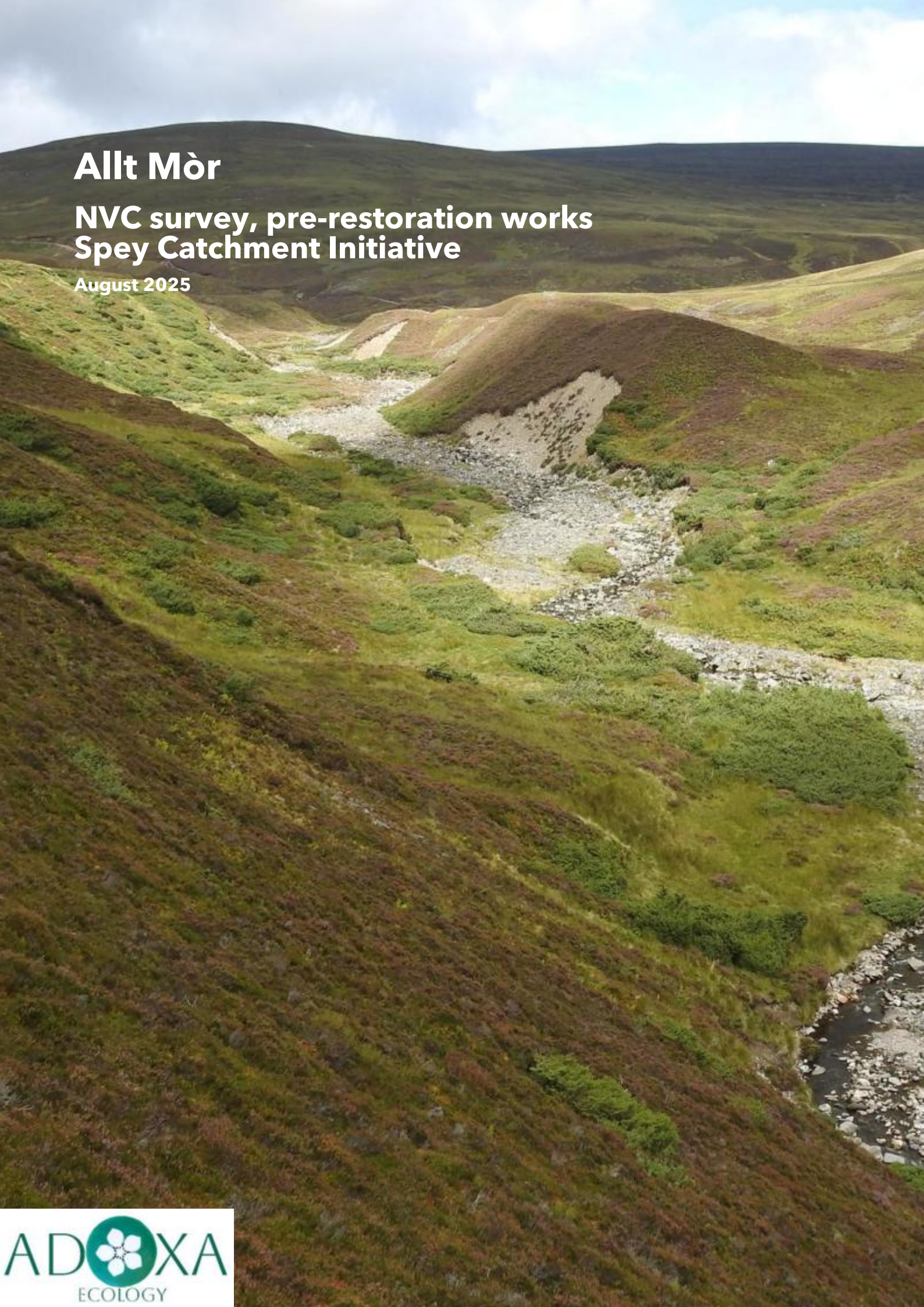


Allt Mòr

NVC survey, pre-restoration works
Spey Catchment Initiative

August 2025

ADOXA ECOLOGY

Contents

Acknowledgements

Thanks go to Ffion Robb at Spey Catchment Initiative for facilitating the work, and to Graham Mabon at Pitmain and Glenbanchor Estate for allowing vehicle access.

1. Context

Ffion Robb (FR) of Spey Catchment Initiative approached Gus Routledge (GR) in June 2025 to enquire about a pre-restoration survey of the Allt Mòr, roughly 4km north-northwest of Kingussie. The Allt Mòr is a highly active upper catchment watercourse with large erosion scars of the steeper banks that have been determined to be unnatural in nature. The combined effects of the natural force of the watercourse and the erosion of these banks have caused localised flooding issues downstream in and around Kingussie and restoration options are being investigated, through a Nature Restoration Fund project, to reduce the rate of erosion of these banks.

GR had already carried out a herbivore impact assessment in April 2025 and so was thought well-placed to carry out further surveys. After some discussion between FR and Sam Jones of Plantlife Scotland, it was decided that either a National Vegetation Classification (NVC) survey of the whole site should be undertaken, or vegetation monitoring plots set up to monitor changes on the site over time. After further discussion between FR and GR, an NVC survey was chosen.

2. Approach

2.1. Field survey

GR felt that the NVC survey needed to be reasonably fine scale in order to pick up on smaller patches of different vegetation communities to allow for a more accurate comparison to be made in the future. This meant mapping polygons and assigning NVC community codes whilst in the field rather than mapping polygons at the desk and assigning them in the field. In order to do this, a Quantum Geographical Information System (QGIS) project was created allowing the drawing of polygons (for NVC communities) and placement of points (target notes) over either an Ordnance Survey 1:25,000 scale map, or aerial imagery. This was then converted to a QField project to allow the surveyor to view and edit the project in the field on a Samsung Galaxy Tab Active 2.

Polygons were drawn as the surveyor covered the ground, walking across and/or around areas of apparently homogenous vegetation that could then be assigned an NVC community. This was done using the surveyor's understanding of these communities from working across the Scottish uplands rather than using quadrats in each community to ascertain their identity. This allowed for much quicker coverage of the ground whereas using quadrats would have likely increased the amount of time required roughly fivefold. Notes were, however, taken in the field for each community to make it easier to recall and describe them when reporting.

Equipment

- Galaxy Samsung Tab Active 2
- Garmin GPSMap66S
- Nikon Coolpix P900

2.2. Desk-based work

The QField project was synchronised back with the original QGIS project once completed, allowing for investigation and interpretation of the results. As mentioned above, all NVC communities were assigned in the field, but some were altered after referring to literature (Rodwell *et al.,* 1998; Rodwell *et al.*, 1998b; Rodwell *et al.*, 1998c; Averis *et al.*, 2014) and comparing this with the vegetation composition of the communities recorded.

