poor examples of the habitat	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: species richness	Number of species at a representative number of 2m x 2m monitoring stops	Species richness at each monitoring stop at least 25	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of negative indicator species individually less than 10% and collectively less than 20%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: <i>Sphagnum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Sphagnum</i> species less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: <i>Polytrichum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Polytrichum</i> species less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: scrub, bracken and heath cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of scrub, bracken ( <i>Pteridium aquilinum</i> ) and heath collectively less than 5%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: forb to graminoid ratio	Percentage cover at a representative number of 2m x 2m monitoring stops	Forb component of forb: graminoid ratio is 20-90%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: sward height	Sward height at a representative number of 2m x 2m monitoring stops	Proportion of the sward between 5cm and 50cm tall is at least 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: litter cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of litter less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: grazing or disturbance	Percentage cover in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Alchemilla alpina</i> , <i>Sibthorpia europaea</i> and <i>Metgeria leptoneura</i> were recorded in this habitat. Curtis and McGough (1988) list the first two species as Rare. Lockhart et al. (2012) list the last as Near Threatened. These and any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs in Mount Brandon SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). Perrin et al. (2014) state that the current total area of blanket bog is 1877.2ha, covering 13.08% of the SAC. This comprises 1814.4ha of active blanket bog and 62.8ha of inactive blanket bog. Perrin et al. (2014) also report obvious losses of habitat since 1995 of approximately 3.6ha. However, this is almost certainly an under-estimate, as chronic losses due to erosion since 1995 cannot be quantified (56.0ha were mapped as eroding blanket bog by Perrin et al. (2014)). It should be noted that further restoration of blanket bog would be required in order to fulfil the targets for peat formation and hydrology presented below. A summary of the mapping methodology and a brief discussion of restoration potential are presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 9	Blanket bog was recorded by Perrin et al. (2014) across the SAC. Extensive patches occur on the eastern flank of Masatiompan, below Loch Cruite, along the Cloghane/Owenmore River valley and in the valley below Slievenagower and Slievenlecha extending to Stradbally. A further location in the west of the site is at Ballysitteragh. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog	At least 99% of the total Annex I blanket bog area is active	From the habitat areas given by Perrin et al. (2014) above, 96.7% of the Annex I blanket bog habitat is currently actively peat-forming. See the uplands supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the uplands supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded seven different active blanket bog communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details including the list of potentially dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2014) but did not form extensive carpets
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Occurrence in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)

To restore the favourable conservation condition of Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) in Mount Brandon 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	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of siliceous scree in the SAC stated by Perrin et al. (2014) is 252.0ha. This covers 1.76% of the SAC. Perrin et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 10	Siliceous scree was recorded by Perrin et al. (2014) extensively throughout the SAC. Significant patches occur below the peaks of Brandon Mountain, Brandon Peak, Beenoshe and above Loch Anscaul. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes and non-crustose lichen species at least 5%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species present in vicinity of each monitoring stop in block scree is at least one	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014) and is the same as for 8220 Siliceous rocky slopes. Further details can be found in the uplands supporting document
Vegetation composition: grass species and dwarf shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of grass species and dwarf shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running, vehicles less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details

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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Bazzania pearsonii</i> , <i>Cyclodictyon laetevirens</i> and <i>Douinia ovata</i> have been recorded from within the habitat. The first of these species is listed as Vulnerable in Lockhart et al. (2012) with the latter two listed as Near Threatened. These and any new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details
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## Conservation Objectives for : Mount Brandon SAC [000375]

### 8210 Calcareous rocky slopes with chasmophytic vegetation

**To maintain the favourable conservation condition of Calcareous rocky slopes with chasmophytic vegetation in Mount Brandon 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	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of calcareous rocky slopes in the SAC stated by Perrin et al. (2014) is 0.8ha. This covers 0.01% of the SAC. Perrin et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 11	Calcareous rocky slopes were recorded by Perrin et al. (2014) are of limited extent in the SAC. Patches were found below Brandon Peak and on the cliff face above Loch an Mhonain east of Gearhane. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: positive indicator fern and <i>Saxifraga</i> species	Number of species in local vicinity of a representative number of monitoring stops	Number of ferns and <i>Saxifraga</i> indicators at each monitoring stop at least one	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species at each monitoring stop at least three	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found reproduced in the uplands supporting document
Vegetation composition: non-native species	Percentage cover in local vicinity of a representative number of monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Perrin et al. (2014)
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed in local vicinity of a representative number of monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Alchemilla alpina</i> , listed as Rare by Curtis and McGough (1988), has been recorded from a number of stations within the habitat. This and any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 8220 Siliceous rocky slopes with chasmophytic vegetation

**To maintain the favourable conservation condition of Siliceous rocky slopes with chasmophytic vegetation in Mount Brandon 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	Mount Brandon SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2014). The total current area of siliceous rocky slopes in the SAC stated by Perrin et al. (2014) is 280.7ha. This covers 1.96% of the SAC. Perrin et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 12	Siliceous rocky slopes were recorded by Perrin et al. (2014) scattered throughout the SAC. Extensive patches occur along the slopes east of Brandon Mountain's summit, on the corrie wall below Slievancea, and on the slope north of Ballysitteragh. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	Number of positive indicator species present in vicinity of each monitoring stop is at least one	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found in the uplands supporting document
Vegetation composition: non-native species	Percentage cover in local vicinity of a representative number of monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Perrin et al. (2014)
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed in local vicinity of a representative number of monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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 and no decline in status of hepatic mats associated with this habitat	Perrin et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Alchemilla alpina</i> , listed as Rare by Curtis and McGough (1988) has been recorded from a number of stations within the habitat. In addition <i>Adelanthus lindenbergianus</i> and <i>Radula carringtonii</i> , listed respectively as Vulnerable and Near Threatened by Lockhart et al. (2012) have also been recorded from the habitat. These and any new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Perrin et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Mount Brandon SAC [000375]

### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in Mount Brandon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 5.79km. See map 13	The conservation objective applies to the Owenmore freshwater pearl mussel population, which is listed on SI 296 of 2009. Its distribution was mapped by Ross (1999) and extends for c.5.79km in the Owenmore River from the confluence of the stream from Lough Atlea to the outflow to the sea at Boherboy. Mussels have not been found in any tributaries. The river substratum is dominated by boulders, making mussels difficult to observe (Ross, 1999). The boulders are interspersed by more stable habitat that should support both adult and juvenile mussels, but the mussel carrying capacity is naturally lower than in gravel/cobble habitat (DEHLG, 2010). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Owenmore system. See DEHLG (2010) for further information
Population size	Number of adult mussels	Restore Owenmore population to at least 3,100 adult mussels	The Owenmore population was estimated as 3,099 in 1999 (Ross, 1999). Mussels were sparse, with low densities even in the two 50m stretches where mussels were 'abundant' (Ross, 1999). The highest density recorded was 4.9/m <sup>2</sup> (Ross, 1999). The population declined significantly between 1999 and 2009: estimated decline in the two 'abundant' stretches was 95% and 75% (Ross, 2009). In 2009, the highest density was 1.12/m <sup>2</sup> , but this was not representative of the rest of the river, and mussels were nowhere 'abundant' (Ross, 2009). This decline is likely to have been ongoing for some time, as Ross (1984) recorded mussels as 'abundant' at the outflow, but only 'common' there in 1999 (DEHLG 2010). NPWS (2013) estimated that the Owenmore population had reduced to 2,541 by 2012, based on a 3% per year decline owing to insufficient recruitment. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Owenmore system
Population structure: recruitment	Percentage per size class	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. See also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. Ross (1984) conducted demographic analysis of the Owenmore population. In 1999, the smallest mussel observed was 54mm (c.9+ years, from Ross (1984)) (Ross, 1999). In 2009, no juvenile or small mussels were found (failed both targets) and the smallest mussel was 89.8mm (c.15 years) (Ross, 2009; DEHLG, 2010). The Owenmore population is unsustainable owing to lack of survival of juvenile mussels. DEHLG (2010) predicted that, based on current rates of decline, the population would be extinct by 2080. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system

Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. As detailed above, population decline was noted in the Owenmore between 1984 and 1999 and again in 2009, with estimated declines in the two 'abundant' stretches of 95% and 75% between 1999 and 2009 (Ross, 2009; DEHLG, 2010). Significant numbers of dead shells have not been recorded. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Habitat extent	Kilometres	Restore suitable habitat in more than 5.79km in the Owenmore and any additional stretches necessary for salmonid spawning	The species' habitat is widespread in the Owenmore. It is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only those spawning areas that can regularly contribute juvenile fish to areas occupied by adult mussels should be considered. The availability of mussel and fish spawning/nursery habitats is determined by flow and substratum conditions. The habitat is highly sensitive to hydromorphological changes, sedimentation and nutrient enrichment. Pressures from throughout the catchment (map 13) contribute to such impacts. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Owenmore failed the macroinvertebrate standard at three of the seven sites sampled for the Sub-basin Management Plan (Williams, 2009; DEHLG, 2010). The Owenmore habitat passed the phytobenthos standard at the single site sampled in 2009 (DEHLG, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Owenmore substratum is predominantly large and small boulder and cobble (Williams, 2009). The habitat in the Owenmore failed macrophyte and filamentous algal targets in 2009 (DEHLG, 2010). Ross (2009) noted extensive coverage of filamentous algae (up to 100%) at three of five sites investigated. These high macrophyte and algal abundances demonstrate excessive nutrient loading to the Owenmore (DEHLG, 2010). There was also evidence of elevated organic loads (dissolved and particulate), leading to poor mussel habitat condition (Ross, 2009; Williams, 2009). Organic material leads to sedimentation and increased fungal and bacterial production. Peatland drainage/degradation may be the source of organic matter. Sufficient recruitment of juvenile mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system

Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat failed this target in 2009 (DEHLG, 2010). Significant sedimentation was observed at one mussel sampling site (Ross, 2009) and slight to moderate silt-plumes at six of the seven macroinvertebrate sites (Williams, 2009). The habitat for the species in the Owenmore is unsuitable for the recruitment of juveniles owing to sedimentation and enrichment of the substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Redox was not measured in the Owenmore in 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediments or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and, thus, are essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is considered sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on fish in 2009, owing to poor habitat condition and/or mussel stress (DEHLG, 2010)

Fringing habitat	Hectares	Maintain the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling, as well as contributing to the aquatic food web (e.g. allochthonous matter such as leaf fall) and providing habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenmore system
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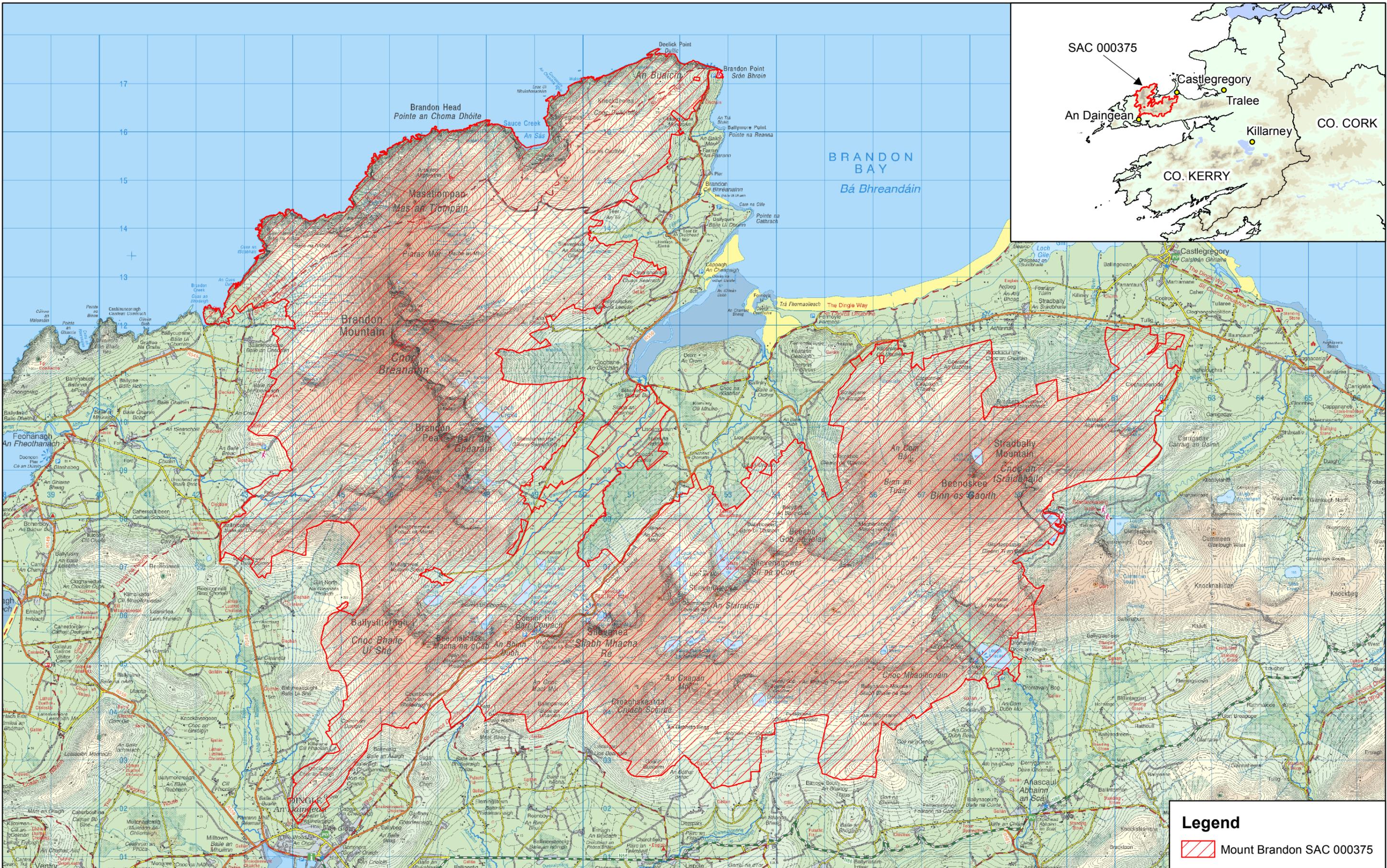
## Conservation Objectives for : Mount Brandon SAC [000375]

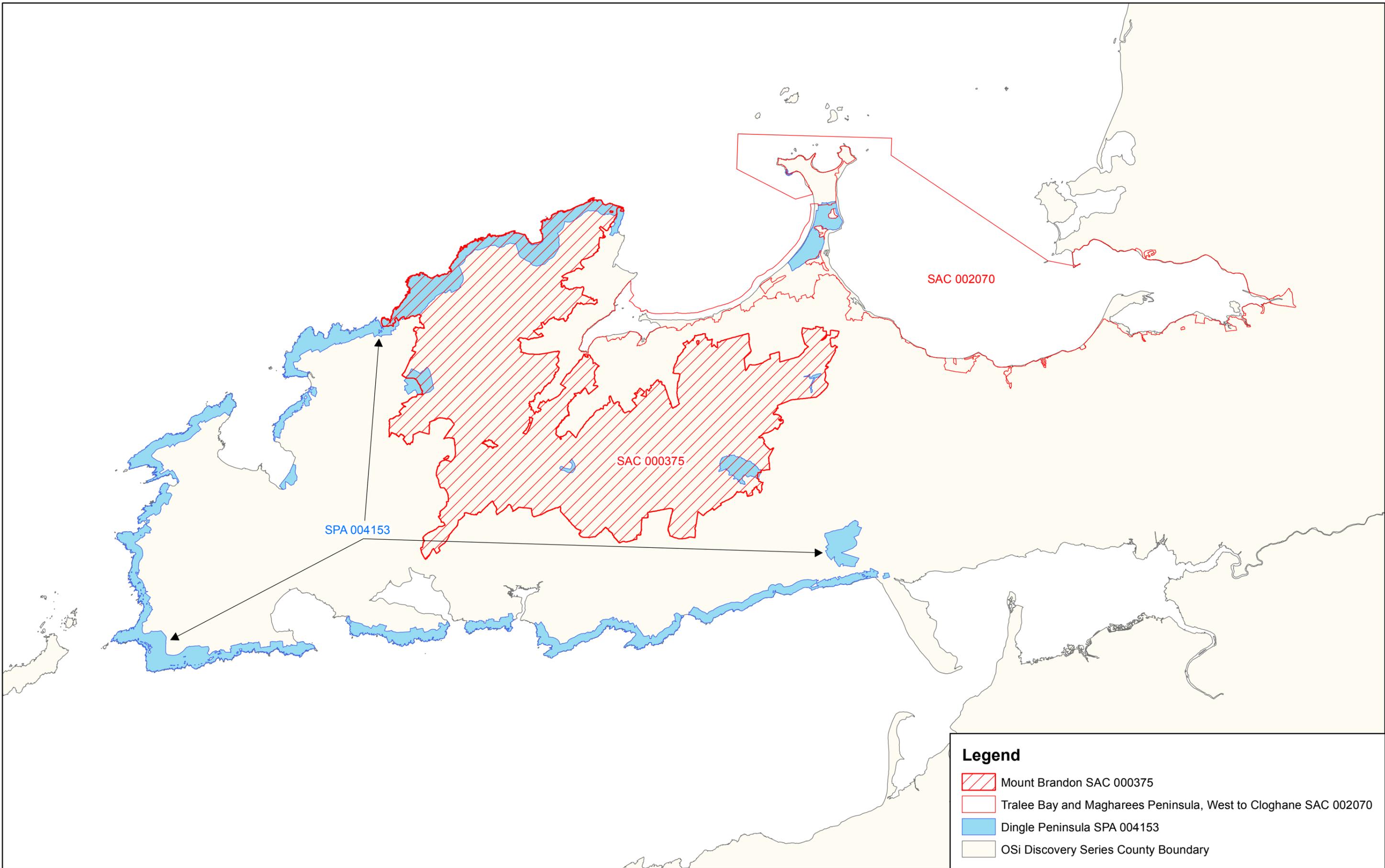
### 1421 Killarney Fern *Trichomanes speciosum*

