

**Stapledon Memorial Trust Report: Surveying river pasture grassland for  
Invasive Non-Native Species in Arieş Region of Transylvania and Comana  
Natural Park, South of Bucharest**

**23<sup>rd</sup> June – 8<sup>th</sup> July 2018**

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## Aim

To undertake in-depth botanical surveys focussing on impact on non-native species on the Arieș and Ampoi River systems in North West Romania and the Comana Natural Park, south of Bucharest. This project will be building on the work of Romanian ecologist Marilena Onete and colleagues at the Romanian Institute of Biology, looking at the impacts of IAS on grasslands adjacent to these river systems and any associated impact on farming and building on the work of the park ecologists.

## Background

Both Oli Pescott and I work as ecologists at the Centre for Ecology and Hydrology (CEH) in the United Kingdom. We spent two weeks studying grassland and transitional habitats in Romania, mapping occurrences and community associations of native and non-native species. This report details the work I undertook, the species seen and the valuable experience and new information I received during this two-week visit.

Three appendices provide a summary of the data gathered during this period in Romania. A full species list of all plants seen during a visit is listed in Appendix A. The results of the quadrats sampled in Arieș can be found in Appendix B and Appendix C lists the species found in quadrats in Comana Natural Park.

## Activity Log

**Day 1:** Oli and I arrived into Otopeni Airport at 1900 hours on Saturday 23<sup>rd</sup> June, collected our hire car and went to our accommodation on the outskirts of Bucharest. We were due to get up early the next day to meet our local host, Marilena Onete and her fiancé Owen Mountford, to undertake a site recce of the Comana River Basin.

**Day 2:** Site visit: Comana river valley. After collecting Owen and Marilena from the metro Lac Străulești, we all headed south to Comana to scope our sites and have training in the native and non-native grassland species we would be seeing on the survey of this region. On the drive, we noted the large number of abandoned agricultural fields. Our host Marilena commented that increasingly the quality of staple items, such as potatoes and maize, is declining as large-scale production of crops intensifies and traditional rural life is abandoned. Figure 1 shows the location of Comana within Romania. The following information was taken from [Natural Water Retention Measures](#) for Comana Natural Park:

**Climate zone:** warm temperate moist

**Mean rainfall:** 560

**Mean rainfall unit:** mm/year

**Average temperature:** 11 degrees C

**Mean runoff:** 122.46

**Mean runoff unit:** 450 - 600 mm

**Average runoff coefficient:** 0.14

**Average slope range:** 1-2%

**Vegetation class:** limit between the steppe and sylvo-steppe



Figure 1. Location of Comana field site (c. Google maps)





Figure 2. Oli Pescott receiving taxonomic training using *Plante Vasculare din România* by Ion Sarbu et al. from Owen Mountford and Marilena Onete at Comana field site.

On arriving in Comana, we parked next to the Neajlov River at 44.177833, 26.140250 and walked west along the river bank noting the plant species found, looking not only at grasslands but also at transition to wetland and aquatic vegetation (Figure 2).

In addition to the wealth of native species seen on this walk, we also noted the presence of non-native species such as *Ambrosia artemisiifolia* and *Xanthium strumarium* (Figure 3). All taxonomy follows the nomenclature of Sârbu et al. (2013).



Figure 3. *Ambrosia artemisiifolia* and *Xanthium strumarium* along the Neajlov river in Comana

After crossing the river, we headed north into a large open area with two distinct habitat types. The field itself comprised open and patchy vegetation which has probably experienced serial flooding, due to changes in management and resulting increased raised water levels. This area may have also been used as a market area for selling livestock. Alongside this grassland, at the edge of the river was a more brackish grassland with the following species indicating salt enrichment: *Althaea officinalis*, *Suaeda maritima* and *Salsola soda*. We also saw *Acer negundo*, another North American species growing at the edge of the river. We headed northeast across the field, over the causeway road and down into another grassland area with wet depressions and small lagoons (as well as retaining floodbanks). This grassland has transitioned to marshy grassland due to the changes in water level experienced as part of the restoration of the Comana river area (Onete, pers comm.). *Galega officinalis* was another non-native species prevalent throughout these areas, as was *Erigeron annuus*. *Morus nigra* was seen naturalised along a pathway.

After lunch we drove back along the forest edge to the south of the Comana Natural Park to appreciate the size of the park and to appreciate the woody species of this area. We finished the days survey on an open somewhat halophytic grassland dominated by *Festuca* spp., with *Carex distans* also present.

**Day 3:** Today we travelled to Turda via Sinaia, Braşov, Rupea and Sighişoara. We stopped for botanical training at 46.0853390, 25.075049 on a small road south of Buneşti, the 104L to Viscri, looking at the diversity of grassland species on the tumps (Romanian: movile) in this region. The grasslands here are renowned within Romania and were the subject of an international conference of the European Dry Grassland Group in 2016, as well as being part of the Târnava Mare EU Site of Community Importance and the focus of action for conservation and sustainable rural development. Looking like vegetated slag-heaps, movile are thought to be natural in origin though the process that formed them is not clear. Though they rather resemble moraines, they are not glacial in origin. Movile host a unique floral community of sub-steppic plants with some species distributed mainly between Central Asia and Ukraine. Although we were not recording quadrats but focussing on the local diversity, we recorded over 80 species of plant within an area of much less than 2 hectares, an incredible diversity given the short time we were at this site (less than 2 hours). The highlight of my day, along with the spectacular floral display, including XX rare species for Romania, was catching a rare glimpse of a European mole-cricket (*Gryllotalpa gryllotalpa*).



Figure 4. Oli getting some great shots of *Veronica spicata* in the grassland at Viscri.

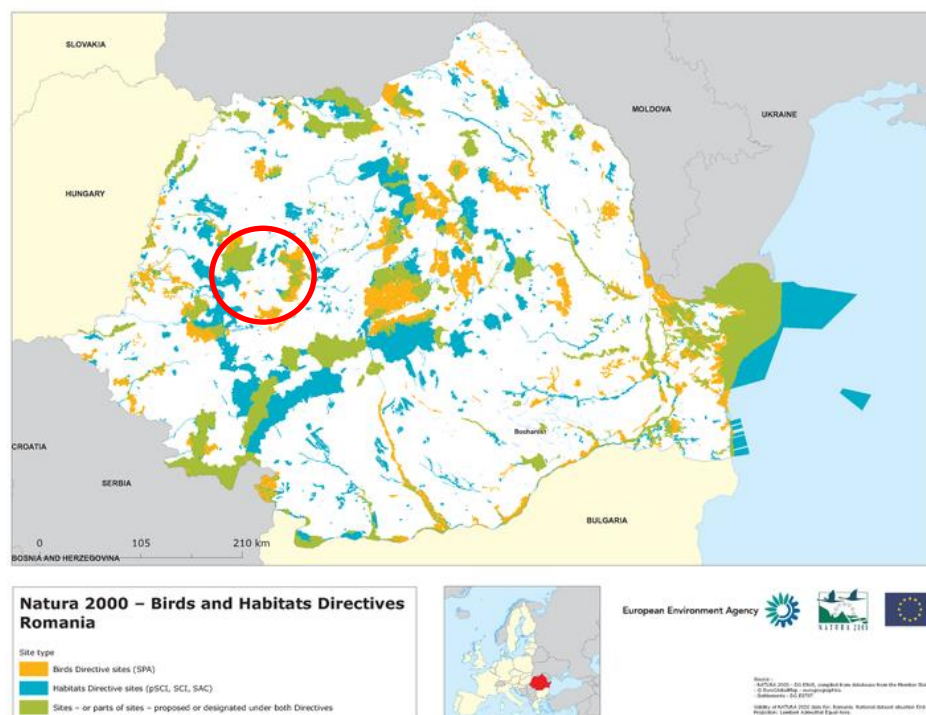


Figure 5. Map of Natura 2000 sites in Romania, including those designated under both Bird and Habitats Directives – the red circle encloses the Apuseni and Turda gorge with its numerous designated area

We arrived at our accommodation in Turda around 7pm and had an early night ready to start our site visit the next morning within the Arieş river valley to the west. This river is situated deep into Transylvania, north and west of the main range of the Carpathians and within the Apuseni mountains (Figure 5). The Arieş river is ca 165 km long and is itself a tributary of the Mureş which, together with the Olt, is the most important river in Transylvania. Rising near Mihoeşti (close to Câmpeni), the river runs approximately eastward, passing through Turda before turning southward to its confluence with the Mureş in the Lunca Mureşului commune. The steep-sided valley within the Apuseni portion of the Arieş is about 70 km in length.

Arieş river valley, near Turda - summary:

- 1) **Why was the site selected?** The Turda region was selected due to the fact that our Romanian collaborator has a field site based there and we wanted to build upon this earlier work.
- 2) **What is the national and international conservation status of the site?** The region contains numerous areas designated for nature protection (see Figure 5). For example the Apuseni Natural Park contains 20-25 nature reserves, many of them caves. The margins of the Apuseni contain remarkably species -rich sites such as the Turda gorge and Cheile Vălişoarei, with a diversity of grassland, woodland and chasmophyte habitats.
- 3) **What are the Habitats Directive types represented at each site?** Taken as a whole, the Apuseni have numerous Natura 2000 types present – among those most relevant to our study tour were the following riparian and grassland types (most forest habitats omitted from the list):

Habitat type code ▼	Habitat type English name
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation



Habitat type code ▼	Habitat type English name
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> pp and <i>Bidention</i> pp vegetation
40A0	Sub-continental peri-Pannonic scrub
6120	Xeric sand calcareous grasslands
6190	Rupicolous Pannonic grasslands (Stipo-Festucetalia pallentis)]
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometea) (* important orchid sites)
6240	Sub-pannonic steppic grasslands]
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )
6520	Mountain hay meadows
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )

- 4) **Recording method:** We had originally intended to re-sample the quadrats of the previous study, but due to problems with relocating the exact site boundary, we decided to revise the methods and undertake pairwise comparisons of adjacent 2m x 2m quadrats in invaded and uninvaded grassland. We recorded percent cover of every species within the quadrat. We geo-referenced the location of every paired quadrat. We also geo-referenced the location of sites of invaded grassland as we travelled the length of the river.
- 5) **Numbers of quadrats and size:** We sampled 15 2m x 2m quadrats along the Arieş river (Appendix B)
- 6) **Number of non-native species recorded:** Nine





Figure 6. Location of Arieş River in Transylvania

**Day 4:** After an hour and a quarter travelling from Turda along the Arieş river we arrived at the proposed field site at 46.384289, 23.23610, on the outskirts of the village of Muncelu. The road side



Figure 7. View south west down the Arieş valley along the disused railway. This area was jumping with Orthoptera

and river margins along the river valley were dominated by *Fallopia japonica*, with abundant *Impatiens glandulifera*, *Helianthus tuberosus*, *Erigeron annuus* and *Robinia pseudoacacia*.

A narrow disused railway (Figure 7) regularly crosses the road, presumably a relic from the mining industry. In parts this railway is open enough for exploration and is full of drier grassland species, such as *Origanum vulgare*, *Thymus* spp., as well as *Achillea millefolium*, *Verbascum* spp., and frequent *E. annuus*.

We parked at a monastery at the top of a small hill and botanised our way to the field site. On route, early on, we encountered a delightful group of four Romanian children who were very interested in us (as they do not get many tourists in this area and were keen to practice their excellent English). With the help of our local guide, Owen, a hand lens, pencil, paper and Google translate, we hope that we managed to convey the aims of our work! It was wonderful to see their expressions when we informed them of the origin of some of their neighbourhood plant species!



*Figure 8. Our local host, Owen Mountford, next to a large stand of Impatiens glandulifera*

The track was very wet from the rain, which got steadily worse in the course of the day.





Figure 9. Oli and I doing our best to translate the nature of our work to the local village children from Muncelu

After leaving the children, two hours later (minus a hand lens that we donated to the eldest of the group, who was very interested in insects) we continued on our way. We noted *Erigeron annuus* growing well in established grassland areas. This is possibly due to a more open sward with bare soil patches being formed after mowing or maybe due to an abundance of seeds at seed set. We assessed the field site and did a site walk to establish the boundaries of the survey area. It rapidly became apparent that we would not be able to re-create the survey that Marilena Onete and her colleagues carried out in 2014 as the map scale we had was not suitable for a fair and accurate repeat survey so a change of plan was needed.