Once NVC communities had been assigned to all polygons, maps were created using different colours for each community, with mire communities broadly blue in colour, heath communities broadly yellow/beige, grassland communities red, and woodland communities green. Colours were chosen to be colourblind accessible whilst also being divergent enough to allow for clear demarcation between communities.

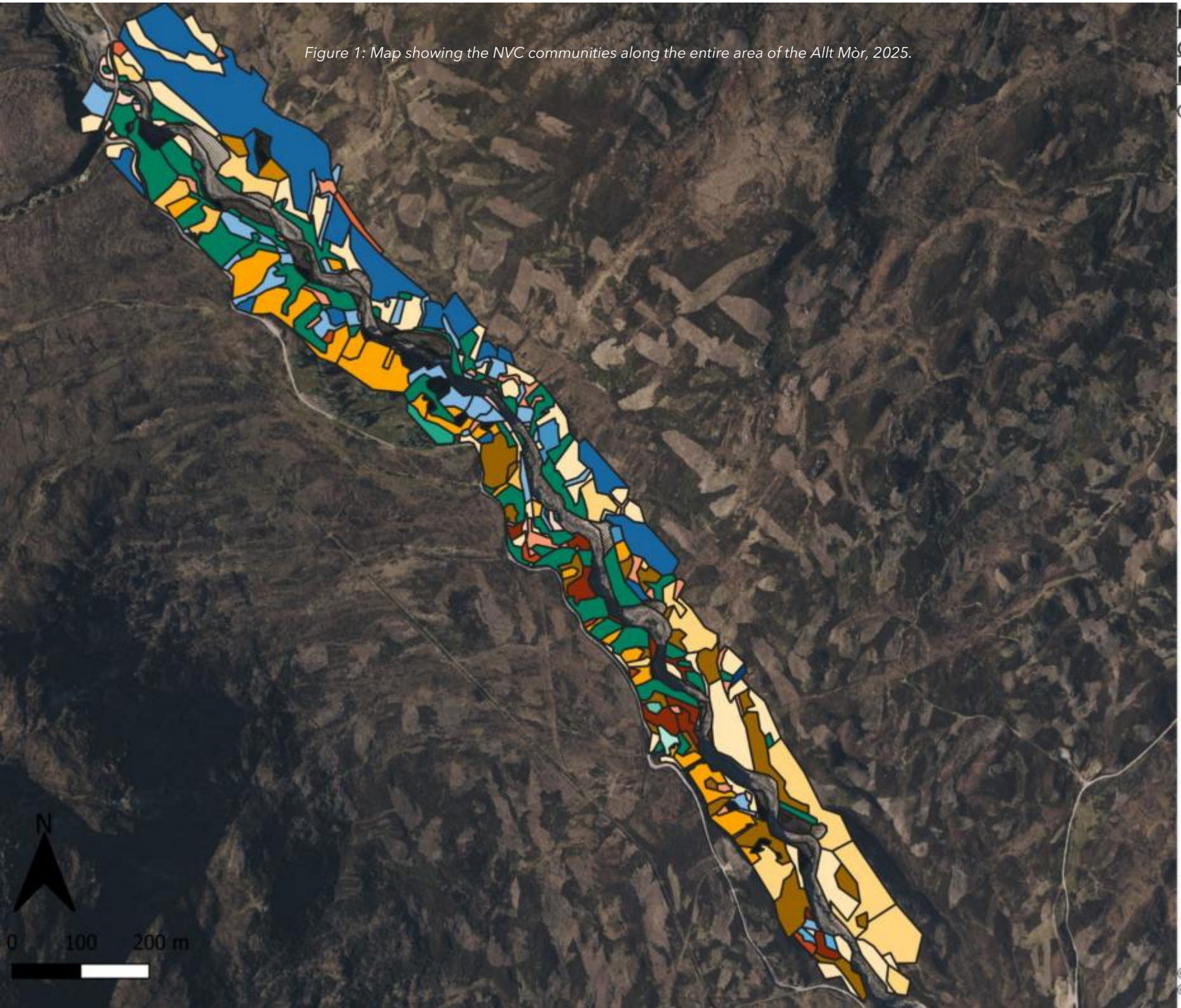
2.3. Survey details

The survey was conducted from the 25th to the 28th August 2025. The weather was often bright and dry, with just a little drizzle and low cloud on one day, but nothing to impact survey results. GR started at the upstream end of the area, just upstream of where the track crosses the bridge from the southwest to the northeast side of the Allt Mòr, and worked downstream from here, working through a section of one side before crossing back and working down the other side to match up the coverage on both sides. GR did contact FR part way through the first day of survey after realising that it was going to take longer than quoted to cover the target area, so an extra third day was added on at this point.

3. Results

The survey resulted in 336 separate polygons across the site covering nearly 27ha. 21 NVC communities were identified across the site, plus areas of scree, landslip and riverbed shingle.

Figure 1: Map showing the NVC communities along the entire area of the Allt Mòr, 2025.