To maintain the favourable conservation condition of Killarney Fern in Mount Brandon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No loss in geographical spread of populations, subject to natural processes	Populations of the species occur in widely-spread locations in the SAC, within three hectads (Q40, Q41 and Q51). Its distribution is not mapped here on account of the threat posed by illegal collecting. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Populations	Number	No decline, subject to natural processes	Nine different populations of the species have been recorded in the SAC since 1960; one of these has not been seen since 1983, despite repeated surveys and it may no longer persist. A possible additional (tenth) population discovered in the SAC in 2015 requires confirmation. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Colonies	Number	No decline, subject to natural processes	16 separate colonies of the species have been identified in the nine populations recorded in the SAC since 1960. 14 are composed of sporophytes (of which two have co-existing gametophytes) and two are of gametophytes only; one of these colonies, last recorded in 1983, may no longer persist. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population: life-cycle stage	Type (sporophyte or gametophyte)	Maintain life-cycle stage composition of populations, subject to natural processes	The sporophyte (frond) stage has been recorded in all nine populations. The gametophyte (filamentous) stage has also been recorded (either as gametophyte-only colonies or mixed with the sporophyte) in four of these. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: area of occupancy	Square metres	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population size: living sporophyte fronds	Number	No decline, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: young and unfurling fronds	Occurrence	Young (not fully expanded) and/or unfurling (crozier) fronds present in populations previously observed to have these, subject to natural processes	Young and unfurling fronds have been recorded from populations in the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: fertile fronds	Occurrence	Fertile fronds present in populations previously observed to have these, subject to natural processes	Fertile fronds have been recorded from populations in the SAC. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Population structure: juvenile sporophyte fronds emerging from gametophytes	Number	No decline, subject to natural processes	Juvenile sporophyte fronds emerging from gametophytes have not been recorded from the SAC to date. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Habitat extent	Hectares	No loss of suitable habitat, subject to natural processes	The species grows in deeply shaded, humid situations - dripping caves, overhangs and crevices on cliffs, rocky slopes, by waterfalls, in stream ravines and gullies, on rock or soil banks in woodlands and, occasionally, under fallen trees and on the floor of damp woodlands. Whilst also occurring in these habitats, the gametophyte can grow in drier areas that do not suit the sporophyte. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files

Hydrological conditions: wet/damp microhabitats	Occurrence	Maintain hydrological conditions at the locations of known populations-visible water source, with dripping or seeping water present and/or substrate wet/damp to touch, subject to natural processes	Not all populations/colonies have an obvious water source, but at these, the substrate should be wet/damp to touch. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: relative humidity	Percentage	Maintain relative humidity levels at known colonies at not less than 80%, subject to natural processes	Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Hydrological conditions: desiccated fronds	Number	No increase, subject to natural processes	Presence of desiccated sporophyte fronds and gametophyte mats is indicative of unsuitable conditions. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Light levels: shading	Shade index score	At least 4 for woodland sporophyte-only and mixed colonies; at least 5 for open upland sporophyte-only and mixed colonies; at least 6 for gametophyte-only colonies, subject to natural processes	Shade Index: 4. Moderate shade, e.g. light-medium deciduous canopy with sun flecks. 5. Permanently shaded from direct sunlight but otherwise open to sky. 6. Deep woodland (e.g. coniferous or in ravine) shade, no sun flecks. 7. Perpetual deep shade, e.g. cave entrance, beneath boulder. Note that woodland colonies have not been recorded from the SAC to date. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Woodland canopy cover	Percentage	No loss of woodland canopy at, or in the vicinity of, the locations of known populations and canopy cover here maintained at more than 33%, subject to natural processes	Woodland management at or near to locations of known populations of the species to take account of its habitat requirements, in particular, with regard to maintenance of sufficient canopy cover. Note that woodland colonies have not been recorded from the SAC to date. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files
Invasive species	Occurrence	Maintain absence of invasive non-native and vigorous native plant species at the locations of known populations or, if present, maintain vegetation cover of these at less than 10%, taking into account the habitat requirements of <i>T. speciosum</i>	In order to avoid negative impacts on <i>T. speciosum</i> , its habitat requirements (site hydrology, relative humidity, canopy cover, shading levels, etc.) must be taken into account in locations that are subject to or proposed for management actions to control invasive non-native and/or vigorous native plant species. Based on Ní Dhúill et al. (2015), NPWS (2013) and NPWS internal files