On the journey back to our accommodation in Turda, we decided to undertake a different sampling methodology for the surveying this week in the Arieş river valley. This in part was also necessitated by the rapid change in weather. With heavy storms and lightning forecast for the majority of the week, we decided it would be prudent to adopt an approach that allowed rapid withdrawal to the car when that proved necessary. Thus, we planned to drive the length of the valley during the worst of the weather noting the locations off the road (with a GPS) of invaded grassland with space to park the car. Once these sites had been selected, we used paired quadrats (2m x 2m) that compared areas invaded by non-native species with uninvaded areas immediately adjacent.

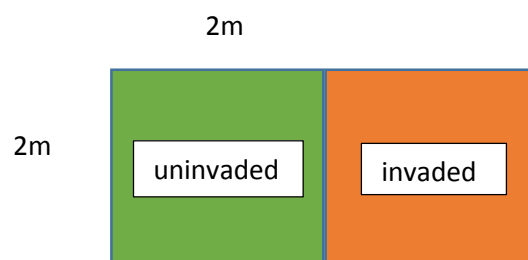


Figure 10. Diagram showing the methods chosen to demonstrate effect of invasion on species diversity in grassland

**Day 5:** On the 27<sup>th</sup> June, we went back to the field site, in heavy rain to undertake five quadrats in the lower lying area of the uncut hay meadow. We placed the quadrats in both invaded and uninvaded grassland (see appendix for the species list). The quadrating was very challenging due to the wet conditions, but we still managed to record over 140 species. *Agrostis capillaris* was the dominant grass, with abundant *Achillea millefolium* and *Festuca pratensis*. The quadrat that we surveyed in the invaded grassland was markedly less diverse than the equivalent area of grassland.

**Day 6:** As we needed to take Owen, back to the airport in Cluj-Napoca and again due to the poor weather conditions, we decided to walk the Turda gorge on this day rather than venture back into the Arieş valley in the strong storms. We parked the car at 46.571196, 23.666889 and set off south down the gorge, recording plant species of note along the way. The Turda gorge (Cheile Turzii) was first designated as a protected area in 1938, and has since been considered for U.N.E.S.C.O. designation as a natural monument. It is floristically remarkable with some 1000 plant species, including a strong representation of often both calcicole and endemic species of *Allium*, *Ranunculus*, *Dianthus*, *Valeriana*, *Aconitum*, *Iris* and *Hieracium*.



Figure 5. The view south down the Turda Gorge. Note the closely cropped grass, presumably due to high grazing pressure

We saw over 100 species this day, with a highlight being the utterly stunning *Centaurea atropurpurea* (Figure 12), which is a speciality of Romania and the Balkan peninsula. This knapweed is, unsurprisingly, becoming a popular subject for specialist gardeners and has even been recorded as self-sown in the Chelsea Physic Garden (BSBI DDb).





Figure 12. The utterly magnificent flower head of *Centaurea atropurpurea* found along the edge of the Turda Gorge

On the walk along the river we met a huge range of small and not so small beasts (Figure 12).



Figure 6. A small selection of the delightful animals we encountered on our botanical walk down the Turda Gorge.

**Day 7:** Oli and I, now sans guide, headed back to the Arieş river valley, excited to put into practice the plant identification skills picked up over the last 6 days with Owen and Mari's input. The inclement weather meant that again, we needed to optimise our time out of the rain. We decided to head the 80 or so km straight to Câmpeni, following the above method of recording sites of interest with parking along the way with a hand-held GPS as we travelled the valley.

After a short break in Câmpeni for lunch, we headed back northeast, stopping at an invaded grassland site near Bistra. We were incredibly lucky on our way to the site, to see an otter, merrily swimming in the still waters at the top end of a hydroelectric weir. We spent ten very happy minutes watching this

stunning animal fishing before moving on to our first survey site of the day. The grassland at 46.376594, 23.152261 was dominated by *Anthoxanthum odoratum* and *Dactylis glomerata*, with *Carex hirta* and *Achillea millefolium* also being found in higher cover values. There were 46 species recorded in this grassland quadrat. The area of *F. japonica* invaded grassland adjacent was under a canopy of *Alnus incana* and had a high cover of *Elytrigia repens* and *Equisetum arvense*.

After completing these quadrats, we then had to dodge the rain again so headed back to the accommodation.

**Day 8:** After a brief rain shower, we headed back along the river to continue our exploration of invaded grasslands, recorded on GPS the previous day. This task was harder than first anticipated the previous day, due to the nature of ownership of fields and the fact that the grasslands had yet to be cut for hay in many places. We did not want to risk damaging the hay crop and so limited our surveys to fields that had already been cut for hay, looked to be either abandoned or stuck to the edge of fields to minimise any damage as a result of our activity. This meant we were unable to survey the full set of 30 possible locations we identified on day 7, but has generated a data set should this be required by Romanian ecologists. The stop-start nature of these attempts to survey did however mean that we got to really appreciate the diversity of the vegetation along the valley as well as the extent of the invasion of *Fallopia* in particular, but of *Robinia* also.

We ended the day taking a small road to a monastery taking in a wonderful array of plants on route, the *Melampyrum bihariense* (known in Romanian as *sor-cu-frate* – literally “sister with brother”) was abundant along the banks and then up in to the meadow (Figure 14), we were lucky enough to see *Trifolium pannonicum*, *Trifolium montanum* and *Centaurea phrygia*, as well as more familiar grassland species such as *Galium verum*, *Trifolium medium*, *Leucanthemum vulgare* and *Lotus corniculatus*.





Figure 7. Our last stop of the day. We spent a delightful hour walking this meadow before heading home.

**Day 9:** Today we started at the northeast end of the valley. We diverted across the road to Aiud to explore more grassland species, before starting the days surveying. We found ourselves driving a spectacular route past Rimetea to Cheile Vălișoarei is a EUNIS nationally designated site, although information is not available (see Figure 14 for a collection of views along this route and the grassland in which we ended up).



Figure 15. Our morning travels to Cheile Vălișoarei to explore an alternative grassland system

The grassland that we walked (top left) had a large amount of cleared scrub of *Crataegus spp.* and *Prunus spp.* We noted a huge diversity of forbs, with around 60 species being recorded as we ascended the slope, amongst which we found *Lotus corniculatus*, *Ononis arvensis*, *Agrostis capillaris*, *Trifolium pratense*, *Cuscuta sp.*, *Cirsium eriophorum*, *Agrimonia eupatoria*, *Origanum vulgare*, *Plantago media*, *Eryngium campestre*, *Scabiosa ochroleuca*, *Asperula cynanchica*, *Festuca rubra*, *Trifolium ochroleucon*,



*Trifolium pratense*, *Anthoxanthum odoratum*, *Carex muricata*, *Festuca pratensis*, *Brachypodium pinnatum*, *B. sylvaticum*, *Cynosurus cristatus* and *Origanum vulgare*.

The low abundance of *Fallopia* along the valley / gorge to Aiud was an interesting contrast to Arieş river valley. We had thought it possible that the *Fallopia* could have been deliberately planted in the Arieş river valley, possibly to stabilise the river and railway / road sidings, but were subsequently advised by Marilena that this was not the case.

After lunch, we headed back to the Arieş river valley, to re-start our quadrating. Figure 16 below shows the four quadrats we surveyed today, the first in a cut hay meadow with *Helianthus tuberosus* encroaching at one end and the second a ranker grassland that did not appear to have much recent management and with both *Erigeron annuus* and *Fallopia japonica* present. Our initial observations appear to show less diversity in the understorey below *H. tuberosus* compared with *F. japonica*, but further survey would be needed to confirm this.



Figure 16. Views of the quadrats surveyed on our last day (1/7/18) in the Arieş river valley. The pictures on the left show the encroachment of *H. tuberosus* and the right, *F. japonica*

We finished the day, and our time in this part of Romania, at a hilltop grassland. This grassland had much the same species composition as other areas we had already seen in the valley. However, whereas the steep slope only had a relatively patchy occurrence of *Erigeron annuus*, the level terrace at the top of the hill was “inundated” with this North American species. Due to problems with access, parking and the weather, we only managed 15 quadrats in the Arieş river basin, but we did however encounter a huge diversity of plant species and communities. This was an extremely useful experience.

Comana summary:



- 1) **Why was the site selected?** The Comana Natural Park was chosen because
- 2) **What is the national and international conservation status of the site?** The site
- 3) **What are the Habitats Directive types represented at each site?** Comana has [16 Habitat Directive Sites](#) (see Table 1 below) and protects 24 Species of the Nature Directive

Habitat type code ▼	Habitat type English name
40C0	Ponto-Sarmatic deciduous thickets
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)
91Y0	Dacian oak & hornbeam forests
91AA	Eastern white oak woods
91I0	Euro-Siberian steppic woods with <i>Quercus</i> spp
91F0	Riparian mixed forests of <i>Quercus robur</i> , <i>Ulmus laevis</i> and <i>Ulmus minor</i> , <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i> , along the great rivers ( <i>Ulmenion minoris</i> )
91M0	Pannonian-Balkanic turkey oak –sessile oak forests
92A0	<i>Salix alba</i> and <i>Populus alba</i> galleries
1530	Pannonic salt steppes and salt marshes
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition -type vegetation
3160	Natural dystrophic lakes and ponds
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> pp and <i>Bidention</i> pp vegetation
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

- 4) **Recording method:** We re-recorded the species in the grassland vegetation and the percent abundance covers for the four long-term monitoring plots set up by the Comana Natural Park. We then went on to undertake sampling of five quadrats in stands of homogenous vegetation, using percent cover for abundance of each species. We positioned these quadrats in a saltire cross (the pattern of the five on a die). We geo-referenced all quadrats sampled.
- 5) **Numbers of quadrats and size:** We sampled 34 1m x 1m quadrats in the Comana Natural Park, including four which were part of the long-term monitoring plots of the Natural Park (Appendix C)
- 6) **Number of non-native species recorded:** Eleven

**Day 10:** Today we headed back south to the Comana Natural Park, a Ramsar site, around the Neajlov River, a tributary of the Danube and only ca 25 km from that great river. This 400 km journey took us across the Carpathians through the Olt Valley between Sibiu and Râmnicu Vâlcea. This fabulously scenic journey followed small fields and a train line through the mountains from Transylvania into Oltenia and ended in Muntenia, on the Danube plain. It was lovely to end up at Casa Comana, where the decorations around the hotel, proudly displayed two local rarities: Butchers Broom (*Ruscus aculeatus*) and Peony (*Paeonia peregrina*), the latter a Balkan-Turkish speciality and the subject of a local festival held in May each year. The following is an extract from the Ramsar citation for Comana Natural Park (<https://www.ramsar.org/countries/romania?page=9>):

*Comana Natural Park (Parcul Natural Comana). 25/10/11; Giurgiu County; 24,963 ha; 44°09'N 026°09'E. Natural Park, Natura 2000 (SPA, SCI). A complex in the flat plain of southern Romania characterised by a high diversity of flora and fauna and consisting mainly of forests, agro-ecosystems, meadows, rivers, lakes, canals, oxbow lakes and a micro-delta. Some 157 bird species have been observed in the park, which regularly supports more than 20,000 water birds, many of them migratory. The park also supports numerous fish species, including the endemic *Petroleuciscus boristhenicus* and the internationally threatened *Umbra krameri*. Neajlov River and its microdelta are optimal habitats for the Otter (*Lutra lutra*), and the Tree-marten (*Martes martes*), "Fitchew" (i.e. polecat - *Putorius putorius*), Jackal (*Canis aureus*), and Badger (*Meles meles*). Of the 1,300 plant species, 72 are threatened nationally and species like *Marsilea quadrifolia* L. are also protected in Europe. Special conservation areas have been established for thorn (butcher's-broom) *Ruscus aculeatus* as well as for the Romanian peony *Paeonia peregrina*, which lends its name to the Peony Festival, celebrated in the park in May. The site plays an important role in water purification, flood protection, shoreline stabilisation, groundwater recharge, and stream flow maintenance. About 10,000 people who live inside the park directly benefit from these services and also use the site for fishing, hunting and traditional agriculture.*

**Day 11:** We started the day at the [Comana Natural Park](#) Administration Headquarters. The Centre Head, Valentine Grigore and his Biologist, Andra David, spent an hour going over the digital maps they have on the area and explaining the work they undertake. Comana Natural Park covers 1200 ha of wetland, 600 ha of which is in permanent open water. The wetland has been re-created from arable land. The arable land was created from drained marsh. The staff at the centre are working on research that would hope to restore a further 400 ha of wetland. This ambitious project would need backing from local residents but, if it can be completed, would add more incredible habitat to this region.