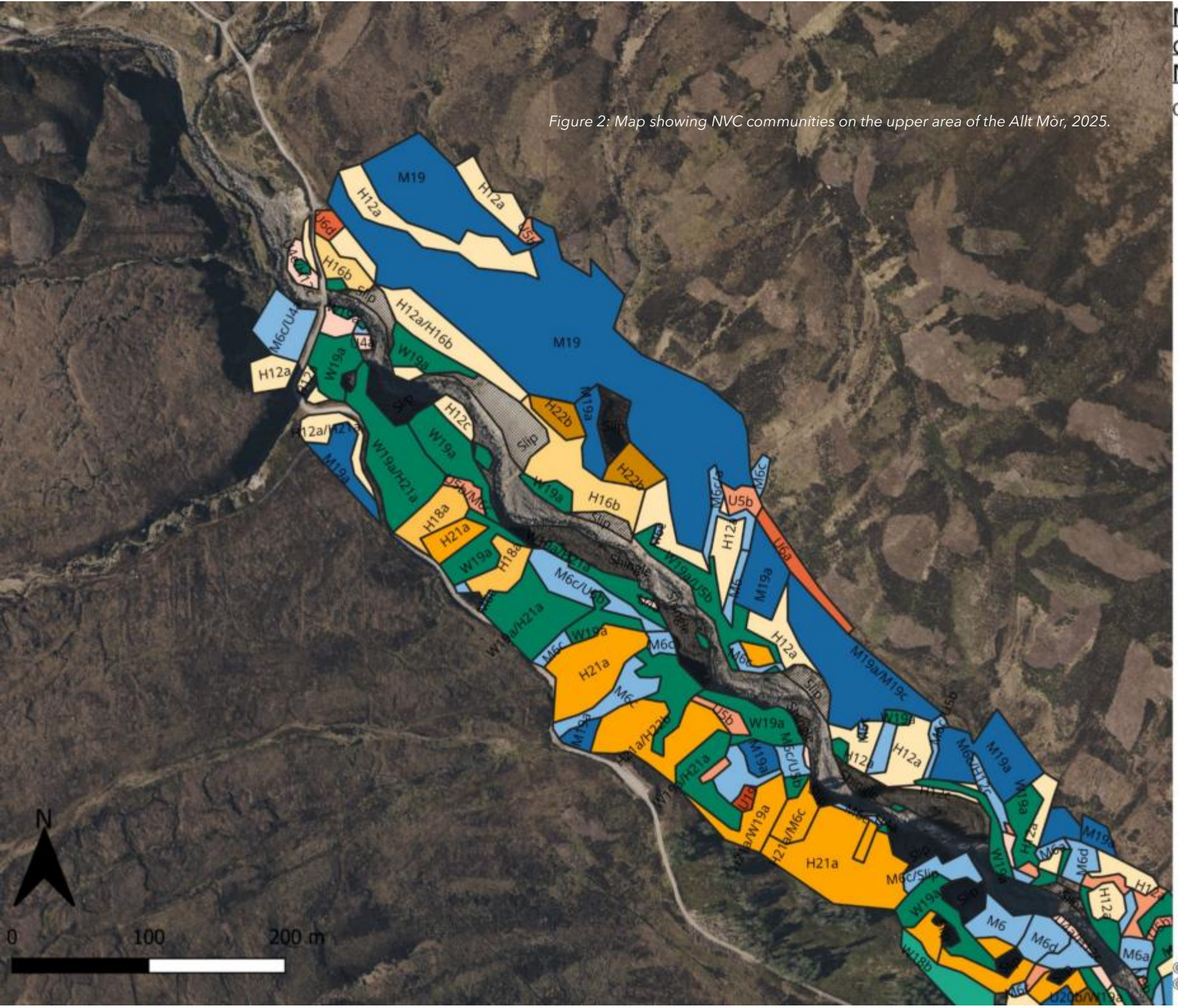


Figure 2: Map showing NVC communities on the upper area of the Allt Mòr, 2025.

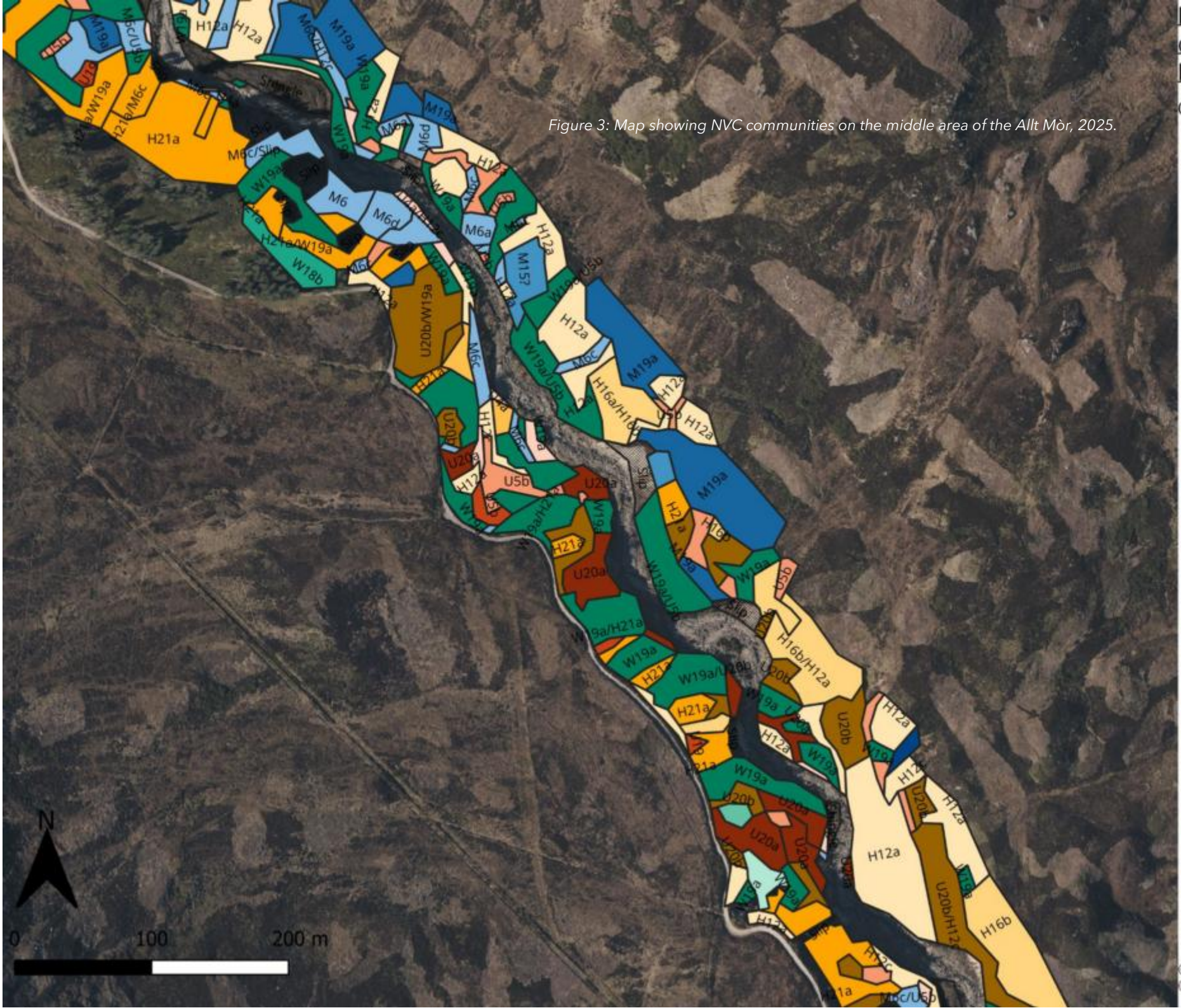


Figure 3: Map showing NVC communities on the middle area of the Allt Mòr, 2025.