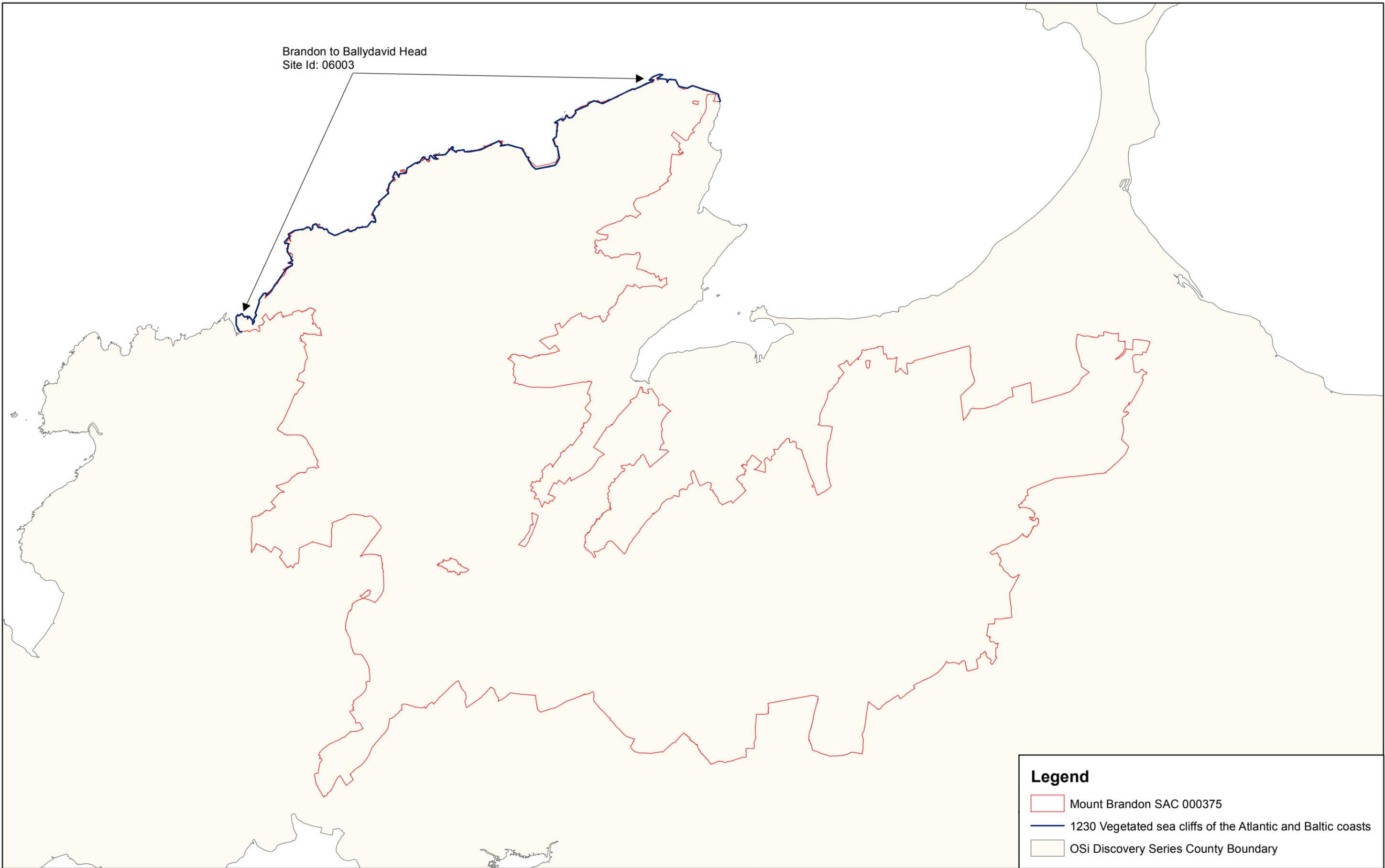




**Legend**

-  Mount Brandon SAC 000375
-  Tralee Bay and Magharees Peninsula, West to Cloghane SAC 002070
-  Dingle Peninsula SPA 004153
-  OSi Discovery Series County Boundary

Brandon to Ballydavid Head  
Site Id: 06003



**Legend**

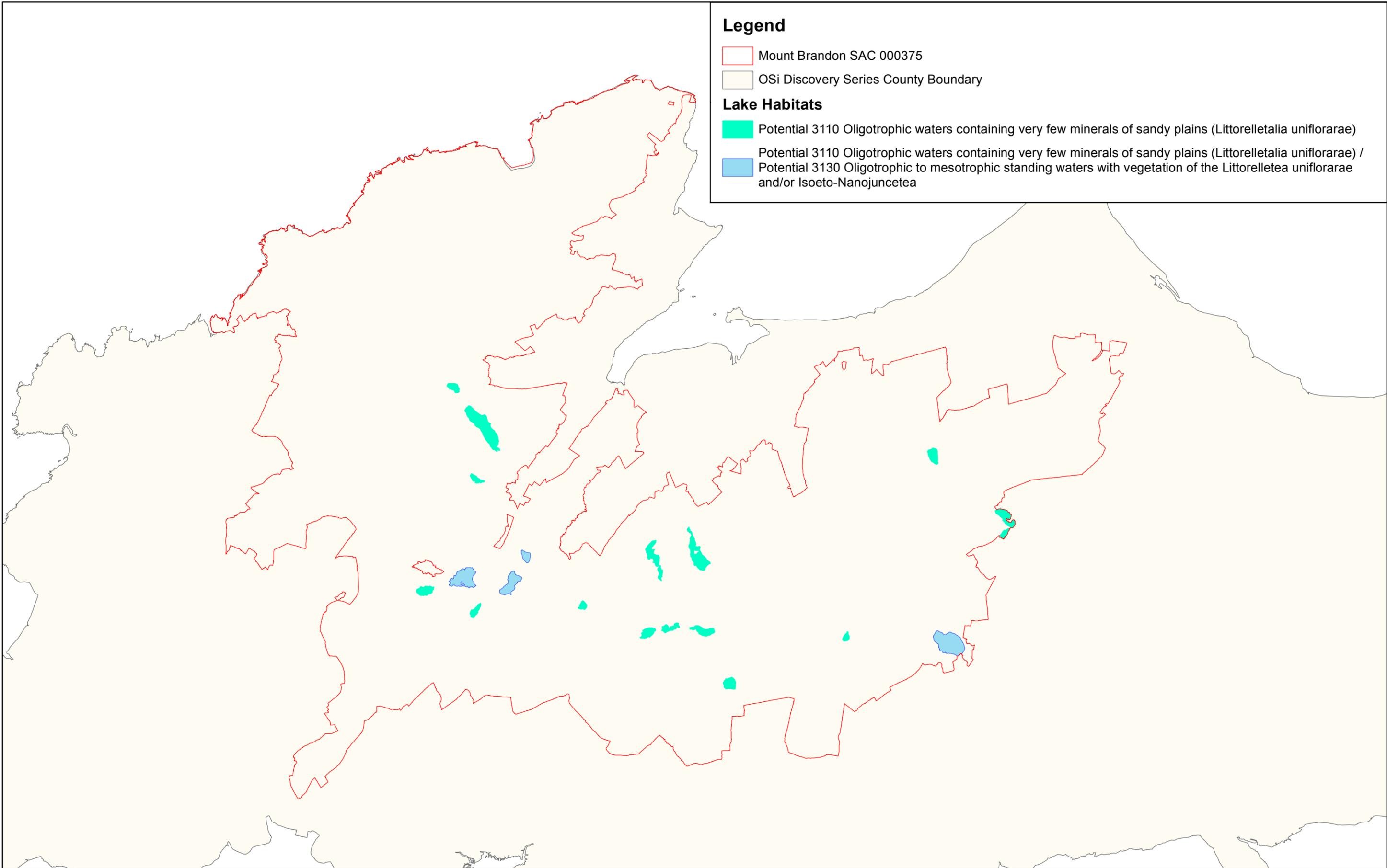
- Mount Brandon SAC 000375
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- OSi Discovery Series County Boundary