Figure 17. Oli and I meeting Andra David and Valentine Grigore at the Comana Natural Park Headquarters

Later that morning, we were given a tour of three grassland areas that we could survey. This was a hugely useful orientation exercise and enabled us get advice on species in the park. The second site we visited led the Park Staff to find a new area for *Marsilea quadrifolia*, which is included in Annex II of the EU Habitats Directive (Council Directive 92/43/EEC) *i.e.* a species whose conservation requires the designation of Special Areas of Conservation. This discovery was a real bonus for the Park, which also contains populations of two other Annex II species: *Himantoglossum caprinum* and *Echium russicum*. *Echium russicum* (sometimes known as *E. maculatum*) occurs in the sub-steppic grasslands near Viscri that we had visited early in our trip. We were mindful to look out for all such designated species during the course of our surveys.

**Day 12:** The day started with a site visit to the long-term monitoring plots (1 m x 1 m) established by the park staff. The species list can be found in Appendix C. These grassy plots were dominated by *Festuca rubra* and *Cynodon dactylon* and *Poa pratensis*. After completing the four monitoring plots, we returned to the site on which we ended day 11. We undertook a further five quadrats (all of 1 m x 1 m) along a gradient of improvement from a football pitch down towards a shallow water body. Again *C. dactylon* was present but with a more diverse mix of species in the sward, including *Trifolium pratense* and *T. repens*, with *Eryngium campestre* indicating overgrazing by the sheep seen on site.

**Day 13:** Today we undertook 15 1 m x 1 m quadrats in permanent grassland, seasonally-inundated grassland and disturbed grassland (with the help of water buffalo!). the results of these quadrats are again listed in Appendix C.

**Day 14:** We were lucky enough to be taken on a boat trip by Andra David and the Comana park ranger on day 14, into the Comana wetland system. We saw four heron species, a grass snake swimming, a musk rat (non-native) and many egrets, pygmy cormorants and Odonata. We recorded the following aquatic plants:

Table 1. Aquatic species recorded from boat trip on Comana wetland system

<i>Ceratophyllum demersum</i>	<i>Najas marina</i>	<i>Salvinia natans</i>
<i>Isoetes cf. lacustris</i>	<i>Nuphar lutea</i>	<i>Schoenoplectus lacustris</i>
<i>Hydrocharis morsus-ranae</i>	<i>Persicaria amphibia</i>	<i>Solanum dulcamara</i>
<i>Lemna minor</i>	<i>Phragmites australis</i>	<i>Typha cf. laxmanii</i>
<i>Lemna minuta</i>	<i>Potamogeton natans</i>	<i>Utricularia cf. vulgaris</i>
<i>Lemna trisulca</i>	<i>Potamogeton pectinatus</i>	
<i>Lythrum salicaria</i>	<i>Salix sp.</i>	

All plants recorded on this trip are listed in Appendix C.

**Day 15:** Today we undertook 10 quadrats, in between a storm, on a steep grassland near the site surveyed on day 13. This site was dominated by *Bothriochloa ischaemum*, *C. dactylon* and *Poa pratensis*. The attractive yellow thistle *Centaurea solstitialis* was present. After quadrating, we walked over an area adjacent to our plots where *Crataegus monogyna* was invading the grassland. Other than the *Crataegus*, which presumably indicates a reduction in sheep grazing, the species encountered were broadly the same, with thistles being more prevalent and the sward being generally taller.



Figure 8. Various views from Comana Natural Park and our quadrats. The image in the top left shows the plot dominated by *Xanthium strumarium*

After the storm, we finished our Comana surveys at a grassland near an abandoned military site. This site was again showing signs of overgrazing, with *Eryngium campestre* being prevalent, and a reduced forb count, with *Bromus hordeaceus / commutatus* (difficult to identify due to the desiccated nature of the mature specimens) and *Lolium perenne* being present in high numbers.

**Day 16:** Our last day in Romania was spent visiting the fabulous museum of rural life at Herastrau in Bucharest with Mari before our flight back home. This was an incredibly interesting cultural experience as it demonstrated the huge regional variety of the different houses and church building styles.



## Summary of findings

Despite the wonderfully dramatic weather we experienced on our fellowship, we recorded, through site walks and quadrats over 500 different plant species, many of which were new to me. This has been the most incredible opportunity for me to learn about a huge diversity of plants. The Romanian flora has around 3,500 species, which is about twice the number found in the UK although the two countries have similar land areas. I certainly feel a lot more confident in my identification of British species and my understanding of the native distribution of species across Europe which will certainly help in my work in future.

In terms of the non-natives, in the Arieş non-native listings, *Fallopia japonica*, *Helianthus tuberosus*, *Erigeron annuus*, *Impatiens glandulifera* and *Robinia pseudoacacia*, were abundant along the road, train and river lines and are starting to encroach into hay meadows. These naturalised species are present in such abundance that, when we were there, we wondered whether they might have been originally planted for bank-stabilisation, but discussions with Marilena Onete alerted us to the fact that this was not the case.

In Comana, the main non-native species invading the grassland were *Xanthium strumarium* and *Ambrosia artemisiifolia*. These seemed to be having the largest impact on disturbed ground (whether that disturbance was through traffic, livestock or water inundation). *R. pseudoacacia* was prevalent throughout woodland and road edges.

We recorded twenty non-native species on our trip from the various habitats we visited.

For my trip, the beauty and sound of the hay meadows is something that will last with me. Every footstep felt like it elicited a new plant and an incredible diversity of grasshoppers and crickets and butterflies. I am truly inspired to come back to Romania to undertake more research.

## Next steps

It would be interesting to understand not only the native flora of the region fully but also more clearly what native species the *Fallopia* and *Helianthus* (primarily) are out competing along the road and river banks. To this end, we recommend that invaded sites identified by our visits along the Arieş are revisited by Romanian-speaking ecologists (to enable access on land we were unable to survey) and more quadrats undertaken. This could perhaps be done in parallel to an equivalent river system where invasion is not so prominent. We suggest this work could be done as part of a larger project that could be undertaken with links to Ecosystem Services. The Arieş river is a key part of the ecosystem in the Apuseni but the water and soil are reported to be heavily polluted with heavy metals and high nutrient (notably ammonium levels (Marilena Onete *pers. comm.*). It would be good to build more research into the whole system function, as the unique ecology, biology and cultural heritage of this region would certainly merit further investment and work to ensure its preservation for future generations.

In the Comana region, we were able to give Marilena Onete and Park staff information on possible grant providers as well as the data from the quadrats which we hope will be useful to them for both monitoring and teaching purposes. We have sent Park staff information on British biological societies and made links around potential funding proposals from staff from CEH.

## Communications

During the trip, I regularly posted pictures of the training we received and the plants seen on Facebook. In each of the posts, I ensured the Stapledon Memorial Trust was acknowledged and thanked and gave weblinks to the Trust's website. I will also share with colleagues at the Centre for

Ecology and Hydrology our experience and promote the work our Romanian colleagues where I can. Marilena is also going to present at a conference in Romania, where she will again, share the work we have done and promote and acknowledge the Stapledon Memorial Trust.

Trust grant <http://www.stapledontrust.org.uk>.

Thank you so much Marilena Onete for helping us get to such a beautiful and biodiverse place and thank you to the brilliant park staff for all your help! Species records will be with you tomo! Lovely to end the morning with a storm :)



Figure 9. An example post promoting Stapledon Memorial Trust from my Facebook account

## Acknowledgements

I would like to give a huge thank you again to the Stapledon Memorial Trust, especially Alan Hopkins and Mike Steele for their help and support in carrying out the work for our successful application. I would also like to thank Marilena Onete and her colleagues at the Institute of Biology, Bucharest, Romania for allowing us to use their research on which to build our fellowship. I would like to thank the Comana Natural Park staff for the field trips on which they took us; these gave us a wonderful insight into the flora and fauna of the region. I give huge thanks to Oli Pescott for the great two weeks but a massive thank you to Owen Mountford who gave so much training over the 6 days we were together – thank you! Finally, I would like to thank the Centre for Ecology and Hydrology for supporting my application to attend this Fellowship.

## References

Sârbu, I., Ştefan, N. and Oprea, A. (2013). *Plante Vasculare din România*. Bucureşti: Editura Victor N. Victor

BSBI Distribution Database <https://database.bsbi.org/>

## Appendices

### Appendix A: Species list of all records from the two weeks of surveys

This is a site-by-site species record and as such, there will be duplication in species listed.

Date	Species	Non-native	General location	Notes
24/06/2018	<i>Acer negundo</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Ailanthus altissima</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Ambrosia artemisiifolia</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Cichorium intybus</i>		Bucharest - Centura Ringroad	
24/06/2018	<i>Eryngium campestre</i>		Bucharest - Centura Ringroad	
24/06/2018	<i>Robinia pseudoacacia</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Salvia nemorosa</i>		Bucharest - Centura Ringroad	
24/06/2018	<i>Sambucus ebulus</i>		Bucharest - Centura Ringroad	
24/06/2018	<i>Sorghum halepense</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Torilis arvensis</i>		Bucharest - Centura Ringroad	
24/06/2018	<i>Xanthium strumarium</i>	y	Bucharest - Centura Ringroad	
24/06/2018	<i>Achillea ochroleuca</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Allium scorodoprasum</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Ambrosia artemisiifolia</i>	y	Monitored grassland north of Park administration	
24/06/2018	<i>Calamagrostis epigejos</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Carduus nutans</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Carex distans</i>		Monitored grassland north of Park administration	
24/06/2018	Cf <i>Erysimum</i> sp.		Monitored grassland north of Park administration	
24/06/2018	<i>Cirsium arvense</i> cf ssp. <i>setosum</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Cynodon dactylon</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Daucus carota</i>		Monitored grassland north of Park administration	



24/06/2018	<i>Elytrigia repens</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Eryngium campestre</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Festuca arundinacea</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Festuca rubra</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Galega officinalis</i>	y	Monitored grassland north of Park administration	
24/06/2018	<i>Galium humifusum</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Hordeum geniculatum</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Juncus compressus</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Linaria vulgaris</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Lotus tenuis</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Medicago lupulina</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Melilotus albus</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Melilotus altissimus</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Mentha pulegium</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Oenanthe silaifolia</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Ononis cf arvensis</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Plantago maritima</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Poa pratensis</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Portulaca oleracea</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Puccinellia distans</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Pulicaria dysenterica</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Schoenoplectus lacustris</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Suaeda cf maritima</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Torilis japonica</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Trifolium pratense</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Verbascum blattaria</i>		Monitored grassland north of Park administration	

24/06/2018	<i>Verbena officinalis</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Verbena officinalis</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Veronica spicata</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Vicia villosa</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Xanthium spinosum</i>	y	Monitored grassland north of Park administration	
24/06/2018	<i>Xanthium strumarium</i>	y	Monitored grassland north of Park administration	
24/06/2018	<i>Xeranthemum cylindraceum</i>		Monitored grassland north of Park administration	
24/06/2018	<i>Achillea ochroleuca</i>		Neajlov River	
24/06/2018	<i>Achillea ochroleuca</i>		Neajlov River	
24/06/2018	<i>Aegilops cylindrica</i>		Neajlov River	
24/06/2018	<i>Agrimonia eupatoria</i>		Neajlov River	
24/06/2018	<i>Alisma plantago-aquatica</i>		Neajlov River	
24/06/2018	<i>Allium scorodoprasum</i>		Neajlov River	
24/06/2018	<i>Allium scorodoprasum</i>		Neajlov River	
24/06/2018	<i>Althaea officinalis</i>		Neajlov River	
24/06/2018	<i>Ambrosia artemisiifolia</i>	y	Neajlov River	
24/06/2018	<i>Artemisia pontica</i>		Neajlov River	finely divided and scented
24/06/2018	<i>Bidens frondosa</i>	y	Neajlov River	
24/06/2018	<i>Bidens vulgata</i>		Neajlov River	
24/06/2018	<i>Bromus japonicus</i>		Neajlov River	awns spreading outwards
24/06/2018	<i>Butomus umbellatus</i>		Neajlov River	
24/06/2018	<i>Calamagrostis epigejos</i>		Neajlov River	purpurea/pseudophragmites in forest edges (in Aries e.g.)
24/06/2018	<i>Carex divisa</i>		Neajlov River	creeping beds of fine leaves; similar to disticha and arenaria but slimmer
24/06/2018	<i>Centaurea calcitrapa</i>		Neajlov River	
24/06/2018	<i>Centaurea stoebe</i> cf. <i>ssp. australis</i>		Neajlov River	
24/06/2018	<i>Ceratophyllum demersum</i>		Neajlov River	