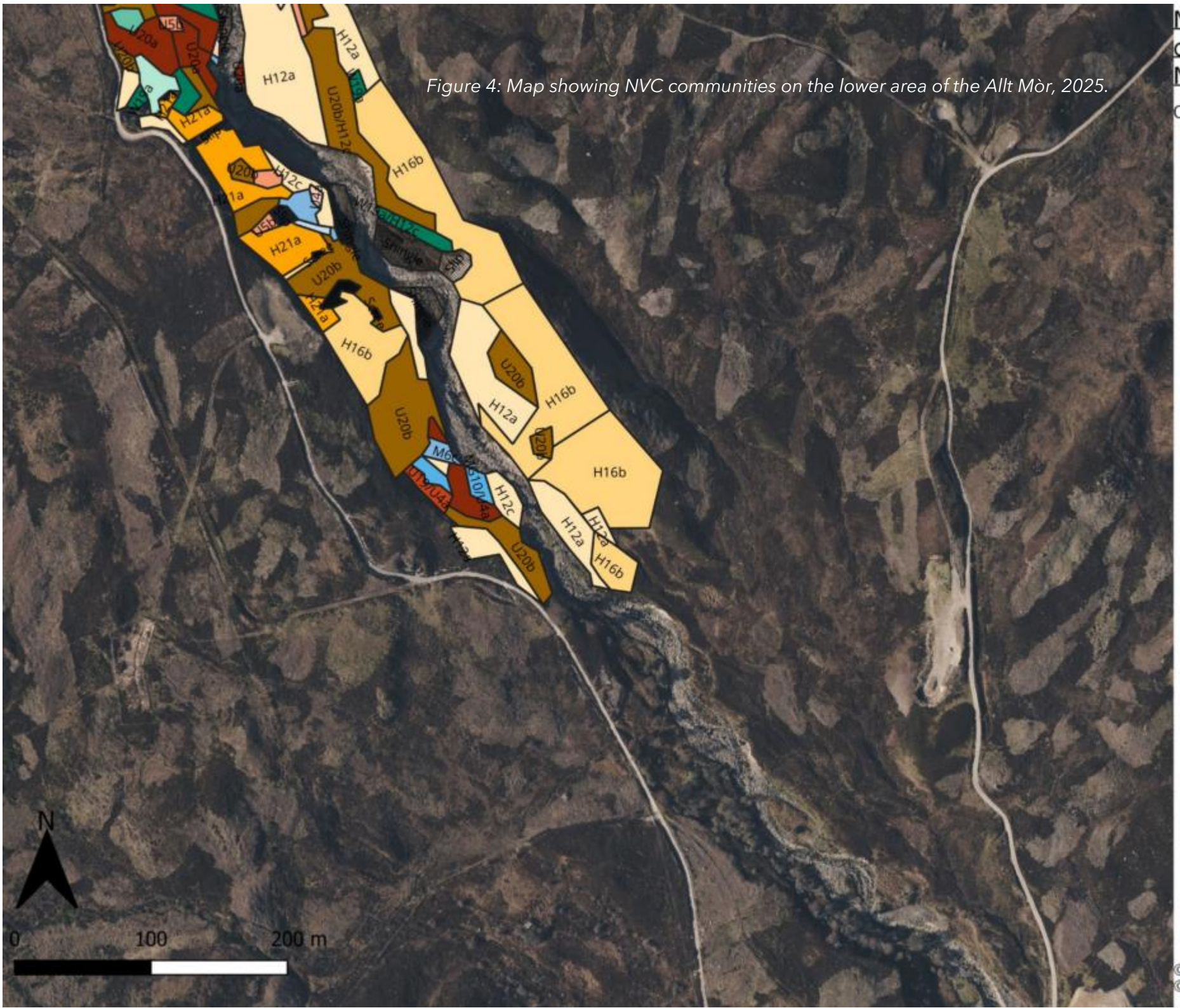


Figure 4: Map showing NVC communities on the lower area of the Allt Mòr, 2025.

Map of NVC communities on the Allt Mòr, lower area

Colourblind accessible version

Legend

Allt Mor NVC communities

- M5
- M6
- M10
- M15
- M19
- MG10
- H12
- H16
- H18
- H21
- H22
- U20b
- U4
- U5
- U6
- U19
- U20a
- W11
- W17
- W18
- W19
- Slip
- Scree
- Shingle

3.1. NVC community accounts

Below are short accounts of each of the NVC communities briefly describing their vegetation composition, occurrence across the site, and the potential outcome of ongoing land management.

M5 Bottle sedge – *Sphagnum squarrosum* mire

This community is only represented by a very small area on the southwest side of the burn, near the southern end of the site. What sets this community apart from others is the occurrence of mildly base-tolerate *Sphagnum* mosses including *Sphagnum squarrosum* though otherwise this is a poor representation of the community, more resembling M6c star sedge – *Sphagnum* mire with soft rush *Juncus effusus* and sharp-flowered rush *Juncus acutiflorus* rather than bottle sedge *Carex rostrata*. Whilst small, it represents an interesting element in the mires and flushes represented across the site and adds to the overall diversity of habitats on the site.

M6 star sedge – *Sphagnum fallax* mire

This is one of the more dominant mire communities on the site with representation particularly in the mid-to-upper section. It occurs on gentle to moderate slopes as well as along more level ground where water flushes through the vegetation from above, making it a sort of poor fen. It is typified by one of a range of dominant graminoids with a carpet beneath of bryophytes typical of moderately though continually wet ground, namely *Polytrichum commune*, *Sphagnum fallax* and *Sphagnum palustre*. Subcommunities are denoted by the dominant graminoid and three subcommunities were found on the site: M6a star sedge *Carex echinata* subcommunity, M6c soft rush subcommunity, and M6d sharp-flowered rush subcommunity. Set amongst this matrix of *Sphagnum, Polytrichum*, sedges and rushes are small grasses and herbs such as common bent *Agrostis capillaris*, heath wood-rush *Luzula multiflora* and tormentil *Potentilla erecta*. This community is a groundwater dependent community and thus would be susceptible to loss if the water table or aquifer is disturbed.

M10 carnation sedge – butterwort flush

Figure 5: Grass-of-Parnassus in M10 flush.

This is another community of flushed slopes though perhaps of slightly steeper ground than that of M6. It was only recorded from one small polygon but its contribution to the diversity of species in the area it occupied was significant. Here, the M10a common yellow-sedge *Carex demissa* – bulbous rush *Juncus bulbosus* subcommunity is noticeable from its shorter sward made up of carnation sedge *Carex panicea*, common yellow-sedge and star sedge. These are scattered with a range of herbs including butterwort *Pinguicula vulgaris*, grass-of-parnassus *Parnassia palustris* and cross-leaved heath *Erica tetralix*. Beneath these vascular plants are so-called 'brown mosses', mostly *Calliergonella cuspidata* and *Campylium stellatum*. These flushes often occur in locations where the flow of groundwater is relatively constant and at least a little base-enriched, setting it apart from the generally acidic ground in the area. Again, it is

groundwater dependent and disturbance of the aquifer may result in the loss of this community.