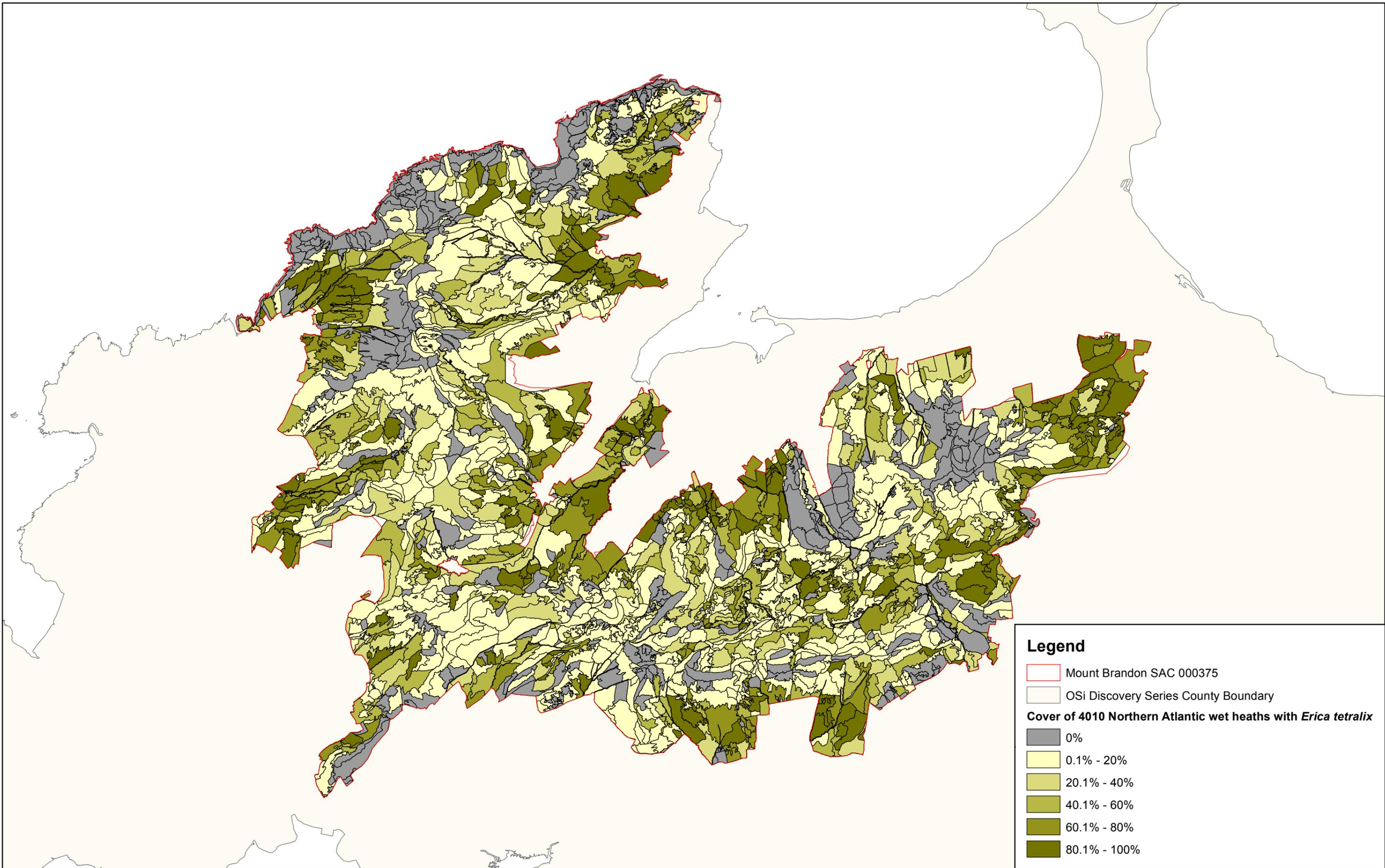
### Legend

-  Mount Brandon SAC 000375
-  OSi Discovery Series County Boundary

### Lake Habitats

-  Potential 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia unifloraræ*)
-  Potential 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea unifloraræ* and/or *Isoeto-Nanojuncetea*



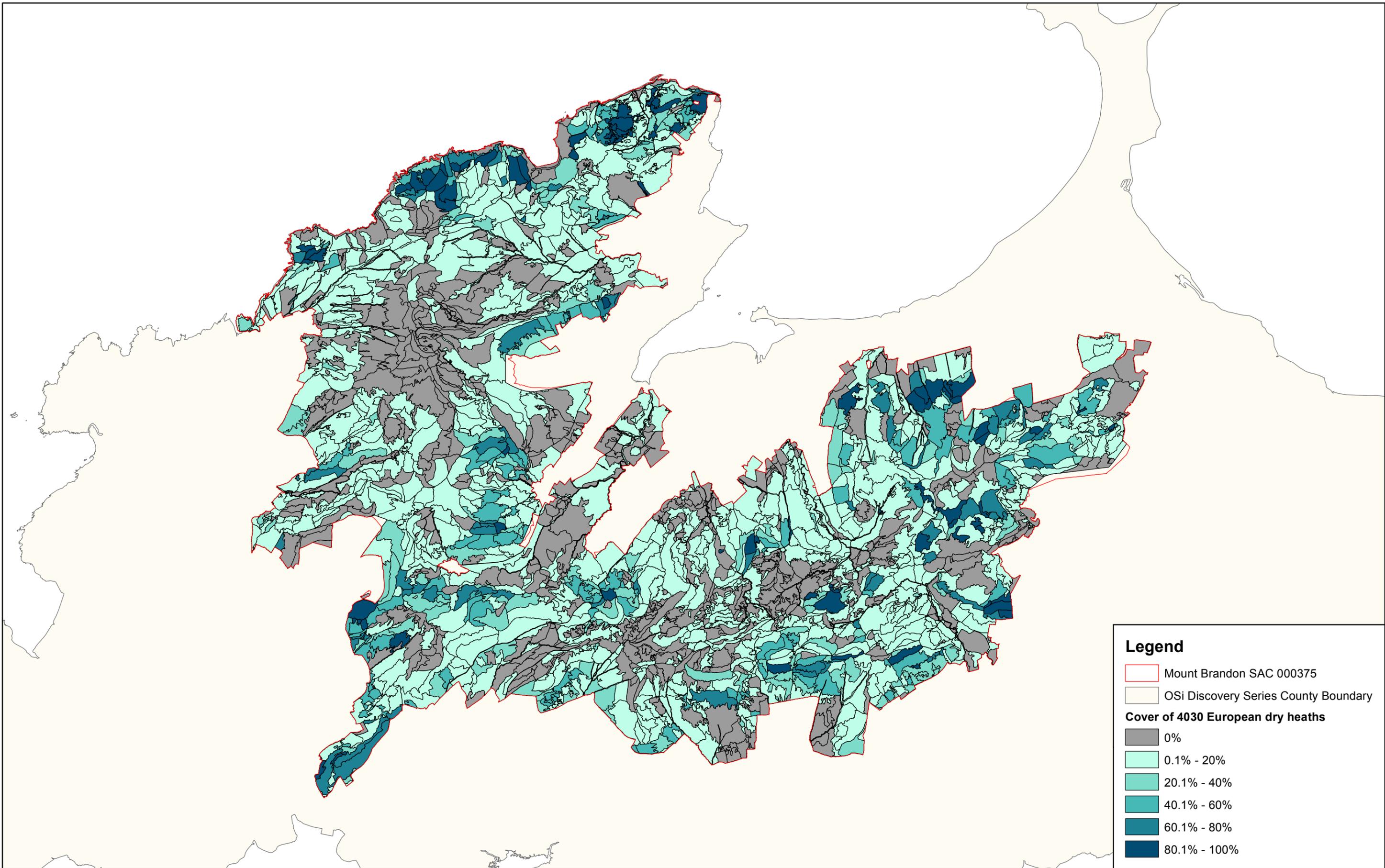


**Legend**

- Mount Brandon SAC 000375
- OSi Discovery Series County Boundary

**Cover of 4010 Northern Atlantic wet heaths with *Erica tetralix***

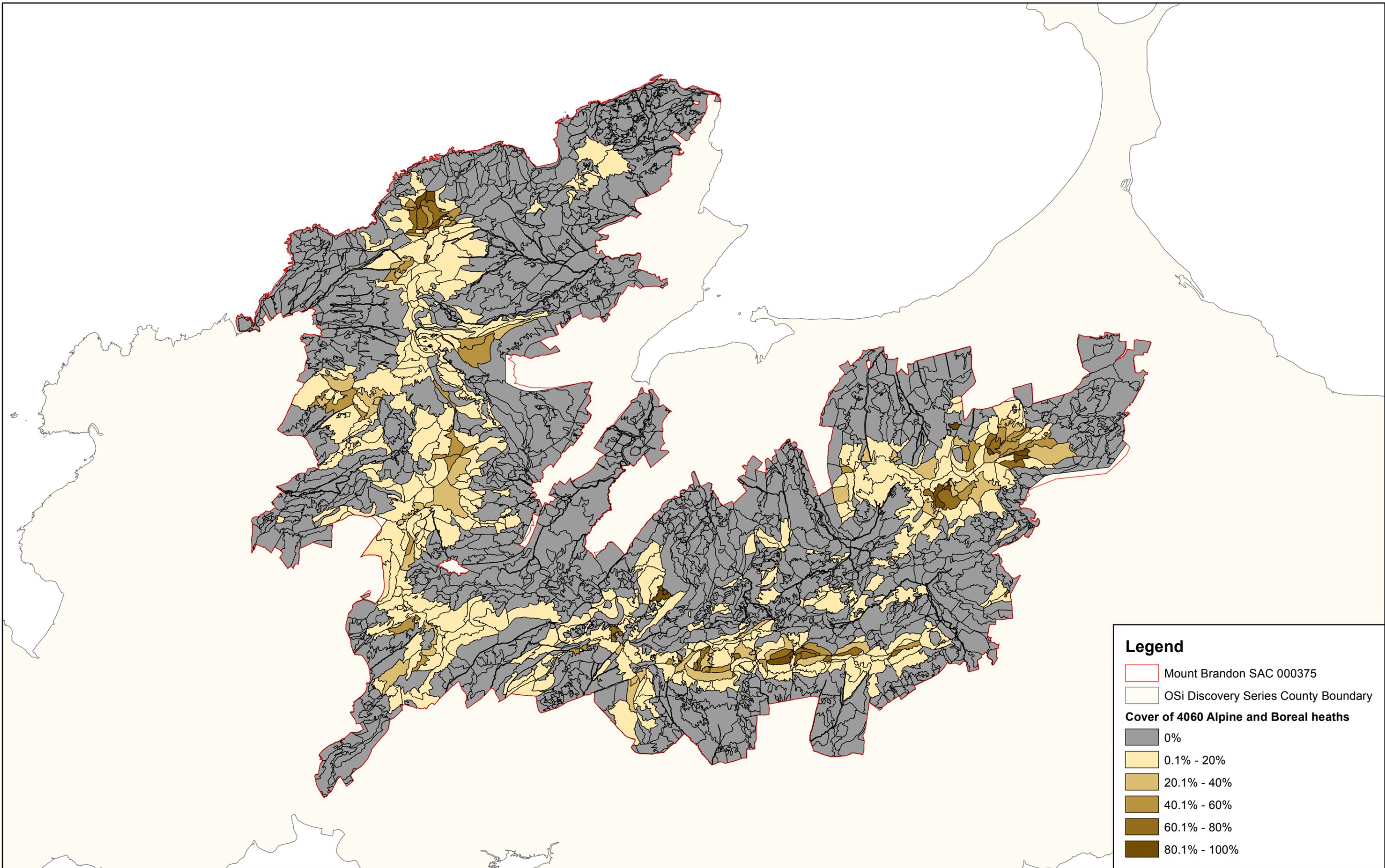
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%