24/06/2018	<i>Convolvulus arvensis</i>		Neajlov River
24/06/2018	<i>Cynodon dactylon</i>		Neajlov River
24/06/2018	<i>Echinochloa crus-galli</i>		Neajlov River
24/06/2018	<i>Eragrostis minor</i>		Neajlov River
24/06/2018	<i>Festuca cf.?</i>		Neajlov River
24/06/2018	<i>Galega officinalis</i>	y	Neajlov River
24/06/2018	<i>Galium album</i>		Neajlov River
24/06/2018	<i>Galium humifusum</i>		Neajlov River
24/06/2018	<i>Glechoma hederacea</i>		Neajlov River
24/06/2018	<i>Glycyrrhiza echinata</i>		Neajlov River
24/06/2018	<i>Gypsophila muralis</i>		Neajlov River
24/06/2018	<i>Hordeum geniculatum</i>		Neajlov River
24/06/2018	<i>Hydrocharis morsus-ranae</i>		Neajlov River
24/06/2018	<i>Iris pseudacorus</i>		Neajlov River
24/06/2018	<i>Juncus compressus</i>		Neajlov River
24/06/2018	<i>Juncus compressus</i>		Neajlov River
24/06/2018	<i>Lactuca saligna</i>		Neajlov River
24/06/2018	<i>Lemna trisulca</i>		Neajlov River
24/06/2018	<i>Linaria vulgaris</i>		Neajlov River
24/06/2018	<i>Lotus tenuis</i>		Neajlov River
24/06/2018	<i>Lythrum salicaria</i>		Neajlov River
24/06/2018	<i>Matricaria chamomilla</i>		Neajlov River
24/06/2018	<i>Mentha pulegium</i>		Neajlov River
24/06/2018	<i>Morus nigra</i>	y	Neajlov River
24/06/2018	<i>Oenanthe silaifolia</i>		Neajlov River
24/06/2018	<i>Oenanthe silaifolia</i>		Neajlov River



24/06/2018	Ononis arvensis		Neajlov River	
24/06/2018	Persicaria hydropiper		Neajlov River	
24/06/2018	Persicaria maculosa		Neajlov River	
24/06/2018	Persicaria mitis		Neajlov River	
24/06/2018	Portulaca oleracea		Neajlov River	
24/06/2018	Potamogeton crispus		Neajlov River	
24/06/2018	Potamogeton natans		Neajlov River	
24/06/2018	Potamogeton nodosus		Neajlov River	
24/06/2018	Potamogeton pectinatus		Neajlov River	
24/06/2018	Potentilla reptans		Neajlov River	
24/06/2018	Prunella vulgaris		Neajlov River	
24/06/2018	Pulicaria dysenterica		Neajlov River	
24/06/2018	Sagittaria sp.		Neajlov River	
24/06/2018	Salvinia natans		Neajlov River	
24/06/2018	Salvinia natans		Neajlov River	
24/06/2018	Sparganium erectum		Neajlov River	
24/06/2018	Spirodela polyrhiza		Neajlov River	
24/06/2018	Stachys palustris		Neajlov River	
24/06/2018	Tanacetum vulgare		Neajlov River	
24/06/2018	Tordylium maximum		Neajlov River	
24/06/2018	Trifolium fragiferum		Neajlov River	
24/06/2018	Typha angustifolia		Neajlov River	
24/06/2018	Typha cf laxmanii		Neajlov River	
24/06/2018	Typha laxmannii		Neajlov River	
24/06/2018	Verbascum blattaria		Neajlov River	
24/06/2018	Verbena officinalis		Neajlov River	

24/06/2018	Xanthium strumarium	y	Neajlov River	
24/06/2018	Xeranthemum cylindraceum		Neajlov River	
24/06/2018	Aegilops cylindrica		Ruderal / draw-down pasture	
24/06/2018	Agrimonia eupatoria		Ruderal / draw-down pasture	
24/06/2018	Agrostis canina		Ruderal / draw-down pasture	
24/06/2018	Ailanthus altissima		Ruderal / draw-down pasture	
24/06/2018	Artemisia absinthium		Ruderal / draw-down pasture	
24/06/2018	Artemisia cf pontica		Ruderal / draw-down pasture	
24/06/2018	Ballota nigra ssp. nigra		Ruderal / draw-down pasture	
24/06/2018	Berteroa incana		Ruderal / draw-down pasture	
24/06/2018	Bolboschoenus maritimus		Ruderal / draw-down pasture	
24/06/2018	Bromus cf japonicus		Ruderal / draw-down pasture	
24/06/2018	Carex distans		Ruderal / draw-down pasture	
24/06/2018	Carex otrubae		Ruderal / draw-down pasture	
24/06/2018	Centaurea solstitialis		Ruderal / draw-down pasture	
24/06/2018	Centaurea stoebe		Ruderal / draw-down pasture	
24/06/2018	Cichorium intybus		Ruderal / draw-down pasture	
24/06/2018	Consolida sp.		Ruderal / draw-down pasture	
24/06/2018	Conyza canadensis	y	Ruderal / draw-down pasture	
24/06/2018	Cuscuta campestris		Ruderal / draw-down pasture	Growing on Xanthium
24/06/2018	Datura sp.	y	Ruderal / draw-down pasture	
24/06/2018	Daucus carota		Ruderal / draw-down pasture	
24/06/2018	Echium vulgare		Ruderal / draw-down pasture	
24/06/2018	Eragrostis minor		Ruderal / draw-down pasture	
24/06/2018	Erigeron annuus	y	Ruderal / draw-down pasture	
24/06/2018	Eryngium campestre		Ruderal / draw-down pasture	

24/06/2018	Euphorbia cyparissias		Ruderal / draw-down pasture	
24/06/2018	Euphorbia palustris		Ruderal / draw-down pasture	
24/06/2018	Fraxinus excelsior		Ruderal / draw-down pasture	
24/06/2018	Galium verum cf ssp. wirtgenii		Ruderal / draw-down pasture	
24/06/2018	Glycyrrhiza echinata		Ruderal / draw-down pasture	
24/06/2018	Hordeum cf marinum		Ruderal / draw-down pasture	
24/06/2018	Humulus lupulus		Ruderal / draw-down pasture	
24/06/2018	Juncus compressus		Ruderal / draw-down pasture	
24/06/2018	Lactuca cf viminea		Ruderal / draw-down pasture	
24/06/2018	Lactuca saligna		Ruderal / draw-down pasture	
24/06/2018	Lathyrus tuberosus		Ruderal / draw-down pasture	
24/06/2018	Linaria vulgaris		Ruderal / draw-down pasture	
24/06/2018	Mentha pulegium		Ruderal / draw-down pasture	
24/06/2018	Morus nigra		Ruderal / draw-down pasture	Self-seeded
24/06/2018	Ononis arvensis		Ruderal / draw-down pasture	
24/06/2018	Onopordum acanthium		Ruderal / draw-down pasture	
24/06/2018	Paulownia sp.	y	Ruderal / draw-down pasture	
24/06/2018	Potentilla argentea		Ruderal / draw-down pasture	
24/06/2018	Potentilla reptans		Ruderal / draw-down pasture	
24/06/2018	Prunus cerasifera		Ruderal / draw-down pasture	
24/06/2018	Ranunculus sardous		Ruderal / draw-down pasture	
24/06/2018	Rumex conglomeratus		Ruderal / draw-down pasture	
24/06/2018	Rumex crispus		Ruderal / draw-down pasture	
24/06/2018	Scabiosa ochroleuca		Ruderal / draw-down pasture	
24/06/2018	Securigera varia		Ruderal / draw-down pasture	
24/06/2018	Sonchus arvensis ssp. uliginosus		Ruderal / draw-down pasture	

24/06/2018	Stachys germanica		Ruderal / draw-down pasture	
24/06/2018	Tordylium maximum		Ruderal / draw-down pasture	
24/06/2018	Torilis arvensis		Ruderal / draw-down pasture	
24/06/2018	Trifolium fragiferum		Ruderal / draw-down pasture	
24/06/2018	Trifolium pratense		Ruderal / draw-down pasture	
24/06/2018	Verbascum blattaria		Ruderal / draw-down pasture	
24/06/2018	Xanthium strumarium	y	Ruderal / draw-down pasture	
24/06/2018	Xeranthemum cylindraceum		Ruderal / draw-down pasture	
24/06/2018	Xeranthemum cylindraceum		Ruderal / draw-down pasture	
25/06/2018	Adonis vernalis		Road to Viscri and grassland	perennial
25/06/2018	Anthemis tinctoria		Road to Viscri and grassland	
25/06/2018	Anthemis tinctoria		Road to Viscri and grassland	
25/06/2018	Anthericum ramosum		Road to Viscri and grassland	Festuca vall/Stipa community
25/06/2018	Anthericum ramosum		Road to Viscri and grassland	
25/06/2018	Asparagus officinale		Road to Viscri and grassland	
25/06/2018	Asperula cynanchica		Road to Viscri and grassland	
25/06/2018	Astragalus cf. monspessulanus		Road to Viscri and grassland	
25/06/2018	Astragalus monspessulanus		Road to Viscri and grassland	
25/06/2018	Asyneuma canescens		Road to Viscri and grassland	
25/06/2018	Asyneuma canescens		Road to Viscri and grassland	
25/06/2018	Atriplex oblongifolia		Road to Viscri and grassland	prob new to Transylvania
25/06/2018	Bupleurum falcatum		Road to Viscri and grassland	
25/06/2018	Bupleurum falcatum		Road to Viscri and grassland	
25/06/2018	Campanula rapunculoides		Road to Viscri and grassland	
25/06/2018	Campanula rapunculoides		Road to Viscri and grassland	
25/06/2018	Campanula sibirica		Road to Viscri and grassland	branched racemes



25/06/2018	Carex distans		Road to Viscri and grassland	
25/06/2018	Carex humilis		Road to Viscri and grassland	base enrichment indicator
25/06/2018	Carex muricata ssp. lamprocarpa		Road to Viscri and grassland	
25/06/2018	Carex panicea		Road to Viscri and grassland	along spring lines
25/06/2018	Carex panicea		Road to Viscri and grassland	
25/06/2018	Centaurea cf. scabiosa		Road to Viscri and grassland	Or C. orientalis
25/06/2018	Centaurea orientalis		Road to Viscri and grassland	previously cf "scabiosa"
25/06/2018	Cerinth minor		Road to Viscri and grassland	
25/06/2018	Cerinth minor		Road to Viscri and grassland	
25/06/2018	Chamaecytisus albus		Road to Viscri and grassland	Cytisus albus
25/06/2018	Chamaecytisus albus		Road to Viscri and grassland	
25/06/2018	Cirsium canum		Road to Viscri and grassland	
25/06/2018	Clematis integrifolia		Road to Viscri and grassland	steppic
25/06/2018	Crambe tartarica		Road to Viscri and grassland	steppic thing, Natura 2000, likes bare soil (likes slippage)
25/06/2018	Cuscuta epithimum		Road to Viscri and grassland	
25/06/2018	Cuscuta sp.		Road to Viscri and grassland	pink flowers
25/06/2018	Cytisus nigricans		Road to Viscri and grassland	sometimes Lembrotropis
25/06/2018	Daucus carota		Road to Viscri and grassland	
25/06/2018	Dianthus carthusianorum		Road to Viscri and grassland	
25/06/2018	Dictamnus albus		Road to Viscri and grassland	steppic/Rutaceous/burning bush
25/06/2018	Dictamnus albus		Road to Viscri and grassland	
25/06/2018	Dorycnium pentaphyllum		Road to Viscri and grassland	
25/06/2018	Dorycnium pentaphyllum		Road to Viscri and grassland	
25/06/2018	Echinops sphaerocephalus		Road to Viscri and grassland	
25/06/2018	Echinops sphaerocephalus		Road to Viscri and grassland	
25/06/2018	Echium vulgare		Road to Viscri and grassland	