M15 deergrass – cross-leaved heath wet heath

A highly variable community that occurs in a range of situations in Scotland but along the Allt Mòr was specific to poor-draining slopes on the northeast side of the burn. Its most obvious constituent here was cross-leaved heath that almost totally dominates over a carpet of *Sphagnum* on old, revegetated landslips on the upper slope. Deergrass *Trichophorum germanicum* was present but in low quantity. Other than these two dominants, tormentil trailed over and through the vegetation whilst bog asphodel *Narthecium ossifragum* punctured the *Sphagnum* carpet. It was not assigned to a specific subcommunity, and if deergrass was not present then this vegetation could have been assigned to a very poor M10 community. It appears to be a stage in recolonisation of a heathland community where small, shallow landslips have occurred but the ground is damp; perhaps it will mature into an H21 heath given the proximity of one of the M15 polygons to an H21a polygon.

M19 heather – hare's-tail cottongrass blanket bog

This is the only blanket bog community recorded on the site, occurring on level or very gently sloping ground where rainwater does not drain freely away, almost exclusively above the slopes leading down to the allt. The largest polygon on the site is an area of M19 covering nearly 2ha at the northern end of the site, above some of the largest landslips on the northeast bank, occupying level plateaux and small valleys, as this community does in other parts of the site. These bogs have a distinctive pattern to them with a grey-green matrix of hare's-tail cottongrass *Eriophorum vaginatum* dotted with the brown, bushy shrubs of heather *Calluna vulgaris* and the grey, upright shrubs of cross-leaved heath. Closer inspection amongst the hummocks and shrubs reveal carpets of *Sphagnum rubellum* (sometimes *Sphagnum fallax*) and pleurocarpous mosses such as *Hylocomium splendens* and *Pleurozium schreberi*. In some of the more continuous areas the broad leaves of cloudberry *Rubus chamaemorus* are scattered across the *Sphagnum*, and in other areas more dwarf shrubs are present including blaeberry *Vaccinium myrtillus* and cowberry *Vaccinium vitis-idaea*. These heathier areas fit into the M19c cowberry – *Hylocomium splendens* subcommunity, whereas the rest of these blanket bogs fit the standard M19a cross-leaved heath subcommunity.

This vegetation forms over areas of shallow or deep peat and so is indicative of sensitive peatland habitats that, if disturbed, would result in the loss of much carbon and could be severely damaged by drainage, if the result is the drying out of the peatland.

MG10 Yorkshire-fog – soft rush pasture

This is one of several communities typified by the presence of soft rush, however this is probably the driest of them. Whilst soft rush is very obvious in the sward, roughly the other half is taken up by a species-poor mix of grasses and a few herbs including Yorkshire-fog *Holcus lanatus*, creeping bent *Agrostis stolonifera* and white clover *Trifolium repens*. This is generally a community of moist soils in grazed pasture and is thus not very common along the Allt Mòr, occurring in just two polygons that are separated by a single polygon in the lower reaches of the surveyed area, on a small, flat, open "shelf" above the

main watercourse but below the slopes of the gorge. It is likely to be a result of grazing by sheep in particular, and may shift to a richer or heathier community if this is ceased.

H12 heather – blaeberry heath

These heathlands make up a larger proportion of the heaths across the site, often occupying drier, freely draining ground and subject to muirburn for driven grouse moorland management. They are scattered along the length of the surveyed area but are mostly on the northeast side of the burn, where the sun and wind create drier conditions than on the other, north-facing side of the burn. They are dominated by heather and blaeberry to varying degrees, depending on grazing level and whether the area has been burnt. Some areas were recently burnt and so held very little vegetation other than the charred remains of the dwarf shrubs and pleurocarpous mosses.

The less species rich, typical subcommunity H12a is most widespread and has little in it other than the typical dwarf shrubs and mosses *Hypnum jutlanticum*, *Hylocomium splendens* and *Pleurozium schreberi*, with cowberry and tormentil occasionally contributing to its make-up. The community does also frequently blend with the H16 heather – bearberry heath. The grassier H16c heath bedstraw – sheep's fescue subcommunity often occurs on more level ground such as along the burn above the usual highwater mark where grazing has reduced the dominance of dwarf shrubs and forms what is basically a mosaic of heathland and U4 grassland with sheep's fescue *Festuca ovina*, sweet vernal grass *Anthoxanthum odoratum* and heath bedstraw *Galium saxatile*.

These heathlands are widespread in the area but, whilst they do contribute to the overall diversity of habitats, do not contribute much in terms of overall diversity on the site. They are species-poor and would naturally succeed into richer, probably scrubby or wooded habitats. Juniper *Juniperus communis* frequently occurs as occasional bushes through the H12 heaths hinting at the potential for the spread of W19 juniper scrub on the site, which holds a greater diversity of plants beneath its canopy.

H16 heather – bearberry heath

Similar to the H12 heaths, this is a heathland dominated by heather but beneath this grows the dark green, leathery-leaved trailing dwarf shrub, bearberry *Arctostaphylos uva-ursi*, which favours thinner, more freely draining soils, these often being quite stony. The slightly sparser heather canopy allows for the bearberry to sometimes rival it for dominance but more often the heather presides over the bearberry at a rough ratio of 4 to1. Bell heather *Erica cinerea* also prefers these drier soils. The community is almost entirely restricted to the warmer, drier, south-facing side of the burn apart from a few drier ridges on the southwest side.

Most of the heath is difficult to pick out from amongst the H12 heath due to the prominence of the heather without actually walking through it to see the bearberry, and here the vegetation fits into the H16b blaeberry – cowberry subcommunity, where bearberry fits in amongst other dwarf shrubs. In some areas, however, the vegetation is richer with scattered grasses herbs providing some interest, including sheep's fescue, wavy hair-grass *Avenella flexuosa*, bitter-vetch *Lathyrus linifolius* and bird's-foot trefoil *Lotus corniculatus* as well as the Scottish Biodiversity List species, intermediate wintergreen *Pyrola media*. This latter plant was found to be quite numerous in some areas of the H16 heath where it fits the H16a intermediate wintergreen – bitter-vetch subcommunity. This vegetation likely benefits somewhat from the burning which extends its occurrence away from the steeper slopes and on to thin, dry soils on level ground above the gorge.

Figure 6: A rosette of intermediate wintergreen amongst bearberry heath.

H18 blaeberry – wavy hair-grass heath

This is a greener heath, generally lacking the brown heather shrubs and instead made up of a mossy, grassy sward dotted through with either sprigs or larger shrubs of blaeberry and cowberry. These sprigs are set amongst wavy hair-grass, mat-grass *Nardus stricta* and heath bedstraw as well as spongy carpets of acidophilous pleurocarpous mosses. It is not widespread on the site and seems to occupy slightly more heavily-grazed patches amongst H21 heath or W19 juniper scrub.