**Legend**

- Mount Brandon SAC 000375
- OSi Discovery Series County Boundary
- Cover of 4030 European dry heaths**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%





**Legend**

- Mount Brandon SAC 000375
- OSi Discovery Series County Boundary

**Cover of 4060 Alpine and Boreal heaths**

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

**Legend**

 Mount Brandon SAC 000375

 OSi Discovery Series County Boundary

**Cover of 6230 \*Species-rich *Nardus* grasslands on siliceous substrates in mountain areas (and submountain areas in continental Europe)**

 0%

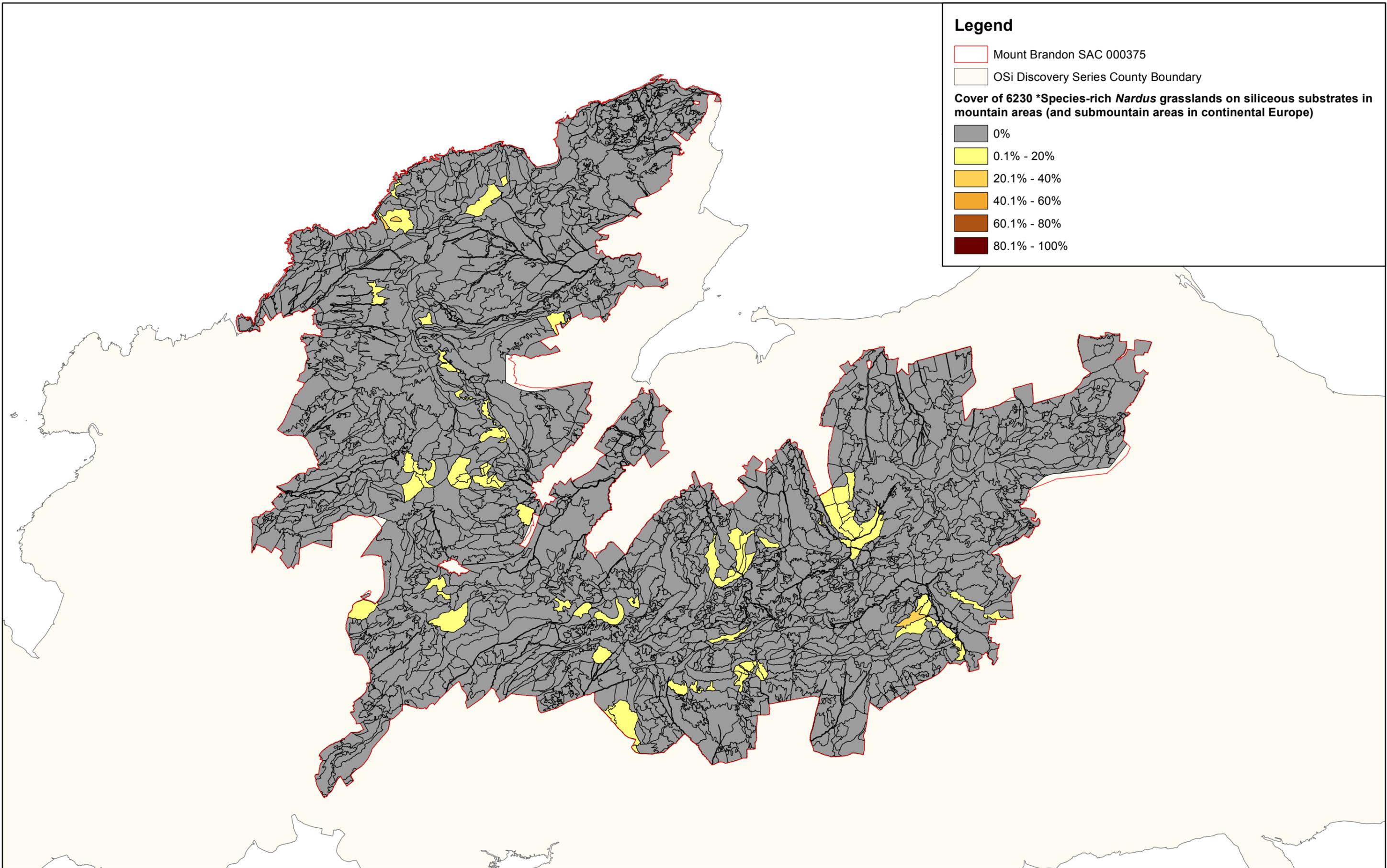
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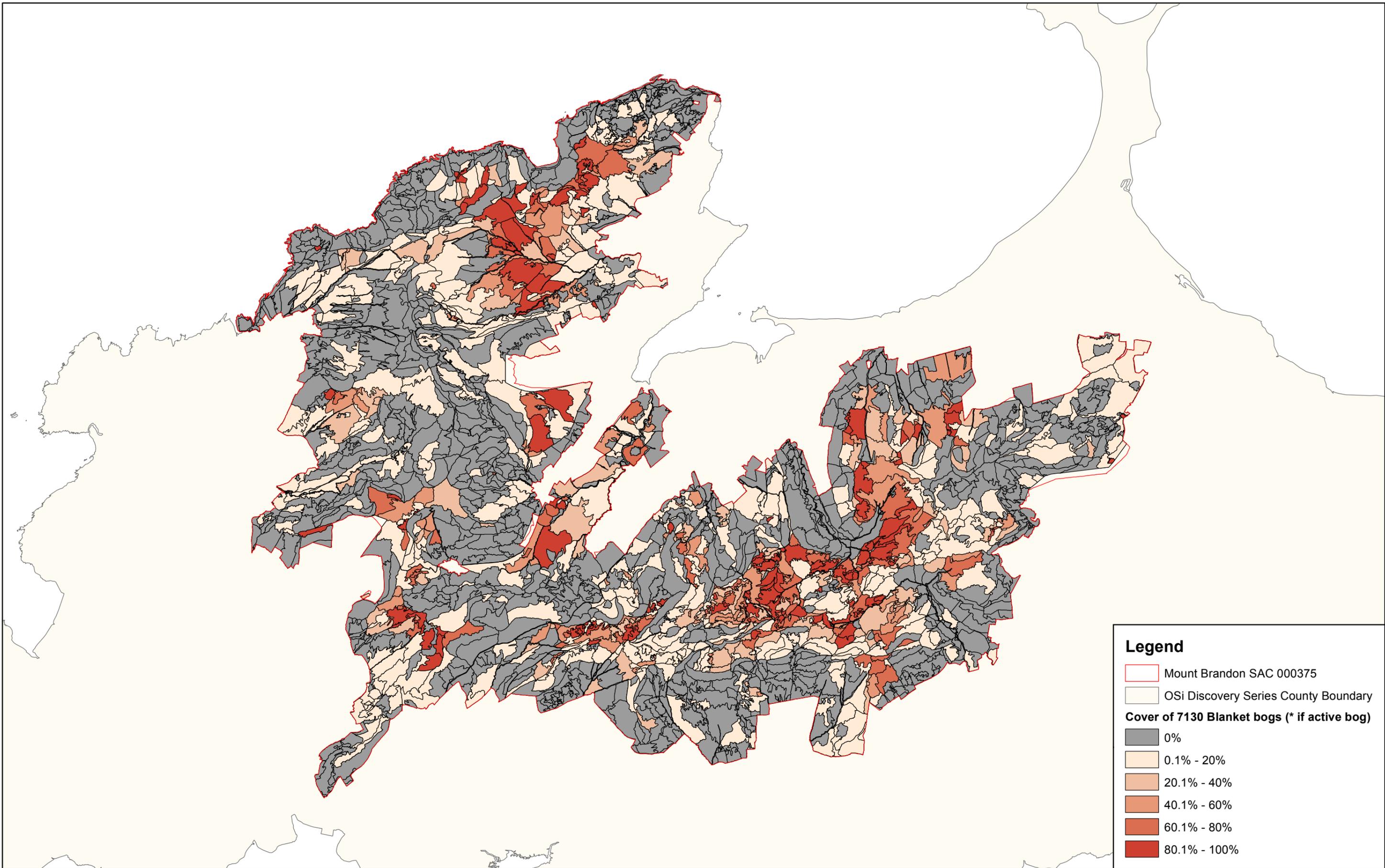
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 40.1% - 60%