25/06/2018	<i>Elytrigia hispidus</i>		Road to Viscri and grassland	steppic couch
25/06/2018	<i>Elytrigia repens</i>		Road to Viscri and grassland	
25/06/2018	<i>Eryngium planum</i>		Road to Viscri and grassland	
25/06/2018	<i>Erysimum odoratum</i>		Road to Viscri and grassland	
25/06/2018	<i>Erysimum odoratum</i>		Road to Viscri and grassland	
25/06/2018	<i>Euphorbia cyparissias</i>		Road to Viscri and grassland	
25/06/2018	<i>Euphorbia</i> sp.		Road to Viscri and grassland	
25/06/2018	<i>Euphorbia virgata</i>		Road to Viscri and grassland	
25/06/2018	<i>Falcaria vulgaris</i>		Road to Viscri and grassland	
25/06/2018	<i>Fallopia convolvulus</i>		Road to Viscri and grassland	
25/06/2018	<i>Festuca valesiaca</i>		Road to Viscri and grassland	not true steppe (not <i>Stipa</i> dominated) but related
25/06/2018	<i>Festuca valesiaca</i>		Road to Viscri and grassland	
25/06/2018	<i>Helleborus purpurascens</i>		Road to Viscri and grassland	
25/06/2018	<i>Inula ensifolia</i>		Road to Viscri and grassland	narrow leaved
25/06/2018	<i>Inula ensifolia</i>		Road to Viscri and grassland	narrow leaved
25/06/2018	<i>Inula ensifolia</i>		Road to Viscri and grassland	
25/06/2018	<i>Inula germanica/oculus-cristi</i>		Road to Viscri and grassland	along spring lines
25/06/2018	<i>Inula helenium</i>		Road to Viscri and grassland	scrub edge
25/06/2018	<i>Inula hirta</i>		Road to Viscri and grassland	broad leaved
25/06/2018	<i>Jurinea mollis</i>		Road to Viscri and grassland	divided leaves
25/06/2018	<i>Knautia arvensis</i>		Road to Viscri and grassland	along spring lines
25/06/2018	<i>Lactuca quercina</i> spp. <i>quercina</i>		Road to Viscri and grassland	leaves in single plane
25/06/2018	<i>Laserpitium latifolium</i>		Road to Viscri and grassland	umbellifer, like <i>Angelica</i>
25/06/2018	<i>Lathyrus hirsutus</i>		Road to Viscri and grassland	
25/06/2018	<i>Lathyrus hirsutus</i>		Road to Viscri and grassland	
25/06/2018	<i>Lathyrus tuberosus</i>		Road to Viscri and grassland	

25/06/2018	<i>Lavatera thuringiaca</i>		Road to Viscri and grassland	
25/06/2018	<i>Leonurus cardiaca</i>		Road to Viscri and grassland	
25/06/2018	<i>Linum flavum</i>		Road to Viscri and grassland	yellow
25/06/2018	<i>Linum hirsutum</i>		Road to Viscri and grassland	blue
25/06/2018	<i>Medicago falcata</i>		Road to Viscri and grassland	native in Brecks
25/06/2018	<i>Mentha cf. longifolia ssp. mollissima</i>		Road to Viscri and grassland	
25/06/2018	<i>Mentha longifolia ssp. mollissima</i>		Road to Viscri and grassland	
25/06/2018	<i>Onobrychis viciifolia</i>		Road to Viscri and grassland	
25/06/2018	<i>Onobrychis viciifolia</i>		Road to Viscri and grassland	
25/06/2018	<i>Ononis arvensis</i>		Road to Viscri and grassland	
25/06/2018	<i>Ornithogalum pyramidale</i>		Road to Viscri and grassland	
25/06/2018	<i>Ornithogalum pyramidale</i>		Road to Viscri and grassland	
25/06/2018	<i>Pastinaca sativa</i>		Road to Viscri and grassland	
25/06/2018	<i>Phleum phleoides</i>		Road to Viscri and grassland	often purple below inflorescence; steppe indicator
25/06/2018	<i>Phragmites australis</i>		Road to Viscri and grassland	
25/06/2018	<i>Polygala major</i>		Road to Viscri and grassland	
25/06/2018	<i>Primula veris</i>		Road to Viscri and grassland	
25/06/2018	<i>Prunella laciniata</i>		Road to Viscri and grassland	
25/06/2018	<i>Prunus cf. fruticosus</i>		Road to Viscri and grassland	
25/06/2018	<i>Prunus fruticosa</i>		Road to Viscri and grassland	
25/06/2018	<i>Prunus tenella</i>		Road to Viscri and grassland	
25/06/2018	<i>Rhinanthus angustifolius</i>		Road to Viscri and grassland	
25/06/2018	<i>Rhinanthus angustifolius</i>		Road to Viscri and grassland	
25/06/2018	<i>Rhinanthus rumelicus</i>		Road to Viscri and grassland	
25/06/2018	<i>Rhinanthus rumelicus</i>		Road to Viscri and grassland	
25/06/2018	<i>Salvia nutans</i>		Road to Viscri and grassland	RDB; steppic

25/06/2018	<i>Salvia pratensis</i>		Road to Viscri and grassland	
25/06/2018	<i>Salvia verticillata</i>		Road to Viscri and grassland	
25/06/2018	<i>Scabiosa ochroleuca</i>		Road to Viscri and grassland	
25/06/2018	<i>Securigera varia</i>		Road to Viscri and grassland	
25/06/2018	<i>Securigera varia</i>		Road to Viscri and grassland	along spring lines
25/06/2018	<i>Sedum maximum</i>		Road to Viscri and grassland	
25/06/2018	<i>Senecio erucifolius</i>		Road to Viscri and grassland	
25/06/2018	<i>Silene noctiflora</i>		Road to Viscri and grassland	
25/06/2018	<i>Silene noctiflora</i>		Road to Viscri and grassland	
25/06/2018	<i>Sinapis arvensis</i>		Road to Viscri and grassland	
25/06/2018	<i>Stachys betonica</i>		Road to Viscri and grassland	
25/06/2018	<i>Stachys recta</i>		Road to Viscri and grassland	
25/06/2018	<i>Stachys recta</i>		Road to Viscri and grassland	
25/06/2018	<i>Stipa pennata</i>		Road to Viscri and grassland	
25/06/2018	<i>Teucrium chamaedrys</i>		Road to Viscri and grassland	
25/06/2018	<i>Thalictrum minus</i>		Road to Viscri and grassland	
25/06/2018	<i>Thalictrum minus</i>		Road to Viscri and grassland	
25/06/2018	<i>Thymus glabrescens</i>		Road to Viscri and grassland	
25/06/2018	<i>Thymus pulegioides</i>		Road to Viscri and grassland	
25/06/2018	<i>Tragopogon pratensis</i> ssp. <i>orientalis</i>		Road to Viscri and grassland	
25/06/2018	<i>Trifolium hybridum</i>		Road to Viscri and grassland	
25/06/2018	<i>Valeriana officinalis</i>		Road to Viscri and grassland	along spring lines
25/06/2018	<i>Verbascum nigrum</i>		Road to Viscri and grassland	
25/06/2018	<i>Veronica scutellata</i>		Road to Viscri and grassland	along spring lines
25/06/2018	<i>Veronica scutellata</i>		Road to Viscri and grassland	
25/06/2018	<i>Veronica spicata</i>		Road to Viscri and grassland	



25/06/2018	Vincetoxicum hirundinaria		Road to Viscri and grassland	one of the few Asclepiadaceae in Europe
25/06/2018	Xanthium strumarium		Road to Viscri and grassland	
26/06/2018	Achillea cf. millefolium		Around Muncel	
26/06/2018	Aegopodium podagraria		Around Muncel	
26/06/2018	Agrimonia eupatoria		Around Muncel	
26/06/2018	Allium scorodoprasum		Around Muncel	
26/06/2018	Allium scorodoprasum		Around Muncel	
26/06/2018	Anagallis arvensis		Around Muncel	
26/06/2018	Angelica sylvestris		Around Muncel	
26/06/2018	Anthoxanthum odoratum		Around Muncel	
26/06/2018	Arctium tomentosum		Around Muncel	
26/06/2018	Asarum europaeum		Around Muncel	
26/06/2018	Astragalus glycyphyllos		Around Muncel	
26/06/2018	Astrantia major		Around Muncel	
26/06/2018	Briza media		Around Muncel	
26/06/2018	Bunias orientalis		Around Muncel	
26/06/2018	Calystegia sepium		Around Muncel	
26/06/2018	Campanula cervicaria		Around Muncel	a paler blue
26/06/2018	Campanula patula		Around Muncel	
26/06/2018	Campanula rapunculoides		Around Muncel	one sided spike
26/06/2018	Campanula trachelium		Around Muncel	
26/06/2018	Carduus personata		Around Muncel	
26/06/2018	Carpinus betulus		Around Muncel	
26/06/2018	Carpinus betulus		Around Muncel	
26/06/2018	Centaurea phrygia		Around Muncel	
26/06/2018	Centaurea phrygia		Around Muncel	

26/06/2018	<i>Centaurea phrygia</i>		Around Muncel	
26/06/2018	<i>Chaerophyllum aromaticum</i>		Around Muncel	
26/06/2018	<i>Chelidonium majus</i>		Around Muncel	
26/06/2018	<i>Cirsium arvense</i> cf <i>ssp. setosum</i>		Around Muncel	white hairy underneath
26/06/2018	<i>Cirsium vulgare</i>		Around Muncel	
26/06/2018	<i>Clematis vitalba</i>		Around Muncel	
26/06/2018	<i>Clinopodium vulgare</i>		Around Muncel	
26/06/2018	<i>Conioselinum</i> sp.		Around Muncel	
26/06/2018	<i>Conyza canadensis</i>	y	Around Muncel	
26/06/2018	<i>Cornus sanguinea</i>		Around Muncel	
26/06/2018	<i>Corylus avellana</i>		Around Muncel	
26/06/2018	<i>Crepis biennis</i>		Around Muncel	
26/06/2018	<i>Cruciata glabra</i>		Around Muncel	
26/06/2018	<i>Cynosurus cristatus</i>		Around Muncel	
26/06/2018	<i>Danthonia decumbens</i>		Around Muncel	
26/06/2018	<i>Daucus carota</i>		Around Muncel	
26/06/2018	<i>Dianthus carthusianorum</i>		Around Muncel	
26/06/2018	<i>Dryopteris filix-mas</i>		Around Muncel	
26/06/2018	<i>Echium vulgare</i>		Around Muncel	
26/06/2018	<i>Epipactis helleborine</i>		Around Muncel	
26/06/2018	<i>Erigeron annuus</i>	Y	Around Muncel	
26/06/2018	<i>Eupatorium cannabinum</i>		Around Muncel	
26/06/2018	<i>Euphorbia cyparissias</i>		Around Muncel	
26/06/2018	<i>Euphorbia serrulata</i>		Around Muncel	
26/06/2018	<i>Euphrasia</i> cf. <i>rostkoviana</i>		Around Muncel	
26/06/2018	<i>Fallopia</i> cf. <i>dumetorum</i>		Around Muncel	

26/06/2018	Fallopia japonica	y	Around Muncel	
26/06/2018	Festuca gigantea		Around Muncel	
26/06/2018	Filipendula ulmaria		Around Muncel	
26/06/2018	Fragaria vesca		Around Muncel	
26/06/2018	Frangula alnus		Around Muncel	
26/06/2018	Frangula alnus		Around Muncel	
26/06/2018	Galinsoga parviflora	Y	Around Muncel	
26/06/2018	Galium album		Around Muncel	
26/06/2018	Galium aparine		Around Muncel	
26/06/2018	Galium verum		Around Muncel	
26/06/2018	Genista sagittalis		Around Muncel	
26/06/2018	Genista tinctoria		Around Muncel	ssp hungarica?
26/06/2018	Genista tinctoria		Around Muncel	
26/06/2018	Geum urbanum		Around Muncel	
26/06/2018	Glechoma hederacea		Around Muncel	
26/06/2018	Helianthemum nummularium		Around Muncel	
26/06/2018	Helianthus tuberosus	y	Around Muncel	
26/06/2018	Holcus lanatus		Around Muncel	
26/06/2018	Humulus lupulus		Around Muncel	giant leaves
26/06/2018	Hypericum maculatum		Around Muncel	
26/06/2018	Hypericum perforatum		Around Muncel	
26/06/2018	Hypochaeris radicata		Around Muncel	
26/06/2018	Impatiens glandulifera	Y	Around Muncel	
26/06/2018	Impatiens noli-tangere		Around Muncel	
26/06/2018	Juncus tenuis	Y	Around Muncel	
26/06/2018	Lamium album		Around Muncel	