H21 heather – blaeberry – *Sphagnum* heath

From a distance one may assume these heaths to be the same as the H12 heaths with the tall, dark shrubs of heather apparently dominating and interspersed with a few other species, but bright red patches of *Sphagnum rubellum* stand out even when viewed from the other side of the gorge. Closer inspection reveals the heather to often be less dense and more continuous, instead, is a rich tapestry of *Sphagnum rubellum, Sphagnum fallax* and sometimes *Sphagnum russowii* and *Sphagnum girgensohnii*. Other dwarf shrubs also occur with blaeberry, cowberry and crowberry *Empetrum nigrum* all adding their own shade of green to the vegetation. Hard fern *Blechnum spicant* and lesser twayblade *Neottia cordata* are also occasional-to-frequent, though the latter a difficult species to spot due to its diminutive size. Grasses are not common.

This community, with its strong *Sphagnum* element, is almost entirely restricted to the shady, north-facing slopes of the gorge where it takes the place of H12 in being the dominant heathland community. It frequently blends with other communities including W19 juniper scrub and the U19 lemon-scented fern – hard fern community. Its reliance on damp conditions means it is neither as easy to burn as H12 nor would it benefit from such management. All of the H21 along the Allt Mòr fits the H21a heather – bracken

subcommunity, though very occasional small patches of leafy liverworts including *Mylia taylorii*, *Anastrepta orcadensis* and *Orthocaulis floerkei* do hint at a slightly oceanic element (not strong enough to qualify as the H21b subcommunity) and add to the overall diversity of the site.

Figure 7: Sphagnum russowii *and* Sphagnum fallax *in H21 heath.*

H22 blaeberry – cloudberry heath

These heaths are similar to the H21 heather – blaeberry – *Sphagnum* heaths in that they are a mix of dwarf shrubs over moist bryophytes, but this community is more northern in its character. Heather is often not quite so dominant, with blaeberry and crowberry more prominent, and cloudberry is most prevalent here, other than where it occurs in the M19 blanket bog. H22 heath and M19 bog communities do occur in close association on the site, with just a couple of small polygons of the H22 heath on steeper, north-facing slopes above blanket bog towards the upper end of the site. The bryophyte carpet does include *Sphagnum* though mostly dense hummocks of *Sphagnum capillifolium* and equally prominent are *Hylocomium splendens, Dicranum scoparium, Rhytidiadelphus loreus* and *Plagiothecium undulatum*. This community is likely more prevalent at higher altitudes away from the Allt Mòr, being a more montane/northern vegetation type.

U20b bracken – heath bedstraw, heathy subcommunity

Although NVC communities denoted by a "U" generally mean upland communities not including heaths, with are denoted by an "H", this subcommunity is a very heathy one and often intergrades with heathland communities so it was deemed appropriate to include it here, alongside other heathland communities.

Obviously, one of the most prominent aspects of this vegetation is the bracken *Pteridium aquilinum* which stands tall over almost every other plant and is obvious from a distance. The U20b blaeberry – *Dicranum scoparium* subcommunity is the heathier bracken community where the tall fronds of the bracken sit above what can be quite a variable heathland community. Sometimes it is very heather dominated, as the H12 heath community. Other times it is more akin to a grassy H18 heath with short sprigs of blaeberry poking through a low sward of grasses. This can largely depend on grazing levels but also just depends on where the bracken has established. This community is most frequent in the lower sections of the survey area where it often occurs in complex mosaics with other heathland communities or W19 juniper scrub.

U4 sheep's fescue – common bent – heath bedstraw grassland

This is the acid grassland that can cover vast areas of the Scottish uplands where a long history of grazing, mostly by sheep, has created a sward of fine-leaved grasses including sheep's fescue, common bent, velvet bent *Agrostis canina* and sweet vernal grass, with a scattering of small herbs including heath bedstraw, tormentil and ribwort plantain *Plantago lanceolata*. Here, however, the community does not cover vast tracts and is instead very much a marginal vegetation type, occurring on the drier raised banks below the slopes of the gorge where sheep pass through frequently, grazing as they go. It is the typical subcommunity, U4a, that is found on the site, other than a single polygon near the bridge where the U4 grassland intermixes with H12 heath, and thus forms the heathier U4e blaeberry – wavy hair-grass subcommunity. Reduced grazing would reduce this community's presence as ericaceous shrubs re-established or, alternatively, increased grazing could increase the coverage of this community though this could also favour the establishment of bracken, resulting in more U20a.

U5 mat-grass – heath bedstraw grassland

This is a community that covers quite a wide range of points on a spectrum of grassland. Firstly, the U5b velvet bent – *Polytrichum commune* subcommunity is an acid grassland where flushing from higher ground results in damp, irrigated, peaty mineral soils. This is seen in the vegetation where, whilst mat-grass remains dominant, it is joined by other fine-leaved grasses and some heath rush *Juncus squarrosus* plus the moss *Polytrichum commune* and occasionally some minor occurrences of *Sphagnum*.

The U5c carnation sedge – common dog-violet subcommunity is also one of damp turfs but mat-grass is perhaps not quite so domineering, and the vegetation is dotted through with heath rush and heath wood-rush plus a relatively rich array of small herbs and sedges such as common dog-violet *Viola riviniana*, carnation sedge, flea sedge *Carex pulicaris* and cat's-ear *Hypochaeris radicata*, with mosses such as *Rhytidiadelphus squarrosus* and *Hylocomium splendens*. In some places the vegetation tends towards M10 which is more of a base-rich flush.

Most of the U5 on site is U5b velvet bent – *Polytrichum* damp grassland, found on flushed slopes and at the bases of these too, often mixed with mire communities. The richer U5c is less widespread and tends to occur on steeper slopes or possibly where some groundwater is percolating through the soil, bringing with it some richness.

U6 heath rush – sheep's fescue grassland

This is another damp grassland but with heath rush as the dominant, defining graminoid alongside fine-leaved grasses including viviparous fescue *Festuca vivipara*, plus *Polytrichum commune* and a few *Sphagnum* species as well as some pleurocarpous mosses. Where *Sphagnum,* common sedge and velvet bent are frequent this falls into the U6a *Sphagnum* subcommunity which was found in one area at the base of a slope on an area of level ground where vehicle movement had disturbed what was otherwise likely a rush mire on peat soil (e.g. M6c) and the disturbance has favoured this community dominated by heath rush. The other area, towards the north of the site, occurs in a similar situation where vehicles and/or track construction has disturbed an area adjoining M19 blanket bog, resulting in the formation of the U6d common bent – heath wood-rush subcommunity which has much heath wood-rush compared to the other area of U6 but

lacks the *Sphagnum* cover and is generally a little drier, likely a result of the ground being sloping allowing for the peaty soil to drain a little better.