 60.1% - 80%

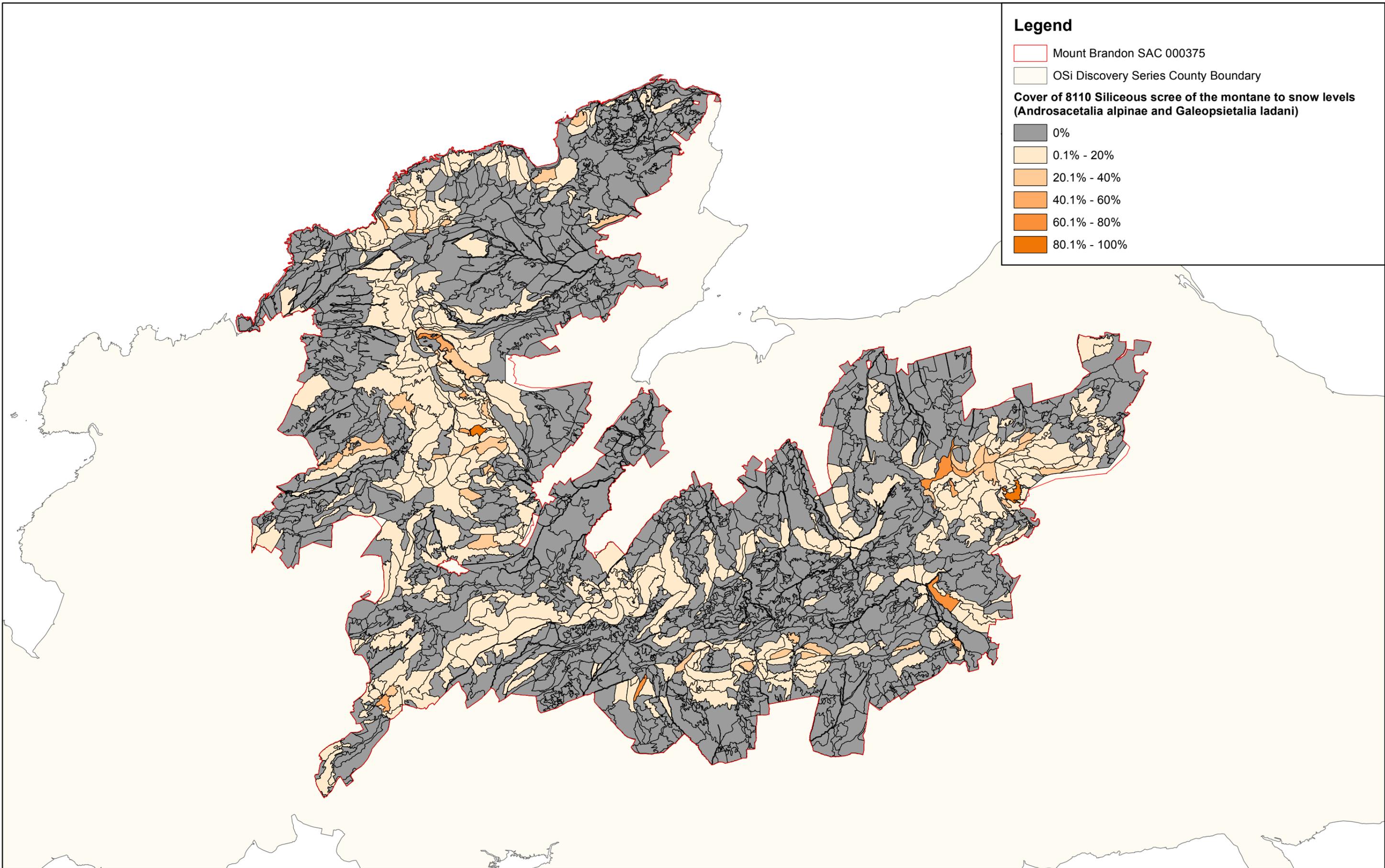
 80.1% - 100%





**Legend**

- Mount Brandon SAC 000375
- OSi Discovery Series County Boundary
- Cover of 7130 Blanket bogs (\* if active bog)**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%