26/06/2018	Lapsana communis		Around Muncel	
26/06/2018	Leontodon tuberosus		Around Muncel	
26/06/2018	Leucanthemum vulgare		Around Muncel	
26/06/2018	Lysimachia nummularia		Around Muncel	
26/06/2018	Lysimachia vulgaris		Around Muncel	
26/06/2018	Matricaria discoidea		Around Muncel	
26/06/2018	Matteuccia struthiopteris		Around Muncel	
26/06/2018	Medicago falcata		Around Muncel	
26/06/2018	Medicago sativa		Around Muncel	
26/06/2018	Melampyrum bihariense		Around Muncel	
26/06/2018	Melica nutans		Around Muncel	
26/06/2018	Mentha longifolia ssp. mollissima		Around Muncel	
26/06/2018	Mentha spicata		Around Muncel	maybe x longifolia (less hairy)
26/06/2018	Mycelis muralis		Around Muncel	
26/06/2018	Myosotis ramosissima		Around Muncel	
26/06/2018	Myosoton aquaticum		Around Muncel	
26/06/2018	Nonea pulla		Around Muncel	
26/06/2018	Ononis arvensis		Around Muncel	
26/06/2018	Oxalis stricta	Y	Around Muncel	syn fontana
26/06/2018	Pastinaca sativa ssp. urens		Around Muncel	
26/06/2018	Persicaria mitis		Around Muncel	
26/06/2018	Picris hieracioides ssp. villarsii		Around Muncel	
26/06/2018	Pimpinella saxifraga		Around Muncel	
26/06/2018	Plantago lanceolata		Around Muncel	
26/06/2018	Plantago major		Around Muncel	
26/06/2018	Plantago media		Around Muncel	



26/06/2018	Poa compressa		Around Muncel	
26/06/2018	Potentilla anserina		Around Muncel	
26/06/2018	Potentilla argentea		Around Muncel	
26/06/2018	Potentilla erecta		Around Muncel	
26/06/2018	Prunus cerasus		Around Muncel	
26/06/2018	Pteridium aquilinum		Around Muncel	
26/06/2018	Quercus frainetto		Around Muncel	
26/06/2018	Ranunculus cf. serpens		Around Muncel	
26/06/2018	Ranunculus repens		Around Muncel	
26/06/2018	Rhamnus cathartica		Around Muncel	
26/06/2018	Robinia pseudoacacia		Around Muncel	
26/06/2018	Rubus caesius		Around Muncel	
26/06/2018	Rubus idaeus		Around Muncel	
26/06/2018	Rumex acetosa		Around Muncel	
26/06/2018	Salvia glutinosa		Around Muncel	
26/06/2018	Salvia pratensis		Around Muncel	
26/06/2018	Salvia verticillata		Around Muncel	
26/06/2018	Saponaria officinalis		Around Muncel	
26/06/2018	Scrophularia nodosa		Around Muncel	
26/06/2018	Securigera varia		Around Muncel	
26/06/2018	Senecio jacobaea		Around Muncel	
26/06/2018	Silene baccifera		Around Muncel	More scrambling than erect
26/06/2018	Silene baccifera		Around Muncel	
26/06/2018	Silene nutans		Around Muncel	
26/06/2018	Silene nutans		Around Muncel	
26/06/2018	Silene nutans		Around Muncel	

26/06/2018	Sonchus asper		Around Muncel	
26/06/2018	Sonchus oleraceus		Around Muncel	
26/06/2018	Stachys betonica		Around Muncel	
26/06/2018	Stachys palustris		Around Muncel	
26/06/2018	Stellaria graminea		Around Muncel	
26/06/2018	Stellaria holostea		Around Muncel	
26/06/2018	Symphytum officinale		Around Muncel	
26/06/2018	Telekia speciosa		Around Muncel	
26/06/2018	Teucrium chamaedrys		Around Muncel	
26/06/2018	Thymus cf. pannonicus		Around Muncel	
26/06/2018	Thymus sp.		Around Muncel	
26/06/2018	Torilis japonica		Around Muncel	flowers symmetric
26/06/2018	Trifolium campestre		Around Muncel	
26/06/2018	Trifolium medium		Around Muncel	
26/06/2018	Trifolium ochroleucon		Around Muncel	
26/06/2018	Trisetum flavescens		Around Muncel	
26/06/2018	Verbascum nigrum		Around Muncel	
26/06/2018	Veronica chamaedrys		Around Muncel	
26/06/2018	Veronica urticifolia		Around Muncel	
26/06/2018	Vicia cracca		Around Muncel	
26/06/2018	Vincetoxicum hirundinaria		Around Muncel	
26/06/2018	Xanthium strumarium		Around Muncel	
26/06/2018	Aegopodium podagraria		Corridor woodland at Muncel site	
26/06/2018	Alliaria petiolata		Corridor woodland at Muncel site	
26/06/2018	Alnus incana		Corridor woodland at Muncel site	
26/06/2018	Campanula rapunculoides		Corridor woodland at Muncel site	

26/06/2018	<i>Campanula trachelium</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Carduus personata</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Cirsium arvense</i> ssp. <i>setosum</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Conioselinum</i> cf. <i>tataricum</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Fallopia japonica</i>	Y	Corridor woodland at Muncel site	
26/06/2018	<i>Galium schultesii</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Helianthus tuberosus</i>	y	Corridor woodland at Muncel site	
26/06/2018	<i>Humulus lupulus</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Impatiens noli-tangere</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Matteuccia struthiopteris</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Ranunculus serpens/lanuginosus</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Salvia transylvanica</i>		Corridor woodland at Muncel site	small cf to <i>pratensis</i>
26/06/2018	<i>Silene baccifera</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Stachys palustris</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Telekia speciosa</i>		Corridor woodland at Muncel site	
26/06/2018	<i>Anthoxanthum odoratum</i>		Road to monastery nr Muncel	
26/06/2018	<i>Astragalus glycyphyllos</i>		Road to monastery nr Muncel	
26/06/2018	<i>Brachypodium pinnatum</i>		Road to monastery nr Muncel	
26/06/2018	<i>Briza media</i>		Road to monastery nr Muncel	
26/06/2018	<i>Campanula cervicaria</i>		Road to monastery nr Muncel	
26/06/2018	<i>Campanula patula</i>		Road to monastery nr Muncel	
26/06/2018	<i>Cardaminopsis arenosa</i>		Road to monastery nr Muncel	
26/06/2018	<i>Centaurea phrygia</i>		Road to monastery nr Muncel	
26/06/2018	<i>Conyza canadensis</i>	y	Road to monastery nr Muncel	
26/06/2018	<i>Cornus australis</i>		Road to monastery nr Muncel	
26/06/2018	<i>Cruciata glabra</i>		Road to monastery nr Muncel	

26/06/2018	<i>Euphorbia serrulata</i>		Road to monastery nr Muncel	
26/06/2018	<i>Euphrasia cf. rostkoviana</i>		Road to monastery nr Muncel	
26/06/2018	<i>Fallopia dumetorum</i>		Road to monastery nr Muncel	
26/06/2018	<i>Filipendula vulgaris</i>		Road to monastery nr Muncel	
26/06/2018	<i>Frangula alnus</i>		Road to monastery nr Muncel	
26/06/2018	<i>Genista sagittalis</i>		Road to monastery nr Muncel	
26/06/2018	<i>Leontodon hispidus</i>		Road to monastery nr Muncel	
26/06/2018	<i>Medicago falcata</i>		Road to monastery nr Muncel	
26/06/2018	<i>Melampyrum bihariense</i>		Road to monastery nr Muncel	
26/06/2018	<i>Myosotis ramosissima</i>		Road to monastery nr Muncel	
26/06/2018	<i>Ononis arvensis</i>		Road to monastery nr Muncel	
26/06/2018	<i>Peucedanum orioselinum</i>		Road to monastery nr Muncel	
26/06/2018	<i>Pimpinella saxifraga</i>		Road to monastery nr Muncel	
26/06/2018	<i>Poa compressa</i>		Road to monastery nr Muncel	
26/06/2018	<i>Prunella laciniata</i>		Road to monastery nr Muncel	
26/06/2018	<i>Salix purpurea</i>		Road to monastery nr Muncel	
26/06/2018	<i>Silene baccifera</i>		Road to monastery nr Muncel	
26/06/2018	<i>Silene nutans</i>		Road to monastery nr Muncel	
26/06/2018	<i>Teucrium chamaedrys</i>		Road to monastery nr Muncel	
26/06/2018	<i>Thymus pannonicus</i>		Road to monastery nr Muncel	
26/06/2018	<i>Trifolium medium</i>		Road to monastery nr Muncel	
26/06/2018	<i>Trifolium ochroleucon</i>		Road to monastery nr Muncel	
26/06/2018	<i>Verbascum nigrum</i>		Road to monastery nr Muncel	
26/06/2018	<i>Veronica chamaedrys</i>		Road to monastery nr Muncel	
26/06/2018	<i>Vincetoxicum hirundinaria</i>		Road to monastery nr Muncel	
26/06/2018	<i>Asarum europaeum</i>		side track to Muncel site	



26/06/2018	<i>Astrantia major</i>		side track to Muncel site
26/06/2018	<i>Brachypodium sylvaticum</i>		side track to Muncel site
26/06/2018	<i>Chaerophyllum aromaticum</i>		side track to Muncel site
26/06/2018	<i>Clinopodium vulgare</i>		side track to Muncel site
26/06/2018	<i>Epipactis helleborine</i>		side track to Muncel site
26/06/2018	<i>Euphorbia amygdaloides</i>		side track to Muncel site
26/06/2018	<i>Festuca gigantea</i>		side track to Muncel site
26/06/2018	<i>Impatiens glandulifera</i>	y	side track to Muncel site
26/06/2018	<i>Juncus tenuis</i>	Y	side track to Muncel site
26/06/2018	<i>Melittis melissophyllum</i>		side track to Muncel site
26/06/2018	<i>Mycelis muralis</i>		side track to Muncel site
26/06/2018	<i>Myosoton aquaticum</i>		side track to Muncel site
26/06/2018	<i>Oxalis stricta</i>	Y	side track to Muncel site
26/06/2018	<i>Potentilla argentea</i>		side track to Muncel site
26/06/2018	<i>Potentilla erecta</i>		side track to Muncel site
26/06/2018	<i>Quercus cf. petraea</i>		side track to Muncel site
26/06/2018	<i>Quercus frainetto</i>		side track to Muncel site
26/06/2018	<i>Salvia pratensis</i>		side track to Muncel site
26/06/2018	<i>Veronica urticifolia</i>		side track to Muncel site
26/06/2018	<i>Allium scorodoprasum</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Arctium tomentosum</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Asperula cynanchica</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Bunias orientalis</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Cuscuta epithymum</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Dianthus carthusianorum</i>		unmown Muncel lumpy grassland adjacent to site
26/06/2018	<i>Hypericum maculatum</i>		unmown Muncel lumpy grassland adjacent to site

26/06/2018	<i>Knautia arvensis</i>		unmown Muncel lumpy grassland adjacent to site	
26/06/2018	<i>Nonea pulla</i>		unmown Muncel lumpy grassland adjacent to site	
26/06/2018	<i>Potentilla argentea</i>		unmown Muncel lumpy grassland adjacent to site	
26/06/2018	<i>Thymus pannonicus</i>		unmown Muncel lumpy grassland adjacent to site	
26/06/2018	<i>Trisetum flavescens</i>		unmown Muncel lumpy grassland adjacent to site	
01/07/2018	<i>Achillea cf. millefolium</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Agrimonia eupatoria</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Arrhenatherum elatius</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Asperula cynanchica</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Astragalus glycyphyllos</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Brachypodium pinnatum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Brachypodium sylvaticum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Bromus arvensis</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Carduus crispus</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Carex hirta</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Carex muricata ssp. lamprocarpa</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Centaurea sp.</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cerastium fontanum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cirsium eriophorum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Clinopodium vulgare</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Crepis setosa</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cruciata cf. laevipes</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cruciata glabra</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cynosurus cristatus</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Daucus carota</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Dianthus carthusianorum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	

01/07/2018	Dipsacus laciniatus		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Equisetum palustre		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Eryngium campestre		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Euphorbia cyparissias		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Ferula sp. (v. narrow leaved)		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Festuca ovina		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Festuca pratensis		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Genista sagittalis		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Genista tinctoria		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Gentiana cruciata		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Geranium columbinum		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Hypericum perforatum		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Leontodon cf. hispidus		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Lysimachia nummularia		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Medicago falcata		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Mentha longifolia ssp. mollissima		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Nepeta sp.		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Origanum vulgare		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Pastinaca sativa ssp. urens		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Plantago lanceolata		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Plantago media		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Plantago media		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Polygala cf. major		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Potentilla reptans		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Prunella laciniata		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	Prunus cf. spinosa		"Dracula hotel" hillside past Rimetea (Coltesti?)	