U19 lemon-scented fern – hard fern community

This is really a woodland understory community but without a canopy. The lush growths of lemon-scented fern and hard fern, alongside other ferns such as oak fern *Gymnocarpium dryopteris* and broad buckler-fern *Dryopteris dilatata* and small herbs including woodland species such as wood-sorrel *Oxalis acetosella* and common dog-violet. Some areas are grassier where grazing influences the vegetation whereas other areas are heathier with blaeberry and cowberry, where the community grades into H21 or U20b. It also tends to occur in association with W19 juniper scrub, and the shrubs likely are assisting in creating that shady environment that the ferns thrive on. All stands of U19 are on the sheltered, southwestern side of the burn where the damper conditions promote the occurrence of this community, and perhaps the steepness of the slopes combined with the surrounding juniper scrub limits the amount of grazing pressure.

U20a bracken – heath bedstraw, grassy subcommunity

As already covered above, U20b is the heathy subcommunity whereas this is the grassy community. Bracken predominates again, however the dwarf shrubs and mosses are absent and instead what is found is generally a U4 acid grassland with fine-leaved grasses and small, trailing herbs. It is found in the mid-to-lower reaches of the surveyed area, generally down on the flatter ground beneath the slope by the burn itself, where sheep obviously spend most time grazing, but also reaches up on to some of the less steep slopes on the southwest side of the burn where it grades into U20b and other heath or scrub communities.

W11 birch – wood-sorrel woodland

The "woodland" along the Allt Mòr is very poorly represented as few areas of continuous canopy exist and even these are very small. The W11c wood anemone subcommunity is represented by just one marginal patch on the southwest side of the burn where there has been some establishment of downy birch *Betula pubescens* and rowan *Sorbus aucuparia* amongst the W19 juniper scrub. Here, the understory is very grassy with creeping soft grass *Holcus mollis*, wavy hair-grass and sweet vernal grass and amongst these are small, woodland herbs including trailing stems of heath bedstraw, the heart-shaped leaves of common dog-violet, wood-sorrel and, particularly in spring, the white flowers of wood anemone *Anemonoides nemorosa* and chickweed-wintergreen *Lysimachia europaea*. This is a more northern woodland type found mostly in eastern Scotland where the climate is more continental. The fringes of this single polygon grade into W19 juniper scrub, U20a/b bracken, H12 heath and H21 heath, all of which could transition into a woodland community of some sort, likely either a variation of W11 birch woodland or potentially W18 pine woodland if browsing pressure is reduced.

W17 birch – *Dicranum majus* woodland

This is another birch-dominated woodland that occurs basically in the same stretch of ground as the patch of W11 woodland and occupies an even smaller area and so is difficult to assign to an NVC community as the vegetation structure is not necessarily fully expressed. However, this small patch was deemed to most resemble the W17c sweet vernal grass – common bent subcommunity which is basically a grassy birch woodland

(some rowan and grey willow *Salix cinerea* also there) that is so as a result of grazing, and indeed several sheep were beneath the birches here grazing when surveyed. Bracken also makes incursions beneath the canopy where the community blends into U20a. Reduced grazing here would likely see dwarf shrubs move in and the community mature into a more functional woodland community with herbs and a subcanopy of e.g. juniper and saplings.

W18 pine plantation

Whilst W18 is a natural vegetation community that certainly could exist in the area, it is represented here by an old plantation on the southwest side of the burn at the top of the slope into the gorge. Scots pine *Pinus sylvestris* is most frequent but Norway spruce *Picea abies* and a few Sitka spruce *Picea sitchensis* have also been planted though it appears the latter have mostly been selectively felled out. Beneath the tall conifers are a few old rowans that have managed to establish despite browsing pressure, and many rowan and birch seedlings that have not. The seedlings find themselves in what is basically a relatively rich H12 heather – blaeberry heath with lush hummocks of mosses, cowberry and crowberry, and occasionally grading into an H21 heath with *Sphagnum* where the trees are on sheltered, north-facing slopes. The community is restricted currently to the footprint of the original plantation and is unlikely to establish elsewhere without significant changes to land management including a reduction in grazing/browsing pressure and a cessation of burning.

W19 juniper – wood-sorrel scrub

This is the most widespread woodland community with representation all the way along the surveyed area of the watercourse. All the significant stands of juniper fall into the W19a cowberry – wavy hair-grass subcommunity which is a heathy community of more open juniper bushes scattered amongst a matrix of heathland and other grasslands. The juniper can afford some protection from browsing to trees such as rowan and grey willow, but these are scattered and do not form a continuous canopy.

Beneath the juniper are, indeed, cowberry and wavy hair-grass, but equally important are other dwarf shrubs such as blaeberry and heather on raised hummocks and small herbs and ferns on the more shaded, grassy ground amongst these, such as oak fern, lemon-scented fern, wood-sorrel and heath speedwell *Veronica officinalis*. There are occasional patches of denser, well-established juniper scrub that tend towards the W19b common dog-violet – wood anemone subcommunity where herb richness is increased with occurrences of wavy bitter-cress *Cardamine flexuosa*, stinging nettle *Urtica dioica* and Herb-Robert *Geranium robertianum*.

The juniper has clearly provided an important refuge for many woodland species that would have otherwise been lost from the otherwise very open site and as a result offers a great source of diversity which could be built from. The age of the juniper here is attested to by the presence of the old-growth lichen *Nephroma parile* which is found on the juniper itself as well as on at least one rowan, though aging the plants themselves is fraught with difficulties due to the growth form. Longevity does, apparently, increase with latitude though, and some bushes in northern England have been aged at over 200 years (Thomas *et al.*, 2007).

Landslips

There have been several landslips along the length of the surveyed area of the Allt Mòr. Some of these are large, active and unvegetated. Others are older and have revegetated, some to the point where they have formed some sort of recognisable community (see M15) but most that have revegetated are still forming their community and are dominated by pioneering plants, either true pioneers or young plants of those found in the communities surrounding the landslips. It was not possible to assign an NVC community to any of the mapped "slips" so instead they were just mapped as such.

Scree

These are small areas of naturally occurring scree slopes that are not typically associated with active erosion but are becoming vegetated slowly as time goes on, unless disturbed by sheep/deer as is the case in some places. Plants such as eyebright *Euphrasia officinalis* agg. and stag's-horn clubmoss *Lycopodium clavatum* occur here but little else does other than pioneering dwarf shrubs.

Shingle

Some areas alongside the main watercourse are frequently inundated by the raised water level during peak flow events. Here there is a sparse vegetation community of species that are either well adapted for recolonisation after such events or are tolerant of the disturbance. The sprawling pleurocarpous mosses, *Racomitrium ericoides* and *Racomitrium heterostichum*, were common species here with the former being on fine gravels and the latter on larger stones, as were fine-leaved grasses and heath bedstraw. Otherwise, most of the vegetation was made up of scattered plants of the surrounding acidic heathland vegetation such as heather, cowberry and tormentil as well as some species adapted to the regular disturbance like foxglove *Digitalis purpurea*, male-fern *Dryopteris filix-mas* and sheep sorrel *Rumex acetosella*. Also prevalent in some areas were seedlings and saplings, mostly of Sitka spruce near the old plantation, but also including Scots pine, downy birch and eared willow.