**Legend**

- Mount Brandon SAC 000375
- OSi Discovery Series County Boundary

**Cover of 8110 Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)**

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

**Legend**

 Mount Brandon SAC 000375

 OSi Discovery Series County Boundary

**Cover of 8210 Calcareous rocky slopes with chasmophytic vegetation**

 0%

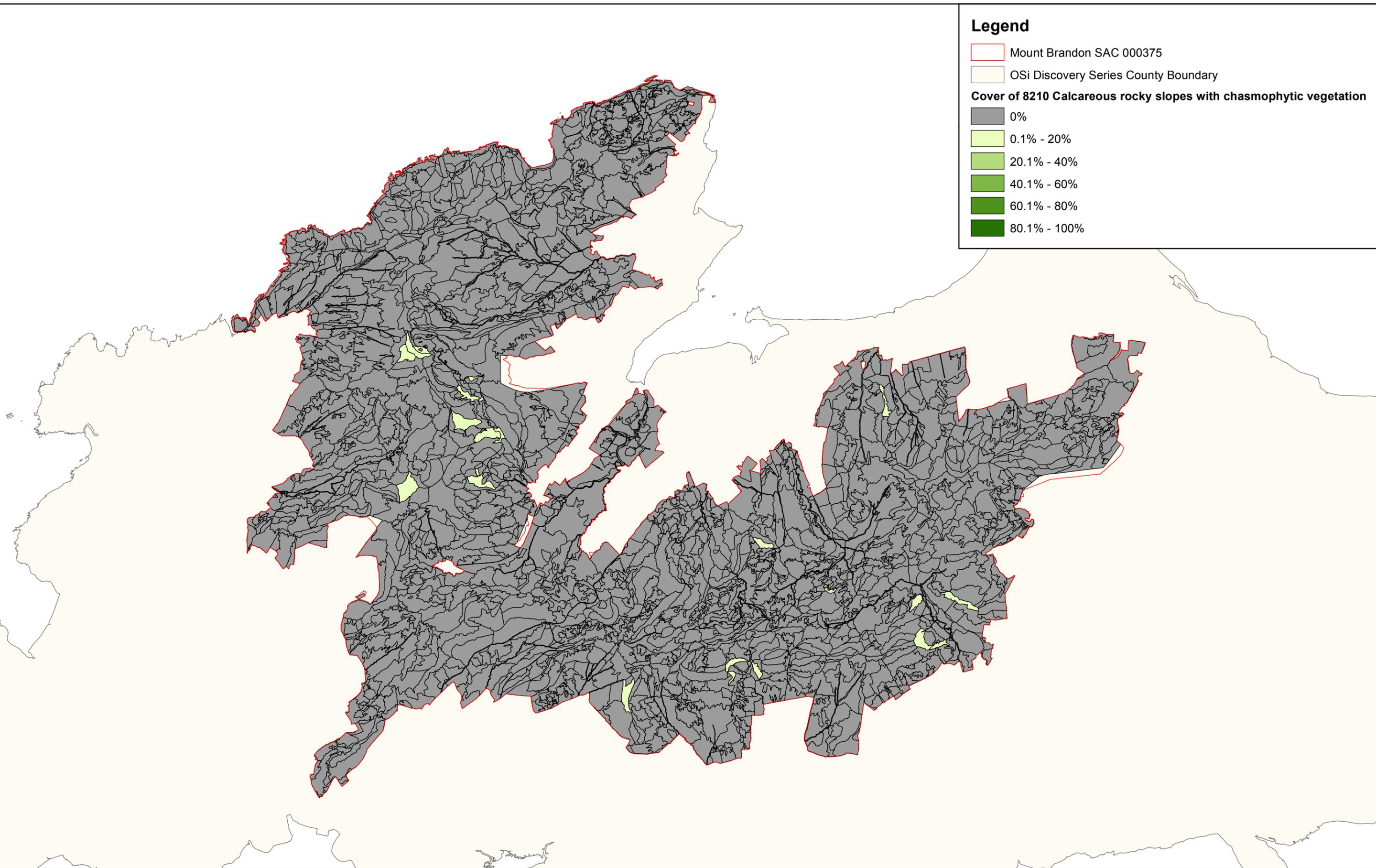
 0.1% - 20%

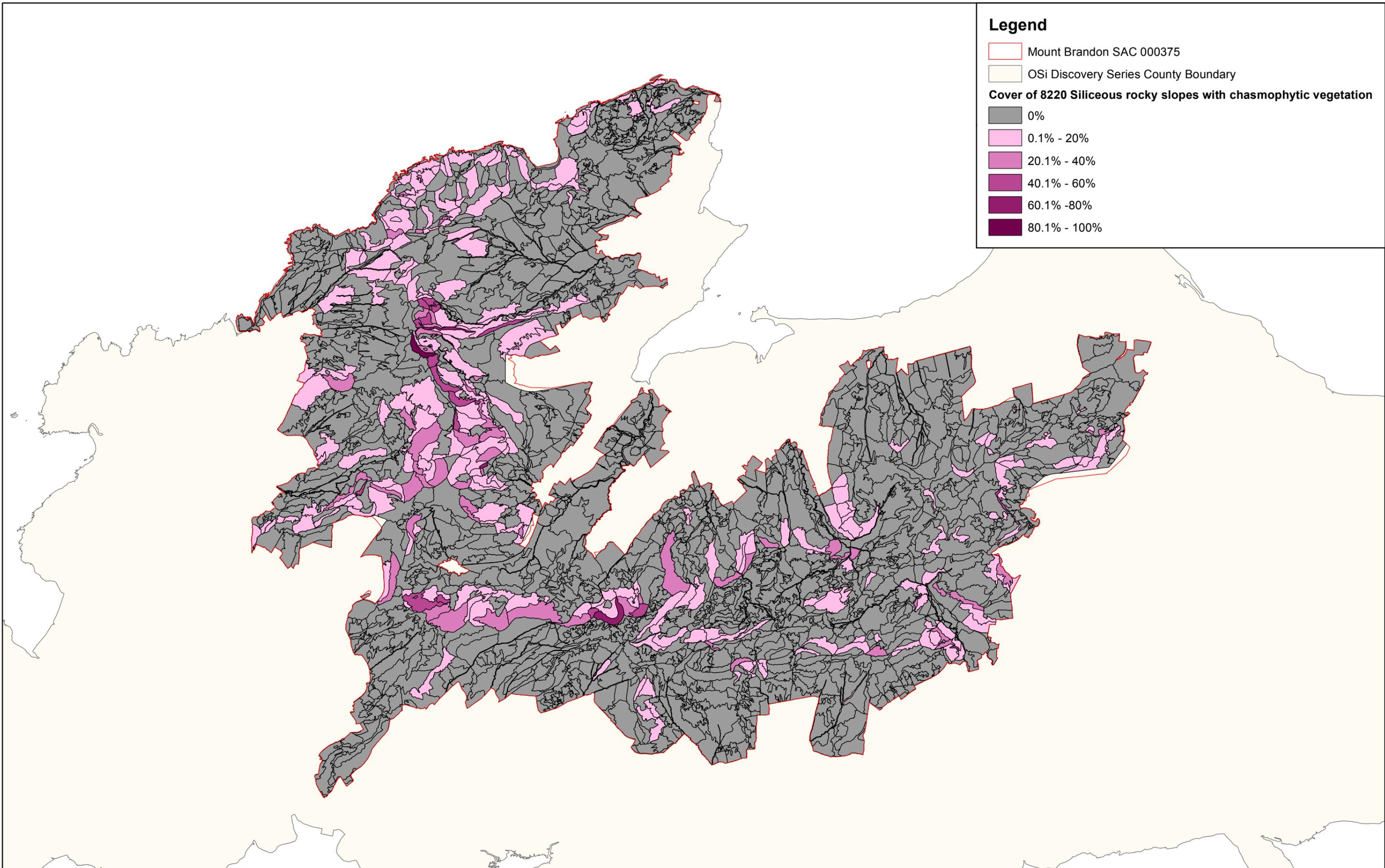
 20.1% - 40%

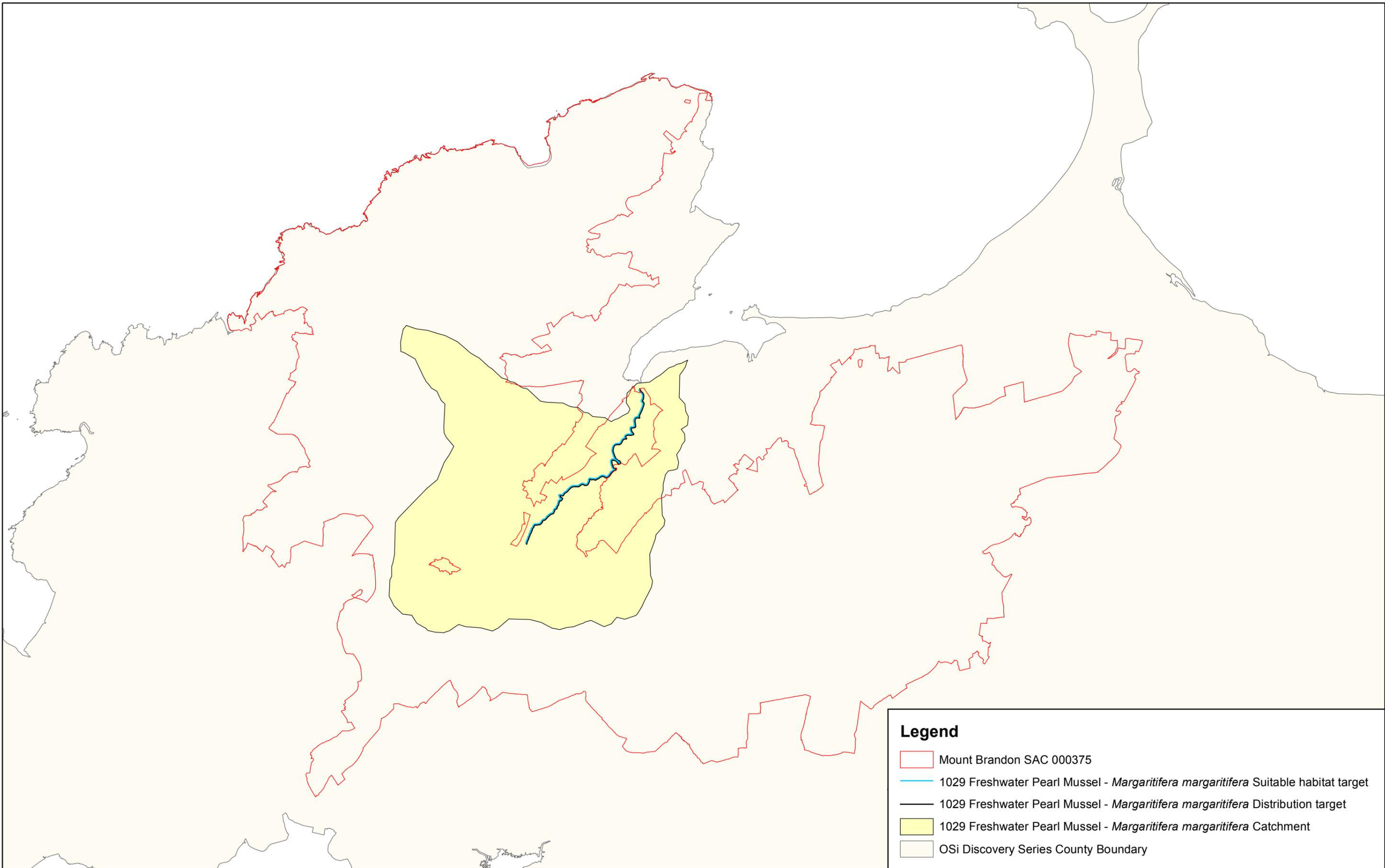
 40.1% - 60%

 60.1% - 80%

 80.1% - 100%







**Legend**

- Mount Brandon SAC 000375
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Suitable habitat target
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Distribution target
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Catchment
- OSi Discovery Series County Boundary