01/07/2018	<i>Pteridium aquilinum</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Rhinanthus</i> (large branched)		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Sambucus ebulus</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Scabiosa ochroleuca</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Stachys germanica</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Teucrium chamaedrys</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Thymus</i> sp. (narrow leaved)		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Torilis ucranica</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Trifolium campestre</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Trifolium ochroleucon</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Trifolium pratense</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Vicia cracca</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Vicia tetrasperma</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Vincetoxicum hirundinaria</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Viola</i> cf. <i>hirta</i>		"Dracula hotel" hillside past Rimetea (Coltesti?)	
01/07/2018	<i>Cornus mas</i>		steep slope near monastery off Aries valley	
01/07/2018	<i>Melampyrum bihariense</i>		steep slope near monastery off Aries valley	
01/07/2018	<i>Trifolium montanum</i>		steep slope near monastery off Aries valley	
01/07/2018	<i>Trifolium pannonicum</i>		steep slope near monastery off Aries valley	see photos for location (GPS)
03/07/2018	<i>Apium nodiflorum</i>		Football field / New Marsilea site	
03/07/2018	<i>Glyceria</i> cf. <i>maxima</i>		Football field / New Marsilea site	
03/07/2018	<i>Marsilea quadrifolia</i>		Football field / New Marsilea site	
03/07/2018	<i>Petrorhagia</i> cf. <i>prolifera</i>		Football field / New Marsilea site	
03/07/2018	<i>Ranunculus</i> cf. <i>sardous</i>		Football field / New Marsilea site	
03/07/2018	<i>Xanthium strumarium</i>	y	Football field / New Marsilea site	
06/07/2018	<i>Ceratophyllum demersum</i>		Comana boat trip	

06/07/2018	<i>Hydrocharis morsus-ranae</i>		Comana boat trip
06/07/2018	<i>Isoetes cf. lacustris</i>		Comana boat trip
06/07/2018	<i>Lemna minor</i>		Comana boat trip
06/07/2018	<i>Lemna minuta</i>		Comana boat trip
06/07/2018	<i>Lemna trisulca</i>		Comana boat trip
06/07/2018	<i>Lythrum salicaria</i>		Comana boat trip
06/07/2018	<i>Najas marina</i>		Comana boat trip
06/07/2018	<i>Nuphar lutea</i>		Comana boat trip
06/07/2018	<i>Persicaria amphibia</i>		Comana boat trip
06/07/2018	<i>Phragmites australis</i>		Comana boat trip
06/07/2018	<i>Potamogeton natans</i>		Comana boat trip
06/07/2018	<i>Potamogeton pectinatus</i>		Comana boat trip
06/07/2018	<i>Salix sp.</i>		Comana boat trip
06/07/2018	<i>Salvinia natans</i>		Comana boat trip
06/07/2018	<i>Schoenoplectus lacustris</i>		Comana boat trip
06/07/2018	<i>Solanum dulcamara</i>		Comana boat trip
06/07/2018	<i>Typha cf. laxmanii</i>		Comana boat trip
06/07/2018	<i>Utricularia cf. vulgaris</i>		Comana boat trip
07/07/2018	<i>Vicia villosa</i>		Steep grassland with water buffalo
07/07/2018	<i>Acer campestre</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Agrimonia eupatoria</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Arum sp.</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Ballota nigra ssp. nigra</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Bromus cf. commutatus/hordeaceus</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Carduus acanthoides</i>		Steep grassland with water buffalo and scrub
07/07/2018	<i>Centaurea solstitialis</i>		Steep grassland with water buffalo and scrub



07/07/2018	Centaurea sp. (winged)		Steep grassland with water buffalo and scrub
07/07/2018	Cichorium intybus		Steep grassland with water buffalo and scrub
07/07/2018	Clematis vitalba		Steep grassland with water buffalo and scrub
07/07/2018	Crataegus monogyna		Steep grassland with water buffalo and scrub
07/07/2018	Crepis setosa		Steep grassland with water buffalo and scrub
07/07/2018	Erigeron annuus	y	Steep grassland with water buffalo and scrub
07/07/2018	Galium humifusum		Steep grassland with water buffalo and scrub
07/07/2018	Lolium perenne		Steep grassland with water buffalo and scrub
07/07/2018	Lotus tenuis		Steep grassland with water buffalo and scrub
07/07/2018	Medicago lupulina		Steep grassland with water buffalo and scrub
07/07/2018	Poa pratensis		Steep grassland with water buffalo and scrub
07/07/2018	Rosa sp.		Steep grassland with water buffalo and scrub
07/07/2018	Rumex pulcher		Steep grassland with water buffalo and scrub
07/07/2018	Stachys germanica		Steep grassland with water buffalo and scrub
07/07/2018	Ulmus sp.		Steep grassland with water buffalo and scrub
07/07/2018	Verbena officinalis		Steep grassland with water buffalo and scrub
07/07/2018	Xeranthemum cylindraceum		Steep grassland with water buffalo and scrub
28/08/2018	Acer tataricum		Turda Gorge
28/08/2018	Acinos alpinus ssp. marjoranifolius		Turda Gorge
28/08/2018	Acinos arvensis		Turda Gorge
28/08/2018	Aconitum anthora		Turda Gorge
28/08/2018	Alliaria petiolata		Turda Gorge
28/08/2018	Allium flavum		Turda Gorge
28/08/2018	Alyssum sp.		Turda Gorge
28/08/2018	Anagallis arvensis		Turda Gorge
28/08/2018	Anthericum ramosum		Turda Gorge

28/08/2018	<i>Arabis cf. saggitata</i>		Turda Gorge	
28/08/2018	<i>Arabis turrita</i>		Turda Gorge	
28/08/2018	<i>Artemisia campestris</i>		Turda Gorge	
28/08/2018	<i>Asplenium ruta-muraria</i>		Turda Gorge	
28/08/2018	<i>Asplenium trichomanes</i>		Turda Gorge	
28/08/2018	<i>Asplenium viride</i>		Turda Gorge	
28/08/2018	<i>Aster alpinus</i>		Turda Gorge	
28/08/2018	<i>Aster alpinus</i>		Turda Gorge	
28/08/2018	<i>Astragalus</i> (prob. not <i>monspessulanus</i> )		Turda Gorge	
28/08/2018	<i>Astragalus cf. monspessulanus</i>		Turda Gorge	
28/08/2018	<i>Berberis vulgaris</i>		Turda Gorge	
28/08/2018	<i>Berteroa incana</i>		Turda Gorge	
28/08/2018	<i>Bothriochloa ischaemum</i>		Turda Gorge	common in dry grassland, steppic situations
28/08/2018	<i>Bunias orientalis</i>		Turda Gorge	
28/08/2018	<i>Caltha palustris</i>		Turda Gorge	
28/08/2018	<i>Campanula bononiensis</i>		Turda Gorge	flowers on all sides of stem
28/08/2018	<i>Campanula cf. rapunculoides</i>		Turda Gorge	
28/08/2018	<i>Campanula persicifolia</i>		Turda Gorge	
28/08/2018	<i>Campanula sibirica/spicata</i>		Turda Gorge	
28/08/2018	<i>Cardamine impatiens</i>		Turda Gorge	
28/08/2018	<i>Cardaminopsis arenosa</i>		Turda Gorge	
28/08/2018	<i>Carduus acanthoides</i>		Turda Gorge	
28/08/2018	<i>Carduus kernerii</i>		Turda Gorge	
28/08/2018	<i>Carduus sp.</i>		Turda Gorge	
28/08/2018	<i>Carex cf. muricata</i>		Turda Gorge	
28/08/2018	<i>Carex flava sens. lat.</i>		Turda Gorge	

28/08/2018	Carex hirta		Turda Gorge	
28/08/2018	Caucalis platycarpos		Turda Gorge	
28/08/2018	Caucalis platycarpos		Turda Gorge	
28/08/2018	Centaurea atropurpurea		Turda Gorge	
28/08/2018	cf. Conioselinum		Turda Gorge	
28/08/2018	Chaerophyllum aromaticum		Turda Gorge	
28/08/2018	Chaerophyllum temulum		Turda Gorge	
28/08/2018	Chamaecytisus albus		Turda Gorge	
28/08/2018	Cirsium erisithales		Turda Gorge	
28/08/2018	Cirsium oleraceum		Turda Gorge	
28/08/2018	Cirsium oleraceum		Turda Gorge	
28/08/2018	Conium maculatum		Turda Gorge	
28/08/2018	Cystopteris cf. fragilis		Turda Gorge	
28/08/2018	Daphne mezereum		Turda Gorge	
28/08/2018	Dictamnus albus		Turda Gorge	
28/08/2018	Erodium cicutarium		Turda Gorge	
28/08/2018	Erysimum odoratum		Turda Gorge	
28/08/2018	Euonymus latifolius		Turda Gorge	
28/08/2018	Euphorbia villosa		Turda Gorge	
28/08/2018	Galium aparine		Turda Gorge	
28/08/2018	Geranium columbinum		Turda Gorge	
28/08/2018	Geranium phaeum		Turda Gorge	
28/08/2018	Geranium pratense		Turda Gorge	
28/08/2018	Geranium pusillum		Turda Gorge	
28/08/2018	Geranium rotundifolium		Turda Gorge	
28/08/2018	Helianthemum nummularium		Turda Gorge	

28/08/2018	<i>Hesperis matronalis</i>		Turda Gorge	
28/08/2018	<i>Inula ensifolia</i>		Turda Gorge	
28/08/2018	<i>Lamium maculatum</i>		Turda Gorge	
28/08/2018	<i>Lavatera thuringiaca</i>		Turda Gorge	
28/08/2018	<i>Leontodon cf. crispus</i>		Turda Gorge	
28/08/2018	<i>Leonurus cardiaca</i>		Turda Gorge	
28/08/2018	<i>Lonicera xylosteum</i>		Turda Gorge	
28/08/2018	<i>Melica cf. ciliata</i>		Turda Gorge	
28/08/2018	<i>Minuartia setacea</i>		Turda Gorge	
28/08/2018	<i>Minuartia sp.</i>		Turda Gorge	
28/08/2018	<i>Moehringia muscosa</i>		Turda Gorge	
28/08/2018	<i>Moehringia trinervia</i>		Turda Gorge	
28/08/2018	<i>Nepeta sp.</i>		Turda Gorge	
28/08/2018	<i>Onopordum acanthium</i>		Turda Gorge	
28/08/2018	<i>Onopordum illyricum</i>		Turda Gorge	
28/08/2018	<i>Parietaria officinalis</i>		Turda Gorge	
28/08/2018	<i>Peltaria alliacea</i>		Turda Gorge	
28/08/2018	<i>Phleum phleoides</i>		Turda Gorge	
28/08/2018	<i>Picris hieracioides</i>		Turda Gorge	
28/08/2018	<i>Piptatherum virescens</i>		Turda Gorge	
28/08/2018	<i>Poa badensis</i>		Turda Gorge	
28/08/2018	<i>Poa compressa</i>		Turda Gorge	
28/08/2018	<i>Polygonatum latifolium</i>		Turda Gorge	
28/08/2018	<i>Potentilla recta</i>		Turda Gorge	
28/08/2018	<i>Potentilla thuringiaca</i>		Turda Gorge	
28/08/2018	<i>Salix triandra</i>		Turda Gorge	

28/08/2018	Scabiosa ochroleuca		Turda Gorge	
28/08/2018	Scirpus sylvaticus		Turda Gorge	
28/08/2018	Scrophularia heterophylla		Turda Gorge	
28/08/2018	Scrophularia umbrosa		Turda Gorge	
28/08/2018	Scutellaria altissima		Turda Gorge	
28/08/2018	Sedum acre		Turda Gorge	
28/08/2018	Sedum hispanicum		Turda Gorge	
28/08/2018	Sedum maximum		Turda Gorge	
28/08/2018	Silene baccifera		Turda Gorge	
28/08/2018	Stachys recta		Turda Gorge	
28/08/2018	Symphytum officinale		Turda Gorge	deep pink/rose flowers
28/08/2018	Teucrium chamaedrys		Turda Gorge	
28/08/2018	Teucrium montanum		Turda Gorge	
28/08/2018	Thalictrum lucidum		Turda Gorge	
28/08/2018	Thalictrum minus		Turda Gorge	
28/08/2018	Torilis ucranica		Turda Gorge	
28/08/2018	Urtica dioica		Turda Gorge	
28/08/2018	Viburnum opulus		Turda Gorge	
28/08/2018	Vincetoxicum hirundinaria		Turda Gorge	
28/08/2018	Viola arvensis		Turda Gorge	