Figure 8: Mosses such as Racomitrium heterostichum *colonise the open rocky ground of the shingle alongside male-fern* Dryopteris filix-mas.

4. Discussion

4.1. Overview of site

The site has a good representation of upland habitats typical of this part of Scotland. The site is generally dominated by open, acidic heathland comprised of a range of ericaceous dwarf shrubs. The north-facing, southwestern side of the site is generally damper with peatier soils and much *Sphagnum* moss due to the greater shading and shelter from prevailing south-westerly winds. The south-facing, northeastern side is generally drier with thinner, stonier soils due to the more consistent sun, with localised dominance of bearberry.

The largest area of mire occurs in the upper site where blanket bog dominates level ground or minor slopes. Otherwise, flushed ground is found along some areas of the slopes of the shallow gorge, where groundwater influences the vegetation. Small tributaries also contribute somewhat to the overall variation in vegetation on the site. Woodland is poorly represented other than by juniper scrub but birch, rowan and willow occur across the site and some conifers are actively regenerating near an old plantation, some of these being the non-native Sitka spruce.

4.2. Impact of physical works

It is understood that one option being explored is the use of machinery to lessen the angle of slope of some of the erosion scars on site. As this could be the most impactful management option, this warrants discussion about the likely impacts on the ground.

Generally, vegetation on the site demonstrates its ability to recolonise bare, eroded ground and so works to lessen the steepness of the erosion scars is unlikely to cause irreparable damage to the site. Any ground currently covered by heathland will recover (as it has in multiple locations already) though some of the wetter, peatier communities of the north-facing side (H21) would preferably be avoided as they are somewhat more fragile than the drier heathland communities. Ground currently covered by juniper scrub would preferably not be disturbed as this is playing host to much important vegetation and is already of relatively limited extent in the wider landscape, plus individual juniper bushes can be of significant age.

Surrounding the upper erosion scars, to their northeast, is a large area of blanket bog. This habitat is vulnerable to drainage and disturbance of the acrotelm and catotelm (upper layers of peat). Breaking these up can result in erosion caused by rainwater and animal movement preventing effective revegetation. Therefore, works should be careful to either totally avoid the use of machinery on areas of blanket peat or use mitigation techniques (e.g. low ground pressure tracked vehicles, "bog mats"). Any work should also be careful not to lower the upper "lip" of the gorge beneath its current level as this could result in the lowering of the water table of the peatland held behind the lip, therefore resulting in artificial drainage.

Some of the flush/mire communities, such as M5, M6, M10, U5c, are groundwater dependent terrestrial ecosystems (SEPA, 2024) and should therefore be protected through careful planning of works to avoid impacts on the groundwater acting as a source

for these habitats. They cover relatively small areas but contribute significantly to the overall diversity of species on site.

4.3. Impact of land management

Most crucial in terms of land management following restoration works is that it facilitates the recovery of vegetation post-works. As mentioned above, machinery could cause significant disturbance to habitats. Some of those are so vulnerable as to warrant avoiding causing disturbance in the first place, such as peatlands. Others are more resilient, and it would be unrealistic and unreasonable to expect total avoidance of disturbance on the site. Many of the heathland communities will recover from disturbance but this does depend on wider land management being conducive to this, particularly with regard grazing, browsing and trampling, as well as burning.

Regardless of use of machinery, the slopes to be restored are obviously prone to erosion and so fast establishment, or re-establishment, of vegetation will be important in reducing the chances of erosion taking hold before vegetation can. Limiting the amount of grazing/browsing on vegetation will obviously ensure better chances of establishment of plants and woody species with significant root systems (e.g. shrubs such as willow) will be important here. These are often more palatable than other species though, meaning herbivore pressure will need to be low. Trampling, obviously, will also be quite impactful if not limited/reduced to low levels.

Management specifically targeted at revegetating the slopes will be most effective if this is carried out to work with and to mimic the ecosystem. As evidenced by this NVC survey, the vegetation on the site is rich and very capable of establishing itself, provided land management is favourable. The erosion scars, once reduced in their angle, may benefit most from the initial establishment of shrubs that will hopefully bind together the rock ground with their roots. Eared willow would be most likely to do this naturally, alongside some grey willow and downy birch, as well as Scots pine.

These shrubs, combined with ericaceous dwarf shrubs such as heather and blaeberry, can be reasonably effective in establishing a more organic soil from leaf litter, allowing for establishment of grasses and other vegetation which will further bind the soil together, almost acting as a weighted blanket on the looser rocks below. Planting of these woody species could be helpful in ensuring this process does take place, though they need to be protected from browsing in this establishment phase. Other shrubby species present in the area include juniper, which may establish on these slopes but does grow slower than the likes of willow, and dog-rose *Rosa canina* agg., which is quite a small species but would be great for overall biodiversity. Note also that dog-rose is a aggregate group of species, and it would be important to identify which precise species is present on site. Seed collection from specimens in the local area would avoid any risk of planting something not native to the area.

4.4. Future monitoring

As far as future monitoring is concerned, if wanting to replicate this survey it would be recommended to do this in around five years. A shorter period between surveys is unlikely to reveal much change, or if it does then it is likely that those changes will be so marginal as to not provide useful insight. Even after five years, any regeneration of

scrubby vegetation is unlikely to have fully expressed itself so a longer period may be more useful.

In the shorter term, the easiest and most insightful monitoring technique may be to carry out fixed-point photography, particularly of the erosion scar areas. It is understood that this is already being considered, and the author here would encourage it to be utilised. This can be done at varying scales, both temporally and physically. It also avoids the requirement for specially trained personnel to carry out the survey, as would be the case if vegetation quadrats were carried out on the erosion slopes (though FR has already mentioned this has been deemed unfeasible due to the terrain).

Depending on who it is that is carrying out the work, and their time availability, more consistent visits immediately post-works, if slopes are physically reprofiled, will reveal whether initial vegetation establishment is taking place. A visit every month should both give enough time for changes in vegetation to be noticeable, whilst also demonstrating the efficacy of restoration quickly enough to inform ongoing land management. These regular visits may be most useful where photography is carried out at a finer scale, perhaps showing the edge of an area of restored landslip.

Visits every three-to-six months showing entire slips may be more useful in showing the overall efficacy of restoration efforts to the area, allowing for detection of broader scale changes in the dynamics of the site. This could also be carried out at an even wider scale, taking in landscape views that encompass both areas of restored slopes and the wider Allt Mòr area, to gauge whether any interventions are limiting the movement of debris downstream.

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