## Appendix B: Quadrats from Arieş Valley

### Quadrat information

Plot	Longitude	Latitude	Dates	Notes	Quadrat size / m
1	46.38418	23.23625	27/06/2018	Mari's site	2x2
2	46.38416	23.23618	27/06/2018	Mari's site	2x2
3	46.38410	23.23627	27/06/2018	Mari's site	2x2
4	46.38421	23.23631	27/06/2018	Mari's site	2x2
5	46.38419	23.23645	27/06/2018	Mari's site	2x2
6	46.37661	23.15235	29/06/2018	Otter site	2x2
7	46.37661	23.15235	29/06/2018	Otter site	2x2
8	46.38564	23.23641	30/06/2018	Wasteland site	2x2
9	46.38564	23.23641	30/06/2018	Wasteland site	2x2
10	45.39837	23.30157	30/06/2018	Old train line site	2x2
11	45.39837	23.30157	30/06/2018	Old train line site	2x2
12	46.50793	23.58871	01/07/2018	Cut hay meadow	2x2
13	46.50793	23.58871	01/07/2018	Cut hay meadow	2x2
14	46.48645	23.52353	01/07/2018	Rough invaded grassland	2x2
15	46.48645	23.52353	01/07/2018	Rough invaded grassland	2x2

Quadrat species list

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0-1m	100	100	100	100	100	100	95	95	100	100	100	85	100	95	100
1-5m	2	20	1	25	0.1	90	2		80		75		75		60
5-10m						10									
10-15m						2									
<i>Acer campestre</i>						2									
<i>Achillea millefolium</i>	5	20	9	0.1	4	5	7	0.1		20	2	3		20	3
<i>Aegopodium podagraria</i>				20							7				
<i>Agrostis canina</i>								10			1				
<i>Agrostis capillaris</i>	40	50	20		50					40		3			
<i>Agrostis gigantea</i>				0.1											
<i>Agrostis stolonifera</i>						5	2								
<i>Alnus incana</i>						60	1								
<i>Anagallis arvensis</i>								0.1	0.1						
<i>Angelica sylvestris</i>						4	0.1								
<i>Anisantha sterilis</i>														1	
<i>Anthoxanthum odoratum</i>	2	2	10		3					10	10				
<i>Anthriscus sylvestris</i>		2													
<i>Arctium</i> sp									0.1						
<i>Arrhenatherum elatius</i>							0.1			10	3				
<i>Artemisia</i> cf <i>vulgaris</i>						1		2							
Bare ground								4	80		20	15	50	5	2
<i>Brachypodium sylvaticum</i>				2											
<i>Briza media</i>							0.1								
<i>Bromus commutatus</i>														1	0.1
<i>Bromus hordeaceus</i>	1	1													
<i>Calystegia sepium</i>				1		7	2		2		1				



Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Euphorbia serrulata								0.1	0.1						
Fallopia japonica						90	5	15	95		80			3	80
Festuca (grey) ovina			2		1										
Festuca rubra	5	7	3		3	1	2			30	8	5	2		
Filipendula vulgaris												5	1		
Fragaria vesca						0.1	0.1								
Fraxinus excelsior	2														
Galium album	6											2			
Galium aparine		0.1		2									1		3
Galium humifusum							1								
Galium rivale							1								
Galium verum		2													
Geranium columbinum														1	
Geranium pratense						0.1						4	1		
Geranium pusillum														2	2
Geum urbanum						1									
Glechoma hederacea	2	1											0.1		
Helianthemum nummularium					4										
Helianthus tuberosus											10	15	100		
Heracleum sphondylium							0.1								
Holcus lanatus	1		0.1			2	1			7	4				
Hypericum maculatum			1												
Hypochaeris radicata			1												
Impatiens glandulifera		2		40		2			4		5		1		
Knautia arvensis	0.1	1	0.1	0.1	1	0.1	2			2		1	1		
Lamium galeobdolon						1									
Leontodon crispus	5	0.1			0.1		0.1					1			

Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Leucanthemum vulgare			3		5	1	0.1			0.1					
Lolium multiflorum												0.1			
Lolium perenne		1						1	0.1	0.1			0.1	0.1	
Lotus corniculatus	1		1		6			1			0.1				
Luzula campestris			1												
Lysimachia nummularium	0.1						2					6	1		
Lysimachia vulgaris				3			1				3				
Matricaria cf chamomilla								0.1							
Medicago lupulina							1		0.1	1	0.1	1			
Melilotus albus								1							
Mentha longifolia	0.1	0.1		10											
Mentha spicata									1						
Moehringia trinervia													1		
Nonea pulla										1	1				
Oxalis stricta	0.1						1								
Peucedanum oreoselinum			0.1												
Pimpinella saxifraga	0.1	0.1	0.1		2	0.1	1					2			
Plantago lanceolata	1		20		8	0.1	2	0.1		2	0.1				
Plantago major								2							
Plantago media															
Poa pratensis agg.		1		1		1	0.1	1	3	1				40	5
Poa trivialis													1		20
Polygala vulgaris			0.1												
Potentilla anserina								3	2						
Potentilla argentea			0.1		0.1						0.1				
Potentilla reptans							1								
Prunella vulgaris	0.1		0.1		0.1	0.1	1	1	0.1						





Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Trifolium pratense	1	0.1	3		0.1			2				0.1		0.1	
Trifolium repens			5		4	0.1	3	20		4	1	1		3	3
Trisetum flavescens						2	0.1								
Urtica dioica				5											
Veronica chamaedrys	0.1	2				0.1	1	0.1							
Vicia cracca								1		2			0.1		
Vicia hirsuta										7				3	0.1
Vicia sativa									1	2	0.1	0.1		2	
Vicia sepium	0.1	0.1	1												
Viola cf. hirta	1	1				0.1	0.1					0.1			

## Appendix C: Quadrats from Comana Natural Park

Plot	Longitude	Latitude	GPS accuracy / m	Dates	Notes	Quadrat size / m
16	44.19286	26.13667	2	04/07/2018	SW corner - Natural Park monitoring	1x1
17	44.19294	26.13674	2	04/07/2018	NW corner - Natural Park monitoring	1x1
18	44.19290	26.13686	2	04/07/2018	NE corner - Natural Park monitoring	1x1
19	44.19279	26.13677	2	04/07/2018	SE corner - Natural Park monitoring	1x1
20	44.23097	25.93490	3	04/07/2018	Football field / New Marsilea site	1x1
21	44.23108	25.93497	3	04/07/2018	Football field / New Marsilea site	1x1
22	44.23116	25.93504	3	04/07/2018	Football field / New Marsilea site	1x1
23	44.23129	25.93509	3	04/07/2018	Football field / New Marsilea site	1x1
24	44.23142	25.93512	3	04/07/2018	Football field / New Marsilea site	1x1
25	44.16743	25.97565	4	05/07/2018	Hordeum dominated grassland with water buffalo	1x1
26	44.16745	25.97578	5	05/07/2018	Hordeum dominated grassland with water buffalo	1x1
27	44.16731	25.97570	3	05/07/2018	Hordeum dominated grassland with water buffalo	1x1
28	44.16718	25.97564	2	05/07/2018	Hordeum dominated grassland with water buffalo	1x1
29	44.16711	25.97577	3	05/07/2018	Hordeum dominated grassland with water buffalo	1x1
30	44.16666	25.97563	3	05/07/2018	Flooded grassland with water buffalo	1x1
31	44.16662	25.97564	3	05/07/2018	Flooded grassland with water buffalo	1x1
32	44.16654	25.97556	3	05/07/2018	Flooded grassland with water buffalo	1x1
33	44.16644	25.97546	3	05/07/2018	Flooded grassland with water buffalo	1x1
34	44.16644	25.97542	2	05/07/2018	Flooded grassland with water buffalo	1x1
35	44.16907	25.97502	4	05/07/2018	Disturbed and invaded grassland with water buffalo	1x1
36	44.16914	25.97508	6	05/07/2018	Disturbed and invaded grassland with water buffalo	1x1
37	44.16920	25.97504	5	05/07/2018	Disturbed and invaded grassland with water buffalo	1x1
38	44.16923	25.97503	4	05/07/2018	Disturbed and invaded grassland with water buffalo	1x1
39	44.16945	25.97506	3	05/07/2018	Disturbed and invaded grassland with water buffalo	1x1
40	44.16179	25.97610	4	07/07/2018	Grassland slope with water buffalo	1x1
41	44.16171	25.97625	3	07/07/2018	Grassland slope with water buffalo	1x1
42	44.16188	25.97634	3	07/07/2018	Grassland slope with water buffalo	1x1
43	44.16187	25.97622	3	07/07/2018	Grassland slope with water buffalo	1x1
44	44.16195	25.97621	3	07/07/2018	Grassland slope with water buffalo	1x1
45	44.11192	26.08082	3	07/07/2018	Military grassland	1x1
46	44.11194	26.08066	3	07/07/2018	Military grassland	1x1
47	44.11180	26.08063	3	07/07/2018	Military grassland	1x1
48	44.11176	26.08085	3	07/07/2018	Military grassland	1x1
49	44.11187	26.08081	4	07/07/2018	Military grassland	1x1





Species	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44		
Eryngium campestre						4	2	8	1																4	8	15	35	3		
Festuca arundinacea	0.1			4																											
Festuca rubra	65	65	15	60					4																7	3					
Fragaria vesca																															
Galium humifusum							0.1	1	1																	0.1	0.1				
Glechoma hederacea							0.1																								
Hordeum geniculatum	2		1							25	35	5	10	30							40	20					0.1				
Juncus compressus	2	1	15																												
Juncus gerardii																20		1													
Knautia arvensis																									0.1	0.1		0.1	0.1		
Lactuca saligna																											1				
Lactuca sp.																0.1															
Leontodon autumnalis	1																														
Lolium perenne					75	10	40	40	15	40	25	20	20	20							10	10				30	15		20	2	
Lotus tenuis						0.1	0.1	1	2			0.1																			
Medicago lupulina						1		1	2																						
Medicago polymorpha																						0.1					0.1				
Mentha pulegium										15	1	0.1	4		45	40	2	45	30												
Oenanthe silaifolia																															
Oxalis stricta																										0.1					
Plantago lanceolata					1	1															0.1	0.1	0.1	0.1				1			
Plantago major															2					6	1										
Poa pratensis	6	10	1	5	1	1	2	30	25		5	2	5	10							1	0.1			1		25	15	10	5	40



Species	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Polygonum aviculare										0.1				0.1	0.1		0.1	0.1	0.1		2								
Portulaca oleracea																					1								
Potentilla argentea					0.1																					0.1			
Potentilla reptans						0.1				0.1	1		0.1	3	1	4	0.1	1	2			0.1							
Puccinellia distans			2																										
Ranunculus cf sardous																										1			
Ranunculus flammula																	0.1												
Ranunculus sardous																													
Ranunculus sceleratus											0.1			1									0.1						
Rhinanthus sp.																													
Rorippa sylvestris																				0.1									
Rumex conglomeratus																								1					
Rumex crispus																		0.1											
Rumex pulcher					1																				1				
Scabiosa ochroleuca																													
Taraxacum agg.								0.1		1	2	2	0.1	1						0.1		1	2	1	1	1			
Torilis ucranica							0.1																						
Trifolium campestre																										0.1		0.1	
Trifolium fragiferum					3					20	30	20	40	30												1			
Trifolium pratense					0.1	7	20	3	25																2	3	0.1	15	
Trifolium repens					6	4		3		30	3	30	30	5		0.1	0.1			0.1			0.1		15	2		3	1
Tripleurospermum inodorum										0.1																			
Verbena officinalis														0.1										2					

Species	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
Vicia sativa																													0.1	
Xeranthemum cylindraceum							1	4	1																0.1	2	1	2		
Xanthium strumarium															0.1					3	2	85		1						